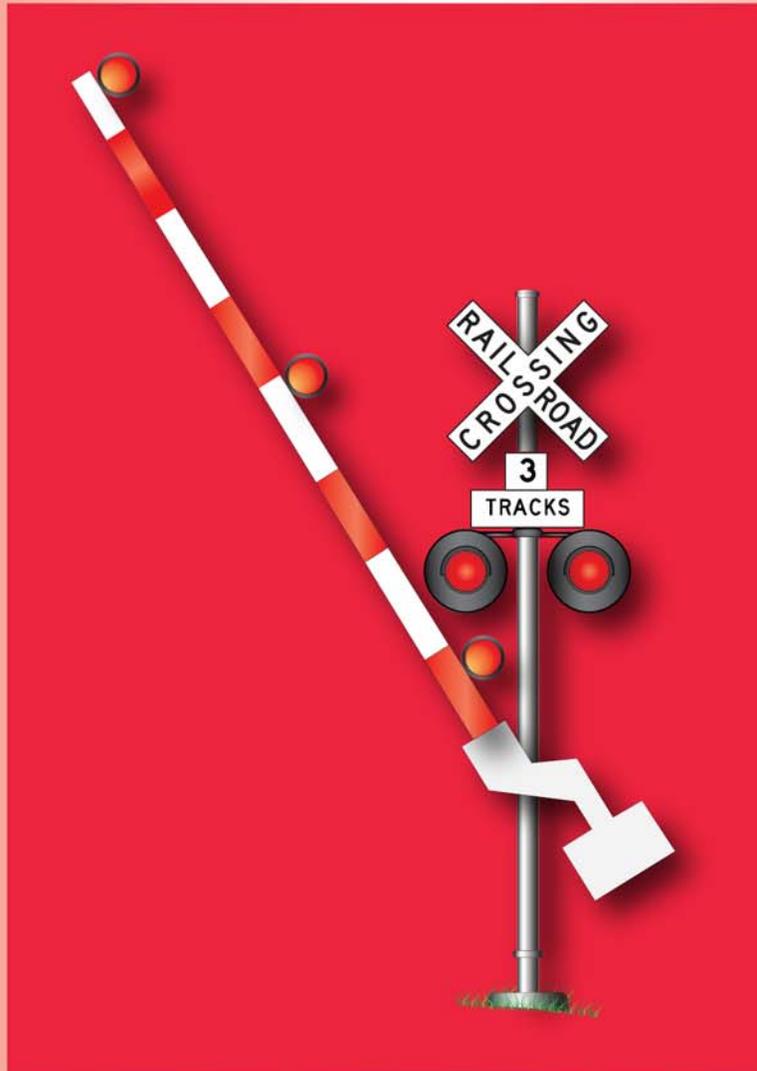




# RAILROAD CROSSING DESIGN GUIDELINES



Traffic Operations Division

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**December 2016**

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**TABLE OF CONTENTS**

**A. INTRODUCTION.....A-1**

**B. ACTIVE DEVICE CONFIGURATIONS.....B-1**

**C. RAILROAD CROSSINGS ADJACENT TO TRAFFIC SIGNALS.....C-1**

**D. RAILROAD CROSSING CLOSURES AND CONSOLIDATIONS.....D-1**

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## **A - INTRODUCTION**

The following design guidelines are intended to assist project designers with roadway design at railroad crossings and supplement the TxDOT Railroad Crossing Detail Standards Sheets (RCD) which contain standards for device placement distances, gate lengths, and crossing panel sizes. These guidelines are not standards, and are intended as examples for various rail-highway configurations. A diagnostic inspection team will determine the ultimate design for each railroad crossing project. The ultimate design shall be compliant with the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and American Railway Engineering and Maintenance-of-Way Association (AREMA) standards.

The guidelines are broken down into 3 main categories:

- ◆ Design of Active Device Configurations
- ◆ Design of Railroad Crossings Adjacent to Traffic Signals
- ◆ Design of Railroad Crossing Closures and Consolidations

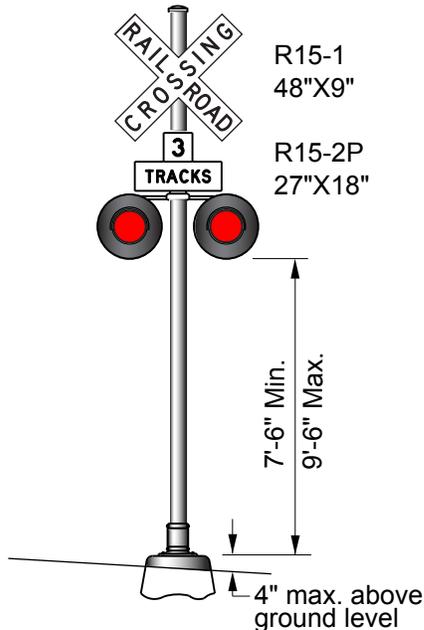
Guidelines are subject to change.

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## B - ACTIVE DEVICE CONFIGURATIONS



I-13 (9"x15")

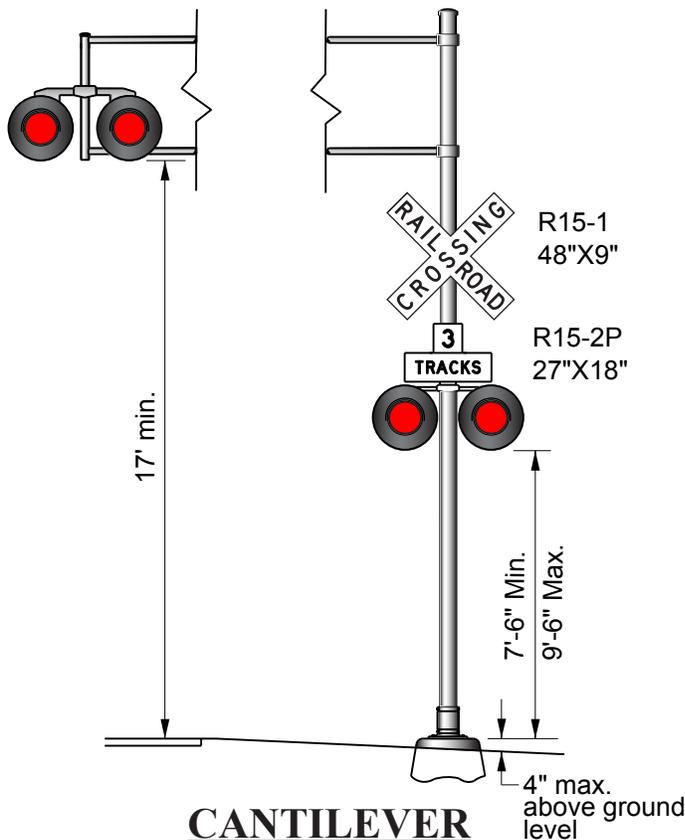


**MAST FLASHER**

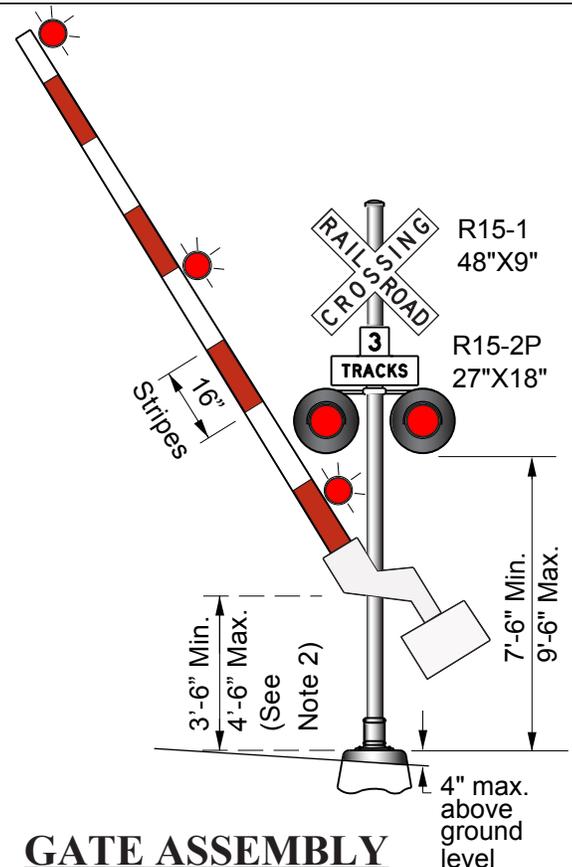
LEGEND	
	Cantilever
	Gate Assembly
	Mast Flasher

### ACTIVE DEVICES NOTES

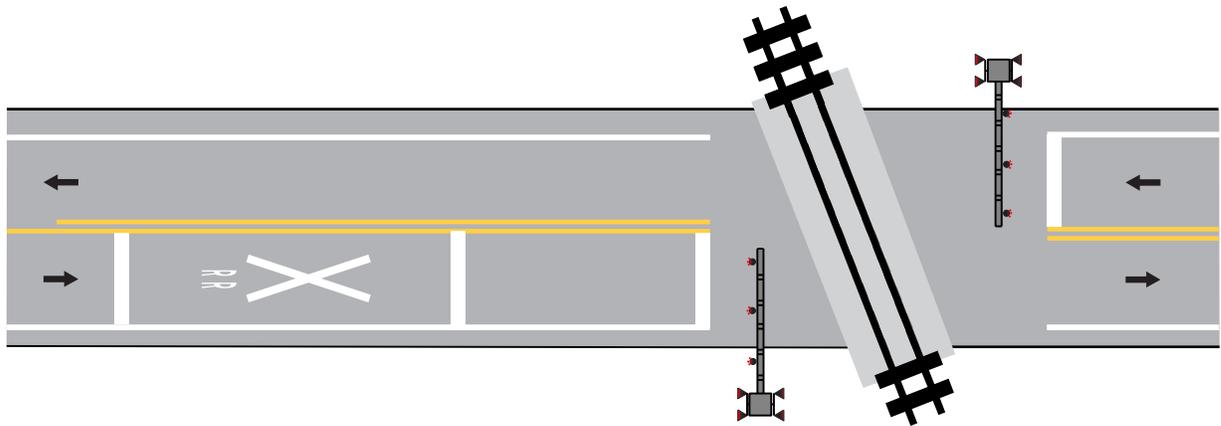
1. EMERGENCY NOTIFICATION (I-13), one sign installed with active device on each approach to the crossing.
2. Gate distance above ground when lowered measured from bottom of gate to top of mast foundation.
3. Crossbuck and # of Tracks signs not required on gate when gate is behind a cantilever with these signs.
4. Crossbuck and # of Tracks signs facing downstream traffic optional unless a sidewalk is present.
5. Emergency notification, crossbuck, and # of tracks signs normally installed by railroad company. Railroad signal design and placement is ultimately the responsibility of the railroad company.



**CANTILEVER**



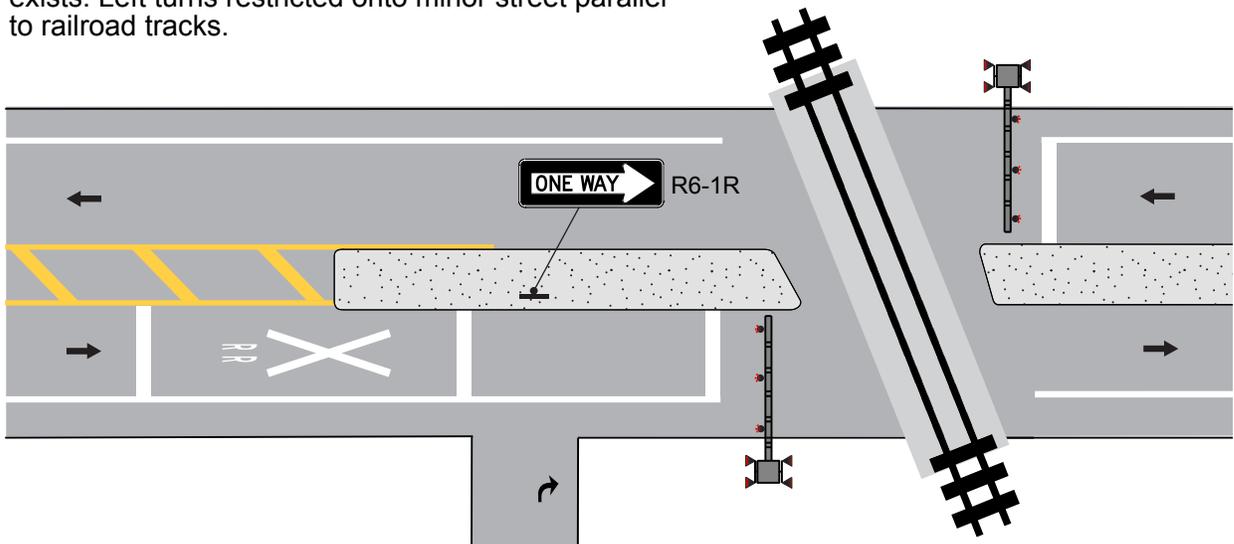
**GATE ASSEMBLY**



**2 LANES, 1 LANE EACH DIRECTION**

**NOTE:**

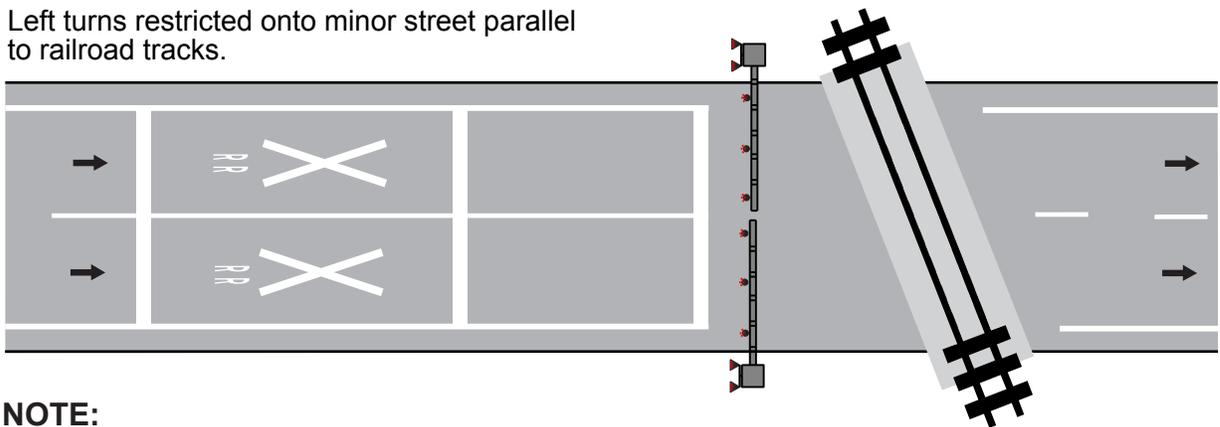
Raised median with 4' minimum width preferred between directions of traffic if right-of-way width exists. Left turns restricted onto minor street parallel to railroad tracks.



**2 LANES, 1 LANE EACH DIRECTION WITH MEDIAN**

**NOTE:**

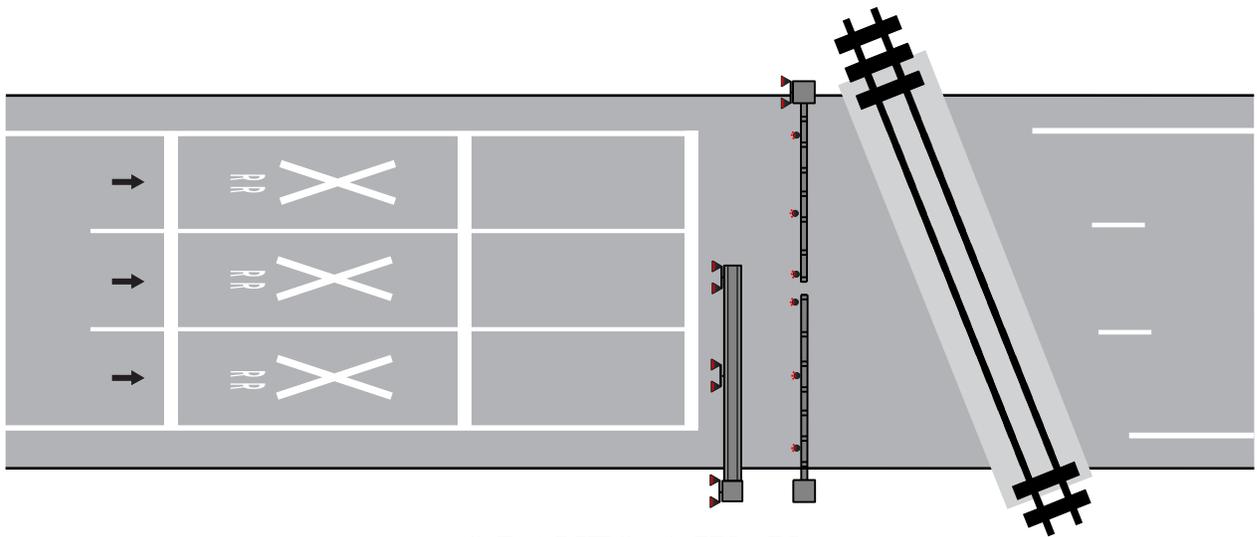
Left turns restricted onto minor street parallel to railroad tracks.



**NOTE:**

Backlights required if sidewalks present.

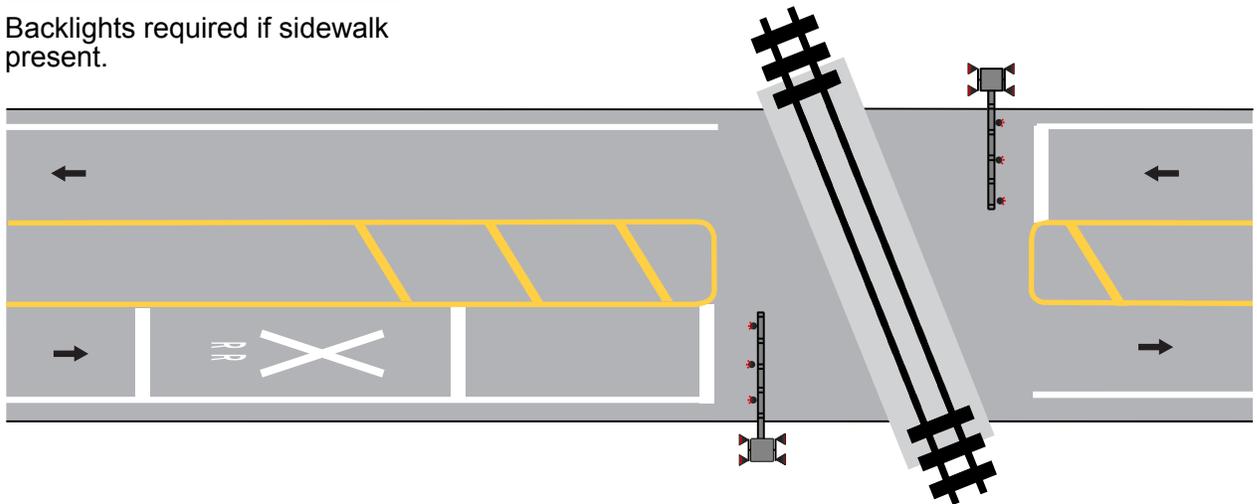
**2 LANES, 1-WAY**



**3 LANES, 1-WAY**

**NOTE:**

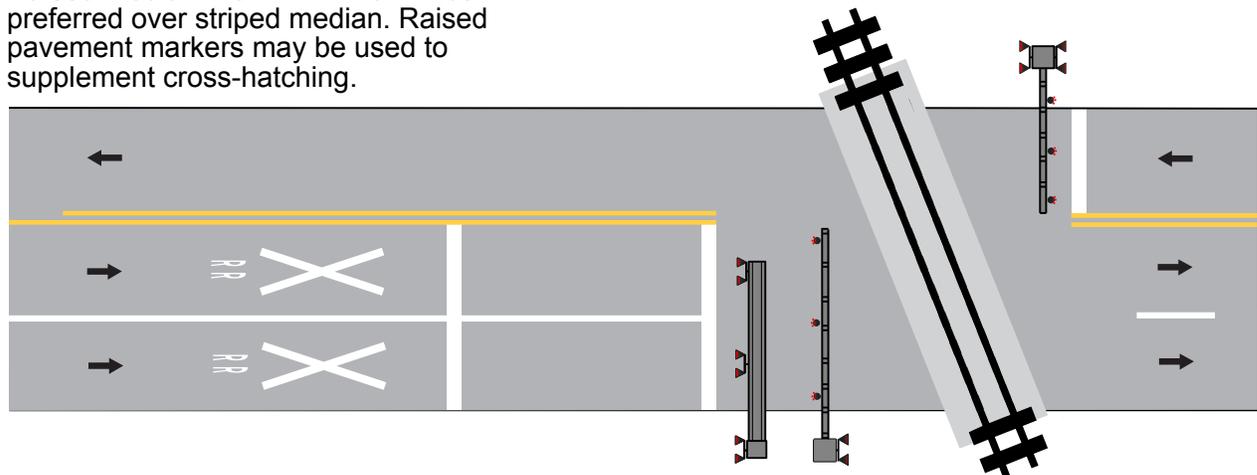
Backlights required if sidewalk present.



**3 LANES, WITH 2 WAY LEFT TURN LANE**

**NOTE:**

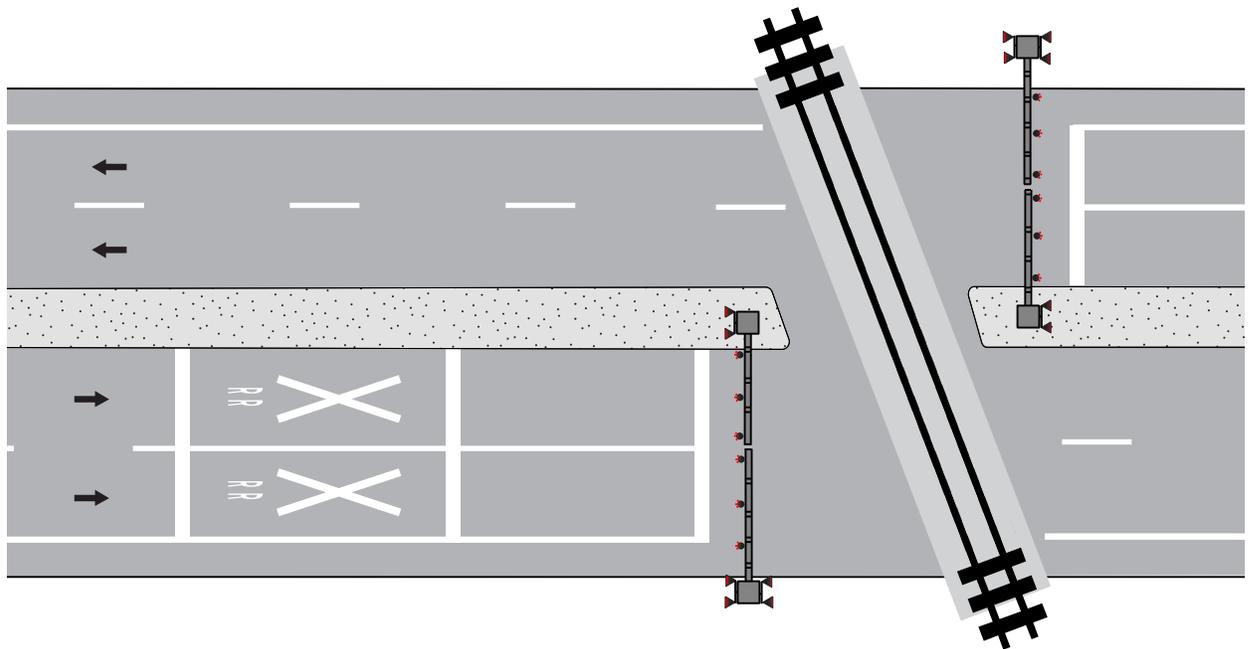
Raised median with 4' minimum width preferred over striped median. Raised pavement markers may be used to supplement cross-hatching.



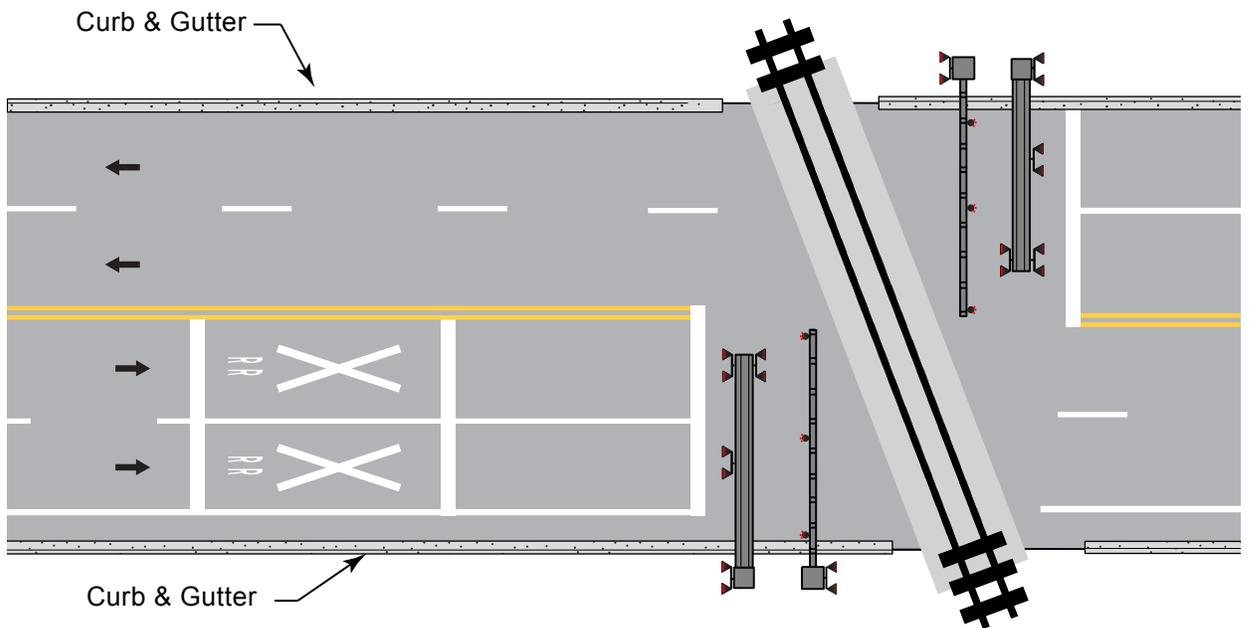
**3 LANES, WITH 2 LANES IN 1 DIRECTION**

**NOTE:**

Raised median with 4' minimum width preferred between directions of traffic if right-of way width exists.



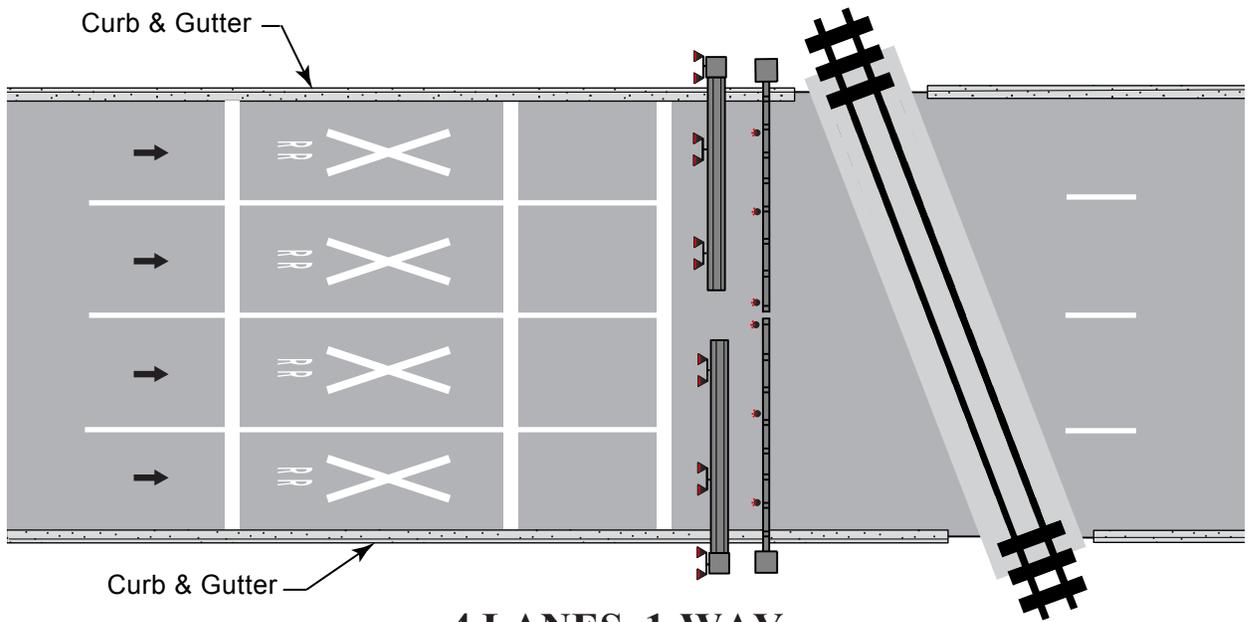
**4 LANES, 2 LANES EACH DIRECTION  
WITH MEDIAN**



**4 LANES, 2 LANES EACH DIRECTION  
NO MEDIAN**

**NOTE:**

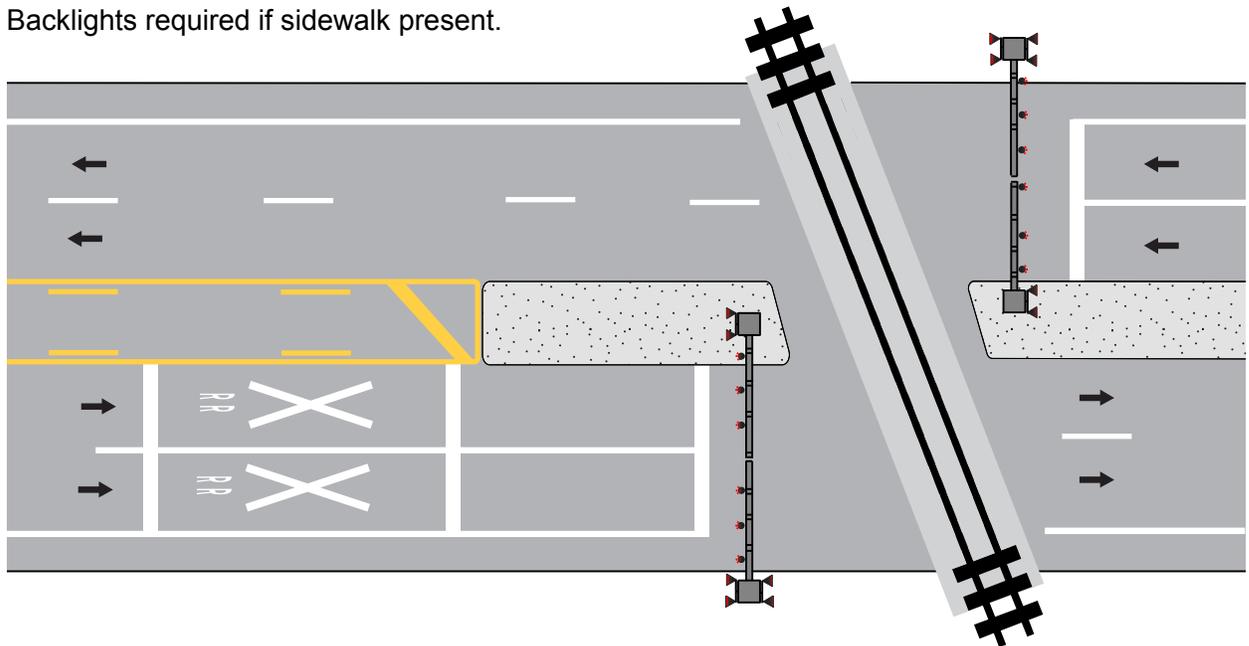
Raised median with 4' minimum width preferred between directions of traffic if right-of-way width exists. 10' median minimum width if active railroad signals are installed on median.



**4 LANES, 1-WAY**

**NOTE:**

Backlights required if sidewalk present.



**5 LANES, 2 LANES EACH DIRECTION  
WITH TWO WAY LEFT TURN LANE**

**NOTE:**

A median mast flasher is also sufficient in this design (instead of a gate in the median) provided the length of the roadside gate does not exceed 28'.

**ACTIVE DEVICES NOTES**

1. Other configurations of active devices are available that meet AREMA requirements.

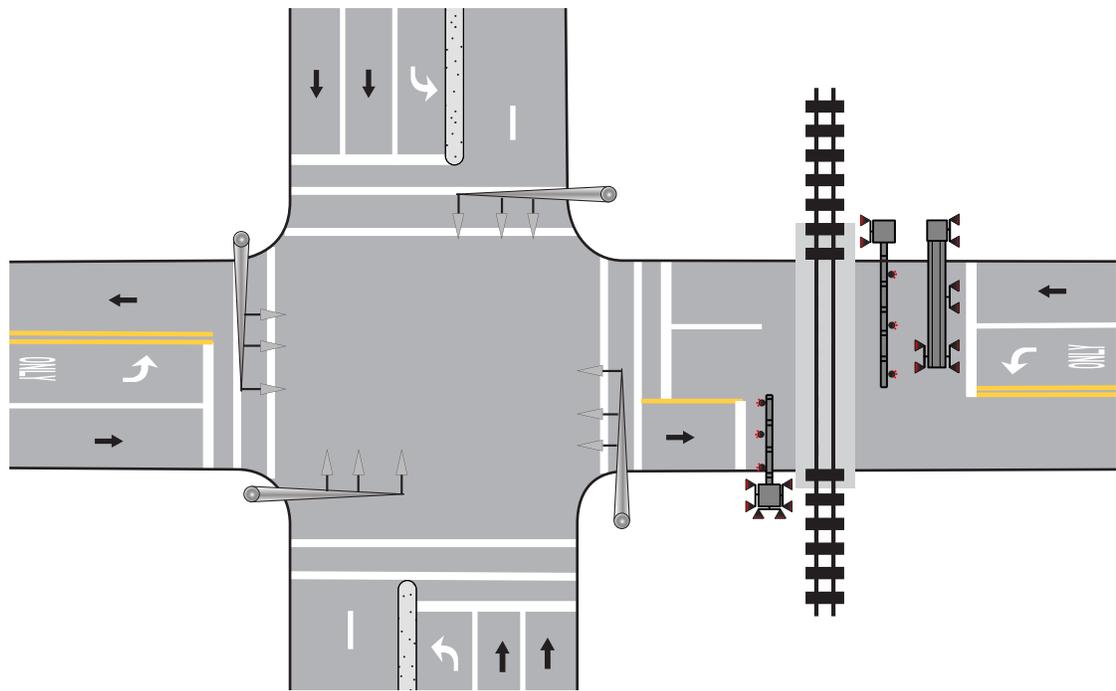
## C - RAILROAD CROSSINGS ADJACENT TO TRAFFIC SIGNALS

**NOTES:**

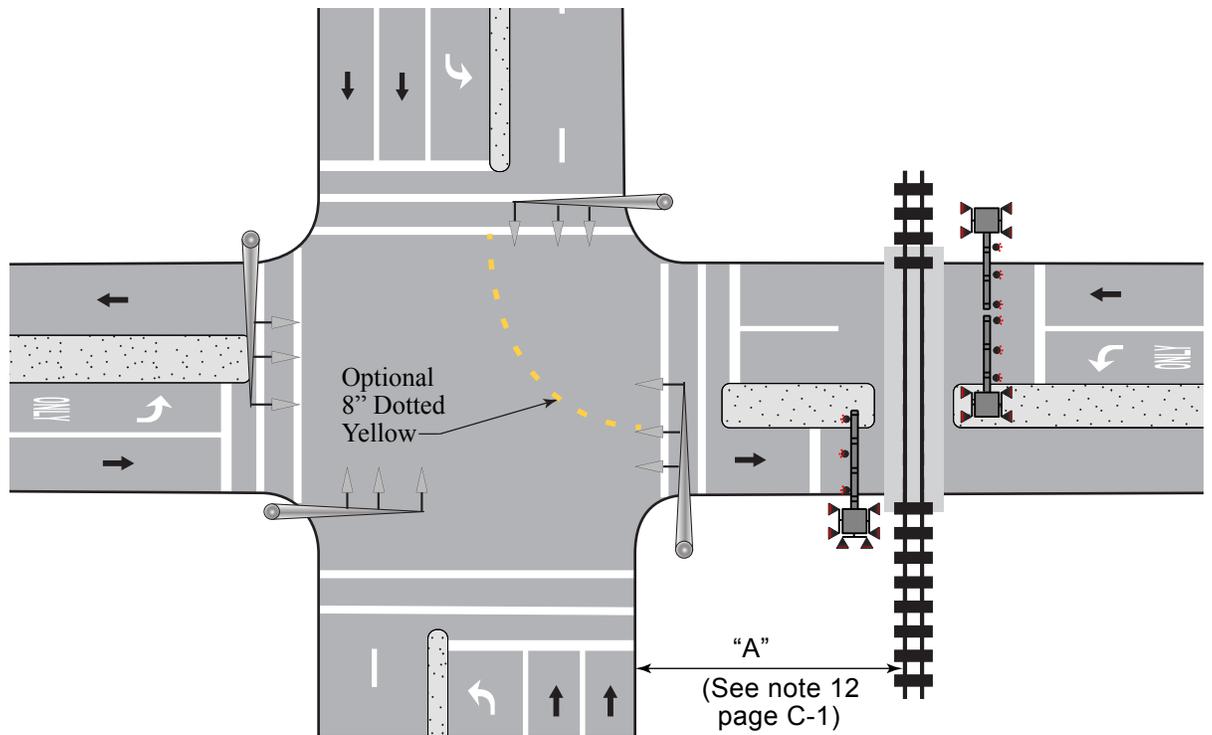
1. For signs and pavement markings, see TxDOT Traffic Operations Division Railroad Crossing Detail RCD(1) and RCD(2) standard sheets.
2. Battery back-up preferred for traffic signals with preemption.
3. Include phasing diagram for normal signal operation as well as for during preemption on plan sheet. All signal heads shown.
4. Show conduit and cable connection between traffic signal cabinet and railroad cabin.
5. Provide a protected left turn phase for track clearance (traffic heading over railroad crossing towards traffic signal). This phase is not required under normal operation.
6. Plans clarify who maintains traffic signal.
7. Railroad cabin located such that it does not impede driver right turns on red.
8. Traffic signal poles located such that they do not impede view of railroad masts.
9. Stop bar not required on approach to crossing from traffic signal if a vehicle may not fit between near edge of intersection and active device. In this case, the stop bar at the traffic signal also serves as the stop bar for the crossing.
10. Median width 10' typical if active railroad signals are installed on median, otherwise a 4 ft minimum median width needed.
11. Evaluate intersection for truck turning movements towards tracks.
12. "A" distance measured as minimum distance from near rail to edge of intersection. See chart below for when to use median between rail and intersection.

Distance "A"	With Crosswalk	Without Crosswalk
0-20'	No Median	No Median
20'-30'	No Median	Median
>30'	Median	Median

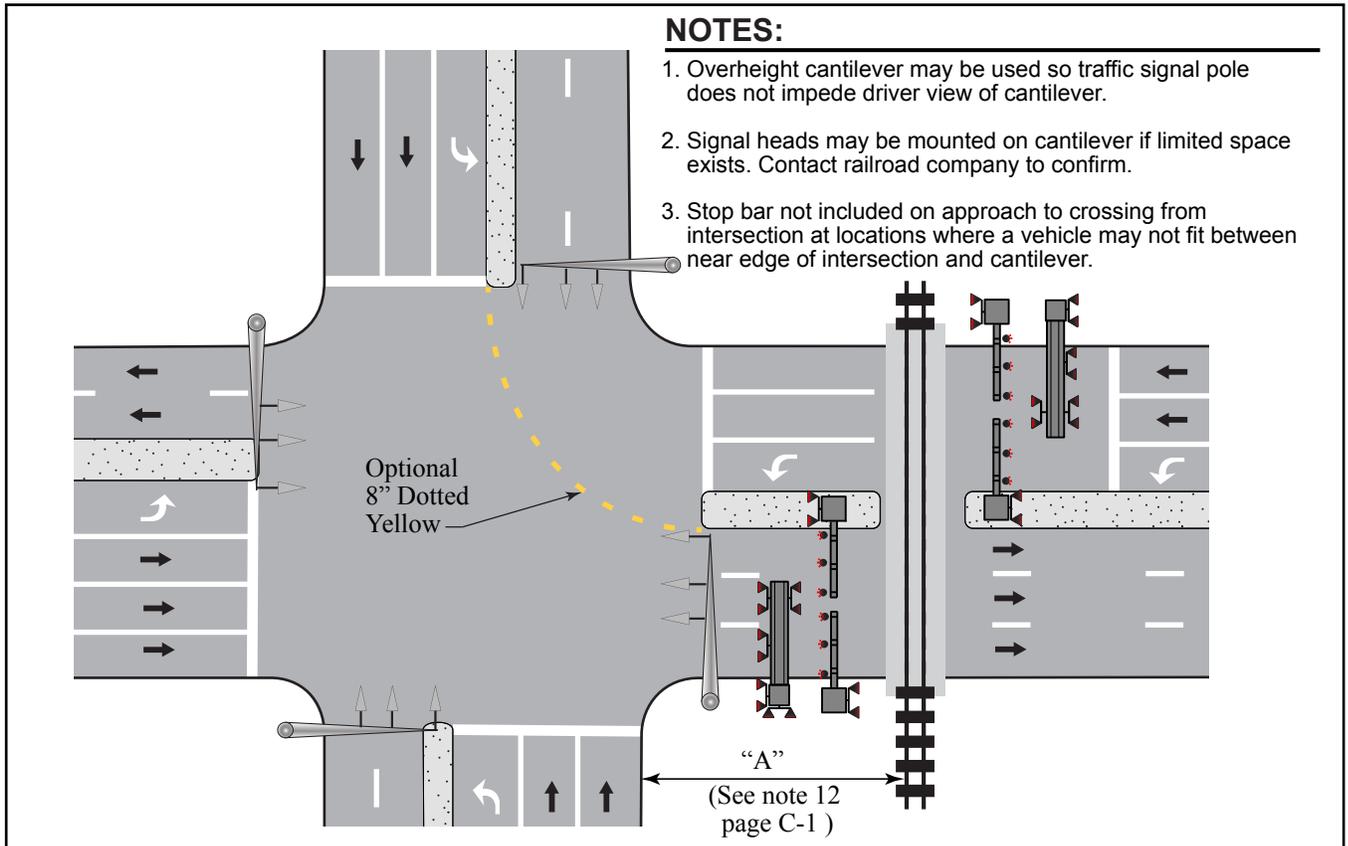
Chart is for general guidance only. Perform a site study to make final determination on usage of median. If a median is not installed, a cantilever may be required in order to meet requirement of a pair of flashers for each approach lane. Smaller width medians (to prevent motorists from driving around the gate) may also be used if active railroad devices are not installed on median.



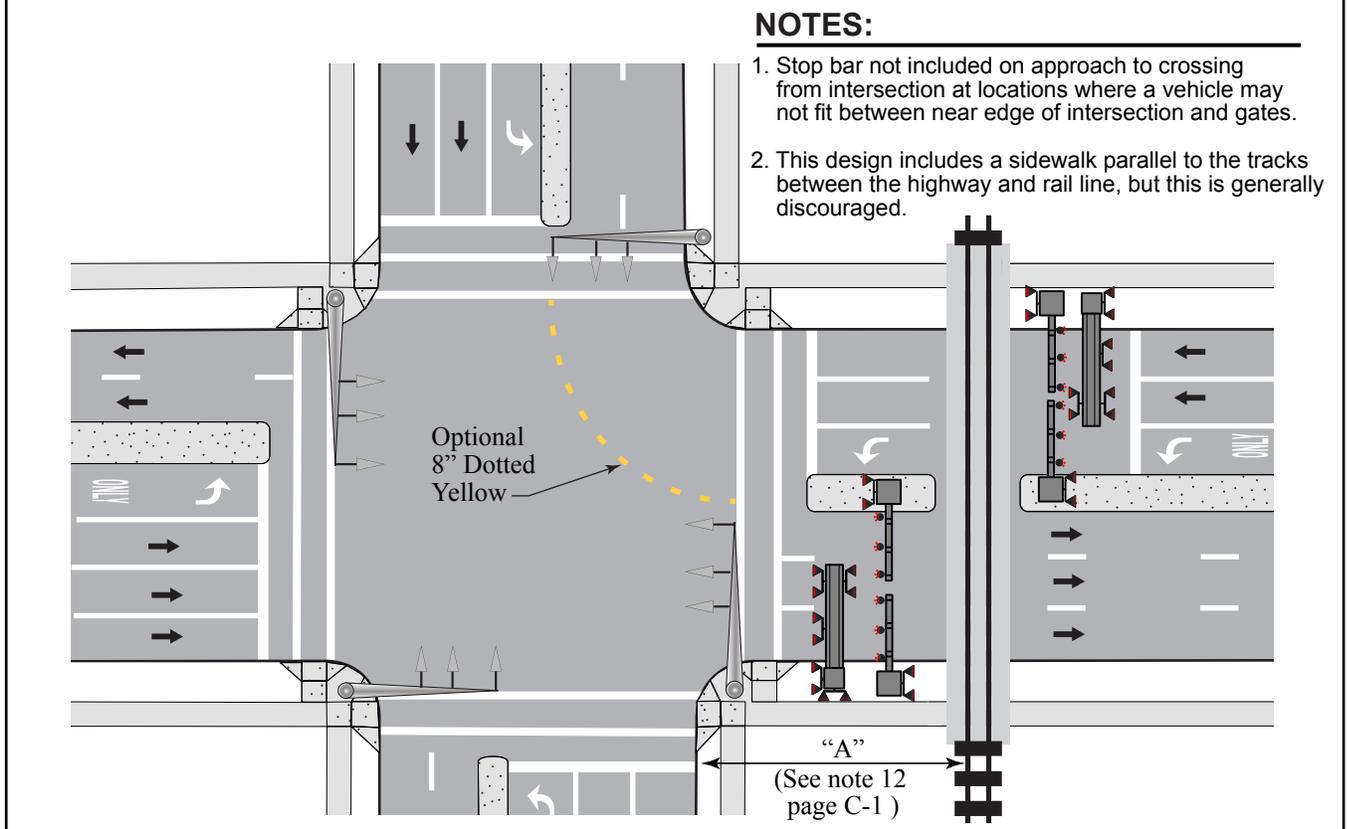
**MINOR STREET TO MAJOR HIGHWAY:**  
**NO MEDIANS ON MINOR STREET**



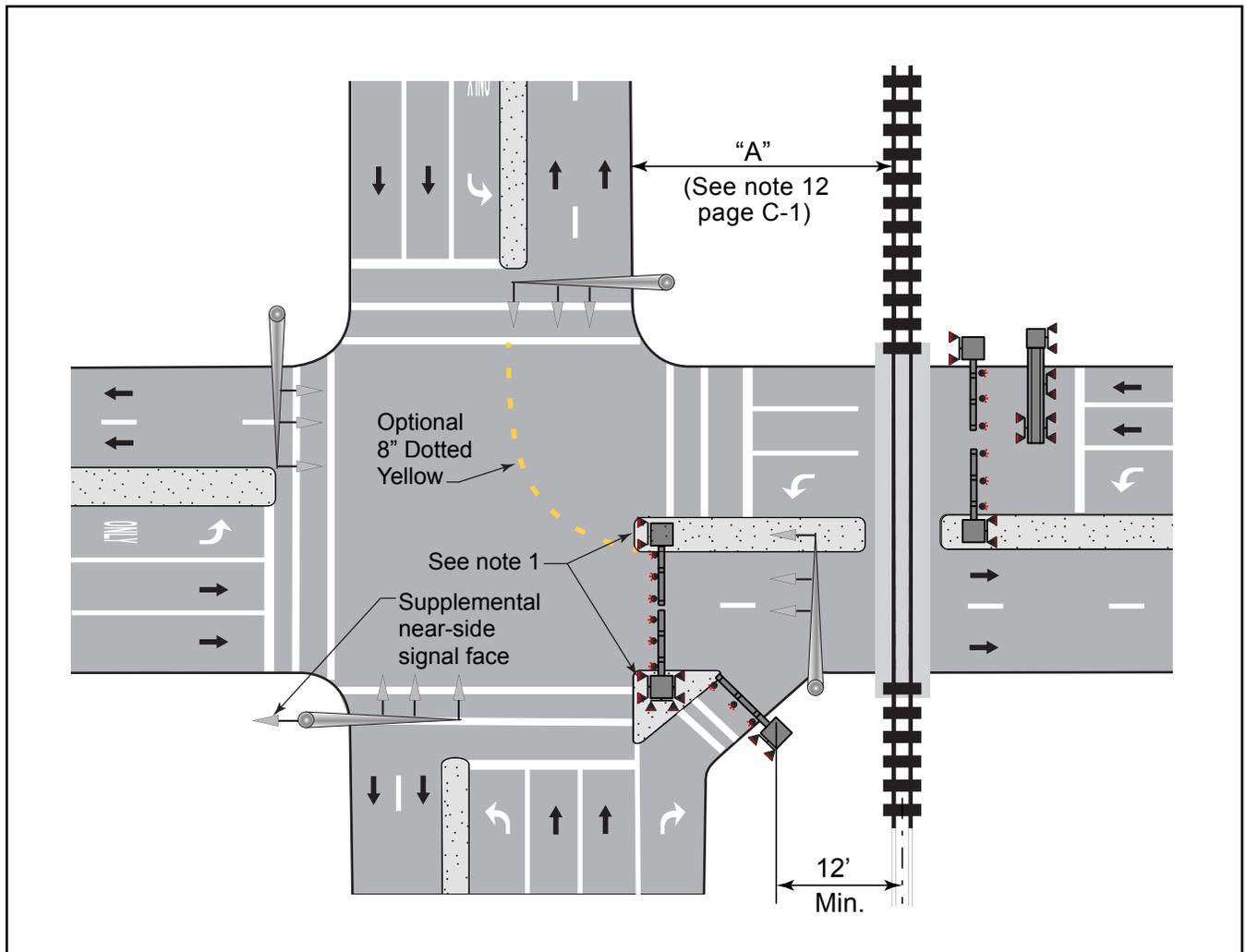
**MINOR STREET TO MAJOR HIGHWAY:**  
**MEDIANS ON MINOR STREET**



**CANTILEVERED APPROACH  
FROM TRAFFIC SIGNAL TO CROSSING**



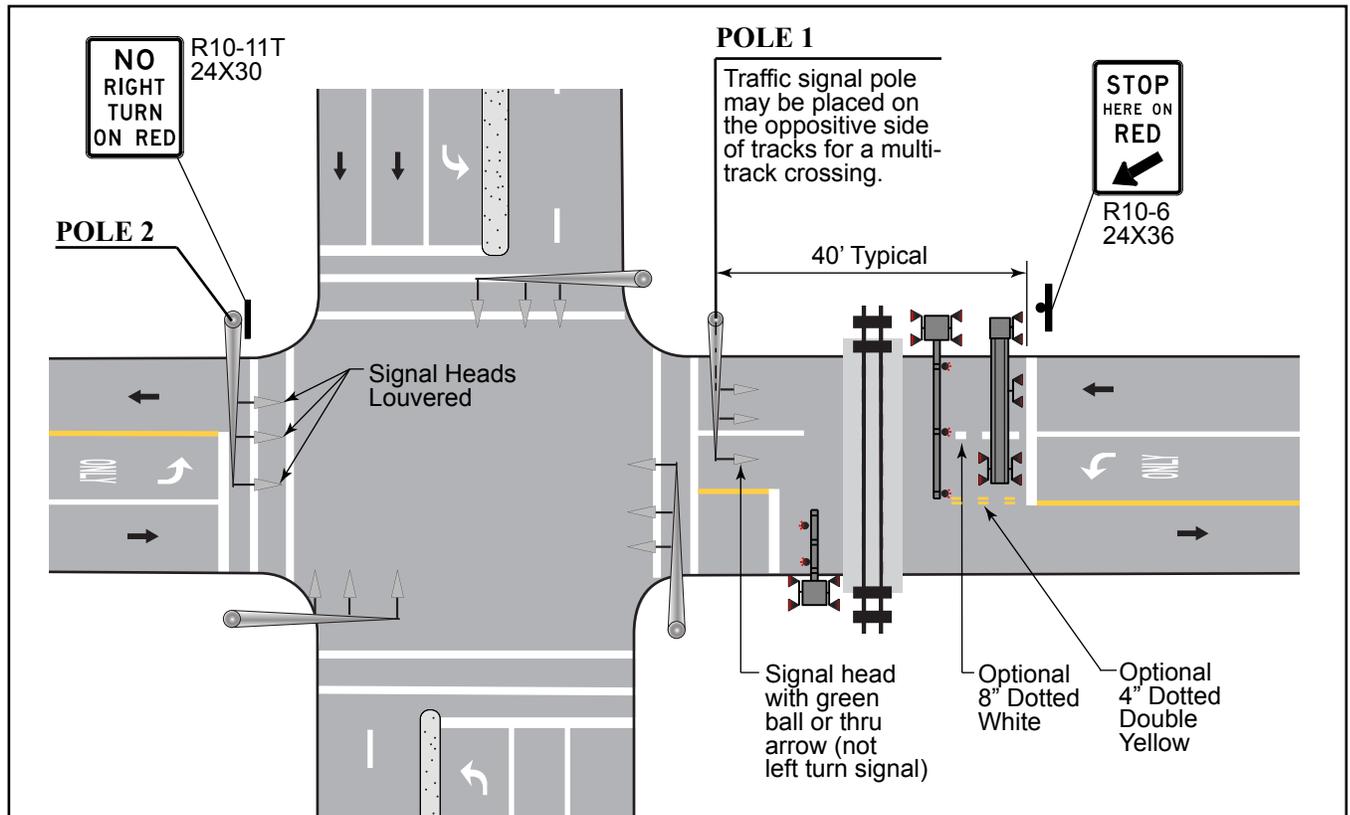
**INTERSECTION WITH SIDEWALKS**



**RIGHT TURN BAY TOWARDS CROSSING**

**NOTES:**

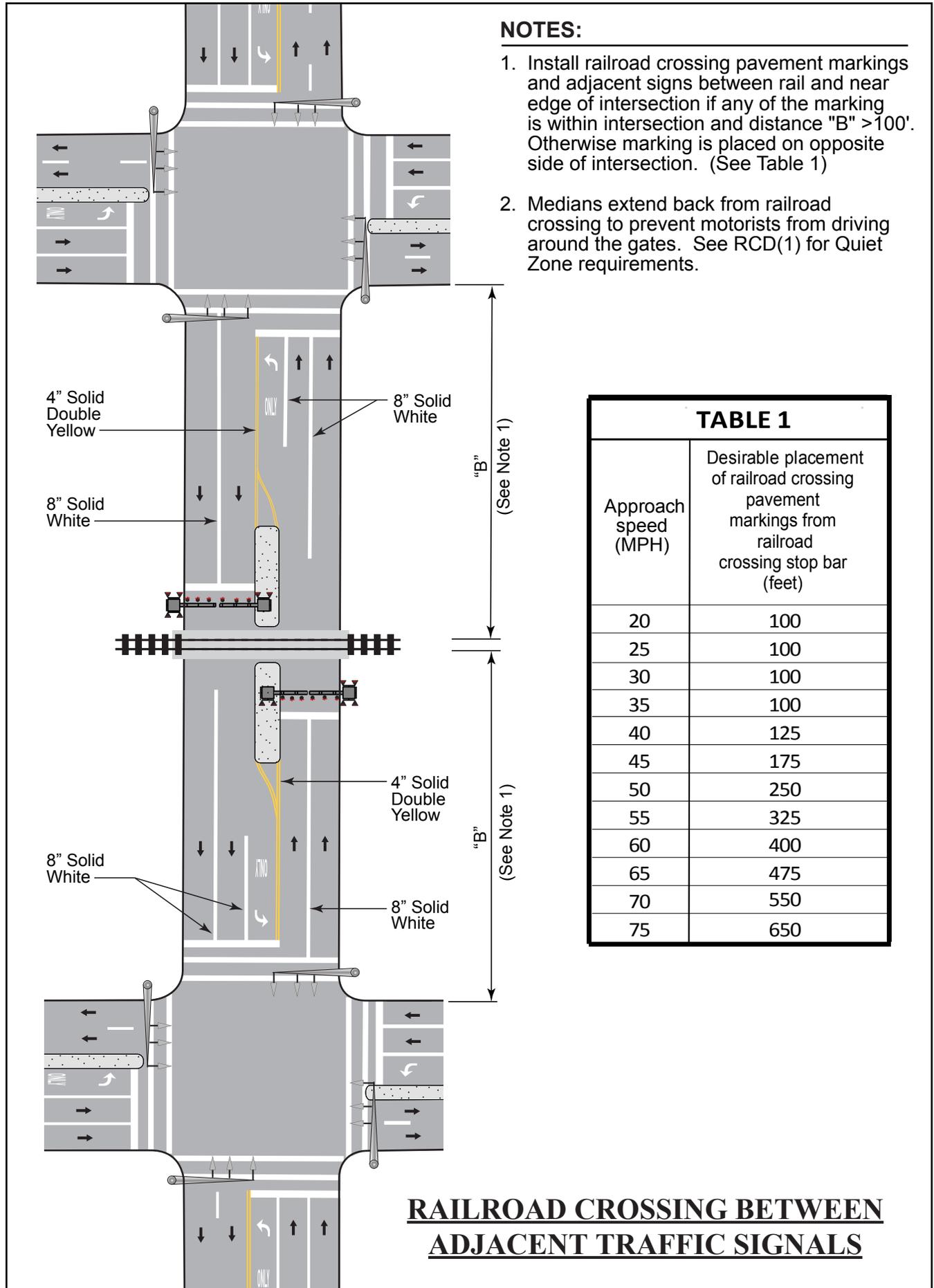
1. On approach from intersection to tracks, gates may be placed before traffic signal pole if:
  - a. Distance from gate tip or mast center to center of track would be less than 12'.
  - b. Gate lengths would exceed 28'.
2. Concrete barrier may be needed to prevent right turning trucks from hitting the gate mast or traffic signal pole.



**PRESIGNAL**

**NOTES:**

1. This configuration may be considered if the distance between the tracks and the stop bar at the traffic signal is less than the design vehicle length.
2. Use overlap with traffic signal poles 1 and 2 to prevent vehicles from stopping between tracks and intersection.
3. If a cantilever is needed on the approach over the tracks toward the intersection, signal heads may be mounted on the cantilever or on a separate traffic signal pole that does not restrict view of the cantilever. Consider use of overheight cantilever. Contact railroad company to confirm if signal heads may be mounted on the cantilever.
4. Raised median with 4' minimum width preferred between directions of traffic if right-of-way width exists.



**D - RAILROAD CROSSING CLOSURES AND CONSOLIDATIONS****NOTES:**

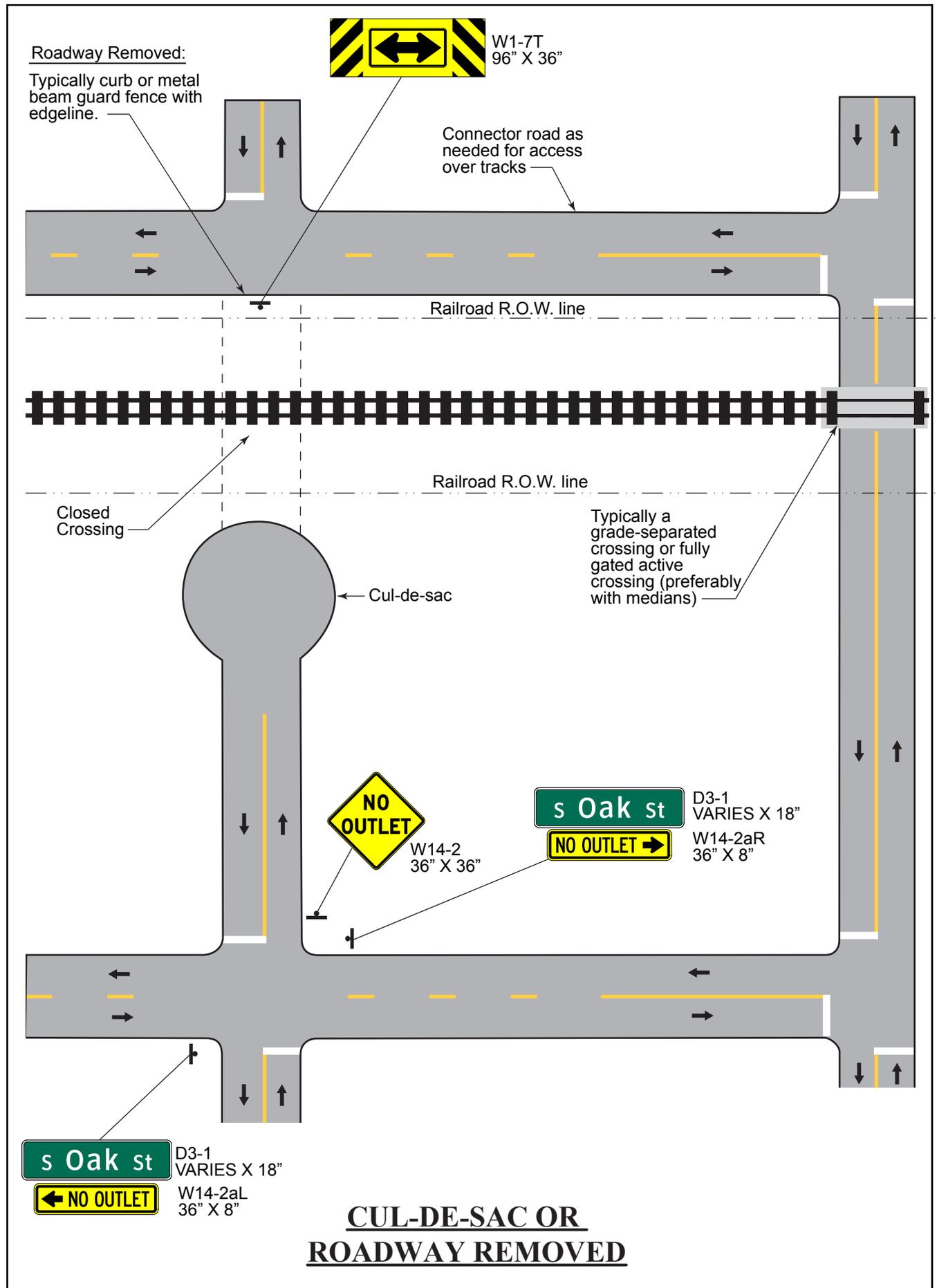
1. All active railroad devices, railroad cabins, signs for the crossing, railroad crossing pavement markings, and planking panels must be removed for the closed crossing, on roadway approaches, and on parallel roads.
2. Restore ditches along railroad right-of-way and remove any drainage pipes used for extending the ditch.
3. Stop signs and/or traffic signals not shown in diagrams on the following pages.
4. See TxDOT Traffic Operations Division Sign Mounting Details (SMD) standard sheets.
5. Signs removed to 6" below ground minimum.
6. See the Standard Highway Sign Design for Texas (SHSD) for sign details.

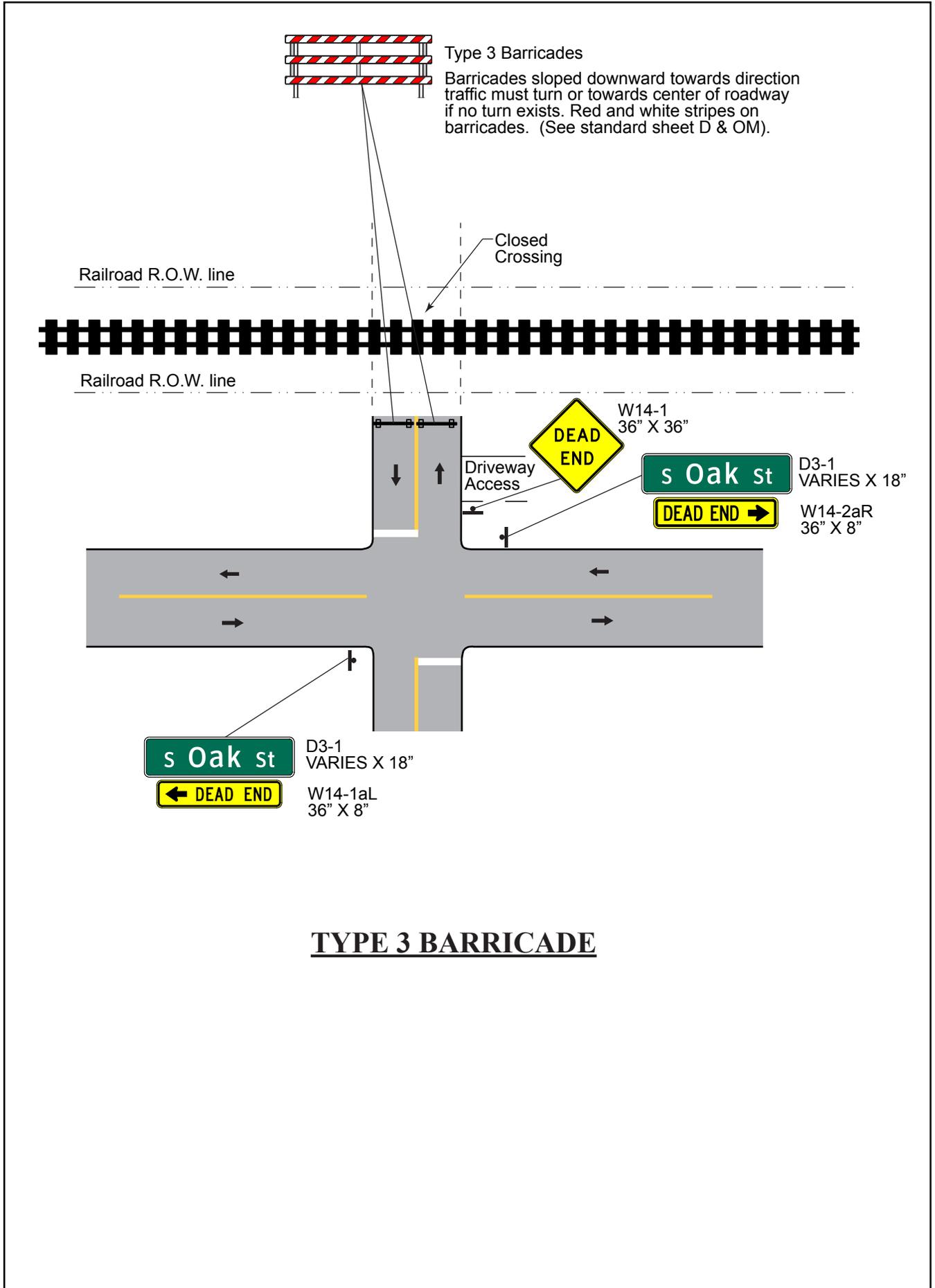
**CROSSING CLOSURE ACTIONS BY RAILROAD COMPANY**

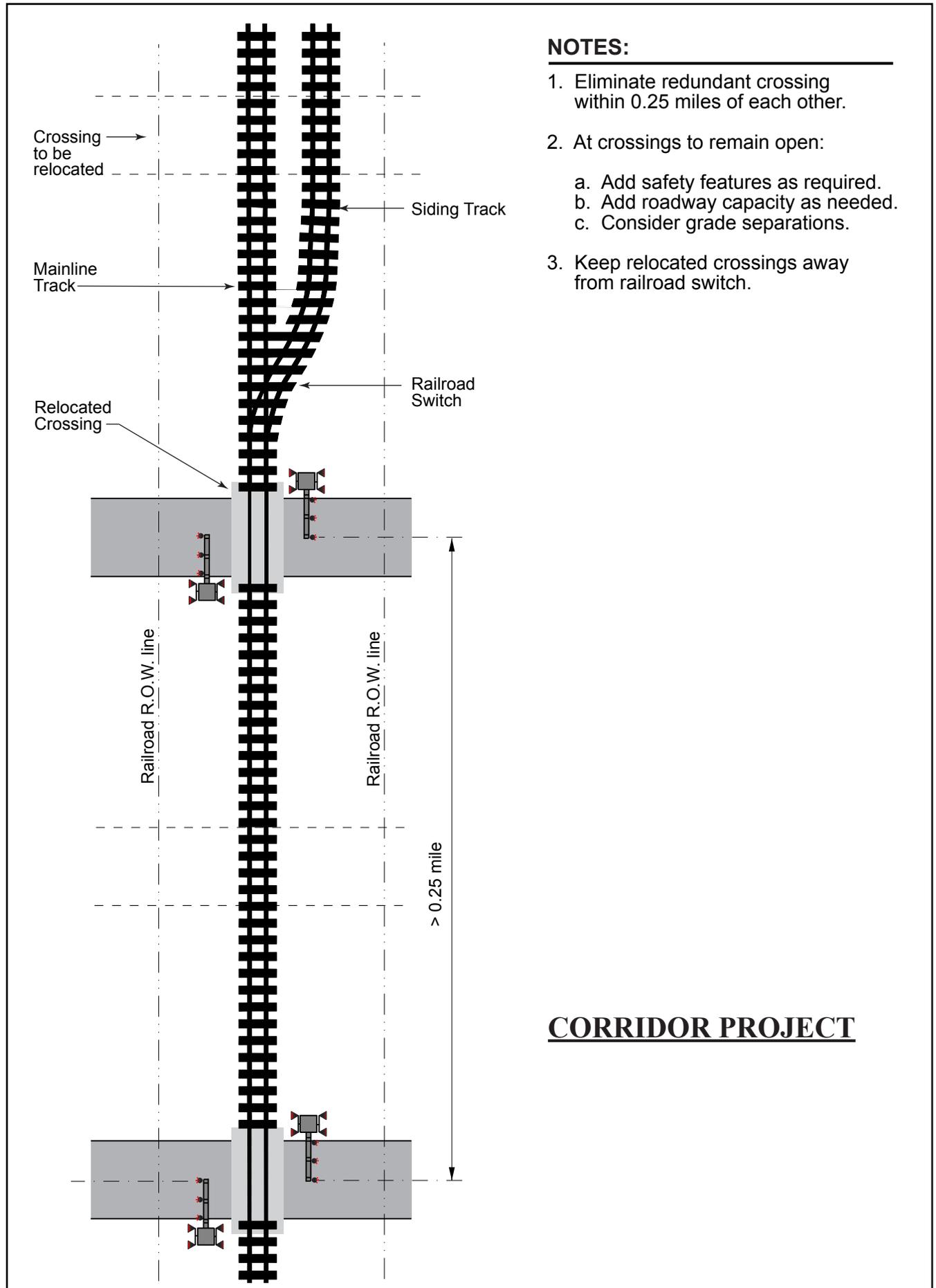
1. Barricade roadway temporarily so traffic cannot use crossing.
2. Remove active devices (gates, cantilevers, mast flashers) and any signs on devices.
3. Remove railroad cabin.
4. Remove planking panels over crossing and adjust track and ballast as needed.
5. Remove crossbucks, stop, ENS, and yield signs (passive crossings only).
6. Remove pavement on railroad right-of-way.
7. Restore ditch line on railroad right-of-way and remove any culverts parallel to track.

**CROSSING CLOSURE ACTIONS BY ROADWAY AUTHORITY**

1. Install traffic control plan and associated devices.
2. Remove signs related to railroad crossing (on both roadway that went over crossing and parallel streets to the track).
3. Remove railroad crossing pavement markings.
4. Relocate any other traffic control devices or roadway features on railroad right-of-way.
5. Install new signs and traffic control devices.
6. Perform pavement work off of railroad right-of-way.
7. Restripe adjacent roadways as needed.
8. Install curb, metal beam guard fence, and barricades.







**NOTES:**

1. Eliminate redundant crossing within 0.25 miles of each other.
2. At crossings to remain open:
  - a. Add safety features as required.
  - b. Add roadway capacity as needed.
  - c. Consider grade separations.
3. Keep relocated crossings away from railroad switch.

**CORRIDOR PROJECT**

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