

NOACA

Technical Memorandum

EXTERNAL STATIONS FORECAST ANALYSIS FOR NOACA 2025 MODEL UPDATE



The Northeast Ohio Areawide Coordinating Agency (NOACA) is a public Organization serving the counties of and municipalities & townships within Cuyahoga, Geauga, Lake, Lorain and Medina (covering an area with 2.1 million people). NOACA is the agency designated or recognized to perform the following functions:

- **Serve as the Metropolitan Planning Organization (MPO), with responsibility for comprehensive cooperative and continuous planning for highways, public transit, and bikeways, as defined in the Transportation Equity Act for the 21st Century.**
- **Perform continuous water quality, transportation-related air quality and other environmental planning functions.**
- **Administer the area clearinghouse function, which includes providing local government with the opportunity to review a wide variety of local or state applications for federal funds.**
- **Conduct transportation and environmental planning and related demographic, economic and land use research.**
- **Serve as an information center for transportation and environmental and related planning.**
- **At NOACA Governing Board direction, provide transportation and environmental planning assistance to the 172 units of local, general purpose government.**

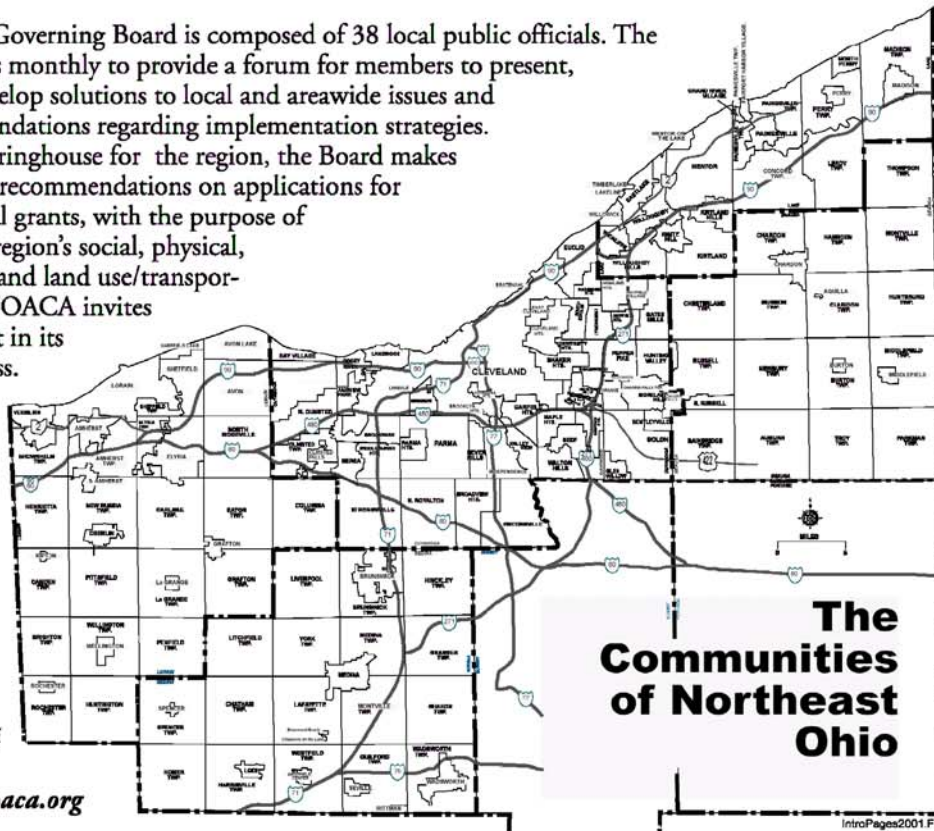
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External Stations Forecast Analysis for NOACA 2025 Model Update

June 2003

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Table of Contents

Table of Contents	1
List of Tables	1
List of Figures	1
List of Appendices	1
ABSTRACT	1
BACKGROUND	2
EXTERNAL TRIP FORECAST	2
Methodology	7
Fratar	7
Matrix Update	9
Mobile6 Analysis	10
SUMMARY	10

List of Tables

Table 1: 2025 External Stations Forecast (2025bf Run)6
Table 2: 2025 External Stations Forecast (2025bg Run)12

List of Figures

Figure 1: NOACA/AMATS External Stations.....4
Figure 2: Create External Trip Table.....8

List of Appendices

Appendix A: External Stations Data 1995 Base Year.....13
Appendix B: TRANPLAN Input File for Matrix Update.....15
Appendix C: Difference in VMT: 2025bg Run vs. 2025bf Run17

ABSTRACT

The peer review panel at the NOACA Travel Demand Model Peer Review held in May 2002 recommended that the validity and robustness of model inputs including networks and land-use data of the NOACA model should be examined. This technical memorandum reviews the results of trips forecasts for year 2025 at the external stations where NOACA shares stations locations with the Akron Metropolitan Area Transportation Study (AMATS) model. The current 2025 “bf” forecast showed significant differences at some external stations at: Medina/Summit, Cuyahoga/Summit, and Geauga/Portage county lines, especially for some freeway and expressway facilities.

The modeling staff developed a procedure to adjust the difference in traffic forecast between these two models. The FRATAR method is applied to create External-External (E-E), External-Internal (E-I) and Internal-External (I-E) factors. The percentage of E-E, E-I, and I-E trips at each external station was estimated based on the assumption and same percentage of each trip as reported in the 1995 External Origin-Destination Study conducted by Wilbur Smith Associates on behalf of the Ohio Department of Transportation.

The new forecast from 2025 “bg” model run was evaluated with the MOBILE6 program to evaluate the environmental impact on air quality. The 2025bg model run shows a reduction of 0.66 ton/day in Hydrocarbon Emissions and reduction of 0.19 ton/day Oxides of Nitrogen Emissions compared to the previous 2025bf model run. These results were expected due to fairly small reduction in Vehicle Miles of Travel (VMT) between the two model runs. The previous run 2025bf resulted 53,043,768 VMT while the 2025bg run produced 51,787,012 VMT or -2.37 percent different in VMT.

BACKGROUND

In May 2002, NOACA hosted a peer review of its Travel Demand Model (TDM). Experts in the field from around the country and Canada came to NOACA's offices to discuss and review the model over a two-day period. General comment on the model by the Peer Review Panel was:

Overall, the existing NOACA travel demand models compare quite favorably to peer large urban areas across the United States. The complete set of models represents "advanced best practice." The model system is clearly capable of addressing air quality conformity determinations, corridor specific studies, and analyzing regionally significant highway and transit investments. (Travel Demand Model Peer Review Summary, May 14-15, 2002, PB Consult Inc.)

The Peer Review Panel divided their recommendations into three stages, near-term, mid-term and long-term. This technical memorandum covers one aspect of the mid-term recommendations, input data refinements. In particular, the memorandum addresses data collection for application of the Ohio statewide model (currently under development), and as a supplement to the TDM documentation.

EXTERNAL TRIP FORECAST

The NOACA Five-County Regional Model trips were generated at each of the 1003 internal Traffic Analysis Zones (TAZ) based on forecasted socio-economic and land use data; and each of the 80 external stations based on historic traffic growth and the External Origin-Destination (OD) survey conducted in 1995.

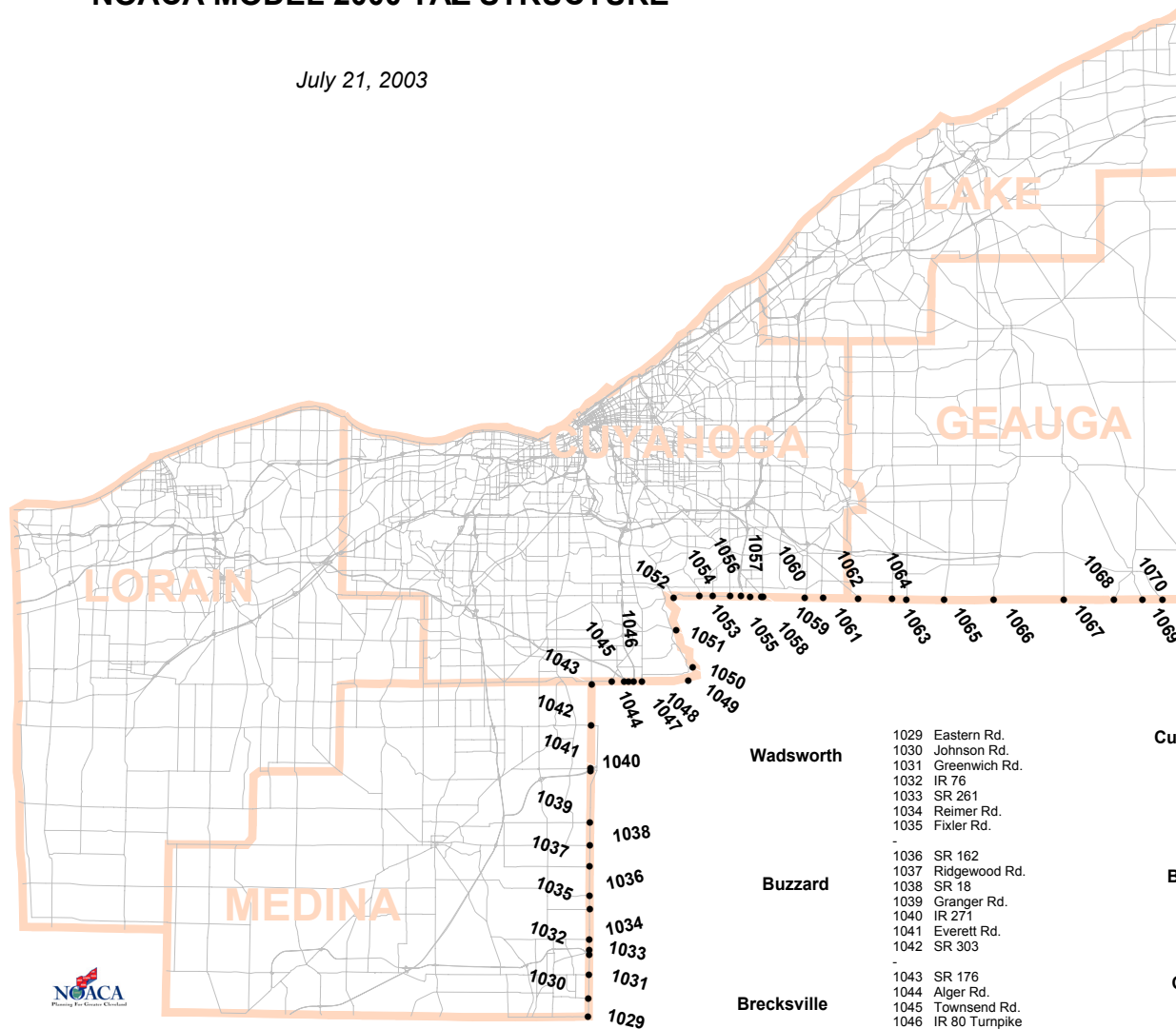
In preparation for the data refinements for the Ohio Statewide model, the NOACA modeling staff initiated a comparison study at the external boundary with AMATS model (Figure 1). NOACA used traffic counts on the interstate and state highway from Ohio Department of Transportation (ODOT) for model validation purpose,. This traffic counts should be the same with the numbers used by other Metropolitan Planning Organization (MPO) model, especially at the boundary between jurisdictions. However, for non-state highways and local streets bordering with AMATS, NOACA adopted traffic counts from AMATS since AMATS conducted an extensive traffic count program on its local roads.

The external trip forecast is compared to the external trip forecast from the AMATS model. The initial comparison using 2025bf run shows significant differences at some external stations compared to the numbers reported in the AMATS 2025 External Station Forecast draft report¹.

¹ Akron Metropolitan Area Transportation Study (AMATS), AMATS 2030 External Station Forecast, Draft Report, February 26, 2003.

FIGURE 1: NOACA/AMATS EXTERNAL STATIONS NOACA MODEL 2000 TAZ STRUCTURE

July 21, 2003



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1029	Eastern Rd.	Cuyahoga	1050	Highland Rd.
1030	Johnson Rd.		1051	SR 82
1031	Greenwich Rd.		1052	Canal Rd.
1032	IR 76		1053	Dunham Rd.
1033	SR 261		1054	Walton Rd.
1034	Reimer Rd.		1055	SR 8
1035	Fixler Rd.		-	-
-	-		1056	IR 271/IR 480
1036	SR 162	Bedford	1057	Bedford Rd.
1037	Ridgewood Rd.		1058	Ravenna Rd.
1038	SR 18		1059	Shepard Rd.
1039	Granger Rd.		1060	SR 91
1040	IR 271		1061	Liberty Rd.
1041	Everett Rd.		1062	SR 43
1042	SR 303		1063	SR 306
-	-		-	-
1043	SR 176	Geauga	1064	Eggleston Rd.
1044	Alger Rd.		1065	Chamberlin Rd.
1045	Townsend Rd.		1066	SR 44
1046	IR 80 Turnpike		1067	SR 700
1047	IR 77		1068	SR 88
1048	SR 21		1069	Parkman-Nelson Rd.
1049	Riverview Rd.		-	-
			1070	US 422 N

Since AMATS area is located adjacent to NOACA, it is important to maintain consistency in the future traffic volumes along the shared border. Table 1 shows the 2025 forecast of both NOACA's model and AMATS' model at the External Stations Screenlines that are identified in the models. NOACA's model overestimates the external trips at some of the freeway and expressway facilities as shown in Table 1. NOACA's forecast for Interstate 76 at Wadsworth East at the Cuyahoga/Summit county line has been forecasted is 16,000 vehicles, or over 30 percent more vehicles than AMATS' prediction. There is a similar situation for Interstate 271 at West Medina county line where NOACA's traffic forecast is more than 12,000 vehicles greater than AMATS' model for their year 2025 forecast. The largest difference is located at Interstate 80-Turnpike where the difference between the two models is over 23,000 vehicles per day.

Table 1: 2025 External Stations Forecast (2025bf Run)

Wadsworth East Screenline– Medina/Summit County Line					
EXTERNAL STATION	ROUTE	2025 AMATS FORECAST	2025 NOACA FORECAST	DIFFERENCE	% DIFF.
1029	Eastern Rd.	4,700	5,950	1,250	27%
1030	Johnson Rd.	2,450	2,490	40	2%
1031	Greenwich Rd.	7,700	7,810	110	1%
1032	IR 76	51,650	67,560	15,910	31%
1033	SR 261 (Wadsworth Rd.)	10,250	10,400	150	1%
1034	Reimer Rd.	3,000	3,020	20	1%
1035	Fixler Rd./Minor Rd.	2,100	2,100	0	0%
Buzzard Screenline – Medina/Summit County Line					
1036	SR 162 (Coley Rd.)	3,440	3,490	50	1%
1037	Ridgewood Rd.	2,050	2,060	10	0%
1038	SR 18	35,700	37,440	1,740	5%
1039	Granger Rd.	2,300	2,310	10	1%
1040	IR 271	35,750	47,860	12,110	34%
1041	Everett Rd.	1,100	1,110	10	1%
1042	SR 303	10,050	10,210	160	2%
Brecksville Screenline – Cuyahoga/Summit County Line					
1043	SR 176 (Broadview Rd.)	5,700	5,730	30	1%
1044	Alger Rd.	1,500	1,530	30	2%
1045	Townsend Rd.	1,500	1,530	30	2%
1046	IR 80 - Turnpike	52,550	75,700	23,150	44%
1047	IR 77	56,700	57,130	430	1%
1048	SR 21	22,250	22,580	330	2%
1049	Riverview Rd.	3,350	3,780	430	13%
Cuyahoga Valley Screenline - Cuyahoga/Summit County Line					
1050	Highland Rd.	2,750	3,090	340	12%
1051	SR 82 (Aurora Rd.)	16,250	16,670	420	3%
1052	Canal Rd.	10,650	10,670	20	0%
1053	Dunham Rd.	5,100	5,110	10	0%
1054	Walton Rd.	2,250	2,270	20	1%
1055	SR 8	18,650	18,810	160	1%
Bedford Screenline – Cuyahoga/Summit County Line					
1056	IR 271/ IR 480	122,900	127,670	4,770	4%
1057	Bedford Rd.	5,900	6,090	190	3%
1058	Ravenna Rd.	17,500	18,970	1,470	8%
1059	Shepard Rd.	5,800	6,600	800	14%
1060	SR 91 (Darrow Rd.)	23,300	23,530	230	1%
1061	Liberty Rd.	6,800	6,860	60	1%
1062	SR 43	20,450	21,150	700	3%
1063	SR 306	14,700	15,070	370	3%
Geauga/Portage Screenline – Geauga/Portage County Line					
1064	Eggleston Rd.	2,550	2,610	60	2%
1065	Chamberlin Rd.	2,700	2,720	20	1%
1066	SR 44	10,250	10,580	330	3%
1067	SR 700	3,350	3,450	100	3%
1068	SR 88	3,350	3,890	540	16%
1069	Parkman-Nelson Rd.	1,350	1,370	20	1%
Geauga/Trumbull Screenline – Geauga/Trumbull County Line					
1070	US 422 North	14,700	17,420	2,720	19%

Methodology

The NOACA external stations are clustered into 14 screenlines for validation purposes. At the external cordon boundary that separates NOACA and AMATS, there are six screenlines that are identified in both models: Wadsworth Screenline, Buzzard Screenline, Brecksville Screenline, Cuyahoga Valley Screenline, Bedford Screenline, and Geauga Screenline. The freeway segment of US 422 North at Trumbull Screenline is included in this analysis because it is located at the Geauga and Portage county line. The methodology applied for each of the external traffic forecasts is based on a standard linear regression analysis. Historic traffic counts from Ohio Department of Transportation and various other sources have been compiled to develop the regression equation.

After finding discrepancies in some significant interstate locations for future traffic volumes at the bordering area with AMATS, modeling staff decided to recalculate the external trip forecast. The method to estimate future external traffic volumes were divided into three steps:

- *Fratat*: Update trip distribution for the external-external trips (E-E) using the Fratar module in TRANPLAN. The distribution factors applied in Fratar were based on data observation from the 1995 OD survey.
- *Matrix Update*: Update matrices for internal-external (I-E), external-internal (E-I) and truck trips using Matrix Update module in TRANPLAN to match AMATS' external forecast at the same locations.
- *Mobile6 Analysis*: Conduct an air quality conformity analysis using MOBILE6 based on the results from travel demand model run after completion of the above steps.

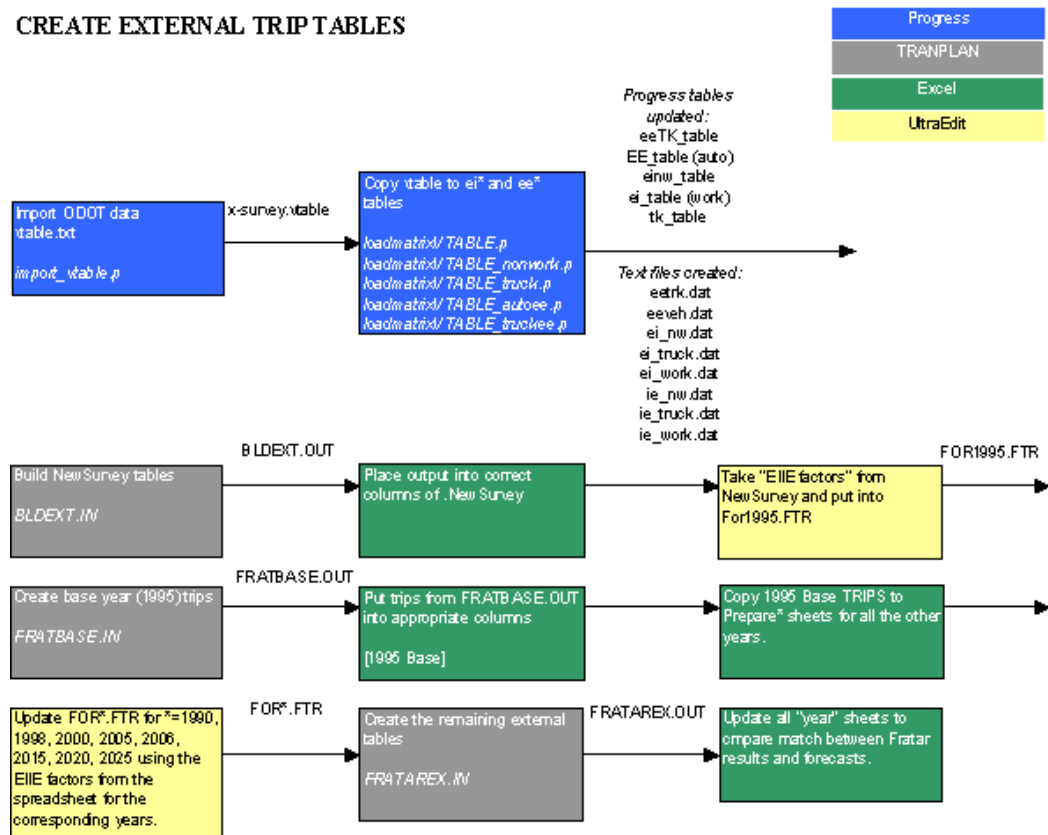
Fratat

Outputs from the external OD survey were summed by station and divided by purpose and direction. This was first done for 1995 because both survey data and counts were available for 1995. The trips were summed by station and compared to the counts. For stations along the NOACA-AMATS border, AMATS' counts were used. The ratio of Count/Survey (EIIIE factor) was calculated for each station. The EIIIE factor was then used in the Fratar module to create new trip tables. The 1995 Base Year table (Appendix A) was used in the same fashion to

generate trip tables for 1990, 2000, 2005, 2006, 2010, 2015, 2020 and 2025. Instead of counts, forecast data were used for comparison. A flow chart in Figure 2 depicting how these tables were created is included below.

Figure 2

CREATE EXTERNAL TRIP TABLES



Tables ready for model run:
 ##eiw.tbl
 ##iew.tbl
 ##einw.tbl
 ##ienw.tbl
 ##eie_trk.tbl
 ##eeveh.tbl
 ##eetrik.tbl

tables without a year are the original
 tables built from survey data with no
 Fratar factoring

3/20/03....CreateFratarFactor.instructions

Progress
TRANPLAN
Excel
UltraEdit

Matrix Update

After the modification at the External-External trip matrix as described at the Fratar section above, the model was run with feedback loops to achieve consistency between initial travel times and costs used in lower levels of the model chain (trip generation, distribution, mode choice) and those output from higher levels of the model chain (highway assignment). The results from highway assignment and 24 hour trip tables were taken from the feedback loops procedure to the next post processing steps in TRANPLAN.

Results from the 24-hour post processing assignment at the external stations were compared to AMATS' external stations count forecast. Comparison showed that discrepancies still occurred between NOACA's and AMATS' forecast at external stations even with the adjustment at external-external trips. The next step is to adjust Internal-External Trips, External-Internal Trips and Truck trips to match AMATS forecast numbers.

The Matrix Update module in TRANPLAN was applied to factor rows and columns without changing the proportion of trips as reported in the Origin-Destination Survey. The factors applied to each external station are based on the proportional difference between forecast 2025 post processing highway assignment and AMATS forecast external trips. A sample of Matrix Update input file commands in TRANPLAN is described in Appendix B.

The output from Matrix Update: Internal-External/External-Internal Work Trips, Internal-External/External-Internal Non-Work Trips and Internal-External/External-Internal Truck Trips were put into the feedback loops and rerun again.

The results of this second run were placed in the 24-hour post processing highway assignment to be analyzed for the final results. At this point, the final highway assignment for the external stations is consistent with the AMATS forecast. The External Stations forecast is comparable (within 2 percent difference) to AMATS' numbers as seen in Table 2.

This final set of post processing highway assignments was used for air quality analysis based on Vehicle Miles Traveled (VMT).

Mobile6 Analysis

Mobile6 analysis was performed to analyze Vehicle Miles of Travel (VMT) produced by the final run of highway assignment as described above in the Matrix Update section. Program VMT.EXE reads AM Peak, PM Peak and Off Peak loaded highway assignments and trip tables to create three individual skim tables for each Peak and Off Peak period.

Vehicle Miles of Travel is reported in TRANPLAN format by functional class and county. The VMT produced by the current run 2025bg was compared to VMT from the previous official 2025bf run. There is a small reduction in VMT resulted from 2025bg run compared to VMT from 2025bf run (Appendix C). This information was taken into Mobile6 program to generate the emission results. The emission result was also compared with the previous run 2025bf. Overall comparison between these two runs shows the 2025bg run has a reduction of 0.66 ton/day of Hydrocarbon (HC) emission and 0.19ton/day reduction in Nitrogen emission. These results look realistic since we reduced the number of trips at some external stations; it also reduced the Vehicle Miles of Travel and emission.

SUMMARY

NOACA is committed to updating and refining data in the regional travel demand model as one of the recommendations from the peer review. During the routine review on the model forecast, NOACA modeling staff found some inconsistencies regarding forecast trips that are located at the border with AMATS jurisdiction. Consistency in travel demand forecast with AMATS' model is very important to support the application of the Ohio statewide model.

The NOACA forecast from the 2025bf model run was showing an over estimation at some of the external stations that are joint with the AMATS' external stations, especially at Ohio Turnpike and Interstate facility. NOACA modeling staff performed an update model run version 2025bg to correct discrepancy between NOACA and AMATS external forecast.

As the air quality emission analysis proved, the updated model run 2025bg result produces significantly lower emissions compared to the previous model run version 2025bf. NOACA will apply results from the updated model run 2025bg to the official model forecast.

Table 2: Updated 2025 External Stations Forecast (2025bg Run)

Wadsworth East Screenline– Medina/Summit County Line					
EXTERNAL STATION	ROUTE	2025 AMATS FORECAST	2025 NOACA FORECAST	DIFFERENCE	% DIFF.
1029	Eastern Rd.	4,700	4,670	-30	-1%
1030	Johnson Rd.	2,450	2,480	30	1%
1031	Greenwich Rd.	7,700	7,780	80	1%
1032	IR 76	51,650	51,660	10	0%
1033	SR 261 (Wadsworth Rd.)	10,250	10,340	90	1%
1034	Reimer Rd.	3,000	3,020	20	1%
1035	Fixler Rd./Minor Rd.	2,100	2,100	0	0%
Buzzard Screenline – Medina/Summit County Line					
1036	SR 162 (Coley Rd.)	3,440	3,450	10	0%
1037	Ridgewood Rd.	2,050	2,060	10	0%
1038	SR 18	35,700	35,780	80	0%
1039	Granger Rd.	2,300	2,310	10	1%
1040	IR 271	35,750	36,190	440	1%
1041	Everett Rd.	1,100	1,110	-10	-1%
1042	SR 303	10,050	10,140	90	1%
Brecksville Screenline – Cuyahoga/Summit County Line					
1043	SR 176 (Broadview Rd.)	5,700	5,730	30	1%
1044	Alger Rd.	1,500	1,510	10	1%
1045	Townsend Rd.	1,500	1,530	20	1%
1046	IR 80 - Turnpike	52,550	52,900	350	1%
1047	IR 77	56,700	56,830	130	0%
1048	SR 21	22,250	22,330	80	0%
1049	Riverview Rd.	3,350	3,360	10	0%
Cuyahoga Valley Screenline - Cuyahoga/Summit County Line					
1050	Highland Rd.	2,750	2,760	10	0%
1051	SR 82 (Aurora Rd.)	16,250	16,410	160	1%
1052	Canal Rd.	10,650	10,670	20	0%
1053	Dunham Rd.	5,100	5,100	0	0%
1054	Walton Rd.	2,250	2,250	0	0%
1055	SR 8	18,650	18,710	60	0%
Bedford Screenline – Cuyahoga/Summit County Line					
1056	IR 271/ IR 480	122,900	122,860	-40	0%
1057	Bedford Rd.	5,900	5,970	70	1%
1058	Ravenna Rd.	17,500	17,480	-20	0%
1059	Shepard Rd.	5,800	5,850	50	1%
1060	SR 91 (Darrow Rd.)	23,300	23,430	130	1%
1061	Liberty Rd.	6,800	6,850	50	1%
1062	SR 43	20,450	20,370	-80	0%
1063	SR 306	14,700	14,840	140	1%
Geauga/Portage Screenline – Geauga/Portage County Line					
1064	Eggleston Rd.	2,550	2,580	30	1%
1065	Chamberlin Rd.	2,700	2,710	10	0%
1066	SR 44	10,250	10,430	180	2%
1067	SR 700	3,350	3,410	60	2%
1068	SR 88	3,350	3,370	20	1%
1069	Parkman-Nelson Rd.	1,350	1,360	10	1%
Geauga/Trumbull Screenline – Geauga/Trumbull County Line					
1070	US 422 North	14,700	14,630	-70	0%

**Appendix A:
External Stations Data
1995 Base Year Data**

Created using Fratar with 8 iterations

14-Mar-03

numbers in red were
changed to Akron's

Zone	Numbers are X100								TOTAL	1995 Count	EIIIE Factors
	Work		Non-Work		Truck	Auto	Truck				
	EI	IE	EI	IE	EIIIE	EE	EE				
1004	291654	291654	604800	604800	30024	58	16	18303	18444	1.01	
1005	47424	47424	108471	108471	2280	47	3	3190	3203	1.00	
1006	11400	11400	47900	47900	8100	20	1	1288	1287	1.00	
1007	368808	368808	549692	549692	347952	354	225	22428	22330	1.00	
1008	17285	17285	70380	70380	9936	35	1	1888	1889	1.00	
1009	13685	13685	29274	29274	2142	19	0	900	901	1.00	
1010	391769	391769	472706	472706	528046	6552	4686	33807	34016	1.01	
1011	110175	110175	178540	178540	30962	53	9	6145	6142	1.00	
1012	124142	124142	166405	166405	157206	80	109	7572	7601	1.00	
1013	12483	12483	28215	28215	8892	21	5	928	927	1.00	
1014	44418	44418	81378	81378	69564	126	148	3485	3495	1.00	
1015	18183	18183	24738	24738	4446	37	2	941	938	1.00	
1016	26964	26964	32697	32697	9828	63	7	1362	1358	1.00	
1017	58464	58464	123366	123366	39788	19	21	4074	4062	1.00	
1018	45472	45472	76734	76734	111852	667	697	4926	4930	1.00	
1019	25882	25882	72352	72352	33916	75	18	2396	2400	1.00	
1020	73124	73124	76912	76912	35250	113	33	3498	3492	1.00	
1021	316407	316407	691054	691054	808990	5446	3923	37608	37783	1.00	
1022	94107	94107	186372	186372	68200	269	80	6641	6621	1.00	
1023	95280	95280	151800	151800	25560	180	21	5398	5382	1.00	
1024	28060	28060	50813	50813	11346	52	8	1750	1750	1.00	
1025	75613	75613	125662	125662	6474	190	8	4288	4290	1.00	
1026	140837	140837	165648	165648	46052	605	100	7295	7319	1.00	
1027	55692	55692	112948	112948	8432	371	13	3841	3853	1.00	
1028	20940	20940	51300	51300	9000	168	11	1713	1710	1.00	
1029	67353	67353	60489	60489	11012	464	12	3142	3150	1.00	
1030	43560	43560	35211	35211	5928	15	0	1649	1650	1.00	
1031	92520	92520	148275	148275	28170	39	3	5139	5150	1.00	
1032	878080	878080	505360	505360	92000	3623	2430	34642	34500	1.00	
1033	198112	198112	128325	128325	26700	44	3	6842	6850	1.00	
1034	31720	31720	65884	65884	3432	7	0	1993	2000	1.00	
1035	27977	27977	40854	40854	2728	2	0	1405	1400	1.00	
1036	46331	46331	49166	49166	8452	12	0	2006	2000	1.00	
1037	20520	20520	37962	37962	3240	3	0	1205	1200	1.00	
1038	463279	463279	525579	525579	209222	381	144	22394	22300	1.00	
1039	25984	25984	40252	40252	1624	4	2	1346	1350	1.00	

1040	14875	14875	791605	791605	193460	2521	1815	22399	22350	1.00
1041	12348	12348	14161	14161	12054	1	1	653	650	1.00
1042	125091	125091	148830	148830	31858	44	4	5845	5850	1.00
1043	68512	68512	111578	111578	16740	14	4	3787	3800	1.00
1044	17869	17869	30602	30602	2354	9	0	1002	1000	1.00
1045	20500	20500	25830	25830	6396	11	0	1001	1000	1.00
1046	819979	819979	333913	333913	244808	5957	3679	35161	35058	1.00
1047	876127	876127	727701	727701	689584	65	42	39079	39100	1.00
1048	443156	443156	316242	316242	264776	142	32	18009	17950	1.00
1049	48583	48583	55860	55860	0	150	10	2249	2250	1.00
1050	52080	52080	39760	39760	3584	117	12	2001	2000	1.00
1051	275392	275392	277316	277316	61048	136	20	11820	11800	1.00
1052	257315	257315	115699	115699	30952	6	3	7779	7750	1.00
1053	90789	90789	89411	89411	7208	8	0	3684	3700	1.00
1054	34814	34814	44702	44702	5150	7	0	1649	1650	1.00
1055	300770	300770	307135	307135	124830	69	11	13485	13550	1.00
1056	2232196	2232196	1569329	1569329	1406580	1119	826	92041	92400	1.00
1057	93132	93132	88712	88712	10088	42	17	3796	3800	1.00
1058	303849	303849	224114	224114	27962	456	31	11325	11300	1.00
1059	90404	90404	76776	76776	10670	272	13	3735	3750	1.00
1060	396321	396321	316812	316812	69564	74	3	15035	15050	1.00
1061	130608	130608	84192	84192	8544	19	0	4400	4400	1.00
1062	311259	311259	305256	305256	62238	212	10	13175	13200	1.00
1063	197315	197315	245433	245433	47976	115	7	9456	9500	1.00
1064	32262	32262	35340	35340	3420	14	3	1402	1400	1.00
1065	39689	39689	31595	31595	7384	3	1	1503	1500	1.00
1066	155117	155117	85264	85264	72114	89	18	5636	5650	1.00
1067	44115	44115	42330	42330	9792	23	5	1855	1850	1.00
1068	32164	32164	39508	39508	25976	135	27	1854	1850	1.00
1069	11025	11025	23175	23175	5760	6	1	748	750	1.00
1070	205065	205065	199903	199903	152428	108	75	9806	9850	1.00
1071	45677	45677	32800	32800	5438	11	1	1635	1632	1.00
1072	80358	80358	28261	28261	12036	117	17	2427	2431	1.00
1073	129093	129093	121656	121656	29304	46	9	5363	5354	1.00
1074	80496	80496	92488	92488	30536	55	10	3830	3845	1.00
1075	22734	22734	29862	29862	21816	5	1	1276	1272	1.00
1076	78462	78462	73224	73224	20304	28	5	3269	3265	1.00
1077	47435	47435	32330	32330	9010	9	1	1694	1700	1.00
1078	12338	12338	13702	13702	3256	1	0	554	554	1.00
1079	31535	31535	43301	43301	6148	2	1	1560	1561	1.00
1080	543031	543031	782026	782026	304108	2243	2172	33957	33909	1.00
1081	71709	71709	90047	90047	11448	5	1	3355	3348	1.00
1082	210569	210569	293620	293620	44520	71	24	10623	10653	1.00
1083	4280	4280	13535	13535	1390	1	1	372	372	1.00

13494142 13494142 14362450 14362450 6921358 34732 21636 682713 683277

Totals

26988284	28724900
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Forecast - Total = 564

Appendix B: TRANPLAN Input File for Matrix Update

```
$MATRIX UPDATE
$FILES
  INPUT FILE = UPDIN, USER ID = $..\..\NEW_EXT\EIENWK.OUT$
  OUTPUT FILE = UPDOU, USER ID = $EIENWK.OUT$
$HEADERS
  UPDATE IE-EI NON-WORK TRIP TABLE FROM LISA CHOW
  CREATE NEW IE-EI NON-WORK TRIP TABLES
  MATCHING AMATS COUNTS 04/24/03 - RUN# 3
$DATA
  T1, 1-1029, 1029-1029, *0.81
  T1, 1029-1029, 1-1083, *0.81
  T1, 1029-1083, 1029-1029, *0.81
  T2, 1-1029, 1029-1029, *0.81
  T2, 1029-1029, 1-1083, *0.81
  T2, 1029-1083, 1029-1029, *0.81
  T1, 1-1032, 1032-1032, *0.78
  T1, 1032-1032, 1-1083, *0.78
  T1, 1032-1083, 1032-1032, *0.78
  T2, 1-1032, 1032-1032, *0.78
  T2, 1032-1032, 1-1083, *0.78
  T2, 1032-1083, 1032-1032, *0.78
  T1, 1-1038, 1038-1038, *0.98
  T1, 1038-1038, 1-1083, *0.98
  T1, 1038-1083, 1038-1038, *0.98
  T2, 1-1038, 1038-1038, *0.98
  T2, 1038-1038, 1-1083, *0.98
  T2, 1038-1083, 1038-1038, *0.98
  T1, 1-1040, 1040-1040, *0.76
  T1, 1040-1040, 1-1083, *0.76
  T1, 1040-1083, 1040-1040, *0.76
  T2, 1-1040, 1040-1040, *0.76
  T2, 1040-1040, 1-1083, *0.76
  T2, 1040-1083, 1040-1040, *0.76
  T1, 1-1046, 1046-1046, *0.62
  T1, 1046-1046, 1-1083, *0.62
  T1, 1046-1083, 1046-1046, *0.62
  T2, 1-1046, 1046-1046, *0.62
  T2, 1046-1046, 1-1083, *0.62
  T2, 1046-1083, 1046-1046, *0.62
  T1, 1-1048, 1048-1048, *0.99
  T1, 1048-1048, 1-1083, *0.99
  T1, 1048-1083, 1048-1048, *0.99
  T2, 1-1048, 1048-1048, *0.99
  T2, 1048-1048, 1-1083, *0.99
  T2, 1048-1083, 1048-1048, *0.99
  T1, 1-1049, 1049-1049, *0.93
  T1, 1049-1049, 1-1083, *0.93
  T1, 1049-1083, 1049-1049, *0.93
  T2, 1-1049, 1049-1049, *0.93
  T2, 1049-1049, 1-1083, *0.93
  T2, 1049-1083, 1049-1049, *0.93
  T1, 1-1050, 1050-1050, *0.94
  T1, 1050-1050, 1-1083, *0.94
  T1, 1050-1083, 1050-1050, *0.94
  T2, 1-1050, 1050-1050, *0.94
  T2, 1050-1050, 1-1083, *0.94
  T2, 1050-1083, 1050-1050, *0.94
  T1, 1-1056, 1056-1056, *0.975
  T1, 1056-1056, 1-1083, *0.975
  T1, 1056-1083, 1056-1056, *0.975
  T2, 1-1056, 1056-1056, *0.975
  T2, 1056-1056, 1-1083, *0.975
  T2, 1056-1083, 1056-1056, *0.975
  T1, 1-1058, 1058-1058, *0.95
  T1, 1058-1058, 1-1083, *0.95
  T1, 1058-1083, 1058-1058, *0.95
  T2, 1-1058, 1058-1058, *0.95
```

T2, 1058-1058, 1-1083, *0.95
T2, 1058-1083, 1058-1058, *0.95
T1, 1-1059, 1059-1059, *0.93
T1, 1059-1059, 1-1083, *0.93
T1, 1059-1083, 1059-1059, *0.93
T2, 1-1059, 1059-1059, *0.93
T2, 1059-1059, 1-1083, *0.93
T2, 1059-1083, 1059-1059, *0.93
T1, 1-1062, 1062-1062, *0.98
T1, 1062-1062, 1-1083, *0.98
T1, 1062-1083, 1062-1062, *0.98
T2, 1-1062, 1062-1062, *0.98
T2, 1062-1062, 1-1083, *0.98
T2, 1062-1083, 1062-1062, *0.98
T1, 1-1068, 1068-1068, *0.91
T1, 1068-1068, 1-1083, *0.91
T1, 1068-1083, 1068-1068, *0.91
T2, 1-1068, 1068-1068, *0.91
T2, 1068-1068, 1-1083, *0.91
T2, 1068-1083, 1068-1068, *0.91
T1, 1-1070, 1070-1070, *0.85
T1, 1070-1070, 1-1083, *0.85
T1, 1070-1083, 1070-1070, *0.85
T2, 1-1070, 1070-1070, *0.85
T2, 1070-1070, 1-1083, *0.85
T2, 1070-1083, 1070-1070, *0.85
\$END TP FUNCTION

Appendix C: Difference in VMT: 2025bg Run vs. 2025bf Run

Five County Base Year Daily VMT by Speed Range and Functional Class

Forecast: Difference between Run 2025bg vs 2025bf

Speed	FREEWAY	MAJOR	SPECIAL	TOLL	MINOR	LOAD	INTRA	TOTAL
0 - 5	-498	210	-157	0	-854	0	0	-1299
5 - 10	-700	-1168	-13	-491	978	0	90	-1304
10 - 5	-6475	9023	0	-112	6706	6350	0	15492
15 - 20	3017	-6018	-17	-37	-29	0	2	-3082
20 - 25	1018	-2258	-3326	503	-11993	0	-134	-16190
25 - 30	14617	3865	3241	317	-1918	0	120	20242
30 - 35	-11650	-31141	1653	-535	1438	0	-4	-40239
35 - 40	-114104	-55328	-1492	354	-3887	0	0	-174457
40 - 45	-102283	25672	0	0	0	0	0	-76611
45 - 50	-140607	0	0	0	0	0	0	-140607
50 - 55	-1442668	0	0	0	0	0	0	-1442668
55 - 60	603946	0	0	0	0	0	0	603946
TOTAL	-1196387	-57143	-111	-1	-9559	6350	74	-1256777

FREEWAY = 00, 03, 10, 80

MAJOR ARTERIALS = 20

SPECIAL = 90

TOLL = 85

MINOR ARTERIALS = 01, 02, 11, 12, 21, 22, 30, 81, 82

LOCAL LINK = 99

VMT for LORAIN COUNTY

Speed	FREEWAY	MAJOR	SPECIAL	TOLL	MINOR	LOAD	INTRA	TOTAL
0 - 5	-1	0	0	0	0	0	0	-1
5 - 10	-221	1	0	-479	-384	0	0	-1083
10 - 5	-303	7	0	867	199	1252	0	2022
15 - 20	48	146	0	-77	318	0	3	438
20 - 25	-646	235	0	-305	-2854	0	-29	-3599
25 - 30	388	1447	0	330	5929	0	23	8117
30 - 35	1574	-4471	0	-467	6789	0	-3	3422
35 - 40	574	901	0	503	109	0	0	2087
40 - 45	11339	-8810	0	0	0	0	0	2529
45 - 50	-118866	0	0	0	0	0	0	-118866
50 - 55	-657252	0	0	0	0	0	0	-657252
55 - 60	518627	0	0	0	0	0	0	518627
TOTAL	-244739	-10544	0	372	10106	1252	-6	-243559

VMT for CUYAHOGA COUNTY

Speed	FREEWAY	MAJOR	SPECIAL	TOLL	MINOR	LOAD	INTRA	TOTAL
0 - 5	-496	377	-157	0	-627	0	0	-903
5 - 10	-479	-983	-13	-13	2154	0	90	756
10 - 5	-6171	5457	0	-979	-1844	3476	0	-61
15 - 20	2865	-2689	-17	39	3321	0	2	3521
20 - 25	-24260	9692	-3326	808	-436	0	-118	-17640
25 - 30	39001	-1562	3241	-13	-2540	0	-77	38050
30 - 35	-7800	1757	1653	-68	3207	0	-1	-1252
35 - 40	-34732	-3336	-1492	-148	-201	0	0	-39909
40 - 45	-85814	0	0	0	0	0	0	-85814
45 - 50	-6515	0	0	0	0	0	0	-6515
50 - 55	-549185	0	0	0	0	0	0	-549185
55 - 60	218146	0	0	0	0	0	0	218146
TOTAL	-455440	8713	-111	-374	3034	3476	-104	-440806

VMT for LAKE COUNTY

Speed	FREEWAY	MAJOR	SPECIAL	TOLL	MINOR	LOAD	INTRA	TOTAL
0 - 5	0	0	0	0	6	0	0	6
5 - 10	0	-3	0	0	5	0	0	2
10 - 5	0	-462	0	0	1052	1484	0	2074
15 - 20	104	1487	0	0	1158	0	-6	2743
20 - 25	-173	-991	0	0	-1883	0	-28	-3075
25 - 30	-238	-922	0	0	-2356	0	-31	-3547
30 - 35	-3076	2921	0	0	6805	0	0	6650
35 - 40	-62489	-9347	0	0	-5225	0	0	-77061
40 - 45	-42592	-231	0	0	0	0	0	-42823
45 - 50	97442	0	0	0	0	0	0	97442
50 - 55	-264598	0	0	0	0	0	0	-264598
55 - 60	106730	0	0	0	0	0	0	106730
TOTAL	-168890	-7548	0	0	-438	1484	-65	-175457

VMT for GEauga COUNTY

Speed	FREEWAY	MAJOR	SPECIAL	TOLL	MINOR	LOAD	INTRA	TOTAL
0 - 5	0	-168	0	0	1	0	0	-167
5 - 10	0	-263	0	0	0	0	0	-263
10 - 5	0	5399	0	0	3	1125	0	6527
15 - 20	0	-7841	0	0	21	0	0	-7820
20 - 25	0	-8489	0	0	-6137	0	-39	-14665
25 - 30	0	1126	0	0	-11273	0	101	-10046
30 - 35	0	-34421	0	0	-6490	0	-3	-40914
35 - 40	0	-5994	0	0	4372	0	0	-1622
40 - 45	0	22543	0	0	0	0	0	22543
45 - 50	-127	0	0	0	0	0	0	-127
50 - 55	-154	0	0	0	0	0	0	-154
55 - 60	-12198	0	0	0	0	0	0	-12198
TOTAL	-12479	-28108	0	0	-19503	1125	59	-58906

VMT for MEDINA COUNTY

Speed	FREEWAY	MAJOR	SPECIAL	TOLL	MINOR	LOAD	INTRA	TOTAL
0 - 5	0	0	0	0	-234	0	0	-234
5 - 10	0	81	0	0	-796	0	0	-715
10 - 5	0	-1377	0	0	7297	-987	0	4933
15 - 20	0	2879	0	0	-4848	0	2	-1967
20 - 25	26096	-2704	0	0	-683	0	81	22790
25 - 30	-24534	3777	0	0	8320	0	102	-12335
30 - 35	-2349	3073	0	0	-8872	0	4	-8144
35 - 40	-17456	-37553	0	0	-2940	0	0	-57949
40 - 45	14785	12170	0	0	0	0	0	26955
45 - 50	-112541	0	0	0	0	0	0	-112541
50 - 55	28521	0	0	0	0	0	0	28521
55 - 60	-227358	0	0	0	0	0	0	-227358
TOTAL	-314836	-19654	0	0	-2756	-987	189	-338044