UDOT Detection Form

Printable Tables - Instructions

Form Revision: 4/9/2019 by MDL

Queue Clearance Detection Zone Instructions

If the approach HAS STOP-BAR DETECTION:

- Do NOT include a queue clearance zone in the Advance detector
- Set stop-bar detector channel(s) in controller to Type "P - Passage Type Queue/Stop Bar"
- Set detector "passage" time equal to phase vehicle extension time

If the approach DOES NOT HAVE STOP-BAR DETECTION:

- Include a queue clearance zone in the Advance detector; make it **as close to the stop-bar as possible** while still reliably detecting vehicles. Length should be approximately 65 feet.
- Queue clearance zone should have **max speed filter** set to 35mph, but **no ETA filter**

Dilemma Zone Detection Zone Instructions

For "Legacy" Advance (not Extended Range):

- Use "Simple" or "Normal" mode.
- Use Legacy Advance Min ETA/Legacy Advance Max ETA as the ETA thresholds.
- "Range" should be as large as possible within the limits of radar coverage.

For Advance Extended Range:

- Use "Priority" mode. Set "Discovery Range" to the point beyond which trucks but not cars are detected.
- Use TRUCKS Min ETA/TRUCKS Max ETA from this sheet as the ETA thresholds in Level 1.
- Use CARS Min ETA/CARS Max ETA from this sheet as the ETA thresholds in Level 2.
- "Range" should be as large as possible within limits of radar coverage for both Level 1 and Level 2.

Speed Filters:

- For Dilemma Zone zones, speed filters are not *needed* but may be useful to filter out slower-moving vehicles, such as those preparing to make turns. A typical speed filter that has been used successfully is 30-100mph.
- If there are a lot of heavy trucks, severe weather, and/or a lack of stop-bar detection, consider setting lower speed filter to a smaller value, or disabling the speed filter altogether.

Instructions for Using Tables to Look Up Values

General Note:

Check the list of assumptions on each table. If any do not apply at your location, **DO NOT USE** these tables; use the interactive form instead. You can fill out a blank form and leave in the cabinet to document any non-standard assumptions.

Step 1:

Determine the **phase passage/vehicle extension time** based on the detector length and posted speed limit in **Table 1**.

Be sure to use the right-most column if Advance Queue Clearance zone is used in place of stop-bar presence detection.

Step 2:

Determine Advance min/max ETA using the phase passage/vehicle extension time from Table 1 and posted speed limit in Table 2.

Use Table 2a with "Legacy" Advance.

Use Table 2b with Advance Extended Range.

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Table 1: Phase Passage/Vehicle Extension Time Based on Detector Length and Posted Speed Limit

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Assumptions in this table:

1) Vehicle length = 20ft *(used only for stop-bar presence detection)*

2) Average Speed for Thru Movements = 0.88 * (Posted Speed + 7)

Note: Average Speed is used only for stop-bar presence detection.
For Queue Clearance zone, max speed of 35mph is used directly.

3) Maximum Allowable Headway for All Movements = 3s

4) Average Speed for Left Turn Movements = 20mph

If any of these assumptions are not valid, do not use this table - use the interactive form.

	Thru Phases with Stop-Bar Presence Detection												Queue-Clearance Zone in Advance with Max Speed Filter =	Left Turn
	Posted Speed Limit, mph													
Length of Detector, ft	15	20	25	30	35	40	45	50	55	60	65	70	35mph	Phases
0	2.3	2.4	2.5	2.6	2.6	2.7	2.7	2.7	2.8	2.8	2.8	2.8	3.0	2.3
5	2.1	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.9	2.1
10	1.9	2.1	2.3	2.4	2.4	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.8	2.0
15	1.8	2.0	2.2	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.7	1.8
20	1.6	1.9	2.0	2.2	2.3	2.3	2.4	2.5	2.5	2.5	2.6	2.6	2.6	1.6
25	1.4	1.7	1.9	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	1.5
30	1.2	1.6	1.8	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.4	1.3
35	1.1	1.4	1.7	1.8	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.3	1.1
40	0.9	1.3	1.5	1.7	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.2	1.0
45	0.7	1.1	1.4	1.6	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.1	0.8
50	0.5	1.0	1.3	1.5	1.7	1.8	2.0	2.0	2.1	2.2	2.2	2.3	2.0	0.6
55	0.4	0.8	1.2	1.4	1.6	1.8	1.9	2.0	2.1	2.1	2.2	2.2	1.9	0.4
60	0.2	0.7	1.1	1.3	1.5	1.7	1.8	1.9	2.0	2.1	2.1	2.2	1.8	0.3
65	0.0	0.6	0.9	1.2	1.4	1.6	1.7	1.8	1.9	2.0	2.1	2.1	1.7	0.1
70		0.4	0.8	1.1	1.3	1.5	1.7	1.8	1.9	2.0	2.0	2.1	1.6	
75		0.3	0.7	1.0	1.2	1.4	1.6	1.7	1.8	1.9	2.0	2.0	1.5	
80		0.1	0.6	0.9	1.2	1.4	1.5	1.6	1.8	1.8	1.9	2.0	1.4	
85			0.5	0.8	1.1	1.3	1.4	1.6	1.7	1.8	1.9	1.9	1.3	
90			0.3	0.7	1.0	1.2	1.4	1.5	1.6	1.7	1.8	1.9	1.2	
95			0.2	0.6	0.9	1.1	1.3	1.4	1.6	1.7	1.8	1.8	1.1	
100			0.1	0.5	0.8	1.0	1.2	1.4	1.5	1.6	1.7	1.8	1.1	
105				0.4	0.7	0.9	1.1	1.3	1.4	1.6	1.7	1.7	1.0	
110				0.3	0.6	0.9	1.1	1.2	1.4	1.5	1.6	1.7	0.9	
115				0.2	0.5	0.8	1.0	1.2	1.3	1.4	1.5	1.6	0.8	
120				0.1	0.4	0.7	0.9	1.1	1.3	1.4	1.5	1.6	0.7	
125					0.3	0.6	0.8	1.0	1.2	1.3	1.4	1.5	0.6	
130					0.2	0.5	0.8	1.0	1.1	1.3	1.4	1.5	0.5	
135					0.1	0.4	0.7	0.9	1.1	1.2	1.3	1.4	0.4	
140					0.0	0.4	0.6	0.8	1.0	1.1	1.3	1.4	0.3	
145						0.3	0.5	0.8	0.9	1.1	1.2	1.3	0.2	
150						0.2	0.5	0.7	0.9	1.0	1.2	1.3	0.1	
155						0.1	0.4	0.6	0.8	1.0	1.1	1.2		

Results in the grayed-out area are less than 0.0
Use of a shorter detector is recommended

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Table 2a: Min/Max ETA for Legacy Advance

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Assumptions in this table:

1) 85th-Percentile Speed = Posted Speed Limit + 7mph
2) 15th-Percentile Speed = 85th-Percentile Speed - 21mph
3) Radar is located approximately at stop-bar and has 600 feet of range

If any of these assumptions are not valid, do not use this table - use the interactive form.

Speed, mph				Max ETA that radar can actually see at	
Posted	85th-%ile	Min ETA, s	Max ETA, s	85th-%ile speed:	
25	32	1.4 + Passage Time	4.4	12.8	
30	37	1.6 + Passage Time	4.6	11.1	
35	42	1.8 + Passage Time	4.9	9.7	
40	47	2.0 + Passage Time	5.1	8.7	
45	52	2.2 + Passage Time	5.3	7.9	
50	57	2.4 + Passage Time	5.6	7.2	
55	62	2.6 + Passage Time	5.8	6.6	
60	67	2.8 + Passage Time	6.0	6.1	*For posted speeds of 65 and above, Legacy Advance does not provide sufficient coverage for full Dilemma Zone.*
65	72	3.0 + Passage Time	6.3	5.7	
70	77	3.2 + Passage Time	6.5	5.3	
75	82	3.4 + Passage Time	6.7	5	

Passage Time is called Vehicle Extension in Econolite controllers. Determine using Table 1.

Table 2b: Min/Max ETA for Advance Extended Range

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Assumptions in this table:

1) 85th-Percentile Speed = Posted Speed Limit + 7mph
2) 15th-Percentile Speed = 85th-Percentile Speed - 21mph
3) Radar is located approximately at stop-bar and has 900 feet of range

If any of these assumptions are not valid, do not use this table - use the interactive form.

Speed, mph					Max ETA that radar can actually see at	
Posted	85th-%ile	Min ETA, s for Cars & Trucks	Max ETA, s for Cars	Max ETA, s for Trucks	85th-%ile speed:	
25	32	1.4 + Passage Time	4.4	5.2	19.2	
30	37	1.6 + Passage Time	4.6	5.5	16.6	
35	42	1.8 + Passage Time	4.9	5.8	14.6	
40	47	2.0 + Passage Time	5.1	6.1	13.1	
45	52	2.2 + Passage Time	5.3	6.4	11.8	
50	57	2.4 + Passage Time	5.6	6.7	10.8	
55	62	2.6 + Passage Time	5.8	7.0	9.9	
60	67	2.8 + Passage Time	6.0	7.3	9.2	*For posted speeds of 75 and above, Advance Extended Range does not provide sufficient coverage for full Dilemma Zone.*
65	72	3.0 + Passage Time	6.3	7.6	8.5	
70	77	3.2 + Passage Time	6.5	7.9	8	
75	82	3.4 + Passage Time	6.7	8.2	7.5	

Passage Time is called Vehicle Extension in Econolite controllers. Determine using Table 1.

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This blank form can be printed and left in the cabinet. **NOT NEEDED AT SITES WHERE STANDARD ASSUMPTIONS APPLY.**

Location:					
Signal ID Number:		**Technician:**		**Date:**	

User Inputs	**Phase:**	1	2	3	4	5	6	7	8	
Length of Thru Lane Stop-Bar Detection:										ft
Length of Advance Queue Clearance Zone:										ft
Posted Speed Limit:										mph
15th-Percentile Approach Speed, Thru Movement:										mph
Average Approach Speed, Thru Movement:										mph
85th-Percentile Approach Speed, Thru Movement:										mph
Wavetronix Advance Type:										
Left Turn Type:										
Length of Left Turn Lane Stop-Bar Detection:										ft
Length of LT Queue Zone:										ft
Left Turn Queue Detection Doesn't Extend LT Phase:										
Left Turn Stop-Bar Detection Extends LT Phase:										
Average Approach Speed, Left Turn Movement:										mph

Outputs	**Phase:**	1	2	3	4	5	6	7	8	
Vehicle Extension/Phase Passage Time:										s
Extended Range Level 1 (Trucks)/Legacy Min ETA:										s
Extended Range Level 1 (Trucks)/Legacy Max ETA:										s
Extended Range Level 2 (Cars) Min ETA:										s
Extended Range Level 2 (Cars) Max ETA:										s
Max ETA Advance can actually see at 85th-%ile Speed:										s
Effective MAH for permissive left turns extending thru Ø:										s
Ideal Length of Permissive LT Zone Extending Thru Phase:										ft

Assumptions	**Typical**		**Phase**								
	Left	**Thru**	1	2	3	4	5	6	7	8	
Representative Car Length:	20	20									ft
Maximum Allowable Headway (MAH):	3	3									s
85th-Percentile Thru Speed = Posted Speed +:		7									mph
Average Thru Speed = 85th-Percentile Speed *:		88									%
15th-%ile Thru Speed = 85th-%ile Speed -:		21									mph
Max range of Legacy Advance:		600									ft
Max range of Advance Extended Range:		900									ft
Max Speed Filter for Queue Clearance Zone:		35									mph
Average Speed of Left Turns:	20										mph

Notes