Nebraska Department of Transportation

Roadway Design Division – Policy Letter

Policy Number: **DES 18-01**

Approval Date: 10/16/18 By: _____ Roadway Design Engineer

Approval Date: 12-03-18 By: _____ FHWA Division Administrator

SUPER 2 GUIDANCE

Purpose

The purpose of this document is to create a policy establishing the Nebraska Department of Transportation's (NDOT) Super 2 Guidelines and provides guidance for implementing Super 2 highways in Nebraska.

Objectives of Using Passing Lanes

Passing lanes are a unique improvement for two-lane highways because they can improve the level of service (LOS) for the roadway but do not increase the roadway capacity. The capacity of the roadway for each direction of travel is controlled by the roadway segments with only one lane in that direction of travel. In general, the Highway Capacity Manual specifies a capacity of 3,200 passenger cars/hour for both directions combined on two-lane highways regardless of whether passing lanes are present.

Location Guidelines for Passing Lanes

Location guidelines for passing lanes are as follows:

- Passing lanes should generally be placed where traffic platooning is highest. It may be desirable to place passing lanes just downstream of a town, a major intersection, or a series of horizontal curves so that any platoons formed in those areas can be dissipated.
- Passing lanes should be placed, when practical, at locations where there is a substantial length of uninterrupted roadway downstream where traffic operational benefits can be obtained. For example, it generally would not make sense to locate a passing lane just upstream of a town because the potential downstream benefits of the passing lane might be quickly dissipated as traffic passes through the town.
- It is also desirable in locating passing lanes to avoid sensitive environmental areas, such as wetlands, and areas of historical or archeological interest.
- The passing lane location should appear logical to the driver. The value of passing lanes is more obvious to the driver at locations where passing sight distance is restricted than on long tangent sections which already provide good passing opportunities.

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- The choice of passing lane location should take into account the desirability of above-minimum sight distance at the lane-addition and lane-reduction tapers.
- The location of major intersections and high-volume driveways should be considered in selecting passing lane locations to minimize the volume of turning movements on a road section where passing is encouraged. Where the presence of higher-volume intersections or driveways cannot be avoided, special provisions for turning vehicles, such as provision of auxiliary turn lanes, should be considered. Low-volume intersections and driveways do not usually create problems within passing lanes; however, it is desirable to avoid locating the lane-addition and lane-reduction transitions near intersections or driveways, since turning movements are not desirable where drivers may be focused on changing lanes. Other physical constraints, such as bridges and culverts, should be avoided, where practical, if their presence increases the construction cost or restricts the provision of a continuous shoulder.

Optimal Lengths of Passing Lanes

Optimal Lengths of Passing Lanes

Directional flow rate (pc/h)	Optimal passing lane length (mi)
100	0.50
200	> 0.50-0.75
400	> 0.75-1.00
≥ 700	> 1.00-2.00

NOTE: The units, pc/h, based on the Highway Capacity Manual, represent passenger car equivalents per hour. The passenger car equivalent volume is the traffic volume in vehicles/hour, with greater weight given to trucks than passenger cars.

Geometric Design of Passing Lanes

Geometric design of passing lanes should consider lane and shoulder widths, other cross-section elements, lane-addition and lane-reduction taper designs, and intersection treatments. The objectives of adding passing lanes to an existing two-lane highway are to reduce delay, improve overall traffic operations, and improve safety. The objectives are consistent with the objectives of resurfacing, restoration, and rehabilitation (3R) projects. Thus, improvement of an existing two-lane highway to a Super 2 highway should be defined as a 3R improvement and follow the guidance presented in Chapter 17 of the NDOT Roadway Design Manual.

- The width for all lanes on Super 2 roadways, including within in passing lane sections, should be 12 ft.
- The surfaced shoulder width adjacent to passing lanes along Super 2 highways should be built to the following widths:
    1. Design year ADT greater than or equal to 4,000 vehicles/day: 6-foot minimum surfaced shoulder width
    2. Design year ADT less than 4,000 vehicles/day : 4-foot minimum surfaced shoulder width

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The surfaced shoulder width adjacent to a Super 2 passing lane may be wider than the minimum shown above. For example, a wider shoulder may be considered for corridors with higher ADTs, for corridors with substantial pedestrian and bicycle volumes, or for Priority Commercial corridors. Also, the surfaced shoulder width may be designed to match the adjacent sections of two-lane highway. However, surfaced shoulders should be constructed to the minimum widths shown above if right-of-way constraints or potential environmental impacts justify use of the minimum width. Shoulders may be omitted next to passing lanes in curb-and-gutter sections.

- The designer should provide the fixed-obstacle clearance from the 3R MDS adjacent to a new passing lane. This distance should be shown and labeled on the main typical section for the project. A 1:3 slope should be used for the new foreslope between the shoulder point and the existing embankment or ditch. Where practical, based on right-of-way constraints and potential environmental impacts, the designer may maintain the clear zone distance that was built in a previous new and reconstruction project. Foreslopes steeper than 1:3 should be avoided, except where a traffic barrier is provided.
- The recommended minimum length for a passing lane is 1,000 feet plus the taper lengths.
- The recommended maximum passing lane length is 2.0 miles, including tapers.
- Based on current Nebraska practice for climbing lanes, the lane addition taper for passing lanes should use a taper rate of 1:50.
- The lane-reduction transition area of a passing lane should use a minimum taper rate of 1:50. In most cases, the outside lane will be dropped, and traffic will move to the inside lane, but in specific cases where it is found to be appropriate, the inside lane may be dropped, and traffic will move to the outside lane.

Average Passing Lane Spacing

Average passing lane spacing tables are shown below. *Highway Capacity Manual* procedures were used to develop these values. These tables are typically meant for planning purposes. Traffic operations analyses should be conducted in conjunction with safety analyses for specific applications. Since these tables are recommended for planning purposes, interpolation of values in these tables should be done conservatively. The spacings shown are from the beginning of one passing lane to the beginning of the next passing lane. Tables are divided for different truck percentages, percent no passing zones, and terrain type.

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Average Passing Lane Spacing (mi) Needed to Meet Specific LOS Targets on Two-Lane Highways In Level Terrain

Target LOS	Percent Trucks	Two-Way AADT (veh/day) 1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
30% No Passing Zones, Level Terrain											
B-	10%	No PL	No PL	No PL	No PL	>60.0	33.5	16.5	11.0	8.0	6.5
	20%	No PL	No PL	No PL	No PL	>60.0	31.5	16.0	11.0	8.0	6.5
	30%	No PL	No PL	No PL	No PL	>60.0	31.0	16.0	9.5	8.0	6.5
B	10%	No PL	No PL	No PL	No PL	28.0	15.5	10.0	7.0	5.0	3.5
	20%	No PL	No PL	No PL	No PL	28.0	15.0	10.0	7.0	5.0	3.5
	30%	No PL	No PL	No PL	No PL	27.5	15.0	10.0	6.5	5.0	3.5
B+	10%	No PL	No PL	No PL	26.5	14.0	9.5	5.5	3.5		
	20%	No PL	No PL	No PL	26.5	14.0	9.5	5.5	3.5		
	30%	No PL	No PL	No PL	25.5	14.0	9.5	5.5	3.0		
A	10%	No PL	No PL	43.0	13.5	7.5	4.0				
	20%	No PL	No PL	41.0	13.5	7.5	4.0				
	30%	No PL	No PL	39.0	13.0	7.5	4.0				
50% No Passing Zones, Level Terrain											
B-	10%	No PL	No PL	No PL	>60.0	35.5	19.0	13.0	9.0	7.0	5.5
	20%	No PL	No PL	No PL	>60.0	35.5	19.0	13.0	9.0	7.0	5.5
	30%	No PL	No PL	No PL	>60.0	34.5	19.0	12.5	8.5	7.0	5.5
B	10%	No PL	No PL	No PL	28.5	16.5	12.0	8.0	6.0	4.0	2.5
	20%	No PL	No PL	No PL	28.5	16.5	12.0	8.0	6.0	4.0	2.5
	30%	No PL	No PL	No PL	28.0	16.0	11.5	8.0	5.0	4.0	2.5
B+	10%	No PL	No PL	47.0	14.5	10.0	7.0	4.0	2.5		
	20%	No PL	No PL	45.5	14.5	10.0	6.5	4.0	2.5		
	30%	No PL	No PL	43.5	14.5	10.0	6.5	4.0			
A	10%	No PL	No PL	16.5	8.5	4.0					
	20%	No PL	No PL	16.5	8.5	4.0					
	30%	No PL	No PL	16.0	8.0	4.0					
70% No Passing Zones, Level Terrain											
B-	10%	No PL	No PL	No PL	57.0	25.0	16.5	11.5	8.5	6.5	5.0
	20%	No PL	No PL	No PL	56.5	25.0	16.0	11.5	8.5	6.5	5.0
	30%	No PL	No PL	No PL	55.5	24.5	16.0	11.5	8.0	6.5	5.0
B	10%	No PL	No PL	No PL	20.5	14.0	10.5	7.0	5.5	3.5	2.5
	20%	No PL	No PL	No PL	20.5	14.0	10.5	7.0	5.5	3.5	2.5
	30%	No PL	No PL	No PL	20.0	13.5	10.0	7.0	4.5	3.5	2.5
B+	10%	No PL	No PL	27.0	12.5	8.5	5.5	3.0			
	20%	No PL	No PL	26.5	12.5	8.0	5.5	3.0			
	30%	No PL	No PL	26.0	12.0	8.0	5.5	3.0			
A	10%	No PL	>60.0	13.5	6.5	2.5					
	20%	No PL	58.0	13.5	6.5	2.5					
	30%	No PL	55.5	13.0	6.0	2.5					

Assumptions:
1-mi passing lane length
Percent of traffic in peak hour (k) = 0.09
Peak-hour factor (PHF) = 0.90
Directional split (D) = 0.50

Notes:
No PL = no passing lanes needed to achieve target LOS
Shaded area = target LOS cannot be achieved with passing lanes of specified length

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Average Passing Lane Spacing (mi) Needed to Meet Specific LOS Targets on Two-Lane Highways in Rolling Terrain

Target LOS	Percent Trucks	Two-Way AADT (veh/day) 1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
30% No Passing Zones, Rolling Terrain											
B-	10%	No PL	No PL	No PL	>60.0	23.0	13.5	9.5	7.5	6.5	5.5
	20%	No PL	No PL	No PL	37.0	18.0	11.0	9.0	7.0	6.0	5.5
	30%	No PL	No PL	No PL	30.0	14.0	9.5	7.5	6.0	5.5	5.0
B	10%	No PL	No PL	No PL	20.0	13.0	8.5	6.5	4.5	3.5	3.0
	20%	No PL	No PL	54.0	16.0	11.0	7.0	5.5	4.0	3.5	2.5
	30%	No PL	No PL	30.0	15.0	8.5	6.5	4.5	3.5	3.0	2.5
B+	10%	No PL	No PL	25.0	12.0	7.5	4.5	3.0			
	20%	No PL	No PL	18.5	10.0	6.5	3.5	2.5			
	30%	No PL	No PL	15.0	9.0	4.5	3.0				
A	10%	No PL	50.5	13.0	6.0	2.5					
	20%	No PL	27.5	10.5	4.5						
	30%	No PL	20.0	8.5	4.0						
50% No Passing Zones, Rolling Terrain											
B-	10%	No PL	No PL	>60.0	25.5	15.5	11.0	8.5	6.5	5.5	5.0
	20%	No PL	No PL	59.5	19.5	13.5	9.0	7.5	6.0	5.5	4.5
	30%	No PL	No PL	39.5	18.5	11.0	8.5	6.5	5.0	5.0	4.5
B	10%	No PL	No PL	27.5	14.0	10.0	7.0	5.0	3.5	2.5	2.0
	20%	No PL	No PL	21.0	12.0	8.5	6.0	4.5	3.0	2.5	
	30%	No PL	No PL	17.5	11.5	7.0	5.0	3.5	2.5	2.0	
B+	10%	No PL	53.5	14.5	8.5	5.5	3.0				
	20%	No PL	29.5	12.5	7.0	4.5	2.5				
	30%	No PL	22.5	10.5	6.5	3.0					
A	10%	No PL	18.0	8.0	3.0						
	20%	No PL	14.0	6.5							
	30%	No PL	12.0	5.0							
70% No Passing Zones, Rolling Terrain											
B-	10%	No PL	No PL	54.5	19.5	14.0	10.0	8.0	6.0	5.0	4.5
	20%	No PL	No PL	36.0	16.5	12.5	8.5	7.0	5.5	5.0	4.5
	30%	No PL	No PL	26.0	16.0	10.0	8.0	6.0	5.0	4.5	4.0
B	10%	No PL	No PL	20.0	12.0	9.0	6.0	4.5	3.0	2.5	
	20%	No PL	No PL	17.0	10.5	8.0	5.5	4.0	3.0	2.0	
	30%	No PL	44.0	14.5	10.0	6.5	4.5	3.0	2.0		
B+	10%	No PL	29.5	12.0	7.0	4.5	2.5				
	20%	No PL	21.0	10.5	5.5	3.5					
	30%	No PL	17.5	9.0	5.5	2.0					
A	10%	No PL	14.5	6.0							
	20%	No PL	12.0	4.5							
	30%	No PL	10.0	3.5							

Assumptions:
1-mile passing lane length
Percent of traffic in peak hour (k) = 0.09
Peak-hour factor (PHF) = 0.90
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