

MEMORANDUM

Date: August 28, 2013

To: Rob Ball and KernCOG Modeling Staff

CC: Jessica Kirchner, Impact Sciences

From: Mike Wallace and Richard Lee

Subject: Revised KernCOG Model Dynamic Validation

WC12-2993

This memo documents the updated dynamic validation and sensitivity testing results based on the revised KernCOG Model. Changes to the model and static validation results are documented in the *Cumulative summary of revisions to the KernCOG MIP travel demand Model*, DKS July 2013. The dynamic validation results are based on the model provided by KernCOG staff as presented in the document above, with the addition of the High Speed Rail (HSR) post-processer. The HSR post-processer does not influence the results of this testing.

Tests originally performed in early 2012 were repeated with the revised model for both the base condition and the dynamic test condition. As expected, the model responds equal to or better than the February 2012 version due to the updated inputs and processes that occurred since the original tests were conducted. Overall, the model responds to the types of changes anticipated to be analyzed as part of the Regional Transportation Plan (RTP) and Sustainable Community Strategy (SCS). Details and results of each test are below.

TRANSPORTATION SYSTEM TESTS

The tests below were designed to test the impact of changes to the highway network in terms of routing and overall VMT and different scales keeping the land use inputs constant, and consist of the following tests:

- Widen an existing roadway
- Add or remove an existing roadway connection
- Change the speed on an existing roadway
- Add a toll to a state route



• Test for suppressed/induced demand

Widen an existing roadway

Select a street across a constraint (railroad track, river, or freeway). Add lanes to selected link.

Expectation

Model should show increased volume on subject links. Parallel facility should show similar magnitude decrease in volume. Screenline should show slight increase. Changes should be concentrated near the subject link.

Model Response

Model showed an increase in volume on the subject link in the peak direction. Parallel facilities showed a decrease in volume nearly identical in magnitude to the subject link. The model responded appropriately.

TABLE 1: SUMMARY OF MODEL PERFORMANCE – WIDEN EXISTING ROADWAY

Construction Decadement	Peak Hou	ır Volume	Volume Change		
Screenline Roadways	NB/EB	SB/WB	NB/EB	SB/WB	
Street Across Screenline - Calloway Drive from Brimhall Road to	o Stockdale	Highway			
Stockdale Highway - Jewetta Avenue to Buena Vista Road	3,318	3,458	-5	-6	
Calloway Drive - Brimhall Road to Stockdale Highway	4,490	3,294	418	9	
Coffee Road - Brimhall Road to Truxtun Avenue	5,143	4,940	-383	5	
SR 99 - Rosedale Highway to Truxtun Avenue	16,723	18,526	-37	19	
Total	29,674	30,218	-7	28	

Source: Fehr & Peers, 2013

Add/Remove a Roadway Connection

Select a street across a constraint (railroad track, river, or freeway). Add/remove facilities to increase or decrease connectivity.



Expectation

For the add facility test, expect increased volume on subject link. The parallel facility should show similar magnitude decrease in volume. Screenline should show slight increase. For remove facility test, expect decreased volume on subject link. Parallel facility should show similar magnitude increase in volume. Screenline should show slight decrease.

Model Response

For the add facility test, the parallel facilities showed a similar magnitude decrease in volume and the screenline showed a slight increase. For the remove facility test, the parallel facilities showed a similar magnitude increase in volume and the screenline showed a slight decrease. The model responded appropriately.

TABLE 2: SUMMARY OF MODEL PERFORMANCE – ADD/REMOVE CONNECTION

Carrandina Dandurara	Peak Hou	ır Volume	Volume Change							
Screenline Roadways	NB/EB	SB/WB	NB/EB	SB/WB						
Added Link Across Screenline - Connecting Mohawk Street across Kern River										
Stockdale Highway - Jewetta Avenue to Buena Vista Road	3,276	3,477	-47	14						
Calloway Drive - Brimhall Road to Stockdale Highway	3,746	3,091	-326	-194						
Coffee Road - Brimhall Road to Truxtun Avenue	5,301	4,466	-225	-468						
Added Link	1,769	1,607	1,769	1,607						
SR 99 - Rosedale Highway to Truxtun Avenue	15,968	17,911	-792	-596						
Total	30,060	30,552	379	363						
Deleted Street Across Screenline - Calloway Drive from	Brimhall Road	i to Stockdale	Highway							
Stockdale Highway - Jewetta Avenue to Buena Vista Road	5,088	4,664	1,765	1,200						
Calloway Drive - Brimhall Road to Stockdale Highway	0	0	-4,072	-3,285						
Coffee Road - Brimhall Road to Truxtun Avenue	7,139	6,358	1,613	1,423						
SR 99 - Rosedale Highway to Truxtun Avenue	17,463	19,184	703	677						
Total	29,689	30,206	9	16						

Source: Fehr & Peers, 2013

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Change Link Speed

Select one street across a constraint (railroad track, river, or freeway) that has a defined screenline developed with subject link and adjacent roadways. Increase and decrease posted speeds by +/- 10 mph on subject facility.

Expectation

As posted speed is increased, volume on selected link should increase and volume on adjacent screenline links should decrease. As posted speed is decreased, volume on selected link should decrease and volume on adjacent screenline links should increase. The influence area should be concentrated near the subject link.

Model Response

For the increased speed test, the parallel facilities showed a similar magnitude decrease and increase in volume, but the decrease was minor on more distant routes. For the decreased speed test, the parallel facilities showed both increases and decreases in volume, but the increases were minor on further distance routes. The model responded appropriately for the increased and decreased speed tests.



TABLE 3: SUMMARY OF MODEL PERFORMANCE – SPEED CHANGE

Screenline Roadways	Speed		Peak Hour Volume		Volume Change				
Screenine Roadways	Posted	Adjusted	NB/EB	SB/WB	NB/EB	SB/WB			
Increased Speed on Street Across Screenline - Coffee Road from Brimhall Road to Truxtun Avenue									
Stockdale Highway - Jewetta Avenue to Buena Vista Road	35	35	3,319	3,456	-4	-7			
Calloway Drive - Brimhall Road to Stockdale Highway	45	45	3,999	3,231	-73	-54			
Coffee Road - Brimhall Road to Truxtun Avenue	45	55	5,594	5,020	68	86			
SR 99 - Rosedale Highway to Truxtun Avenue	65	65	16,751	18,487	-9	-20			
Total			29,663	30,194	-18	4			
Decreased Speed on Street Across Scree	nline - Co	offee Road fr	om Brimh	nall Road t	o Truxtun	n Avenue			
Stockdale Highway - Jewetta Avenue to Buena Vista Road	35	35	3,324	3,477	1	13			
Calloway Drive - Brimhall Road to Stockdale Highway	45	45	4,482	3,348	410	63			
Coffee Road - Brimhall Road to Truxtun Avenue	45	35	5,074	4,831	-452	-103			
SR 99 - Rosedale Highway to Truxtun Avenue	65	65	16,770	18,536	10	29			
Total			29,650	30,192	-31	3			

Source: Fehr & Peers, 2013

Add Toll

Select a corridor of a State Route within the vicinity of a defined screenline. Add tolling to the subject corridor.



Expectation

Screenline facilities parallel to the State Route should show an increase in volume. Facilities perpendicular to the State Route may show slight volume decreases. Screenline should show volume increase.

Model Response

Initial tests used a value of \$3 per mile and the screenline facilities parallel to the subject State Route showed an increase in volumes, but the model was too sensitive and all trips were shifted from the subject corridor due to tolling. This was a very high toll and the cost was reduced incrementally until results were reasonable. The results below are for a toll of \$0.10 per mile. For tolls less than \$0.50 per mile the model behaves reasonably. If tolls greater than this need to be modeled, further calibration may be needed.

TABLE 4: SUMMARY OF MODEL PERFORMANCE – TRAVEL COST (ADD TOLL RATES)

Canada Barahana	Peak Ho	ur Volume	Volume Change						
Screenline Roadways	NB/EB	SB/WB	NB/EB	SB/WB					
State Route Corridor - SR 99 from Houghton Road to SR 204									
Stockdale Highway - Jewetta Avenue to Buena Vista Road	3,645 3,572		322	109					
Calloway Drive - Brimhall Road to Stockdale Highway	4,507	3,587	435	302					
Coffee Road - Brimhall Road to Truxtun Avenue	5,954	5,612	428	677					
SR 99 - Rosedale Highway to Truxtun Avenue	14,115	15,419	-2,645	-3,088					
Total	28,221	28,190	-1,460	-2,000					

Source: Fehr & Peers, 2013

Reduce Roadway Capacity

This test consists of reducing by half the roadway capacity on a State Route within the County. Due to the widespread impact of such a major change, the full model was run to allow for distribution and mode choice to be adjusted through the feedback loop process.



Expectation

Percent change in VMT should increase as capacity is halved. Calculated short-term elasticity should be comparable to results found in research literature. Cervero for example, estimated a short-term elasticity = 0.20-0.50.

Model Response

Percent change in VMT was observed and the model was in the middle of the range. The model responded appropriately.

TABLE 5:
SUMMARY OF MODEL PERFORMANCE – INTERSTATE CAPACITY REDUCTION

Performance Measure	Base Scenario	Reduce Roadway Capacity	% Change		
Lane Miles	7,419.41	6,689.00	-9.84%		
VMT	21,387,326	20,562,331	-3.86%		
Elasticity			-0.39		

Source: Fehr & Peers, 2013

LAND USE TESTS

The tests of model sensitivity to changes in land use density, design, diversity, destination-proximity, distance to transit, etc. are often referred to as the "Ds" tests. To implement these tests, land use developments by Traffic Analysis Zone (TAZ) were classified into place types and selected to be changed either geographically (move all the development to a different place but retain the development and demographics) or by place type (keep the development in the same location but modify the place type to reflect different "D" variables). The response of the model to these land use changes is compared to results from a well-validated small scale Ds analysis process known as MXD

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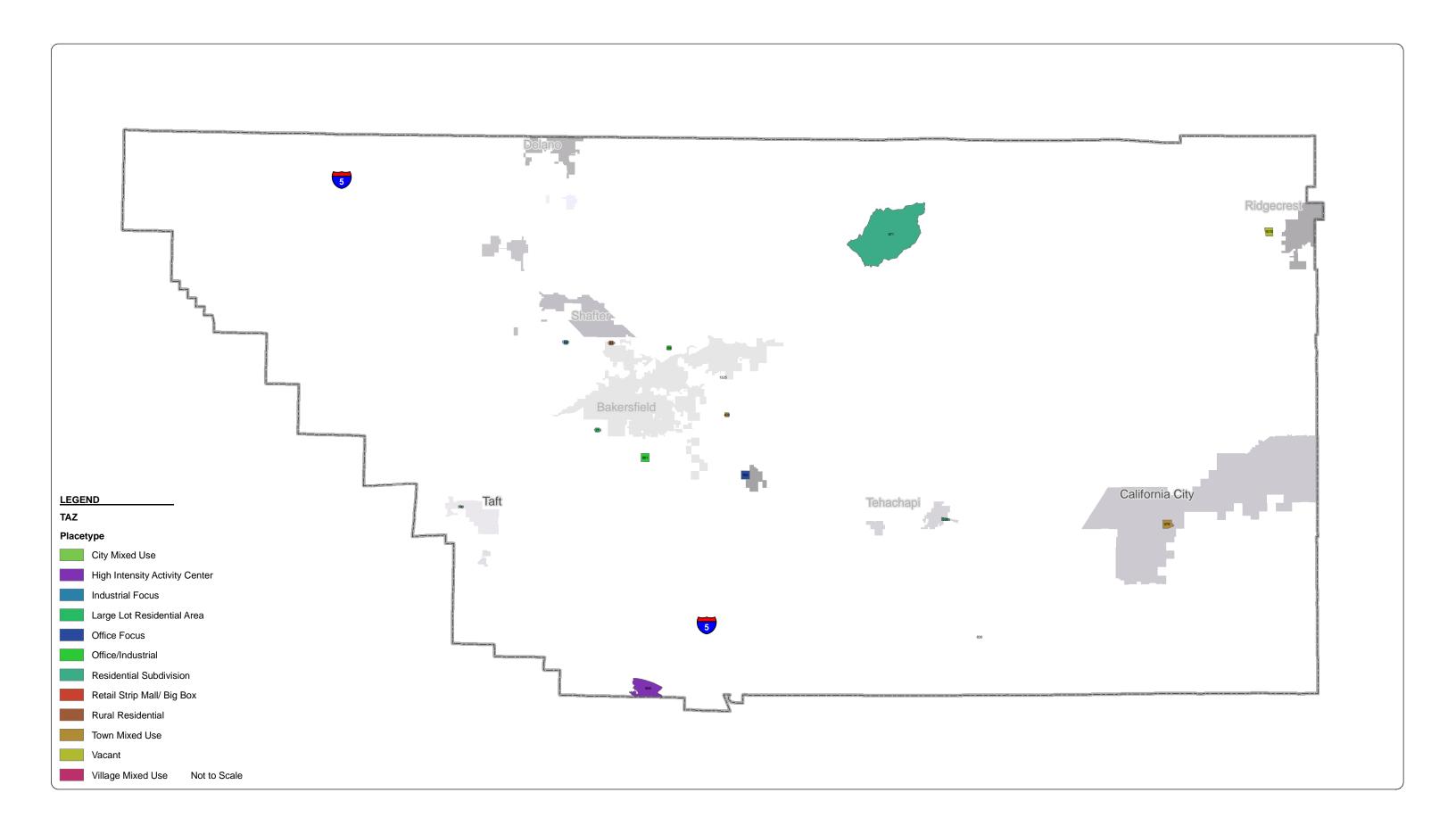
Expectation

When Vehicle Trip (VT) changes due to land use changes predicted by the model are plotted against changes predicted by MXD, the test points should cluster along a diagonal line.

Model Response

The model results show that the model and MXD results do cluster along diagonal line. It should be noted that the California Statewide Ds project developed post-processors to adjust model results for a greater sensitivity to small-scale land use change beyond what was evaluated in this comparison. Many of the variables included in the Statewide Ds processors are sub-TAZ level, and would be useful for enhancing the analysis of large zones or zones near high-quality transit. These tools were delivered to COG staff as part of the Statewide Ds project and could be used in scenario refinement.

The following pages contain the list of zones where land uses were changed, a map showing their location, and the scatter plot of expected vs. observed VMT reduction.



SJV MIP - Placetype Summary - Kern

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SJV MIP - Placetype Summary - Kern

