North Carolina Department of Transportation
Traffic Signal – Railroad Grade Crossing Interconnection and Preemption
Inspection Form

Date of Inspection: ________________________  Inspected By: ________________________

Signal Inventory No.: ________________________  DOT Crossing No.: ________________________

Railroad Co: ________________________  RR Representative: ________________________

Date of Last Inspection: ________________________  RR Rep. Phone: (_____)_______________

Division: ______ County: ________________  City or Town: In / Near ________________________

Traffic Controller (Manuf/Model) ______________  Traffic Cabinet (Manuf/Model) ______________

**Intersection Location**

Route Number: ________________________ Name: ______________________________________

at

Route Number: ________________________ Name: ______________________________________

Railroad Milepost ________________________

1. Calculate track clearance green by current standard (Greenshield’s formula).

**Distance To Measure In Order To Calculate Track Clear Green Time**

L = ______ Feet

If an approach has multiple stopbars, measure the distance from the stopbar behind the track to the farthest stopbar (closest to intersection).

Measure from stopbar behind track to stopbar at intersection. If calculation is less than 10 sec., use 10 sec. minimum.
a.) Insert distance L into formula below:

\[
\text{2 sec. x } \frac{L}{20} \quad (L = \text{distance divided by 20 feet per car})
\]

\[+ 4 \text{ sec.} \quad \text{(Start-up delay)}\]

\[= \text{Seconds} \quad \text{= Greenshield’s Formula Calc. for } \text{TRACK CLEARANCE GREEN.}\]

b.) If **Simultaneous Preemption** is used, record the calculated value shown in item 1a) (above) in the **Track Clearance Green** section in the chart under item 2 (below) and skip items 1c) and 1d).

c.) If **Advance Preemption** is used, the **Right of Way Transfer Time** must be calculated and added to the Greenshield’s calculation to determine the total amount of **Track Clearance Green** time (see item 1d below):

d.) If **Advance Preemption** is used, calculate **Right of Way Transfer Time**:

\[
\text{Min Green Before Preempt} + \text{Ped Clear Before Preempt} + \text{Yellow Clear Before Preempt} + \text{Red Clear Before Preempt}
\]

\[
= \text{Seconds} \quad \text{GREENSHEELD’S Formula Green [From 1a]} + \text{Seconds}
\]

Total Amount of **Track Clearance Green Time** = \[\text{Seconds} \quad \text{(Record this time in chart below in item 2 beside Track Clearance Green).}\]

e.) Is the calculated **Track Clearance Green** time above for the type of preemption used at this crossing (advance or simultaneous), consistent with what is shown on the signal plans and/or programmed in the field?  

Yes  No

2. Calculate the **Preemption Time Required**:

<table>
<thead>
<tr>
<th>Function</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay Time</td>
<td></td>
</tr>
<tr>
<td>Ped Clear Before Preempt*</td>
<td></td>
</tr>
<tr>
<td>Min Green Before Preempt</td>
<td></td>
</tr>
<tr>
<td>Yellow Clear Before Preempt</td>
<td></td>
</tr>
<tr>
<td>Red Clear Before Preempt</td>
<td></td>
</tr>
<tr>
<td>Track Clearance Green</td>
<td></td>
</tr>
<tr>
<td>Track Clearance Yellow</td>
<td></td>
</tr>
<tr>
<td>Track Clearance Red</td>
<td></td>
</tr>
<tr>
<td>Preemption Time Required</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Ped Clear Before Preempt should be timed concurrently with Yellow Clear Before Preempt. Enter only the exclusive amount of Ped Clear time that is not displayed concurrently with the Yellow Clear (ex. 5 sec. Ped Clear – 4.5 sec. Yel. Clear = .5 sec.).

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Enter the above Preemption Time Required in Item 14a) of this form---
3. **OBSERVE OPERATION** of the traffic signal (including control equipment in the cabinet and field equipment) for proper programming & operation. Is equipment operating properly and does the operation coincide with the signal plans?  
   • Yes  • No  
   a) Are signs shown on signal plan installed properly?  
   • Yes  • No  

4. **If intersection has** MULTIPLE PREEMPTS **in use, verify that the RAILROAD PREEMPT is set as the HIGHEST PRIORITY.**  
   • N/A  • Pass  • Fail  

5. If crossing has multiple through line tracks — **perform SECOND TRAIN SEQUENCE test** (preempt re-service).  
   • N/A  • Pass  • Fail  
   a) Does **preempt call release** immediately when gates **begin** to rise?  
   • Pass  • Fail  

6. Identify the general type of railroad signal equipment with its particular reaction time:  
   - Circle type:  PREDICTOR  MOTION  AC/DC  AFO  
   Manuf.: ___________________  Model: ___________________  Reaction time: _______ Seconds  

   **Note:** Reaction time will be used in RR WARNING TIME formula (item 9). If reaction time cannot be obtained, use 5 seconds as worst case.  

7. **Obtain the TRACK CIRCUIT APPROACH LENGTHS** for each direction from the railroad signal maintainer / inspector as shown on their PLAN OF RECORD or inspection documentation in the railroad signal cabinet:  
   - Northbound/Eastbound approach: _______  
   - Southbound/Westbound approach: _______  

   Indicate to what point approach length is measured from starter/shunt, as each railroad may reference differently (circle):  
   - ISLAND  - EDGE OF CROSSING SURFACE  - EDGE LINE OF TRAVEL  - CENTER OF CROSSING  

8. **Obtain MAXIMUM TRAIN SPEED** for the crossing from railroad signal maintainer / inspector (using Timetable Speed or Railroad Permanent Speed Restriction):  
   - Railroad Northbound / Eastbound approach: _______ MPH  
   - Railroad Southbound / Westbound approach: _______MPH  

9. Calculate amount of **RR WARNING TIME** provided by track circuitry as calculated using the formula below (use space provided at bottom of page to aid in calculation):  
   (Shortest Approach Length in Feet) (Minus) Equipment Reaction Time = **RR Warning Time**  
   (1.47) (Train Speed in MPH)  

   
   ---  
   minus  =  Seconds [Carry to item 14c)]  
   (1.47)  

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10. Is crossing signal equipped with **ADVANCE PREEMPTION**?  
   Yes  No

   **Note:** If **ADVANCE PREEMPTION** is used, a train movement must be observed. Care must be taken to answer items 11, 11a, and 11b below. If **SIMULTANEOUS PREEMPTION** is used, a train movement observation is **not required**; however, if train movement occurs during inspection, enter actual observed warning time (taken with stopwatch) in item 11.

11. Observed total warning time of **ACTUAL TRAIN MOVEMENT**:  
   N/A  _____ Seconds
   a) Does controller/cabinet respond to preempt call properly?  
      Pass  Fail
   b) During train movement, does signal remain in **TRACK CLEARANCE** green at least until entrance gate is **fully horizontal**?  
      Pass  Fail

12. If no train movement is expected, have the railroad signal maintainer/inspector activate the crossing with a shunt placed across the rails in the island circuit  
   (**This item may be omitted if train movement is observed**).  
   Observe traffic signal **preemption & crossing** operation.  
   N/A  Pass  Fail

13. If Railroad crossing signal equipment is designed for **CONSTANT WARNING TIME** (i.e. predictor) and/or is equipped with **ADVANCE PREEMPTION** obtain the following values from the railroad signal maintainer / inspector:

   a) How much **RR WARNING TIME** is programmed in the unit?  
      _____ Seconds
   b) If railroad provides **ADVANCE PREEMPTION**, how many seconds of additional **DAX TIME** is programmed (**DAX time minus** warning time).  
      _____ Seconds

14. Compare **PREEMPTION TIME REQUIRED** with **RR WARNING TIME**:

   a) **PREEMPTION TIME REQUIRED** (**from Item 2**):  
      _____ Seconds
   b) Total **RR WARNING TIME** programmed on railroad predictor  
      (if used).  
      **Total from Item 13a) + 13b):**  
      _____ Seconds
   c) Total Warning Time avail. from **TRACK CIRCUITRY** (**From Item 9**)  
      _____ Seconds

**CONCLUSION**

- Is 14c) GREATER THAN OR EQUAL TO 14b)?  
  Yes  No
- Is 14a) LESS THAN OR EQUAL TO 14b) and 14c)?  
  Yes  No

*If the answer to either of the above questions is NO, contact the Signal Design Section (Regional Signal Engineer) immediately at (919) 814-5000.*

Send a copy of this **INSPECTION FORM** with **ATTACHED COMMENTS** (if necessary) and any marked-up plans to:

**Mail:**  
NCDOT – Rail Division  
Engineering Coordination and Safety Branch  
ATTN: Inventory & Data Analysis Manager  
1556 Mail Service Center  
Raleigh, NC 27699-1556

**Office/Delivery:**  
862 Capital Boulevard  
Raleigh, NC 27603

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