

### 3. Design Standards

#### 3.9. Geometric Design Criteria

##### 3.9.7. *Median and Turn Lane Design*

###### 3.9.7.1 Medians

###### 3.9.7.1.1 Definition and Appropriateness

1. Medians are the center portion of the roadway that separates general purpose travel lanes moving in opposite directions. Medians frequently incorporate features to improve safety and operations by providing space for turning vehicles.
2. Center turn lanes may be incorporated as part of a median and interspersed with median islands. Medians may also serve as pedestrian or bicycle refuges, whether as raised features or through physical barriers, pavement markings, and signage that distinguishes the pedestrian safe zone. Options for medians and center turn lanes include:
  - Two-way left-turn lanes (TWTL)
  - Raised medians with intersection turn bays
  - Median refuges for pedestrians and cyclists
  - Raised landscaped medians
3. Some form of raised or striped median is strongly preferred on principal and minor arterials, with wider medians required along segments with turn lanes or turn bays.
4. Median landscaping and pedestrian refuges are desirable in high-pedestrian activity areas and as space allows.

###### 3.9.7.1.2 Design Considerations

1. Median widths are measured from curb face to curb face.
2. Medians may serve as pedestrian or bicycle refuges, whether as raised features or through physical barriers, pavement markings, and signage that distinguishes the pedestrian safe zone. Median refuges should be at least 6' in width, with a preferred width of 8-10'. See the Pedestrian Facilities section (23-3.5) for more information on median refuge islands. See the Network Connectivity section (23-3.1) for guidance on pedestrian crossing locations.
3. For collector and arterial roadways where the median also serves as center turn lane space, the width should be 10-12', with 14' desirable on higher speed roadways (i.e. over 35 MPH) to allow for a 2-4' space separating traffic, plus at least an additional 6' for a median refuge, as needed.

4. Narrow medians (i.e. less than 6') are most appropriate for restricting turning movements and separating opposing traffic, and may be utilized for some landscaping purposes (i.e. shrubs).
5. Medians must be a minimum of 6' for the placement of traffic signals.
6. Trees generally require a minimum 6' median. Placement and maintenance of street trees as part of median landscaping must ensure adequate clear zone and sight distance. See the current AASHTO Roadside Design Guide for clear zone recommendations, section 23-3.9.5 for sight distance requirements, and Chapter 28 for additional guidance on landscaping requirements.
7. See the Public Transit section (23-3.7) for guidance on median-running transit infrastructure.
8. Raised medians may require drainage infrastructure, including a curb and gutter pan and drop inlet. See Chapter 22 for drainage requirements.

### 3.9.7.2 Median Openings

#### 3.9.7.2.1 Definitions and Appropriateness

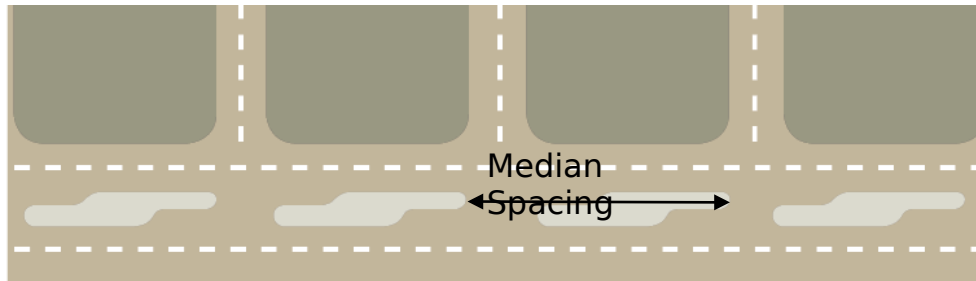
1. Median openings, or median cuts, are an unobstructed section of a raised median that allow for left turns. Raised medians generally improve safety and traffic operations but reduce site access.
2. The frequency of median openings depends on the corridor type and the surrounding land use context.
3. Medians and access limitations shall be consistent with all restrictions contained in the MRCOG inventory of roadway access limitations.

#### 3.9.7.2.2 Spacing and Access Control

1. Where a median opening is desired, access to both sides of the street needs to be considered. If development exists on both sides of the street, left turn bays for both directions may need to be constructed.
2. Streets or driveways with median access points shall to be placed such that the centerline of the access points are as closely aligned as conditions allow on the median openings.
3. Where an access point exists on the opposite side of the street, the centerline of the new access points needs to be as closely aligned as conditions allow.
4. If access points cannot be aligned, it is desirable to have them offset so potential left turn paths do not cross and AASHTO Case F Sight Distance is accommodated.

- The minimum distance between the ends of adjacent median openings is 300' on local roads and collectors and 400' on minor arterials and principal arterials, with greater distances preferred on Commuter corridors and other roadways where vehicle through put is highly prioritized. See Figure 3.9.7-1.

**Figure 3.9.7-1 Median Opening Spacing**



- Only one road or driveway on each side of the roadway shall be served by the median opening. Where a property line falls within the median opening area, a common drive serving both properties shall be utilized.
- A median opening will not be created or approved automatically because it meets the spacing requirements. The type of development, internal circulation and traffic operating conditions (existing or projected) on the street must also be considered.
- Consolidation of median openings should be considered during roadway reconstruction projects.
- See the Site Access section (23-3.2) for guidance related to curb cuts and driveway frequency.
- Median openings shall follow guidance from section 23-3.1 Network Connectivity and 23-3.7 Intersection Design.

#### 3.9.7.2.3 Design Considerations

- Approval by the New Mexico Department of Transportation is required for all median openings along state-owned and maintained roadways. Median openings on NMDOT-owned and maintained facilities must follow NMDOT design criteria.
- The construction of appropriate left turn lanes must be included with any new median opening. The length of the turn bay approaching the median opening shall allow for anticipated queuing needs.
- All median opening designs must address drainage needs.
- See section 3.9.7.6 for Turn Lane Design guidelines.

#### 3.9.7.2.4 Median Opening Requests

1. Median cuts require approval by the City Engineer and construction is the responsibility of the applicant.
2. A work order must be obtained for construction. Work orders require engineered plans and may be obtained from DRC.
3. Depending on the size of the development, a traffic impact study may be required for a median opening to be created. See the Traffic Impact Study section (23-4) for additional information.

#### 3.9.7.4 Turning Lanes

##### 3.9.7.4.1 Definition and General Provisions

1. Separate turning lanes expedite the movement of through traffic, increase roadway capacity, permit the controlled movement of turning traffic, and promote the safety of all traffic.
2. Turning lanes for right and left turns into a driveway or street may be necessary for safety and capacity reasons, where roadway speeds and traffic volumes are high, or if there are substantial turning volumes.

#### 3.9.7.5 Turn Lane Warrants

1. A turn lane or a taper is required on streets where the Turn Lane Warrants (Table 3.9.7-1) are exceeded in the AM or PM peak. At locations that do not exceed the criteria, the City Engineer may still require a turn lane or taper to address known safety concerns.
2. Turn lanes shall be required per the current version of the New Mexico State Access Management Manual (SAMM). See Tables 17.B-1 and 17B-2 from the 2017 version below.
3. The City may require additional turning lanes and tapers or other improvements when it believes that the absence of such improvement will create an unsafe condition.
4. Turn Lanes shall be required if a drivepads/access points utilizing a median opening is constructed. The turn lane shall provide for both the storage and deceleration of turning vehicles.
5. Additional right-of-way for deceleration lanes or tapers may need to be dedicated.

**Table 3.9.7-1 Turn Lane Warrants**

Note: These tables are contained in the New Mexico Department of Transportation 2017 State Access Management Manual (referred to as the SAMM). Equivalent tables from updated versions of the SAMM should be referenced when they become available.

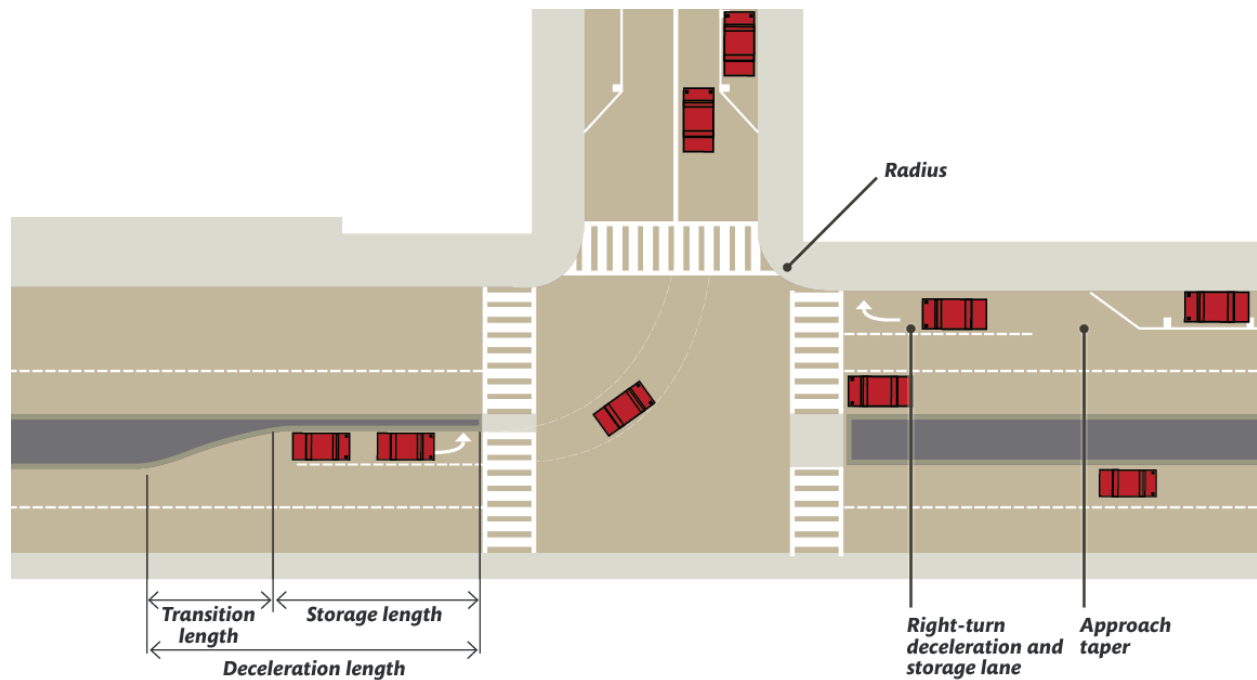
<b>Table 17.B-1 Criteria for Deceleration Lanes on URBAN TWO-LANE HIGHWAYS</b>						
<b>Turning Volume<sup>1</sup> (vph)</b>	<b>LEFT-TURN DECELERATION LANE</b>			<b>RIGHT-TURN DECELERATION LANE</b>		
	<b>Minimum Directional Volume in the Through Lane (vphpl)<sup>2</sup></b>			<b>Minimum Directional Volume in the Through Lane (vphpl)<sup>2</sup></b>		
	<b>≤ 30 mph</b>	<b>35 to 45 mph</b>	<b>45 to 55 mph</b>	<b>≤ 30 mph</b>	<b>35 to 40 mph</b>	<b>45 to 55 mph</b>
< 5	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
5	510	450	330	1,080	610	360
10	390	330	210	700	400	240
15	320	250	150	500	280	170
20	270	200	120	380	210	140
25	230	160	100	300	180	120
30	200	130	Required	250	160	110
35	170	110	Required	220	150	100
40	150	Required	Required	200	140	Required
45	130	Required	Required	190	Required	Required
≥ 46	Required	Required	Required	Required	Required	Required
	<i>Left-turn Deceleration Lanes are Required on Urban Two-lane Highways for the following Left-turn Volumes:</i> <ul style="list-style-type: none"> <li>• ≤ 30 mph : 46 vph or more</li> <li>• 35 to 40 mph : 36 vph or more</li> <li>• 45 to 55 mph : 26 vph or more</li> </ul>			<i>Right-turn Deceleration Lanes are Required on Urban Two-lane Highways for the following Right-turn Volumes:</i> <ul style="list-style-type: none"> <li>• ≤ 30 mph : 46 vph or more</li> <li>• 35 to 40 mph : 41 vph or more</li> <li>• 45 to 55 mph : 36 vph or more</li> </ul>		
<i>Notes:</i> <ol style="list-style-type: none"> <li>1. Use linear interpolation for turning volumes between 5 and 45 vph.</li> <li>2. The directional volume in the through lane includes through vehicles and turning vehicles.</li> </ol>						

**Table 17.B-2  
Criteria for Deceleration Lanes on  
URBAN MULTI-LANE HIGHWAYS**

Turning Volume <sup>1</sup> (vph)	LEFT-TURN DECELERATION LANE			RIGHT-TURN DECELERATION LANE		
	Minimum Volume in the Adjacent Through Lane (vphpl) <sup>2</sup>			Minimum Volume in the Adjacent Through Lane (vphpl) <sup>2</sup>		
	≤ 30 mph	35 to 40 mph	45 to 55 mph	≤ 30 mph	35 to 40 mph	45 to 55 mph
< 5	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
5	Not Required	490	420	1,200	730	450
10	420	370	300	820	490	320
15	360	290	220	600	350	240
20	310	230	160	460	260	180
25	270	190	130	360	230	150
30	240	160	110	290	200	130
35	210	130	100	260	180	120
40	180	120	Required	240	170	110
45	160	110	Required	220	160	Required
50	140	Required	Required	200	Required	Required
55	120	Required	Required	190	Required	Required
≥ 56	Required	Required	Required	Required	Required	Required
	<i>Left-turn Deceleration Lanes are Required on Urban Multi-lane Highways for the following Left-turn Volumes:</i> <ul style="list-style-type: none"> <li>• ≤ 30 mph : 56 vph or more</li> <li>• 35 to 40 mph : 46 vph or more</li> <li>• 45 to 55 mph : 36 vph or more</li> </ul>			<i>Right-turn Deceleration Lanes are Required on Urban Multi-lane Highways for the following Right-turn Volumes:</i> <ul style="list-style-type: none"> <li>• ≤ 30 mph : 56 vph or more</li> <li>• 35 to 40 mph : 46 vph or more</li> <li>• 45 to 55 mph : 41 vph or more</li> </ul>		
<b>Notes:</b> <ol style="list-style-type: none"> <li>1. Use linear interpolation for turning volumes between 5 and 55 vph.</li> <li>2. The volume in the adjacent through lane includes through vehicles and turning vehicles.</li> </ol>						

### 3.9.7.6 Turn Lane Design

1. Design elements, which make up a turning lane, are shown in Figure 3.9.7-2.

**Figure 3.9.7-2 Turning Lane Design Elements**

2. The design of turning lanes are based primarily on the following:
  - the speed at which drivers will turn into the lane;
  - the speed to which drivers must reduce in order to turn into the driveway or side street after traversing the deceleration lane;
  - The amount of vehicular storage that will be required.
3. The total length of the turning lane and taper should accommodate storage requirements plus deceleration and taper. If this is not feasible, the following criteria should be followed:
  - Include the taper length in the deceleration length requirement
  - Assume that vehicles slow down to 10 mph below the roadway speed limit before entering the auxiliary lane and calculate deceleration needs based on this speed.
  - Calculate deceleration to a turning speed of 15 mph rather than a full stop (more applicable to right-turns).
  - If none of the above is feasible, at a minimum the lanes should accommodate the 95th percentile queue length.

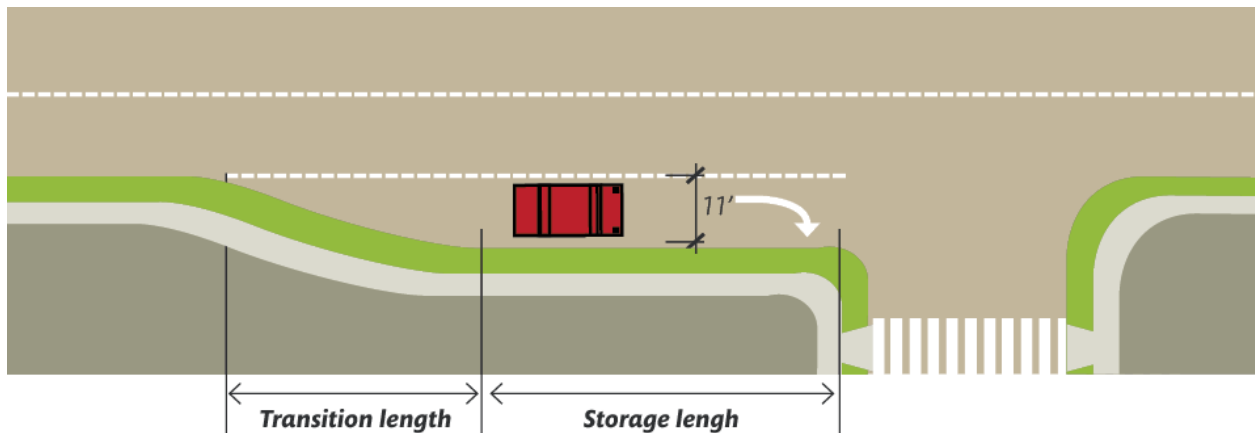


4. Turn lanes should be 11 feet in width; however, the lane width may be adjusted to be compatible with the adjacent roadway lane width. In no event shall the turn lane width be less than ten feet.

3.9.7.6.1 Right Turn Lane Design

See Figure 3.9.7-3 for Right Turn lane Design Elements and Table 3.9.7-2 for the minimum lane length and turn lane transition requirements.

**Figure 3.9.7-3 Right Turn Lane Design Elements**



**Table 3.9.7-2 Turn Lane Design Criteria**

Design Speed of Roadway	Minimum Storage Length	Lane Transition Length
< 35	240'	150'-150' Reverse Curve
35 – 45	240' – 350'	300'-150' Reverse Curve
45 – 50	350' – 405'	600'-300' Reverse Curve

The Required Lane Length assume the roadway is on a two percent or less vertical grade. Longer deceleration lengths may be required on downgrades greater than two percent. Required Lane Length assume a 15 mph speed differential.

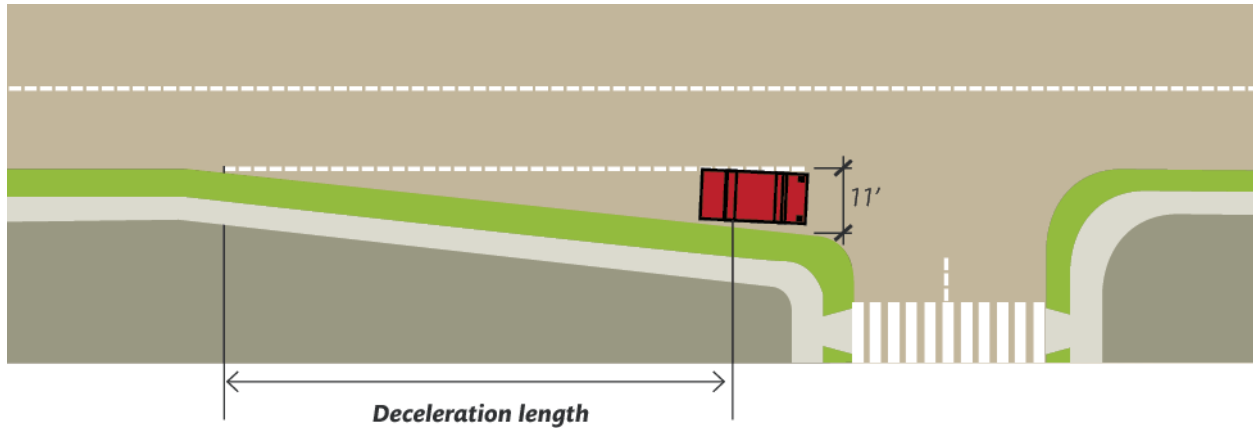
3.9.7.6.2 Right taper Design

See Figure 3.9.7-4 for Right Turn lane Design Elements and Table 3.9.7-3 for the minimum lane length and turn lane transition requirements.



The use of tapers in lieu of dedicated right turn lanes is strongly discouraged and requires approval of the City Engineer.

**Figure 3.9.7-4 Right Taper Design Elements**



**Table 3.9.7-3 Taper Design Criteria**

Design Speed of Roadway	Required Taper
30 – 40	8:1 Taper
45 – 50	15:1 Taper

3.9.7.6.3 Left Turn Lane Design

1. Where traffic is to be controlled by a traffic signal, the turn lane should be of sufficient length to store the turning vehicles and clear the equivalent lane volume of all other traffic on the approach, whichever is the longest.
2. This length is necessary to ensure that full use of the separate turn lane will be achieved and that the queue of the other vehicles on the approach will not block vehicles from the turn lane.
3. See below for guidance on turn lane Length.
4. See Table 3.9.7 for the Minimum Left Turn Lane Transition Length requirements.

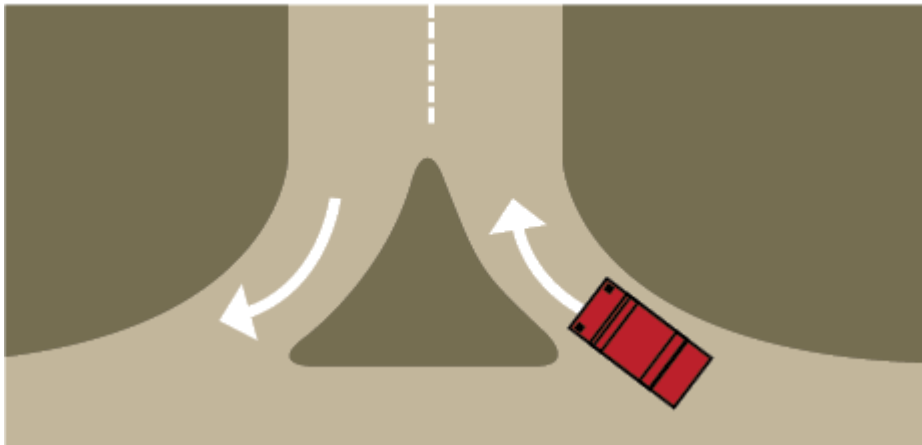
**Table 3.9.7-4 Minimum Left Turn Lane Transition Length**

Design Speed of Roadway	Lane Transition
< 35	150'-150' Reverse Curve
35 – 45	300'-150' Reverse Curve
45 – 50	600'-300' Reverse Curve

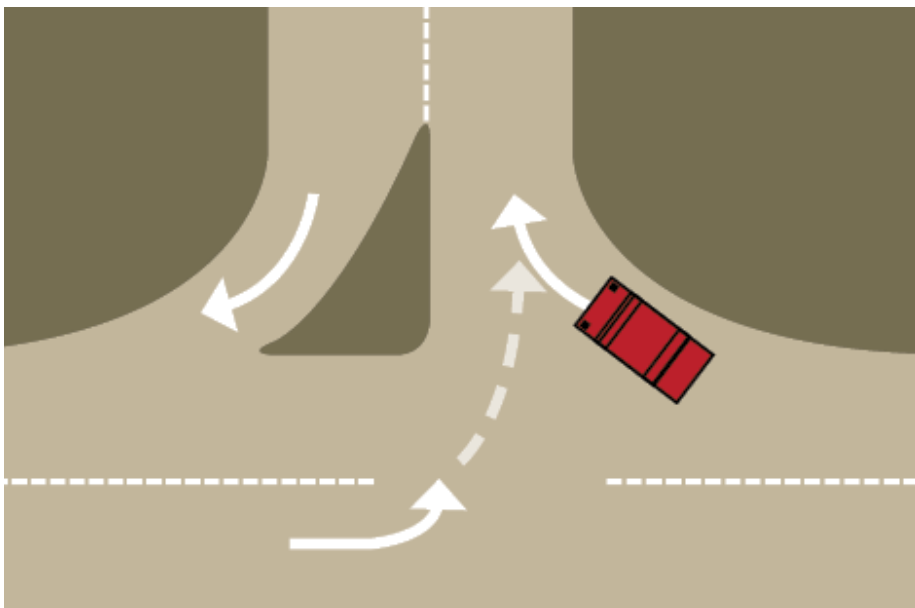
### 3.9.7.7 Restricted Turning Movements

Restricted right and/or left turn movements may be required based upon factors such as one way roadways or the necessary restriction of movements at a drive at the discretion of the city engineer. See Figures 3.9.7-5 thru 3.9.7-10 for illustrative examples of restricted turning movements.

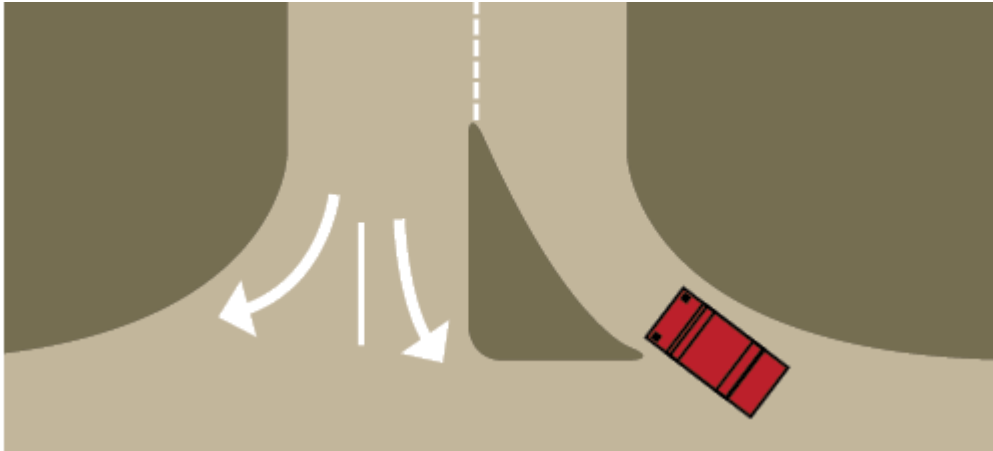
**Figure 3.9.7-5: Right In / Right Out**



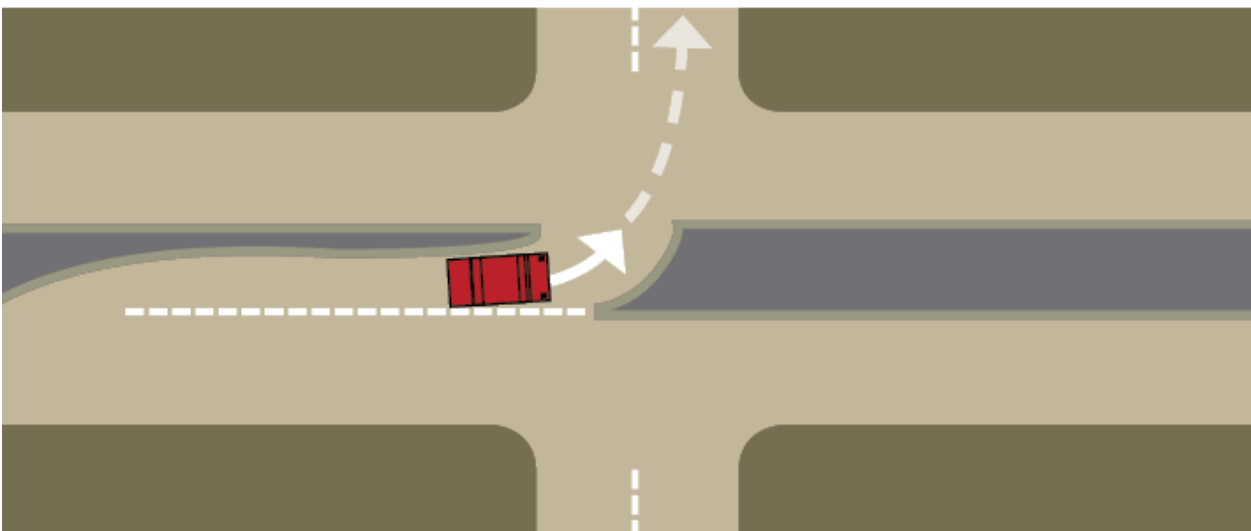
**Figure 3.9.7-6: Right In / Right Out and Left In**



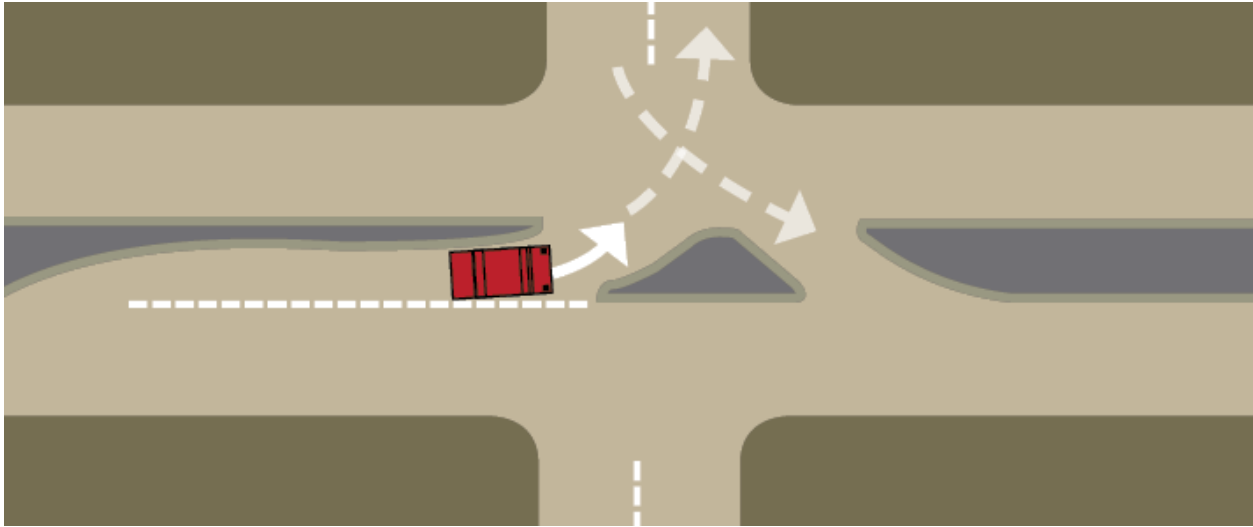
**Figure 3.9.7-7: Right In / Right Out and Left Out**



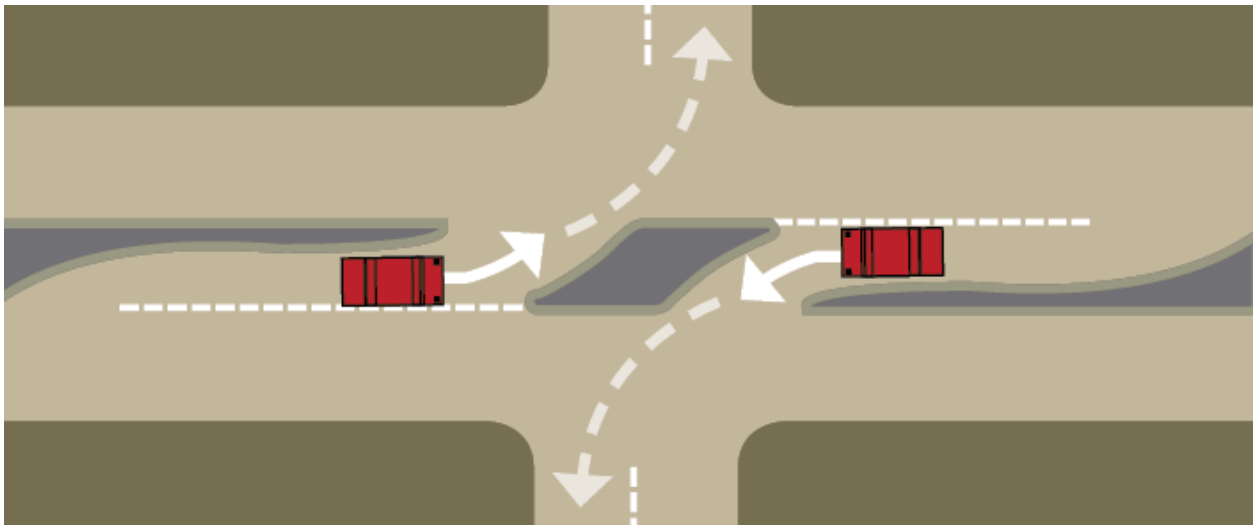
**Figure 3.9.7-8: Restricted Median – Left In Only**



**Figure 3.9.7-9: Restricted Median – Left In and Left Out on One Side**



**Figure 3.9.7-10: Restricted Median – Left In Both Sides**



### 3.9.7.8 Two Way Left Turn Lanes

#### 3.9.7.8.1 Definition and Appropriateness

1. Two-way left turn lanes (TWLTLs) are continuous center lanes that allows motorists traveling in both directions to pull out of through lanes and into a shared lane for left turns. TWLTLs offer spatial separation between opposing lanes of traffic and provide additional roadway capacity without adding general purpose lanes in each direction.
2. TWLTLs are most appropriate in locations with a high degree of land access, including a high intersection density and a large number of driveways, and where turning movements and business access on both sides of the street are desired.
3. TWLTLs are also appropriate where mid-block entrances are too close together to create dedicated turn lanes or turn bays.
4. Locations with few driveways or intersections are better served by medians and dedicated turn lanes.
5. TWLTLs are particularly appropriate for preserving roadway capacity in the application of a road diet where a four or six-lane roadway is converted to a two or four-lane facility with a continuous center turn lane. TWLTLs are not appropriate for locations with traffic volumes above 30,000 vehicles per day.

#### 3.9.7.8.2 Design Considerations

1. The width of TWLTLs should be 12-14' as measured from the middle of the striping on either side of the turn lane.
2. TWLTLs can create impediments for pedestrians as they add to crossing distance and may be incompatible with median refuge islands at mid-block crossings.
3. There should be no more than two through lanes in each direction adjacent to a TWLTL.