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MEMORANDUM

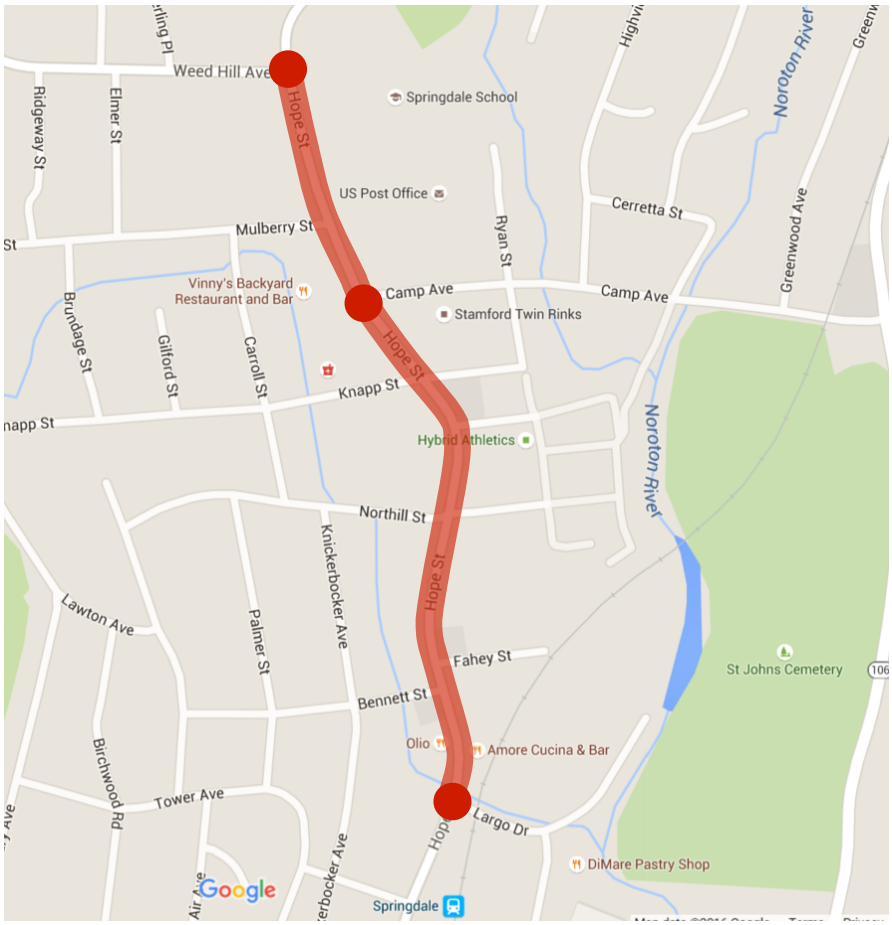
To:	David Woods and Norman Cole	Project:	Glenbrook/Springdale TOD Feasibility Study
From:	Michael Morehouse, PE	Date:	March 4, 2016
Subject:	Springdale Traffic and Land Use Analysis		

In accordance with your request, Fitzgerald & Halliday, Inc. (FHI) has undertaken a traffic and land use study to help the City of Stamford understand the potential impacts of modifying zoning in the Springdale Neighborhood of Stamford, CT. This study is a high-level assessment that is not suitable for satisfying permitting requirements for local development projects. Results of this study are based on assumptions made in the Glenbrook/Springdale TOD Feasibility Study prepared by Goody Clancy in June 2015.

Introduction

Fitzgerald & Halliday, Inc. (FHI) was asked by the City of Stamford Land Use Bureau to conduct a cursory review of the potential impacts associated with various land use scenarios resulting from a proposed change in zoning along Hope Street in the Springdale neighborhood of Stamford, CT. The study corridor is illustrated in the figure below and the three intersections highlighted by red dots are the focus of the analysis. This analysis is not intended to be a detailed operational assessment of the corridor or of the three signalized intersections, but rather a 'what-if' analysis that demonstrates the potential benefits and trade-offs of changing zoning.

Figure 1: Study Area



Findings

The results of this traffic study indicate that if development is left to progress in a way that is compatible with current zoning regulations, automobile trips will be maximized. By modifying zoning to encourage a higher density and mix of uses (housing, retail, and office), plus street design that encourages walking and bicycling, trips will increase but car trips will be minimized. Of the three scenarios tested, Scenario 1 (20 years of future area-wide growth plus redevelopment through existing zoning) will yield the greatest number of new vehicular trips and will have the highest impact to intersection along Hope Street. Scenario 2 (10 years of future area-wide growth plus redevelopment through Village Commercial zoning) and Scenario 3 (20 years of future area-wide growth plus redevelopment through Village Commercial zoning)do a better job at creating more business growth opportunities while minimizing vehicular

demand along Hope Street. Table 1 shows the net number of new automobile trips expected to be generated by each redevelopment scenario.

Table 1 – Net Vehicle Peak Hour Trips generated under each Land Use Scenario

ZONE	**Existing Conditions Total PM Peak Hour Trips**	**Scenario 1 New PM Trip Total**	**Scenario 2 New PM Trip Total**	**Scenario 3 New PM Trip Total**
1	100	110	140	130
2	180	170	180	130
3	220	230	140	140
4	20	40	70	70
5	30	40	30	100
6	70	70	70	70
Total	**620**	**660 (+40)**	**630 (+10)**	**640 (+20)**

Source: ITE Trip Generation Manual, 9th Edition

The table shows an almost negligible increase in new trips under the two proposed Village Commercial (VC) zoning scenarios (Scenarios 2 and 3). The remainder of this report details the analysis to support these findings.

Traffic Data Collection Plan

FHI collected traffic counts at 3 key study area locations (Largo Drive, Camp Avenue, and Weed Hill Avenue) in order to obtain 'existing conditions' traffic information for the purposes of determining how travel demand may change and what transportation related impacts might be expected to occur as a result of the proposed village commercial (VC) district.

The locations for 'existing conditions' traffic information were gathered by FHI during the PM (4:00 to 6:00 PM) peak period on January 6th, 2016 at the following three locations:

- Hope Street / Weed Hill Avenue
- Hope Street / Camp Avenue
- Hope Street / Largo Drive

Intersection Turning Movement Counts (TMCs) are traffic counts taken of movements at each approach to an intersection during the weekday PM peak hour. TMCs provide the baseline for establishing a 'No Build' scenario, which is a future year condition prior to any change (in this case change of zoning). While a comprehensive operational analysis will not be conducted, the TMCs will survey the number of vehicles turning on and off Hope Street at each location to help understanding of the existing travel patterns at these key locations. The TMCs will also show whether each intersection is over or under its theoretical capacity.

Additionally, a Saturday TMC was conducted on January 9th, 2016 to observe peak traffic conditions to compare against weekday conditions. The Saturday count was within 1% of the PM Peak Hour weekday count. Given the expectation that future redevelopment will include new residential and office uses which typically result in PM peak hour demand, the PM peak hour was chosen over the Saturday mid-day peak hour as a worst case condition.

In addition to the TMCs at intersections, historical Average Daily Traffic (ADT) counts along Hope Street near the project corridor were collected. These ADT counts indicate flat or declining traffic growth

between 1991 and 2008. Due to this fact, we suggest a modest growth rate of 0.25% per year be used for area-wide background traffic. Table 2 lists the available historical daily traffic volumes near the project corridor.

The background growth rate of 0.25% was applied to the 'through traffic' on the road network. Through traffic is defined as the component of traffic that passes through the study area without stopping at a local land use. To determine this component of traffic, the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition was used to approximate the number of local trips (i.e. trips generated by all of the properties within the defined study area), which was then subtracted from the existing traffic counts. The remaining trips resulting from this arithmetic are assumed to represent the amount of through traffic on the network. Based on this methodology, the through component of traffic is estimated to be approximately 50% of the overall traffic on the network.

Table 2: Historical Average Daily Traffic (ADT) Counts

Street	location	Year				% change	Annual change
		1991	1994	1996	2008		
Weed Hill Ave	West of Hope St		8,300		7,800	-6%	-0.4%
Church St	East of Hope St		17,500		15,500	-11%	-0.9%
Camp St	East of Hope St	10,000			9,200	-8%	-0.5%
Hope St	North of Mulberry			11,700	10,900	-7%	-0.6%
Hope St	North of Glenbrook		14,600		14,400	-1%	-0.1%
Hope St	North of Rose		18,000		19,100	6%	0.4%

Source: CT Department of Transportation

It should be noted that 2008 was the start of the economic recession and traffic generally declined over the subsequent years. In many locations across the State of CT, 2016 traffic levels are back to where they were around 2008.

Land Use Assumptions

The City of Stamford Land Use Bureau provided existing land use data for all properties currently zoned Village Commercial (VC) and includes eleven properties that are under consideration for rezoning to VC. Three scenarios were developed for the purpose of understanding potential traffic impacts from the proposed VC zoning change, and are as follows:

- ### Scenario One – "No Zoning Changes"
  This scenario assumes that the prior C-N (Commercial Neighborhood) and current MG (General Manufacturing) zoning remains and none of the properties have been rezoned to VC (Village Commercial). Background traffic growth for a 20-year time period was forecasted and is independent of the trips generated by the redeveloped properties.

- ### Scenario Two – "VC Rezoning Near Term"
  This scenario assumes that all properties are now zoned Village Commercial (VC) and measures traffic impacts from redevelopment over a 10-year time period. The Goody Clancy Study identified a "near term" growth (5 to 7 years) and a mid-term growth (8 to 10 years), which have been combined into a single 10-year growth period. Similar to above, background traffic growth is forecasted by adding 10 years of area-wide growth, removing the traffic attributable to

existing development of the 22 redevelopment parcels and adding the traffic generated by new VC development.

- Scenario Three – "VC Rezoning Long Term"
  This scenario assumes Village Commercial (VC) rezoning and a 20-year time period. Methodology is similar to scenario two. The results of scenario two adds in the redevelopment of the six "long term" properties as identified by Goody Clancy.

To simplify the arithmetic, redevelopment properties were aggregated into six zones based on logical groupings in close proximity to one another. The six zones are illustrated in Figure 2.

Figure 2: Redevelopment Zones

The trips generated by these zones for each land use scenario are listed in Table 3. These are vehicle trips that enter and exit the various driveways of the properties along Hope Street. In these trip estimates, all retail trips were given a 20% pass-by credit. A pass-by trip is one that would already be traveling on the road network, but will make a stop at the retail establishment before completing the trip. This is typical for retail businesses because they are often dependent on pass-by traffic to make up some of their customer base.

Table 3 – Total Vehicle Trips generated under each Land Use Scenario

ZONE	**Existing Conditions Total PM Peak Hour Trips**	**Scenario 1 New PM Trip Total**	**Scenario 2 New PM Trip Total**	**Scenario 3 New PM Trip Total**
1	100	110	140	140
2	180	170	190	140
3	220	230	160	150
4	20	40	80	80
5	30	40	30	120
6	70	70	70	70
Total	**620**	**660**	**670**	**700**

Source: ITE Trip Generation Manual, 9th Edition

The reason that some of the zones have fewer trips than in Existing Conditions is due to the changes in land use. In an example shown in Table 4, Zone 2 consist of the following uses:

Table 4: Vehicular Trip Generation in Zone 2

Existing Land Use	**Vehicular Trips (In and Out)**
auto repair x 2	40
lumber yard	60
office	10
Manufacturing x 2	20
restaurant	50
TOTAL	**180**

Source: ITE Trip Generation Manual, 9th Edition

Under Scenario 1, several of these uses change to office and warehousing. The office use in particular generates a lot of PM peak hour trips as employees are leaving work, so overall vehicle trips are higher. Under Scenario 2, most of the properties are converted to residential units, which have a high peak hour generation as people return home from work. Under Scenario 3, the existing restaurant in Zone 2 (which has a high PM trip generation) is replaced by modest housing and therefore has the fewest trips of all the scenarios.

To reflect the level of vehicular traffic that would use the road network, trip reduction credits were applied to various land use types based on the following assumptions:

- 10% reduction of residential trips for transit and pedestrian use (Scenarios 2 and 3 only)
- 5% reduction of all trips for the internal usage in the site (Scenarios 2 and 3 only)
- 20% reduction of retail trips for pass-by trips (the assumption that some trips are already on the roadway system – applies to all Scenarios as well as Existing and Future)

The rationale for applying trip credits is that under a Transit-Oriented Development (TOD), the mixing of land uses and the walkable qualities of the street design can create an environment in which more trips will be made on foot (and by bicycle and transit) rather than by automobile. For instance, a resident of the neighborhood living near the train station may choose to forgo a car to take the train to work, and upon returning may walk at a restaurant located near the station on the return trip. Similarly, an office trip in close proximity to a restaurant will more likely result in a walk trip for lunch. Under the assumption that Hope Street will be redeveloped in a way that maximizes and encourages walking, the

TOD trip credits previously described have been applied. The trips generated for each zone, with trip reduction credits applied, is listed in Table 5.

Table 5 – Net Vehicle Trips generated under each Land Use Scenario (with TOD trip reductions)

ZONE	**Existing Conditions Total PM Peak Hour Trips**	**Scenario 1 New PM Trip Total**	**Scenario 2 New PM Trip Total**	**Scenario 3 New PM Trip Total**
1	100	110	140	130
2	180	170	180	130
3	220	230	140	140
4	20	40	70	70
5	30	40	30	100
6	70	70	70	70
Total	**620**	**660**	**630**	**640**

Source: ITE Trip Generation Manual, 9th Edition

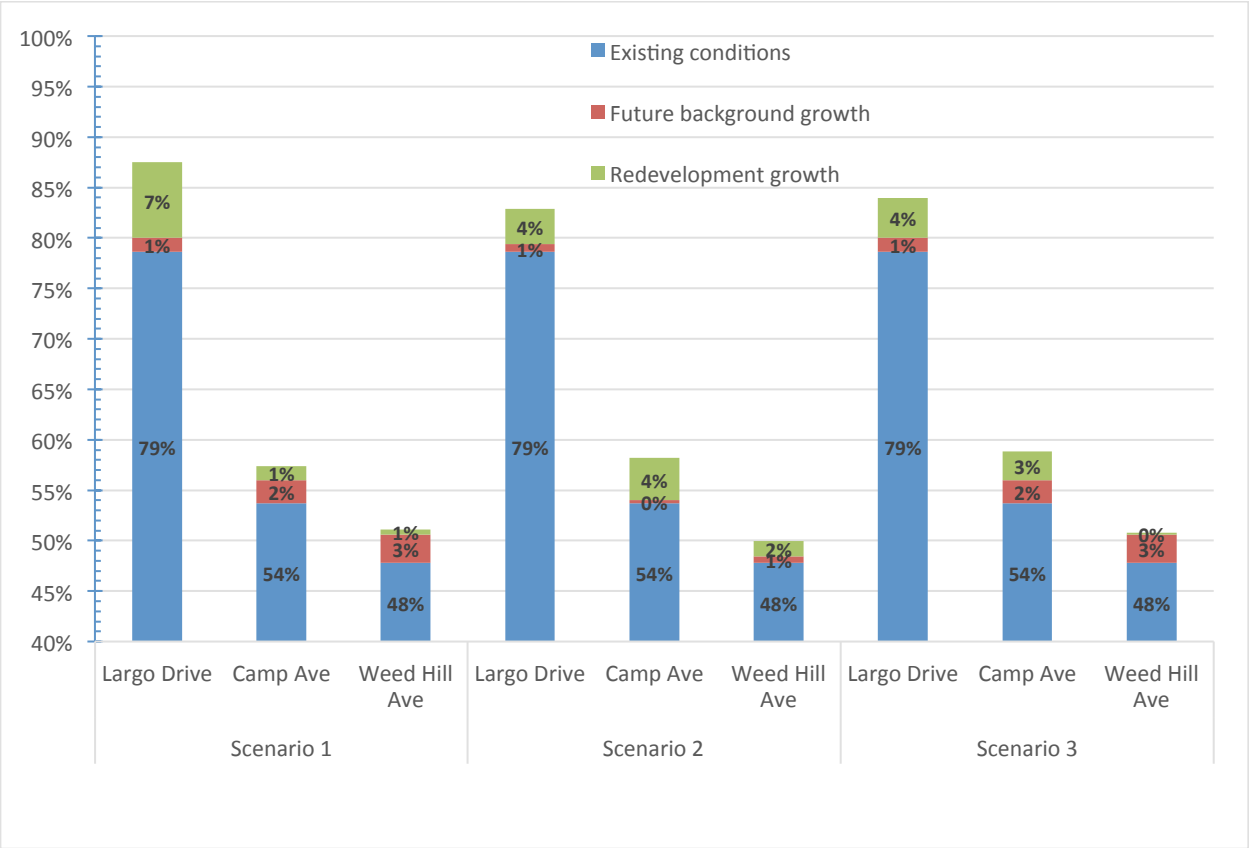
As illustrated in the table, Scenario 1 has the highest overall vehicular trip generation. Scenarios 2 and 3, once adjusted for the TOD trip reductions, produce fewer trips on the road network. In fact, even with 10 and 20 years of background growth applied, does not significantly add trips over what is currently on the road today. That is one of the benefits of TODs. Even though more trips are being made (which is good for the economy), fewer trips are being made by car (which is good for the neighborhood).

Impact of Trip Generation on Intersections

A simple test was used to demonstrate the effect of additional generated traffic on the three intersections counted for this study. The Intersection Capacity Utilization (ICU) method is a tool for measuring a roadway intersection's capacity. It is ideal for transportation planning applications such as traffic impact studies. It is not intended for traffic operations or signal timing design. The ICU tells how much reserve capacity is available or how much the intersection is over capacity. The ICU does not predict delay, but it can be used to predict how often an intersection will experience congestion.

Figure 3 illustrates the utilization percentage of each study area intersection under existing traffic (blue), future traffic (blue plus red), and for each land use scenario (blue plus red plus green). This is useful for comparing across scenarios to visualize how much additional intersection capacity is used up by normal traffic growth as well as by the additional trips generated under each scenario.

Figure 3 – Percent of Intersection Capacity used under each Land Use Scenario



The ICU analysis points to the following observations:

1. Redevelopment under Scenarios 2 and 3, which adhere to Transit Oriented Development principles, will have a lower traffic impact on Hope Street than Scenario 1 which assumes continued redevelopment under existing zoning code.
2. Scenario 1 has the greatest impact on Largo Drive, which is the intersection that currently has the least amount of capacity. Real world operation may be better than modeled, since the travel lanes are wide enough to allow through traffic to bypass left turning traffic, even though formal lane designations do not exist. The existence of on-street parking is also a factor that influences capacity.
3. Both Camp Avenue and Weed Hill Road have adequate capacity to absorb new trips. Scenario 3 has a slightly lower impact to these two intersections than Scenario 2.
4. Background growth accounts for some of the overall impact to intersection capacity. A modest 0.25% per year growth rate applied just to the through traffic component will result in a 1% increase in intersection capacity utilization over 10 years and a 1 to 3% increase in traffic over 20 years. If area-wide traffic growth is higher than predicted, then the greatest impact to the neighborhood could be in the form of through traffic, and not from the specific redevelopment properties assumed in this analysis.
5. Truck traffic should decrease as a result of a change in use of several sites, including a warehouse, a lumber yard, and a couple manufacturing uses. The redeveloped sites in turn, will replace truck trips with more car trips.

Conclusion

The results of this traffic study indicate that if development is left to progress in a way that is compatible with current zoning regulations, automobile trips will be maximized. By modifying zoning to encourage a higher density and mix of uses (housing, retail, and office), plus street design that encourages walking and bicycling, trips will increase but car trips will be minimized. Of the three scenarios tested, Scenario 1 (20 years of future area-wide growth plus redevelopment through existing zoning) will yield the greatest number of new vehicular trips and will have the highest impact to intersection along Hope Street. Scenarios 2 and 3 do a better job at creating more business growth opportunities while minimizing vehicular demand along Hope Street.

It should be noted that redevelopment of the proposed Village Commercial (VC) zones along Hope Street in Springdale is expected to generate more traffic than currently experienced today, but traffic will likely continue to grow as a result of general area-wide growth in the City of Stamford as a whole irrespective of any redevelopment efforts. Redevelopment in the form of higher-density, mixed-use land uses provides travel options to the personal automobile. So, while new trips are expected (and that's generally a good thing for communities) they needn't all be served by car. With proper Transit-Oriented and pedestrian-scale design, such as streetscaping, pedestrian amenities, traffic calming, lighting, right-sized parking, etc. research shows that trips will increasingly be made on foot or by bicycle in such environments. This form of development will also contribute to the creation of a vibrant place which is increasingly become more and more attractive to people seeking less suburban lifestyles and property values are generally on the rise in such area.

> The traffic analysis performed for this study indicates that the major intersections along Hope Street in Springdale have enough capacity to handle increased growth in traffic. Though, as with many commercial districts, congestion is not only a function of how efficiently an intersection can process vehicles. While this does play a role, so does the frequency of driveways and unsignalized intersections, the degree of pedestrian activity, proximity to schools, influence of transit routes, interaction of railroad grade crossings, existence of on-street parking, and many other factors. Vibrant places are complex and dynamic, and they should not be measured by how fast or efficiently they can move traffic. Rather, they should be measured by how efficiently they can accommodate and manage growth, how successful they are economically, and by the sense of place that people experience upon visiting. By developing in a manner consistent with the proposed VC zoning language, traffic is not expected to become significantly worse than it would be under normal growth over time. In fact, Hope Street should experience an increase in the overall pedestrian activity and economic revitalization that many TOD projects across the nation are benefiting from.