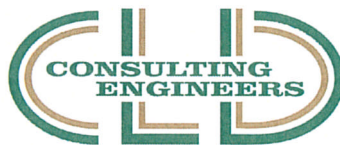


**FINAL REPORT**

**TRAFFIC STUDY  
FOR  
PROPOSED CONNECTOR ROAD  
NORTH MAIN STREET TO WAKEFIELD STREET  
ROCHESTER, NEW HAMPSHIRE**

**April 2007**

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**Traffic Study  
for  
Proposed Connector Road  
North Main Street to Wakefield Street  
Rochester, New Hampshire**

This report presents the results of a detailed analysis of traffic in the downtown area for a proposed crossing of the Cocheco River in the area of St. James Terrace and Chestnut Hill Road in Rochester, which would provide a local road connection between NH Routes 11 and 125.

Summary

The proposed Connector Road between North Main Street and Wakefield Street is expected to reduce traffic in the intersections near downtown by as much as 26% in the AM peak and 16% in the PM peak at the Wakefield Street/Union Street intersection, with associated delay reductions. Somewhat smaller reductions can be expected at the other downtown intersections.

It is estimated that, in terms of 2005 traffic, the Connector Road would carry approximately 300 vehicles in both the AM and PM peak hours, for a total estimated daily traffic volume of 4100. Of course, these numbers would be expected to increase in the future. With the Connector Road in place, reduced fuel usage and fewer vehicle emissions would be expected as vehicles would be removed from the slower downtown traffic.

The analyses of 2005 traffic show the projected relief of traffic in downtown Rochester for current traffic if the Connector Road were to be built. That relief of traffic, the possibility of providing another river crossing for emergency vehicles, and the possible economic stimulation of the commercial areas must be balanced against the estimated \$4.8 million construction cost (not including right-of-way and other possible contingencies), the need to examine a full range of alternatives, and the requirement to do environmental studies that would examine air and noise quality, wetland encroachment, potential hazardous material sites, and many other issues.

The City should compare the traffic information presented in this report to all the other pros and cons of building the Connector Road, including environmental constraints, overall City goals, the Rochester Master Plan, and public input in order to assess how to proceed in this matter.

Should the City wish to proceed, the next steps in this process would be the detailed traffic and environmental studies required to support an environmental assessment of the project, followed by preliminary design. The City should work with the Strafford Regional Planning Commission (SRPC) to place the project on the NHDOT Transportation Improvement Program (TIP) list. The process will likely require an air quality assessment in conjunction with their regional air quality model. This will likely be the next phase in the process for you to consider for planning purposes if the project moves forward into the design and construction process.





## Purpose and Scope

The City of Rochester retained CLD to evaluate the expected impacts on traffic due to the proposed construction of a new Connector Road between North Main Street and Wakefield Street. This proposed road has been under discussion within the City for many years, and could possibly relieve traffic congestion in downtown Rochester by diverting some trips away from the downtown that now must go through that area. The City Council at one point voted to not build the Connector Road along St. James Terrace, but in a community survey, the project was supported by 55% of the respondents, with 18% opposed. This study is meant to quantify the traffic impacts that would be associated with the Connector Road.

As envisioned for this study, the Connector Road would start at the intersection of Ten Rod Road and North Main Street, travel northeasterly in the vicinity of St. James Terrace, cross the Cocheco River to the intersection of Chestnut Hill Road and Community Way, and thence follow Chestnut Hill Road to its intersection with Wakefield Street. As such, it would connect the North Main Street and Wakefield Street commercial areas and provide a bypass for many trips that must now travel through downtown Rochester. It would also provide an alternate route for emergency vehicles, and could provide economic stimulation to the commercial areas by connecting those areas with good access. Figure 1 shows the study area and the location of the proposed Connector Road.

CLD had previously performed an origin-destination (O-D) study to estimate the traffic diversion potential of the Connector Road. The report on that portion of the study, dated December 31, 2003, discussed the data collection methodology and some preliminary results of the study. The report concluded that the projected average daily traffic on the connector road appeared to have the potential to measurably divert traffic away from downtown Rochester.

This stage of the study (Phase 2) has been conducted to evaluate the potential benefits to the downtown area through more defined trip distribution and related capacity analyses of key intersections during the weekday morning and afternoon peak periods. Traffic estimates were made only for the current year of data collection (2005), as the study is meant to evaluate the relative impacts of diverting traffic from the downtown.

For this study, nine intersections were evaluated, and are shown in Figure 1.

- ◆ North Main Street at Ten Rod Road
- ◆ North Main Street at Home Depot
- ◆ North Main Street at Washington Street/Walnut Street (Strafford Square)
- ◆ North Main Street at Union Street
- ◆ North Main Street at South Main Street/Wakefield Street/Hanson Street (Central Square)
- ◆ Wakefield Street at Union Street
- ◆ Wakefield Street at Columbus Avenue
- ◆ Wakefield Street at Chestnut Hill Road
- ◆ Wakefield Street at Lilac Mall.





## Methodology

In order to evaluate the possible effects of the proposed Connector Road, existing traffic data is required. Turning-movement counts were collected during the morning peak hours (7 to 9 AM) and the evening peak hours (4 to 6 PM) at eight study intersections during October 2005, and automatic traffic recorder counts were collected at six locations in and near the downtown. Traffic-turning movements previously collected by CLD at Strafford Square were also used. The traffic data were seasonally adjusted and balanced between intersections where applicable to estimate the 2005 average weekday AM and PM traffic at each of the intersections. The calculated existing average weekday AM and PM traffic numbers are shown in Table 1 and Figure 2. The traffic data are provided in Appendix A, and the seasonal adjustments factors are provided in Appendix B.

The study also utilized the O-D data that was collected for the study by CLD in 2003. That data was collected at interview locations on both North Main Street and Wakefield Street to determine what trips might be diverted to a new river crossing if it were available, and included both the AM and PM peak hours. The data for the peak hours were checked for completeness and illogical trips were removed. The data were then adjusted to match the automatic traffic recorder information that was collected at the same time as the interviews at each O-D station location. The individual trips from the O-D study were plotted on maps of the study intersections, and trips that would be expected to use the Connector Road were added to or deleted from the existing turns at each of the study intersections, as appropriate, to derive the turning movements at each intersection if the Connector Road was in place. The resulting turning movements are shown in Table 1 and Figure 3. Also shown in Table 1 and in Figure 4 are the estimated changes in traffic at the intersections if the Connector Road were to be built.

Because of the location of the O-D survey stations, traffic which currently uses the Turnpike to move between North Main Street and Wakefield Street could not be determined. It is expected that many of these trips could use the Connector Road if it were built. Some other trips that now use other streets, such as Chestnut Hill Road and Little Falls Bridge Road, may also be diverted to the Connector Road. Therefore, the estimates of traffic developed for this study that are likely to use the Connector Road are probably low.

## Analysis

Traffic through most of the study area intersections would be reduced by the construction of the Connector Road. Table 1 and Figure 4 shows the estimated amount of change in 2005 traffic for each movement at each intersection in both the AM and PM peaks. Also shown in Table 1 are the percentage changes for the movements affected by the Connector Road. Total traffic in the intersections near downtown would be reduced with the Connector Road in place, by as much as 273 vehicles (26%) in the AM peak and 287 vehicles (16%) in the PM peak at the Wakefield Street/Union Street intersection. Total traffic on North Main Street at Ten Rod Road/Connector Road and Wakefield Street at Chestnut Hill Road would increase and change patterns as drivers take advantage of the new facility.



The traffic data were analyzed using the methods contained in the Highway Capacity Manual (HCM) as emulated in the Synchro™ software package. Synchro analyzes each of the intersections and estimates how each intersection would operate for the given conditions. The turning-movement data and geometrics of each intersection are coded into the software to make this determination. Based on the input data, the Level of Service (LOS), average delay of a vehicle, and length of the queue on each approach can be estimated. It should be noted that the analysis procedure only accounts for traffic at an intersection as though it were isolated from the rest of the roadway system. It does not account for other factors that may influence the flow of traffic, such as pedestrians, parking maneuvers, and deliveries. As such, the LOS may be overstated compared to what may be observed on the ground.

The intersection of North Main Street/Ten Rod Road, assumed to be the western end of the Connector Road, was the only intersection that was assumed to be reconfigured because of the construction of the Connector Road. It was assumed that a southbound left-turn lane from North Main Street to the Connector Road would be added, and that the approach from the Connector Road would have a left-through lane and a right-turn lane instead of the current one-lane approach from the car dealership. We have initially assumed that there would be no need for changes to the existing lane configuration at all of the other intersections in this study.

Two of the intersections are in configurations that can not be analyzed by the Synchro software or other traditional means.

- ◆ Strafford Square is a complex area consisting of three intersections. For this study, it was coded to be a 3-way intersection, with North Main Street being the through street and Washington and Walnut Streets coded to be combined as the third leg of the intersection. This intersection is proposed to be reconstructed into a roundabout as part of the Washington Street reconstruction, but the 3-way intersection configuration was chosen as the most accurate analyzable configuration for the intersection as it currently exists. While this is not an entirely accurate configuration, the relative comparison of traffic at this intersection without and with the Connector Road gives an indication of how the differences in traffic may affect the operation of the intersection.
- ◆ Central Square is actually a 5-legged intersection, with 4 legs being one-way. For analysis purposes, it was coded to be a 4-way intersection, with the Congress Street leg deleted and the right turns into Congress Street added to the turns onto South Main Street. Again, while this is not an entirely accurate configuration, the relative comparison of traffic at this intersection without and with the Connector Road gives an indication of how the differences in traffic may affect the operation of the intersection.

The results of the analyses are summarized in Table 2 for the signalized intersections and in Table 3 for the unsignalized intersections. The signalized intersections have an overall LOS and average delay reported because the traffic signal timing can be optimized for the entire intersection. In addition, the software estimates the LOS, average delay, and queue length for each lane group approaching the intersection. The unsignalized intersections have calculated LOS, average delay, and queue lengths only for those approaches that experience delays (stopped approaches and unstopped lanes with left turns). Appendix C contains the Synchro





output sheets for the intersections utilizing traffic patterns without the Connector Road, and Appendix D contains the Synchro output sheets for the intersections using the traffic patterns with the Connector Road in place.

As may be expected, the intersections that would have reduced travel through them if the Connector Road were to be built show less delay and shorter queues than currently exist, although the levels of service do not change in many cases. The results of the analyses are summarized below. It should be noted that the analysis procedure only accounts for traffic at an intersection as though it were isolated from the rest of the roadway system. It does not account for other factors that may influence the flow of traffic, such as pedestrians, parking maneuvers, and deliveries. As such, the LOS may be overstated compared to what may be observed on the ground.

◆ Signalized Intersections – See Table 2

- North Main Street at Ten Rod Road – This intersection is assumed to be the western end of the Connector Road. As such, there are many changes in the turning movements at the intersection, as well as some additional trips drawn to the intersection, with the total volume of traffic through the intersection increasing by 15% and 12% in the AM and PM peaks, respectively. The average overall delays through the intersection would increase somewhat in the AM peak, but would decrease in the PM peak, with no change in overall LOS, although some movements would have LOS changes. Note the changes in lanes at this intersection, as discussed above.
- North Main Street at Home Depot – This intersection would see a small increase in through traffic as traffic patterns change due to completion of the Connector Road. Average delays through the intersection would remain about the same with the added traffic.
- North Main Street at Union Street – Traffic volumes at this intersection are expected to decrease by up to 18% overall, with individual movements decreasing by up to 32%. Overall delay through the intersection would decrease by 2 to 3 seconds per vehicle, although the LOS would remain at “B.” The eastbound approach from North Main Street would have much shorter queues and somewhat shorter delays in both the AM and PM peaks.
- Wakefield Street at Columbus Avenue – The through movements at this intersection would be greatly reduced and average delays reduced by 2 to 3 seconds with the construction of the Connector Road, although the LOS would remain about the same.
- Wakefield Street at Chestnut Hill Road – This intersection would be the eastern end of the Connector Road. There would be somewhat more traffic through the intersection, and the movements through the intersection would be changed as drivers shift their traffic patterns to the Connector Road. The average delay of vehicles would be increased by 4 to 5 seconds, although the LOS would be “C” or better.
- Wakefield Street at Lilac Mall – There would be a slight decrease in through traffic in this intersection, with almost no effect on the operation of the intersection.



◆ Unsignalized Intersections – See Table 3

- North Main Street at Washington/Walnut Streets – As noted above, the configuration of the intersection was adjusted so that the software could analyze it. This intersection would see a decrease in through traffic on North Main Street. The northbound left turns out of Washington/Walnut Streets would increase and the right turns would decrease as traffic from these streets seeks the easier path of the Connector Road to access the shopping area on Wakefield Street. Largely because of the reduction in through traffic, average delays in the intersection would decrease.
- North Main Street at South Main Street/Wakefield Street/Hanson Street – As noted above, the configuration of the intersection was adjusted so that the software could analyze it. The left turn volume in both the AM and PM peaks from North Main Street to Wakefield Street is expected to decrease by 65% if the Connector Road is built, and this would improve the LOS for this movement from “C” to “B” in the AM peak and from “F” to “C” in the PM peak. Other movements through the intersection would be only slightly affected.
- Wakefield Street at Union Street – Nearly one-half of the northbound through traffic in this intersection would be diverted by construction of the Connector Road, changing the LOS for that movement from “B” to “A” in the AM peak and from “D” to “C” in the PM peak.

Based on our analysis, the traffic volumes expected to use the Connector Road at the Cocheco River would be 279 in the AM peak and 317 in the PM peak if it were in place in 2005. A similar analysis done on the O-D data for the whole day shows that the average weekday traffic on the Connector Road would be about 4100.

The traffic estimates are based on the analysis of only the O-D data for those trips that CLD considered eligible to be diverted to the Connector Road if it were built. This analysis was more detailed than the analysis done in Phase 1 of this project, resulting in daily traffic estimates that are somewhat less than the estimates derived in Phase 1, which estimated the average weekday traffic on the Connector Road to be about 5100. For this phase, the data were checked for completeness and any illogical trips were removed. The data were then adjusted to match the automatic traffic recorder information that was collected at the same time as the interviews at each O-D station location. This process yielded fewer trips from the O-D data that could use the Connector Road than the Phase 1 process that took a less detailed look at the data.

The analysis also is only for trips that currently use North Main Street and Wakefield Street at the locations of the O-D stations. Other trips that may use the Connector Road if it were built include some that now use the Spaulding Turnpike, as well as some that now use other streets, such as Chestnut Hill Road and Little Falls Bridge Road. In addition, we would expect that the new road would attract other traffic to the area due to the better access between North Main Street and Wakefield Street. Therefore, the above estimates are probably somewhat low.

## Network Performance Measures of Effectiveness

In an effort to estimate the effect of building the Connector Road on the City-wide environment, CLD performed simulations of the traffic at the studied intersections for both the 2005 No-Build and Build scenarios. These simulations use the SimTraffic™ software, which models individual vehicle travel through the highway network and estimates several performance measures of effectiveness (MOE). From those, we can further gauge the effect of changes that the Connector Road would have on the study area highway network.

The table below gives the results of some of the MOEs from the simulations. The output sheets are presented in Appendix E. An additional MOE presented in the table, but not calculated by the SimTraffic software, is the total number of vehicles entering the downtown area:

- ◆ eastbound on North Main Street at Union Street/Bridge Street;
- ◆ northbound on Bridge Street;
- ◆ northbound on South Main Street at Wakefield Street;
- ◆ westbound on Hanson Street; and
- ◆ southbound on Wakefield Street at Union Street.

Measure of Effectiveness	AM No-Build	AM Build	AM % Incr.	PM No-Build	PM Build	PM % Incr.
Total Delay (hours)	46.9	37.9	-19%	333.5	128.3	-62%
Travel Distance (miles)	2959	2965	+0%	4357	4731	+9%
Travel Time (hours)	157	148	-6%	496	305	-39%
Fuel Used (gallons)	278	270	-3%	459	373	-19%
HC Emissions (grams)	615	600	-2%	1408	1067	-24%
CO Emissions (grams)	21401	21584	+1%	34103	34116	+0%
NOx Emissions (grams)	1774	1743	-2%	2980	2832	-5%
Vehicles Entering Downtown	1644	1371	-15%	2314	2027	-12%

Notes: HC = Hydrocarbon  
CO = Carbon Monoxide  
NOx = Nitrous Oxides

As the table shows, there are considerable reductions in most of the various MOEs, except for increases in travel distance and CO emissions in both the AM and PM peak. In general, from these very preliminary estimates it appears that there are many benefits to constructing the Connector Road, in addition to the reduced delay and improved travel conditions in downtown Rochester. These benefits include reduced fuel usage and reduction of some types of vehicle emissions. A complete analysis using the regional traffic model would be required to properly estimate the area-wide MOEs associated with the construction of the Connector Road.

## Conclusions

CLD was able to estimate the potential effect of a new river crossing on current traffic volumes and operations in downtown Rochester, NH. Origin-Destination data that were collected in 2003





were used in conjunction with traffic counts collected in 2005 to develop the estimates of potential traffic redistributions, and to perform capacity analyses of the downtown intersections.

Total traffic in the intersections near downtown is expected to be reduced with the Connector Road in place, by as much as 273 vehicles in the AM peak and 287 vehicles in the PM peak at the Wakefield Street/Union Street intersection. These are reductions of 26% and 16%, respectively, from existing traffic at that intersection. Somewhat smaller reductions can be expected at the other downtown intersections.

It is expected that there would be reductions in the average delay of vehicles in the intersections, with the exception of the proposed ends of the Connector Road at North Main Street/Ten Rod Road and Wakefield Street/Chestnut Hill Road, which would have somewhat more traffic and therefore somewhat more delay.

Based on our analysis, the traffic volumes expected on the Connector Road at the Cocheco River would be 279 in the 2005 AM peak and 317 in the 2005 PM peak, with the average weekday traffic estimated to be about 4100 vehicles per day. The analysis is only for trips that currently use North Main Street and Wakefield Street at the locations of the O-D stations. Additional trips that may use the Connector Road if it were built include some that now use the Spaulding Turnpike, as well as some that now use other streets, such as Chestnut Hill Road and Little Falls Bridge Road. In addition, we would expect that the new road would attract other traffic to the area due to the better access.

Evaluations of some preliminary measures of effectiveness indicate that there are many benefits to constructing the Connector Road, in addition to the reduced delay in downtown Rochester. These include reduced fuel usage and fewer vehicle tailpipe emissions.

### Recommendations

The above analyses of 2005 traffic show the projected relief of traffic in downtown Rochester for current traffic if the Connector Road were to be built. That relief of traffic, the possibility of providing another river crossing for emergency vehicles, and the possible economic stimulation of the commercial areas must be balanced against the estimated \$4.8 million construction cost (not including right-of-way and other possible contingencies), the need to examine a full range of alternatives, and the requirement to do environmental studies that would examine air and noise quality, wetland encroachment, potential hazardous material sites, and many other issues.

The City should compare the traffic information presented in this report to all the other pros and cons of building the Connector Road, including environmental constraints, overall City goals, the Rochester Master Plan, and public input in order to assess how to proceed in this matter.

Should the City wish to proceed, the next steps in this process would be the detailed traffic and environmental studies required to support an environmental assessment of the project, followed by preliminary design. The City should work with the Strafford Regional Planning Commission (SRPC) to place the project on the NHDOT Transportation Improvement Program (TIP) list. The process will likely require an air quality assessment in conjunction with their regional air quality model. This will likely be the next phase in the process for you to consider for planning purposes if the project moves forward into the design and construction process.





**Table 1**  
**2005 Turning Movement Data**

			AM Peak Hour Traffic				PM Peak Hour Traffic			
Intersection	Approach		Without Connector	With Connector	Difference	% Diff	Without Connector	With Connector	Difference	% Diff
N. Main St. at Ten Rod Road	From N. Main	SE Left	0	44	44		0	67	67	
		SE Thru	329	285	-44	-13%	441	374	-67	-15%
		SE Right	9	9	0		25	25	0	
	From N. Main	NW Left	142	115	-27	-19%	132	132	0	0%
		NW Thru	309	262	-47	-15%	715	690	-25	-3%
		NW Right	2	109	107		1	144	143	
	From Ten Rod	NE Left	46	46	0		114	114	0	
		NE Thru	3	9	6		2	21	19	
		NE Right	218	212	-6	-3%	272	253	-19	-7%
	From Dealership or Connector Road	SW Left	0	41	41		1	35	34	
		SW Thru	0	27	27		0	0	0	
		SW Right	0	54	54		4	58	54	
		Intersection		1058	1213	155	15%	1707	1913	206
N. Main St. at Home Depot	From N. Main	SE Left	17	17	0		27	27	0	
		SE Thru	451	441	-10	-2%	587	535	-52	-9%
		SE Right	79	79	0		100	100	0	
	From N. Main	NW Left	8	8	0		21	21	0	
		NW Thru	374	407	33	9%	661	778	117	18%
		NW Right	37	37	0		66	66	0	
	From Home Depot	NE Left	55	55	0		149	149	0	
		NE Thru	7	7	0		20	20	0	
		NE Right	10	10	0		29	29	0	
	From Cumb. Farms	SW Left	27	27	0		30	30	0	
		SW Thru	3	3	0		2	2	0	
		SW Right	24	24	0		38	38	0	
		Intersection		1092	1115	23	2%	1730	1795	65
N. Main St at Washington St./Walnut St.	From N. Main	SE Left	355	267	-88	-25%	473	283	-190	-40%
		SE Thru	69	69	0		87	87	0	
		SE Right	1	1	0		5	5	0	
	From N. Main	WB Left	148	148	0		188	188	0	
		WB Thru	56	56	0		187	187	0	
		WB Right	260	145	-115	-44%	558	499	-59	-11%
	From Washington	NB Left	15	15	0		23	23	0	
		NB Thru	69	126	57	83%	89	99	10	11%
		NB Right	200	143	-57	-29%	175	165	-10	-6%
	From Walnut	EB Left	3	3	0		3	3	0	
		EB Thru	161	148	-13	-8%	101	72	-29	-29%
		EB Right	17	17	0		20	20	0	
		Intersection		1354	1138	-216	-16%	1909	1631	-278
N. Main St. at Union St.	From N. Main	EB Thru	676	518	-158	-23%	714	486	-228	-32%
		EB Right	11	11	0		9	9	0	
	From Bridge	NB Right	148	148	0		130	130	0	
		SB Left	144	144	0		241	241	0	
	From Union	SB Thru	84	84	0		95	95	0	
		SB Right	486	371	-115	-24%	971	912	-59	-6%
		Intersection		1549	1276	-273	-18%	2160	1873	-287
N. Main St. at S. Main St./Wakefield St.	From N. Main	EB Left	242	84	-158	-65%	350	122	-228	-65%
		EBThru	618	618	0		626	626	0	
		EB Right	109	109	0		109	109	0	
	From Hanson	WB Right	44	44	0		77	77	0	
		From S. Main	NB Thru	469	449	-20	-4%	990	973	-17
			Intersection		1482	1304	-178	-12%	2152	1907
Wakefield St. at Union St.	From Wakefield	NB Left	418	398	-20	-5%	913	896	-17	-2%
		NB Thru	337	179	-158	-47%	504	276	-228	-45%
	From Wakefield	SB Right	296	201	-95	-32%	394	352	-42	-11%
			Intersection		1051	778	-273	-26%	1811	1524
Wakefield St. at Columbus Ave.	From Columbus	WB Left	1	1	0		4	4	0	
		WB Right	239	259	20	8%	452	469	17	4%
	From Wakefield	NB Thru	335	177	-158	-47%	500	272	-228	-46%
		NB Right	2	2	0		4	4	0	
	From Wakefield	SB Left	270	270	0		288	288	0	
		SB Thru	295	200	-95	-32%	390	348	-42	-11%
		Intersection		1142	909	-233	-20%	1638	1385	-253
Wakefield St. at Chestnut Hill Rd.	From Chestnut Hill	EB Left	22	117	95	432%	85	275	190	224%
		EB Right	125	182	57	46%	158	177	19	12%
	From Shopping Plaza	WB Left	3	3	0		11	11	0	
		WB Thru	5	5	0		6	6	0	
		WB Right	6	6	0		23	23	0	
	From Wakefield	NB Left	32	86	54	169%	145	171	26	18%
		NB Thru	271	170	-101	-37%	616	397	-219	-36%
	From Wakefield	SB Thru	312	251	-61	-20%	523	481	-42	-8%
		SB Right	18	79	61	339%	67	109	42	63%
		Intersection		794	899	105	13%	1634	1650	16
Wakefield St. at Lilac Mall	From VIP	EB Left	3	3	0		13	13	0	
		EB Thru	0	0	0		1	1	0	
		EB Right	3	3	0		7	7	0	
	From Lilac Mall	WB Left	65	65	0		274	274	0	
		WB Thru	0	0	0		2	2	0	
		WB Right	28	28	0		193	193	0	
	From Wakefield	NB Left	6	6	0		20	20	0	
		NB Thru	134	128	-6	-5%	353	324	-29	-8%
		NB Right	90	90	0		307	307	0	
	From Wakefield	SB Left	65	65	0		149	149	0	
		SB Thru	235	235	0		242	242	0	
		SB Right	3	3	0		4	4	0	
		Intersection		632	625.69	-6	-1%	1565	1536.44	-29

**Table 2**  
**Summary of 2005 Signalized Intersection Analyses**

Approach		Weekday AM Peak						Weekday PM Peak					
		No-Build			Build			No-Build			Build		
		LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue
<b>N. Main St. at Ten Rod Road</b>	<b>Overall</b>	<b>B</b>	<b>10.4</b>		<b>B</b>	<b>13.5</b>		<b>B</b>	<b>17.4</b>		<b>B</b>	<b>15.8</b>	
From N. Main	SE	B	10.3	150	n/a	n/a	n/a	C	20.6	221	n/a	n/a	n/a
	SE Left	n/a	n/a	n/a	B	12.7	31	n/a	n/a	n/a	C	21.9	51
	SE Th-Rt	n/a	n/a	n/a	B	16.8	149	n/a	n/a	n/a	C	21.0	195
From N. Main	NW Left	A	6.4	59	A	6.5	23	C	23.2	85	A	9.1	30
	NW Th-Rt	A	2.3	25	A	4.2	0	A	6.0	111	A	6.0	64
From Ten Rod	NE Lt-Th	C	21.7	42	C	20.8	45	D	38.5	105	C	29.7	97
	NE Right	C	21.3	49	C	20.4	46	C	24.7	36	C	22.8	34
From Dealership or	SW	*	*	*	n/a	n/a	n/a	C	27.4	7	n/a	n/a	n/a
Connector Road	SW Lt-Th	n/a	n/a	n/a	C	24.9	56	n/a	n/a	n/a	C	27.1	33
	SW Rt	n/a	n/a	n/a	C	22.6	27	n/a	n/a	n/a	C	25.3	14
<b>N. Main St. at Home Depot</b>	<b>Overall</b>	<b>A</b>	<b>9.6</b>		<b>A</b>	<b>9.2</b>		<b>B</b>	<b>12.5</b>		<b>B</b>	<b>12.5</b>	
From N. Main	SE Left	C	34.9	15	C	31.7	13	D	37.0	20	C	33.5	19
	SE Thru	A	6.2	46	A	4.9	51	A	7.6	68	A	5.9	66
	SE Right	A	0.8	0	A	2.0	1	A	0.4	0	A	2.0	2
From N. Main	NW Left	C	23.9	13	C	24.4	14	C	26.7	26	C	26.7	26
	NW Th-Rt	A	9.1	81	A	9.1	87	B	11.7	158	B	12.6	191
From Home Depot	NE Lt-Th	C	23.7	30	C	24.3	32	C	26.3	72	C	26.3	72
	NE Right	B	19.0	5	B	19.4	5	B	19.3	10	B	19.3	10
From Cumb. Farms	SW Left	C	24.1	28	C	24.7	28	C	27.8	32	C	27.8	32
	SW Th-Rt	C	23.0	18	C	23.5	19	C	26.1	19	C	26.1	19
<b>N. Main St. at Union St.</b>	<b>Overall</b>	<b>B</b>	<b>14.6</b>		<b>B</b>	<b>12.7</b>		<b>B</b>	<b>14.1</b>		<b>B</b>	<b>10.9</b>	
From N. Main	EB	B	18.6	407	B	16.5	263	C	25.4	514	C	22.7	324
From Bridge	NB	C	25.2	9	C	20.2	0	C	25.4	30	B	19.9	6
From Union	SB Left	C	23.2	55	B	17.3	43	C	23.4	98	B	18.0	63
	SB Thru	C	22.3	62	B	17.0	54	C	21.8	67	B	16.7	58
	SB Right	A	0.1	0	A	0.1	0	A	0.7	0	A	0.5	0
<b>Wakefield St. at Columbus Ave.</b>	<b>Overall</b>	<b>B</b>	<b>14.9</b>		<b>B</b>	<b>11.9</b>		<b>B</b>	<b>13.2</b>		<b>B</b>	<b>10.9</b>	
From Columbus	WB Left	C	21.9	4	C	21.9	4	C	21.0	8	B	19.4	8
	WB Right	B	11.0	48	A	9.1	14	B	10.8	127	A	9.2	58
From Wakefield	NB Th-Rt	B	18.8	131	B	14.5	76	B	17.6	239	B	12.2	110
From Wakefield	SB Left	C	26.1	163	C	20.2	141	C	22.2	163	C	21.7	172
	SB Thru	A	2.8	40	A	2.4	26	A	11.3	59	A	3.0	47
<b>Wakefield St. at Chestnut Hill Rd.</b>	<b>Overall</b>	<b>B</b>	<b>12.7</b>		<b>B</b>	<b>17.0</b>		<b>B</b>	<b>17.5</b>		<b>C</b>	<b>22.8</b>	
From Chestnut Hill	EB Left	C	24.5	22	C	23.1	82	D	37.3	71	C	31.5	223
	EB Right	C	24.4	27	C	20.6	29	C	30.7	47	B	19.9	45
From Shopping Plaza	WB Lt-Th	C	29.9	13	C	26.6	14	C	32.1	23	C	27.1	23
	WB Right	C	28.7	8	C	25.8	9	C	31.2	18	C	26.3	18
From Wakefield	NB Left	C	31.1	32	C	25.9	68	D	50.2	128	C	30.9	161
	NB Thru	A	5.7	92	A	6.8	62	A	6.7	205	A	10.0	145
From Wakefield	SB Thru	B	10.3	161	B	15.9	144	B	14.1	270	C	28.6	302
	SB Right	A	7.5	12	B	12.3	26	A	8.7	20	B	13.5	18
<b>Wakefield St. at Lilac Mall</b>	<b>Overall</b>	<b>B</b>	<b>12.1</b>		<b>B</b>	<b>12.1</b>		<b>B</b>	<b>16.3</b>		<b>B</b>	<b>14.3</b>	
From VIP	EB	C	31.1	7	C	31.1	7	C	27.0	18	C	28.6	19
From Lilac Mall	WB Th-Lt	C	29.3	31	C	29.3	31	C	25.6	124	C	25.1	127
	WB Right	B	19.9	11	B	19.9	11	B	11.8	35	B	15.0	25
From Wakefield	NB Th-Lt	A	8.1	63	A	8.1	61	B	20.0	207	B	12.5	151
	NB Right	A	4.6	4	A	4.6	4	A	7.9	15	A	2.4	0
From Wakefield	SB Left	C	33.9	54	C	33.9	54	C	26.9	129	C	30.0	133
	SB Th-Rt	A	4.3	69	A	4.3	69	A	6.6	83	A	7.0	83

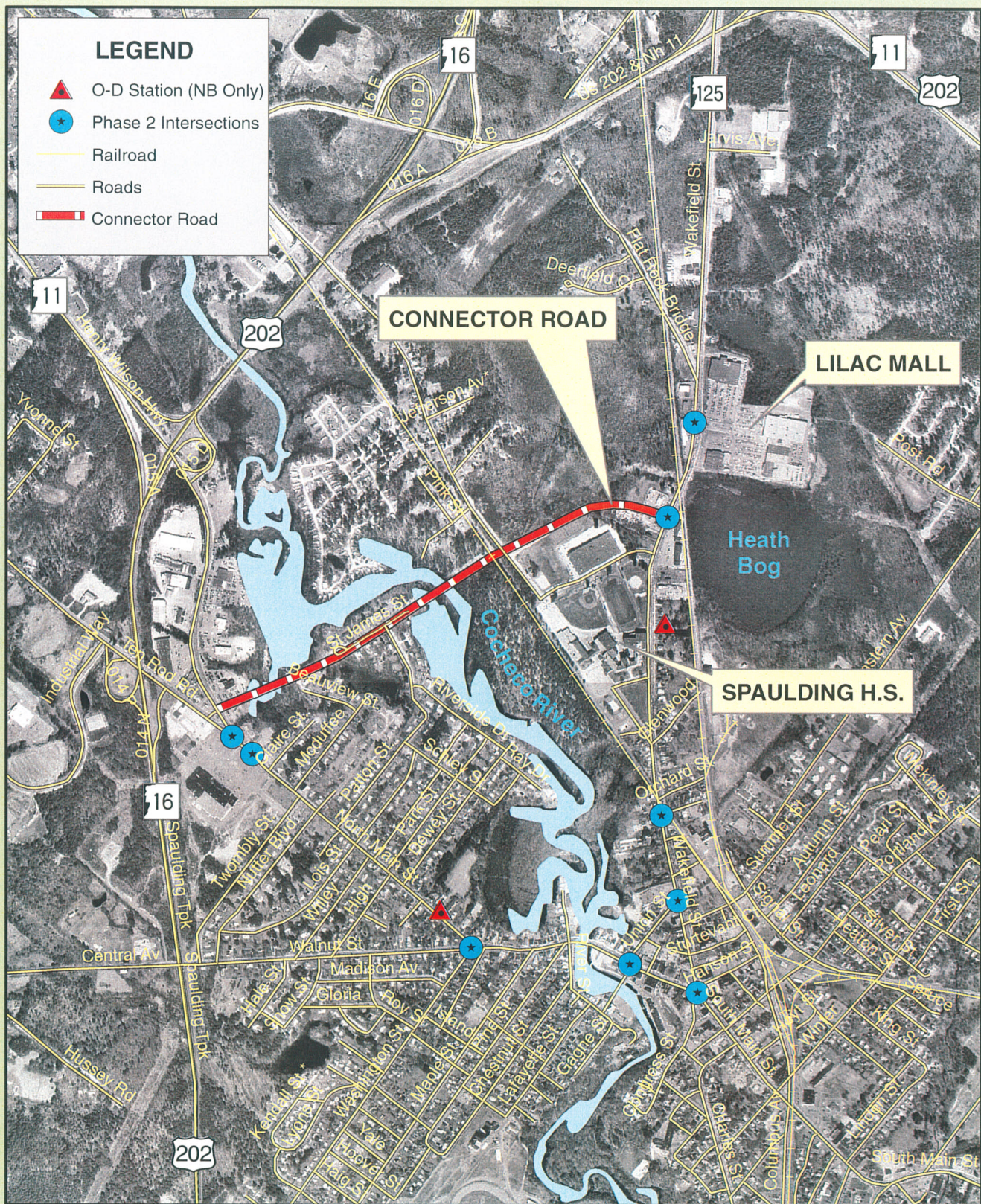
**Table 3**  
**Summary of 2005 Unsignalized Intersection Analyses**

Approach		Weekday AM Peak						Weekday PM Peak					
		No-Build			Build			No-Build			Build		
		LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue	LOS	Delay	Queue
<b>N. Main St at Washington St./Walnut St.</b>													
From N. Main	WB	A	5.4	21	A	6.0	19	A	9.1	53	A	7.1	40
From Washington/	NB Left	E	48.6	60	E	46.1	95	F	944	277	F	492	250
Walnut	NB Right	C	19.3	106	B	13.9	57	C	21.1	91	B	13.5	44
<b>N. Main St. at S. Main St./Wakefield St.</b>													
From N. Main	EB Left	C	16.6	59	B	12.4	14	F	158	411	C	24.6	49
	EB Right	C	16.5	165	C	16.5	165	C	16.2	162	C	16.2	162
From Hanson	WB Right	B	10.3	6	B	10.2	6	B	14.1	16	B	13.9	16
<b>Wakefield St. at Union St.</b>													
From Wakefield	NB Left	B	11.2	67	A	9.9	51	D	26.8	319	C	21.4	260

Notes:

LOS = Level of Service  
 Delay = Average intersection delay (seconds per vehicle)  
 \* = No vehicles  
 n/a = Not Applicable  
 Queue lengths are in feet



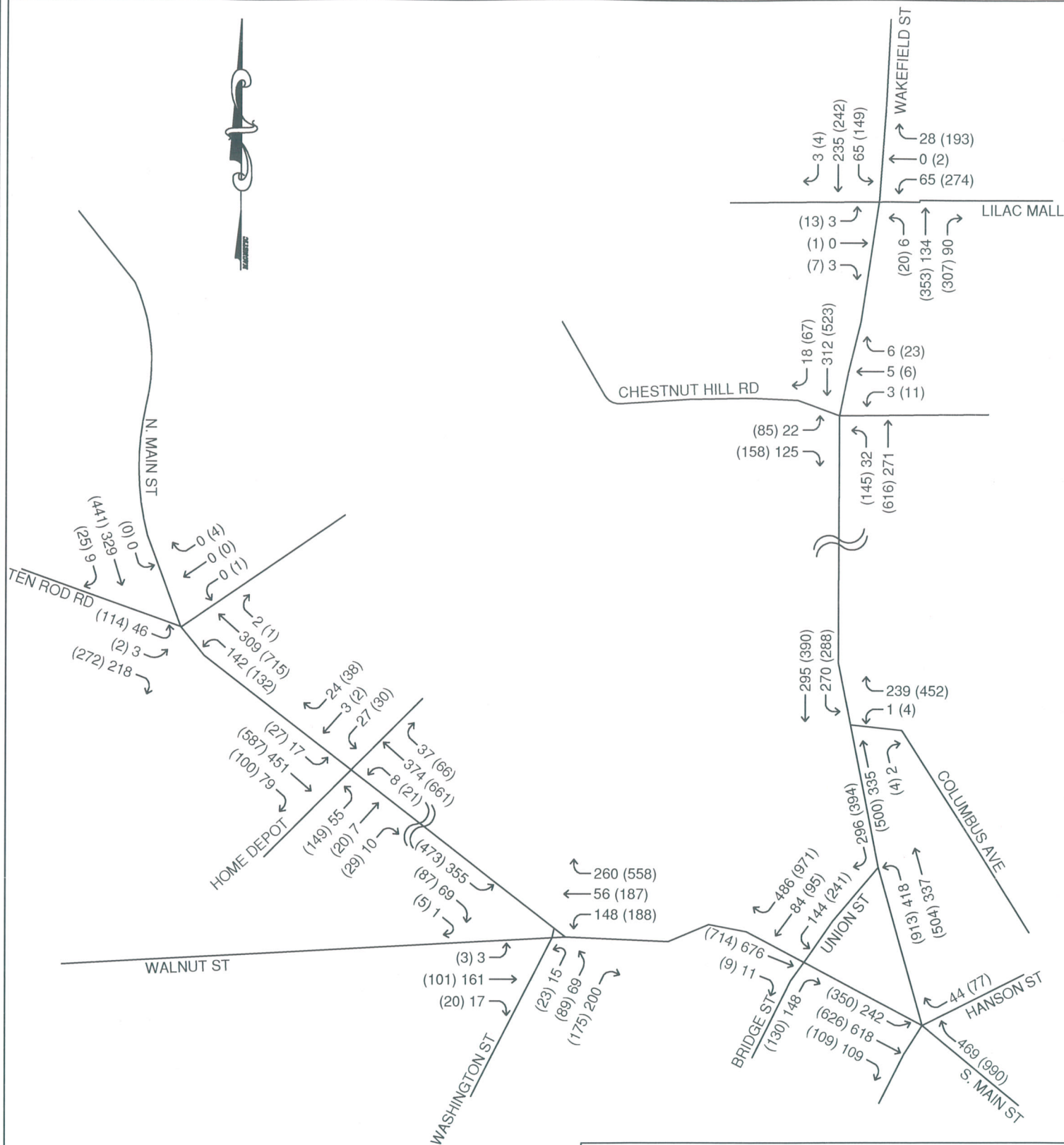


# Rochester Origin-Destination Study Figure 1- Study Area



November 2006  
Source: GRANIT and NHDOT  
Created in ArcGIS 9 using ArcMap





XX = AM PEAK HOUR  
(XX) = PM PEAK HOUR

**ROCHESTER**  
**ORIGIN-DESTINATION STUDY**  
CLD REFERENCE # 03-0368

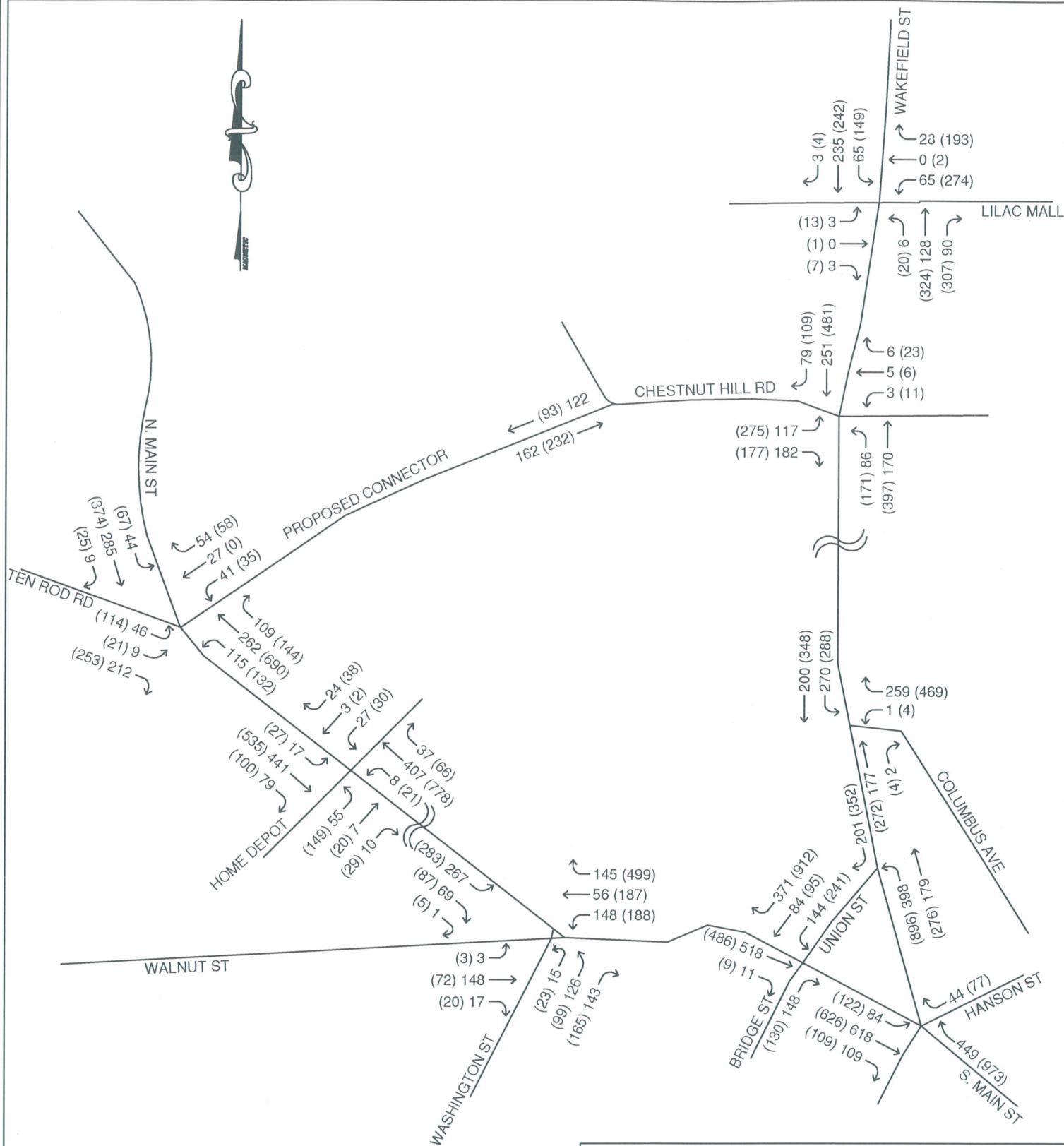
**EXISTING STREET CONFIGURATION**  
**2005 AM & PM TRAFFIC VOLUMES**



540 Commercial Street - Manchester, NH 03101  
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**FIGURE 2**

NOT TO SCALE



XX = AM PEAK HOUR  
(XX) = PM PEAK HOUR

**ROCHESTER**  
**ORIGIN-DESTINATION STUDY**  
CLD REFERENCE # 03-0368

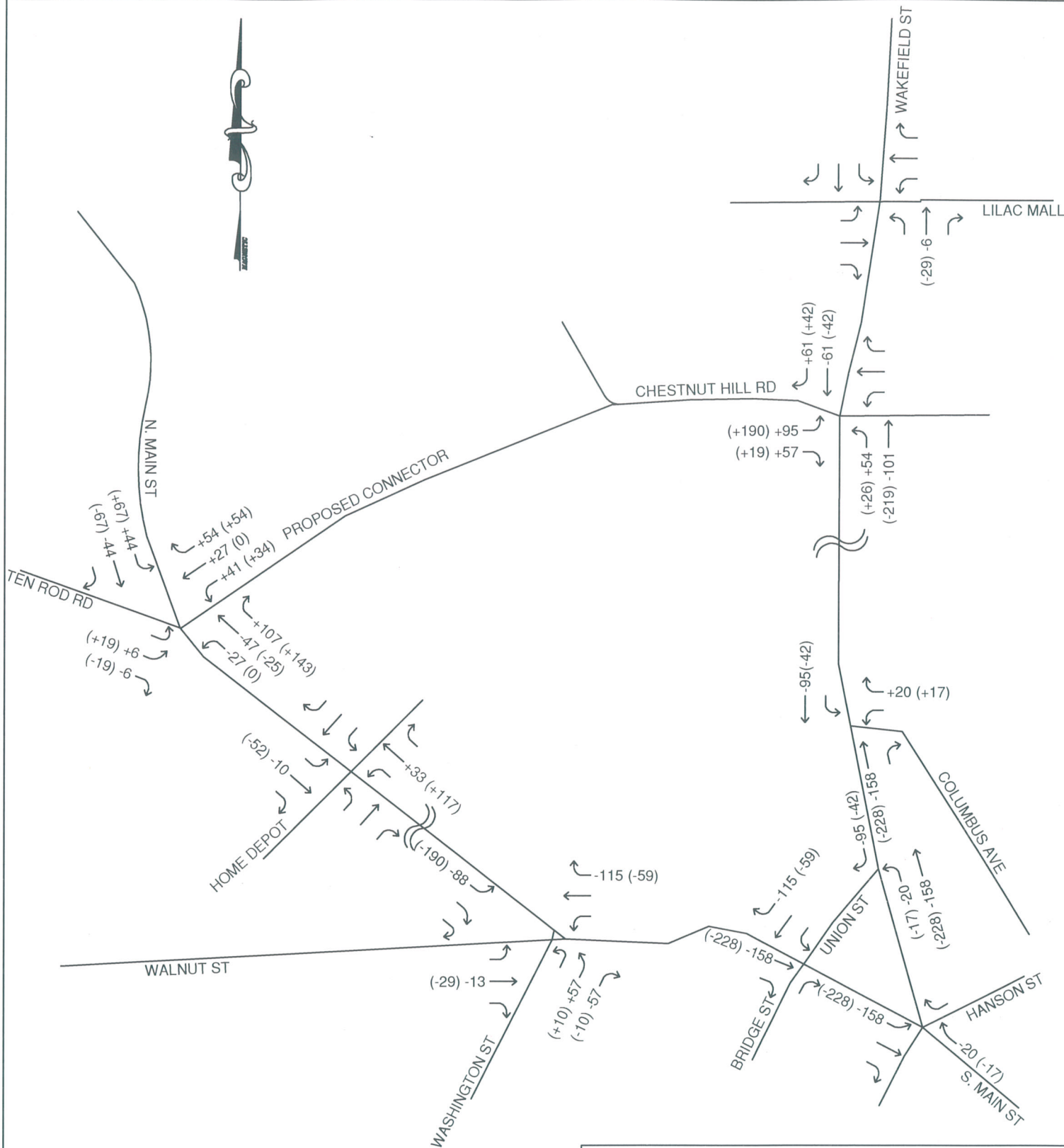
**BUILD CONNECTOR ROAD**  
**2005 AM & PM TRAFFIC VOLUMES**



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**FIGURE 3**

NOT TO SCALE



XX = AM PEAK HOUR  
(XX) = PM PEAK HOUR

**ROCHESTER**  
**ORIGIN-DESTINATION STUDY**  
CLD REFERENCE # 03-0368

**DIFFERENCE DUE TO CONNECTOR ROAD**  
**2005 AM & PM TRAFFIC VOLUMES**



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**FIGURE 4**

NOT TO SCALE