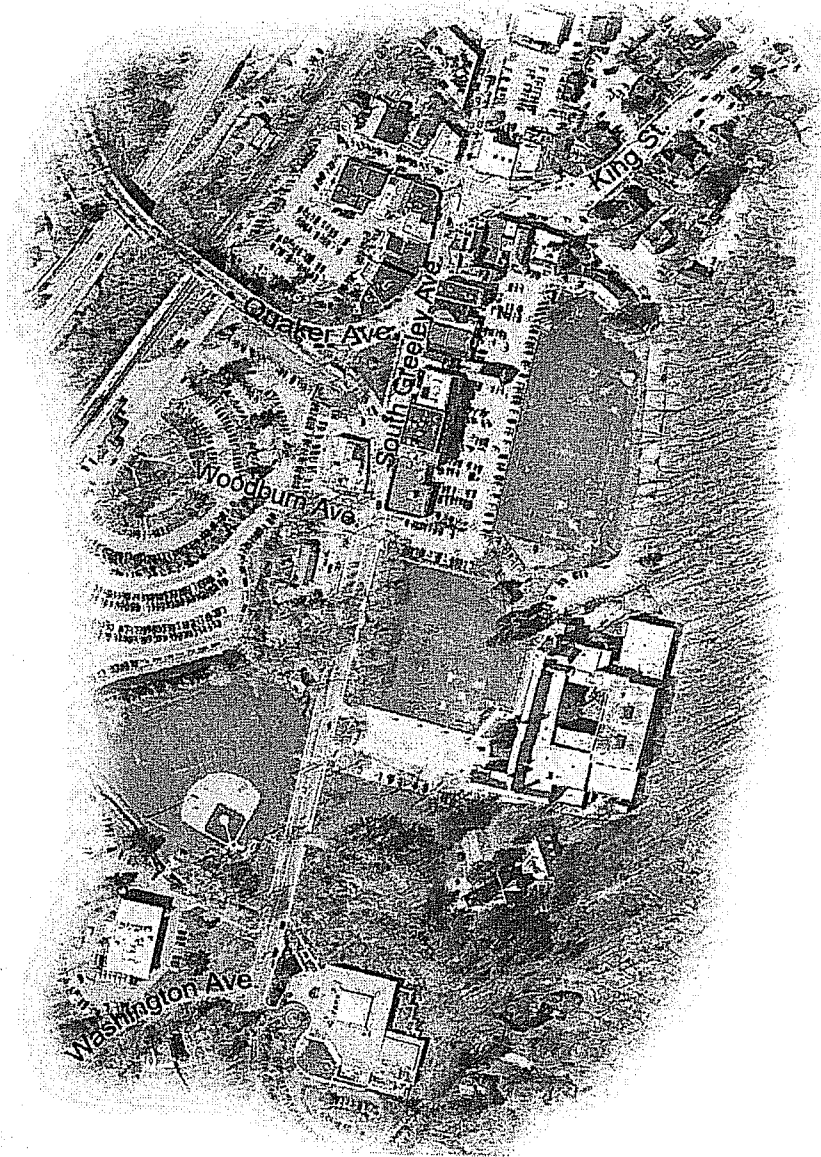


Westchester County Department of Public Works

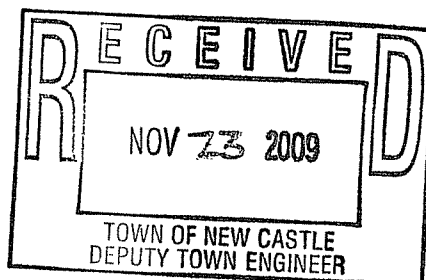


Traffic Safety & Operational Assessment South Greeley Avenue Streetscape Project

Westchester
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Andrew J. Spano, County Executive
County Board of Legislators

Ralph L. Butler, P.E., Public Works Commissioner



November 2009

November 19, 2009

Traffic Safety & Operational Assessment South Greeley Avenue Streetscape Project

By: David Smyth, P.E., P.T.O.E.
Senior Engineer (Civil)

Background/Introduction

Westchester County Department of Public Works was contacted by the Town of New Castle and requested to provide technical assistance on a purposed Town Streetscape Project along a central business district in the Hamlet of Chappaqua. The streetscape project incorporates geometric roadway alterations and pedestrian enhancements which would be applied to South Greeley Avenue & Washington Avenue (County Roads #79), State Route 120 (King Street & Quaker Avenue) and several local town roadways.

This report is an assessment of the safety and traffic operations under the existing conditions and proposed geometric redesigns. The Department has provided recommended geometric improvements with turning movement analysis to support these changes. These findings are derived from field observations, volume counts, accident data records and professional submittals. A summary of these assessments and recommended improvements are followed.

Summary

Traffic Operations

Traffic operations are defined as "Level of Service" which categorizes the effects and tolerances of delays experienced by motorists. In this suburban area, a Level of Service of "C" or lower (Levels "A" or "B") are acceptable. Level "C" characteristics are defined as: "Most drivers feel restricted, but tolerably so" with "often more than one vehicle in queue," and fall within the range of greater than 15 and up to 25 seconds of delay per vehicle. Below are instances where intersections are operating under less then acceptable conditions.

- During the AM Peak hour (7:00AM to 8:00AM) the intersection of South Greeley Avenue and King Street operates at Level of Service "E." Level "E" characteristics are defined as: "Drivers find delays approaching intolerable levels" with "frequently more than one vehicle in queue," and fall within the range of greater than 35 and up to 50 seconds of delay per vehicle.
- During the PM Peak hour (2:30PM to 3:30PM) the intersection of South Greeley Avenue and Woodburn Avenue also operates at a Level of Service of "E."
- During the Saturday Peak hour (1:00PM to 2:00PM) the intersection of South Greeley Avenue and King Street operates at a Level of Service of "F." Level "F" characteristics are defined as: "very constrained flow" with "intersection failure situation caused by geometric and/or operational constraints external to the intersection," and is greater than 50 seconds of delay per vehicle.

Traffic Safety

Traffic accident or "MV104" reports were obtained for the project area from the Town of New Castle Police Department for a three year period at start of this study. This period provides a large enough sample to indicate trends or patterns of accidents that may be present.

Traffic Safety Cont.

These reports were used to create collision diagrams (See Appendix A – Collision Diagrams & Accident Rates) at the intersections and have produced the following locations of interest;

- At the intersections of South Greeley Avenue and King Street; there were two pedestrian accidents, with personal injuries, that occurred in an unmarked crossing location. There is a popular, large chain coffee shop at one end of this unmarked crossing path which generates heavy pedestrian traffic. The intersection has an unusual traffic control designation in addition to the heavy pedestrian activity. King Street is a state arterial and consequently, the traffic control at this intersection is under the State's jurisdiction. There were three other accidents that occurred at this intersection which were all related to parking activities.
- At the intersection of South Greeley Avenue and the northern leg of Quaker Avenue, there is a significant history of rear end collisions present on the eastbound approach of Quaker Avenue. Police report accounts attribute instances of start up and sudden stopping actions of motorists to the causes of these accidents. Quaker Avenue is a state arterial and consequently, the traffic control at this intersection is under the State's jurisdiction.
- At the intersection of South Greeley Avenue and Woodburn Avenue, there are patterns of turning movement and pedestrian related accidents. For a 12 month period (January 1, 2006 to December 31, 2006), there were 5 accidents which are potentially correctable by a traffic signal. This statistic, with the existing volumes, satisfies the Crash Experience Warrant for a traffic signal. A full traffic signal warrant was performed at this intersection and only this Crash Experience Warrant, one of eight total warrants, was met. There was also a pedestrian accident that occurred in a crosswalk and two rear end accidents where reports cited stopping for pedestrians in the roadway.
- There were a total of 12 accidents involving parking related movements that occurred on South Greeley Avenue between Woodburn Avenue and King Street. This accident type accounts for approximately 24% of the total accidents that occurred in the study area, an indication that the parking area and maneuvers should be reviewed for improvements. * POSSIBLY INSTALL 45° STALLS ALONG STOREFRONTS

Intersection Geometrics & Other

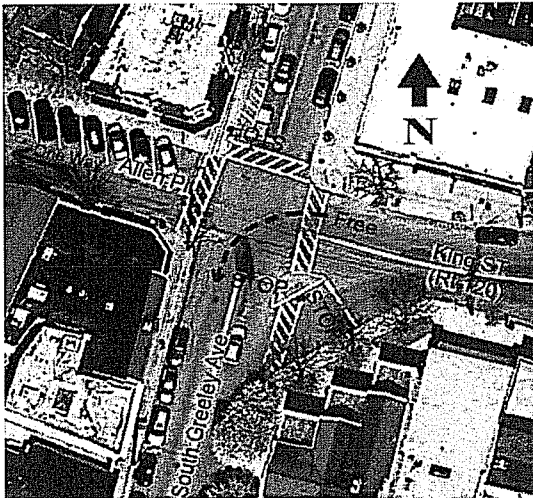
- The South Greeley Avenue streetscape geometrics/curb outlines were designed to balance the travel between vehicles and pedestrians. Designs reduced the crossing distances for pedestrians by narrowing intersection corners with bulb outs while maintaining sufficient turning radii for large trucks (WB-50 along state arterial, WB-40 remaining locations) and school buses (SB40) where applicable.
- Currently, there is a flashing pedestrian signal in operation on South Greeley Avenue at Robert E. Bell Middle School. This town signal was installed to provide assistance to individuals and school children accessing a ball field across South Greeley Avenue from the school parking area. This pedestrian signal does not meet current standards under the New York State Manual of Uniform Traffic Control Devices (NYSMUTCD) for the existing conditions. There were no traffic accidents recorded at this location based on received police reports.
- The Town had requested additional crossing locations along South Greeley Avenue. Crosswalks were suggested at each leg of Quaker Avenue and one at the midblock locations between Quaker Avenue and King Street. These locations were reviewed and will be addresses in the recommendation section of this report.

Recommendations

Our recommendations (see Appendix B – Recommended Improvements with Turning Movement Diagrams) are summarized on an intersection by intersection basis and are as followed:

South Greeley Avenue @ King Street

At this intersection, there were two pedestrian accidents that occurred at a location where crossing is prohibited. At one end of prohibited crossing path, resides a large chain coffee shop which is a big generator of pedestrian traffic.



Intersection of South Greeley Ave. & King St.

On King Street (Route 120), a state route, vehicles proceed southeast under “free” traffic control operation to maintain traveling south along the state route. The free movement from south to east (see left picture) accounts for this crossing restriction.

Pedestrians continue to cross South Greeley Avenue at this prohibited location, a distance of 44 feet, instead of the required alternate route along the three other crosswalks (requiring waiting for three separate gaps in traffic and total route distance of 150 feet).

An average of 13 and 23 pedestrians use the unmarked crossing location per hour during the peak hours on the weekdays and weekend, respectively. These counts indicate an established route of travel and adherence to this restriction may be unrealistic.

Our recommendations are as followed:

- Install stop sign on westbound King Street, converting the intersection to an all-way stop control,
- Install a crosswalk across the southern leg, allowing pedestrian to utilize all legs of the intersection to cross,
- Increase the area of the refuge island, narrowing the right turn lane from South Greeley Avenue to eastbound King Street,
- Install bulb outs, where applicable, to reducing the crossing distances while accommodating the turning movements of trucks, and
- Switch the angle parking on Allen Place to the opposite side of the roadway.

These improvements would provide safe crossing paths along the entire intersection, implement a more natural or expected control of movement and reduce the crossing distance for pedestrians, resulting in less time/exposure of pedestrians in the roadway.

The repositioning of parking spots on Allen Place to other side of the road will eliminate the required transition for vehicles on westbound King Street traveling onto Allen Place. It also provides smoother travel and reduces the amount of information processing motorists will have to consider when traveling through the intersection.

A traffic signal warrant was not conducted for this intersection due to the low accident numbers but an All-Way Stop Study was performed (See Appendix C – Stop and Signal Warrants). Although the intersection volumes were just under the suggested condition requirements, the average number of crossing pedestrians at this intersection was 111 and 255 per hour during the peak periods on the weekdays and weekend, respectively. Another characteristic to be consider for an All-Way Stop application besides these high pedestrian volumes, are field observations. Motorists, whom are unfamiliar with the intersection and are traveling southbound on King Street, presently slow down, or in some instances come to a complete stop, when approaching the intersection with an expectation of a stop condition.

South Greeley Avenue @ King Street Cont.

The proposed stop control on westbound King Street was analyzed using Synchro/SimTraffic, analytical traffic operations software, and found to cause no detrimental effect to intersection operations (Table 1). In fact, the overall intersection delays would be reduced if this recommendation were implemented.

These results occur due to the removal of the queues on both approaches of South Greeley Avenue, particularly from the northbound. Of all the entering volumes at this intersection, Westbound King Street accounts for an average of 34% in the AM Peak and only 24% in the PM peak. As vehicles are stopped on the northbound approach at the intersection and wait for an adequate gap in traffic on the westbound King Street approach prior to proceeding through the intersection, traffic begins to queue. Depending on how close vehicles will pull between one another, only 2 to 3 cars will be allowed to wait on this approach before the northbound right turn lane is blocked. Motorists whom want to continue north on the state route, averaging 57% of entering vehicles in the AM Peak and 65% in the PM peak, are also stopped and prevented from traveling. The All-Way Stop would prevent the blocking of this right turn lane and the majority of the entering vehicles at this location.

Table 1 – Delay Results – South Greeley & King Street

Time Period	Existing Cond.			All Stop @ King St.		
	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*
AM Peak	66.4/(3.9)	E	35.2	12.7/(1.5)	(A)	7.1
PM Peak	168.6/(4.8)	F	86.7	13.7/(6.2)	(A)	10.0
SAT Peak	>168.6**/(9.7)	F	>86.7**	47.7/(6.7)	D	27.2

* THIS IS
A MARKED
IMPROVEMENT,*
~ MAY BE TOO HIGH

* Values = Seconds of Delay per Vehicle per Hour.

** Synchro model delay calculations exceed limits and displays as error due to unusual layout in software.

The maximum queue lengths were also analyzed using Synchro/SimTraffic (Table 2). The positive benefits of reducing the maximum queue lengths on the northbound and southbound approaches noticeably out way the queue increase for the westbound approach. Synchro/SimTraffic reports for these results are found in Appendix D – Synchro and SimTraffic Reports.

Table 2 – Maximum Queue Length Averages* (Feet) – South Greeley & King Street

Approach	AM Peak			PM Peak			SAT Peak		
	Existing	All Stop	Diff**	Existing	All Stop	Diff**	Existing	All Stop	Diff**
WB (LTR)	56	110	54	51	120	69	29	56	27
NB (LT)	310	73	-237	422	90	-333	84	47	-37
NB (R)	306	66	-240	407	56	-351	26	26	-0.5
SB (LTR)	87	49	-38	169	59	-110	50	31	-20

*Results based on average of Synchro and SimTraffic calculations.

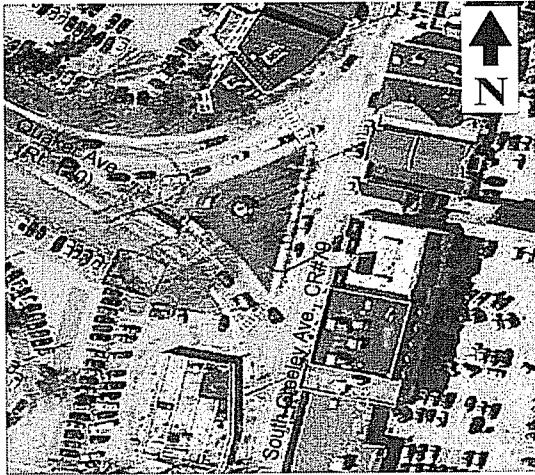
**Positive values indicate increase in queue, negative values indicate queue reduction @ maximum volume conditions.

Under New York State Vehicle and Traffic Law – Section 1684; the Town of New Castle, if desired, will be required to petition the state to install the stop sign on the westbound approach of King Street and other improvements at this intersection, to complete these recommendations. Town officials will also be required to complete a local ordinance to make the traffic control device official.

→ THEY MIGHT DO WARRANT ANALYSIS AND CONCLUDE STOP
LIGHT IS NECESSARY

South Greeley Avenue @ Quaker Avenue – Northern Leg

Quaker Avenue splits into two separate roadways which are skewed at acute angles (see picture). As the degree of the intersecting roadways decreases and become sharper, the sight distance available for motorist diminishes.



Intersection of South Greeley Ave. and Quaker Ave. (Rt. 120)

There is a significant history of rear end collisions present at this intersection on the eastbound approach of Quaker Avenue on the northern leg (see Appendix A – Collision Diagrams & Accident Rates). Quaker Avenue is a state arterial and consequently, the traffic control at this intersection is under the State's jurisdiction.

After a thorough review of the accident reports and observing intersection field conditions, it can be concluded that the location of the stop bar in conjunction with the skew of the intersection and the infrequent number of adequate gaps in traffic on Greeley Avenue, all contribute to these types of collisions.

The existing crosswalk on Quaker Avenue is positioned to line up with a pedestrian alleyway, providing access to rear a parking area. Town officials have indicated this alleyway has low usage.

To reduce the number of rear end collisions occurring on the eastbound approach of Quaker Avenue, it is recommended to;

- Increase the radius of the northwest corner of the intersection,
- Rotate the crosswalk to lie parallel in the direction with South Greeley Avenue, and
- Relocate the stop bar closer to the intersection.

These improvements will allow vehicles on the eastbound approach of Quaker Avenue to stop closer to South Greeley Avenue, improving the sight distance for motorists at the intersection. The increased sight distance provides more time for motorist to determine when a safe turning movement can be made and provides a greater distance to see oncoming traffic.

The increased radius of the northwest corner allows the crosswalk to be installed at the recommended location by maintaining a safe crossing distance for pedestrians. Another benefit of alternating this curb line is it will provide traffic calming measures and reduce the speeds of vehicles making the right turn onto Quaker Avenue from South Greeley Avenue. Lowering the speeds of turning vehicles at this area will benefit pedestrians and vehicles on eastbound Quaker Avenue.

The location of the new crosswalk positions pedestrians where they can be seen and expected to cross the street.

These improvements will result in reducing the instances of start up and sudden stopping actions that were identified in police reports to contribute to rear end accidents, while providing safety enhancements for pedestrians.

South Greeley Avenue @ Quaker Avenue – Southern Leg

On the southern leg of Quaker Avenue there were three rear end accidents on the eastern approach and three right-angle accidents that occurred due to vehicles entering a driveway on the southwest corner (see Appendix A – Collision Diagrams & Accident Rates). The driveway at the southwest corner has since been removed therefore eliminating the right angle accident problem.

South Greeley Avenue @ Quaker Avenue – Southern Leg Cont.

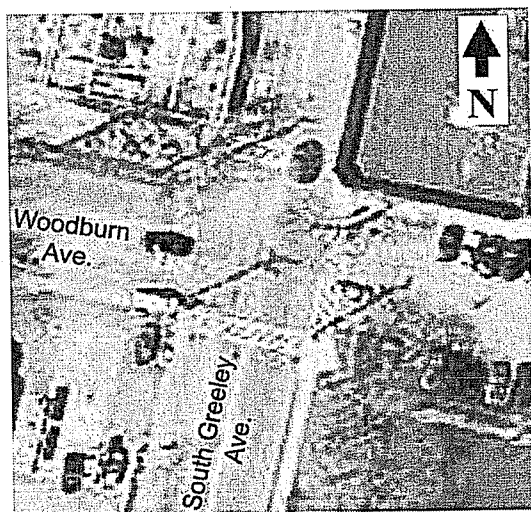
In an effort to improve pedestrian features, maintain consistent streetscape enhancements and address additional requested crossing locations, it is recommended to:

- Increase the radius of the southwest corner of the intersection,
- Rotate the crosswalk to lie parallel in the direction with South Greeley Avenue,
- Install a 6 foot median island on South Greeley Avenue between both legs of Quaker Avenue, and
- Install a crosswalk, yield to pedestrian warning signs and other traffic control devices on South Greeley Avenue.

The geometric and traffic control improvements to Quaker Avenue approach would yield similar benefits described previously for the northern leg of the intersection. The installation of a median island on South Greeley Avenue, with crosswalk markings and other related traffic control improvements, will establish two separate crossing locations to traverse South Greeley Avenue at the southern and northern legs of Quaker Avenue. These items would facilitate the Towns request to provide safe crossing areas to the park located in the island.

South Greeley Avenue @ Woodburn Avenue

There were several turning movement and pedestrian related accidents which occurred here at various times during the day. For a 12 month period (January 1, 2006 to December 31, 2006), there were 5 accidents which potentially could have been corrected by a traffic signal. This accident statistic, in combination with the existing intersection traffic volumes, satisfies one of the warrants for justifying the installation of a traffic signal.



Intersection of South Greeley Ave. & Woodburn Ave.

A full traffic signal warrant was performed at this intersection and only the Crash Experience Warrant was met. An All-Way Stop study (See Appendix C – Stop and Signal Warrants) was also performed and the accommodating requirements for this condition are met.

There was also a pedestrian accident that occurred in a crosswalk and two rear end accidents where police report accounts cite vehicles stopping for crossing pedestrians. It is recommended to;

- Install stop signs on South Greeley Avenue, thereby creating an all-way stop controlled intersection to reduce the crash history at this location, and
- Install bulb outs near the intersection to would provide traffic calming benefits and reduce the time/exposure of pedestrians in the roadway. The bulb outs also provide buffer and benefit between parked and moving vehicles.

It is not recommended having a traffic signal installed at this time, as industry standards are to exhaust other methods of improvements prior to proceeding with a signal installation. The All-Way Stop is expected to reduce these crashes. The new stop signs and intersection shall be monitored for a three year period to determine the affects of the installation. The installation of a traffic signal at this location may be reconsidered if, during the evaluation period, the accident history remains unchanged or other types of accidents have increased as a result of stop sign installations.

*TURNING RADIUS SHOULD BE CHECKED FOR RIGHT-TURN
ON NORTHBOUND APPROACH.

* ADD PARKING ON SOUTH GREELEY ALONG BELL SCHOOL.

Q1) * WHAT'S THE EFFECT OF QUEUE TOWARDS QUAKER
Q2) * WHY NOT PLACE STOP ALONG S. GREELEY ALLOWING FREE RIGHTS

Q3) MAKE SB RIGHT TURN LANE RIGHT TURN AND THRU. CREATE LEFT TURN ONLY LANE TO ALIGN WITH PROPOSED S. GREELEY ISLAND.
Westchester County Department of Public Works

South Greeley Avenue @ Woodburn Avenue Cont.

The proposed all-way stop control at this intersection was analyzed using Synchro/SimTraffic and found not to cause a detrimental effect to intersection operations (see Table 3 below). In fact, the overall intersection delays would be reduced if this recommendation were implemented. These results are due to the removal of the queues on both approaches of Woodburn Avenue, particularly the higher delays present in the PM Peak from the dismissal of the local middle school.

Table 3 – Delay Results – South Greeley & Woodburn Avenue

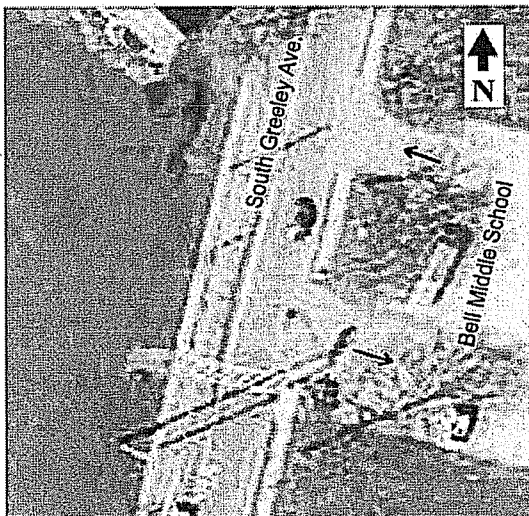
Time Period	Existing Cond.			All-Way Stop		
	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*
AM Peak	13.7/(2.3)	A	8.0	14.2/(2.9)	A	8.2
PM Peak	81.2/(5.4)	E	43.3	19.4/(9.0)	B	14.2
SAT Peak	27.9/(4.1)	C	16.0	14.3/(7.4)	B	10.9

* Values = Seconds of Delay per Vehicle per Hour.

Under New York State Vehicle and Traffic Law – Section 1660; the Town of New Castle, if desired, will be required to petition the county to install stop signs on the South Greeley Avenue to complete this recommendation. Town officials will also be required to complete a local ordinance to make the traffic control device official.

South Greeley Avenue @ Bell Middle School

At this location, an existing flashing pedestrian signal is in operation to assist pedestrians and school children in accessing a ball field across South Greeley Avenue to/from the school parking lot (see picture). This pedestrian signal does not meet current standards under the New York State Manual of Uniform Traffic Control Devices



Intersection of South Greeley Ave. & Bell Middle School

(NYSMUTCD) for the existing conditions due to low pedestrian volumes. An average total of 8, 15 & 5 pedestrians crossed South Greeley Avenue during the AM, PM & Saturday Peak Period respectively. The existing crosswalk is approximately 34 feet long and crosses two lanes of traffic.

It is recommended that:

- bulb outs be created on both sides of South Greeley Avenue, with parking restricted 50 feet in advance of the crosswalk in each direction, *** ELIMINATES PARKING ALONG GREELEY WOODS ***
- “Yield to Pedestrians” and pedestrian warning signs, with associated roadway markings, be installed in advance of the crosswalk,
- “SCHOOL” designation lettering installed on roadway; and
- removal of the pedestrian signal installation.

The use of bulb outs would reduce the crossing distance by almost 8 feet, requiring less time for pedestrians to be exposed to moving vehicles. Restricting parking 50 feet leading up to the crosswalks provides the required visibility for interaction between pedestrians and motorists. The new signs and roadway markings will increase awareness of a crossing location and the potential for school children to be in the roadway.

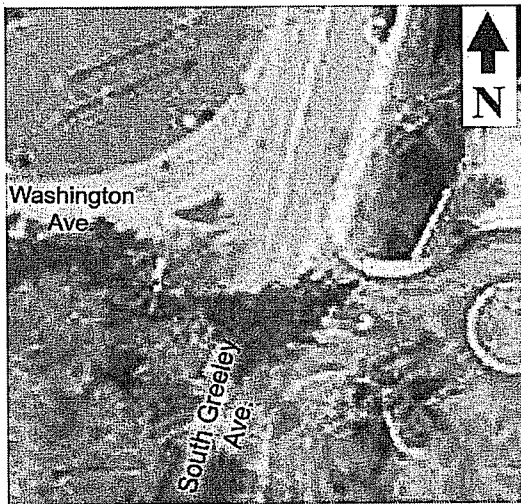
South Greeley Avenue @ Bell Middle School Cont.

These improvements will also compel motorists and pedestrians to focus on the important crossing activity at this section of South Greeley Avenue, accomplishing safer travel across the roadway.

The removal of flashing signal will eliminate any false sense of security that a pedestrian may experience when crossing and diminish the potential for rear-end crashes that may occur from signal operation. Additionally, the cost for maintenance of the signal and the power consumption of signal equipment will be eliminated.

South Greeley Avenue @ Washington Avenue

On the southbound approach to this intersection lies a wide right turn lane with a small raised island separating traffic on this approach (see picture below). Based on the right turning movement volumes, this lane is not needed at the substitution of the increased pavement and long crossing distance of Washington Avenue.



Intersection of South Greeley Ave. & Washington Ave.

It is recommended for;

- The southbound channelization island to be removed, and
- Increase the radius of the south-east corner of the intersection to provide traffic calming benefits while reducing the crossing distance/exposure time for pedestrians in the roadway.

The installation of these recommendations will improve the safety for the crossing at Washington Avenue and allows the existing asphalt to be converted to grass, creating additional usable open spaced at the south-east corner. The reduction of asphalt also provides a benefit of reducing storm water runoff to local drainage basin.

Conclusions

This report is an assessment of the safety and traffic operations under the existing conditions and proposed geometric changes. Results are derived from field observations, volume counts, accident data records and professional submittals. This report also provides conceptual geometrics/curb designs that were focused on balancing the safe travel between motor vehicles and pedestrians for the purposed local South Greeley Avenue Streetscape Project.

Information provided in this report can be used by the Town to assist in the direction of completing a more detailed design for construction. The analysis can also be used to petition the State or the Department for approval to pursue the recommended modifications, if desired, to non-town roadways.

A state highway work permit would be required for any alterations or work performed on Quaker Avenue, King Street and/or the intersections at South Greeley Avenue @ Quaker Avenue and King Street. A county highway permit would be required for any alterations or work on South Greeley Avenue from Town line to King Street and at Washington Avenue.

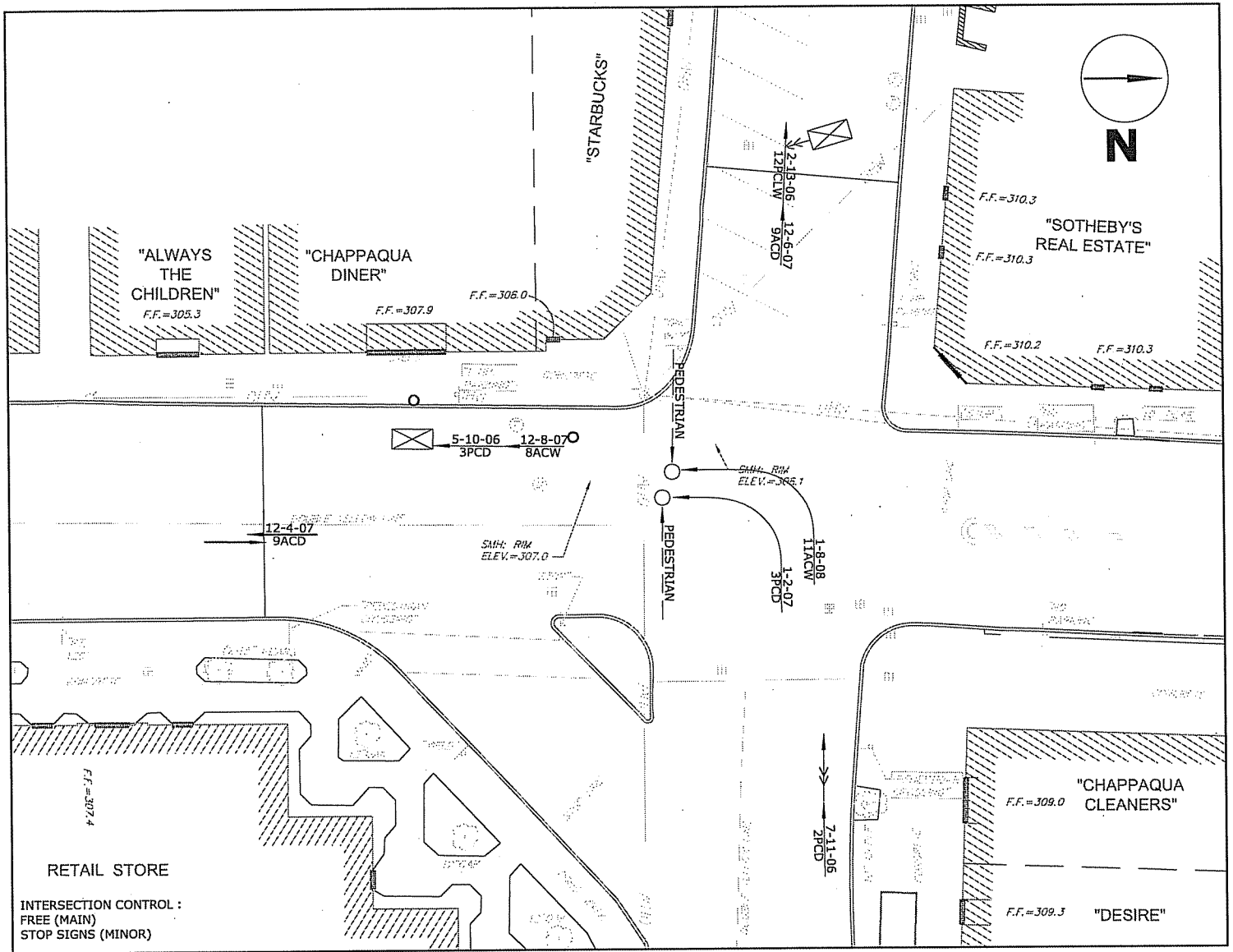
APPENDICES

- 1. APPENDIX A – COLLISION DIAGRAMS & ACCIDENT RATES**
 - 2. APPENDIX B – RECOMMENDED IMPROVEMENT DESIGNS
WITH TURNING MOVEMENT**
 - 3. APPENDIX C – STOP AND SIGNAL WARRANTS**
 - 4. APPENDIX D – SYNCRHO AND SIMTRAFFIC REPORTS**
 - 5. APPENDIX E – POLICE “MV-104” ACCIDENT REPORTS**
 - 6. APPENDIX F – TRAFFIC AND PEDESTRIAN VOLUME DATA**
-

APPENDIX “A”

COLLISION DIAGRAMS & ACCIDENT RATES

- ◆ South Greeley Avenue and King Street
 - ◆ South Greeley Avenue and Quaker Avenue (Northern Leg)
 - ◆ South Greeley Avenue and Quaker Avenue (Southern Leg)
 - ◆ South Greeley Avenue and Woodburn Avenue
 - ◆ South Greeley Avenue and Washington Avenue
-



WEATHER

	%	
CLEAR	7	87
CLOUDY	1	13
FOG	0	
RAIN	0	
SLEET	0	
SNOW	0	
A = A.M.	P = P.M.	
D = DRY	W = WET	
I = ICE	F = FOG	
C = CLEAR	R = RAIN	
CL = CLOUDY	S = SNOW	
M = MUD	SL = SLEET	

ROADWAY SURFACE

	%	
DRY	5	63
WET	3	37
SNOW	0	
ICE	0	

LIGHT CONDITIONS

	%	
DAY	8	100
DUSK/DAWN	0	
DARK	0	

ACCIDENT SEVERITY

FATALITY	0
PERSONAL INJURY	2
PROPERTY DAMAGE	6
NON - REPORTABLE	0

TOTAL ACCIDENTS

8

ROAD LIGHTED

YES / NO

Y

TYPE OF ACCIDENT

INTERSECTION		
SIDE SWIPE		1
REAR END		
HEAD ON		
SKIDDING		
OVERTURN		
FIXED OBJECT		
BACKING		1
PARKING		2
PARKED		2
PEDESTRIAN		2

COLLISION DIAGRAM

SOURCE: MV104 ACC. REPORTS

ROAD: SO. GREELEY AVE. @ RT. 120 (KING ST.)

MUNICIPALITY: NEW CASTLE

WESTCHESTER COUNTY

PREPARED BY: D. SMYTH

C.R.: 79

FROM: NA

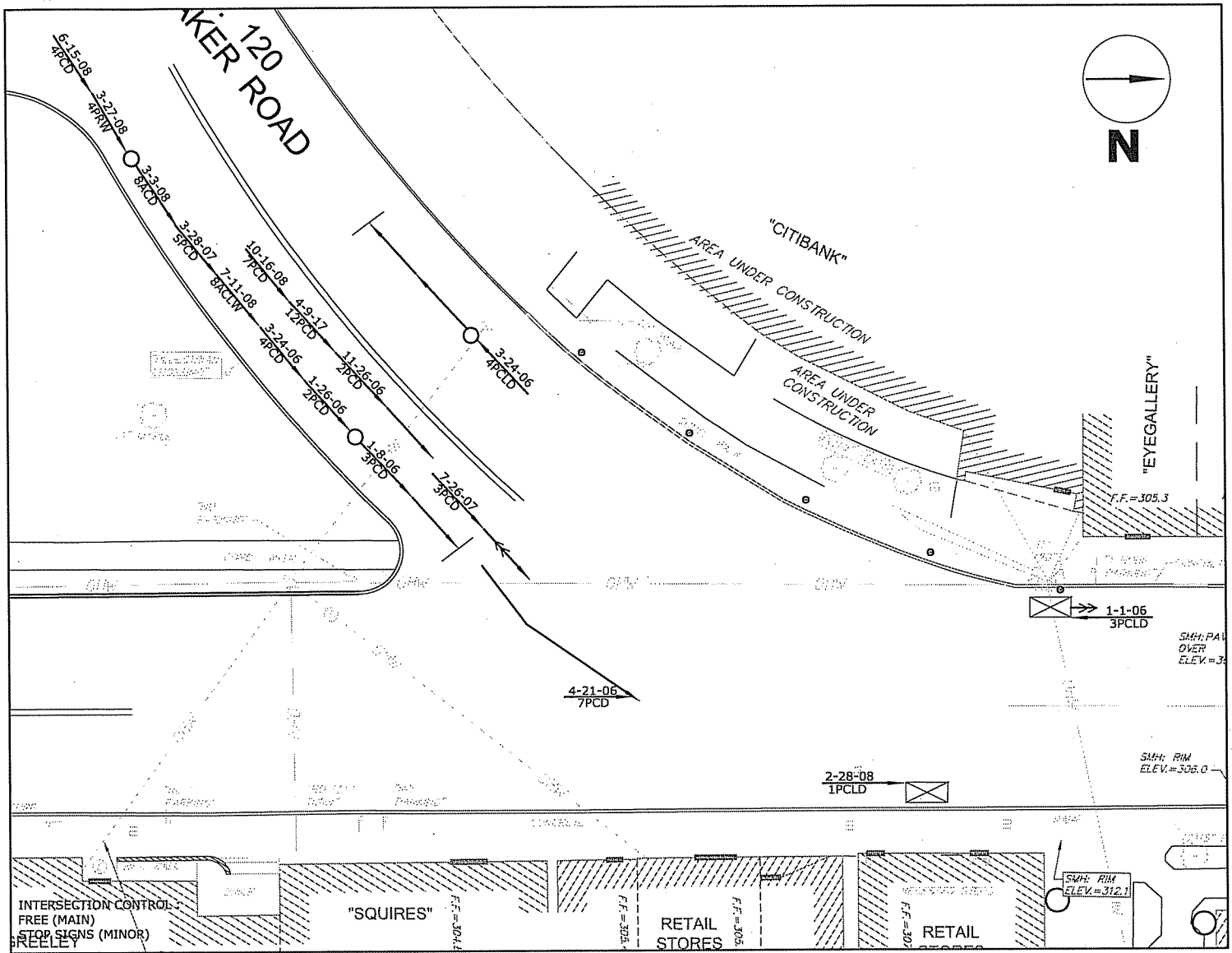
TO: NA

DEPARTMENT OF PUBLIC WORKS

DATE: 5/11/09

TOTAL: 8

TRAFFIC ENGINEERING



WEATHER

	%	
CLEAR	11	69
CLOUDY	4	25
FOG	0	
RAIN	1	6
SLEET	0	
SNOW	0	
A = A.M.	P = P.M.	
D = DRY	W = WET	
I = ICE	F = FOG	
C = CLEAR	R = RAIN	
CL = CLOUDY	S = SNOW	
M = MUD	SL = SLEET	

ROADWAY SURFACE

	%	
DRY	14	87
WET	2	13
SNOW	0	
ICE	0	

LIGHT CONDITIONS

	%	
DAY	14	88
DUSK/DAWN	1	6
DARK	1	6

ACCIDENT SEVERITY

FATALITY	0
PERSONAL INJURY	2
PROPERTY DAMAGE	14
NON - REPORTABLE	0

TOTAL ACCIDENTS 16

ROAD LIGHTED

YES / NO

Y

TYPE OF ACCIDENT

INTERSECTION	1
SIDE SWIPE	
REAR END	12
HEAD ON	
SKIDDING	
OVERTURN	
FIXED OBJECT	
BACKING	1
PARKING	1
PARKED	1
PEDESTRIAN	

COLLISION DIAGRAM

SOURCE: MV104 ACC. REPORTS

ROAD: SO. GREELEY AVE. @ RT. 120 (NORTH)

MUNICIPALITY: NEW CASTLE

WESTCHESTER COUNTY

PREPARED BY: D. SMYTH

C.R.: 79

FROM: NA

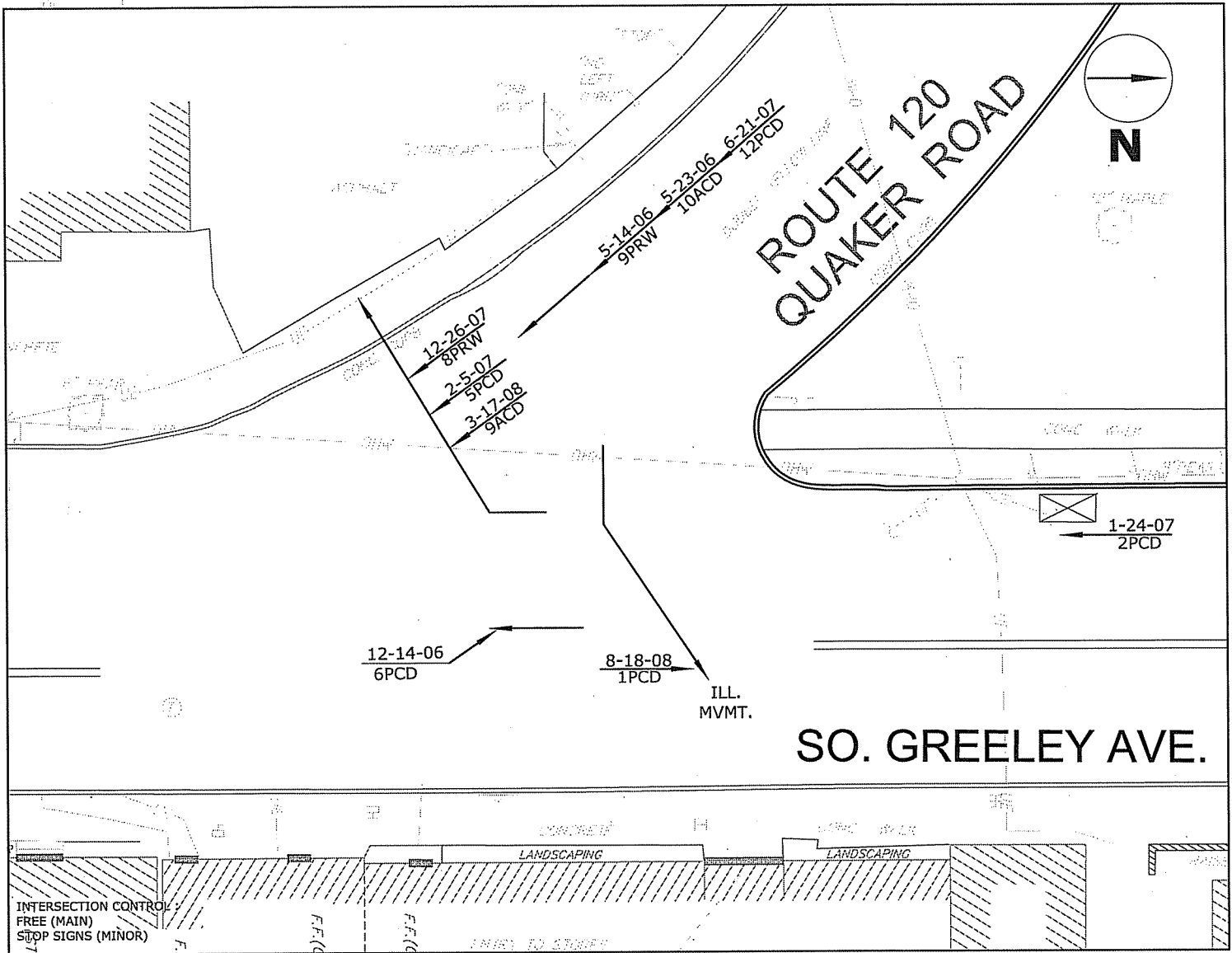
TO: NA

DATE: 5/11/09

TOTAL: 16

DEPARTMENT OF PUBLIC WORKS

TRAFFIC ENGINEERING



WEATHER

CLEAR	7	78
CLOUDY	2	22
FOG	0	
RAIN	0	
SLEET	0	
SNOW	0	
A = A.M.	P = P.M.	
D = DRY	W = WET	
I = ICE	F = FOG	
C = CLEAR	R = RAIN	
CL = CLOUDY	S = SNOW	
M = MUD	SL = SLEET	

ROADWAY SURFACE

DRY	7	78
WET	2	22
SNOW	0	
ICE	0	

LIGHT CONDITIONS

DAY	5	56
DUSK/DAWN	1	11
DARK	3	33

ACCIDENT SEVERITY

FATALITY	0
PERSONAL INJURY	0
PROPERTY DAMAGE	9
NON - REPORTABLE	0

TOTAL ACCIDENTS

9

ROAD LIGHTED

YES / NO

Y

TYPE OF ACCIDENT

INTERSECTION	5
SIDE SWIPE	
REAR END	3
HEAD ON	
SKIDDING	
OVERTURN	
FIXED OBJECT	
BACKING	
PARKING	
PARKED	
PEDESTRIAN	1

COLLISION DIAGRAM

SOURCE: MV104 ACC. REPORTS

ROAD: SO. GREELEY AVE. @ RT. 120 (SOUTH)

MUNICIPALITY: NEW CASTLE

WESTCHESTER COUNTY

PREPARED BY: D. SMYTH

C.R.: 79

FROM: NA

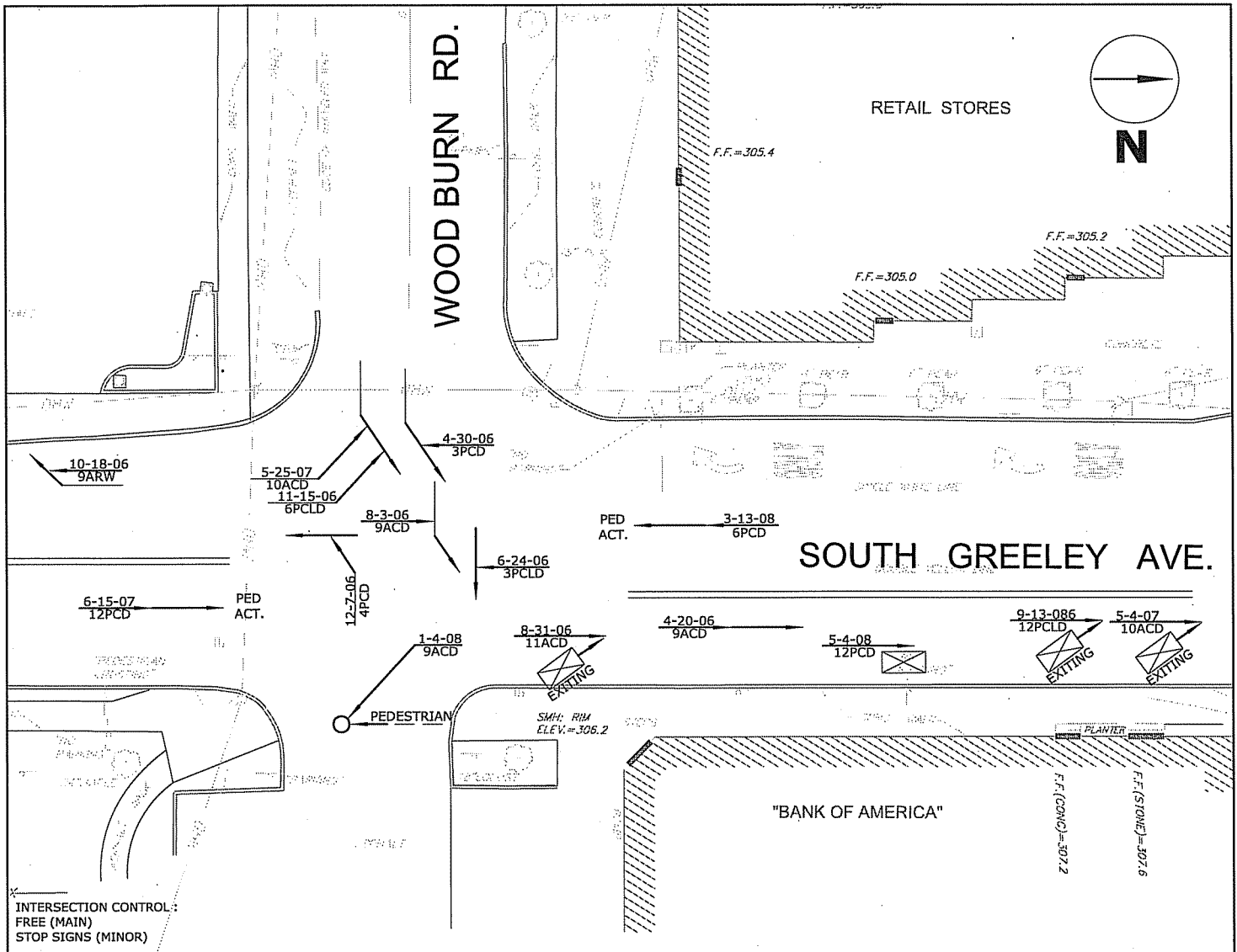
TO: NA

DEPARTMENT OF PUBLIC WORKS

DATE: 5/11/09

TOTAL: 9

TRAFFIC ENGINEERING



WEATHER

	%	
CLEAR	11	73
CLOUDY	3	20
FOG	0	/
RAIN	1	7
SLEET	0	/
SNOW	0	/
A = A.M.	P = P.M.	
D = DRY	W = WET	
I = ICE	F = FOG	
C = CLEAR	R = RAIN	
CL = CLOUDY	S = SNOW	
M = MUD	SL = SLEET	

ROADWAY SURFACE

	%	
DRY	14	93
WET	1	7
SNOW	0	/
ICE	0	/

LIGHT CONDITIONS

	%	
DAY	12	80
DUSK/DAWN	1	7
DARK	2	13

ACCIDENT SEVERITY

FATALITY	0
PERSONAL INJURY	1
PROPERTY DAMAGE	14
NON - REPORTABLE	0

TOTAL ACCIDENTS

15

ROAD LIGHTED

YES / NO

☐

TYPE OF ACCIDENT

INTERSECTION	6
SIDE SWIPE	1
REAR END	4
HEAD ON	/
SKIDDING	/
OVERTURN	/
FIXED OBJECT	/
BACKING	/
PARKING	3
PARKED	1
PEDESTRIAN	1

COLLISION DIAGRAM

SOURCE: MV104 ACC. REPORTS

ROAD: SOUTH GREELEY AVE.

MUNICIPALITY: NEW CASTLE

WESTCHESTER COUNTY

PREPARED BY: D. SMYTH

C.R.: 79

FROM: NA

TO: NA

DEPARTMENT OF PUBLIC WORKS

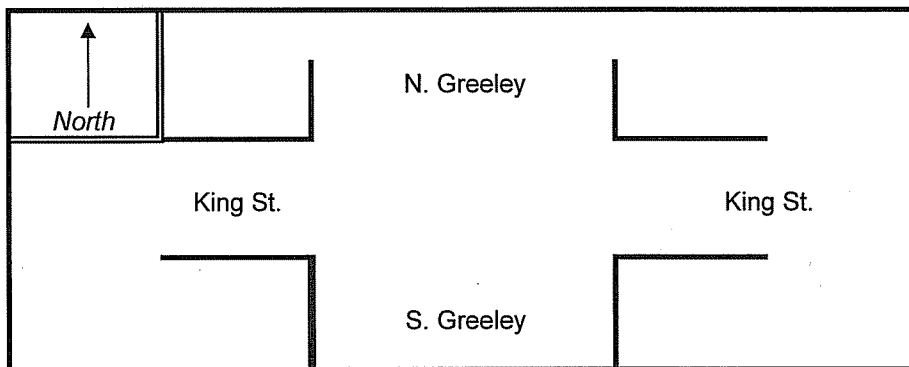
DATE: 5/5/09

TOTAL: 15

TRAFFIC ENGINEERING

CITY/TOWN : NEW CASTLECOUNT DATE : Mar-09DISTRICT : WCUNSIGNALIZED : ☒SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : KING STREET (RT. 120)MINOR STREET(S) : NORTH GREELEY AVENUESOUTH GREELEY AVENUEINTERSECTION
DIAGRAM
(Label Approaches)

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	WB	NB	EB	SB		
VOLUMES (AM/PM) :	384	507	0	90		981

" K " FACTOR :

0.100

APPROACH ADT* :

9,810

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES :

2# OF
YEARS :3AVERAGE # OF
CRASHES (A) :0.67CRASH RATE CALCULATION

$$\text{RATE} = \frac{(A * 1,000,000)}{(ADT * 365)}$$

ALL ACCIDENTS (MEV)

0.19

STATE AVG.**:

0.09

LEFT TURN (MEV):

00.00

STATE AVG.**:

0.02

REAR END (MEV):

00.00

STATE AVG.**:

0.04

Comments :

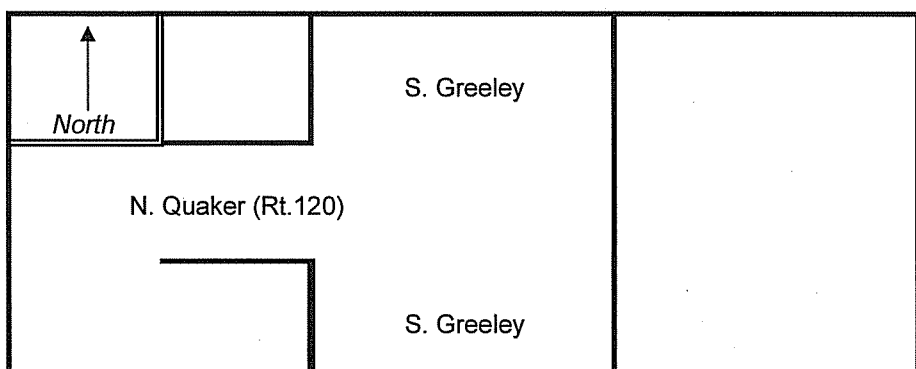
Project Title & Date:

*2009 Traffic Volume Counts

** NYSDOT Accident Data (1/1/06 to 12/31/07)

CITY/TOWN : NEW CASTLE COUNT DATE : Mar-09DISTRICT : WC UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : QUAKER ROAD (RT. 120) - NORTH LEGMINOR STREET(S) : SOUTH GREELEY AVENUEINTERSECTION
DIAGRAM
(Label Approaches)

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	WB	NB	EB	SB		
VOLUMES (AM/PM) :	375	126	0	382		883

" K " FACTOR : 0.100 APPROACH ADT* : 8,830 ADT = TOTAL VOL/"K" FACT.TOTAL # OF CRASHES : 16 # OF YEARS : 3 AVERAGE # OF CRASHES (A) : 5.33CRASH RATE CALCULATION

$$\text{RATE} = \frac{(A * 1,000,000)}{(ADT * 365)}$$

ALL ACCIDENTS (MEV) 1.65
 STATE AVG.** 0.09

LEFT TURN (MEV): 1 0.10
 STATE AVG.** 0.02

REAR END (MEV): 12 1.24
 STATE AVG.** 0.04

Comments : _____

Project Title & Date: _____

*2009 Traffic Volume Counts

** NYSDOT Accident Data (1/1/06 to 12/31/07)

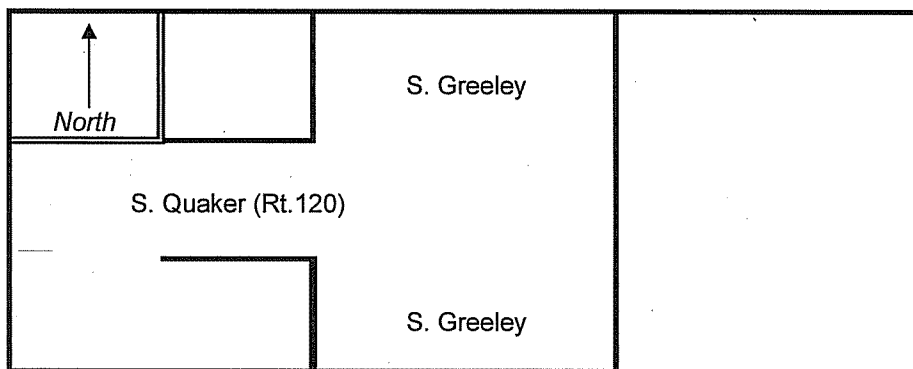
CITY/TOWN : NEW CASTLECOUNT DATE : Mar-09DISTRICT : WC

UNSIGNALIZED :

☒

SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : QUAKER ROAD (RT. 120) - SOUTH LEGMINOR STREET(S) : SOUTH GREELEY AVENUEINTERSECTION
DIAGRAM
(Label Approaches)

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	WB	NB	EB	SB		
VOLUMES (AM/PM) :	548	255	0	143		946

" K " FACTOR :

0.100

APPROACH ADT* :

9,460

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES :

8# OF
YEARS :3AVERAGE # OF
CRASHES (A) :2.67CRASH RATE CALCULATION

$$\text{RATE} = \frac{(A * 1,000,000)}{(ADT * 365)}$$

ALL ACCIDENTS (MEV)

0.77

STATE AVG.**:

0.09

LEFT TURN (MEV):

50.48

STATE AVG.**:

0.01

REAR END (MEV):

30.29

STATE AVG.**:

0.03

Comments : Driveway @ intersection responsible for three (3 LT) accidents was closed.
(Reduces Accident Rate by 0.29)

Project Title & Date: _____

*2009 Traffic Volume Counts

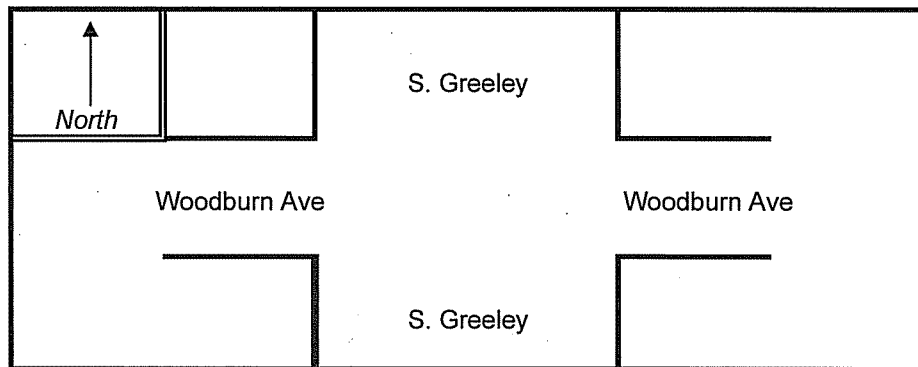
** NYSDOT Accident Data (1/1/06 to 12/31/07)

CITY/TOWN : NEW CASTLECOUNT DATE : Mar-09DISTRICT : WCUNSIGNALIZED : ☒SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : SOUTH GREELEY AVENUEMINOR STREET(S) : WOODBURN AVENUE

**INTERSECTION
DIAGRAM**
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	WB	NB	EB	SB		
VOLUMES (AM/PM) :	103	292	190	398		983

" K " FACTOR :

0.100

APPROACH ADT* :

9,830

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES :

11# OF
YEARS :3AVERAGE # OF
CRASHES (A) :3.67CRASH RATE CALCULATION

$$\text{RATE} = \frac{(A * 1,000,000)}{(ADT * 365)}$$

ALL ACCIDENTS (MEV)

1.02

STATE AVG.**:

0.17

LEFT TURN (MEV):

50.46

STATE AVG.**:

0.02

REAR END (MEV):

20.19

STATE AVG.**:

0.04

Comments :

Project Title & Date:

*2009 Traffic Volume Counts

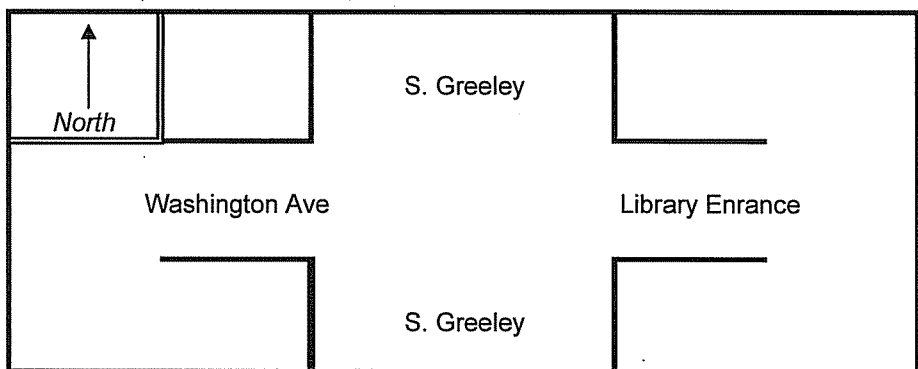
** NYSDOT Accident Data (1/1/06 to 12/31/07)

CITY/TOWN : NEW CASTLE COUNT DATE : Mar-09
 DISTRICT : WC UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : SOUTH GREELEY AVENUE
 MINOR STREET(S) : WASHINGTON AVENUE

INTERSECTION
 DIAGRAM
 (Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	WB	NB	EB	SB		
VOLUMES (AM/PM) :	61	162	193	316		732

" K " FACTOR : 0.100 APPROACH ADT* : 7,320 ADT = TOTAL VOL/"K" FACT.
 TOTAL # OF CRASHES : 3 # OF YEARS : 3 AVERAGE # OF CRASHES (A) : 1.00

CRASH RATE CALCULATION

$$\text{RATE} = \frac{(A * 1,000,000)}{(ADT * 365)}$$

ALL ACCIDENTS (MEV) 0.37
 STATE AVG.** 0.17

LEFT TURN (MEV): 2 0.25
 STATE AVG.** 0.02

REAR END (MEV): 1 0.12
 STATE AVG.** 0.04

Comments : _____

Project Title & Date: _____

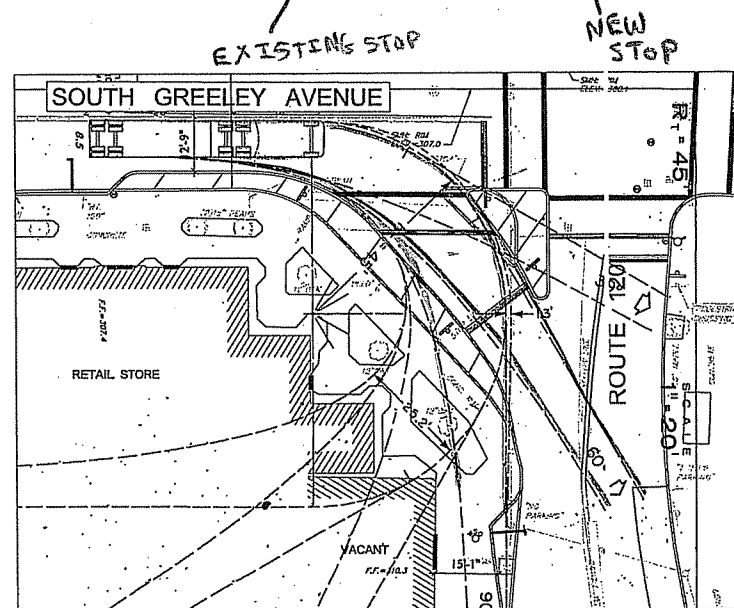
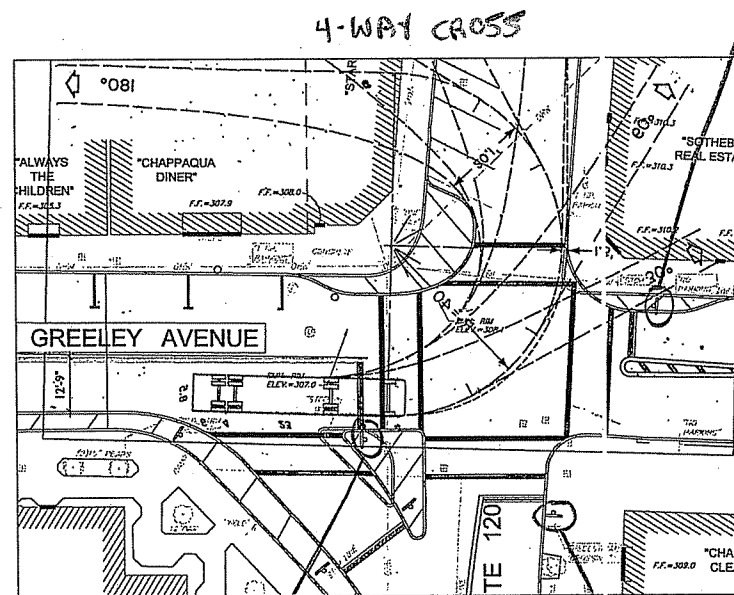
*2009 Traffic Volume Counts

** NYSDOT Accident Data (1/1/06 to 12/31/07)

APPENDIX “B”

RECOMMENDED IMPROVEMENT DESIGNS WITH TURNING MOVEMENTS

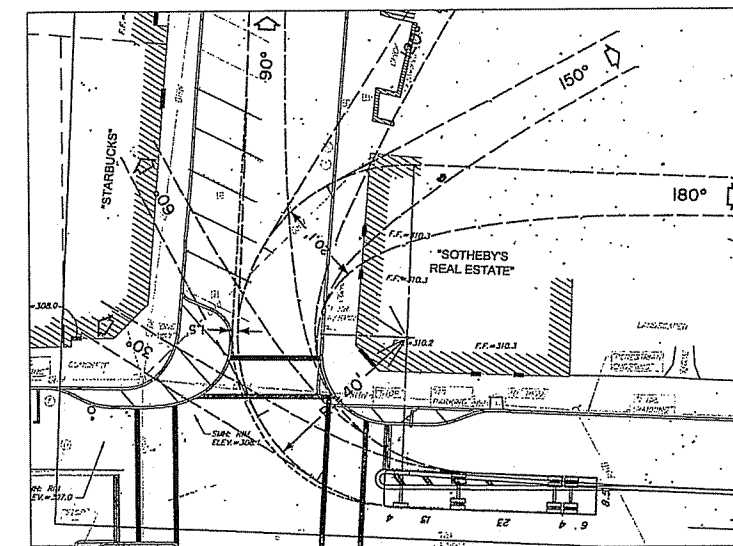
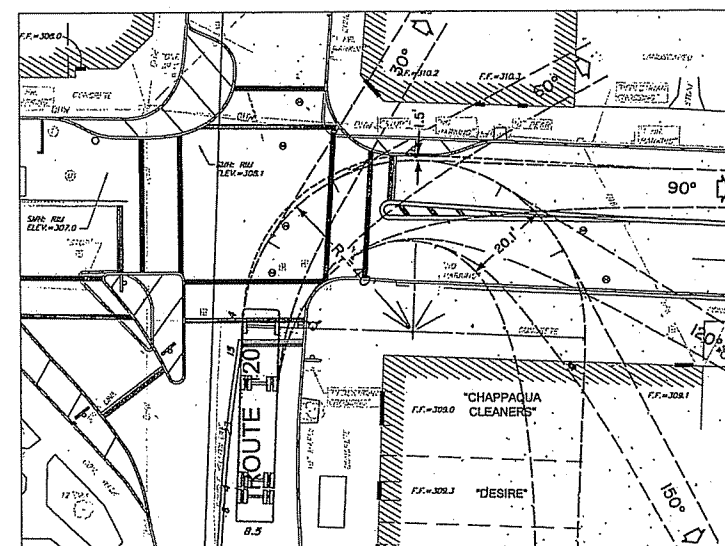
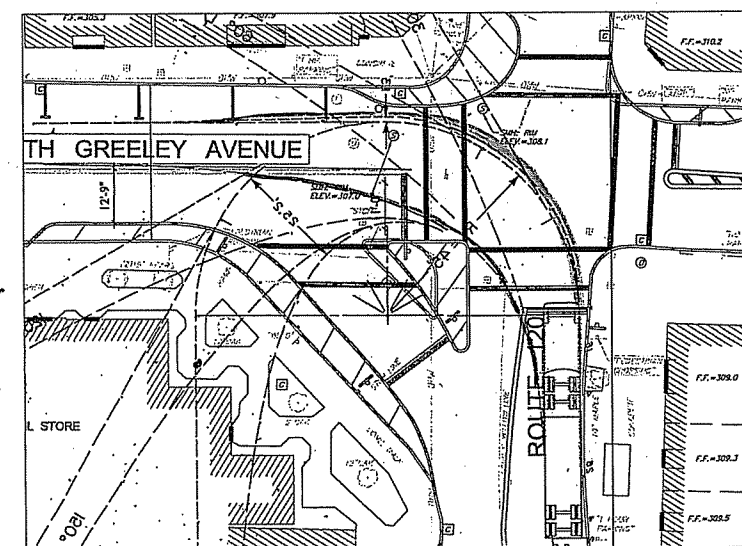
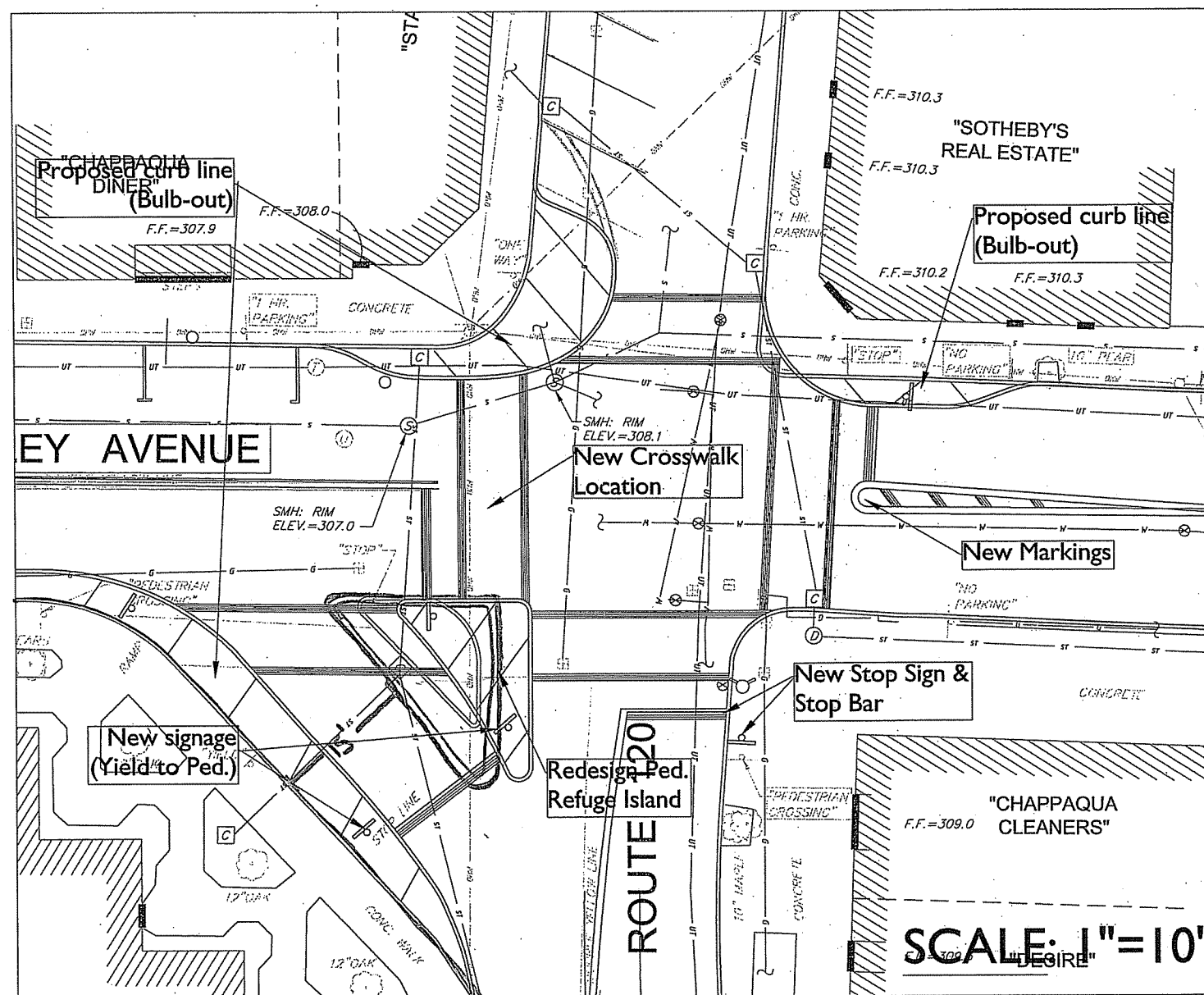
- ◆ South Greeley Avenue and King Street
 - ◆ South Greeley Avenue and Quaker Avenue (Both Legs)
 - ◆ South Greeley Avenue and Woodburn Avenue
 - ◆ South Greeley Avenue and Bell Middle School
 - ◆ South Greeley Avenue and Washington Avenue
-



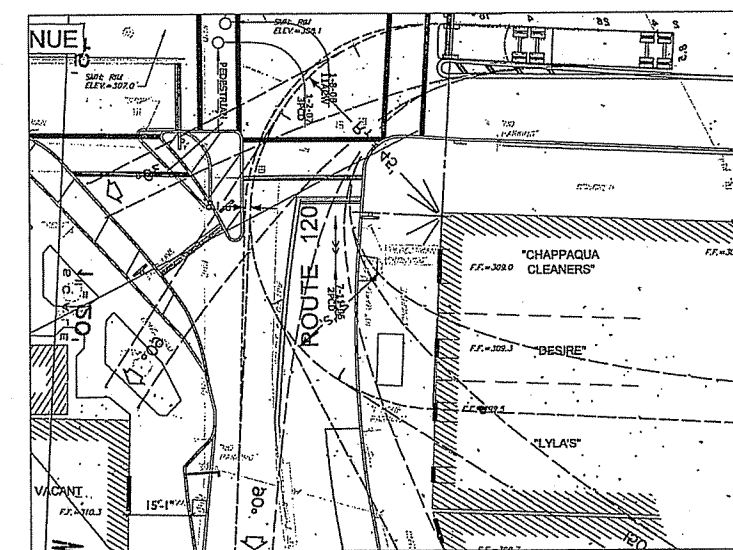
* TURNING RADIUS IS
TIGHT

* LT MOVEMENT CLIPS
PARALLEL SPOT
AND RIDES CURB

EXISTING STOP



RT NOT POSSIBLE

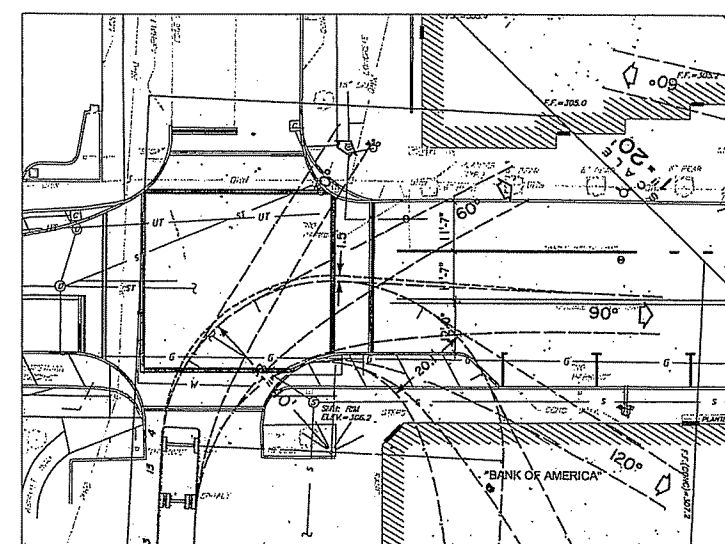
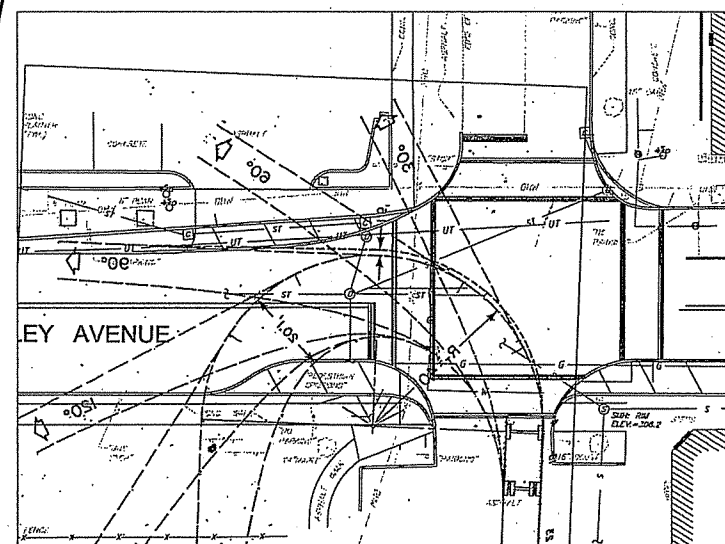
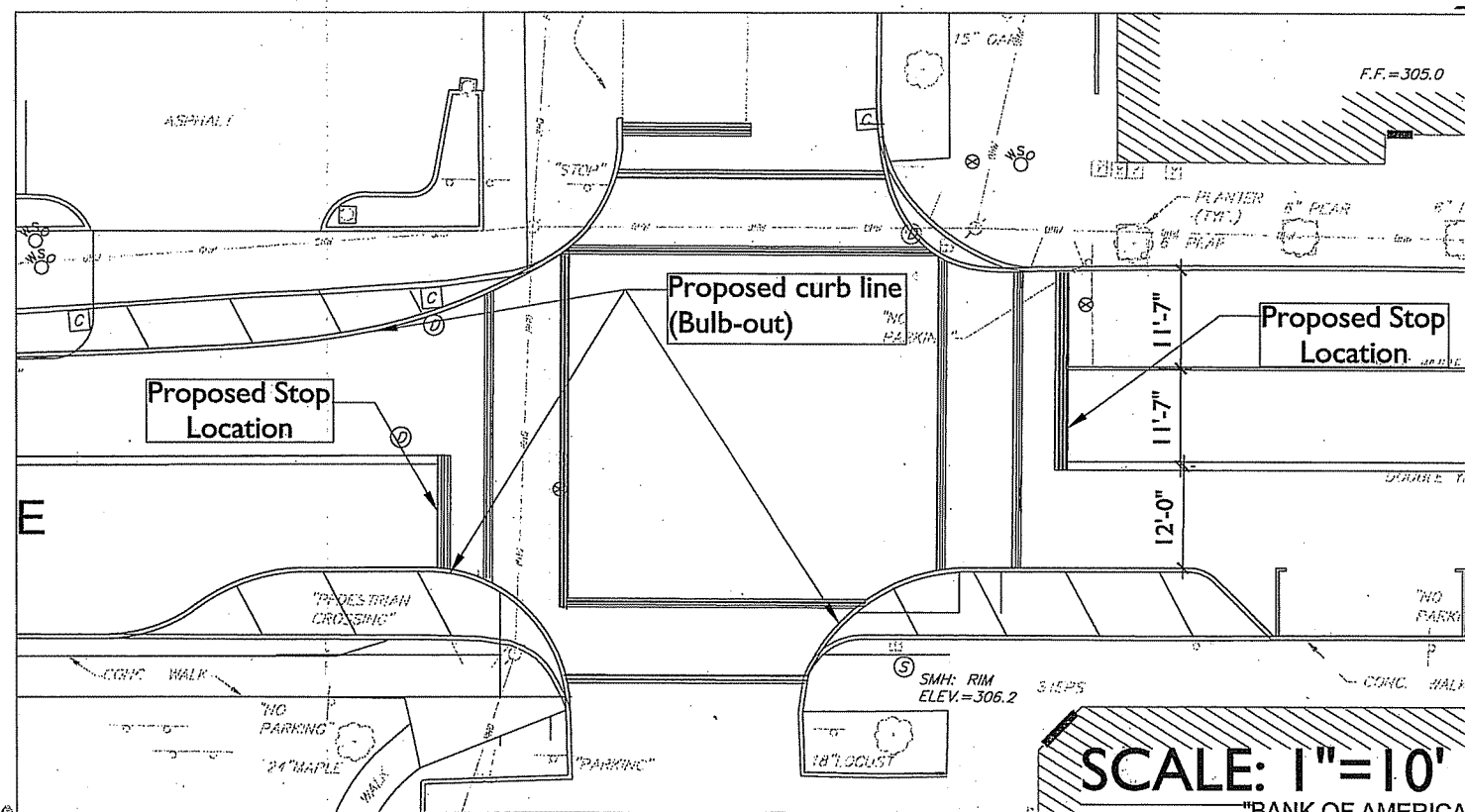
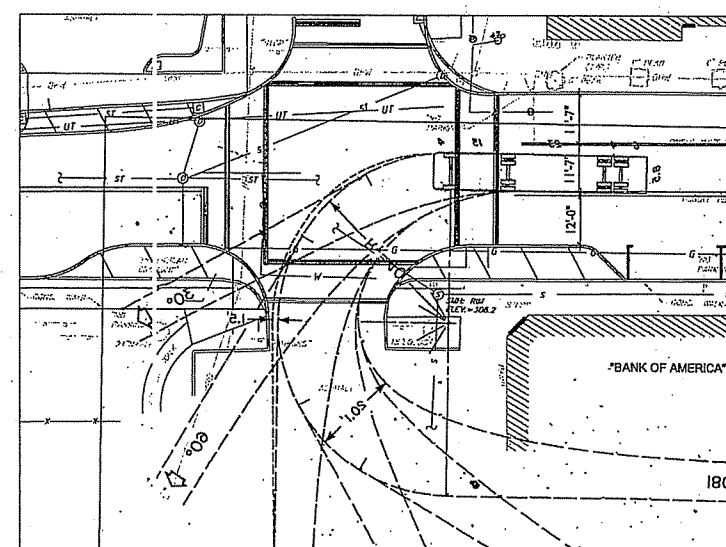
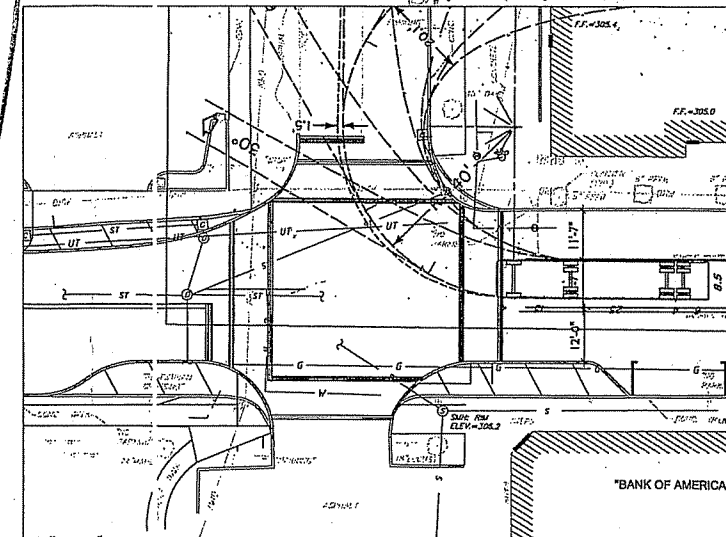
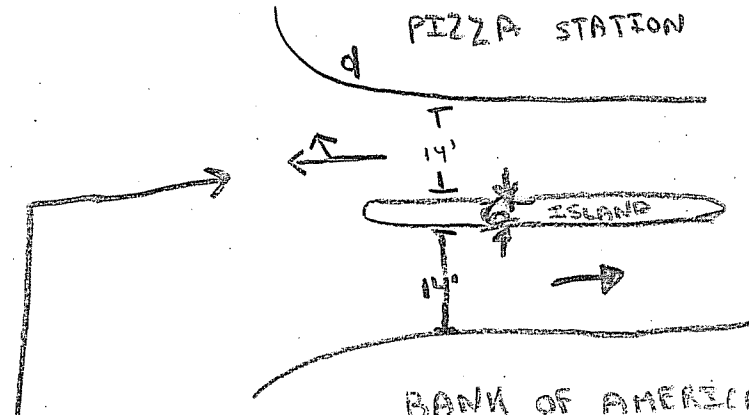
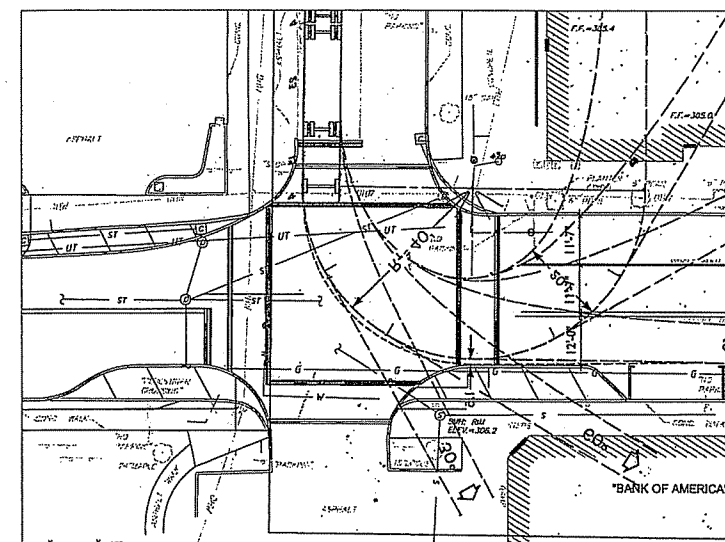
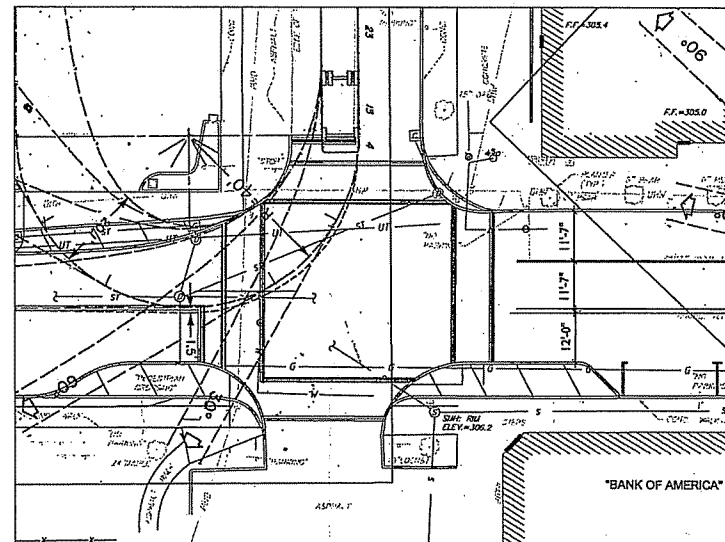
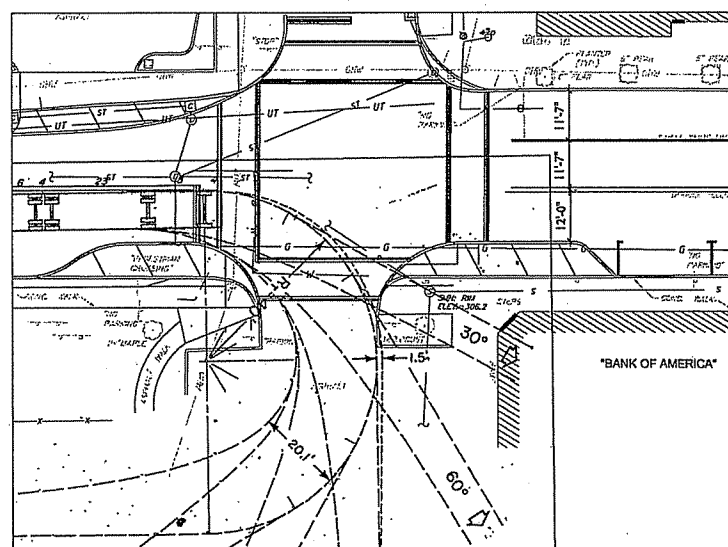
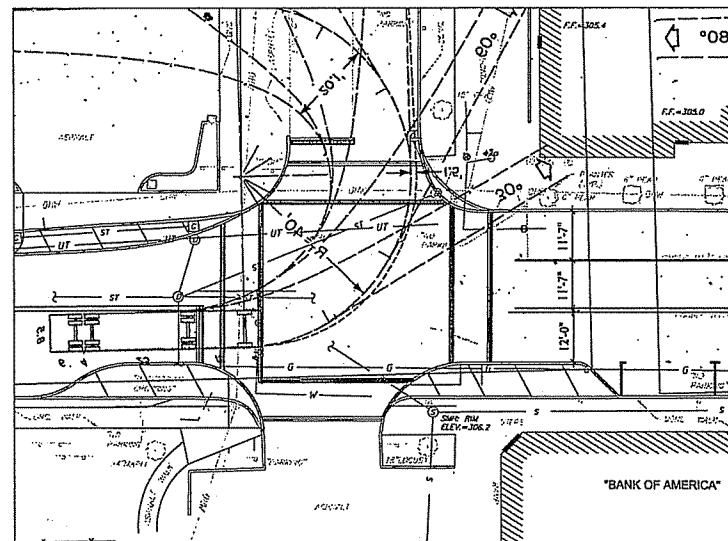


LT NOT POSSIBLE

PHF - 76 HV

South Greeley &
Rt. 120 (King Street)

SCALE: 1"=20' OR AS NOTED

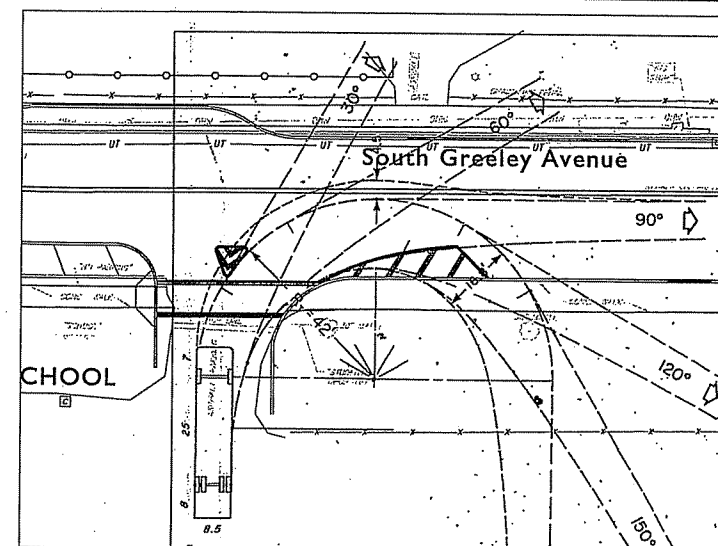
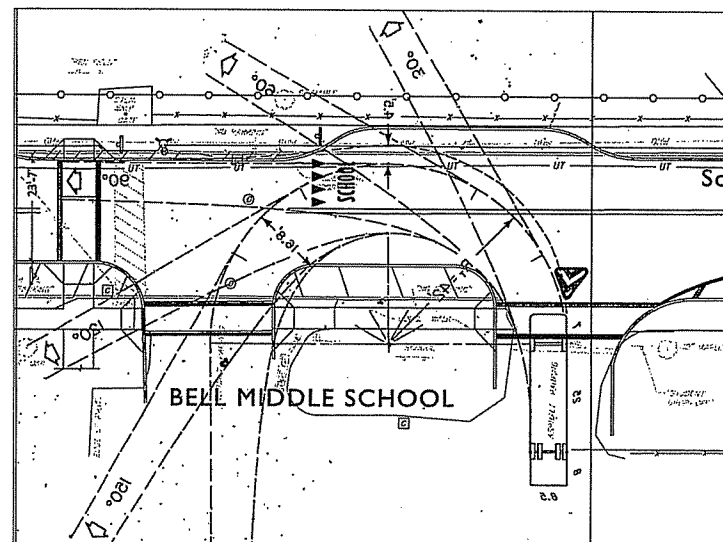
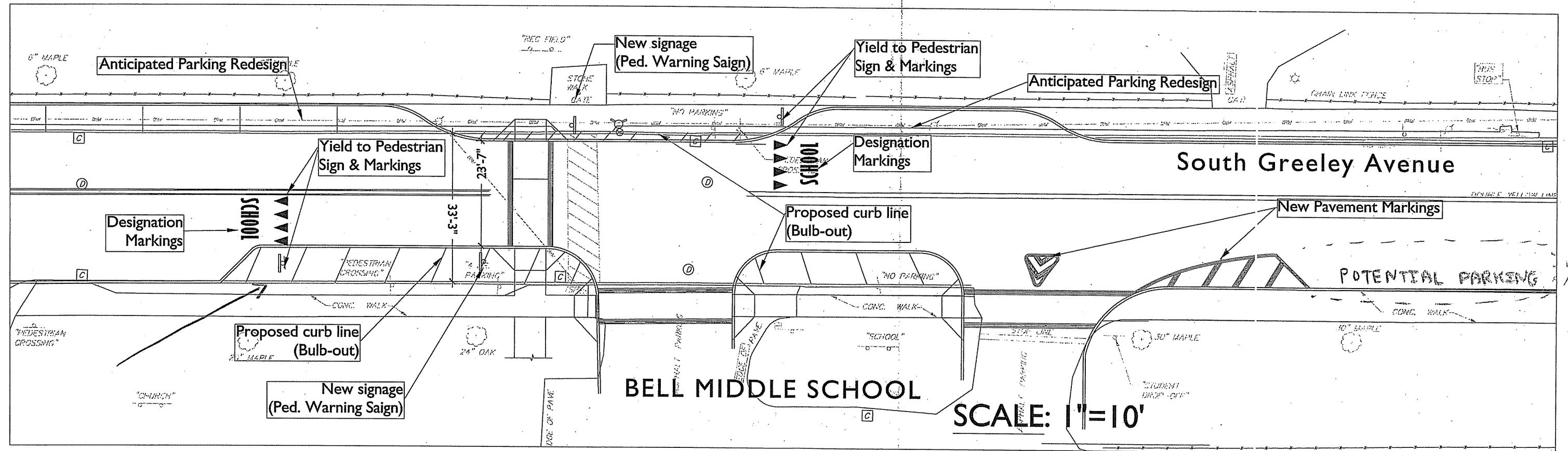
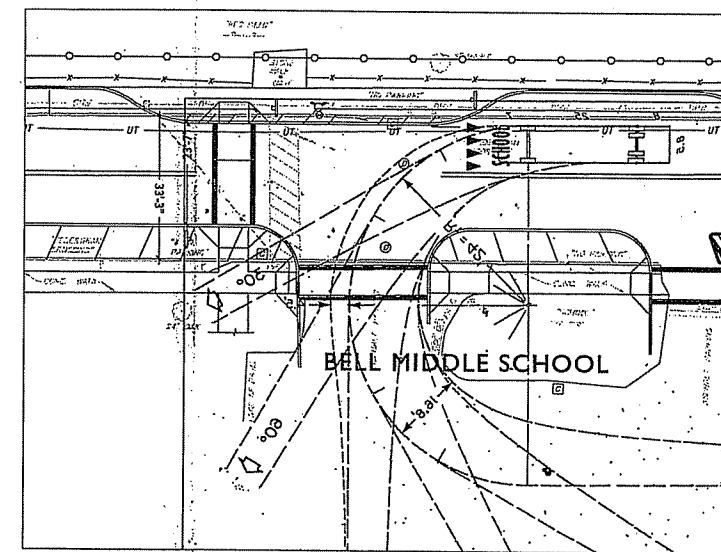
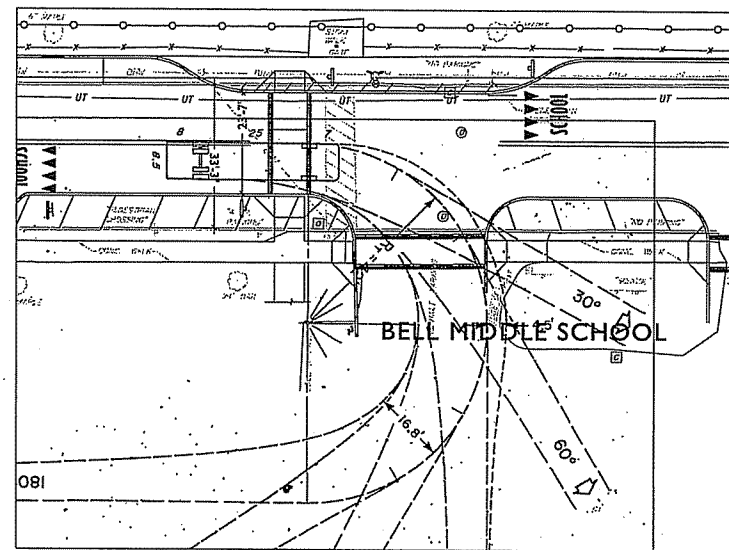


* WITH BUMP OUT RT HINDERED.

WITH ALL WAY
STOP NO LONGER A NEED FOR (2)
11'-7" LANES. CREATE (1) LANE
14'-0" WIDE AND INCREASE
SIDEWALK WIDTH

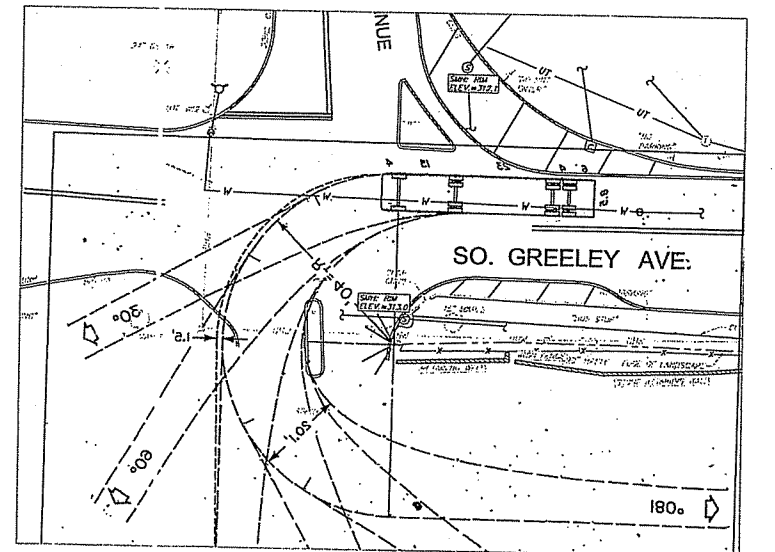
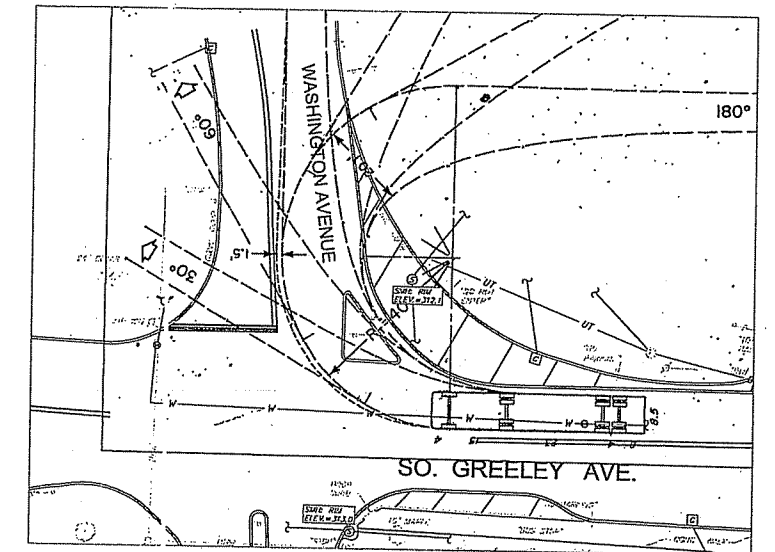
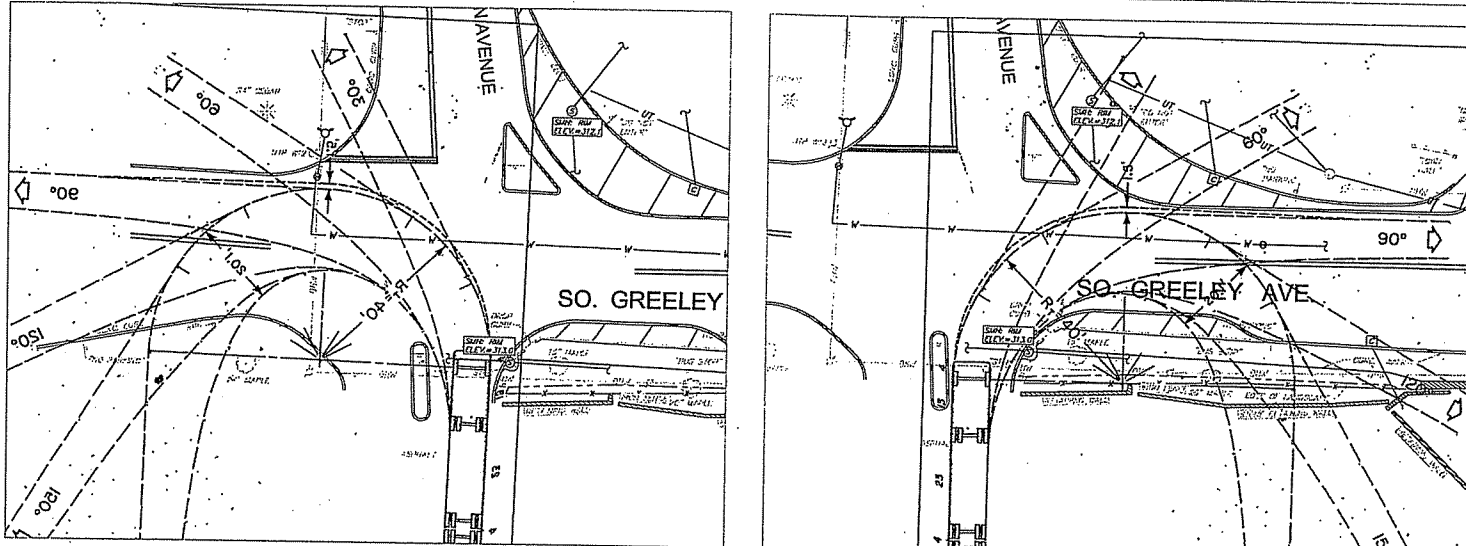
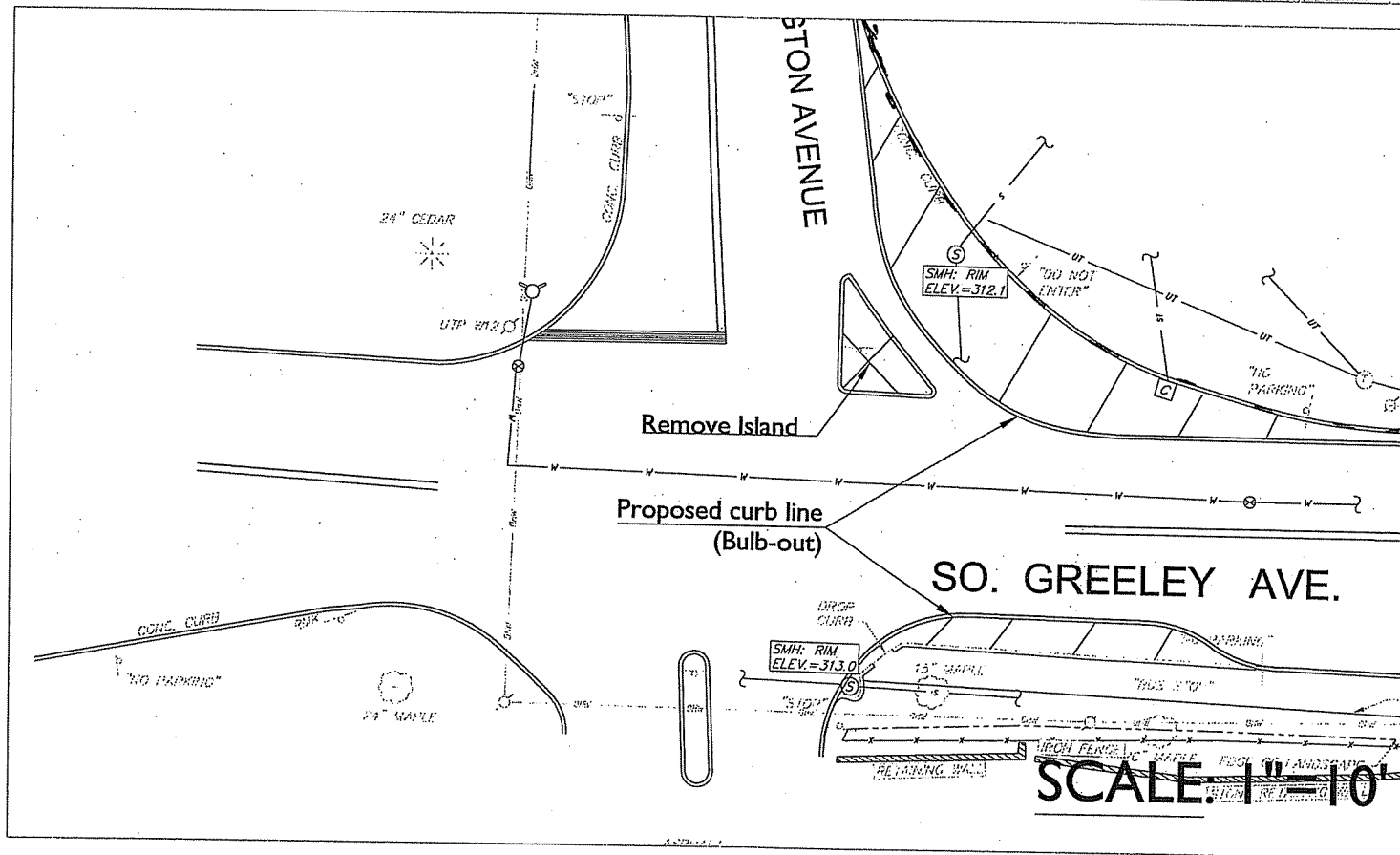
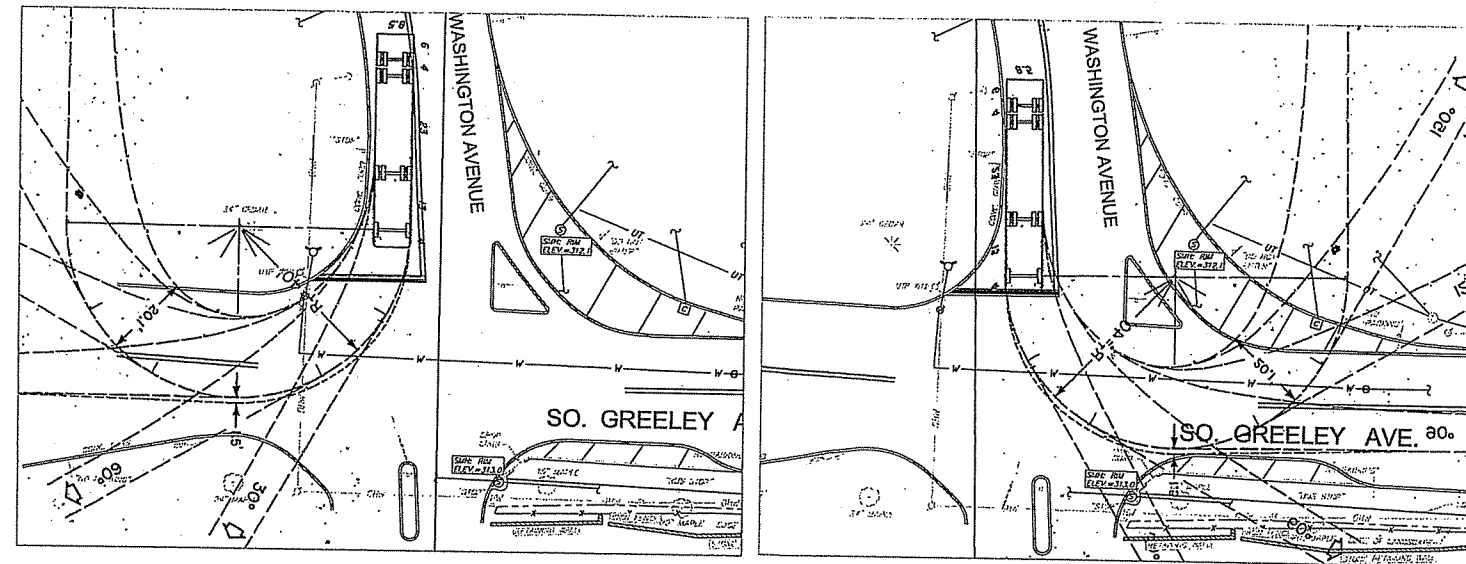
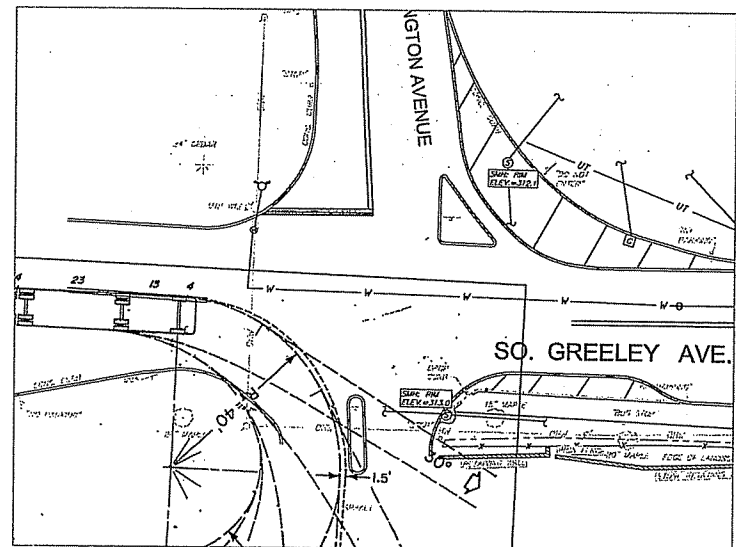
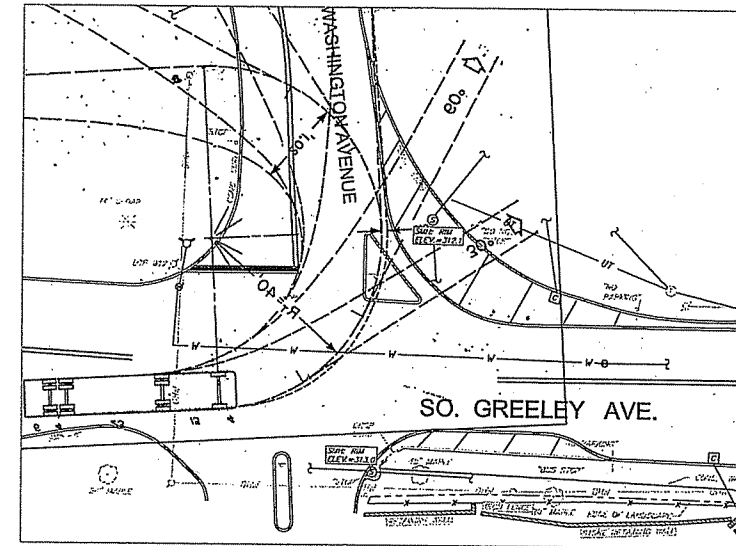
South Greeley &
Woodburn Avenue

SCALE: 1"=20' OR AS NOTED



South Greeley at Bell Middle School

SCALE: 1"=20' OR AS NOTED



South Greeley & Washington Avenue

SCALE: 1"=20' OR AS NOTED

APPENDIX “C”

STOP AND SIGNAL WARRANTS

- ◆ South Greeley Avenue and King Street Stop Warrant
 - ◆ South Greeley Avenue and Woodburn Avenue Stop Warrant
 - ◆ South Greeley Avenue and Woodburn Avenue Signal Warrant
-

ALL WAY STOP WARRANT - South Greeley Avenue @ King Street

The following criteria should be considered in the engineering study for a multiway STOP sign installation:

A. Where traffic control signals are justified, the multiway stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

B. A crash problem, as indicated by 5 or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation. Such crashes include right- and left-turn collisions as well as right-angle collisions.

C. Minimum volumes:

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and

2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traf

3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the above values.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values (240vph on Major Street & 160 vph on Minor Street). Criterion C.3 is excluded from this condition.

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to reasonably safely negotiate the intersection unless conflicting cross traffic is also required to stop; and

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multiway stop control would improve traffic operational characteristics of the intersection.

This location does meet this warrant for All-Way Stop condition for 8 hours of an average day.

Date	Time	NB Greeley	SB Greeley	WB King Street	EB King Street	Main Line Total	ped Minor Street	Side Street Total	Main Line Total	Side Street Total
3/25/2009	10:00 PM					0		0		
	11:00 PM					0		0		
	12:00:00 AM					0		0		
	1:00 AM					0		0		
	2:00 AM					0		0		
	3:00 AM					0		0		
	4:00 AM					0		0		
	5:00 AM					0		0		
	6:00 AM					0		0	<u>8 Hr</u>	<u>8 Hr</u>
	7:00 AM	476	68	389	0	544	59	127	544	127
	8:00 AM	535	91	371	0	626	44	135	626	135
	9:00 AM	546	83	199	0	629	0	83	629	83
	10:00 AM	0						0	0	0
	11:00 AM	0						0	0	0
	12:00 PM	0						0	0	0
	1:00 PM	0						0	0	0
	2:00 PM	915	158	366	0	1073		158	1073	158
	3:00 PM	968	138	373	0	1106	71	209	1106	209
	4:00 PM	956	139	376	0	1095	85	224	1095	224
	5:00 PM	952	145	402	0	1097	43	188	5073	936
	6:00 PM	0			0	0		0	6009	
	7:00 PM	0				0		0		
	8:00 PM	0				0		0		
	9:00 PM	0				0		0		
	10:00 PM	0				0		0		
	11:00 PM	0				0		0		

ALL WAY STOP WARRANT - South Greeley Avenue @ Woodburn Avenue

The following criteria should be considered in the engineering study for a multiway STOP sign installation:

A. Where traffic control signals are justified, the multiway stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

B. A crash problem, as indicated by 5 or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation. Such crashes include right- and left-turn collisions as well as right-angle collisions.

C. Minimum volumes:

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and

2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, but

3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the above values.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values (240vph on Major Street & 160 vph on Minor Street). Criterion C.3 is excluded from this condition.

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to reasonably safely negotiate the intersection unless conflicting cross traffic is also required to stop; and

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multiway stop control would improve traffic operational characteristics of the intersection.

This location does meet this warrant for All-Way Stop condition for 8 hours of an average day.

Date	Time	NB Greeley	SB Greeley	WB Woodburn	EB Woodburn	Main Line Total	Side Street Total	Main Line Total	Side Street Total
3/25/2009	10:00 PM					0	0		
	11:00 PM					0	0		
	12:30:00 AM	23	5			28	0		
	1:30 AM	9	7			16	0		
	2:30 AM	2	2			4	0		
	3:30 AM	3	2			5	0		
	4:30 AM	10	6			16	0		
	5:30 AM	18	9			27	0		
	6:30 AM	83	55			138	0	<u>8 Hr</u>	<u>8 Hr</u>
	7:30 AM	176	600	18	151	776	169	776	169
	8:30 AM	171	487	54	122	658	176	658	176
	9:30 AM	231	383	59	129	614	188	614	188
	10:30 AM	215	300	77	131	515	208	515	208
	11:30 AM	259	311	73	129	570	202	570	202
	12:30 PM	250	300	83	148	550	231	550	231
	1:30 PM	244	321	73	142	565	215	565	215
	2:30 PM	279	328	124	157	607	281	607	281
	3:30 PM	240	302	63	128	542	191	542	191
	4:30 PM	203	301	53	163	504	216	504	216
	5:30 PM	335	243			578	0	5901	2077
	6:30 PM	376	220			596	0	7978	
	7:30 PM	344	190			534	0		
	8:30 PM	225	90			315	0		
	9:30 PM	158	60			218	0		
	10:30 PM	107	48			155	0		
	11:30 PM	27	20			47	0		

**2003 NYSDOT/FEDERAL MUTCD - TRAFFIC SIGNAL WARRANTS
SOUTH GREELEY AVENUE & WOODBURN AVENUE**

WARRANT NO.1 - EIGHT-HOUR VEHICULAR VOLUME

This warrant is satisfied when either of the following two conditions exist for each of any eight hours on an average day:

Condition A* (Minimum Vehicular Volume) - The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 (500vph) exist on the major-street and the higher-volume minor-street (150vph) approaches, respectively, to the intersection; or

Condition B* (Interruption of Continuous Traffic) - The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1(750vph) exist on the major-street and the higher-volume minor-street (75vph) approaches, respectively, to the intersection.

This section of the warrant is satisfied when neither of the above conditions have been satisfied. The combined conditions shall be considered after other alternatives with minor delays and inconvenience to traffic has failed.

This section is satisfied when the combination of the following two conditions exist **independently** for each of any eight hours on an average day:

Combined Conditions A & B** - For a major street's 85% speed less than 40 mph, this condition is satisfied when both 80 percent columns of Condition A in Table 4C-1 (total of both approaches for major street- 400vph) and for higher-volume minor-street (one direction only-120vph) intersection; and when both 80 percent columns of Condition B in Table 4C-1 (total of both approaches for major street-600vph) and for higher-volume minor-street (one direction only-60vph) intersection.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1.....	1.....	500	400	350	280	150	120	105	84
2 or more ...	1.....	600	480	420	336	150	120	105	84
2 or more ...	2 or more ...	600	480	420	336	200	160	140	112
1.....	2 or more ...	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1.....	1.....	750	600	525	420	75	60	53	42
2 or more ...	1.....	900	720	630	504	75	60	53	42
2 or more ...	2 or more ...	900	720	630	504	100	80	70	56
1.....	2 or more ...	750	600	525	420	100	80	70	56

* In applying to Condition A or B, the major and minor street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these eight hours.

** In applying to Combined Condition A & B, the major and minor street volumes shall be for the same 8 hour of each condition; however, the 8 hours satisfied in Condition A shall not be required the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of these eight hours.

This location does not meet this warrant for 8 hours during the length of our study due to insufficient Side and Main Street volumes.

**2003 NYSDOT/FEDERAL MUTCD - TRAFFIC SIGNAL WARRANTS
SOUTH GREELEY AVENUE & WOODBURN AVENUE**

WARRANT NO.2 - FOUR-HOUR VEHICULAR VOLUME

This warrant shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Warrant 2 Graph for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

This location does not meet this warrant for 4 hours during the length of our study due to insufficient side street volumes.

WARRANT NO.3 - PEAK HOUR

This warrant is applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high occupancy vehicle facilities that attract or discharge large numbers of vehicles over a period of time.

This warrant is satisfied when either of the following two categories are met.

Category A: All of the three following conditions exist for the same 1 hour (any four consecutive 15 minute periods) of an average day:

1. The total stopped time delay experienced by traffic on one minor-street approach (one direction only) controlled by a Stop Sign equals or exceeds: 4 vehicle-hours for a one lane approach or 5 vehicle hours for a two lane approach, and
2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and
3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

Category B: The plotted point representing the vehicles per hour plotted point representing the number of vehicles on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume side road approach (one direction only) for any 1 hour (any four consecutive 15-minute periods) of an average day falls above the appropriate curve data.

This location does not meet this warrant due to due to insufficient side street volumes and vehicle delays experienced by motorists.

WARRANT NO.4 - PEDESTRIAN VOLUME

The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that both of the following criteria are met:

1. The pedestrian volume crossing the major street at an intersection or midblock location during an average day is 100 or more for each of any 4 hours or 190 or more during any 1 hour; and
2. There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. Where there is a divided street having a median of sufficient width for pedestrians to wait, the requirement applies separately to each direction of vehicular traffic.

The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.

The criterion for the pedestrain volume crossing the major roadway may be reduced as much as 50% (50 for 4 hours or 85 for any 1 hour) if the average crossing speed is less than 3.5 feet per second.

This warrant is not applicable due to low pedestrian volumes.

**2003 NYSDOT/FEDERAL MUTCD - TRAFFIC SIGNAL WARRANTS
SOUTH GREELEY AVENUE & WOODBURN AVENUE**

WARRANT NO.5 - SCHOOL CROSSING WARRANT

The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period (see Section 7A.03) and there are a minimum of 20 students during the highest crossing hour.

The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.

This warrant is not applicable.

WARRANT NO.6 - COORDINATED TRAFFIC SIGNAL SYSTEM WARRANT

The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:

1. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.
2. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.

This warrant is not applicable.

WARRANT NO.7 - CRASH EXPERIENCE WARRANT

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are

1. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
2. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and
3. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1, or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street (400vph for A & 600vph for B) and the higher-volume minor-street approach (120vph for A & 60vph for B), respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements (20 or greater for each of 4 hours crossing mainline) specified in the Pedestrian Volume warrant. These major street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Five (5) potentially correctable accidents were reported between April 2006 to April 2007 at this intersection. This warrant will be met if adequate trials of alternative traffic safety improvements do not reduce the occurrences of these accidents.

WARRANT NO.8 - ROADWAY NETWORK WARRANT

The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

1. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or
2. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a nonnormal business day (Saturday or Sunday).

This location does not meet this warrant due to insufficient volumes.

WARRANT NO.1 - EIGHT-HOUR VEHICULAR VOLUME

This warrant is satisfied when either of the following two conditions exist for each of any eight hours on an average day:

Condition A* (Minimum Vehicular Volume) - The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 (500vph) exist on the major-street and the higher-volume minor-street (150vph) approaches, respectively, to the intersection; or

Condition B* (Interruption of Continuous Traffic) - The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 (750vph) exist on the major-street and the higher-volume minor-street (75vph) approaches, respectively, to the intersection.

This section of the warrant is satisfied when neither of the above conditions have been satisfied. The combined conditions shall be considered after other alternatives with minor delays and inconvenience to traffic has failed.

This section is satisfied when the combination of the following two conditions exist **independently** for each of any eight hours on an average day:

Combined Conditions A & B** - For a major street's 85% speed less than 40 mph, this condition is satisfied when both 80 percent columns of Condition A in Table 4C-1 (total of both approaches for major street - 400vph) and for higher-volume minor-street (one direction only - 120vph) intersection, and when both 80 percent columns of Condition B in Table 4C-1 (total of both approaches for major street - 600vph) and for higher-volume minor-street (one direction only - 60vph) intersection.

Date	Time	NB Greeley	SB Greeley	WB Woodburn	EB Woodburn	Main Line Total	Con A	Con B	Comb A	Comb B	Side Street Total	Main Line Total	Side Street Total
3/25/2009	12:00 AM	23	5			28					0	5901	2077
	1:00 AM	9	7			16					0		
	2:00 AM	2	2			4					0		
	3:00 AM	3	2			5					0		
	4:00 AM	10	6			16					0		
	5:00 AM	18	9			27					0		
	6:00 AM	83	55			138					0	8 Hr	8 Hr
	7:00 AM	176	600	18	151	776					169	776	169
	8:00 AM	171	487	54	122	658					176	658	176
	9:00 AM	231	383	59	129	614					188	614	188
	10:00 AM	215	300	77	131	515					208	515	208
	11:00 AM	259	311	73	129	570					202	570	202
	12:00 PM	250	300	83	148	550					231	550	231
	1:00 PM	244	321	73	142	565					215	565	215
	2:00 PM	279	328	124	157	607					281	607	281
	3:00 PM	240	302	63	128	542					191	542	191
	4:00 PM	203	301	53	163	504					216	504	216
	5:00 PM	335	243			578					0		
	6:00 PM	376	220			596					0		
	7:00 PM	344	190			534					0		
	8:00 PM	225	90			315					0		
	9:00 PM	158	60			218					0		
	10:00 PM	107	48			155					0		
	11:00 PM	27	20			47					0		
3/26/2009	12:00 AM	19	4			23					0		
	1:00 AM	16	2			18					0		
	2:00 AM	7	4			11					0		
	3:00 AM	3	0			3					0		
	4:00 AM	4	13			17					0		
	5:00 AM	22	10			32					0		
	6:00 AM	71	52			123					0		
	7:00 AM	251	157			408					0		
	8:00 AM	233	241			474					0		
	9:00 AM	247	236			483					0		
	10:00 AM	178	215			393					0		
	11:00 AM	238	249			487					0		
	12:00 PM	242	225			467					0		
	1:00 PM	238	233			471					0		
	2:00 PM	277	276			553					0		
	3:00 PM	310	285			595					0		
	4:00 PM	319	265			584					0		
	5:00 PM	313	260			573					0		
	6:00 PM	283	248			531					0		
	7:00 PM	362	237			599					0		
	8:00 PM	224	156			380					0		
	9:00 PM	181	68			249					0		
	10:00 PM	107	38			145					0		
	11:00 PM	54	22			76					0		

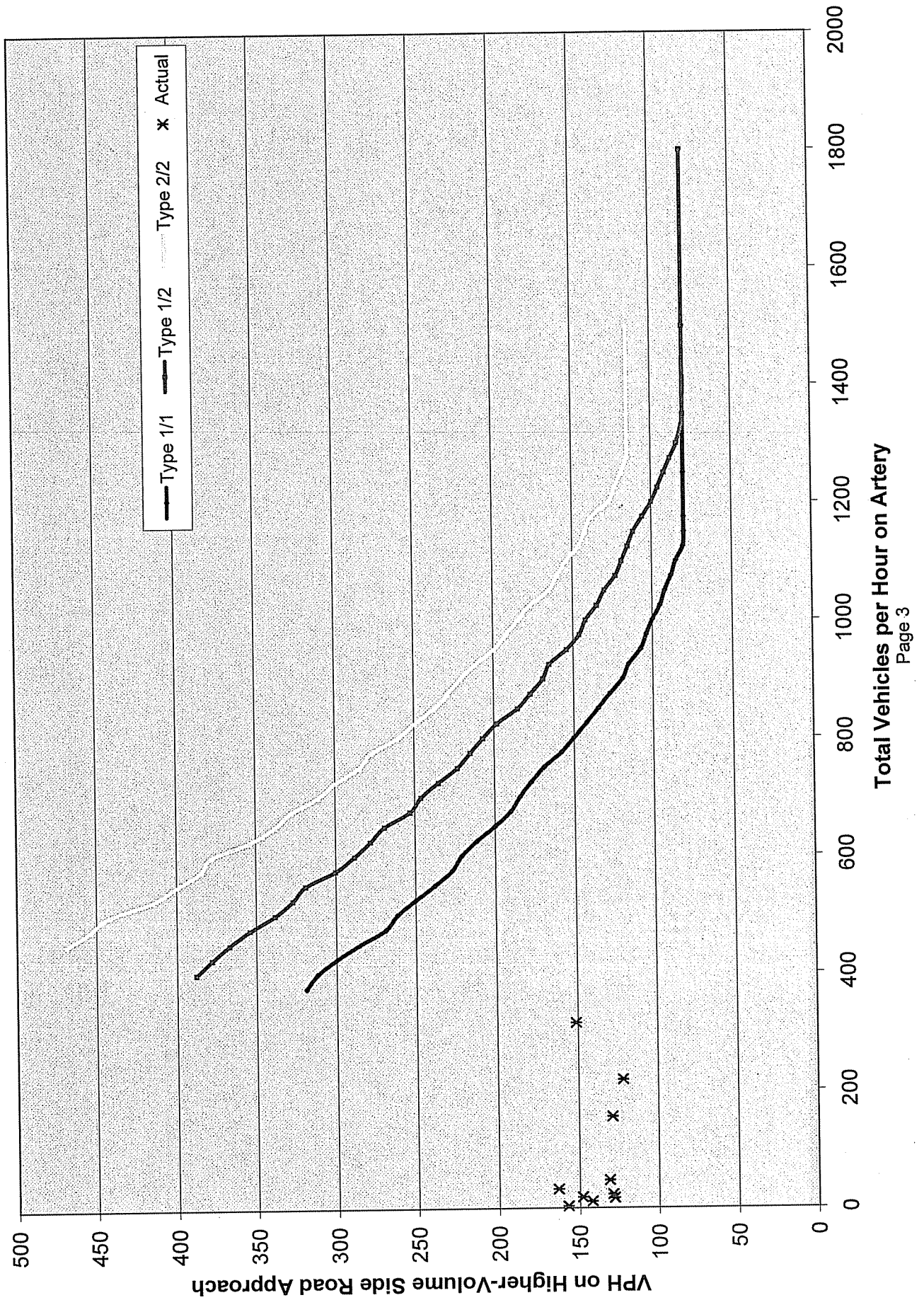
* approach delay = veh/sec.

WARRANT NO.2 - FOUR-HOUR VEHICULAR VOLUME

This warrant shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Warrant 2 Graph for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

Date	Time	NB Greeley	SB Greeley	Greeley Total	WB Woodburn	EB Woodburn	Higher Side Street Volume
10/19/2005	11:00 AM	23	5	28			
	12:00 PM	9	7	16			
	1:00 PM	2	2	4			
	2:00 PM	3	2	5			
	3:00 PM	10	6	16			
	4:00 PM	18	9	27			
	5:00 PM	83	55	138			
	6:00 PM	176	600	776			
	7:00 PM	171	487	658			
	8:00 PM	231	383	614			
	9:00 PM	215	300	515			
10/20/2005	10:00 PM	259	311	570			
	11:00 PM	250	300	550			
	12:00 AM	244	321	565			
	1:00 AM	279	328	607			
	2:00 AM	240	302	542			
	3:00 AM	203	301	504			
	4:00 AM	335	243	578			
	5:00 AM	376	220	596			
	6:00 AM	344	190	534			
	7:00 AM	225	90	315	18	151	151
	8:00 AM	158	60	218	54	122	122
	9:00 AM	107	48	155	59	129	129
	10:00 AM	27	20	47	77	131	131
	11:00 AM	19	4	23	73	129	129
	12:00 PM	16	2	18	83	148	148
	1:00 PM	7	4	11	73	142	142
	2:00 PM	3	0	3	124	157	157
	3:00 PM	4	13	17	63	128	128
	4:00 PM	22	10	32	53	163	163
	5:00 PM	71	52	123			
	6:00 PM	251	157	408			
	7:00 PM	233	241	474			
	8:00 PM	247	236	483			
	9:00 PM	178	215	393			
	10:00 PM	238	249	487			
	11:00 PM	242	225	467			
10/21/2005	12:00 AM	238	233	471			
	1:00 AM	277	276	553			
	2:00 AM	310	285	595			
	3:00 AM	319	265	584			
	4:00 AM	313	260	573			
	5:00 AM	283	248	531			
	6:00 AM	362	237	599			
	7:00 AM	224	156	380			
	8:00 AM	181	68	249			
	9:00 AM	107	38	145			

Warrant 2 - Four-Hour Volume Warrant (V<40MPH)



WARRANT NO. 3 - PEAK HOUR VOLUME

This warrant is applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high occupancy vehicle facilities that attract or discharge large numbers of vehicles over a period of time.

This warrant is satisfied when either of the following two categories are met.

Category A: All of the three following conditions exist for the same 1 hour (any four consecutive 15 minute periods) of an average day:

1. The total stopped time delay experienced by traffic on one minor-street approach (one direction only) controlled by a Stop Sign equals or exceeds: 4 vehicle-hours for a one lane approach or 5 vehicle hours for a two lane approach, and

2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and

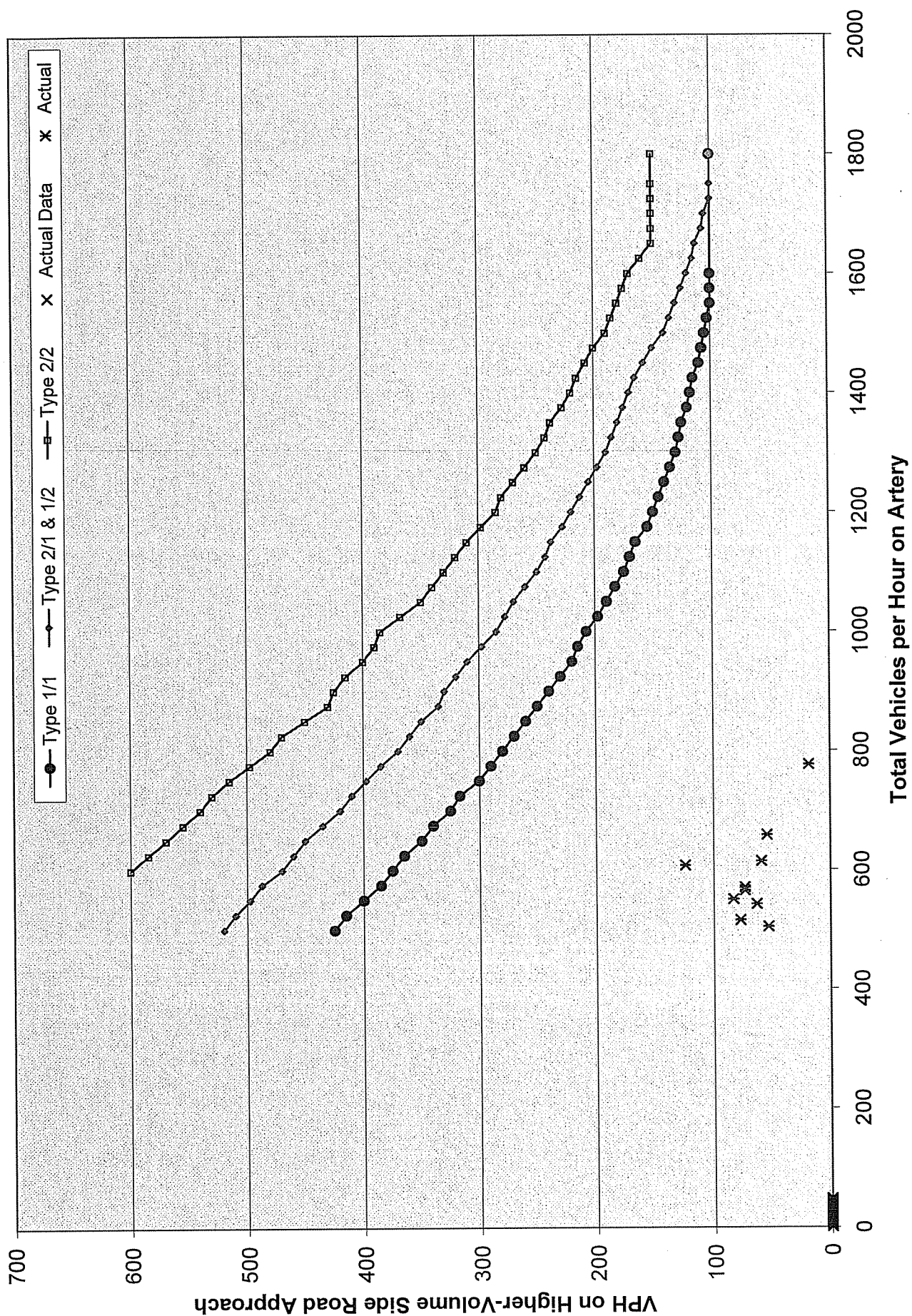
3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches

Category B: The plotted point representing the vehicles per hour plotted point representing the number of vehicles on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume side road approach (one direction only) for any 1 hour (any four consecutive 15-minute periods) of an average day falls above the appropriate curve data.

Date	Time	NB Greeley	SB Greeley	Greeley Main Total	WB Woodburn	EB Woodburn	Woodburn Total	Total Vol Entering	Delay (sec/veh)	Delay (sec/v eh)				
3/25/2009	12:00 AM			0			0	0						
	1:00 AM			0			0	0						
	2:00 AM			0			0	0						
	3:00 AM			0			0	0						
	4:00 AM			0			0	0						
	5:00 AM			0			0	0						
	6:00 AM			0			0	0						
	7:00 AM	176	600	776	18	151	169	945	58.5	21.6	8833.5	2.5		
	8:00 AM	171	487	658	54	122	176	834						
	9:00 AM	231	383	614	59	129	188	802						
	10:00 AM	215	300	515	77	131	208	723						
	11:00 AM	259	311	570	73	129	202	772						
	12:00 PM	250	300	550	83	148	231	781						
	1:00 PM	244	321	565	73	142	215	780						
	2:00 PM	279	328	607	124	157	281	888	58.5	21.6	9184.5	2.6		
	3:00 PM	240	302	542	63	128	191	733	58.5	21.6	9535.5	2.6		
	4:00 PM	203	301	504	53	163	216	720						
	5:00 PM			0			0	0						
	6:00 PM			0			0	0						
	7:00 PM			0			0	0						
	8:00 PM			0			0	0						
	9:00 PM			0			0	0						
	10:00 PM			0			0	0						
	11:00 PM			0			0	0						
3/26/2009	12:00 AM			0			0	0						
Saturday														
3/21/2009	11:00 AM	301	381		86	166		934	D1	14.5				
	12:00 PM	275	355		117	189		936	D2	112.5				
	1:00 PM	282	336		97	203		918	Da	63.5	21.6	12890.5	3.6	

D1=Synchro Measured Delay
D2=SymTraffic Measured Delay
Da=Average of D1&D2

Warrant 3: Peak Hour Volume Warrant ($V < 40\text{MPH}$)



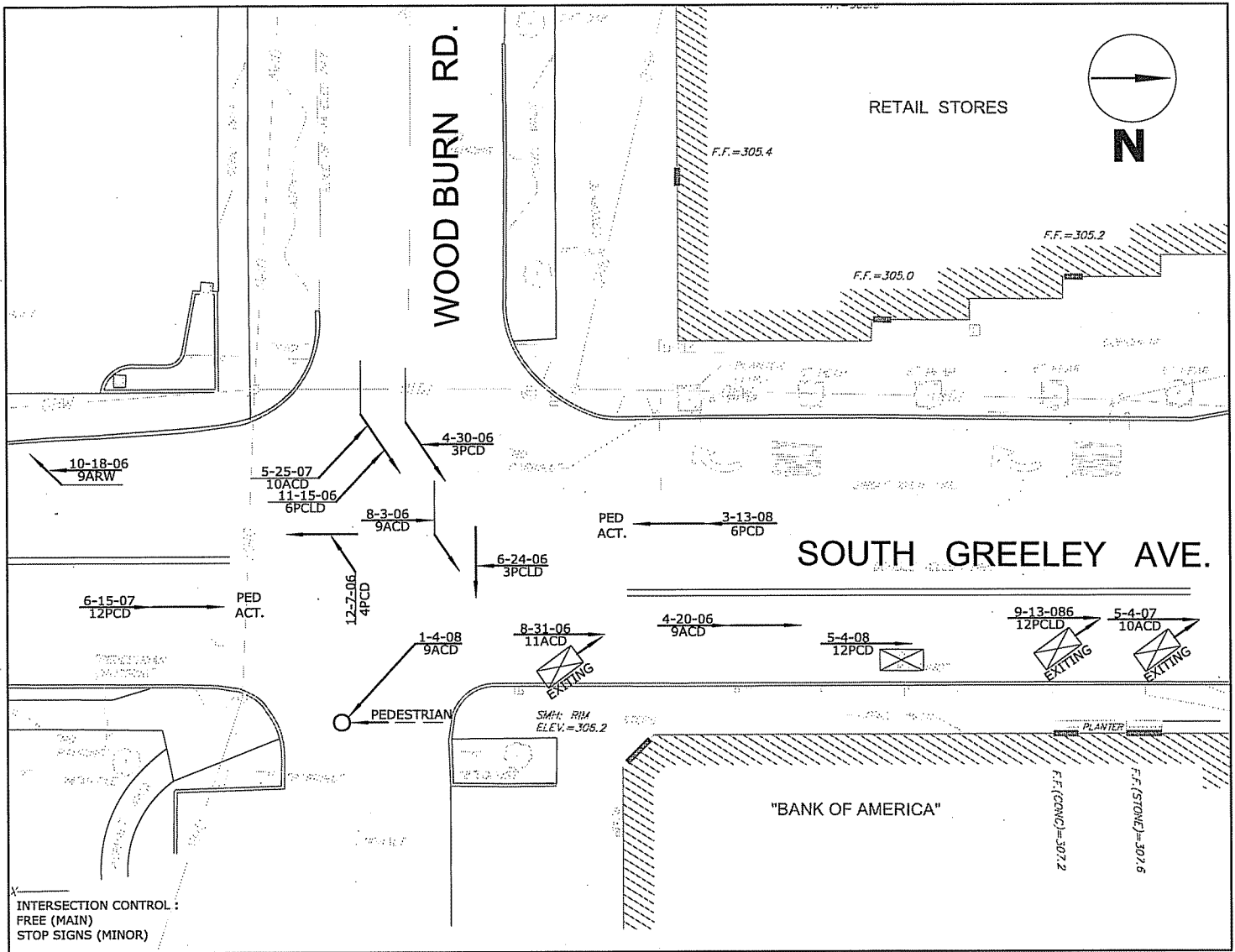
WARRANT NO.7 – CRASH EXPERIENCE WARRANT

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

1. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
2. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and

3. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1, or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street (400vph for A & 600vph for B) and the higher-volume minor-street approach (120vph for A & 60vph for B), respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements (20 or greater for each of 4 hours crossing mainline) specified in the Pedestrian Volume warrant. These major street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Date	Time	NB Greeley	SB Greeley	WB Woodburn	EB Woodburn	Main Line Total	Side Street Total	Main Line Total	Side Street Total
3/24/2009	11:00 AM					0	0	5901	2077
	12:00 PM					0	0		
	1:00 PM					0	0		
	2:00 PM					0	0		
	3:00 PM					0	0		
	4:00 PM					0	0		
	5:00 PM					0	0		
	6:00 PM					0	0		
	7:00 PM					0	0		
	8:00 PM					0	0		
	9:00 PM					0	0		
	10:00 PM					0	0		
	11:00 PM					0	0		
3/25/2009	12:00 AM	23	5			28	0		
	1:00 AM	9	7			16	0		
	2:00 AM	2	2			4	0		
	3:00 AM	3	2			5	0		
	4:00 AM	10	6			16	0		
	5:00 AM	18	9			27	0		
	6:00 AM	83	55			138	0	8 Hr	8 Hr
	7:00 AM	176	600	18	151	776	169	776	169
	8:00 AM	171	487	54	122	658	176	658	176
	9:00 AM	231	383	59	129	614	188	614	188
	10:00 AM	215	300	77	131	515	208	515	208
	11:00 AM	259	311	73	129	570	202	570	202
	12:00 PM	250	300	83	148	550	231	550	231
	1:00 PM	244	321	73	142	565	215	565	215
	2:00 PM	279	328	124	157	607	281	607	281
	3:00 PM	240	302	63	128	542	191	542	191
	4:00 PM	203	301	53	163	504	216	504	216
	5:00 PM	335	243			578	0		
	6:00 PM	376	220			596	0		
	7:00 PM	344	190			534	0		
	8:00 PM	225	90			315	0		
	9:00 PM	158	60			218	0		
	10:00 PM	107	48			155	0		
	11:00 PM	27	20			47	0		



WEATHER

	%	
CLEAR	11	73
CLOUDY	3	20
FOG	0	/
RAIN	1	7
SLEET	0	/
SNOW	0	/
A = A.M.	P = P.M.	
D = DRY	W = WET	
I = ICE	F = FOG	
C = CLEAR	R = RAIN	
CL = CLOUDY	S = SNOW	
M = MUD	SL = SLEET	

ROADWAY SURFACE

	%	
DRY	14	93
WET	1	7
SNOW	0	/
ICE	0	/

LIGHT CONDITIONS

	%	
DAY	12	80
DUSK/DAWN	1	7
DARK	2	13

ACCIDENT SEVERITY

FATALITY	0
PERSONAL INJURY	1
PROPERTY DAMAGE	14
NON - REPORTABLE	0

TOTAL ACCIDENTS 15

ROAD LIGHTED

YES / NO



TYPE OF ACCIDENT

INTERSECTION	6
SIDE SWIPE	1
REAR END	4
HEAD ON	/
SKIDDING	/
OVERTURN	/
FIXED OBJECT	/
BACKING	/
PARKING	3
PARKED	1
PEDESTRIAN	1

COLLISION DIAGRAM

SOURCE: MV104 ACC. REPORTS
ROAD: SOUTH GREELEY AVE.
MUNICIPALITY: NEW CASTLE
WESTCHESTER COUNTY

PREPARED BY: D. SMYTH
C.R.: 79
FROM: NA **TO:** NA
DEPARTMENT OF PUBLIC WORKS

DATE: 5/5/09
TOTAL: 15
TRAFFIC ENGINEERING

WARRANT NO. 8 - ROADWAY NETWORK

The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

1. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or

2. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a nonnormal business day (Saturday or Sunday).

Date	Time	NB Greeley	SB Greeley	WB Woodburn	EB Woodburn	Main Line Total	Side Street Total	Total Entering Volume	Main Line Total	Side Street Total
3/24/2009	11:00 AM					0	0	0	4811	1264
	12:00 PM					0	0	0		
	1:00 PM					0	0	0		
	2:00 PM					0	0	0		
	3:00 PM					0	0	0		
	4:00 PM					0	0	0		
	5:00 PM					0	0	0		
	6:00 PM					0	0	0		
	7:00 PM					0	0	0		
	8:00 PM					0	0	0		
	9:00 PM					0	0	0		
	10:00 PM					0	0	0		
	11:00 PM					0	0	0		
3/25/2009	12:00 AM	23	5			28	0	28		
	1:00 AM	9	7			16	0	16		
	2:00 AM	2	2			4	0	4		
	3:00 AM	3	2			5	0	5		
	4:00 AM	10	6			16	0	16		
	5:00 AM	18	9			27	0	27		
	6:00 AM	83	55			138	0	138	<u>8 Hr</u>	<u>8 Hr</u>
	7:00 AM	176	600	18	151	776	169	945	776	169
	8:00 AM	171	487	54	122	658	176	834	658	176
	9:00 AM	231	383	59	129	614	188	802		
	10:00 AM	215	300	77	131	515	208	723		
	11:00 AM	259	311	73	129	570	202	772		
	12:00 PM	250	300	83	148	550	231	781	550	231
	1:00 PM	244	321	73	142	565	215	780		
	2:00 PM	279	328	124	157	607	281	888	607	281
	3:00 PM	240	302	63	128	542	191	733	542	191
	4:00 PM	203	301	53	163	504	216	720	504	216
	5:00 PM	335	243			578	0	578	578	0
	6:00 PM	376	220			596	0	596	596	0
	7:00 PM	344	190			534	0	534		
	8:00 PM	225	90			315	0	315		
	9:00 PM	158	60			218	0	218		
	10:00 PM	107	48			155	0	155		
	11:00 PM	27	20			47	0	47		
3/26/2009	12:00 AM	19	4			23	0	23		
	1:00 AM	16	2			18	0	18		
Saturday										
3/21/2009	11:00 AM	301	381	86	166			934		
	12:00 PM	275	355	117	189			936		
	1:00 PM	282	336	97	203			918		

APPENDIX “D”

SYNCRHO AND SIMTRAFFIC REPORTS

- ◆ Synchro/SimTraffic Table of Results
 - ◆ Synchro AM Peak Hour
 - ◆ Synchro PM Peak Hour
 - ◆ Synchro Saturday Peak Hour
 - ◆ SimTraffic AM Peak Hour
 - ◆ SimTraffic PM Peak Hour
 - ◆ SimTraffic Saturday Peak Hour
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Synchro & Simtraffic Analysis Results

South Greeley Avenue Streetscape Project

10/16/2009

Time Period: AM Peak

Intersection	Existing Cond.			All Stop @ King St.			All Stop @ Woodburn Ave		
	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*
So. Greeley @ King Street	66.4/(3.9)	E	35.2	12.7/(1.5)	A	7.1	12.7/(4.4)	A	8.6
So. Greeley @ Quaker N	11.8/(7.3)	A	9.6	11.7/(6.7)	A	9.2	11.7/(9.5)	B	10.6
So. Greeley @ Quaker S	14.2/(5.0)	A	9.6	14.1/(6.0)	B	10.1	14.1/(6.2)	B	10.2
So. Greeley @ Woodburn	13.7/(2.3)	A	8.0	13.5/(2.9)	A	8.2	14.2/(4.2)	A	9.2
So. Greeley @ Washington	3.4/(1.8)	A	2.6	3.4/(1.7)	A	2.6	3.4/(1.6)	A	2.5
King Street @ Senter Street	1.1/(4.2)	A	2.7	1.1/(3.8)	A	2.5	1.1/(4.1)	A	2.6

Time Period: PM Peak

Intersection	Existing Cond.			All Stop @ King St.			All Stop @ Woodburn Ave		
	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*
So. Greeley @ King Street	168.6/(4.8)	F	86.7	13.7/(6.2)	A	10.0	13.7/(5.8)	A	9.8
So. Greeley @ Quaker N	6.3/(3.6)	A	5.0	6.4/(3.8)	A	5.1	6.3/(4.3)	A	5.3
So. Greeley @ Quaker S	6.9/(2.5)	A	4.7	6.9/(2.6)	A	4.8	6.9/(4.0)	A	5.5
So. Greeley @ Woodburn	81.2/(5.4)	E	43.3	82.9/(4.8)	E	43.9	19.4/(9.0)	B	14.2
So. Greeley @ Washington	34.6/(3.4)	C	19.0	35.0/(2.8)	C	18.9	34.6/(2.6)	C	18.6
King Street @ Senter Street	1.3/(3.3)	A	2.3	1.3/(3.4)	A	2.4	1.3/(3.5)	A	2.4

Time Period: SAT Peak

Intersection	Existing Cond.			All Stop @ King St.			All Stop @ Woodburn Ave		
	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*	Synchro/ (SimTraffic) Results	LOS	Average Delays*
So. Greeley @ King Street	>168.6**/(9.7)	F	>86.7**	47.7/(6.7)	D	27.2	47.7/(5.3)	D	26.5
So. Greeley @ Quaker N	11.8/(17.0)	B	14.4	11.8/(8.9)	B	10.4	11.8/(9.6)	B	10.7
So. Greeley @ Quaker S	5.2/(2.6)	A	3.9	5.2/(2.3)	A	3.8	5.2/(3.1)	A	4.2
So. Greeley @ Woodburn	27.9/(4.1)	C	16.0	27.9/(5.6)	C	16.8	14.3/(7.4)	B	10.9
So. Greeley @ Washington	5.5/(2.1)	A	3.8	5.5/(2.0)	A	3.8	5.5/(2.3)	A	3.9
King Street @ Senter Street	1.4/(3.7)	A	2.6	1.4/(3.6)	A	2.5	1.4/(3.4)	A	2.4

*Values = Seconds of Delay per vehicle per hour

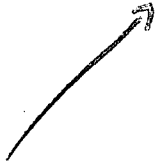
** - Synchro calculates delays are too high and displays as error.

Lower King Street @ South Greeley Avenue

Time Period: AM Peak (SimTraffic Results*)

Intersection	Queue Length (ft)				
	WB (LTR)	NB (LT)	NB (R)	SB (LTR)	
Existing	92	77	68	66	
WB Stop Controlled	110	71	65	59	Net Change
Difference	18	-6	-3	-7	2

INCREASES QUEUE
UP KING STREET.



Time Period: PM Peak (SimTraffic Results*)

Intersection	Queue Length (ft)				
	WB (LTR)	NB (LT)	NB (R)	SB (LTR)	
Existing	76	85	55	62	
WB Stop Controlled	121	90	57	61	Net Change
Difference	45	5	2	-1	51

Time Period: SAT Peak (SimTraffic Results*)

Intersection	Queue Length (ft)				
	WB (LTR)	NB (LT)	NB (R)	SB (LTR)	
Existing	57	167	52	100	
WB Stop Controlled	111	94	51	61	Net Change
Difference	54	-73	-1	-39	-59

* - Synchro analysis did not yield queueing delay lengths.

Time Period: AM Peak (Synchro Results)

Intersection	Queue Length (ft)				Net Change
	WB (LTR)	NB (LT)	NB (R)	SB (LTR)	
Existing	20	543	543	107	
WB Stop Controlled	110	75	67	39	
Difference	90	-468	-476	-68	-922

Time Period: PM Peak (Synchro Results)

Intersection	Queue Length (ft)				Net Change
	WB (LTR)	NB (LT)	NB (R)	SB (LTR)	
Existing	26	759	759	276	
WB Stop Controlled	119	89	55	57	
Difference	93	-670	-704	-219	-1500

Time Period: SAT Peak (Synchro Results)

Intersection	Queue Length (ft)				Net Change
	WB (LTR)	NB (LT)	NB (R)	SB (LTR)	
Existing	0	0	0	0	
WB Stop Controlled	0	0	0	0	
Difference	0	0	0	0	0

* - Synchro analysis did not yield queueing delay lengths.

