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5.0 DESIGN CRITERIA

Design concepts are developed using standards and design criteria. To evaluate the viability of this project, the US 52 Corridor transportation system utilized the design standards and criteria based on design speed, traffic volumes, and functional classification of the roadway.

Current design standards and criteria which reflect the most recent advancements in engineering and technology have been applied to this master plan study.

5.1 Roadway Design Standards

A number of documents were reviewed for their application to the US 52 Corridor Plan. The following documents were among the principal references used as roadway design guides.

A Policy on Geometric Design of Highways and Streets, Fourth Edition, American Association of State Highway and Transportation Officials (AASHTO) 2001

Roadway Design Manual, State of North Carolina Department of Transportation 2001

Manual on Uniform Traffic Control Devices, Millennium Edition, Federal Highway Administration (FHWA) 2001

Engineering design criteria address such items as lane and median widths, bridge and roadway shoulder widths, horizontal curvature, superelevation, horizontal clearances, grades, and vertical clearances. Operational criteria consist of design speeds and levels of service. Each roadway aspect such as the mainline, interchange entrance and exit ramps, as well as the bridge structure are independently analyzed and appropriate design criteria are applied.

Along the entire length of the US 52 Corridor, the designs were developed to minimize right-of-way conflicts. To accommodate ramp terminal reconfigurations and construction slopes, property takings were limited by the use of retaining walls. To further minimize impacts to sensitive properties, adjustments to the roadway design may be necessary during the final design stage of this project.

Table 5-1 Summarizes the design criteria used in developing the roadway alternative plans.

5.2 Typical Section

Figure Series 5-1 illustrates the typical sections proposed for the reconstruction of the US 52 Corridor. Generally, a six-lane shoulder section, Typical Section 1, is used throughout most of the US 52 Corridor. In urban areas where expansion is constrained by development located close to the right-of-way, the use of retaining walls would be necessary to minimize impacts as illustrated with Typical Section 2. In areas where traffic demand warrants the use of additional lanes, Typical Section 3 would be utilized. Typical Section 3 includes a six-lane freeway section with auxiliary lanes.

Table 5-1. Proposed Design Criteria

Design Feature	Existing 60 mph	Proposed 70 mph
DESIGN SPEED	60 mph	70 mph
TRAFFIC FEATURES		
2000 ADT	79,000 vph	79,000 vph
2025 ADT	107,000-158,000 vph	107,000-158,000 vph
Traffic Factors		
Design Hour Volume	8.3-9.8%	8.3-9.8%
Directional Distribution	58/42% to 65/35%	58/42% to 65/35%
GEOMETRIC FEATURES		
Superelevation		
Roadway (shoulder)	0.08 foot/foot	0.10 foot/foot
Urban (curbed)	N/A	N/A
Horizontal Curve		
Min. Radius R_{min}	1205 feet	1820 feet
Max. Degree of Curve D_{max}	4^0 45' 17.41"	3^0 08' 52"
Length of spiral L_s		
Minimum *	208 feet-2 lanes	284 feet - 3 lanes
Lane Width		
Mainline	12 feet	12 feet
Cross Slopes		
Travel Lane	2%	2%
Paved Shoulder	4%	4%
Unpaved Shoulder	8%	8%
Shoulder Widths (Roadway)		
Mainline (outside)	12 ft pvd [1]; 4 fdps	12 ft pvd [1]; 4 fdps
Median	10 ft pvd; 4 fdps	10 ft pvd; 4 fdps
Vertical Grade (rolling terrain)		
Mainline (rural)	4%	4%
Mainline (urban)	4% [2]	4%
Stopping Sight Distance	570 feet	730
Vertical Curves		
Sag K	136 feet	181
Crest K	151 feet	247
Vertical Clearance		
Over Mainline	16 feet	16 feet
Over Railroads	23 feet	23 feet

Source: A Policy on Geometric Design of Highways and Streets, American Association of St
Highway and Transportation Officials, Washington, DC 2001

[1] *With the high truck volume on the route, shoulders 12 feet wide is preferred*

[2] *In extreme cases in urban areas, a grade of 5% is permitted.*

** Not required for 1822' radius with a design speed of 60 mph*
2479' radius with a design speed of 70 mph

Figure 5-1
1 or 2

Figure 5-1
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