Does the Difference Method Always Work for Travel Demand Forecasting?

ITE 2017 Western District Annual Meeting

Made Possible Using Data Courtesy of NDOT

Topics Covered

- What is the difference method?
- Our previous experience with that model
- Case Study
- Model Adjustments
- Conclusion

What is the difference method?

Two Common Methods in Difference Method

NCHRP 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design

- Difference Method (Delta)
- Ratio Method

Example #1: Model represents existing well

Where:

Existing Count	=	1,000
Base Year Model Volume	=	800
Future Year Model Volume	=	2,800
Delta	=	2,000

Model-to-Count Ratio = 0.80

Ratio = 3.5

Forecasts = **3,000** or **3,500**

Ratio vs. Delta = 500 or 1.07

Example #2: Model represents existing poorly

Where:

Existing Count	=	1,000
Base Year Model Volume	=	200
Future Year Model Volume	=	2,200
Delta	=	2,000

Model-to-Count Ratio = 0.20

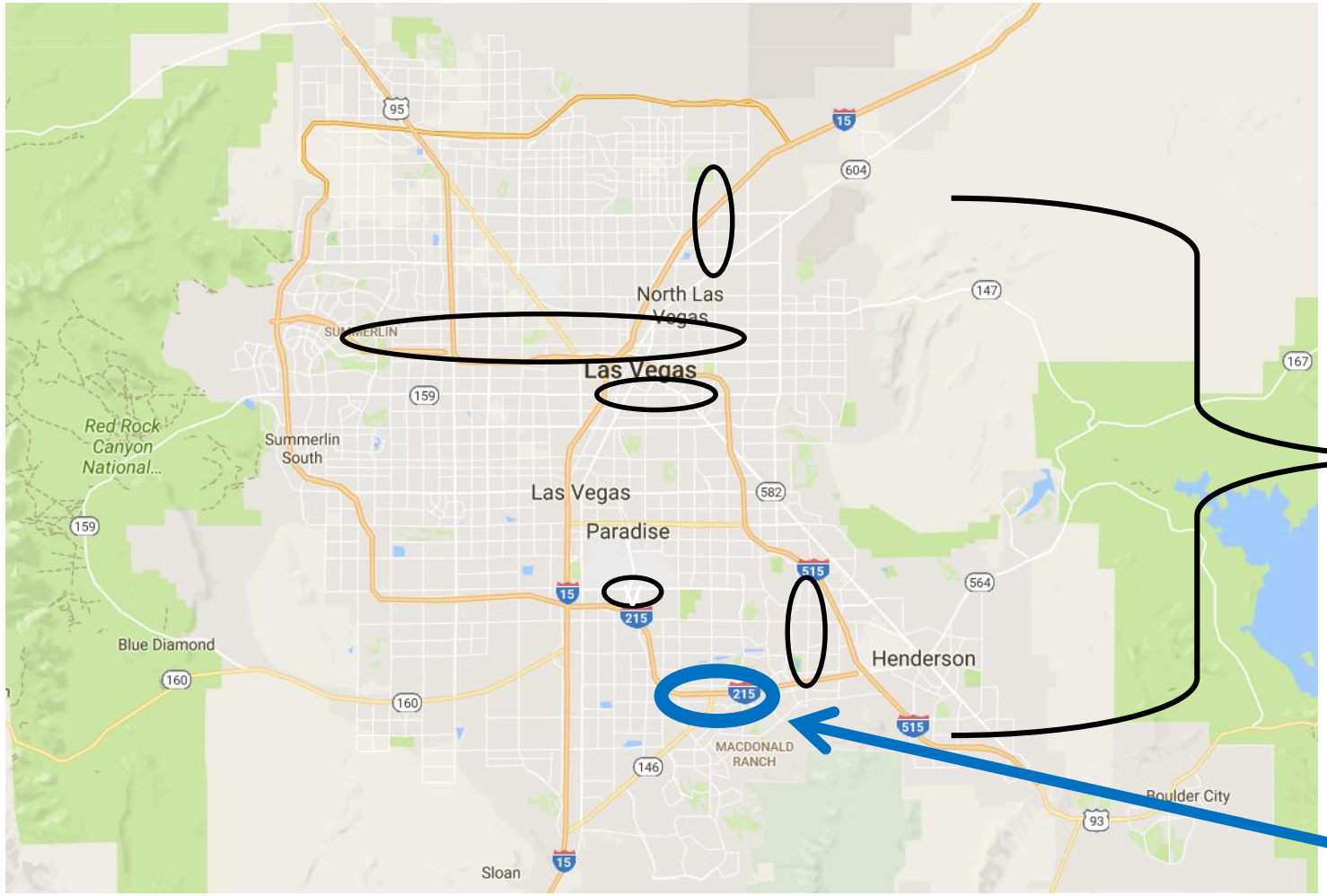
Ratio = 11.0

Forecasts = **3,000** or **11,000**

Ratio vs. Delta = 8,000 or 3.67

Our previous experience with that model

Previous Project Locations

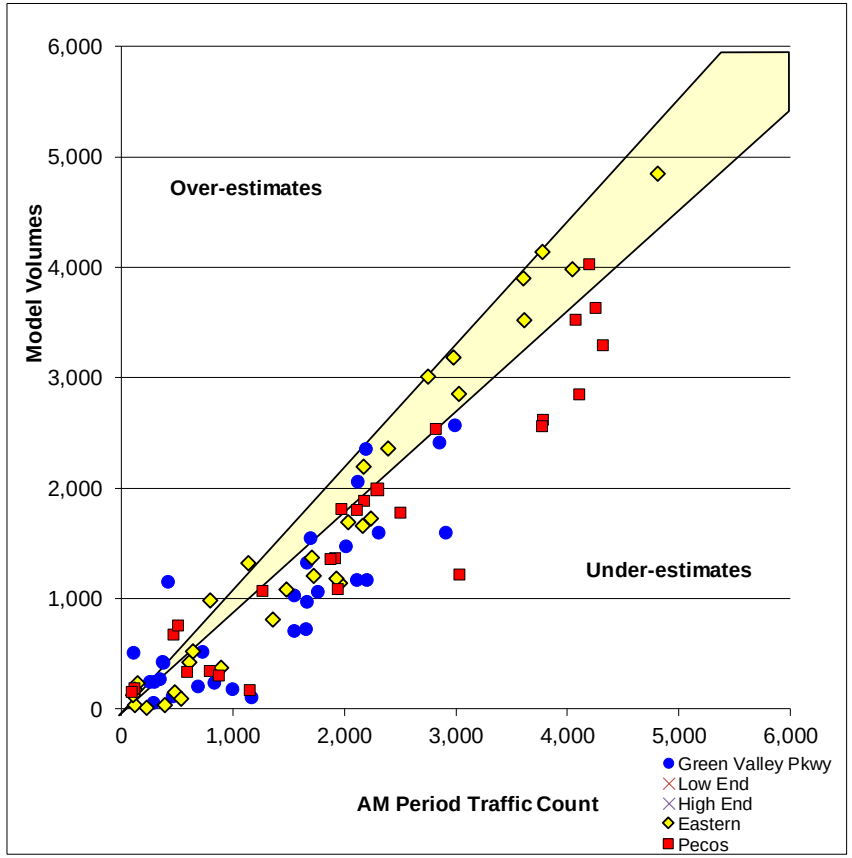


Previous experience

Recent experience

Recent Experience (Unadjusted)

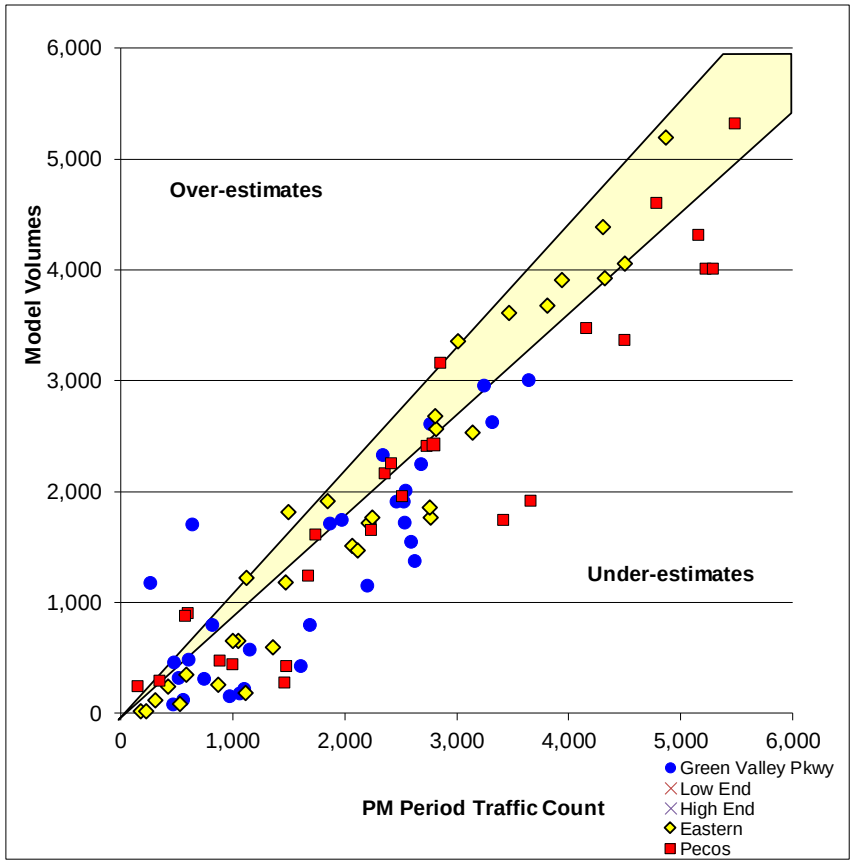
AM Peak Period



Statistics

AM	Description	PM
0.79	Model/Count Ratio	0.80
33%	PRMSE	30%
0.87	R^2	0.88
0.93	Correlation Coefficient	0.94

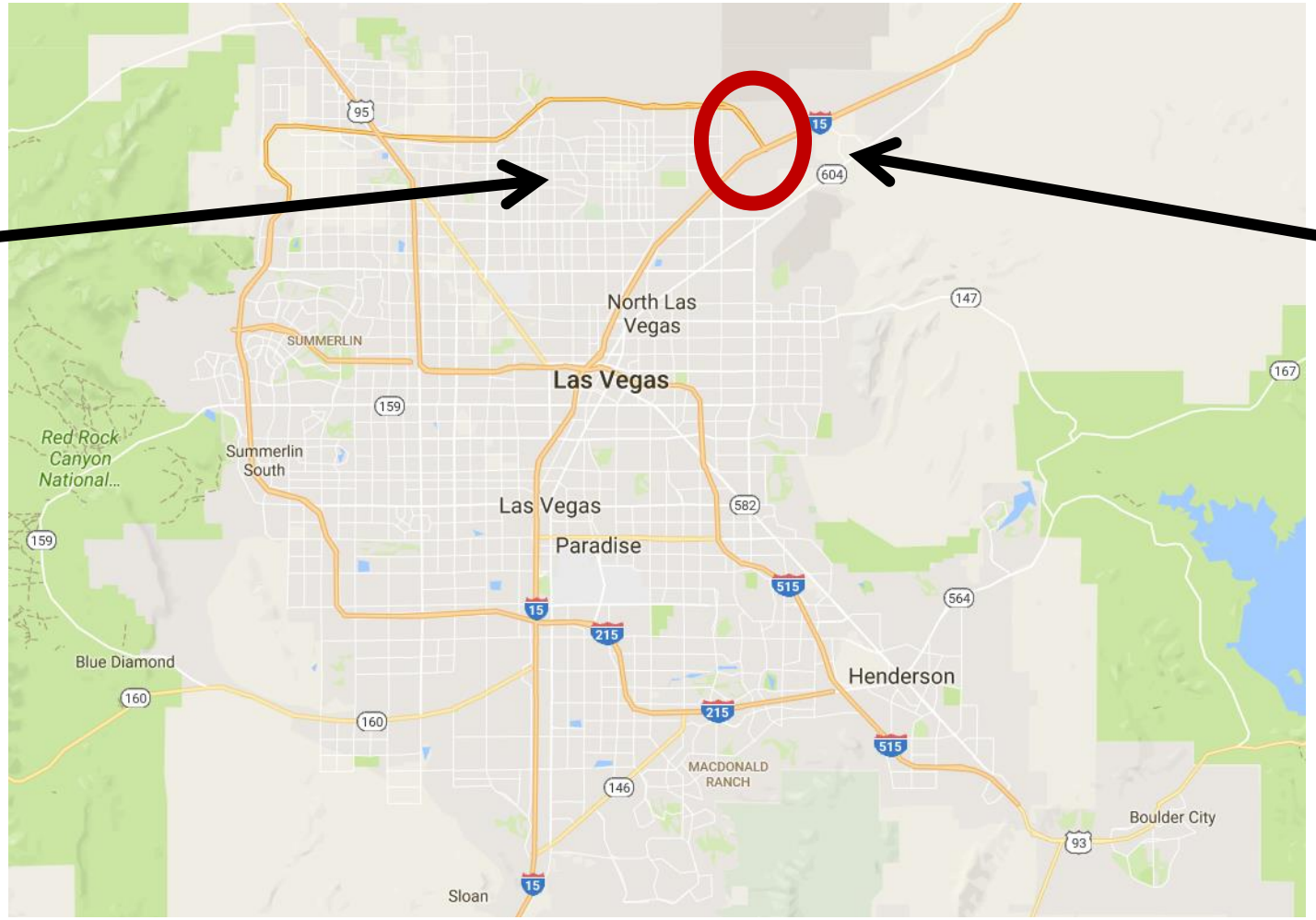
PM Peak Period



Case Study

Project Location: Challenges

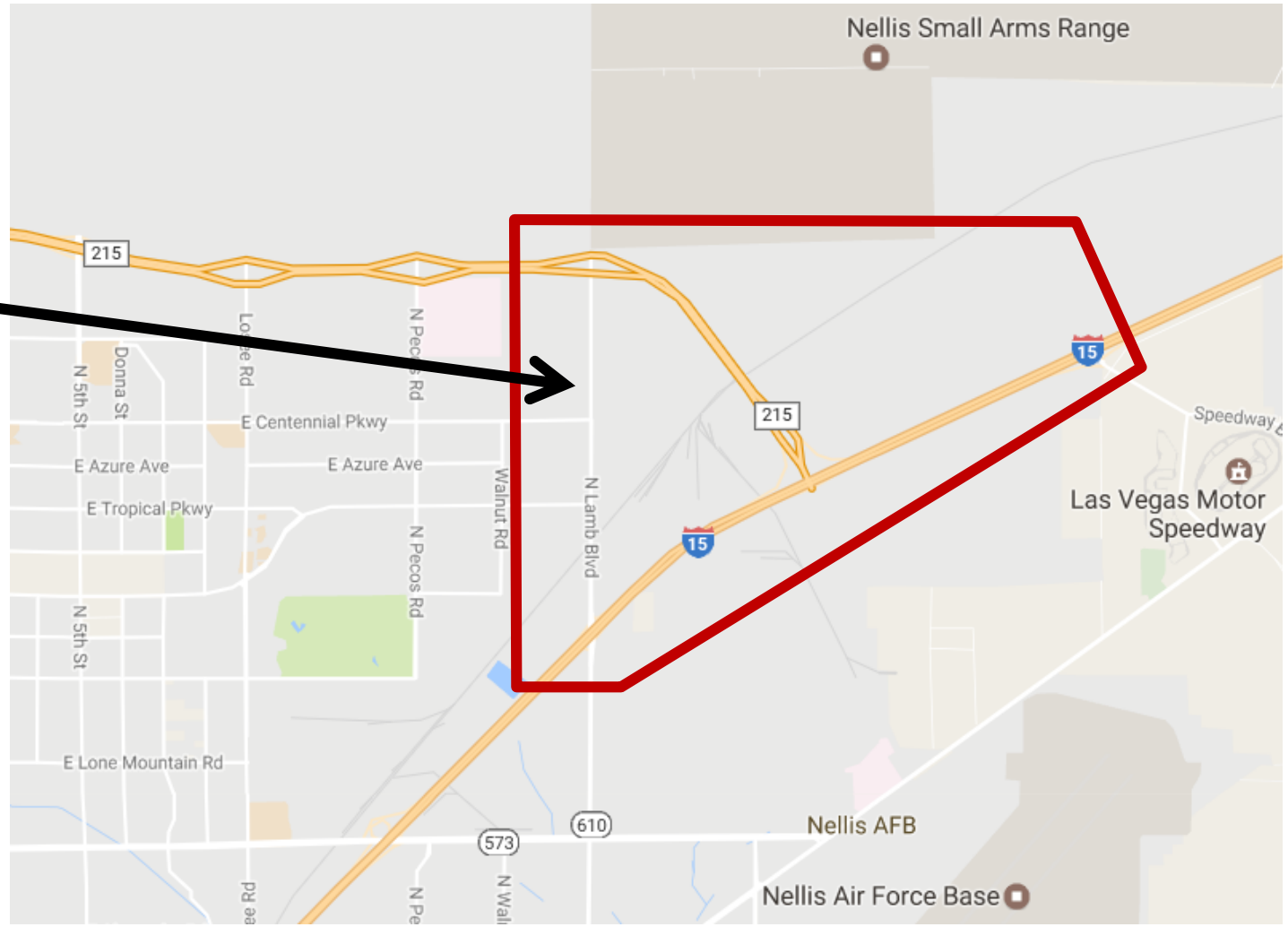
Too many path with grid system



Models tend to be bad in edge of model

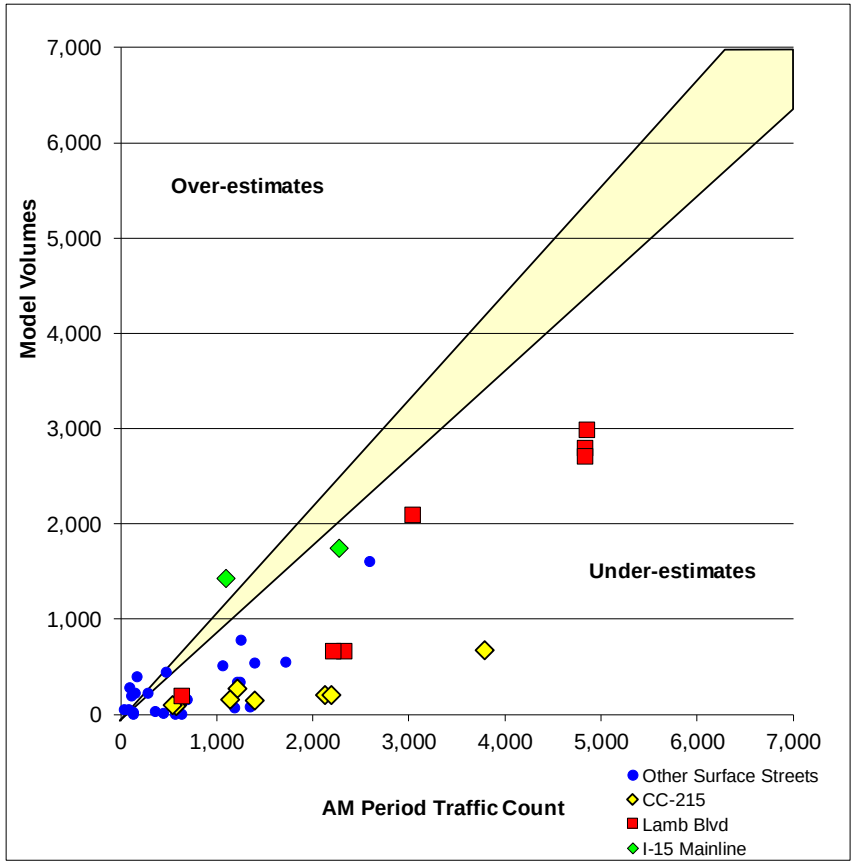
Project Location: Challenges

Less than 90 degree freeway system: Cut-through



Case Study (Unadjusted): All Locations

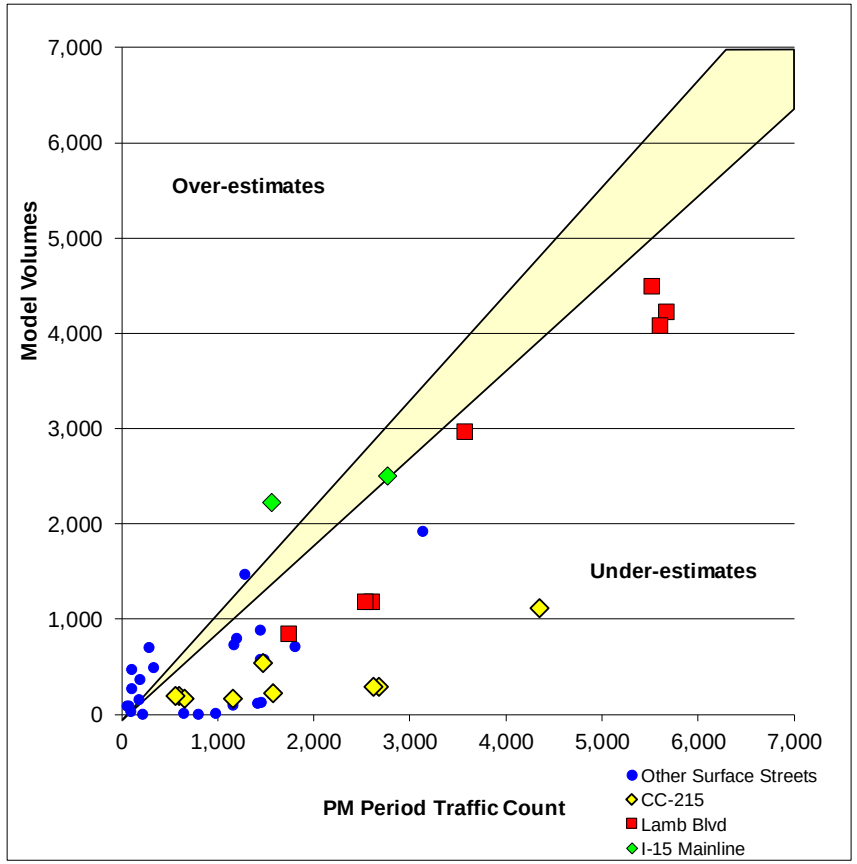
AM Peak Period



Statistics

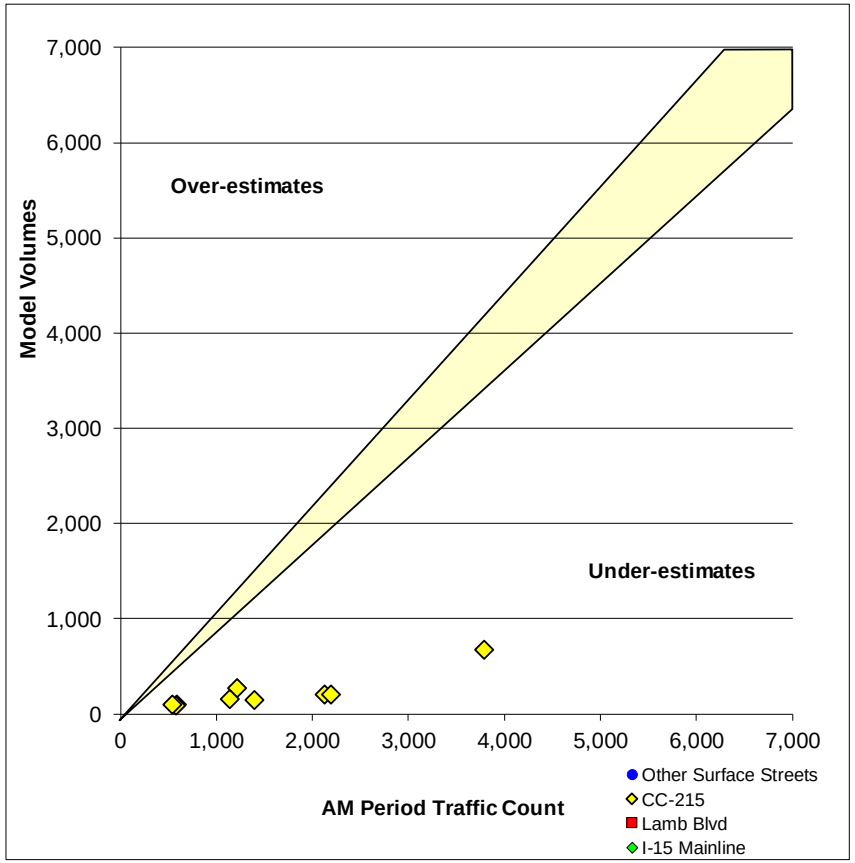
AM	Description	PM
0.42	Model/Count Ratio	0.55
80%	PRMSE	66%
0.72	R^2	0.73
0.85	Correlation Coefficient	0.85

PM Peak Period



Case Study (Unadjusted): CC-215 Only

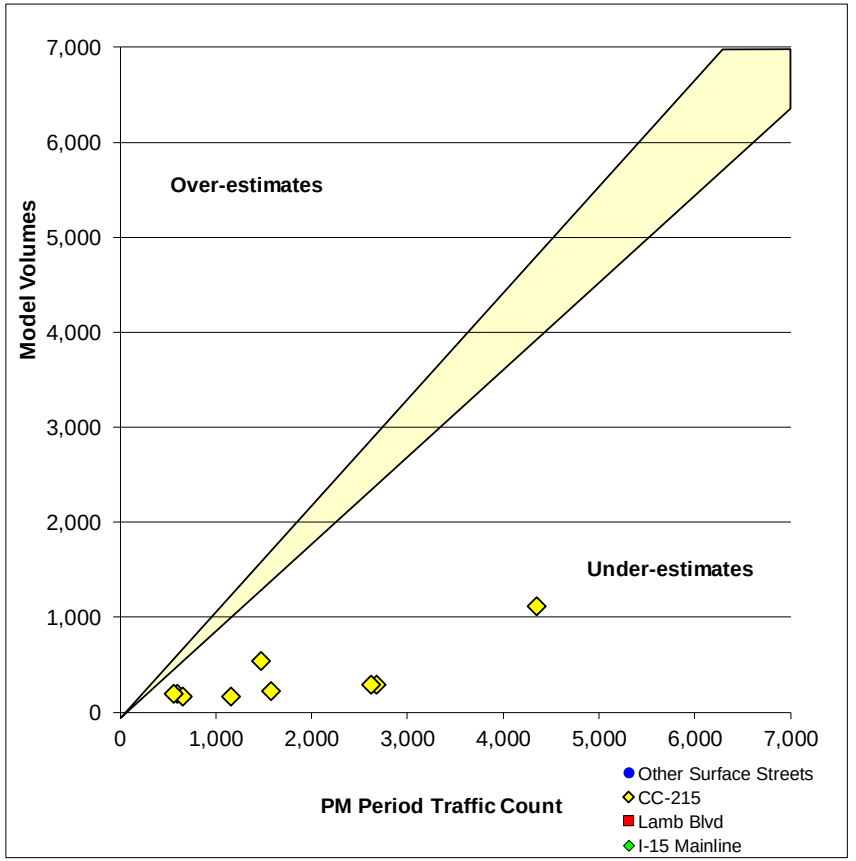
AM Peak Period



Statistics

AM	Description	PM
0.14	Model/Count Ratio	0.20
	Seriously under-estimating	
103%	PRMSE	97%
0.81	R^2	0.65
0.90	Correlation Coefficient	0.81

PM Peak Period



Example #2: Model represents existing poorly

Where:

Existing Count	=	1,000
Base Year Model Volume	=	200
Future Year Model Volume	=	2,200
Delta	=	2,000

Model-to-Count Ratio = 0.20

Ratio = 11.0

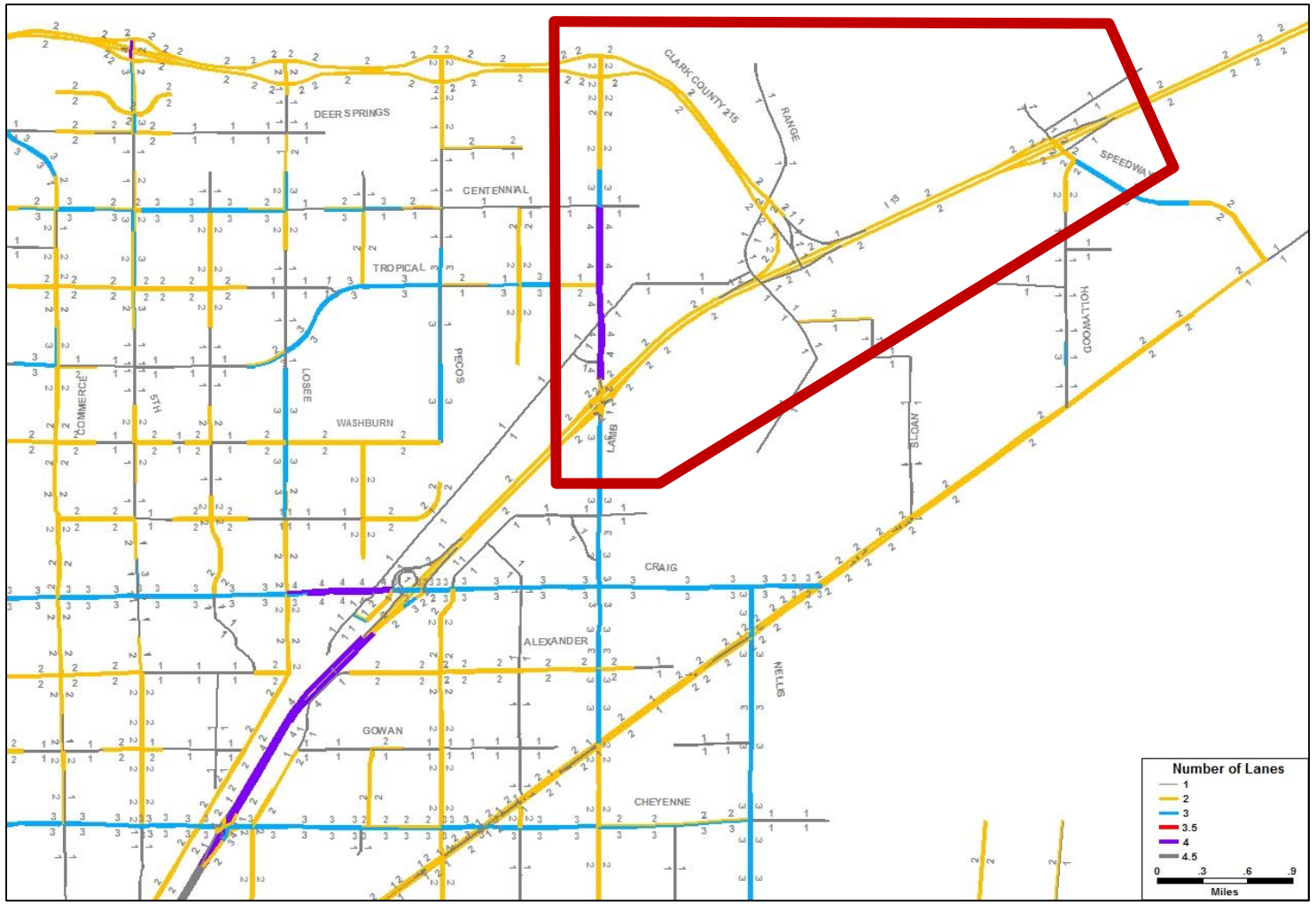
Forecasts = **3,000** or **11,000**

Ratio vs. Delta = 8,000 or 3.67

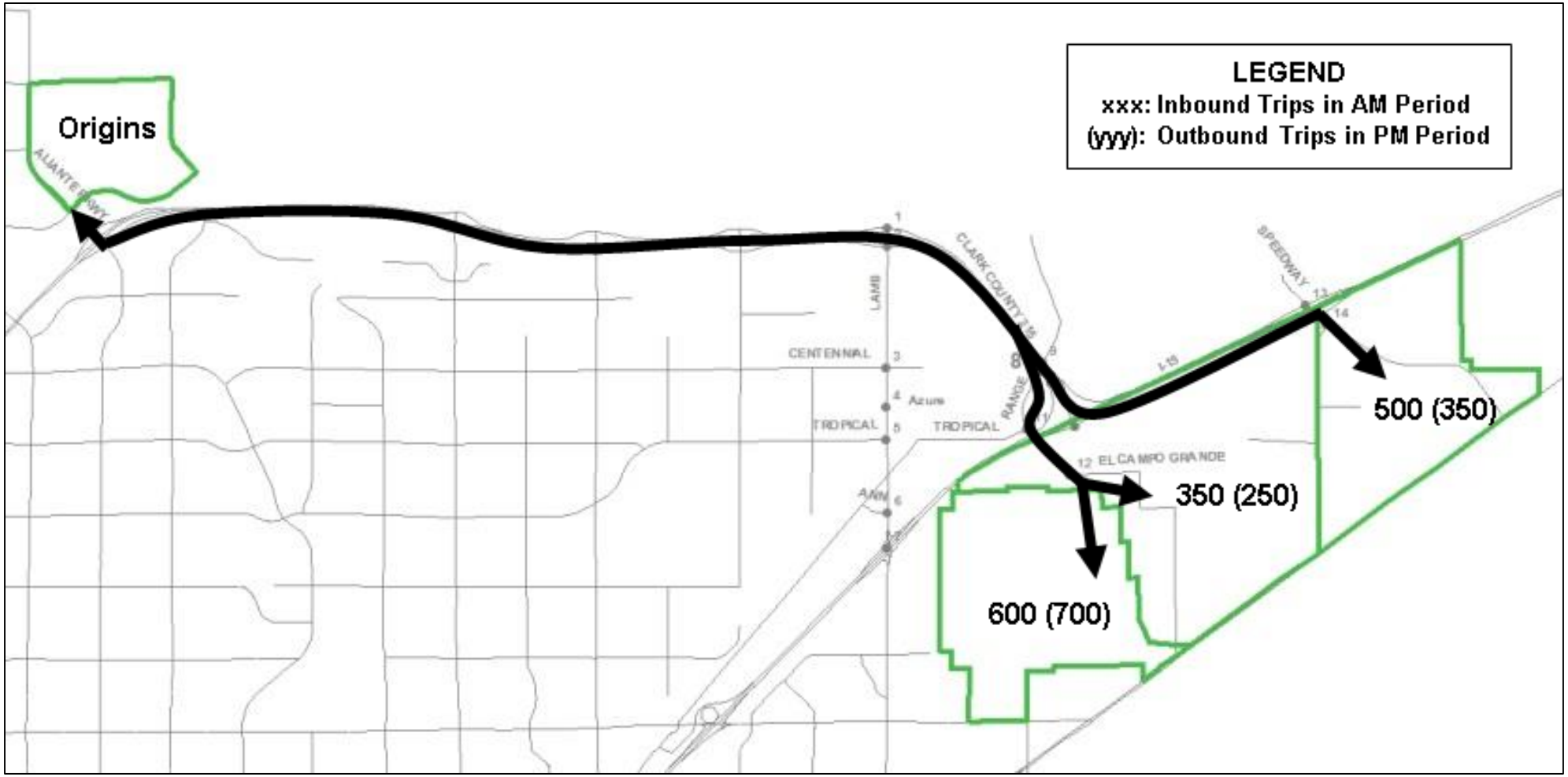
Model Adjustments

Corrected Network and Land Use

- First, corrected typical stuff
  - Land Use
  - Network
- But…

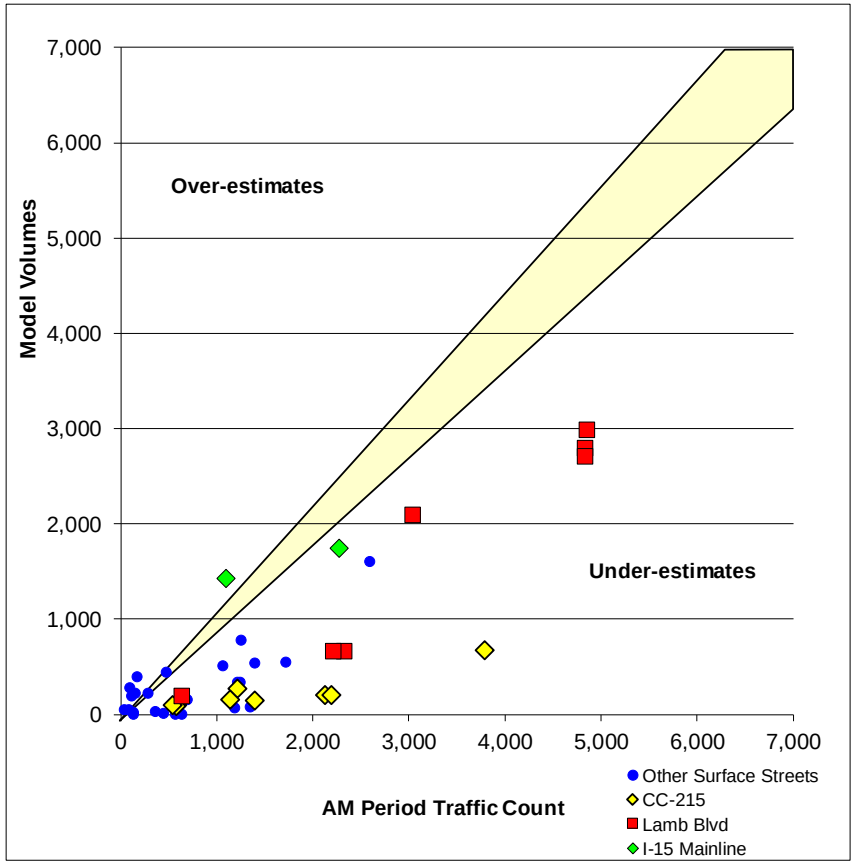


OD-based Adjustments



Before and After (AM Peak Period): All

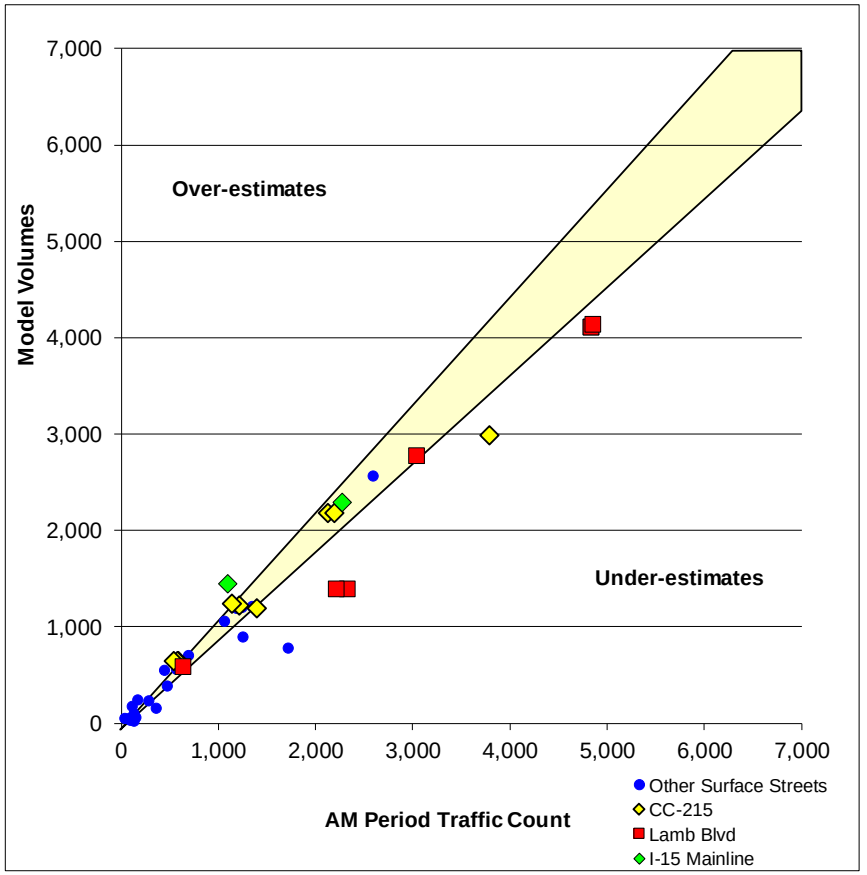
Before



Statistics

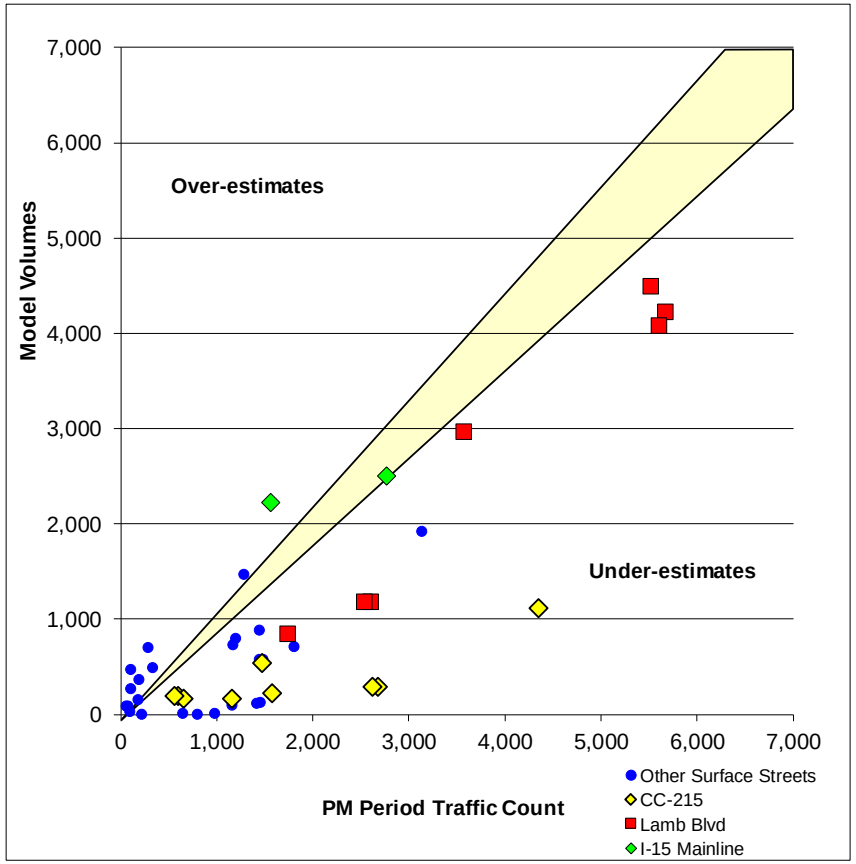
Before	Description	After
0.42	Model/Count Ratio	0.88
80%	PRMSE	26%
0.72	R^2	0.96
0.85	Correlation Coefficient	0.98

After



Before and After (PM Peak Period): All

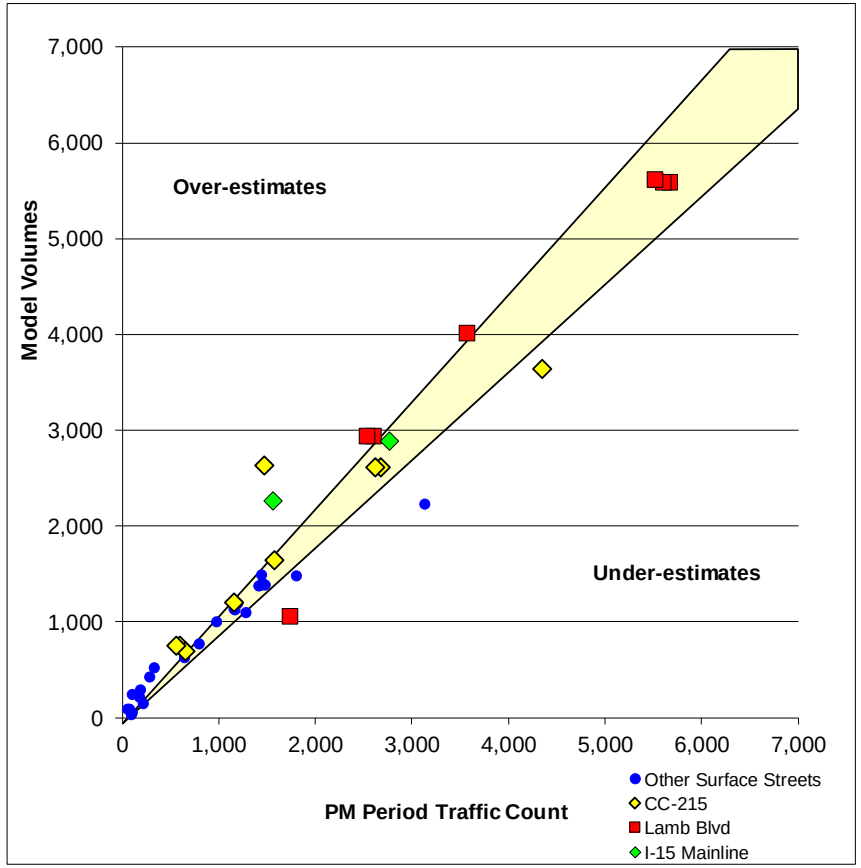
Before



Statistics

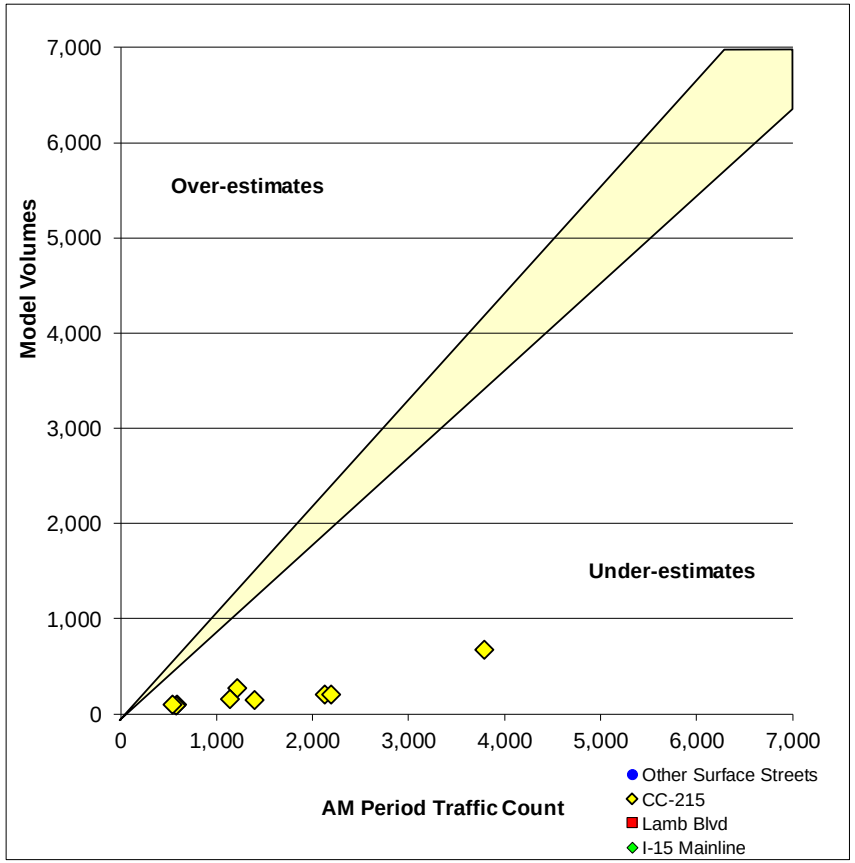
Before	Description	After
0.55	Model/Count Ratio	1.01
66%	PRMSE	20%
0.73	R^2	0.95
0.85	Correlation Coefficient	0.98

After



Before and After (AM Peak Period): CC-215 Only

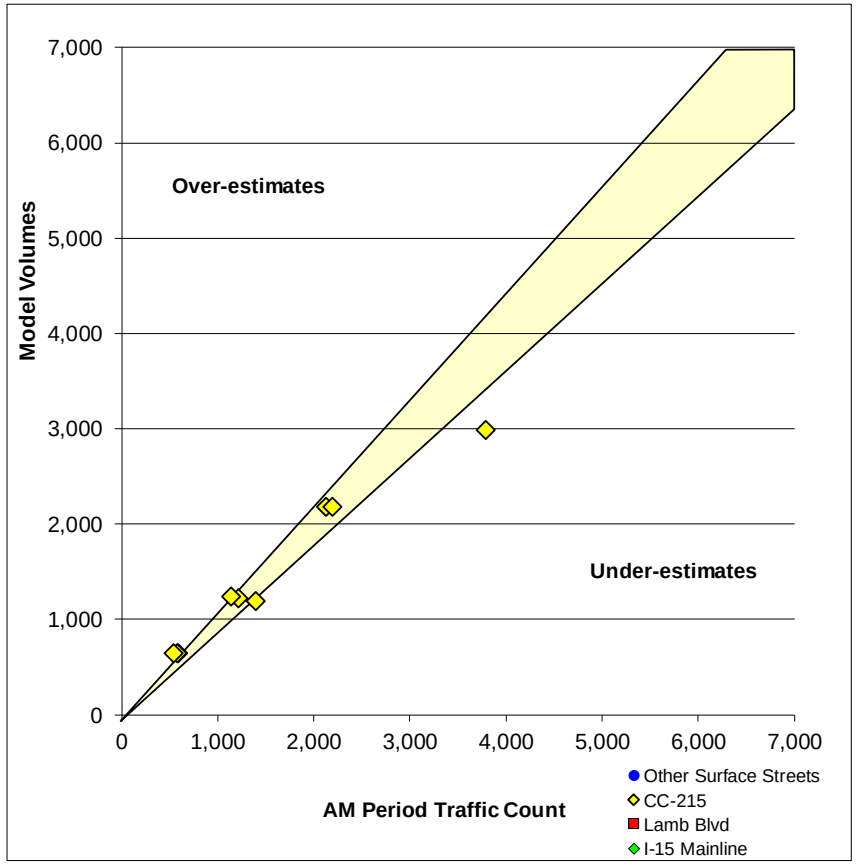
Before



Statistics

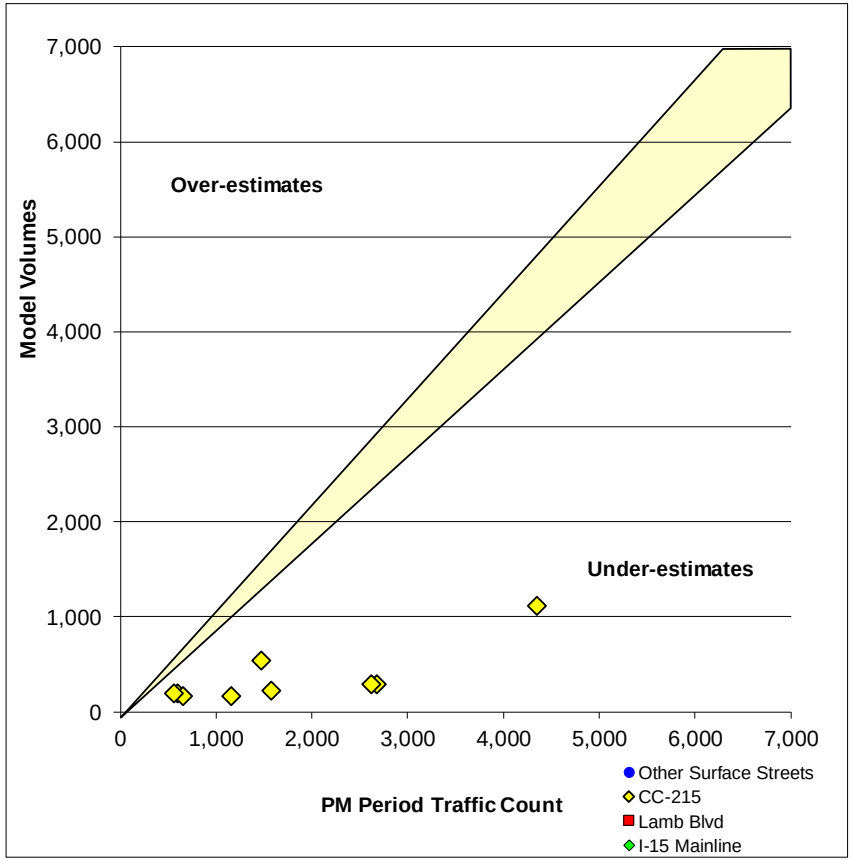
Before	Description	After
0.14	Model/Count Ratio	0.95
103%	PRMSE	19%
0.81	R^2	0.96
0.90	Correlation Coefficient	0.98

After



Before and After (PM Peak Period): CC-215 Only

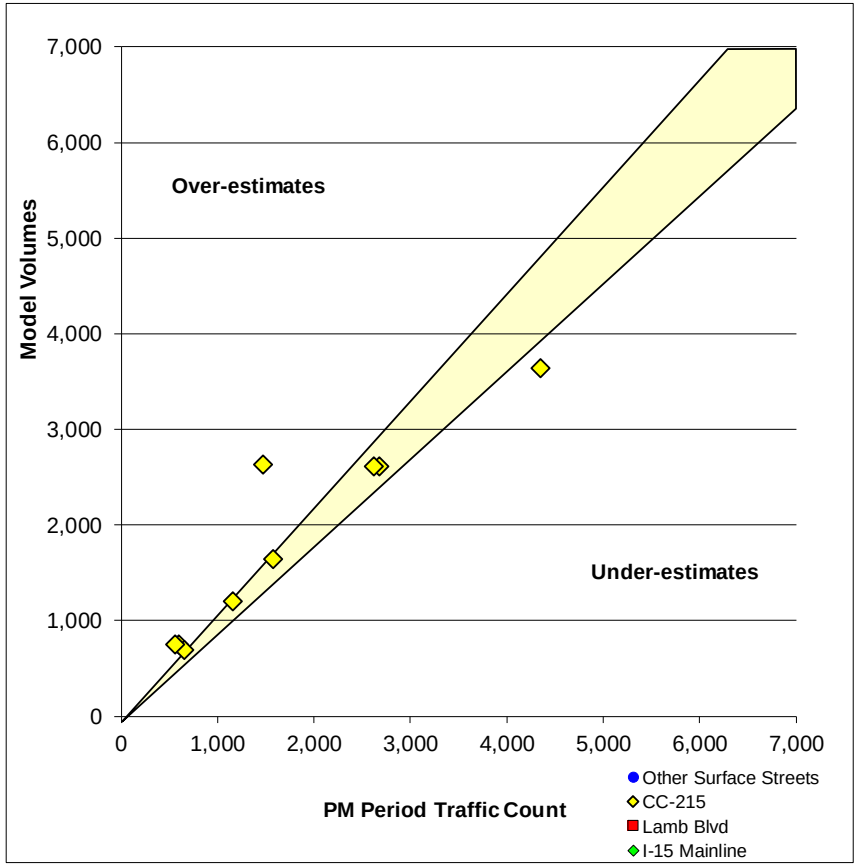
Before



Statistics

Before	Description	After
0.20	Model/Count Ratio	1.06
97%	PRMSE	27%
0.65	R^2	0.86
0.81	Correlation Coefficient	0.93

After



Conclusion

- Model calibrated well in several areas does not mean it will in elsewhere.
  - ➢Compare the model versus traffic counts,
  - ➢Especially towards the edges
- Models may over-estimate the attractiveness of cut-through routes
- When model-to-count ratio is poor, use Delta method

Questions?

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