

13.1 TEMPORARY BARRIER SYSTEMS

13.1.1 GENERAL

This BDM provides guidance on using the temporary barrier systems. All bridge and earth retaining systems projects should use the minimum clear area width as stipulated in Section 12-3.20C of the Caltrans *Standard Specifications* and the Caltrans *Traffic Safety System Manual*. Temporary barrier systems are used to protect the traveling public and highway construction workers from errant vehicles and other hazards, such as excavation, open deck edges, embankments, etc.

13.1.2 DEFINITIONS

Anchored (or Bolted) – Secured to Portland Cement Concrete (PCC) or approach slabs or bridge decks by post-installed anchors.

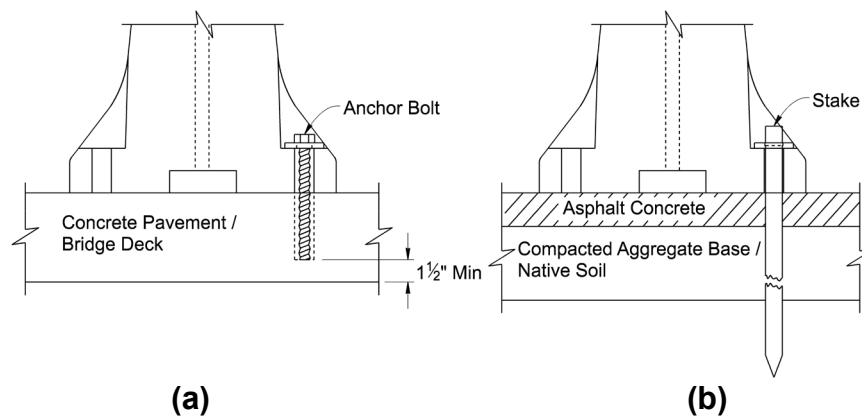


Figure 13.1.2-1 Illustration for (a) Anchored (b) Staked

Clear area width – The minimum width throughout the length of the barrier system that must be maintained clear of obstructions, objects, drop-offs, slopes steeper than 4:1 (horizontal: vertical), and work resources during non-working hours. The width is measured perpendicular from the toe of the barrier on the side opposite to traffic.

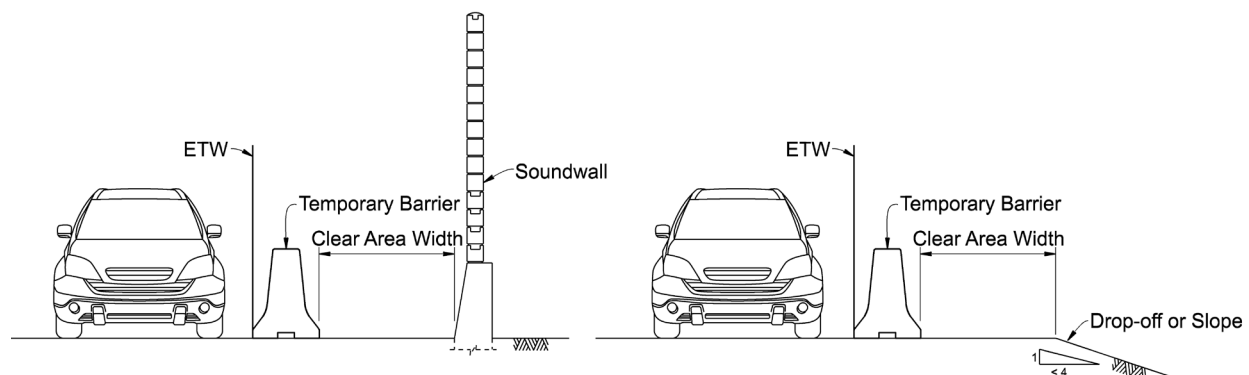


Figure 13.1.2-2 Illustration for Clear Area Width, and Drop-off or slope

Freestanding – Not secured to the pavement, bridge deck, PCC, or approach slab.

Height differential – The greatest distance from the top of pavement, bridge deck, edge of deck, PCC, or approach slab to the grade below. A height differential may be present due to an excavation, a downward slope steeper than 4:1 (horizontal: vertical), or a drop-off.

Minimum system length – the minimum installation length of the temporary barrier to meet MASH required standards.

Minimum alignment curve radius – the minimum alignment curve radius to install the temporary barrier to meet MASH required standards.

Setback distance – The distance measured between the traffic side toe of the temporary barrier and the edge of the traveled way for each direction of traffic.

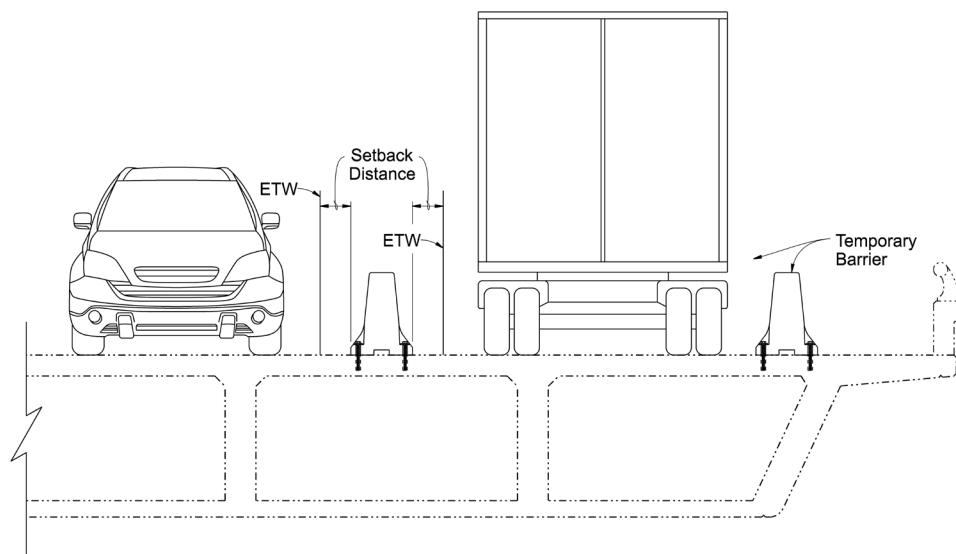


Figure 13.1.2-3 Illustration for a setback distance

Staked – Secured to asphalt pavement using a metal stake. (Figure 13.1.2-1 (b))

13.1.3 NOTATIONS

LDS Low deflection system

MDS Minimum deflection system

SDS Standard deflection system

NDY Not determined yet at the publication of this document; contact HQ Traffic Safety team by emailing hq.ossd.support@dot.ca.gov

13.1.4 REQUIREMENTS

Compliance with the Manual for Assessing Safety Hardware (MASH) requires a clear area width between the barrier and fixed objects, or height differentials, to ensure the safety of the traveling public outside the time construction activities are taking place. The clear area width requirements are based on MASH TL-3 or TL-4 crash test results and analytical modeling. As such, each temporary barrier system will have a minimum requirement for clear area width, anchorage options, setback distance, and application for various traffic arrangements.

Temporary barrier systems are intended for use in short-term applications of less than 5 years.

Table 13.1.4-1 provides a list of temporary barrier systems from which designers and contractors can choose for use on asphalt pavement, PCC pavement, approach slabs, or concrete decks. The table is similar to the one from Standard Specification 12-3.20C, with the addition of the barrier width and other design considerations, as follows:

- anchor embedment length
- system (installation) length
- alignment curve radius
- setback distance for a single row of temporary barriers separating opposing or same-direction traffic lanes

Table 13.1.4-2 lists barrier systems approved to be used only on asphalt pavement. They are more suitable for construction sites where a temporary barrier is placed on asphalt pavement, such as an earth-retaining wall project adjacent to a roadway or a temporary support (falsework) for bridge bent construction with adjoining roadway traffic, particularly for bridge and structure applications.

Notes:

- These tables do not list all the approved systems available on the AML or the requirements, such as the number of stakes or anchors required, or approach or departure requirements (if any). Engineers are encouraged to check for the latest temporary barrier systems in the latest standard specifications, Highway Safety Features on [Authorized Materials Lists](#), or Temporary Barrier Systems, MASH (XLSX) under List Devices on the [Caltrans MASH Implementation](#) website, as new products are being approved.
- The 1990 Memo to Designers 14-19 Temporary Railing is attached as Appendix A, providing information for Temporary Railing (Type K). Design engineers and contractors may continue to use this system on projects advertised before January 1, 2027.

Table 13.1.4-1: Minimum Clear Area Width Requirements

Barrier	Barrier Width (inches)	Configuration ¹	Minimum Clear Area Width (ft)				Other Design Considerations			
			Height differentials 3 feet or less	Height differentials greater than 3 feet up to 8 feet	Edge of deck or height differentials greater than 8 feet	Fixed objects, falsework members, or temporary supports ^a	Minimum anchor embedded depth ² (inch)	Minimum required Setback ³ (ft)	Minimum system length (ft)	Minimum radius for Installation (ft)
Temporary Railing (Type K) 20-foot precast concrete barrier	24	Freestanding	2	3	8	7	Refer to Appendix A			
		2 stakes or 2 anchor bolts	1	1	3	4				
		4 stakes or 4 anchor bolts	N/A	N/A	3	3				
Temporary Barrier System (Cross-Bolt) 10, 20 & 30-foot temporary concrete barrier with cross bolt	24	Freestanding	1	2	5	5	N/A	1	120	10-foot – 125 20-foot – 265 30-foot – 400
		Staked or anchored	1	1	2	3	6		80	
Temporary Barrier System (Cal F-23) 12 & 20-foot temporary concrete barrier	24	Freestanding	4	5	8	8	N/A	1	120	12-foot – 100 20-foot – 165
		Staked or anchored	1	1	2	3	6		80	
HighwayGuard 19.8 feet temporary steel barrier	21.3	LDS - Staked or anchored	2	2	2	2	6	2	200	NDY
		MDS - Staked or anchored	1	1	1	1		Not allow	118	
		SDS - Staked or anchored	7	7	7	7		7	393	
HV2 19-foot temporary steel/concrete barriers	18	Freestanding	4	5	7	8	N/A	5	323	262

Table 13.1.4-1: Minimum Clear Area Width Requirements (Cont.)

Barrier	Barrier Width (inches)	Configuration ¹	Minimum Clear Area Width (ft)				Other Design Considerations			
			Height differentials 3 feet or less	Height differentials greater than 3 feet up to 8 feet	Edge of deck or height differentials greater than 8 feet	Fixed objects, falsework members, or temporary supports ^a	Minimum anchor embedded depth ² (inch)	Minimum required Setback ³ (ft)	Minimum system length (ft)	Minimum radius for Installation (ft)
J-J Hooks 12.5 & 20-foot temporary concrete barriers with "J" hook	24	Freestanding	3	4	8	7	N/A	1	12.5 feet – 192 20 feet – 220	12.5 feet – 100 20 feet – 165
		staked or anchored	1	1	2	3	6.75			
REBLOC 39.33 feet temporary concrete barrier	12	Freestanding	6	6	6	6	N/A	6	SDS – 354 MDS – 197	853
		Staked or anchored	2	2	2	3	6.25	2		
Zoneguard 50-foot temporary steel barriers	27.56	Staked or anchored at both ends only	6	7	9	10	4 to 6	Not allow	250	Not allow
		Staked or anchored every 250 feet	5	6	8	9				
		Staked or anchored every 33 feet	1	1	3	4		2		800 ^b

¹ Refer to the AML or Standard Specifications for the number of stakes or anchors required

² Refer to the AML for approved plans or Standard Specifications for the embedded length of the stake

³ For a single run of barrier with traffic on both sides of the barrier with typical lane widths. For lane widths less than 11 feet, consult the District Traffic Safety Systems Coordinator

^a The minimum clear area width to a falsework or temporary support footing can be 2 feet less than the clear area width shown. Measure clear area width to the footing edge closest to traffic. At the time of publication of this document, the standard specifications allow this reduction in the clear area width adjacent to falsework and temporary support; however, that allowance is anticipated to be removed.

^b Contact the manufacturer for a tighter radius

Table 13.1.4-2 Systems Suitable for Asphalt Concrete Pavement

Barrier	Barrier Width (inches)	Configuration ¹	Minimum Clear Area Width (ft)				Other Design Considerations		
			Height differentials 3 feet or less	Height differentials greater than 3 feet up to 8 feet	Edge of deck or height differentials greater than 8 feet	Fixed objects, falsework members, or temporary supports ^a	Minimum Required Setback ² (ft)	Minimum system length (ft)	Minimum Radius for Installation (ft)
Defender 12-3/4-foot temporary steel barriers	26.75	100HC-Freestanding with stakes at each end - Max L 158'	2	3	8	7	2	320	755
		100LDS-Staked at each end and every 30 feet	1	2	4	5	2	260	755
Pro-Cast Rigid Barriers 10-foot temporary concrete barrier	24	Freestanding	2	3	6	6	6	200	75.33
		2 stakes on traffic side	1	1	4	3	Not allow		
		2 stakes each side (total 4)	1	1	3	2			
Pro-Cast Rigid Barriers 20-foot temporary concrete barrier	24	Freestanding	1	2	5	5	6	200	150.67
		3 stakes on traffic side	1	1	3	2	Not allow		
		3 stakes each side (total 6)	1	1	2	1			
Pro-Cast Rigid Barriers 30-foot temporary concrete barrier	24	Freestanding	1	1	4	4	6	210	378.17
		3 stakes on traffic side or each side	1	1	2	1	Not allow		

¹ Refer to the AML or Standard Specifications for the number of stakes or anchors required

² For a single run of barrier with traffic on both sides of the barrier with typical lane widths. For lane widths less than 11 feet, consult the District Traffic Safety Systems Coordinator

^a The minimum clear area width to a falsework or temporary support footing can be 2 feet less than the clear area width shown. Measure clear area width to the footing edge closest to traffic. At the time of publication of this document, the standard specifications allow this reduction in the clear area width adjacent to falsework and temporary support; however, that allowance is anticipated to be removed.

13.1.5 ILLUSTRATIONS FOR SELECTED SCENARIOS

The following figures illustrate a few scenarios from Tables 13.1.3-1 and 13.1.3-2. Most of the illustrations shown use the *Temporary Barrier System (Cal F-23)*. However, the designer should evaluate and select the barrier system that best suits the project.

For a height differential greater than 8 feet:

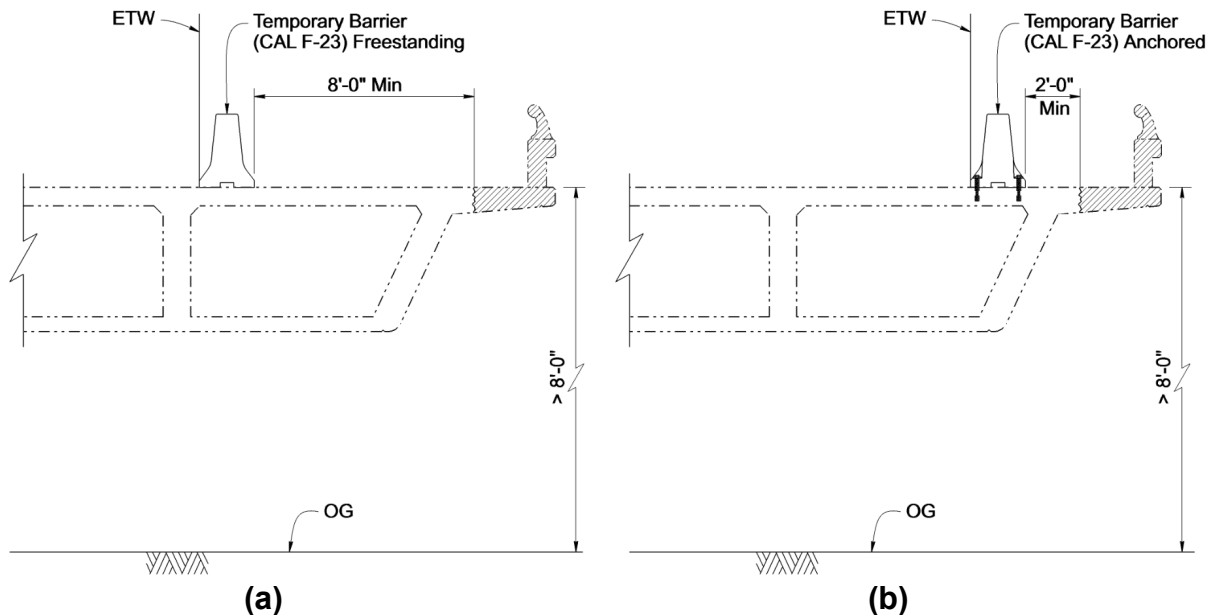


Figure 13.1.5-1 Illustration Using Temporary Barrier System Cal F-23
(a) Freestanding (b) Anchored

Figure 13.1.5-2 illustrates a staked or anchored temporary barrier system (left barrier) and a freestanding temporary barrier (right barrier) near falsework members or temporary supports.

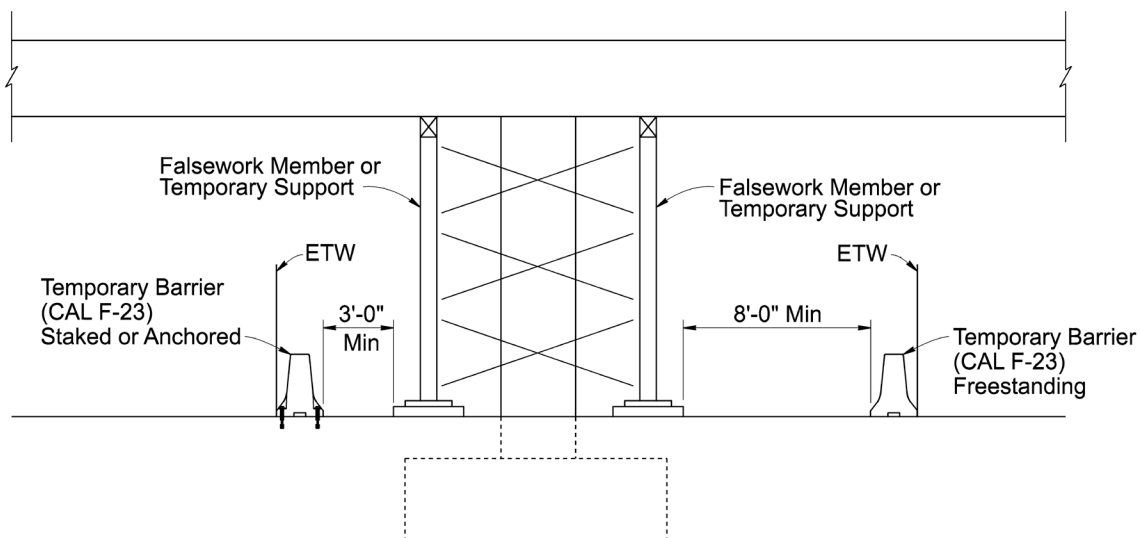


Figure 13.1.5-2 Illustration Using Temporary Concrete Barrier Cal F-23 near Falsework Member or Temporary Support

13.1.6 OTHER CONSIDERATIONS

Depending on the project needs and the clear area width available, the placement of the temporary barrier would depend on the available systems and whether they are freestanding, staked, or anchored. Staked configurations are used on asphalt concrete pavement. Anchored configurations are typically used on PCC pavement, approach slabs, or bridge decks.

Shorter length segments of the temporary barrier systems are available for tight radius curves. *Standard Specifications* 12-3.20C(2) and 12-3.20C(3), and tables in this BDM provide the minimum curve radius for the available systems. Some systems require more stakes or anchors to be installed, depending on the radius.

Attention should be given to the existing deck condition if the temporary barrier system needs to be anchored to it. Per *Standard Specifications*, the anchor should not penetrate closer than 1 ½ inches from the bottom of the deck.

The concrete temporary barrier system typically includes drainage scuppers, while the steel temporary barrier does not.

Steel temporary barrier systems are lighter and easier to move, allowing more barrier segments to be transported in a single truckload than concrete systems.

Collaborating as much as possible between the bridge and roadway design engineers to select a temporary barrier system could reduce project costs if the system can be used for the entire project.

Lane widths less than 11 feet may require more setback distance and consultation with the District Traffic Safety Systems Coordinator.

The *Traffic Safety System Manual* provides guidance for the Roadway engineer on requesting an exception to the traffic safety system standards.

13.1.7 REFERENCES

1. Caltrans. (2025). Traffic Safety System Manual, on the [Traffic Safety Devices website](#), California Department of Transportation, Sacramento, CA.
2. Caltrans. (2025). *Standard Specifications*, 2025 Edition, California Department of Transportation, Sacramento, CA.
3. Caltrans. (2025). *Standard Plans*, 2025 Edition, California Department of Transportation, Sacramento, CA.
4. Caltrans. (2021). [Design Information Bulletin 91](#) *Guidelines on the use of Positive Work Zone Protection & Mitigation Measures*, June 25, 2021, California Department of Transportation, Sacramento, CA.

APPENDIX A

TEMPORARY RAILING

The sloping terminal panel is no longer an acceptable end-treatment for installations of Temporary Railing (Type K).

Designers will use Temporary Railing (Type K), also referred to as "K-rail", according to the following guidelines:

1. At Falsework Openings

The Standard Specifications require the installation of K-rail on both sides of vehicular openings through falsework or whenever falsework will be within 12 feet of the edge of a traffic lane. (See the Project Preliminary Report for falsework opening requirements.)

An item for Temporary Railing (Type K) and for Temporary Crash Cushions shall be included in General Plan and Blue Sheet estimates whenever the above conditions are met. The estimated length for Temporary Railing (Type K) will be based on the width of the structure plus 150 feet of approach K-rail arranged at 10:1 taper on the approach end, and 60 feet on the trailing end for two way traffic (Figure 1). Assume a 12-module crash-cushion array per installation for the Temporary Crash Cushion quantity.

Do not detail K-rail or temporary crash-cushion layout for the falsework openings on the bridge plans. Insert a copy of the sheet entitled "Temporary Crash Cushion, Sand Filled" (Figure 5), into the bridge plans. A full-size reproducible copy of this sheet is available from the Bridge Railing Staff Specialist. This sheet is not to be altered except for the addition of the contract number, the page number, and district/county/route designation.

2. Bridge Widenings or Barrier Upgrades

Whenever possible, use the existing bridge railing for barrier purposes during construction.

When existing bridge railing or bridge approach guard railing is to be removed prior to construction, K-rail shall be shown on the plans.

The layout of K-rail may be placed on the General Plan sheet, or on another sheet as a separate detail. The K-rail shall be placed such that the ends of the barrier extend beyond the bridge ends. On the traffic approach side, provide a minimum of 150 feet of barrier at a 10:1 taper (Figure 2).

If the designer determines that the roadway geometry or lack of available space prohibits such a taper, the District must be contacted to recommend an appropriate K-railing and/or temporary crash cushion layout. If no recommendations from the District are available at the Planning or General Plan stage, assume a minimum of 150 feet of approach K-rail for estimating purposes.

If the Structures and District designers have agreed upon the need for a temporary crash cushion, show the crash cushion and K-rail layout on the General Plan or on another sheet as a separate detail. The K-rail approach may be shortened as necessary (maintain a 10:1 taper).

It may be appropriate for the District to take the responsibility for the crash cushion, and all or part of the K-rail quantity. This may be the case if site conditions at the approaches are unknown, construction staging requires the K-rail to be moved frequently, or if the project has many structure sites (such as bridge railing upgrade or approach slab projects). Denote the portion of K-rail to be estimated by Structures and refer to road plans for crash cushion details (Figure 3). Variations of this procedure are permissible, but, as in all cases, the project engineer must coordinate traffic control details with the District.

3. Other Considerations

Quantity estimates for K-rail shall be in multiples of 20 feet.

On two-way secondary roads without a median, the trailing end K-rail should be treated as the 60 foot taper for falsework (Figure 1) with a 12 module crash cushion array.

Traffic delineation shall not be shown on bridge plans. All traffic controls, other than K-rail on a bridge deck, shall be detailed on the road plans. Timber barricades are not to be used in highway construction.

Keep in mind that K-rail deflects and is displaced when subjected to vehicular impact. When laying out K-rail, allow for such deflections by providing approximately two feet clear from the K-rail to a drop-off. If less than two feet is available, attach the K-rail to the bridge deck (Figure 4).

Temporary crash cushions may consist of the Construction Zone (CZ) GREAT if lateral space is limited, or if specifically requested by the District. See Memo to Designers 14-14 for additional information.

The Standard Specifications and the Special Provisions may cite other situations which require installation of K-rail between a lane carrying public traffic and the contractor's operations. In general, this K-rail may be the contractor's responsibility and payment should be included in other items of work if not required to be shown on the plans.


Floyd L. Mellon


Guy D. Mancari

JPH:jgf
Attachments

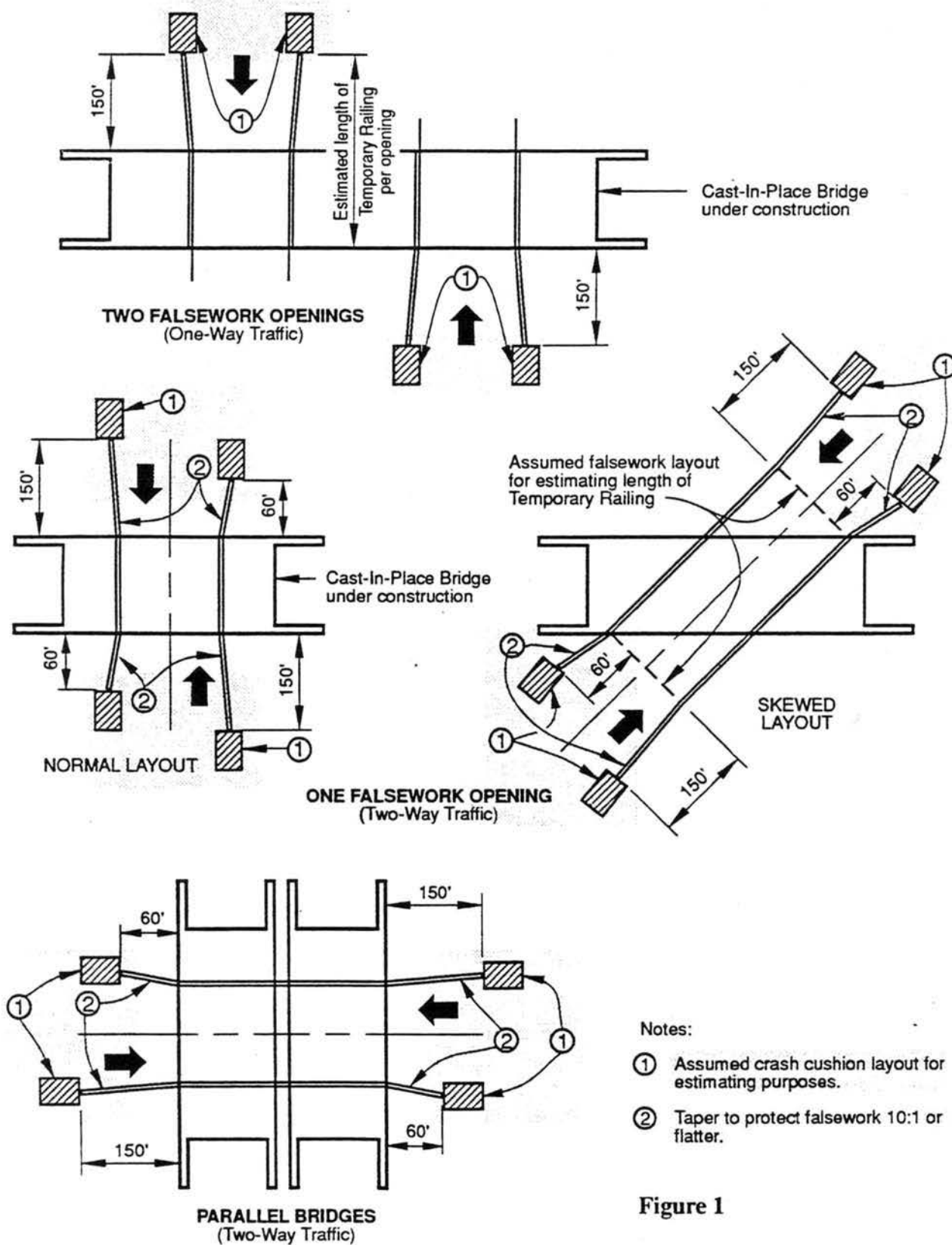
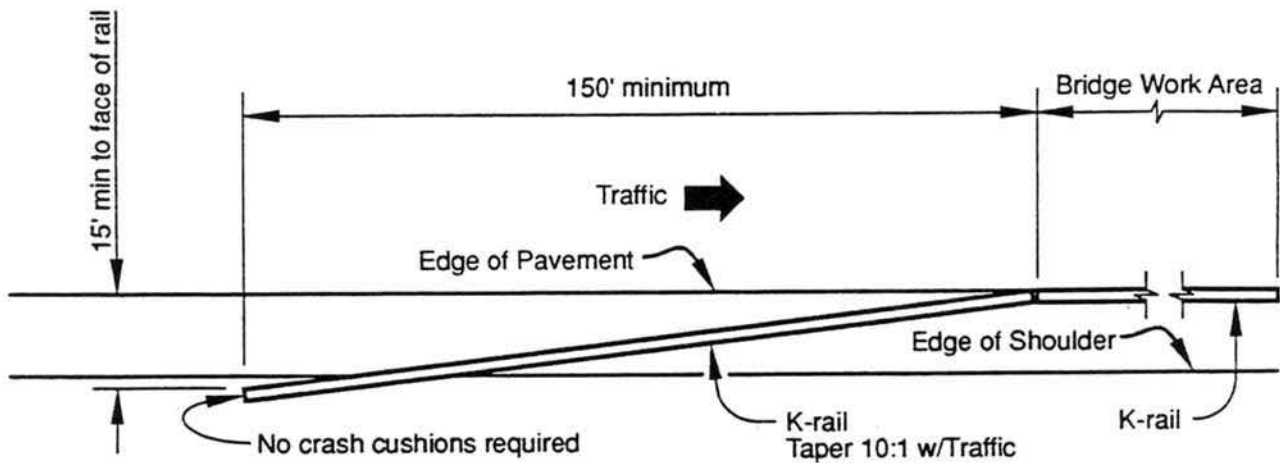
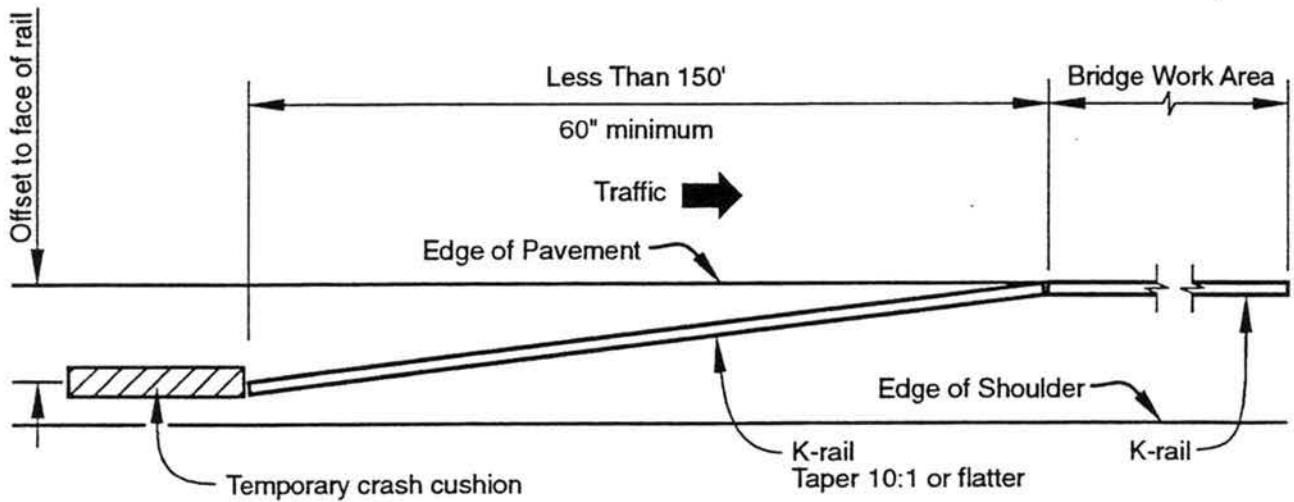
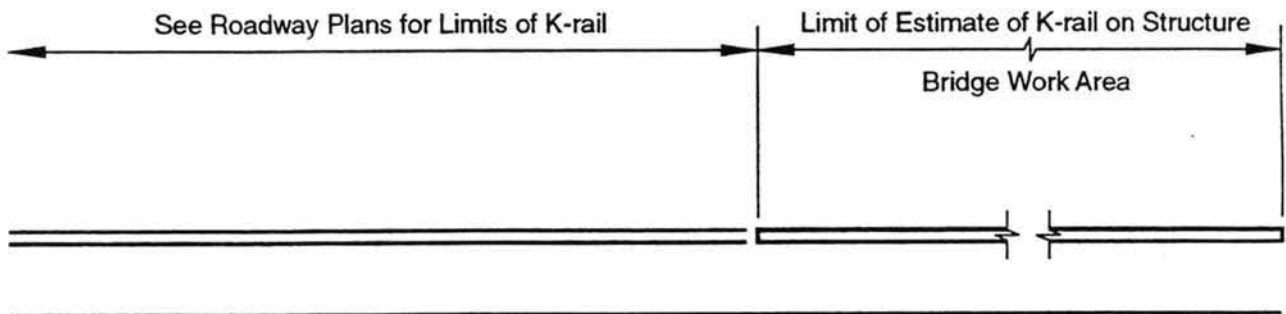


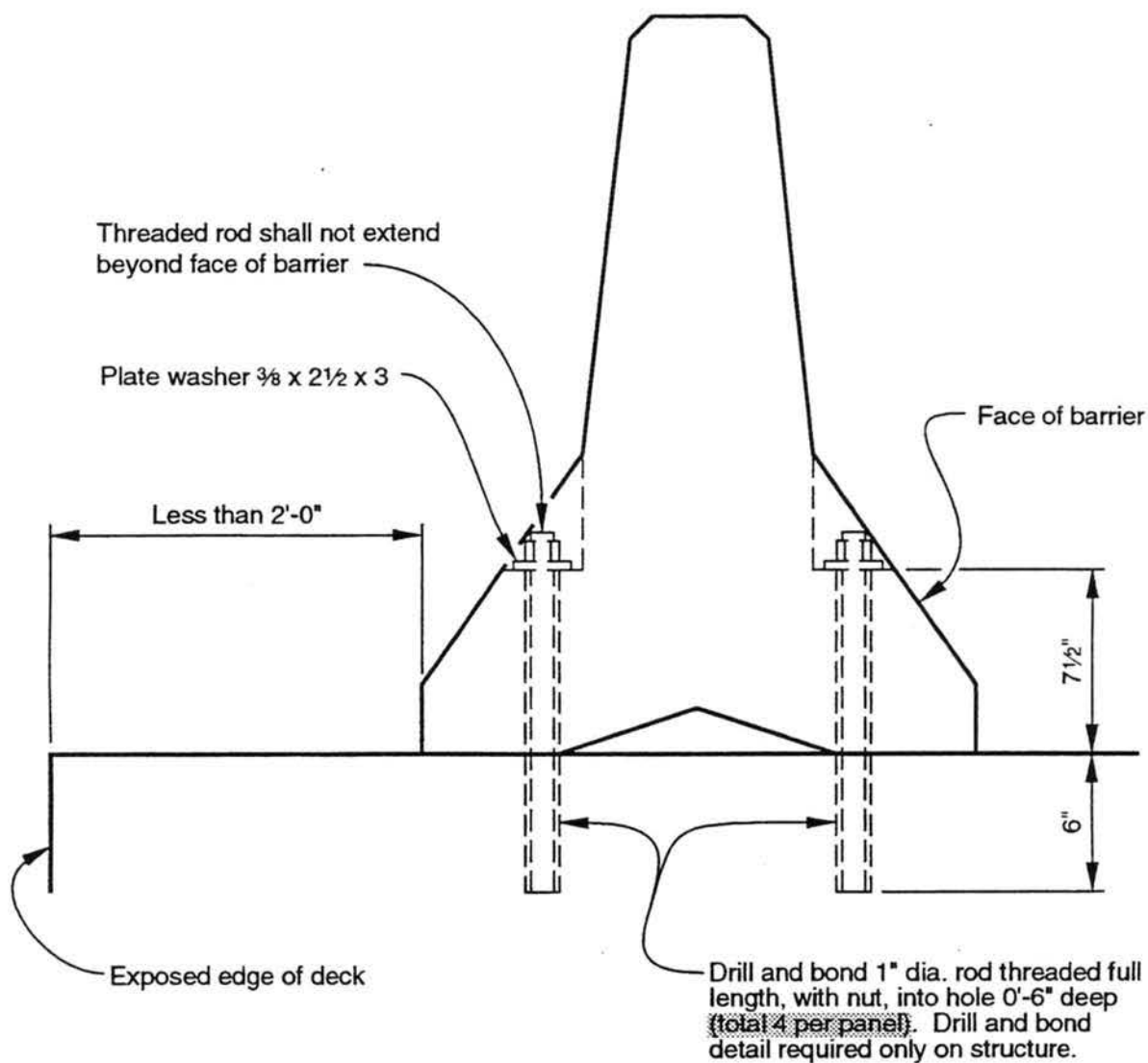
Figure 1



NO CRASH CUSHIONS REQUIRED

Figure 2

**TEMPORARY CRASH CUSHION REQUIRED****EXAMPLE OF ESTIMATE SHARED WITH DISTRICT****Figure 3**



TYPE K RAILING ATTACHMENT DETAILS

See "Temporary Railing (Type K)" for details not shown

Figure 4