

STATE OF COLORADO

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I-25/US 24/Cimarron Design Build

MEMORANDUM

TO: Shortlisted Contractors
FROM: Dave Watt, CDOT Resident Engineer
DATE: August 14, 2014
SUBJECT: Basic Configuration plus AREs 2035 VISSIM Model

This memo is transmitted with the 2035 VISSIM Basic Configuration Plus AREs model and documentation of model parameters to be used in evaluating ATCs for the I-25/US 24/Cimarron Interchange.

The Basic Configuration Plus AREs Model utilizes 2035 volumes and is based off of the calibrated existing “No-Build” conditions at the I-25/US 24/Cimarron interchange. This model was developed so that Contractors can analyze the future operations of their proposed ATCs for equal or better performance. The operational characteristics of contractor proposed ATCs will be measured against the Basic Configuration alternative for several parameters or Measures of Effectiveness (MOEs). The MOEs for this analysis are as follows:

- Travel times through the analysis area
- Travel speeds through the analysis area
- Volume served at critical locations
- Queuing
- Speed differential by lanes

The results of MOE analysis for the Basic Configuration Plus AREs are summarized in the following three tables:

Intersection Delay SPUI - Basic Configuration Plus AREs	
	Average Vehicle Delay (seconds)
Average Intersection Delay	66.03

Travel Times SPUI - Basic Configuration Plus AREs			
Travel Time Sections	Limits for Measurement	2035 SPUI - Basic Configuration Plus AREs	
		Vehicles Served	Travel Time (seconds)
Full Network System			
1: From Cimarron EB to I-25 NB	West of 8th Street to North of Bijou On-ramp	850	437.46
2: From Cimarron WB to I-25 NB	East of Sierra Madre to North of Bijou On-ramp	788	262.73
3: From Cimarron EB to I-25 SB	West of 8th Street to South of Tejon Off-ramp	1130	251.17
4: From Cimarron WB to I-25 SB	East of Sierra Madre to South of Tejon Off-ramp	231	224.43
5: From I-25 SB to Cimarron WB	North of Bijou Off-ramp to West of 8th Street	1183	196.98
6: From I-25 SB to Cimarron EB	North of Bijou Off-ramp to East of Sierra Madre	480	174.88
7: From I-25 NB to Cimarron WB	South of Tejon On-ramp to West of 8th Street	1246	597.86
8: From I-25 NB to Cimarron EB	South of Tejon On-ramp to East of Sierra Madre	92	342.14
9: From W. Cimarron to E. Cimarron	West of 8th Street to East of Sierra Madre	586	303.73
10: From E. Cimarron to W. Cimarron	East of Sierra Madre to West of 8th Street	651	326.44
TOTAL VEHICLES SERVED (NETWORK w/o I-25)		7237	
I-25 Only			
11: From I-25 South to I-25 North	South of Tejon On ramp to North of Bijou On-ramp	7468	362.09
12: From I-25 North to I-25 South	North of Bijou Off ramp to South of Tejon Off-ramp	8152	119.99
TOTAL VEHICLES SERVED (I-25 ONLY)		15620	
I-25/US 24/Cimarron Interchange Only			
13: Short I-25 NB to Cimarron WB		2132	348.17
14: Short I-25 NB to Cimarron EB		122	140.39
15: Short Cimarron WB to I-25 SB		336	128.26
16: Short Cimarron WB to I-25 NB		1028	80.11
17: Short I-25 SB to Cimarron WB		2359	50.20
18: Short I-25 SB to Cimarron EB		676	87.94
19: Short Cimarron EB to I-25 SB		2081	47.39
20: Short Cimarron EB to I-25 NB		1423	135.49
TOTAL VEHICLES SERVED (INTERCHANGE ONLY)		10157	

**Speeds by Lane
SPUI - Basic Configuration Plus AREs**

NB	Section Type	Lane 1 (Outer)	Lane 2	Lane 3	Lane 4	Lane 5 (Inner)	Average Speed
South of Nevada	Basic	13.36	14.86	17.52	61.92		26.92
Cimarron Off-Ramp	Weave	15.97	12.15	15.13	21.22	47.85	22.46
Cimarron On-Ramp	Weave	25.01	18.16	24.43	26.76	47.79	28.43
Bijou On-Ramp	Merge	30.65	18.39	28.16	29.87	49.01	31.22
North of Bijou	Basic	55.38	55.19	52.47	59.06		55.53

SB	Section Type	Lane 1 (Outer)	Lane 2	Lane 3	Lane 4	Lane 5 (Inner)	Average Speed
North of Bijou	Basic	55.61	52.90	54.26	56.50	61.88	56.23
Bijou Off-Ramp	Diverge	57.68	50.48	51.76	54.16	61.96	55.21
Cimarron Off-Ramp	Weave	58.76	58.62	58.65	59.70	62.01	59.55
Cimarron On-Ramp	Weave	61.67	59.68	60.77	61.40	62.12	61.13
South of Nevada	Basic	61.41	61.50	61.59	62.08		61.64

While it is understood that the attached model is based from the calibrated existing conditions model, suggested ATCs may have an effect on particular parameters as well as the physical network of the provided model. Therefore, Contractors may adjust the physical model (i.e. remove AREs if they are not being proposed) and/or parameters as they desire while analyzing their ATCs. However, **Contractors shall provide documentation and justification for any adjustments, changes, or other modifications made to the model and/or parameters of the model.** The CDOT project team will use this information to confirm that proposed ATCs perform equal or better than the required Basic Configuration operations.

The specific parameter values and setting are summarized in the following tables:

1. Vehicle Composition

Name	Vehicle Type	Percentage
Freeway	Car	97%
	Truck	3%
Urban	Car	98%
	Truck	2%

2. Simulation Parameters

Simulation Period	0 – 10800 seconds
Evaluation Period	1800 – 9000 seconds
Simulation Resolution	10 time steps / simulation seconds
Number of Runs	10

3. Desired Speed Distribution

Name	Lower Bound	Upper Bound	Notes
Freeway	60	65	
Urban	28	35	
Right Turn	9	12	
Left Turn	12	15	
SPUI Left Turn	20	25	For SPUI left turn links
Freeway Speed Limit	50	55	Posted 55 mph speed limit along I-25 NB at Cimarron On-Ramp gore
Urban Speed Limit	25	30	Posted 30 mph speed limit along EB Cimarron St. east of Cimarron NB Off-Ramp
Ramp	25	30	For I-25 SB Cimarron Off-Ramp

4. Driving Behaviors

- Urban (Used for regular urban links)

Calibration Parameter	Default Value	Used Value
Arterial Car Following (Wiedemann 74)		
Average standstill distance	6.56 ft	4.5 ft
Additive part of safety distance	2.00 ft	3.00 ft
Multiplic. Part of safety distance	3.00 ft	Use Default
Smooth closeup behavior	Unchecked	Use Default
Lane Change		
Maximum deceleration	-13.12 ft/s ²	Use Default

-1 ft/s ² per distance	100 ft	Use Default
Accepted deceleration	-3.28 ft/s ²	Use Default
Waiting time before diffusion	60 s	120 s
Min. headway	1.64 ft	Use Default
Safety distance reduction factor	0.6	Use Default
Max. dec. for cooperative braking	-9.84 ft/s ²	Use Default
Overtake reduced speed areas	Unchecked	Use Default
Advanced merging	Unchecked	Checked
Cooperative lane change	Unchecked	Use Default

- Freeway (Used for regular freeway links)

Calibration Parameter	Default Value	Used Value
Freeway Car Following (Wiedemann 99)		
CCO Standstill distance	4.92 ft	Use Default
CC1 Headway time	0.9 s	1.0 s
CC2 'Following' variation	13.12 ft	20.00 ft
CC3 Threshold for entering 'following'	-8	Use Default
CC4 Negative 'following' threshold	-0.35	Use Default
CC5 Positive 'following' threshold	0.35	Use Default
CC6 Speed Dependency of oscillation	11.44	Use Default
CC7 Oscillation acceleration	0.82 ft/s ²	Use Default
CC8 Standstill acceleration	11.48 ft/s ²	Use Default
CC9 Acceleration at 50 mph	4.92 ft/s ²	Use Default
Smooth closeup behavior	Unchecked	Checked
Lane Change		
Maximum deceleration	-13.12 ft/s ²	Use Default
-1 ft/s ² per distance	200 ft	Use Default

Accepted deceleration	-3.28 ft/s ²	Use Default
Waiting time before diffusion	60 s	Use Default
Min. headway	1.64 ft	Use Default
Safety distance reduction factor	0.6	Use Default
Max. dec. for cooperative braking	-9.84 ft/s ²	Use Default
Overtake reduced speed areas	Unchecked	Use Default
Advanced merging	Unchecked	Checked
Cooperative lane change	Unchecked	Checked

- Merge Urban (Used for links at urban merge and diverge areas)

Calibration Parameter	Default Value	Used Value
Arterial Car Following (Wiedemann 74)		
Average standstill distance	6.56 ft	4.00 ft
Additive part of safety distance	2.00 ft	Use Default
Multiplic. Part of safety distance	3.00 ft	Use Default
Smooth closeup behavior	Unchecked	Checked
Lane Change		
Maximum deceleration	-13.12 ft/s ²	Use Default
-1 ft/s ² per distance	100 ft	Use Default
Accepted deceleration	-3.28 ft/s ²	Use Default
Waiting time before diffusion	60 s	300 s
Min. headway	1.64 ft	Use Default
Safety distance reduction factor	0.6	0.1
Max. dec. for cooperative braking	-9.84 ft/s ²	Use Default
Overtake reduced speed areas	Unchecked	Use Default
Advanced merging	Unchecked	Checked
Cooperative lane change	Unchecked	Checked

- Merge Freeway (Used for links at freeway merge and diverge areas)

Calibration Parameter	Default Value	Used Value
Freeway Car Following (Wiedemann 99)		
CCO Standstill distance	4.92 ft	5.50 ft
CC1 Headway time	0.9 s	1.1 s
CC2 'Following' variation	13.12 ft	20.00 ft
CC3 Threshold for entering 'following'	-8	Use Default
CC4 Negative 'following' threshold	-0.35	Use Default
CC5 Positive 'following' threshold	0.35	Use Default
CC6 Speed Dependency of oscillation	11.44	Use Default
CC7 Oscillation acceleration	0.82 ft/s ²	Use Default
CC8 Standstill acceleration	11.48 ft/s ²	Use Default
CC9 Acceleration at 50 mph	4.92 ft/s ²	Use Default
Smooth closeup behavior	Unchecked	Checked
Lane Change		
Maximum deceleration	-13.12 ft/s ²	Use Default
-1 ft/s ² per distance	200 ft	100 ft
Accepted deceleration	-3.28 ft/s ²	Use Default
Waiting time before diffusion	60 s	300 s
Min. headway	1.64 ft	Use Default
Safety distance reduction factor	0.6	0.1
Max. dec. for cooperative braking	-9.84 ft/s ²	Use Default
Overtake reduced speed areas	Unchecked	Use Default
Advanced merging	Unchecked	Checked
Cooperative lane change	Unchecked	Checked