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MEMORANDUM

TO: Mr. Lawrence Stabile, Chair
Wayland Planning Board
41 Cochituate Road
Wayland, MA 01760

DATE: April 19, 2006

FROM: Kevin R. Dandrade, PE, PTOE

PROJECT NO.: T0124.01

RE: Traffic Assessment – 2006 Mixed Use Overlay District Proposal
Wayland, Massachusetts

INTRODUCTION

The purpose of this memorandum is to update the Planning Board on the results of the traffic analysis completed for the 2006 Mixed Use Overlay District (MUOD) zoning proposal for the former Raytheon site, currently owned by Twenty Wayland, LLC. At the request of the Wayland Planning Board, TEC, Inc. evaluated the general traffic impacts associated with new vehicle trips generated by a reduced development program that is consistent with the proposed April 2006 MUOD zoning amendment. The TEC assessment also includes several other trip generation estimates to compare the following development scenarios:

- Assumed Existing Office Use – Fully Reoccupied (410,000 sf)
- June 2005 Proposal by Twenty Wayland, LLC
- November 2005 MUOD Proposal
- April 2006 MUOD Proposal
- 40B Residential Proposal

For the April 2006 MUOD scenario, the estimated new vehicle trips were distributed to the roadways surrounding the site. The impacts of the new trips for the April 2006 MUOD Proposal were gauged by performing signalized capacity analyses at key locations and they were compared to the impacts associated with the original June 2005 Twenty Wayland, LLC proposal. This memorandum also offers recommendations for improvements at key locations and suggestions for future studies.

TRIP GENERATION

TEC previously reviewed the trip generation estimates performed by Vanasse & Associates, Inc. (VAI) on behalf of entities seeking to re-develop the former Raytheon site. Their traffic report[1] identified an assumed existing allowable use of 410,000 square feet (sf) of general office building space. The June 2005 VAI analysis was based on a development program consisting of approximately 308,000 sf of retail area, 40,000 sf of office space, 40,000 sf of municipal use, and 100 residential apartment units. TEC reviewed the VAI report and offered comments and

[1] *Preliminary Traffic Impact and Access Study – Proposed Town Center – Wayland, MA*, Vanasse & Associates, Inc., June 14, 2005 (prepared for Streetscape, LLC).

recommendations as a peer review agent for the Town of Wayland Board of Road Commissioners[2].

The current TEC analysis effort includes calculations of vehicle trip generation for the development program assumed for the April 2006 MUOD Bylaw and other proposals as a comparison. TEC used an assumption of various land uses and allowable sizes listed within the "2005 MUOD Bylaw" column within the summary document provided by the Town to estimate future trip generation characteristics. The April 2006 MUOD proposal identifies the following maximum allowable size of individual uses with land use categories identified by the Institute of Transportation Engineers (ITE)[3]:

Land Use Category	ITE Land Use Code	Size
Shopping Center – General Retail	820	155,000 sf
General Office Building	710	10,000 sf
Municipal Office Complex	733	40,000 sf
Residential Condominiums	230	100 units

The trip generation rate for a Shopping Center is appropriate for calculating the total number of trips for the total building area of retail users, knowing that individual uses on the site may vary. The proposed (allowable) supermarket is typically associated with a slightly higher trip generation rate, but the other smaller users identified within the restrictions of the April 2006 MUOD zoning balance the overall rate. For the residential portion, TEC's analysis assumes a trip generation rate for condominiums rather than apartments because the condominium rates are slightly more conservative. However, they can be considered interchangeable with no noticeable difference in traffic.

TEC has been informed that no specific use has been determined for the municipal area allocated on the site. For the purposes of this evaluation, a municipal office complex (similar to a Town Hall facility) was assumed since it contributes a higher volume of traffic to the adjacent roadway network during the typical commuter peak hours. If the municipal building use changes to a library or community recreational facility, there may be a higher level of trips during some weekend periods, but lower traffic during the typical commuter peak periods.

In addition, the property owner recently submitted a 40B Comprehensive Permit Application for 200 condominium units, which involves the demolition of the existing office building. The Town has asked TEC to also estimate the number of trips associated with that proposal as an additional point of comparison.

TEC performed a detailed analysis of the trips associated with each assumed land use for the weekday daily, weekday morning and evening commuter peaks, Saturday daily, and Saturday peak periods (See Attachment C). The table on the

[2] Letter from TEC to Stephen Kadlik, Highway Director, dated August 8, 2005, regarding Traffic Engineering Peer Review – Proposed Town Center Project (Redevelopment of Former Raytheon Property) – Wayland, Massachusetts (See Attachment A).
[3] *Trip Generation*, 7th Edition, Institute of Transportation Engineers, Volumes 2 and 3, 2003.

following page presents a summary of the trip generation characteristics of various proposals for the site.

Trip Generation Comparison (Total Trips) – Former Raytheon Site

Time Period	410,000 sf Assumed Existing Office Use (Fully Reoccupied) [1]	June 2005 Proposal by Twenty Wayland, LLC [1]	November 2005 MUOD Proposal [2]	April 2006 MUOD Proposal [3]	200-unit 40B Residential Proposal [4]
Weekday Daily	3,954	16,350	12,238	11,014	1,157
Weekday AM Peak	580	514	425	373	90
Weekday PM Peak	538	1,554	1,234	1,100	106
Saturday Daily	896	19,374	14,372	13,007	1,152
Saturday Midday Peak	116	1,864	1,388	1,228	101

Notes:
1. Based on land uses from *Preliminary Traffic Impact and Access Assessment - Proposed Town Center* by Vanasse & Associates - June 14, 2005
2. From Wayland Planning Board's 2005 proposed Mixed-Use Overlay District zoning proposal - See Attachment B
3. From Wayland Planning Board's 2006 proposed Mixed-Use Overlay District zoning proposal - See Attachment B
4. Based on MassHousing Development Application for "The Residences at Wayland Center" submitted by Twenty Wayland, LLC on February 16, 2006

The differences between the assumed full reoccupation of the 410,000 sf office building and the April 2006 MUOD proposal can be viewed on the previous page. If the April 2006 MUOD is approved and constructed, the morning peak hour should reflect an approximate 30% drop in overall trip generation for the site. During the weekday evening peak hour, the 2006 MUOD is expected to increase the total trips accessing the site by close to 100%. However, some of these trips are "passby" trips and are already on the adjacent roadways passing the site for another reason. The number of "new" trips during the evening peak hour increases over the existing assumed use by approximately 66%.

The greatest difference in the number of new trips will occur during the weekend period when the traditional office user generates very few trips. During the Saturday daily and Saturday midday peak hour intervals, the number of trips associated with the 2006 MUOD is expected to increase substantially over the fully re-occupied office building use (>1000% increase). Although the 2006 MUOD reflects a reduction of the overall development program when compared with the June 2005 Twenty Wayland, LLC and the November 2005 MUOD proposals, it will elevate the traffic volumes on the adjacent street during the Saturday peak intervals to a level that is closer to that of the typical weekday commuter peak hours. TEC did not assume a credit for residents that may already pass through the intersection on their way to other shopping opportunities and will be "intercepted" by the proposed development.

As tabulated above, the 40B residential proposal would introduce the lowest number of vehicle trips during the traditional peak hours even when compared with the fully re-occupied office building use.

BACKGROUND GROWTH AND TRIP DISTRIBUTION

The 2005 traffic data collected by VAI was used as a basis for TEC's analyses. In order to assess future year conditions, TEC adjusted the existing 2005 traffic volumes for the study area by 1% per year for five years, which is consistent with the VAI study that TEC reviewed previously. The 2010 No-Build traffic volumes also include background traffic from the Wayland Commons 40B age-restricted residential development[4], which is proposed to access Old Sudbury Road (Route 27) near the access point for the existing office building.

The new trips associated with the 2006 MUOD proposal were distributed to the adjacent roadway network based on existing traffic volumes and U.S. Census data collected previously by VAI and reviewed by TEC. A copy of the estimated trip distribution graphics from the VAI study is provided within Attachment D.

The following is a summary of the approximate peak hour traffic volumes (in vehicles per hour) on roadway segments near the site under existing actual and future build conditions:

Peak Hour Traffic Volume Comparison for Adjacent Roadways

Roadway Segment	2005 Actual Conditions	2010 Build Condition June 2005 Twenty Wayland, LLC Proposal	2010 Build Condition April 2006 MUOD Proposal
Route 20 (East of Site Roadway)			
PM Peak Hour	1,418	1,716	1,551
SAT Peak Hour	1,662	1,951	1,937
Route 27 (South of Site Roadway)			
PM Peak Hour	1,077	1,469	1,436
SAT Peak Hour	698	1,114	1,050

The operations analysis that follows describes the impacts of the additional future build traffic volumes on the intersections and arterial roadways in the surrounding area, most notably the intersection of Route 20 at Routes 27/126.

OPERATIONS ANALYSIS

TEC analyzed the 2010 Build conditions assuming full build-out of the April 2006 MUOD proposal on the site. As part of this effort, the Planning Board has asked TEC to assume a full connection through the site between Route 20 and Route 27 ("Site Roadway") in order to provide a similar comparison to the analyses previously prepared by VAI.

[4] Traffic Impact and Access Study – Wayland Commons – A Residential Community, VHB/Vanasse Hangen Brustlin, Inc., June 2005.

This assessment concentrates on the comparative results for the following four intersections:

- Route 20 at Proposed Site Roadway
- Route 20 at Routes 27/126
- Route 27 at Route 126 (north of Route 20)
- Route 27 at Proposed Site Roadway

Based on the volumes of traffic accessing the site, TEC recommends physical improvements as well as traffic control improvements to safely and efficiently accommodate the new movements. The number of travel lanes used within the attached TEC analyses is consistent with the lane use proposed by VAI in their report. Under full-build conditions for the 2006 MUOD proposal, TEC anticipates the need for traffic signals at the four major intersections listed above. At the intersection of Routes 20 / 27 / 126, TEC assumes that the improvements currently under construction by MassHighway will be completed in conformance with the approved plans.

The following is a summary of the results of the capacity analyses for each signalized intersection during the expected peak hours under 2005 actual conditions and 2010 build conditions. The two build conditions assessed include the original June 2005 Twenty Wayland, LLC proposal and the April 2006 MUOD proposal (See Attachment E for detailed analyses).

Signalized Intersection Peak Hour Capacity Analysis Results

Intersection/ Overall Results	2005 Actual Conditions			2010 Build Condition June 2005 Twenty Wayland, LLC Proposal			2010 Build Condition April 2006 MUOD Proposal		
	Overall V/C[a]	Delay[b]	LOS[c]	Overall V/C	Delay	LOS	Overall V/C	Delay	LOS
Route 20 at Site Roadway									
Weekday Evening	N/A	N/A	N/A	0.89	27.3	C	0.76	18.2	B
Saturday Midday				0.99	40.2	D	0.91	28.2	C
Route 20 at Routes 27/126*									
Weekday Evening	1.02	62.0	E	1.22	102.5	F	1.17	97.2	F
Saturday Midday	0.84	38.9	D	0.99	57.2	E	0.89	43.8	D
Route 27 at Route 126									
Weekday Evening	N/A	N/A	N/A	0.84	14.6	B	0.76	10.7	B
Saturday Midday				0.68	9.2	A	0.57	6.9	A
Route 27 at Site Roadway									
Weekday Evening	N/A	N/A	N/A	0.56	9.9	A	0.56	8.9	A
Saturday Midday				0.50	9.9	A	0.42	8.8	A

(See table notes on the following page)

Table Notes:
*The 2005 Existing and 2010 Build traffic volumes from the VAI study were analyzed based on the completion of the MassHighway improvements for Routes 20 at Routes 27/126 and Route 27 at Route 126
[a]Volume-to-Capacity ratio as a weighted-average for each movement at the intersection
[b]Delay in seconds (average per vehicle entering the intersection)
[c]Level of service (A-F)
N/A - Not Applicable; the intersection is not currently signalized

As tabulated on the previous page, there will be a moderate decrease in delay at the proposed intersection of Route 20 at the proposed Site Roadway when considering the 2006 MUOD proposal. The level of traffic volumes at this intersection requires exclusive turn lanes on each Route 20 and side street approach. TEC has assumed that the access for Russell's Garden Center will be consolidated at the proposed traffic signal. With the June 2005 Twenty Wayland, LLC development proposal, the eastbound left turn and southbound left turn movements will likely operate with long delays at level of service (LOS F) unless additional turn lanes are provided.

Regardless of which mixed-use development proposal is accepted, the intersection of Route 20 at Routes 27/126 will operate in an over-capacity situation during the weekday evening commuter peak period, because that peak period also corresponds with a high level of trip generation for most of the uses that would be on the site. The April 2006 MUOD proposal will reduce delays slightly over the June 2005 Twenty Wayland, LLC proposal during the weekday evening peak hour, but will still operate at LOS F as an intersection with long queues on each approach. However, TEC expects the operating condition of this intersection to be better under the 2006 MUOD Proposal than the full occupancy of the existing office building (assumed at 410,000 sf). Because the existing office use has established limitations on the number of vehicles that can access the northeasterly parking lot for the former Raytheon site via the Route 27 gated entrance, full re-occupancy of that office building would put an additional strain on the intersection of Route 20 at Routes 27/126 by introducing additional turning movements. For the foregoing reasons, TEC recommends that the Planning Board consider a through road between Route 20 and Route 27 as part of any development proposal for the site.

The intersection of Route 27 at Route 126 will operate at LOS F with excessive delays for the Concord Road approach if a traffic signal is not installed at that location. The expected number of left-turning vehicles on the Route 27 southbound approach warrants the introduction of an exclusive left-turn lane to provide a refuge area for turning vehicles and make the through movement more efficient. Although the traditional capacity analysis results show a very good level of service, this intersection is often affected by queues from the intersection of Route 20 at Routes 27/126. TEC expects moderate delays for the Route 27 at Route 126 intersection with operations that reflect higher delays (LOS D or E) during future commuter peak hours.

The intersection of Route 27 at the proposed Site Roadway is expected to warrant the installation of a traffic signal under full-build conditions. Therefore, it was analyzed with signalization under the 2010 build conditions for the 2006 MUOD

proposal. TEC recommends that a traffic signal be installed at this location only if actual traffic volumes warrant its introduction. If the April 2006 MUOD proposal is accepted and constructed, it is likely that the risk of cut-through traffic along Glezen Lane and Bow Road can be reduced if there are longer delays for motorists attempting to turn left from the proposed Site Roadway onto Route 27 northbound. The introduction of a traffic signal at the intersection of Route 27 at Route 126 will also likely influence motorists leaving the site to use Old Sudbury Road (Route 27) southbound to access Concord Road (Route 126) northbound via Library Lane.

If the 40B Comprehensive Permit Application is approved and no other further development occurs on the site, TEC does not anticipate a need for any significant widening improvements or the installation of traffic signals at the intersections of Route 20 at Site Roadway or Route 27 at Site Roadway. This is contingent on the use of a gated access to the residential community that restricts cut-through traffic from Route 20 to Route 27, as currently shown on the plans accompanying the 40B application[5]. However, the volume of traffic using Route 20 to access the site may require the construction of a short right-turn lane on Route 20 westbound at the Site Roadway. The applicant will be required to coordinate with MassHighway to confirm the need for geometric improvements as part of their Highway Access Permit. It is unlikely that other off-site traffic mitigation measures will be warranted as part of the 40B Comprehensive Permit. Although the 40B proposal generates the lowest volume of traffic, a gated access road through the site will not alleviate the intersection of Route 20 at Route 27/126 because through traffic would not be permitted.

CONCLUSIONS / RECOMMENDATIONS

This assessment is meant to summarize and compare the general traffic impacts associated with the various development proposals for the former Raytheon site. It is not a comprehensive assessment of all of the traffic impacts associated with the development of the site. However, it is a reasonable representation of the characteristics of the existing roadway network required to accommodate the proposed traffic volumes. It also defines specific elements of geometric mitigation and changes in traffic control necessary to reasonably process traffic. TEC maintains all of its recommendations from the original review of the Twenty Wayland, LLC traffic study prepared by VAI and offers the following recommendations to the Planning Board to consider as it moves forward on the April 2006 MUOD zoning proposal.

The Planning Board and/or the Applicant should:

1. Identify as many pedestrian connections as possible to connect the proposed site with the existing sidewalk network and adjacent parcels, including the potential for a rail trail that spans between Route 20 and Routes 27/126.

2. Perform a detailed review of travel times and intersection delays along Glezen Lane, Bow Road, and other local roadways to perform a more detailed

[5] The Residences at Wayland Center, Site Plan (Sheet C-1), Sasaki Associates / Arrowstreet, February 15, 2006 (Prepared for Twenty Wayland, LLC)

assessment of cut-through traffic potential associated with the proposed site connection between Route 20 and Route 27.

3. Consider widening and signalization for the main entrance on Route 20 due to the excessive delays that would be realized due to lack of gaps in the Route 20 mainline traffic and the high volume of commuter and retail traffic that will likely use this entrance. Route 20 is under the jurisdiction of MassHighway and will require permitting for a highway access permit, traffic signal permit, and environmental permitting associated with fill areas within a flood plain.

4. Consider a through Site Roadway between Route 20 and Route 27 as part of any proposal for the site in order to partially alleviate the turning movements at the intersection of Route 20 at Routes 27/126 and reduce the overall travel distances for site-related trips that either originate northeast of the site or are bound for locations northeast of the site.

5. Consider the widening along Route 27 at the proposed Site Roadway with early installation of the conduit infrastructure for a potential traffic signal. The traffic signal should not be installed unless fully warranted. If there are longer delays for left-turning motorists exiting from the site due to stop sign control, that would encourage the use of Route 126 for those bound for points northeast of the site.

6. Consider peak hour turning restrictions (*e.g.,* 7:00 to 9:00 AM and 3:00 to 6:00 PM) for the intersections of Old Sudbury Road (Route 27) at Bow Road and Glezen Lane. If the Route 27 northbound site traffic is prohibited from turning onto Bow Road or Glezen Lane, it will force site traffic to use Route 27 southbound to Route 126 for exiting movements (travel to the northeast) during the busiest times of the day. If left-turns are prohibited out of the same side streets during the peak hours, it will influence motorists to use Route 126 southbound to enter the site.

7. Consider widening Route 27 at its junction with Route 126 to provide an exclusive southbound left-turn lane as depicted in the conceptual design prepared by VAI. The traffic signal is currently warranted during the peak hours and will be further justified following either full occupancy of the existing buildings or redevelopment under the proposed 2006 MUOD. Any signal design at the intersection of Route 27 at Route 126 should be included as a signal system with the intersection of Route 20 at Routes 27/126 with queue detection for Route 27/126 northbound traffic near Millbrook Road.

8. Consider reversing the direction of permissible travel on Library Lane for the one-way operation so it can operate as an advance right-turn lane for Route 126 southbound traffic attempting to turn right onto Route 27 northbound.

9. Develop a Route 20 transportation plan that identifies the possibility of widening to provide defined left-turn lanes at major private driveways, consolidate driveways, and improve pedestrian features along this arterial roadway.

TEC is pleased to present the results of these analyses and looks forward to working with the Town of Wayland to identify the project controls and commitments for parties involved as you proceed with this zoning proposal. Please feel free to contact us with any questions regarding our findings and recommendations.

Attachments:

A – Peer Review Letter from TEC to Stephen Kadlik, Highway Director, August 8, 2005
B – Comparison of Planning Board's Proposed MUOD Bylaws 2005 vs 2006
C – TEC Trip Generation Calculations / Comparisons (8 pages)
D – Trip Distribution Estimates – Vanasse & Associates, Inc., June 14, 2005
E – Capacity Analyses

Attachment A

Peer Review Letter from TEC to Stephen Kadlik, Highway Director, August 8, 2005

TRANSPORTATION
ENGINEERING + CONSTRUCTION, INC.
INNOVATORS IN PROJECT DELIVERY

Stephen Kadlik
Highway Director
Town of Wayland – Board of Road Commissioners
195 Main Street
Wayland, MA 01778

August 8, 2005
Ref: T0124

Re: Traffic Engineering Peer Review - Proposed Town Center Project
(Redevelopment of Former Raytheon Property)
Wayland, Massachusetts

Dear Mr. Kadlik,

At the request of the Board of Road Commissioners, Transportation Engineering and Construction, Inc. (TEC) completed an independent peer review of the following documents submitted to the Town of Wayland for the development known as the Proposed Town Center:

- Preliminary Traffic Impact and Access Assessment – Proposed Town Center
  Vanasse & Associates, Inc., June 14, 2005
- Peer Review – Wayland Town Center Traffic Impact Study and Mitigation Plan
  Fay, Spofford, & Thorndike, LLC, June 16, 2005
- Conceptual Improvement Plans – 3 Intersections (Updated Mitigation Plans)
  Vanasse & Associates, Inc., revisions dated July 11, 2005 and July 22, 2005
- Traffic Distribution Worksheets and Conceptual Site Design
  Vanasse & Associates, delivered to TEC on July 15, 2005
- Route 20 at Route 27/126 Intersection Plans – CAD files
  Greenman-Pedersen, Inc., delivered to TEC by e-mail on July 14, 2005

Vanasse & Associates, Inc. (VAI) and Fay, Spofford, & Thorndike (FST) completed an appropriate level of review of the general traffic impacts associated with the requested change in land use zoning for the 56.5 acre site previously used by Raytheon and Polaroid. The study completed by VAI and the subsequent peer review by FST are the preliminary assessments of traffic conditions associated with the redevelopment of the site. Although this study did not project future year conditions without the "by right" use, the presented scenarios provide a comparison of the full reuse of the existing office buildings in comparison to the conceptual development program for a mixed use site, which is primarily retail in nature. If the Town supports the change in zoning, this site is expected to undergo site plan and special permit review through the Planning Board, a Physical Alteration Permit through the Board of Road Commissioners, and all state level permitting, including the MassHighway Driveway Access Permit review and the Massachusetts Environmental Policy Act (MEPA) review.

In reviewing the assumptions for traffic included in the "by right" use of office space, TEC inquired of the Building Inspector's office concerning any special permit conditions that may have been required when the office space was first permitted. Most of these documents were not available at the time TEC prepared this review letter. If there were prior controls over shift times (typical for

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both Raytheon and Polaroid) or transportation demand management measures, the traffic volumes for the existing use depicted in the VAI report would need to be revised, as the reduced volumes would make the net difference between the number of trips (no-build versus build) greater. A careful review of the initial 1954 Zoning Board of Appeals decision, and subsequent modifications to that decision, will be required to determine what, if any, rights currently exist for site traffic to use the Route 27 driveway for access under the "by right" scenario.

The traffic study identifies the lane use and traffic control needs for each designated access point for the proposed development. The proposed design accommodates cut-through traffic along a primary site road that has minimal curb cuts along its length with a traffic calming roundabout and curvilinear alignment. During the weekday morning and evening and Saturday midday peak hours, there is a consistent volume of traffic turning from Route 20 to/from Route 27/126 that will likely be candidates as cut-through users for this new private road. In fact, the results of the mitigated analyses rely, in part, on this cut-through trend. If the private driveway is designed in accordance with Town and/or MassHighway standards, there should be no inherent safety issues with its use by cut-through traffic.

The broader issue lies with the understanding that this new roadway will be maintained by the property owner. The public will likely come to expect that this new private roadway will be maintained at the same level as the other town infrastructure due to its location and accessibility. Therefore, it will be important that the Town require a bonded maintenance plan to ensure that the public will continue to comfortably and safely use the new roadway and partially alleviate the intersection of Routes 20/27/126. The project name "Town Center" also infers municipal ownership. The proponent should provide multiple pedestrian connections between the existing roadway network and the proposed site to tie the site into the existing town center rather than creating an isolated development on its periphery.

The existing and proposed land uses have different traffic generation characteristics depending on the time period analyzed. TEC agrees with the summary table entitled, "Number of Vehicles Passing Through the Route 20/27 Intersection", shown on page 4 of the FST Peer Review letter dated June 16, 2005. This table shows that the two land uses will have similar traffic generation during the typical morning and evening commuter peak hours. However, the weekday and Saturday daily volumes will be noticeably higher. The proposed land use change will have its greatest impact during the Saturday midday peak hour since the retail use has a much higher trip generation rate than an office use. The mixed use Town Center proposal will add approximately 14% more traffic at the intersection of Routes 20/27/126 during the Saturday midday peak hour over the "by right" use of the property during a Saturday peak period. If there are no feasible or available mitigation measures that can alleviate the impacts of the Saturday peak traffic so as to make traffic volumes less and, therefore, comparable to a no-build (or "by right") condition, the Town can consider requesting a minor reduction in the proposed development program to reduce the future traffic volumes.

The following is a discussion of specific intersections included within the VAI study:

Boston Post Road (Route 20) at Proposed Private Road

The proposed site roadway intersects with Boston Post Road (Route 20) from the north along with a new driveway for Russell's Garden Center to form a new four-way signalized intersection. Route 20 will need to be widened to accommodate auxiliary left- and right-turn lanes, which are necessary to safely and efficiently process the projected traffic volumes. The proposed turning movement volumes necessitate the proposed geometry. The concept for this intersection was modified from the initial concept originally included within the VAI traffic assessment, which had shown the need for two eastbound left turn lanes. The traffic analyses should be updated to reflect the newly proposed geometry and updated traffic information for Russell's Garden Center.

The proposed realignment of the Russell's Garden Center Driveway should improve the safety characteristics along this stretch of Route 20 due to the long uncontrolled curb cut that exists today. These improvements are shown on a sketch-level plan that has not been developed to include information concerning the vertical profile of Route 20 and associated slope impacts. TEC understands that this intersection lies within the 100-year flood plain of the Sudbury River. The applicant will be required to mitigate any fill areas within this flood plain. Additional detail will be required to support the driveway permit process for MassHighway at this state highway location.

Old Sudbury Road (Route 27) at Proposed Private Road

The proposed private road will intersect Old Sudbury Road (Route 27) from the west to form a T-intersection at the approximate location of the former Raytheon driveway. This intersection lies adjacent to conservation land signed as the Bow Meadow and owned by the Sudbury Valley Trustees. The level of impact to conservation land or wetland bodies is not discernable based on the information shown on the plan. The most recent concept depicts the need to widen Old Sudbury Road on the west side (site side) to accommodate new auxiliary lanes for left and right turns. The proposed road geometry can be revised to reduce the width for only one lane entering the site since there should be sufficient capacity to handle the traffic from one left-turn and one right-turn lane turning from Route 27. The proposed development and the adjacent 40B residential proposal, named "Wayland Commons" should maintain the vegetative buffer areas along their frontage wherever possible in order to maintain the rural characteristics of Old Sudbury Road. The driveways for the Wayland Commons should be consolidated with the proposed private roadway at a location behind the expected queue for vehicles waiting to turn onto Route 27.

While this intersection may meet signal warrants upon full development, TEC recommends that this intersection be designed with conduits to facilitate a future signal installation, but remain unsignalized until the applicant can demonstrate the need for signalization based on actual site traffic volumes. The construction costs associated with any proposed signal should be bonded with the applicant since it is tied closely to the travel time benefits for cut-through traffic. In association with the proposed roadway plans that will be reviewed as part of any future site plan process, the applicant should provide a traffic signal design that conforms to the Town of Wayland's standard for post-mounted traffic signals. The operating expenses associated with the proposed traffic signal should be funded (and bonded) by the project proponent.

The traffic that is projected to use this easterly point of access for the proposed development from points north along Route 126 are projected to travel through the intersection of Route 27 / 126. In reality, many of these motorists will be influenced to use Bow Road or Glezen Lane due to long delays on the Route 126 approach near the library. The VAI study should be expanded to review the safety and capacity considerations along these roadways, either at this level or at the site plan review level.

Old Sudbury Road (Route 27) at Concord Road (Route 126)

As noted by VAI and FST, the Concord Road approach will operate at Level of Service F (LOS F) during all peak hours and currently meets the minimum threshold for the installation of the traffic signal. The current VAI concept shows widening along Route 27 to accommodate a southbound exclusive left-turn lane for turns onto Route 126 northbound. The left-turn lane will be helpful from a safety perspective by providing a refuge area for left-turns while allowing through vehicles to bypass. There is also a noticeable benefit for intersection capacity associated with the proposed widening.

The Town should be aware that the capacity analyses have been performed without consideration of an exclusive pedestrian phase at the signal even though there is a recreational trail proposed along the MBTA right-of-way. This will equate to slightly longer delays for each vehicle approach. Currently, the northbound traffic bound for Route 27 is not required to stop. If a traffic signal is installed at this location, the northbound through queues will often block the lane for vehicles turning onto Route 126 northbound and may extend back to Millbrook Road during the evening peak hours. Any traffic signal at this location should be designed with northbound queue detection near Millbrook Road to limit the risk of queues extending back to Route 20.

The concept does not currently show a proposed extension of the new sidewalk network to the north along the west side of Route 27. This will be necessary to provide a logical connection for pedestrians accessing the east side of the proposed development.

Old Sudbury Road (Route 27/126) at Millbrook Road / Pelham Island Road Extension

Under existing conditions, this intersection is blocked by traffic approaching Route 20 during most peak hours. Once completed, the MassHighway improvement project will modify Pelham Island Road Extension, west of Route 27/126, to become one-way westbound. This will relocate the eastbound movements on Pelham Island Road Extension over to the adjacent intersection at Routes 20/27/126. While the proposed development will add traffic along Route 27, it is not expected to significantly worsen the operations at the Old Sudbury Road/Millbrook Road intersection since it is already impacted under existing conditions. A "Do Not Block Intersection" sign should be maintained at this intersection to encourage motorists to keep the intersection clear for turning movements to/from Millbrook Road and for access for emergency vehicles.

Boston Post Road (Route 20) at Old Sudbury Road / Cochituate Road (Routes 27/126)

MassHighway is currently completing the safety and capacity improvements to this intersection based on plans prepared by Greenman-Pedersen, Inc. (GPI). TEC understands that a functional design report was not completed by MassHighway for this project. Therefore, there is limited

recent count information. Route 20 (State Highway) is being widened to accommodate one exclusive left-turn lane, one through lane, and one very short exclusive right-turn lane in each direction. Each of the Route 27/126 approaches consists of one exclusive left-turn lane and one shared through-right lane. There are several cultural and environmental constraints at this intersection that limit future widening without impacts. Based on traffic operations alone, a five-lane cross-section on Route 20, with one exclusive left-turn lane and two through lanes in each direction, is necessary to efficiently handle peak hour traffic volumes. However, this will have significant impacts to private and town-owned parcels as well as Mill Brook.

The current VAI-proposed mitigation concept for this intersection calls for the reconstruction of Route 20 to allow two shared through lanes in each direction. This will create a two-lane approach for approximately 300 feet in advance of the signal and will require a lane reduction approximately 300 feet after the intersection. Both the current MassHighway improvements and the proposed VAI concept utilize short travel lanes for processing the projected traffic volumes under the No-Build and Build scenarios. With the VAI concept, during the peak hours, the innermost lane will operate as a defacto left-turn lane since it only requires one queued left-turning vehicle to restrict flow for through traffic. The option to prohibit left-turns at the intersection during peak hours will have noticeable capacity benefits, but will impede regional access to Route 27/126 and cause motorists to perform U-turn movements at nearby public streets or private parking lots along Route 20. This will increase the overall number of trips entering the intersection.

TEC expects limited capacity benefits with the VAI-intended changes during the typical peak hours with a possible degradation in safety since left turns and through movements would again share the same lane. The capacity analyses do not consider the effects of the exclusive pedestrian phase at this intersection. Therefore, the Town should expect slightly higher delays than what is depicted in the analyses supplied by VAI. TEC believes that, even with implementation of VAI's proposed design, this intersection will continue to operate effectively at LOS F (greater than 80 seconds of average delay per vehicle) during the peak hours due to the short auxiliary lanes and the likelihood of long queues, especially on Route 20.

This intersection defines Wayland's town center. The design accommodations for the proposed project need to balance the through capacity for this state highway (Route 20), capacity for the town-maintained infrastructure (Route 27/126), and the cultural and environmental constraints along each leg of the intersection. Given a choice between the current MassHighway improvements or the improvements suggested by VAI, TEC recommends that the Town attempt to maintain the MassHighway improvements currently under construction. This will provide a similar level of traffic flow, will avoid unnecessary interim delays due to construction activities, and will not compromise the planned landscaping enhancements.

Boston Post Road (Route 20) at Pelham Island Road

This unsignalized intersection lies approximately 300 feet west of the intersection of Routes 20/27/126. The Route 20 eastbound left-turns onto Pelham Island Road Extension will be relocated to Route 20/27/126; this should improve the safety characteristics for left-turning vehicles bound for points to the north. There are currently significant delays during the weekday peak hours for motorists attempting to turn left out of Pelham Island Road adjacent to the Town Building driveway. While the proposed development will add through traffic on Route 20, it is not expected

to significantly change the operations for motorists exiting from Pelham Island Road since the Route 20 queues currently extend beyond this intersection during the weekday peak periods.

Boston Post Road (Route 20) at Old County Road

This intersection lies along Route 20 west of the site within the Town of Sudbury on the opposite side of the Sudbury River. Under existing conditions, this intersection warrants the introduction of an exclusive eastbound left-turn lane on Route 20. Whether as part of the "by right" scenario or the proposed mixed use development, there will be additional future through traffic on Route 20 that will have a risk of being queued behind an eastbound left-turning vehicle waiting for a gap in westbound traffic. TEC understands that Old County Road is often used as a bypass route for traffic when Route 20 is heavily congested in Wayland during peak hours.

Route 20 Commercial Corridor

The VAI study does not identify deficiencies within the existing commercial corridor along Route 20 between Pelham Island Road and Russell's Garden Center. This section of Route 20 has a two-lane cross-section. There are often long delays for left turns into and out of private sites. The report should be expanded to study the effects on major retail driveways and investigate potential mitigation associated with the additional vehicle trips that will be added to Route 20.

Pedestrian/Multi-Use Trail Connections

The conceptual site design does not identify specific pedestrian connections to adjacent sites or to the MBTA right-of-way. The applicant should propose pedestrian/bicycle connections along Route 20, Route 27, as well as along and through the MBTA right-of-way to make the development as "walkable" as possible.

Conclusions

The Preliminary Traffic Impact and Access Assessment was prepared to identify the general traffic conditions for the reuse of the Raytheon/Polaroid site for a mixed use development. The proposed Town Center proposal will have traffic impacts that can be reasonably mitigated at each end of the proposed private roadway. The Town should request additional analysis of traffic operations along Route 20 between Routes 27/126 and the proposed private roadway to assess the impacts on the existing business community. The applicant should assess the existing and future mobility through the commercial corridor, identify deficiencies, and propose any appropriate mitigation. The intersection of Routes 20/27/126 will operate at a degraded level of service whether considering the full re-use of the existing office buildings or the redevelopment for retail and other mixed use.

TEC recommends that the Town of Wayland request the following action items from the applicant's design team as part of the site plan approval process once a final development program has been defined with more detailed site engineering:

- Confirm traffic operating conditions for the former office use including any previously established shift times

- Provide an additional 2010 No-Build scenario that assesses the impacts of background traffic growth exclusive of the "by right" use as included in the VAI preliminary report
- Quantify the number of trips expected to use cut-through routes along Bow Road, Glezen Lane, Plain Road, or Claypit Hill Road, considering travel time assessments between the proposed site and primary routes to/from the north (Concord Road – Route 126) and to/from east (Route 20) through the established local residential streets
- Update the analysis to consider the effects of pedestrian phasing at each signalized intersection
- Provide a simulated analysis (SimTraffic or CorSim) of the No-build and Build conditions at the intersections of Route 20/27/126 and Route 27/126 to review the global corridor delays associated both with the MassHighway improvements and those recommended by VAI
- Provide detailed design plans showing the geometric and signalization improvements at each end of the proposed private roadway
- Provide plans for multiple pedestrian/multi-use trail connections along roadways, the MBTA right-of-way, and possibly through easements on adjacent parcels to access Route 20
- Provide additional data and analysis of the traffic impacts to the existing Route 20 commercial corridor between Route 27/126 and Russell's Garden Center
- Provide new data and updated traffic analyses for the Russell's Garden Center approach to the new intersection at Route 20.

There is sufficient information included in VAI's preliminary report and FST's subsequent peer review to identify the general traffic impacts related to the change in land use zoning. The Town of Wayland and MassHighway will have several opportunities to determine if the traffic impacts of the finalized development program are sufficiently mitigated at the study area intersections.

Please call me at (978) 794-1792 (x145) if you have any questions regarding specific areas of our traffic engineering review for the Town Center proposal. Thank you for this opportunity to assist the Town of Wayland.

Very truly yours,
TRANSPORTATION ENGINEERING
AND CONSTRUCTION, INC.

Kevin R. Dandrade, P.E., PTOE
Senior Traffic Engineer

Attachment B

Comparison of Planning Board's Proposed MUOD Bylaws 2005 vs 2006

Attachment B

Mixed-Use Overlay District (at the former Raytheon site)
Planning Board Article for Special Town Meeting

COMPARISON OF PLANNING BOARD'S PROPOSED MUOD BYLAWS 2005 vs. 2006

	2005 MUOD Bylaw	2006 MUOD Bylaw
Overall Size of Project	**450,000 sq. ft. Gross Floor Area ("GFA")**	**372,500 sq. ft. Gross Floor Area ("GFA")**
▪ **Non-Residential**	▪ 200,000 sq. ft. GFA ▪ Not more than 10% of such GFA shall be dedicated to office uses	▪ 165,000 sq. ft. GFA ▪ Office uses shall not be more than 10,000 sq. ft. GFA
▪ **Residential**	▪ 210,000 sq. ft. GFA ▪ 120 units/240 bedrooms ▪ At least 70% (147 units) to be 2 bedroom units ▪ 25% of units to be Affordable	▪ 167,500 sq. ft. GFA ▪ 100 units/200 bedrooms ▪ Up to 15 units with 3 bedrooms ▪ 25% of units to be Affordable
▪ **Municipal**	40,000 sq. ft. GFA	40,000 sq. ft. GFA
▪ **Open space**	At least 2 acres	At least 2 acres
Aggregate Limits On Individual Establishments ("Stores")		
▪ **Food Store**	48,000 sq. ft. GFA	45,000 sq. ft. GFA
▪ **Large Stores**	Between 20,000 and 30,000 sq. ft. GFA	2 "stores" at between 10,000 and 15,000 sq. ft.
▪ **Medium Large Stores**	Between 10,000 and 20,000 sq. ft. GFA	3 "stores" at between 7,000 and 10,000 sq. ft.
▪ **Medium Stores**	Not more than 10,000 sq. ft. GFA	5 "stores" at between 5,000 and 7,000 sq. ft.
▪ **Small Stores**	Not more than 10,000 sq. ft. GFA	Unlimited "stores" at not more than 5,000 sq. ft.
Project Controls		
▪ **Ability to Reduce Total Aggregate Size of Project to Mitigate for Traffic**	Yes	No
▪ **Level of Master Special Permitting (MSP) Control**	▪ Moderate Control ▪ Planning Board could exert control over the project in terms of overall size, size of buildings, and specific uses	▪ Limited Control ▪ Essentially the Mixed-Use Project is an as-of-right project ▪ Once categories of interchangeable uses have been established, project can freely change uses within a category
▪ **Ability to Control Access Onto Rt. 27 (Old Sudbury Rd.)**	Yes – through MSP conditions	Yes – through MSP conditions

Attachment C

TEC Trip Generation Calculations / Comparisons (8 pages)

Trip Generation Assessment - Comparison of Proposals

Project: Updated 2006 Town Center Mixed Use Overlay District (MUOD)
Date: April 4, 2006
Analyst: TEC / Kevin R. Dandrade, P.E., P.T.O.E.
Source: Institute of Transportation Engineers - Trip Generation - 7th Ed.

Comparison of Total Trips (Primary + Pass-by + Shared) Associated with the Former Raytheon Site

	Assumed Existing Office Use (Fully Re-occupied)[1]	June '05 Proposal by Twenty Wayland, LLC	November 2005 MUOD Proposal[2]	April 2006 MUOD Proposal[3]	40B Residential Proposal[4]
Weekday Daily	3954	16,350	12238	11014	1157
Weekday AM PH - Adjacent Street	580	514	425	373	90
Weekday PM PH - Adjacent Street	538	1554	1234	1100	106
Saturday Daily	896	19374	14372	13007	1152
Sat Midday PH	116	1864	1388	1228	101

Notes:
1. based on land uses from Preliminary Traffic Impact and Access Assessment - Proposed Town Center by Vanasse & Associates - June 14, 2005
2. from Wayland Planning Board's 2005 proposed Mixed-Use Overlay District zoning proposal - See Attachment B
3. from Wayland Planning Board's 2006 proposed Mixed-Use Overlay District zoning proposal - See Attachment B
4. based on MassHousing Development Application for "The Residences at Wayland Center" submitted by Twenty Wayland, LLC on February 16, 2006.

Trip Generation Assessment - Assumed Existing Office Use (Fully Re-occupied)

Project: Updated 2006 Town Center Mixed Use Overlay District (MUOD)
Date: April 7, 2006
Analyst: TEC / Kevin R. Dandrade, P.E., P.T.O.E.
Source: Institute of Transportation Engineers - Trip Generation - 7th Ed.

Based on Building Area

410 ksf General Office Building - ITE LUC 710 (Used within Comparative analysis)

Units: 410 KSF

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips 0%*	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	4514	3954	0	0	3954	50%	50%	1977	1977
Weekday AM PH - Adjacent Street	636	580	0	0	580	88%	12%	510	70
Weekday PM PH - Adjacent Street	611	538	0	0	538	17%	83%	91	447
Saturday Daily	972	896	0	0	896	50%	50%	448	448
Sat Midday PH	168	116	0	0	116	54%	46%	63	53

Trip Generation Assessment - November 2005 MUOD Proposal

Project: Updated 2006 Town Center Mixed Use Overlay District (MUOD)
Date: March 30, 2006
Analyst: TEC / Kevin R. Dandrade, P.E., P.T.O.E.
Source: Institute of Transportation Engineers - Trip Generation - 7th Ed.

10 ksf General Office Building - ITE LUC 710

Units: 10 KSF

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	110	227	0	7	220	50%	50%	110	110
Weekday AM PH - Adjacent Street	16	30	0	1	29	88%	12%	25	3
Weekday PM PH - Adjacent Street	15	90	0	3	87	17%	83%	15	72
Saturday Daily	24	40	0	1	39	50%	50%	19	19
Sat Midday PH	4	6	0	0	6	54%	46%	3	3

10 ksf Medical-Dental Office Building - ITE LUC 720

Size: 10 ksf

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	361	194	0	6	188	50%	50%	94	94
Weekday AM PH - Adjacent Street	25	N/A	0	1	24	79%	21%	19	5
Weekday PM PH - Adjacent Street	37	37	0	1	36	27%	73%	10	26
Saturday Daily	90	N/A	0	3	87	50%	50%	43	43
Sat Midday PH	36	N/A	0	1	35	57%	43%	20	15

180.0 ksf Shopping Center - ITE LUC 820

Units: 180 KSF

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 25%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	7729	9951	2488	299	7165	50%	50%	3582	3582
Weekday AM PH - Adjacent Street	185	223	56	7	160	61%	39%	98	63
Weekday PM PH - Adjacent Street	675	923	231	28	664	48%	52%	319	345
Saturday Daily	8995	13381	3345	401	9634	50%	50%	4817	4817
Sat Midday PH	895	1268	317	38	913	52%	48%	475	438

Assumes a Pass-by Rate of 25%

40 ksf Government Office Complex - ITE LUC 733

Size: 40 ksf

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	1117	N/A	0	34	1083	50%	50%	542	542
Weekday AM PH - Adjacent Street	88	N/A	0	3	86	89%	11%	76	9
Weekday PM PH - Adjacent Street	114	N/A	0	3	111	31%	69%	34	76
Saturday Daily	0	N/A	0	0	0	50%	50%	0	0
Sat Midday PH	0	N/A	0	0	0	50%	50%	0	0

120 Residential Condominium Units - ITE LUC 230

Units: 120 Res. Units

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	703	749	0	22	727	50%	50%	363	363
Weekday AM PH	53	60	0	2	58	17%	83%	10	48
Weekday PM PH	62	70	0	2	68	67%	33%	45	22
Saturday Daily	680	862	0	26	836	50%	50%	418	418
Sat Midday PH	56	77	0	2	75	54%	46%	41	35

Total Trips - All Uses

	Total Trips	Passby Trips	Shared Trips	Primary Trips	# Primary Trips	
					IN	OUT
Weekday Daily	12238	2488	367	9383	4691	4691
Weekday AM PH - Adjacent Street	425	56	13	357	228	129
Weekday PM PH - Adjacent Street	1234	231	37	966	423	543
Saturday Daily	14372	3345	431	10596	5298	5298
Sat Midday PH	1388	317	42	1029	538	491

Note: 1. Pass-by Trip and Shared Trip estimates based on ITE Trip Generation Handbook, Figures 5.5, 5.8 and Tables 5.4, 5.7, 7.1, 7.2
2. Shared trip assumption: 3% for all time periods

Trip Generation Assessment - April 2006 MUOD Proposal

Project: Updated 2006 Town Center Mixed Use Overlay District (MUOD)
Date: April 4, 2006
Analyst: TEC / Kevin R. Dandrade, P.E., P.T.O.E.
Source: Institute of Transportation Engineers - Trip Generation - 7th Ed.

10 ksf General Office Building - ITE LUC 710

Units: 10 KSF

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	110	227	0	7	220	50%	50%	110	110
Weekday AM PH - Adjacent Street*	16	30	0	1	29	88%	12%	25	3
Weekday PM PH - Adjacent Street	15	90	0	3	87	17%	83%	15	72
Saturday Daily	24	40	0	1	39	50%	50%	19	19
Sat Midday PH	4	6	0	0	6	54%	46%	3	3

155.0 ksf Shopping Center - ITE LUC 820

Units: 155 KSF

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 25%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	6656	9029	2257	271	6501	50%	50%	3251	3251
Weekday AM PH - Adjacent Street	160	204	51	6	147	61%	39%	89	57
Weekday PM PH - Adjacent Street	581	836	209	25	602	48%	52%	289	313
Saturday Daily	7745	12178	3044	365	8768	50%	50%	4384	4384
Sat Midday PH	770	1151	288	35	829	52%	48%	431	398

Assumes a Pass-by Rate of 25%

40 ksf Government Office Complex - ITE LUC 733

Size: 40 ksf

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	1117	N/A	0	34	1083	50%	50%	542	542
Weekday AM PH - Adjacent Street	88	N/A	0	3	86	89%	11%	76	9
Weekday PM PH - Adjacent Street	114	N/A	0	3	111	31%	69%	34	76
Saturday Daily	0	N/A	0	0	0	50%	50%	0	0
Sat Midday PH	0	N/A	0	0	0	50%	50%	0	0

100 Residential Condominium Units - ITE LUC 230

Units: 100 Res. Units

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips[2]	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	586	642	0	19	623	50%	50%	311	311
Weekday AM PH	44	52	0	2	50	17%	83%	9	42
Weekday PM PH	52	60	0	2	58	67%	33%	39	19
Saturday Daily	567	790	0	24	766	50%	50%	383	383
Sat Midday PH	47	72	0	2	69	54%	46%	38	32

Total Trips - All Uses

	Total Trips	Passby Trips	Shared Trips	Primary Trips	# Primary Trips IN	# Primary Trips OUT
Weekday Daily	11014	2257	330	8427	4213	4213
Weekday AM PH - Adjacent Street	373	51	11	311	200	112
Weekday PM PH - Adjacent Street	1100	209	33	858	377	481
Saturday Daily	13007	3044	390	9573	4786	4786
Sat Midday PH	1228	288	37	904	471	432

Note: 1. Pass-by Trip and Shared Trip estimates based on ITE Trip Generation Handbook, Figures 5.5, 5.8 and Tables 5.4, 5.7, 7.1, 7.2
2. Shared trip assumption: 3% for all time periods

Trip Generation Assessment
Comparison of Assumed Existing Office Use / April 2006 MUOD

Project: Updated 2006 Town Center Mixed Use Overlay District (MUOD)
Date: April 4, 2006
Analyst: TEC / Kevin R. Dandrade, P.E., P.T.O.E.
Source: Institute of Transportation Engineers - Trip Generation - 7th Ed.

Difference in Total Trips (Primary + Pass-by + Shared) Associated with the Site

	Assumed Existing Office Use (Fully Re-occupied)	April 2006 MUOD Proposal	Difference
Weekday Daily	3954	11014	7061
Weekday AM PH - Adjacent Street	580	373	-207
Weekday PM PH - Adjacent Street	538	1100	562
Saturday Daily	896	13007	12112
Sat Midday PH	116	1228	1112

Difference in Primary (New) Trips Associated with the Site

	Assumed Existing Office Use (Fully Re-occupied)	April 2006 MUOD Proposal	Difference
Weekday Daily	3954	8427	4473
Weekday AM PH - Adjacent Street	580	311	-269
Weekday PM PH - Adjacent Street	538	858	320
Saturday Daily	896	9573	8677
Sat Midday PH	116	904	788

Notes:
1. Pass-by Trips are made by vehicles that are already on Route 20 or Route 27 and turn into the site for a impulse trip and then leave the site bound in the original intended direction of travel.
2. Shared trips are those associated with a person that visits two of the uses on the site during the same interval.
3. Primary trips are those associated with a specific trip to one of the proposed uses and are new to the adjacent street system.

Trip Generation Assessment - 40B Residential Condominium Proposal

Project: Updated 2006 Town Center Mixed Use Overlay District (MUOD)
Date: March 30, 2006
Analyst: TEC / Kevin R. Dandrade, P.E., P.T.O.E.
Source: Institute of Transportation Engineers - Trip Generation - 7th Ed.

200 Residential Condominium Units - ITE LUC 230*

Units: 200 Res. Units

	Total Trips				Total	% Distribution		# Primary Trips	
	Avg. Rates	Fitted Curve	Pass-by 0%	Shared Trips	Primary Trips	IN	OUT	IN	OUT
Weekday Daily	1172	1157	0	0	1157	50%	50%	578	578
Weekday AM PH	88	90	0	0	90	17%	83%	15	75
Weekday PM PH	104	106	0	0	106	67%	33%	71	35
Saturday Daily	1134	1152	0	0	1152	50%	50%	576	576
Sat Midday PH	94	101	0	0	101	54%	46%	54	46

* ITE defines the trip generation for condominiums based on the total number of units. There is no differentiation for the number of bedrooms per unit.

Attachment D

Trip Distribution Estimates – Vanasse & Associates, Inc.

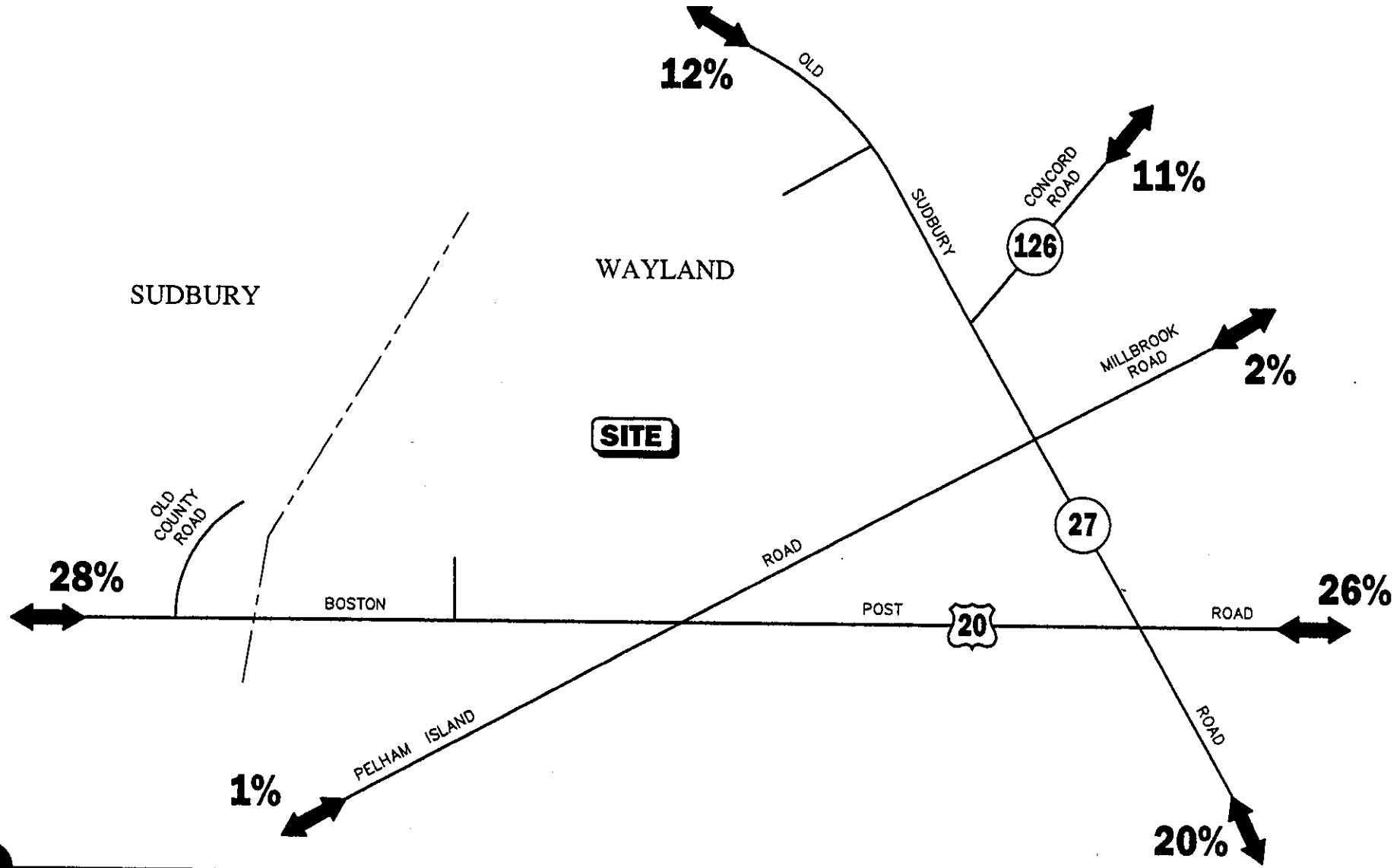
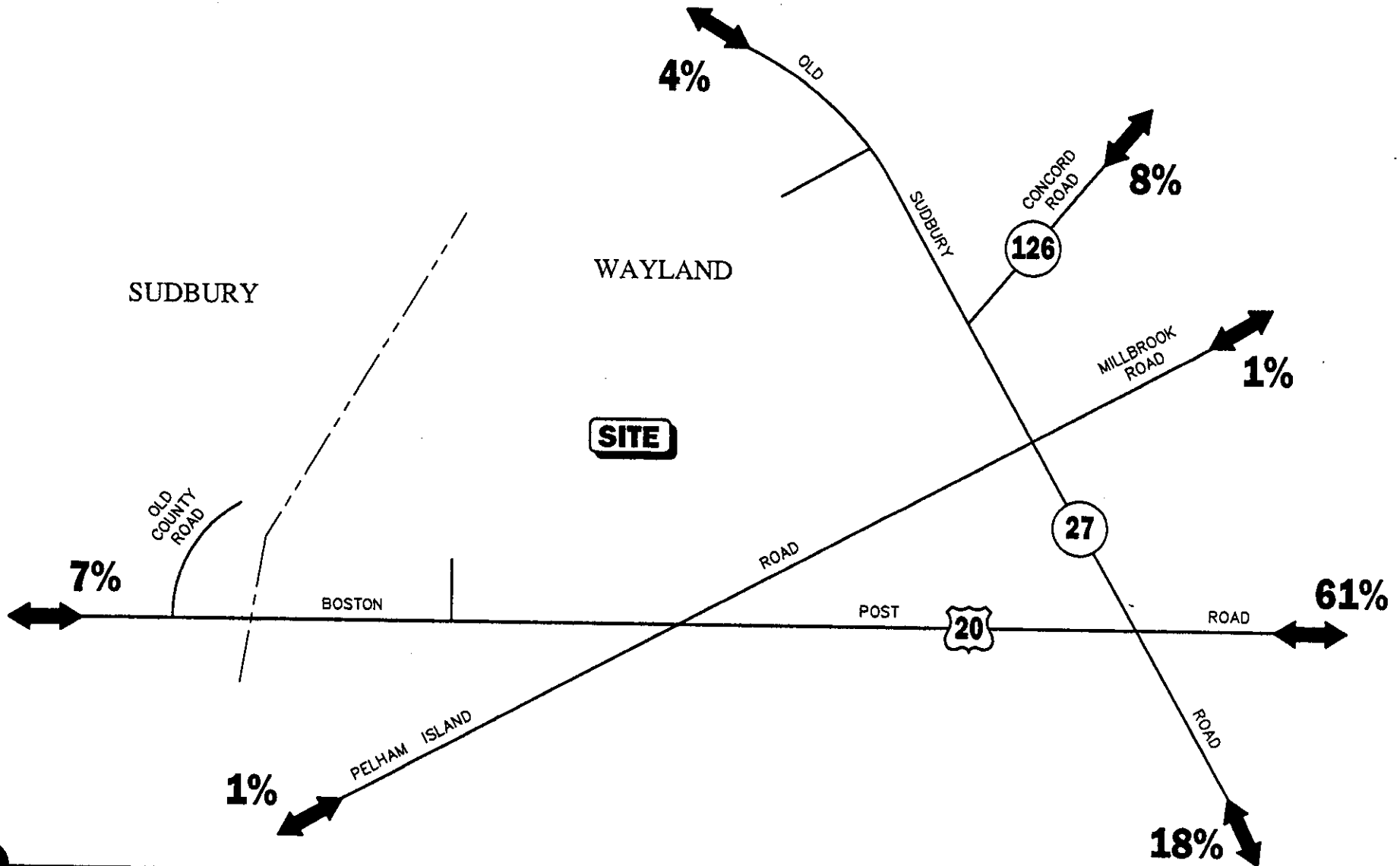


Figure 8

Trip Distribution Map
Retail Trips

VAI Vanasse & Associates, Inc.
Transportation Engineers & Planners



Not To Scale

Figure 9

Trip Distribution Map
Residential Trips

Vanasse & Associates, Inc.
Transportation Engineers & Planners

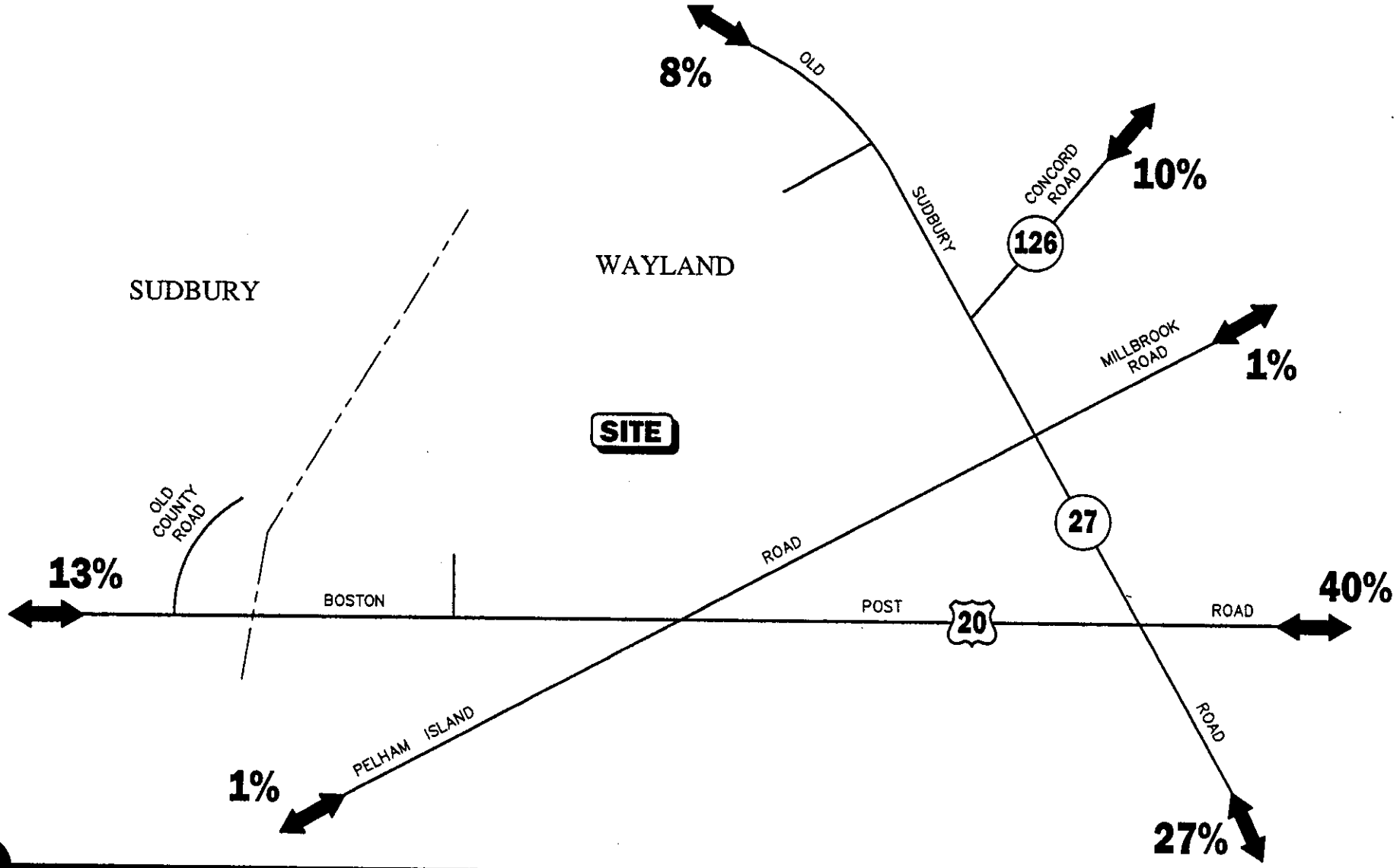


Figure 10

Trip Distribution Map
Office and Municipal Trips

Vanasse & Associates, Inc.
Transportation Engineers & Planners

Attachment E

Capacity Analyses

Abbreviations:
HCM = Highway Capacity Manual
LOS = Level of Service
ICU = Intersection Capacity Utilization

2005 Existing Conditions
Weekday Evening Peak Hour &
Saturday Midday Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	11	11	12	11	11	12	12	11	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1454	1881	1561	1745	1900	1546	1745	1898		1728	1879	
Flt Permitted	0.09	1.00	1.00	0.10	1.00	1.00	0.09	1.00		0.22	1.00	
Satd. Flow (perm)	133	1881	1561	183	1900	1546	171	1898		400	1879	
Volume (vph)	175	618	128	29	627	281	169	401	3	124	610	40
Peak-hour factor, PHF	0.94	0.94	0.94	0.96	0.96	0.96	0.86	0.86	0.86	0.94	0.94	0.94
Adj. Flow (vph)	186	657	136	30	653	293	197	466	3	132	649	43
RTOR Reduction (vph)	0	0	28	0	0	39	0	0	0	0	0	0
Lane Group Flow (vph)	186	657	108	30	653	254	197	469	0	132	692	0
Heavy Vehicles (%)	20%	1%	0%	0%	0%	1%	0%	0%	0%	1%	0%	3%
Turn Type	pm+pt		pt+ov	pm+pt		pt+ov	pm+pt			pm+pt		
Protected Phases	5	2	2 3	1	6	6 7	7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	53.4	45.4	58.4	42.6	39.0	52.0	45.0	39.0		45.0	39.0	
Effective Green, g (s)	57.0	48.4	62.4	46.6	42.0	56.0	53.0	43.0		53.0	43.0	
Actuated g/C Ratio	0.47	0.40	0.51	0.38	0.34	0.46	0.43	0.35		0.43	0.35	
Clearance Time (s)	7.0	7.0		5.0	7.0		8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	181	746	798	129	654	710	203	669		283	662	
v/s Ratio Prot	c0.09	0.35	0.07	0.01	0.34	0.16	c0.08	0.25		0.04	c0.37	
v/s Ratio Perm	c0.39			0.08			0.34			0.16		
v/c Ratio	1.03	0.88	0.13	0.23	1.00	0.36	0.97	0.70		0.47	1.05	
Uniform Delay, d1	35.9	34.1	15.6	28.1	40.0	21.4	58.0	34.0		23.9	39.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	74.3	14.1	0.1	0.9	34.8	0.3	54.4	3.3		1.2	47.4	
Delay (s)	110.2	48.2	15.7	29.0	74.8	21.7	112.4	37.3		25.1	86.9	
Level of Service	F	D	B	C	E	C	F	D		C	F	
Approach Delay (s)		55.5			57.4			59.5			77.0	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	62.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	11	11	12	11	11	12	12	11	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1863	1561	1711	1863	1546	1694	1874		1728	1839	
Flt Permitted	0.12	1.00	1.00	0.27	1.00	1.00	0.26	1.00		0.11	1.00	
Satd. Flow (perm)	220	1863	1561	477	1863	1546	463	1874		208	1839	
Volume (vph)	199	500	213	52	488	163	175	437	12	193	309	42
Peak-hour factor, PHF	0.92	0.92	0.92	0.89	0.89	0.89	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	216	543	232	58	548	183	184	460	13	208	332	45
RTOR Reduction (vph)	0	0	59	0	0	29	0	0	0	0	0	0
Lane Group Flow (vph)	216	543	173	58	548	154	184	473	0	208	377	0
Heavy Vehicles (%)	0%	2%	0%	2%	2%	1%	3%	1%	0%	1%	1%	5%
Turn Type	pm+pt		pt+ov	pm+pt		pt+ov	pm+pt			pm+pt		
Protected Phases	5	2	2 3	1	6	6 7	7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	57.1	47.3	64.3	43.9	39.1	55.1	38.9	29.9		40.9	30.9	
Effective Green, g (s)	60.1	50.3	68.3	47.9	42.1	59.1	46.9	33.9		48.9	34.9	
Actuated g/C Ratio	0.50	0.42	0.57	0.40	0.35	0.49	0.39	0.28		0.41	0.29	
Clearance Time (s)	7.0	7.0		5.0	7.0		8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	288	781	888	250	654	761	314	529		262	535	
v/s Ratio Prot	c0.09	0.29	0.11	0.01	c0.29	0.10	0.06	c0.25		c0.09	0.21	
v/s Ratio Perm	0.29			0.08			0.17			0.23		
v/c Ratio	0.75	0.70	0.19	0.23	0.84	0.20	0.59	0.89		0.79	0.70	
Uniform Delay, d1	23.6	28.6	12.5	23.9	35.8	17.2	26.6	41.3		28.0	38.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.5	5.1	0.1	0.5	12.2	0.1	2.8	17.4		15.1	4.2	
Delay (s)	34.0	33.6	12.6	24.3	48.0	17.3	29.3	58.7		43.1	42.2	
Level of Service	C	C	B	C	D	B	C	E		D	D	
Approach Delay (s)		28.8			39.1			50.5			42.5	
Approach LOS		C			D			D			D	

Intersection Summary

HCM Average Control Delay	38.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2010 Weekday Evening Peak Hour Build Conditions for
Vanasse & Associates Traffic Volumes
(June '05 Twenty Wayland, LLC Proposal)
with TEC's Assumed Lane Use and Timing

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	11	11	12	11	11	12	12	11	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1454	1881	1561	1745	1900	1546	1745	1899		1728	1881	
Flt Permitted	0.09	1.00	1.00	0.09	1.00	1.00	0.09	1.00		0.11	1.00	
Satd. Flow (perm)	132	1881	1561	167	1900	1546	171	1899		197	1881	
Volume (vph)	98	744	208	30	746	392	286	492	3	187	703	42
Peak-hour factor, PHF	0.94	0.94	0.94	0.96	0.96	0.96	0.86	0.86	0.86	0.94	0.94	0.94
Adj. Flow (vph)	104	791	221	31	777	408	333	572	3	199	748	45
RTOR Reduction (vph)	0	0	38	0	0	38	0	0	0	0	0	0
Lane Group Flow (vph)	104	791	183	31	777	370	333	575	0	199	793	0
Heavy Vehicles (%)	20%	1%	0%	0%	0%	1%	0%	0%	0%	1%	0%	3%
Turn Type	pm+pt		pt+ov	pm+pt		pt+ov	pm+pt			pm+pt		
Protected Phases	5	2	2 3	1	6	6 7	7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	47.4	43.4	58.4	44.6	41.0	58.0	49.0	39.0		45.0	37.0	
Effective Green, g (s)	53.4	46.4	62.4	48.6	44.0	62.0	57.0	43.0		53.0	41.0	
Actuated g/C Ratio	0.44	0.38	0.51	0.40	0.36	0.51	0.47	0.35		0.43	0.34	
Clearance Time (s)	7.0	7.0		5.0	7.0		8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	715	798	126	685	786	261	669		236	632	
v/s Ratio Prot	c0.04	c0.42	0.12	0.01	0.41	0.24	c0.15	0.30		0.08	0.42	
v/s Ratio Perm	0.30			0.09			c0.45			0.28		
v/c Ratio	0.78	1.11	0.23	0.25	1.13	0.47	1.28	0.86		0.84	1.25	
Uniform Delay, d1	58.4	37.8	16.5	30.4	39.0	19.4	56.2	36.7		27.5	40.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	24.0	66.6	0.1	1.0	77.7	0.4	150.5	10.7		23.0	127.3	
Delay (s)	82.4	104.4	16.6	31.4	116.7	19.8	206.7	47.4		50.6	167.8	
Level of Service	F	F	B	C	F	B	F	D		D	F	
Approach Delay (s)		85.0			82.0			105.8			144.3	
Approach LOS		F			F			F			F	

Intersection Summary

HCM Average Control Delay	102.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	113.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1805	1881	1881	1615	1783	
Flt Permitted	0.15	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	288	1881	1881	1615	1783	
Volume (vph)	73	510	822	325	324	64
Peak-hour factor, PHF	0.76	0.76	0.99	0.99	0.80	0.80
Adj. Flow (vph)	96	671	830	328	405	80
RTOR Reduction (vph)	0	0	0	0	12	0
Lane Group Flow (vph)	96	671	830	328	473	0
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	Perm			pm+ov		
Protected Phases		6	2	8	8	
Permitted Phases	6			2		
Actuated Green, G (s)	25.4	25.4	25.4	40.8	15.4	
Effective Green, g (s)	26.4	26.4	26.4	42.8	16.4	
Actuated g/C Ratio	0.52	0.52	0.52	0.84	0.32	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	150	978	978	1615	576	
v/s Ratio Prot		0.36	c0.44	0.07	c0.27	
v/s Ratio Perm	0.33			0.14		
v/c Ratio	0.64	0.69	0.85	0.20	0.82	
Uniform Delay, d1	8.8	9.1	10.5	0.8	15.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	1.6	6.7	0.0	8.8	
Delay (s)	15.6	10.7	17.2	0.8	24.6	
Level of Service	B	B	B	A	C	
Approach Delay (s)		11.3	12.5		24.6	
Approach LOS		B	B		C	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.42	1.00
Satd. Flow (perm)	1770	1583	1863	1583	779	1881
Volume (vph)	216	289	294	148	277	609
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	235	314	320	161	301	662
RTOR Reduction (vph)	0	162	0	50	0	0
Lane Group Flow (vph)	235	152	320	111	301	662
Heavy Vehicles (%)	2%	2%	2%	2%	2%	1%
Turn Type		pt+ov		pt+ov	pm+pt	
Protected Phases	4	4 5	6	6 4	5	2
Permitted Phases					2	
Actuated Green, G (s)	10.8	24.9	23.0	38.8	37.1	37.1
Effective Green, g (s)	11.8	25.9	24.0	39.8	38.1	38.1
Actuated g/C Ratio	0.20	0.45	0.41	0.69	0.66	0.66
Clearance Time (s)	5.0		5.0		5.0	5.0
Vehicle Extension (s)	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	361	708	772	1088	685	1238
v/s Ratio Prot	c0.13	0.10	0.17	0.07	0.08	c0.35
v/s Ratio Perm					0.21	
v/c Ratio	0.65	0.21	0.41	0.10	0.44	0.53
Uniform Delay, d1	21.2	9.8	12.0	3.0	4.7	5.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	0.1	1.6	0.0	0.2	1.7
Delay (s)	24.3	9.8	13.6	3.1	4.9	6.9
Level of Service	C	A	B	A	A	A
Approach Delay (s)	16.0		10.1			6.3
Approach LOS	B		B			A

Intersection Summary

HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1870		1770	1881	1583		1803	1583		1778	1583
Flt Permitted	0.95	1.00		0.44	1.00	1.00		0.73	1.00		0.71	1.00
Satd. Flow (perm)	1770	1870		816	1881	1583		1357	1583		1325	1583
Volume (vph)	283	554	20	20	705	193	20	10	20	224	10	277
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	295	577	22	22	750	205	22	11	22	243	11	301
RTOR Reduction (vph)	0	2	0	0	0	79	0	0	17	0	0	72
Lane Group Flow (vph)	295	597	0	22	750	126	0	33	5	0	254	229
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm		Perm	Perm		Perm	Perm		pm+ov
Protected Phases	5	2			6			4			8	5
Permitted Phases				6		6	4		4	8		8
Actuated Green, G (s)	15.4	55.3		34.9	34.9	34.9		16.8	16.8		16.8	32.2
Effective Green, g (s)	16.4	56.3		35.9	35.9	35.9		17.8	17.8		17.8	34.2
Actuated g/C Ratio	0.20	0.69		0.44	0.44	0.44		0.22	0.22		0.22	0.42
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	354	1282		357	823	692		294	343		287	737
v/s Ratio Prot	c0.17	0.32			c0.40							0.06
v/s Ratio Perm				0.03		0.08		0.02	0.00		c0.19	0.08
v/c Ratio	0.83	0.47		0.06	0.91	0.18		0.11	0.01		0.89	0.31
Uniform Delay, d1	31.5	6.0		13.4	21.6	14.1		25.8	25.3		31.2	16.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	14.7	0.1		0.0	14.0	0.0		0.1	0.0		25.4	0.1
Delay (s)	46.3	6.1		13.4	35.6	14.2		25.9	25.3		56.5	16.1
Level of Service	D	A		B	D	B		C	C		E	B
Approach Delay (s)		19.3			30.6			25.6			34.6	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	27.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2010 Saturday Midday Peak Hour Build Conditions for
Vanasse & Associates Traffic Volumes
(June '05 Twenty Wayland, LLC Proposal)
with TEC's Assumed Lane Use and Timing

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	11	11	12	11	11	12	12	11	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1863	1561	1711	1863	1546	1694	1873		1728	1846	
Flt Permitted	0.10	1.00	1.00	0.10	1.00	1.00	0.15	1.00		0.15	1.00	
Satd. Flow (perm)	183	1863	1561	185	1863	1546	274	1873		280	1846	
Volume (vph)	110	632	300	55	628	293	291	431	13	282	404	44
Peak-hour factor, PHF	0.92	0.92	0.92	0.89	0.89	0.89	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	120	687	326	62	706	329	306	454	14	303	434	47
RTOR Reduction (vph)	0	0	75	0	0	50	0	0	0	0	0	0
Lane Group Flow (vph)	120	687	251	62	706	279	306	468	0	303	481	0
Heavy Vehicles (%)	0%	2%	0%	2%	2%	1%	3%	1%	0%	1%	1%	5%
Turn Type	pm+pt		pt+ov	pm+pt		pt+ov	pm+pt			pm+pt		
Protected Phases	5	2	2 3	1	6	6 7	7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	41.2	37.2	53.2	40.8	36.0	52.0	31.0	22.0		31.0	22.0	
Effective Green, g (s)	47.2	40.2	57.2	44.8	39.0	56.0	39.0	26.0		39.0	26.0	
Actuated g/C Ratio	0.47	0.40	0.57	0.44	0.39	0.55	0.39	0.26		0.39	0.26	
Clearance Time (s)	7.0	7.0		5.0	7.0		8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	742	884	170	719	857	289	482		294	475	
v/s Ratio Prot	c0.04	0.37	0.16	0.02	c0.38	0.18	c0.14	0.25		0.13	0.26	
v/s Ratio Perm	0.25			0.14			c0.27			0.27		
v/c Ratio	0.62	0.93	0.28	0.36	0.98	0.33	1.06	0.97		1.03	1.01	
Uniform Delay, d1	22.6	29.0	11.3	21.7	30.7	12.2	26.9	37.1		26.8	37.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	19.2	0.2	1.3	29.4	0.2	69.3	33.4		60.6	44.5	
Delay (s)	28.4	48.2	11.5	23.0	60.1	12.5	96.2	70.5		87.4	82.0	
Level of Service	C	D	B	C	E	B	F	E		F	F	
Approach Delay (s)		35.5			43.7			80.7			84.1	
Approach LOS		D			D			F			F	

Intersection Summary

HCM Average Control Delay	57.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	101.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1805	1863	1845	1599	1747	
Flt Permitted	0.40	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	755	1863	1845	1599	1747	
Volume (vph)	78	504	443	314	316	89
Peak-hour factor, PHF	0.89	0.89	0.98	0.98	0.91	0.91
Adj. Flow (vph)	88	566	452	320	347	98
RTOR Reduction (vph)	0	0	0	0	15	0
Lane Group Flow (vph)	88	566	452	320	430	0
Heavy Vehicles (%)	0%	2%	3%	1%	2%	0%
Turn Type	Perm			pm+ov		
Protected Phases		6	2	8	8	
Permitted Phases	6			2		
Actuated Green, G (s)	16.7	16.7	16.7	30.6	13.9	
Effective Green, g (s)	17.7	17.7	17.7	32.6	14.9	
Actuated g/C Ratio	0.44	0.44	0.44	0.80	0.37	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	329	812	804	1599	641	
v/s Ratio Prot		c0.30	0.25	0.07	c0.25	
v/s Ratio Perm	0.12			0.13		
v/c Ratio	0.27	0.70	0.56	0.20	0.67	
Uniform Delay, d1	7.3	9.3	8.6	0.9	10.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	2.1	0.5	0.0	2.2	
Delay (s)	7.5	11.4	9.1	1.0	13.0	
Level of Service	A	B	A	A	B	
Approach Delay (s)		10.9	5.7		13.0	
Approach LOS		B	A		B	

Intersection Summary

HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	40.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1881	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.44	1.00
Satd. Flow (perm)	1770	1583	1881	1615	841	1881
Volume (vph)	218	305	277	205	332	200
Peak-hour factor, PHF	0.92	0.92	0.96	0.96	0.97	0.97
Adj. Flow (vph)	237	332	289	214	342	206
RTOR Reduction (vph)	0	180	0	69	0	0
Lane Group Flow (vph)	237	152	289	145	342	206
Heavy Vehicles (%)	2%	2%	1%	0%	0%	1%
Turn Type		pt+ov		pt+ov	pm+pt	
Protected Phases	4	4 5	6	6 4	5	2
Permitted Phases					2	
Actuated Green, G (s)	10.8	25.5	22.4	38.2	37.1	37.1
Effective Green, g (s)	11.8	26.5	23.4	39.2	38.1	38.1
Actuated g/C Ratio	0.20	0.46	0.40	0.68	0.66	0.66
Clearance Time (s)	5.0		5.0		5.0	5.0
Vehicle Extension (s)	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	361	725	760	1093	732	1238
v/s Ratio Prot	c0.13	0.10	0.15	0.09	c0.09	0.11
v/s Ratio Perm					c0.22	
v/c Ratio	0.66	0.21	0.38	0.13	0.47	0.17
Uniform Delay, d1	21.2	9.4	12.1	3.3	4.7	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.1	1.4	0.0	0.2	0.3
Delay (s)	24.5	9.5	13.6	3.3	4.9	4.1
Level of Service	C	A	B	A	A	A
Approach Delay (s)	15.7		9.2			4.6
Approach LOS	B		A			A

Intersection Summary

HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1870		1770	1881	1583		1799	1583		1777	1583
Flt Permitted	0.95	1.00		0.39	1.00	1.00		0.60	1.00		0.71	1.00
Satd. Flow (perm)	1770	1870		729	1881	1583		1125	1583		1316	1583
Volume (vph)	389	674	25	25	718	263	25	10	25	246	10	341
Peak-hour factor, PHF	0.97	0.97	0.97	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	401	695	26	28	798	292	27	11	27	267	11	371
RTOR Reduction (vph)	0	2	0	0	0	103	0	0	21	0	0	54
Lane Group Flow (vph)	401	720	0	28	798	189	0	38	6	0	278	317
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm		Perm	Perm		Perm	Perm		pm+ov
Protected Phases	5	2			6			4			8	5
Permitted Phases				6		6	4		4	8		8
Actuated Green, G (s)	19.0	62.0		38.0	38.0	38.0		18.0	18.0		18.0	37.0
Effective Green, g (s)	20.0	63.0		39.0	39.0	39.0		19.0	19.0		19.0	39.0
Actuated g/C Ratio	0.22	0.70		0.43	0.43	0.43		0.21	0.21		0.21	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	393	1309		316	815	686		238	334		278	756
v/s Ratio Prot	c0.23	0.38			c0.42							0.09
v/s Ratio Perm				0.04		0.12		0.03	0.00		c0.21	0.11
v/c Ratio	1.02	0.55		0.09	0.98	0.28		0.16	0.02		1.00	0.42
Uniform Delay, d1	35.0	6.6		15.0	25.1	16.4		29.0	28.1		35.5	17.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	50.7	0.3		0.0	26.0	0.1		0.1	0.0		54.0	0.1
Delay (s)	85.7	6.8		15.1	51.1	16.5		29.1	28.1		89.5	17.8
Level of Service	F	A		B	D	B		C	C		F	B
Approach Delay (s)		35.0			41.2			28.7			48.5	
Approach LOS		D			D			C			D	

Intersection Summary

HCM Average Control Delay	40.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

2010 Weekday Evening Peak Hour Build Conditions for
TEC, Inc. Calculated Traffic Volumes
(April 2006 MUOD Proposal)
with TEC's Assumed Lane Use and Timing

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	11	11	12	11	11	12	12	11	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1454	1881	1561	1745	1900	1546	1745	1898		1728	1880	
Flt Permitted	0.09	1.00	1.00	0.09	1.00	1.00	0.09	1.00		0.12	1.00	
Satd. Flow (perm)	132	1881	1561	167	1900	1546	171	1898		218	1880	
Volume (vph)	97	735	200	30	743	371	267	483	3	185	695	42
Peak-hour factor, PHF	0.94	0.94	0.94	0.96	0.96	0.96	0.86	0.86	0.86	0.94	0.94	0.94
Adj. Flow (vph)	103	782	213	31	774	386	310	562	3	197	739	45
RTOR Reduction (vph)	0	0	37	0	0	39	0	0	0	0	0	0
Lane Group Flow (vph)	103	782	176	31	774	347	310	565	0	197	784	0
Heavy Vehicles (%)	20%	1%	0%	0%	0%	1%	0%	0%	0%	1%	0%	3%
Turn Type	pm+pt		pt+ov	pm+pt		pt+ov	pm+pt			pm+pt		
Protected Phases	5	2	2 3	1	6	6 7	7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	47.4	43.4	58.4	44.6	41.0	58.0	49.0	39.0		45.0	37.0	
Effective Green, g (s)	53.4	46.4	62.4	48.6	44.0	62.0	57.0	43.0		53.0	41.0	
Actuated g/C Ratio	0.44	0.38	0.51	0.40	0.36	0.51	0.47	0.35		0.43	0.34	
Clearance Time (s)	7.0	7.0		5.0	7.0		8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	715	798	126	685	786	261	669		243	632	
v/s Ratio Prot	c0.04	c0.42	0.11	0.01	0.41	0.22	c0.14	0.30		0.08	0.42	
v/s Ratio Perm	0.29			0.09			c0.42			0.27		
v/c Ratio	0.77	1.09	0.22	0.25	1.13	0.44	1.19	0.84		0.81	1.24	
Uniform Delay, d1	58.3	37.8	16.4	30.4	39.0	19.0	56.2	36.4		26.9	40.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	22.8	62.1	0.1	1.0	76.0	0.4	116.2	9.6		18.2	121.3	
Delay (s)	81.2	99.9	16.5	31.4	115.0	19.4	172.4	46.0		45.1	161.8	
Level of Service	F	F	B	C	F	B	F	D		D	F	
Approach Delay (s)		82.0			81.9			90.8			138.4	
Approach LOS		F			F			F			F	

Intersection Summary

HCM Average Control Delay	97.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	111.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (prot)	1805	1881	1881	1615	1804	
Flt Permitted	0.16	1.00	1.00	1.00	0.95	
Satd. Flow (perm)	311	1881	1881	1615	1804	
Volume (vph)	75	467	806	274	272	10
Peak-hour factor, PHF	0.76	0.76	0.99	0.99	0.80	0.80
Adj. Flow (vph)	99	614	814	277	340	12
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	99	614	814	277	350	0
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	Perm			pm+ov		
Protected Phases		6	2	8	8	
Permitted Phases	6			2		
Actuated Green, G (s)	23.4	23.4	23.4	35.6	12.2	
Effective Green, g (s)	24.4	24.4	24.4	37.6	13.2	
Actuated g/C Ratio	0.54	0.54	0.54	0.82	0.29	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	166	1007	1007	1615	522	
v/s Ratio Prot		0.33	c0.43	0.05	c0.19	
v/s Ratio Perm	0.32			0.12		
v/c Ratio	0.60	0.61	0.81	0.17	0.67	
Uniform Delay, d1	7.2	7.3	8.7	0.8	14.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.8	0.7	4.6	0.0	2.7	
Delay (s)	11.0	8.0	13.3	0.8	16.9	
Level of Service	B	A	B	A	B	
Approach Delay (s)		8.5	10.1		16.9	
Approach LOS		A	B		B	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	45.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.42	1.00
Satd. Flow (perm)	1770	1583	1863	1583	784	1881
Volume (vph)	142	228	314	105	207	687
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	154	248	341	114	225	747
RTOR Reduction (vph)	0	148	0	33	0	0
Lane Group Flow (vph)	154	100	341	81	225	747
Heavy Vehicles (%)	2%	2%	2%	2%	2%	1%
Turn Type		pt+ov		pt+ov	pm+pt	
Protected Phases	4	4 5	6	6 4	5	2
Permitted Phases					2	
Actuated Green, G (s)	9.2	21.7	24.6	38.8	37.1	37.1
Effective Green, g (s)	10.2	22.7	25.6	39.8	38.1	38.1
Actuated g/C Ratio	0.18	0.40	0.45	0.71	0.68	0.68
Clearance Time (s)	5.0		5.0		5.0	5.0
Vehicle Extension (s)	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	321	638	847	1119	679	1273
v/s Ratio Prot	c0.09	0.06	0.18	0.05	0.05	c0.40
v/s Ratio Perm					0.17	
v/c Ratio	0.48	0.16	0.40	0.07	0.33	0.59
Uniform Delay, d1	20.7	10.7	10.2	2.5	4.0	4.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.0	1.4	0.0	0.1	2.0
Delay (s)	21.1	10.7	11.7	2.6	4.1	6.9
Level of Service	C	B	B	A	A	A
Approach Delay (s)	14.7		9.4			6.2
Approach LOS	B		A			A

Intersection Summary

HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1870		1770	1881	1583		1803	1583		1779	1583
Flt Permitted	0.95	1.00		0.43	1.00	1.00		0.77	1.00		0.71	1.00
Satd. Flow (perm)	1770	1870		807	1881	1583		1440	1583		1328	1583
Volume (vph)	215	565	20	20	611	154	20	10	20	181	10	229
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	224	589	22	22	650	164	22	11	22	197	11	249
RTOR Reduction (vph)	0	2	0	0	0	76	0	0	17	0	0	99
Lane Group Flow (vph)	224	609	0	22	650	88	0	33	5	0	208	150
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm		Perm	Perm		Perm	Perm		pm+ov
Protected Phases	5	2			6			4			8	5
Permitted Phases				6		6	4		4	8		8
Actuated Green, G (s)	12.4	45.2		27.8	27.8	27.8		13.8	13.8		13.8	26.2
Effective Green, g (s)	13.4	46.2		28.8	28.8	28.8		14.8	14.8		14.8	28.2
Actuated g/C Ratio	0.19	0.67		0.42	0.42	0.42		0.21	0.21		0.21	0.41
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	344	1252		337	785	661		309	340		285	739
v/s Ratio Prot	c0.13	0.33			c0.35							0.04
v/s Ratio Perm				0.03		0.06		0.02	0.00		c0.16	0.06
v/c Ratio	0.65	0.49		0.07	0.83	0.13		0.11	0.01		0.73	0.20
Uniform Delay, d1	25.6	5.6		12.0	17.9	12.4		21.8	21.4		25.2	13.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	3.3	0.1		0.0	6.9	0.0		0.1	0.0		7.7	0.0
Delay (s)	29.0	5.7		12.1	24.8	12.4		21.8	21.4		32.9	13.2
Level of Service	C	A		B	C	B		C	C		C	B
Approach Delay (s)		11.9			22.0			21.6			22.2	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2010 Saturday Midday Peak Hour Build Conditions for
TEC, Inc. Calculated Traffic Volumes
(April 2006 MUOD Proposal)
with TEC's Assumed Lane Use and Timing

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	11	11	12	11	11	12	12	11	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1863	1561	1711	1863	1546	1694	1873		1728	1844	
Flt Permitted	0.10	1.00	1.00	0.12	1.00	1.00	0.15	1.00		0.15	1.00	
Satd. Flow (perm)	183	1863	1561	208	1863	1546	274	1873		280	1844	
Volume (vph)	109	589	267	55	580	243	244	412	13	249	373	44
Peak-hour factor, PHF	0.92	0.92	0.92	0.89	0.89	0.89	0.95	0.95	0.95	0.93	0.93	0.93
Adj. Flow (vph)	118	640	290	62	652	273	257	434	14	268	401	47
RTOR Reduction (vph)	0	0	75	0	0	45	0	0	0	0	0	0
Lane Group Flow (vph)	118	640	215	62	652	228	257	448	0	268	448	0
Heavy Vehicles (%)	0%	2%	0%	2%	2%	1%	3%	1%	0%	1%	1%	5%
Turn Type	pm+pt		pt+ov	pm+pt		pt+ov	pm+pt			pm+pt		
Protected Phases	5	2	2 3	1	6	6 7	7	4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	41.2	37.2	53.2	40.8	36.0	52.0	31.0	22.0		31.0	22.0	
Effective Green, g (s)	47.2	40.2	57.2	44.8	39.0	56.0	39.0	26.0		39.0	26.0	
Actuated g/C Ratio	0.47	0.40	0.57	0.44	0.39	0.55	0.39	0.26		0.39	0.26	
Clearance Time (s)	7.0	7.0		5.0	7.0		8.0	8.0		8.0	8.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	742	884	179	719	857	289	482		294	475	
v/s Ratio Prot	c0.04	0.34	0.14	0.02	c0.35	0.15	0.11	0.24		c0.12	c0.24	
v/s Ratio Perm	0.24			0.13			0.23			0.23		
v/c Ratio	0.61	0.86	0.24	0.35	0.91	0.27	0.89	0.93		0.91	0.94	
Uniform Delay, d1	21.3	27.9	11.0	20.6	29.3	11.8	25.1	36.6		25.2	36.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.3	12.6	0.1	1.2	17.3	0.2	26.4	24.3		30.6	27.4	
Delay (s)	26.6	40.5	11.2	21.7	46.5	11.9	51.5	60.9		55.7	64.2	
Level of Service	C	D	B	C	D	B	D	E		E	E	
Approach Delay (s)		30.8			35.4			57.5			61.0	
Approach LOS		C			D			E			E	

Intersection Summary

HCM Average Control Delay	43.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	101.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (prot)	1805	1863	1845	1599	1771	
Flt Permitted	0.46	1.00	1.00	1.00	0.95	
Satd. Flow (perm)	869	1863	1845	1599	1771	
Volume (vph)	74	457	413	262	264	7
Peak-hour factor, PHF	0.89	0.89	0.98	0.98	0.91	0.91
Adj. Flow (vph)	83	513	421	267	290	8
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	83	513	421	267	297	0
Heavy Vehicles (%)	0%	2%	3%	1%	2%	0%
Turn Type	Perm			pm+ov		
Protected Phases		6	2	8	8	
Permitted Phases	6			2		
Actuated Green, G (s)	15.0	15.0	15.0	25.1	10.1	
Effective Green, g (s)	16.0	16.0	16.0	27.1	11.1	
Actuated g/C Ratio	0.46	0.46	0.46	0.77	0.32	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	396	849	841	1599	560	
v/s Ratio Prot		c0.28	0.23	0.05	c0.17	
v/s Ratio Perm	0.10			0.11		
v/c Ratio	0.21	0.60	0.50	0.17	0.53	
Uniform Delay, d1	5.7	7.2	6.7	1.0	9.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.8	0.2	0.0	0.4	
Delay (s)	5.8	8.0	6.9	1.1	10.3	
Level of Service	A	A	A	A	B	
Approach Delay (s)		7.7	4.6		10.3	
Approach LOS		A	A		B	

Intersection Summary

HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	35.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1881	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.42	1.00
Satd. Flow (perm)	1770	1583	1881	1615	789	1881
Volume (vph)	144	201	330	123	244	275
Peak-hour factor, PHF	0.92	0.92	0.96	0.96	0.97	0.97
Adj. Flow (vph)	157	218	344	128	252	284
RTOR Reduction (vph)	0	129	0	38	0	0
Lane Group Flow (vph)	157	89	344	90	252	284
Heavy Vehicles (%)	2%	2%	1%	0%	0%	1%
Turn Type		pt+ov		pt+ov	pm+pt	
Protected Phases	4	4 5	6	6 4	5	2
Permitted Phases					2	
Actuated Green, G (s)	9.3	22.1	24.3	38.6	37.1	37.1
Effective Green, g (s)	10.3	23.1	25.3	39.6	38.1	38.1
Actuated g/C Ratio	0.18	0.41	0.45	0.70	0.68	0.68
Clearance Time (s)	5.0		5.0		5.0	5.0
Vehicle Extension (s)	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	323	648	844	1134	692	1271
v/s Ratio Prot	c0.09	0.06	c0.18	0.06	c0.06	0.15
v/s Ratio Perm					0.19	
v/c Ratio	0.49	0.14	0.41	0.08	0.36	0.22
Uniform Delay, d1	20.7	10.4	10.5	2.6	4.1	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.0	1.5	0.0	0.1	0.4
Delay (s)	21.1	10.5	12.0	2.7	4.2	3.9
Level of Service	C	B	B	A	A	A
Approach Delay (s)	14.9		9.4			4.0
Approach LOS	B		A			A

Intersection Summary

HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1872		1770	1881	1583		1799	1583		1779	1583
Flt Permitted	0.95	1.00		0.35	1.00	1.00		0.68	1.00		0.71	1.00
Satd. Flow (perm)	1770	1872		659	1881	1583		1275	1583		1322	1583
Volume (vph)	273	779	25	25	793	186	25	10	25	179	10	253
Peak-hour factor, PHF	0.97	0.97	0.97	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	281	803	26	28	881	207	27	11	27	195	11	275
RTOR Reduction (vph)	0	1	0	0	0	65	0	0	22	0	0	59
Lane Group Flow (vph)	281	828	0	28	881	142	0	38	5	0	206	216
Heavy Vehicles (%)	2%	1%	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm		Perm	Perm		Perm	Perm		pm+ov
Protected Phases	5	2			6			4			8	5
Permitted Phases				6		6	4		4	8		8
Actuated Green, G (s)	15.4	61.0		40.6	40.6	40.6		14.7	14.7		14.7	30.1
Effective Green, g (s)	16.4	62.0		41.6	41.6	41.6		15.7	15.7		15.7	32.1
Actuated g/C Ratio	0.19	0.72		0.49	0.49	0.49		0.18	0.18		0.18	0.37
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	339	1354		320	913	768		234	290		242	667
v/s Ratio Prot	c0.16	0.44			c0.47							0.06
v/s Ratio Perm				0.04		0.09		0.03	0.00		c0.16	0.07
v/c Ratio	0.83	0.61		0.09	0.96	0.19		0.16	0.02		0.85	0.32
Uniform Delay, d1	33.3	5.9		11.8	21.3	12.5		29.5	28.7		33.9	19.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	14.6	0.6		0.0	21.4	0.0		0.1	0.0		23.1	0.1
Delay (s)	47.9	6.5		11.9	42.7	12.5		29.6	28.7		57.0	19.2
Level of Service	D	A		B	D	B		C	C		E	B
Approach Delay (s)		17.0			36.3			29.2			35.4	
Approach LOS		B			D			C			D	

Intersection Summary

HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	85.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Town of Wayland
2006 Mixed Use
Overlay District Proposal
* Traffic Assessment *

Kevin R. Dandrade, PE, PTOE

TEC, Inc.

Introduction to TEC, Inc.

- TEC is a multi-service civil engineering firm currently assisting the Planning Board with a Traffic Engineering Assessment for the 2006 Mixed Use Overlay District (MUOD) proposal
- TEC is currently assisting the following Town Boards / Department with traffic engineering assignments:
  - Board of Road Commissioners
  - Zoning Board of Appeals (ZBA)
  - Planning Board
  - Wayland Police Department

2006 MUOD Scope of Work

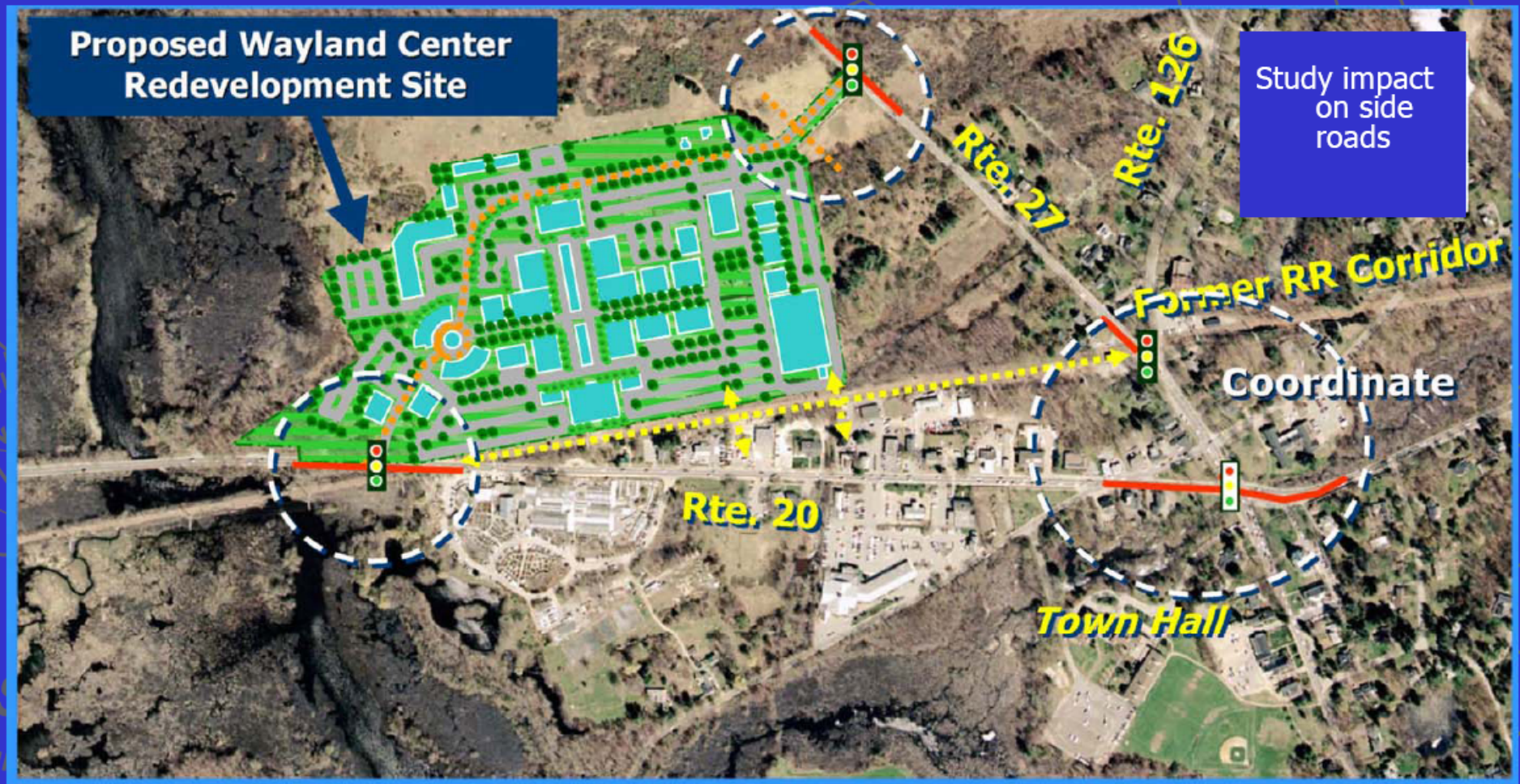
TEC performed the following tasks:

- Estimated vehicle trip generation for five different development proposals on the former Raytheon site in the center of Wayland
- Analyzed intersection capacity for the 2006 MUOD proposal and compared it to the June 2005 Twenty Wayland, LLC proposal
- Evaluated roadway improvements and traffic control devices

Site Proposals Analyzed:

1. Assumed existing office use – Fully Re-occupied
2. June 2005 Twenty Wayland, LLC Proposal
3. November 2005 MUOD Proposal – Planning Board
4. April 2006 MUOD Proposal – Planning Board
5. 40B Comprehensive Permit Proposal (Residential)

Project Areas



Uses Assumed for April 2006 MUOD Proposal

Institute of Transportation Engineers (ITE) categories:

- 155,000 sf Shopping Center (General Retail)
- 10,000 sf General Office
- 40,000 sf Municipal Office Complex
- 100 Residential Condominium Units

Key Elements of Trip Generation

- Primary Trips
- Pass-by Trips
- Shared Trips
- Options to distribute traffic to area roadways

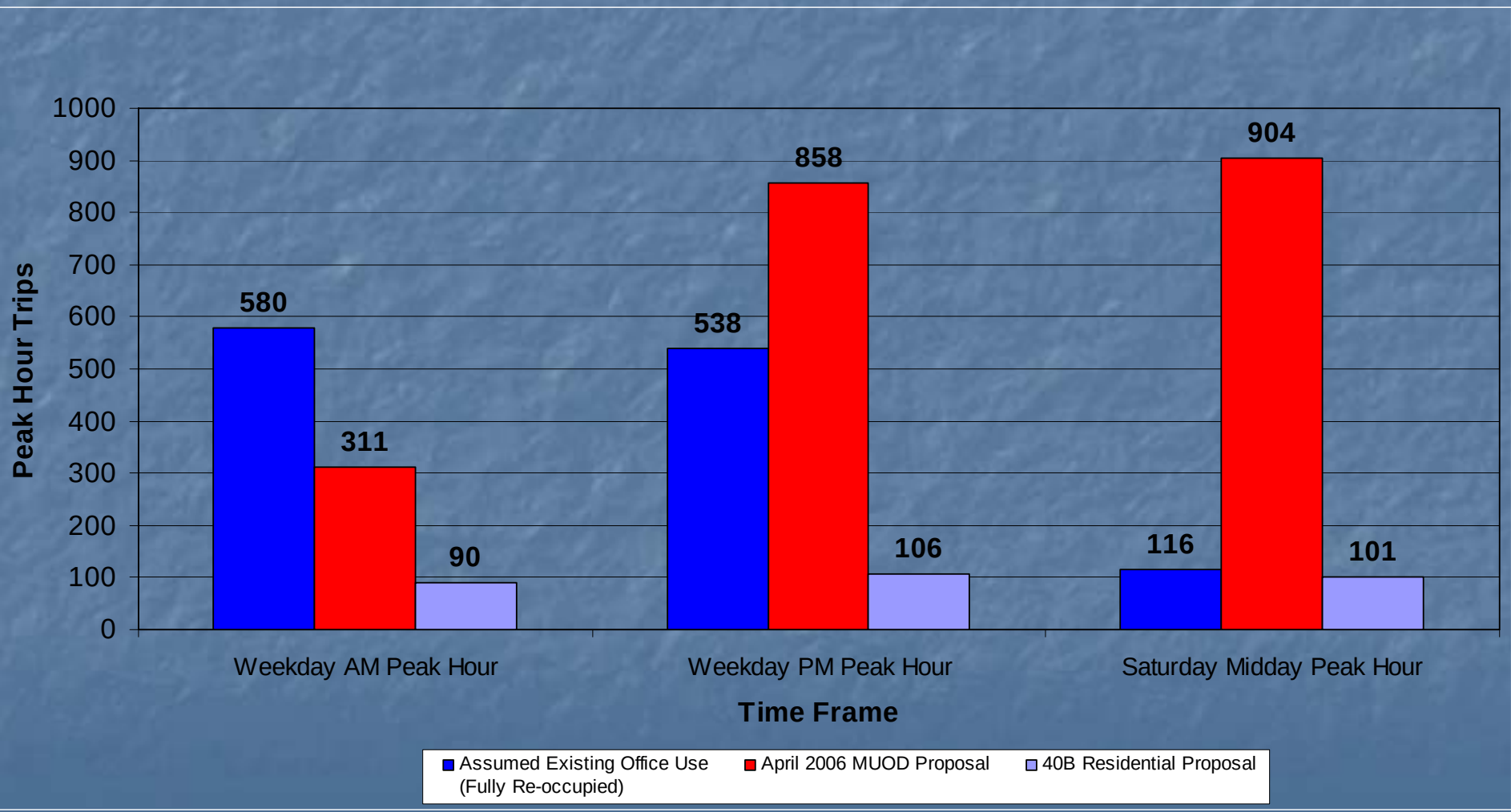
Trip Generation Comparison Estimated *Total* Trips

Time Period	410,000 sf Assumed Existing Office Use (Fully Reoccupied)	June 2005 Twenty Wayland, LLC Proposal	November 2005 MUOD Proposal	April 2006 MUOD Proposal	40B Residential Proposal
Weekday Daily	3,954	16,350	12,238	11,014	1,157
Weekday AM Peak	580	514	425	373	90
Weekday PM Peak	538	1,554	1,234	1,100	106
Saturday Daily	896	19,374	14,372	13,007	1,152
Saturday Peak	116	1,864	1,388	1,228	101

Trip Generation Comparison Estimated *Primary (New)* Trips

Time Period	410,000 sf Assumed Existing Office Use (Fully Reoccupied)	June 2005 Twenty Wayland, LLC Proposal	November 2005 MUOD Proposal	April 2006 MUOD Proposal	40B Residential Proposal
Weekday Daily	3,954	12,822	9,383	8,427	1,157
Weekday AM Peak	580	434	357	311	90
Weekday PM Peak	538	1,226	966	858	106
Saturday Daily	896	14,684	10,596	9,573	1,152
Saturday Peak	116	1,414	1,029	904	101

Comparison of New Peak Hour Trips



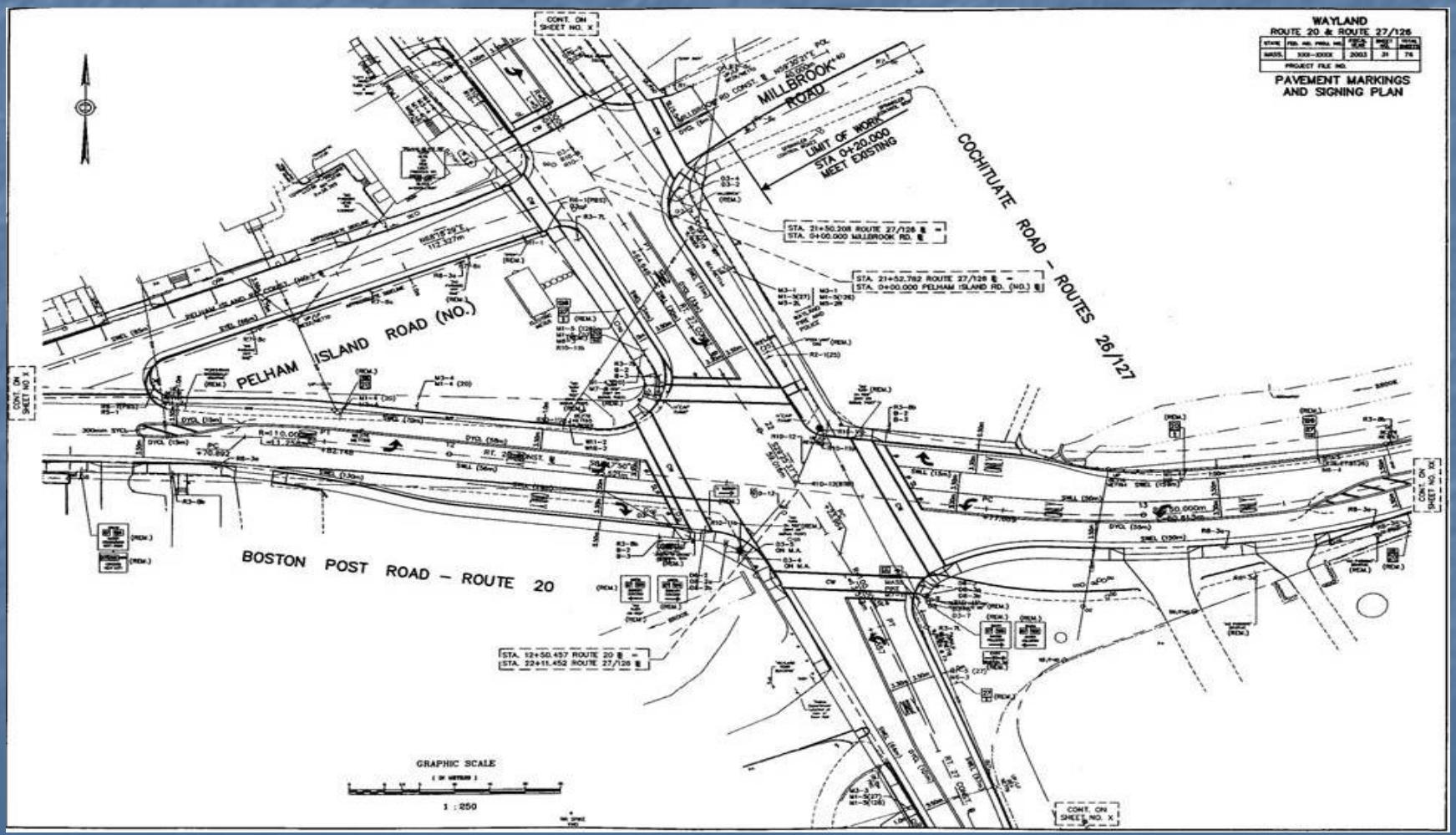
Differences in Trip Generation

- The 2006 MUOD proposal generates more traffic over the course of an entire weekday
- The 2006 MUOD proposal will actually present a reduction in trips during the weekday AM peak
- The impacts of “new” trips at the intersection of Route 20 at Routes 27/126 will be comparable for the fully re-occupied office space and the 2006 MUOD proposal
- The 2006 MUOD proposal will increase Saturday trips significantly
- The 40B Residential proposal will generate the fewest trips during all peak hours (AM, PM, SAT)

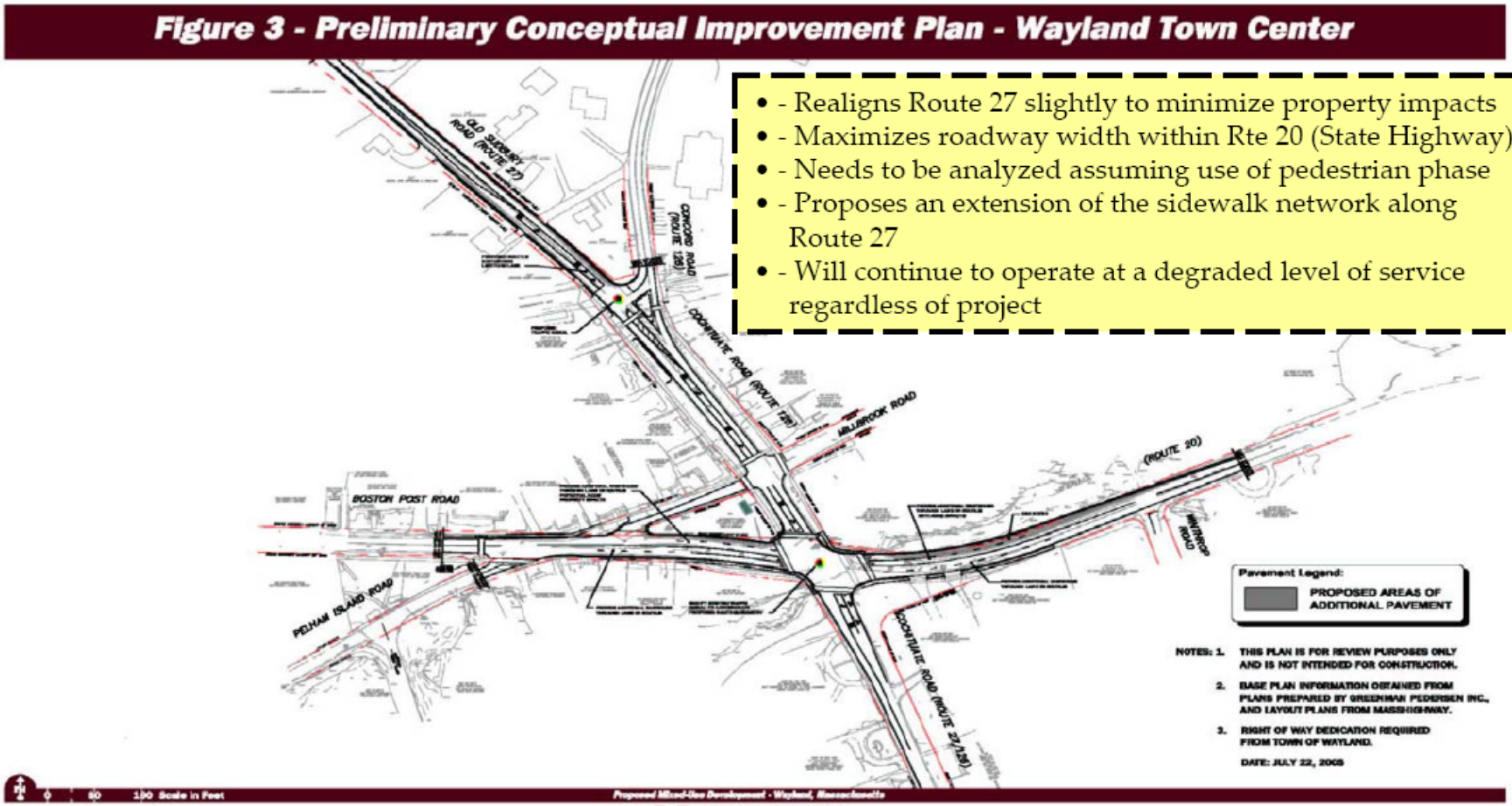
Peak Hour Traffic Volume Comparison for Adjacent Roadways

Roadway Segment	2005 Actual Conditions	2010 Build Condition June 2005 Twenty Wayland, LLC Proposal	2010 Build Condition April 2006 MUOD Proposal
Route 20 (East of Site Roadway)			
PM Peak Hour	1,418	1,716	1,551
SAT Peak Hour	1,662	1,951	1,937
Route 27 (South of Site Roadway)			
PM Peak Hour	1,077	1,469	1,436
SAT Peak Hour	698	1,114	1,050

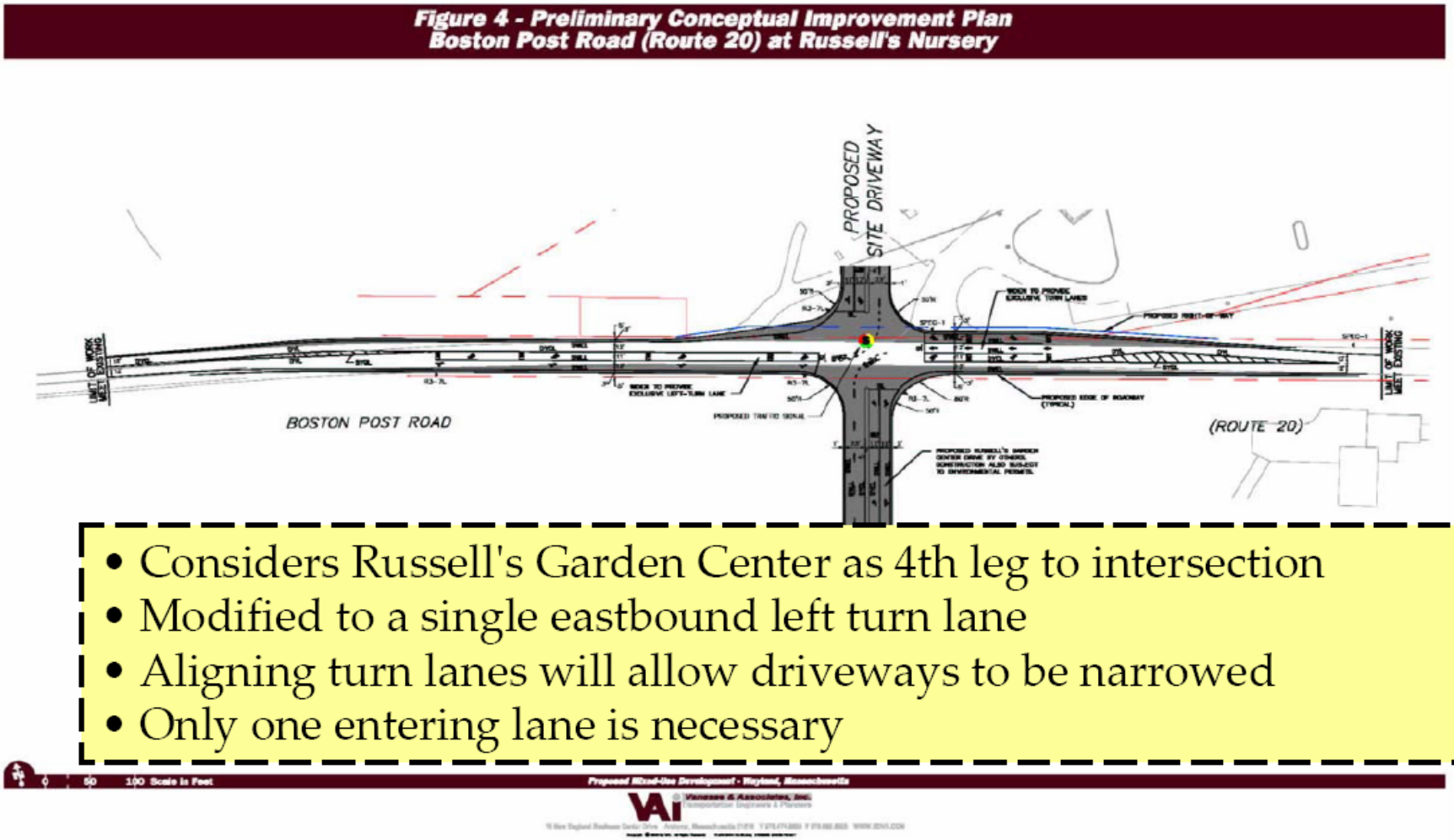
Current MassHighway Project
Route 20 at Routes 27 / 126



Route 27 at Route 126



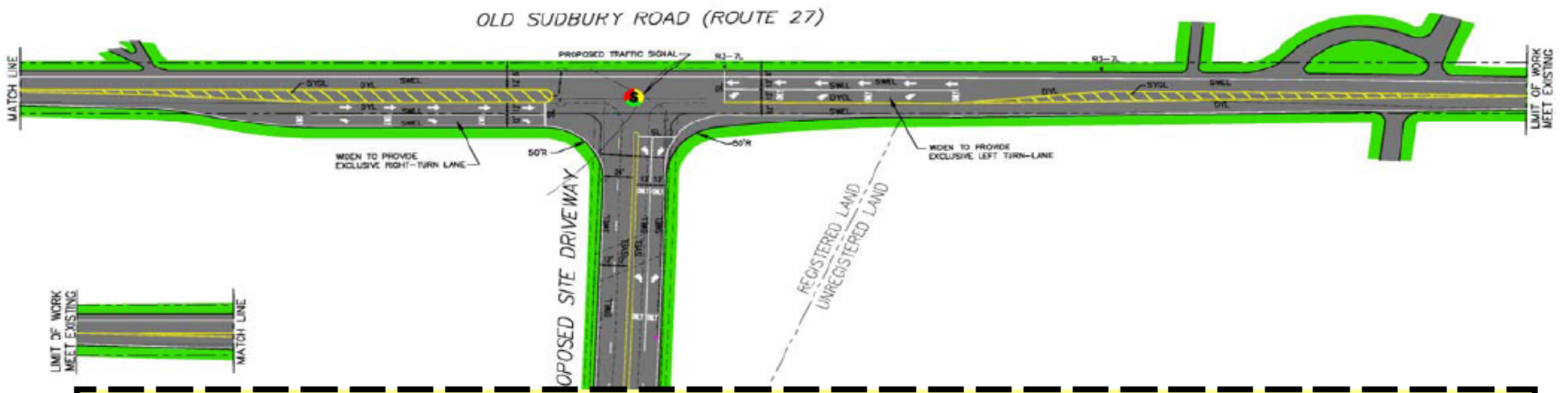
Route 20 at Site Roadway



- Considers Russell's Garden Center as 4th leg to intersection
- Modified to a single eastbound left turn lane
- Aligning turn lanes will allow driveways to be narrowed
- Only one entering lane is necessary

Route 27 at Site Roadway

Conceptual Improvement Plan - Old Sudbury Road (Route 27)



- - Lies adjacent to conservation land and wetlands
- - Planned as access for multiple properties
- - Requires new left-turn lane under full-build condition
- - Signals will likely be warranted under full build conditions

Proposed Mixed-Use Development - Wayland, Massachusetts

Vanasse & Associates, Inc.
Transportation Engineers & Planners
10 New England Business Center Drive Andover, Massachusetts 01810 V 978.474.8800 F 978.688.6805 WWW.RDVA.COM

Summary of Assumed Future-year Intersection Improvements

Route 20 / Site Roadway

- Widen Route 20 for eastbound left-turn and westbound right-turn lane and install signal
- Realign Russell's Garden Center driveway

Route 27 / Site Roadway

- Widen Route 27 for a new northbound left-turn lane and install traffic signal

Route 27 / Route 126

- Widen Route 27 for a new southbound left-turn lane and install traffic signal

Route 20 at Route 27 / 126

- Maintain MassHighway widening improvements (currently nearing completion)

Capacity Analysis Summary

Signalized Intersection/ Overall Results	June 2005 Twenty Wayland, LLC Proposal			April 2006 Planning Board MUOD Proposal		
	Overall V/C	Delay	LOS	Overall V/C	Delay	LOS
Route 20 at Site Roadway						
Weekday Evening	0.89	27.3	C	0.76	18.2	B
Saturday Midday	0.99	40.2	D	0.91	28.2	C
Route 20 at Routes 27/126						
Weekday Evening	1.22	102.5	F	1.17	97.2	F
Saturday Midday	0.99	57.2	E	0.89	43.8	D
Route 27 at Route 126						
Weekday Evening	0.84	14.6	B	0.76	10.7	B
Saturday Midday	0.68	9.2	A	0.57	6.9	A
Route 27 at Site Roadway						
Weekday Evening	0.56	9.9	A	0.56	8.9	A
Saturday Midday	0.50	9.9	A	0.42	8.8	A

TEC Recommendations

1. Identify Pedestrian Connections
2. Perform Travel Time Assessment for local roads to assess cut-through traffic
3. Widen and Signalize Route 20 / Site Roadway Intersection
4. Consider a connecting Site Roadway between Route 20 and Route 27 as part of any proposal for the site
5. Widen Route 27 at Site Roadway for a new northbound left-turn lane and install conduit for future signal

Recommendations (Continued)

6. Consider peak hour turning restrictions at Route 27 / Glezen Lane and Route 27 / Bow Road
7. Widen Route 27 at Route 126 and install a traffic signal
8. Consider changing one-way operation of Library Lane
9. Study business driveways along Route 20 between Site Roadway and Routes 27 / 126 to identify opportunities for driveway consolidation and widening for turn lanes

Question & Answer Session

Town of Wayland Planning Board

2006 MUOD Proposal
Traffic Assessment

TEC, Inc.

COMMUNITY OPPORTUNITIES GROUP, INC.
129 Kingston Street Third Floor
Boston, Massachusetts 02111
(617) 542-3300

April 20, 2006

Rebecca Regan, Planning Board
Wayland Town Hall
41 Cochituate Road
Wayland, MA 01778

Reference: Review of Proposed Town Center Developments

Dear Ms. Regan:

You have requested a fiscal and economic impact review of two proposed development options for the Wayland Business Center property. The proposals include a mixed-use development with commercial space and up to 100 housing units, and a 200-unit comprehensive permit development. The former project is similar to a mixed-use development proposed last year, although the amount of commercial space has been reduced to a maximum of 165,000 square feet. This letter is in response to your request.

Our report is organized as follows:

We would like to thank the Planning Board, Finance Committee, Town Administrator, municipal and school department heads, and the development team for providing information for this review.

COMMUNITY OPPORTUNITIES GROUP, INC.

Judith A. Barrett
Project Manager

1.0 SUMMARY OF FISCAL IMPACTS

We have been asked to review two development proposals for the former Wayland Business Center property at 400-440 Boston Post Road (Route 20). One is a Mixed-Use Overlay District (MUOD) for a development with retail, office and residential uses, and the second is a mixed-income housing development known as The Residences at Wayland Center. In our opinion, each proposal offers fiscal advantages and other public benefits to the Town.

Since the proposals are fairly conceptual, they can be expected to change somewhat as they advance through the development process. For the MUOD, the Town and developer have negotiated a fairly specific Development Agreement that sets forth the responsibilities of the parties and imposes a number of requirements on the project. Although some of the requirements are useful for making assumptions about the mix of commercial tenants, it is premature to speculate about the identity of the tenants or how much they will pay to lease space in the MUOD. This makes it difficult to forecast the amount of income the development will generate; consequently, any estimate of the development's assessed value must be treated as tentative, for a fiscal impact analysis conducted during the predevelopment phase of a project must rely on many assumptions. The Residences at Wayland Center is currently being reviewed by MassHousing for a Project Eligibility determination. For basic information about each proposal, our analysis draws heavily on the Development Agreement and the developer's Project Eligibility Application to MassHousing.

Table 1 presents a comparison of the estimated revenue and community service costs associated with the proposed reuses of the Wayland Business Center site. We want to emphasize that Table 1 reports an estimate of <u>direct</u> revenue and service costs, i.e., revenue generated by the proposed uses and the cost of services used by residents and businesses in the development. It does not include the following:

- One-time, non-recurring expenditures such as development review, permitting and inspection costs, which should be covered by the Town's fee regulations or addressed in the Development Agreement.

- Special revenue fund and enterprise fund revenue and expenditures, recurring or non-recurring.

- The impacts of "echo-effect" or housing resales activity that may occur due to in-town moves to the new housing units. The probability of echo-effect impacts is discussed under the comments on each project (Section 2.0 and Section 3.0).

Table 1: Estimated Fiscal Impact of Proposed Reuse Projects		
Fiscal Impact Component	Mixed-Use Overlay District (MUOD)	Comprehensive Permit
I. General Fund Revenue		
Commercial		
Property Taxes	$486,000	$0
Residential		
Property Taxes	$669,000	$1,080,000
Motor Vehicle Excise Taxes	$35,100	$76,200
Additional Chapter 70 Aid	$0	$36,400
Total General Fund Revenue	$1,190,100	$1,192,600
II. General Fund Expenditures		
General Government	$0	$0
Public Safety	$211,900	$230,000
Education	$168,000	$472,000
Public Works	$41,200	$55,800
Health & Human Services	$14,630	$19,300
Culture & Recreation	$44,260	$125,000
Debt Service	$0	$82,900
Total General Fund Service Costs	$479,990	$985,000
Surplus/(Deficit) Revenue	$710,110	$207,600
Cost-Revenue Ratio	0.40	0.83
Note: Numbers may not add up to the total due to rounding.		

Due to the preliminary state of both proposals, the estimates in Table 1 should be interpreted as midpoints of a revenue figure that may vary by 4-6% and cost figures that may vary by 5-7%.

We note that under existing conditions, the property generates about $260,000 in real estate taxes. It is beyond the scope of our review to determine the Town's costs to provide municipal services to uses currently occupying the site. Table 1 does not include revenue or service cost adjustments for the existing uses.

2.0 MIXED-USE OVERLAY DISTRICT

We understand that the proposed mixed-use development will consist of up to 332,500 square feet of space, subject to the following caps:

- A maximum of 167,500 square feet of residential space for not more than 100 housing units and 200 bedrooms. Of the total number of units, 25% must be affordable housing.[1]

- A maximum of 165,000 square feet of commercial space, including not more than 156,750 square feet of retail and not more than 10,000 square feet of office space. In addition, the project is subject to a number of caps on the amount of space that may be devoted to various classes of retail.

The project also includes a set-aside of up to 40,000 square feet for municipal uses, to be constructed by the Town in the future.

2.1 Revenue

Property taxes will be the primary source of general fund revenue from this project. The residential units will also generate excise tax revenue. Although Wayland will most likely experience a modest increase in other local receipts as well, we have not factored them into our calculations. We do not believe the town will see any increase in local aid as a direct result of the proposed development. (See Section 4.0, Chapter 40R.)

2.2 Commercial Component

We requested that the Town retain an independent appraiser to estimate the assessed value of the commercial component of this project. Unfortunately, the Town was not able to obtain an appraiser's estimate by the deadline for submission of our report. In an effort to assist the Planning Board with its review of the MUOD, we have estimated the project's revenue by consulting several sources: our own commercial property database, which includes assessed value and tax revenue data obtained from demographically similar suburbs, other fiscal impact professionals who have recently evaluated developments proposed in other Eastern Massachusetts communities, assessors in other communities, and the developer's assumptions as we understand them.

We need to underscore that our firm does not provide appraisal services. As a result, we cannot say that the values presented below are equal to what a certified appraiser would estimate as the project's market value once it is fully built and occupied. However, our conversations with other fiscal impact consultants and assessors in other communities persuade us that the assessed value shown in Table 2 is a reasonable estimate of the value that would be

[1] For purposes of this review, we assume that "affordable units" refers to housing eligible for the Chapter 40B Subsidized Housing Inventory under the guidelines of the Local Initiative Program (LIP).

used for tax assessment purposes, assuming the mix of stores by size category listed in the Development Agreement and the developer's description of the project.

Table 2: Revenue Estimate for MUOD Commercial Component (Rounded)

	Rent Assumptions (Triple Net)	
Commercial/Retail Tenant Class	Fiscal Impact Analysis	Developer's Lower-Range Estimate (1)
I. Retail (Size Caps in Development Agreement)		
15,000-45,000 sq. ft.	$24	$33
10,000-15,000 sq. ft.	$29	$30
7,000-10,000 sq. ft.	$20	$20
5,000-7,000 sq. ft.	$35	$35
Less than 5,000 sq. ft.	$28	$30
Retail Weighted Average	$27	$33
II. Office	$18	$18
Retail Gross Income	$4,150,000	$5,120,000
Office Gross Income	$180,000	$180,000
Retail O&M/Credit Loss/Vacancy Ratio, 25% (2)	$1,040,000	$1,280,000
Estimated Net Operating Income	$3,300,000	$4,020,000
Estimated Assessed Value at Cap Rate 8.5% (3)	$38,800,000	$47,300,000
Property Taxes @ $12.54	$486,000	$593,000

(1) Upper-end rents range from a low of $30/sq. ft. to a high of $55/sq. ft. Table 2 excludes the upper-end rents because in consultation with assessors and other professional in the field, we could not find evidence that the upper-end rent estimates are attainable in this location.

(2) Standard expense ratios in other communities range from 25-30%.

(3) Capitalization rates are set on a project-by-project basis. For recently built commercial projects, rates commonly identified range from 8-10%.

In our opinion, the Town will realize approximately $486,000 in tax revenue from the commercial side of the mixed-use development, assuming Wayland's current tax rate of $12.54. It is possible that when the project is completed, the actual tenant mix under build-out operating conditions will justify applying a lower capitalization rate to net operating income in order to set the assessed value of the project. Given that the town center project remains in a conceptual/predevelopment stage and there are a number of unknowns at this time, we cannot recommend assuming more optimistic rents or a lower capitalization rate.[2]

[2] Author's Note. We acknowledge that our assumptions are more conservative than the developer's assumptions. For example, the developer suggested assuming a 3% vacancy rate, no O&M, and a 7.5% capitalization rate. However, we have never seen a commercial property assessed on the basis of a 0% expense ratio. The assumptions used to forecast the market value of a commercial project may differ from the assumptions used to estimate the project's assessed value as an income-generating property.

2.3 Residential Component

The MUOD Development Agreement caps the allowable number of dwelling units at 100. We understand from the developer that the actual number of units may be somewhat less because the gross floor area cap does not support 100 units of the type contemplated for this project. For our analysis, we assumed 100 two-bedroom units and we also assumed that the units will be condominiums, not apartments.

On April 14, 2006, the Town Administrator received three comparable sales reports from a certified appraiser. The appraiser's estimate for two-bedroom condominiums ($445,000) is not as high as the developer's sale price assumption ($800,000±). We do not know the sample unit specifications that were available for the appraiser's review. To estimate residential property tax revenue for the MUOD, we have used the median value of condominiums built in Wayland from 1990-2000, i.e., recently constructed units.

Table 3: Revenue Estimate for MUOD Residential Component (Rounded)

Source of Revenue	Fiscal Impact Assessed Value & Other Revenue Assumptions	Developer's Sale Price Assumptions
I. Property Taxes		
Market-Rate Units (75)		
Assessed Value/Unit	$660,000	$800,000
Total Assessed Value	$49,500,000	$60,000,000
Property Tax Revenue	$621,000	$753,000
Affordable Units (25)	$153,000	$153,000
Total Assessed Value	$3,830,000	$3,830,000
Property Tax Revenue	$48,000	$48,000
Total Tax Revenue	$669,000	$801,000
II. Excise Tax	$35,100	
Total Revenue	$704,100	

In addition to property taxes, residential uses generate motor vehicle excise taxes. Wayland's actual excise tax revenue in FY05, converted to revenue per capita, is $155. We used this figure to estimate the excise tax revenue shown in Table 3, based on assumptions about the household population that would live in the development (Table 4). We assumed no other local receipts and no additional local aid.

Table 4: MUOD Estimate of Household Population & School-Age Children

		Average Household Size		Average School-Age Children	
Housing Units	# Units	Per Unit	Total	Per Unit	Total
Market-Rate	75	2.25	168.8	0.11	8.3
Affordable	25	2.29	57.3	0.32	8.0
Total	100		226.0		16.3

Source: Census 2000 SuperPUMA 25102; cross-tabulations by author.

The development's total household and school-age populations may vary by 5-6% from the figures reported in Table 4.

2.4 Community Service Expenditures

For our previous study, we analyzed Wayland's actual expenditures and revenue, FY 1990-2004, in order to account for long-term financial trends and understand the rates of growth or change that had occurred in various departmental operating budgets. Thereafter, we converted the Town's FY05 departmental appropriations to per capita costs and used them as base multipliers to estimate the cost to serve residents of the MUOD. On a case-by-case basis, these base multipliers were adjusted for marginal cost impacts with coefficients developed from fiscal impact case studies conducted nationally. Modified per capita cost studies are commonly used by fiscal impact analysts when more refined information is unavailable from the unit of local government.

The Town Administrator arranged for us to meet with Wayland's department heads on April 5, 2006, to discuss the MUOD and comprehensive permit proposal. We also met with the Town Administrator individually on March 30, 2006, consulted by telephone with Fire Chief Robert Loomer on April 3, 2006, and had follow-up communication with School Superintendent Gary Burton after the department head meeting. Table 5 provides our revised estimate of municipal and school service costs directly attributable to the proposed MUOD, based on our present understanding of the project. The estimates in Table 5 incorporate information we received from the Town and standard costing practices used in fiscal impact studies.

Table 5: Municipal & School Service Cost Estimate (Rounded)

(A)	(B)	(C)	(D)
General Fund Service Category	Total	Commercial	Residential
General Government	$0	$0	$0
Public Safety	$211,900	$165,000	$46,900
Education	$168,000	$0	$168,000
Public Works	$41,200	$15,500	$25,700
Health & Human Services	$14,630	$5,790	$8,840
Culture & Recreation	$44,260	$3,860	$40,400
Total General Fund Services	$479,990	$190,150	$289,840

Table 5 Notes

(1) General Government. The Town Administrator anticipates no additional general government service costs as a direct result of this project. It is his position that Wayland's existing general government operations can absorb any service demands that may be generated by the development, i.e., a de minimus impact. In the future, the Town may want to consider a methodology for measuring the cumulative impacts of new growth on community services.

Education. In consultation with the School Superintendent, we have used Wayland's FY 2005 Per Pupil Expenditure (as reported by the Department of Education) to estimate the Town's K-12 school costs for children living in the MUOD. Depending on the grades directly affected by new enrollments, the Town may need to add a bus route. It is premature to estimate this cost. We assumed all school-age children would attend the Wayland Public Schools, and needs for special education services would be consistent with Wayland's existing experience.

Public Safety. Estimating additional public safety costs is more difficult than estimating any other municipal service costs. Our conversations with Wayland's public safety officials, our knowledge of public safety staffing levels in other communities, state and county data reported by the Census of Governments, and industry publications persuade us that Wayland's police and fire departments are already understaffed. It is conceivable that Wayland would postpone increasing its police and fire personnel indefinitely if the MUOD were not built, so perhaps an argument can be made for assigning a much larger public safety cost to the proposed project, i.e., the Town's existing deficit plus costs directly attributable to the development. However, we do not think it is appropriate or methodologically sound to assign the Town's existing deficit to the MUOD or the comprehensive permit development.[3]

The costs shown in Table 5 reflect the following assumptions and procedures. For public safety demands from commercial uses, the cost represents a "proportional valuation" analysis in which Wayland's existing non-residential public safety expenditures are multiplied by the ratio of the project's assessed value to Wayland's total nonresidential assessed value, and thereafter by a marginal cost coefficient.[4] For residential uses, we estimated Wayland's salary, employee benefits and supplies expenditures per police officer and firefighter,[5] and converted the population estimate for this project to a multiplier based on the statewide standard for the average number of police (1.9) and firefighters (2.1) per 1,000 population. The total public safety cost in Table 5, Column B, is the sum of commercial and residential public safety costs estimated with these two methods.

Public Works; Health & Human Services. Estimated costs are based on Wayland's current expenditures per capita multiplied by the mid-point and upper-range population estimates for the project; and commercial costs on a proportional valuation analysis. The development may have little if any direct impact on Wayland's public works functions because the project will be

[3] Our estimate of Wayland's current public safety deficit is approximately $388,865, assuming the state average of 1.9 officers per 1,000 population and 2.1 career (paid) firefighters per 1,000 population. Wayland does not meet either of these standards. The total cost estimate represents 2.8 police officers (plus employee benefits) and an additional police cruiser, and 3.4 firefighters (with benefits), both multiplied by an entry-level salary assumption and a factor for supplies (see below).

[4] Estimated FY06 nonresidential public safety costs = $1,479,047; FY06 nonresidential real property assessed value = $118,743,474; ratio of project value to total nonresidential value = .33; refinement coefficient = .40.

[5] Employee benefits calculated at 40% salary costs; a factor for supplies was derived from Wayland's FY06 police and fire budgets (salaries x 0.08 for police, and salaries x 0.04 for fire).

responsible for road maintenance, solid waste disposal and other services. However, it will have a recurring impact on the Board of Health, which is responsible for commercial, food service and multi-family residential inspections.

Culture & Recreation. Our cost estimate assumes Wayland's existing expenditures per capita for recreation and library services and a modest addition for services used by employees of MUOD businesses (estimated on a proposal valuation basis).

Debt Service. We understand that this project will require improvements to the wastewater treatment facility (WWTF). Capital and operating costs for the WWTF are excluded from this analysis because WWTF revenue and expenditures are accounted for on an enterprise basis. We are not aware of any other capital improvement costs the Town will incur as a direct result of the MUOD.

Unclassified or Shared Costs/Employee Benefits. In consultation with the Town Administrator, we assumed 40% of wage/salary costs as a basis for estimating the Town's new municipal employee benefit expenditures. The Department of Education's Per Pupil Expenditure formula already includes a municipality's shared costs for school employees and school property. The costs are based on information the Department of Education receives in year-end reports (Schedule 19) submitted by school districts and certified by city or town finance officers. Where applicable, benefit costs are included in total amounts shown in Table 5.

2.5 Summary of Revenue and Expenditure Estimates

In our opinion, the MUOD will produce a favorable fiscal impact on the Town. Actual revenue from the proposed development may exceed our estimates depending on the commercial/retail tenant mix. We believe the project will not impose more demands on general fund services than the estimates presented in this report. The services most likely to be affected by the MUOD are Wayland's public safety operations, which are currently understaffed, and the Wayland Public Schools. Impacts associated with improvements to the wastewater treatment facility (WWTF) are beyond the scope of our review because the WWTF is a municipal enterprise.

Table 6: MUOD Net Fiscal Impact (Numbers Rounded)

I. Revenue		II. Expenditures	
Commercial		General Government	$0
Property Taxes	$486,000	Public Safety	$211,900
Residential		Education	$168,000
Property Taxes	$669,000	Public Works	$41,200
Excise Taxes	$35,100	Health & Human Services	$14,630
Chapter 70	$0	Culture & Recreation	$44,260
Total Revenue	$1,190,100	*General Fund Total*	$479,990
Surplus/(Deficit) Revenue	$710,110	Cost-Revenue Ratio	0.40

2.6 Echo-Effect Growth in Population and School-Age Children

The developer expects that for the most part, the market-rate housing units in the MUOD will attract empty-nester or over-55 households. We think this is plausible. Accordingly, the Town should anticipate that approximately 20% of the market-rate units will be sold to existing Wayland households, or 15 units. Since the average number of school-age children in new housing units and older homes upon resale ranges from .90-1.11, the echo-effect or secondary fiscal impacts of the MUOD would be about $171,500, or 16.7 students multiplied by Wayland's FY05 average per pupil cost.

3.0 COMPREHENSIVE PERMIT DEVELOPMENT

The developer has applied to MassHousing for Project Eligibility/Site Approval to build 200 homeownership units on the site. According to the developer's application, The Residences at Wayland Center consists of 80 three-bedroom units and 120 two-bedroom units, including 40 three-bedroom townhouses and 160 multi-family condominiums configured in three six-story buildings, with 120 two-bedroom units and 40 three-bedroom units. The cost and revenue estimates in this report are based on the developer's current plan.

In 2005, we developed a forecast of school-age children by cross-tabulating decennial census data for Wayland and surrounding communities. The results were very similar to statistics in our own multi-family database. We believe regional data make sense because the proposed project will attract local and non-local homebuyers. Moreover, Wayland does not have large, mid-rise multi-family buildings. Since the Chapter 40B project and the MUOD involve different uses, we calculated new household size and school-age children multipliers in order to estimate a household population range for The Residences at Wayland Center. The multipliers for this development are not the same as the MUOD multipliers shown in Table 3.

Table 7: Estimate of Comprehensive Permit Household Population & School-Age Children

		Average Household Size		Average School-Age Children	
Housing Units	# Units	Per Unit	Total	Per Unit	Total
Townhouses					
Market-Rate	30	3.22	96.6	0.31	9.3
Affordable	10	2.48	24.8	0.65	6.5
Condominiums					
Market-Rate					
2-Bedroom	90	2.27	204.3	0.12	10.8
3-Bedroom	30	2.46	73.8	0.19	5.7
Affordable					
2-Bedroom	30	2.26	67.8	0.33	9.9
3-Bedroom	10	2.41	24.1	0.36	3.6
Total	200		491.4		45.8

Source: Census 2000 SuperPUMA 25102; cross-tabulations by author.

3.1 Revenue

The developer's application to MassHousing includes assumptions about the sale prices of the market-rate and affordable housing units. When the application was prepared, the developer estimated that the affordable units would sell for $155,000 (2-bedroom condominium) and $166,000 (3-bedroom condominium or townhouse) and the market-rate units at $617,500 (2-bedroom condominium), $831,200 (3-bedroom condominium) and $878,500 (3-bedroom townhouse). Recently the developer supplied an update of market-rate sale price assumptions, reflecting an overall average value of $390/sq. ft. This assumption revises the sale prices for market-rate units to $507,000 (2-bedroom condominium), $682,500 (3-bedroom condominium) and $713,500 (3-bedroom townhouse). The Town's appraisal consultant has supplied lower estimates for the market-rate units: $445,000 (2-bedroom condominium), $490,000 (3-bedroom condominium) and $780,000 (3-bedroom townhouse). Our analysis incorporates the appraisal consultant's market-rate sale prices because in our experience, the prices more closely represent what we have seen in other comprehensive permit developments in the Boston area.

Table 8: Comprehensive Permit Estimate of Assessed Values & Revenue

Source of Revenue	# Units	Fiscal Impact Values & Other Revenue Assumptions	Developer's Updated Sale Prices (Approximate)
I. Property Taxes			
Market-Rate Townhouse	30	$780,000	$714,000
Market-Rate 2-Bedroom Flat	90	$445,000	$507,000
Market-Rate 3-Bedroom Flat	30	$490,000	$683,000
Total Assessed Value		$78,200,000	$87,600,000
Affordable 2-Bedroom Unit	30	$153,000	$153,000
Affordable 3-Bedroom Unit	20	$166,000	$166,000
Total Assessed Value		$7,910,000	$7,910,000
Grand Total	200	$86,100,000	$95,500,000
Property Tax Revenue		$1,080,000	$1,200,000
II. Excise Taxes		$76,200	
III. Chapter 70 Aid[6]		$36,400	
Total Revenue (Rounded)		$1,192,600	

[6] We included Chapter 70 aid in the comprehensive permit revenue estimate because under the current Chapter 70 formula, we believe Wayland would receive a small amount of additional assistance. This is largely because of the estimated enrollment growth reflected in Table 7 and a limited amount of "echo effect growth."

3.2 Community Service Expenditures

We estimate the following municipal and school service costs for the comprehensive permit development. In most cases, the cost assumptions are similar to those used in the MUOD analysis. Where differences exist, they are explained in the notes to Table 9.

Table 9: Municipal & School Service Cost Estimate (Rounded)

General Fund Service	Estimated Cost
General Government	$0
Public Safety	$230,000
Education	$472,000
Public Works	$55,800
Health & Human Services	$19,300
Culture & Recreation	$125,000
Debt Service	$82,900
General Fund Total	$985,000

Table 9 Notes

Public Safety. See Table 5 notes for methodology used to estimate new residential public safety costs.

Culture & Recreation. Our cost estimate assumes Wayland's existing expenditures per capita for recreation and library services, and an increase in library personnel by one part-time librarian (with benefits at 40%). When we met with department heads on April 5, 2006, the library director noted that school-age population growth within walking distance of the library would most likely increase the number of children using the facility during afternoon and early evening hours. We believe this impression is reasonable and should be incorporated into a fiscal impact analysis for the project.

Debt Service. The fiscal impact estimate incorporates purchase of a 110-foot aerial ladder truck, per comments from Fire Chief Robert Loomer. We assigned 100% of the annual debt service payments for the ladder truck to The Residences of Wayland Center. We do not know of other conditions that would prompt Wayland to make such an investment, at least in the near term, except for the construction of mid-rise buildings. The debt service assumes an acquisition price of $650,000 for the ladder truck and a 10-year repayment period, with a one-year BAN at 2.5% and nine years of permanent financing at 5%.

3.3 Summary of Revenue and Expenditure Estimates

Table 10: Comprehensive Permit Net Fiscal Impact (Numbers Rounded)

I. Revenue		II. Expenditures	
Commercial		General Government	$0
Property Taxes	$0	Public Safety	$230,000
Residential		Education	$472,000
Property Taxes	$1,080,000	Public Works	$55,800
Excise Taxes	$76,200	Health & Human Services	$19,300
Chapter 70	$36,400	Culture & Recreation	$125,000
Total Revenue	$1,192,600	Debt Service	$82,900
		General Fund Total	$985,000
Surplus/(Deficit) Revenue	$207,600	Cost-Revenue Ratio	0.83

3.4 Echo Effect Growth in Population and School-Age Children

In our experience, comprehensive permits developments comprised of townhouses and multi-family units tend to attract very few market-rate homebuyers from within the community. In addition, empty-nester or over-55 households usually do not buy or rent market-rate units in a comprehensive permit development. Up to 70% of the affordable units in the development may be reserved on a "local preference" basis for Wayland families, but in an affluent suburb it is very unlikely that there will be 35± income-eligible homebuyers already living in the town. We estimate that not more than 5% of the market-rate units and approximately 20-22% of the affordable units will be purchased by Wayland households (a total of 18 units). The echo-effect or secondary fiscal impacts of the comprehensive permit development would be about $228,505, or 17-19 students.

4.0 STATE FINANCIAL INCENTIVES FOR HOUSING DEVELOPMENT

4.1 Chapter 40R

We were asked to comment on potential revenue the Town may receive if the property is zoned under the provisions of M.G.L. c.40R ("Chapter 40R"). Assuming DHCD determines that the site is eligible in accordance with 760 CMR 59.04, the residential density conforms to Chapter 40R requirements at 760 CMR 59.04(1)(d), and the residential uses are permitted as of right (subject to site plan review), Wayland should be eligible for a Zoning Incentive Payment of $75,000 for the number of units proposed in the mixed-use development and $200,000 for the number of units proposed in the comprehensive permit. The payment is based on the number of units that can be built in the Chapter 40R Overlay District minus the number of units that can be built as of right under existing zoning; in Wayland, this would apply to all of the units because currently the site is not zoned for residential development. The Zoning Incentive Payment is a one-time payment to cities and towns with DHCD-approved Chapter 40R Overlay Districts, i.e., it is a non-recurring revenue source.

In addition to the Zoning Incentive Payment, the Town would receive $3,000 per unit upon issuance of building permits. Much like the Zoning Incentive Payment, the payment per unit applies to "Bonus Units," or units that would not have been buildable as of right under existing zoning. According to DHCD regulations, "Bonus Units" also include "units that are developed within a [Chapter 40R Overlay] District under a Comprehensive Permit issued pursuant to M.G.L. c.40B after the submission of an application to the Department under 760 CMR 59.05(2), in excess of the number of Existing Zoned Units for the same Project." Assuming that DHCD would treat all units in the mixed-use town center or the comprehensive permit as Bonus Units, Wayland would be eligible for total Bonus Unit payments of up to $300,000 for units in the town center project and $600,000 for units in the comprehensive permit. The Bonus Payment is a one-time, non-recurring revenue source.

The above revenue estimates assume that sufficient funds will exist in the Chapter 40R Trust Fund to make full payments to DHCD-approved communities in the future.

4.2 Chapter 40S

The legislature recently enacted a companion law, M.G.L. c.40S (Chapter 141, Acts of 2005), which pledges future state revenue to offset the cost of educating children living in Chapter 40R developments. Payments under Chapter 40S would effectively increase the community's Chapter 70 (education) reimbursements. Unlike Chapter 40R payments, receipts under Chapter 40S would constitute a recurring source of revenue to the Town – <u>if</u> the Town qualifies for the assistance. Although Wayland may receive some additional Chapter 70 aid through Chapter 40S appropriations, we question whether the proposed projects will generate any Chapter 40S payments because they will most likely produce enough tax and other revenue to pay for the services used by residents. Under Section 2 of Chapter 40S, the state has assumed financial responsibility for making payments according to the following formula, subject to appropriation:

> <u>Total Education Costs for Eligible Students</u> = Actual Net School Spending (Actual NSS) per student for the previous fiscal year, multiplied by the total number of students in Chapter 40R development.
>
> <u>minus</u>:
>
> <u>Total Education Revenue for Eligible Students</u> = the sum of (a) Chapter 40R development property tax and excise tax revenue, multiplied by the *statewide* percentage of general fund expenditures attributable to public schools, as certified by the Department of Revenue, and (b) additional Chapter 70 aid, such as foundation or minimum aid increases, if any, included in the community's Chapter 70 allocation as a direct result of new students generated by the Chapter 40R development, as certified by the Department of Education.

If the formula results in a deficit, i.e., insufficient revenue to pay for education costs, Chapter 40S authorizes a compensatory school cost reimbursement. If there is no deficit, the community is presumed to have sufficient revenue to cover the full cost of educating Chapter 40R students. Since there is currently no appropriation for Chapter 40S payments and the Wayland projects appear to have a positive revenue position (without any additional foundation or minimum aid) we assumed no Chapter 40S revenue in our analysis. Ultimately, the Town would need to furnish educational cost and revenue documentation to the state, and the Department of Revenue will determine whether Wayland is eligible for Chapter 40S payments.

Wayland Town Center

Fiscal & Economic Impacts Review

Outline

- Fiscal Impact Report
  - Summary
  - Issues
- Economic Impacts
- Fiscal Impact and Land Use Policy

Important Questions

- Fiscal Impact
  - Will the estimated net fiscal impact, or the ratio of new service costs to new revenue, be favorable or unfavorable to the town?
  - If the ratio is favorable, what is the probability that it will remain favorable over time?
  - What departments (if any) will absorb a noticeable increase in demand for services?

Important Points

- Fiscal impact
  - Focuses on General Fund revenue & expenditures directly attributable to the project
  - Excludes enterprise fund, special revenue fund, trust fund revenue & expenditures not accounted for as General Fund activity
  - Focuses on recurring sources of revenue and ongoing expenditures

Mixed-Use Project

I. REVENUE		II. EXPENDITURES	
Property Taxes		General Government	$0
Commercial	$486,000	Public Safety	$211,900
Residential	$669,000	Education	$168,000
Excise Taxes	$35,100	Public Works	$41,200
Chapter 70 Aid	$0	Health & Human Services	$14,630
Total Revenue	$1,190,100	Culture & Recreation	$44,260
		Debt Service	$0
		Total Service Costs	$479,990

Comprehensive Permit

I. REVENUE		II. EXPENDITURES	
Property Taxes		General Government	$0
Commercial	$0	Public Safety	$230,000
Residential	$1,080,000	Education	$472,000
Excise Taxes	$76,200	Public Works	$55,800
Chapter 70 Aid	$36,400	Health & Human Services	$19,300
Total Revenue	$1,192,600	Culture & Recreation	$125,000
		Debt Service	$82,900
		Total Service Costs	$985,000

Major Findings

- The proposed projects:
  - Should generate enough tax and other revenue to pay for their associated municipal & school service costs
  - Differ by degree of fiscal benefit
  - Will affect municipal & school services in different ways

Key Differences-Revenue

- MUOD
  - Commercial & residential property taxes
  - Motor vehicle excise taxes
- Comprehensive Permit
  - Residential property taxes
  - Motor vehicle excise taxes
  - Modest increase in Chapter 70 aid

Key Differences-Cost

- MUOD
  - Affects public safety more than other operations
  - Virtually all additional public safety costs attributable to commercial component
  - Direct impact on schools less pronounced: fewer housing units, developer anticipates “over-55” market

Key Differences-Cost

- Comprehensive permit
  - Large number of three-bedroom units
  - Project affects public safety & schools
  - Some impacts on library due to increase in school-age patrons during after-school hours
  - Existing fire equipment inadequate for fire protection in mid-rise buildings (hence debt service)

However…

- MUOD
  - Much greater likelihood of echo-effect school enrollment growth
  - Project is conceptual, tenant mix unconfirmed
  - Market-rate sale prices difficult to estimate at this stage; condo market has softened
  - If rental instead of ownership housing, revenue will drop and service costs may increase

However…

- Comprehensive Permit
  - Market-rate sale prices also difficult to estimate
  - Household size & school-age children multipliers assume most units will be in mid-rise buildings
  - If project design changes in favor of low-rise buildings, multipliers no longer valid
  - Very little “echo effect” impact either way

MUOD Assumptions

- Commercial
  - Weighted average for retail rents: $27/ft
  - Office rents: $18/ft.
  - Expense ratio: 25%
  - NOI capitalization rate: 8.5%
  - Assessed value: $38.8M
  - Property taxes: $486,000 (FY06 $)

MUOD Assumptions

- Residential
  - Market-rate sale price: $660,000
  - Affordable sale price: $153,000
  - Assessed value: $53.M
  - Property taxes: $669,000
  - MV excise tax per capita @ $155 x estimated population (226) = $35,100

40B Assumptions

- Market-rate sale prices
  - Townhouse: $780,000
  - 2-BR Flat: $445,000
  - 3-Br Flat: $499,000
- Affordable sale prices
  - 2-BR: $153,000
  - 3-BR: $166,000
- MV Excise Tax Revenue @ $155 x estimated population (492) = $76,200
- Add'l Chapter 70 aid @ 7.7% Actual NSS/ Student (46 students) = $36,400

Changes Since 2005

- Original analysis: per-capita cost methodology using Wayland's actual FY05 expenditures, adjusted for marginal cost impacts
- New analysis: more information, not only from the developer but also from the Town
  - Town Administrator expects no increase in general government expenditures for either project
  - Market assumptions for MUOD housing units

Chapter 40R

- Zoning Incentive Payment
  - Town Center: $75,000
  - Comprehensive Permit: $200,000
- Bonus Unit Payments
  - Town Center: $300,000
  - Comprehensive Permit: $600,000

Chapter 40R

- Site & zoning district must be approved by DHCD
- State payments represent a one-time, non-recurring revenue source
- Chapter 40S may generate some additional Chapter 70 aid, but only if project operates at a deficit as determined by statutory formula
- All payments subject to appropriation

Issues

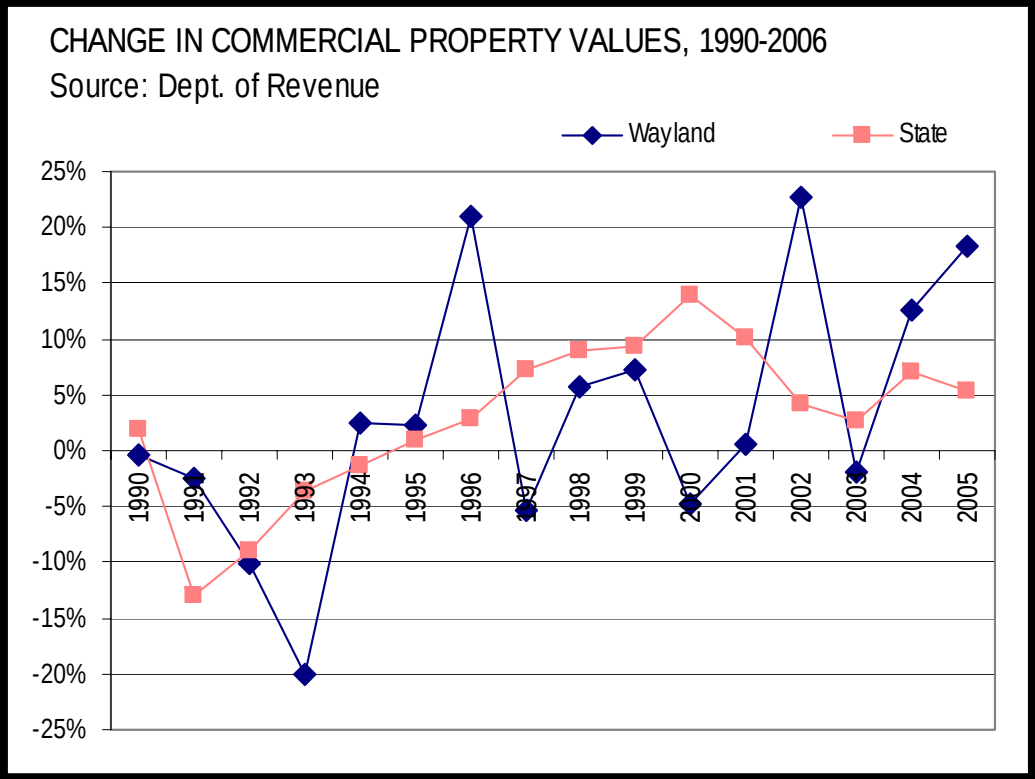
- Estimating commercial property values
- Variations in commercial property values over time
- Factors that affect capitalization rates
- Impact of housing “product” on sale prices & household population
- Limited research on echo-effect impacts
- Existing capacity deficits
- Phased development

Issue #1

- Estimating commercial property values at predevelopment stage requires many assumptions
  - Actual tenant mix will determine rents
  - Actual tenant mix + rents + community demographics + perceived investment risk = actual cap rate
  - Cap rates not homogenous for a city/town, location or use class

Issue #2

- Fluctuations in commercial property values make optimistic assumptions inadvisable



Unadjusted dollars

Issue #3

- Capitalization rates
  - Used to convert net operating income to market value, i.e., the amount a willing investor would pay to purchase the asset
  - Lower cap rate = higher value
  - Influenced by objective and subjective factors
  - Assessed value usually less than market value

Issue #3

- More on capitalization rates
  - Industry literature reports cap rates currently running at historic lows – retail, multi-family
  - Interest rate changes likely to increase cap rates
  - For project with so many unknowns, assessors in other towns suggested cap rate of 8-10%
  - 8.5% higher than industry norms for Boston & many suburbs, closer to historic trends

Issue #4

- Housing unit variables
  - Owner-occupied single-family homes & renter-occupied townhouses have largest households
  - Owner-occupied single-family homes generate more school-age children per unit than any other housing type, regardless of tenure
  - Rental 1 & 2-bedroom units generate very few children, but also much less tax revenue

Issue #4

- Housing unit variables
  - High-end condominiums = very favorable cost-revenue ratio
  - Lower price range increases likelihood of school impacts, higher cost-revenue ratio
  - Number of bedrooms has significant impact on affordable-unit household size because families with children have so few options

Issue #5

- "Echo Effect"
  - No research in juried publications
  - From our own database:
    - 15-22% units in suburban over-55 developments sold to existing residents
    - Comprehensive permits seem to generate very little echo-effect activity & attract very few empty-nester homebuyers

Issue #5

- "Echo Effect" cont'd
  - Associated mainly with homeownership units
  - Echo-effect sales generate population & school enrollment growth, but new units also generate revenue and relatively few service costs
  - Fiscal impact should not be measured solely on the basis of growth in K-12 school costs because analysis must also account for additional revenue

Issue #6

- New development not responsible for existing capacity deficits
  - Wayland currently below state and national averages for police/fire
  - Both projects will trigger public safety demands, but in different ways
  - Analysis assumes proportion of police/fire costs required to serve new population, using state police/fire averages, plus commercial demand

Issue #6

- Deficits reflect policy choices
  - If existing police/fire staffing adequate from town's point of view, then no deficit exists regardless of state and national averages
  - In that case, our residential public safety costs are too high, but
  - MUOD commercial uses will impose demands on police department and may exceed public safety costs of Chapter 40B development

Issue #7

- Project phasing
  - Fiscal impact estimate assumes project completion, operations in place
  - While under construction, impacts will differ
  - Phasing may be affected by:
    - Softening in commercial market
    - Continued softening in condo market
    - Saturation of over-55 market

Economic Impacts

- Issues
  - Employment growth (by type & wages)
  - Community's capacity to absorb growth in retail sales
  - Negative effects on existing businesses can mean fiscal impact is less advantageous than it appears

Retail Trade

- Wayland has room to absorb retail sales growth
- Current retail activity = about 22% household retail expenditures, remaining sales "leaked" to other communities
- MUOD trade area defined as radius of about 4.5 miles: Wayland and portions of Weston, Lincoln, Framingham, Natick & Sudbury

MUOD

- Creates both opportunities & challenges for existing businesses
  - Impacts will depend on MUOD's actual tenant mix
  - In all communities, retailers make marketing, merchandising & management decisions to "reposition" in response to major economic event
  - New space may be more advantageous to some existing businesses

Issues

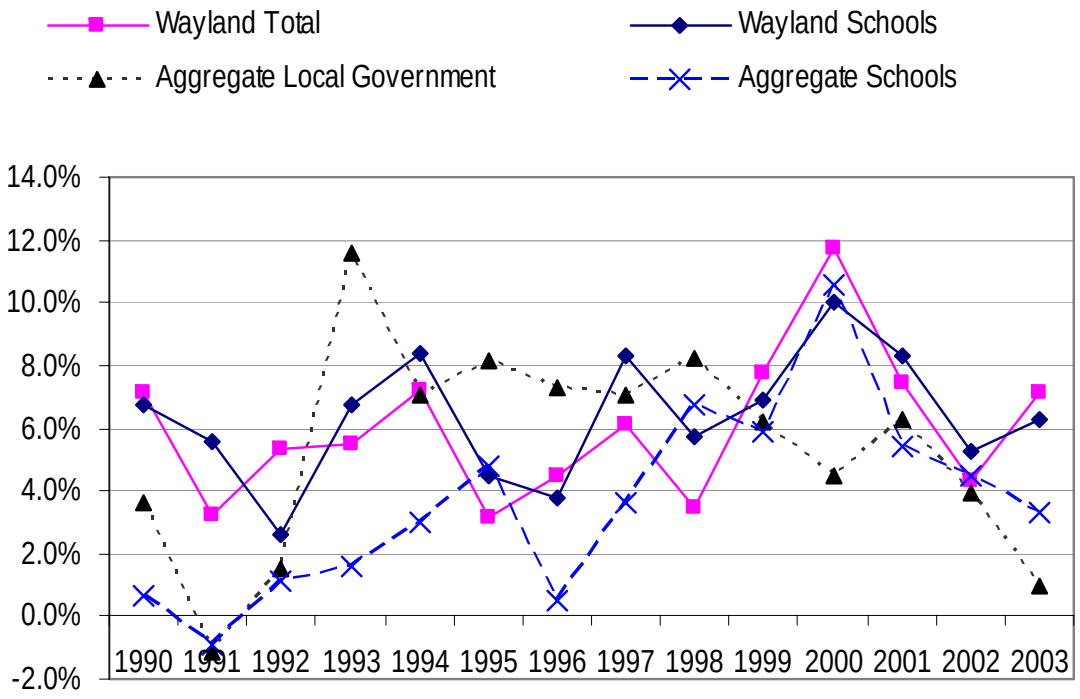
- Relocation of existing businesses to MUOD means potential for vacant space; vacancy = reduced commercial property values elsewhere
- MUOD also creates opportunity to redevelop/reposition existing commercial buildings
- MUOD may cause shifts in tenancy, make-up & strength of existing commercial base, but most likely a short-term issue

Fiscal Impact & Land Use Policy

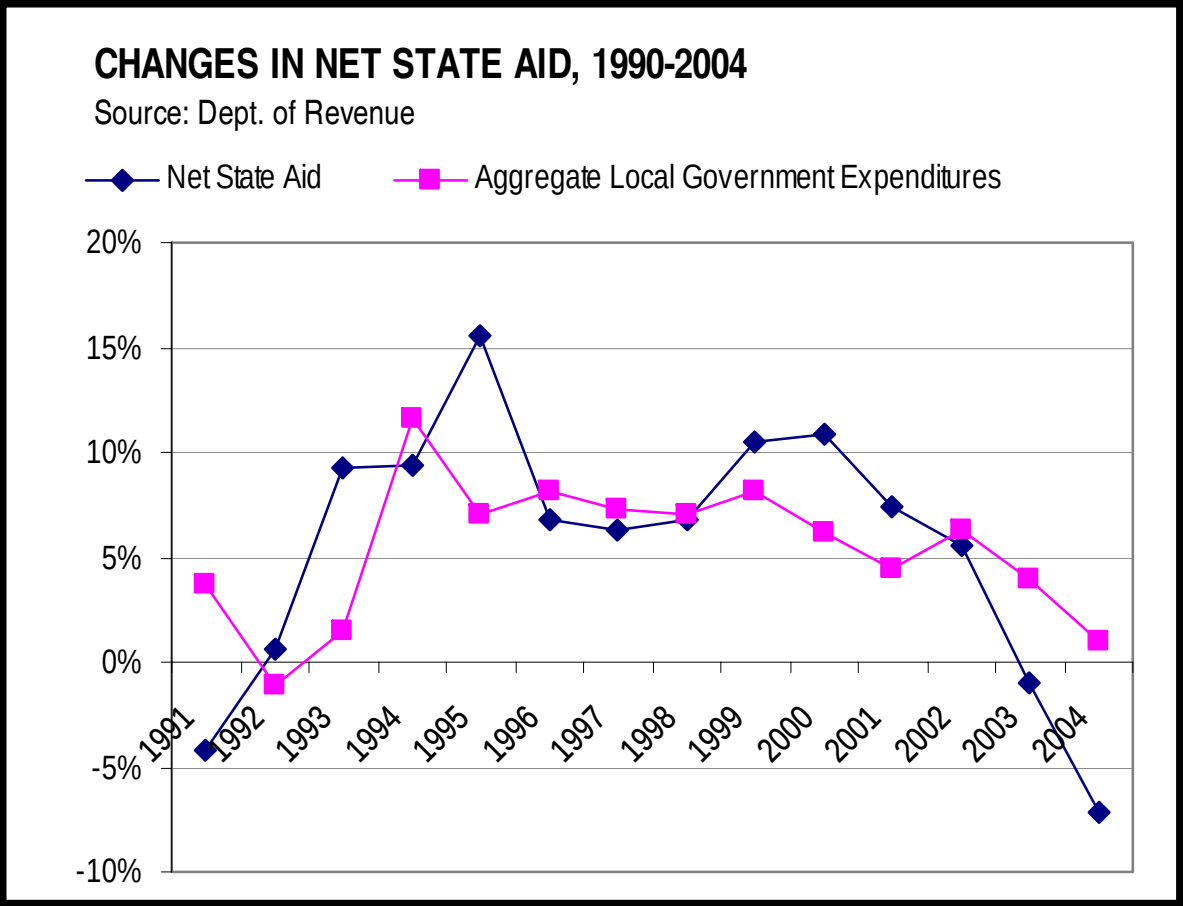
- Massachusetts communities tend to make "fiscal zoning" decisions
- "Fiscal Zoning" means basing land use policy on tax revenue or strategies to reduce service costs
  - Competition for commercial & industrial development
  - Incentives for over-55 housing

Impetus for Fiscal Zoning

CHANGE IN GENERAL FUND EXPENDITURES, 1990-2004
Source: Dept. of Revenue



Impetus for Fiscal Zoning



Final Comments

- A fiscal impact analysis depends on best available information, which may be incomplete and/or influenced by short-term conditions
- Housing development and mixed-use development offer more tax base stability than all-commercial projects
- Wayland should think positively about both options for this site