



Revisions to the TxDOT Guide for Determining Time Requirements for Traffic Signal Preemption at Highway-Rail Grade Crossings

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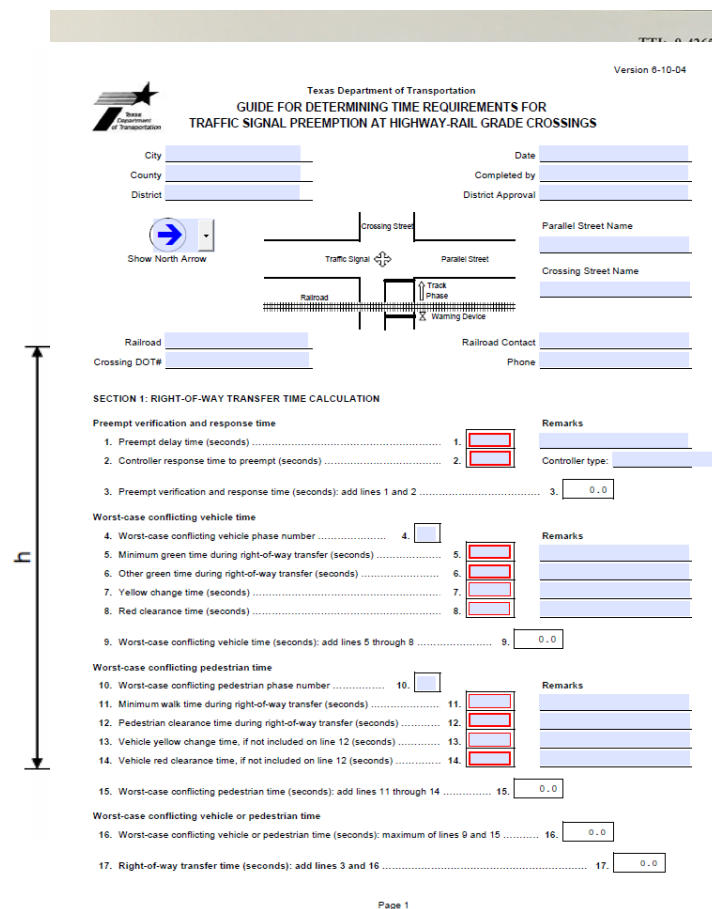


Presentation Outline

- History of TxDOT Worksheet
- Need for Revisions
- Describe Sections in Worksheet
- Items shown in **RED** indicate new items

TxDOT Preemption Worksheet –2004 Update

- Updated the worksheet as result of research project conducted by TTI
 - Studied advance preemption at grade crossings
 - Specifically addressed preemption trap
 - Gate/vehicle interaction
 - Fillable and non-fillable format



Version 6-10-04

Texas Department of Transportation
GUIDE FOR DETERMINING TIME REQUIREMENTS FOR
TRAFFIC SIGNAL PREEMPTION AT HIGHWAY-RAIL GRADE CROSSINGS

City _____ Date _____
 County _____ Completed by _____
 District _____ District Approval _____

Parallel Street Name _____
 Crossing Street Name _____

Parallel Street _____
 Crossing Street _____

Railroad _____ Railroad Contact _____
 Crossing DOT# _____ Phone _____

SECTION 1: RIGHT-OF-WAY TRANSFER TIME CALCULATION

Preempt verification and response time

1. Preempt delay time (seconds)	1.	<input type="text"/>	Remarks
2. Controller response time to preempt (seconds)	2.	<input type="text"/>	Controller type: _____
3. Preempt verification and response time (seconds); add lines 1 and 2	3.	<input type="text" value="0.0"/>	

Worst-case conflicting vehicle time

4. Worst-case conflicting vehicle phase number	4.	<input type="text"/>	Remarks
5. Minimum green time during right-of-way transfer (seconds)	5.	<input type="text"/>	
6. Other green time during right-of-way transfer (seconds)	6.	<input type="text"/>	
7. Yellow change time (seconds)	7.	<input type="text"/>	
8. Red clearance time (seconds)	8.	<input type="text"/>	
9. Worst-case conflicting vehicle time (seconds); add lines 5 through 8	9.	<input type="text" value="0.0"/>	

Worst-case conflicting pedestrian time

10. Worst-case conflicting pedestrian phase number	10.	<input type="text"/>	Remarks
11. Minimum walk time during right-of-way transfer (seconds)	11.	<input type="text"/>	
12. Pedestrian clearance time during right-of-way transfer (seconds)	12.	<input type="text"/>	
13. Vehicle yellow change time, if not included on line 12 (seconds)	13.	<input type="text"/>	
14. Vehicle red clearance time, if not included on line 12 (seconds)	14.	<input type="text"/>	
15. Worst-case conflicting pedestrian time (seconds); add lines 11 through 14	15.	<input 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 type="text" value="0.0"/>	
17. Right-of-way transfer time (seconds); add lines 3 and 16	17.	<input type="text" value="0.0"/>	

Page 1



Need for Revision

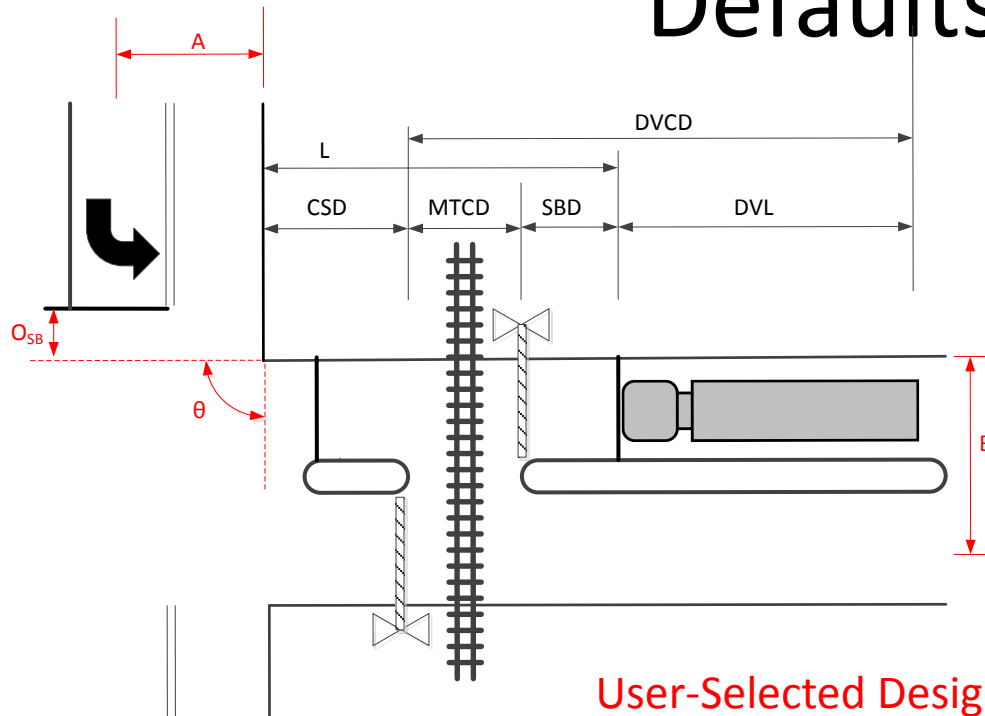
- Accommodate longer trucks
- New design case – left turning vehicle across grade crossing
- Guidance on pedestrian truncation
- Document preemption traffic signal parameters
- Fully automated Adobe form



Sections of Revised Worksheet

- Geometric Data & Defaults
- Right-of-way Transfer Time Calculation
- Queue Clearance Time Calculation
- Maximum Preemption Time Calculation
- Sufficient Warning Time Check
- Track Clearance Green Time Calculation
- **Summary of Controller Preemption Settings**

Section 1: Geometric Data and Defaults



- CSD = Clear storage distance
- MTCD = Minimum track clearance distance
- SBD = Stop bar setback distance
- DVL = Design vehicle length
- L = Queue start-up distance, also stop-line distance
- DVCD = Design vehicle clearance distance
- O_{SB}** = Offset distance to Left-turn stop bar
- A** = Distance from curb line to center of farthest left turn lane
- B** = Distance from curb line to center of nearest lane receiving left turns
- θ** = Angle of turn (degrees)

User-Selected Design Vehicle (NEW)

- S-Bus 40
- WB-50
- WB-67 (Default)

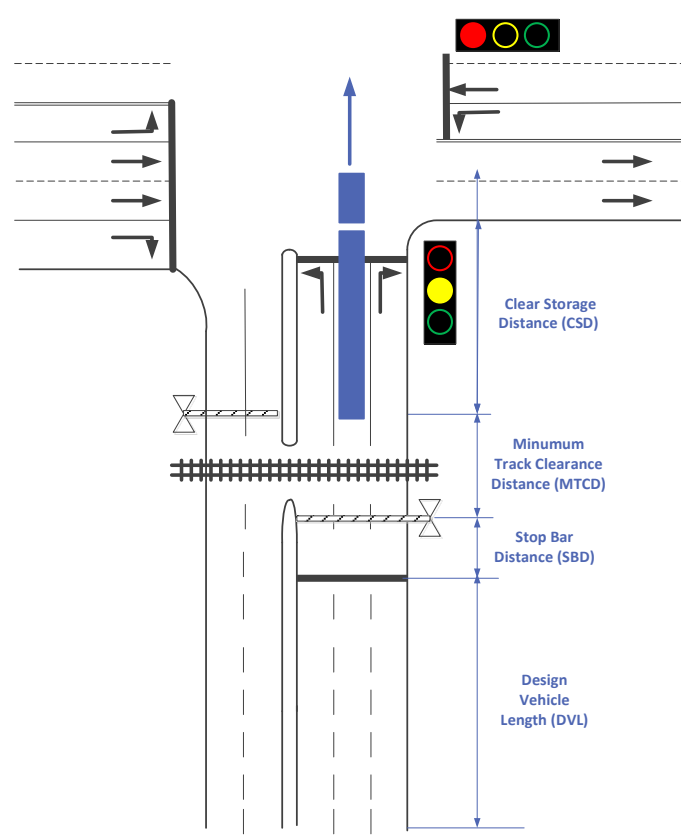


Section 2. Right of Way Transfer Time

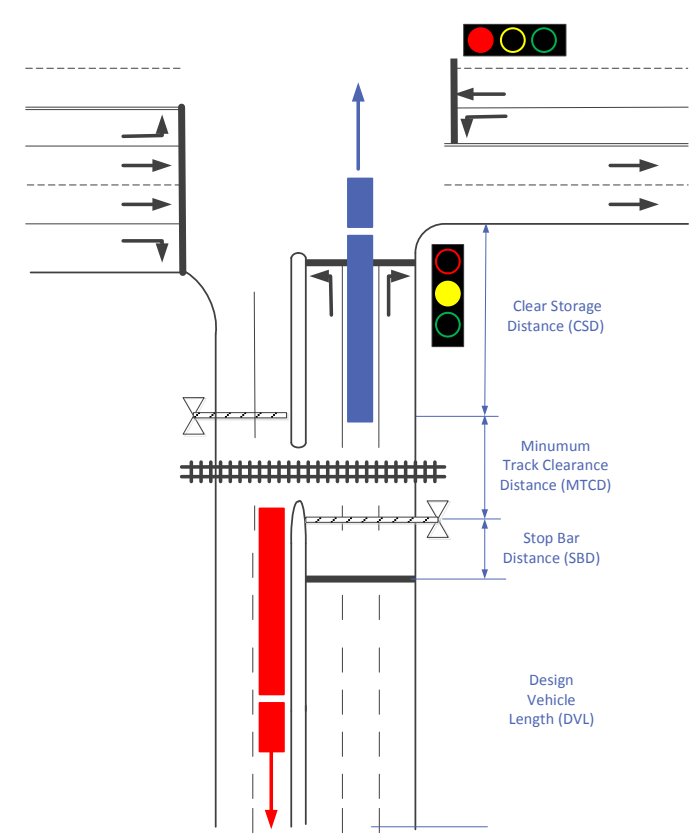
- Compute time required to transfer to track clearance time
- Includes preemption verification and response time delays
- Determines worse-case timing constraints
 - Vehicle phase
 - Pedestrian phase
- Compute the ROW transfer time

Section 3: Queue Clearance Time

Base Case (Mandatory)



Base + Left Turn (Optional)





Section 4: Maximum Preemption Time

- Compute maximum preemption time to clear queue
 - ROW Transfer Time
 - Queue Clearance Time
 - Desired Minimum Separation



Section 5: Sufficient Warning Time Check

- Is time provided by RR \geq maximum preemption time?
 - No \rightarrow required advance preemption time (APT) needed from RR
- Allows agencies document APT currently provided by RR to show it is sufficient
- Suggestion possibly ways to reduce maximum preemption time (where permitted by MUTCD)



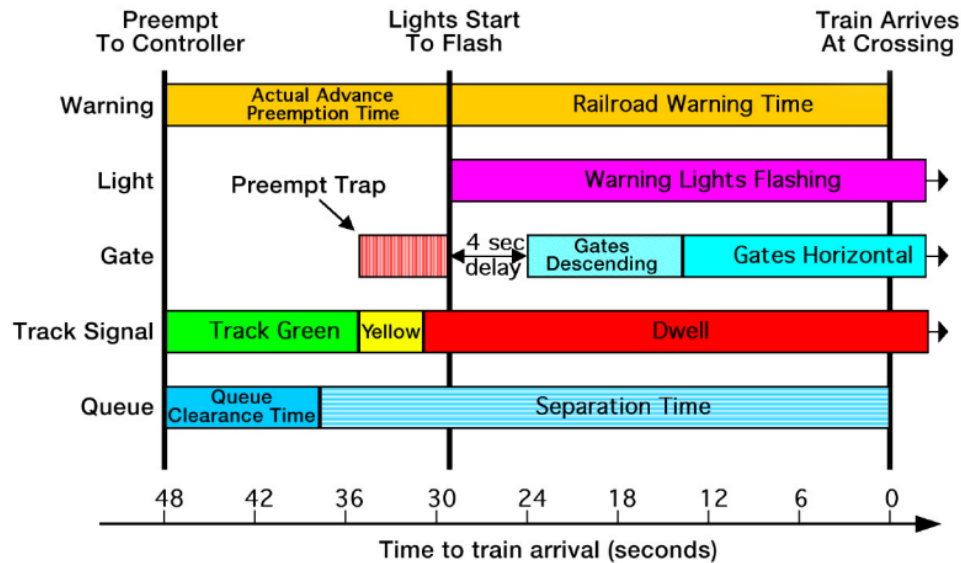
Guidance for Truncating Pedestrian Intervals during Preemption

- Risk Management Approach (based on engineering study)

Frequency of Pedestrian Usage	Frequency of Preemption Events			
	Very Light	Light	Moderate	High
Very Light	Full	Full	Full	Intermediate
Light	Full	Intermediate	Intermediate	Partial
Moderate	Intermediate	Partial	Partial	None
High	Partial	Partial	Full Ped Clear	Full Ped Clear
Special circumstances	Full Ped Clear			

Section 6: Track Clearance Green Time Calculation

- Preempt Trap Condition
 - Track clearance terminates before gates come down



- Track clearance green too long

Section 7: Summary of Controller Settings

SECTION 7: SUMMARY OF CONTROLLER PREEMPTION SETTINGS

69. Duration Time (seconds)	69.	0
70. Preempt Delay Time (seconds)	70.	0

Remarks
Default Value
From Line 13

Right of Way Transfer Phase

71. Minimum Green Interval (seconds)	71.	5
72. Pedestrian Walk Interval (seconds)	72.	0
73. Pedestrian Clearance Interval (Flashing "DON'T WALK", seconds)	73.	0
74. Yellow Change Interval (seconds)	74.	0.0
75. All Red Vehicle Clearance (seconds)	75.	0.0

Remarks
From Line 16
From Line 21
From Line 22
From Line 18
From Line 19

Track Clearance Phase

76. Green Interval (seconds) (in the absence of gate down circuit)	76.	20
77. Green Interval (seconds) <u>with</u> gate down circuit	77.	15
78. Yellow Change Interval (seconds)	78.	0.0
79. All Red Vehicle Clearance (seconds)	79.	0.0

Remarks
From Line 65
From Line 40
From Line 18
From Line 19

Exit Phase

80. Dwell/Cycle Minimum Green Time (seconds)	80.	0
81. Yellow Change Interval (seconds)	81.	0.0
82. All Red Vehicle Clearance (seconds)	82.	0.0

Remarks
Default Value
From Line 18
From Line 19



Final Comments

- Status of Implementation
 - TxDOT adopted in Fall of 2017
- Acknowledgements
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Questions

