

Appendix A

Collector Highway Improvement Project Design Standards

The designer should consider the following controlling criteria to decision making

Design Speed	Superelevation Rate*
Design Loading	Stopping Sight Distance*
Lane Width*	Maximum Grade*
Shoulder Width*	Cross Slope*
Horizontal Curve Radius*	Vertical Clearance*

*Applicable only to "High Speed" roads, 50+ mph.

<https://highways.dot.gov/federal-lands/pddm/dpg/about-controlling-criteria>

The designer should also consider supplemental standards that require formal approval and documentation each time they are not attained ([PDDM Chapter 9.1.3](#)):

Clear Zone	Design Flood
Barrier Crashworthiness	Pavement Design Service Life

This document intends to codify the safety and design standards that will be used under the CHIP program.

2.0 Design Speed

Design speed shall follow the current Engineering Instruction ([EI-C3](#)) as approved by the Engineering Council

3.0 Design Loading

All new drainage structures shall meet HL-93 calibrated live load design

4.0 Lane Width

Lane Width should be 11 feet. However, 10-foot striped lanes may be considered at times due to limitations in existing Right of Way or Environmental impacts through the CHIP Design Exception process. If it is a designated active transportation corridor, 10-to-10.5-foot travel lanes might be possible to give maximum width to the shoulder.

5.0 Shoulder Width

Shoulder width shall be between 1 foot and 4 feet. Construction materials may be gravel, but all low side superelevated curves should be considered for paving. If it is a designated active transportation corridor, we should strive to get a 4 and if possible, a 5-foot paved shoulder.

Both Lane and shoulder widths should follow the executive office policy guidance dated 11/17/22 and attached.

6.0 Horizontal Curve Radius

Curve Radii shall meet the following table (Green Book Table 3-7):

Design Speed (mph)	25	30	35	40	45	50	55
Min Radius (ft)	134	214	314	444	587	758	960

7.0 Superlevation Rate

Superelevated Section: Every effort shall be made to bring the superelevation of a curve to +3%, if existing is >3%, maintain existing +%. Impacts outside of the roadway will be considered. There may also be times we want to break the shoulder at the high side to better match into the existing conditions. The minimum cross slope on the high side of the curve shall be no less than +1%. The minimum cross slope for the low side shall meet the abutting normal cross slope.

<i>Design Speed</i>	25	30	35	40	45	50	55
e (%)	Radius (ft)	Radius (ft)	Radius (ft)	Radius (ft)	Radius (ft)	Radius (ft)	Radius (ft)
NC	2290	3130	4100	5230	6480	7870	9410
2	1630	2240	2950	3770	4680	5700	6820
2.2	1450	2000	2630	3370	4190	5100	6110
2.4	1300	1790	2360	3030	3770	4600	5520
2.6	1170	1610	2130	2740	3420	4170	5020
2.8	1050	1460	1930	2490	3110	3800	4580
3	944	1320	1760	2270	2840	3480	4200
3.2	850	1200	1600	2080	2600	3200	3860
3.4	761	1080	1460	1900	2390	2940	3560
3.6	673	972	1320	1740	2190	2710	3290
3.8	583	864	1190	1590	2010	2490	3040
4	511	766	1070	1440	1840	2300	2810
4.2	452	684	960	1310	1680	2110	2590
4.4	402	615	868	1190	1540	1940	2400
4.6	360	555	788	1090	1410	1780	2210
4.8	324	502	718	995	1300	1640	2050
5	292	456	654	911	1190	1510	1890
5.2	264	413	595	833	1090	1390	1750
5.4	237	373	540	759	995	1280	1610
5.6	212	335	487	687	903	1160	1470
5.8	186	296	431	611	806	1040	1320
6	144	231	340	485	643	833	1060

8.0 Stopping Sight Distance

The Designer shall review existing crash data to prioritize sight distance improvement within the budget of the project. Reconstructed segments shall meet the Basic Safety Standards for Sight Distance as approved in the latest version of the Highway Driveway and Entrance Rules ([Access Management Rules](#))

9.0 Maximum Grade

Maximum Grade shall be no more than 20%

10.0 Cross Slope

Normal Section: The allowable cross slope range shall be -1 ½% to -4%. Standard cross slope shall be -3%. The DE process will be followed for cross slopes exceeding -4%. Paved shoulders shall have a normal cross slope of 6% max. Shoulder rollover shall not exceed 9%. Efforts should be made to provide consistent cross slopes over reasonable lengths of the project.

11.0 Vertical Clearance

Vertical clearance shall be 15 feet for new structures and 14 feet for existing structures.

12.0 Clear Zone

Clear Zone shall be a minimum 5 feet.

13.0 Barrier Crashworthiness

Guardrail End Terminals shall meet the current Engineering Guidance.

14.0 Design Flood

50-year storm designs shall be used for culvert sizing. Grade changes to mitigate overtopping shall be dictated by engineering judgment, flood plain analysis, and evaluation of impacts from past storm events.

15.0 Pavement Design Service Life

Utilization of FWD, GPR, USGS Soils Maps, test pits, cores, and engineering judgment shall combine to develop a minimum 10-year, 80% confidence pavement design life using empirical data available.

[Pavement shall be designed to accommodate current and predicted traffic needs in a safe, durable, and cost-effective manner.](#)

16.0 CHIP Design Exception Process

Regional Program Management will approve design exceptions that go beyond the already flexible design guidance and document in the projects scoping document. Regional Program Manager will then discuss with the Chief Engineer for awareness and to see if anything was missed in the decision-making process.