Tennessee Department of Transportation

Project Scoping Guide (PSG)

Module 2: Chapters 5 through 7 and Appendices

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TDOT PROJECT SCOPING GUIDE

SEPTEMBER 2024

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KITTELSON & ASSOCIATES

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Outline

- Chapter 1: Introduction and Overview
- Chapter 2: Decision-Making Framework and Documentation
- Chapter 3: Identifying Design Year Context
- Chapter 4: Multimodal Planning and Design
- Chapter 5: Intersection Planning and Design
- Chapter 6: Context Design Guidance and Criteria
- Chapter 7: Case Studies

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Chapter 5: Intersection Planning and Design

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Chapter 5: Intersection Planning and Design

- Intersection Control Types
- Intersection and Interchange Evaluation (IIE)
- Intersection Design Principles
- Intersection Context Considerations
- *TDOT 20-Flag Intersection Evaluation Guide*

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Chapter 5: Intersection Planning and Design

Intersection Control Types

- Yield
- Two-Way Stop-Control (TWSC)
- All-Way Stop-Control (AWSC)
- Roundabout
- Traffic Signal

Source: TDOT

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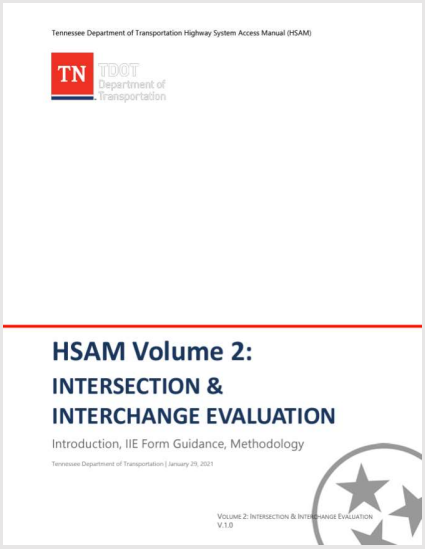
Chapter 5: Intersection Planning and Design

Intersection and Interchange Evaluation (IIE)

- *Highway System Access Manual* Volume 2 focused on IIE
- IIE provides framework, steps, and tools for assessing trade-offs between intersection forms and control types
- IIE typically applied when modifying or creating a new intersection
- IIE recommended as part of PDN Stage 0



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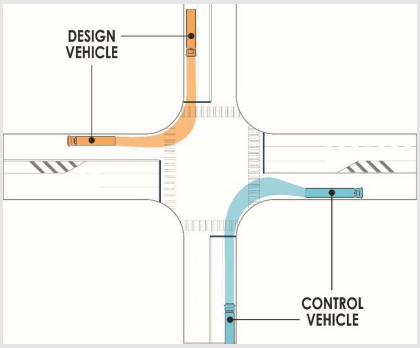
Chapter 5: Intersection Planning and Design

Intersection Design Principles

- Intersection Alignment
  - Horizontal Curves
  - Intersection Angle
  - Tangent Approach
- Lanes at Intersections
- Design Vehicles
- Intersection Profile
  - Grade
  - Cross Slope Transitions
- Intersection Crossing Elements



Additional information in:
TDOT *Roadway Design Guidelines*
TDOT *Standard Drawings*
TDOT *Highway System Access Manual*
AASHTO *Green Book*

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Chapter 5: Intersection Planning and Design

Intersection Context Considerations

- Intersection designs vary by context
- Context influences:
  - Design controls
  - Geometry
  - Pedestrian facilities
  - Bicycle facilities

Table 5-3 At-Grade Intersection Design Considerations—Pedestrian and Bicycle Facilities

Design Element	Examples of Context Considerations
Pedestrian Facilities	• In all contexts, make the crossing distance as short as possible along the natural walking path. This may lead to some out-of-direction patterns, especially at alternative intersection forms. Appropriate wayfinding guidance should be provided for pedestrians. • In all contexts, intersections should be accessible to pedestrians of all ages and abilities, and ramps should be provided when pedestrian facilities exist. Designs should not preclude ramp construction later. • Consider including pedestrian-scale lighting in all contexts, when possible. • In Urban and Urban Core, consider wider sidewalks to serve higher pedestrian volumes and activities. In addition, consider pedestrian timing strategies, including leading pedestrian intervals or exclusive pedestrian phasing in these contexts. • Refer to Chapter 4 of the *PSG* for more information on context considerations for pedestrians.
Bicycle Facilities	• Bicyclists should experience the same quality of service at the intersection as they experience along the approaching segments in all contexts. • In all contexts, bicyclists are exposed going through intersections, especially when turning vehicles cross their travel paths. • Bicyclists' movements typically follow the vehicle or the pedestrian patterns in various contexts. • When bicyclists have separated approaching facilities, intersections may include dedicated and protected movements in all contexts. • Consider bicyclist and/or pedestrian leading intervals and other traffic control devices in all contexts, but specifically in Suburban, Urban, and Urban Core contexts. • Refer to Chapter 4 of PSG for more information on context considerations for bicyclists.

Table adapted from NCHRP Web-Only Document 320, Aligning Geometric Design with Roadway Context. (6)

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Chapter 5: Intersection Planning and Design

TDOT 20-Flag Intersection Evaluation Guide

- NCHRP 948 includes 20 design flags to streamline pedestrian and bicyclist safety evaluation
- TDOT *20-Flag Intersection Evaluation Guide* provides guidance for conducting design flag evaluation

→Coming Soon!

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Chapter 5: Intersection Planning and Design

TDOT 20-Flag Intersection Evaluation Guide

- Design flags reflect level of exposure and risk of injury
  - 3 flags just apply to pedestrians
  - 7 flags just apply to on-street bicyclists
  - 10 flags apply to both
- TDOT *20-Flag Intersection Evaluation Guide* can be used to compare design alternatives as part of PDN Stage 0 or Stage 1

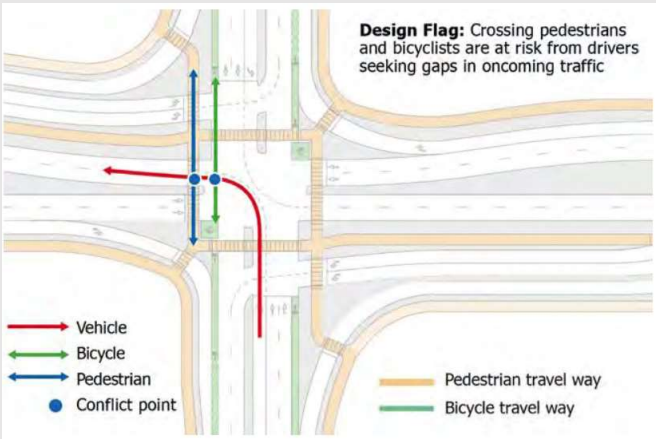

Exhibit 4-40. Design Flag 10 – Motor vehicle left-turns.

Source: NCHRP Research Report 948

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Chapter 6: Context Design Guidance and Criteria

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Chapter 6: Context Design Guidance and Criteria

- Target Speed
- Cross Section Realms
- Cross Section Design Criteria
- Selecting and Documenting Design Values

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Chapter 6: Context Design Guidance and Criteria

Target Speed

"**Target Speed:** The highest speed at which vehicles should operate on a thoroughfare in a specific context." – *PSG*

Table 6-1: Recommended Target and Design Speeds (mph)

Context	Local	Collector	Arterial
Rural	20–45	20–55	≥40
Rural Town	20–25	20–35	25–35
Suburban	20–30	25–35	30–45[1]
Urban	20–30	25–35	25–40
Urban Core	20–25	20–25	25–30

1 In commercial areas where walking, biking, and transit are more common, start at the low end of the target speed range.

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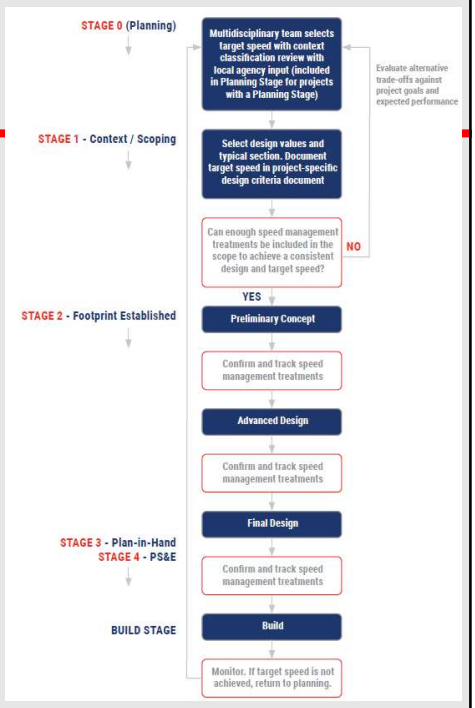
Target Speed

- Target speed identified during PDN Stage 0
- *PSG* includes guidance on determining target and posted speeds



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Target Speed

PSG includes guidance on:

- Aligning posted speed with target speed
- Speed management to achieve a desired target speed

Table 6-2: Speed Management Treatments by Context

Context	Treatments
Rural	Speed feedback signs, transverse pavement markings, lane narrowing
Rural Town	Roundabouts, lane narrowing, speed feedback signs, on-street parking,[1] street trees,[2] median islands, curb extensions, chicanes, speed tables, road diets
Suburban	Roundabouts, transverse pavement markings, lane narrowing, speed feedback signs, road diets, median islands
Urban	Roundabouts, lane narrowing, speed feedback signs, on-street parking,[1] street trees,[2] median islands, curb extensions, chicanes, textured surface, coordinated signal timing, road diets
Urban Core	Roundabouts, lane narrowing, speed feedback signs, on-street parking,[1] street trees,[2] median islands, curb extensions, chicanes, textured surface, coordinated signal timing, speed tables, road diets

[1] If on-street parking is not well utilized, the additional pavement width may increase operating speeds.
[2] When used along roadways, street trees may not reduce speeds to a point where it is appropriate to have a vertical element adjacent to the roadway.

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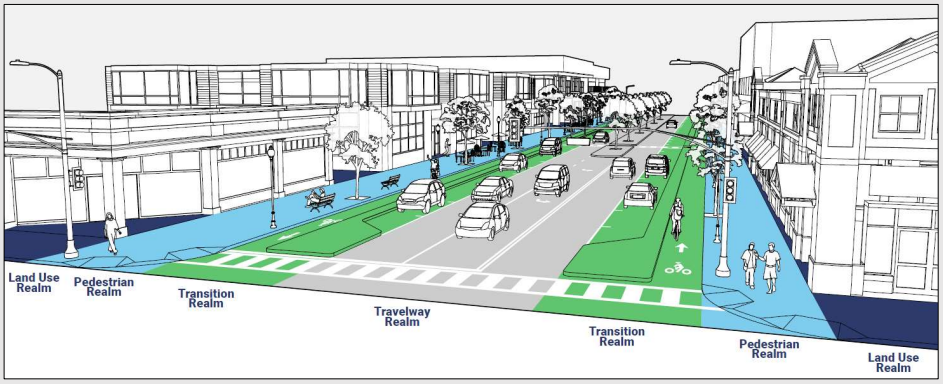
Cross Section Realms

- TDOT roadway cross sections are organized into four realms
- *PSG* includes a table with the function and design characteristics of each realm



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Chapter 6: Context Design Guidance and Criteria

Cross Section Realms

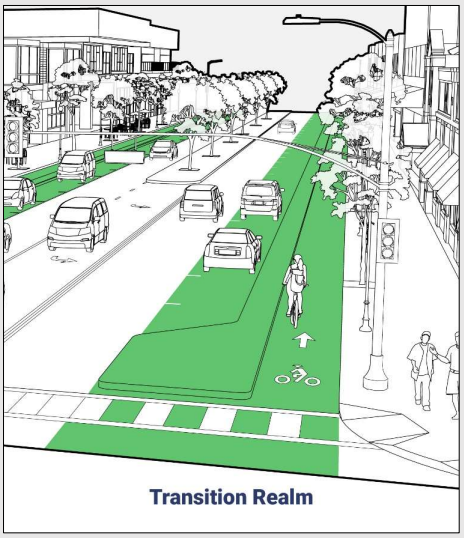

Table 6-6: Design Element Considerations within the Transition Realm

Design Element	Transition Realm Considerations
Edge Zone	• The edge zone is the transition between the pedestrian realm and the roadway. • Curbs are often present in Rural Town, Suburban, Urban, and Urban Core contexts. • Curbside uses may include parking, transit stops, loading/unloading zones, and pickup/drop-off zones. Curb uses may serve multiple functions in the same block or vary by time of day. • At intersections and driveways, the edge zone includes Americans with Disabilities Act (ADA) compliant ramps.
Right Side Shoulder	• There may be a need for roadside recoverable area or shy distance based on the context, target speed, and/or likelihood of run-off-the-road crashes. • Shoulders can limit stormwater encroachment into travel lanes. • In Rural Town, Suburban, Urban, and Urban Core contexts, the right-side shoulder is often eliminated or replaced with a dedicated bicycle facility.
Bicycle Facility Width and Separation	• When speeds and volumes are higher and/or there is a high percentage of trucks, the project team should consider additional separation, such as extra buffer width or physical separation. • Minimum bicycle lane widths should not be used adjacent to minimum travel lane widths. • In constrained areas, buffer widths can be minimized by providing higher vertical barriers.

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria

- Design Controls
- Project-Specific Design Criteria for Each Context
- Horizontal and Vertical Design Considerations
- Sight Distance Design Considerations

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Design Controls

- Context influences design controls
- *PSG* includes context considerations for:
  - Design Speed
  - Design/Control Vehicle
  - Traffic Volumes
  - Non-Motorized User Needs
  - Vehicle Access Points and Density
  - Terrain
- TDOT's *Roadway Design Guidelines* provide additional design guidance

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Cross Section Design Criteria – Project-Specific Design Criteria for Each Context

- Travelway Realm:
  - Number of Lanes
  - Travel Lane Width
  - Right-Turn Lane Width
  - Left-Turn Lane Width
  - Two-Way Left-Turn Lane Width
  - Left Side Shoulder on Divided Roadways (paved)
  - Right Side Shoulder (paved)
  - Shy Distance
  - Median

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Project-Specific Design Criteria for Each Context

- Transition Realm:
  - Bicycle Facility Type and Width
  - Buffer and Separation
  - On-Street Paring
  - Curb/Gutter
- Pedestrian Realm:
  - Frontage Zones
  - Pedestrian Facility Type
  - Pedestrian Zone Width
  - Buffer Zone
  - Target Pedestrian Crossing Spacing Range
  - Shared-Use Path

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Project-Specific Design Criteria for Each Context

Table 6-12: Design Criteria by Facility Type—Urban Context

Design Element	Local	Collector	Arterial
Travelway Realm[1]			
Number of Lanes	2	Primarily 2	Primarily 2-4
Travel Lane Width[2]	9'-10', 11' if transit	9'–11', 11' if transit	10'–12', 11'-12' if transit
Right-Turn Lane Width	9'-10', 11' if transit	9'–11'	10'–12'
Left-Turn Lane Width	9'-10', 11' if transit	9'–11'	11'–12'
Two-Way Left-Turn Lane Width	10'–11'	10'–12'	11'–12'
Left Side Shoulder on Divided Roadways (paved)	N/A	N/A	N/A
Right Side Shoulder	N/A	N/A	N/A
Shy Distance	0'–1'	0'–1'	0'–1'
Median[3]	0'–8'	0'-12'	0'-14'

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Project-Specific Design Criteria for Each Context

Design Element	Local	Collector	Arterial
Transition Realm			
Bicycle Facility Type and Width[4,5,6]	Buffered bicycle lane: • Width 4'-5' • Buffer: 2-3' striping Shared lane markings if target speed is 25 mph or less and two-lane roadway	Buffered bicycle lane: • Width 4'-5' • Buffer: 2-3' striping Separated bicycle lane: • Width: 5'-7' if one-way or 8'-12' if two-way • Buffer: ≥3' physical separation including parking, raised island, flexible delineator posts, rigid bollards, parking stops, planters, and landscape Shared lane markings if target speed is 25 mph or less and two-lane roadway	Buffered bicycle lane: • Width 4'-6' • Buffer: 2-3' striping Separated bicycle lane: • Width: 5'-7' if one-way or 8'-12' if two-way • Buffer: ≥3' physical separation including parking, raised island, flexible delineator posts, rigid bollards, parking stops, planters, and landscape
Parallel On-Street Parking[7]	Limited and typically informal	7'-8', where provided	7'-8', where provided
Curb/Gutter	Curb: 0.5' Gutter: 2.0'	Curb: 0.5' Gutter: 2.0'	Curb: 0.5' Gutter: 2.0'

Pedestrian Realm			
Frontage Zone	2'	2'	2'
Pedestrian Facility Type	Sidewalk on both sides	Sidewalk on both sides	Sidewalk on both sides
Pedestrian Zone Width	≥8'	≥10'	≥12'
Buffer Zone	0'-6'	2'-6'	2'-8'
Target Pedestrian Crossing Spacing Range	250-550 (1-2 blocks)	250-550 (1-2 blocks)	250-550 (1-2 blocks)
Shared-Use Path	N/A	N/A	N/A

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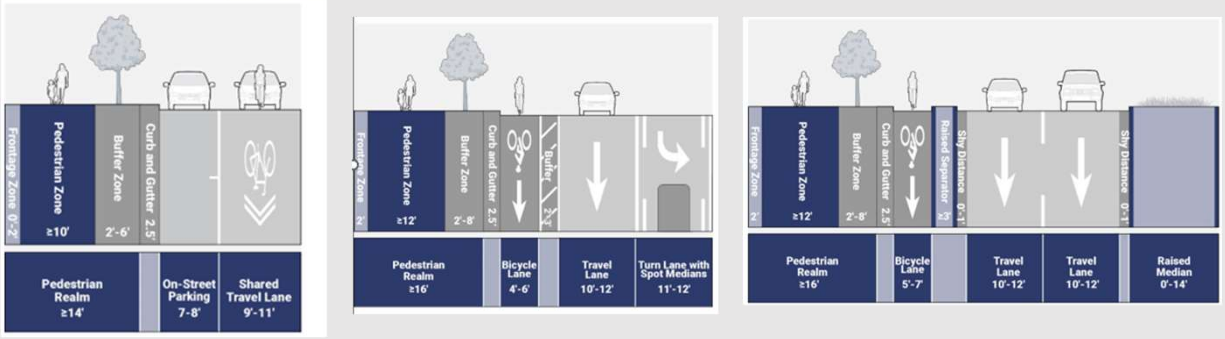
Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Project-Specific Design Criteria for Each Context

Figure 6-10 Example Urban Typical Sections



Example Urban Typical Sections

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Horizontal and Vertical Design Considerations

Horizontal Design

- Minimum Radius
- Spiral Curve
- Superelevation
- Minimum Horizontal Clearances

Vertical Design

- Length of Vertical Curve (Sag or Crest)
- Maximum Grades
- Minimum Vertical Clearances

Examples:

Spiral curves are typically discouraged except in Rural contexts and on freeways.

The **lengths of sag and/or crest curves** in Urban and Urban Core contexts may be shorter but are typically adjusted based on intersection and/or driveway locations.

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Chapter 6: Context Design Guidance and Criteria

Cross Section Design Criteria – Sight Distance Design Considerations

Table 6-16: Sight Distance Considerations

Design Element	Context Considerations
Stopping Sight Distance (SSD)	• Based on design speed and assumptions for driver reaction time, the braking ability of most vehicles under wet pavement conditions, and the friction provided by most pavement surfaces. • Influenced by both vertical and horizontal alignment. • Higher speeds typically in Rural contexts will require increased sight distance; less sight distance will be needed in Urban and Urban Core contexts due to lower speeds
Passing Sight Distance (PSD)	• Passing sight distances only apply to two-lane highways and generally to low-volume roadways in a Rural context. • Minimum passing sight distance is sufficient only for the passing of a single isolated vehicle. • Passing sight distances coincide with the vertical alignment that is determined by the speed associated with the various contexts.
Intersection Sight Distance (ISD)	• Dimensions are affected by the operating speed and clear sight lines from the stopped vehicle. • Landscape, signs, and appurtenances should be positioned and maintained to avoid blocking needed sight lines. • Providing adequate sight distance can influence intersection design outside the TDOT footprint including obstacles on private property.

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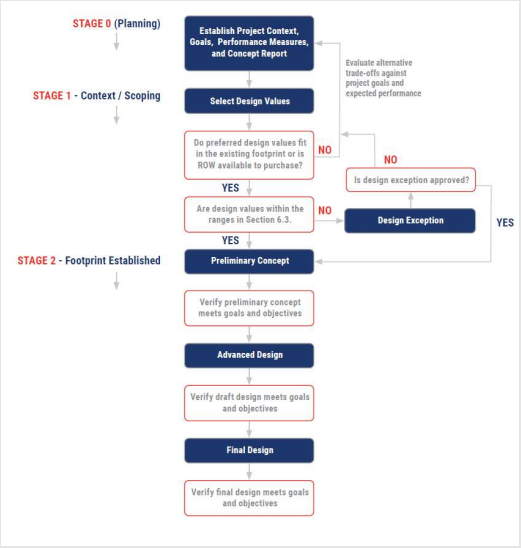
Chapter 6: Context Design Guidance and Criteria

Selecting and Documenting Design Values

- Align design values with project's goals and intended outcomes
- Evaluate trade-offs when needed
- Request Design Exceptions/ Deviations/Waivers when criteria cannot be reasonably met
- Clearly document decisions



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Chapter 6: Context Design Guidance and Criteria

Selecting and Documenting Design Values

- Roadways may be constrained and trade-offs need to be evaluated
- *PSG* includes potential considerations, including:

Is there an opportunity to reduce or remove shy distance?
- On low-speed streets in many Urban or Urban Core contexts, shy distance can be minimized or removed.

Is there an opportunity to narrow or remove the two-way left-turn lane?
- On low-speed streets in many Urban or Urban Core contexts, 10' is sufficient width for a two-way left-turn lane. Turn lanes may not be needed as higher levels of vehicle congestion are expected.

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Chapter 7: Case Studies

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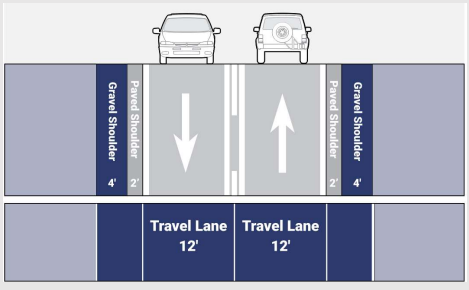
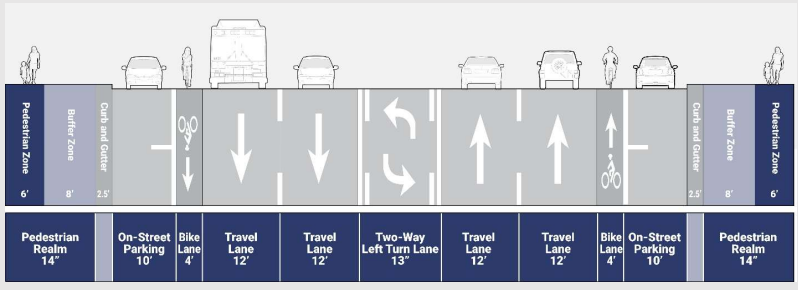
Chapter 7: Case Studies

- Case Study #1: Transition from Rural to Suburban Context
- Case Study #2: Urban Transit Corridor

Case Study #1



Case Study #2



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Chapter 7: Case Studies

Case studies use the following steps:

1. Establish project goals and performance measures (PDN Stage 0)
2. Concept development (PDN Stage 0)
3. Evaluation and selection (PDN Stage 1)
4. Design phase (PDN Stage 2)

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Chapter 7: Case Studies

7.1.3 STEP 2: Concept Development *(PDN Stage 0)*

Step 2 focuses on developing alternative concepts. The alternatives are intended to represent a range of options and may be refined through the evaluation process. **Project alternative concepts are initially identified in the Final Concept Report in Stage 0 and further refined in Stage 1 as part of the Draft Project Commitment Documentation.**

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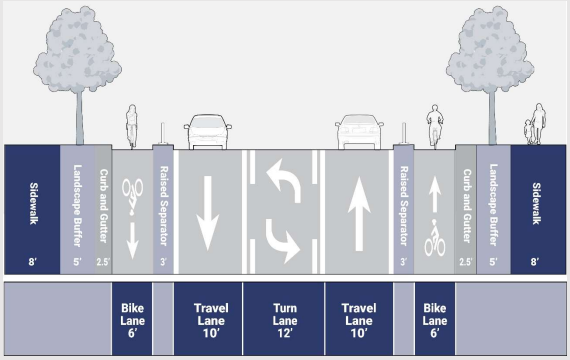
Chapter 7: Case Studies

Project Goal	Performance Measures	
1. Provide increased safety and access for pedestrians and bicyclists along the corridor.	Safety	Expected reduction in operating speeds
		Anticipated reduction in crashes
		Pedestrian assessment (e.g., facility type, level of separation)
		Bicyclist assessment (e.g., facility type, level of separation)
2. Enhance long-term viability for the local community.	Livability	Community feedback on how the design alternatives maintain the character of the roadway
	Modal Integration	Consistency with modal integration (See Chapter 3) for Suburban context
3. Accommodate future traffic anticipated on the corridor.	Operations	Design year volume-to-capacity (v/c) ratio
		Expected change in travel time reliability (review of available existing data and estimated microsimulation data)
4. Preserve existing natural features.	Environmental and ROW Impacts	Property impacts due to right-of-way acquisition
		Level of impact to environmental features
5. Optimize project performance within available project funding.	Feasibility	Expected project cost
		Anticipated construction feasibility



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Chapter 7: Case Studies

Performance Measure	PEDESTRIAN AND BICYCLE MODAL INTEGRATION Improvement Rating		
	Low	Medium	High
Pedestrian LTS	LTS 3 or 4	LTS 2	LTS 1
Bicycle LTS	LTS 3 or 4	LTS 2	LTS 1
Average distance between marked crossings	Distance between crossings is significantly more than target spacing	Distance between crossings is more than target spacing	Distance between crossings meets or is less than target spacing

Performance Measure		Improvement Ratings		
		Alt 1	Alt 1	Alt 1
Safety	Anticipated change in crashes	M	H	H
	Pedestrian assessment	M	H	M
	Bicyclist assessment	M	H	M
	Design flag assessment (pedestrian)	M	M	M
	Design flag assessment (bicyclist)	M	M	M
Pedestrian/ Bicyclist Modal Integration	Pedestrian LTS	M	H	M
	Bicycle LTS	L	M	M
	Average distance between marked crossings	H	H	H
Transit Mobility	Presence of transit priority treatments	L	M	H
	Expected delay from transit stops	M	H	H
	Expected change in transit travel time reliability	L	M	H
Transit Modal Integration	Proximity of marked street crossings to transit stop locations	H	H	H
	Sidewalk effective width	H	H	H
Vehicle Mobility/ Traffic Operations	Design year v/c ratio	H	M	L
	Expected change in vehicle travel time reliability	H	M	L
Economic Revitalization	Feedback from local business owners	M	M	H
	Market analysis of expected development	M	H	H
Financial Investment	Life cycle cost	M	H	L
Livability	Expected mode share	M	H	H
	Presence of placemaking elements (trees, art, benches, vegetation, micromobility hubs, etc.)	M	H	M
	Feedback from local community members	L	M	M

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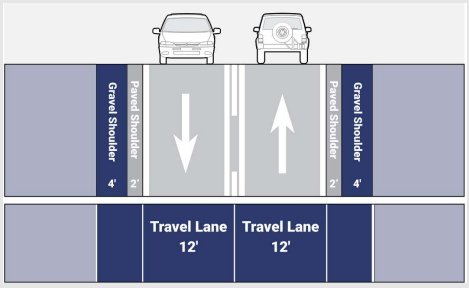
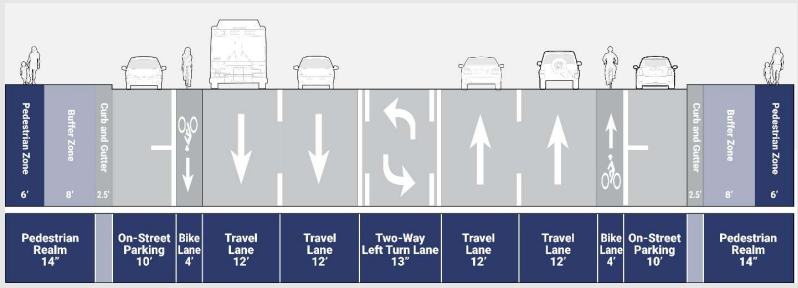
Chapter 7: Case Studies

- Case Study #1: Transition from Rural to Suburban Context
- Case Study #2: Urban Transit Corridor

Case Study #1



Case Study #2



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Chapter 7: Case Studies

Case studies use the following steps:

1. Establish project goals and performance measures (PDN Stage 0)
2. Concept development (PDN Stage 0)
3. Evaluation and selection (PDN Stage 1)
4. Design phase (PDN Stage 2)

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Case Study #1: Transition from Rural to Suburban Context

Project Background

- Two lanes, high-speed arterial
- Area currently rural with low-density residential development
- Winds through forested area with natural features
- Connects established metropolitan area and growing suburban development

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Case Study #1: Transition from Rural to Suburban Context

Project Background

- TDOT evaluating potential improvements to address increase in crashes and to better serve all users and ongoing development
- Residents concerned about maintaining character and aesthetic of roadway

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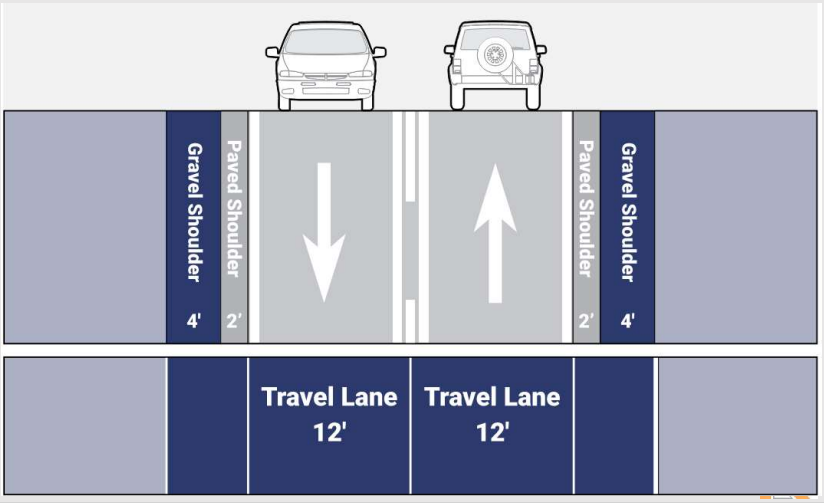
Case Study #1: Transition from Rural to Suburban Context

Characteristics

- Paved width 28’
- Existing ROW 60’



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Case Study #1: Transition from Rural to Suburban Context

Characteristics

- **Density**: low but increasing
- **Users**: through vehicles, moderate truck traffic, recreational bicyclists, occasional pedestrians
- **Land Use**: mix of low-density residential and denser neighborhoods and commercial clusters
- **Speed**: posted speed 45 mph, observed 85th percentile speed 48 mph

Future Context: Suburban

Target Speed: 35 mph

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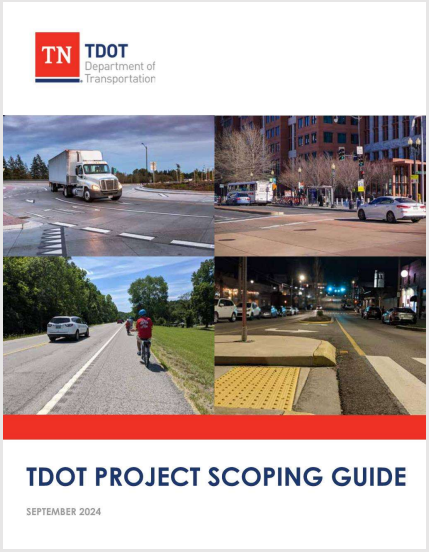
Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

- Goals determined based on community input and project background
- *Resource: Chapter 2 of the PSG*



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Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

GOALS

1. Provide increased safety and access for pedestrians and bicyclists along the corridor.
2. Enhance long-term viability for the local community.
3. Accommodate future traffic anticipated on the corridor.
4. Preserve existing natural features.
5. Optimize project performance within available project funding.

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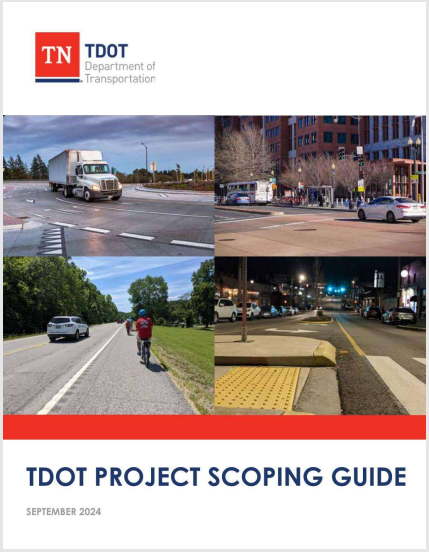
Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

- Performance measures reflect project goals and desired outcomes for the area
- Used to evaluate alternative's ability to meet users' needs
- *Resource: Chapter 2 of the PSG*



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Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

Project Goal	Performance Measures	
1. Provide increased safety and access for pedestrians and bicyclists along the corridor.	Safety	• Expected reduction in operating speeds • Anticipated reduction in crashes • Pedestrian assessment (e.g., facility type, level of separation) • Bicyclist assessment (e.g., facility type, level of separation)

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Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

Project Goal	Performance Measures	
2. Enhance long-term viability for the local community.	Livability	• Community feedback on how the design alternatives maintain the character of the roadway
	Modal Integration	• Consistency with modal integration (See Chapter 3) for Suburban context

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Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

Project Goal	Performance Measures	
3. Accommodate future traffic anticipated on the corridor.	Operations	• Design year volume-to-capacity (v/c) ratio
		• Expected change in travel time reliability (review of available existing data and estimated microsimulation data)

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Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

Project Goal	Performance Measures	
4. Preserve existing natural features.	Environ-mental and ROW Impacts	• Property impacts due to right-of-way acquisition • Level of impact to environmental features

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Case Study #1: Transition from Rural to Suburban Context

Step 1: Establish Project Goals and Performance Measures (PDN Stage 0)

Project Goal	Performance Measures	
5. Optimize project performance within available project funding.	Feasibility	• Expected project cost • Anticipated construction feasibility

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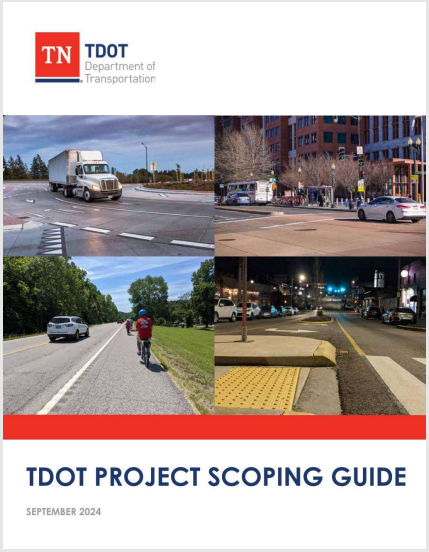
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

- Alternatives developed based on TDOT design guidance and collaboration with community members
- *Resource: Chapter 6 of the PSG*



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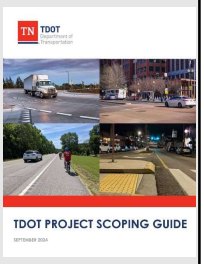
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

Table 6-11: Design Criteria by Facility Type—Suburban Context

Design Element	Local	Collector	Arterial
Travelway Realm[1]			
Number of Lanes	2	Primarily 2-4	Primarily 2-4[2]
Travel Lane Width[3]	9′–11′, 11′ if transit	10′–12′, 11′-12′ if transit	10′–12′, 11′-12′ if transit
Right-Turn Lane Width	9′–11′	10′–12′	10′–12′
Left-Turn Lane Width	9′–10′	10′–11′	11′–12′
Two-Way Left-Turn Lane Width	10′–11′	10′–12′	11′–14′
Left Side Shoulder on Divided Roadways (paved)	N/A	N/A	0-2′
Right Side Shoulder (paved)	2′-4′	4′–6′	Curbed: 4-6′ Flush: 10-12′
Shy Distance	0′–1′	0′–1′	0′–2′
Median[4]	Flush: 0′–2′	Raised: 6′-22′	Raised: 6′-22′

For example, recommended TWLTL width 11′-14′ for suburban arterial



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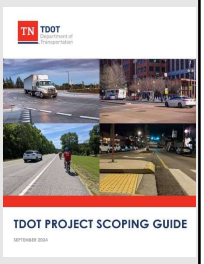
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

Table 6-11: Design Criteria by Facility Type—Suburban Context

Design Element	Local	Collector	Arterial
Transition Realm			
Bicycle Facility Type and Width[5,6,7]	Conventional bicycle lane: • Width 4'-5' • Buffer: N/A Buffered bicycle lane: • Width 4'-5' • Buffer: 2-3' striping Shared lane markings if target speed is 25 mph or less and two-lane roadway	Buffered bicycle lane: • Width 4'-5' • Buffer: 2-3' striping Separated bicycle lane: • Width: 5'-7' if one-way or 8'-12' if two-way • Buffer: ≥3' physical separation including raised island, flexible delineator posts, concrete barrier, guardrail, and vegetation	Separated bicycle lane: • Width: 5'-7' if one-way or 8'-12' if two-way • Buffer: ≥3' physical separation including raised island, flexible delineator posts, concrete barrier, guardrail, and vegetation Shared-use path • Width: ≥10' • Buffer: 2'-16'
Parallel On-Street Parking[8]	Limited and typically informal	7'-8', where provided	7'-8', where provided
Curb/Gutter	Curb: 0.5' Gutter: 2.0'	Curb: 0.5' Gutter: 2.0'	Curb: 0.5' Gutter: 2.0'



For example, separated bicycle lane or shared-use path recommended for suburban arterial

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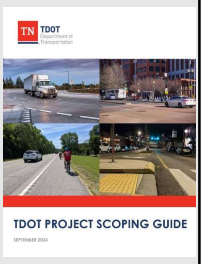
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

Table 6-11: Design Criteria by Facility Type—Suburban Context

Design Element	Local	Collector	Arterial
Pedestrian Realm			
Frontage Zone	0'-2'	0'-2'	0'-2'
Pedestrian Facility Type	Sidewalk	Sidewalk on both sides with option for shared-use path on one side	Sidewalk on both sides with option for shared-use path on one or both sides
Pedestrian Zone Width[9]	≥6', where provided	≥6'	≥8'
Buffer Zone	0'-6'	2'-8'	2'-16'
Target Pedestrian Crossing Spacing Range	600+/-, Varies based on adjacent land uses	600+/-, Varies based on adjacent land uses	600+/-, Varies based on adjacent land uses
Shared-Use Path	Not anticipated	≥10' if provided	≥10' if provided



For example, recommended pedestrian zone width ≥8' for suburban arterial

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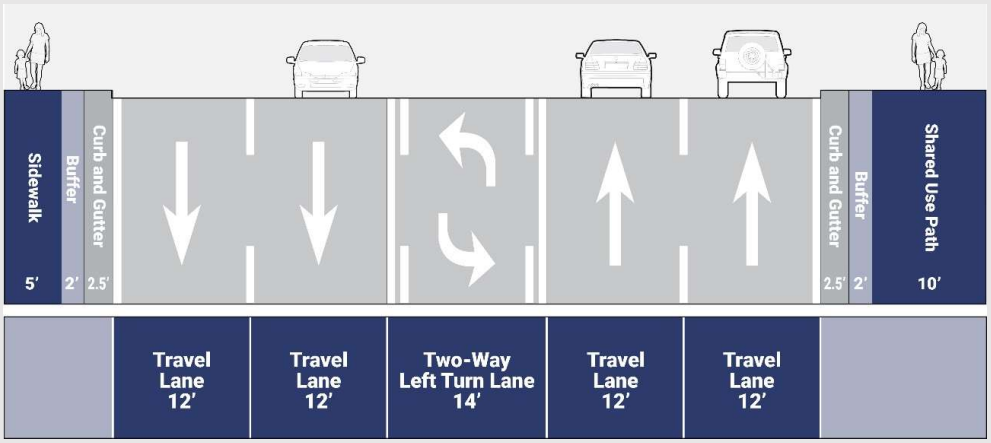
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

Alternative 1—Vehicle-Oriented Five-Lane Suburban Cross Section



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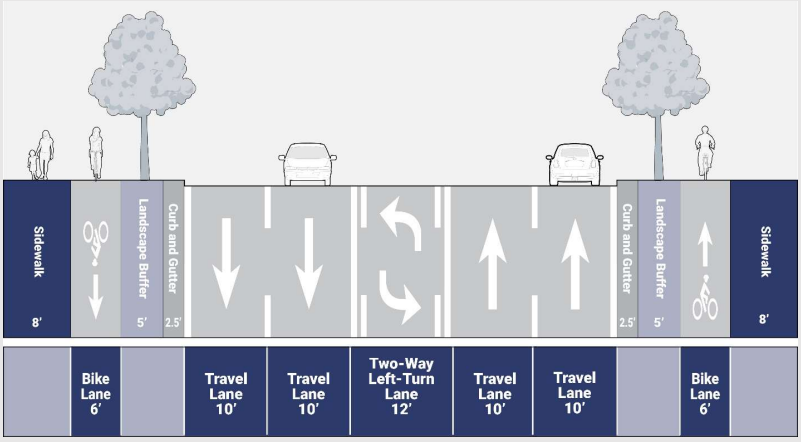
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

Alternative 2—Multimodal Five-Lane Suburban Cross Section



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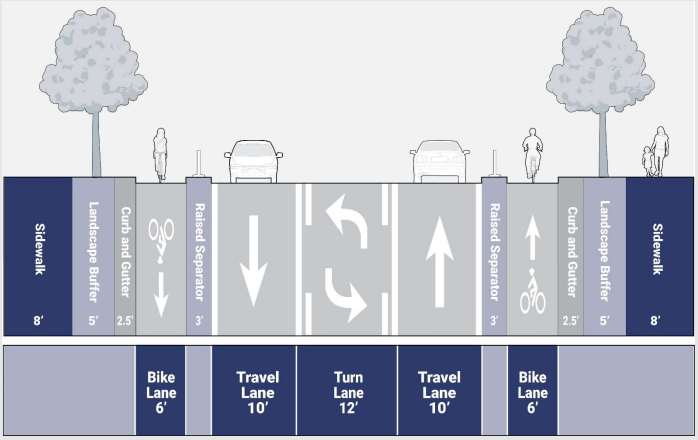
Case Study #1: Transition from Rural to Suburban Context

Step 2: Concept Development (PDN Stage 0)

Alternative 3—Multimodal Three-Lane Suburban Cross Section



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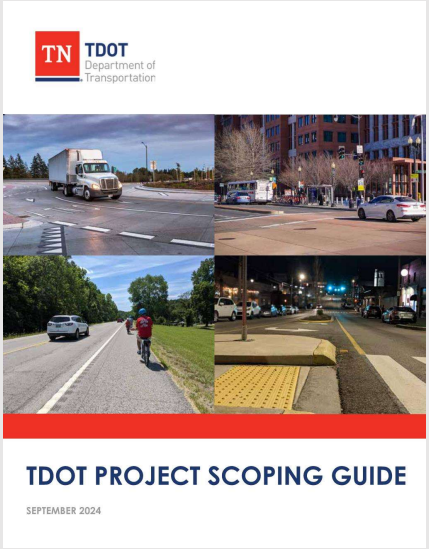
Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1)

- Alternatives evaluated using performance measures identified in Step 1
- *Resource: Chapter 2 of the PSG*



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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Safety Rating

Performance Measure	SAFETY Improvement Rating		
	Low	Medium	High
Expected reduction in operating speeds	Project includes **0-1 treatments** with documented effectiveness at speed **reduction**	Project includes **2 treatments** with documented effectiveness at speed **reduction**	Project includes **3 or more** treatments with documented effectiveness at speed **reduction**
Anticipated change in crashes	Project is **not** anticipated to reduce crashes	Project has a **moderate** value crash reduction factor	Project has a **high** value crash reduction factor
Pedestrian assessment	Project provides a facility of **minimum width**	Project provides a wider facility with **horizontal separation**	Project provides a wider facility with **horizontal and vertical separation**
Bicyclist assessment	Project provides a facility of **minimum width**	Project provides a wider facility with **horizontal separation**	Project provides a wider facility with **horizontal and vertical separation**

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Livability Rating

Performance Measure	LIVABILITY Improvement Rating		
	Low	Medium	High
Community feedback on how the design alternatives maintain the character of the roadway	Mostly negative feedback	Neutral or mixed feedback	Mostly positive feedback

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Modal Integration Rating

Performance Measure	MODAL INTEGRATION Improvement Rating		
	Low	Medium	High
Consistency with modal integration considerations for Suburban context[1]	Modal integration is NOT consistent with expectations	Modal integration addresses some expectations	Modal integration is consistent with expectations

[1]Modal integration expectations are described in Chapter 3, Table 3-3 of the PSG.

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Operations Rating

Performance Measure	OPERATIONS Improvement Rating		
	Low	Medium	High
Design year v/c ratio	>0.90	0.75 to 0.90	<0.75
Expected change in travel time reliability (review of available existing data and estimated microsimulation data)	Inconsistent travel time	Maintains travel time expectations	Improves travel time consistency

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Environmental and ROW Impacts Rating

Performance Measure	ENVIRONMENTAL AND ROW IMPACTS Improvement Rating		
	Low	Medium	High
Property impacts due to right-of-way acquisition	Right-of-way acquisition impacts the function and/or structures on adjacent properties	Right-of-way acquisition required but no impacts to function and/or structures	No right-of-way acquisition
Level of impact to environmental features	Significant environmental impacts that require extensive mitigation	Minimal environmental impacts that can be mitigated	No environmental impacts

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Feasibility Rating

Performance Measure	FEASIBILITY Improvement Rating		
	Low	Medium	High
Expected project cost	Project costs exceed available funding	Project costs align with available funding	Project costs are below available funding
Anticipated construction feasibility	Project poses significant construction challenges	Project poses moderate construction challenges	Project poses no construction challenges

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Safety Evaluation

Performance Measure	SAFETY Improvement Rating		
	Low	Medium	High
Expected reduction in operating speeds	**Low** Project includes 0-1 treatments with documented effectiveness at speed reduction: • Curbs, sidewalks, and bicycle lanes	**High** Project includes 3 or more treatments with documented effectiveness at speed reduction: • Curbs, sidewalks, and separated bicycle lanes • Narrower travel lanes (from 12' to 10') • Landscaped buffer	**High** Project includes 3 or more treatments with documented effectiveness at speed reduction: • Curbs, sidewalks, and bicycle lanes • Narrower travel lanes (from 12' to 10') • Narrower pavement width and cross section • Landscaped buffer

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) – Livability Evaluation

Performance Measure	LIVABILITY Improvement Rating		
	Low	Medium	High
Community feedback on how the design alternatives maintain the character of the roadway	**Low** Wide cross section with limited aesthetics Minimum pedestrian and bicycle facilities adjacent to roadway	**Medium** Wide cross section but pedestrian and bicycle facilities have a landscape buffer that reduces impervious pavement	**High** Narrower cross section with fewer travel lanes and improved pedestrian and bicycle facilities with buffers

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) –Evaluation Summary

Performance Measure		Improvement Ratings		
		Alt 1	Alt 2	Alt 3
Safety	Expected reduction in operating speeds	L	H	H
	Anticipated change in crashes	M	H	H
	Pedestrian assessment	L	H	H
	Bicycle assessment	M	H	H
Livability	Community feedback on how the design alternatives maintain the character of the roadway	L	M	H
Modal Integration	Consistency with modal considerations for Suburban context	L	M	H
Operations	Design year v/c ratio	H	H	L
	Expected change in travel time reliability	H	H	L
Environmental and ROW Impacts	Property impacts due to right-of-way acquisition	M	L	M
	Level of impact to environmental features	L	M	H
Feasibility	Expected project cost	M	L	H
	Anticipated construction feasibility	M	M	L

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Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) –Evaluation Summary

Key considerations and trade-offs include:

- **Alternative 2** has highest ratings
- **Alternative 1** eliminated due to low ratings
- **Alternative 3** not as highly rated as **Alternative 2**, but preferred by community
  - Potential vehicle capacity constraints
  - Construction feasibility
- May be opportunities to combine **Alternative 2** and **Alternative 3**

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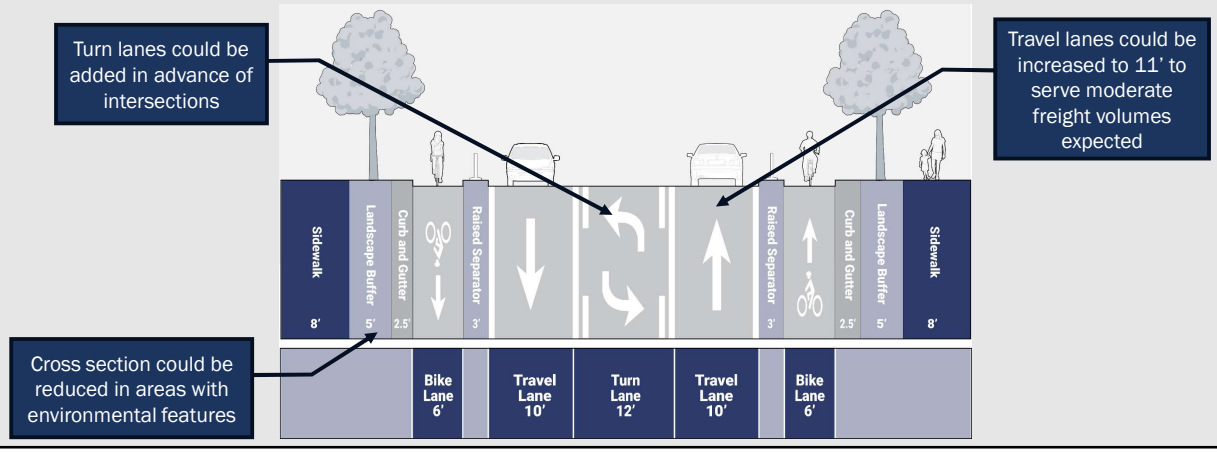
Case Study #1: Transition from Rural to Suburban Context

Step 3: Evaluation and Selection (PDN Stage 1) –Evaluation Summary

Alternative 3—Multimodal Three-Lane Suburban Cross Section



Case Study #1: Transition from Rural to Suburban Context

Step 4: Design Phase (PDN Stage 2)

- May need to revisit and refine concept if constraints become apparent
- Revisit the context and goals if changes made to ensure consistency with project purpose
- Document changes and review
- *Resource: Chapter 2 of the PSG*

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Outline

- Chapter 1: Introduction and Overview
- Chapter 2: Decision-Making Framework and Documentation
- Chapter 3: Identifying Design Year Context
- Chapter 4: Multimodal Planning and Design
- Chapter 5: Intersection Planning and Design
- Chapter 6: Context Design Guidance and Criteria
- Chapter 7: Case Studies

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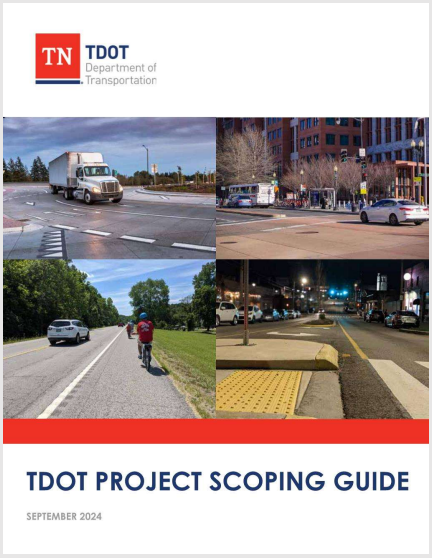
Questions?



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