

Accuracy Assessment of Traffic Forecasts

Presentation to the NCMUG April 27th, 2021



Speakers



David Schmitt, AICP Director



Ashutosh Kumar Senior Project Manager



Special Thanks



- University of Kentucky
 - Dr. Greg Erhardt
 - Jawad Hoque
 - Dr. Mei Chen
 - Dr. Reginald Souleyrette
- Marty Wachs, UCLA
- Florida Department of Transportation, District 4
- H.W. Lochner





Highlights from NCHRP 934: Traffic Forecasting Accuracy Assessment Research

Application for FDOT, District 4



Traffic Forecasting Accuracy Assessment Research (NCHRP 934)



Research Questions and Approach



How accurate are traffic forecasts?	Dave Schmitt
 Method: Statistical analysis of actual vs forecast traffic for a large sample of p Output: Distribution of expected traffic volume as a function of forecast volu 	rojects after they open. Ime.
What are the sources of forecast error?	Dave Schmitt
 Method: "Deep dives" into forecasts of six substantial projects after they oper Output: Estimated effect of known errors, and remaining unknown error. 	n.
How can we generate an expected range of outcomes?	Jawad Hoque
 Method: Estimate uncertainty in future forecasts from accuracy of past foreca Output: A range of forecasts. 	ists.
How can we improve forecasting practice?	Greg Erhardt
 Method: Derive lessons from this research and review with practitioners. Output: Recommendations for how to learn from past traffic forecasts. 	



Large-N Analysis

Question: How accurate are traffic forecasts?

- Method: Statistical analysis of actual vs forecast traffic for a large sample of projects after they open.
- Output: Distribution of expected traffic volume as a function of forecast volume.





Forecast Accuracy Database

6 states: FL, MA, MI, MN, OH, WI + 4 European nations: DK, NO, SE, UK Total: 2,600 projects, 16,000 segments Open with Counts: 1,300 projects, 3,900 segments

					Data Sou	urce				Pecommonded
Category	Field	Ohio DOT	Wisconsin	Michigan	Virginia	Florida	Florida	Minnesota	Kentucky	for 08-110 DB
		ONIO DOT	DOT	DOT	DOT	DOT-D4	DOT-D5	Winnesota	TC	101 00-110 00
Mota	Number of records	6,229	458	9	1,160	143	50	2,179	n/a	
Wieta	Number of unique projects	2,466	132	7	39	134	31	110		
File Format(s)	Cumulative Spreadsheet or database (flat file)	V	٧	٧	٧	v		V		
Provided	Cumulative Database (relational)						٧			V
Trovided	ESAL or technical reports			V	V		V		V	
	Project identification number or code	v	٧	٧	v	٧	٧	V	V	V
	Description, including facility name	v		٧	v	v	v	V	V	٧
	Location									
	County	v	٧			٧	٧	V	V	V
Project	Mile Post	v					v			
Identification	Other Type of Location							V	V	
Fields	Facilty type or functional class	v	٧	٧	v		٧	V		V
Fields	Segment identification codes	v			v	٧	٧	V		V
	Length						٧	V		
	Project cost									
	Area type									
	Type of improvement	v		٧	V					V
	Forecaster (person, agency, company)	v	٧	٧			٧		V	
	Year Forecast Made	V	٧	٧		v	٧	V	V	V
	Forecast year(s)							V		V
	Opening Year	V		٧		v	V			V
	Interim Year					٧	٧			V
	Design Year	V		٧	V	v	٧		V	V
Forecast	Unlabeled Year		V							V
Value Fields	Forecast value									V
	AADT forecast	v	٧	٧	v	٧	٧	V	٧	V



Large N Analysis- Methodology

Compared the earliest post-opening traffic counts with forecast volume

Percent difference from forecast:

Actual Count–Forecast Volume Forecast Volume * 100 %

Level of Analysis

- Segment Level
- Project Level

Expressing the percent difference relative to the forecast is forwardlooking, and a useful measure of uncertainty before a project opens.

CTC Connetics Transportation Group How Accurate Are Traffic Forecasts?



On average, the actual traffic volume is about 6% lower than forecast.

different from forecast.

How Accurate Are Traffic Forecasts?



Traffic forecasts are more accurate, in percentage terms, for higher volume roads.

How Accurate Are Traffic Forecasts?



Source: Hoque, Jawad Mahmud, Gregory D. Erhardt, David Schmitt, Mei Chen, Ankita Chaudhary, Martin Wachs, and Reginald Souleyrette. "The Changing Accuracy of Traffic Forecasts." *Transportation*, in-review.

NCHRP Report 255: maximum desirable deviation of a traffic assignment model from base year traffic counts.

CTG Connetics Transportation Group

84% of forecasts fell within the maximum desirable deviation, and 47% of forecasts had less deviation than expected of traffic counts.

95% of forecasts reviewed are "accurate to within half of a lane."



What Factors Affect Forecast Accuracy?

- Traffic forecasts are more accurate for:
- Higher volume roads
- Higher functional classes
- Shorter time horizons
- Travel models over traffic count trends
- Opening years with unemployment rates close to the forecast year
- More recent opening & forecast years

Deep Dives- Methodology

- Collect data:
 - Public Documents
 - Project Specific Documents
 - Model Runs
- Investigate sources of errors as cited in previous research:
 - Employment, Population projections etc.
- Adjust forecasts by elasticity analysis
- Run the model with updated information

0.7	y I I I I I I I I I I I I I I I I I I I	te Hooka	me Inser	Design I Design I Design I I I I I I I I I I I I I I I I I I I	Pin Layout I f A A A' A' Fort For	2018-09-07 References Aa = A A = A Anno Anno 2 2(m n n besite provide where $A = A$ references	Deep Divers	Annotated Reviews Paragraphic	Quatine v2 View F I = I = I = I = I = I = I = I = I = I =	Composition of the properties	y Save 20 vel Solv hange 2021 PDF-XChange 10 AGE AGENCED 11 Hoading 1 Tileading 2 39/2 struction, etc.]> located in struction, etc.]> located in norm for the WmY, Wm accuracy of traffic forecase an XMV bit for YMMY. real available for YMMY. real availa	<pre>context to context to contex</pre>	Terme Construction	Conn Trans Srou	netics portation p
				Z.0	i chirhi area h	vendaria	s are cher	e> <ber< th=""><th>a> choro</th><th>> and chores</th><th>A summary of the project</th><th>ternne</th><th></th><th></th><th></th></ber<>	a> choro	> and chores	A summary of the project	ternne			
I 😳 🖥 🖥	S 3 -							2018-09-06	DeepDive_A	ssessmentTables	_Template v3 + Excel				
Home Insert	Page Layout Formulas Da	ata Rev	iew Vie	w De	eveloper Ad	dd-ins I	Help PE	F-XChange	2012	PDF-XChange	v6 Team ,O Tell me	vhat you	wan in do		
Cut Copy -	Arial • 10 • A* A* 3	==	·	Wrap To	ot	General	*	Condition	eni Econat	Normal	Bad Good		Neutral	Calculatio	n
Format Painter	B I U Y H Y M Y A Y		1 == = E	🛃 Merge i	& Center *	3 - % 7	768 -478	Formattin	g • Table ·		Department of parts		united cen	HOLE	
*] : [×	✓ fr The sensitivity to tolls	i, or the va	lue of the	tolls the	msetves is in e	rror. For e	xample, Ar	iam, S. (20	16) study o	on Coleman Bri	dge found that the project co	nsidered	l two toll amounts (\$1 and \$0.7	75),
o Table 3: Forec	c ast Adjustment Table based on	o Elasticitie	E	,	a	н		J	к	L	м		N	1.1	0
			Forecast	Actual	Change in Forecast	0	Effect on	Actual Forecast	Adj Fereoast	Remaining % Error for Adj					
Employment	The actual employment (or ODP) drives from what was projected.	Yeafio			0.00	0.30	0%		-	Forecast #CIV/0	Gilla Deuroes for Elasticit		Comprote		
Population/Household	what was projected. Actual car ownership differs from projection. Should			-	0%	0.75	0%			+0\V0				_	
Fact Price/Elicie	ecogenous to the forecast. The sumage kaliprice or kali eliciency deleter				05		0%			+01/101					
Tracel TenetSpeed	Nom expectations. Travel time comparison of the facility itself and alternative rockes.				02	10.20	0% 0%			+0N/0					
Toll Sensitivity/False of Tare	The sensitivity to colir, or the value of the tolir technologies, is an entry, is or analysis, value, so (come) radig on Coloreana Bridge round that the project considered two tolil amounts (\$1 and \$6.7%) however by the time of opening/horizon year it got to \$6.05 and \$0.				07		0%			101/12					
Study-Forecast Duration	Number of years between forecast year and have year. According to Anam, S. et al. (2016) as the difference destreamer, accurace instream**			-	05		0%			+01/VP					
Project Seape	The project was built to different specifications than was assumed at the time of the forecast. For example, budget constraints meant that only 4 lanes														
Reat of Network	vere ball instead of 6. There were assumptions about related projects that would be constructed that different from the same			-	05		0%			+CIV/O					
Assumptions Original Traffic	ortuals built. Original Forecasted Yolame for Segment 1				00	NIA	0%			#Drvior					-
Adjusted Traffie Forecast	Adjusted Yolume for Segment 1		NLA	NEA	NFA					001970					
Employment	The actual employment (or ODP) drives from what was projected. The actual population or hospeliolds dillar from.	YeaNo		-	0	0.30	0%			+CIVUD					
Population/Hourshold	what was projected. Actual car ownership drivers from projection. Should			-	0%	0.75	0%			+0/v0					
Fail Price Ellicience	ecogenous to the loweest, ecogenous to the loweest. The average kall price or lust efficiency different				00		0%		<u>· ·</u>	+CI-V02				_	
Travel TimeHipeed	Travel time comparison of the facility itself and alternative routes.				05	10.00	0%			+01/10					
Toll Sensitivity/false of Time	I no executing to tota, or the value of the total thematives is in error. For example, Anam, 5. (2018) mady on Coleman Bridge found that the project considered two tall amounts (EI and EI 76), however by the time of opening/horizon year is got to EU 55 and 62.				07		0%			•DIV/0					
Study Porecest Duration	pear. According to Asian, S. et al. (2005) as the			L			-								



Deep Dive Conclusions

- The reasons for forecast inaccuracy are diverse.
- Employment, population and fuel price forecasts often contribute to forecast inaccuracy.
- External traffic and travel speed assumptions also affect traffic forecasts.
- Better archiving of models, better forecast documentation, and better validation are needed.



What are the Limitations?

- Project documentation often does not record relevant information—those projects where we had reproducible model runs were more successful.
- These are only a few examples. Can they be generalized?

Continued and consistent data collection is needed to overcome these limitations.

How to Generate Uncertainty Envelopes

CTG Connetics Transportation Group





Using the base-rate and distribution results from similar situations in the past to adjust forecasts.

Ouantile Regression A method to both measure accuracy & estimate uncertainty envelopes



Draw line through the middle of the cloud: regression.

Draw a line along the edge of the cloud: quantile regression.

Quantifying uncertainty is as simple as inputting values in a spreadsheet and drawing lines.



Measuring accuracy and estimating uncertainty windows using Quantile Regression

Model Form

$$y_i = \alpha + \beta \hat{y}_i + \gamma X_i \hat{y}_i + \varepsilon_i$$

- Multiplicative effect instead of additive
- Estimate separate α , β and γ for different percentile values (95th, 80th, 50th, 20th, 5th).
- Coefficients signify the effect of the explanatory variables on different percentile values of actual observation (traffic or transit ridership).
- Example, coefficient of -0.25 on unemployment rate on the 95th percentile model means with each unit increase in unemployment rate, the 95th percentile actual traffic value decreases by 0.25 units.

Quantile Regression Models



- Actual Traffic Count as a function of Forecast Traffic
- Detects bias

Inference Model

• Actual Traffic Count as a function of forecast traffic as well as other statistically significant explanatory variables

Connetics Transportation Group

• Performance Metric

Forecasting Model

- Actual Traffic Count as a function of forecast traffic as well as other statistically significant explanatory variables that are known at the time of forecast.
- Uncertainty envelope

SII	npie model	
A _{95th}	= 2940 + 1.42F	+

90000

95th Percentile

Cimple Madel

$$A_{50th} = 37 + 0.94F + \varepsilon$$

 $A_{5th} = -826 + 0.62F + \varepsilon$



A= Actual Traffic F= Forecasted Traffic Connetics Transportation Group



	5th Percentile	50th Percentile	95th Percentile
Pseudo R-Squared	0.475	0.739	0.830
	Coef.	Coef.	Coef.
(Intercept)	-182.267	255.551	976.786
Adjusted Forecast	0.705	0.891	1.254
Control for forecasts values over 30,000 ADT	0.024	-0.004	-0.413
Unemployment Rate in the Year Forecast was Produced	-0.006	0.002	0.010
Control variable for Forecasts Produced Before 2010	-0.007	0.0002	0.003
Forecast Horizon	0.006	0.008	0.020
Control Variable for Project on a New Road	0.093	-0.008	-0.090
Control Variable for Forecasts done using Travel Demand Model	0.068	-0.008	-0.101
Control Variable for Project on Higher Functional Class	-0.150	-0.062	-0.116
Control Variable for Project on Collector or Local Roadway	-0.212	-0.126	-0.321

Uncertainty Envelope





Resources & Publications



- Guidance Document & Research Report
 - <u>https://www.nap.edu/catalog/25637/traffic-forecasting-accuracy-assessment-research</u>

• Quantile Regression Spreadsheet

<u>http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_93</u>
 <u>4_QuantileRegressionModels.xlsx</u>

• Archiving Software

 <u>https://github.com/uky-transport-data-</u> science/forecastcards

• Data

<u>https://github.com/uky-transport-data-science/forecastcarddata</u>

"The Changing Accuracy of Traffic Forecasts"

Hoque, J.M., Erhardt, G.D., Schmitt, D. *et al.* The changing accuracy of traffic forecasts. *Transportation* (2021). <u>https://doi.org/10.1007/s11116-021-10182-8</u>

"Estimating the Uncertainty of Traffic Forecasts from their Historical Accuracy"

Hoque, Erhardt, Schmitt, Chen & Wachs. Transportation Research Part A: Policy and Practice. Volume 147. 2021. Pages 339-349. ISSN 0965-8564. <u>https://doi.org/10.1016/j.tra.2021.03.015</u>.



Application for FDOT, District 4

Motivation & Objectives



- D4 develops dozens of traffic forecasts every year
 - Forecast reports are archived on a regular basis
 - Accuracy of the forecasts are accessed from time to time, using actual/realized traffic counts (previous assessments done in 2010 and 2014)

Opportunity to utilize the archived data to enhance D4's forecasting process

- Assess the accuracy of recent forecasts
 - Identify areas of improvements
- Apply lessons learned from the rich data set of forecasts
 - Quantify uncertainty in the forecasts and assist district reviewer estimate potential error range in project forecasts

Methodology

- Adopt guidance from the NCHRP 934 report (developed with D4 contributions)
- Utilize rich archived data and professional experience of seasoned D4 staff
- More emphasis on products that are easily reproducible and applicable
- Opening year forecasts assessed for accuracy



NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP RESEARCH REPORT 934

Traffic Forecasting Accuracy Assessment Research

Greg Erhardt Jawad Hoque Mei Chen Reginald Souleyrette UNIVERSITY OF KENTUCKY Lexington, KY

David Schmitt Ankita Chaudhary Sujith Rapolu Kyeongsu Kim Connetics Transportation Group

Key Tasks



Data Gathering

Data Analysis

Gather forecast reports developed since 1999 and <u>develop a database</u> of D4 traffic forecast Analyze data and develop an automated routine to <u>create an</u> <u>interactive report</u> that can be easily updated by FDOT staff when including future projects Uncertainty Analysis

Develop a <u>process</u> to define potential <u>uncertainty</u> in a forecast

Forecast Database



- Forecasts stored in Excel
- Includes forecasts developed after 1999

																Coun	ty	# Records
					SUMMAR	Y OF ALL I	04 TRAFFIC F	ROJECTI	ONS								Counting	
				143 SEI	LECT REPO		UCTED FRO	M 2008 TH	ROUGH 2014				COUNT	8		AII D4	counties	597
	GENERAL RO	DWAY INFO	RMATION	TYPE OF STUDY	DATE	EXIST	ING YEAR	PRO	JECTIONS		FORECASTED DA	ATA	STATION		ACTUAL D			
Segment/ Intersection	Roadway ID	County	Roadway Segment	Operational/Planning Study	Date of Report	Report's Existing Year	Report's Existing Year AADT	Year Open to Traffic	Year Open to Traffic AADT	Number of Forecasting Years	Future Forecasted Year (Opening Year)	Future Forecasted AADT (Opening Year)	FDOT/ County	Actual AADT	Forecasted Actual AA Difference	Br	oward	279
SR 5/US 1 from 11 Street to Silver Beach Road	93020000	Palm Beach	SR 5/US 1 from 11 Street to Silver Beach Road	Traffic Projection Report	04/23/08	2008	26,800	2013	29,200	5	2013	29,200	930755	23500	5,700			
SR A1A from Azalea Terrace to (MP 4.030)	86030000	Broward	SR A1A from Axalea Terrace (MP 2.011) to S. of Sheridan Street (MP 4.0)	Traffic Projection and 18- Kip	06/23/08	2007	23,500	2012	29,100	5	2012	29,100	865042	23000	6,100	Pa	Im Beach	161
SR A1A from Azalea Terrace to (MP 4.030)	86030000	Broward	SR A1A from Axalea Terrace (MP 2.011) to S. of Sheridan Street (MP 4.0)	Traffic Projection and 18- Kip	06/23/08	2007	20,500	2011	24,100	4	2011	24,100	865166	19800	4,300			
SR A1A from Cordova Road to Eastof Eisenhower Boulevard	86180000	Broward	Cordova Road to East Eisenhower Boulevard	Traffic Projection Report and 18-Kip	09/15/08	2008	44,300	2013	47,700	5	2013	47,700	865306	41000	6,700	Ma	artin	49
SR 708 from Old Dixie Highway to 1100 feet east of Old Dixie Highway	93012000	Palm Beach	SR 708 Blue Blvd from Dixie to US 1	Traffic Projection and Turning Movement	03/11/08	2007	27,500	2013	30,100	6	2013	30,100	930071	16600	13,500			(7
SR 70 Okeechobee Road Virginia Avenue from East of Jenkins Road (MP 21.600) to US 1 (MP 25.255)	94030000	St. Lucie	SR 70 from Jenkins Road to Virginia Avenue	Traffic Projection and 18- Kip	11/12/08	2008	34,000	2012	39,200	4	2012	39,200	940742	27000	12,200	St.	Lucie	67
SR 70 Okeechobee Road Virginia Avenue from East of Jenkins Road (MP 21.600) to US 1 (MP 25.255)	94030000	St. Lucie	SR 70 from Okeechobee Road to US 1	Traffic Projection and 18- Kip	11/12/08	2008	25,200	2012	30,300	4	2012	30,300	940032	21000	9,300			4.1
SR 804 from East of Hagen Ranch Road (MP 2.760) to West of Jog Rod (MP 3.360)	93200000	Palm Beach	from Hagen Ranch Road (MP 2.76) to Jog (MP 3.36)	Traffic Projection, and 18 Kip	10/14/08	2007	32,500	2012	37,400	5	2012	37,400	935201	41000	-3,600		alan River	41
SR 802 East of Congress Avenue (MP 7.200) to West of Lake Osborne Drive (MP 8.010)	93180000	Palm Beach	SR 802 East of Congress Avenue (MP 7.200) to West of Lake Osborne Drive (MP 8.010)	Traffic Projection, and 18 Kip	10/14/08	2007	23,500	2012	25,500	5	2012	25,500	930025	24500	1,000	3.92%		
SR 811 from Hillsboro Boulevard to SW 18 Street (Boca Raton)	86170000	Broward	SR 810 to Broward and Palm Beach County Line	Traffic Projection, and 18 Kip	08/13/08	2007	15,500	2012	23,900	5	2012	23,900	860490	15600	8,300	34.73%		
SR 713 St. Lucie County from SR 614/Indrio (MP 7.5) to North of Spanish	94003000	St. Lucie	Kings Hwg from Indrio Road (MP7.5) to North of Spanish Lakes Blvd(MP 9.5)	Traffic Projection and Turning Movement	05/14/08	2008	12,800	2013	15,600	5	2013	15,600	940269	9000	6,600	42.31%		

597 Total Records!

Interactive Report in RMarkdown HTML

- Reads the forecast Excel database
- Analyzes the data develops interactive tables and maps in a HTML report
 - D4 staff can easily monitor the accuracy in house on a more frequent basis (e.g., every year)
- Provides recommendations to further improve the forecasting process



0	FDOT	D4 Ti	raffic F	orecas	ting Ac	ci. X	4	F																					-	
÷	\rightarrow	C	()	File	C:/Pr	rojec	ts/Dat	ta/FD	OTD	4_Tra	iffic_Lo	chne	r/Forec	astAr	nalysisl	Repor	t/FDO	T%20	D4%20Tr	affic	%20Fo	oreca	st%20	Accu	racy/FDOT	☆	0	G		*
	Apps		YMail	000	BBC	CNN	CNN	TOI	TOI	Ν	NDTV	۲	Cricinfo	E	ESPN	1999)	FDOT		Personal		CTG		Work		New Business		R	HCN	A	

Abbreviations Terminologies used in the

Report

I. Introduction
 A. Methodology
 S. Forecast Accuracy
 Assessment
 4. Summary of Observations
 5. Recommendations
 References
 Aopendix

1. Introduction

Connetics Transportation Group, Inc. (CTG) was requested by the Florida Department of Transportation (FDOT) District 4 (D4) staff to assess the accuracy of the project traffic forecasts developed by FDOT D4 over the past 11 years. The purposes of this task include:

- Analyze the accuracy of forecasts by different dimensions geographic area, county, forecasting method etc.
- Provide margin of error on the forecasts developed by D4 over the years
- Assess whether the forecasting accuracy has improved compared to years prior to recent database update.
 Provide guidance on how to use this information in reviewing/evaluating future traffic forecasts, especially for those projects which are expected to have substantial financial, community and environmental impacts.

In order to assess the accuracy, the traffic forecasts were compared to the actual traffic counts of the projects that are now open to traffic. Currently, FDOT's project traffic forecasting process typically generates a daily volume forecast for the Opening Year (the year when project was Opened to traffic), Interim Year, and Design Year. This analysis compared the forecast and actual volumes for the opening year of the project.

Similar studies were conducted by FDOT in 2010 and 2014 that included review of **214** and **143** projects respectively (referred to as *Year 2010 Study dataset* and *Year 2014 Study dataset* in this report). This effort builds upon those previous studies to include **240** additional projects since 2014 (referred to as *Year 2020 Study* dataset in this report) and enhances the analysis based on recently published NCHRP Research Report 934 - Traffic Forecasting Accuracy Assessment Research.

Figure 1 shows the study area and the locations of the projects included in the new dataset.



Districtwide Observations



Attributes	Value
# Records	597
Mean of PDFF (MPDFF)	-7.2%
Median of PDFF	-6.2%
MAPDFF	15.4%
Standard Deviation of PDFF	19.7%

- Evidence of over-estimation in opening the year forecast
- Forecasts ~15% off the actual counts





Additional Observations

- On an average, the D4 forecasts are within ~15% (MAPDFF) of the actual traffic volumes
- Greater accuracy for the urban areas, high volume and short-term forecasts
- Improved accuracy for the most recent set of forecast data (2020 dataset)
- Slightly better accuracy of D4 forecasts compared to the database developed for NCHRP 934 report
- Regional models are very relevant to the D4 forecasting decision making process

Uncertainty Assessment: Web Application



FDOT reviewer defines characteristics of the project here

- Developed a process to **quantify uncertainty** in a forecast to assist D4 in traffic forecast reviews
 - Process based on *NCHRP* 934 Traffic Forecasting Accuracy Assessment
 - Uncertainty range desirable if a "lane call" is involved
 - Requires house-training of the methodology

		Traine Forecast Oncertain	ity Analysis	
Jainty Analysis of Opening Year Forecasts for Test Projec	1			
⊥ Data SampkoTomplate	Project Forecast: Executed Opening Year AADT 5000 Project Characterist Project County Enound Diff between Opening & Existing Years	ics Inputs: Area Type URBAN No. of Lane (Option Currently Not A	Function Class	Source of Recommended Growth Rate
E	pected Ranges of Actual AADT		Results: Uncertainty An	alvsis of the Project Forecast
0k 0		Quartiles 5% Quartiles 5% Quart	used on 279 records, 90% of all pro 58,369 and 60% of all projects had the forecasted AADT was 50,000 used on 279 records, 79,9% of all and 80% of the forecasted AADT	ojects had actual AADT between 38,380 i actual AADT between 43,094 and 52,71 projects had actual AADT between the T.

based on prior project experience



Next Steps

- Utilize the findings from this assessment to enhance D4's forecasting / modeling process
- Train the uncertainty methodology for D4 project application
- Enhance this assessment based on continued application and inputs from other D4 departments
- Develop process to understand potential impacts of uncertainty on traffic operations analysis of future studies



Questions?



Thank you!