



ECF SPEED REDUCTION MEASURES



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Overview

Entry control facilities (ECFs) serve as installation access points, presenting unique security, safety, and traffic flow challenges. An essential component of meeting both security and safety objectives is implementing effective traffic calming measures to ensure vehicles travel at safe speeds through the ECF. However, these measures should not impede overall traffic flow. Given that ECFs often experience high traffic volumes, their design must strategically balance the need for efficient traffic flow with efforts to reduce vehicle speeds.

Traffic calming within an ECF addresses two primary needs:

- ☑ To reduce the speed of non-threat vehicles to align with the designated speed limit through the ECF
- ☑ To ensure that threat vehicles experience a sufficient delay by physically limiting their speed when approaching an active vehicle barrier (AVB).

Slow, non-threat vehicles help maintain safer conditions for pedestrians, motorists, and guards, while also assisting guards in identifying potential high-speed threat vehicles. A high-speed attack through an ECF is one type of vehicular risk; however, not all vehicles approaching an ECF at high speed pose a threat. Traffic calming measures can assist in slowing down non-threat vehicles and in assessing threat vehicles' intent. An effective ECF design should include geometric speed controls that physically limit the speed of potential threat vehicles, recognizing that methods effective on compliant drivers may not deter hostile ones.

Various techniques are used to reduce speed; each tailored to different requirements. Some methods are best suited for specific situations, while others are versatile and effective across multiple situations. The Transportation Engineering Agency (TEA) has noted instances where certain techniques have been applied incorrectly; this bulletin aims to clarify appropriate and inappropriate uses, as well as provide guidance on proper application.

ECF Speed Basics

The inbound and outbound approaches to ECFs often have speed limits higher than that of the ECF itself. TEA has determined that a speed limit of 25 miles per hour (mph) is the ideal speed limit for an ECF. It is a relatively slow speed; therefore, if traffic is traveling at 25 mph, it is generally considered acceptable. Speed limits slower than 25 mph are frequently not enforceable and not respected by drivers. The speed limit should be posted in both directions through an ECF.

The design speed influences various aspects of roadway design, such as curve radii, superelevation rates, taper rates, sight distance, barrier signal timings, and detection zone or loop spacing in certain safety systems. Consequently, it is essential to establish appropriate speed limits and ensure that motorists comply with them. While speed limit enforcement is crucial, traffic calming measures also play an effective role in reducing vehicle speeds.

Much of the traffic stream consists of regular traffic — motorists who enter the installation on a daily basis. These motorists may exceed the speed limit for generally innocent reasons, such as driver characteristics, inattentiveness, following the speeds of others, or any other common reason. These motorists can typically be slowed by traditional traffic calming methods that are appropriate for the facility.

Threat vehicles intend to run through the ECF and gain access to the installation as quickly as possible. There are different threat scenarios, but the threat scenario that most frequently governs is a high-speed threat. In this scenario, only physical design features, such as geometric traffic calming, can effectively reduce vehicle speed, as threat drivers are unlikely to respond to psychological based traffic control devices. Traffic calming helps reduce speeds for all drivers, but in ECF design, it also plays a key role in slowing threat vehicles and minimizing the response zone length. If there is no limitation to the length of the response zone, traffic calming for threat vehicles is not needed, and the AVBs could be located at a significant distance downstream to accommodate the high-speed threat. This scenario is uncommon, and when land is available, an extended response zone substantially increases costs due to the additional passive barrier length required as well as the greater distance for communications between the barriers and the ID check area.

Some traffic calming measures rely on physical means to force speed reduction, while others at least partially use psychological techniques to slow traffic. Psychological techniques can be effective, particularly for drivers not familiar with the area. Physical means are always effective because they use roadway geometry and in-roadway traffic calming devices, which require a slower operating speed.

Before implementing traffic calming measures, verify that all signage is accurate. Signs should be legible, visible, correctly positioned, adequately sized, retroreflective, and correctly fabricated. Mounting must meet required height and offset specifications from the roadway, and signs should not be obstructed by other signs, vegetation, or objects within the ECF corridor. Additionally, signage should be placed far enough in advance of the ECF to give drivers adequate time to respond and slow down gradually before reaching the ID checkpoint.

Traffic Calming Measures

Various traffic calming methods are listed in the table below, with their effectiveness and target traffic types.

	Effective for:	
	Regular Traffic	Threat Vehicle
Speed Bumps	No	No
Speed Humps	Physical/ Psychological	No
Chicane	Physical	Physical
Roadway Curvature	Physical	Physical
Raised Median Island	Psychological	Physical
Roadway Narrowing	Psychological	Physical
Roundabout	Physical	Physical
Speed Limit Signing	Psychological	No
Rumble Strips	Psychological	No

Speed Bumps

Speed bumps are vertical deflections, typically a few inches high and 1- to 3-feet long. They are highly effective at reducing vehicle speeds, which can be beneficial in certain contexts but problematic in others. Their abrupt impact can interfere with traffic flow and may pose operational challenges in high-security environments. While speed bumps are permitted at ECFs, their use should be carefully evaluated based on mission requirements, traffic characteristics, and installation-specific guidance. TEA does not recommend the use of speed bumps on installations.

Speed Bump Profile

Image Source:
SDDCTEA Pamphlet
55-17

SPEED BUMP

- ✓ 1- to 3-feet long
- ✓ 3- to 6-inches high

Speed Humps

Speed humps are effective in slowing regular traffic. Unlike speed bumps, they are longer—typically 12- to 22-feet in length—with a vertical deflection of approximately 3- to 4-inches. The extended transition in elevation creates a smoother ride, which encourages drivers to reduce speed without causing abrupt discomfort.

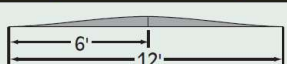
Speed humps are suitable for use in both inbound and outbound directions prior to the ID checkpoint, particularly within the approach zone. When placed at least 150 feet from the ID checkpoint, they can help maintain vehicle speeds below 25 mph. For approach zones longer than 400 feet, additional speed humps may be used to sustain speed control throughout the zone. In some cases, speed humps may also be used to reduce speed approaching AVBs.

Although speed humps do not significantly impact high-speed threat vehicles, they can assist in gauging driver intent. A vehicle that fails to slow down for a speed hump may indicate suspicious behavior, prompting further attention from security personnel.

Speed humps may also be used in the response zone for outbound traffic to reduce speeds as vehicles approach the ID check area. However, they are not recommended in the response zone for inbound traffic, as they do not improve response time or enhance safety for ECF personnel. In outbound lanes, placement should be carefully considered to avoid queuing traffic onto adjacent intersections.

Speed Hump Profiles

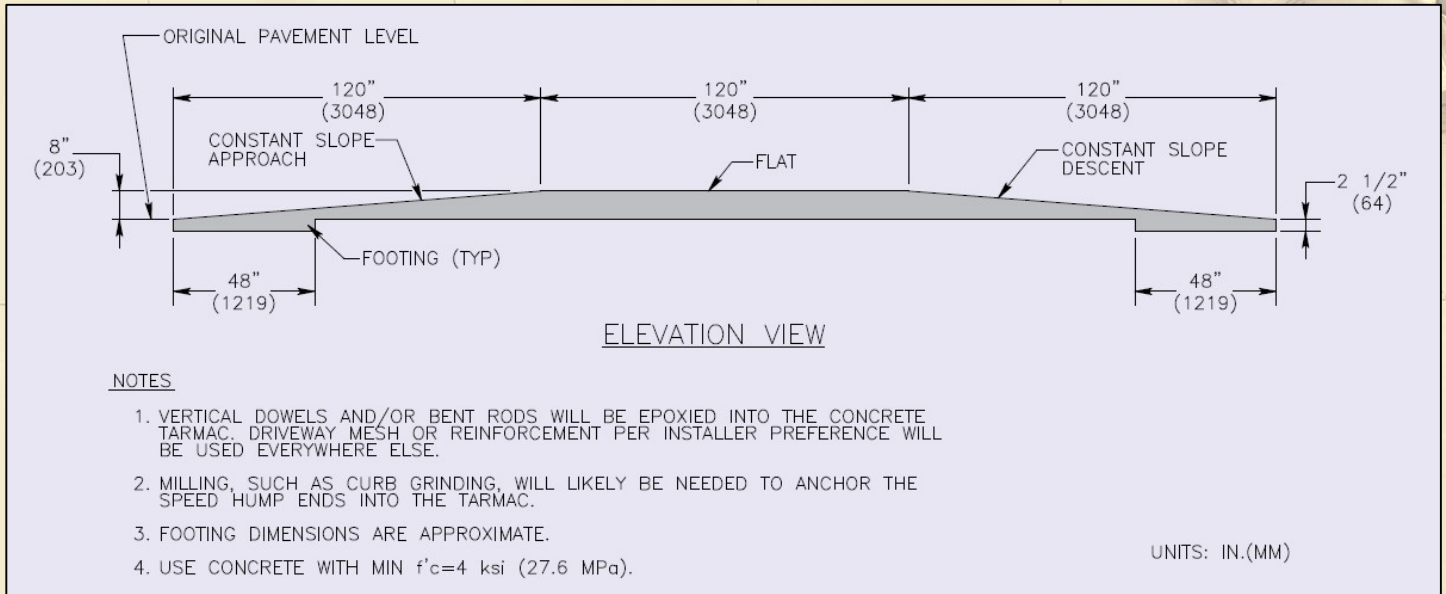
Image Source: SDDCTEA Pamphlet 55-17

SPEED HUMP (WATTS PROFILE)	SPEED HUMP (SEMINOLE PROFILE)
	
✓ 12-feet long ✓ 3- to 4-inches high	✓ 22-feet long ✓ 3- to 4-inches high ✓ Also called speed tables

TEA has also developed and tested an aggressive speed hump design optimized for comfort and safety across a range of vehicle types, including compact cars, sports cars, large vehicles, motorcycles, and trailers. The recommended profile includes an 8-inch height, a 10-foot approach slope, a 10-foot-long speed table, and a symmetrical departure slope. While this design may be used when a more aggressive profile is needed, the Watts or Seminole profiles remain preferred for most applications. The recommended aggressive speed table design is shown on the next page.

TEA Aggressive Speed Table

Image Source: SDDCTEA Pamphlet 55-15



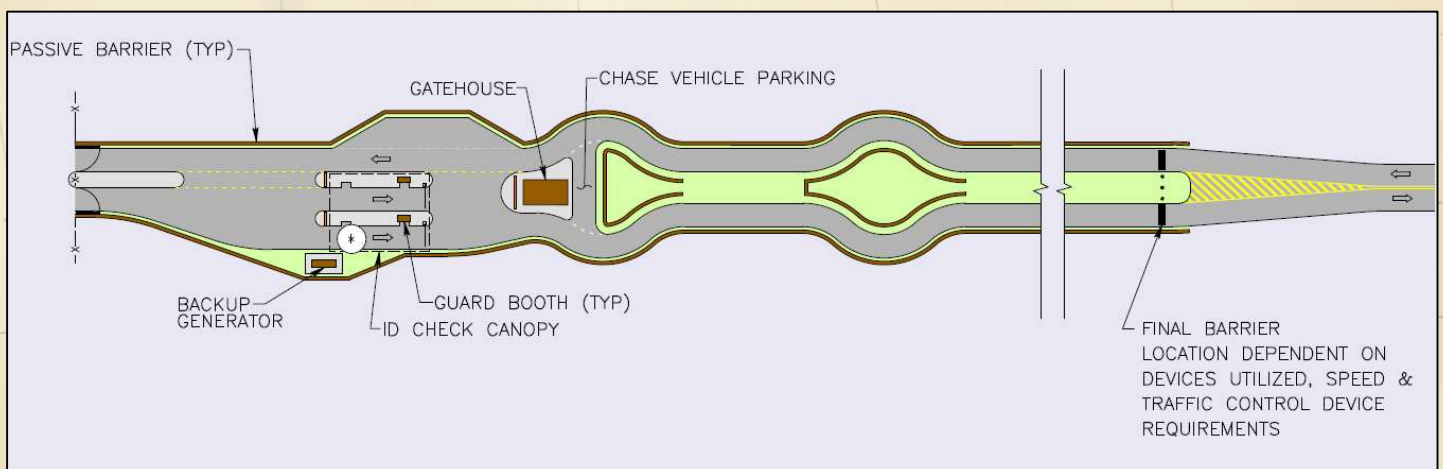
Chicane

A chicane is a lateral shift in the roadway designed to slow vehicles by altering their travel path. This shift can be created through roadway curvature or in-roadway devices that force vehicles to change direction. Chicanes are effective only when the deflection is significant enough to physically slow traffic.

Both methods described above are effective for reducing traffic speeds. A single-lane deflection alters the horizontal alignment through roadway modifications such as pavement markings and curbing. These changes provide a clear visual cue to drivers, signaling the shift in alignment and encouraging reduced speeds. In some designs, two travel lanes are merged into a single lane using in-roadway barriers or channelization devices, forcing vehicles to slow as they navigate the resulting S-curve. This approach not only reinforces the deflection but also physically restricts lateral movement.

In-Roadway Devices: Chicane at ECF

Image source: SDDCTEA Pamphlet 55-15

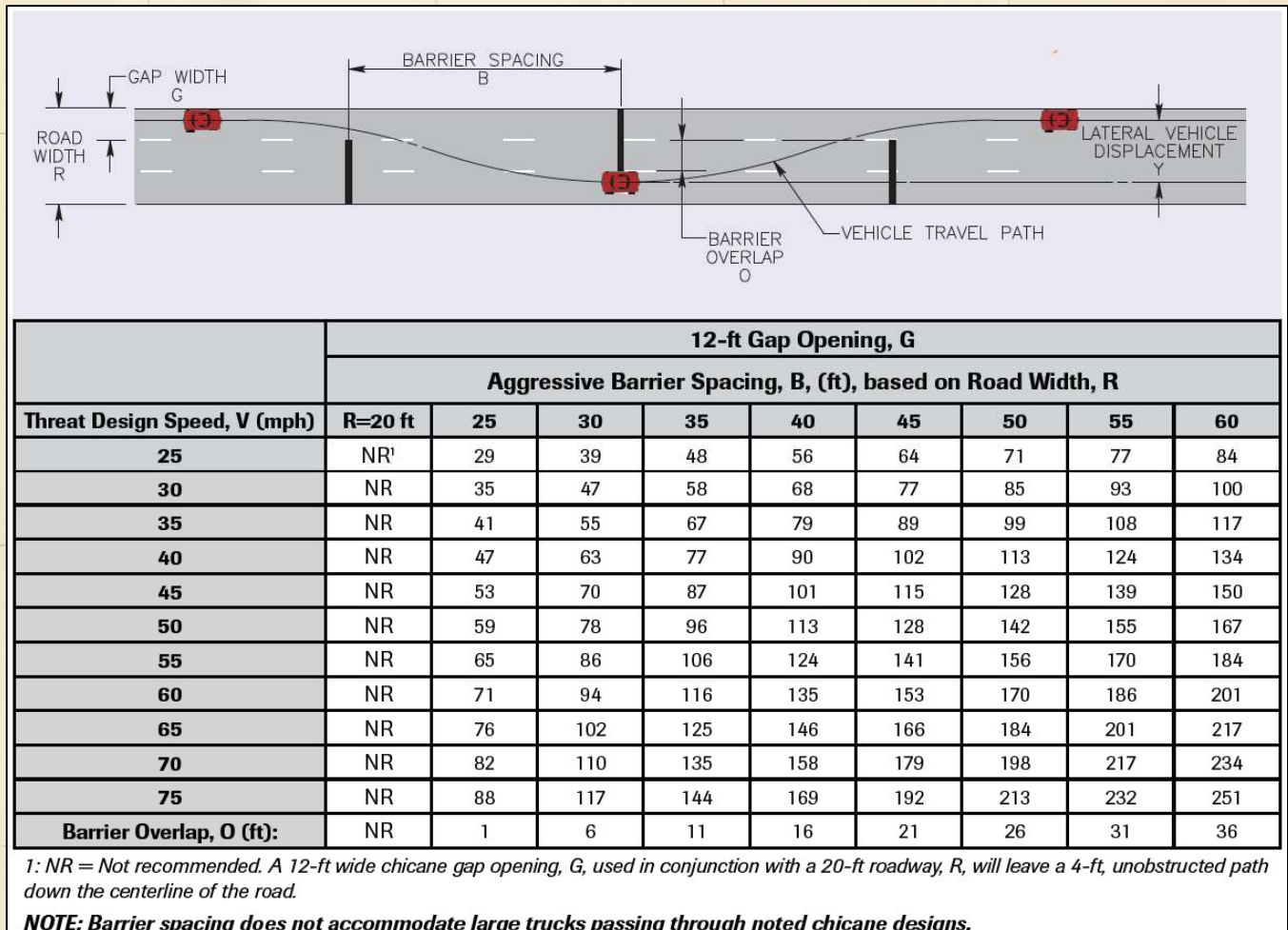


The following should be considered when implementing chicanes and reducing the number of lanes:

- ☑ Evaluate current traffic volumes to determine whether the reduced lane count can handle existing demand.
- ☑ The use of blunt-end objects (like concrete barriers and bollards) to close off lanes are considered a roadway hazard (for a safe alternative, see TEA 8 inch in-roadway curb design on page 6).
- ☑ Install appropriate signage, markings and channelizers to reflect the new roadway configuration.
- ☑ Proper spacing of chicanes to achieve the desired design speed.
- ☑ Space chicanes appropriately to allow for the turning radius of the largest design vehicle.

Aggressive 3-Chicane Barrier Design With 12-Ft Chicane Gap Width

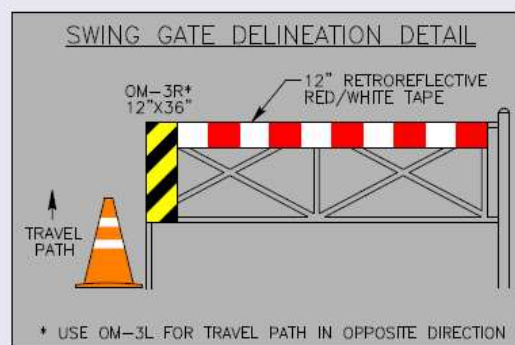
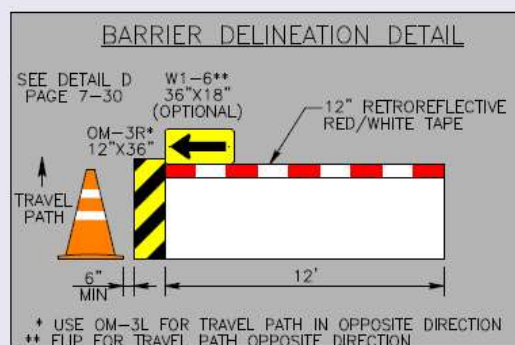
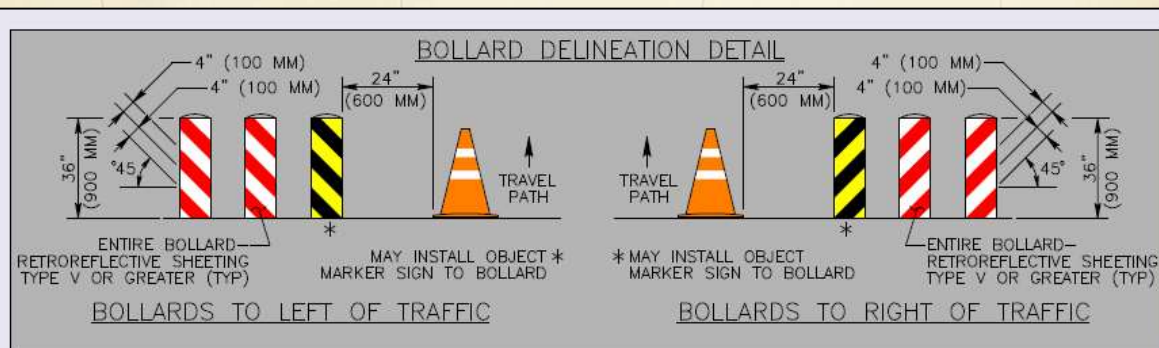
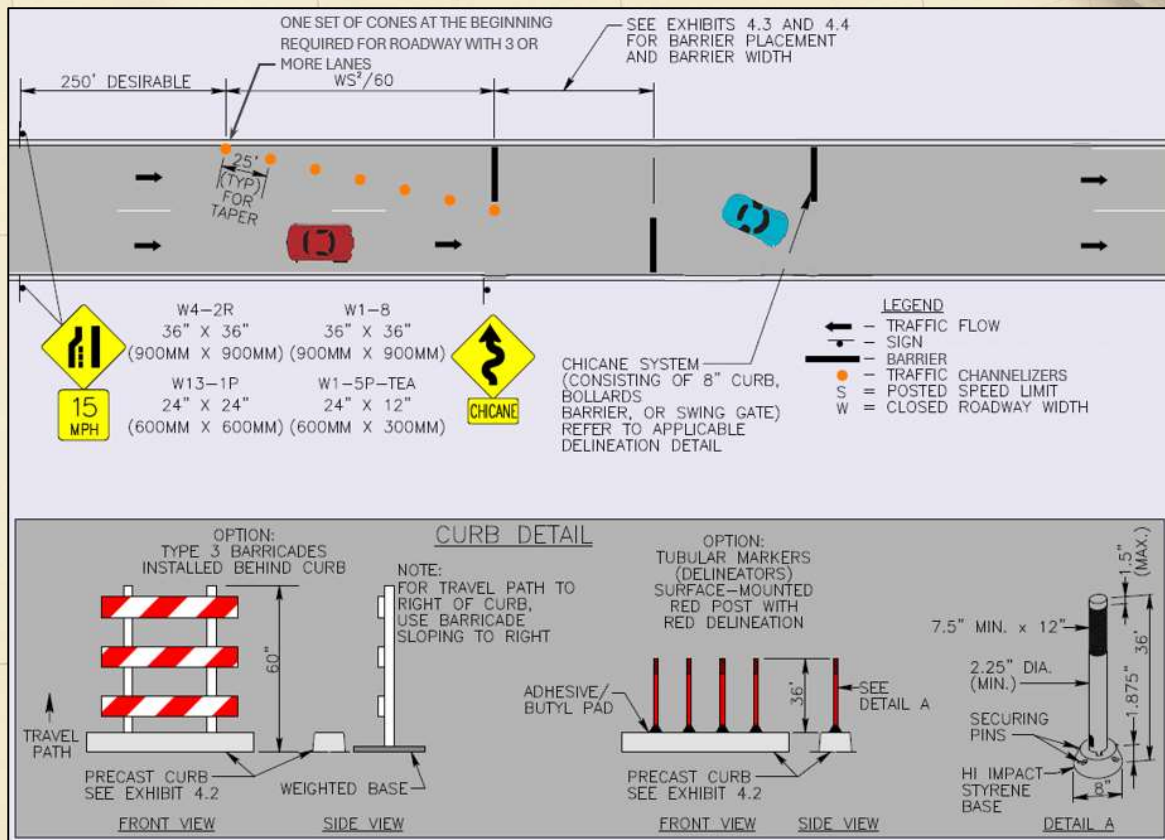
Image source: SDDCTEA Pamphlet 55-15



If barriers must be used, the preferred delineation style is shown below.

Barrier Delineation Detail

Image source: SDDCTEA Pamphlet 55-15



Roadway Curvature and Median Islands

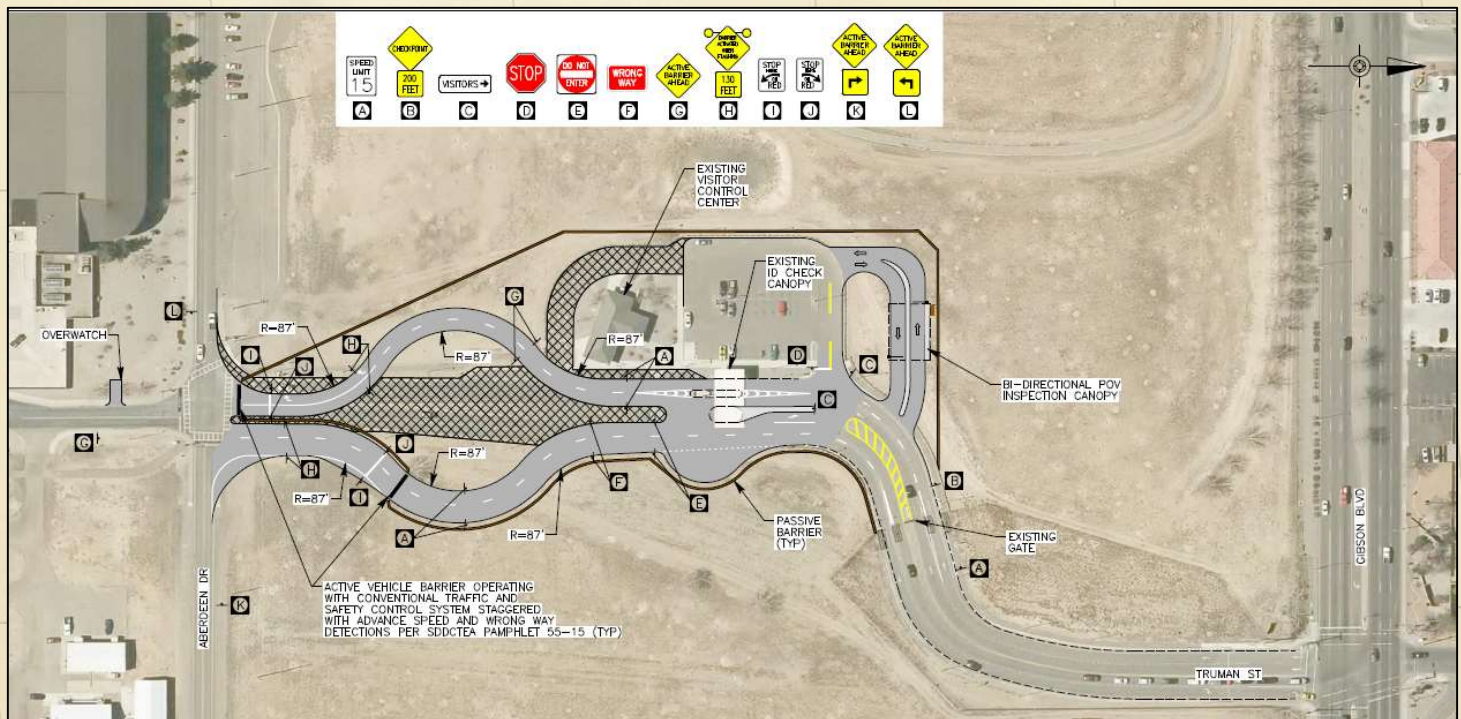
Roadway curvature is the preferred method for slowing traffic through an ECF. The curvature physically slows traffic by forcing traffic to reduce speeds for drivers to remain in control. In an ECF application, the curvature must be accompanied by passive barriers to prevent vehicles from bypassing the curves and following a straight path by leaving the pavement. The amount that curvature slows traffic depends on the radius of the curve.

In wide ECF corridors, threat vehicles may attempt to cut across multiple lanes through a curve to maintain higher speeds. In such cases, a raised median island can be used in conjunction with curvature to limit lateral movement and reduce the effective travel width. This physical constraint helps lower the maximum speed a threat vehicle can achieve.

Raised median islands also serve as a form of directional separation, providing a clear physical divide between inbound and outbound lanes. This separation enhances operational control and can contribute to psychological traffic calming by narrowing the perceived travel lane. While the speed reduction from psychological effects may be minimal, a slight decrease in non-threat vehicle speeds can be observed.

ECF with Curvature and Islands

Image source: SDDCTEA Pamphlet 55-15



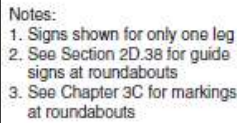
Roadway Narrowing

Roadway narrowing can have a psychological effect on reducing travel speeds for normal traffic and a physical effect on reducing speeds on threat vehicles, similar to a raised median island. A narrower roadway, for example using 11-foot lanes instead of 12-foot lanes, or eliminating shoulders, can reduce travel speeds by making motorists feel more constrained. This may be less effective with commuters who are accustomed to the roadway.

Narrowing the roadway—particularly through curves—can physically reduce the speed of threat vehicles by limiting the radius of the threat path. A tighter turning radius lowers the maximum speed at which a vehicle can safely navigate the curve without spinning out. One variation of this approach is to eliminate shoulders on both sides, leaving only the travel lane available for vehicle movement. However, any implementation of road narrowing must account for truck off-tracking to ensure that large vehicles can still safely pass through the ECF.

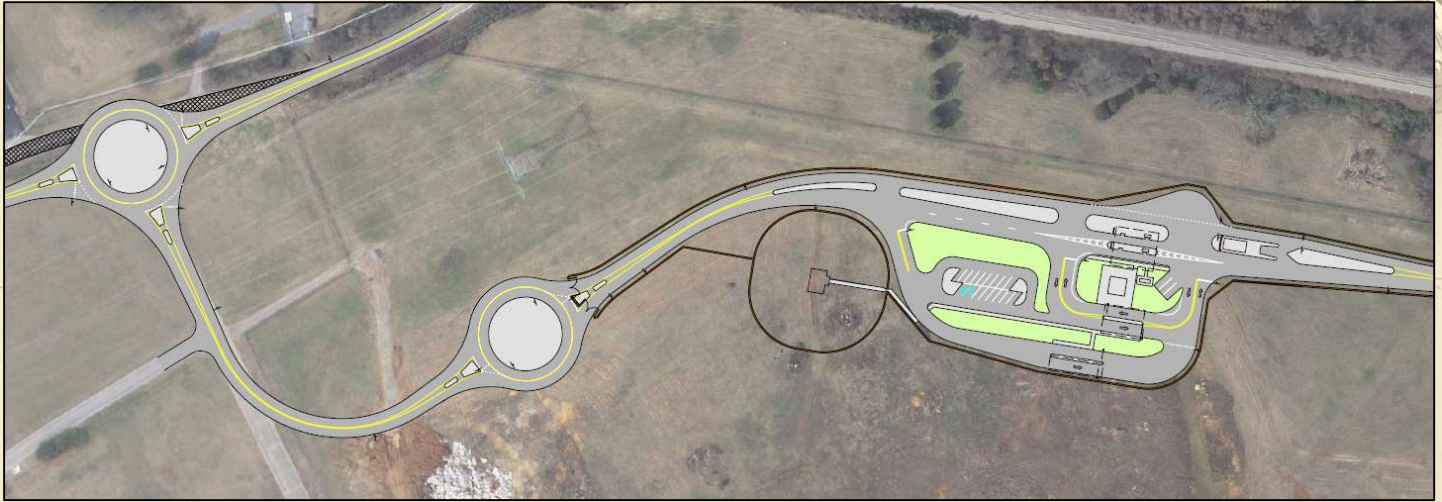
An example of an ECF with roundabouts is shown on the next page.

Image source: MUTCD Figure 2B-23



Roundabout at ECF Example

Image source: SDDCTEA Pamphlet 55-15



Speed Limit Signing

Speed limit signing can have a psychological speed reduction effect by simply making drivers aware of the actual reduced speed limit for the ECF. Many instances of speeding can be simply due to non-compliant signage. While it is recognized that signage alone may not fully ensure compliance with speed limits, enhancing signage in combination with attention-grabbing devices can be effective. These devices and enhancements may include:

- ☑ Increased sign size. Instead of a 24x30-inch size sign, use a 30x36-inch or 36x48-inch sign. The larger sign size is more visible.
- ☑ Left-hand signing. Primary signs must always be mounted on the right-hand side of the road, but supplemental signing can be located on the left-hand side. This is especially effective on multi-lane roadways. A large vehicle in the right lane can block visibility of a sign mounted on the right side of the roadway.
- ☑ Pavement marking legends. A legend can be painted within the travel lanes that indicates the speed limit. Legends can only be used as a supplement to the speed limit sign.
- ☑ Speed feedback signing. Speed feedback signing is helpful at displaying the actual travel speed to the driver. These signs typically use flashing yellow lights when the speed limit is exceeded, providing a compliant and effective visual cue to encourage drivers to slow down.
- ☑ Flashing warning devices. These are flashing amber lights located above a warning sign to draw additional attention to the sign. While these cannot be used with a speed limit sign, they can be used with a speed limit reduction warning sign, or any other warning sign, to draw additional attention to the warning condition.

Rumble Strips

Rumble strips are an effective traffic calming measure that work by creating audible noise and vibration, which most drivers find unpleasant. This sensory feedback helps increase driver awareness, especially among those who may be momentarily inattentive, leading to reduced vehicle speeds.

While rumble strips are useful for alerting drivers to changing road conditions or upcoming checkpoints, they have notable drawbacks—primarily the noise they generate. Because of this, rumble strips should not be installed near noise-sensitive areas such as residential neighborhoods, schools, parks, or other similar land uses.

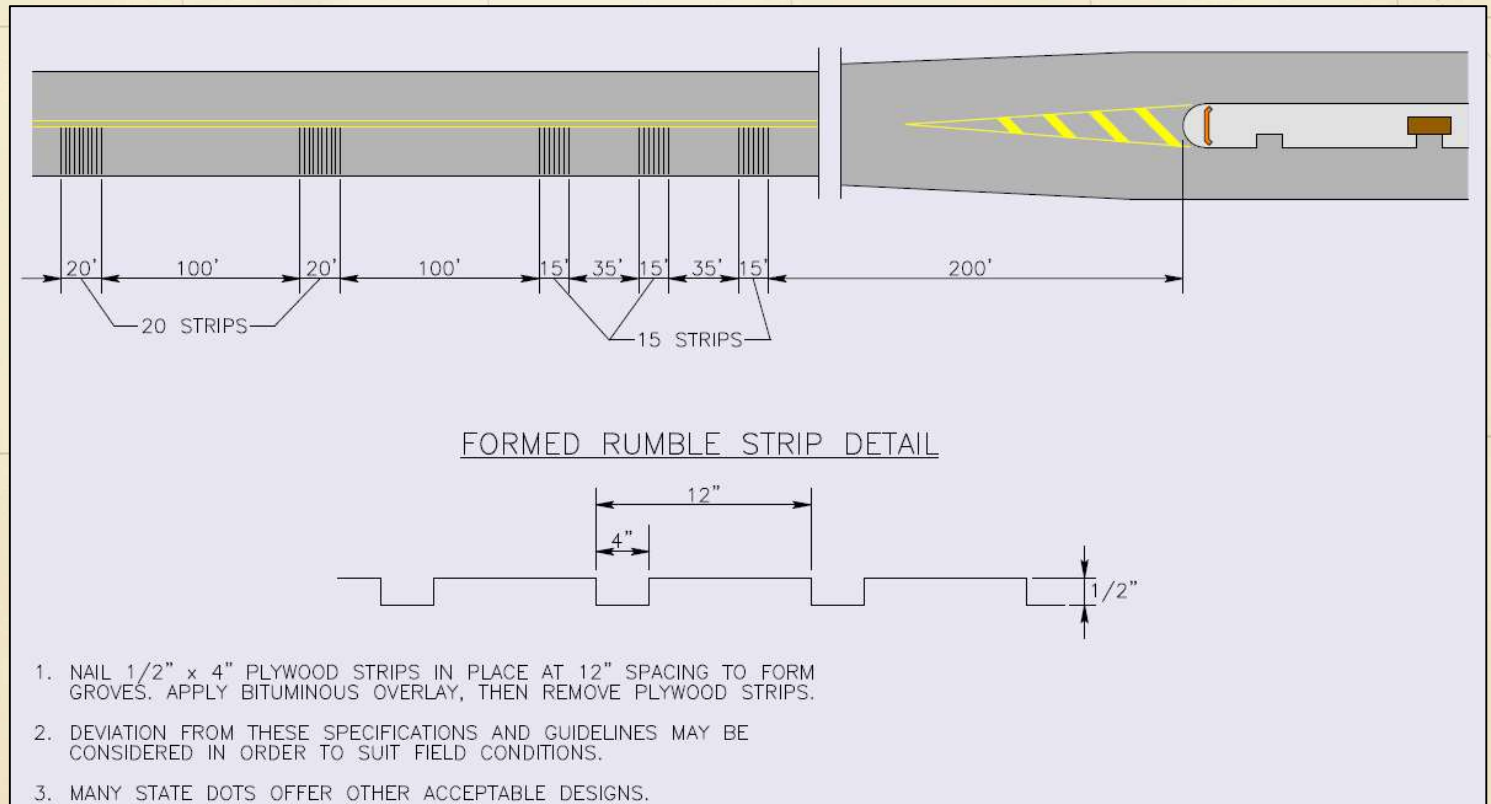
When used near security checkpoints, rumble strips should be placed far enough in advance so that the noise does not interfere with guards' ability to communicate effectively.

In terms of installation, rumble strips require suitable pavement conditions. They are typically milled into the wearing course of asphalt pavement or formed into concrete surfaces. Surface-applied alternatives exist, but they lack the durability of in-pavement options. It's important to note that rumble strips offer no physical barrier. As such, they are ineffective at slowing or diverting threat vehicles, which are not deterred by the noise or vibration alone.

Several state departments of transportation have developed their own design guidelines for the use of transverse rumble strips. The figure below shows one example illustration of rumble strips used in an ECF approach zone.

Detail for Transverse Rumble Strips

Image Source: SDDCTEA Pamphlet 55-15



Summary

Traffic calming measures are often necessary at ECFs. They bring a significant benefit to motorists and guards, and contribute to the intended operation of the ECF. While traffic calming measures are effective for reducing vehicle speeds and enhancing security, they may present challenges under certain conditions. Winter maintenance can be more complex around vertical deflections and geometric features, requiring additional planning for snow removal and ice control. Emergency response must also be considered—particularly when external agencies, such as municipal fire departments, need rapid access to the installation. Calming features should be designed to minimize delays for emergency vehicles and allow for clear, unobstructed passage when needed. As part of assessing the viability of a traffic calming technique, consult TEA to ensure the most appropriate method is selected.

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for pamphlets, bulletins and studies

Reference List

- ☑ [TEA Home](#)
- ☑ [TEA Pamphlet 55-15, *Traffic and Safety Engineering for Better Entry Control Facilities* \(2019\)](#)
- ☑ [TEA Pamphlet 55-17, *Better Military Traffic Engineering* \(2016\)](#)
- ☑ [FHWA *Manual on Uniform Traffic Control Devices, 11th Edition* \(2023\)](#)

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