

Box span wire displays for traffic signal installations.

This type of display places the traffic signal heads on the far side of each approach to an intersection, with at least one signal head for each approach lane. The requirement for one signal head per lane is a MMUTCD requirement. It is much easier to meet this requirement for all approaches using the box span display.

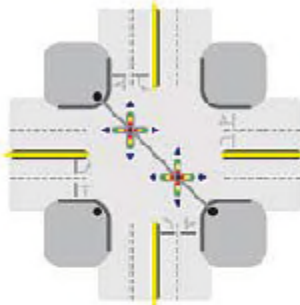
Past practice has been for the diagonal style span wire installation for traffic signals at intersections. Diagonal design did not always provide adequate visual angle of the signal heads. The box span display allows drivers to see the signal heads with a less obtrusive visual angle (cone of vision) which is in line with the department's emphasis on elderly mobility. It also assists in the reduction in red light running. With signal heads on the far side of the intersection, drivers are reluctant to "run the red" when they can see the red indication as they traverse the intersection.

The change was innovative in that it changed MDOT's long standing approach to signal design to a safer new signal display pattern.

Below is a page from our “Traffic Signals – A guide for their use” pamphlet which graphically shows the difference between diagonal and box spans.

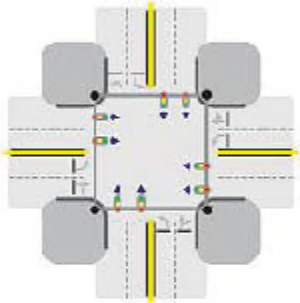
The New Box Span Traffic Signal

Box span signal design is a new method for positioning traffic signals in an intersection. In the course of projects that require upgrading an intersection and/or signal, MDOT will be replacing the traditional signal configuration with the box span design.



Traditional signal design

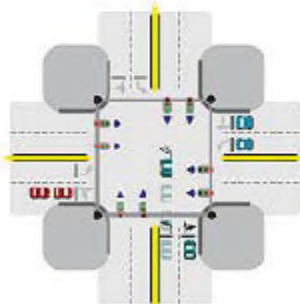
With the traditional signal design, two traffic signals are located in the middle of an intersection. They are suspended on wires secured to two poles placed opposite each other in the intersection.



New box span signal configuration

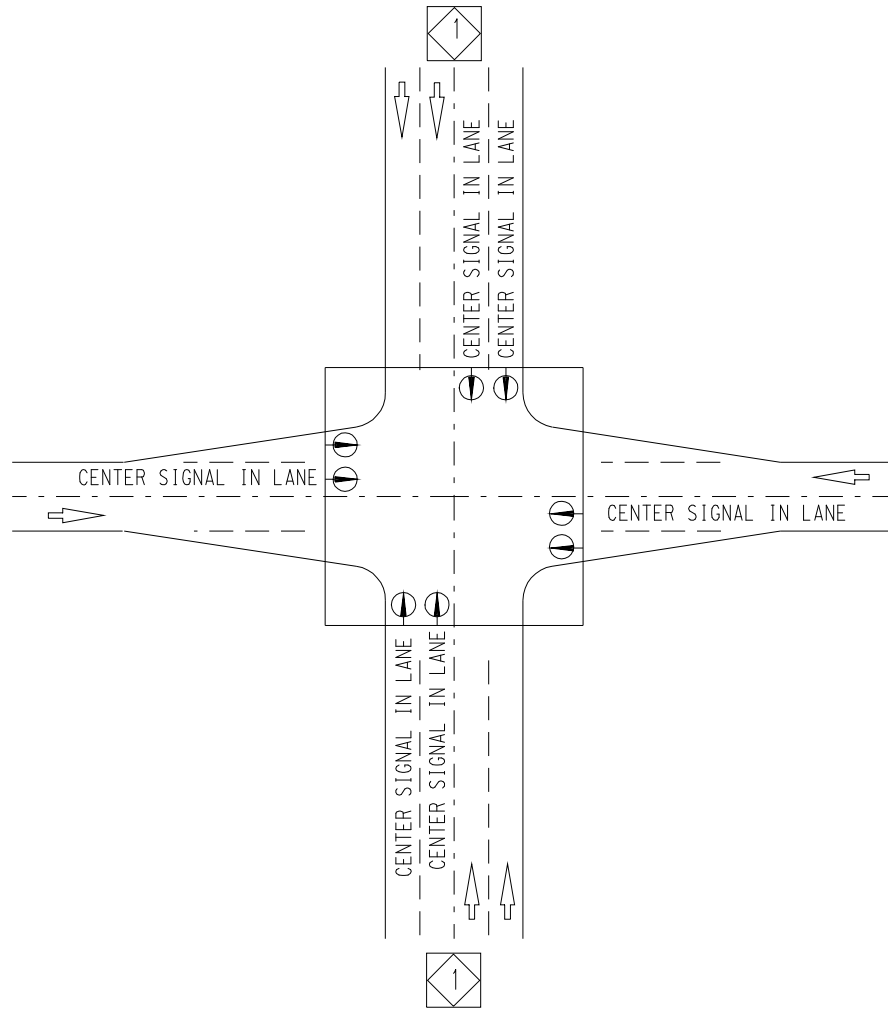
With the new box span configuration, signals are located near each corner of the intersection (thus, the “box” design).

Advantages of this design include increased safety for maintenance workers who no longer need to be stationed in the middle of a busy intersection to make repairs, and placement of the signal head over each lane which makes it easier for drivers to see the signals.



How a box span signal works

This diagram shows how the new signal configuration works. Motorists will continue to pull up to the stop line and proceed according to the signal directly opposite them at the far side of the intersection. Once this signal turns green, a motorist could go straight or turn, depending on their lane of travel. Motorists turning left need to follow through with the left-turn regardless of what the other traffic signals show; drivers should NOT stop in an intersection for any reason.



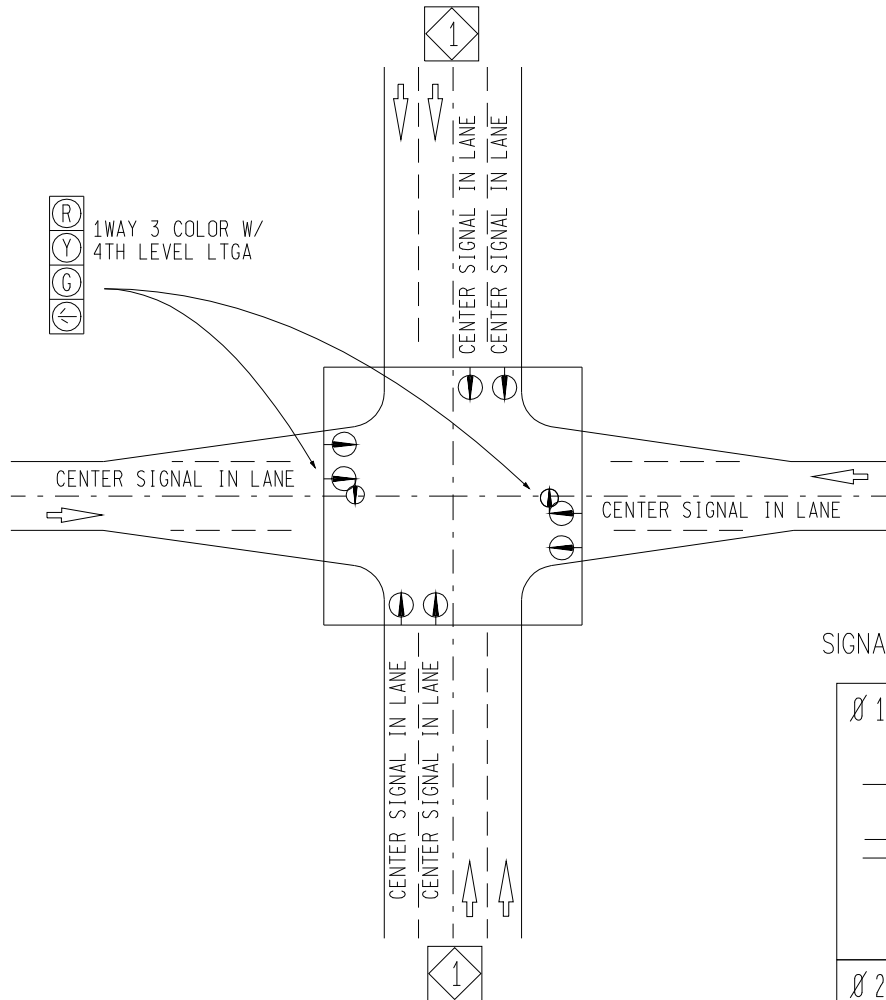
NOTES:

- 1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 2 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.

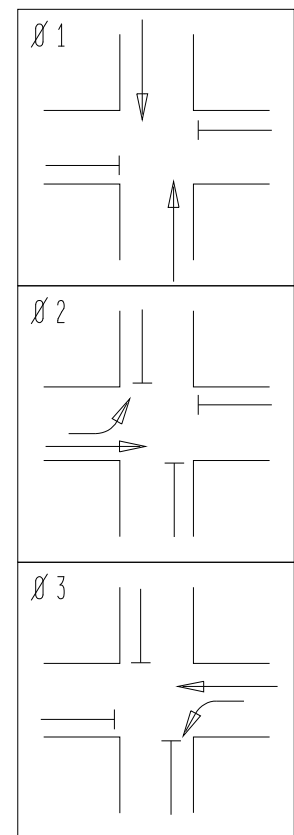


HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



SIGNAL PHASING DIAGRAM



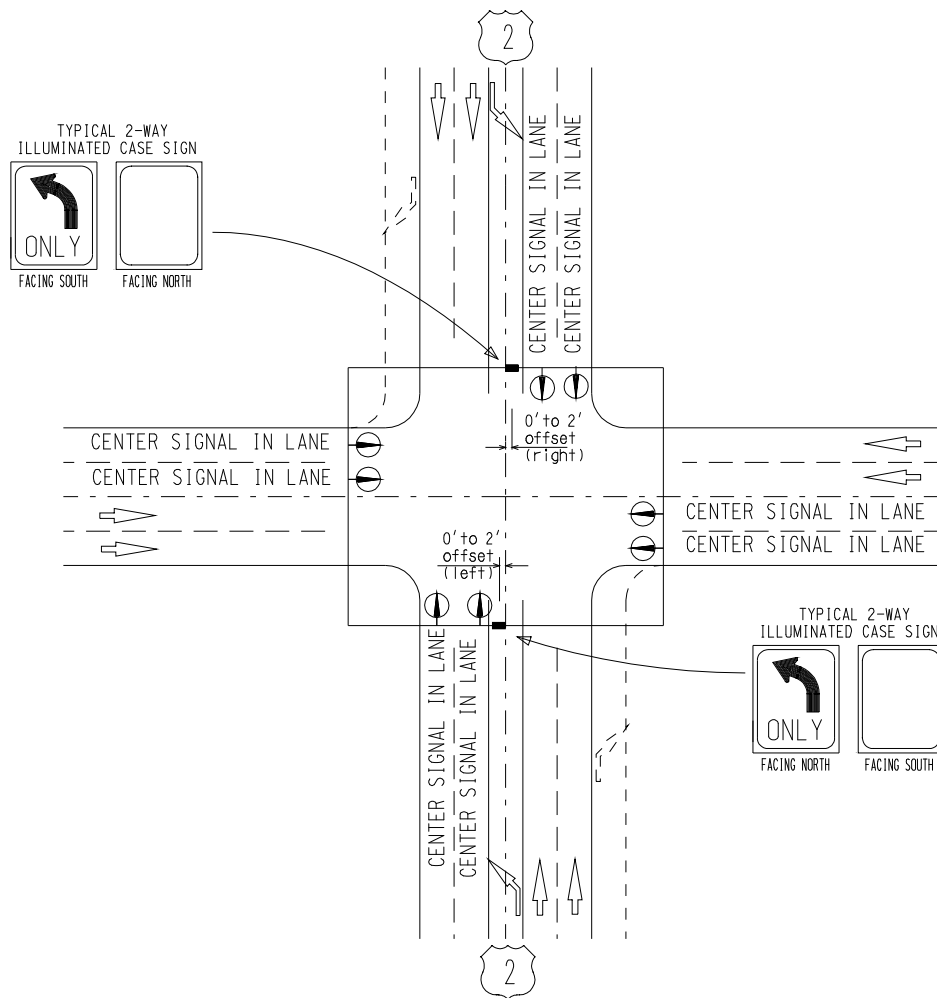
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- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 UTILIZE A 4TH LEVEL LTGA FOR THE EAST & WEST PROTECTED LEFT MOVEMENTS.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION
SPLIT PHASE



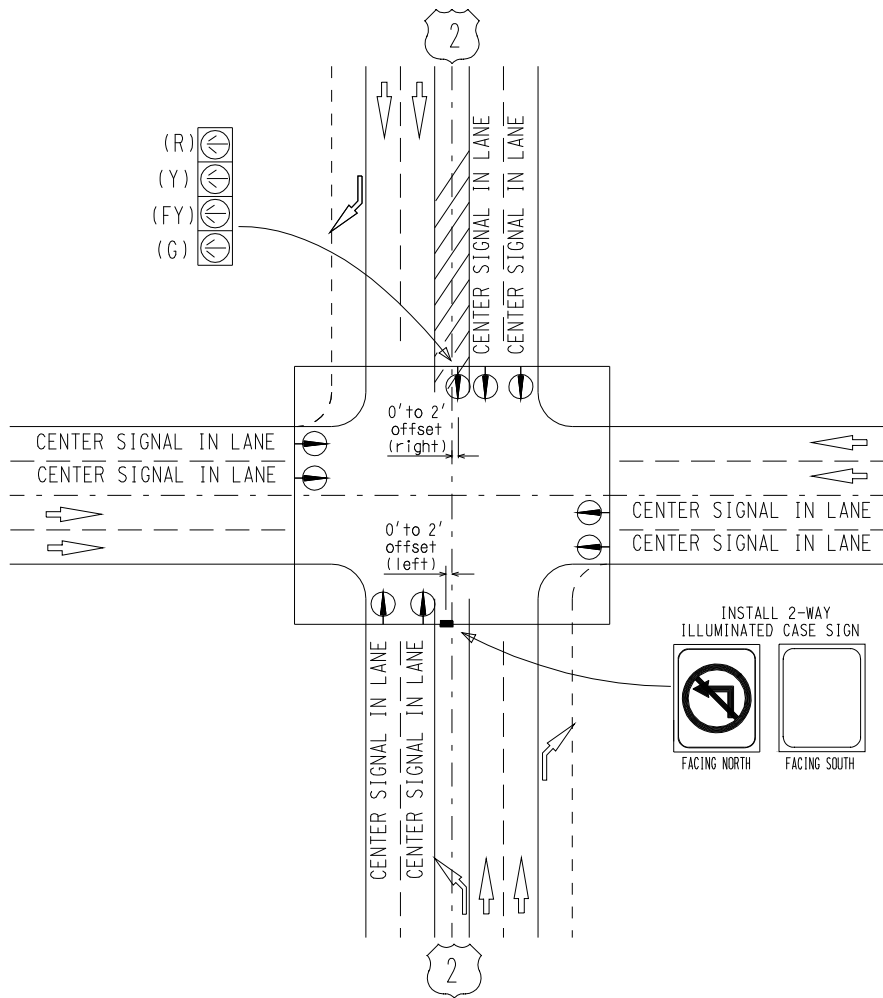
NOTES:

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- 2 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION.

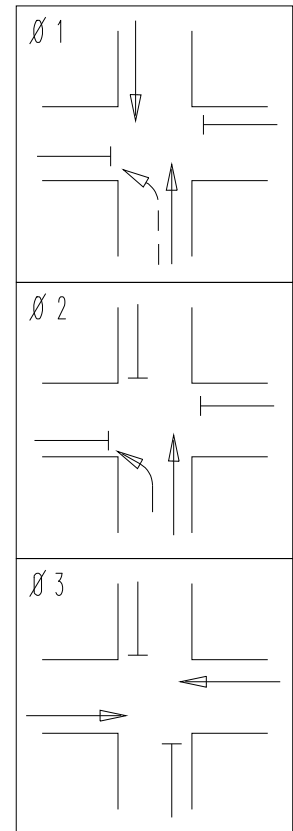


HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



SIGNAL PHASING DIAGRAM



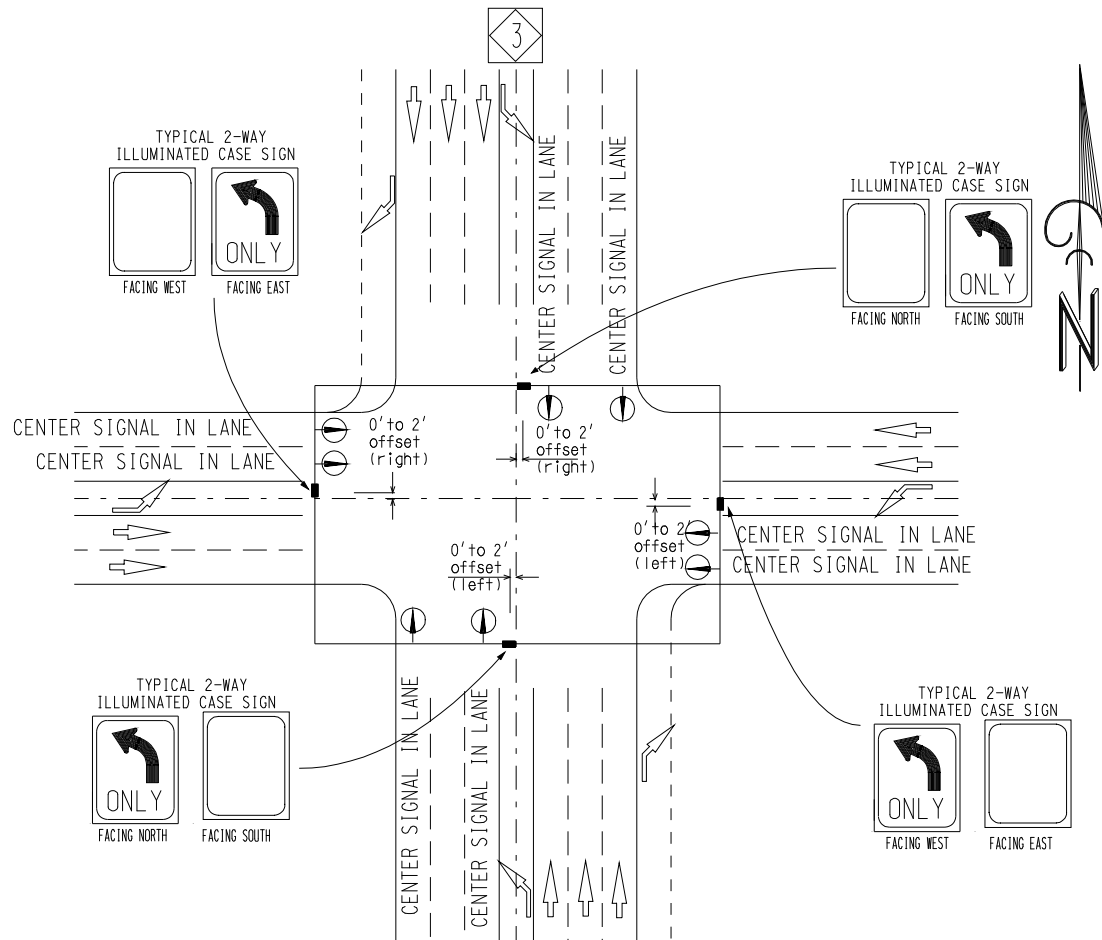
NOTES:

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- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION.
- 5 USE PERMISSIVE FLASHING YELLOW LEFT TURN.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION WITH
SINGLE LAGGING LEFT TURN PHASE
ON TRUNKLINE



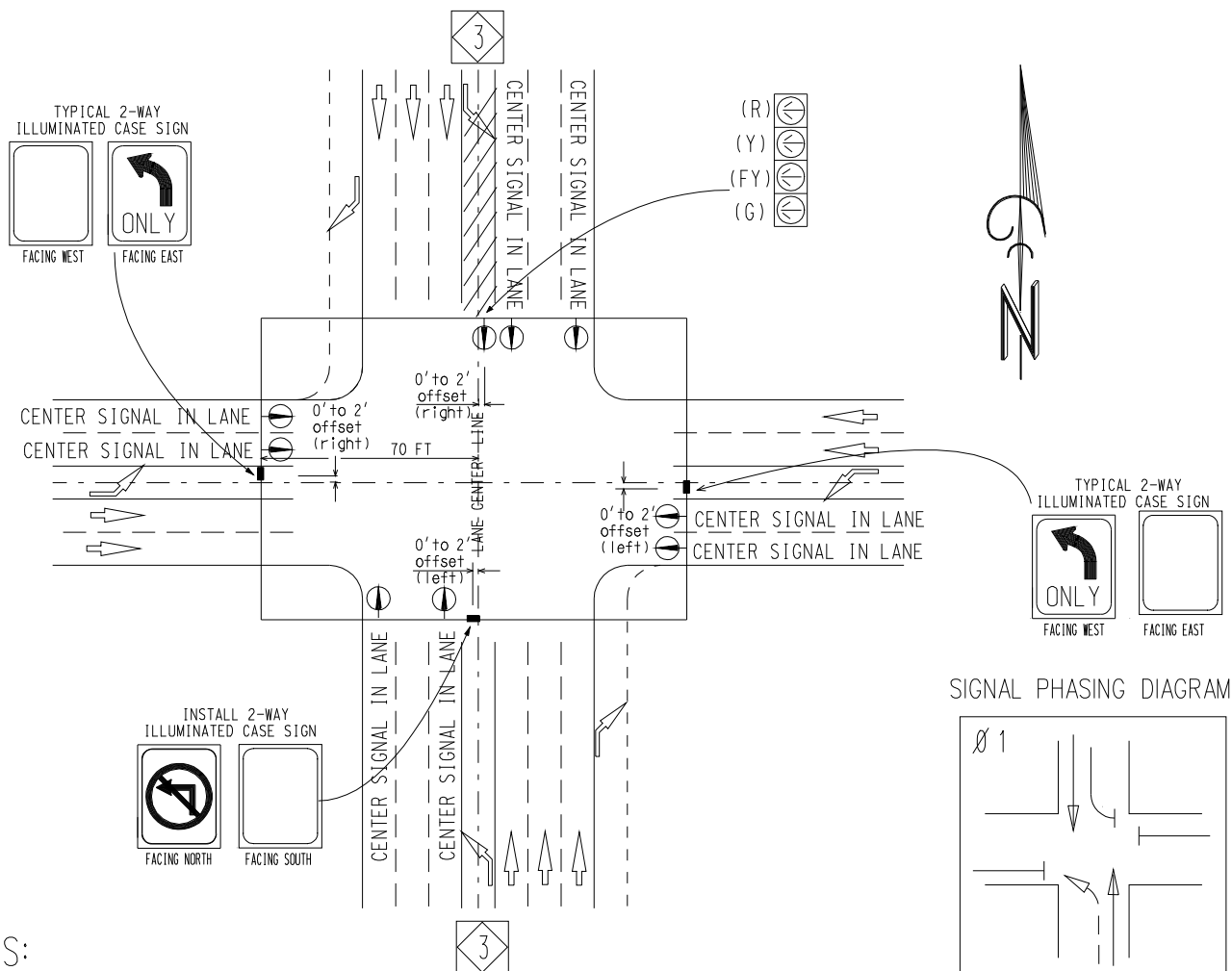
NOTES:

- 1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 2 IN THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION.
- 5 PEDESTRIAN SIGNALS OPTIONAL.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



NOTES:

- 1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 2 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION.
- 5 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 6 THE MAXIMUM DESIRED DISTANCE FROM THE CENTER OF THE LANE TURNING LEFT, TO THE CROSSROAD THROUGH SIGNAL (LOCATED ON THE SPAN, LEFT OF THE LANE TURNING LEFT) SHOULD NOT EXCEED 70 FEET. ADDITIONAL SIGNS AND ENGINEERING JUDGMENT MAY BE REQUIRED FOR DISTANCES IN EXCESS OF 70 FEET; OR AT SKEWED INTERSECTIONS.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION WITH
SINGLE LAGGING LEFT TURN PHASE
ON TRUNKLINE



1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL
SHALL NOT EXCEED 150 FEET.

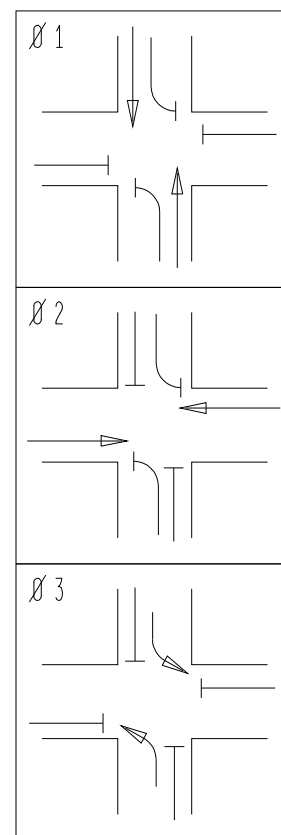
2 IN THE ABSENCE OF A STOP BAR, THE CURB RADIUS
SPRING POINT SHOULD BE USED.

3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN
SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.

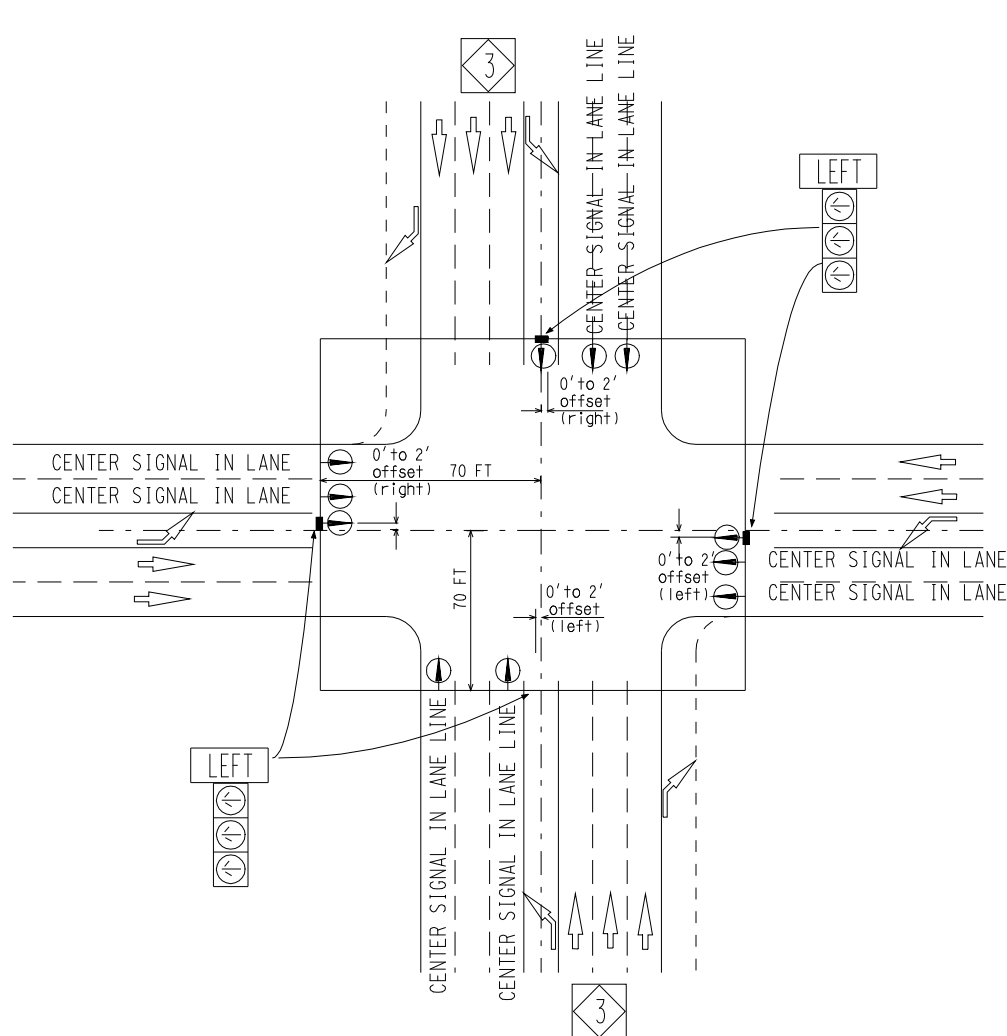
4 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN
SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE
THE CASE SIGN LEGEND ON THE FAR SIDE OF
THE INTERSECTION.

5 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE
PEDESTRIAN ACTIVITY IS EVIDENT.

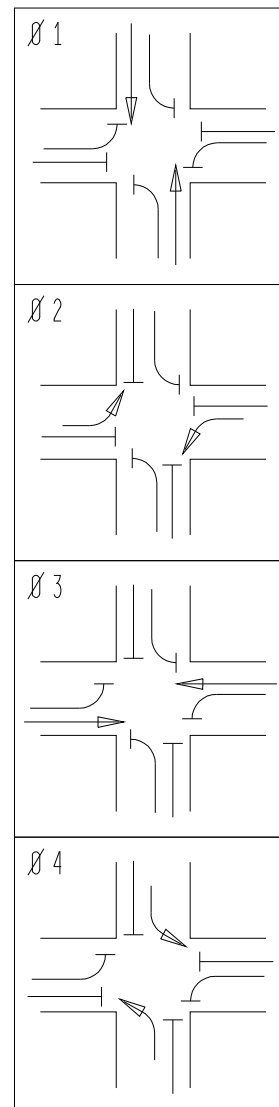
6 THE MAXIMUM DESIRED DISTANCE FROM THE CENTER OF
THE LANE TURNING LEFT, TO THE CROSSROAD THROUGH
SIGNAL (LOCATED ON THE SPAN, LEFT OF THE LANE
TURNING LEFT) SHOULD NOT EXCEED 70 FEET.
ADDITIONAL SIGNS AND ENGINEERING JUDGMENT MAY
BE REQUIRED FOR DISTANCES IN EXCESS OF 70 FEET;
OR AT SKEWED INTERSECTIONS.



3 PHASE OPERATION WITH DUAL LEADING LEFT TURN PHASING ON TRUNKLINE



SIGNAL PHASING DIAGRAM



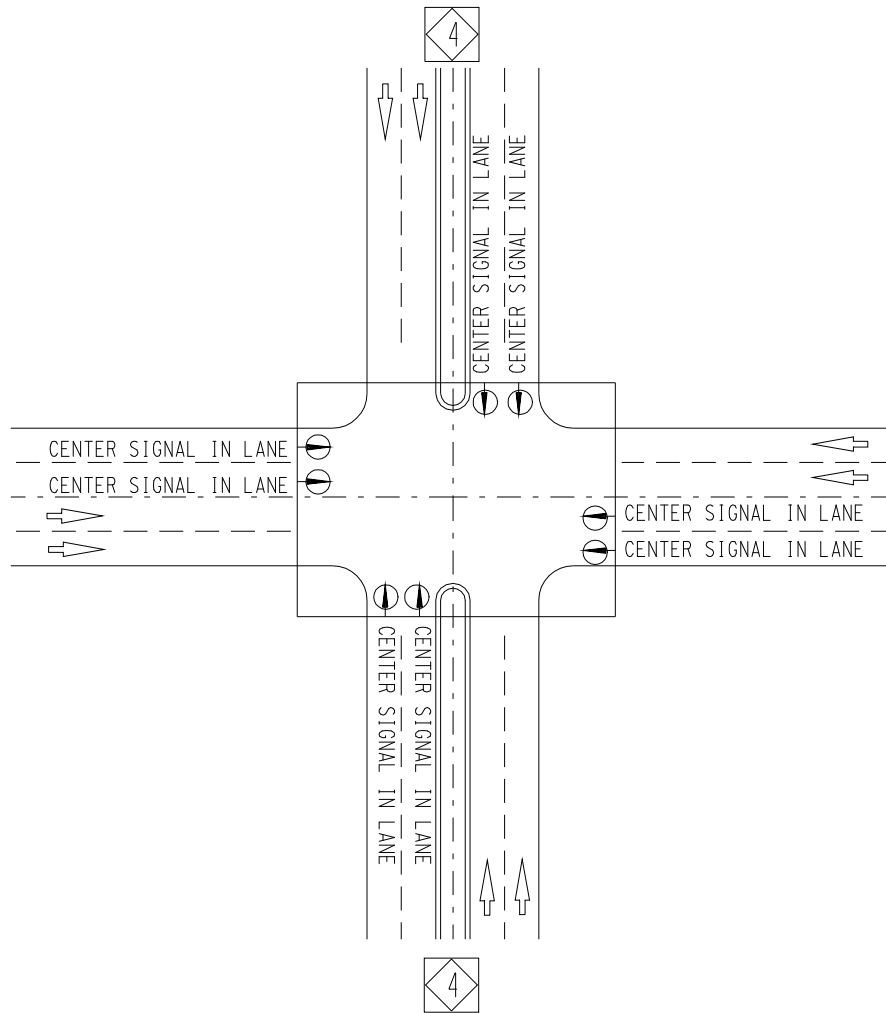
NOTES:

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- 2 in THE ABSENCE OF A STOP BAR, THE CURB RADII SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 5 THE MAXIMUM DESIRED DISTANCE FROM THE CENTER OF THE LANE TURNING LEFT, TO THE CROSSROAD THROUGH SIGNAL (LOCATED ON THE SPAN, LEFT OF THE LANE TURNING LEFT) SHOULD NOT EXCEED 70 FEET. ADDITIONAL SIGNS AND ENGINEERING JUDGMENT MAY BE REQUIRED FOR DISTANCES IN EXCESS OF 70 FEET; OR AT SKEWED INTERSECTIONS.



HEAD PLACEMENT DIAGRAM

4 PHASE OPERATION WITH
LEADING LEFT TURNS FOR BOTH ROADS
(SAME OPERATION AS 8 PHASE)



NOTES:

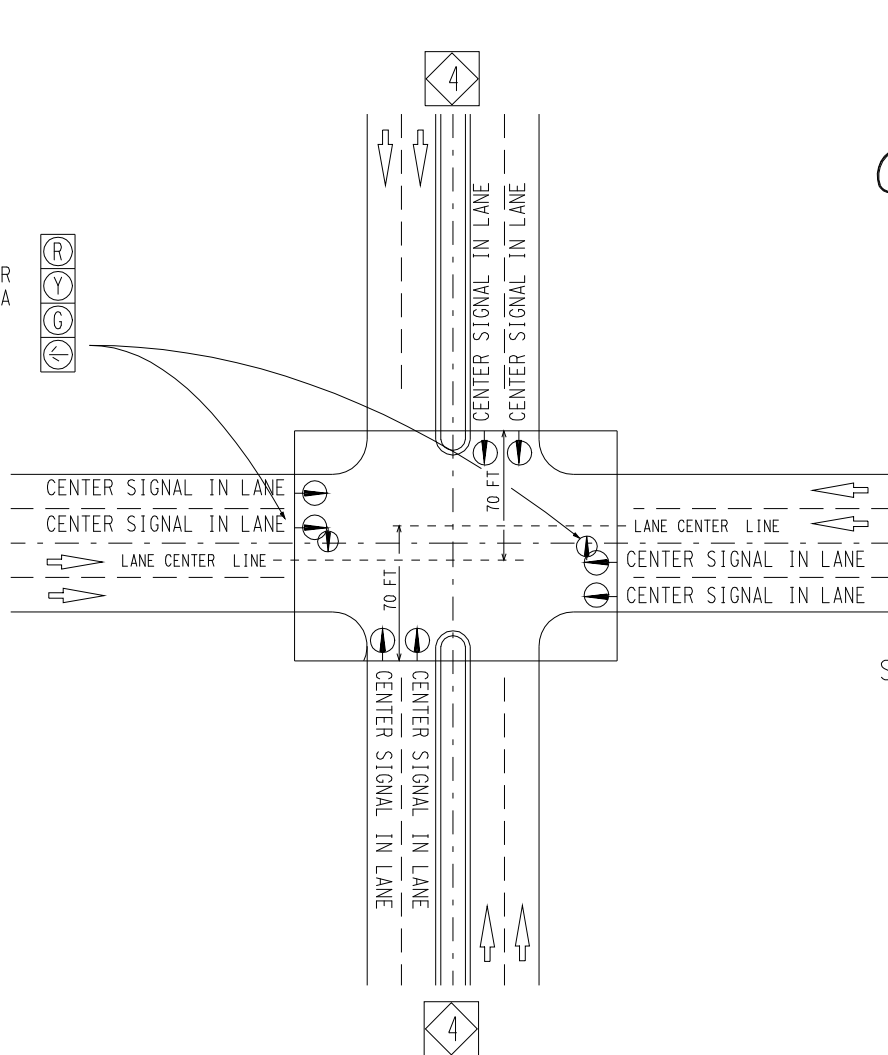
- 1 MEDIAN WIDTH LESS THAN 30'.
- 2 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 3 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 4 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.



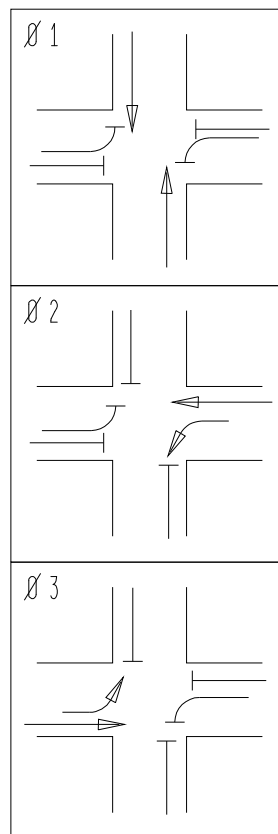
HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION

1WAY 3 COLOR
W/4TH LEVEL LTGA



SIGNAL PHASING DIAGRAM



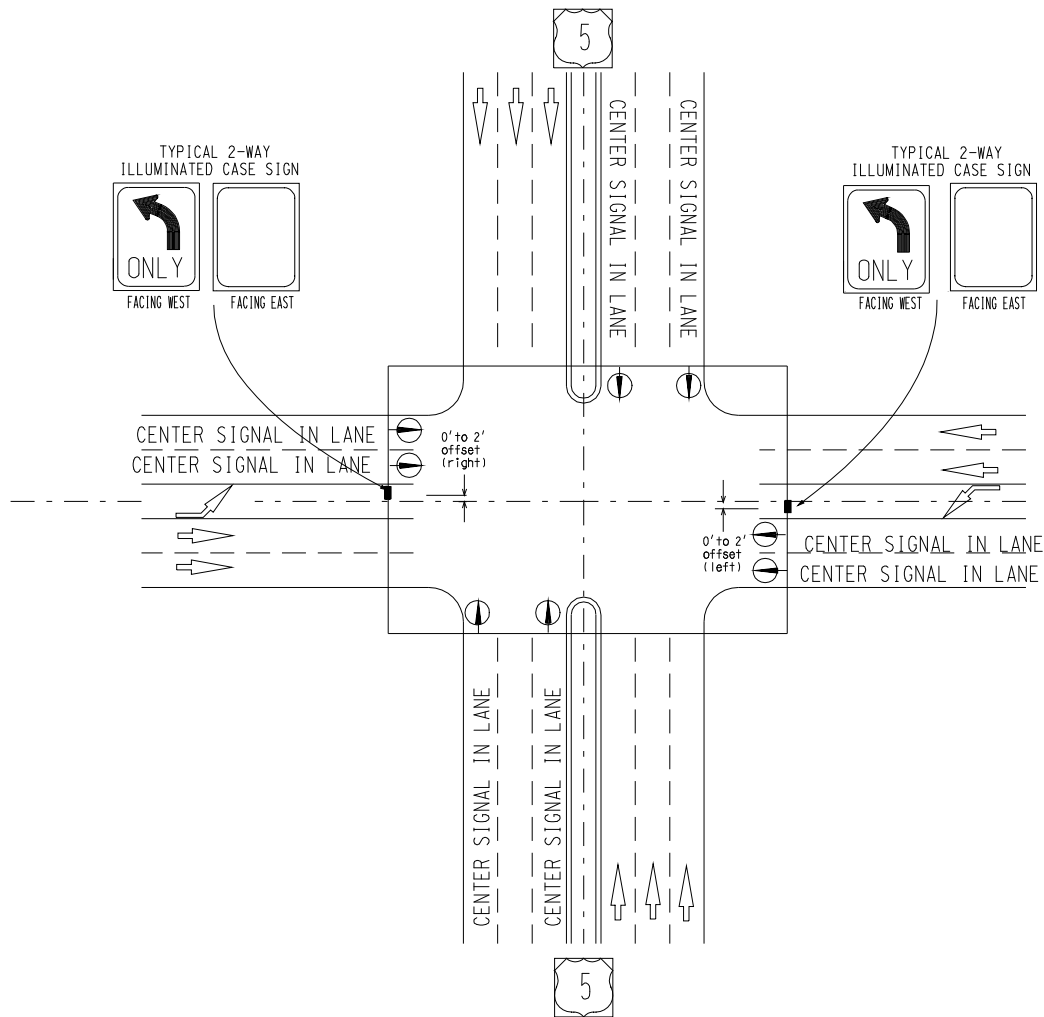
NOTES:

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- 4 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 5 UTILIZE A 4TH LEVEL LTGA FOR THE EAST & WEST PROTECTED LEFT MOVEMENTS.
- 6 THE MAXIMUM DESIRED DISTANCE FROM THE CENTER OF THE LANE TURNING LEFT, TO THE CROSSROAD THROUGH SIGNAL (LOCATED ON THE SPAN, LEFT OF THE LANE TURNING LEFT) SHOULD NOT EXCEED 70 FEET. ADDITIONAL SIGNS AND ENGINEERING JUDGMENT MAY BE REQUIRED FOR DISTANCES IN EXCESS OF 70 FEET; OR AT SKEWED INTERSECTIONS.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION
SPLIT PHASE



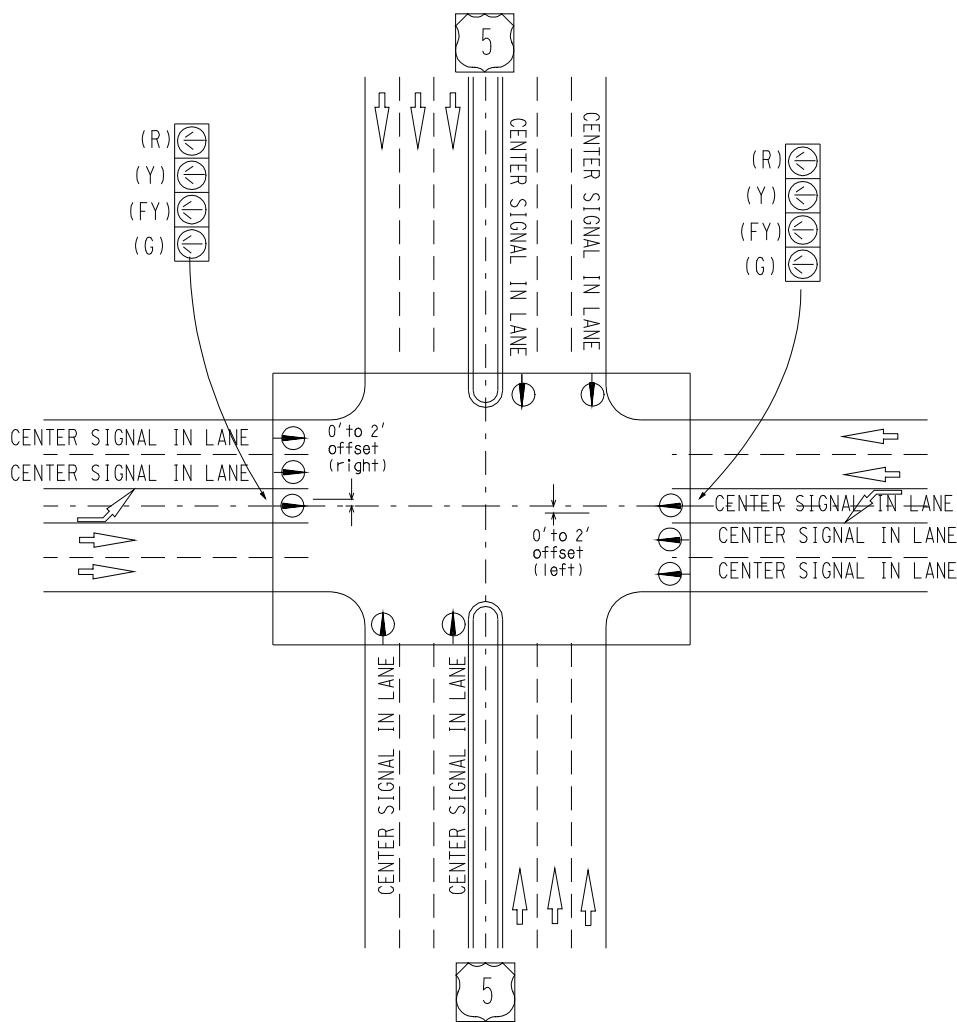
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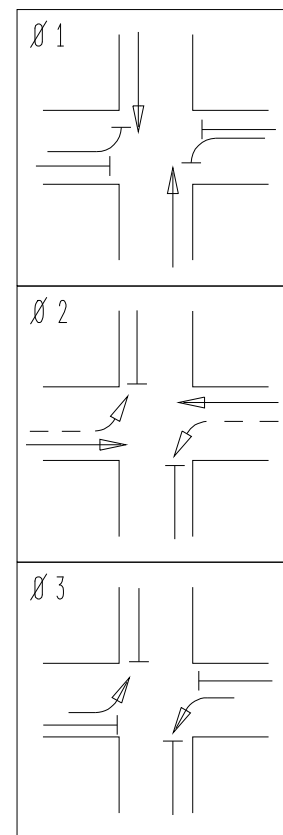


HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



SIGNAL PHASING DIAGRAM



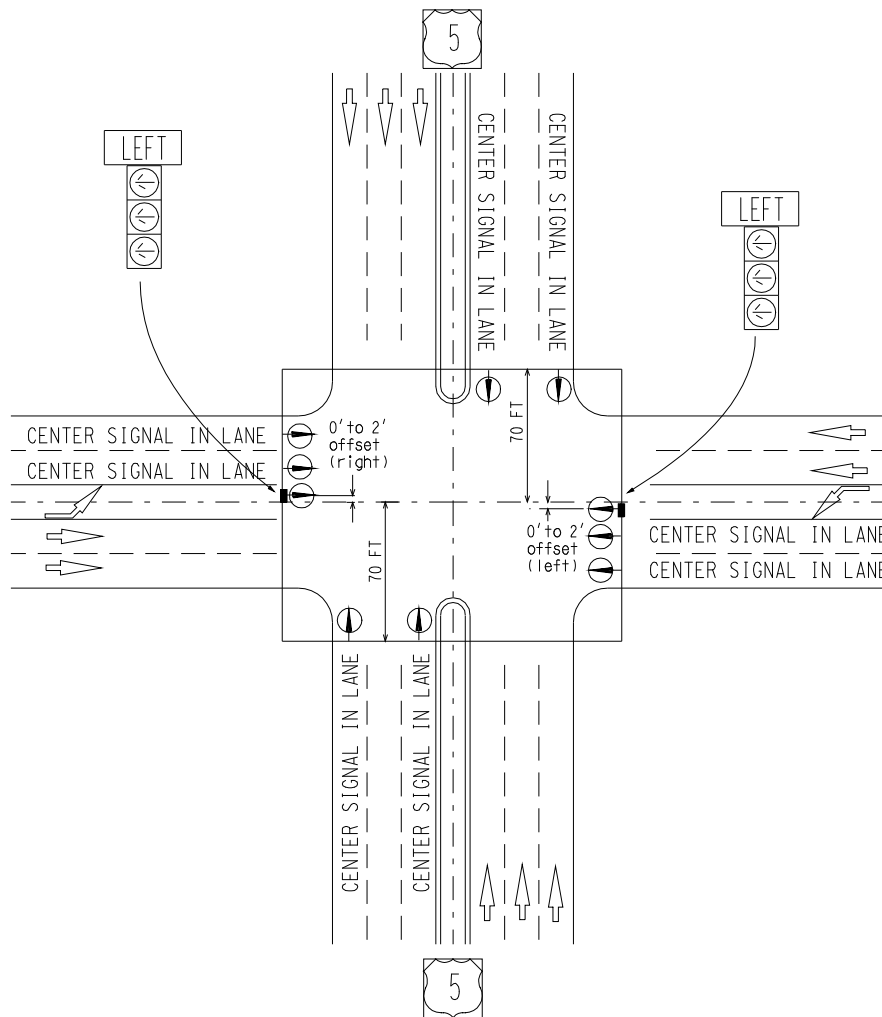
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- 5 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION.
- 6 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 7 USE PERMISSIVE FLASHING YELLOW LEFT TURN.

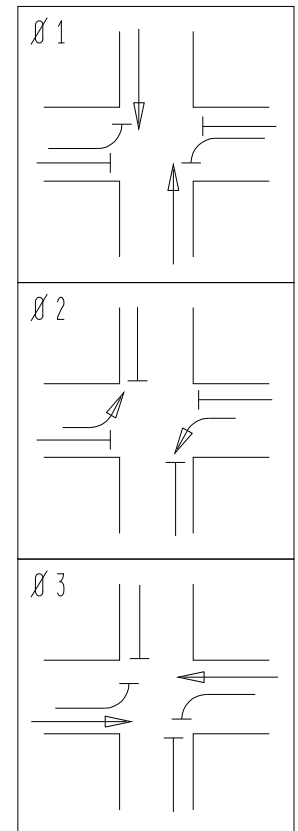


HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION WITH
DUAL LAGGING LEFT TURN PHASE
ON X-RD



SIGNAL PHASING DIAGRAM



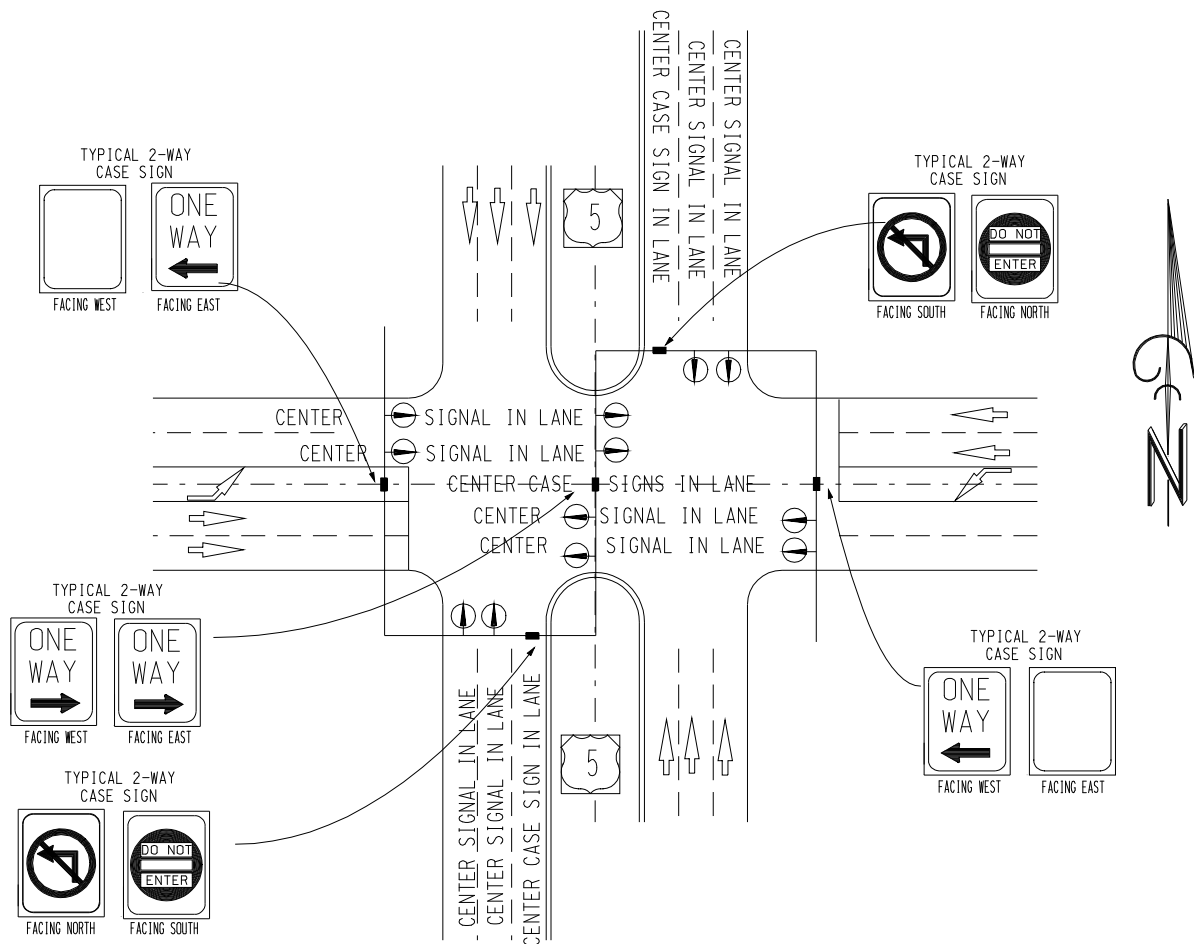
NOTES:

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- 2 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 3 in THE ABSENCE OF A STOP BAR, THE CURB RADII SPRING POINT SHOULD BE USED.
- 4 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 5 LEAD LEFT-TURN SHALL NOT BE PERMISSIVE.
- 6 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 7 THE MAXIMUM DESIRED DISTANCE FROM THE CENTER OF THE LANE TURNING LEFT, TO THE CROSSROAD THROUGH SIGNAL (LOCATED ON THE SPAN, LEFT OF THE LANE TURNING LEFT) SHOULD NOT EXCEED 70 FEET. ADDITIONAL SIGNS AND ENGINEERING JUDGMENT MAY BE REQUIRED FOR DISTANCES IN EXCESS OF 70 FEET; OR AT SKEWED INTERSECTIONS.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION WITH
DUAL LEADING LEFT TURN PHASE
FOR X-RD



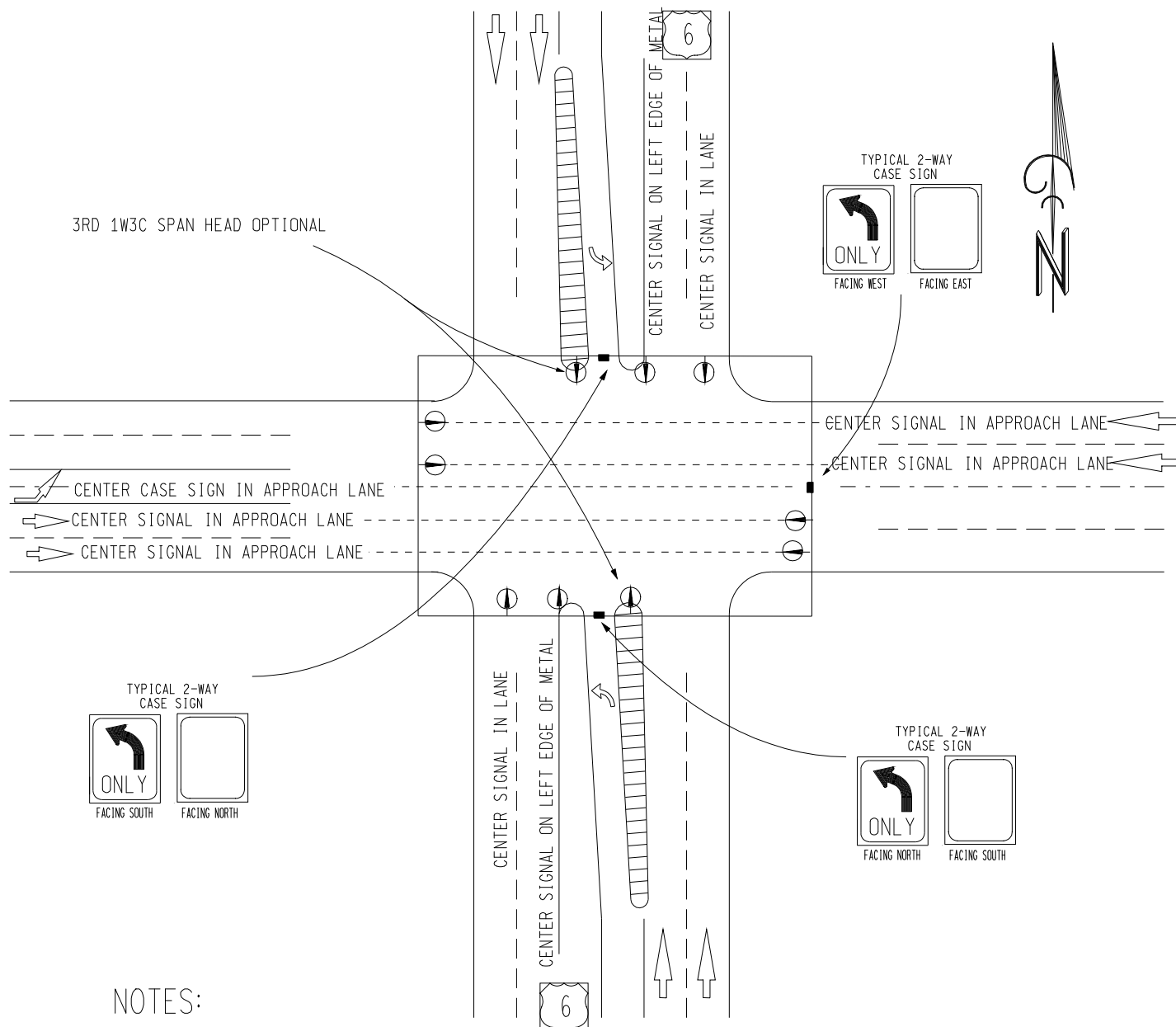
NOTES:

- 1 MEDIAN WIDTH IS 30' OR MORE, AND THE DISTANCE FROM THE X-ROAD STOP BAR TO THE MEDIAN SIGNAL IS LESS THAN OR EQUAL TO 150 FEET.
- 2 IN THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION.
- 5 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 6 WHILE PHASING IS POSSIBLE FOR EITHER ROADWAY, USUALLY LEFT TURNS ARE PROHIBITED AT THE INTERSECTION PROPER AND REDIRECTED THROUGH MEDIAN Crossovers. THE MAIN PROBLEM IS THE INTERLOCKING OF LEFT TURN MOVEMENTS.
- 7 TO REDUCE THE NUMBER OF CONDUCTOR CABLES CROSSING A SPAN, CONSIDERATION SHOULD BE GIVEN TO PLACING THE CONTROLLER IN THE MEDIAN.
- 8 A DIRECTIONAL BORE CONDUIT MAY BE REQUIRED TO REDUCE THE NUMBER OF OVERHEAD CONDUCTORS CABLES CROSSING THE SPAN TO 10 OR LESS.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



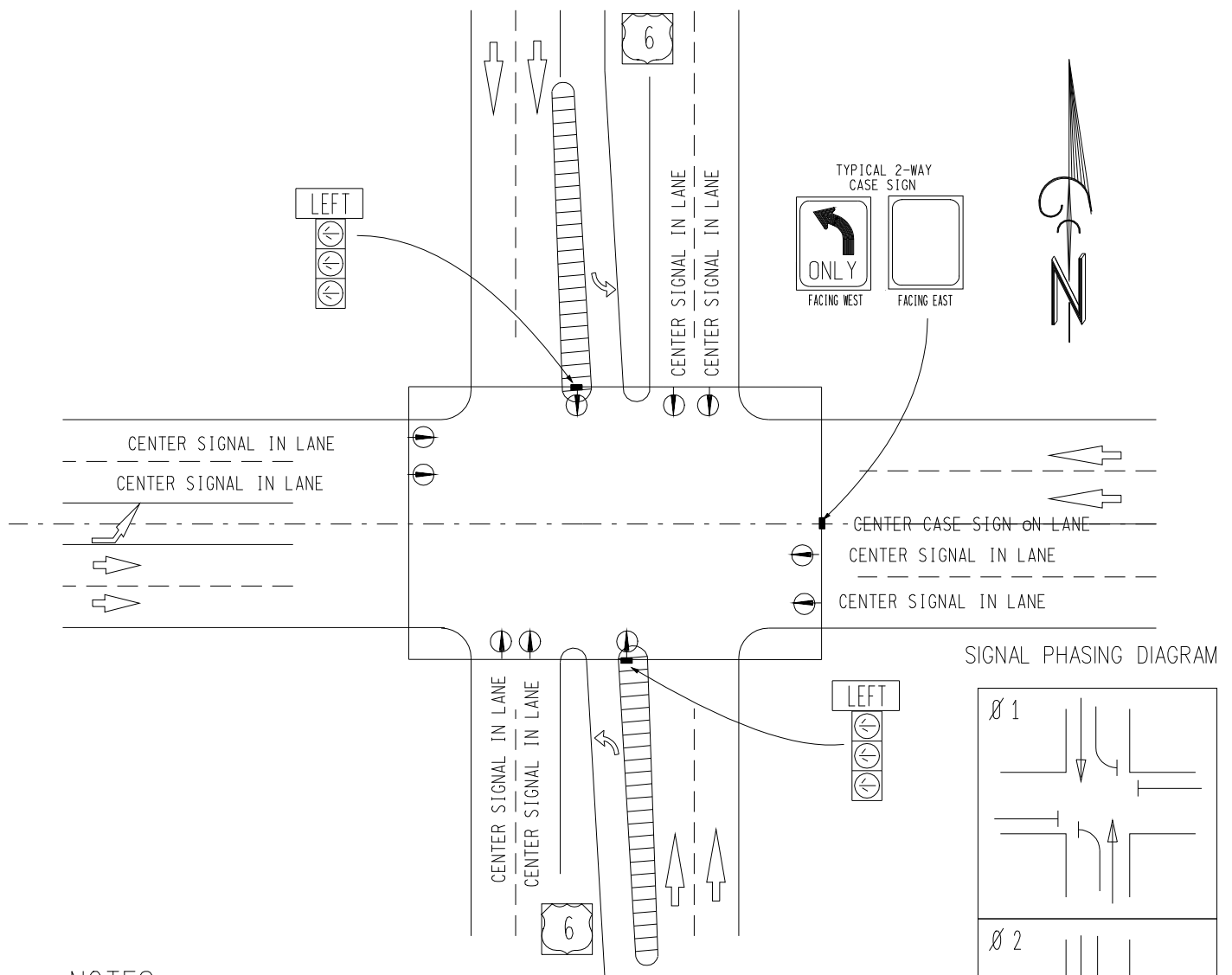
NOTES:

- 1 EXCLUSIVE LEFT TURN SLOTS
- 2 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 3 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 4 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 5 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION (IF THERE ARE CASE SIGNS).
- 6 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 7 TO MEET THE REQUIREMENTS FOR CONE OF VISION A 3RD 1W3C SPAN HEAD OR LOW LEVEL MAY BE REQUIRED.

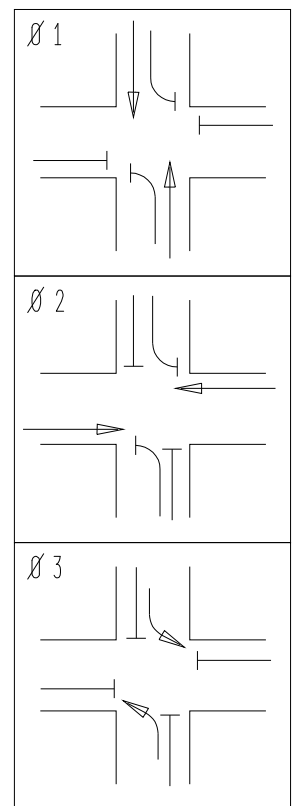


HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



SIGNAL PHASING DIAGRAM



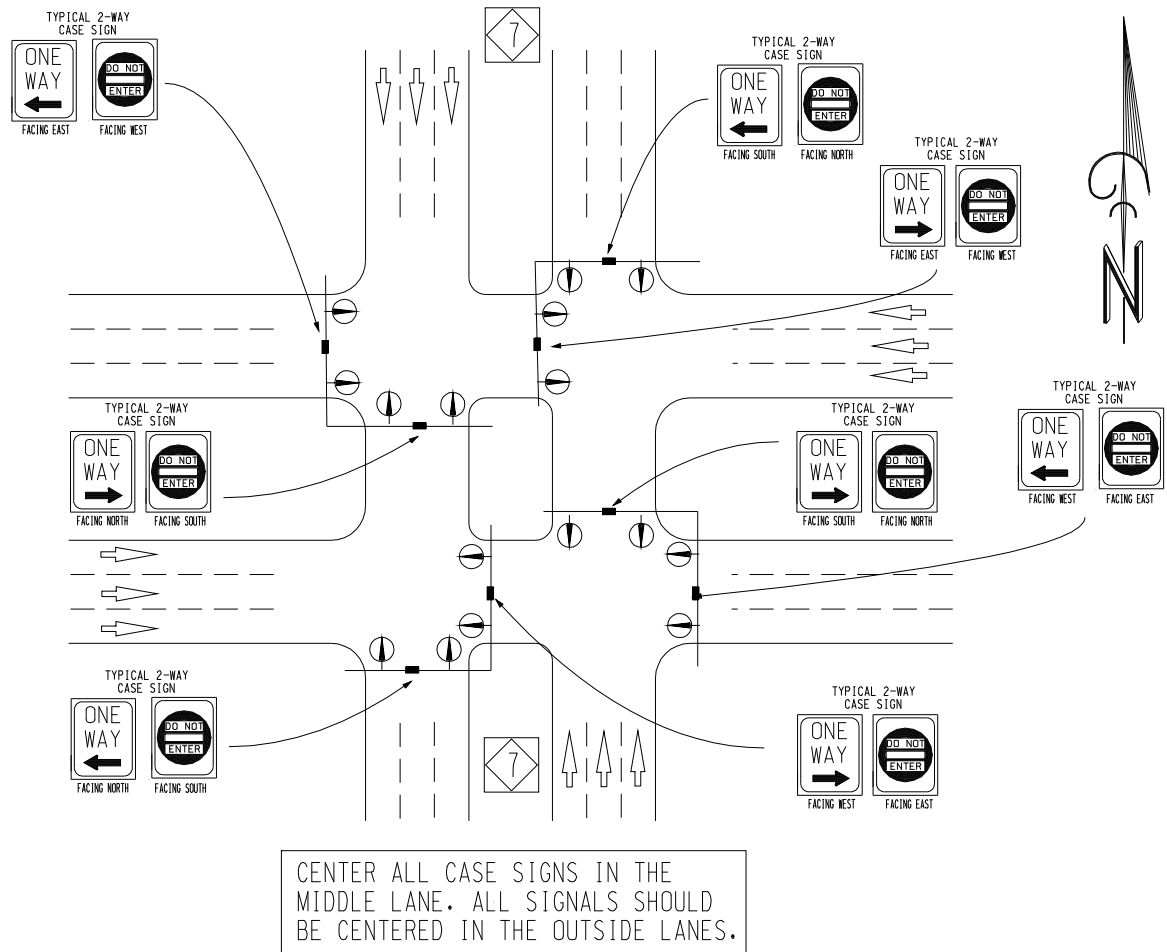
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- 3 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
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- 5 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION (IF THERE ARE CASE SIGNS).
- 6 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION WITH
DUAL LEADING LEFT-TURN PHASE
(SAME FOR LAGGING LEFT-TURN)



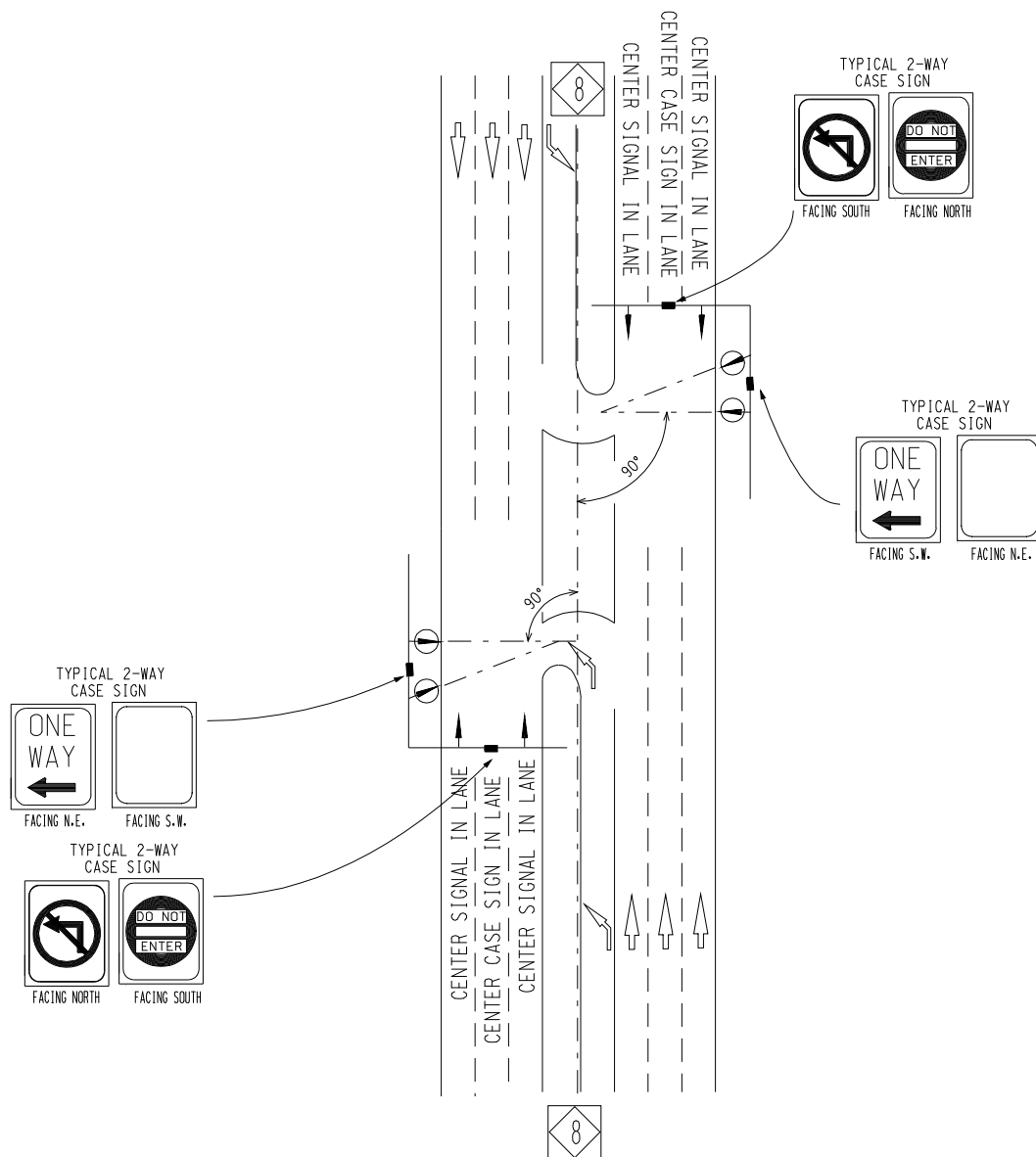
NOTES:

- 1 MEDIAN WIDTH IS 30' OR MORE, AND THE DISTANCE FROM THE X-ROAD STOP BAR TO THE MEDIAN SIGNAL IS GREATER THAN 150 FEET.
- 2 DESIGN AS FOUR SEPARATE INTERSECTIONS
- 3 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 4 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 5 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 6 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.
- 7 WHILE PHASING IS POSSIBLE FOR EITHER ROADWAY, USUALLY LEFT TURNS ARE PROHIBITED AT THE INTERSECTION PROPER AND REDIRECTED THROUGH MEDIAN Crossovers. THE MAIN PROBLEM IS THE INTERLOCKING OF LEFT TURN MOVEMENTS.
- 8 TO REDUCE THE NUMBER OF CONDUCTOR CABLES CROSSING A SPAN, CONSIDERATION SHOULD BE GIVEN TO PLACING THE CONTROLLER IN THE MEDIAN.
- 9 A BASE MOUNTED CABINET MAY BE REQUIRED



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



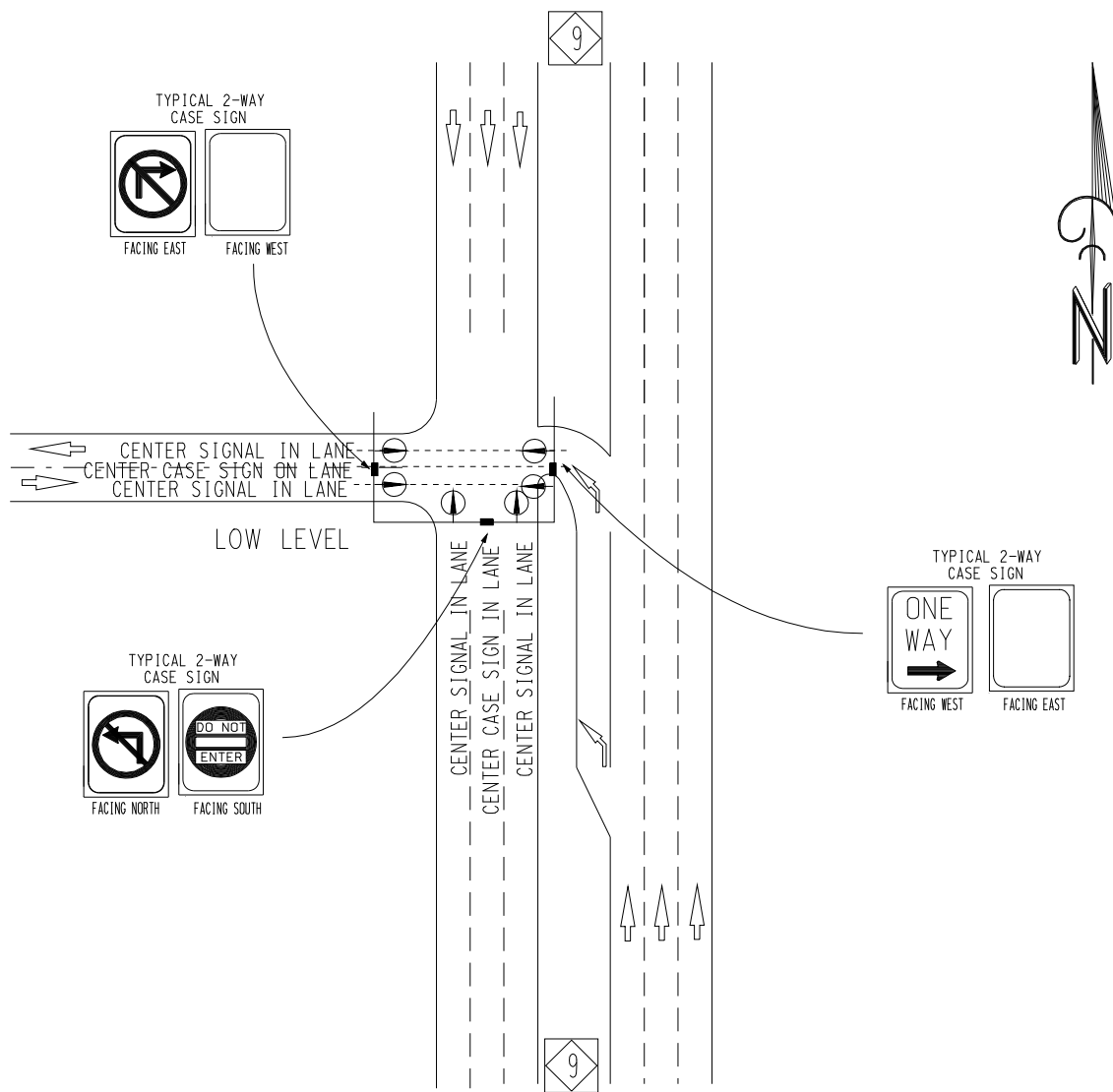
NOTES:

- 1 TREAT EACH CROSS OVER AS A SEPARATE INTERSECTION
- 2 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



NOTES:

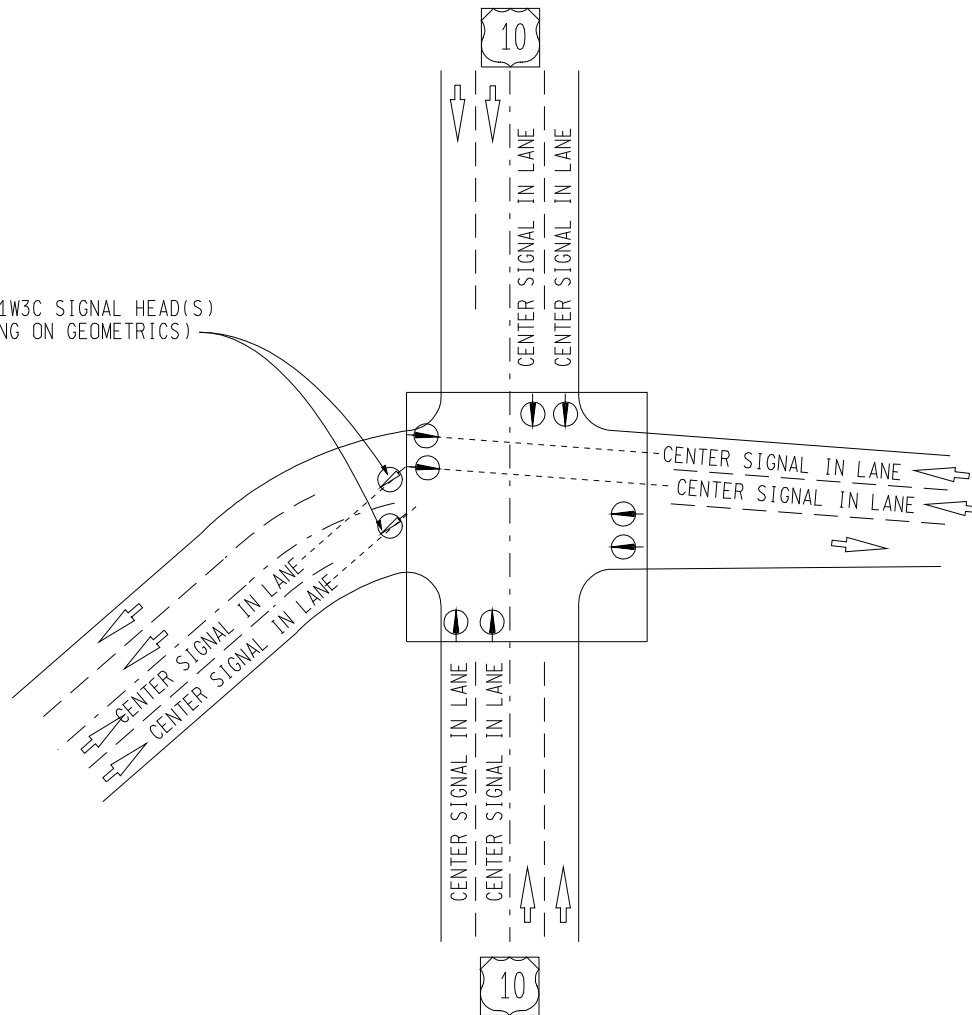
- 1 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION

OPTIONAL 1W3C SIGNAL HEAD(S)
(DEPENDING ON GEOMETRICS)



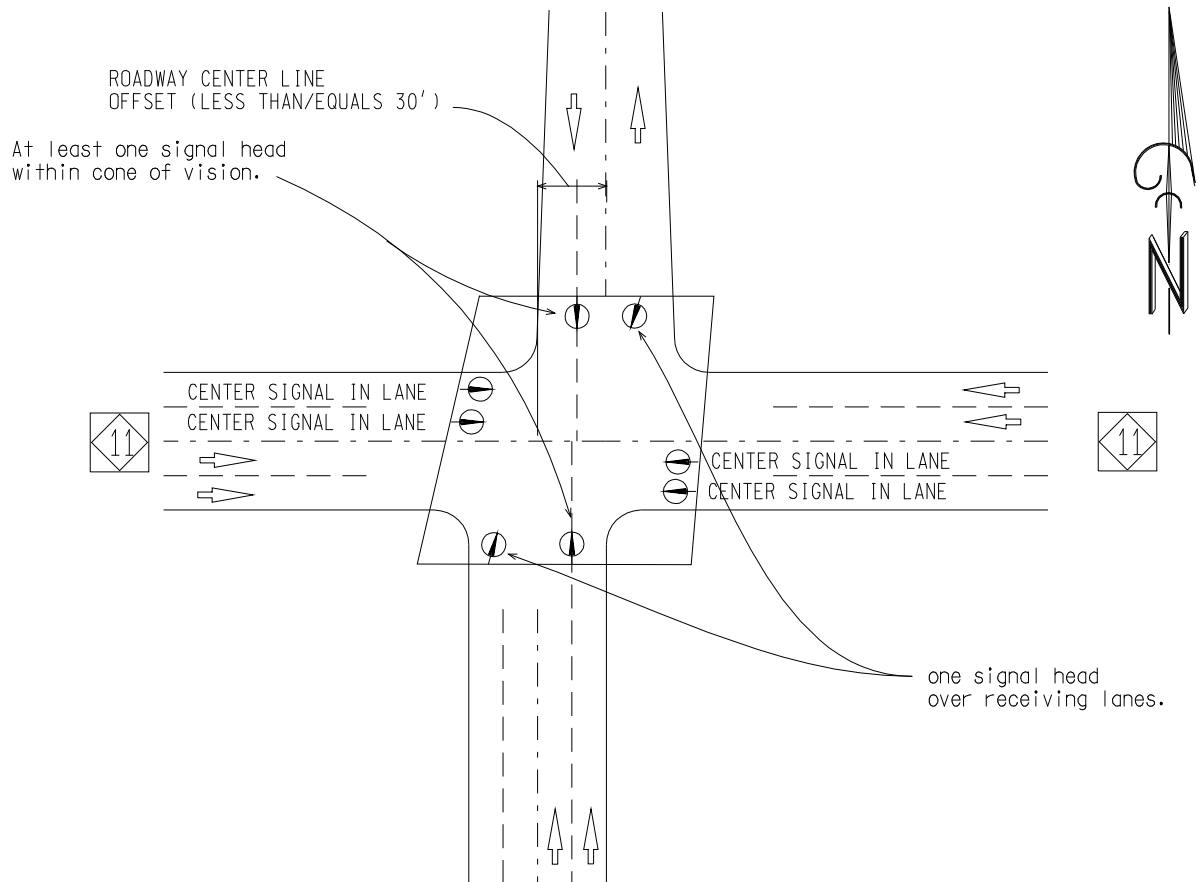
NOTES:

- 1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 2 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 3 TO MEET THE REQUIREMENTS FOR CONE OF VISION - 1W3C SPAN HEADS OR LOW LEVEL MAY BE REQUIRED.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



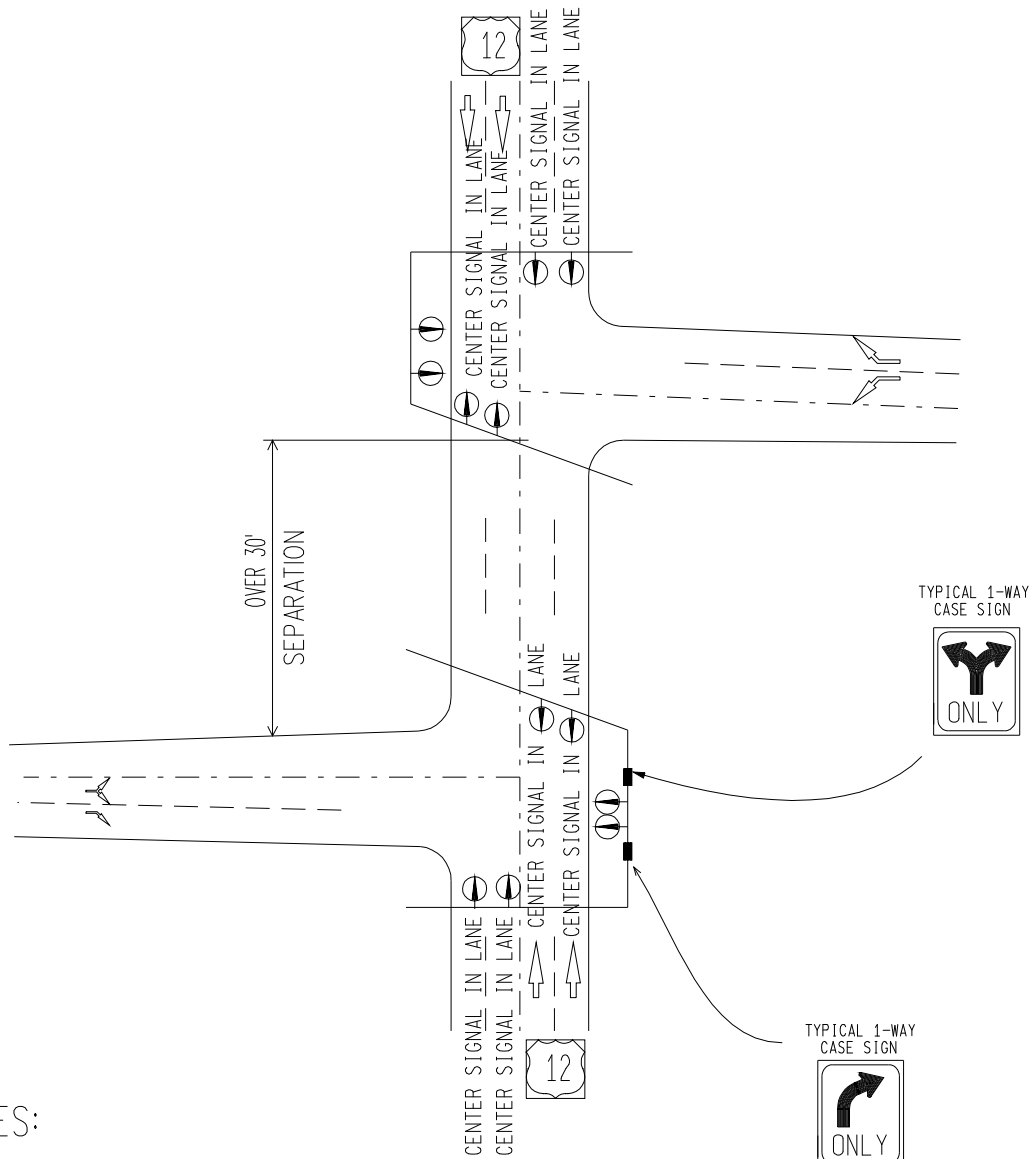
NOTES:

- 1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 2 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



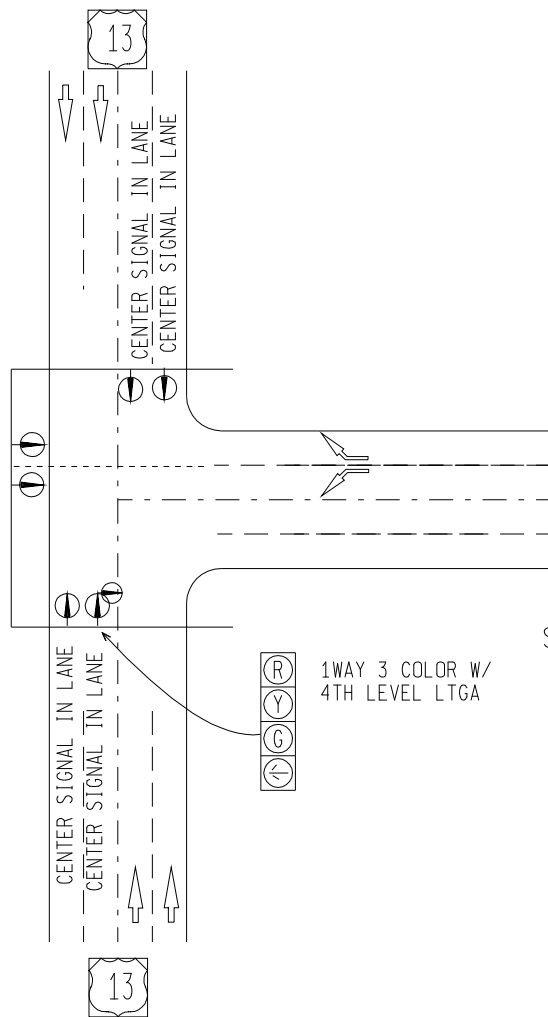
NOTES:

- 1 DESIGN AS TWO SEPARATE INTERSECTIONS (IF SEPARATION IS 30 ' OR MORE)
- 2 DESIGN AS ONE INTERSECTION (IF SEPARATION IS LESS THAN 30').
- 3 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 4 in THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 5 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 6 No case sign is necessary unless one of the approach lanes is a combination lane

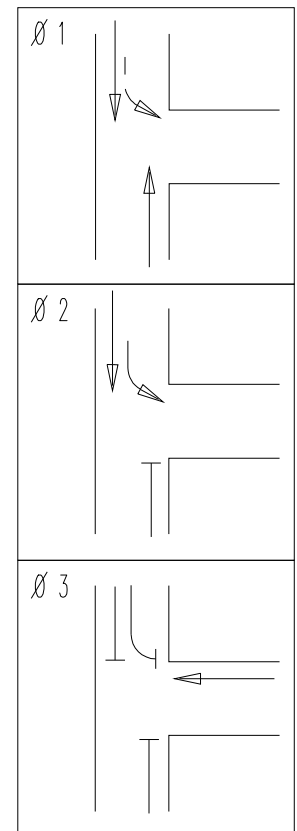


HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION



SIGNAL PHASING DIAGRAM



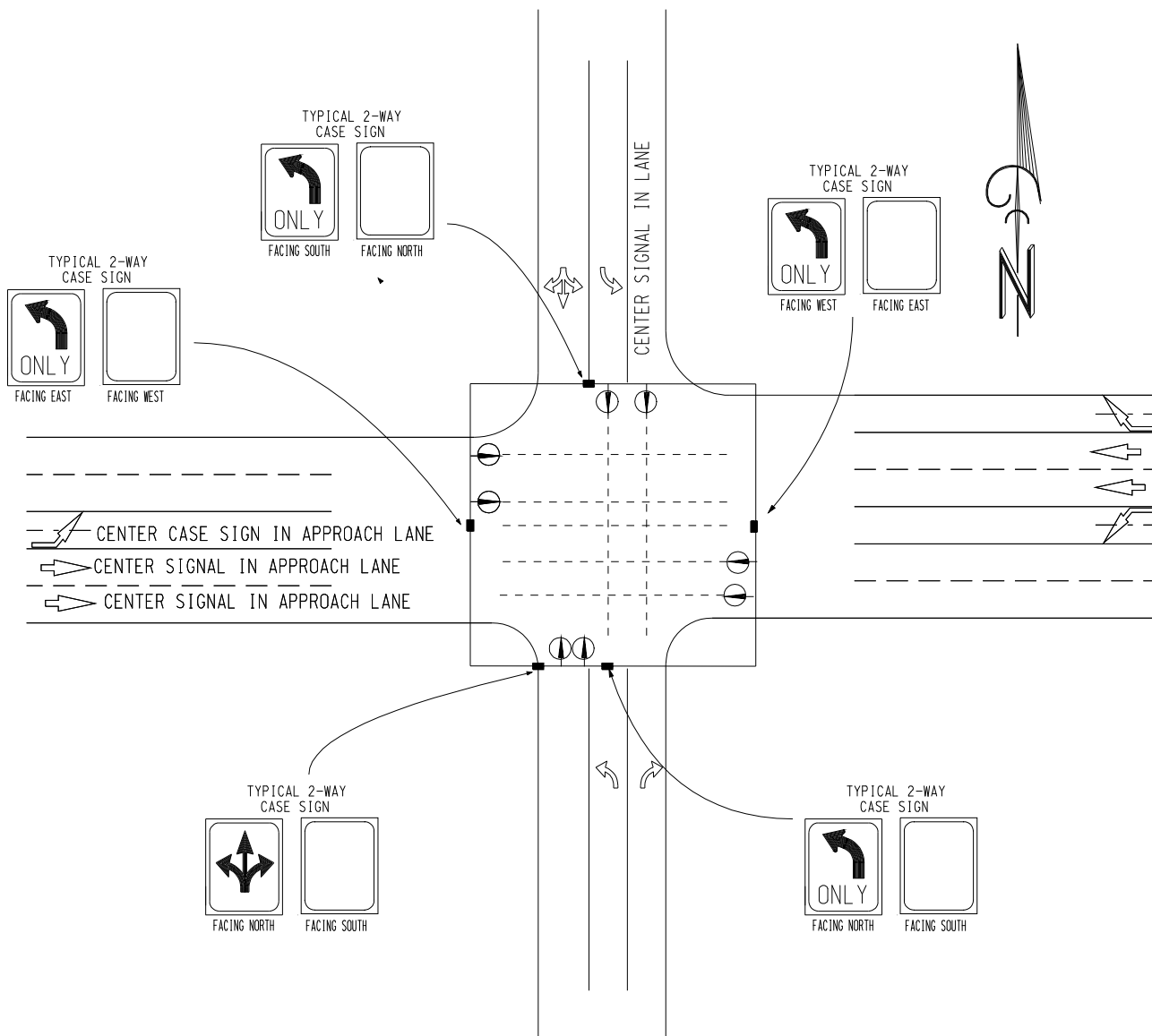
NOTES:

- 1 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 2 IN THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 3 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 4 PEDESTRIAN SIGNALS REQUIRED UNLESS OTHERWISE DIRECTED.
- 5 UTILIZE A 4TH LEVEL LTGA FOR THE SOUTH PROTECTED LEFT MOVEMENTS.



HEAD PLACEMENT DIAGRAM

3 PHASE OPERATION WITH
SINGLE LAGGING LEFT-TURN PHASE
ON TRUNKLINE



NOTES:

- 1 EXCLUSIVE LEFT TURN SLOTS
- 2 THE DISTANCE BETWEEN THE STOP BAR AND SIGNAL SHALL NOT EXCEED 150 FEET.
- 3 IN THE ABSENCE OF A STOP BAR, THE CURB RADIUS SPRING POINT SHOULD BE USED.
- 4 MAINTAIN 8 FEET (MIN) -12 FEET (DESIRED) BETWEEN SIGNAL HEADS, SIGNS, AND OTHER SPAN EQUIPMENT.
- 5 THE APPROACH LEGEND OF THE NEAR SIDE CASE SIGN SHOULD BE BLANKED OUT SO DRIVERS ONLY READ THE CASE SIGN LEGEND ON THE FAR SIDE OF THE INTERSECTION (IF THERE ARE CASE SIGNS).
- 6 PEDESTRIAN SIGNALS SHOULD BE CONSIDERED WHERE PEDESTRIAN ACTIVITY IS EVIDENT.



HEAD PLACEMENT DIAGRAM

2 PHASE OPERATION