

DIRECTRIZ DE DISEÑO NUMERO 700
Instalación de caras de semáforos[®]

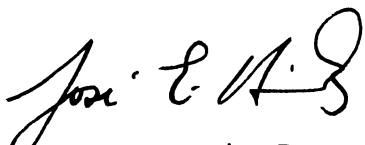
Con el propósito de estandarizar la localización y tipos de caras de semáforos y de ese modo crear en el usuario la expectativa de encontrar y responder a indicaciones similares en las intersecciones semaforizadas, la Autoridad ha adoptado la guía adjunta.

Fundamentalmente esta guía establece los siguientes principios:

- Se limita el número de caras de semáforos a tres tipos:
 - a) cara con tres indicaciones circulares
 - b) cara con tres indicaciones de flechas
 - c) cara de cinco indicaciones circulares y de flecha que implantan el control de movimientos protegidos y permitidos.
- Se estandariza el centralizar las caras en el centro del carril o en las líneas del carril del movimiento que controlan y se adopta el cono de 20 grados.
- Se establecen estándares para los movimientos continuos.
- Se establecen estándares reducidos para intersecciones menores.

Dichas guías están en conformidad con los planos modelos y especificaciones de la Autoridad

Esta directriz entra en vigor inmediatamente.

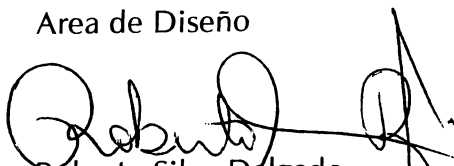


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Fecha



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7-IV-97

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TRAFFIC SIGNAL DESIGN DIRECTIVES

Cone of Vision

Vertically, a driver's vision is limited by the top of the vehicle's windshield. This restriction requires that the signal be located far enough beyond the stop bar to be seen by the driver of a stopped vehicle. The lateral location of the face is based on the driver's cone of vision and the width of the intersecting cross streets.

It has been determined by recognized human factor studies that, generally, a driver's lateral vision is excellent up to 5° on either side of the center line of the eye position (a cone of 10°). Vision is still very good up to 10° on either side (cone of 20°). At 20° on either side (cone of 40°), the driver's vision is judged as "adequate". The MUTCD requires that at least one (and preferably two) signal face be located within a cone 20° to the left or 20° to the right of the "center of the approach lanes extended". This constitutes the maximum acceptable cone.

The cone of vision originates at a point that represents the center of approach lanes at the stop bar. There is some controversy as to what lanes should be included. For example, should the center line bisect the entire approach width, including parking lane and left-turn lane? In general practice, the parking lane is usually excluded and separate turn lanes are included unless they are controlled by separate signal displays.

This concept is illustrated in Figure 1. The maximum cone of vision in this figure is shown superimposed on a typical two-lane approach with parking lane and in relation to various-width cross streets. Critical distances from the stop bar are also shown. If a separately controlled left-turn lane were added to the street, the cone would remain as shown. However, if the left-turn lane was not separately controlled, the cone would shift, as shown in Figure 2.

Other Location Criteria

The MUTCD (Section 4B-12) lists several other criteria that should be considered in locating signal indications. These additional requirements are listed below.

- Where a signal face is meant to control a specific lane or lanes of approach, its position should be unmistakably in line with the path of that movement.

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- Near-side signals should be located as near as possible to the stop bar.
- Required signal faces for any one approach must be mounted no less than 8 feet apart measured horizontally between the center of the faces.
- Where possible, at least one and preferably both signal displays that control through traffic must be located a minimum of 40 feet and a maximum of 150 feet beyond the stop bar.
- Where, because of roadway geometry, the nearest signal face is 150 feet or more beyond the stop bar, a supplemental near-side signal face must be used.
- Where, because of roadway geometry, the nearest signal faces is 40 feet or less beyond the stop bar, a supplemental near-side signal face must be used.

As discussed previously, at least one signal face is required to control a single turn lane (in addition to the minimum two signals for through traffic). Should the indications of a separate signal face(s) serving a separately controlled turn lane be visible to other traffic, a LEFT (or RIGHT) TURN SIGNAL sign is required and is located adjacent to the signal face. It is the policy of the agency to include the permissible or protected turn signal sign in all turn signal applications, whether they be arrow faces or clusters, as illustrated in the standard plans.

If two or more lanes are provided for the separately controlled turn movement, or if the turn movement represents the major movement from the approach, two signal faces should be provided.

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SIGNAL DISPLAY AND DESIGN CONFIGURATION

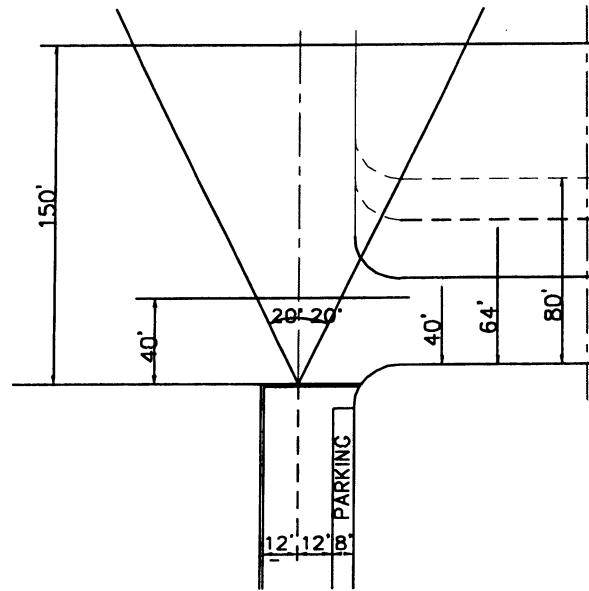


FIGURE #1. CONE OF VISION FOR TWO-LANE APPROACH.

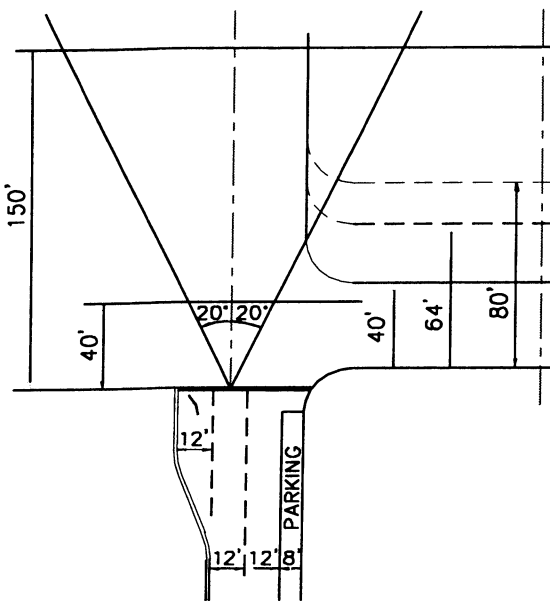


FIGURE #2. CONE OF VISION WITH UNCONTROLLED LEFT-TURN LANE APPROACH.

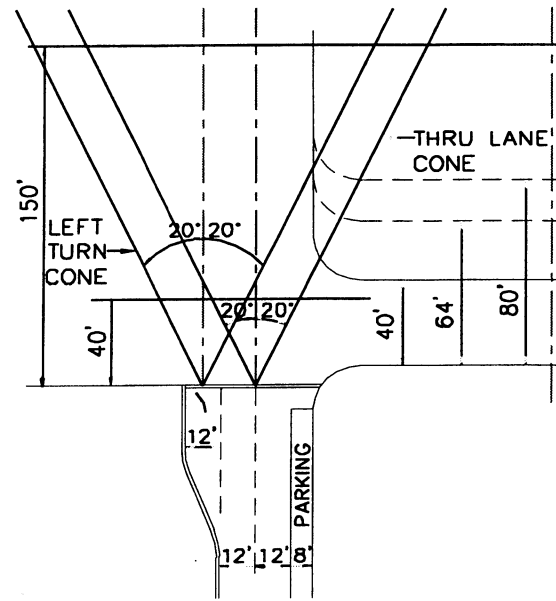


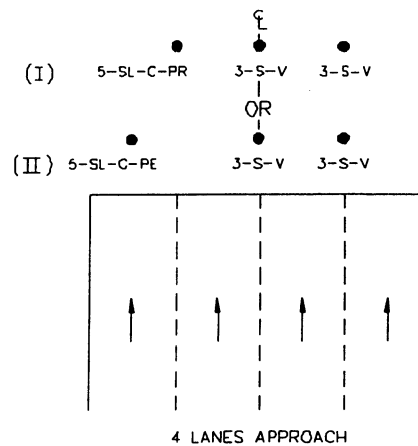
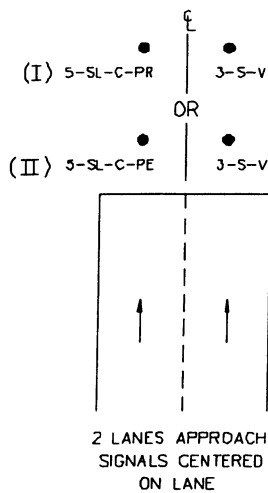
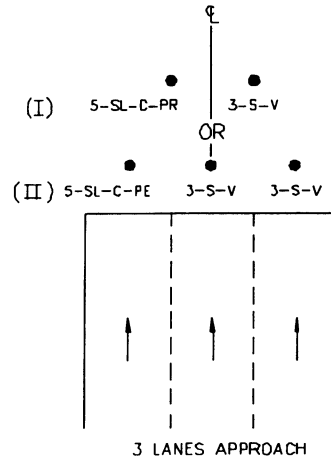
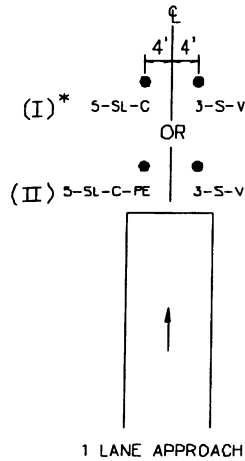
FIGURE #3. CONE OF VISION WITH CONTROLLED LEFT-TURN LANE APPROACH.

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THRU LANES AND APPROACHES
 WITHOUT TURNING LANES



CASES:

- (I) Protect left turn
- (II) Protect left turn interval with permissive interval

NOTES:

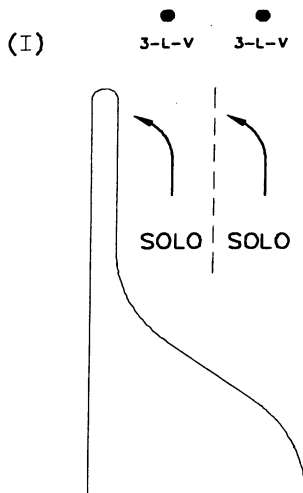
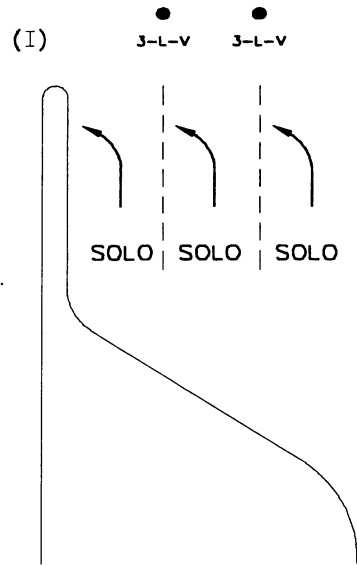
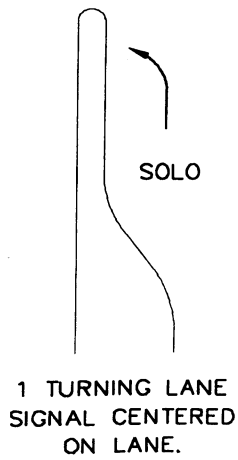
1. Apply same principles for horizontal mounting.
2. To be used in mast arm and span wire mountings.

* Through and left turn movements will occur and terminate in the same interval.

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LEFT OR RIGHT TURNING LANES
 FOR THRU LANES USE THRU LANES

(I) ●
 3-L-V
 OR
 ●
 (II) 5-SL-C*



NOTES

- 1- Apply same principle for horizontal mounting.
- 2- To be used in Mast Arm and Span Wire mounting.
- 3- When shared lanes are used in combination with turning lanes, combine thru and turning lane principles.

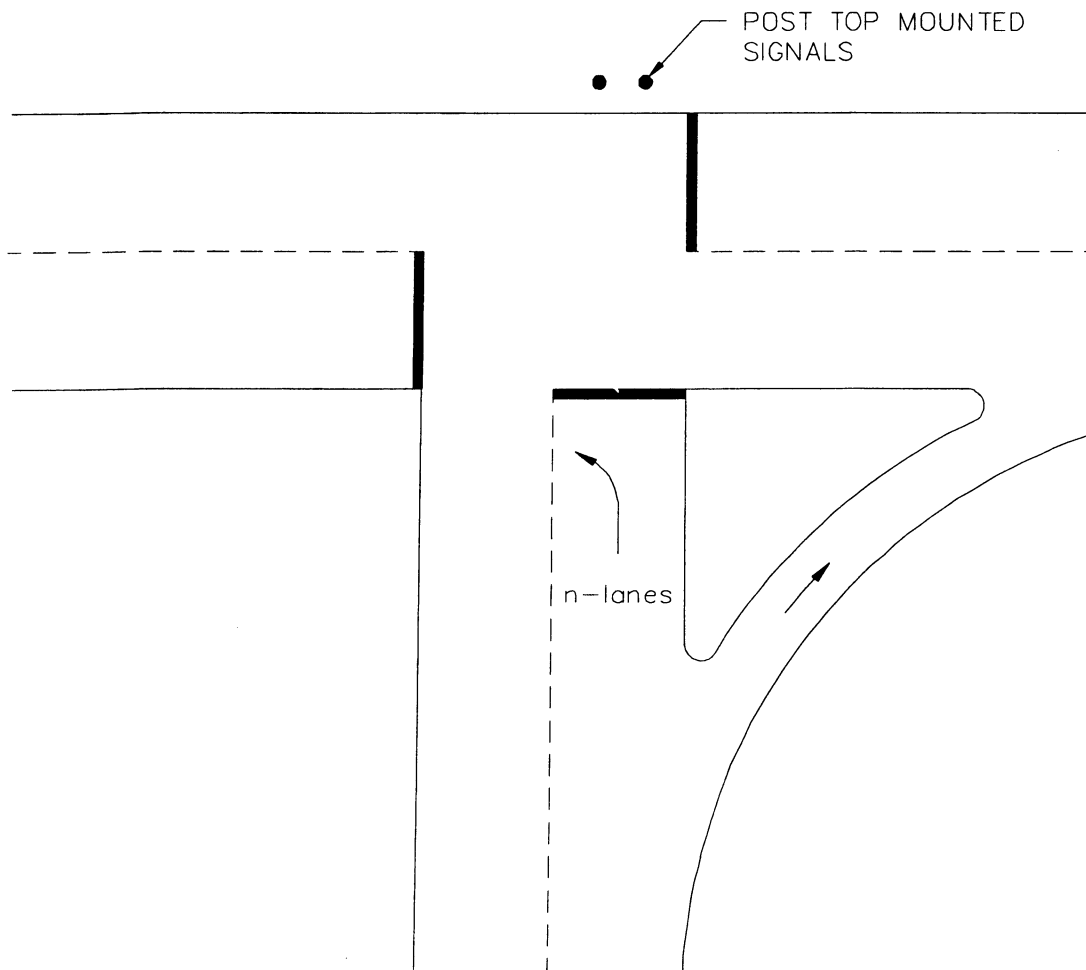
* FOR LEADING OR LAGGING GREEN
 USE CASE II

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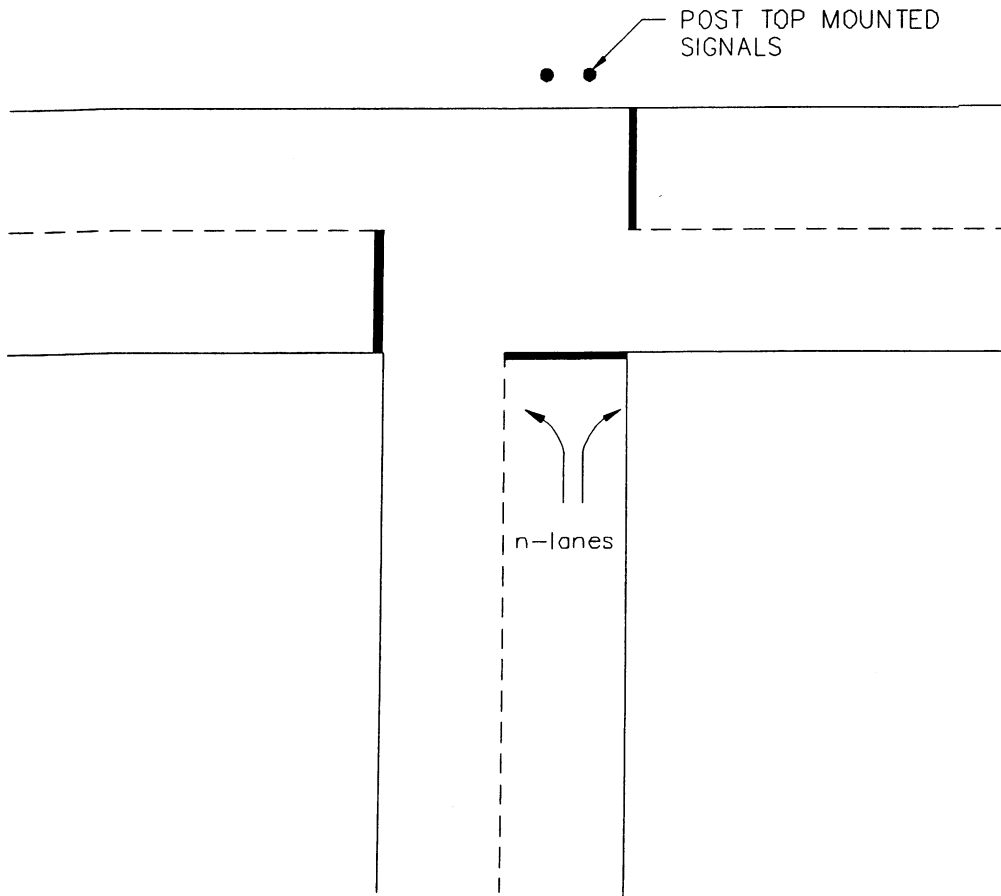
T INTERSECTIONS
WITH OUTER CONNECTOR



STEM OF T INTERSECTIONS USE TURNING
LANE PRINCIPLES CASE II ONLY

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T INTERSECTIONS
WITHOUT OUTER CONNECTOR



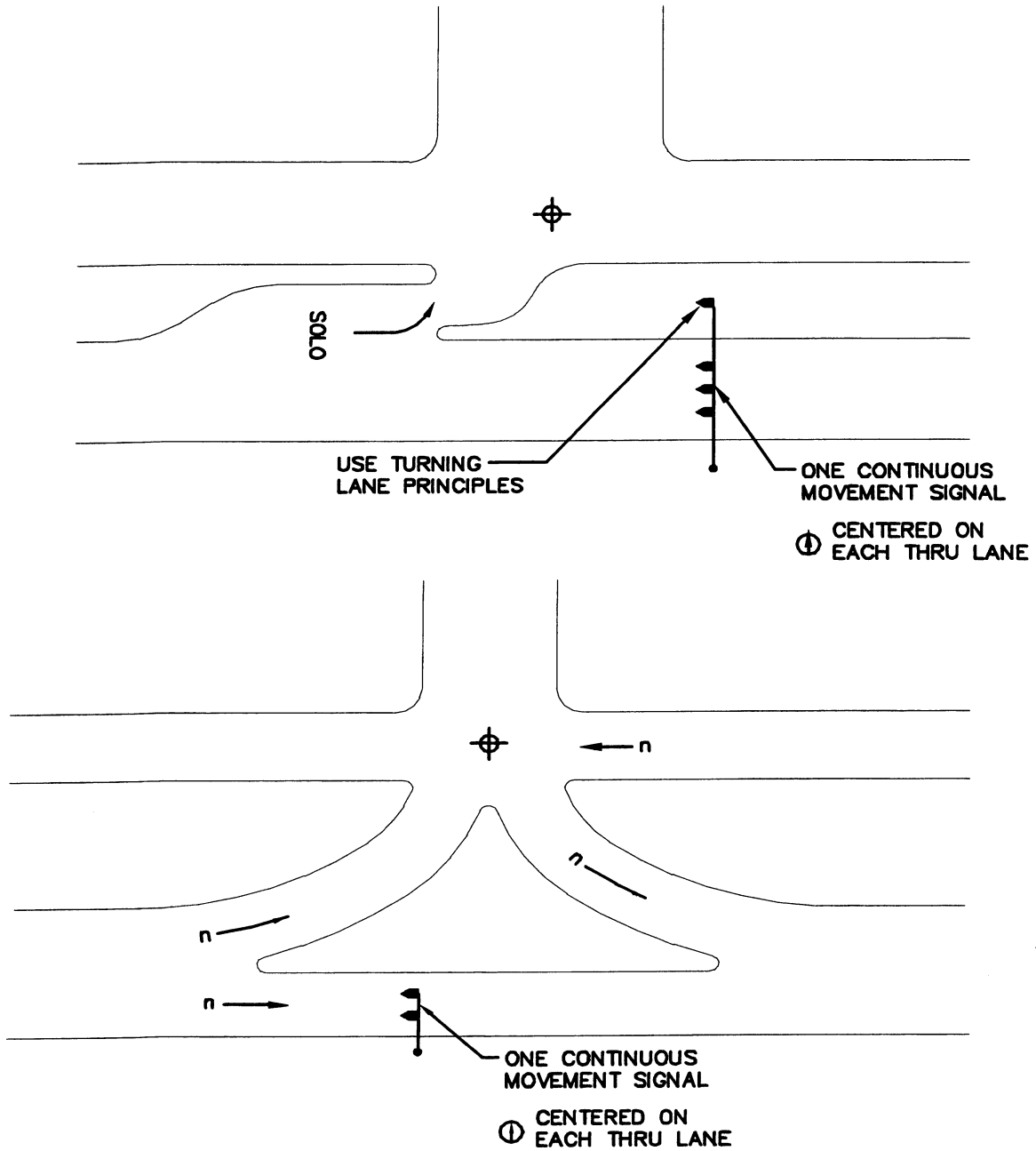
STEM OF T INTERSECTIONS USE TURNING
LANE PRINCIPLES CASE II ONLY

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HI-TYPE T INTERSECTIONS



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Diagonal Span Wire Mounting of Signals at Minor Intersections

This mounting scheme is to be used at the intersection of minor facilities, which generally have ADTs less than 5,000 vehicles per day on the major approach. Normally these intersections would not have channelized left turning bays and the number of thru lanes is 1 or 2 per approach.

Signal operation for left turns generally would be unprotected or protected by means of a leading or lagging green.

The location of the intersection would be a minor urban area, a suburban location or a rural location.

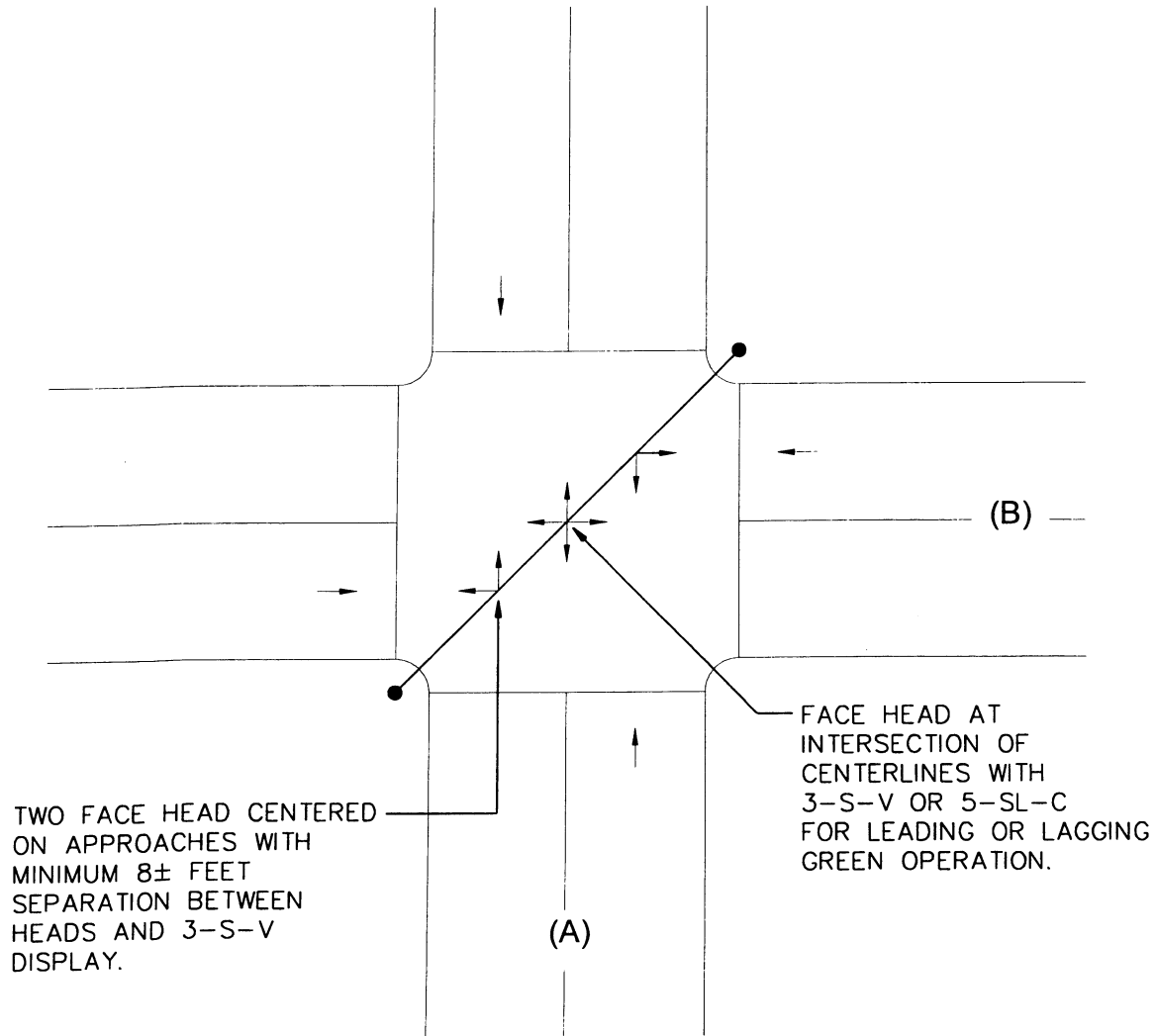
The design should not be used when a minor highway facility intersects a major highway facility, specially so when other signalized intersections along the major facility are treated at a higher standard.

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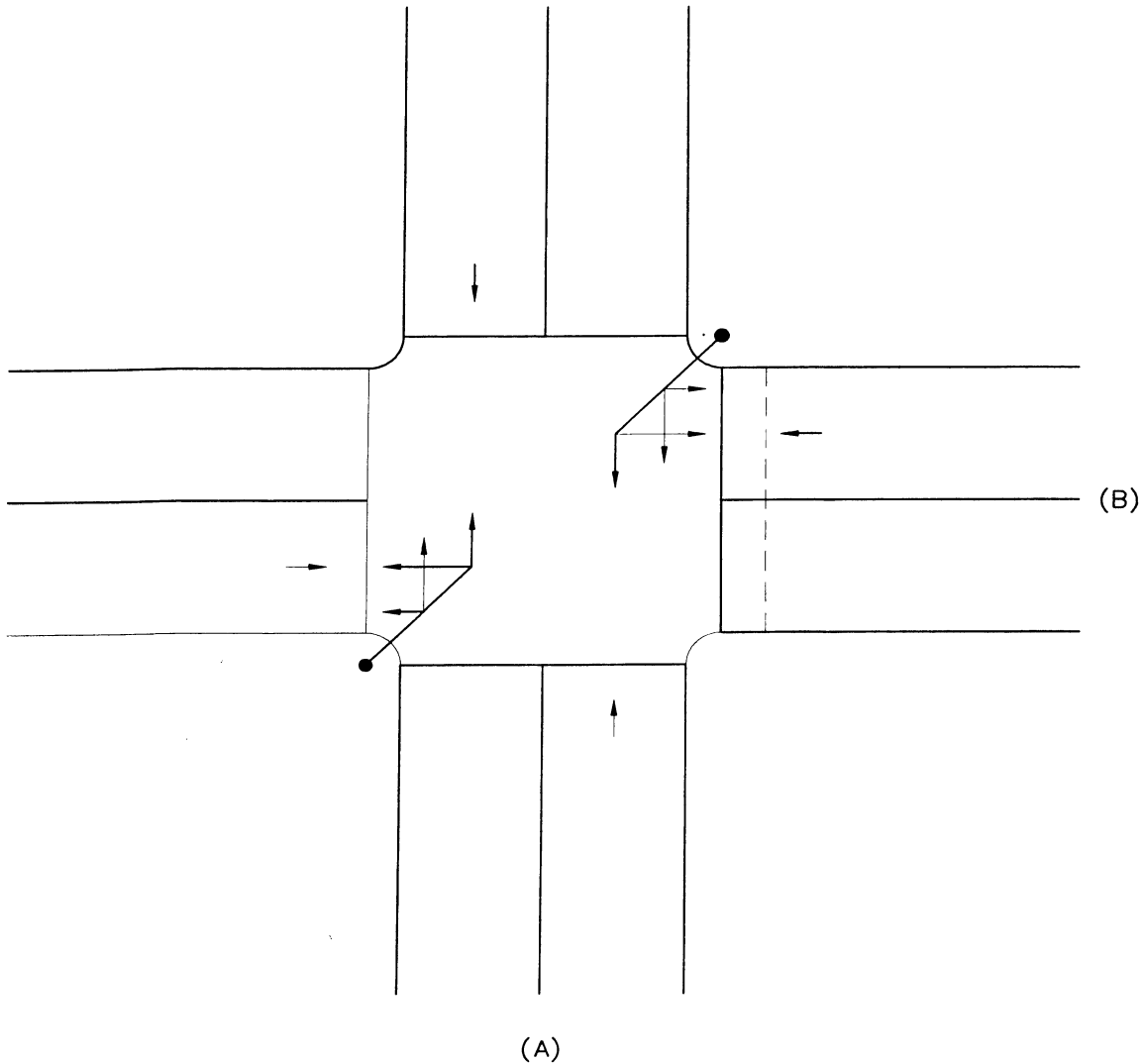
**DIAGONAL SPAN WIRE MOUNTING
FOR MINOR INTERSECTIONS**



Signal mounts for (A) are superior and should be used for the principal facility. Mounts for (B) may not meet the Cone of Vision minimums. If Cone of Vision requirements are not met, use Supplementary Signals.

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ALTERNATE MOUNTING AT MINOR INTERSECTION
MAST ARM MOUNTING



Signal mounts for (A) are superior and should be used for the principal facility. Mounts for (B) may not meet the Cone of Vision minimums. If Cone of Vision requirements are not met, use Supplementary Signals.