California Joint Utility Traffic Control Manual

April 2010  5th Edition
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The California Joint Utility Traffic Control Manual is a joint effort among members of the California Inter-Utility Coordinating Committee. The member logos below are proudly displayed as a sign of their support in developing safe working conditions for their employees as well as for the traveling public. We are a dedicated group who wants safety first. As you read through this manual, please keep in mind that safety is everyone’s business and it is up to each one of us to do our part in ensuring a safe work zone.
ENDORSEMENTS

California Department of Transportation (Caltrans) has reviewed the California Joint Utility Traffic Control Manual and finds it to be in conformance with the California Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA’s MUTCD 2003 Revision 2, as amended for use in California) also called California MUTCD 2010 issued by Caltrans on January 21, 2010.

Caltrans is not responsible for the content of this manual and it is up to the local jurisdiction to ensure the plans and traffic control being used are appropriate for the field conditions and work being performed. When working on State Highways in California refer to the California MUTCD 2010 and use the existing encroachment permit processes.

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I have been using the California Joint Utility Traffic Control Manual for more than 8 years because it has proven to be a sound resource for routine permit work within the public right of way. The modifications included in this edition ensure that safe work zones are properly set up to perform standard utility repairs and maintenance within the public right of way. This manual may help expedite the permitting process by notifying the jurisdictional agency exactly what traffic control will be used to successfully complete the permitted work.

Nelson D. Nelson, P.E.
City of Corona
Assistant Public Works Director/Assistant City Engineer

The City of Corona is not responsible for the content of this manual and it is up to the local jurisdiction to ensure the plans and traffic control being used are appropriate for the field conditions and work being performed.
The **City of Dana Point** allows encroachment permit applicants (applicants), generally Contractors and Utility Companies, to use the California Joint Utility Traffic Control Manual, among other publications via City Ordinance 14.01.220 Safety and Warning Devices Required. The guidelines and manuals noted in this ordinance are invaluable tools to applicants that need to accomplish work in City Streets. In a number of cases, these standard documents have helped these applicants in the City of Dana Point avoid expense in generating traffic control plans, as these plans specifically accommodate their needs, and provide for a safe working environment. The City will continue to allow these manuals/guidelines to be utilized to accomplish work in our rights-of-way. Of course, any Contractor or Utility Company doing work in any City street assumes all responsibility and liability.

Matthew Sinacori, P.E.
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After reviewing the manual and its accompanying drawings I can completely endorse the use of the manual for routine utility work within Covina’s rights-of-way.

Steve Henley
**City of Covina**
Public Works Director

The city of Claremont endorses the use of the (CJUTCM) manual.

Craig Bradshaw
**City of Claremont**
Senior City Engineer
Introduction to the Fifth Edition

This Manual is coordinated and prepared by the California Joint Utility Traffic Control Committee. It provides the basic standards for the safe movement of traffic upon highways or streets in accordance with Section 21400 of the California Vehicle Code and the California Manual on Uniform Traffic Control Devices for Street and Highways 2010 Edition. Traffic control includes safe protection for the public, motorist, cyclist, pedestrian and worker. It is the responsibility of the contractor or organization performing work on, or adjacent to, a roadway to install and maintain such devices which are necessary to provide safe passage for the traveling public through the work area and for the safety of the workers.

This text is not intended to establish or create a legal standard. The criteria for the position, location, manner of installation, and the use of such signs, lights and devices are furnished solely for the purpose of information and guidance. This manual will be updated as required to conform to Federal and State guidelines. When working on State Highways in California refer to the California Manual on Uniform Traffic Control Devices for Streets and Highways 2010 Edition and use the existing encroachment permit processes.

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I have reviewed the Manual prepared by the California Joint Utility Traffic Control Committee and am pleased to endorse it.

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Public Utilities Code

AT&T and Verizon as telephone utilities have been granted by the State the right to use public streets. This grant, known as the state franchise is found in Section 7901 of the California Public Utilities Code. Section 7901 provides that:

“Telegraph or telephone corporations may construct lines of telegraph or telephone lines along and upon any public road or highway, along or across any of the waters or lands within this State, and may erect poles, posts piers, or abutments for supporting the insulators, wires, and other necessary fixtures of their lines, in such manner and at such points as not to incommode the public use of the road or highway or interrupt the navigation of the waters.”

Many cities and counties have granted Southern California Edison, as an electric utility, San Diego Gas & Electric, as a gas and electric utility, Southern California Gas Company, as a gas utility, and Pacific Gas and Electric Company as an electric and gas utility the right to use public streets. These grants, known as the city or county franchises, are granted in accordance with: (1), the Broughton Act, set forth in Section 6001, et seq. of the Public Utilities Code, or (2) the Franchise Act of 1937, set forth in Section 6201, et seq. of the Public Utilities Code.

Illustrative of the franchise rights granted by counties and cities to public utilities, Section 6265 of the Public Utilities Code provides that:

“Every gas franchise granted pursuant to this chapter confers upon the grantee the right to use, or to lay and use, gas pipes and appurtenances for the purpose of transmitting and distributing oil or products thereof; every industrial gas franchise so granted confers upon the grantee the right to use, or lay and use industrial gas pipelines and appurtenances for the purpose of transmitting and distributing industrial gas;… and every electric franchise so granted confers upon the grantee thereof the right to use, or to construct and use, poles, wires or conduits and appurtenances for the purpose of transmitting and distributing electricity for all purposes, under, along, across, or upon the public streets, ways, alleys, and places as they now or hereafter exist within the municipality.”
California Joint Utility Traffic Control Manual

Fundamental Principles:

The needs and control of all road users (motorists, bicyclists and pedestrians within the highway including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA Title II, Paragraph 35.130) through a temporary traffic control (TTC) zone shall be an essential part of highway construction, utility work, maintenance operations and the management of traffic incidents.

Those using the roadway (motorists, bicyclists and pedestrians), worker safety at the job site and accessibility in TTC zones should be an integral part of every project initiated in the planning phase and continuing through design and construction. In a like fashion, maintenance and utility work should be planned and conducted with the safety and accessibility of all motorists, bicyclists, pedestrians (including those with disabilities) as well as the safety of those workers performing the work.

NOTE: Work around a railroad or highway rail grade crossing will require early coordination with the railroad company prior to work planning.

To provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials and equipment at the job site, the following factors must be considered:

1. Safety principles governing the design of permanent roadways and roadsides should also govern the design of temporary traffic control zones. The goal should be to route road users through such zones using roadway geometrics, roadway features and temporary traffic controls as nearly as possible comparable to those for normal highway/traffic situations.

2. A temporary traffic control plan should be prepared and understood by all responsible parties before the site is occupied. Any changes in the TTC plan shall be approved by the Engineer of the public agency or authority having jurisdiction over the highway.

Road user movement should be inhibited as little as practical, based on the following considerations:

1. TTC at work and incident sites should be designed on the assumption that drivers will only reduce their speeds if they clearly perceive a need to do so.
2. Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes or main roadway transitions that require rapid maneuvers should be avoided.
3. Provisions shall be made for the reasonably safe operation of work, particularly on high-speed, high-volume roadways.
4. Road users should be encouraged to use alternative routes that do not include TTC zones.
5. Bicyclists and pedestrians, including those with disabilities, should be provided with access and reasonably safe passage through the TTC zone.
NOTE: The context of through does not mean a bicyclist or pedestrian may enter a TTC zone but that passage is provided in the bike lane or crosswalk for a bicyclist and on the sidewalk or crosswalk for a pedestrian to navigate past or around (i.e. through) the TTC zone.

The following three items should be considered when planning for pedestrians in TTC zones:

Pedestrians should not be led into conflicts with work site vehicles, equipment or operations.
Pedestrians should not be led into conflicts with vehicles moving through or around the worksite.
Pedestrians should be provided with a reasonably safe, convenient and accessible path that replicates as nearly as possible the most desirable characteristics of the existing sidewalks(s) or footpath(s). Where pedestrians who have visual disabilities encounter work sites that require them to cross the roadway to find an accessible route, instructions should be provided using an audible information device.

6. Roadway occupancy should be scheduled during off-peak hours and, if necessary, night work should be considered.
7. Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur before roadway or ramp closures.

Motorists, bicyclists and pedestrians should be guided in a clear and positive manner while approaching and traversing TTC zones and incident sites. The following principles should apply:

A. Adequate warning, delineation and channelization (tapers) should be provided to assist in guiding road users in advance of and through (i.e. past or around) the TTC zone or incident site by using proper pavement marking, signing, or other devices that are effective under varying conditions. Providing information that is in usable formats by pedestrians with visual disabilities should also be considered.
B. TTC devices inconsistent with intended travel paths through (i.e. past or around) should be removed or covered. Intermediate-term stationary, short term, and mobile operations, where visible permanent devices are inconsistent with intended travel paths, devices that highlight or emphasize the appropriate path should be used (attached directional arrow indicators on a vehicle). Providing information that is in usable formats by pedestrians with visual disabilities should also be considered.
C. Flagging procedures, when used, should provide positive guidance to road users traversing the TTC zone.

NOTE: Flaggers must have received the State of California Title 8, Construction Safety Orders, Section 1599 (f) “Training of Construction Site Flaggers” prior to performing flagger duties (See reference section).

D. Inspect the TTC zone to make sure warning flags are not wrapped around supports. Inspect warning signs for proper visibility, barricade lights or flashers for visibility and function. A good test of a TCC zone is to drive through the zone yourself, in addition to observing traffic, to determine if there is an orderly
transition. For nighttime work, lighting the work zone and approaches will allow the motorist better comprehension of imposed requirements. Since traffic patterns change, observation should be conducted periodically and adjustments made accordingly to assure traffic flow.

Each person whose actions affect the TTC zone safety, from upper-management through the field worker, should receive training appropriate to the job decisions each individual is required to make. Only those individuals who are trained in proper TTC practices and have a basic understanding of the principles (established by applicable standards and guidelines) should supervise the selection, placement and maintenance of TTC devices for TTC zones and for incident management.

NOTE: Before any new detour or temporary route is opened to traffic, all necessary signs shall be in place. All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.

Good public relations should be maintained by applying the following:

1. The needs of the road user should be assessed such that appropriate advance road notice is given and clearly defined alternative paths are provided.
2. The cooperation of the various news media should be sought in publicizing the existence and reason for the TTC zones as news releases can assist by keeping the road user well informed.
3. The needs of abutting property owners, residents, and businesses should be assessed and appropriate accommodations made.
4. The needs of emergency service providers (law enforcement, fire, and medical) should be assessed and appropriate coordination and accommodations made.
5. The needs of railroads and transit should be assessed and appropriate coordination and accommodations made.
6. The needs of operators of commercial vehicles such as busses and large trucks should be assessed and appropriate coordination and accommodations made.

Temporary Traffic Control (TTC) General/Reference Information

Short Duration Work Operations

The CA MUTCD addresses work duration under section 6G.02 Work Duration and states:

Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location.

Standard:
The five categories of work duration and their time at a location shall be:
A. Long-term stationary is work that occupies a location more than 3 days.
B. Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.
C. Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period.
D. Short duration is work that occupies a location up to 1 hour.
E. Mobile is work that moves intermittently or continuously.

Standard:
Since intermediate-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in intermediate-term stationary TTC zones.

Support:
Most maintenance and utility operations are short-term stationary work. As compared to stationary operations, mobile and short-duration operations are activities that might involve different treatments. Devices having greater mobility might be necessary such as signs mounted on trucks. Devices that are larger, more imposing, or more visible can be used effectively and economically. The mobility of the TTC zone is important. Maintaining reasonably safe work and road user conditions is a paramount goal in carrying out mobile operations.

Guidance:
Safety in short-duration or mobile operations should not be compromised by using fewer devices simply because the operation will frequently change its location.

Option:
 Appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe lights may be used in place of signs and channelizing devices for short-duration or mobile operations. These vehicles may be augmented with signs or arrow panels.

Support:
During short-duration work, it often takes longer to set up and remove the TTC zone than to perform the work. Workers face hazards in setting up and taking down the TTC zone. Also, since the work time is short, delays affecting road users are significantly increased when additional devices are installed and removed.

Option:
Considering these factors, simplified control procedures may be warranted for short-duration work. A reduction in the number of devices may be offset by the use of other more dominant devices such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles.

**End of Work Period**

Before leaving a work area, it is necessary that approved warning devices be placed to protect motorists, bicyclists or pedestrians.

1. Ensure the area is properly barricaded and that flashing lights, where required, are functioning satisfactorily.
2. Make sure that equipment is secured and that the work area is left orderly. Cover or barricade exposed openings (trenches, excavations, bell holes, etc.) to assure protection of the public.

Night Operations

Night Operations should be set up pursuant to the National Cooperative Highway Research Program (NCHPP) report 476, guidelines for design and operation of nighttime traffic control for highway maintenance and construction.

In order to provide enhanced warning and safety during twilight and night operations, the following steps are recommended:

1. When the work area is to be illuminated by use of flood lights, the light placement shall be such that the light beams are not hazardous to oncoming traffic.
2. All warning signs and channelizers shall have reflective properties.
3. Flashing or rotating amber lights on vehicles may be used when the vehicles are blocking established traffic lanes or for additional work area protection.

NOTE: Flares and red emergency lights and reflectors are strictly for emergency situations and must not be used as substitutes for standard work area warning devices. Flares shall not be used in high hazard fire areas.

TTC Sign Recommendations

All temporary traffic control signs shall be sized to be in accordance with CA MUTCD Table 6F-1, Sizes of Temporary Control Signs.

Approved warning signs shall be installed and properly maintained whenever hazards exist due to moving or stationary vehicles, open excavations, construction or maintenance operations or similar work. Warning signs shall be placed so as to provide adequate notice to motorists, bicyclists or pedestrians that they are approaching an excavation, obstruction or hazard. Warning signs shall be removed as soon as the excavation, obstruction or hazard is removed or cleared.

California MUTCD Section 6F.105(CA):

OPEN TRENCH Sign (C27(CA))
The OPEN TRENCH sign shall be used in advance of open trenches in/or adjacent to roadway. The edge of the traveled way shall be defined by edge line delineation consisting of appropriate markers or striping. Edge line delineation shall be white when located on the right of traffic and yellow when located on the left of traffic.

Standard:
Trenches in excess of 0.25 ft (3-inches) in depth that are less than 8 ft from the edge of traveled way shall be identified by C27(CA) and NO SHOULDER (C31A(CA)) portable signs on Type II or Type III barricades alternately set in the trench at intervals not to exceed 2,000 ft.
Use of C27(CA) and C31(CA) signs shall be incorporated into all temporary traffic control drawings contained in this manual where trenches are within 8-ft of the traveled way. See Figure A for reference.

**FIGURE A – Use of C27 Open Trench Sign**

1. C27 and C31 signs shall be used when trench $D_1$ is 8-ft or less and $D_2$ is 0.25-ft (3-inches) or greater.
2. $D_1$ shall not be less than 5-ft.
### Table A - Suggested Minimum Advance Warning Sign Spacing

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>Distance Between Signs **</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Urban (low speed) 25 mph or less *</td>
<td>100</td>
</tr>
<tr>
<td>Urban (high speed) 30 mph or more *</td>
<td>350</td>
</tr>
<tr>
<td>Rural</td>
<td>500</td>
</tr>
<tr>
<td>55 mph &amp; above</td>
<td>1,000</td>
</tr>
</tbody>
</table>

* Speed category to be determined by highway agency.

** Distances are shown in feet. The column headings A, B, and C are the dimensions shown on drawings No. 1-51. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The third sign is one in a three sign series encountered by a driver/motorist approaching a TTC zone).

### Table B - Taper Length Criteria for Temporary Traffic Control Zones

<table>
<thead>
<tr>
<th>Type of Taper</th>
<th>Taper Length (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merging Taper</td>
<td>at least L</td>
</tr>
<tr>
<td>Shifting Taper</td>
<td>at least 0.5L</td>
</tr>
<tr>
<td>Shoulder Taper</td>
<td>at least 0.33L</td>
</tr>
<tr>
<td>One-Lane, Two-Way Traffic Taper</td>
<td>100 feet maximum</td>
</tr>
<tr>
<td>Downstream taper</td>
<td>100 feet per lane</td>
</tr>
</tbody>
</table>

### Table C - Formulas for Determining Taper Lengths

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>Taper Length (L) Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 mph or less</td>
<td>L = WS^2/60</td>
</tr>
<tr>
<td>45 mph or more</td>
<td>L = WS</td>
</tr>
</tbody>
</table>

Where:  
- L = taper length in feet  
- W = width of offset feet  
- S = posted speed limit, or off peak 85th-percentile speed prior to work starting. Or the anticipated operating speed in mph
### Table D – Buffer Space Table

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>% Downgrade (Buffer Space)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>&lt;-3% (ft)</td>
</tr>
<tr>
<td>20</td>
<td>115</td>
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<tr>
<td>25</td>
<td>155</td>
</tr>
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<td>30</td>
<td>200</td>
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<td>65</td>
<td>645</td>
</tr>
<tr>
<td>70</td>
<td>730</td>
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</tbody>
</table>

### Table E - Taper Length Criteria for Temporary Traffic Control zones for 12 feet Offset Width

<table>
<thead>
<tr>
<th>Speed* S (mph)</th>
<th>Minimum Taper Length ** For Width of Offset 12 ft (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Merging L (ft)</td>
</tr>
<tr>
<td>20</td>
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</tbody>
</table>

* - Posted Speed, off peak 85th percentile speed prior to work starting, or the anticipated operating speed.

** - For other offsets use the following merging taper length formula for L:
  - For speeds of (40 mph) or less (L=WS²/60)
  - For speeds of (45 mph) or more (L=WS)
**Channelizing Devices**

Channelizing devices (cones, tubular markers, drums or vertical panels) are elements in a total system of temporary traffic control for use during construction and maintenance operations. These elements shall be preceded by a subsystem of warning devices, adequate in size, number and placement for the type of roadway on which the work will take place.

Channelizing devices can be used as follows:

1. To channel and/or divert traffic in advance of a temporary traffic control zone (work zone).
2. To define traffic lanes through the work zone.
3. To define a change in the position of the lanes around a work zone.
4. On detours to define curves and the edges of the roadway.
5. To separate opposing lanes of traffic.

**Table F – Maximum Spacing of Channelizing Devices**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Taper* (ft)</th>
<th>Tangent (ft)</th>
<th>Conflict** (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>20</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>50</td>
<td>12</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>60</td>
<td>15</td>
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<tr>
<td>35</td>
<td>35</td>
<td>70</td>
<td>17</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>45</td>
<td>45</td>
<td>90</td>
<td>22</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>55</td>
<td>55</td>
<td>110</td>
<td>27</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>120</td>
<td>30</td>
</tr>
<tr>
<td>65</td>
<td>65</td>
<td>130</td>
<td>32</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
<td>140</td>
<td>35</td>
</tr>
</tbody>
</table>

* Maximum channelizer spacing for all speeds on one-lane/two-way tapers is (20 ft). Maximum channelizer spacing for all speeds on downstream tapers is (20 ft). All other tapers are as shown.

** Use on intermediate and short term projects for taper and tangent sections where there are no pavement markings or where there is a conflict between existing pavement markings and channelizers.

On State highways a spacing of 10 ft is recommended for tapers and tangent sections.
**Barricades**

The function of barricades is to separate the motorist from objects or unusual situations created by construction or maintenance operations in or near the traveled way. Barricades should not be used to guide motorist through the transition or work zones.

The barricade would not be used where a collision with the barricade would be more severe than a collision with the object being separated. At such locations, channelizers or similar less rigid devices should be used.

Barricade design:
Barricades for vehicular traffic shall be of three types conforming to the CA MUTCD: Type I, Type II and Type III. Markings for barricades shall be alternate orange and white stripes sloping downward at a 45 degree angle. The entire area of orange and white shall be effectively reflectorized. Other barricade components shall be predominately the color white.

**Arrow Panels**

California MUTCD Section 6F.56 Arrow Panels:

An arrow panel shall be a sign with a matrix of elements capable of either flashing or sequential display. This sign shall provide additional warning and directional information to assist in merging and controlling road users through or around a Temporary Traffic Control (TTC) zone.

**Guidance:** An arrow panel in the arrow or chevron mode should be used to advise approaching traffic of a lane closure along major multi-lane roadways in situations involving heavy traffic volumes, high speeds and/or limited sight distances or at other locations and under the conditions where road users are less likely to expect such lane closures. When used, an arrow panel should be used in conjunction with appropriate signs, channelizing devices, or other TTC devices. An arrow panel should be placed on the shoulder of the roadway or if practical, further from the traveled lane. It should be delineated with retro reflective devices. When the arrow panel is not being used, it should be removed, if not removed, it should be shielded, or if the previous two options are not feasible, it should be delineated with retro reflective devices.

**Standard:** When arrow panels are used to close multiple lanes, a separate arrow panel shall be used for each closed lane.

**Guidance:** When arrow panels are used to close multiple lanes, if the first arrow panel is placed on the shoulder, the second arrow panel should be placed in the first closed lane at the beginning of the second merging taper. When the first arrow panel is placed in the first closed lane, the second arrow panel should be placed in the second closed lane at the downstream end of the second merging taper.
Table G – Arrow Panel Table

<table>
<thead>
<tr>
<th>Panel Type</th>
<th>Minimum Size</th>
<th>Minimum Legibility Distance</th>
<th>Minimum Number of Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A – Low Speed Urban Areas</td>
<td>(48 X 24 inches)</td>
<td>(0.5 or ½ miles)</td>
<td>12</td>
</tr>
<tr>
<td>Type B or II – Intermediate speed facilities or mobile operations on high –speed roadways</td>
<td>(60 X 30 inches) On State highways Use 72 X 36 inches</td>
<td>(0.75 or ¾ miles)</td>
<td>13</td>
</tr>
<tr>
<td>Type C or I – High speed, high volume motor vehicle traffic control projects</td>
<td>(96 X 48 inches)</td>
<td>(1 mile)</td>
<td>15</td>
</tr>
<tr>
<td>Type D – for use on authorized vehicles</td>
<td>None</td>
<td>0.5 or 1/5 mile</td>
<td>12</td>
</tr>
</tbody>
</table>

Flagger Reference Information

1599 TRAINING OF CONSTRUCTION SITE FLAGGERS
Effective August 22, 2009

(a) Flaggers shall be utilized at locations on a construction site where barricades and warning signs cannot control the moving traffic.

(b) When flaggers are required, they shall be placed in relation to the equipment or operation so as to give effective warning.

(c) Placement of warning signs shall be according to the California Manual on Uniform Traffic Control Devices for Streets and Highways, September 26, 2006, published by the State Department of Transportation, which is herein incorporated by reference and referred to as the "Manual."

(d) Flaggers shall wear warning garments such as vests, jackets, or shirts manufactured in accordance with the requirements of the American National Standards Institute (ANSI)/International Safety Equipment Association (ISEA) 107-2004, High Visibility Safety Apparel and Headwear.

(e) During the hours of darkness, flaggers' stations shall be illuminated such that the flagger will be clearly visible to approaching traffic and flaggers shall be outfitted with reflectorized garments manufactured in accordance with the requirements of the American National Standards Institute (ANSI)/International Safety Equipment Association (ISEA) 107-2004, High Visibility Safety Apparel and Headwear. The retroreflective material shall be visible at a minimum distance of 1,000 feet. White outer garments with retroreflective material that meets the above requirements may be worn during hours of darkness but not during snow or fog conditions, in lieu of colored vests, jackets and/or shirts.

(f) The employer shall select the proper type (class) of high visibility safety apparel for a given occupational activity by consulting the Manual, apparel manufacturer, ANSI/ISEA 107-2004, Appendix B or the American Traffic Safety Services Association (ATSSA).
(g) Flaggers shall be trained in the proper fundamentals of flagging moving traffic before being assigned as flaggers. Signaling directions used by flaggers shall conform to the "Manual" (CA MUTCD). The training and instructions shall be based on the "Manual" (CA MUTCD) and work site conditions and also include the following:

1. flagger equipment which must be used,
2. layout of the work zone and flagging station,
3. methods to signal traffic to stop, proceed or slow down,
4. methods of one-way traffic control,
5. trainee demonstration of proper flagging methodology and operations,
6. emergency vehicles traveling through the work zone,
7. handling emergency situations,
8. methods of dealing with hostile drivers,
9. flagging procedures when a single flagger is used (when applicable)

Documentation of the training shall be maintained as required by Section 3203, Injury Illness and Prevention Program of the General Industry Safety Orders.

(h) Flaggers shall be trained by persons with the qualifications and experience necessary to effectively instruct the employee in the proper fundamentals of flagging moving traffic.


California MUTCD Section 6E.04 Flagger Procedures:

**Support:**
The use of paddles and flags by flaggers is illustrated in Figure 6E-1 (see page 27).

**Standard:**
The following methods of signaling with paddles shall be used:

A. To stop road users, the flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.

B. To direct stopped road users to proceed, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed.

C. To alert or slow traffic, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.
Option:
To further alert or slow traffic, the flagger holding the SLOW paddle face toward road users may motion up and down with the free hand, palm down.

Standard:
The following methods of signaling with a flag shall be used:

A. To stop road users, the flagger shall face road users and extend the flag staff horizontally across the road users’ lane in a stationary position so that the full area of the flag is visibly hanging below the staff. The free arm shall be held with the palm of the hand above the shoulder level toward approaching traffic.

B. To direct stopped road users to proceed, the flagger shall stand parallel to the road user movement and with flag and arm lowered from the view of the road users, and shall motion with the free hand for road users to proceed. Flags shall not be used to signal road users to proceed.

C. To alert or slow traffic, the flagger shall face road users and slowly wave the flag in a sweeping motion of the extended arm from shoulder level to straight down without raising the arm above a horizontal position. The flagger shall keep the free hand down.

Section 6E.05 Flagger Stations

Standard:
Flagger stations shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.

Guidance:
Flagger stations should be located such that an errant vehicle has additional space to stop without entering the work space.

Standard:
Except in emergency situations, flagger stations shall be preceded by an advance warning sign or signs. Except in emergency situations, flagger stations shall be illuminated at night.
### CA MUTCD Figure 6E-1. Use of Hand Signaling Devices by Flaggers

<table>
<thead>
<tr>
<th>PREFERRED METHOD</th>
<th>EMERGENCY SITUATIONS ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STOP/SLOW Paddle</strong></td>
<td><strong>Red Flag</strong></td>
</tr>
<tr>
<td>450 mm (18 in) MIN.</td>
<td>900 mm (36 in)</td>
</tr>
</tbody>
</table>

#### TO STOP TRAFFIC

- STOP Paddle

#### TO LET TRAFFIC PROCEED

- SLOW Paddle

#### TO ALERT AND SLOW TRAFFIC

- Red Flag
REFERENCE SIGN CHART

C9A (CA)  C12 (CA)  C20 (CA)  C30 (CA)  C27 (CA)

G20-2  M4-8a  M4-9a  M4-10  R4-7a

R1-1  R3-1  R3-2  R3-7  R9-3a

R9-11a  R9-11  R9-9  W1-4  W1-6

W4-7  W5-1  W4-2  W12-1

W20-3  W20-1  W20-2  W20-4  W20-5
REFERENCE SIGN CHART

W3-4  W24-1  W6-3  W11-2  W73A (CA)

W16-1  Paddle  Paddle  Type II Barricade  Cone, Tubular Marker, Channelizer

W1-7
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD.Sign (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS.

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE.

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE Merging SHORING SHOULDER</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT. 40 FT. 27 FT.</td>
<td>20 FT. 40 FT. 100 FT.</td>
<td></td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT. 63 FT. 42 FT.</td>
<td>25 FT. 63 FT. 100 FT.</td>
<td></td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT. 90 FT. 60 FT.</td>
<td>30 FT. 90 FT. 350 FT.</td>
<td></td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT. 123 FT. 82 FT.</td>
<td>35 FT. 123 FT. 350 FT.</td>
<td></td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT. 160 FT. 107 FT.</td>
<td>40 FT. 160 FT. 350 FT.</td>
<td></td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT. 270 FT. 180 FT.</td>
<td>45 FT. 270 FT. 500 FT.</td>
<td></td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT. 300 FT. 200 FT.</td>
<td>50 FT. 300 FT. 500 FT.</td>
<td></td>
</tr>
<tr>
<td>55+MPH</td>
<td>680 FT. 330 FT. 220 FT.</td>
<td>55 FT. 330 FT. PER TABLE 'A'</td>
<td></td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formulae:

Taper formula:

$$ L = S \times W $$ for speeds of 45 mph or more.

$$ L = \frac{W^2}{60} $$ for speeds of 40 mph or less.

Where:

- $L$ = Minimum length of taper.
- $S$ = Numerical value of posted speed limit prior to work or 85 percentile speed.
- $W$ = Width of offset.

i.e.: 50 mph and 19' lane; $L = 50 \times 19 = 950$ feet
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

PLACEMENT OF BIKE LANE CLOSURE SIGN (IF NECESSARY)

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE Merging</th>
<th>SHIFTING</th>
<th>SHOULDER</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>TAPER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
<td>40 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
<td>63 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
<td>30 FT.</td>
<td>90 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
<td>35 FT.</td>
<td>123 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
<td>160 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
<td>270 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
<td>300 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>55+ MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
<td>330 FT.</td>
<td>PER TABLE 'A'</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formulas:

Taper formula:

\[ L = S \times W \text{ for speeds of 45 mph or more.} \]
\[ L = \frac{WS^2}{60} \text{ for speeds of 40 mph or less.} \]

Where:

\[ L = \text{Minimum length of taper.} \]
\[ S = \text{Numerical value of posted speed limit prior to work or 85 percentile speed.} \]
\[ W = \text{Width of offset.} \]

i.e.: 50 mph and 19' lane; \( L = 50 \times 19 = 950 \text{ feet} \)
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED
AHEAD SIGN (C20) HALF THE
DISTANCE BETWEEN THE FIRST
AND SECOND SIGNS

PLACEMENT OF BIKE LANE CLOSURE SIGN
IF NECESSARY

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN
OPEN (WHenever POSSIBLE)
THROUGHOUT TRAFFIC
CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE
& SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-Ft LANE Merging</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>620 FT.</td>
<td>400 FT.</td>
<td>200 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>860 FT.</td>
<td>530 FT.</td>
<td>220 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart is based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formulae:

Taper formula:
\[ L = S \times W \] for speeds of 45 mph or more.
\[ L = \frac{WS^2}{60} \] for speeds of 40 mph or less.

Where:
\[ L = \text{Minimum length of taper.} \]
\[ S = \text{Numerical value of posted speed limit prior to work or 85 percentile speed.} \]
\[ W = \text{Width of offset.} \]

i.e.: 50 mph and 19' lane; \[ L = 50 \times 19 = 950 \text{ feet} \]
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

PLACEMENT OF BIKE LANE CLOSURE SIGN (IF NECESSARY)

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE Merging</th>
<th>TAPER LENGTH SHIFTING</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>SPACING DESIGNATION TAPER BETWEEN SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>20 FT.</td>
<td>TAPER 100 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>25 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>30 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
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<tr>
<td>40 MPH</td>
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<td>100 FT.</td>
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<td>45 MPH</td>
<td>440 FT.</td>
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<td>100 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>50 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>55+ MPH</td>
<td>680 FT.</td>
<td>330 FT.</td>
<td>55 FT.</td>
<td>100 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formula:
Taper formula:

\[ L = S \times W \text{ for speeds of 45 mph or more.} \]
\[ L = \frac{W^2}{60} \text{ for speeds of 40 mph or less.} \]

Where:
- \( L \) = Minimum length of taper.
- \( S \) = Numerical value of posted speed limit prior to work or 85 percentile speed.
- \( W \) = Width of offset.

i.e.: 50 mph and 19’ lane; \( L = 50 \times 19 = 950 \text{ feet} \)
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

NOTE: This chart based on 12-foot wide lanes.

For lane widths greater than 12 feet, use the following formulas:

Taper formula:

\[ L = S \times W \text{ for speeds of 45 mph or more.} \]

\[ L = \frac{WS^2}{60} \text{ for speeds of 40 mph or less.} \]

Where:

- \( L \) = Minimum length of taper.
- \( S \) = Numerical value of posted speed limit prior to work or 85 percentile speed.
- \( W \) = Width of offset.

i.e.: 50 mph and 19\' lane; \( L = 50 \times 19 = 950 \text{ feet} \)
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

NO. OF LANES

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>CHANNELIZER SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>800 FT.</td>
<td>40 FT.</td>
</tr>
</tbody>
</table>

CHART B
TAPER LENGTH SPACING (CHANGING FROM 12 TO 16 FT.)

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH</th>
<th>SIGN SPACING</th>
<th>CHANNELIZER SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>20 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>40 FT.</td>
<td>25 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>40 FT.</td>
<td>30 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>40 FT.</td>
<td>35 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>40 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT.</td>
<td>40 FT.</td>
<td>45 FT.</td>
</tr>
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<td>600 FT.</td>
<td>40 FT.</td>
<td>50 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>800 FT.</td>
<td>40 FT.</td>
<td>55 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes. For lane widths greater than 12 feet, use the following formula:

Taper formula:

\[ L = S \times W \] for speeds of 45 mph or more.

\[ L = \frac{WS^2}{60} \] for speeds of 40 mph or less.

Where:

- \( L \) = Minimum length of taper.
- \( S \) = Numerical value of posted speed limit prior to work or 85 percentile speed.
- \( W \) = Width of offset.

i.e.: 50 mph and 19' lane; \( L = 50 \times 19 = 950 \) feet
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS.

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE.

CHAkH A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE Merging</th>
<th>SHIFTING SHOULDER</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>TAPER</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
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<td>27 FT.</td>
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<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
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<td>90 FT.</td>
</tr>
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<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
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<td>123 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>325 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
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<td>160 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
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</tr>
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<td>50 FT.</td>
<td>300 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
<td>330 FT.</td>
</tr>
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NOTE: This chart based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formulae:

Taper formula:

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L = \( \frac{W^2}{60} \) for speeds of 40 mph or less.

Where:

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i.e.: 50 mph and 19' lane; L = \( 50 \times 19 = 950 \) feet
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

NO. OF LANES

ABBREVIATIONS:
S = Sign Spacing
Min = Minimum
LT = Left
RT = Right
LTP = Lane Traffic Panel
TANSAT = Tow Away, No Stopping Anytime
TANS = Tow Away, No Stopping

--- CHART A ---
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<tr>
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CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

PLACEMENT OF BIKE LANE CLOSURE SIGN (IF NECESSARY)
NO. OF LANES

CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED
AHEAD SIGN (C20) HALF THE
DISTANCE BETWEEN THE FIRST
AND SECOND SIGNS

---

PLACE LANE CLOSURE SIGN

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ALL DRIVEWAYS TO REMAIN
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CONTROL ZONE

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CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE
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<td>160 FT.</td>
<td>107 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT.</td>
<td>190 FT.</td>
<td></td>
</tr>
<tr>
<td>50 MPH</td>
<td>500 FT.</td>
<td>200 FT.</td>
<td></td>
</tr>
<tr>
<td>55+MPH</td>
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MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>SHIFTING</th>
<th>SHOULDER</th>
<th>CHANNELIZER SPACING</th>
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<th>TANGENT</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
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<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
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<td>100 FT.</td>
<td>PER TABLE 'A'</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
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<td>42 FT.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT.</td>
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<td></td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
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<td>300 FT.</td>
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<td></td>
</tr>
<tr>
<td>55+MPH</td>
<td>860 FT.</td>
<td>330 FT.</td>
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ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

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for speeds of 45 mph or more.

\[ L = \frac{W}{6} \]

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**CHART A**

**MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT**

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<td></td>
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</tr>
<tr>
<td></td>
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<td>57 FT.</td>
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WORKSITE TRAFFIC CONTROL PLAN

WEBLOCK NO. 1 LANE AND LEFT TURN LANE CLOSURE

LEGEND

- Type II Barricade w/Sign
- Type II Barricade w/o Sign
- Channeling Device
- Traffic Cone with Clip on Sign
- Sign
- Signalized Intersection
- Arrow Panel (Flashing Arrow) (Where Required)
- High Level Warning Device (Flashtree) (Optional)
- Flagger
- TANS Tow Away No Stopping ___ to ___ (24 Hour Notice)
- TANSAT Tow Away No Stopping Any Time
- Work Zone (Activity Area) Limits
- Direction of Traffic (Not Pavement Marking)
- Roadway Designation (A Through O)

DURATION RESTRICTED BY WORKING ZONE

REMEMBER WORKS WITH A "U" AND AN ATTIC LANE!
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

PLACEMENT OF BIKE LANE CLOSURE SIGN (IF NECESSARY)

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<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
<td>160 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
<td>270 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
<td>300 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
<td>330 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formulae:
Taper formula:
\[ L = S \times W \] for speeds of 45 mph or more.
\[ L = \frac{W^2} {60} \] for speeds of 40 mph or less.

Where:
- \( L \) = Minimum length of taper.
- \( S \) = Numerical value of posted speed limit prior to work or 85 percentile speed.
- \( W \) = Width of offset.

i.e.: 50 mph and 19' lane; \( L = 50 \times 19 = 950 \) feet
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSURE SIGN (IF NECESSARY)

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>40 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>40 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>40 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>40 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>40 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>40 FT.</td>
</tr>
</tbody>
</table>

CHANNELIZER SPACING:
- 20 MPH: 27 FT.
- 25 MPH: 30 FT.
- 30 MPH: 30 FT.
- 40 MPH: 30 FT.
- 45 MPH: 30 FT.
- 50 MPH: 30 FT.
- 55+MPH: 30 FT.

SIGN SPACING:
- 20 MPH: 100 FT.
- 25 MPH: 100 FT.
- 30 MPH: 100 FT.
- 40 MPH: 100 FT.
- 45 MPH: 100 FT.
- 50 MPH: 100 FT.
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MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>20 FT.</td>
<td>27 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>25 FT.</td>
<td>42 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>30 FT.</td>
<td>60 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>35 FT.</td>
<td>82 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>40 FT.</td>
<td>107 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>410 FT.</td>
<td>45 FT.</td>
<td>150 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>540 FT.</td>
<td>50 FT.</td>
<td>200 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>660 FT.</td>
<td>55 FT.</td>
<td>220 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
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CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE Merging OR Shifting Shoulder</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>CHANNELIZER SPACING TANGENT</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
<td>30 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
<td>35 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
</tr>
<tr>
<td>$55+ MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
</tr>
</tbody>
</table>

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Where:

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CONSTRUCTION NOTE:
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CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING, SHIFTING, SHOULDER</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>190 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
</tr>
<tr>
<td>* 45 MPH</td>
<td>440 FT.</td>
<td>230 FT.</td>
<td>160 FT.</td>
</tr>
<tr>
<td>* 50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
</tr>
<tr>
<td>* 55+MPH</td>
<td>660 FT.</td>
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### Chart A
**Minimum Recommended Delineator/Cone & Sign Placement**

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<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>TAPER LENGTH FOR 12-FT LANE SHIFTING SHOULDER</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>CHANNELIZER SPACING TANGENT</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
<td>63 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>160 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
<td>30 FT.</td>
<td>90 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>240 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
<td>35 FT.</td>
<td>123 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
<td>160 FT.</td>
</tr>
<tr>
<td>* 45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
<td>270 FT.</td>
</tr>
<tr>
<td>* 50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
<td>300 FT.</td>
</tr>
<tr>
<td>* 55+MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
<td>330 FT.</td>
</tr>
</tbody>
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  \[ L = \frac{W^2}{60} \text{ for speeds of 40 mph or less.} \]

Where:

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CONSTRUCTION NOTE:
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NO. OF LANES

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

---

**CHART A**

**MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT**

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT. 40 FT. 27 FT.</td>
<td>20 FT. 40 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT. 63 FT. 42 FT.</td>
<td>25 FT. 63 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT. 90 FT. 60 FT.</td>
<td>30 FT. 90 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT. 123 FT. 82 FT.</td>
<td>35 FT. 123 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT. 160 FT. 107 FT.</td>
<td>40 FT. 160 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT. 270 FT. 180 FT.</td>
<td>45 FT. 270 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT. 300 FT. 200 FT.</td>
<td>50 FT. 300 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>55+ MPH</td>
<td>660 FT. 330 FT. 220 FT.</td>
<td>55 FT. 330 FT. PER TABLE 'A'</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**
1. A Flashing Arrow sign shall be used for each lane closed.
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\[ L = \frac{W^2}{60} \text{ for speeds of 40 mph or less.} \]

Where:
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i.e.: 50 mph and 19' lane; \( L = 50 \times 19 = 950 \text{ feet} \)
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS.

NO. OF LANES

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE.

APPROACH STREET

CHANNELIZER SPACING

SEE TABLE A-T FOR SIGN AND CHANNELIZER DEVICE SPACING AND TAPER LENGTH

S = Sign Spacing
MIN = Minimum
LT = Left
RT = Right
LTP = Lane Traffic Panel
TANSAT = Tow Away, No Stopping Anytime
TANS = Tow Away, No Stopping

--- CHART A ---

MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-Ft LANE MERGING</th>
<th>SHIFTER LENGTH</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>TAPER</th>
<th>TAPER &amp; BETWEEN SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
<td>63 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
<td>30 FT.</td>
<td>90 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>62 FT.</td>
<td>35 FT.</td>
<td>123 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
<td>160 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
<td>270 FT.</td>
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<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
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For lane widths greater than 12 feet, use the following formula:

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Where:

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**Minimum Recommended Delineator/Cone & Sign Placement**

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<tr>
<th>POSTED SPEED LIMIT</th>
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<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
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<tr>
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<td>160 FT.</td>
<td>30 FT.</td>
<td>350 FT.</td>
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<tr>
<td>40 MPH</td>
<td>220 FT.</td>
<td>40 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>330 FT.</td>
<td>50 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>60 MPH</td>
<td>480 FT.</td>
<td>60 FT.</td>
<td>PER TABLE 'A'</td>
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</tbody>
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**Where:**
- \( L \) = Minimum length of taper.
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**Example:** 50 mph and 19' lane; \( L = 50 \times 19 = 950 \) feet
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CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<tr>
<th>POSTED SPEED LIMIT</th>
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<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
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<tr>
<td>20 MPH</td>
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<td>40 FT.</td>
<td>27 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
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<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
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<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
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<tr>
<td>40 MPH</td>
<td>325 FT.</td>
<td>160 FT.</td>
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<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
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<td>50 MPH</td>
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<td>55+MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes.
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Taper formula:
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Where:
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W = Width of offset.

i.e.: 50 mph and 19' lane; L = 50 \times 19 = 950 feet
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) - HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

NO. OF LANES

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>TAPER LENGTH FOR 12-FT LANE SHIFTING SHOULDER</th>
<th>CHANNELIZER SPACING TAPER LENGTH</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
</tr>
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<td>30 MPH</td>
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<td>60 FT.</td>
<td>30 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
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</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>400 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
</tr>
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<td>50 MPH</td>
<td>500 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
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<td>55 FT.</td>
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i.e.: 50 mph and 19' lane; \( L = 50 \times 19 = 950 \) feet
LEGEND

= Type II Barricade w/Sign

= Type II Barricade w/o Sign

= Channeling Device

= Traffic Cone With Clip On Sign

= Sign

= Signalized Intersection

= Arrow Panel (Flashing Arrow) (Where Required)

= High Level Warning Device (Flashing) (Optional)

= Flagger

= Tow Away No Stopping ___ to ___ (24 Hour Hours)

= Tow Away No Stopping Any Time

= Work Zone (Activity Area) Limits

= Direction of Traffic (Not Pavement Marking)

= Roadway Designation (A, Through 9)
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<td>500 FT.</td>
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<tr>
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CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

PLACEMENT OF BIKE LANE CLOSURE SIGN (IF NECESSARY)

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>SHIFTING SHOULDER</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>TAPER SPACING TANGENT</th>
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<td>40 FT.</td>
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<td>63 FT.</td>
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</tr>
<tr>
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<td>123 FT.</td>
</tr>
<tr>
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<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
<td>160 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>410 FT.</td>
<td>210 FT.</td>
<td>132 FT.</td>
<td>45 FT.</td>
<td>210 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
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CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<tr>
<th>POSTED SPEED LIMIT</th>
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<td>40 FT.</td>
</tr>
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</tr>
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<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
<td>30 FT</td>
<td>90 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>240 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
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<td>123 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT</td>
<td>160 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>440 FT.</td>
<td>270 FT.</td>
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<td>270 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT</td>
<td>300 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>680 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT</td>
<td>330 FT.</td>
</tr>
</tbody>
</table>

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Where:
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CONSTRUCTION NOTE:
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CHAIR A
MINIMUM RECOMMENDED DELINEATOR/COKE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>SHIFTING SHOULDER</th>
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<tbody>
<tr>
<td>20 MPH</td>
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<td>27 FT.</td>
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<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>105 FT.</td>
<td>65 FT.</td>
<td>37 FT.</td>
<td>25 FT.</td>
<td>65 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>130 FT.</td>
<td>90 FT.</td>
<td>47 FT.</td>
<td>30 FT.</td>
<td>90 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>155 FT.</td>
<td>115 FT.</td>
<td>57 FT.</td>
<td>35 FT.</td>
<td>115 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>180 FT.</td>
<td>140 FT.</td>
<td>67 FT.</td>
<td>40 FT.</td>
<td>140 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>205 FT.</td>
<td>165 FT.</td>
<td>77 FT.</td>
<td>45 FT.</td>
<td>165 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>230 FT.</td>
<td>190 FT.</td>
<td>87 FT.</td>
<td>50 FT.</td>
<td>190 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>255 FT.</td>
<td>215 FT.</td>
<td>97 FT.</td>
<td>55 FT.</td>
<td>215 FT.</td>
</tr>
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</table>

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i.e.: 50 mph and 19' lane, \( L = 50 \times 19 = 950 \) feet.
See Table A-T for sign and channelizer device spacing and taper length

**Abbreviations:**
- **S** = Sign Spacing
- **Min** = Minimum
- **LT** = Left
- **RT** = Right
- **LTP** = Lane Traffic Panel
- **TANSAT** = Tow Away, No Stopping Anytime
- **TANS** = Tow Away, No Stopping

---

**Chart A**

**Minimum Recommended Delineator/Cone & Sign Placement**

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
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</tr>
<tr>
<td>30 MPH</td>
<td>160 FT.</td>
<td>90 FT.</td>
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</tr>
<tr>
<td>35 MPH</td>
<td>175 FT.</td>
<td>100 FT.</td>
<td>52 FT.</td>
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<td>40 MPH</td>
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<td>160 FT.</td>
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<td>250 FT.</td>
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<td>300 FT.</td>
<td>300 FT.</td>
<td>50 FT.</td>
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<tr>
<td>55+MPH</td>
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<td>330 FT.</td>
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CHART A
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PLACEMENT OF BIKE LANE CLOSURE SIGN (IF NECESSARY)

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<td>90 FT.</td>
<td>60 FT.</td>
<td>30 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
<td>35 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>400 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
<td>45 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>480 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>660 FT.</td>
<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
</tr>
</tbody>
</table>

NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
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NOTE: This chart is based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formulae:

Taper formula:

\[ L = S \times W \] for speeds of 45 mph or more.

\[ L = \frac{W^2}{60} \] for speeds of 40 mph or less.

Where:

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i.e.: 50 mph and 19' lane, \( L = 50 \times 19 = 950 \) feet
**CONSTRUCTION NOTE:**

PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

---

**CHART A**

**MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT**

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>20 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
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<td>30 MPH</td>
<td>180 FT.</td>
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<td>350 FT.</td>
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<tr>
<td>35 MPH</td>
<td>240 FT.</td>
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<td>350 FT.</td>
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<td>40 MPH</td>
<td>320 FT.</td>
<td>40 FT.</td>
<td>350 FT.</td>
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<td>540 FT.</td>
<td>45 FT.</td>
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</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>50 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>55+MPH</td>
<td>660 FT.</td>
<td>55 FT.</td>
<td>PER TABLE 'A'</td>
</tr>
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CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-Ft LANE Merging</th>
<th>SHIFTING SHOULDER</th>
<th>CHANNELIZER SPACING TAPER LENGTH</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
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<td>107 FT.</td>
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</tr>
<tr>
<td>45 MPH</td>
<td>410 FT.</td>
<td>210 FT.</td>
<td>130 FT.</td>
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</tr>
<tr>
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<td>270 FT.</td>
<td>180 FT.</td>
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Where:
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S = Numerical value of posted speed limit prior to work or 85 percentile speed.
W = Width of offset.

i.e.: 50 mph and 19' lane, L = 50 x 19 = 950 feet
**NOTE:**
1. ONE (1) C30 SIGN MAY BE USED FOR SPEEDS 40 MPH OR LESS. WO-2-3 SIGNS MAY BE USED IN PLACE OF C30 SIGNS.
2. C27 (OPEN TRENCH) AND C31 (NO SHOULDER) SIGNS SHALL BE USED AS SHOWN IN FIGURE "A" FOR ALL OPEN TRENCHES WITHIN 6-FT OF A TRAVELED WAY.
CONSTRUCTION NOTE:

PLACE BIKE LANE CLOSED
AHEAD SIGN (C20) HALF THE
DISTANCE BETWEEN THE FIRST
AND SECOND SIGNS

---

CONSTRUCTION NOTE:

ALL DRIVEWAYS TO REMAIN
OPEN (WHenever POSSIBLE)
THROUGHOUT TRAFFIC
CONTROL ZONE

---

CHART A

MINIMUM RECOMMENDED DELINEATOR/CONE
& SIGN PLACEMENT

| POSTED SPEED LIMIT | TAPER LENGTH FOR 12-FT LANE MERGING | CHANNELIZER SPACING | SIGN SPACING
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
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</tr>
<tr>
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<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
</tr>
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<td>180 FT.</td>
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<td>500 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
</tr>
<tr>
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**CONSTRUCTION NOTE:**

ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

---

**CHAIR A**

**MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT**

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE SHIFTERING SHOULDER</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>60 FT.</td>
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<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>323 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>540 FT.</td>
<td>270 FT.</td>
<td>180 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
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<td>55+MPH</td>
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\[
L = S \times W \text{ for speeds of 45 mph or more.}
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L = \frac{W \times S^2}{60} \text{ for speeds of 40 mph or less.}
\]

Where:

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i.e.: 50 mph and 19' lane; \(L = 50 \times 19 = 950\) feet
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\]

Where:

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**CONSTRUCTION NOTE:**
PLACEMENT OF BIKE LANE CLOSURE SIGN
( IF NECESSARY)

**CONSTRUCTION NOTE:**
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

---

**CHART A**
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>CHANNELIZER SPACING TAPER</th>
<th>CHANNELIZER SPACING TANGENT</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>20 FT.</td>
<td>27 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>25 FT.</td>
<td>36 FT.</td>
<td>100 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>30 FT.</td>
<td>50 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>240 FT.</td>
<td>35 FT.</td>
<td>62 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>325 FT.</td>
<td>40 FT.</td>
<td>76 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
<td>460 FT.</td>
<td>45 FT.</td>
<td>100 FT.</td>
<td>350 FT.</td>
</tr>
<tr>
<td>50 MPH</td>
<td>600 FT.</td>
<td>50 FT.</td>
<td>125 FT.</td>
<td>500 FT.</td>
</tr>
<tr>
<td>55+ MPH</td>
<td>800 FT.</td>
<td>55 FT.</td>
<td>150 FT.</td>
<td>500 FT.</td>
</tr>
</tbody>
</table>

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**CONSTRUCTION NOTE:**
Place bike lane closed ahead sign (C20) half the distance between the first and second signs.

**See Table A–T for sign and channelizer device spacing and taper length.**

**ABBREVIATIONS:**
- S = Sign Spacing
- Min = Minimum
- LT = Left
- RT = Right
- LTP = Lane Traffic Panel
- TANSAT = Tow Away, No Stopping Anytime
- TANS = Tow Away, No Stopping

---

**CHART A**

**MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT**

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE WIDENING</th>
<th>SHIFTING</th>
<th>TAPER</th>
<th>CHANNELIZER SPACING</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
<td>40 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
<td>63 FT.</td>
</tr>
<tr>
<td>30 MPH</td>
<td>180 FT.</td>
<td>90 FT.</td>
<td>50 FT.</td>
<td>30 FT.</td>
<td>90 FT.</td>
</tr>
<tr>
<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>52 FT.</td>
<td>35 FT.</td>
<td>123 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
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<td>57 FT.</td>
<td>40 FT.</td>
<td>160 FT.</td>
</tr>
<tr>
<td>45 MPH</td>
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<td>270 FT.</td>
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</tr>
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<tr>
<td>55+MPH</td>
<td>680 FT.</td>
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CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<tr>
<th>POSTED SPEED LIMIT</th>
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<th>CHANNELIZER TAPER LENGTH</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
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PLACEMENT OF BIKE LANE CLOSURE SIGN
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--- CHART A ---
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
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i.e.: 50 mph and 19' lane; \[ L = 50 \times 19 = 950 \text{ feet} \]
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHenever POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

<table>
<thead>
<tr>
<th>POSTED SPEED LIMIT</th>
<th>TAPER LENGTH FOR 12-FT LANE MERGING</th>
<th>TAPER LENGTH FOR 12-FT LANE SHIFTING SHOULDER</th>
<th>CHANNELIZER SPACING TAPER LENGTH</th>
<th>SIGN SPACING (ADVANCE OF TAPER &amp; BETWEEN SIGNS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MPH</td>
<td>80 FT.</td>
<td>40 FT.</td>
<td>27 FT.</td>
<td>20 FT.</td>
</tr>
<tr>
<td>25 MPH</td>
<td>125 FT.</td>
<td>63 FT.</td>
<td>42 FT.</td>
<td>25 FT.</td>
</tr>
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<td>180 FT.</td>
<td>90 FT.</td>
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</tr>
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<td>35 MPH</td>
<td>245 FT.</td>
<td>123 FT.</td>
<td>82 FT.</td>
<td>35 FT.</td>
</tr>
<tr>
<td>40 MPH</td>
<td>320 FT.</td>
<td>160 FT.</td>
<td>107 FT.</td>
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</tr>
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<td>45 MPH</td>
<td>540 FT.</td>
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</tr>
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<td>* 50 MPH</td>
<td>600 FT.</td>
<td>300 FT.</td>
<td>200 FT.</td>
<td>50 FT.</td>
</tr>
<tr>
<td>* 55+MPH</td>
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<td>330 FT.</td>
<td>220 FT.</td>
<td>55 FT.</td>
</tr>
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NOTES
1. A Flashing Arrow sign shall be used for each lane closed.
2. Two lane closure signs (C-20) shall be used on the approach to a lane closure with speeds of 45 mph or greater.

NOTE: This chart based on 12-foot wide lanes.
For lane widths greater than 12 feet, use the following formula:
Taper formula:
\[ L = S \times W \text{ for speeds of 45 mph or more.} \]
\[ L = \frac{W^2}{60} \text{ for speeds of 40 mph or less.} \]

Where:
\[ L = \text{Minimum length of taper.} \]
\[ S = \text{Numerical value of posted speed limit.} \]
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i.e.: 50 mph and 19' lane, \[ L = 50 \times 19 = 950 \text{ feet} \]
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PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

**CHART A**
MINIMUM RECOMMENDED DELINEATOR/CONES
& SIGN PLACEMENT

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i.e.: 50 mph and 19’’ lane, \[ L = 50 \times 19 = 950 \] feet
CONSTRUCTION NOTE:
PLACE BIKE LANE CLOSED AHEAD SIGN (C20) HALF THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS

NO. OF LANES

CONSTRUCTION NOTE:
ALL DRIVEWAYS TO REMAIN OPEN (WHENEVER POSSIBLE) THROUGHOUT TRAFFIC CONTROL ZONE

CHART A
MINIMUM RECOMMENDED DELINEATOR/CONE & SIGN PLACEMENT

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For speeds of 40 mph or less:

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Where:

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