

Texas DOT Federal Railroad Signal Program Project Process

Projects selected under the federal railroad signal programs are processed as follows:

1. The FHWA and Texas Transportation Commission approves allocation program funding amount and method of project selection.
2. Rail Division coordinates with the Districts and railroads to prioritize crossing locations for preliminary engineering study, under the terms of a master agreement in place with each railroad.
3. Rail Division schedules diagnostic inspection with District and the Railroad, and local road authority if applicable. The diagnostic team agrees and recommends closure or safety improvements (if any) to be accomplished.
4. District develops project layouts (to be used as Exhibit A) from the diagnostic team field notes and sketches and submits, signed, sealed, and dated title and layout sheets on 11"x17" inch sheets to the Rail Division.
5. Rail Division reviews project layouts (Exhibit A) and transmits it to the railroad, requesting estimate, and signal circuit layout.
6. Railroad prepares estimate and signal circuit layout and sends them to Rail Division.
7. Rail Division allocate funds to each projects and submits to the FHWA.
8. The FHWA obligates the funds.
9. Rail Division reviews estimate and signal circuit layout; prepares and approves Exhibit B set of approved plans, specifications, and estimates; and sends items to railroad and district as approved and ready for construction, following issuance of work order.
10. Rail Division issues work orders upon request from Railroad.
11. District coordinates any work to be done by the state, city, or county; (i.e.) signing, pavement markings, and construction inspection; and advises Rail Division when project is complete.
12. Railroad coordinates with District and performs the installation, then advises the Rail Division when signals are placed in service.
13. Rail Division sends notification to the district to schedule final inspection with, railroad, city or county,
14. District provides to Rail Division the final inspection form, final material inventory list, and project certification memo that project is complete.
15. Railroad bills State.
16. State pays Railroad.
17. State certifies to the FHWA project complete.
18. FHWA reimburses State.

The Texas Priority Index Formula:

$$PI = V \times SV_f \times T \times (S \times 0.10) \times P_f \times A^{1.15} \times 0.01$$

where:

V = average daily traffic — number of vehicles per day

SV_f = average daily school bus traffic – a factor weighted according to the range of school bus traffic reported as follows:

- 0 buses = 1.00
- 1 - 3 buses = 1.20
- 4 - 10 buses = 1.60
- 11 + buses = 2.0

T = number of trains in a 24-hour period

S = speed — maximum speed of the trains

P_f = protection factor — a factor weighted according to the type of existing traffic control device as follows:

- gates = 0.10
- cantilever flashers = 0.70
- mast flashers = 0.70
- crossbuck, other = 1.00

A = number of auto-train involved crashes in the last five years to the 1.15 power
(when $A = 0$ or $A = 1$, then $A = 1$)

EXAMPLE COMPUTATION:

$V = 5000$ v.p.d.

$SV_f = 1.6$ (6 school buses/day)

$T = 12$ trains/day

$S \times 0.10 = 6.0$ ($S = 60$ mph)

$P_f = 0.70$ (mast flashers)

$A = 2.22$ (2 crashes in last five years to the 1.15 power)

$$PI = 5000 (1.6) (12) (6.0) (0.70) (2.22) (0.01)$$

$$PI = 8,951$$

All locations with more than one track where main line and switching movements occur over the same crossing and at different speeds, a priority index is calculated for both the main line traffic and switching traffic, then added together to equal the total priority index for the crossing.

**PRELIMINARY DOCUMENT
NOT FOR RELEASE PURSUANT TO 23 U.S.C. SECTION 409**

OFFICE USE ONLY

_____ Average Daily Traffic (ADT)
_____ Special Vehicle moves
_____ MPH
_____ through trains at _____ mph per day
_____ switch moves at _____ mph per day

<u>PROJECT INFORMATION</u>	
COUNTY:	_____
DOT No.:	_____
CONTROL:	_____
PROJECT:	_____
LOCATION:	_____
RAILROAD:	_____
MILEPOST:	_____
Date of Inspection:	_____
Date Layout Due:	_____

Salvaged equipment: YES NO

Total estimated cubic yards of fill material: _____

- This project is actual cost for reimbursement of payment to the Railroad Company as agreed to by:
- This project is lump sum cost for reimbursement of payment to the Railroad Company as agreed to by:
- This project has a cost participation of _____ from the Railroad Company as agreed to by:

DOT: _____ Railroad Company: _____

- Existing cross bucks meet TMUTCD guidelines
- Existing cross bucks do not meet TMUTCD guidelines and need to be replaced repaired. If replacement or repair is needed The railroad company or its contractor will make necessary arrangements, within 30 days of diagnostic
Notify TRF/RR when discrepancies are correct

- RxR pavement markings are to be installed, per the guidelines in the TMUTCD
- No RxR pavement markings are to be installed because
- Stop bars are to be installed, per the guidelines in the TMUTCD
- No stop bars are to be installed because

- Side lights are to be installed at this location. (Crossing is 50 feet or less from the parallel roadway)
- No side lights will be installed at this location. (Crossing is greater than 50 feet from the parallel roadway)

- AC power service is available at this location
- AC power service is not available at this location

- A signalized intersection is located _____ft from crossing. Distance measured from the warning device to the edge of road/shoulder.
Attach copy of the preemption form
- No signalized intersection at this location

- Letter to proceed with project development was given to the Railroad Company
- No letter to proceed with project development was given to the Railroad Company because:

- Closure of crossing was not discussed with local road authority because:
- Closure of crossing was discussed with local road authority. Local road authority will consider will not consider.
Closure Letter send proposal letter Dot not send proposal letter

- No yield or stop signs are to be installed by the State because:
- Yield Stop signs were recommended by the diagnostic team on an interim basis, per the guidelines in the TMUTCD.
The local road authority was notified at Diagnostic. Will be notified in writing. Signs to be installed within 30 days of diagnostic.
Notify TRF/RR when signs are installed

<u>DIAGNOSTIC TEAM MEMBERS</u>		
DOT: _____	RAILROAD: _____	OTHER: _____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**PRELIMINARY DOCUMENT
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GENERAL NOTES

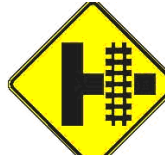
1. Signal circuits are designed to give 20 seconds Minimum Warning Time, plus _____ seconds clearance time, plus _____ seconds buffer time, plus _____ seconds equipment response time, plus _____ seconds of advance traffic signal preemption for a total of _____ seconds approach time, prior to the arrival of the fastest train at this crossing. Refer to signal circuit layout for total approach time.
2. **Constant warning** **Phase motion** **C Style /AC-DC** _____ circuits are to be used at this location. Upgrades required; _____ for circuit compatibility.
3. Conduit, fill dirt and crushed cover rock to be furnished in place by the Railroad Company or its Contractor at state's expense.
4. The Railroad Company or its Contractor will remove the existing **cross bucks** **mast flashers** **cantilevers** and dispose of the foundations.
5. The State or its Contractor will furnish and install or replace the appropriate pavement markings as outlined on the attached layout and standard sheet and in accordance with the guidelines in the Texas Manual on Uniform Traffic Control Devices.
6. The State or its Contractor will furnish and install or replace the following signs in accordance with the guidelines in the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and the Standard Highway Sign Designs Manual for Texas(SHSD): _____ ea.(W10-1), _____ ea.(W10-2), _____ ea.(W10-3), _____ ea.(W10-4), _____ ea.(R15-4). Additional signs to be added. _____
7. The **State** **County** **City** agrees to maintain the pavement markings and advance warning signs placed along the roadways under their jurisdiction in accordance with the guidelines in the Texas Manual on Uniform Traffic Control Devices and as shown on the layout and standard sheets as acknowledged on the Title Sheet.
8. The Railroad Company or its Contractor shall furnish, install and maintain sign mounting brackets for the Report sign (R15-4) at the States expense.
9. The Railroad Company or its Contractor shall stencil the DOT-AAR numbers on the signal masts facing the adjacent roadway in 2" black lettering.
10. The **State** **County** **City** agrees to trim and maintain trees and vegetation for adequate visibility of the crossing signals and advance warning signs as acknowledged on the Title Sheet.
11. The Railroad Company or its Contractor will provide traffic control in accordance with the guidelines in the Texas Manual on Uniform Traffic Control Devices.
12. The **State** **Railroad Company** or its Contractor will install metal beam guard fence as shown on the layout, at the **State's** **Railroads** expense.
13. The **State** **Railroad Company** or its Contractor will install retaining wall as shown on the layout, at the **State's** **Railroads** expense.
14. The State and the Railroad Company agrees to install a _____ foot concrete crossing as shown on the re-surface layout, at a shared cost of \$ _____ dollars per track foot.
15. The Railroad or its Contractor will furnish and install a relay to provide **simultaneous** **advance** preemption to **existing traffic signal** **proposed traffic signal** **advance flasher**. Normally a closed circuit is required between the control relay of the grade crossing warning device and the traffic signal controller or flasher as stated in the Texas Manual on Uniform Traffic Control Devices.



W10-1



W10-2



W10-3



W10-4



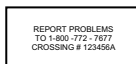
W10-11



W10-5



W 10-13



R15-4



R15-2



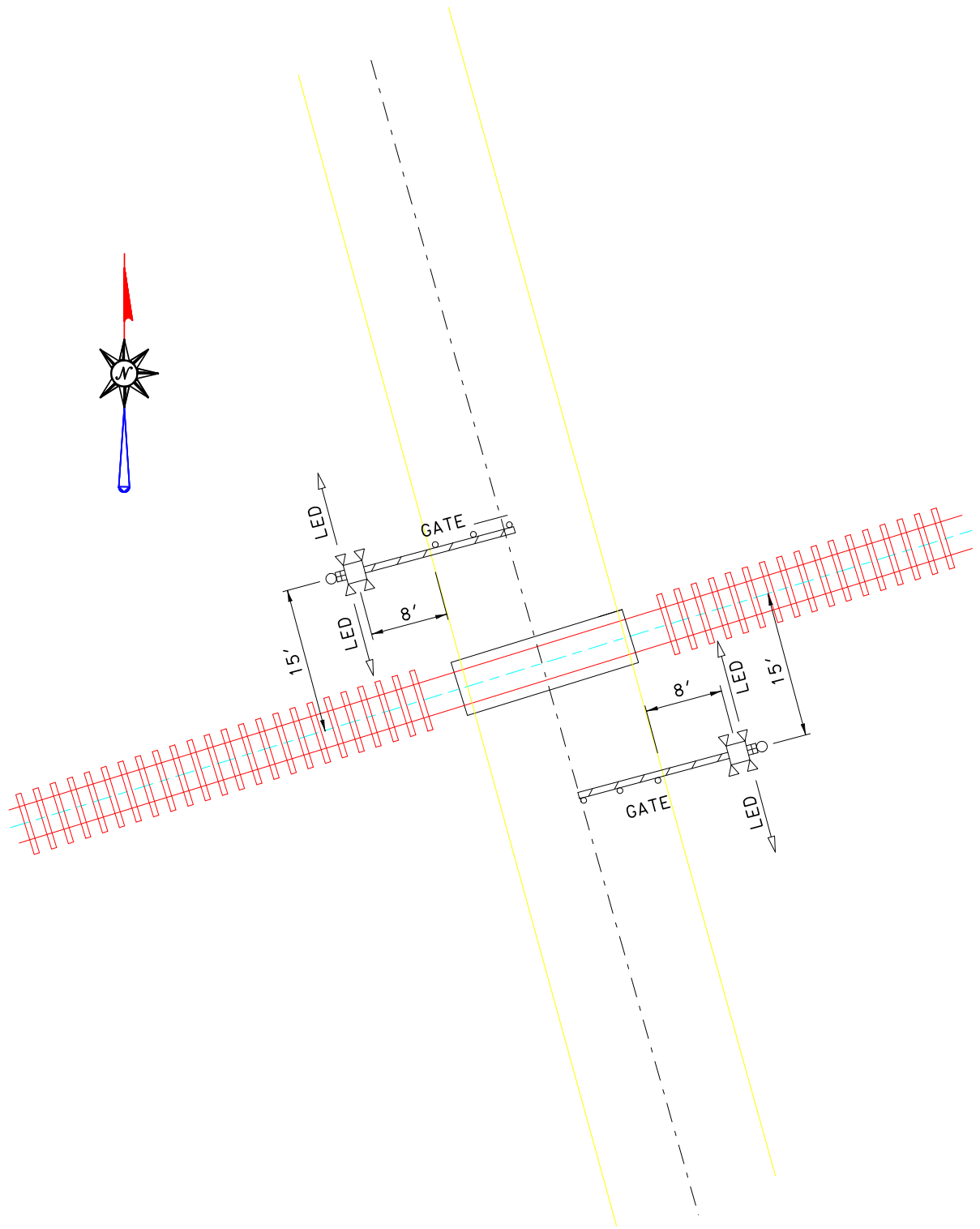
R8-8

ADDITIONAL NOTES

DESCRIPTION OF PROJECT

_____ Complete Flashing Lights with gate assemblies and _____ Bells
 _____ Complete _____ walkout cantilever(s) assemblies with _____ Bells
 _____ Ea. R15-2, (_____ Tracks)

12" lamp housing shall be used and equipped with LED's (light emitting diodes) lights, operated at not less than 8.5 volts under normal operating conditions.



**FINAL INSPECTION REPORT
FOR RAILROAD SIGNAL PROJECTS**

**CREATE BLANK PAGES AT THE BOTTOM OF THIS DOCUMENT FOR INCLUSION OF
DIGITAL PHOTOS AND SEND PHOTOS IN ELECTRONIC FORMAT TO
RAIL DIVISION**

Location:
Street/Highway:
County:
Project No.:
CSJ:

Railroad:
DOT No.:
Milepost:
Date of Inspection:
Placed in Service Date:

Based on our final inspection the following items are noted as per the approved plans, and in accordance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

WORK DONE BY THE ROAD AUTHORITY/CONTRACTOR:

STOP LINES AND RxR MARKINGS

Shown on Plans yes no (If yes please check below, if no explain)
Installed Correct
Needs Repainting
Installed Incorrect

Remarks: _____

CENTERLINE, LANE LINES, EDGE LINES

Shown on Plans yes no (If yes please check below, if no explain)
Installed Correct
Needs Repainting
Installed Incorrect

Remarks: _____

ADVANCE WARNING SIGNS (W10-XX)

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

REGULATORY SIGNS (R15-1, R15-2, R15-4, R8-8)

Installed According to the Plans yes no (If no please comment below)
DOT Number Correct yes no (if no please comment below)
Phone Number Correct yes no (if no please comment below)
(1-800-772-7677)

Remarks: _____

CURB AND GUTTER, MEDIANS, SIDEWALK

Installed/Adjusted According to Plans yes no (If no please comment below)

Remarks: _____

DRAINAGE PIPE, CULVERT EXTENSIONS, RETAINING WALL

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

APPROACH REALIGNMENT, APPROACH GRADE ADJUSTMENT

Constructed According to Plans yes no (if no please comment below)

Remarks: _____

METAL BEAM GUARD FENCE

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

INTERIM SIGNS REMOVED (YIELD/YIELD AHEAD, STOP/STOP AHEAD, NO LIGHTS)

Removed yes no (If no please comment below)

Remarks: _____

VEGETATION CONTROL

Adequate Visual Clearance yes no (If no please comment below)

Remarks: _____

CROSSING SURFACE

Installed according to plans yes no (if no please comment below)

Remarks: _____

UTILITIES

Adjusted according to plans yes no (if no please comment below)

Remarks: _____

WORK DONE BY THE RAILROAD/CONTRACTOR:

WARNING DEVICES (LIGHT ASSEMBLIES)

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

Front Lights Aimed Correctly yes no (if no please check below)
Lights Readjusted at Time of Inspection yes no (if no please comment below)

Remarks: _____

Back Lights Aimed Correctly yes no (if no please check below)
Lights Readjusted at Time of Inspection yes no (if no please comment below)

Remarks: _____

Side Lights Aimed Correctly yes no (if no please check below)
Lights Readjusted at Time of Inspection yes no (if no please comment below)

Remarks: _____

WARNING DEVICES (GATE ASSEMBLIES)

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

DOT NUMBER STENCILED ON EACH SIGNAL MAST

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

INSTRUMENT HOUSE

Installed According to the Plans yes no (If no please comment below)

Remarks: _____

TYPE OF CIRCUIT

Phase Motion (PMD)
Constant Warning (CWT)
Other type: _____

Remarks: _____



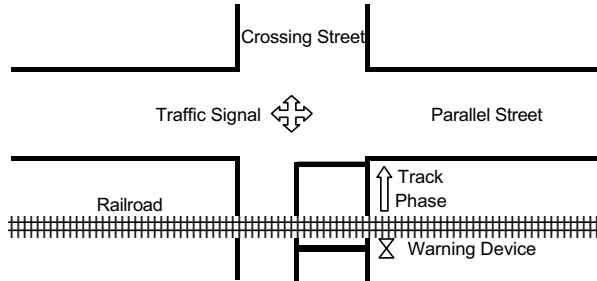
GUIDE FOR DETERMINING TIME REQUIREMENTS FOR TRAFFIC SIGNAL PREEMPTION AT HIGHWAY-RAIL GRADE CROSSINGS

City _____
 County _____
 District _____

Date _____
 Completed by _____
 District Approval _____



Show North Arrow



Parallel Street Name _____

Crossing Street Name _____

Railroad _____
 Crossing DOT# _____

Railroad Contact _____
 Phone _____

SECTION 1: RIGHT-OF-WAY TRANSFER TIME CALCULATION

Preempt verification and response time

Remarks

- | | | | |
|--|----|--|------------------------|
| 1. Preempt delay time (seconds) | 1. | <input style="width: 50px; height: 20px;" type="text"/> | |
| 2. Controller response time to preempt (seconds) | 2. | <input style="width: 50px; height: 20px;" type="text"/> | Controller type: _____ |
| 3. Preempt verification and response time (seconds): add lines 1 and 2 | 3. | <input style="width: 50px; height: 20px; border: 1px solid black;" type="text" value="0.0"/> | |

Worst-case conflicting vehicle time

Remarks

- | | | | |
|---|----|--|-------|
| 4. Worst-case conflicting vehicle phase number | 4. | <input style="width: 30px; height: 20px;" type="text"/> | |
| 5. Minimum green time during right-of-way transfer (seconds) | 5. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 6. Other green time during right-of-way transfer (seconds) | 6. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 7. Yellow change time (seconds) | 7. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 8. Red clearance time (seconds) | 8. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 9. Worst-case conflicting vehicle time (seconds): add lines 5 through 8 | 9. | <input style="width: 50px; height: 20px; border: 1px solid black;" type="text" value="0.0"/> | |

Worst-case conflicting pedestrian time

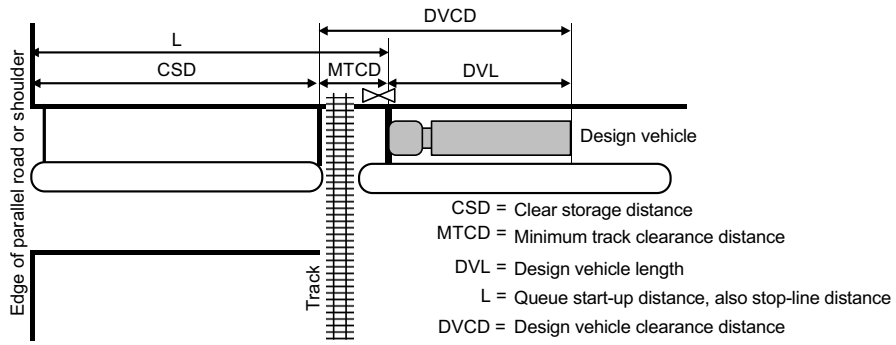
Remarks

- | | | | |
|---|-----|--|-------|
| 10. Worst-case conflicting pedestrian phase number | 10. | <input style="width: 30px; height: 20px;" type="text"/> | |
| 11. Minimum walk time during right-of-way transfer (seconds) | 11. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 12. Pedestrian clearance time during right-of-way transfer (seconds) | 12. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 13. Vehicle yellow change time, if not included on line 12 (seconds) | 13. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 14. Vehicle red clearance time, if not included on line 12 (seconds) | 14. | <input style="width: 50px; height: 20px;" type="text"/> | _____ |
| 15. Worst-case conflicting pedestrian time (seconds): add lines 11 through 14 | 15. | <input style="width: 50px; height: 20px; border: 1px solid black;" type="text" value="0.0"/> | |

Worst-case conflicting vehicle or pedestrian time

- | | | | |
|--|-----|--|--|
| 16. Worst-case conflicting vehicle or pedestrian time (seconds): maximum of lines 9 and 15 | 16. | <input style="width: 50px; height: 20px; border: 1px solid black;" type="text" value="0.0"/> | |
| 17. Right-of-way transfer time (seconds): add lines 3 and 16 | 17. | <input style="width: 50px; height: 20px; border: 1px solid black;" type="text" value="0.0"/> | |

SECTION 2: QUEUE CLEARANCE TIME CALCULATION



Remarks

- 18. Clear storage distance (CSD, feet) 18.
- 19. Minimum track clearance distance (MTCD, feet) 19.
- 20. Design vehicle length (DVL, feet) 20. Design vehicle type: _____

- 21. Queue start-up distance, L (feet): add lines 18 and 19 21.

Remarks

- 22. Time required for design vehicle to start moving (seconds): calculate as $2+(L+20)$ 22.
- 23. Design vehicle clearance distance, DVCD (feet): add lines 19 and 20 23.
- 24. Time for design vehicle to accelerate through the DVCD (seconds) 24. Read from Figure 2 in Instructions.
- 25. Queue clearance time (seconds): add lines 22 and 24 25.

SECTION 3: MAXIMUM PREEMPTION TIME CALCULATION

Remarks

- 26. Right-of-way transfer time (seconds): line 17 26.
- 27. Queue clearance time (seconds): line 25 27.
- 28. Desired minimum separation time (seconds) 28.
- 29. Maximum preemption time (seconds): add lines 26 through 28 29.

SECTION 4: SUFFICIENT WARNING TIME CHECK

Remarks

- 30. Required minimum time, MT (seconds): per regulations 30.
- 31. Clearance time, CT (seconds): get from railroad 31.
- 32. Minimum warning time, MWT (seconds): add lines 30 and 31 32.
- 33. Advance preemption time, APT, if provided (seconds): get from railroad .. 33.
- 34. Warning time provided by the railroad (seconds): add lines 32 and 33 34.
- 35. Additional warning time required from railroad (seconds): subtract line 34 from line 29, round up to nearest full second, enter 0 if less than 0 35.

If the additional warning time required (line 35) is greater than zero, additional warning time has to be requested from the railroad. Alternatively, the maximum preemption time (line 29) may be decreased after performing an engineering study to investigate the possibility of reducing the values on lines 1, 5, 6, 7, 8, 11, 12, 13 and 14.

Remarks: _____

SECTION 5: TRACK CLEARANCE GREEN TIME CALCULATION (OPTIONAL)

Preempt Trap Check

- 36. Advance preemption time (APT) provided (seconds): 36. Line 33 only valid if line 35 is zero.
- 37. Multiplier for maximum APT due to train handling 37. See Instructions for details.
- 38. Maximum APT (seconds): multiply line 36 and 37 38. **Remarks**
- 39. Minimum duration for the track clearance green interval (seconds) 39. For zero advance preemption time
- 40. Gates down after start of preemption (seconds): add lines 38 and 39 40.
- 41. Preempt verification and response time (seconds): line 3 41. **Remarks**
- 42. Best-case conflicting vehicle or pedestrian time (seconds): usually 0..... 42.
- 43. Minimum right-of-way transfer time (seconds): add lines 41 and 42 43.
- 44. Minimum track clearance green time (seconds): subtract line 43 from line 40 44.

Clearing of Clear Storage Distance

- 45. Time required for design vehicle to start moving (seconds), line 22 45.
- 46. Design vehicle clearance distance (DVCD, feet), line 23 46. **Remarks**
- 47. Portion of CSD to clear during track clearance phase (feet) ... 47. CSD* in Figure 3 in Instructions.
- 48. Design vehicle relocation distance (DVRD, feet): add lines 46 and 47 48.
- 49. Time required for design vehicle to accelerate through DVRD (seconds) 49. Read from Figure 2 in Instructions.
- 50. Time to clear portion of clear storage distance (seconds): add lines 45 and 49 50.
- 51. **Track clearance green interval (seconds): maximum of lines 44 and 50, round up to nearest full second** 51.

SECTION 6: VEHICLE-GATE INTERACTION CHECK (OPTIONAL)

- 52. Right-of-way transfer time (seconds): line 17 52.
- 53. Time required for design vehicle to start moving (seconds), line 22 53.
- 54. Time required for design vehicle to accelerate through DVL (on line 20, seconds) 54. Read from Table 3 in Instructions.
- 55. Time required for design vehicle to clear descending gate (seconds): add lines 52 though 54 55. **Remarks**
- 56. Duration of flashing lights before gate descent start (seconds): get from railroad 56. **Remarks**
- 57. Full gate descent time (seconds): get from railroad 57.
- 58. Proportion of non-interaction gate descent time 58. Read from Figure 5 in Instructions.
- 59. Non-interaction gate descent time (seconds): multiply lines 57 and 58 59.
- 60. Time available for design vehicle to clear descending gate (seconds): add lines 56 and 59 60.
- 61. **Advance preemption time (APT) required to avoid design vehicle-gate interaction (seconds): subtract line 60 from line 55, round up to nearest full second, enter 0 if less than 0** 61.