| Design Element | | | | Manual Section | Design Values (By Type of Area) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Suburban | Intermediate | Built-Up |
| Design Controls | Design Forecast Period | | | 55-4.01 | 20 Years (1) | 20 Years (1) | 20 Years (1) |
| | *Design Speed (mph) (2) | | | 55-4.01 | Posted Speed Limit | Posted Speed Limit | Posted Speed Limit |
| | Access Control | | | 40-5.0 | Partial Control / None | None | None |
| | Level of Service | | | 40-2.0 | Des: B; Min: D | Des: C; Min: D | Des: C; Min: D |
| | On-Street Parking | | | 45-1.0 | None | Optional (3) | Optional (3) |
| Cross Section Elements | Travel Lane | *Width (4) | | 55-4.05 | Curbed: Des: 12 ft; Min: 11 ft<br>Uncurbed: Des: 12 ft; Min: 11 ft | Curbed: Des: 12 ft; Min: 11 ft<br>Uncurbed: Des: 12 ft; Min: 11 ft | Curbed: Des: 12 ft; Min: 10 ft |
| | | Typical Surface Type (5) | | Ch. 52 | Asphalt / Concrete | Asphalt / Concrete | Asphalt / Concrete |
| | *Curb Offset (6) | | | 55-4.05 | Des: 2 ft; Min: 1 ft | Des: 2 ft; Min: 1 ft | Des: 2 ft; Min: 1 ft |
| | Shoulder | *Paved Width (7) | | 55-4.05 | Curbed, Rt. Des: 10 ft; Min 1 ft<br>Curbed, Lt. Des: 4 ft; Min 1 ft<br>Uncurbed, Rt.: 10 ft; Lt.: 4 ft | Curbed, Rt. Des: 8 ft; Min 1 ft<br>Curbed, Lt. Des: 3 ft; Min 2 ft<br>Uncurbed, Rt.: 8 ft; Lt.: 3 ft | Right: 6 ft; Left: 3 ft |
| | | Typical Surface Type (5) | | Ch. 52 | Asphalt / Concrete | Asphalt / Concrete | Asphalt / Concrete |
| | Cross Slope | *Travel Lane (8) | | 55-4.05 | 2% - 3% | 2% - 3% | 2% - 3% |
| | | Shoulder (9) | | 55-4.05 | Rt.: 4% - 6%; Lt.: 2% - 3% | Paved Width ≤ 4 ft: 2%-3%;<br>Paved Width > 4 ft: 4%-6% | Paved Width ≤ 4 ft: 2%-3%;<br>Paved Width > 4 ft: 4%-6% |
| | Auxiliary Lane | Lane Width | | 55-4.05 | Des: 12 ft; Min: 11 ft | Des: 12 ft; Min: 10 ft | Des: 12 ft; Min: 10 ft |
| | | Curb Offset | | | Des: 1 ft; Min: 0 ft | Des: 1 ft; Min: 0 ft | Des: 1 ft; Min: 0 ft |
| | | Shoulder Width | | | Des: 10 ft; Min: 2 ft | Des: 8 ft; Min: 2 ft | Des: 6 ft; Min: 2 ft |
| | | Typical Surface Type (5) | | Ch. 52 | Asphalt / Concrete | Asphalt / Concrete | Asphalt / Concrete |
| | TWLTL-Lane Width | | | 46-5.0 | Des: 16 ft; Min. 14 ft | Des: 16 ft; Min: 12 ft | Des: 14 ft; Min: 11 ft |
| | Parking-Lane Width | | | 45-1.04 | N/A | Des: 10 ft; Min: 8 ft (10) | Des: 10 ft; Min: 8 ft (10) |
| | Median Width | Depressed | | 55-4.05 | Existing | Existing | N/A |
| | | Raised Island | | | Des: 16 ft.; Min: 2 ft | Des: 16 ft; Min: 2 ft | Des: 16 ft; Min: 2 ft |
| | | Flush / Corrugated | | | Des: 16 ft.; Min: 2 ft | Des: 16 ft; Min: 2 ft | Des: 16 ft; Min: 2 ft |
| | Sidewalk Width (11) | | | 55-4.05 | 4 ft with 5 ft Buffer (Des) | Des: 6 ft. Min: 4 ft | Des: 6 ft; Min: 4 ft |
| | Bicycle-Lane Width (12) | | | 51-7.0 | Curbed: 5 ft<br>Uncurbed: Shld. Width +4 ft | Curbed: 5 ft<br>Uncurbed: Shld. Width +4 ft | Curbed: 5 ft |
| | Obstruction-Free Zone | | | 55-5.02 | See Section 55-5.02 | See Section 55-5.02 | See Section 55-5.02 |
| | Typical Curbing Type (where used) (13) | | | 55-4.05 | Vertical / Sloping | Vertical / Sloping | Vertical / Sloping |
| | Side Slopes (Uncurbed) | Cut | Foreslope | 55-4.05 | 2:1 or Flatter | 2:1 or Flatter (14) | N/A |
| | | | Ditch Width | | (14) | (14) | N/A |
| | | | Backslope | | 2:1 or Flatter (14) | 2:1 or Flatter (14) | N/A |
| | | Fill | | | 2:1 or Flatter (14) | 2:1 or Flatter (14) | N/A |
| | Side Slopes (Curbed) | Cut (Backslope) | | 55-4.05 | (15) | (15) | (15) |
| | | Fill | | | 2:1 or Flatter (14) | 2:1 or Flatter (14) | 2:1 or Flatter (14) |
| | Median Slopes (Depressed) | | | 55-4.05 | Desirable: 8:1; Maximum: 4:1 | Desirable: 8:1; Maximum: 4:1 | Desirable: 8:1; Maximum: 4:1 |

Des: Desirable; Min: Minimum
* Controlling design criterion.

**GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT**

**Figure 55-3E**

| Design Element | | | Manual Section | Design Values (By Type of Area) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Suburban | Intermediate | Built-Up | | |
| Bridges | New or Reconstructed Bridge | *Structural Capacity (16) | Ch. 60 | HS-25 | HS-25 | HS-25 | | |
| | | *Clear Roadway Width(17) | 55-6.03 | Curbed: Full Approach Curb-to-Curb Width<br>Uncurbed: Full Approach Width | | | | |
| | Existing Bridge to Remain in Place | *Structural Capacity | Ch. 72 | HS-20 | HS-20 | HS-20 | | |
| | | *Clear-Roadway Width | 55-6.02 | Curbed: Full Approach Curb-to-Curb Width; Uncurbed: Travelway Plus 2 ft. on Each Side | | | | |
| | *Vertical Clearance (Arterial Under) | New or Replaced Overpassing Bridge (18a & 18c) | 55-6.0 | 16.5 ft | 16.5 ft (18b) | 16.5 ft (18b) | | |
| | | Existing Overpassing Bridge (19) | | 14.0 ft | 14.0 ft | 14.0 ft | | |
| | | Sign Truss / Pedestrian Bridge (18a & 18c) | | New: 17.5 ft; Existing: 17.0 ft | New: 17.5 ft; Existing: 17.0 ft | New: 17.5 ft; Existing: 17.0 ft | | |
| | Vertical Clearance (Arterial over Railroad) (20) | | Ch. 69 | 23.0 ft. | | | | |
| Alignment Elements | Design Speed | | | 30 mph | 35 mph | 45 mph | 50 mph | 55 mph |
| | *Stopping Sight Distance (Desirable) | | 55-4.02 | 200 ft | 250 ft | 360 ft | 425 ft | 495 ft |
| | Decision Sight Distance | Speed / Path / Direction Change | 42-2.0 | U: 620 ft<br>SU: 535 ft | U: 720 ft<br>SU: 625 ft | U: 930 ft<br>SU: 800 ft | U: 1030 ft<br>SU: 890 ft | U: 1135 ft<br>SU: 980 ft |
| | | Stop Maneuver | | 490 ft | 590 ft | 800 ft | 910 ft | 1030 ft |
| | Intersection Sight Distance, -3% to +3% (21) | | 55-4.06 | P: 355 ft<br>SUT: 450 ft | P: 415 ft<br>SUT: 525 ft | P: 530 ft<br>SUT: 675 ft | P: 665 ft<br>SUT: 825 ft | P: 770 ft<br>SUT: 950 ft |
| | *Minimum Radius | | 55-4.03 | See Section 55-4.03 | | | | |
| | *Superelevation Rate | | 55-4.03 | See Section 55-4.03 | | | | |
| | *Horizontal Sight Distance | | 55-4.03 | See Section 55-4.03 | | | | |
| | *Vertical Curvature (K-value) | Crest | 55-4.04 | See Section 55-4.04 | | | | |
| | | Sag | | See Section 55-4.04 | | | | |
| | *Maximum Grade | Level | 55-4.04 | 10% | 9% | 8.5% | 8% | 7% |
| | | Rolling | | 11% | 10% | 9.5% | 9% | 8% |
| | Minimum Grade | | 44-1.03 | Curbed Des: 0.5%; Curbed Min: 0.3%<br>Uncurbed: 0.0% | | | | |

SU: Suburban. U: Urban.

* Controlling design criterion. A deviation from such is a design exception, and is subject to approval. See Section 40-8.0.

## GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

**Figure 55-3E** (Continued)

## GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

### Footnotes to Figure 55-3E

(1) Design Forecast Period. For a partial 3R project, the pavement should be designed for at least a 10-year design life.

(2) Design Speed. The minimum design speed should equal the anticipated posted speed limit after construction or the legal speed limit on a non-posted highway. This is 30 mph, but with an engineering study it may be raised to a maximum of 55 mph.

(3) On-Street Parking. In general, on-street parking is discouraged.

(4) Travel Lane (Width). For an arterial on the National Truck Network, the right lane must be 12 ft in width. For a non-National-Truck-Network route, a minimum 11-ft travel lane should be used where truck volume exceeds 200 trucks per day. See Section 55-4.05.

(5) Surface Type. The pavement type selection will be determined by the Office of Pavement Engineering or by the local jurisdiction.

(6) Curb Offset. Vertical curbs which are either continuous or introduced intermittently may be offset 1 ft.

(7) Shoulder Width. The value applies to paved-shoulder width. The following will also apply:

a. For an uncurbed section, the shoulder is paved to the face of guardrail. The desirable guardrail offset is 2 ft from the effective usable-shoulder width. See Section 49-5.0 for more information.
b. For an uncurbed section, a desirable additional 1 ft of compacted aggregate will be provided.
c. If guardrail is present, the minimum offset from E.T.L. to face of guardrail should desirably be equal to the shy-line offset distance, but not less than 4 ft (see Section 49-5.0 for shy-line offsets). In a restrictive situation, the guardrail offset may be 1 ft from the effective usable-shoulder width.
d. For a curbed section, the curb offset is included in the paved-shoulder width.

(8) Cross Slope (Travel Lane). Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.

(9) Cross Slope (Shoulder). Value is for a tangent section. See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information. See Figure 43-3M or Figure 43-3N for shoulder cross slope on a horizontal curve.

## GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

**Footnotes to Figure 55-3E** (Continued)

(10) Parking Lane Width. The following will apply:

a. Where the parking lane will be used as a travel lane during peak hours or may be converted to a travel lane in the future, the width should be equal to the travel lane width plus the curb offset width (if present).
b. A parking lane for residential usage may be 7 ft narrower.
c. The cross slope for a parking lane is typically 1% steeper than that of the adjacent travel lane.

(11) Sidewalk Width. Value is for the installation of a new sidewalk. An existing sidewalk width of 3 ft or greater (with or without a buffer) may be retained. A buffer strip of 4 ft or more is desirable.

(12) Bicycle-Lane Width. The value is in addition to the width of a parking lane, if present. See Section 51-7.0 for additional details.

(13) Curbing Type. Vertical curbs may only be used with design speed lower than 50 mph.

(14) Side Slopes. Section 55-4.05 provides additional information for side-slope criteria.

(15) Side Slope (Curbed) Cut. A shelf or sidewalk will be present immediately behind the curb before the toe of the backslope. The minimum width of a shelf desirably should be 6 ft. Where a sidewalk is present, the toe of the backslope will be 1 ft beyond the edge of sidewalk. See Section 45-3.0 for more information.

(16) Structural Capacity (New or Reconstructed Bridge). The following will apply:

a. HS-25 loading with Alternate Military Loading should be applied for each project with notice to proceed with design beginning September 1, 2004, through December 31, 2005.
b. Each State highway bridge within 15 mi of a Toll-Road gate must be designed for Toll-Road loading.
c. Each bridge on an Extra-Heavy-Duty Highway must be designed for the Michigan Train truck loading configuration.
d. See Chapter Sixty for additional information on the loading criteria.

(17) Width (New or Reconstructed Bridge). Width is minimum for a 3R project. See Section 59-1.0 for additional information on bridge width.

## GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

**Footnotes to Figure 55-3E** (Continued)

(18) Vertical Clearance (Arterial Under Railroad). The following will apply:

a. Value includes an additional 6-in. allowance for a future pavement overlay.
b. In a highly-urbanized area, a minimum clearance of 14.0 ft may be provided if there is at least one route with a 16.0-ft clearance.
c. Vertical clearance applies from usable edge to usable edge of shoulder.

(19) Vertical Clearance (Existing Bridge). See Section 55-6.02 for additional information on minimum allowable vertical clearance.

(20) Vertical Clearance (Arterial Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.

(21) Intersection Sight Distance. For left turn onto a two-way, 4-lane undivided roadway. P = Passenger car; SUT = single unit truck. See Figure 46-10G for value for a combination truck.