Memorandum

To: National Parks Conservation Association
From: Norman L. Marshall and Lucinda E. Gibson, P.E.
Subject: Review of Traffic Impact Study
Date: June 5, 2007

Summary

We have reviewed the "Old Standard LLC Quarry Traffic Impact Study", prepared by Greenhorne & O'Mara Consulting Engineers for Old Standard LLC, revised January 16, 2007. This memo documents significant errors and omissions in the traffic impact study. Most seriously, the study focuses all of its attention on the four-lane section of US 340 and its capacity to handle larger traffic volumes, and ignores the impacts of the proposed project on the two-lane section of US 340 immediately to the east. As demonstrated below, this section of roadway would reach a failing level-of-service F using the traffic volumes in the traffic impact study. Furthermore, the future traffic numbers used in the study are too low, so the true impacts are even greater.

Significant Impacts Identified in Traffic Impact Study

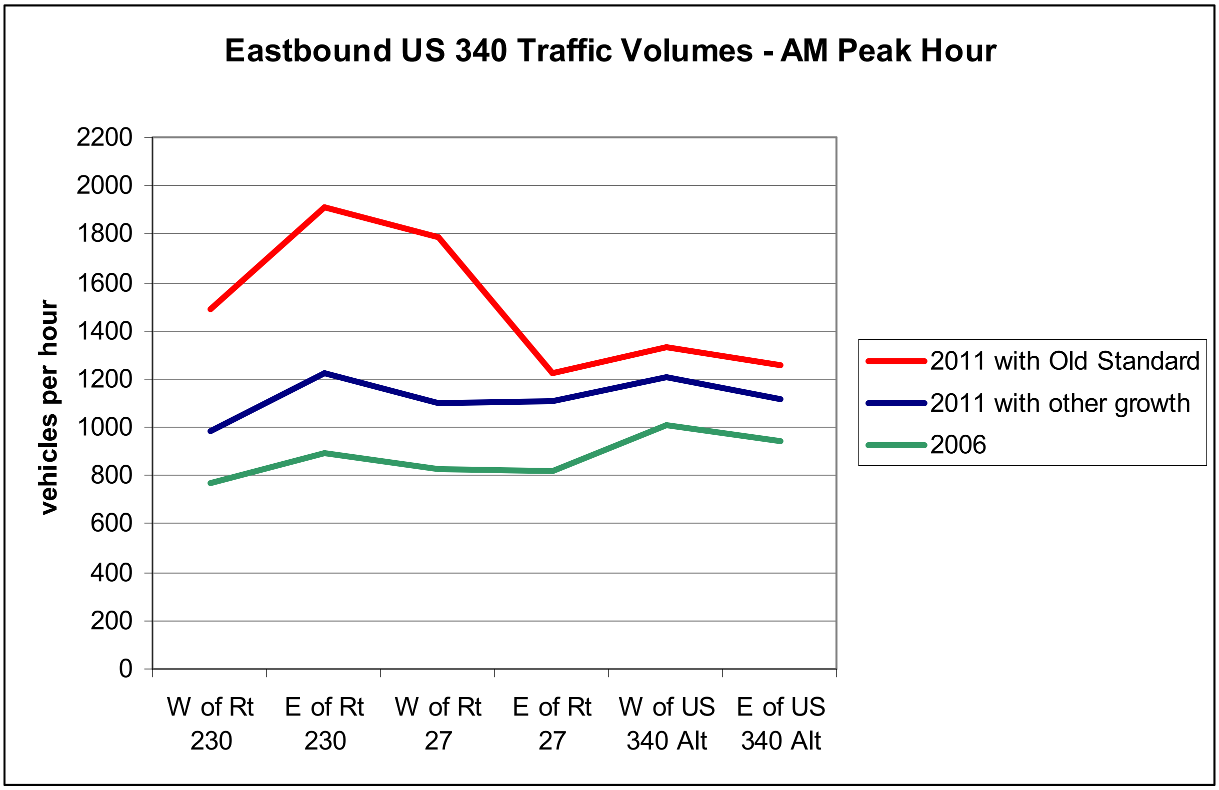
The traffic impact study (Table 4, p. 12) estimates that the proposed development will result in 16,227 new trips, with 2,171 new trips in the morning peak hour, and 2,093 new trips in the afternoon peak hour. The traffic impact study documents that proposed development would result in great increases in Route 340 traffic volumes during the peak hours.

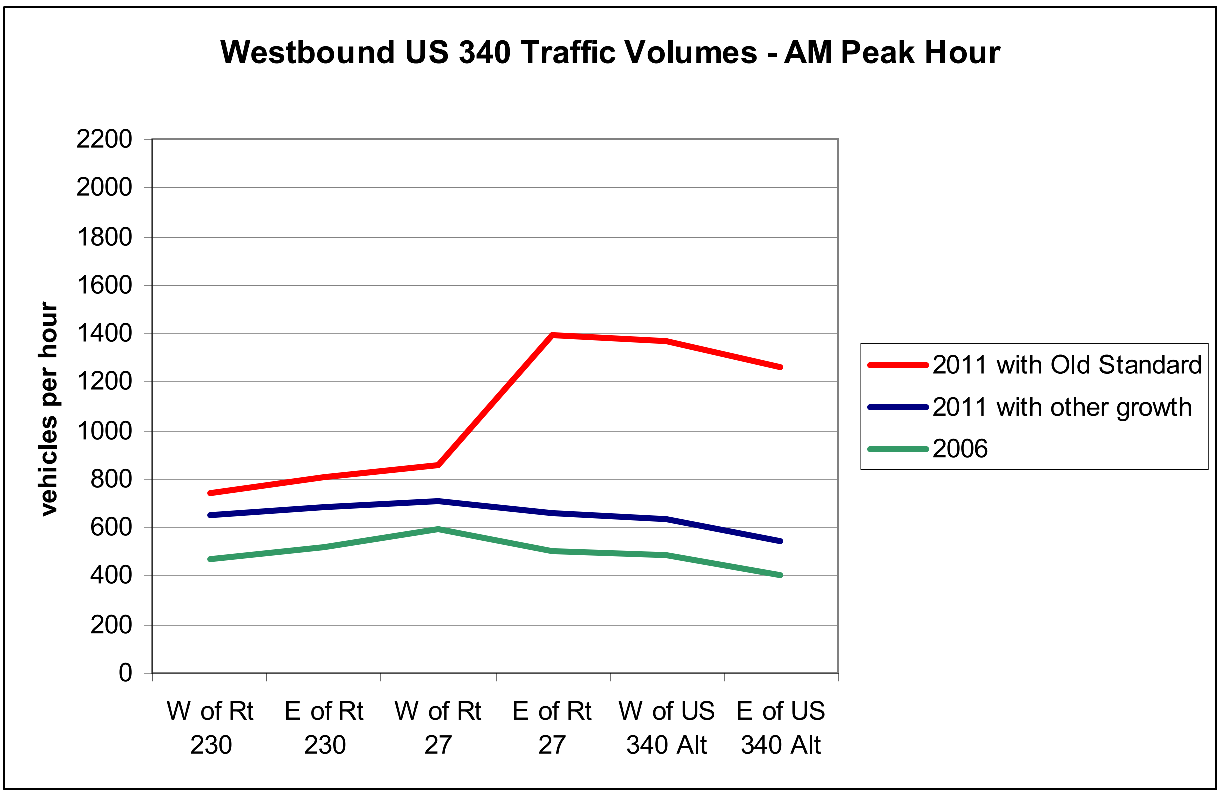
> *Overall, at full buildout this development is expected to add approximately 6,500 VPD [vehicles per day] to US 340 east of Route 27 and approximately 4,550 VPD west of Route 230. Route 230 will experience an increase of approximately 1,620 VPD and Route 9 south of Route 27 will increase approximately 2,430 VPD.*
> (traffic study, p. 12)

US 340 traffic volume estimates taken from the traffic impact study are graphed in Figures 1 and 2. These figures compare the counted 2006 traffic volumes, estimated 2011 traffic volumes with other planned projects and background traffic growth, and 3) 2011 with the Old Standard project.

The traffic impact study assumes that a traffic signal will be installed at the US 340/Route 230 intersection as part of the Sheridan Subdivision. The Old Standard project would require installation of traffic signals at the US 340/Route 27 intersection and at the northernmost project access with Route 27. Analysis in the traffic impact study also indicates that a signal will be warranted at the Route 9/Route 27 intersection (p. 15). The traffic impact study describes US 340 as "a major four lane regional highway" and notes in error that the "posted speed limit in the vicinity of the site is 65 m.p.h." (p. 1). The speed limit west from the light at Bolivar Heights is 60 m.p.h., and from Bolivar Heights east is 45 m.p.h. A 60 m.p.h. speed limit is unsafe for a strip of highway with closely spaced signals and large turning movement volumes at the signalized intersections. The proposed development will significantly change the character of US 340 in this area.

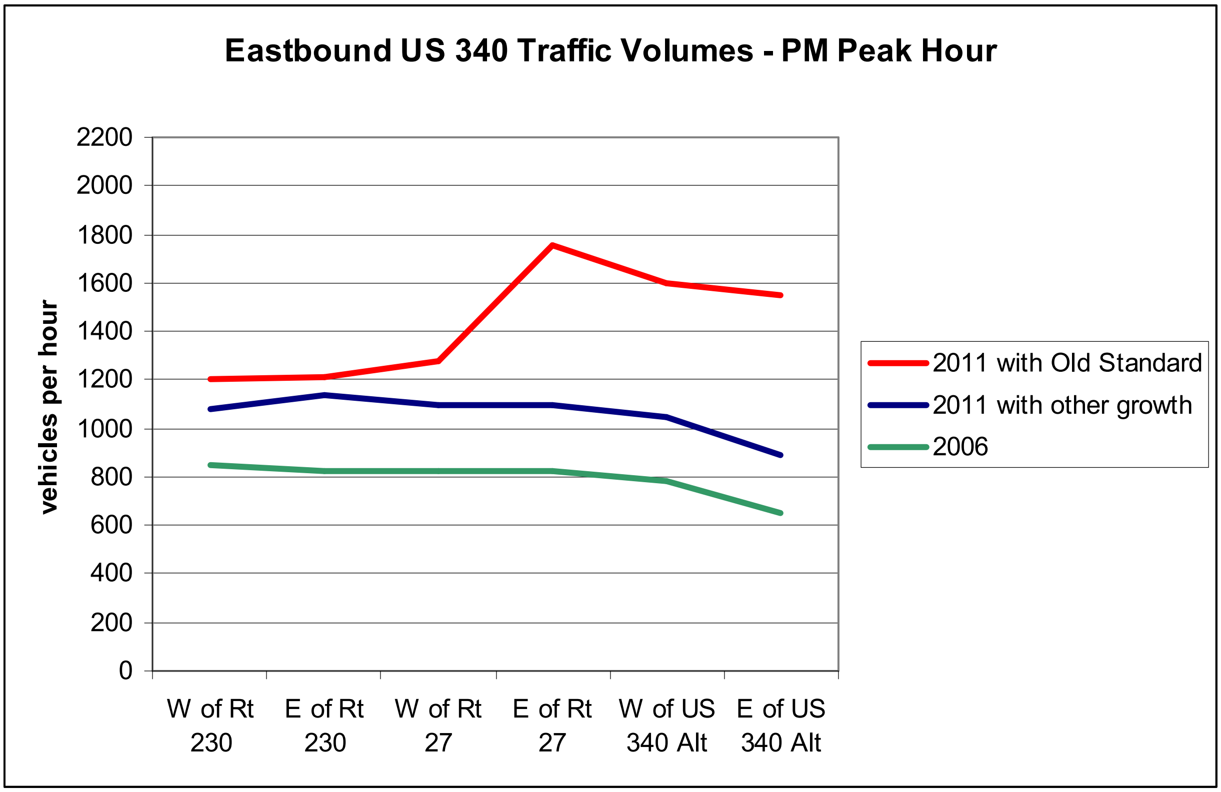
Figure 1: Morning Peak Hour Traffic Volumes from Old Standard Traffic Impact Study

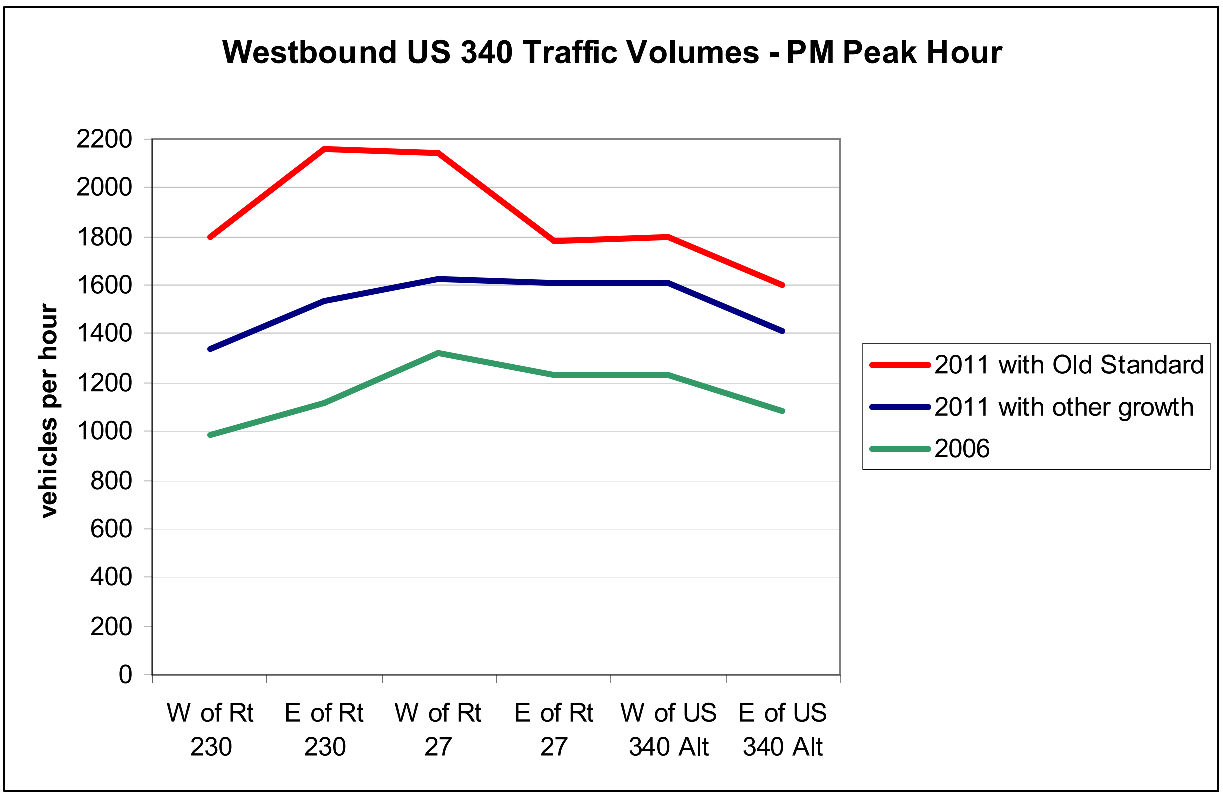




Notes: Traffic volumes taken directly from “Old Quarry Traffic Impact Study”, Greenhorne & O’Mara Consulting Engineers, January 16, 2007, Figures 3, 6 and 9. 340 Alt is at Bolivar Heights stoplight.)

Figure 2: Afternoon Peak Hour Traffic Volumes from Old Standard Traffic Impact Study





Notes: Traffic volumes taken directly from "Old Quarry Traffic Impact Study", Greenhorne & O'Mara Consulting Engineers, January 16, 2007, Figures 3, 6 and 9. 340 Alt is at Bolivar Heights stoplight.)

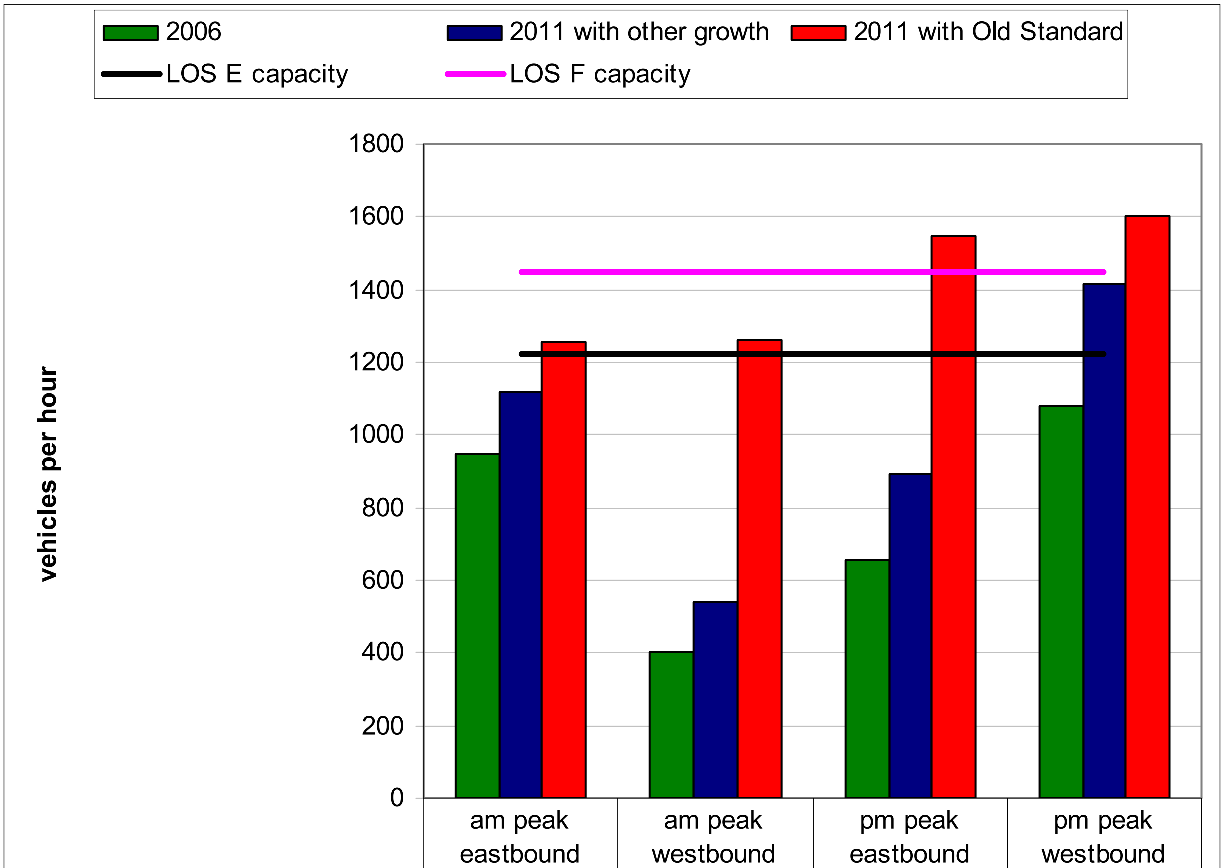
Significant Impacts Not Disclosed in Traffic Impact Study

The traffic impact study focuses on the four-lane section of US 340.The four-lane section begins just to the east of the signalized intersection of US 340 with US 340 Alt at Bolivar Heights. To the east, US 340 is a two-lane roadway including a bridge over the Shenandoah River reconstructed in 2000.

Figure 3: US 340 Four-Lane and Two-Lane Sections Including Bridge Over Shenandoah River

By focusingon providing adequate levels of service where it is relatively easy to do it – on the four-lane section, and ignoring the effect of increased traffic volumes on the two-lane section, the traffic study dramatically understates the impact of traffic generated by the proposed development on area traffic. We have taken the numbers from the traffic impact study and entered them into Highway Capacity Software (the same program used in the traffic impact study) and determined that the traffic volumes exceed the maximum number of vehicles that could pass through that section in an hour. This represents a failing level-of-service "F". At level-of-service F, traffic is stop-and-go and the queues of backed up traffic will grow longer over time, not just on some weekdays but on all weekdays.

Figure 4: US 340 Peak Hour Traffic Volumes East for 2-Lane Section



	am peak eastbound	am peak westbound	pm peak eastbound	pm peak westbound
2006	945	400	655	1080
2011 with other growth	1115	540	890	1415
2011 with Old Standard	1255	1260	1545	1600
LOS E capacity	1220	1220	1220	1220
LOS F capacity	1450	1450	1450	1450

Notes: At the threshold of level-of-service E, cars are following another car in front of them at least 80 percent of time at speeds less than or equal to 40 m.p.h. At level-of-service F, cars are following another car in front of them 100 percent of time, generally in stop-and-go traffic. The higher that traffic volumes are above level-of-service F capacity, the farther the traffic backs up and the longer it will take to clear.

This is a fatal flaw with the proposed development. The traffic network is only as strong as the weakest link. Because of the over-capacity level-of-service F conditions described above, **the traffic volumes shown in the traffic study will not even reach the intersections analyzed in the traffic impact study. Many of the cars will be stuck in Virginia.**

Furthermore, Figure 4 understates the magnitude of the problem due to other problems with the traffic impact statement, including:

- apparently omitting counted trucks from the analysis,
- relying on summer Friday counts, in contrast to standard industry protocols because so doing likely underestimates average conditions,
- basing the traffic study on traffic generated by two large buildings (one of 858,000 square feet and the other (the flex space) of 520,000 square feet plus warehouse and hotel space, instead of the proposed approximately 16 separate smaller office buildings, and
- ignoring uncertainty in future trip generation and background traffic.

Problems with Traffic Counts/"Existing Conditions" Analysis

It appears that existing truck traffic[1] was incorrectly omitted from both the Existing Conditions analyses and all future analyses. Appendix A includes traffic count printouts for counts done by Sabra, Wang & Associates Inc. For most of the intersections Appendix A includes two sets of count information, with each set numbered pages 1-6. The traffic impact study uses the first set, labeled, cryptically "Unshifted." The second set (not used in the traffic impact study) is labeled "Unshifted – TRUCKS." Without looking at the numbers, one might conclude that this second set includes truck counts only. However, the numbers in the second set are somewhat higher than the first set, and the magnitude of the difference is consistent with adding trucks. Therefore, it appears that the first set includes cars only, and that the second set (including trucks) should have been used in the level-of-service analyses. For example, at the US 340 /US 340 Alt intersection, the eastbound approach volume used in the traffic impact study was 1009 vehicles between 7 a.m. and 8 a.m. When trucks are included, the total approach volume is 1077. This implies that 6.3 percent of the vehicles are trucks, which appears to be reasonable. For the westbound approach, the numbers with and without trucks are 395 and 458, respectively. This implies 13.8 percent trucks, which is also reasonable. The truck traffic volumes are similar in both directions, but the passenger traffic volume is much higher in the eastbound direction.

There is another problem with ignoring trucks in the analyses in LOS analysis. Highway capacity analysis is done on the basis of "passenger car equivalents" where each truck consumes more roadway capacity than each car. If trucks were not considered in entering the volumes in the Highway Capacity Software worksheets, it is unlikely that the percentage trucks were entered. This would mean either that the level-of-service analyses assumed that there were no trucks, or that there were a nominal default number of trucks. Neither of these would be correct, and the level-of-service analyses would overestimate the levels of service.

---

[1] When trucks counts are done, the rules used generally exclude pickup trucks. A common rule is to count trucks with more than four tires.

There also are problems with the estimates of existing car traffic, which are based on traffic counts for Friday, August 4, 2006. The West Virginia Department of Transportation specifies that counts be done on Fridays, but this is contrary to national practice. For example, the Institute of Transportation Engineers' (ITE) book Transportation Impact Analyses for Site Development (2006) specifies;

> … peak period (site and street peaks) turning movement counts (in good weather, usually excluding Mondays and Fridays, when school is in session; otherwise, summer counts are acceptable, but may need to be "seasonally" adjusted); (p. 19)

The rationale for excluding Mondays and especially, Fridays, is that traffic patterns may be significantly different from the other weekdays. This is especially true in the summer, when taking three-day weekends is common. This problem is aggravated because early August is likely to be the peak vacation time of the entire year. Many regular commuters likely did not commute on August 4, 2006, and many who did commute that day may have shifted their travel times. For the intersection of US 340/US 340 Alt (the most important intersection in this critique), the peak 15 minutes counted in the morning was the first 15 minutes (7:00 -7:15 a.m.) This suggests that a significant number of commuters may have shifted their commute earlier, and that the peak hour may not have been counted at all. There also is an anomaly in the afternoon count at this location, where the 5:00 – 5:15 p.m. 15-minute period had the lowest traffic observed between 4 p.m. and 6 p.m. It seems likely that August 4, 2006 was an atypical traffic day, and that observed traffic volumes were likely lower than average, particularly during the morning peak hour.

The ITE excerpt quoted above also mentioned the possibility of seasonal adjustments. Traffic volumes vary by time of year and day of week. Design is typically done for the "design hour" – most commonly the thirtieth highest hour of the year.[2] The design hour concept is based on balancing the need to provide adequate levels of service for most days against the cost that might be necessary to provide adequate levels of service during peak traffic flows. The traffic impact study does not discuss traffic variation or attempt to estimate design hour traffic volumes.

Traffic count contracts done for public agencies interested in average traffic volumes often specify that counts be done only when school is in session and only on Mondays, Tuesdays, Wednesdays and Thursdays. The summer months and all Fridays are considered unrepresentative of average conditions.

It is likely that the morning commuting traffic volume was unusually low on August 4, 2006 due to some workers taking vacation and others taking long weekends. It is also likely that the summer commutes may occur earlier in the day than during the majority of the year. For the US 340/US 340 Alt intersection, the peak 15-minute period between 7 a.m. and 9 a.m. (the period counted) was between 7:00 and 7:15 a.m. Therefore, we cannot even know for sure whether the peak hour really was between 7:00 and 8:00 a.m. as assumed. It may have been earlier on that day. Similarly, the afternoon peak 15 minutes observed between 4 p.m. and 6 p.m. was the first hour – 4:00 – 5:00 p.m. Not only do these August 4, 2006 counts not represent design hour conditions, they are likely to represent a below-average condition.

---

[2] A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 5th edition, 2004, p.59.

The traffic counts/Existing Conditions analysis is the base for all of the other analyses. If the analyzed traffic volumes are too low due to omitting trucks and not considering an appropriate design period, all of the other analyzed volumes also are too low, and the future levels of service are overestimated.

Trip Generation Error

The trip generation equations are estimated from traffic counts across the U.S. The land use category generating most of the daily trips estimated in the traffic impact study is labeled "General Office Building" in the Institute of Transportation Engineers' *Trip Generation*. The traffic impact study treats the office space as two very large, standalone office buildings – one of 858,000 square feet and the other (the flex space) of 520,000 square feet. Very few of the counts in the Trip Generation data set exceed 858,000 square feet. In general, the few large office buildings in the data set have lower trip rates, on average, than the smaller office buildings. This results in a fitted equation where large buildings are estimated to produce less traffic than the same space in smaller buildings.

The preliminary plans accompanying the traffic impact study imply that the plans are for a number of individual buildings rather than two large office buildings. The guidance in Trip Generation is:

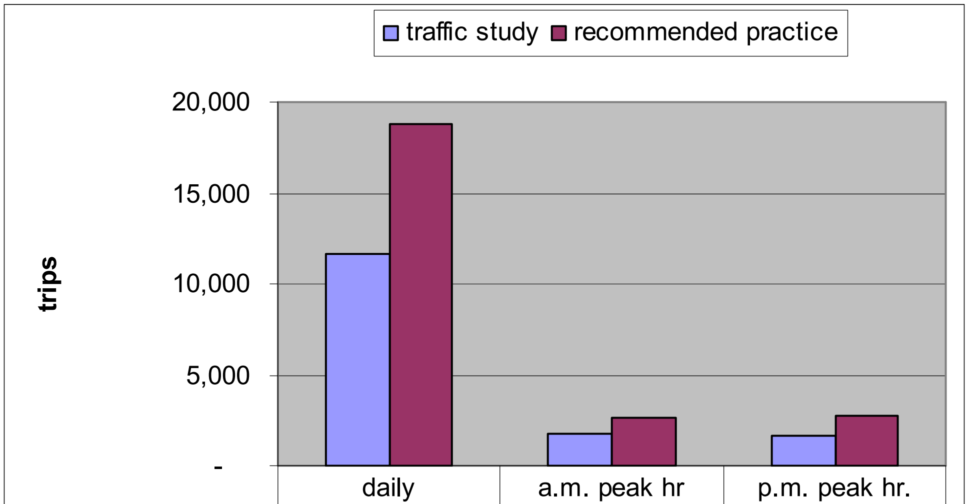
> When the buildings are interrelated by shared parking facilities or the ability to easily walk between buildings) or house one tenant, it is suggested that the total area or employment of all the buildings be used for calculating the trip generation. When the individual buildings are isolated and not related to one another, it is suggested that the trip generation be calculated for each building separately and then summed.[3]

No evidence has been put forward that the buildings would house a single tenant or share facilities. Therefore, trip generation should have been estimated for separate buildings and added together. The plan indicates that about 16 office buildings may be constructed. Adding the office space (845,000 sq. ft.) and flex space (520,000 sq. ft.) gives a total of 1,365,000 square feet; dividing this total by 16 results in 85,313. ft. per building. Figure 5 summarizes trip generation for 16 separate 85,313 square foot buildings versus the trip generation numbers in the traffic impact study. By using two large buildings instead of the 16 smaller buildings currently proposed to model the traffic impacts, the traffic impact study shows lower impacts because a number of smaller buildings is estimated to generate more traffic than the same amount of commercial/office space contained in one or two large buildings."

---

[3] Institute of Transportation Engineers. Trip Generation, 6th Edition, p. 1043, 1997.

Figure 5: Recalculated Trip Generation for Office Use Following Recommended Practice in Trip Generation



	daily	a.m. peak hr	p.m. peak hr.
traffic study	11,648	1,735	1,686
recommended practice	18,795	2,629	2,799

As shown in Figure 5, the recommended practice of calculating trip generation for separate office buildings results in 7,100 more daily trips, 900 more morning peak hour trips, and 1,100 more afternoon peak hour trips than assumed in the traffic impact study. However, even this is not the worst case scenario. The methodology in *Trip Generation* gives average trip generation rates, and there is considerable variation around this mean. In general, it can be expected that actual trip generation will exceed the calculated rates 50 percent of the time and be lower than the calculated rates 50 percent of the time. Therefore, the actual rates could be significantly higher even that the rates shown in Figure 5.

The numbers above address only the office and flex space components of the proposed development, and need to be added together with trip generation for the hotel, restaurant and warehouse uses. The grand totals, using the trip generation estimates in the traffic study for the other uses, are:

- daily 23,374 trips,
- morning peak hour 3,064 trips, and
- afternoon peak hour 3,218 trips

Future Conditions if the Old Standard Project is Built

As documented above, the traffic impact study is seriously flawed because it:

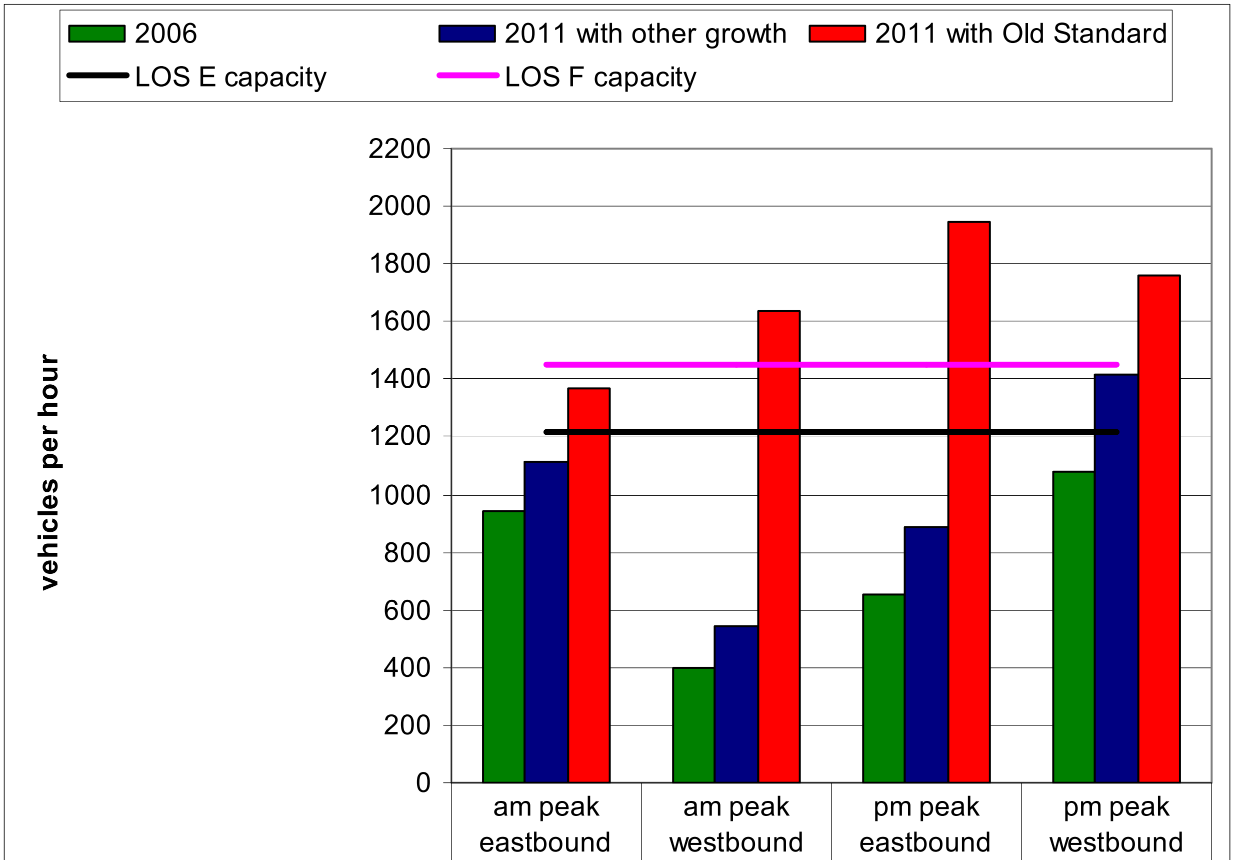
- appears to omit counted trucks from the analyses,
- bases the analyses on uncharacteristically low traffic counts,
- models traffic from two large buildings rather than the 16 proposed, and
- underestimates office trip generation by failing to follow recommended procedures.

Most seriously, the study focuses all of its attention on the four-lane Section of US 340 and its capacity to handle larger traffic volumes, and ignores the impacts of the proposed project on the two-lane section of US 340 immediately to the east. As discussed above, this section of roadway would reach a failing level-of-service F, even using the traffic volumes in the traffic impact study. Figure 6 below shows the impacts on the two-lane section of US 340 with corrections for the omitted trucks and the underestimated office trip generation. (No adjustment has been made for the likely underestimation of existing traffic volumes; correcting for this likely error would make the results even worse, particularly for the morning peak hour.)

In Figure 6, the traffic volumes with Old Standard (red) total to over twice today's traffic volumes (green) in both the morning and afternoon peak hours. Traffic volumes are shown as significantly in excess of level-of-service F capacity in both directions in the afternoon peak hour, and in the westbound direction during the morning peak hour. The morning peak eastbound volume shown also is very close to level-of-service F capacity, and would likely be shown to exceed it if base traffic had been counted on a more typical commuting day than on a Friday in August. The increases are particularly great in the reverse commute direction (i.e. from Virginia in the morning and returning to Virginia in the afternoon). This reflects the traffic impact study assumption that 40 percent of the workers will be coming from east of Harpers Ferry.

Traffic volumes analyzed in the traffic study are too low due to the four factors described above. Therefore, the level-of-service analyses in the traffic impact study are invalid. However, it is not useful to redo the analyses because the corrected traffic volumes cannot reach the analyzed intersections in the four-lane section because the traffic volumes are too high to pass through the two-lane section of US 340. Unless it is assumed that the roadway and bridge will be widened, it is invalid to assume such high traffic volumes on the four-lane section.

Figure 6: US 340 Peak Hour Traffic Volumes for 2-Lane Section (with omitted trucks and corrected Office trip generation)



	am peak eastbound	am peak westbound	pm peak eastbound	pm peak westbound
2006	945	400	655	1080
2011 with other growth	1115	540	890	1415
2011 with Old Standard	1365	1636	1943	1757
LOS E capacity	1220	1220	1220	1220
LOS F capacity	1450	1450	1450	1450

Notes: At the threshold of level-of-service E, cars are following another car in front of them at least 80 percent of time at speeds less than or equal to 40 m.p.h. At level-of-service F, cars are following another car in front of them 100 percent of time, generally in stop-and-go traffic. The higher traffic volumes are above level-of-service F capacity, the farther the traffic backs up and the longer it will take to clear.

.

Resume

NORMAN L. MARSHALL, Principal

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Envision Central Texas Vision (5-countyregion)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for "choice" riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model's sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Burlington (Vermont) Transportation Plan – Leading team developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Georgia Intercity Rail Plan (Georgia DOT)—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Roadway Corridor Planning

State Routes 5 & 92 Scoping Phase (NYSDOT) —evaluated TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Twin Cities Minnesota Area and Corridor Studies (MinnDOT)—improved regional demand model to better match observed traffic volumes, particularly in suburban growth areas. Applied enhanced model in a series of subarea and corridor studies.

Developing Regional Transportation Model

Pease Area Transportation and Air Quality Planning (New Hampshire DOT)—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Syracuse Intermodal Model (Syracuse Metropolitan Transportation Council)—developed custom trip generation, trip distribution, and mode split models for the Syracuse Metropolitan Transportation

Council. All of the new models were developed on a person-trip basis, with the trip distribution model and mode split models based on one estimated logit model formulation.

Portland Area Comprehensive Travel Study (Portland Area Comprehensive Transportation Study)—Travel Demand Model Upgrade—enhanced the Portland Maine regional model (TRIPS software). Estimated person-based trip generation and distribution, and a mode split model including drive alone, shared ride, bus, and walk/bike modes.

Chittenden County ISTEA Planning (Chittenden County Metropolitan Planning Organization)—developed a land use allocation model and a set of performance measures for Chittenden County (Burlington) Vermont for use in transportation planning studies required by the Intermodal Surface Transportation Efficiency Act (ISTEA).

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions, and making recommendations for future practice.

Trip Generation Characteristics of Multi-Use Development (Florida DOT)—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Critiques

C-470 (Denver region) – Reviewed express toll lane proposal for Douglas County, Colorado and prepared reports on operations, safety, finances, and alternatives.

Intercounty Connector (Maryland) – Reviewed proposed toll road and modeled alternatives with different combinations of roadway capacity, transit capacity (both on and off Intercounty Connector) and pricing.

Foothills South Toll Road (Orange County, CA) – Reviewed modeling of proposed toll road.

I-93 Widening (New Hampshire) – Reviewed Environment Impact Statement and modeling, with a particular focus on induced travel and secondary impacts, and also a detailed look at transit potential in the corridor.

Stillwater Bridge – Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

Indiana I-69 – Reviewed model analyses from Indiana statewide travel demand model of proposed new Interstate highway for coalition, including the Environmental Law and Policy Center of the Midwest.

Washington, DC region – Reviewed modeling of Potomac River bridge crossings.

Phoenix, Arizona – Reviewed conformity analyses and long-term transportation plan under contract to Tempe, a municipality in the Phoenix region.

Atlanta, Georgia – Critiqued conformity analyses and long-term transportation plan for an environmental coalition.

Daniel Island (Charleston, South Carolina) – Reviewed Draft Environmental Impact Statement for large proposed Port expansion (the "Global Gateway") for an environmental coalition.

Houston, Texas– Analyzed conformity analyses and long-term transportation plan for an environmental coalition.

PUBLICATIONS AND PRESENTATIONS (partial list)

Sketch Transit Modeling Based on 2000 Census Data with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, "Transit Management, Maintenance, Technology and Planning", p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, "Travel Demand 2005", p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation's Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

Subarea Modeling with a Regional Model and CORSIM" with K. Kaliski, presented at Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.

New Distribution and Mode Choice Models for Chicago with K. Ballard, Transportation Research Board Annual Meeting, Washington DC: January 1998.

"Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions" with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Multimodal Statewide Travel Demand Modeling Within a GIS with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Linking a GIS and a Statewide Transportation Planning Model, with L. Barbour and Judith LaFavor, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Land Use, Transportation, and Air Quality Models Linked With ARC/INFO. with C. Hanley, C. Blewitt, and M. Lewis, Urban and Regional Information Systems Association (URISA) Annual Conference,: San Antonio, TX, July 1995.

Forecasting Land Use Changes for Transportation Alternative with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods, Seattle WA, April 1995.

Forecasting Land Use Changes for Transportation Alternatives, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board),: Seattle WA, April 1995.

Integrated Transportation, Land Use, and Air Quality Modeling Environment with C. Hanley and M. Lewis Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board
Member, American Planning Association
Member, Congress for the New Urbanism
Technical Advisory Committee Member and past Board Member, Vital Communities (VT/NH)

Resume

LUCINDA GIBSON, PE, Principal

lgibson@smartmobility.com

EDUCATION

- Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1988
- Bachelor of Science in Civil Engineering, University of Vermont, Burlington, VT, 1983

SELECTED PROFESSIONAL EXPERIENCE:

Ms. Gibson helped found Smart Mobility, Inc. in 2001 and is its Vice President. Prior to this, she was employed for 7 years at the Two Rivers-Ottauquechee Regional Commission as a Senior Transportation Planner, and the for the previous 6 years at Resource Systems Group, Inc. Her current work at Smart Mobility focuses on context sensitive and multi-modal traffic engineering, preparing alternative transportation solutions for conventional roadway projects, and preparing comprehensive, multimodal community transportation plans. This work includes bicycle and pedestrian planning and design, scenic byway corridor planning, and moving beyond conventional traffic engineering by addressing traffic congestion through improving transportation networks, consideration of land use and development patterns, and broadening the range of options in terms of both routes and modes.

Representative Project Experience

Two Lane Plan for PA Route 41—Prepared conceptual plan alternative to a Four lane limited access widening proposed by Pennsylvania DOT for PA Route 41 through Chester County, PA. Used RODEL for roundabout analysis and design, and VISSIM for developing corridor-wide measures and informational display. Sub-contracted with Barry Crown of Rodel Software, and Faber Maunsell, UK Distributors of VISSIM. Plan is currently under review by PennDOT for consideration as an alternative.

Halfmoon, NY Transportation Analysis and Plan-As part of a project team with Behan Planning Associates to develop an innovative plan for hamlet and mixed use center development in a rapidly growing suburb outside Albany, NY. Plan elements included improves street connectivity within proposed growth areas, pedestrian oriented designs and in the hamlet and mixed use areas, and illustrating access management concepts for the main highway corridors.

Transportation Plan for Montpelier, Vermont—Comprehensive, multimodal transportation plan for the City of Montpelier, Vermont to be integrated into their updated municipal plan. Planning process included public visioning workshop, a review of all modes of transportation, travel demand management and parking options, and options to increase street connectivity. In collaboration with ORW, Landscape Architects.

Chicago Metropolis 2020 Plan for Growth and Transportation-Contributed to this APA Burnham Award-winning project to explore alternative scenarios for growth and transportation investment and management for the Chicago Region. Developed alternative transportation investment strategies and budgets, and prepared modeling input files to analyze these scenarios with an advanced regional TransCAD model.

Dresden School Transportation Committee—Conducted study on the Feasibility of Queue Jump Lane for the Ledyard Bridge Approach in Norwich, Vermont. Reviewed options and obstacles for establishing a bus-only during morning peak hours for buses, with the goal of reducing bus travel time and encouraging school bus and public transit use between Norwich, Vermont and Hanover, New Hampshire.

Barnard Villages Traffic and Growth Management Plan—Developed a plan for Barnard, Vermont's two village areas, including intersection safety, pedestrian circulation, traffic calming, establishing village identity, re-designing lakefront parking on Silver Lake, and exploring opportunities for infill development.

Prairie Crossing Boulevard Plan, Grayslake, Illinois-Developed context sensitive integrated transportation and land use alternative plan for an abandoned Tollway right-of-way through a new urbanist development in Grayslake, Illinois. Integrated traffic and transportation design into community street network and land use patterns. Plan features landscaped boulevards, roundabouts, and improved street connectivity in the area.

Monadnock Traffic Calming Foundation—Developed conceptual traffic calming plan and design criteria for a NHDOT traffic calming project on Route 101through the center of Dublin, New Hampshire.

NEPA Document Reviews-Reviewed and prepared comments on several EIS and EA documents for community groups and other stakeholders for a variety of projects, including the I-93 Salem to Manchester, NH Widening; the Ohio River Bridges in Louisville, Kentucky; US 202 Section 100 in Chester County, PA.

PROFESSIONAL CERTIFICATIONS AND MEMBERSHIPS

- Professional Engineer – P.E., Vermont Board of Professional Engineering, License #6133
- Member, Institute of Transportation Engineers (ITE)
- Member, Congress for the New Urbanism, Transportation Planning Committee
- Member, Board of Directors, CNU New England Chapter of CNU
- Member, ITE/CNU Design Standards Task Force

PUBLICATIONS

Context Sensitive Design Approach for the Route 41 Corridor, Gibson, Lucinda E., and Dee Durham. Presented the Historic Roads National Conference in Portland, OR. Described multi-faceted approach including research, public involvement and education, used to develop a context sensitive plan for improvements to PA Route 41, an NHS route through scenic rural landscapes and Amish farms. April, 2004.

Chicago Metropolis 2020: The Business Community Develops an Integrated Land Use/Transportation Plan, Gibson, Lucinda E., Frank Beal, John Fregonese, Norman Marshall. Presented at the ITE 2003 Technical Conference, *Transportation's Role in Successful Communities* Presented in Fort Lauderdale, FL, 2003.

Functional Classification for Multimodal Planning, Strate, Harry E., Elizabeth Humstone, Susan McMahon, Lucy Gibson and Bruce D. Bender, Transportation Research Record #1606, Transportation Planning, Programming, and Land Use, National Academy Press, Washington DC, 1997.

SPEAKING ENGAGEMENTS (Partial List)

Smarter Alternatives to Highway Projects. Presented at the American Planning Association annual meeting in San Antonio, TX, April, 2006.

Context Sensitive Traffic Engineering for Historic Road Corridors. Presented at the biannual Historic Roads Conference, Portland, Oregon, April, 2004.

Emerging Transportation Planning Techniques for Smart Growth Planning. Presented at the Smart Growth Network annual conference in Burlington, VT, September, 2003.

Success Stories and How-To's, Vermont Bicycle and Pedestrian Coalition Annual Meeting, Randolph, VT, April, 2002.

Transportation Concepts for Smart Growth Planning, Chicago Metropolis 2020 Steering Committee, Chicago, IL, January 2002.

How Engineers Think, Vermont Historic Preservation Annual Conference, Manchester, VT, June, 1999.