


TXDOT BICYCLE ACCOMMODATION DESIGN GUIDANCE
BAC MEETING

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TxDOT Bike Accommodation Design Guidance (Released on 4/02/21)

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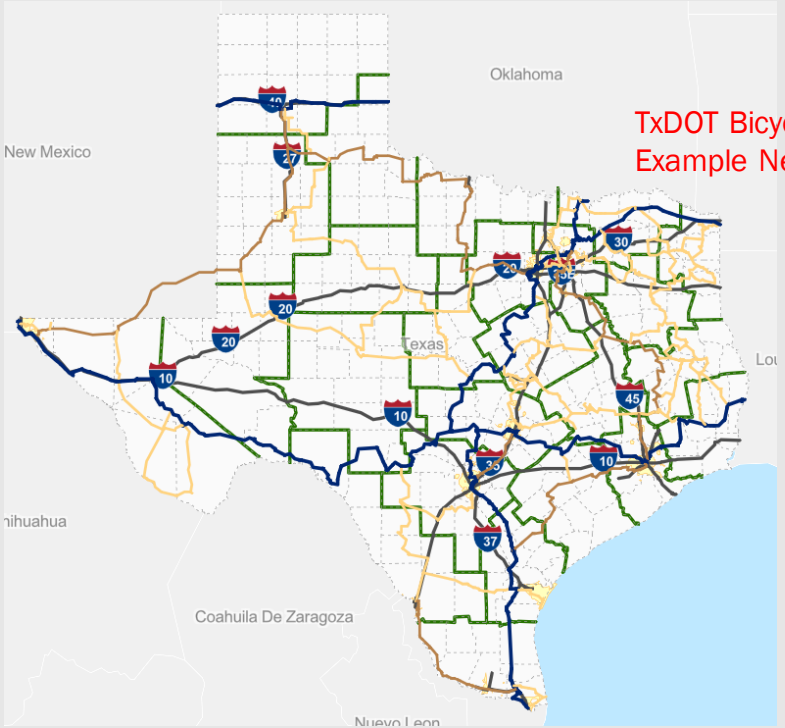
TxDOT Bicycle Tourism Example Network

Note, projects located on the Texas Bicycle Tourism Example Network are not excepted from bicycle accommodations regardless of location. The TxDOT Statewide Planning Map provides additional information on MPO boundaries, area types, and the Texas Bicycle Tourism Trails Example Network. Shoulders, if used to provide bike accommodations, must be a minimum of 8 ft. in width.

TxDOT Bicycle Tourism Example Network (TxDOT Statewide Planning Map)

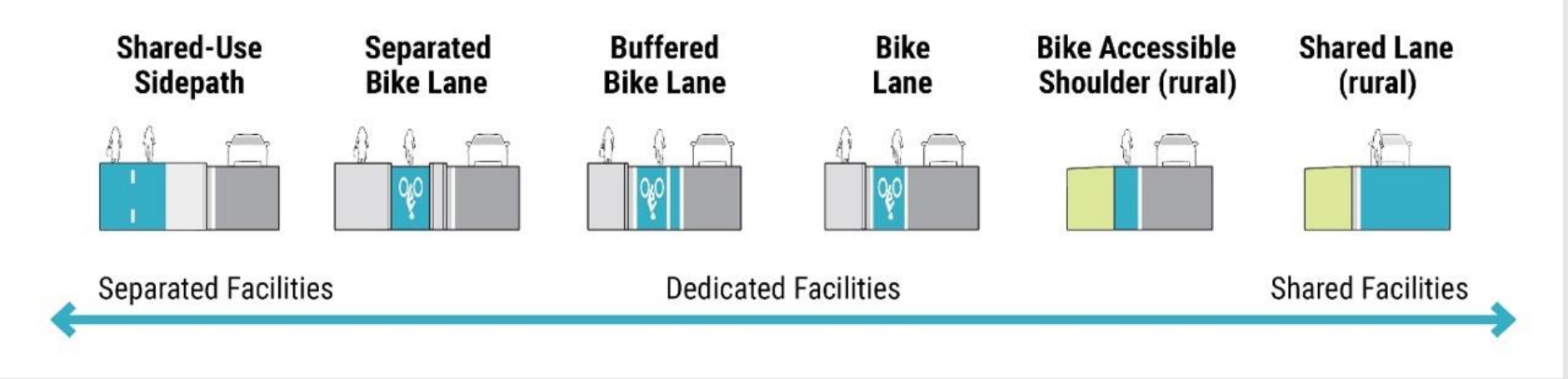


Target Design User

The common target design user are those who are interested in riding but concerned about safety ("Interested but Concerned") as this is the largest group of potential bikeway users among the general population. These bicyclists would ride more if they felt safer and, thus, are more likely to take short trips, avoiding busier arterial roadways. "Interested but Concerned" bicyclists prefer separation from vehicles and have a lower tolerance for traffic stress than more confident riders.

Facility Types

Below is a description and brief design guidance for the most common bicycle facility types. From left to right, it shows decreasing separation between bicyclists and motor vehicles.



Shared Use Paths Adjacent to Roadways (Sidepaths)

- Are located within a roadway corridor following the roadway alignment
- Are typically separated from motorized vehicular traffic by a landscaped buffer or a barrier
- Two-way travel, because in addition to bicyclists, users may include inline skaters, skateboarders, pedestrians, and runners
- Conflict points such as driveways and frequent street crossings should be mitigated to the greatest extent practicable to maximize comfort and safety
- A bicycle design speed of 15 mph is generally appropriate
- The desired width for a sidepath is 11 to 15 feet or more (SUPLOS calculation)
- To maximize service life and to assure a reasonable SUPLOS grade, paved widths should not be less than 10 feet
- As path user volumes increase, designers should consider increasing the width of the sidepath up to 15 feet
- Standard minimum width is 10 ft. A minimum width of 8 feet may be used in rare circumstances
- Horizontal and vertical alignments provide frequent, well-designed passing and resting opportunities where the width is at least 10 feet

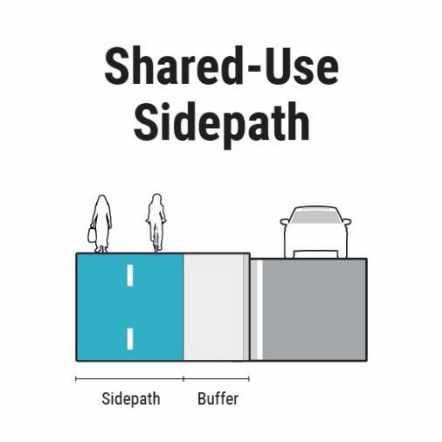


Table 3: SUPLOS example calculation (higher foot traffic)

Segment Name	Path Width	Centerline	Volume (users per hour in 1 direction) and Mode Split						
Name	Width (ft)	1=Centerline	One-Way (per hour)	Adult Bicyclists	Peds	Runners	In-Line Skaters	Child Bicyclists	SUPLOS grade
More Peds	12.0	0	100.0	20.0%	60.0%	15.0%	2.0%	3.0%	C

- A SUPLOS grade of "C" or better is desirable over the life of the facility to ensure it is comfortable and safe for all users
- Table 3 provides a sample SUPLOS calculation with higher foot traffic
- When foot traffic exceeds 15%, SUPLOS degrades more rapidly
- Counts or projected counts should be made in anticipated peak hour, analogous parallel facilities may be used for additional guidance as well
- *Texas Bicycle and Pedestrian Count Exchange* (https://mobility.tamu.edu/bikepeddata/) has pedestrian and bicycle count data for various facilities statewide
- FHWA SUPLOS Users Guide and calculator is located at https://www.fhwa.dot.gov/publications/research/safety/pedbike/05138/

Bike Accessible Shoulders

- Bike accessible shoulders are one-way facilities on a roadway that carry bicycle traffic in the same direction as adjacent motor vehicle traffic
- A bike accessible shoulder is one that is at least as wide or wider than a bike lane to accommodate bicyclists and paved to provide a smooth, solid surface across its width
- While the bike accessible shoulder distinguishes predictable areas for bicyclist and automobile movement, bicyclists may leave the shoulder to pass other cyclists or avoid debris and other traffic conflicts
- A minimum width of 4’ is allowable in low speed (45 mph or less) conditions
- A minimum width of 5’ is allowable for high speed conditions.
- A minimum width of 5’ is required for shoulders adjacent to bridge railings, MBGF, and other vertical elements
- Some shoulders should be up to 10 feet wide adjacent to higher speed roadways to allow bicyclists to operate with more separation to the high-speed traffic
- Roadways indicated in TxDOT’s *Bicycle Tourism Trails Study* must be designed with a minimum 8-foot shoulder
- Bike accessible shoulders are not for use by pedestrians

Bike Accessible Shoulder Rumble Strip Design and Gap Placement

- Rumble strips are used to warn the driver that they are leaving the travel way and is beneficial on the safety of bicycles using the shoulder
- Allowances should be made in the shoulder to provide an adequate width for bike accommodations beyond the rumble strip
- Profile pavement markings serve a similar function as milled rumble strips and can be considered an option to avoid reduction in width of the accessible shoulder
- Where bicycle traffic is expected, rumble strips should be designed to minimize crash risk for bicyclists
- Where bicyclists are operating at 20 mph or less, a minimum 15 ft gap every 40 to 60 ft should be provided
- Where bicyclists are operating over 20 mph, the gap should be increased to 20 ft or more or the rumble strips should be located on the right side of the shoulder to allow bicyclist to avoid them if they need to enter the travel lane

Figure 9 Rumble Strip Placement in a Shoulder

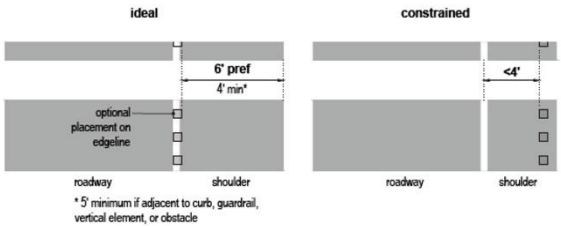
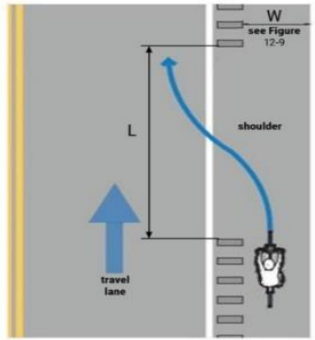


Figure 10 Rumble Strip Design and Gap Placement

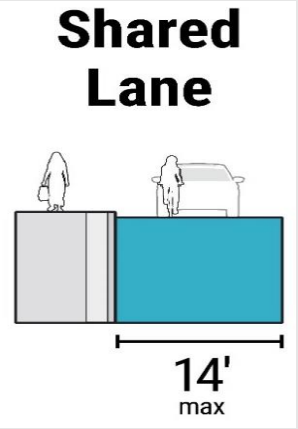


Rumble strip gap (L) dimensions:

1. Where bicyclists are operating at 20 mph or less, a minimum 15-foot gap every 40 to 60 feet allows half a second for a bicyclist to cross the rumble strip
2. Where bicyclists are operating over 20 mph, the gap should be increased to 20 feet or more or the rumble strips should be located on the right side of the shoulder to allow bicyclists to avoid them if they encounter a need to enter the trave lane (e.g. a downhill location)

Shared Lanes (wide outside lane)

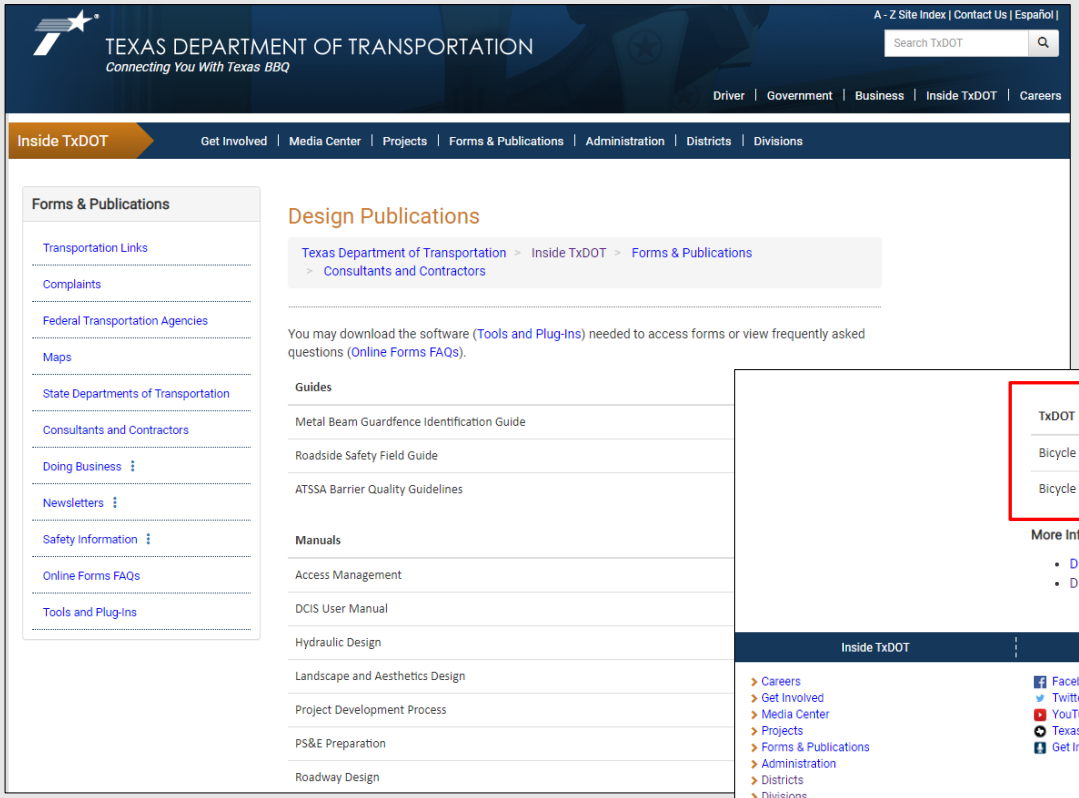
- Bicycles may be operated on all roadways except where prohibited by statute or regulations
- Shared lanes without markings already exist in many different urbanized settings
- Note that although marked shared lanes are allowed in the TMUTCD for certain conditions, TxDOT as a general policy does not recommend marked shared lanes for TxDOT roadways due to the higher speed nature of TxDOT roadways as compared to local jurisdictions
- In Urbanized applications, Shared wide outside lanes are only allowed in locations with low volumes (3,000 ADT or lower) and very low speeds (35 mph or less)
- In Rural applications, Shared wide outside lanes are only allowed in locations with very low volumes (1,000 ADT or lower) and low speeds (45 mph or less)
- 14 feet is the maximum and 13 feet is the minimum "usable width" for a shared wide outside lane
- The usable width is measured from the lane stripe to either the gutter joint or one foot from the nominal face of a monolithic curb
- If the usable width is greater than 14 feet, a bike lane should be provided instead (use of minimum travel lane widths may be necessary to incorporate the bike lane)



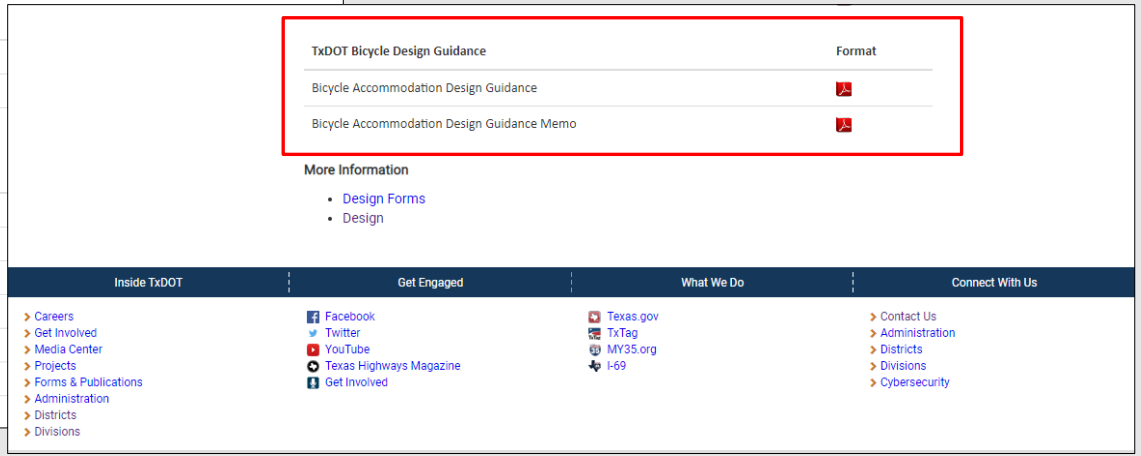
Bicycle Guidance Implementation date

	By November 1st, 2021 approved 30% Plans or schematic	By November 1st, 2021 30% Plans or schematic not approved
Let Prior to September 2022	Optional	Optional
September 2022 Letting or later	Optional	Required

Bike Design Guidance Resources



[Internet: https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/design.html]



[Intranet: https://tntoday.dot.state.tx.us/des/Pages/Roadway-Design-Guidance.aspx]

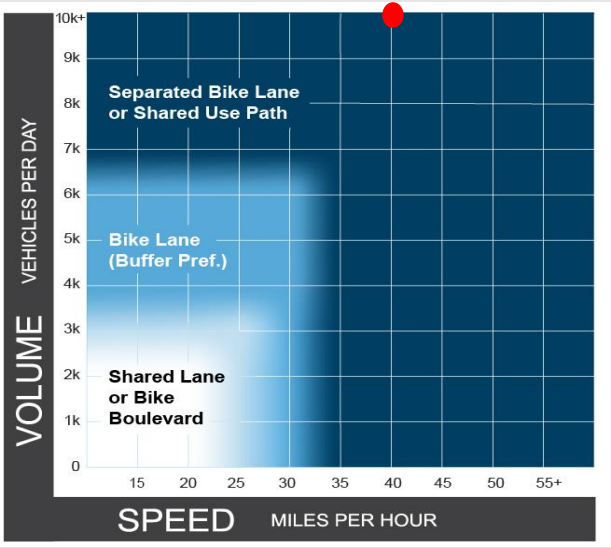
SHARED USE PATH EXAMPLE # 1

Example #1 Project Parameters

- Suburban Context
- 4 Ln Divided Roadway with current ADT of 16,000 with current wide outside lanes (14 ft.)
- Posted Speed of 40 mph
- Existing 4 ft. sidewalk
- Intersecting Driveways (per side) 6 driveways in two mile stretch of roadway, driveways relatively low volume. One intersecting Collector type roadway at halfway point.

SHARED USE PATH EXAMPLE # 1

Use Figure 4 (Urbanized) from Bike Guidance for initial bike facility recommendation



Due to relatively low driveway density, investigate the possible application of a shared use path (sidepath)

SHARED USE PATH EXAMPLE # 1

General rules for the use of the FHWA SUPLOS calculator

- Segment Length analyzed is between .25 – 2 to 3 miles
- The segment analyses should be broken up as needed to account for changes in user volumes in project limits.
- All user mixes of the Treadway should be counted or estimated (adult bicyclists, peds, runners, in-line skaters, child bicyclists).
- If new user counts are collected, it's recommended that a minimum of three two-way, hourly counts be taken on each analyzed segment, an average, one-way per-hour volume can be created from the three, two-way hourly counts. An assumed 50/50 split is recommended for conversion to one-way volumes.

For this particular example

- There are two one mile segments analyzed (break at intersecting collector) for this project.
- After conducting two way counts and averaging (for each analyzed segment). The two-way total volumes of 240 (Segment A), and 100 (Segment B) are then assumed to be 50/50 for the one-way entry into the calculator. The respective user type count/proportion information was also gathered during the counts.

Model average user speed

Trail user type (mode)	Average speed (mi/h)
Adult bicyclists	12.8
In-line skaters	10.1
Child bicyclists	7.9
Runners	6.5
Pedestrians	3.4

1 mi/h = 1.6 km/h

LOS Score & Grade

LOS Score	LOS Grade	
$X \geq 4.0$	A	Best
$3.5 \leq X < 4.0$	B	
$3.0 \leq X < 3.5$	C	
$2.5 \leq X < 3.0$	D	
$2.0 \leq X < 2.5$	E	
$X < 2.0$	F	Worst

SUPLOS Calculator Example # 1

Target LOS Grade of C or better (adjust width to update LOS)

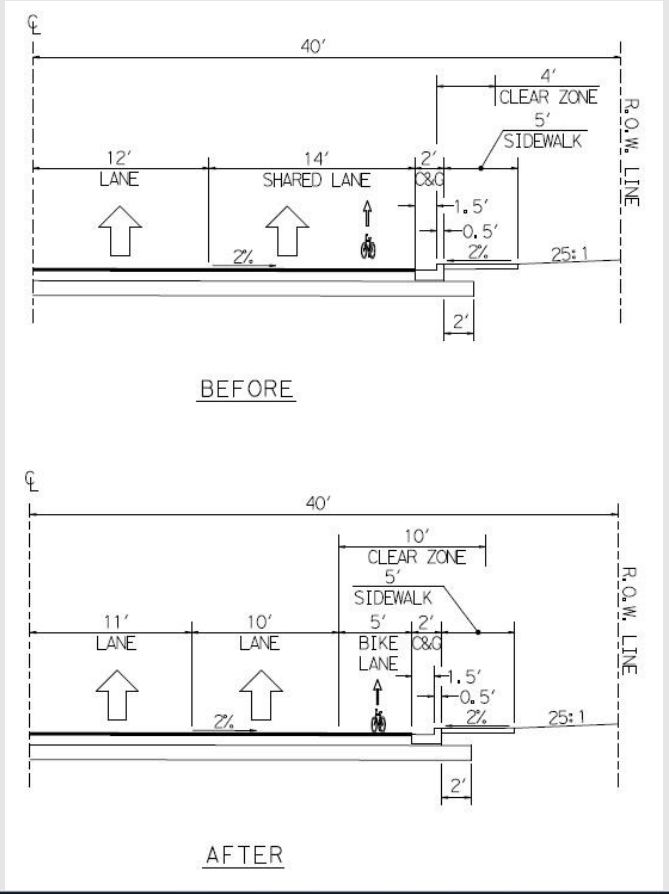
Segment Name	Path Width	Centerline	Volume (users per hour in 1 direction) and Mode Split							Trail Level of Service	
	Closest 0.5 ft.	0=No Centerline	Volume	Mode Split (%)*							
Name	Width (ft)	1=Centerline	One-Way (per hour)	Adult Bicyclists	Pedestrians	Runners	In-Line Skaters	Child Bicyclists	All Modes	LOS Score	LOS Grade
Segment A	12.0	0	120.0	25.0%	50.0%	15.0%	7.5%	2.5%	100.0%	3.11	C

Segment Name	Path Width	Centerline	Volume (users per hour in 1 direction) and Mode Split							Trail Level of Service	
	Closest 0.5 ft.	0=No Centerline	Volume	Mode Split (%)*							
Name	Width (ft)	1=Centerline	One-Way (per hour)	Adult Bicyclists	Pedestrians	Runners	In-Line Skaters	Child Bicyclists	All Modes	LOS Score	LOS Grade
Segment B	10.0	0	50.0	25.0%	50.0%	15.0%	7.5%	2.5%	100.0%	3.32	C

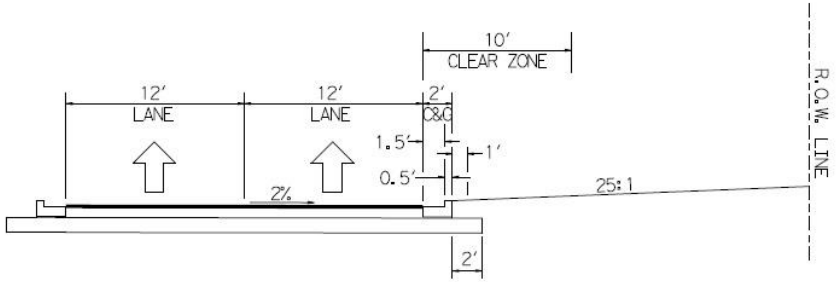
TYPICAL SECTION EXAMPLES

- URBANIZED

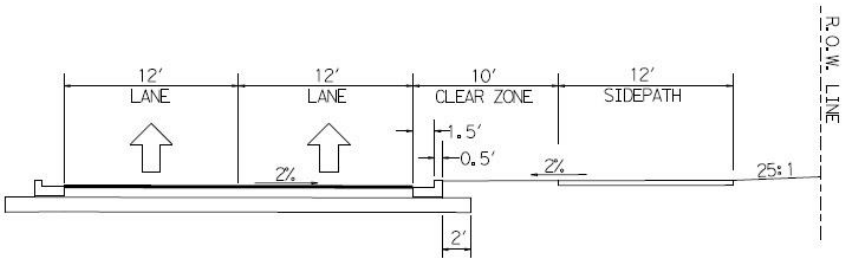
4 LN UNDIV; URBAN LOW SPEED (COLLECTOR-RESTRIPING)



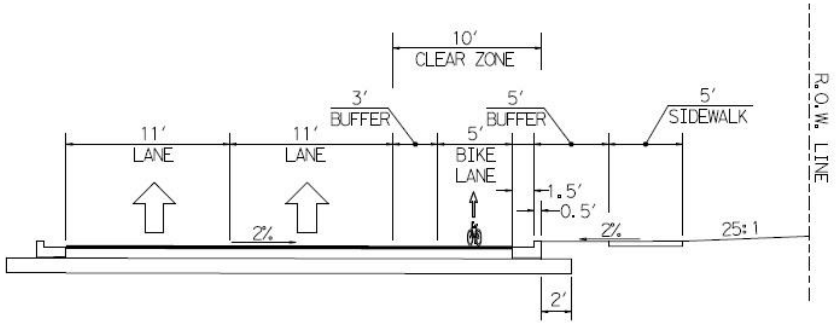
Frontage Rd.; URBAN HIGH SPEED 50 MPH; 10,000 ADT



FRONTAGE ALTERNATIVE ANALYSIS: EXISTING



FRONTAGE ALTERNATIVE ANALYSIS:
ALTERNATIVE-B



FRONTAGE ALTERNATIVE ANALYSIS:
ALTERNATIVE-A




THANK YOU!

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