

# **BRIAN KETCHAM ENGINEERING, P.C.**

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## **The Real Traffic Impacts from the Proposed Tuxedo Reserve, Orange County, NY**

By Brian T. Ketcham, P.E.<sup>1</sup>  
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The Related Companies is proposing to construct 1,195 dwelling units, a mix of senior housing, single family and multi-family homes along with 30,000 square feet of local retail space in the Town of Tuxedo, Orange County, NY. In a supplemental analysis (SEIS Appendix A, Draft Technical Memorandum), The Related Companies—the developer—asserts this project will have minimum impact on traffic along Route 17 just south of Tuxedo. The Draft Technical Memorandum is limited to examining just four intersections in close proximity to the project site. The conclusion reported in the Draft Technical Memorandum is that “...the Proposed Modifications do not have the potential to generate any new significant adverse environmental impacts not previously identified or analyzed in the FEIS, and accordingly, no SEIS is required.” (Emphasis added) In other words, the analysis concludes that the project will reportedly have little traffic impact at the four intersections tested in the Draft Technical Memorandum, that traffic will move smoothly during peak traffic periods with the full build out of the project, and that no traffic mitigation will be required for this project.

I will show in this examination of these assertions that the supplemental traffic analysis that is described in the Draft Technical Memorandum under-estimates project traffic impacts, fails to provide justification for a number of assumptions, fails to provide supporting documentation for other assumptions, cannot justify assumed reductions in traffic volumes along Route 17, has far greater impact along Route 17 particularly south of the site; indeed, imposes a huge amount of traffic at locations south of the site that have already been demonstrated to be operating significantly over capacity without this project.

**Trip generation rates:** The project uses trip generation rates reported by the Institute of Transportation Engineers (ITE) in their *Trip Generation Manual*. However, the rates that are assumed in the Draft Technical Memorandum are significantly below what ITE reports as “average conditions,” conditions largely observed in suburban and rural areas across America in places like Kansas and Utah. In addition, Related reduced these under-reported trip generation rates by 17% to account for second home owners and by an additional 10% for their assumption that home owners who might utilize the nearby commuter train would use a proposed shuttle bus service to get to and from the station.

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Table 1 provides ITE vehicle trip generation rates for the land use types reported in the 2008 Traffic Impact Study Addendum. ITE reports ranges observed in the field—high, low and average rates. Table 1 presents these ranges from the *ITE Trip Generation Manual* for four land use groups: Single Family-Detached Housing (ITE Land Use 210), Residential Condominium-Townhouses (ITE Land Use 230), Detached Elderly Housing (ITE Land Use 251) and a Specialty Retail Center (ITE Land Use 814<sup>2</sup>). Note that some data are missing (NA or Not Available) due to the small sample size provided for the ITE Manual. The resulting number of daily and peak hour vehicle trips is displayed in the lower part of Table 1 assuming 764 Single Family-Dedicated Housing units, 293 Residential Condominium/Townhouse units and 138 Detached Elderly Housing units plus 30,000 square feet of retail along with a 3,000 square foot farm stand.

The results in Table 1 are compared with the results presented in the 2008 Traffic Impact Study Addendum (adjusted downwards as described above for residential units). In general the rates assumed in the Addendum are significantly below *average rates reported by ITE*. As noted above, “average conditions,” conditions largely observed in suburban and rural areas across America in places like Kansas and Utah. Traffic conditions within the New York Metropolitan Area would be more accurately represented by the “high” end of the ITE rates. Yet, not only does the Tuxedo Reserve Traffic Study utilize below “average” rates, but weekday peak hour rates are then further reduced by 25% to account for the assertion that a large number of the residential units will be second homes and that 10% of daily commuters will use shuttle buses to get to the Tuxedo Park train station. However, as reported in this critique, no justification has been provided in the Traffic Impact Study Addendum supporting these assumptions. Tuxedo Reserve has also cut the traffic associated with their retail center by 75% asserting that most traffic will be walk-in. Clearly, the Tuxedo Reserve analysis does not represent a worst case condition for the proposed project.

However, not even these adjustments tell the whole story. ITE provides ranges of trip generation rates for conditions observed from areas across America. But we are dealing here with a relatively well-to-do class of people who exhibit different travel behavior from those median income folks from the suburbs of less densely settled states.

Closer to home, we have the surveys completed a decade ago by the New York Metropolitan Transportation Council (NYMTC) reported in “Regional Travel-Household Interview Survey,” February 2000 prepared by Parsons Brinckerhoff Quade & Douglas, Inc. for the 31-county New York metropolitan area. This extensive survey reports some interesting characteristics: that the rich own more cars and undertake many more auto trips than other income groups—that they make more trips per day than average income households.

For example, the average number of auto trips per household in the New York metro area is 7.1. However, for households in the income bracket of \$100,000 to \$150,000<sup>3</sup> the rate is 11.3 trips, an increase of 59%.<sup>4</sup> The rich own more cars as well—for a household of 4 people, the average for the metro area is 1.93 cars versus 2.55 cars for a household with an income of between

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<sup>2</sup> ITE Land Use: 814 – Specialty retail centers are generally small strip shopping centers that contain a variety of retail shops and specialize in quality apparel; hard goods; and services such as real estate offices, dance studios, florists, and small restaurants.

<sup>3</sup> Note that these household income levels are from a decade ago and have increased significantly for this income group. However, travel behavior has not changed.

<sup>4</sup> Table 49, Trip Rates by Type and Income, NYMTC, “Regional Travel-Household Interview Survey,” February 2000, page 81.

\$100,000 and \$150,000, an increase of 32%.<sup>5</sup> NYMTC goes on to report the obvious, that the richer a household the more cars that a household owns producing more daily trips than “average.” The point is simply that The Related Companies has ignored the travel behavior exhibited by the very folks who they themselves claim would locate in the Tuxedo Reserve, generating many more auto trips than has been reported in the supplemental traffic assessment (or, in any of the analyses completed for this project thus far).

Moreover, because there is no evidence provided to support the assumption that 17% of homes will be second homes or that, even used as second homes that owners might not commute from their Tuxedo Reserve homes as well, we really have to dismiss the 17% reduction in trips as one more trick to under-report project impacts. And, will homeowners, with their BMW’s and Mercedes parked outside really stand in the rain and sleet waiting for a shuttle bus let alone put up with the time it takes to make multiple stops to pick other commuters before arriving at a train station instead of using their comfy new cars to get to the train station or more likely to commute to Manhattan directly? Where is the evidence that wealthy residents such as these would be willing to utilize a shuttle bus? Where are the surveys of folks in the income class expected to locate in Tuxedo Reserve to support the claims made in the Tech Memo?

So, adjusted for the drastically low-balled ITE rates in the Tuxedo Reserve traffic analysis, eliminating the assumed reduction in rates as unsupportable (and, frankly not worst case conditions) and further adjusting for NYMTC findings for well to do homeowners, we can theoretically adjust Related’s reported trip generation rates upwards by 227%<sup>6</sup> for both peak hour travel and for 24-hour weekday and weekend impacts. However, for argument’s sake, a reasonable worst case analysis could be justified assuming trip generation rates that are 40% greater than ITE average rates for residential trip making while the retail rates are left at 25% of ITE average rates (the assumption is not entirely unreasonable<sup>7</sup> and the number of trips relatively small compared to residential trip totals).

This would raise the number of trips generated by the project during the weekday PM peak hour from the 720 vehicle trips assumed in the Tech Memo to 1,372 trips, a 90% increase when you reject the reductions assumed for the project, and adjust very slightly for the travel behavior identified in NYMTC surveys for the socio-economic demographics of the presumed residents for the Tuxedo Reserve. The result is still *significantly* below the high rates reported by ITE for similar projects across America, and which should be more reasonably applied in the New York Metropolitan Area. While ITE does not report demographic characteristics, the NYMTC data demonstrate that a project like the Tuxedo Reserve is likely to generate a great many more trips than have been assumed for this project based on The Related Companies data. It is disingenuous to propose a project like the Tuxedo Reserve that will add hugely to the existing Route 17 traffic burden and claim that by mitigating project impacts from, say 400 seconds of delay to 200 seconds (still a severe Level of Service F) that the problems along Route 17 will simply disappear. It is not true!

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<sup>5</sup> Table 52, Number of Vehicles by Household Size and Income, Ibid, page 83.

<sup>6</sup>  $1.2 \times 1.17 \times 1.10 \times 1.59 \times 1.32 - 1 = 2.27 \times 100$  or a theoretical increase of 227%; these figures include a 20% increase for low balling average ITE trip generation rates times the 17% cut in rates for second home owners times the 10% reduction in travel for shuttle use times the 59% increase in trip making for wealthy travels compared to median income folks times a 32% adjustment for rich households that own many more cars than average. The assumption of 40% for the adjustment rate is made for argument sake but is a TINY fraction of what the numbers produce.

<sup>7</sup> In fact, the reduction from ITE average rates for specialty retail is actually much greater than 75%; as shown in Table 1, the reduction is 93% for the AM peak hour and 88% for the PM peak hour.

This worst case scenario must be analyzed for the original Route 17 corridor reported on in the original 1998 analysis using traffic simulation modeling (not just intersections in very close proximity to the project site). Traffic simulation will demonstrate the effects of intersection break-down conditions that are ignored in the Traffic Impact Study Addendum even though that document reports certain Level of Service (LOS) for intersection movements with average vehicle delay in the hundreds of seconds which, if permitted, would result in traffic backed up along Route 17 for great distances.

**Baseline traffic along Route 17:** The Related also argues that background traffic conditions observed on one day in 2008 (July 2<sup>nd</sup> to be precise; during a week when many commuters are on vacation and schools are not in session) to justify reducing background traffic volumes from those observed in 2003. While not specifically stated, it is likely that counts were taken for just one hour for each time period on just one day. One hour of data is pretty flimsy support for any change from a far more robust data collection effort in 2003 (See Tables 2A and 2B).<sup>8</sup> Moreover, a comparison with NYSDOT data over the last decade suggests that traffic volumes have grown slightly or at worst not declined (See Table 3).<sup>9</sup> Data reported for a one-week period in March 2007 suggests it might have actually grown along Route 17. This data also demonstrates that traffic volume data can vary by upwards of plus or minus 10% from one day to the next (See Tables 2A and 2B) suggesting the variation from the July 2<sup>nd</sup> counts are within statistical error and can be ignored. The point is that there was no justification for reducing traffic volumes as reported in the supplemental traffic analysis and a far greater likelihood that traffic will increase significantly by 2020 as the New York metro area population increases by more than 1.8 million people between 2000 and 2020.<sup>10</sup> Note also that by under reporting background traffic conditions The Related Companies can effectively add more traffic with no additional mitigation.

Population growth is a good indicator of how traffic is likely to grow along Route 17. The combined growth of population for Orange and Rockland counties supports the premise above that, contrary to the assertion that traffic along Route 17 has declined since 2003, it should have increased significantly (As Table 3 also illustrates). Between 2000 and 2010, the population in Rockland and Orange counties increased by approximately 96,000 (a 15% increase) and is estimated to grow another 85,000 by 2020 (an additional increase of 12%). In the face of this official estimated population growth, to suggest that traffic along Route 17 actually declined (and dramatically from the 1998 data provided) simply does not make sense (especially when based on a flimsy one-day sample during a high vacation week like July 4<sup>th</sup>).<sup>11</sup>

**Trip Assignments:** We will not argue about the assignment of trips (although we would like to see the gravity model referenced as the means of making those assignments). We only point out that the supplemental traffic analysis reports that 77% of traffic will travel south of the site along Route 17 towards I-87 (unchanged from the 1998 traffic analysis). The supplemental traffic analysis reports that the project will generate about 10,000 auto trips per day, weekdays and weekends, 365 days a year. That means that approximately 7,700 project generated daily autos

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<sup>8</sup> Tables 2A and 2B from the New York State Department of Transportation Traffic Count Hourly Report at Station 850010, 0.8 miles south of the Orange County line, March 2007.

<sup>9</sup> Table 3 from New York State Department of Transportation Traffic Volume Reports, HDM220, page 54, 6/16/09.

<sup>10</sup> "Demographic and Socioeconomic Forecasting, Technical Memorandum Task 4.1.2, County Level Demographic and Socioeconomic Forecasts, 2002-2030," New York Metropolitan Transportation Council, June 15, 2005, Table 5.

<sup>11</sup> Ibid. NYMTC, Table 5.

will travel along Route 17 south of the Tuxedo Reserve site, half northbound, half southbound.<sup>12</sup> Currently, Route 17 carries about 10,000 auto trips in each direction on average weekdays. The Related's Tuxedo Reserve will therefore increase traffic along Route 17 by nearly 38% over 24-hours. This is a huge increase and draws into question why the project's traffic impacts further to the south have been ignored in the Traffic Impact Study Addendum.

**Externality Costs:** Setting aside the adjustments presented above, the Tuxedo Reserve will produce at a minimum about 3.5 million auto trips per year (and likely a great deal more). At an average trip length of 8.9 miles,<sup>13</sup> Tuxedo Reserve auto trips will increase regional travel by about 32 million miles. An increase in travel of this magnitude comes with significant externality cost (increased congestion and lost productivity, increased traffic accidents, increased health consequences from traffic noise and air pollution, etc.). The following characterizes and quantifies these costs.

One serious externality ignored by The Related is the growth in traffic accidents. While none of the traffic analyses prepared for the Tuxedo Reserve address the growth in traffic accidents that a project of this magnitude will produce by adding more than 32 million additional miles of travel, these impacts should be recognized and considered by the Tuxedo community. Table 4 summarizes these impacts including both the number of additional accidents that the Tuxedo Reserve will produce along with the costs to motorists and residents of the surrounding communities. Table 4 reports that Tuxedo Reserve will produce another 264 traffic accidents including one death every two years and 78 personal injuries annually. These numbers are based on NYS and USDOT data. The cost to motorists and to society (accident costs not covered by auto insurance) total more than \$11.5 million annually.

Table 5 summarizes all externality costs, including the cost of additional accidents. The addition of more than 32 million vehicle miles of travel will result in more than \$26 million in costs to the Tuxedo community, much of this in increased health costs. Table 5 summarizes the types of externalities and their costs that increased traffic would generate. Congestion, an increase in traffic accidents and environmental damages are just the most obvious externalities.

Table 5 summarizes these costs in terms of their dollar value to the community. These are costs that would be borne by existing motorists as well as by new Tuxedo Reserve travelers, by residents and businesses alike. These costs total more than \$26 million dollars a year and represent a real loss to the community in terms of lost productivity, increased health care costs, and losses associated with traffic accidents not covered by auto insurance. Congestion and lost productivity from The Related's residential project comes to approximately \$8.6 million a year in losses; increased health costs from air pollution, \$4.6 million a year; traffic accident costs covered and not covered by insurance, more than \$11.5 million a year. In addition to this, the project will generate 18,000 tons of carbon dioxide emissions annually; adding to the world's global warming problems.

**Conclusion:** As noted at the outset the Draft Technical Memorandum states that "...the Proposed Modifications do not have the potential to generate *any new significant adverse...impacts not previously identified or analyzed in the FEIS*, and accordingly, no SEIS is required." (Emphasis again added) The key phrase is "*any new significant...impacts not*

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<sup>12</sup> Note that these totals could be drastically under-reported as demonstrated in Table 1 as discussed above.

<sup>13</sup> Table 93, Travel Time, Distance and Estimated Speed—By County Group—Auto Weekday Trips, Ibid, page 112

*previously identified...*” The 1998 traffic analysis for this project identified high traffic volumes along Route 17 with equally severe traffic impacts north and south of the site. The 2003 analysis essentially repeated these effects (albeit with slight modifications). The subject 2008 traffic analysis, the Traffic Impact Study Addendum, limits its traffic analysis to two nearby intersections plus the proposed entry points to the Tuxedo Reserve. It intentionally leaves out the project impacts at Route 17 and County Route 72, Route 17 and Washington Avenue, and Route 17 and NYS Route 17A, all of which currently exhibit peak hour traffic problems and for which earlier Tuxedo Reserve traffic analyses have demonstrated severe operating conditions. While these impacts may not have gotten worse than earlier reported (and that has not really been established) they are very significant and must be addressed in a supplemental traffic analysis. The only way to do this and to show the real effect of project traffic is to utilize a traffic simulation model.

We are proposing that the Tuxedo Reserve traffic consultant go beyond what has been presented to the Tuxedo community in the past and utilize traffic simulation software such as the Synchro/SimTraffic<sup>14</sup> to simulate traffic movement along the Route 17 corridor from south of County Route 72 to north of NYS Route 17A. No Build and Build conditions using traffic volumes to be agreed upon with the Tuxedo community’s traffic consultant should be used for AM and PM peak hours. Build conditions should be developed using the modified trip generation characteristics developed above for worst case conditions. Only by using traffic simulation can the community actually see the effects of project traffic along the length of the Route 17 corridor and measure the overall effects on travel behavior (travel time, delay, travel speeds, increased air pollution, etc. as well as Level of Service reported in earlier analyses).

The bottom line is that The Related Companies has very significantly under reported the impact of the Tuxedo Reserve project and the resulting traffic impacts along Route 17. Even utilizing their own numbers, this project will increase traffic along Route 17 by approximately 38% over existing conditions. Simply put, where backups occur now, it can be expected to get much worse with this project. However, it is our conclusion that the projected trips generated by this project have been underestimated by at least 90% for the PM peak hour and by 108% for the AM peak hour, which could result in a significant worsening of conditions over current conditions. A potential increase of this magnitude is not something that should be taken lightly, and given that this one project will in itself double the population of Tuxedo, it should neither be unexpected. Their analysis has also ignored the effects of project traffic on the number of traffic accidents the Tuxedo community will suffer along with the huge externality costs this project will impose on the community and on existing motorists traveling along Route 17. It is our strong opinion that the project must be reassessed by The Related Companies in cooperation with the Tuxedo community before any action is taken to move this project forward.

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<sup>14</sup> Synchro is a software application for optimizing traffic signal timing and performing capacity analysis. The software optimizes splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro performs capacity analysis using both the ICU and HCM methods. SimTraffic is software that performs micro simulation and animation of vehicle traffic. With SimTraffic, individual vehicles are modeled and displayed traversing a road network. SimTraffic models signalized and unsignalized intersections, and freeway sections with cars, trucks, pedestrians, and buses.

**TABLE 1**

**ESTIMATED TRIP GENERATION FROM TUXEDO RESERVE RESIDENTIAL DEVELOPMENT  
TUXEDO PARK, ORANGE COUNTY, NEW YORK**

**TRIP GENERATION RATES**

ITE CODE	PROJECT TYPE				VEHICLE TRIPS PER DWELLING UNIT (1)				
					AM PK HR	PM PK HR	SAT PK HR	WEEKDAY	SATURDAY
210	Single Family-Detached Housing	764	Units	Low	0.33	0.42	0.5	4.31	5.32
				High	2.27	2.98	1.75	21.85	14.72
				Avg.	0.77	1.02	0.94	9.57	10.09
230	Residential Condominium/Townhouse	293	Units	Low	0.15	0.18	0.14	1.83	1.17
				High	0.97	1.24	0.93	11.79	11.4
				Avg.	0.44	0.54	0.47	5.86	5.67
251	Elderly Housing -- Detached	139	Units	Low	0.19	0.17	NA	NA	NA
				High	0.45	0.95	NA	NA	NA
				Avg.	0.21	0.23	NA	NA	NA
814	Speciality Retail Center	30,000	SF	Low	5.4	4.59	NA	21.3	22.57
				High	8.85	5.75	NA	50.94	54.47
				Avg.	6.41	7.93	NA	40.67	42.04

(1) Except for Speciality Retail Center which reports trips per 1,000 gross square feet of retail space. Reference Institute of Transportation Engineers trip generation rates, ITE Trip Generation Manual

**ESTIMATED VEHICULAR TRIPS GENERATED BY PROJECT**

ITE CODE	PROJECT TYPE				VEHICLE TRIPS				
					AM PK HR	PM PK HR	SAT PK HR	WEEKDAY	SATURDAY
210	Single Family-Detached Housing	764	Units	Low	252	321	382	3,293	4,064
				High	1,734	2,277	1,337	16,693	11,246
				Avg.	588	779	718	7,311	7,709
				2008 Study (2)	347	494	603	5,942	6,247
230	Residential Condominium/Townhouse	293	Units	Low	44	53	41	536	343
				High	284	363	272	3,454	3,340
				Avg.	129	158	138	1,717	1,661
				2008 Study (2)	87	103	142	1,670	1,670
251	Elderly Housing -- Detached	138	Units	Low	26	23	NA	NA	NA
				High	62	131	NA	NA	NA
				Avg.	29	32	NA	NA	NA
				2008 Study (2)	36	57	0	964	964
814	Speciality Retail Center	30,000	SF	Low	162	138	NA	639	677
				High	266	173	NA	1,528	1,634
				Avg.	192	238	NA	1,220	1,261
				2008 Study (2)	13	28	37	322	375
	Farm Stand (2)	3,000	SF	2008 Study	20	38			
	Summation of ITE LU 210, 230, 251 and 814	1195	DU's	Low	458	511	423	4,468	5,084
		30,000	SF	High	2,284	2,813	1,609	21,676	16,220
				Avg.	910	1,175	856	10,249	10,631
				2008 Study (2)	503	720	782	8,898	9,256
	<b>Real Impact of the Proposed Project (5)</b>				<b>1,052</b>	<b>1,372</b>	<b>1,258</b>	<b>12,945</b>	<b>13,433</b>
	% Increase, Real Impact Over 2008 Traffic Study (6)				109%	90%	61%	45%	45%

(2) AM and PM peak hours adjusted from ITE as reported in Appendices (8/21/08) to the Traffic Impact Study Addendum and Note 4 below, number of residential units modified for latest "official" land use numbers. Farm Stand taken from same Appendix table (Tuxedo Reserve Trip Generation with Transit and Second Home Reductions dated 8/21/08).

(3) The actual reduction shown for the 2008 Study vs. ITE for a Speciality Retail Center is 93% for the AM peak hour and 88% for the PM peak hour.

(4) AM and PM peak hour trips for residential units reduced by 17% for second home owners and 10% for use of shuttle service to Tuxedo Park train station (0.83 x 0.9 = 0.75); Plus the trip generation from the Speciality Retail Center has been reduced by 75%.

(5) ITE Average Rates Adjusted Upwards by 40% Except for Retail which is assumed to be 25% of ITE. Estimated by B. Ketcham.

(6) The percent increase of the real impact versus the assumed impact in the Traffic Impact Study Addendum (e.g., ((1,052/503) - 1) X 100 = 109%).



## New York State Department of Transportation Traffic Count Hourly Report

ROUTE #:	NY 17	ROAD NAME:	17	FROM:	ROCKLAND CO LINE	TO:	RAMP TO STERLING MINE RD CR	COUNTY:	Rockland
DIRECTION:	Southbound	FACTOR GROUP:	30	REC. SERIAL #:	5153	FUNC. CLASS:	16	VILLAGE:	SLOATSBURG
STATE DIR CODE:	2	WK OF YR:	13	PLACEMENT:	.8 S of Orange County Line	NHS:	no	BIN:	1014060
DATE OF COUNT:	03/28/2007			@ REF MARKER:	17 85111008			JURIS:	NYS DOT
NOTES LANE 0:	Week 13-Sb			ADDL DATA:				CC Stn:	
				COUNT TYPE:	AXLE PAIRS			BATCH ID:	R08-r8conww13
COUNT TAKEN BY:	ORG CODE: TST INITIALS: JSV			PROCESSED BY:	ORG CODE: DOT INITIALS: jh			HPMS SAMPLE:	

DATE	DAY	AM												PM												DAILY TOTAL	DAILY HIGH COUNT	DAILY HIGH HOUR	
		12 TO 1	1 TO 2	2 TO 3	3 TO 4	4 TO 5	5 TO 6	6 TO 7	7 TO 8	8 TO 9	9 TO 10	10 TO 11	11 TO 12	12 TO 1	1 TO 2	2 TO 3	3 TO 4	4 TO 5	5 TO 6	6 TO 7	7 TO 8	8 TO 9	9 TO 10	10 TO 11	11 TO 12				
28	W																404	386	432	385	332	246	156	133	97	61			
29	T	20	23	24	39	166	561	1263	1623	1285	672	507	420	416	430	439	444	403	399	301	200	150	146	103	59	10093	1623	7	
30	F	32	24	22	43	156	536	1143	1367	1230	647	470	450	421	461	453	430	411	434	400	298	203	171	146	88	10036	1367	7	
31	S	50	45	29	35	56	178	339	424	502	481	530	515	516	513	525	510	505	492	443	350	234	169	161	106	7708	530	10	
1	S	58	42	23	16	25	85	161	189	257	413	442	541	500	520	504	469	451	378	311	258	177	129	108	60	6117	541	11	
2	M	29	29	26	44	153	515	1138	1451	1171	627	472	471	426	404	435	454	431	410	396									
3	T																												
4	W																												

AVERAGE WEEKDAY HOURS (Axle Factored, Mon 6AM to Fri Noon)															ADT									
26	24	23	40	158	539	1161	1455	1208	638	475	439	414	410	419	421	415	391	337	219	150	138	98	59	9657
DAYS Counted	HOURS Counted	WEEKDAYS Counted	WEEKDAY Hours	AVERAGE WEEKDAY		Axle Adj. Factor	Seasonal/Weekday Adjustment Factor	ESTIMATED (one way)																
				High Hour	% of day			AADT																
								9628																
5	125	2	59	1455	15%	0.983	1.003																	

ROUTE #:	NY 17	ROAD NAME:	17	FROM:	ROCKLAND CO LINE	TO:	RAMP TO STERLING MINE RD CR	COUNTY:	Rockland
STATION:	850010	STATE DIR CODE:	2	PLACEMENT:	.8 S of Orange County Line	DATE OF COUNT:	03/28/2007		

**TABLE 2B**

# New York State Department of Transportation

## Traffic Volume Report

County Order	End Mile Point	Count LOC Reference Marker	Section Length	Section End Description	LATEST COUNT		-----PREVIOUS COUNTS-----						Count Station Number	YR
					EST AADT	YR	EST AADT	YR	EST AADT	YR	EST AADT	YR		
<b>Route NY17 County 105 SULLIVAN</b>					<b>Region 09</b>									
9	45.50	17 96091437	02.05	ACC CR 61 EXIT 116 EB	22650	**	21630	04	20980	01	24590	98	0034	
9	45.74	17 96091457	00.24	ORANGE CO LINE	35200	08	35640	07	32190	05	28020	01	0070	
<b>Route NY17 County 071 ORANGE</b>					<b>Region 08</b>									
10	00.36	17 96091459	00.36	RT 17K	35200	08	35640	07	32190	05	28030	01	0040	
10	04.63	17 83101005	04.27	RT 302	32950	08	33780	07	31710	06	33020	05	0164	CC
10	07.36	17 83101048	02.73	RT 211	40840	**	40040	07	40270	04	39300	02	0165	
10	08.28	17 83101075	00.92	ACC RT 84I EAST	62520	**	59010	05	46930	99	45040	97	0064	
10	12.36	17 83101084	04.08	START RTS 6 & 17M OLAPS	52040	**	51030	07	55180	04	45640	01	0166	
10	12.75	17 83101124	00.39	RTS 207 & 17A	65510	**	53780	97	44010	96			0009	
10	13.33	17 83101128	00.58	END RT 17M OLAP	55320	**	47750	00	45800	97			0010	
10	16.82	17 83101134	03.49	ACC RTS 94 & 17M CHESTER	61080	**	54590	02	47540	99	38270	96	0011	
10	18.65	17 83101169	01.83	ACC RT 17M CHESTER	51840	**	43990	99	43080	96			0004	
10	22.15	17 83101187	03.50	RT 208 MONROE	56700	08	58550	07	58090	06	57760	05	0002	CC
10	25.11	17 83101222	02.96	END RT 6 OLAP	42660	**	41830	07	46810	96			0025	
10	25.70	17 83101252	00.59	RT 32	51750	**	49780	06	44680	03	41230	00	0098	
10	25.89	17 83101257	00.19	ACC RT 87I HARRIMAN RT 984C	50770	**	47920	05	34310	01	24570	97	0026	
10	26.88	17 83101260	00.99	RT 17M E JCT HARRIMAN	11110	**	11040	07	11700	04	10560	01	0136	
10	31.50	17 83101269	04.62	CR 19 OLD ORANGE TPK	6970	08	6820	05	7310	02	11490	99	0068	
10	32.75	17 83101316	01.25	RTS 210 17A	11380	**	11290	07	10890	01	10750	98	0167	
10	36.40	17 83101329	03.65	ROCKLAND CO LINE	25960	**	25750	07	18230	04	16070	01	0169	
<b>Route NY17 County 087 ROCKLAND</b>					<b>Region 08</b>									
11	02.08	17 83101365	02.08	RAMP TO STERLING MINE RD CR 72	19730	**	19610	07	20100	04	18580	01	0010	
11	03.40	17 85111021	01.32	RAMP TO RT 59	33540	**	32720	06	34010	02			0039	
11	03.86	17 85111035	00.46	EXIT 15 RT 87I SOUTH	4530	**	4470	07	4330	04	3530	01	0170	
11	05.76	17 85111041	01.90	START RT 287I OLAP	3520	**	3470	07					0168	
11	05.87		00.11	END RT 287I OLAP NEW JERSEY STATE LINE	112660	**	110000	07					0002	
<b>Route NY17A County 071 ORANGE</b>					<b>Region 08</b>									
1	00.00		00.00	RTS 6 & 17 & 207 GOSHEN										
1	02.33	207 83011001	02.33	CR 6 PULASKI HWY	12710	**	12540	06	12890	99	10750	96	0671	
1	04.49	17A83011023	02.16	START RT 94 OLAP FLORDIA	10860	**	10720	06	11490	03	10160	00	0135	
1	10.22	17A83011044	05.73	CR 13 KINGS HWY	8100	08	6560	02	7870	99	6500	96	0363	
1	10.99	17A83011101	00.77	END RT 94 OLAP WARWICK	11820	08	9120	05	10280	02	9870	99	0090	
1	17.30	17A83011109	06.31	JCT RT 210	6780	08	7880	03	6510	00	6080	97	0148	
1	24.76	17A83011172	07.46	RT 17 END RT 17A	8150	**	8100	07	9220	06	7860	03	0150	
<b>Route NY17B County 105 SULLIVAN</b>					<b>Region 09</b>									
1	00.00		00.00	RT 97 CALLICOON										
1	01.22	17B96011000	01.22	CR 121 HORTONVILLE	3320	08	2840	05	2770	02	2770	99	0038	
1	01.75	17B96011013	00.53	CR 164 HORTONVILLE	2110	**	2140	06	2680	03	2040	00	0039	

## TABLE 4

### ESTIMATION OF THE NUMBER OF TRAFFIC ACCIDENTS ANNUALLY GENERATED BY 32.5 MILLION VMT NEAR THE PROPOSED TUXEDO RESERVE PROJECT, 2020 (1)

<b>ACCIDENT TYPE</b>	<b>RATE/100 MIL VMT (2)</b>	<b>NUMBER OF ACCIDENTS</b>	<b>EXTERNAL COSTS (3)</b>
<b>Fatal Accidents</b>	<b>1.5</b>	<b>0.5</b>	<b>\$2,496,410</b>
<b>Incapacitating Injury Accidents</b>	<b>41</b>	<b>13</b>	<b>\$4,685,270</b>
<b>Serious Injury Accidents</b>	<b>81</b>	<b>26</b>	<b>\$1,846,251</b>
<b>Minor Injury Accidents</b>	<b>150</b>	<b>49</b>	<b>\$1,816,181</b>
<b>Property-Damage-Only Accidents</b>	<b>540</b>	<b>176</b>	<b>\$694,454</b>
<b>TOTAL NUMBER OF ACCIDENTS EACH YEAR</b>		<b>264</b>	<b>\$11,538,565</b>

(1) 32.6 million miles of travel estimated assuming 10,000 trips per day times 365 days times 8.9 miles per vehicle trip; as shown elsewhere this is probably 30% below is likely given project demographics.

(2) Rates based on accident data provided by NYMTC in their 2006 Transportation Safety Statistical Report adjusted for national figures presented in the NHTSA's Traffic Safety Facts 2006.

(3) Based on costs reported in "SafetyAnalyst: Software Tools for Safety Management of Specific Highway Sites, White Paper for Model 3-Economic Appraisal and Priority Ranking," prepared for FHWA by Midwest Research Institute, 2002, adjusted to 2017 dollars.

Brian Ketcham Engineering, PC, December 26, 2009

**TABLE 5**

**ANNUAL EXTERNALITY COSTS OF THE TUXEDO RESERVE, 2020  
SUMMARY OF RESULTS**

	<b>Externality Costs</b>
<b>Pavement Wear &amp; Tear</b>	<b>\$1,028,838</b>
<b>Air Pollution (1)</b>	<b>\$4,556,282</b>
<b>Noise Impacts</b>	<b>\$783,877</b>
<b>Accident Costs, Internal</b>	<b>\$7,423,178</b>
<b>Accident Costs, External</b>	<b>\$4,115,822</b>
<b>Added Travel Time (Congestion) Costs</b>	<b>\$8,622,642</b>
<b>TOTALS</b>	<b>\$26,530,639</b>

(1) Traffic generated by the Tuxedo Reserve project will generate about 18,000 tons of CO2 emissions annually (cost not quantified).

**Brian Ketcham Engineering, PC, December 28, 2009**