

| Design Element                                    |                                       |   | Manual Section | 2-Lane   |                        |  |                               |                               |  |
|---|---------------------------------------|---|----------------|--|------------------------|--|-------------------------------|-------------------------------|--|
| Design Controls                                   | Design-Year AADT                      |   | 40-2.01        | < 400  | 400 ≤ AADT < 1000      | 1000 ≤ AADT < 3000                     | 3000 ≤ AADT < 5000            | ≥ 5000                        |  |
|   | Design Forecast Period                |   | 55-4.01        | 20 Years (2)   |                        |  |                               |                               |  |
|   | *Design Speed (mph)                   |   | 55-4.01        | See Section 55-4.01 (3)  |                        |  |                               |                               |  |
|   | Access Control                        |   | 40-5.0         | None   |                        |  |                               |                               |  |
|   | Level of Service                      |   | 40-2.0         | Desirable: B; Minimum: D   |                        |  |                               |                               |  |
| Cross Section Elements**                          | Travel Lane                           | *Width (4)                              | 55-4.05        | Des: 10 ft; Min: 9 ft (4a)   |                        | Des: 11 ft<br>Min: 10 ft (4b)          | Des: 12 ft<br>Min: 11 ft (4c) | Des: 12 ft<br>Min: 11 ft (4c) |  |
|   |                                       | Typical Surface Type                    | Ch. 52         | Asphalt / Concrete / Aggregate   |                        |  |                               |                               |  |
|   | Shoulder (5)                          | *Width Usable                           | 55-4.05        | Min: 2 ft  | Des: 4 ft<br>Min: 2 ft | Des: 6 ft<br>Min: 3 ft                 | Des: 6 ft<br>Min: 4 ft        | Des: 8 ft<br>Min: 6 ft        |  |
|   |                                       | Typical Surface Type                    | Ch. 52         | Asphalt / Aggregate / Earth  |                        |  |                               |                               |  |
|   | Cross Slope                           | *Travel Lane (6)                        | 55-4.05        | 2%-3% Asphalt / Concrete; 6%-8% Aggregate  |                        |  |                               |                               |  |
|   |                                       | Shoulder (7)                            | 55-4.05        | Paved Width ≤ 4 ft: 2% - 3%;<br>Paved Width > 4 ft: 4%-6% Asphalt; 6%-8% Aggregate; 8% Earth |                        |  |                               |                               |  |
|   | Auxiliary Lane                        | Lane Width                              | 55-4.06        | Des: Same As Travel Lane<br>Min: 9 ft  |                        | Des: Same as Travel Lane<br>Min: 10 ft |                               |                               |  |
|   |                                       | Shoulder Width                          |                | Des: 4 ft; Min: 2 ft   |                        |  |                               |                               |  |
|   | Obstruction-Free Zone                 |   | 55-5.02        | See Section 55-5.02  |                        |  |                               |                               |  |
|   | Side Slopes                           | Cut                                     | Foreslope      | 55-4.05  | 2:1 or Flatter (8)     |  |                               |                               |  |
|   |                                       |   | Ditch Width    |  | (8)                    |  |                               |                               |  |
|   |                                       |   | Backslope      |  | 2:1 or Flatter (8)     |  |                               |                               |  |
|   |                                       | Fill                                    | 55-4.05        | 2:1 or Flatter (8)   |                        |  |                               |                               |  |
| Bridges**   | New or Reconstructed Bridge           | *Structural Capacity                    | Ch. 60         | HL-93 (8A)   |                        |  |                               |                               |  |
|   |                                       | *Clear-Roadway Width (9)                | 55-6.03        | Travelway +4 ft  | Travelway +6 ft        |  |                               | Full Paved Appr. Width        |  |
|   | Existing Bridge to Remain in Place    | *Structural Capacity                    | Ch. 72         | HS-15 (10)   |                        |  |                               |                               |  |
|   |                                       | *Clear-Roadway Width (11)               | 55-6.02        | 20 ft  | 22 ft                  | 24 ft                                  | 28 ft                         | 28 ft                         |  |
|   | *Vertical Clearance (Collector Under) | New or Replaced Overpassing Bridge (12) | 55-6.0         | 14.5 ft  |                        |  |                               |                               |  |
|   |                                       | Existing Overpassing Bridge             |                | 14.0 ft  |                        |  |                               |                               |  |
| Vertical Clearance (Collector Over Railroad) (13) |                                       | Ch. 69                                  | 23.0 ft        |  |                        |  |                               |                               |  |

Des: Desirable; Min: Minimum. \* Controlling design criterion. \*\* Selection of cross section and bridge elements is based on design-year traffic volume irrespective of design speed.

**GEOMETRIC DESIGN CRITERIA FOR RURAL LOCAL ROAD, 3R Project**

**Figure 55-3D**

| Design Element     |   | Manual Section                  | 2-Lane                         |                          |                          |                          |                          |                          |
|--------------------|---|---------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 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                         | 450 ft                   | 525 ft                   | 675 ft                   | 750 ft                   | 865 ft                   |
|                    |   | Stop Maneuver                   |                                | 220 ft                   | 275 ft                   | 395 ft                   | 465 ft                   | 535 ft                   |
|                    | Passing Sight Distance                        |                                 | 42-3.0                         | Existing                 | Existing                 | Existing                 | Existing                 | Existing                 |
|                    | Intersection Sight Distance , -3% to +3% (14) |                                 | 55-4.06                        | P: 330 ft<br>SUT: 420 ft | P: 390 ft<br>SUT: 490 ft | P: 500 ft<br>SUT: 630 ft | P: 550 ft<br>SUT: 780 ft | P: 610 ft<br>SUT: 890 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            |   | 12%                             |                                | 11%                      | 10.5%                    | 10%                      | 9%                       |                          |
| Minimum Grade      |   | 44-1.03                         | Desirable: 0.5%; Minimum: 0.0% |                          |                          |                          |                          |                          |

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

An operational or maintenance change, permanent or temporary, exclusive of work-zone traffic control, that in fact creates substandard conditions such as by re-striping to obtain added lane(s) by reducing existing lane widths or shoulders, must be addressed in a design exception, whether or not actual construction or reconstruction is involved.

## GEOMETRIC DESIGN CRITERIA FOR RURAL LOCAL ROAD, 3R PROJECT

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

## GEOMETRIC DESIGN CRITERIA FOR RURAL LOCAL ROAD, 3R PROJECT

### Footnotes to Figure 55-3D

- (1) Applicability. This figure is applicable only to a federal-aid funded project.
- (2) Design Forecast Period. For a partial 3R project, the pavement should be designed for at least a 10-year design life.
- (3) Design Speed. The minimum design speed should equal the anticipated posted speed limit after construction or the legal speed limit, 55 mph, on a non-posted highway.
- (4) Travel Lane (Width). An 11-ft travel lane should be used where truck volume exceeds 200 trucks per day. In addition, the following will apply:
  - a. Where  $V \geq 50$  mph, the minimum width is 10 ft.
  - b. Where  $V \geq 50$  mph, the minimum width is 11 ft.
  - c. Where  $V \geq 50$  mph, the minimum width is 12 ft.
- (5) Shoulder Width. The following will apply:
  - a. The desirable guardrail offset is 2 ft from the effective usable-shoulder width. In a restrictive situation, the guardrail offset may be 1 ft from the effective usable-shoulder width. See Section 49-5.0 for more information.
  - b. 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).
  - c. Usable-shoulder width is defined as the distance from the edge of the travel lane to the shoulder break point.
- (6) Cross Slope (Travel Lane). Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.
- (7) 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.
- (8) Side Slopes. Section 55-4.05 provides additional information for side-slope criteria.

## GEOMETRIC DESIGN CRITERIA FOR RURAL LOCAL ROAD, 3R PROJECT

### Footnotes to Figure 55-3D (Continued)

- (8A) Structural Capacity (New or Reconstructed Bridge). 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. A bridge with an ADTT less than or equal to 1,000 may be designed for HS 25 or HS 20, whichever the LPA elects.
- (9) Width (New or Reconstructed Bridge). The width of a bridge of more than 100 ft in length should be analyzed individually. At a minimum, the roadway width of such a bridge will be the width of travel lanes plus a 2-ft right shoulder and 2-ft left shoulder. Where shoulders are paved, it is desirable to provide the full roadway width across the bridge. See Section 59-1.0 for more information on bridge width.
- (10) Structural Capacity (Existing Bridge to Remain in Place). If the  $AADT \leq 50$ , an HS-10 loading is acceptable.
- (11) Width (Existing Bridge to Remain in Place). A minimum clear-roadway width that is 2 ft narrower than that shown may be used on a road with few trucks. The clear-roadway width should be at least the same width as the approach travelway. For a one-lane bridge, the width may be 18 ft. For a bridge of more than 100 ft in length, the value does not apply. The acceptability of such a bridge will be assessed individually.
- (12) Vertical Clearance (Local Under). Value includes an additional 6-in. allowance for a future pavement overlay. Vertical clearance applies from usable edge to usable edge of shoulders.
- (13) Vertical Clearance (Local Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.
- (14) Intersection Sight Distance. For left turn onto a 2-lane road, P = Passenger car; SUT = single unit truck. See Figure 46-10G for value for a combination truck.