TRAFFIC IMPACT AND ACCESS STUDY

WOODBRIDGE CROSSING
RESIDENTIAL DEVELOPMENT/
STOUGHTON, MASSACHUSETTS

GPI

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Traffic Impact and Access Study
Proposed Woodbridge Crossing
Residential Development
Stoughton, Massachusetts
May 2008

EXISTING CONDITIONS

Study Area

Evaluation of the traffic impacts associated with the proposed project requires an evaluation of existing and projected traffic volumes on the adjacent streets, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets and nearby intersections. Based on the project's expected traffic impacts and comments received from the Town of Stoughton, the following intersections have been analyzed and evaluated in this report:

- Central Street (Route 27) at West Street
- Central Street (Route 27) at Island Street
- Central Street (Route 27) at Mill Street
- Canton Street (Route 27) at Central Street
- Canton Street (Route 27) at Pratts Court
- Central Street at Pratts Court
- Island Street at Mill Street

Traffic Volumes

Base traffic conditions within the study area were developed by conducting Automatic Traffic Recorder (ATR) counts, manual-turning movement counts (TMCs), and vehicle classification counts between September and November of 2003 and in November of 2005. The ATR counts were conducted on Central Street east of West Street, on Island Street north of Central Street, and on Mill Street north of Central Street, each for a 24-hour weekday period. The TMCs and vehicle classification counts were performed during the weekday AM peak period (7:00 to 9:00 AM) and the weekday PM peak period (4:00 to 6:00 PM). The TMCs conducted in November of 2005 revealed existing traffic volumes that were significantly lower than the volumes recorded in September and November of 2003. Therefore, to provide a conservative analysis scenario, the traffic counts conducted in 2003 were used. In addition, they were upwardly adjusted to reflect a base 2005 traffic volume condition. All traffic count data are provided in the Appendix.

Seasonal Adjustment

Traffic on a given roadway typically fluctuates throughout the year depending on the area and the type of roadway. To determine if the data needed to be adjusted to account for this fluctuation, traffic-volume data from the Massachusetts Highway Department (MassHighway) were researched. Based on statewide traffic-volume data from MassHighway, traffic during the months of September, October, and November represent above average-month conditions.[1] Therefore, to provide a conservative (worse than expected) analysis scenario, no seasonal adjustments were made to the roadway traffic volume data. The MassHighway traffic-volume data are provided in the Appendix.

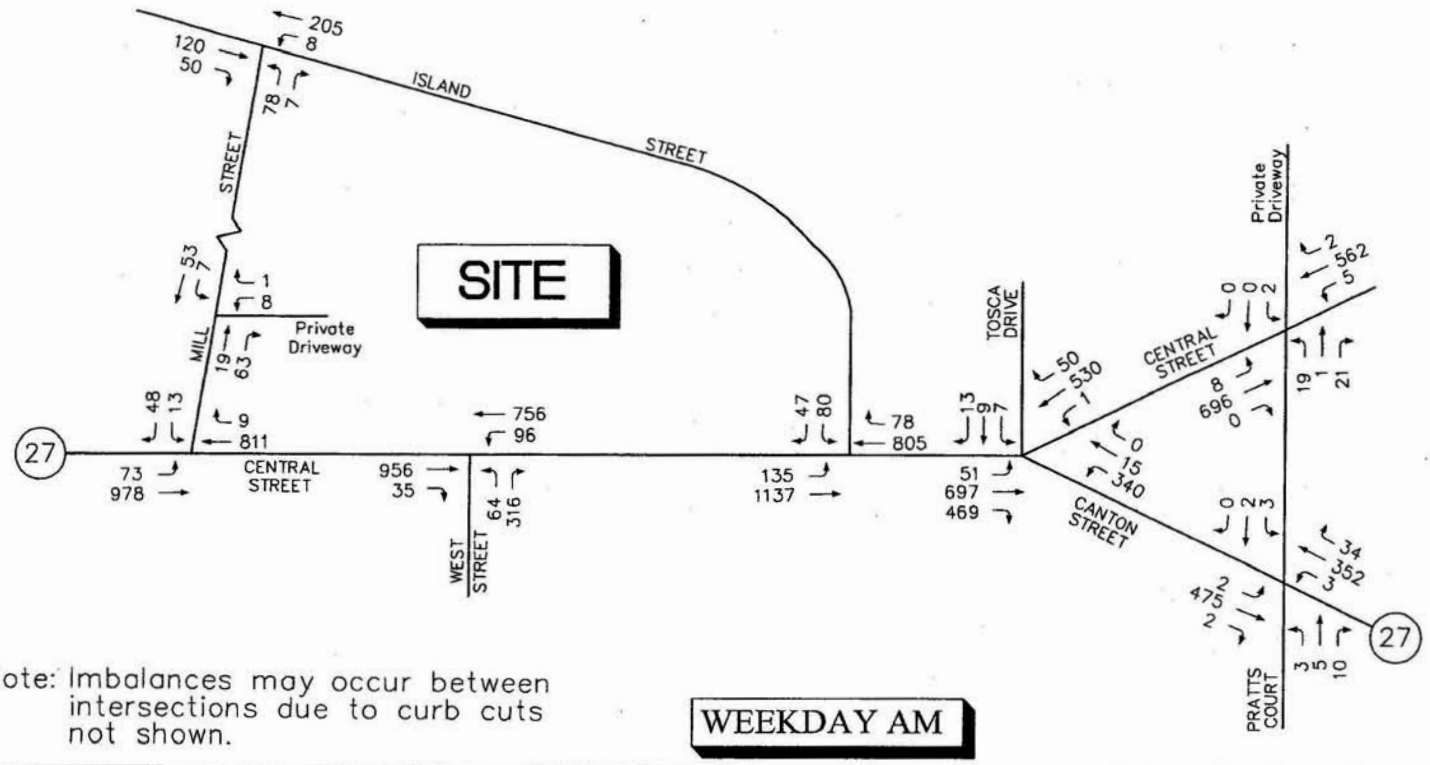
Table 1 summarizes the weekday daily and peak-hour traffic volumes within the study area adjusted to reflect 2005 traffic-volume conditions. The 2005 Existing weekday AM and weekday PM peak hour traffic-flow networks are shown graphically on Figure 2.

Table 1
EXISTING TRAFFIC-VOLUME SUMMARY

Location/Time Period	Traffic Volume	K Factor[c]	Directional Distribution[d]
Central Street east of the site:			
Weekday Daily (vpd[a])	25,500		
Weekday AM Peak Hour (vph[b])	2,124	8.3	60% EB
Weekday PM Peak Hour (vph)	2,239	8.8	51% WB
Island Street north of Central Street:			
Weekday Daily (vpd)	3,800		
Weekday AM Peak Hour (vph)	340	8.9	63% NB
Weekday PM Peak Hour (vph)	348	9.2	56% SB
Mill Street north of Central Street:			
Weekday Daily (vpd)	1,900		
Weekday AM Peak Hour (vph)	143	7.5	57% NB
Weekday PM Peak Hour (vph)	142	7.5	59% SB

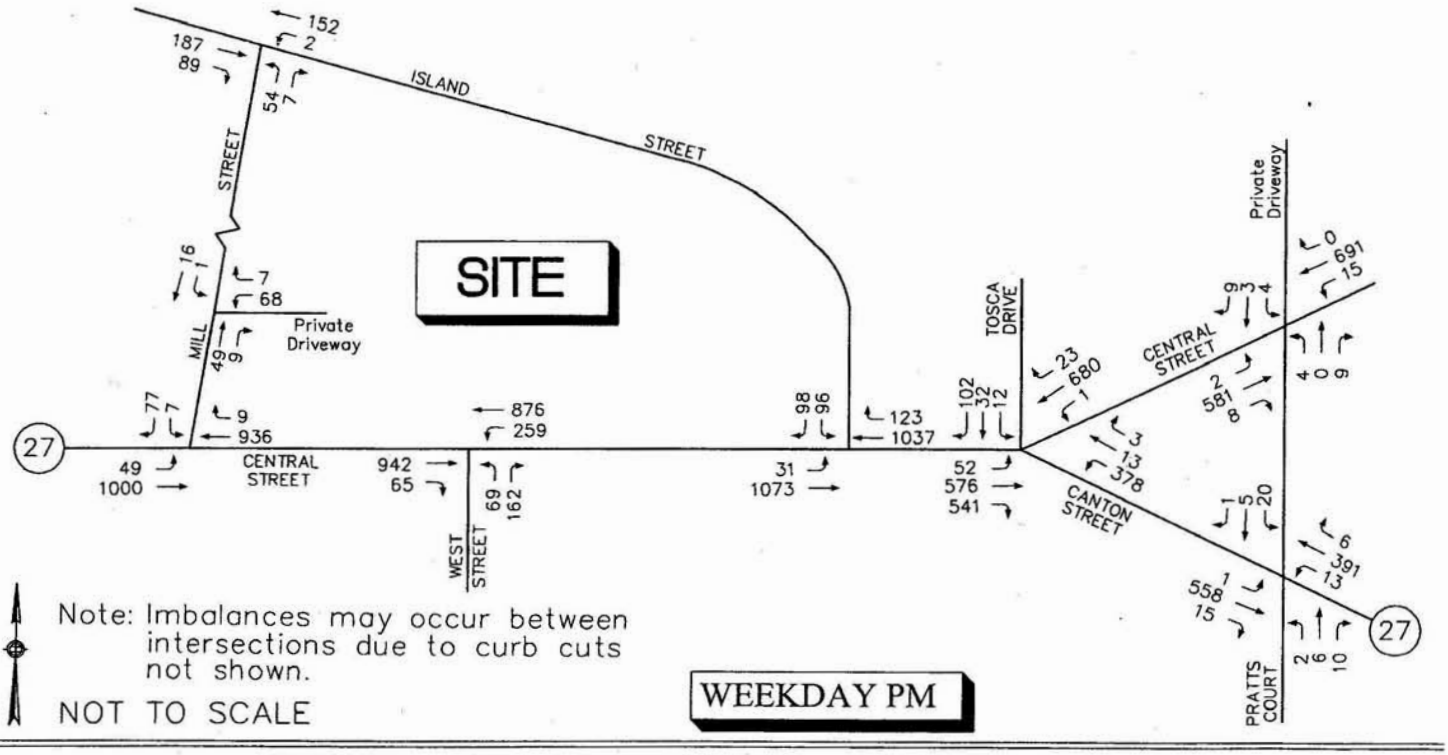
[a]Vehicles per day.
[b]Vehicles per hour.
[c]Percent of average daily traffic occurring during the peak hour.
[d]EB = eastbound; WB = westbound, NB = northbound, SB = southbound.

[1]*2003 Weekday Seasonal Factors;* Massachusetts Highway Department – Statewide Traffic Data Collection.



Note: Imbalances may occur between intersections due to curb cuts not shown.

WEEKDAY AM



Note: Imbalances may occur between intersections due to curb cuts not shown.

NOT TO SCALE

WEEKDAY PM

GPI Greenman-Pedersen, Inc.

Engineers, Architects, Planners, Construction Engineers & Inspectors

Figure 2

2005 Existing
Peak Hour Traffic Volumes

Accidents

Accident data for the study area intersections were obtained from the Town of Stoughton for the period between 2002 and 2004. A summary of the Town accident data at the study area intersections is provided in Table 2. In addition to the summary, accident occurrence also should be compared to the volume of traffic through a particular intersection to determine any significance. Accordingly, the accident rates were calculated for each study area intersection and compared with the statewide and district-wide averages. An intersection accident rate is a measure of the frequency of accidents compared to the volume of traffic through an intersection and is presented in accidents per million entering vehicles (acc/mev). For unsignalized intersections, the statewide average is 0.66 acc/mev and the district-wide average is 0.59 acc/mev. A comparison of the calculated accident rate to these averages can be used to establish the significance of accident occurrence and whether or not potential safety problems exist. All crash rate worksheets are provided in the Appendix.

The intersection of Central Street and Island Street experienced the highest frequency of accidents with 29 accidents over the three-year study period (average 9.7 accidents per year). Approximately 66 percent (19 of 29) of the accidents involved property damage only and 76 percent (22 of 29) involved cross movement collisions. Approximately 34 percent of the incidents have occurred during the peak hours. The accident trend shows difficulty for turning movements from Island Street onto Central Street. The calculated crash rate for this location (0.95 acc/mev) is higher than both the district-wide and statewide averages. Improvements are recommended at this location as described in the *Recommended Roadway Improvements* section of this report.

The remaining study area intersections experienced 4 or fewer accidents per year with crash rates well below both the district-wide and statewide averages. There does not appear to be any specific accident trend at any other study location. There were no fatalities reported at the study area intersections within the time period studied.

Table 2
ACCIDENT SUMMARY

Location	Number of Accidents			Severity[a]			Accident Type[b]						Percent During Peak Hours
	Total	Average per Year	Accident Rate[c]	PD	PI	F	CM	RE	HO	FO	Ped	Other	
Central Street at West Street	5	1.7	0.17	4	1	0	1	3	0	0	0	1	60%
Central Street at Island Street	29	9.7	0.95	19	10	0	22	5	1	1	0	0	34%
Central Street at Mill Street	4	1.3	0.15	4	0	0	1	3	0	0	0	0	0%
Canton Street at Central Street	11	3.7	0.37	5	6	0	7	4	0	0	0	0	45%
Canton Street at Pratts Court	0	0	0.00	0	0	0	0	0	0	0	0	0	0%
Central Street at Pratts Court	1	0.3	0.06	1	0	0	1	0	0	0	0	0	0%
Island Street at Mill Street	0	0	0.00	0	0	0	0	0	0	0	0	0	0%
TOTAL	50	--	--	33	17	0	32	15	1	1	0	1	--

Source: Town of Stoughton.
[a]PD = property damage only; PI = personal injury; F = fatality.
[b]CM = cross movement/angle; RE = rear end; HO = head on; FO = fixed object; Ped = pedestrian.
[c]Measured in accidents per million entering vehicles.

Sight Distance

To identify potential safety concerns associated with site access and egress, sight distances have been evaluated at the proposed site driveway locations on Central Street, Island Street, and Mill Street to determine if the available sight distances for vehicles exiting the site meet or exceed the minimum distances required for approaching vehicles to safely stop. The available sight distances were compared with minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO)[2]. AASHTO is the national standard by which vehicle sight distance is calculated, measured, and reported. The Massachusetts Executive Office of Transportation and Construction (EOTC) and the Executive Office of Environmental Affairs (EOEA) require the use of AASHTO sight distance standards when preparing traffic impact assessments and studies, as stated in their guidelines for traffic impact assessments.

Sight distance is the length of roadway ahead that is visible to the driver. Stopping Sight Distance (SSD) is the minimum distance required for a vehicle traveling at a certain speed to safely stop before reaching a stationary object in its path. The values are based on a driver perception and reaction time of 2.5 seconds and a braking distance calculated for wet, level pavements. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. Stopping sight distance is measured from an eye height of 3.5 feet to an object height of 2 feet above street level, equivalent to the taillight height of a passenger car. The SSD is measured along the centerline of the traveled way of the major road.

Intersection sight distance (ISD) is provided on minor street approaches to allow the drivers of stopped vehicles a sufficient view of the major roadway to decide when to enter the major roadway. By definition, ISD is the minimum distance required for a motorist exiting a minor street to turn onto the major street, without being overtaken by an approaching vehicle reducing its speed from the design speed to 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet above street level. The use of an object height equal to the driver eye height makes intersection sight distances reciprocal (i.e., if one driver can see another vehicle, then the driver of that vehicle can also see the first vehicle). When the minor street is on an upgrade that exceeds 3 percent, grade correction factors are applied. The ISD design values for right turns from a minor street are less than the design values for left turns because, in making right turns, drivers generally accept gaps that are slightly shorter than those accepted in making left turns.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersection. In accordance with the AASHTO manual, *"If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping*

[2] *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2004.

sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road." Accordingly, ISD should be at least equal to the distance required to allow a driver approaching the minor road to safely stop.

The available SSD and ISD at the proposed site driveway location were measured and compared to minimum requirements as established by AASHTO. Since the distance required to stop a vehicle is dependent on the speed of that vehicle, the SSD and ISD requirements at these intersections were calculated based on the posted speed limit. The required minimum sight distances are compared to the available distances, as shown in Table 3.

Table 3
SIGHT DISTANCE SUMMARY

	Stopping Sight Distance (feet)		Intersection Sight Distance (feet)		
Location	Measured	Required[a]	Measured	Minimum Required[b]	Desirable (30 mph)
Central Street at Site driveway:					
East of intersection	200	200	200	200	290
West of intersection	200	200	200	200	335
Island Street at Site driveway:					
North of intersection	300	200	345	200	290
South of intersection	340	200	400	200	335
Mill Street at Site driveway:					
North of intersection	400+	200	400+	200	335
South of intersection	340	200	340	200	290

[a]Values based on AASHTO requirements for legal speed limit of 30 mph.
[b]Values based on minimum SSD requirements.

As indicated in Table 3, available sight distances at the proposed site driveways on Central Street, Island Street, and Mill Street meet or exceed the minimum SSD and ISD requirements for safe operation. Although the proposed site driveway on Central Street will not meet desirable sight distances, improvement measures are proposed as described in the *Recommended Roadway Improvements* section of this study. Accordingly, safe operation can be expected at the three proposed site driveways. It is recommended that any proposed landscaping and signs in the vicinity of the site driveways be located sufficiently back from Central Street, Island Street, and Mill Street or kept low to the ground so as not to impede the available sight distances.