Highway System Access Manual
Volumes 1, 2 & 3 Overview
TNMUG May 2022 Meeting
Highway System Access Manual Overview

TNMUG May Meeting

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Project History & Purpose


TDOT Highway System Access Manual

* Introduction
* HSAM Volume 1: Planning - Corridor ManagementAgreement Guidance, Model Land Development Regulations
* HSAM Volume 2: Intersection & Interchange Evaluation - Introduction, IIE Form Guidance, Methodology
  * IIE Tool
* HSAM Volume 3: Geometric Design Criteria
  * HSAM 1 Deviation Request v1 (TDOT Projects)
  * HSAM 2 Deviation Request v1 (External Projects)
TSMO Overview - How HSAM Fits

What is TSMO?

*TSMO is an emerging term used to describe a cross-discipline, collaborative, and integrated program of strategies and applications to improve existing and planned transportation infrastructure and multimodal systems through better integration, coordination and implementation of key operational strategies, innovation, and technology. TSMO improves the safety, reliability, and operation of the transportation system with lower-cost, high-impact actions that can be implemented relatively quickly as well as enhance traditional capacity projects.*
TSMO Overview - How HSAM Fits
TSMO Overview - How HSAM Fits

- How Traffic Conditions Have Been Communicated

- What Travelers Experience... and what they remember

- Travel Times Vary Greatly Day-to-Day

Travel Time

January July December

Annual Average
## TSMO Overview - How HSAM Fits

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>Reduce the frequency and severity of crashes on the transportation system through TSMO focused planning, design and management.</td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td>Operate and maintain a coordinated multi-modal transportation system that provides seamless mobility to users.</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>Improve travel-time reliability by managing transportation network delays and enhancing real-time traveler information.</td>
</tr>
<tr>
<td><strong>Workforce</strong></td>
<td>Support and advance TSMO education, training needs, and resource depositories for TDOT and local partners.</td>
</tr>
</tbody>
</table>
TSMO Overview - How HSAM Fits

Why Update TDOT’s Standards?

- Safety
  - 55% of all vehicular crashes involve access activity
  - 20 to 60% reduction in crashes with proper access management

- Operations
  - 40-60% percent reduction in delay with proper access management
HSAM - Why are we doing this?

Crashes vs. Access

Ratio of Crashes per mile vs. Access Points per Mile

- 7 access points
- no parcel connections
- minimal side-street access
- minimal landscaping

- 3 access points
- full parcel connections
- 2 side-street connections
- landscaping

(a) vs. (b)
TSMO Overview - How HSAM Fits

TSMO Program Vision
Support and promote a TSMO Program in Tennessee that becomes fully integrated into both state and local agency practices.

TSMO Program Mission
To preserve and optimize the efficiency, reliability, and safety of Tennessee’s transportation system for all road users by leveraging data-driven, operational, and technology-based strategies and applications.
A. The HSAM Volume 1: Planning is recommended guidance to local agencies for use in the development of their land use policies. The Volume 1 Guidance is to guide land use decisions to allow for appropriate access management.

B. The HSAM Volume 1: Planning shall be used to guide the process of developing corridor management agreements.

C. The HSAM Volume 2: Intersection and Interchange Evaluation shall be used during the project planning process to evaluate intersections on all projects. For projects where there are more than 1 intersection, the intersections shall be evaluated individually.

Projects implemented by in-house maintenance, private driveways, other than street type intersections, and intersections where the major and minor approach have less than 400 vehicles per hour are not required to be evaluated under this policy.

D. The HSAM Volume 3: Geometric Design Criteria shall apply to the following types of projects:

   1. New alignment projects
   2. Roadway widening projects
   3. Major reconstruction projects

The project planning process shall utilize this manual when scoping projects.

E. The HSAM Volume 3: Geometric Design Criteria guidelines should be used when feasible on all other projects; though, no exception or waiver is required for not meeting design
Project History and Purpose

Volume 1 Planning
- Model Land Development Regulations
- Corridor Management Agreement Guidance

Volume 2 IIE
- TDOT Form / Process Guidance
- CAP-X Guidance
- SPICE Guidance
- Life-Cycle Cost Guidance

Volume 3 Design
- Geometric Design Criteria

3-Volume Set
Volume 1: Planning

- Strengthens Corridor Management Agreements
- Develop Model Land Development Regulations
- Provide resources for local agencies for Land Use Planning

The importance of incorporating access management and right-of-way preservation strategies into the comprehensive plan cannot be overstated.
Volume 1: Planning

• Best Practice Resources
  • TRB
  • NCHRP
• Other States
  • FDOT
  • Iowa DOT
  • MnDOT
  • PennDOT
  • VDOT
Corridor Management Agreements (CMA)
CMA is a collaborative agreement among multiple jurisdictions or agencies that addresses the development, management, and operations of a transportation corridor.
Volume 1: Planning - CMAs

- SR 449 CMA a success story
- Strategies include interagency coordination for:
  - Access Management
  - Land Use Planning
  - Roadway Design and Capacity
**Vol. 1 Planning - CMAs**

**Corridor Management Agreement Potential Incentives**

<table>
<thead>
<tr>
<th>Planning / Technical Resources</th>
<th>Planning Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitation of permit review processes on projects</td>
<td>Cost sharing of local plans and policies (e.g. comprehensive plan, major thoroughfare plan)</td>
</tr>
<tr>
<td>with access management components</td>
<td>Cost sharing of corridor management plans or local access management plans</td>
</tr>
<tr>
<td>Access management training for local agency staff and</td>
<td>Preferred consideration for multimodal planning grants</td>
</tr>
<tr>
<td>officials</td>
<td>Cost sharing of corridor management plans or local access management plans</td>
</tr>
<tr>
<td>Training and technical assistance on supporting plans,</td>
<td>Funding for integrating access management improvements in transportation capacity or maintenance projects</td>
</tr>
<tr>
<td>policies, and standards</td>
<td>Preferred consideration for multimodal access grants</td>
</tr>
<tr>
<td></td>
<td>Additional weight in transportation project selection formula for criteria that support access management (e.g. cost, impacts, safety)</td>
</tr>
<tr>
<td></td>
<td>Funding for stand-alone streetscape projects</td>
</tr>
<tr>
<td></td>
<td>Priority funding for state projects in growth areas identified in corridor management plans</td>
</tr>
<tr>
<td></td>
<td>Funding for ITS and TSM&amp;O strategies identified in corridor management plans</td>
</tr>
</tbody>
</table>
By State Law, TDOT cannot dictate Land Development Regulations; this is the responsibility of local agencies.

But we do control the permitting of driveways on State Routes.

So TDOT developed model regulations for 25 different topics as guidance to help local planning agencies improve land development regulations.

Topics include joint and cross access, outparcel access, reverse frontage, flag lot standards (avoidance), etc.
Vol. 1 Planning - Model LDRs

Model Land Development Regulations

Section 1 Intent and Purpose Variances, Deviations, and Exemptions
Section 2 Applicability Variances, Deviations, and Exemptions
Section 3 Conformance with Plans, Regulations, and Statutes
Section 4 Definitions
Section 5 Access Category System
Section 6 Deviations and Waivers
Section 7 Corner Clearance and Side Street Access
Section 8 Driveway Location and Design
Section 9 Nonconforming Access
Section 10 Joint and Cross Access
Section 11 Outparcels and Phased Development Plans
Section 12 Street Network and Connectivity
Section 13 Pedestrian and Bicycle Access
Section 14 Location and Placement of Transit Access
Section 15 Interchange Area Access Management
Section 16 Corridor Access Management Plans and Overlays
Section 17 Reverse Frontage
Section 18 Flag Lot Standards
Section 19 Lot Width-to-Depth Ratios
Section 20 Small Subdivisions and Rural Residential Access
Section 21 Review of Minor Subdivisions
Section 22 Private Roads
Section 23 Emergency Access
Section 24 Site Plan Review Procedures
Section 25 Variance Standards

25 different topics
Vol. 1 Planning - Model LDRs

- Regulate lot splits and promote network development.
- Prohibit small lot frontages with no alternative access.
Vol. 1 Planning - Model LDRs

- Outparcel guidance

EXHIBIT 9-7 Outparcel access: (a) configuration to avoid and (b) preferred configuration.
• Joint Use Driveways
Vol. 1 Planning - Model LDRs

• Discourage “Flag Lots”
• Small subdivision/rural residential access
• Promote Street Network Connectivity

(a) Poor connectivity impedes walking, bicycling, and transit use. It also increases local trips on major roads and results in more properties requiring direct access to major roadways.

(b) Improved connectivity shortens local trips and improves multimodal mobility. It also enhances local mobility and provides opportunities for internalizing site access off of major roadways.

Figure 1-16: Street Network Connectivity and Access
Project History and Purpose

Volume 1 Planning
- Model Land Development Regulations
- Corridor Management Agreement Guidance

Volume 2 IIE
- TDOT Form / Process Guidance
- CAP-X Guidance
- SPICE Guidance
- Life-Cycle Cost Guidance

Volume 3 Design
- Geometric Design Criteria

HSAM Vol. 2 IIE
Volume 2 IIE- Intersections

Used to evaluate alternatives for at-grade intersections:

- Traditional intersections
- The modern roundabout
- Displaced left-turn (DLT)
- Restricted crossing U-turn (RCUT)
- The J-turn
- The median U-turn (MUT)
- Quadrant roadway (QR) intersections
- Others
Volume 2 IIE - Interchanges
Used to evaluate alternatives for interchanges:
• Diamond
• Parclo
• Displaced Left Turn
• Contraflow Left
• Diverging Diamond
• Single Point
• Single Point with Roundabout
• New for TDOT:
  – ICE Guidance and Policy
  – CAP-X volume/capacity screening tool
  – LCCET Life Cycle Cost Estimating Tool (Optional)
  – SPICE predictive crash analysis tool (Optional)
### Series of Forms
- Traffic Screening
- Cost
- Life-Cycle Cost (Optional)
- Traffic Analysis
- Predictive Crash Analysis (Optional)
- Multimodal
- Stakeholder Input

### Traffic Screening
- Existing Control: Two-Way Stop Control
- Option 1: Traffic Signal
- Option 2: Roundabout

### Cost
- Total Project Cost: $1,000,000

### Life-Cycle Cost
- Total Life-Cycle NPV Cost: $3,626,270

### Traffic Operations
- Traffic Analysis Software Used: Synchro, Synchro, Synchro
- 2025 Opening Year: AM, PM, AM, PM, AM, PM, AM, PM
- LOS: C, F, B, 8, 8, A, A
- Delay (s/veh): 20, 290, 12, 10, 4, 8
- v/c: 0.28, 1.25, 0.55, 0.4, 0.2, 0.5

### Predictive Crash Analysis
- Tool Used: SPICE, SPICE, SPICE
- Analysis Period: 2025 to 2045
- Total Crashes: 17.36, 28.37, 15.28

### Multimodal
- Are pedestrians, bicyclists, and transit riders accommodated?: Poorly, Well, Adequately

### Stakeholder Posture
- Local Community Support: Not Applicable, Supportive, Neutral
- T&DOT Support: Not Applicable, Supportive, Neutral

### TDOT Approval
- Preferred Option: Not Applicable
- Comments: "Opening is controlling time. Two-Way Stop Control has LOS F on stop-controlled approaches (reported values). Roundabout shows improved LOS compared to signal, but concern with pedestrians and bicyclists crossing multi-lane roundabouts. Budget constraints are a concern with Roundabout - initial costs more of a concern than life-cycle. Local Government is not as supportive of a roundabout due to ROW impacts."
Project History and Purpose

Volume 1 Planning
- Model Land Development Regulations
- Corridor Management Agreement Guidance

Volume 2 IIE
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- SPICE Guidance
- Life-Cycle Cost Guidance

Volume 3 Design
- Geometric Design Criteria
Volume 3 Design

- Updates to TDOT’s Design Criteria
- Coordination with new 2018 AASHTO “Greenbook”
- Implement some elements of TRB’s Access Management Manual 2nd Edition
Volume 3: Design Criteria
<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>Context</th>
<th>Rural</th>
<th>Rural Town</th>
<th>Suburban</th>
<th>Urban</th>
<th>Urban Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Arterial</td>
<td>H speed</td>
<td>L/M speed</td>
<td>M/H speed</td>
<td>L/M speed</td>
<td>L speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mobility-L access</td>
<td>H/M mobility-M access</td>
<td>M mobility-H access</td>
<td>M mobility-M access</td>
<td>M mobility-M access</td>
<td></td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>H speed</td>
<td>L/M speed</td>
<td>M/H speed</td>
<td>L/M speed</td>
<td>L speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mobility-M access</td>
<td>H/M mobility-M access</td>
<td>M mobility-H access</td>
<td>M mobility-M access</td>
<td>M/H mobility-M access</td>
<td></td>
</tr>
<tr>
<td>Collector</td>
<td>M speed</td>
<td>L speed</td>
<td>M/H speed</td>
<td>L speed</td>
<td>L speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mobility-M access</td>
<td>H/M mobility-M access</td>
<td>M mobility-H access</td>
<td>M mobility-H access</td>
<td>M/H mobility-H access</td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>M speed</td>
<td>L speed</td>
<td>L/H speed</td>
<td>L/H speed</td>
<td>L/H speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mobility-M access</td>
<td>H/M mobility-M access</td>
<td>L mobility-H access</td>
<td>L mobility-H access</td>
<td>L mobility-H access</td>
<td></td>
</tr>
</tbody>
</table>

H = high, M = medium, L = low

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Figure 2: Five context categories.

Volume 3: Design Criteria

Figure 3-2: Full Access Intersections & Driveways

Full Access

Figure 3-3: Restricted Access Driveways (Right in / Right Out)

Restricted Access

Figure 3-4: Restricted Access Driveway (Right In / Right Out / limited Left-Turns / J-Turns)
Volume 3 Design

• Updates to TDOT’s Design Criteria
• Coordination with new 2018 AASHTO “Greenbook”
• Implement some elements of TRB’s Access Management Manual 2nd Edition
Volume 3: Design Criteria

- Align TDOT Standards with the 2018 AASHTO Greenbook’s Functional Classifications and Context Classes

Table 3-5: Required Minimum Spacing of Driveways (Urban, Urban Core & Suburban)

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Suburban</th>
<th>Urban</th>
<th>Urban Core</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Traversable Median</td>
<td>Traversable Median</td>
<td>Non-Traversable Median</td>
</tr>
<tr>
<td>Full Access</td>
<td>1,320 ft.</td>
<td>880 ft.</td>
<td>880 ft.</td>
</tr>
</tbody>
</table>

- Freeway: N/A
- Principal Arterial*: 1,320 ft. 330 ft. 880 ft. 880 ft. 880 ft. 330 ft. 660 ft.
- Local Road or Street: **

* Direct driveway connections along Principal Arterials is discouraged whenever practical.
** Refer to Local zoning and ordinances for desired spacing, in lieu of additional guidance use 330 feet.
*** Spacing to be measured from the centerline of a driveway to the centerline of the next successive access point.
Volume 3: Design Criteria

- Align TDOT Standards with the 2018 AASHTO Greenbook’s Functional Classifications and Context Classes

Table 3-6: Required Minimum Spacing of Driveways (Rural & Rural Town)***

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Rural</th>
<th>Rural Town</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Traversable Median</td>
<td>Non-Traversable Median</td>
</tr>
<tr>
<td></td>
<td>Full Access</td>
<td>Full Access</td>
</tr>
<tr>
<td></td>
<td>Restricted Access</td>
<td>Restricted Access</td>
</tr>
<tr>
<td></td>
<td>Traversable Median</td>
<td>Traversable Median</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freeway</th>
<th>Rural</th>
<th>Rural Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

| Principal Arterial*      | 1,320 ft.              | 880 ft.                |
| Principal Arterial*      | 660 ft.                | 330 ft.                |
| Principal Arterial*      |                        | 660 ft.                |
| Minor Arterial           | 880 ft.                | 440 ft.                |
| Minor Arterial           | 660 ft.                | 330 ft.                |
| Minor Arterial           |                        | 660 ft.                |
| Major Collector          | 880 ft.                | 440 ft.                |
| Major Collector          | 660 ft.                | 330 ft.                |
| Major Collector          |                        | 660 ft.                |
| Minor Collector          | 440 ft.                | 330 ft.                |
| Minor Collector          |                        | 330 ft.                |
| Local Road or Street     | **                     |                        |

* Direct driveway connections along Principal Arterials is discouraged whenever practical.
** Refer to Local zoning and ordinances for desired spacing. In lieu of additional guidance use 330 feet.
*** Spacing to be measured from the centerline of a driveway to the centerline of a successive access point.
Multimodal Considerations

The Opportunities

• Medians serve as pedestrian refuges
• Fewer driveways = fewer conflicts with pedestrians and bicyclists
• Improved opportunities for transit operations

The Challenges

• More turn lanes and larger radius can lead to higher turning speeds
• Larger intersection spacing = fewer crossing opportunities
• Potential for higher speeds
- Limiting Access points to right-in / right-out
- Consider use of frontage or backage roads to consolidate access
- Consider joint access driveways
- Reducing the number of driveways for properties with multiple access points
- Limit corner lot access to minor roadway
Our TSMO Program Plan is now available
Sets our goals for the next three years
Institutional, Organizational, Procedural; Performance Measurement; Services and Projects

Thank You!

TNMUG May Meeting

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TSMO Integration Manager
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HSAM V3: Content Overview

HSAM V3

- Access Spacing
- Access Geometry
- Medians
- U-Turn Guidance
Access Spacing - Overview

- Signalized Intersections
- Unsignalized Intersections
- Driveways
- Opposite side of the Roadway
- Median Openings
- Near Interchange Ramps

Figure 3-5: Typical Access Point Spacing
# Access Spacing: Unsignalized Intersections

## Table 3-4: Required Minimum Spacing of Unsignalized Intersections

<table>
<thead>
<tr>
<th>Functional Classification of Road</th>
<th>Rural</th>
<th>Rural Town</th>
<th>Suburban</th>
<th>Urban</th>
<th>Urban Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principal Arterial</td>
<td>2,640 ft.</td>
<td>660 ft.</td>
<td>1,320 ft.</td>
<td>1,320 ft.</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>1,320 ft.</td>
<td>660 ft.</td>
<td>1,320 ft.</td>
<td>1,320 ft.</td>
<td>660 ft.</td>
</tr>
<tr>
<td>Major Collector</td>
<td>1,320 ft.</td>
<td>660 ft.</td>
<td>660 ft.</td>
<td>660 ft.</td>
<td>660 ft.</td>
</tr>
<tr>
<td>Local Road or Street</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Refer to Local zoning and ordinances for desired spacing. In lieu of additional guidance use 330 feet.

** Spacing to be measured from centerline to centerline of successive roads.
Access Spacing: Driveways

Table 3-6: Required Minimum Spacing of Driveways (Urban, Urban Core & Suburban) **

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Driveway Spacing— (Urban, Urban Core &amp; Suburban) **</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suburban</td>
</tr>
<tr>
<td>Freeway</td>
<td>N/A</td>
</tr>
<tr>
<td>Principal Arterial*</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>660 ft.</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>440 ft.</td>
</tr>
<tr>
<td>Local Road or Street **</td>
<td>**</td>
</tr>
</tbody>
</table>

* Direct driveway connections along Principal Arterials is discouraged whenever practical.
** Refer to local zoning and ordinances for desired spacing, in lieu of additional guidance use 330 feet.
*** Spacing to be measured from the centerline of a driveway to the centerline of the next successive access point.

Table 3-6: Required Minimum Spacing of Driveways (Rural & Rural Town) **

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Driveway Spacing (Rural &amp; Rural Town) **</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
</tr>
<tr>
<td></td>
<td>Non-Traversal</td>
</tr>
<tr>
<td>Freeway</td>
<td>N/A</td>
</tr>
<tr>
<td>Principal Arterial*</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>880 ft.</td>
</tr>
<tr>
<td>Major Collector</td>
<td>880 ft.</td>
</tr>
<tr>
<td>Local Road or Street **</td>
<td>**</td>
</tr>
</tbody>
</table>

* Direct driveway connections along Principal Arterials is discouraged whenever practical.
** Refer to local zoning and ordinances for desired spacing, in lieu of additional guidance use 330 feet.
*** Spacing to be measured from the centerline of a driveway to the centerline of the next successive access point.
Access Spacing: At Signalized Interchanges

Table 3-9: Required Minimum Access Spacing at Signalized Interchange Ramp Terminals\textsuperscript{16, 17}

<table>
<thead>
<tr>
<th>Spacing Requirements at Signalized Interchange Ramps</th>
<th>Arterial Width (no. of Lanes)</th>
<th>Spacing Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>Urban Area (35mph)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>590 ft.</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>4</td>
<td>590 ft.</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>Suburban Area (45 mph)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>590 ft.</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>4</td>
<td>590 ft.</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>Rural Area (55 mph)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>535 ft.</td>
<td>1,320 ft.</td>
</tr>
<tr>
<td>4</td>
<td>535 ft.</td>
<td>2,640 ft.</td>
</tr>
</tbody>
</table>

X – Distance from ramp terminal to first restricted access driveway.
Y – Distance to first major intersection from end of ramp terminal.
Z – Distance from last driveway to the start of freeway entrance ramp.
M – Distance from first directional restricted access median opening after the exit ramp or before the entrance ramp.
Access Spacing: At Unsignalized Interchanges

Table 3-10: Required Minimum Access Spacing at Free-Flow Interchange Ramp Terminals

<table>
<thead>
<tr>
<th>Spacing Requirements at Free-Flow Interchange Ramps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial Width (no. of Lanes)</td>
</tr>
<tr>
<td>Urban Area (35mph)</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>Suburban Area (45 mph)</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>Rural Area (55 mph)</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

X – Distance from ramp terminal to first restricted access driveway.
Y – Distance to first major intersection from end of ramp terminal.
Z – Distance from last driveway to the start of freeway entrance ramp.
M – Distance to first directional restricted access median opening after the exit ramp or before the entrance ramp.
Access Geometry - Overview

Access Geometry

- Intersection Geometrics
- Driveway Geometrics
- Design Vehicle
- Horizontal Geometrics (Radius, Width, Length . . .)
- Turn Lanes
- Grading & Profile
- Lane Drops
- Cross Slopes
- Corner Islands
- Sight Distance
- Grading & Tie-ins
- Multimodal

Figure 3-20: Functional Area, for an Exclusive Turn Lane.
Access Geometry - Left-Turn Lane Warrants (Unsignalized)

“... Warrants indicate situations where a left-turn lane would help mitigate traffic conflicts, not necessarily situations where a left-turn lane is required. ...”

Urban & Suburban

3-Leg Intersection

4-Leg Intersection
Access Geometry - Left-Turn Lane Warrants (Unsignalized)

2-Lane Rural

4-Lane Rural

(a) Three-Leg Intersections
(b) Four-Leg Intersections
Access Geometry - Left-Turn Lane Warrants (Unsignalized)

Left Turn Volume = 6 veh/hr
Major Highway Volume = 40 veh/hr/ lane
Access Geometry - Right-Turn Lane Warrants (Unsignalized)

Two-Lane Roadway

- Major-road speed = (40 mph)
- Add right-turn bay

Four-Lane Roadway

- Major-road speed = (40 mph)
- Add right-turn bay
Right Turn Volume = 40 veh/hr
Major Highway Volume = 800 veh/hr DHV
Design Speed = 50 MPH
Access Geometry - Driveway

Horizontal Geometry

R – Radius of Curvature
W – Driveway Throat Width
T – Driveway Throat Length
Y – Driveway Angle
E – Driveway Edge Clearance
“Driveway guidance traditionally focused on accommodating motor vehicles . . . Emphasis is also being placed on managing access and accommodating pedestrians and cyclists”

Manual Directs users to TDOT Design Guide, Chapter 3 along with relevant STD Drawings.

**Key Points**

- Additional Turn lanes increase conflict points with pedestrians and bikes.
- Larger turning radii increase crossing lengths for pedestrians.
- Larger turning radii increase vehicle speeds.
Medians - Overview

- Median Widths
- Left Turn Lanes in Medians
- Two-Way Left-Turn Lanes
HSAM *Recommendations* for TWLTL:

- 3-Lane TWLTL should have ADT < 17,000 VPD
- 5-Lane TWLTL should have ADT < 28,000 VPD
- Posted Speed should be <45 MPH to warrant TWLTL
- 7-Lane TWLTL is strongly discouraged
- Unsignalized Left-Turning movements across 3+ Lanes of Opposing traffic is strongly discouraged
Exclusive Left-Turn lanes *should* be provided instead of TWLTL where left-turning volumes from the median to a single access point exceed:

- 150 veh/h across one lane of opposing traffic
- 100 veh/h across two lanes of opposing traffic
U-Turn Guidance - Overview

U-Turn Geometrics

Large Vehicle Accommodations

U-Turn at Signalized Intersections

U-Turn in Advance of a Signal

U-Turn After a Signal

Figure 3-34: U-Turns at Dual Left-Turn Lanes

Figure 3-35: U-Turn in Advance of an Intersection
Most information is simple check boxes or drop downs. Need to identify:

- Roadway Classification
- Land Use context
- Speed
- Exact Criteria not being met
- Reason for not meeting criteria
  - Check boxes offer typical answers
  - Include any supporting documents

Deviations submitted to the Regional Traffic Engineer. **Approved deviations required prior to the submittal of Right-of-Way Plans.**

Only applicable to Criteria in the HSAM Manual.
Deviations - Design Jobs

Highway System Access Manual Form 1 (HSAM-1)
For Access Spacing and/or Access Design Deviations on TDOT Design Projects

<table>
<thead>
<tr>
<th>To:</th>
<th>Enter text</th>
<th>Title:</th>
<th>Select Region</th>
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</thead>
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<td>From:</td>
<td>Enter text</td>
<td>Email</td>
<td>Enter text</td>
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<tr>
<td>Project Number:</td>
<td>Enter text</td>
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<td>Log Mile(s):</td>
<td>Enter text</td>
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<tr>
<td>Description of Design Project:</td>
<td>Enter text</td>
<td>Provide short description of project including termini.</td>
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</tbody>
</table>

This form is intended to be used for either one or multiple deviation requests per design project. Select all that apply concerning the roadway and land use context classifications, design speed, and type(s) of deviation(s) requested. Attach plan sheets or aerial imagery identifying each location.

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>Land Use Context</th>
<th>Speed: mph</th>
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<tr>
<td>Minor Arterial</td>
<td>Rural Town</td>
<td></td>
</tr>
<tr>
<td>Minor Collector</td>
<td>Suburban</td>
<td></td>
</tr>
<tr>
<td>Local Road or Street</td>
<td>Urban</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urban Core</td>
<td></td>
</tr>
</tbody>
</table>

**Part A: Access Spacing Deviation Request**

Complete the following for spacing deviation request(s). Note: Single family and duplex residential driveways do not need to be included in the deviation request.

Access Spacing Deviation(s) Requested {select all that apply}

- [ ] Unsignalized Intersection Spacing (HSAM Table 3-4)
- [ ] Driveway Spacing (HSAM Tables 3-5 and 3-6)
- [ ] Number of Entrances per Property
- [ ] Access Spacing Opposite Side of the Roadway (HSAM Table 2-7)
- [ ] Spacing of Median Openings (HSAM Table 3-4)
- [ ] Spacing near Interchange Ramps (HSAM Tables 3-9 and 3-10)
- [ ] Driveway Edge Clearance (HSAM Table 3-15)
- [ ] Driveway Corner Clearance (HSAM Table 3-16)
- [ ] Other Spacing: Description

**Address to Region Traffic Engineer.**

Provide Project information.

<table>
<thead>
<tr>
<th>Title: Select Region</th>
<th>Date: Select date</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Title:**

**Email:**

**Phone:**

---

**TDOT Department of Transportation**
Deviations - Design Jobs

Highway System Access Manual Form 1 (HSAM-1)
For Access Spacing and/or Access Design Deviations on TDOT Design Projects

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<td>Select date</td>
<td>Phone:</td>
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<tr>
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<td>Enter text</td>
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<tr>
<td>Mainline Route:</td>
<td>Enter text</td>
<td>Log Mile(s):</td>
<td>Enter text</td>
</tr>
</tbody>
</table>

Description of Design Project:
Provide short description of project including termini.

Select:
- Classification
- Speed
- Deviation Type (Spacing / Design)

Roadway Classification
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local Road or Street

Land Use Context
- Rural
- Rural Town
- Suburban
- Urban
- Urban Core

Type(s) of Deviation(s)
- Spacing - Complete Part A
- Design - Complete Part B

Access Spacing Deviation(s) Requested (select all that apply)
- Unsignalized Intersection Spacing (HSAM Table 3-4)
- Driveway Spacing (HSAM Tables 3-5 and 3-6)
- Number of Entrances per Property
- Access Spacing Opposite Side of the Roadway (HSAM Table 2-7)
- Spacing of Median Openings (HSAM Table 3-8)
- Spacing near Interchange Ramps (HSAM Tables 3-9 and 3-10)
- Driveway Edge Clearance (HSAM Table 3-11)
- Driveway Corner Clearance (HSAM Table 3-16)
- Other Spacing: Description

Part A: Access Spacing Deviation Request
Complete the following for spacing deviation request(s). Note: Single family and duplex residential driveways do not need to be included in the deviation request.

Roadway Classification
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local Road or Street

Land Use Context
- Rural
- Rural Town
- Suburban
- Urban
- Urban Core

Speed: ___ mph
Deviations - Design Jobs

Highway System Access Manual Form 1 (HSAM-1)
For Access Spacing and/or Access Design Deviations on TDOT Design Projects

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</tr>
<tr>
<td>Date:</td>
<td>Select date</td>
</tr>
</tbody>
</table>

Project Number: Enter text
County: Enter text
Mainline Route: chXX
Log title(s): Enter text
Description of Design Project: Provide short description of project including termini.

This form is intended to be used for either one or multiple deviation requests (per design project). Select all that apply concerning the roadway and land use context classifications, design speed, and type(s) of deviation(s) requested. Attach plan sheets or aerial imagery identifying each location.

- Roadway Classification
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local Road or Street

- Land Use Context
  - Rural
  - Rural Town
  - Urban
  - Urban Core

- Speed
  - mph

Part A: Access Spacing Deviation Request
Complete the following for spacing deviation requests. Note: Single family and duplex residential driveways do not need to be included in this deviation request.

Access Spacing Deviation(s) Requested (select all that apply)
- Unsignalized Intersection Spacing (HSAM Table 3-4)
- Driveway Spacing (HSAM Tables 3-5 and 3-6)
- Number of Entrances per Property
- Access Spacing Opposite Side of the Roadway (HSAM Table 2-7)
- Spacing of Median Openings (HSAM Table 3-4)
- Spacing near Interchange Ramps (HSAM Tables 3-9 and 3-10)
- Driveway Edge Clearance (HSAM Table 3-15)
- Driveway Corner Clearance (HSAM Table 3-16)
- Other Spacing: Description

For Spacing Deviations:
Check box of exact criteria not being met
Deviations - Design Jobs

Complete Table 1 or attach a table with similar information, including the following:
1. ID number
2. Route (mainline or crossroad name)
3. Station of each entrance/intersection/crossover
4. Type of entrance/intersection (signalized, unsignalized/full access, restricted access)
5. Access spacing deviation requested
6. Required spacing standards

Table 1: Access Spacing Deviation Locations

<table>
<thead>
<tr>
<th>ID</th>
<th>Route</th>
<th>Station</th>
<th>Type of Entrance</th>
<th>Deviation Requested</th>
<th>Required Spacing (FT.)</th>
<th>Proposed Spacing (FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route</td>
<td>Station</td>
<td>Type of Entrance</td>
<td>Deviation Requested</td>
<td>Required Spacing (FT.)</td>
<td>Proposed Spacing (FT.)</td>
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<tr>
<td>2</td>
<td>Route</td>
<td>Station</td>
<td>Type of Entrance</td>
<td>Deviation Requested</td>
<td>Required Spacing (FT.)</td>
<td>Proposed Spacing (FT.)</td>
</tr>
<tr>
<td>3</td>
<td>Route</td>
<td>Station</td>
<td>Type of Entrance</td>
<td>Deviation Requested</td>
<td>Required Spacing (FT.)</td>
<td>Proposed Spacing (FT.)</td>
</tr>
<tr>
<td>4</td>
<td>Route</td>
<td>Station</td>
<td>Type of Entrance</td>
<td>Deviation Requested</td>
<td>Required Spacing (FT.)</td>
<td>Proposed Spacing (FT.)</td>
</tr>
<tr>
<td>5</td>
<td>Route</td>
<td>Station</td>
<td>Type of Entrance</td>
<td>Deviation Requested</td>
<td>Required Spacing (FT.)</td>
<td>Proposed Spacing (FT.)</td>
</tr>
</tbody>
</table>

Reason(s) for access spacing deviation request(s) (select all that apply):
☐ Replacing in existing location(s) with modifications only related to tie-down points to adjacent roadway. Note all location IDs: List (ID(s)).
☐ To be located on an established corridor where existing spacing does not meet the HSAM spacing criteria. Note all location IDs: List (ID(s)).
☐ Property frontage length(s) does not allow for HSAM spacing criteria to be met. Note all location(s) (List ID(s)).
☐ Other (beyond scope of project, etc.). Provide description(s) in text box below. Note all location(s): [Description]

Access Spacing Deviation Request Approval / To be completed by Reviewers

Table to capture multiple deviations along a specific route

Attach accompanying plan exhibits as needed to identify locations
Deviations - Design Jobs

Complete Table 1 or attach a table with similar information, including the following:
1. ID number
2. Route (mainline or crossroad name)
3. Station of each entrance/intersection/crossover
4. Type of entrance/intersection (signalized, unsignalized/full access, restricted access)
5. Access spacing deviation requested
6. Required spacing standards
7. Proposed spacing

<table>
<thead>
<tr>
<th>Table 1: Access Spacing Deviation Locations</th>
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<td>ID</td>
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<td>#</td>
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<tr>
<td>#</td>
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</tbody>
</table>

Reason(s) for access spacing deviation request(s) (select all that apply):
- Replacing in existing location(s) with modifications only related to tie-down points to adjacent roadway. Note all location IDs: List ID#(s).
- To be located on an established corridor where existing spacing does not meet the HSAM spacing criteria. Note all location IDs: List ID#(s).
- Property frontage length(s) does not allow for HSAM spacing criteria to be met. Note all location IDs: List ID#(s).
- Other (beyond scope of project, etc.). Provide description(s) in text box below. Note all location IDs:

Description:

Identify reason for Deviation

Standard list provided for common answers to this section
Deviations - Design Jobs

Complete Table 1 or attach a table with similar information, including the following:
1. ID number
2. Route (mainline or crossroad name)
3. Station of each entrance/intersection/crossover
4. Type of entrance/intersection (signalized, unsignalized/full access, restricted access)
5. Access spacing deviation requested
6. Required spacing standards
7. Proposed spacing

<table>
<thead>
<tr>
<th>ID</th>
<th>Route</th>
<th>Station</th>
<th>Type of Entrance</th>
<th>Deviation Requested</th>
<th>Required Spacing (FT)</th>
<th>Proposed Spacing (FT)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Choose an item.</td>
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<tr>
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<tr>
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<td>Choose an item.</td>
<td># # # # #</td>
<td># # # # #</td>
</tr>
</tbody>
</table>

Reason(s) for access spacing deviation request(s) (select all that apply):
- replacing in existing location(s) with modifications only related to be-down points to adjacent roadway. Note all location IDs: list (ID#s).
- to be located on an established corridor where existing spacing does not meet the HSAM spacing criteria. Note all location IDs: list (ID#s).
- property frontage length does not allow for HSAM spacing criteria to be met. Note all location IDs: list (ID#s).
- other (beyond scope of project, etc.), provide description(s) in text box below. Note all location IDs:

Access Spacing Deviation Request Approval / To be completed by Reviewers

<table>
<thead>
<tr>
<th>Spacing Deviation Reviewed By:</th>
<th>Action:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter text</td>
<td></td>
<td>Select date</td>
</tr>
<tr>
<td>Regional Traffic Engineer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Action:  
- Acceptable  
- Not Acceptable

Remarks:  
Provide remarks if necessary.

Spacing Deviation Reviewed By:  
Enter text  
State Traffic Engineer  
Action:  
- Approved  
- Denied

Date:  
Select date

Remarks:  
Provide remarks if necessary.  
Signature:
### Deviations - Design Jobs

**Part B: Access Design Deviation Request**

Complete the following for design deviation request(s).

**Access Design Deviation(s) Desired (Check all that apply)**
- **Driveway Radius of Curvature** (HSAM Table 8-11 and 8-12)
- **Driveway Width** (HSAM Table 3-13)
- **Driveway Grade and Profile**
- **Driveway Sight Distance**
- **Other Design Criteria/Description**

Complete Table 2 or attach a table with similar information, including the following:

1. **ID number**
2. **Route (mainline or intersecting name)**
3. **Station of each entrance/intersection/crossover**
4. **Access design deviation requested**
5. **Description of deviation and why the deviation is necessary.**

**Table 2: Access Design Deviation Location(s)**

<table>
<thead>
<tr>
<th>ID</th>
<th>Route</th>
<th>Station</th>
<th>Deviation Requested</th>
<th>Description</th>
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<tr>
<td>#</td>
<td>Route</td>
<td>Station</td>
<td>Choose an item.</td>
<td></td>
</tr>
</tbody>
</table>

Optional: Provide additional description(s) in text box below including why the deviation(s) are necessary. Note all location ID(s).

**Access Design Deviation Request Approval** To be completed by Reviewers

**Design Deviation Reviewed By:**
- Enter Test
- Regional Traffic Engineer

**Action:**
- Acceptable
- Not Acceptable

**Date:** Select date

**Remarks:**
- Provide remarks if necessary.

**Design Deviation Requested By:**
- Enter Test
- State Traffic Engineer

**Action:**
- Approved
- Denied

**Date:** Select date

**Remarks:**
- Provide remarks if necessary.

**Signature:**
Deviations - Design Jobs

Part B: Access Design Deviation Request

Complete the following for design deviation request(s).

- Access Design Deviation(s) Desired (Check all that apply)
  - Driveway Radius of Curvature (HSAM Table 8-11 and 8-12)
  - Driveway Width (HSAM Table 2-13)
  - Driveway Grading and Profile
  - Driveway Sight Distance
  - Other Design Criteria: Description

Complete Table 2 or attach a table with similar information, including the following:

1. ID number
2. Route (mainline or intersecting name)
3. Station of each entrance/intersection/crossover
4. Access design deviation requested
5. Description of deviation and why the deviation is necessary.

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<tr>
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<td>Route</td>
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<td>d</td>
<td>Route</td>
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<td>Choose an item</td>
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</table>

Optional: Provide additional description(s) in text box below including why the deviation(s) are necessary. Note all location ID(s):

Accept Design Deviation Request Approval / To be completed by Reviewers

<table>
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<tr>
<th>Design Deviation Reviewed By:</th>
<th>Action:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Enter Test</td>
<td>Select</td>
<td></td>
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<tr>
<td>Regional Traffic Engineer</td>
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</tbody>
</table>

Remarks:
- Provide remarks if necessary.

Design Deviation Requested By:

<table>
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<td>Select</td>
<td></td>
</tr>
<tr>
<td>State Traffic Engineer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks:
- Provide remarks if necessary.

Identify Specifics of the deviation. Include specific values used, what they should be, and why that cannot be met.

Table allows for multiple similar deviations to be combined to single submittal.
Part B: Access Design Deviation Request

Complete the following for design deviation request(s).

Access Design Deviation(s) Desired (Check all that apply)
☐ Driveway Radius of Curvature (HSAM Table 8-11 and 8-12)
☐ Driveway Width (HSAM Table 3-13)
☐ Driveway Grading and Profile
☐ Driveway Sight Distance
☐ Other Design Criteria: Description

Complete Table 2 or attach a table with similar information, including the following:
1. ID number
2. Route (mainline or crossroad name)
3. Station of each entrance/intersection/crossover
4. Access design deviation requested
5. Description of deviation and why the deviation is necessary.

Table 2: Access Design Deviation Location(s)

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<td>#</td>
<td>Route</td>
<td>Station</td>
<td>Deviation Requested</td>
<td>Description</td>
</tr>
</tbody>
</table>

Optional: Provide additional description(s) in text box below including why the deviation(s) are necessary. Note all location ID(s):

Approval section for TDOT Reviewers

Access Design Deviation Request Approval / To be completed by Reviewers

Design Deviation Reviewed By: Enter Test
Regional Traffic Engineer

Action: ☐ Acceptable
☐ Not Acceptable

Date: Select date

Remarks: Provide remarks if necessary.

Design Deviation Reviewed By: Enter Test
State Traffic Engineer

Action: ☐ Approved
☐ Denied

Date: Select date

Remarks: Provide remarks if necessary.

Signature: