North/South Clinton Avenue
St. Paul Street/South Avenue
Two-Way Conversion Study

FINAL REPORT

Prepared for:

City of Rochester
30 Church Street
Rochester, New York 14614

AUGUST 2012

Prepared by:

Laberge
ENGINEERING
ARCHITECTURE
Group
SURVEYING
PLANNING
4 Computer Drive West • Albany, New York 12205
www.labergegroup.com

TABLE OF CONTENTS

APPENDICES (Bound Separately)

LIST OF GRAPHICS/FIGURES page

LIST OF GRAPHICS/FIGURES (cont.) page

LIST OF TABLES page

1.0 INTRODUCTION

Laberge Group was retained by the City of Rochester to investigate the feasibility of converting the North/South Clinton Avenue and the St. Paul Street/South Avenue corridors from one-way to two-way traffic operations. This "Two-Way Conversion Study" will:

- Document existing conditions with regard to traffic operations, pedestrian and bicycle traffic, transit, safety and parking.
- Review future anticipated developments within the City and forecast one-way and two-way future peak hour traffic volumes that could result from those developments.
- Summarize the operational analysis and anticipated levels of service resulting from two-way conversion, providing information of pedestrian, bicycle and transit, as well as vehicular operations, and assessing the effect on parking and safety.
- List recommendations and requirements necessary, as well as potential impediments, to the conversion.

The complete Two-Way Conversion Study is comprised of three separate, but integrated reports, which have all been incorporated into this Final Report. The previously submitted reports include:

- **Existing Conditions Analysis Report** – Data and analysis summarizing current conditions was reviewed by the Project Advisory Committee (PAC) and was accepted by the City in July 2011.
- **Traffic Forecasting Report** – A summary of the anticipated future peak hour traffic volumes, after two-way conversion, and the methodology used to derive them, which was accepted by the City in January 2012.
- **Feasibility Assessment Report** – Analysis of future conditions and recommendations related to the two-way conversion. The Feasibility Assessment Report itself will be a two step process with a draft report, approved by the PAC, being submitted and presented in a public forum to solicit comments before the final report is issued. The Feasibility Assessment Report was accepted by the City in August 2012

2.0 PROJECT BACKGROUND

St. Paul Street, North Clinton Avenue and other downtown streets were converted to one-way traffic in the 1960s in order to reduce traffic congestion in the downtown area and to accommodate expressway ramp connections. With heavy industrialization in the northern neighborhoods and a number of large office developments in the southern downtown area, the need to efficiently process vehicles in and out of the City during commuter peaks was the City's primary objective and the one-way roadways achieved that goal.

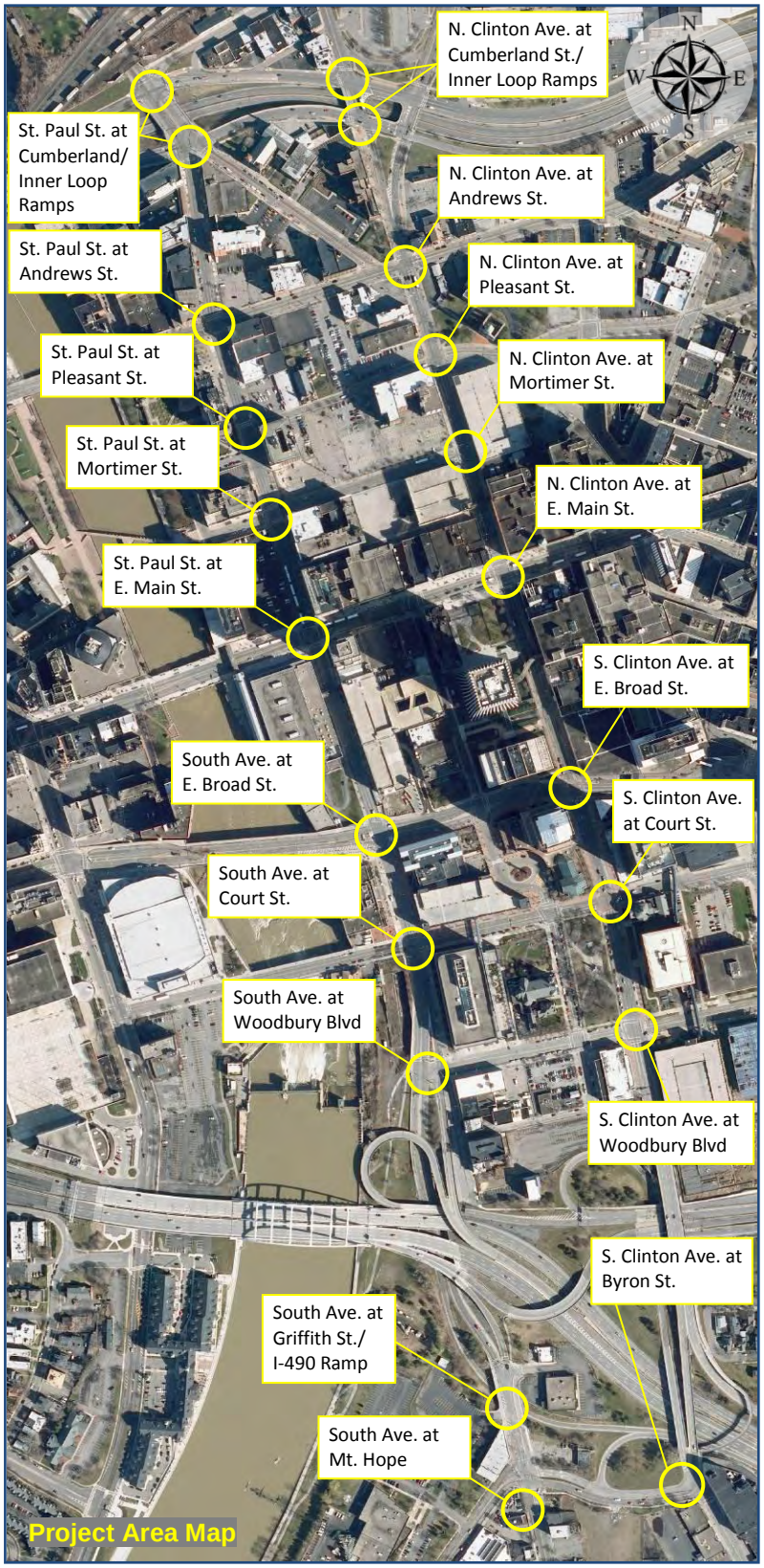
By the 1980's many of the industrial businesses relocated from the downtown area, and residential and commercial land uses were on the rise. Today, in addition to the over 5 million square feet of office space that hosts over 18,000 workers, the eastern downtown area has nearly 5,000 residents, several college campuses (Eastman School of Music, Monroe Community College, SUNY Brockport Metrocenter, SUNY EOC), a significant commercial presence and soon a major transit center. This mix of land uses

has shifted the City's goals from the "get them in and out" attitude of the past to a "complete streets" approach that focuses on multi-modal transportation and gives importance to all modes of transportation including pedestrian, bicycle and transit. Although the current one-way street patterns efficiently served high traffic volumes for decades, these up to four-lane one-way arterials that dominate the downtown (St. Paul/South and North/South Clinton) are less hospitable to other modes of transportation. This raises safety concerns for the current land uses, which require increased walkability and bikeabilty throughout the downtown area.

Another concern with the one-way streets is the absence of a predictable grid street pattern, which makes it challenging to direct visitors to downtown destinations, and potentially hampers business development and retail viability.

Given the character change of the downtown area over the past few decades and the increasing need to provide better pedestrian and bicycle safety and accommodations, provide better access to commercial properties, improve wayfinding and reduce driver confusion, the City of Rochester desires to investigate the feasibility of converting St. Paul Street/South Avenue and North/South Clinton Avenue between Byron Street and the Inner Loop to two-way traffic. See the map to the right for specific intersections included in the study.

Overall the study is limited to 21 intersections along Clinton Avenue and St. Paul Street/South Avenue between Byron Street and Cumberland Street in downtown Rochester. Originally, only 20 intersections were included in this study, but after the initial analysis it was determined that the South Clinton Avenue at Byron Street intersection would be affected much more than originally anticipated, so that intersection was added during the feasibility assessment phase.



Other intersections reviewed but not specifically analyzed as part of this study include the two Joseph Avenue at Cumberland St./Inner Loop Intersections, which were included in the signal analysis for Clinton Avenue at Cumberland St./Inner Loop, as all four intersections operate off the same signal controller.

3.0 EXISTING CONDITIONS ANALYSIS

3.1 DATA GATHERING

3.1.1 Record Data and Previous Studies

Numerous traffic studies have been performed for various developments throughout the downtown area over the past several years. Data from these studies and record information from various Municipal Agencies were gathered and reviewed as part of this study.

Previously developed traffic reports examined and considered as part of the Two-Way Conversion Study include:

- Midtown Redevelopment Traffic Assessment, Fisher Associates, 2008
- Broad Street Aqueduct Traffic Impact Study, T.Y. Lin International, 2009
- Renaissance Square Traffic Analysis, Passero Associates & Kimley-Horn Associates, 2006
- Comprehensive Downtown Parking Study, Walker Parking Consultants, 2008
- Erie Harbor Park Master Plan, T.Y. Lin International, 2010

In addition, the following data was received from various other Agencies:

- Historical traffic count data and traffic signal timings, Monroe County DOT
- Historical accident data, City of Rochester
- Development Information and Market Summary, Rochester Downtown Development Corp.
- Transit ridership information, Rochester Genesee Regional Transportation Authority

3.1.2 Data Collection

In addition to the record data obtained, Laberge Group conducted peak hour turning movement and pedestrian/bicycle counts on April 12-14, 2011 at following four locations:

- South Clinton Avenue at Woodbury Blvd.
- North Clinton Avenue at Andrews Street
- St. Paul Street at East Main Street
- South Avenue at East Broad Street

In addition, Laberge Group, took field notes and pictures of the area, noting significant parking areas, road geometry, traffic signing and transit locations.

Based on the data collected, the AM Peak Hour for traffic within the downtown area generally occurs between the hours 7:30 am and 8:30 am, and the PM peak hour occurs from 5:00 pm to 6:00 pm.

These counts, along with previously collected traffic count data from past studies, were used in determining the existing traffic volumes for the analysis. A summary of all the peak hour intersection turn movement traffic counts available for use in this study are included in Table 3.1.

TABLE 3.1
Intersection Peak Hour Count Summary

Intersection	Count Year[source]
South Ave. at Mt. Hope Ave./Byron St.	1999[5], 2000[7], 2010[1]
South Ave. at Griffith /I-490 EB Off-Ramp	2000[7], 2011[1]
South Ave. at Woodbury Blvd	1996[8], 2000[7]
South Ave. at Court St.	2006[3]
South Ave. at E. Broad St.	1996[1], 2006[3], **2011[9]**
St. Paul St. at E. Main St.	1989[1], 2006[3], **2011[9]**
St. Paul St. at Mortimer St.	1989[1], 2006[2]
St. Paul St. at Pleasant St.	2006[2]
St. Paul St. at Andrews St.	1989[1], 2006[2]
St. Paul St. at Inner Loop EB/Bittner St.	1997[1], 2006[2]
St. Paul St. at Inner Loop WB/Cumberland St.	1997[1], 2006[2]
S. Clinton Ave. at Woodbury Blvd.	1999[5], **2011[9]**
S. Clinton Ave. at Court St.	2010[4]
S. Clinton Ave. at E. Broad St.	1996[6], 2006[2], 2010[4]
N. Clinton Ave. at E. Main St.	2006[2], 2010[4]
N. Clinton Ave. at Mortimer St.	2004[1]-PM Only, 2006[2]
N. Clinton Ave. at Pleasant St.	2006[2]
N. Clinton Ave. at Andrews St.	2006[2], **2011[9]**
N. Clinton Ave. at Inner Loop EB	2000[7], 2006[2]
N. Clinton Ave. at Cumberland St.	2000[7], 2006[2]

Sources:
[1] Monroe County Dept. of Transportation (MCDOT)
[2] Kimley-Horn (Renaissance Square Traffic Analysis)
[3] FRA (Broad Street Aqueduct Project)
[4] Fisher Associates (Midtown Redevelopment)
[5] SRF Engineering (SE Loop Garage Project)
[6] Bergmann Associates (Project Unknown)
[7] Sear Brown Group (Inner Loop Reconstruction)
[8] Sear Brown Group (Project Unknown)
[9] Laberge Group (2-Way Conversion Study) - **Shown in Bold**

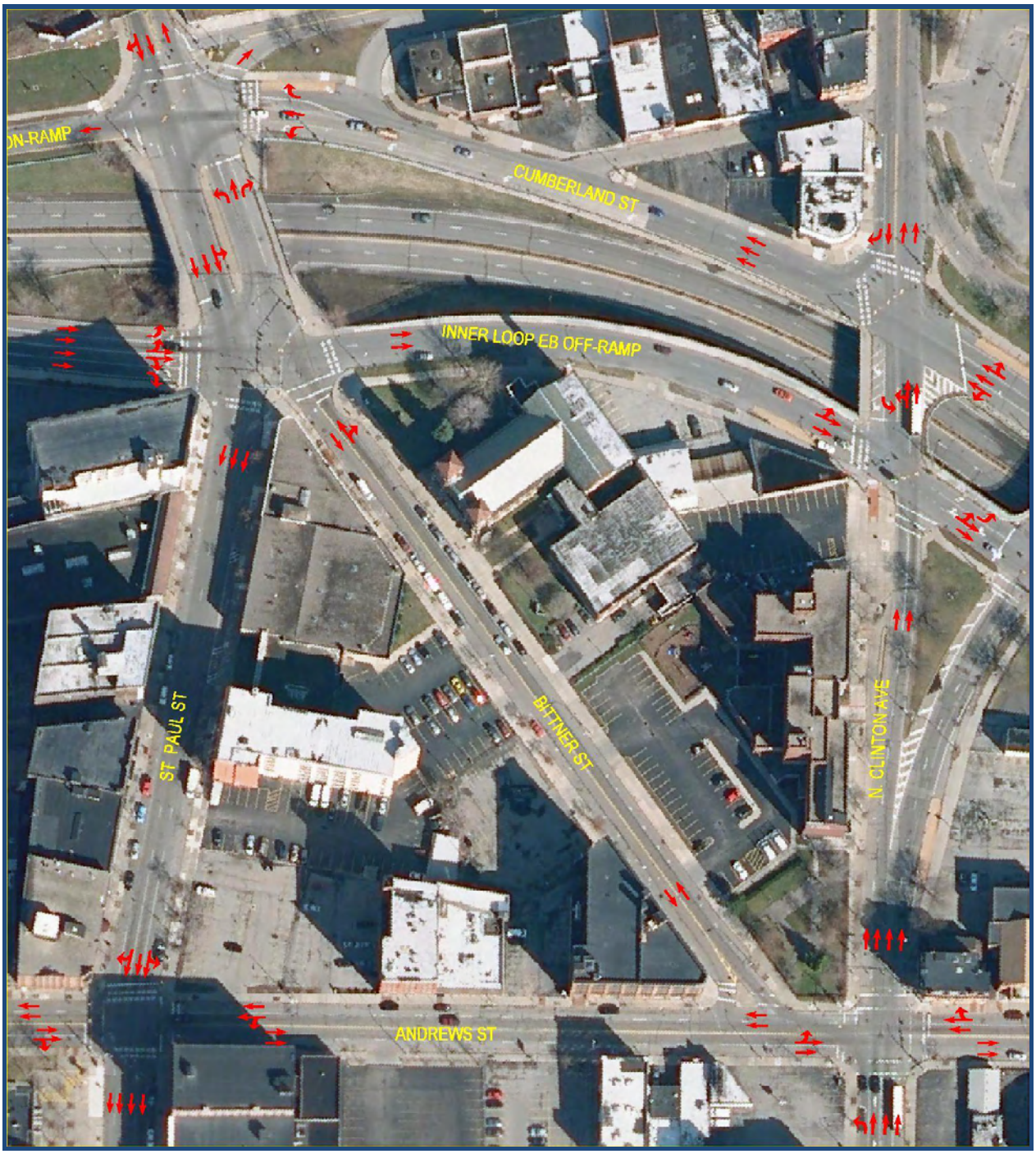
3.2 ROADWAY NETWORK

The Study Area is comprised of two major arterial corridors; the North/South Clinton Avenue corridor, a one-way roadway servicing northbound traffic; and the St. Paul Street/South Avenue corridor, a one-way roadway servicing southbound traffic. The speed limit on both these roadways is 30 mph and they range between two and four lanes wide between intersections. Both streets have intermittent on-street parking, several bus stops and are heavily traveled by bus traffic. There are pedestrian crossings at all intersections and at a couple of mid-block locations. A description of the road network by blocks follows:

3.2.1 Cumberland Street to Andrews Street

Between Cumberland Street and Andrews Street, North Clinton splits from four lanes to two lanes with the other two lanes heading to Joseph Avenue. St. Paul Street is a three lane roadway with parking on both sides. Two-way traffic begins north of the Inner Loop Eastbound Ramp. Though Andrews Street

has two lanes each direction, on-street parking effectively reduced the roadway to one lane per direction away from the intersections. Bittner Street is used as a significant cut-through route in the PM peak hour for commuters leaving the downtown area. See below for a graphical representation of the lane layout.



3.2.2 Andrews Street to Mortimer Street

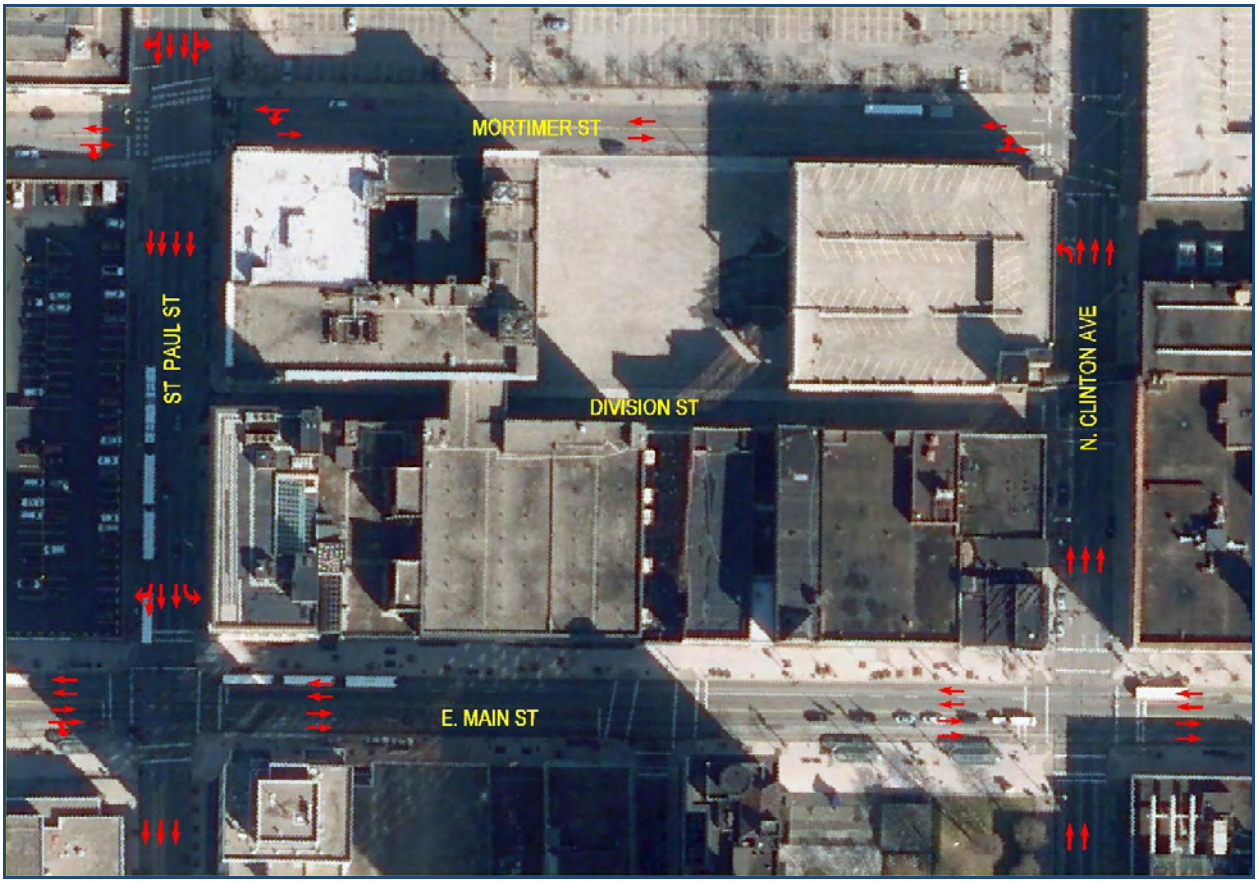
Between Andrews Street and Mortimer Street, North Clinton Avenue has three northbound through lanes with parking spread intermittently along the east side of the road. This parking ends near the intersections allowing for the formation of a small left turn lane at each. St. Paul Street has four lanes traveling southbound with parking on the east side of the roadway. However, transit vehicles stopped at bus stops and vehicles stopped to load and unload effectively limits any use of the rightmost lane (as you are traveling down the roadway) for through traffic. Both Pleasant Street and Mortimer Street are two lane roadways with one lane in either direction. Pleasant Street has no on-street parking, while Mortimer Street has parking on both sides of the roadway. The large parking lot between Mortimer and Pleasant is the proposed location for the new downtown transit center.

3.2.3 Mortimer Street to East Main Street

Between Mortimer Street and East Main Street, North Clinton Avenue has three full travel lanes with parking on the west side of the road between East Main Street and Division Street. Parking ends north of Division Street allowing for a short left turn lane to be formed at Mortimer Street. There is a heavily utilized bus stop along this block, which tends to reduce capacity of the rightmost lane. This stop was relocated from just south of East Main Street in Fall 2010 to accommodate Midtown Redevelopment construction. Service to this and other major stops in the vicinity of East Main Street will be relocated to the new RTS Transit Center when it opens in the Fall of 2013.

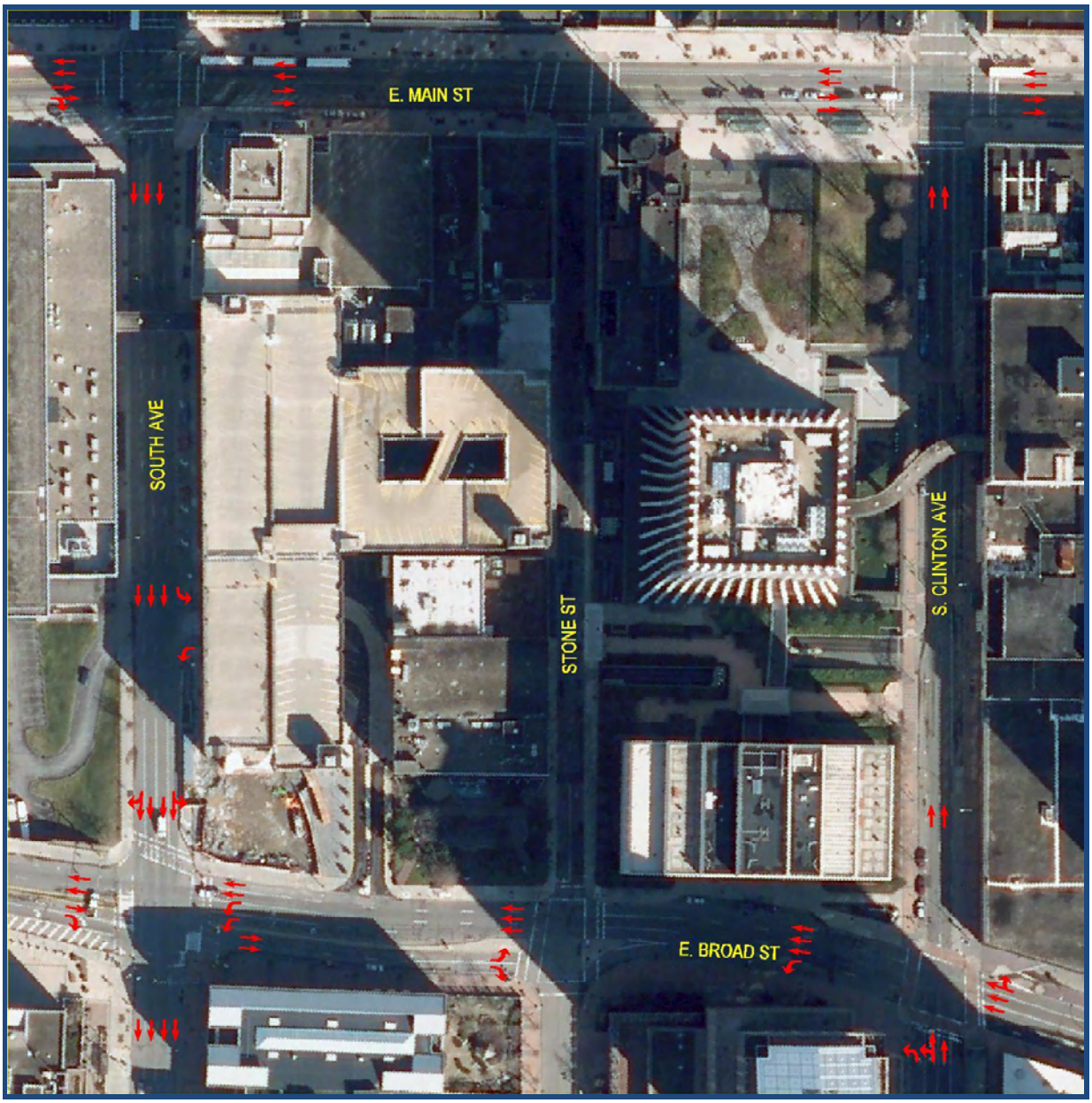
St. Paul Street has four lanes in this area. North of Division Street there is parking adjacent to the leftmost travel lane. This parking ends south of Division Street to form a left turn lane at the intersection. The roadway narrows at that point, so four lanes are still maintained (three through lanes and the left turn lane). There is a major transit stop along this block where buses routinely queue awaiting passengers. This effectively turns the rightmost travel lane into a bus lane that provides very little capacity for other vehicular traffic.

East Main Street is a four lane roadway, with two lanes in each direction. The rightmost lane in both directions has been designated as a bus lane/right turn lane leaving just one through lane per direction for through traffic. East Main Street is a major transit route and hosts the busiest bus stops within the downtown area. At the intersection of North Clinton Avenue and East Main Street signing has been placed to restrict any turning traffic between the hours of 7:30 am and 6:00 pm.



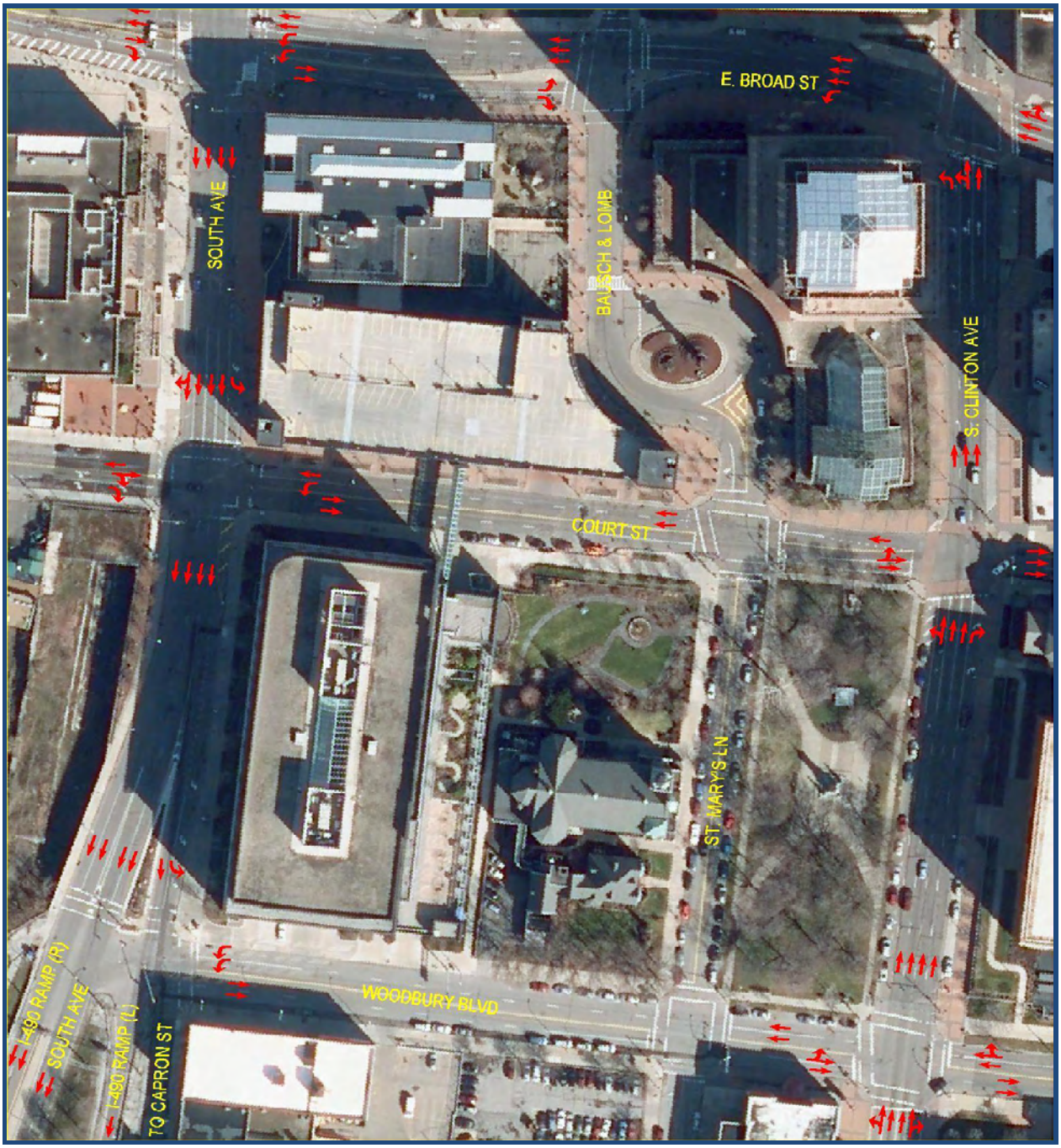
3.2.4 East Main Street to East Broad Street

South Clinton Street between East Main Street and East Broad Street is a two lane northbound roadway. There is parking on the west side of the road with curb bulbouts that provide some protection. On the east side of the road, construction on the new Midtown development is ongoing and concrete barriers line the roadway. It is anticipated that a parking lane with bulbouts will be present once construction is complete. There is a mid-block pedestrian crossing along this roadway segment. South Avenue along this block is a three lane southbound roadway. A left turn lane is picked up midblock to service the South Avenue Garage. This fourth lane is dropped at the garage, but reemerges from the garage exit to yield four lanes southbound at the East Broad Street Intersection. East Broad Street is a one way roadway at the South Clinton Avenue Intersection, but switches to two-way traffic from the Stone Street Intersection to the west. It should be noted that the Midtown Redevelopment project proposes to switch East Broad Street to two-way operations east of Clinton Avenue and possibly all the way to Stone Street in the future.

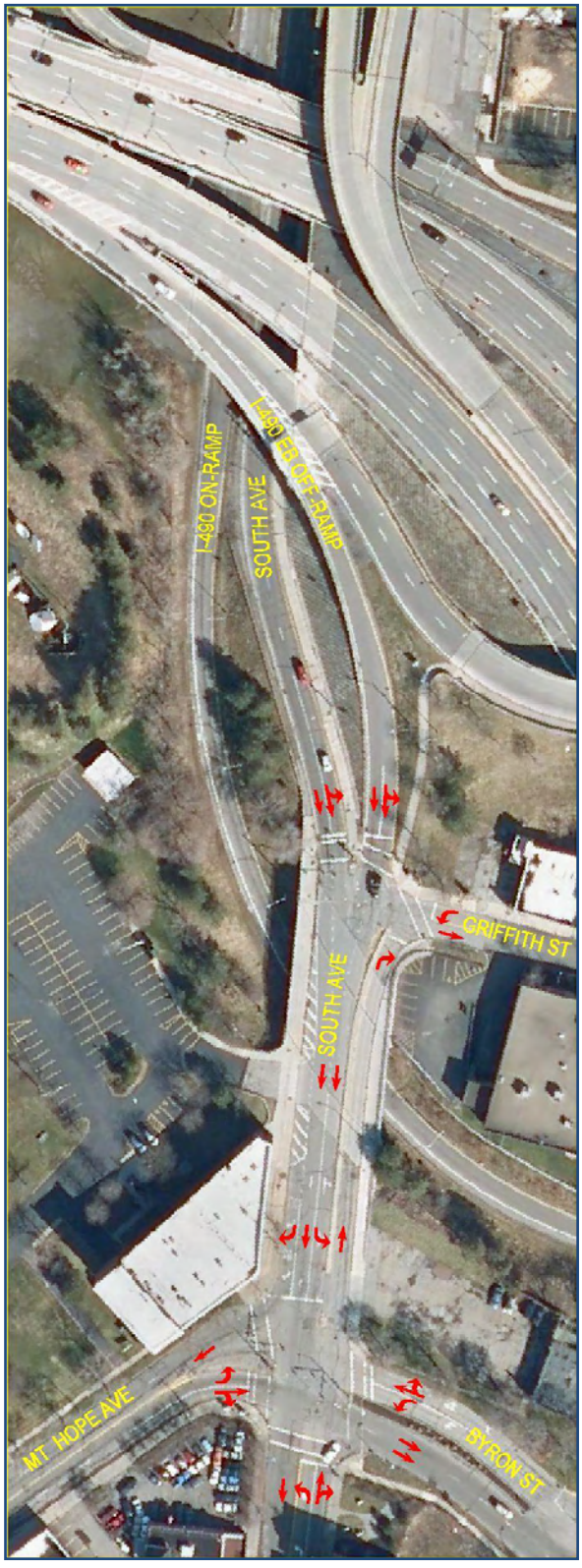


3.2.5 East Broad Street to Woodbury Boulevard

South Clinton Avenue between Woodbury Boulevard and Court Street is a four lane northbound roadway. It drops to three lanes between Court Street and East Broad Street. Parking on South Clinton occurs on the west side between Woodbury Boulevard and Court Street, and in a small bulbout on the east side of that block. South Avenue is a four lane southbound roadway between East Broad Street and Woodbury Boulevard, but an additional left turn lane is added at its intersection with Court Street. At the Intersection of South Avenue and Woodbury Boulevard, it splits into six southbound lanes; two lanes enter I-490 from on the right side, one lane enters I-490 on the left side, two lanes continue south on South Avenue and one lane is designated as a left turn lane onto Woodbury Boulevard.



3.2.6 Woodbury Boulevard to Mount Hope Avenue/Byron Street



South Avenue returns to two way operations south of Griffith Street. Between Woodbury Boulevard (located immediately to the north of the intersections shown in the figure to the right) and Byron St. is an interchange with I-490 eastbound, whose on and off ramps are directly accessed by South Avenue. At the South Avenue intersection with Griffith Street, South Avenue has two lanes southbound and the I-490 ramp has one lane southbound. The I-490 approach was two-lanes previously, as shown in the aerial to the right, but was recently changed to one lane as part of a recent construction project. Griffith Street has a single lane in each direction, though traffic from Griffith is only allowed to turn left at the intersection because of the northern roads being one way southbound. However, future it is planned in the near future to restripe these lanes such that only one lane comes off of the I-490 ramp and only one through lane southbound will be present at the Mt. Hope Avenue/Byron Street intersection. This will change the second southbound through lane to an exclusive left turn lane in the future.

South Avenue in the area of I-490 loses its downtown character. Though there is an adjacent sidewalk for most of the length, the access point to that sidewalk at Woodbury Blvd. is away from the roadway and not readily apparent making pedestrian and bicycle access to the roadway more difficult.

There is no parking on South Avenue between Mt. Hope Avenue and Woodbury Blvd, but on-street parking is present on both Mt. Hope Avenue and South Avenue at points south of that location.

Please see figure to the right for a graphical depiction of the lane arrangement for this area.

Though not pictured to the right, South Clinton Avenue between Woodbury Blvd and Byron Street is a one-way northbound roadway. At Woodbury Blvd, four lanes exist on the northbound approach. Two of these lanes travel from Byron Street and the other two lanes are picked up mid-block from the I-490 westbound off-ramp.

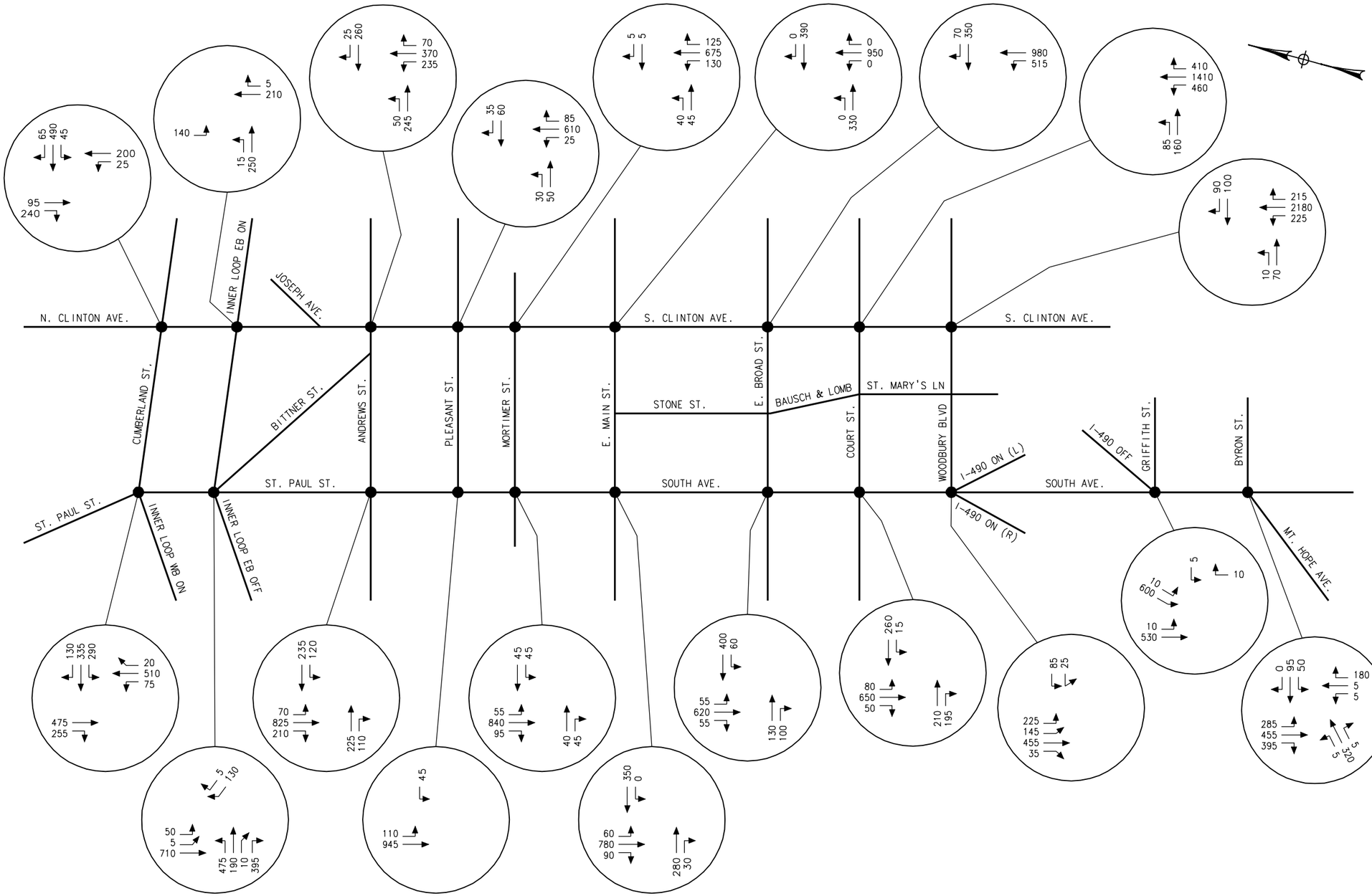
3.3 EXISTING TRAFFIC VOLUMES

As discussed in Section 3.1.2, traffic count data was obtained from a variety of sources and was collected over a number of years. Consolidating and adjusting this data to create peak hour traffic volumes that accurately reflect 2011 conditions involved several steps. First, the Genesee Transportation Council (GTC) was consulted and past counts were reviewed to determine historic and projected traffic growth rates for the area. The information examined indicated that traffic over the last decade has remained relatively constant, and has even declined at some locations. The GTC's projections for traffic growth appear to reflect this general trend as well. Based on their travel demand model, traffic growth in this area is projected to be about 0.2% per year over the next 25 years, exclusive of any major developments planned within the study area. This translates to an estimated increase of only 5% in the year 2035.

Recognizing that traffic volumes have not increased over the past few years and that traffic counts have been conducted at almost all the studied intersections over the last 5 years, no adjustments were made to the counts for annual traffic growth. Knowing that traffic volumes fluctuate on a daily basis and certain blocks should see little to no change in volume between adjacent intersections, the available traffic volume information was "balanced" to reflect volumes for the AM and PM peak hours on a typical day. For instance, South Avenue between Woodbury Boulevard and Griffith Street has no development that would draw or add traffic to the roadway. Thus, the magnitude of traffic volume leaving the Woodbury Boulevard intersection should equal what arrives at the Griffith Street intersection. This could be done for much of the St. Paul Street/South Avenue corridor except for between East Main Street and East Broad Street, where the South Avenue Garage causes a noticeable mid-block volume change. For the North/South Clinton Avenue corridor, the Clinton Square and Mortimer Street Parking Garages cause significant changes in mid-block traffic, but the other blocks of that corridor see little to no mid-block change and were balanced accordingly. All balancing considered the most recent counts as the most representative of current traffic volumes, so more weight was given to the traffic counts conducted in 2011.

As much of the parking access for the downtown occurs along the side streets, all side streets from the Inner Loop eastbound ramps to Woodbury Boulevard saw mid-block traffic variations and were not balanced as a result. For these locations, the available count data was reviewed to determine the most likely change in traffic volumes as a result of these mid-block locations, and adjustments were made accordingly.

The resulting AM Peak Hour Traffic Volumes and PM Peak Hour Traffic Volumes used in the analysis for this study are shown in Figures 1 and 2 respectively, on the following pages.



DATE: JUNE 27, 2011

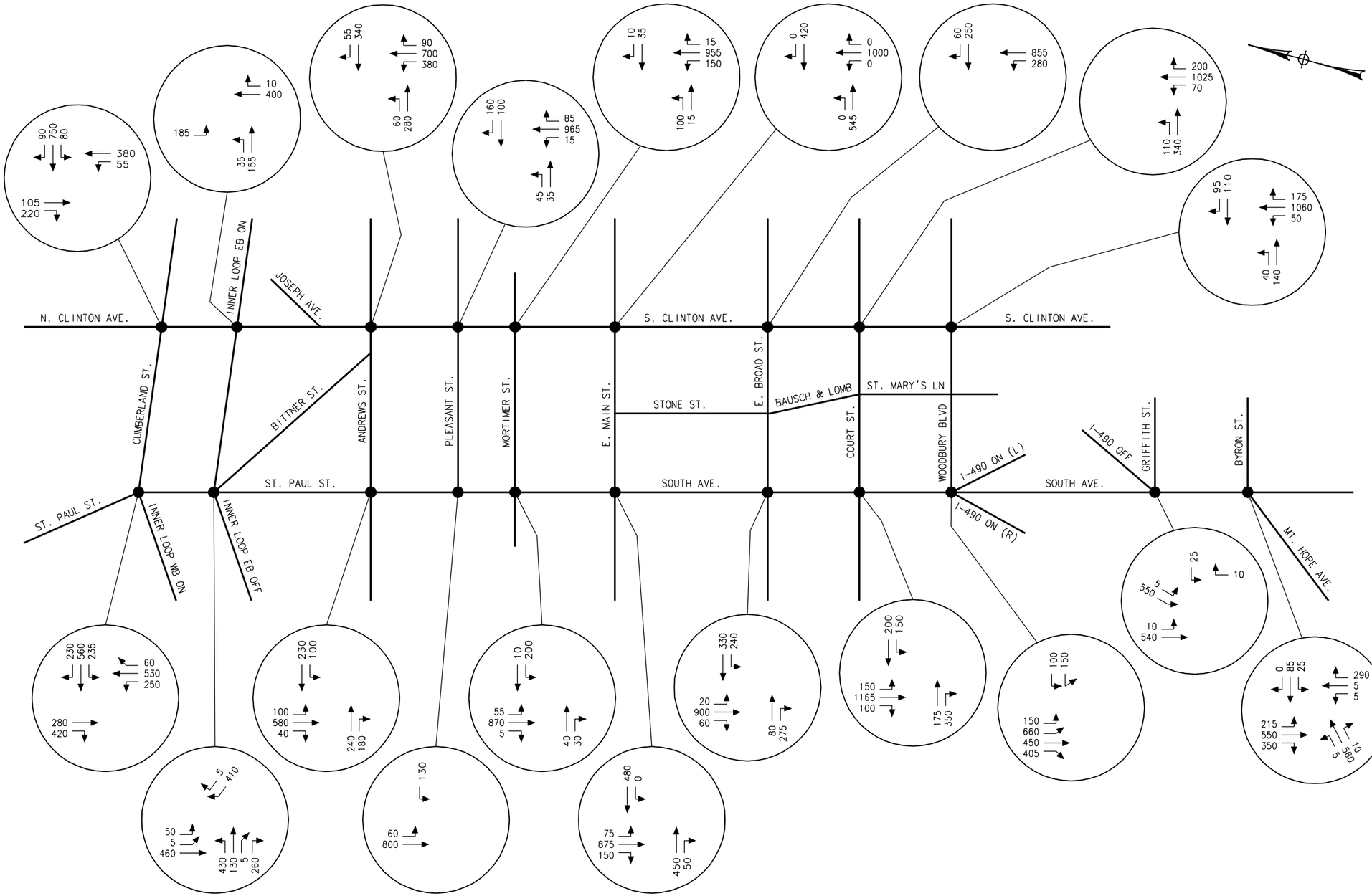
SCALE: N/A

Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 1
2011 AM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mr● 6/27/2011 2:18:58 PM



DATE:	JUNE 27, 2011
SCALE:	N/A

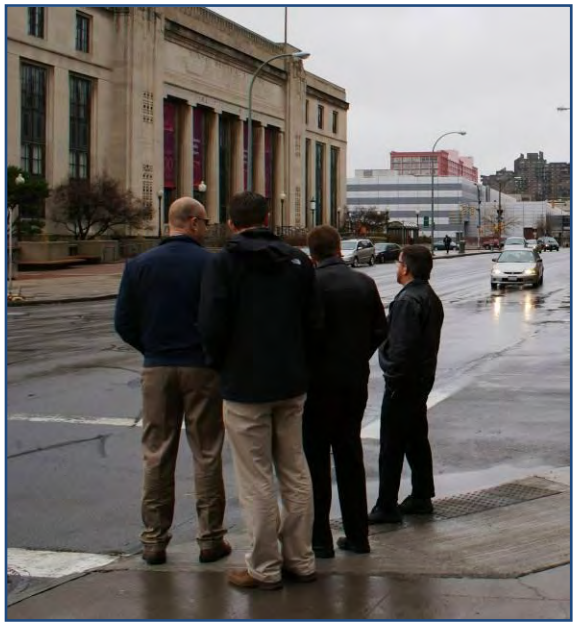
Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 2
2011 PM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PMVOL.dgn mr● 6/27/2011 2:18:03 PM

3.4 PEDESTRIANS AND BICYCLES



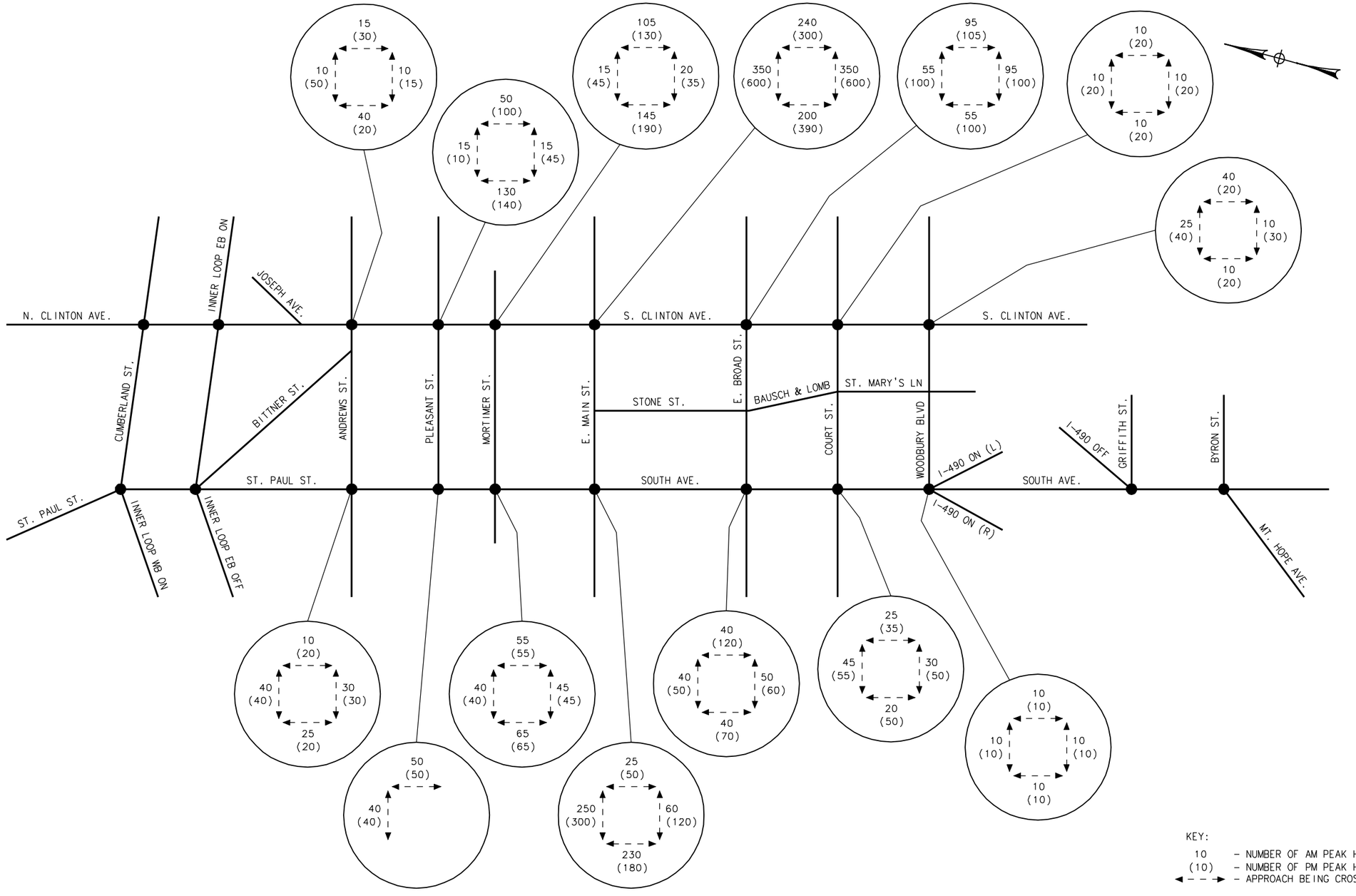
Pedestrian and bicycle counts were conducted at select locations in April 2011. Pedestrian volume information from other traffic studies was also reviewed. The data indicates that the Rochester Downtown area has significant pedestrian traffic with most intersections seeing between 100 and 500 pedestrians in the peak hours. The highest of these volumes occur where transit usage is the highest. In fact, at the East Main Street intersections, which see the highest downtown transit usage, the magnitude of pedestrians is extremely elevated with over 500 peak hour pedestrians at St. Paul Street and between 1,000 and 2,000 pedestrians at the North Clinton Avenue Intersection. However, this number of existing pedestrians is related to the use of these stops as bus transfer locations. The RTS Transit Center, once constructed in 2013, will eliminate the need for these transfers in the future, thus reducing the number of pedestrian crossings seen. The existing pedestrian traffic is shown on Figure 3.

Concerning bicycles, it was observed that between 2 and 18 bicycles crossings occurred per peak hour at each the four recently counted intersections. However, field conditions during the timeframe of the counts included sporadically rainy weather that may have skewed observations away from typical activity, as fewer pedestrians and bicycles are typically seen during inclement weather. A summary of the bicycle crossings observed is in Table 3.2 below.

TABLE 3.2
Peak Hour Bicycle Traffic Summary

Intersection	AM PEAK HOUR		PM PEAK HOUR	
	East-West Crossings	North-South Crossings	East-West Crossings	North-South Crossings
S. Clinton Ave. at Woodbury Blvd.	8	7	12	6
N. Clinton Ave. at Andrews St.	1	1	0	4
South Ave. at E. Broad St.	9	4	5	9
St. Paul St. at E. Main St.	5	1	2	3

As bicycle observations were not available for all of the other intersections being studied and the observations that were conducted were all generally similar in magnitude, it was assumed for the capacity analysis that all the studied intersections will experience the same level of bicycle activity during the peak hours. Given the bicycle volumes observed, it was determined that using 5 bicycle crossings per approach (20 crossings per 4-legged intersection) for each of the intersections during the peak hours would be a close and reasonable approximation of bicycle traffic at each and would account for any underrepresentation because of weather at the time of the observations.



KEY:

10 – NUMBER OF AM PEAK HOUR PEDESTRIAN CROSSINGS
(10) – NUMBER OF PM PEAK HOUR PEDESTRIAN CROSSINGS
◄ - - - ► – APPROACH BEING CROSSED

DATE: JUNE 27, 2011

SCALE: N/A

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 3
2011 ESTIMATED PEDESTRIAN TRAFFIC

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PED.dgn mrw 6/27/2011 2:18:28 PM

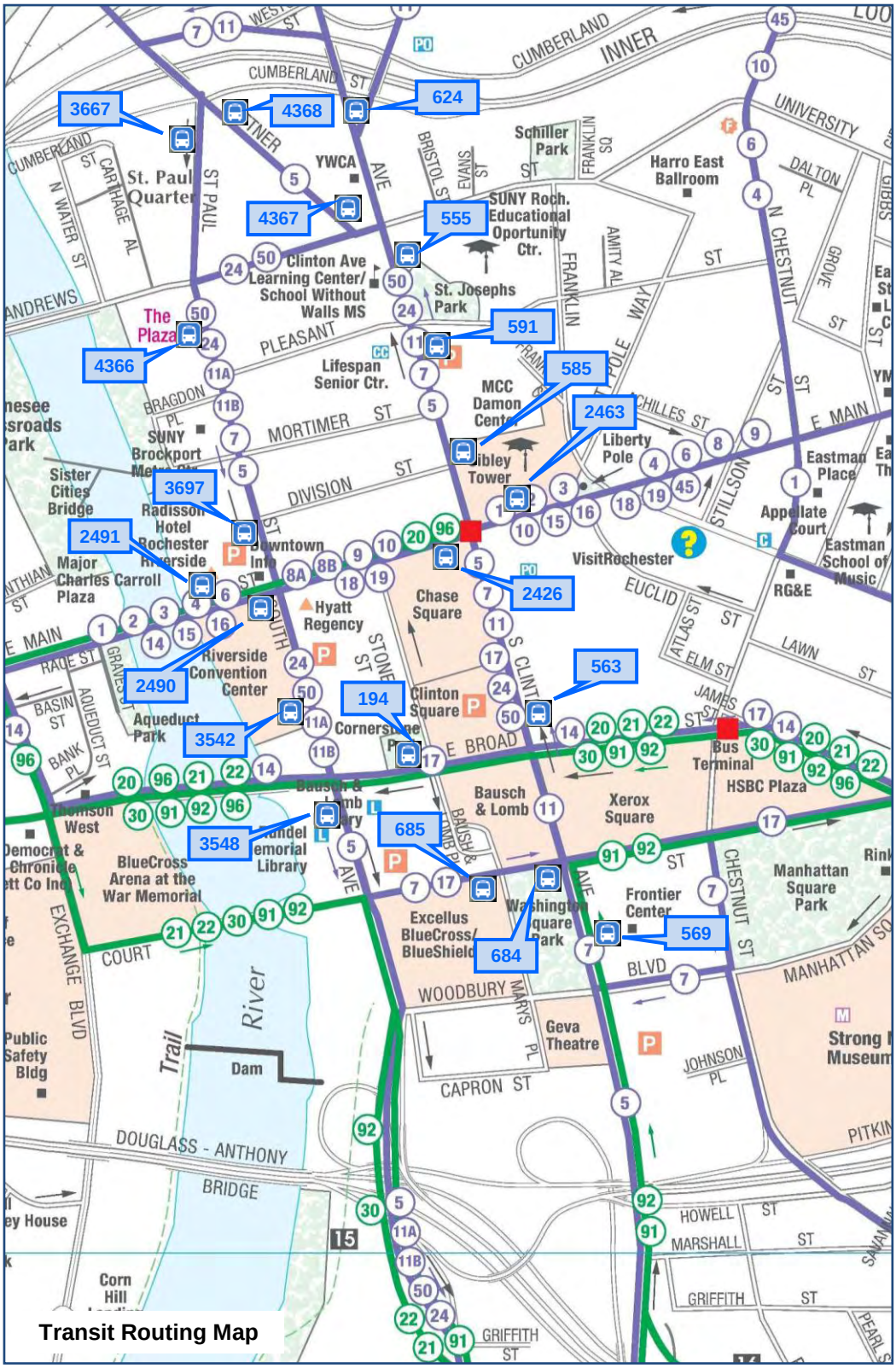
3.5 TRANSIT OPERATIONS

Significant transit activity occurs in downtown Rochester, with more than two dozen transit routes available. There are more than 20 bus stops within the study area and ridership accounts for nearly 10,000 boardings (people entering the bus) and over 8,500 alightings (people exiting the bus) at those stops each day. Much of the transit activity is centered around East Main Street, which serves as the route transfer area downtown with the Central Information Shelter for the Regional Transit Service (RTS) being located along East Main Street, just west of North Clinton Avenue. The current downtown bus stops and a summary of the average number of boardings and alightings at each are summarized in Table 3.3.

TABLE 3.3
Bus Stop Boardings/Alightings Summary

Stop Name	Stop ID	Average Daily Boardings	Average Daily Alightings
Clinton & Cumberland	624	1	4
Clinton & Andrews	555	14	6
Clinton & Pleasant	591	40	27
Clinton & Main Northbound (Shelter)	585	unk	unk
Clinton & Broad	563	0	1
Clinton & Court	569	43	242
Bittner & Andrews	4367	8	8
Bittner & Cumberland	4368	1	1
St Paul & Cumberland	3667	2	7
St Paul & Plaza Apts (Shelter)	4366	57	94
St Paul & Main (Shelter)	3697	1886	1473
South & Broad	3542	238	20
South & Court (Shelter)	3548	160	45
Main & South (Shelter)	2490	800	1867
Main & Clinton Eastbound (Shelter)	2426	2520	2864
Main & Clinton Westbound (Shelter)	2463	2261	1121
Main & St Paul (Shelter)	2491	1495	774
Broad & Stone (Shelter)	194	55	30
Court & Saint Marys	685	18	8
Court & Clinton	684	22	2

Of these boardings and alightings, between 6% and 8% will typically occur per peak hour in both the morning and afternoon. As indicated above, 9 of the 20 stops have shelters, the others do not. A map showing the general transit routing through the study area (by route number) and each of the stop locations listed above can be found on the next page. Bus Stops are shown in blue with their Stop ID.



Courtesy of Rochester Genesee Regional Transportation Authority

It should be noted though that the bus stops shown above will be changed in the future to accommodate the RTS Transit Center, which will be constructed along Mortimer Street by the Fall of 2013. Once completed, the Transit Center will serve as a central focal point for bus transfers. This will result in a reduced need for and possible elimination of Stops #2426, #2491, #3697, #2463, #585 & #591.

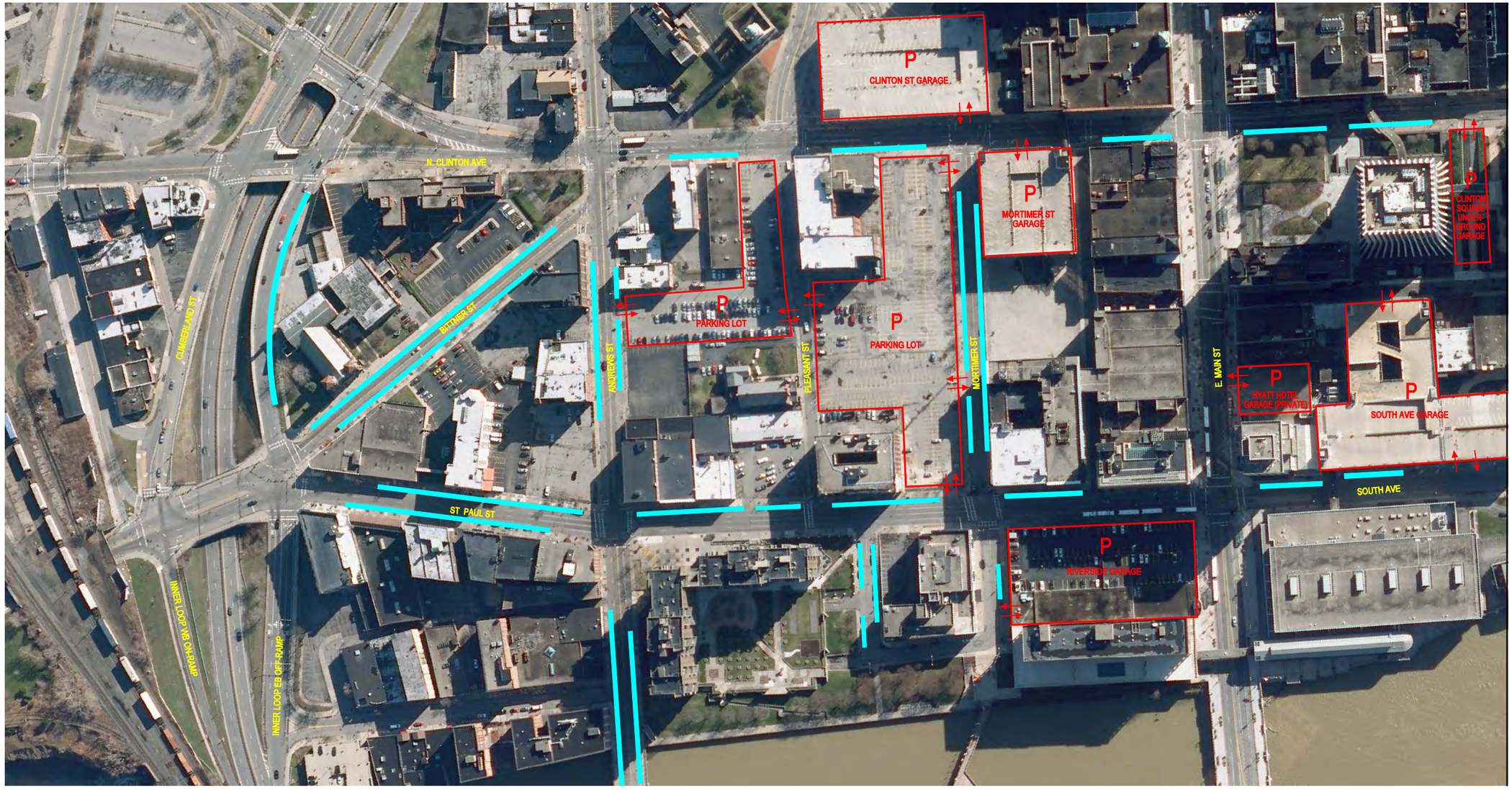
3.6 PARKING OPERATIONS

Parking within the Study Area is comprised of on-street public parking, off-street public parking (both surface lots and garages), and off-street private parking (both surface lots and garages). The on-street parking is predominantly pay parking, with a combination of on-street meters and "Pay and Display" being used. "Pay and Display" is a term to represent a pay parking system where a user would pay for parking at a designated on-street pay station and display the receipt in the front window of their vehicle during the valid period. On-Street parking is generally limited to a 2-hour parking limit.

For off-street parking, there are six garages available for public use and at least three additional garages restricted for private use, there are at least three major surface lots for public use and several smaller surface lots used for private businesses. There is also an expansion of the Washington Square Garage being proposed. In addition, once the Midtown Redevelopment is complete, another 1,800 space parking garage and additional on-street parking will also be available for use.

Overall, based on information from the Comprehensive Downtown Parking Study completed by Walker Parking Consultants in 2008, there are approximately 4,700 total existing parking spaces within the blocks designated as the Study Area for the Two-Way Conversion Study. Approximately 225 of those spaces are short term on-street parking and the remainder is comprised of a combination of public and private off-street locations. Based on data from that 2008 Parking Study, the difference between parking supply and parking demand within the Study Area is over 1,900 spaces on a typical weekday, meaning parking is generally only 60% occupied within the Study Area. This does varies by block though, with some blocks seeing parking occupancy over 80%, and with some individual parking garages being at capacity. In addition, the future RTS Transit Center will replace one of the larger surface lots within the north side of the study area (along Mortimer St.). This will reduce the parking capacity in that area.

Figures 4A & 4B depict the general locations of on-street parking as well as the locations of the major parking garages and surface lots within the Study Area.



MATCHLINE A

KEY:

- GENERAL AREA OF ON-STREET PARKING
- P — MAJOR PARKING GARAGE OR SURFACE LOT
- ACCESS POINT TO PARKING AREA

DATE: JUNE 27, 2011

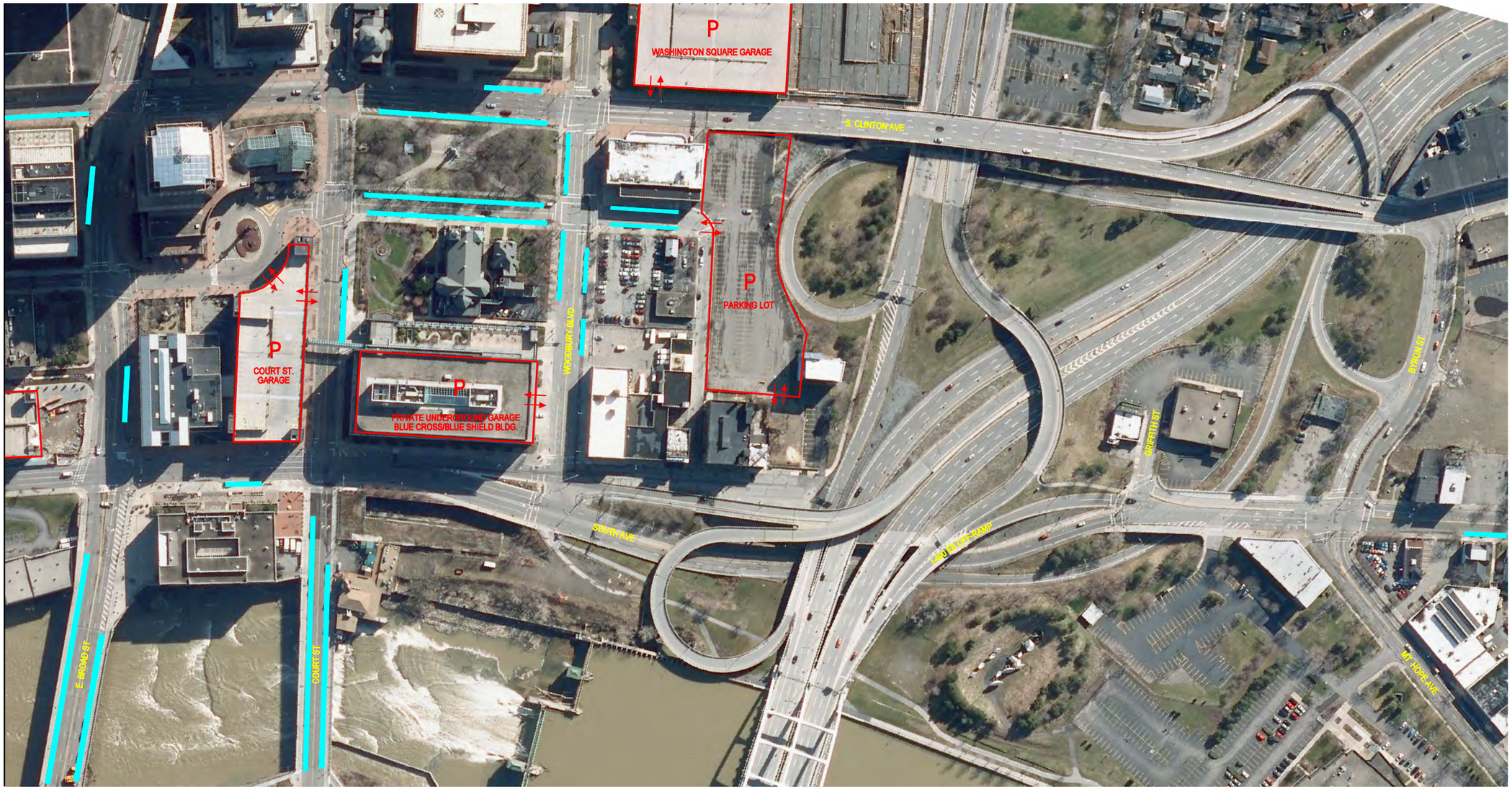
SCALE: 1"=200' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 4A – NORTHERN SECTION PARKING OVERVIEW

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PARKING_NORTH.dgn mr# 6/27/2011 2:21:10 PM



KEY:

GENERAL AREA OF ON-STREET PARKING

P — MAJOR PARKING GARAGE OR SURFACE LOT

ACCESS POINT TO PARKING AREA

DATE: JUNE 27, 2011

SCALE: 1"=200' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 4B – SOUTHERN SECTION PARKING OVERVIEW

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\20110351\Cadd\E-PARKING_SOUTH.dgn mrw 6/27/2011 2:20:18 PM

3.7 ACCIDENT HISTORY

A review of accidents within the project area was conducted to assess areas where a change from one-way to two-way operations may be problematic with regards to safety. The review included accident data for the full three year period from January 1, 2008 through December 31, 2010. The data shows that 305 accidents occurred at the 20 intersections being studied. Of those accidents, there were no fatalities, 99 involved an injury, 115 involved property damage only (PDO) and 91 were non-reportable, meaning there was less than $400 of property damage. A breakdown of the Accident Severity by intersection is found in Table 3.4.

TABLE 3.4
Intersection Accident Severity Summary

Intersection	Total Accidents	Fatality	Injury	PDO	Non-Reportable
South Ave. at Mt. Hope Ave./Byron St.	16	0	5	7	4
South Ave. at Griffith /I-490 EB Off-Ramp	1	0	0	0	1
South Ave. at Woodbury Blvd	9	0	5	4	0
South Ave. at Court St.	22	0	7	7	8
South Ave. at E. Broad St.	16	0	7	8	1
St. Paul St. at E. Main St.	38	0	10	13	15
St. Paul St. at Mortimer St.	4	0	0	2	2
St. Paul St. at Pleasant St.	10	0	3	6	1
St. Paul St. at Andrews St.	18	0	4	6	8
St. Paul St. at Inner Loop EB/Bittner St.	25	0	9	8	8
St. Paul St. at Inner Loop WB/Cumberland St.	4	0	0	4	0
S. Clinton Ave. at Woodbury Blvd.	21	0	7	9	5
S. Clinton Ave. at Court St.	27	0	8	11	8
S. Clinton Ave. at E. Broad St.	6	0	1	2	3
N. Clinton Ave. at E. Main St.	35	0	14	10	11
N. Clinton Ave. at Mortimer St.	5	0	1	2	2
N. Clinton Ave. at Pleasant St.	14	0	4	5	5
N. Clinton Ave. at Andrews St.	22	0	9	4	9
N. Clinton Ave. at Inner Loop EB	1	0	1	0	0
N. Clinton Ave. at Cumberland St.	11	0	4	7	0

Investigating these accidents in more detail, they can be grouped by accident type to help identify any patterns that may indicate a geometric or operational concern. The accident types at each of the studied intersections are summarized in Table 3.5.

TABLE 3.5
Intersection Accident Type Summary

Intersection	Head-on	Rear End	Turning (Left or Right)	Right Angle	Overtaking	Sideswipe	Fixed Object	Pedestrian/Bicycle	Other/Unknown
South Ave. at Mt. Hope Ave./Byron St.	0	4	1	2	3	0	2	0	4
South Ave. at Griffith /I-490 EB Off-Ramp	0	0	0	0	0	0	1	0	0
South Ave. at Woodbury Blvd	0	0	0	2	1	0	1	0	5
South Ave. at Court St.	0	1	3	3	7	0	0	3	5
South Ave. at E. Broad St.	0	3	1	3	5	0	0	2	2
St. Paul St. at E. Main St.	1	11	2	6	7	1	0	3	7
St. Paul St. at Mortimer St.	0	0	0	0	2	0	1	0	1
St. Paul St. at Pleasant St.	0	0	1	0	5	0	0	0	4
St. Paul St. at Andrews St.	0	2	4	1	2	1	0	1	7
St. Paul St. at Inner Loop EB/Bittner St.	0	6	4	5	2	0	4	0	4
St. Paul St. at Inner Loop WB/Cumberland St.	0	0	0	0	1	0	3	0	0
S. Clinton Ave. at Woodbury Blvd.	0	3	2	4	3	1	0	2	6
S. Clinton Ave. at Court St.	0	2	1	9	10	0	0	0	5
S. Clinton Ave. at E. Broad St.	0	0	0	4	1	0	0	0	1
N. Clinton Ave. at E. Main St.	0	9	1	3	5	0	1	7	9
N. Clinton Ave. at Mortimer St.	0	0	0	0	1	0	0	0	4
N. Clinton Ave. at Pleasant St.	0	3	1	2	1	0	0	1	6
N. Clinton Ave. at Andrews St.	0	2	1	6	4	0	1	1	7
N. Clinton Ave. at Inner Loop EB	0	0	1	0	0	0	0	0	0
N. Clinton Ave. at Cumberland St.	0	0	2	1	2	0	0	0	6

The main indicator of potential concern would be the accident rate at a particular location. Accident rates are measured in terms of number of accidents per million entering vehicles (MEV) at an intersection. Accident rates can also be calculated along roadway links in terms of accidents per million vehicle miles (MVM) traveled, but because of the short block lengths within a downtown area, even a small number of accidents can result in extremely high rates that may not be indicative of any real problem. The accident rate for links is better considered when applied to longer stretches of roadway with few intersections. Because of this, this study will focus on the intersection accident rates only. Intersection accident rates within a downtown area will still tend to be much higher than similar intersections outside of a central business district because of the numerous conflicts (parked cars, pedestrians, bicycles, etc.) associated with these areas, but comparing the intersection accident rates from intersection to intersection, and to the

average rate within the downtown area, the intersections with the highest rates can be identified. Intersection accident rates calculated for the Study Area intersections are shown in Table 3.6 below.

TABLE 3.6
Intersection Accident Rate Summary

Intersection	Total Accidents	Accident Rate (Accidents/MEV)
South Ave. at Mt. Hope Ave./Byron St.	16	0.68
South Ave. at Griffith /I-490 EB Off-Ramp	1	0.08
South Ave. at Woodbury Blvd	9	0.29
South Ave. at Court St.	22	0.77
South Ave. at E. Broad St.	16	0.75
St. Paul St. at E. Main St.	**38**	**1.30**
St. Paul St. at Mortimer St.	4	0.28
St. Paul St. at Pleasant St.	10	0.76
St. Paul St. at Andrews St.	18	0.69
St. Paul St. at Inner Loop EB/Bittner St.	25	1.01
St. Paul St. at Inner Loop WB/Cumberland St.	4	0.14
S. Clinton Ave. at Woodbury Blvd.	21	0.77
S. Clinton Ave. at Court St.	27	0.95
S. Clinton Ave. at E. Broad St.	6	0.29
N. Clinton Ave. at E. Main St.	**35**	**1.36**
N. Clinton Ave. at Mortimer St.	5	0.35
N. Clinton Ave. at Pleasant St.	14	0.90
N. Clinton Ave. at Andrews St.	22	0.96
N. Clinton Ave. at Inner Loop EB	1	0.10
N. Clinton Ave. at Cumberland St.	11	0.59

The average accident rate for the studied intersections within the downtown area is 0.65 accidents per million entering vehicles. Though 12 of the 20 intersections exceed this rate, only two of the intersections stand out as twice the area's average rate or more. Those intersections are:

- St. Paul Street at East Main Street
- North Clinton Avenue at East Main Street

In looking at the accident types present, these intersections both see a high number of both rear end and pedestrian/bicycle accidents. Given the significant transit activity at these locations and the pedestrians associated with that activity, it appears that pedestrian conflicts and vehicles stopping unexpectedly for those conflicts may be the contributing factor to the increased rates. The only other noteworthy rate, is at St. Paul St. and the Inner Loop/Bittner Street intersection. The elevated rate at that location can most likely be attributed to the 5-legged intersection geometry and the confusion it may present.

3.8 OPERATIONAL ANALYSIS

The operating conditions of transportation facilities are evaluated based on the relationship of existing or projected traffic volumes to the theoretical capacity of the highway facility. Various factors affect capacity including traffic volume, travel speed, roadway geometry, grade, number and width of travel lanes and intersection control. The current standards for evaluating capacity and operating conditions are contained in the *Highway Capacity Manual*, published by the Transportation Research Board. The procedures describe operating conditions in terms of Level of Service (LOS). In general, "A" represents the best operating condition and "F" represents the worst. Level of service "D" or better normally represents acceptable operating conditions during peak periods.

To determine the impact of the proposed two-way conversion on the operations of the adjacent transportation system, traffic operations will be analyzed for both the weekday AM and PM peak hour conditions under existing, future no-build and future build conditions. The traffic operations for the existing conditions within the study area are presented in this report. The operational analyses for the future conditions will be presented in the Feasibility Assessment Report which will subsequently be developed. The existing traffic conditions for the intersections within the study area are discussed below and capacity analysis results are summarized in 2011 Existing Peak Hour Level of Service Summary shown in Table 3.7 at the end of this section. The computation worksheets for the capacity analysis are provided in Appendix A.

3.8.1 St. Paul Street/South Avenue Corridor Operations

Operations at the intersections within this corridor are all within an acceptable range. Overall intersection levels of service range between LOS A and LOS C in the AM Peak Hour, and LOS B to LOS D in the PM Peak Hour. For the individual approaches to the intersections, all but one approach within the entire corridor operate at LOS D or better in both peak hours. The only approach that shows a poor level of service is the northwest-bound Bittner Street approach at St. Paul Street, which operated at LOS E with an estimated average delay of 65.4 seconds per vehicle in the PM Peak Hour.

The Corridor itself was evaluated as an urban street using the methodologies outlined in the *Highway Capacity Manual* to get an overall Arterial Level of Service based on average travel speed through the corridor. The result was that the St. Paul Street/South Avenue corridor as a whole experiences LOS D in both peak hours with an average travel speed of 12.7 miles per hour (mph) in the AM Peak Hour and 11.2 mph in the PM Peak Hour.

3.8.2 North/South Clinton Corridor Operations

Operations at the intersections within this corridor also operate within acceptable ranges for both the AM and PM Peak Hours. Overall the intersections experience LOS A to LOS D in the AM Peak Hour and LOS A to LOS C in the PM Peak Hour. All intersection approaches within this corridor operate at LOS D or better. The corridor overall experiences an arterial level of service of LOS C in the AM Peak Hour and LOS D in the PM Peak hour with average travel speeds of 13.6 mph and 12.1 mph respectively.

TABLE 3.7
2011 Existing Peak Hour Level of Service Summary

Intersection	Approach	AM Peak Hour LOS(delay)	PM Peak Hour LOS(delay)
South Ave. at Mt. Hope Ave./ Byron St.	NB	A (6.2)	B (10.8)
	SB	A (8.5)	C (20.3)
	EB	C (20.8)	B (19.6)
	WB	B (19.7)	B (15.8)
	Overall	**B (11.5)**	**B (18.4)**
South Ave. at Griffith/I-490 EB Off-Ramp	NB	C (27.4)	C (27.5)
	SB	B (11.1)	B (14.4)
	SW	C (21.8)	B (17.9)
	WB	C (28.9)	C (29.0)
	Overall	**B (16.9)**	**B (16.6)**
South Ave. at Woodbury Blvd	SB	A (1.4)	A (8.9)
	WB	D (40.0)	D (44.8)
	Overall	**A (5.8)**	**B (13.6)**
South Ave. at Court St.	SB	A (6.5)	B (15.2)
	EB	B (17.2)	D (39.2)
	WB	A (7.9)	C (20.8)
	Overall	**A (9.7)**	**C (21.6)**
South Ave. at E. Broad St.	SB	A (8.8)	B (11.9)
	EB	C (28.9)	D (43.6)
	WB	B (17.1)	B (17.5)
	Overall	**B (14.7)**	**B (19.5)**
St. Paul St. at E. Main St.	SB	A (7.8)	B (13.0)
	EB	D (35.7)	D (36.2)
	WB	B (16.7)	C (23.3)
	Overall	**B (15.2)**	**C (21.0)**
St. Paul St. at Mortimer St.	SB	A (1.1)	B (10.7)
	EB	C (31.8)	C (22.3)
	WB	D (50.8)	C (27.3)
	Overall	**A (7.1)**	**B (14.1)**
St. Paul St. at Pleasant St.	SB	A (5.1)	A (4.9)
	WB	D (49.6)	D (46.6)
	Overall	**A (6.9)**	**B (10.4)**
St. Paul St. at Andrews St.	SB	C (20.2)	C (21.7)
	EB	C (20.8)	B (19.8)
	WB	C (28.9)	C (23.9)
	Overall	**C (22.0)**	**C (21.6)**
St. Paul St. at Inner Loop EB/ Bittner St.	SB	A (1.9)	A (0.9)
	EB	D (46.1)	D (37.6)
	NW	C (22.3)	E (65.4)
	Overall	**C (27.3)**	**C (33.4)**
St. Paul St. at Inner Loop WB/ Cumberland St.	NB	A (9.2)	A (7.7)
	SB	C (32.3)	D (44.1)
	WB	D (37.3)	D (38.1)
	Overall	**C (27.3)**	**C (29.7)**
S. Clinton Ave. at Woodbury Blvd.	NB	B (13.8)	C (24.5)
	EB	D (41.8)	B (19.3)
	WB	C (32.7)	B (15.2)
	Overall	**B (15.9)**	**C (22.6)**
S. Clinton Ave. at Court St.	NB	A (6.1)	A (7.2)
	EB	C (22.4)	B (19.7)
	Overall	**A (7.7)**	**B (10.8)**
S. Clinton Ave. at E. Broad St.	NB	A (3.8)	A (8.2)
	WB	C (26.6)	B (17.2)
	Overall	**A (9.0)**	**B (10.1)**
N. Clinton Ave. at E. Main St.	NB	A (8.7)	B (17.8)
	EB	D (54.8)	C (21.0)
	WB	D (47.6)	C (27.1)
	Overall	**C (27.6)**	**C (20.7)**
N. Clinton Ave. at Mortimer St.	NB	A (0.2)	A (0.6)
	EB	D (54.7)	D (49.2)
	WB	D (39.4)	D (36.0)
	Overall	**A (5.1)**	**A (6.2)**
N. Clinton Ave. at Pleasant St.	NB	A (5.1)	A (4.8)
	EB	D (52.9)	C (34.9)
	WB	C (31.9)	C (31.6)
	Overall	**B (12.2)**	**B (11.5)**
N. Clinton Ave. at Andrews St.	NB	B (10.9)	A (4.0)
	EB	B (17.2)	C (28.3)
	WB	B (18.6)	C (29.3)
	Overall	**B (14.2)**	**B (13.7)**
N. Clinton Ave. at Inner Loop EB	NB	B (10.9)	B (11.6)
	SB	A (4.9)	A (9.5)
	EB	C (21.2)	B (15.2)
	Overall	**B (13.9)**	**B (12.0)**
N. Clinton Ave. at Cumberland St.	NB	A (3.0)	A (4.3)
	SB	C (25.9)	C (30.9)
	WB	C (20.7)	C (20.4)
	Overall	**B (18.8)**	**B (18.3)**

Notes:
Delay = Seconds per Vehicle
NB=northbound, NW=northwestbound, SB=southbound, SW=southwestbound, EB=eastbound, WB= westbound

3.9 SUMMARY OF EXISTING CONDITIONS ANALYSIS

The preceding presents the existing conditions analysis for the North/ South Clinton Avenue and the St. Paul Street/South Avenue corridors within the City of Rochester's Central Business District. These are one-way roadways that are being evaluated to see if conversion to two-way traffic is feasible.

The existing conditions analysis includes the following:

- Summary of existing roadway geometry and lane arrangements
- Existing peak hour traffic volume information
- Existing pedestrian and bicycle traffic volume information
- Summary of transit operations and shelter locations
- Summary of parking locations
- Analysis of accident history
- Analysis of existing traffic operations

Items of note concerning the analyses contained in this section of the report include:

- Existing Traffic Volumes were estimated from traffic counts conducted over the past 5 years from previous studies supplements by select traffic counts recently conducted for this study.
- Traffic growth has been minimal over the last decade and in some cases traffic volumes have dropped. GTC anticipates traffic growth within the study area will be only 5% over the next 25 years (0.2% annually), exclusive of any major development within the study area.
- A significant pedestrian presence can be found at most of the intersections within the study area. Pedestrian traffic is particularly high where transit is prevalent, especially along East Main Street.
- Transit activity within the study area is extensive with many routes traveling along both the North/South Clinton Avenue and the St. Paul Street/South Avenue corridors, and several of the side street, most notably East Main Street, where the RTS Central Information Shelter can be found.
- Over 4,700 parking spaces exist within the study area with approximately 225 being on-street parking. Parking overall is generally 60% occupied during a typical weekday leaving approximately 1,900 spaces available for use at any given time.
- The average accident rate within the study area is 0.65 accidents per million entering vehicles at the intersections. Two intersections stand out as high accident locations, both along East Main Street. The accident types found at these locations indicate that high pedestrian volume and transit activity at these locations may be a contributing factor.
- Both the North/South Clinton Avenue and St. Paul Street/South Avenue corridors operate at an arterial LOS D or better in the peak hours, and all intersections within the study area operate at LOS D or better as well. No significant operational deficiencies exist with either corridor.

The addition of the Midtown Redevelopment and the RTS Transit Center over the next couple years will cause changes in vehicular and pedestrian volumes, parking and lane geometry which were only touched upon in this Section. They will be better addressed in the Feasibility Section of this report.

4.0 FUTURE CONDITION TRAFFIC FORECASTING

4.1 FUTURE NO-BUILD TRAFFIC

To develop traffic forecasts for the two-way conversion scenario, the future traffic for the current geometry and traffic control (no-build condition) must first be estimated. To do this, a three step process was utilized. First, 2011 peak hour traffic volumes were redistributed to account for known geometric changes that will occur in the near future. Next, a background growth rate was applied to approximate future traffic volume growth resulting from regional development. For this study, the background growth applied represents a 20 year design horizon. Finally, trip generation from known major developments within the study area were added to the existing traffic volumes. Combined, these adjustments create the estimated future no-build traffic.

4.1.1 Existing Traffic Volumes

The 2011 Existing Peak Hour Traffic Volumes were developed as part of the Existing Conditions Analysis. These volumes for the AM peak hour are shown on Figure 1 in Section 3.0. For the PM peak hour, they are shown on Figure 2, and for pedestrian traffic the existing peak hour volumes are shown on Figure 3.

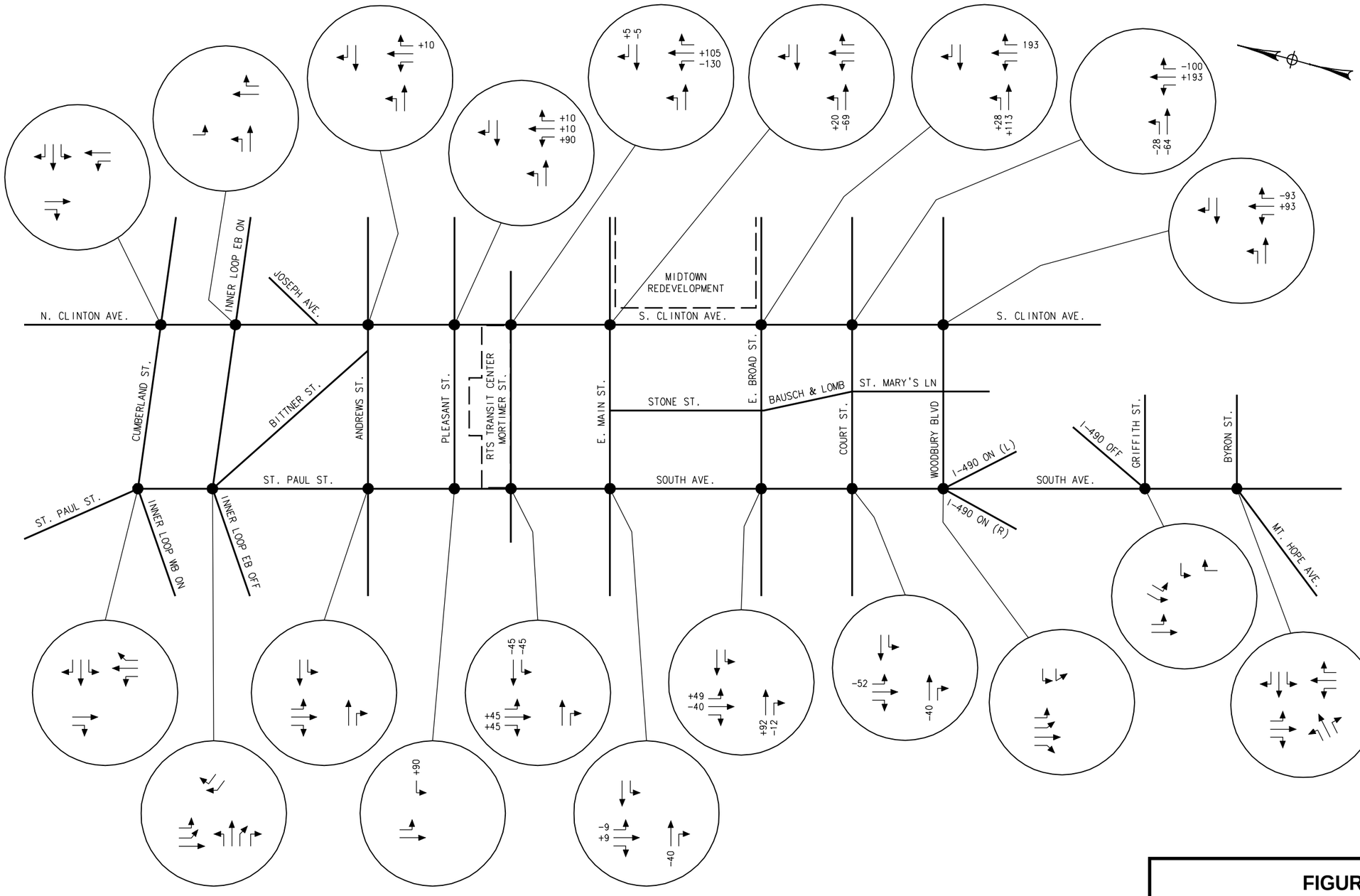
4.1.2 Traffic Redistribution Resulting from Near-Term Geometric Changes

Two significant developments are being planned in the study area within the next few years that would result in road geometry changes; the Midtown Redevelopment, currently under construction; and the RTS Transit Center, planned for 2013. There is also the possibility of a hotel development on the corner of East Main Street and Stone Street, which proposes Stone Street to be converted to two-way traffic, but since that development is only conceptual at this point and no specific project is currently being progressed, it was not included in this study. In addition, there is also the potential for the Broad Street Aqueduct project to move forward, which would bring additional geometric changes, but given the uncertainty of this project and the probable timeframe if constructed, the adjustments resulting from this development were handled as a separate alternative, which will be discussed later in this report.

With regards to the Midtown Redevelopment, the most significant geometric change is the conversion of East Broad Street between Stone Street and South Clinton Avenue to two-way traffic. The Final Design Report issued for the Midtown Redevelopment outlined the necessary traffic adjustments for this conversion. Information from that report was used as a basis for the traffic redistribution used in this report.

In addition, the RTS Transit Center will change the traffic flow pattern within the study area as well. This development proposes to convert Mortimer Street to one-way eastbound operation, and to add site driveways between Mortimer Street and Pleasant Street along both North Clinton Avenue and St. Paul Street. It also proposes to remove turn restrictions along East Main Street at both the Clinton Avenue and St. Paul/South Avenue intersections and re-designate the current “through only” lanes on East Main Street to “through/left” lanes at those intersections and re-designate the current bus lanes at those intersections as “through/right” lanes. For these geometric changes, existing traffic flow patterns were reviewed and existing turn movements were reassigned to achieve a logical progression of traffic while maintaining traffic volumes outside the affected area.

Figures 5 and 6 depict the traffic redistribution resulting from these geometric changes for the AM and PM peak hours respectively.



DATE: JAN 5, 2012	**FIGURE 5**
SCALE: NONE	TRAFFIC REDISTRIBUTION FROM FUTURE GEOMETRIC CHANGES AM PEAK HOUR
	TWO-WAY CONVERSION STUDY NORTH/SOUTH CLINTON AVENUE & ST. PAUL STREET/SOUTH AVENUE CITY OF ROCHESTER, NEW YORK

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/5/2012 4:17:57 PM

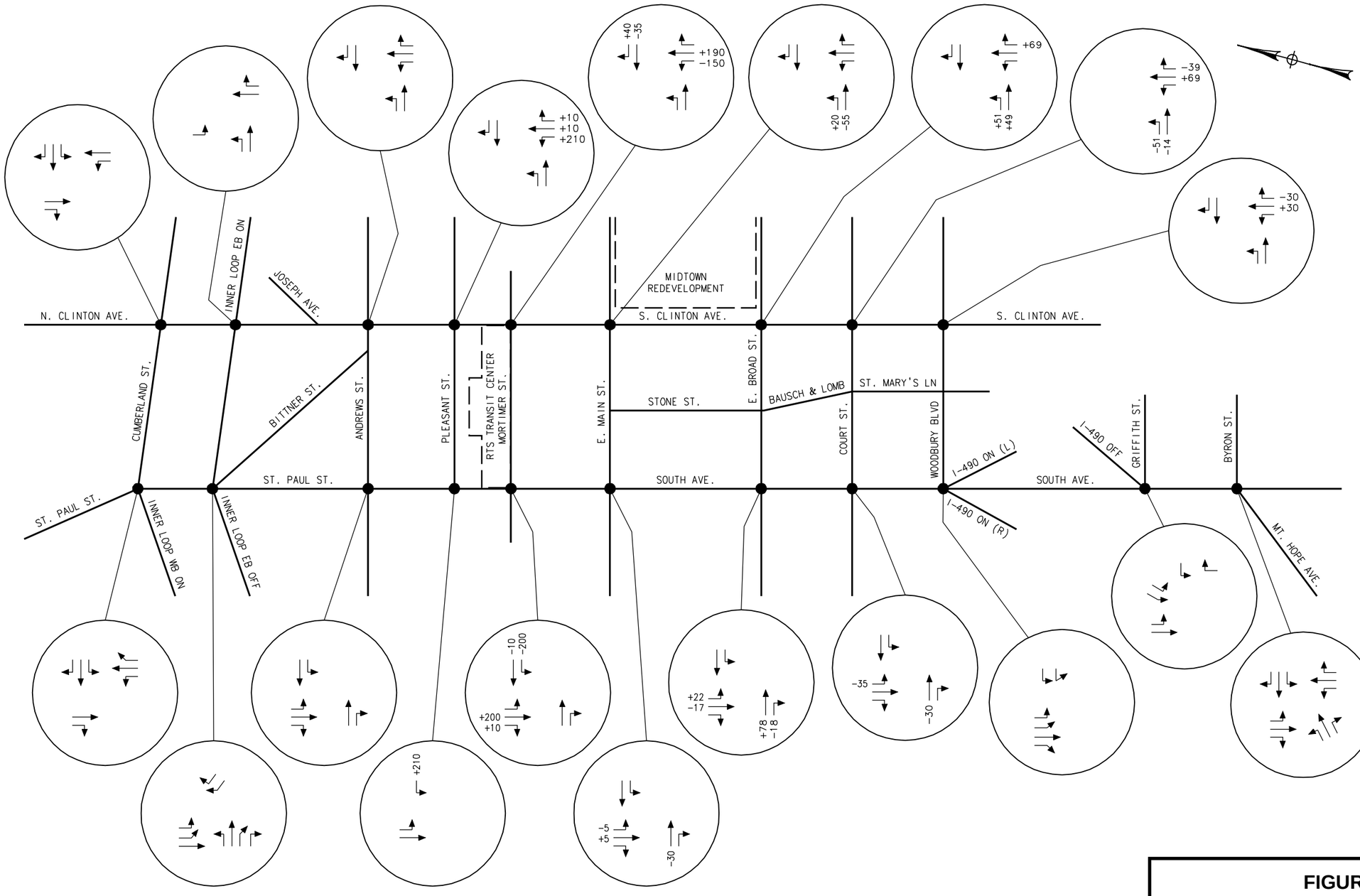


FIGURE 6

TRAFFIC REDISTRIBUTION FROM
FUTURE GEOMETRIC CHANGES
PM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE:
JAN 5, 2012

SCALE:
NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

4.1.3 Background Growth

It is typical for a roadway improvement project to be designed to accommodate traffic over a 20 year design horizon, so the future traffic volumes developed for this study will be adjusted to account for regional traffic growth over the next 20 years. Based on historic data, as well as forecasted growth projections obtained from the Genesee Transportation Council (GTC), a 0.2% annual growth is a reasonable assumption for growth within the study area, outside of any known localized development. Over a 20 year period, this represents a 4% total growth. Thus, existing traffic volumes were increased by 4% to account for background growth. Figures 7 and 8 depict the additional trips applied to the existing traffic volumes to account for background growth during the AM and PM peak hours respectively.

4.1.4 Known Future Developments

Two significant developments are imminent within the project area within the next few years. These developments include the Midtown Redevelopment, currently under construction, and the RTS Transit Center, which is planned for construction within the next 2-3 years. As these projects are major traffic generators within the project area, their trips will result in localized traffic volume changes that couldn't be effectively represented by application of a general background growth rate. As a result the trips from these developments were estimated and applied to the existing volumes separately as described below.

4.1.4.1 RTS Transit Center

The Rochester Genesee Regional Transportation Authority (RGRTA) has proposed a new Regional Transit Service hub in downtown Rochester, commonly referred to as the RTS Transit Center. This Transit Center is scheduled for construction in 2012-2013 and will serve as a central transfer point for most of the regional transit routes within the City. It will eliminate the need for bus to bus transfers along the local roads and will reduce the need for several existing bus stops, most notably along East Main Street, which currently hosts the existing Central Information Shelter and several stops that act as transfer points.

To determine the trips generated by this development, projected Transit Center bay assignment and turn information was obtained from RGRTA and pedestrian traffic forecasts were obtained from Kimley-Horn and Associates, who performed some of the detailed analysis for the project. From this data and a review of the existing transit routes, the projected traffic changes were developed. The trips shown for this project are strictly bus trips, as the passenger car generation from this development is considered negligible. Figure 9 shows the bus diversions and additions estimated for the AM peak hour and Figure 10 shows the estimated diversions and additions for the PM peak hour.

4.1.4.2 Midtown Redevelopment

This development has been analyzed and approved through past studies. To determine the conditions and traffic resulting from this development, the initial Traffic Assessment developed by Fisher Associates in 2008 for the Draft Generic Environmental Impact Statement (DGEIS) was first reviewed, but updated trip generation and distribution information found in the Final Design Report for the Midtown Redevelopment project developed by Labella Associates in 2011 was selected as the best data to use as a basis. Trip generation and distribution from that report was used to the fullest extent possible, but as their report did not include the entire study area, trips at locations not covered in that study had to be extrapolated. This was done by reviewing existing traffic patterns and distributing trips accordingly. The trip generation data for the Midtown Development is depicted on Figure 11 for the AM peak hour and on Figure 12 for the PM peak hour.

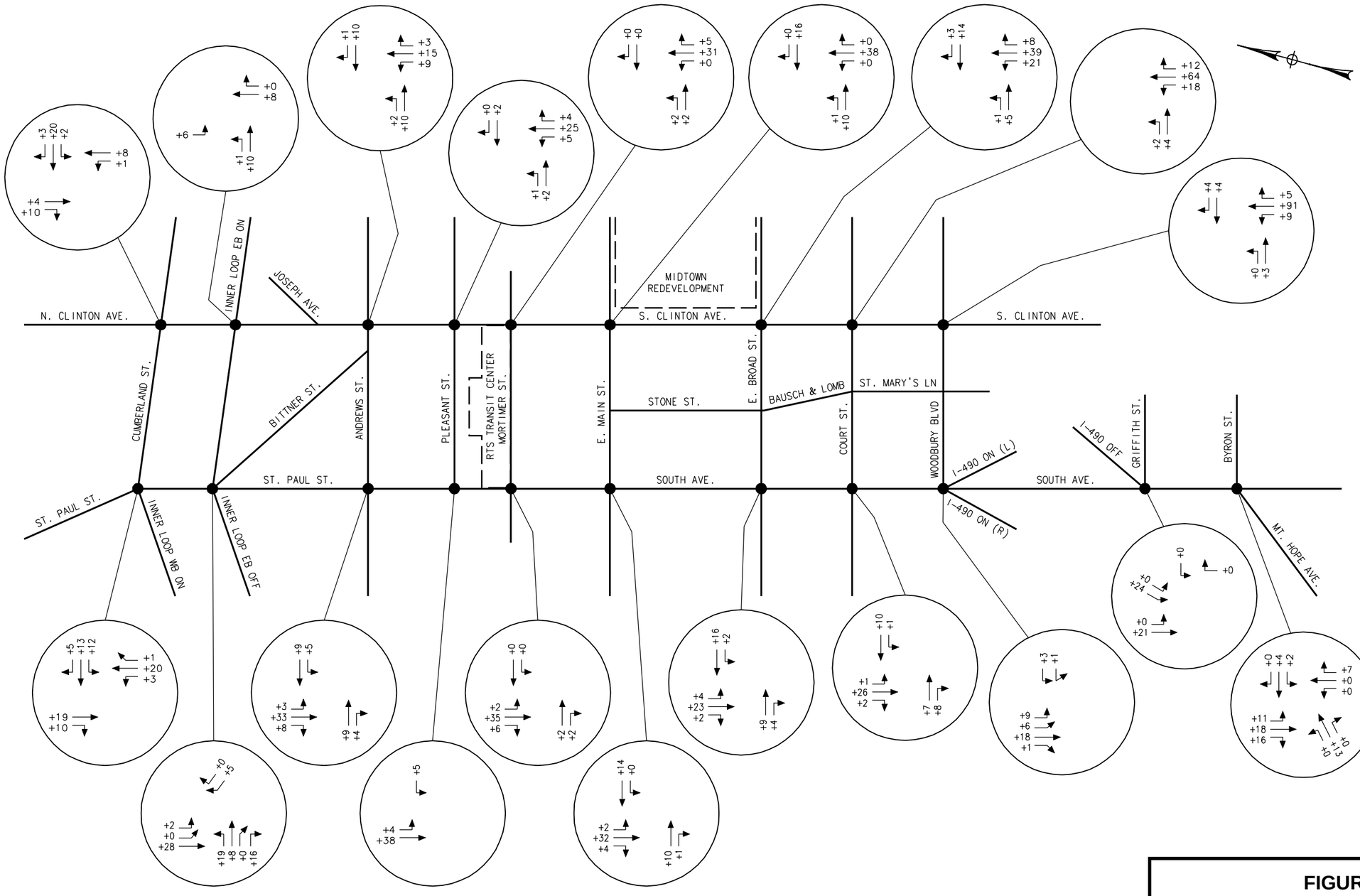


FIGURE 7

20 YEAR BACKGROUND GROWTH
AM PEAK HOUR

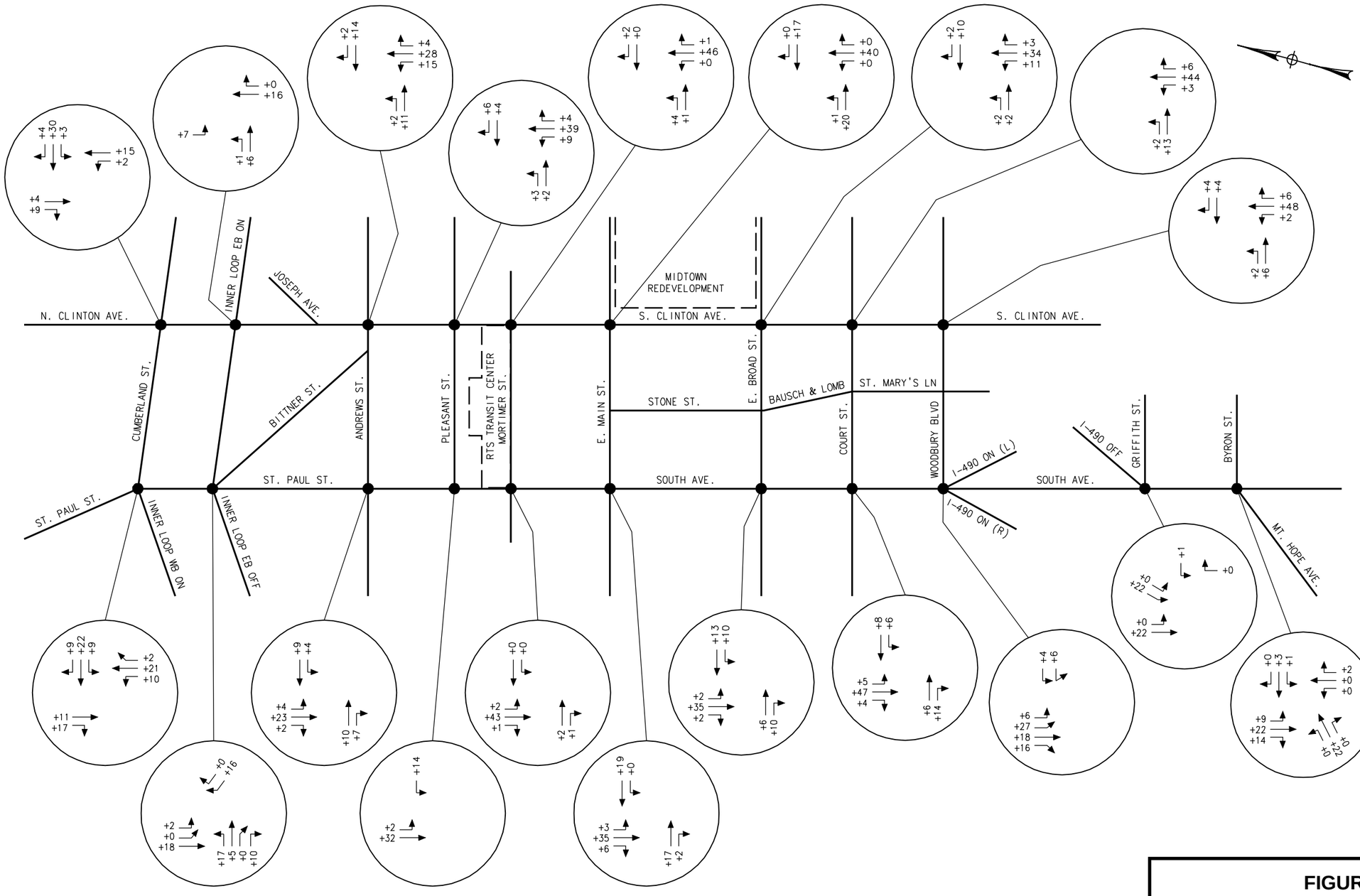
TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/5/2012 4:18:27 PM



DATE: JAN 5, 2012

SCALE: NONE

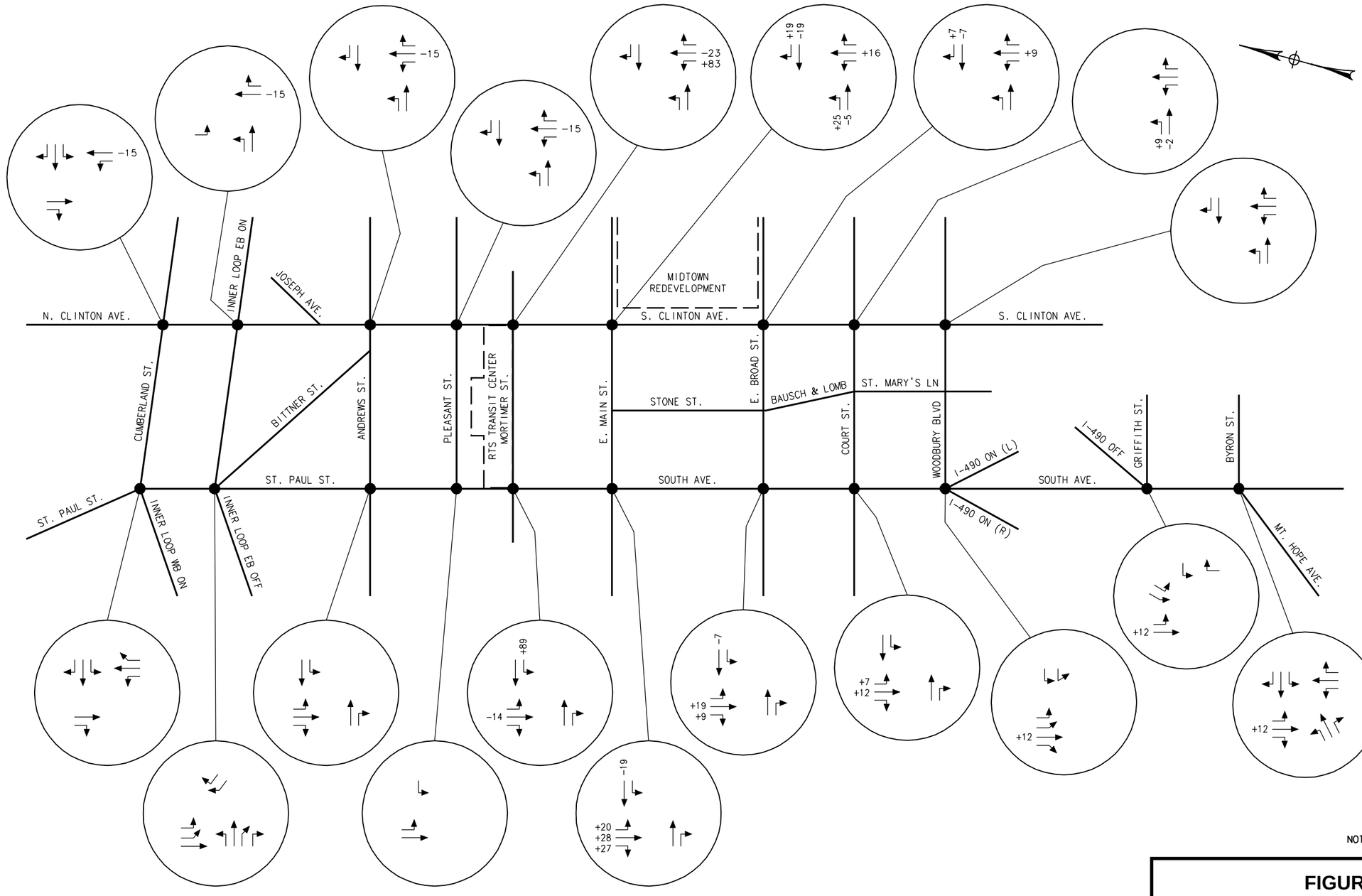
Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 8

20 YEAR BACKGROUND GROWTH
PM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PM\VOL.dgn mrw 1/6/2012 4:56:09 PM



NOTE: ALL TRIPS SHOWN ARE BUSES.

FIGURE 9

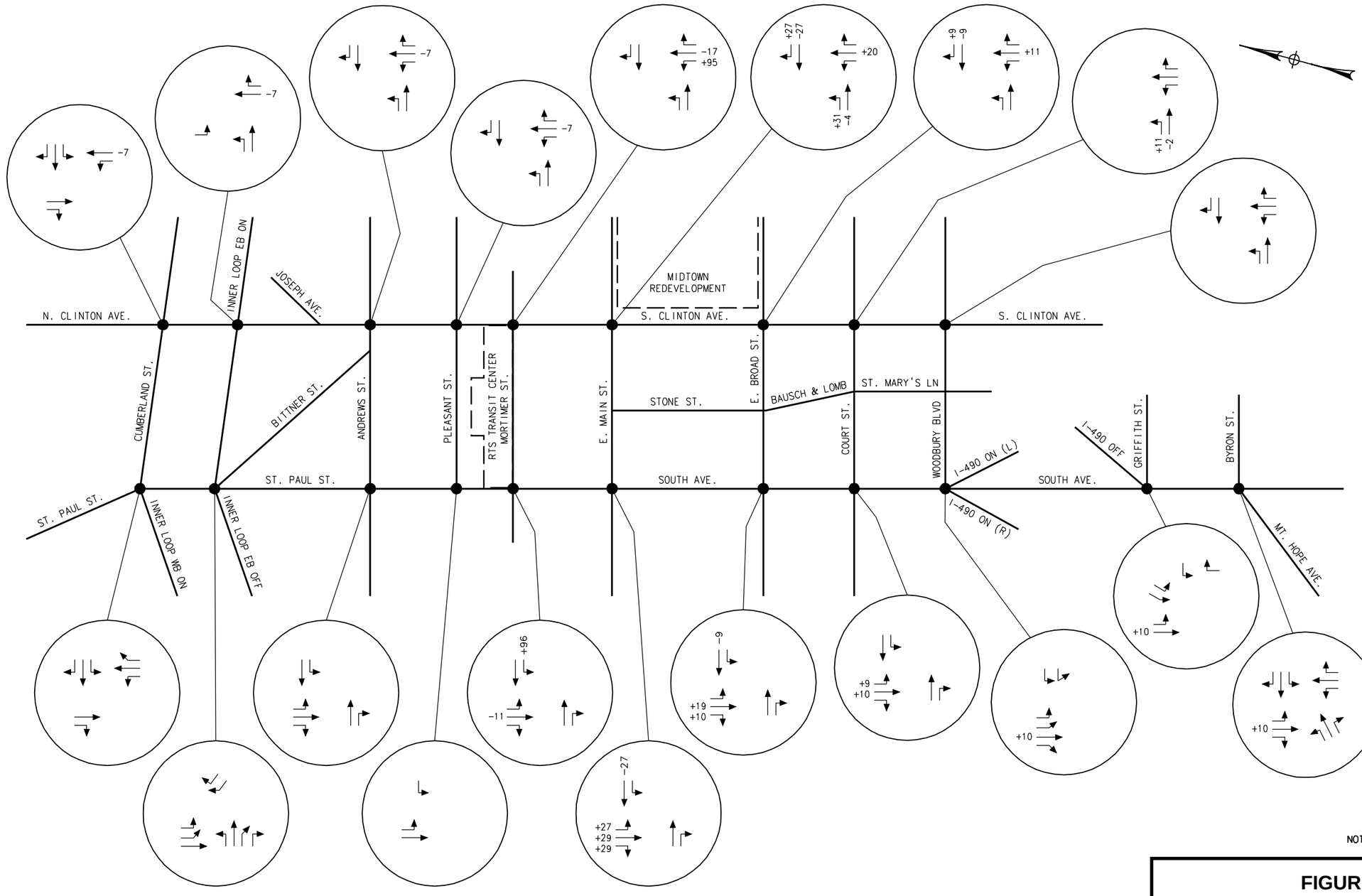
RTS TRANSIT CENTER
AM PEAK HOUR TRIP DIVERSIONS

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com



NOTE: ALL TRIPS SHOWN ARE BUSES.

FIGURE 10

RTS TRANSIT CENTER
PM PEAK HOUR TRIP DIVERSIONS

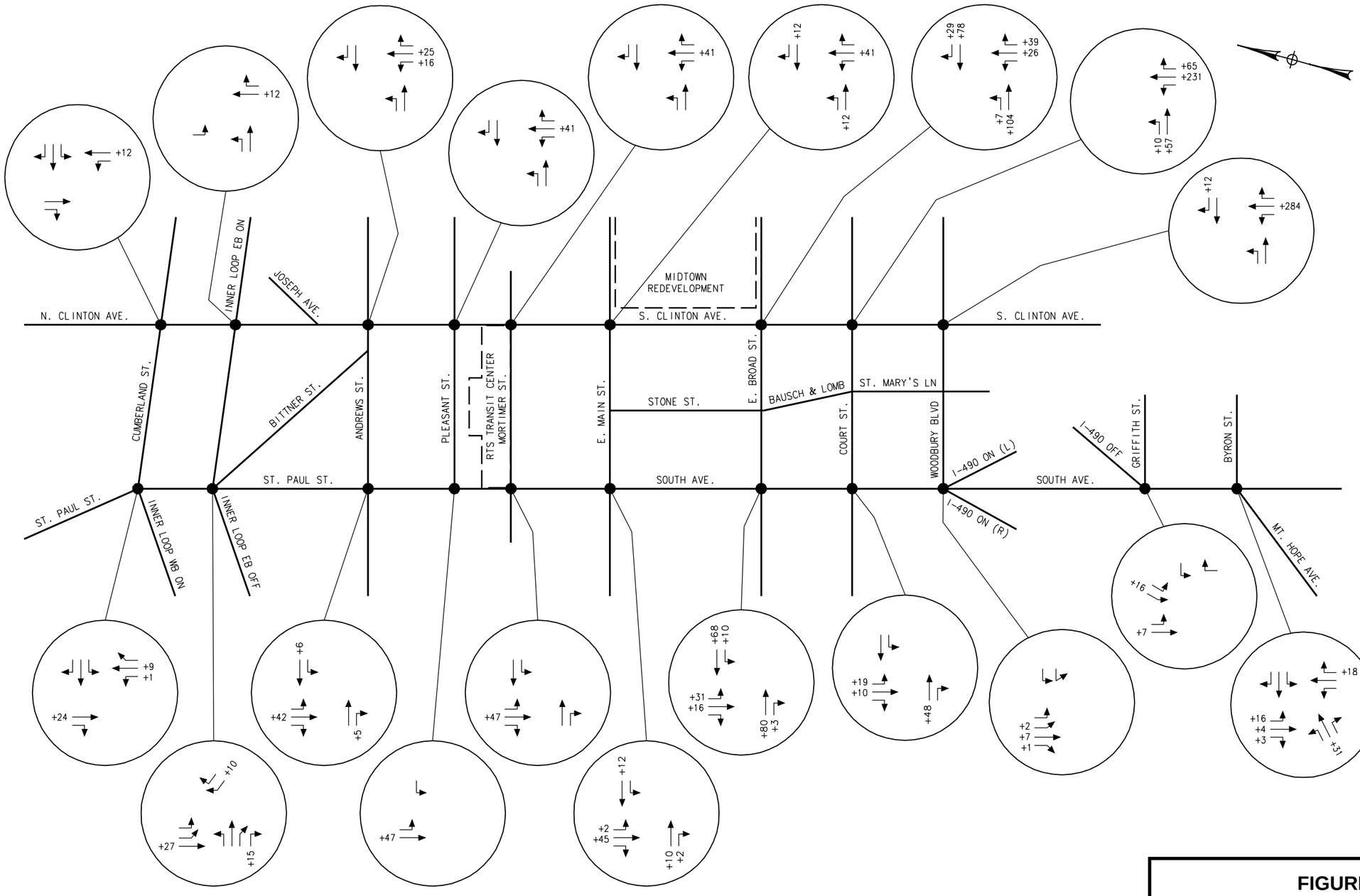
TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-PMVOL.dgn mrw 1/6/2012 4:56:25 PM



DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 11

MIDTOWN REDEVELOPMENT
AM PEAK HOUR TRIP GENERATION

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

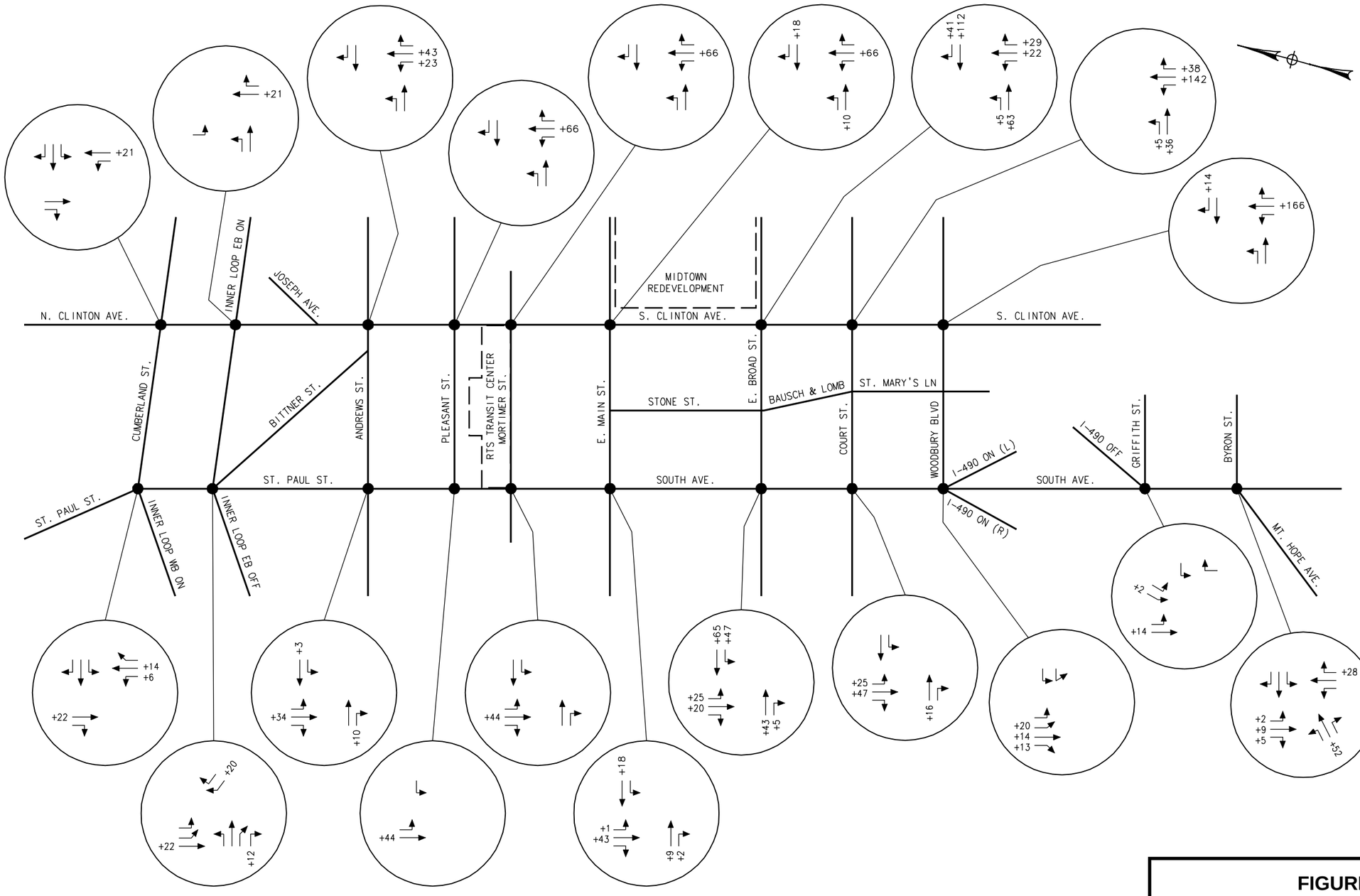


FIGURE 12

MIDTOWN REDEVELOPMENT
PM PEAK HOUR TRIP GENERATION

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

4.1.5 Future No-Build Traffic Volumes

Combining the existing traffic volumes shown on Figures 1 & 2 with the additions and subtractions shown on Figures 5 thru 12 results in the Future No-Build Traffic Volumes. These volumes are depicted on Figure 13 for the AM peak hour and on Figure 14 for the PM peak hour.

The future no-build traffic volumes represent traffic conditions 20 years in the future if the two-way conversion of North/South Clinton Avenue and St. Paul Street/South Avenue does not occur. These volumes serve as the basis for the traffic diversions assigned for the two-way conversion forecasts.

4.2 FUTURE TWO-WAY CONVERSION TRAFFIC

Forecasting the traffic diversions for the two-way conversion required many factors to be considered and several assumptions to be made. Ideally traffic would be split 50% along each corridor in each direction, but when you look at the inlets and outlets to the system and where vehicles need to go, this isn't always be possible. Some of the strategies used to make reassignment decisions included:

- Inflow traffic north and south were equalized to the greatest extent possible, but were limited by where traffic originated and the roads used to get there. For example, traffic entering the City from I-490 westbound has a direct ramp to Clinton Avenue and no direct access to South Avenue, so northbound traffic entering the study area would be naturally skewed to Clinton Avenue. It is assumed that some of that traffic will divert along Woodbury Blvd to South Avenue to avoid the heavier northbound traffic along Clinton Avenue, but because any alternate route to South Avenue outside the study area would be much longer and more time consuming, it is unlikely that vehicles would divert before reaching the study area
- Outflow traffic north and south were equalized to the greatest extend possible, but were also limited by where traffic would be destined and the roads required to get there. Examples of this include:
    - I-490 eastbound has a direct access ramp off of South Avenue and access via Clinton Avenue would require traffic to travel a longer route down to Byron Street before accessing another ramp there. As a result, it was assumed that traffic in the study area would predominantly want to access I-490 eastbound from South Avenue and would tend to travel down Clinton Avenue to access from Byron Street only when congestion and delay on South Avenue increased to an unacceptable level. The forecasts reflect this heavier inclination to the South Avenue Ramp.
    - Joseph Avenue has a direct access connection to Clinton Avenue. Traffic bound to northeastern Rochester has no direct route to that area from St. Paul Street, so this traffic would continue to use Joseph Avenue, which would skew northbound traffic at Andrews Street to be naturally higher along Clinton Avenue than along St. Paul Street.
    - Traffic along Bittner Street, which provides Clinton Avenue traffic easy access to St. Paul Street heading northbound, gives a great indication of the magnitude of traffic heading to destinations outside the study area via St. Paul Street. These volumes were used as a basis for determining the number of northbound diversions exiting the system in the forecasts.
- Traffic in and out of the study area along side road access points were kept consistent with no-build conditions.

- Turn movement volumes were determined based on existing turn percentages, assumed destinations (parking garages, etc.) and the logical movements drivers would make to generally minimize travel time and delay.
- The conversion to two-way traffic requires certain geometric changes that were considered in the traffic assignments. Most notably, use of the left side ramp to I-490 eastbound at the South Avenue and Woodbury Blvd intersection must be discontinued, so traffic destined for that ramp needed to be shifted to the right side ramp or to the Byron Street ramp.

It should be noted that the traffic forecasts presented in this report are a starting point for analysis and will need to be adjusted during the feasibility analysis to account for various geometric alternatives and diversions that would result from trying to avoid localized congestion.

A discussion of each peak hour and the specifics concerning the forecast for each are included below:

4.2.1 AM Peak Hour Traffic for Two-Way Conversion

Traffic entering the study area northbound included traffic from I-490 and traffic from the local roads south of the study area. Unfortunately for equalizing traffic, over 60% of the inbound traffic from that direction is from the I-490 ramp, which will not redirect to St. Paul Street/South Avenue outside of the study area because of the length of diversion required. Some of this traffic (approximately 10%) was diverted to South Avenue via Woodbury Blvd and Main Street, but given that much of the northbound traffic is destined for parking garages adjacent to Clinton Avenue, it is unlikely that more than that would divert. For these diversions to South Avenue, Woodbury Blvd is the most likely location for vehicles to divert (turn left), being that it is the first available release point from the heavier northbound traffic along Clinton Avenue. East Main Street was selected as a secondary release point, as opposed to East Broad Street and Court Street, because the lower left turn volume at East Main Street would be more enticing for diverting vehicles than the much heavier left turn volumes at the other intersections. For the northbound traffic entering from the local roads, nearly 750 vehicles were shifted to South Avenue, this represents almost all traffic northbound at the Mount Hope intersection and over half the trips northbound along Clinton Avenue at Byron Street. It was felt that this heavy percentage of diversions would occur to avoid the heavier congestion caused by the over 1,800 vehicles entering from the I-490 eastbound off-ramp at Clinton Avenue.

For traffic entering the study area from the north, traffic was adjusted such that southbound through traffic at Andrews Street was generally equalized between the two corridors with 435 vehicles being diverted to Clinton Avenue and 465 vehicles going through on St. Paul Street.

Traffic exiting the study area was generally equalized between the two roadways as well. For traffic heading south, 260 vehicles were diverted to Clinton Avenue and 232 vehicles remained on South Avenue heading from Woodbury Blvd to Byron Street. Heading north, 170 vehicles were redistributed to St. Paul Street and 185 vehicles remained on Clinton Avenue traveling northbound at the Inner Loop Eastbound ramp intersections. It should be noted that northbound through traffic along Clinton Avenue at Andrews Street is not balanced with the northbound traffic along St. Paul Street at Andrews Street. This is because approximately half of the northbound traffic at this location is destined for Joseph Avenue, and

given traffic origins within the study area, very little of that traffic would reasonably divert to St. Paul Street.

Turn movements within the study area were developed by determining if traffic was bound for a destination within the study area (i.e. parking garages) or outside along one of the side streets, and assigning turn movements to approximate the same number of arrivals at each assumed destination based on the percentage of traffic along each roadway and the likelihood of diversion based on logical driver decision-making. Traffic flow and congestion was considered in the decision making process, realizing that drivers would avoid turn movements that already saw significant traffic. Generally, trips were assigned to locations where vehicles would see the least resistance, but without diverting from a logical path to their destination. For the AM peak hour it is assumed that most traffic was destined for the major parking garages and that little traffic exited these garages during this period.

The Traffic Redistribution developed for the Future Two-Way Conversion AM Peak Hour is detailed on Figure 15 and the forecasted AM Peak Hour Traffic Volumes for the Two-Way Conversion are shown on Figure 17.

4.2.2 PM Peak Hour Traffic for Two-Way Conversion

In the PM peak hour a much lower percentage of northbound traffic enter the city via I-490 westbound allowing for a much more even distribution of northbound traffic than in the AM peak hour. As a result, northbound traffic entering the study area is fairly balanced with 55% along Clinton Avenue and 45% along South Avenue. Leaving the study area to the north using traffic volume information from Bittner Street to determine the number of diversions, traffic is also reasonable balanced with 380 vehicles along Clinton Avenue and 400 vehicles along St. Paul Street traveling northbound at the Inner Loop Eastbound intersection. Similar to the AM peak, northbound traffic at Andrews Street appears much more skewed to Clinton Avenue, but again, that is a result of over 400 vehicles traveling to Joseph Avenue, most from the downtown parking areas where the most direct and logical route would be up Clinton Avenue.

Southbound traffic in the PM peak hour is fairly balanced at the northern and southern termini of the project. At the north side, there are 342 southbound through vehicles on St. Paul Street at Andrews Street and 285 southbound through vehicles on North Clinton Avenue at Andrews Street. Where traffic leaves the system to the south, there are 237 through vehicles on South Avenue and 655 through vehicles on South Clinton Street heading to Byron Street. The 655 vehicles on South Clinton Avenue include 255 "through" vehicles at Byron Street, which is fairly balanced with what would remain on South Avenue, and 400 vehicles that will utilize the Byron Street entrance ramp onto I-490 eastbound. It is assumed that these vehicles would divert from South Avenue and Woodbury Blvd because of the potential congestion caused if the over 1,000 vehicles wanting to access I-490 eastbound had to utilize that single ramp.

Turning traffic was distributed similar to the AM peak hour, but with the assumption that the parking garages will have mostly outbound traffic and little inbound.

The Traffic Redistribution developed for the Future Two-Way Conversion PM Peak Hour is detailed on Figure 16 and the forecasted PM Peak Hour Traffic Volumes for the Two-Way Conversion are shown on Figure 18.

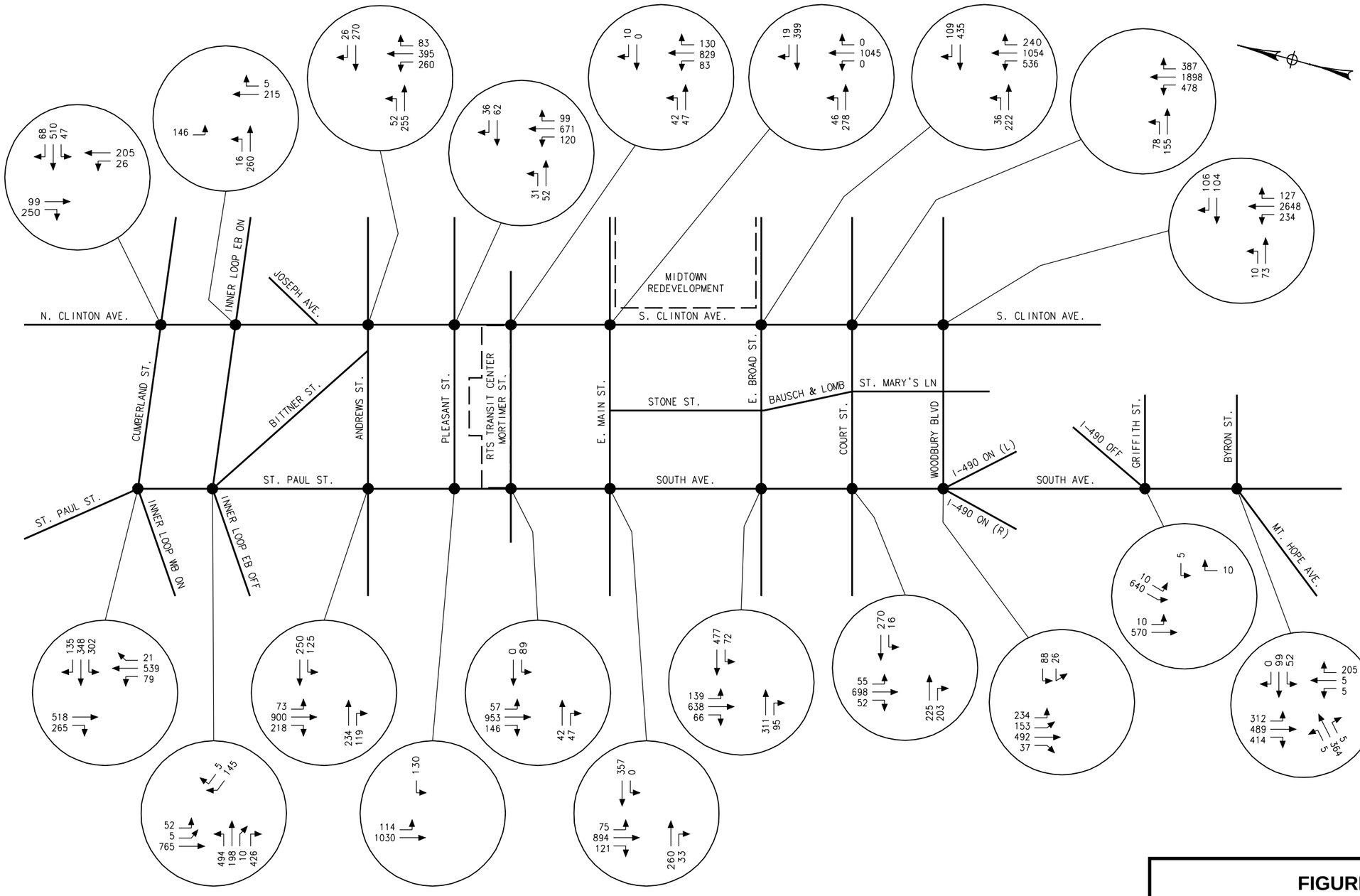


FIGURE 13

FUTURE NO-BUILD
AM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

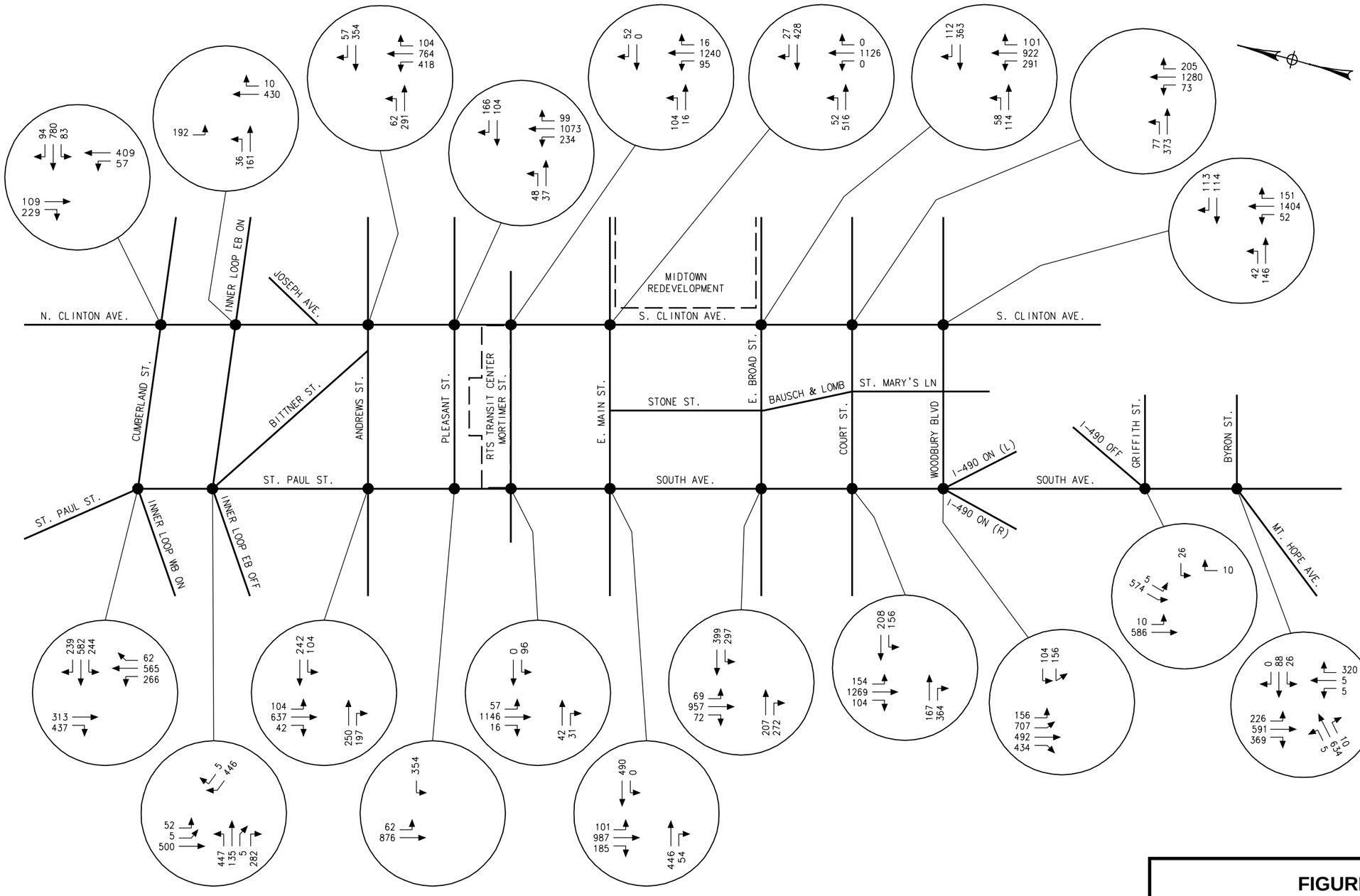


FIGURE 14

FUTURE NO-BUILD
PM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

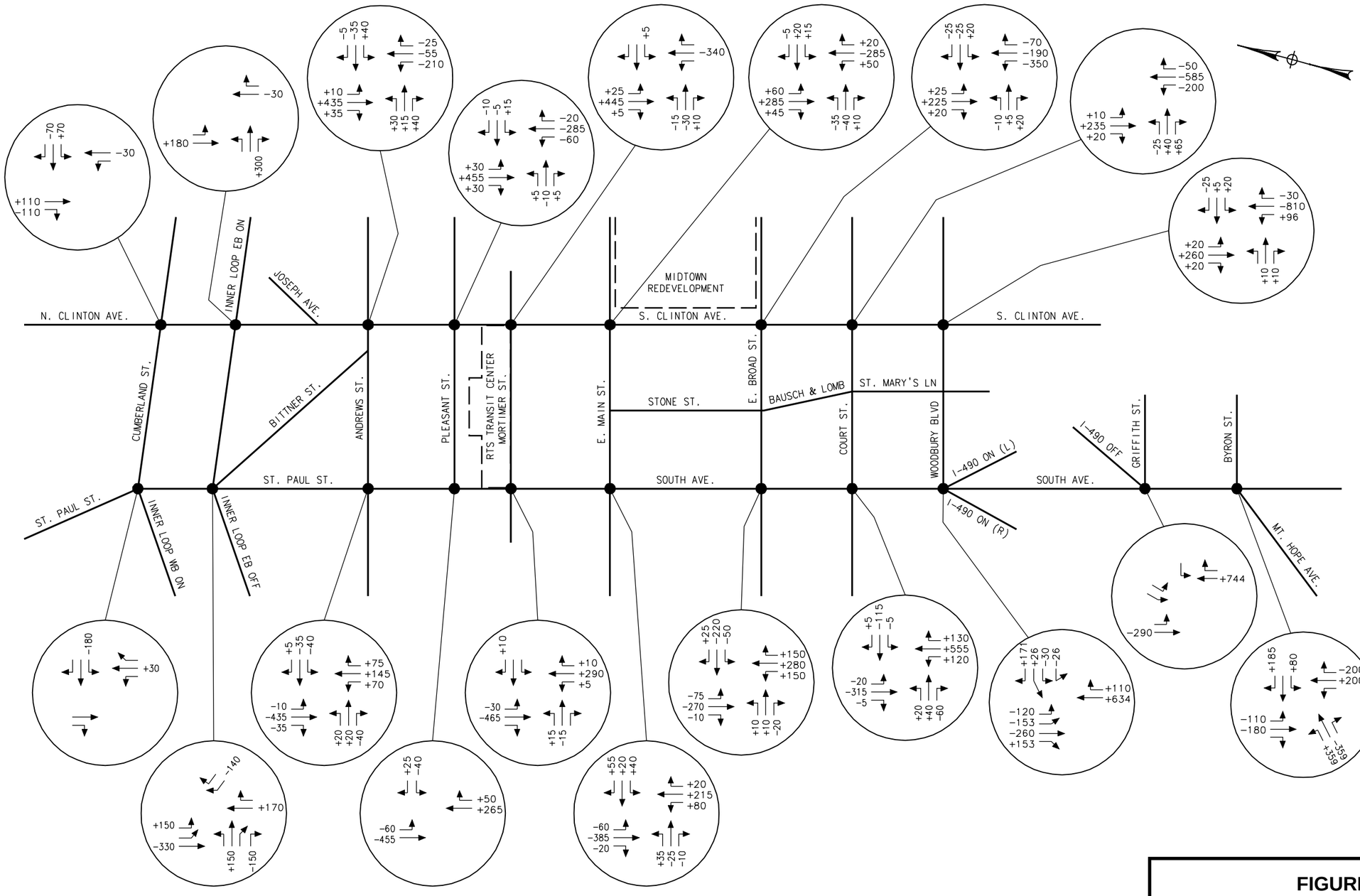


FIGURE 15

TWO-WAY CONVERSION TRAFFIC REDISTRIBUTION
FUTURE AM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/5/2012 4:28:03 PM

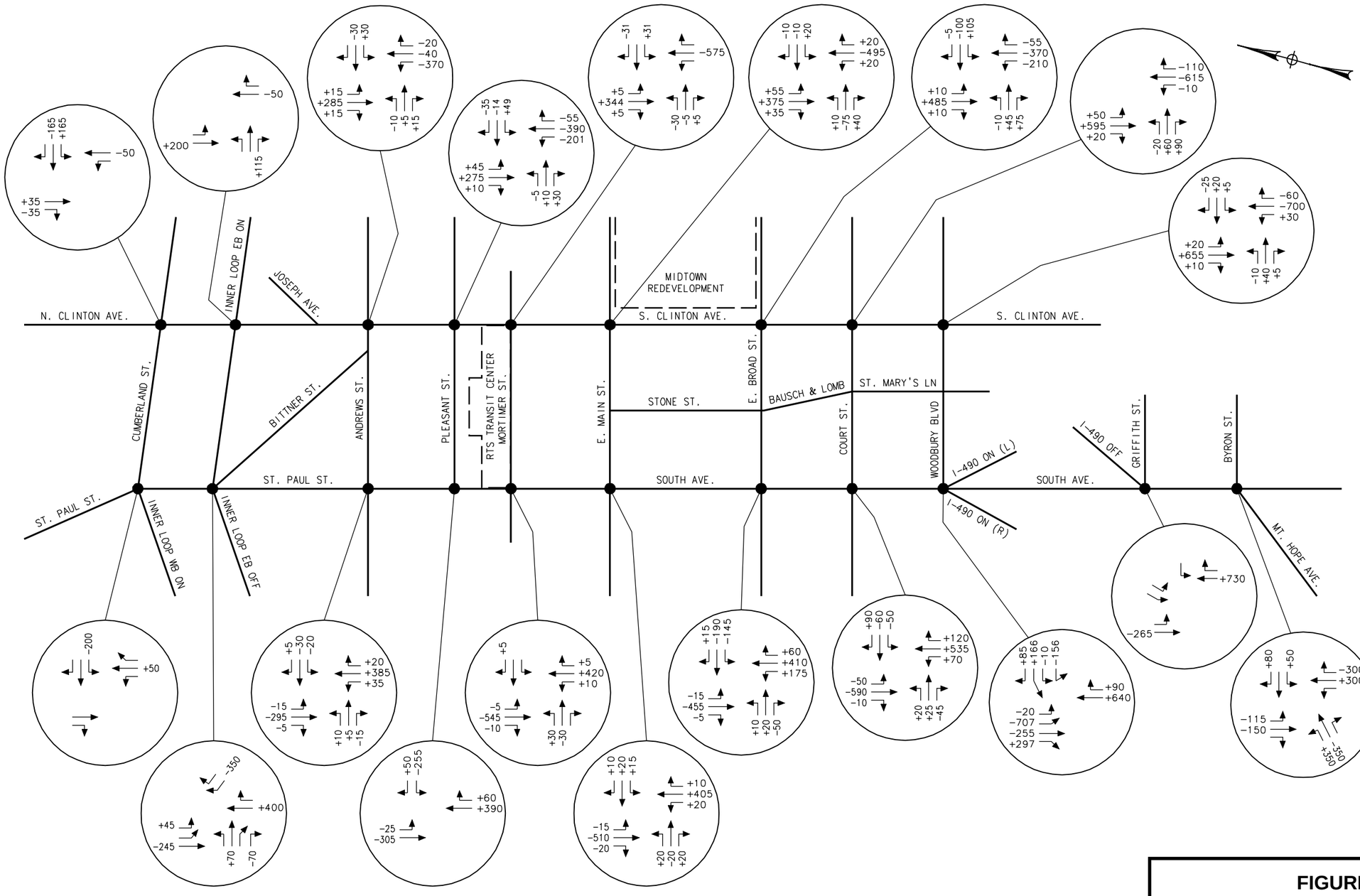


FIGURE 16

TWO-WAY CONVERSION TRAFFIC REDISTRIBUTION
FUTURE PM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

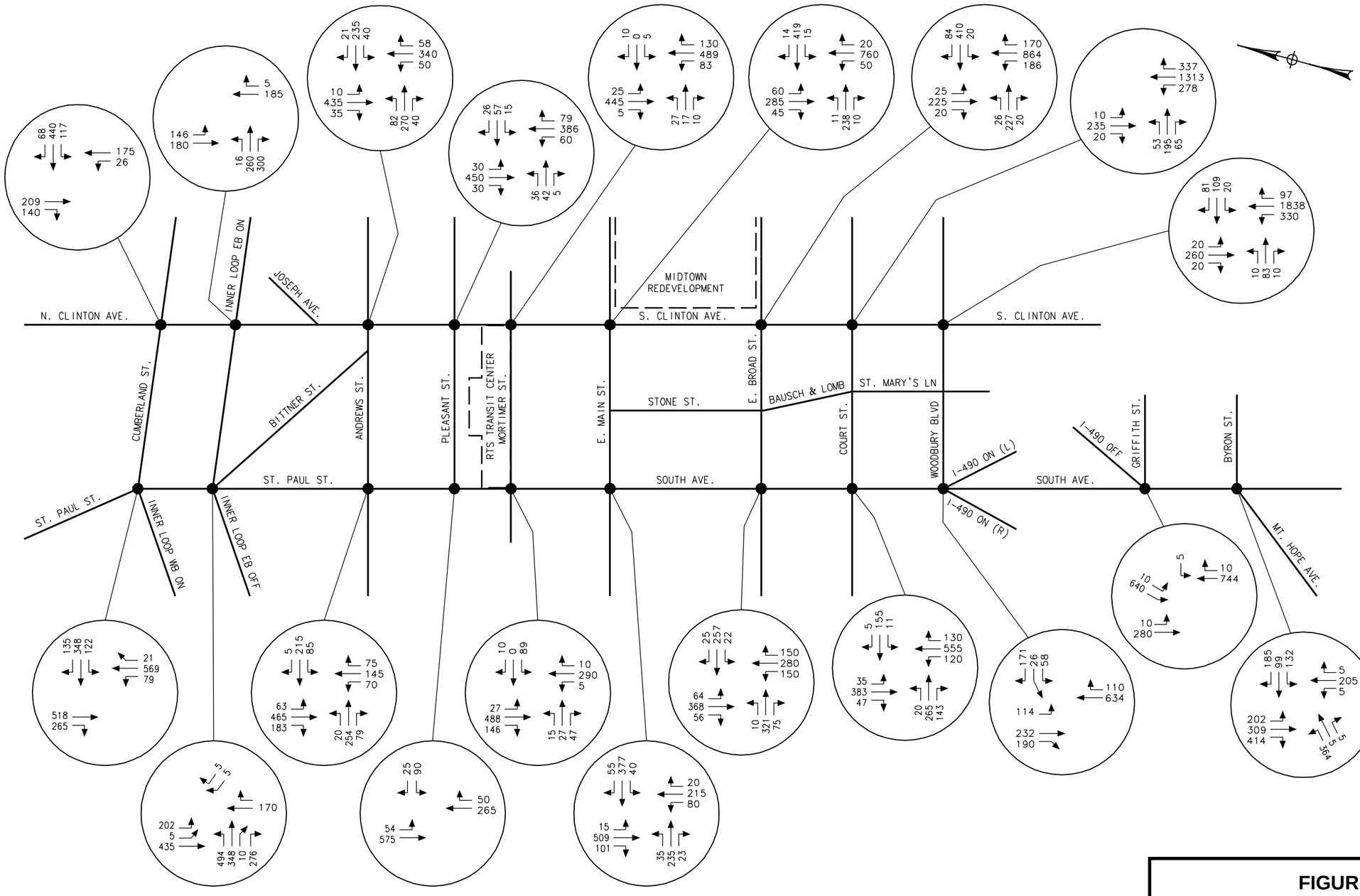


FIGURE 17

FUTURE TWO-WAY CONVERSION
AM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

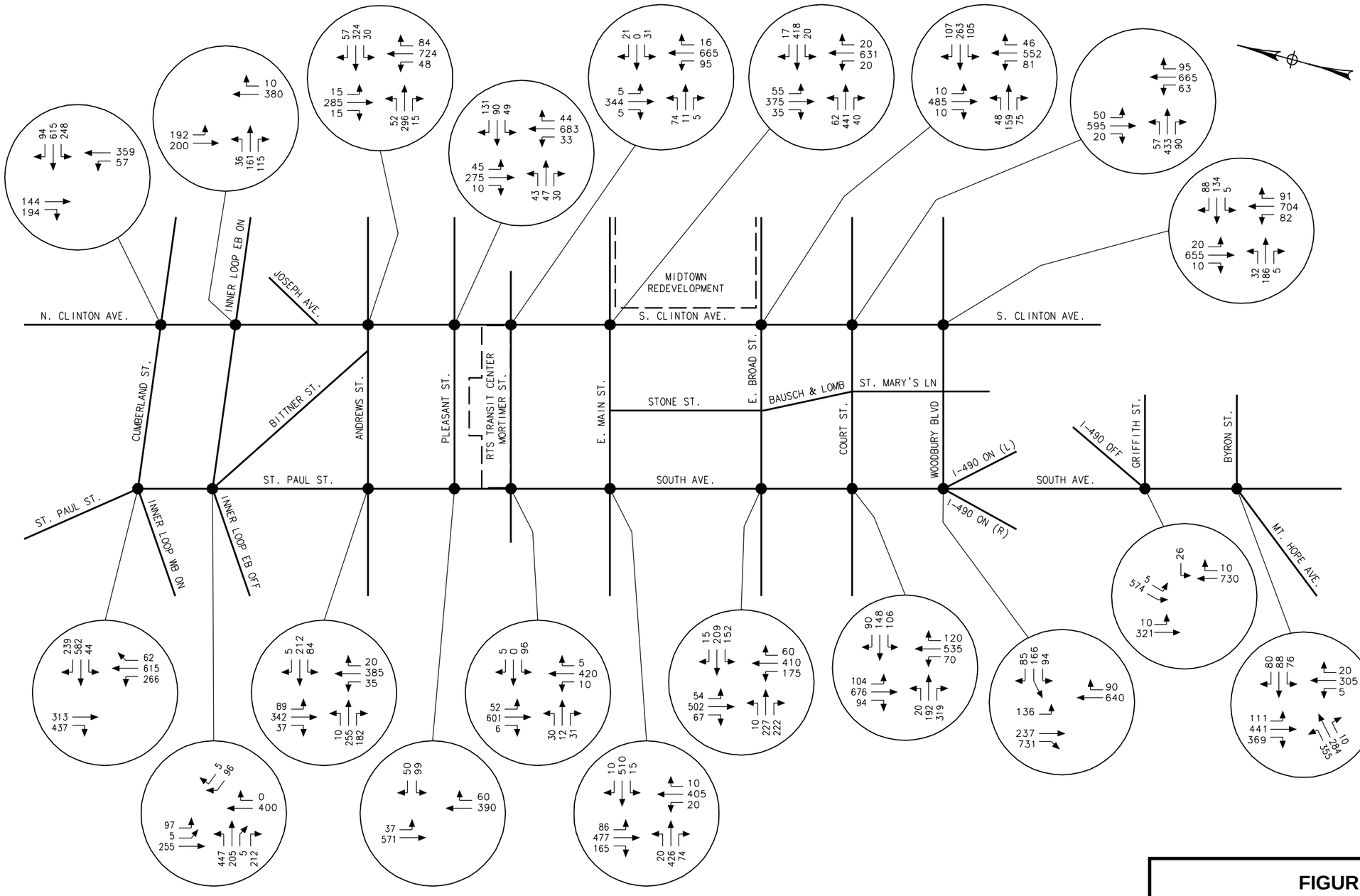


FIGURE 18

FUTURE TWO-WAY CONVERSION
PM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

4.2.3 Two-Way Conversion Pedestrian Traffic

As the conversion to two-way traffic will change little with regard to pedestrians, the only significant change in pedestrian traffic and distribution will be the addition of the RTS Transit Center. This development will not only shift a large portion of the pedestrians crossing Clinton Avenue and St. Paul Street from East Main Street to Mortimer Street, but will also increase the number of pedestrian in the localized area because the ease of transit realized will promote more use of mass transit. However, it is assumed that this increase in pedestrian traffic would only occur within the first two blocks from the transit center and that pedestrian volumes outside that area would remain as existing.

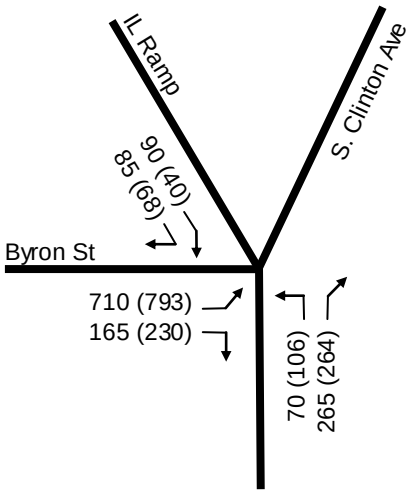
To determine the probable changes in pedestrian traffic, information developed by Kimley-Horn and Associates for the RTS Transit Center was reviewed. The number of transit riders in the current pedestrian mix was estimated, and the number of additional pedestrian trips was projected. In addition, the locations of current transit transfers were reviewed and the number of pedestrian trips shifted to other locations was estimated. Based on these potential pedestrian traffic shifts the future pedestrian traffic for two-way traffic conditions was calculated.

Also considered in the pedestrian forecasts was the need to accommodate SUNY Brockport students crossing St. Paul Street at the Transit Center. Pedestrian crossing numbers were obtained from the City and added to the forecasts to account for this.

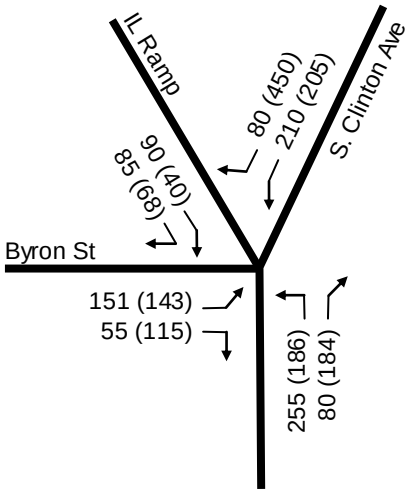
Figure 19 depicts the Future No-Build Pedestrian Traffic for the AM and PM peak hour, Figure 20 depicts the Pedestrian Traffic Redistribution for the peak hours and Figure 21 shows the Future Peak Hour Pedestrian Traffic under Two-Way Conversion Conditions.

4.2.4 South Clinton Avenue at Byron Street

The South Clinton Avenue at Byron Street intersection was not included in the original scope of work for this study, but after the initial assessment of future conditions with two-way operations, it was determined that this intersection may be affected more than originally thought and should be analyzed to better understand the potential impacts. However, this location was not added to the study until after the forecasting phase was completed, as a result, the future traffic volumes for this intersection were forecasted separately based on the work previously done and shown in the preceding Sections of this report. The peak hour traffic volumes for the Future No-Build and Build Conditions are shown below:

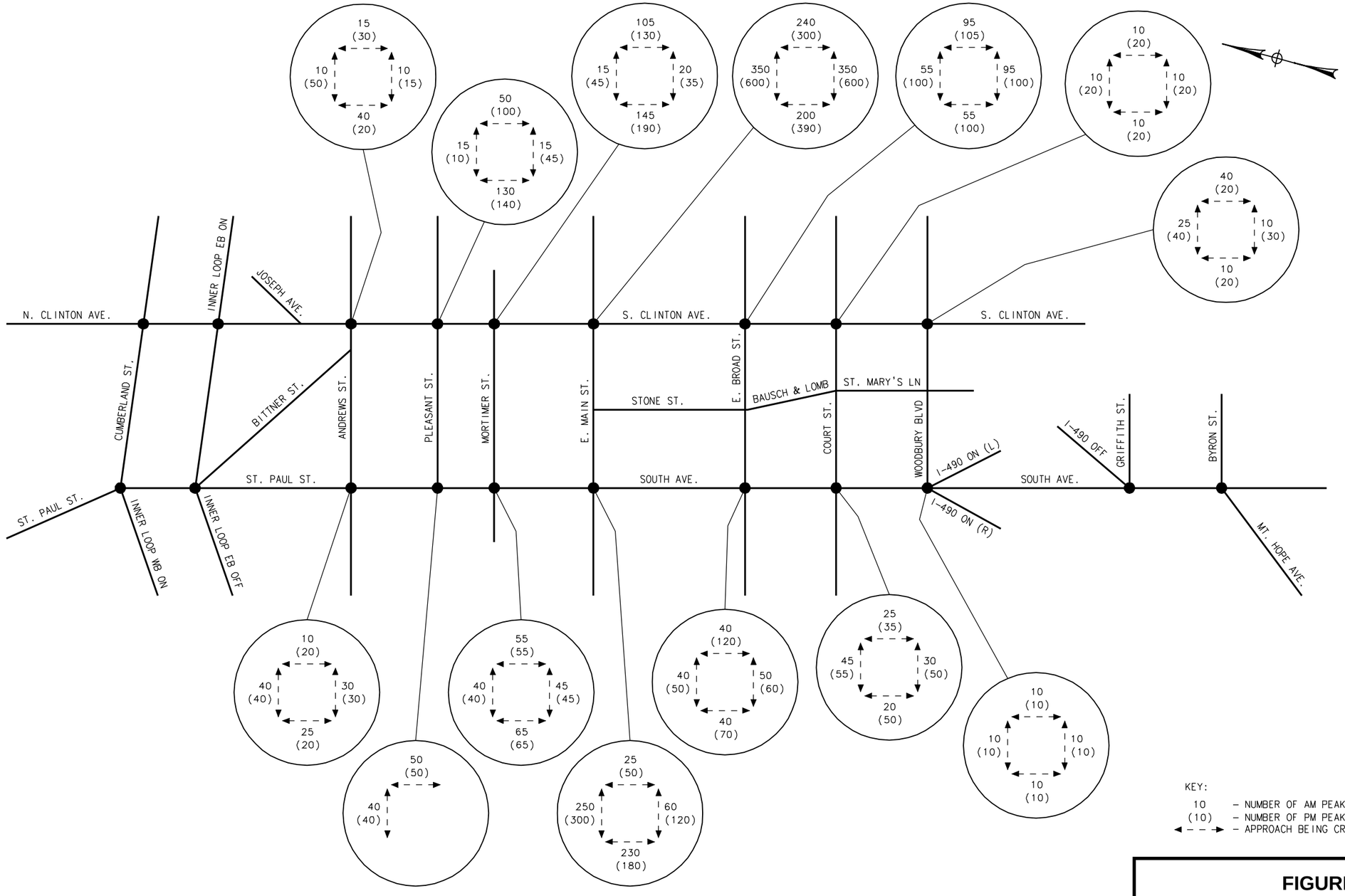


Future No-Build Condition
Peak Hour Traffic Volumes



Future Build Condition
Peak Hour Traffic Volumes

Key: AM (PM)



KEY:

10 – NUMBER OF AM PEAK HOUR PEDESTRIAN CROSSINGS
(10) – NUMBER OF PM PEAK HOUR PEDESTRIAN CROSSINGS
◄- - -► – APPROACH BEING CROSSED

FIGURE 19

NO-BUILD PEDESTRIAN TRAFFIC

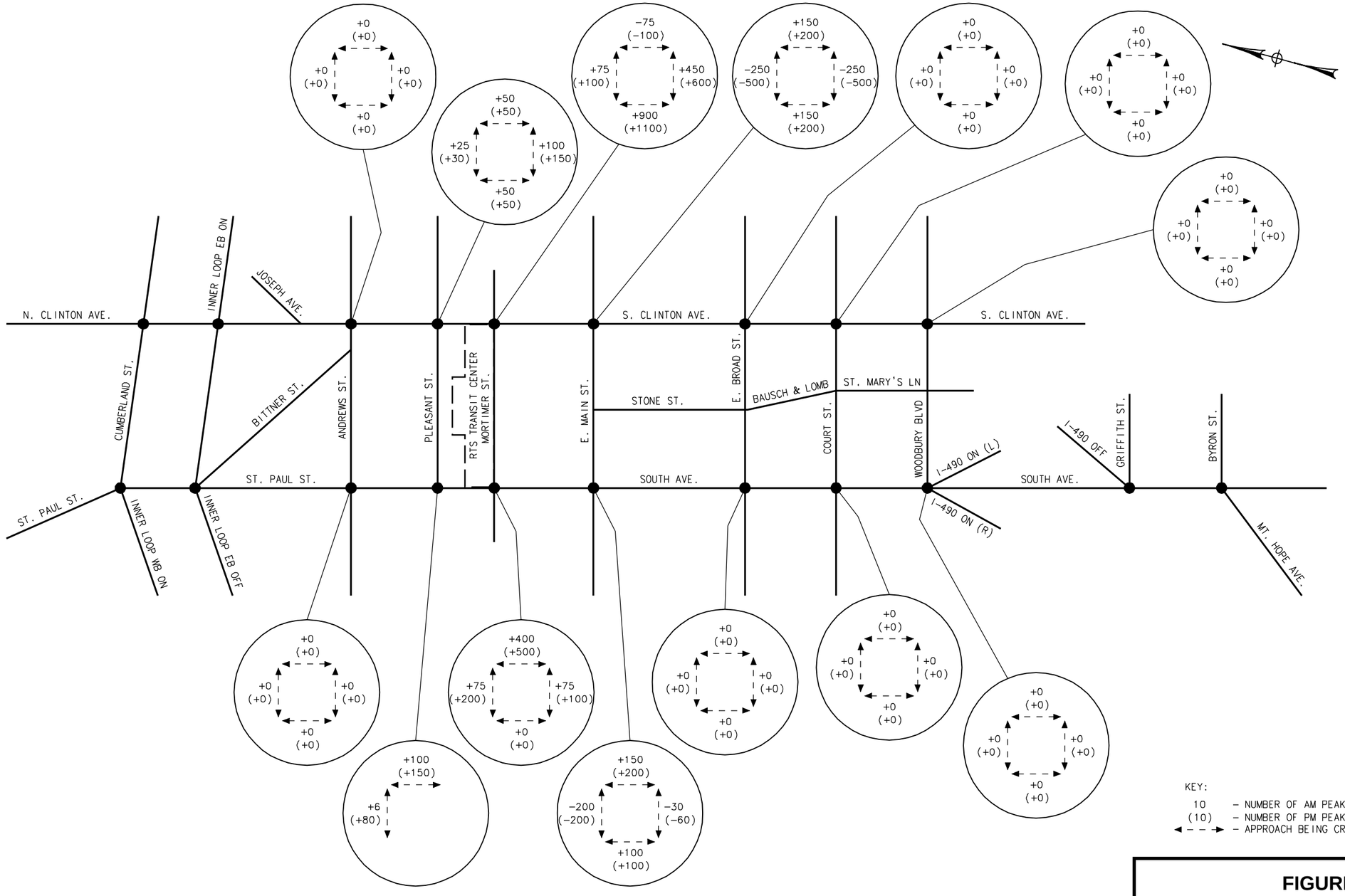
TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-PED.dgn mrw 1/9/2012 8:49:15 AM



KEY:

10 – NUMBER OF AM PEAK HOUR PEDESTRIAN CROSSINGS
(10) – NUMBER OF PM PEAK HOUR PEDESTRIAN CROSSINGS
◄- - -► – APPROACH BEING CROSSED

FIGURE 20

PEDESTRIAN TRAFFIC REDISTRIBUTION

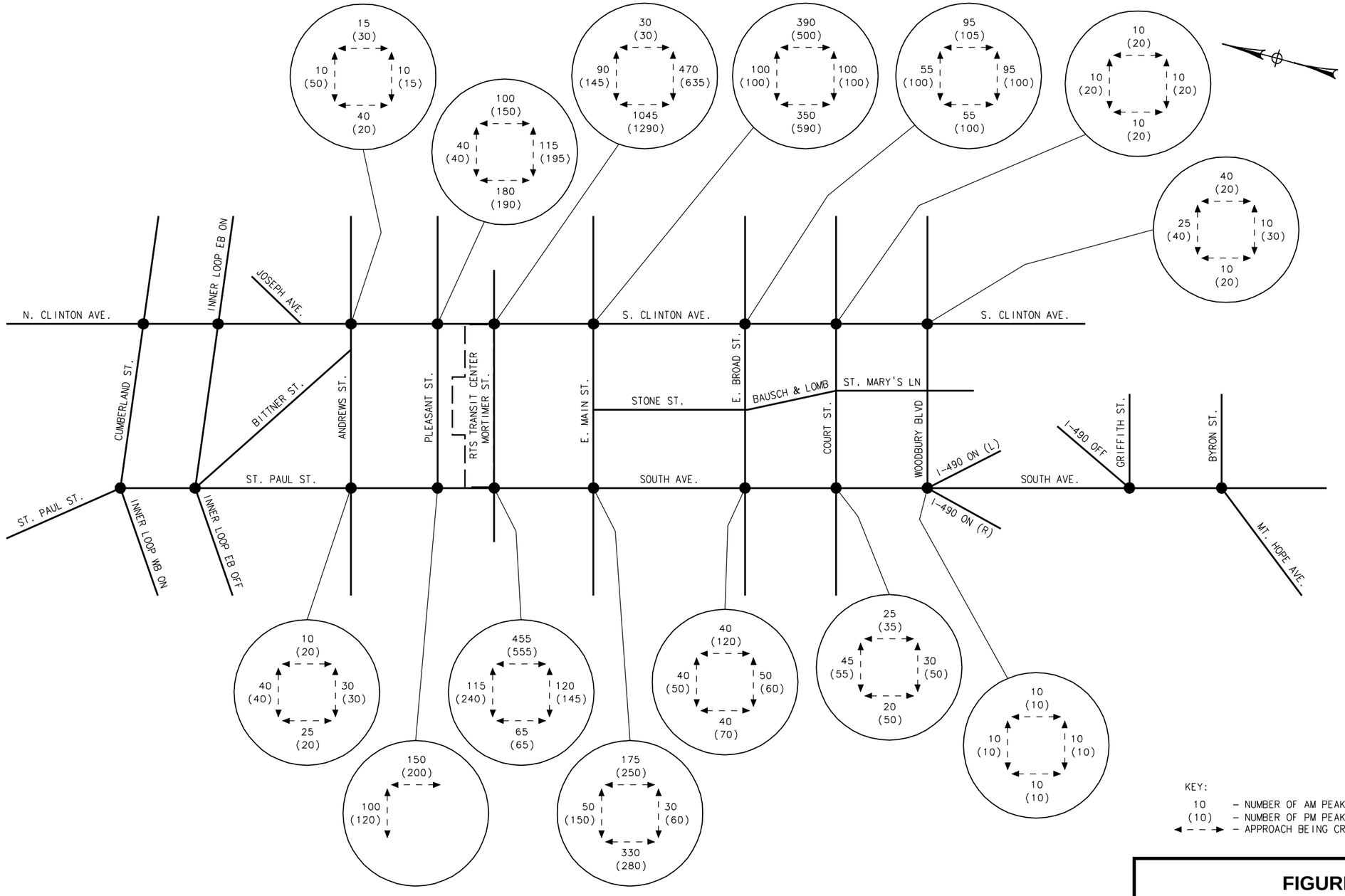
TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-PED.dgn mrw 1/9/2012 8:49:33 AM



KEY:

10 – NUMBER OF AM PEAK HOUR PEDESTRIAN CROSSINGS
(10) – NUMBER OF PM PEAK HOUR PEDESTRIAN CROSSINGS
◄- - -► – APPROACH BEING CROSSED

FIGURE 21

FUTURE TWO-WAY CONVERSION
PEDESTRIAN TRAFFIC

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-PED.dgn mrw 1/9/2012 8:49:48 AM

4.3 ALTERNATE 1 TRAFFIC VOLUMES

A second future build alternative was also developed. This alternative, referred to as "Alternate 1", projects future traffic volumes with all the conditions described above, but with the addition of geometric changes and traffic generation resulting from the Broad Street Aqueduct Project. The basis of the diversions and redistribution used for Alternate 1 is the *Broad Street Aqueduct Traffic Impact Study* developed by T.Y. Lin International in 2009.

The process to develop the Two-Way Conversion Traffic Volumes for Alternate 1 includes redistributing future no-build traffic to account for the removal of the Broad Street bridge, then assign new trips generated by the Broad Street Aqueduct Project to develop the Alternate 1 Future No-Build Traffic Volumes. These volumes were then used as a base for the future two-way conversion traffic redistribution for Alternate 1. For this alternative, most of the traffic redistribution will be the same as discussed above in Section 4.2, except in the area localize to Broad Street and its adjacent intersections, where traffic was redistributed to avoid the Broad Street bridge similar to how the Alternate 1 No-Build volumes were developed.

Based on the data from the *Broad Street Aqueduct Traffic Impact Study*, if the Broad Street bridge were removed, the following redistribution would occur:

Westbound traffic:

- 5% redistributed to cross at Andrews Street in the AM Peak Hour (0% in the PM Peak Hour)
- 10% redistributed to cross at Main Street in the AM Peak Hour (15% in the PM Peak Hour)
- 65% redistributed to cross at Court Street in both the AM and PM Peak Hours
- 20% diverted to cross outside the Study Area in both the AM and PM Peak Hours
    - In the PM Peak Hour, 5% of the westbound diversions will leave study area via Clinton Avenue northbound, other diversions occur outside the immediate study area.

Eastbound Traffic:

- 5% redistributed to cross at Andrews Street in both the AM and PM Peak Hours
- 65% redistributed to cross at Main Street in both the AM and PM Peak Hours
- 10% redistributed to cross at Court Street in both the AM and PM Peak Hours
- 20% diverted to cross outside the Study Area in both the AM and PM Peak Hours
    - In the AM Peak Hour 15% of the eastbound diversions will enter the study area via the north side of St. Paul Street, 5% go elsewhere.

Using the distribution percentages above as a guideline, the traffic redistribution for the Broad Street closure under future no-build conditions is shown in Figures 22 and 23 (AM and PM Peak Hours respectively). Figures 24 and 25 show the Trip Generation resulting from the Broad Street Aqueduct Project assuming a 100% Development Distribution as presented in the Traffic Impact Study for that project, and Figures 26 and 27 depict the Alternate 1 Future No-Build Peak Hour Traffic Volumes.

Figures 28 and 29 show the Alternate 1 Traffic Redistribution that would result from two-way conversion for the AM and PM Peak Hours respectively, and Figures 30 and 31 combine the previous figures to yield the Alternate 1 Future Two-Way Conversion Peak Hour Traffic Volumes.

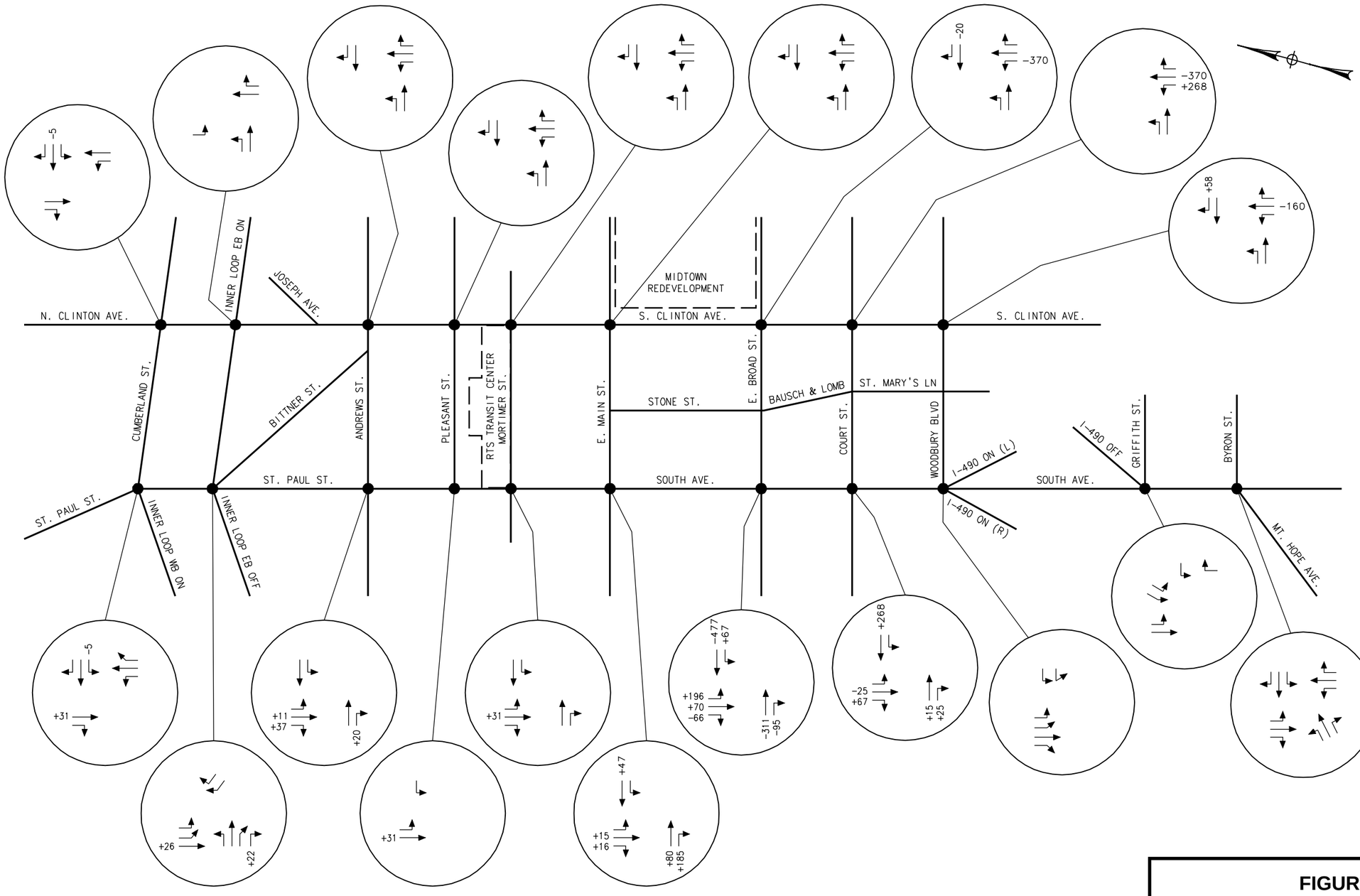


FIGURE 22

ALTERNATE 1
BROAD ST CLOSURE TRAFFIC REDISTRIBUTION
AM PEAK HOUR

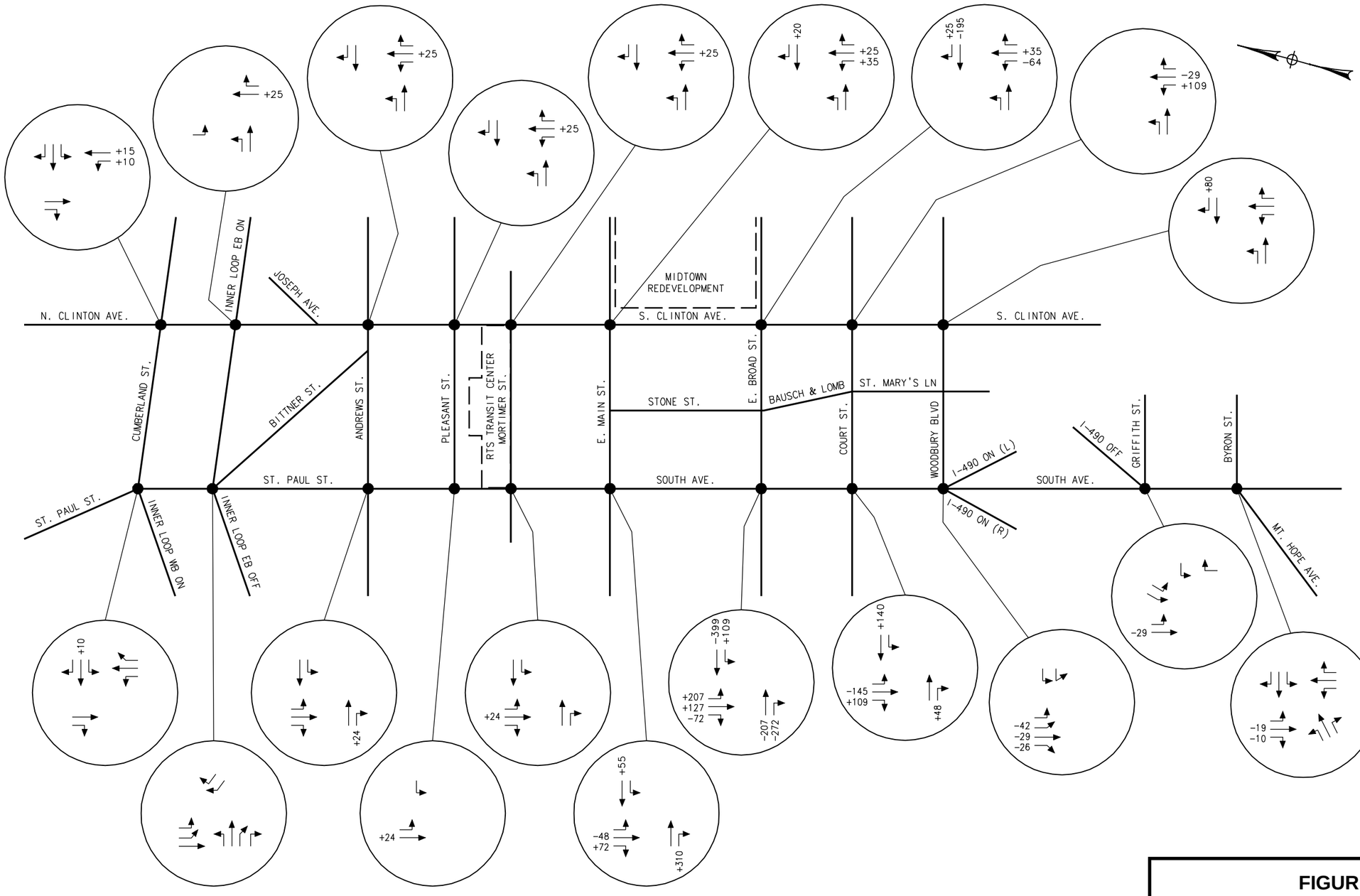
TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/10/2012 10:33:50 AM



DATE: JAN 5, 2012

SCALE: NONE

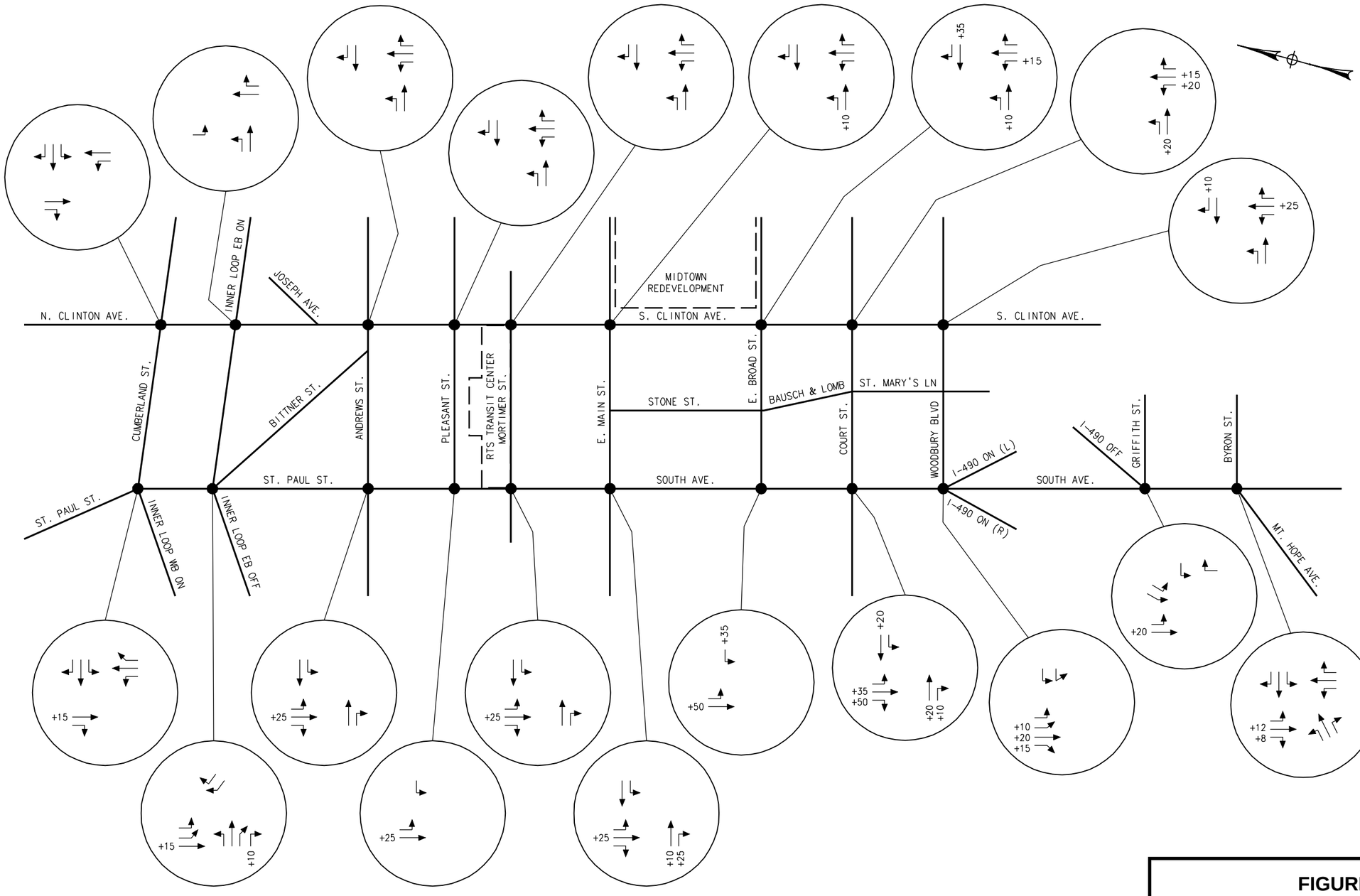
Laberge Group
ENGINEERING ARCHITECTURE
SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 23

ALTERNATE 1
BROAD ST CLOSURE TRAFFIC REDISTRIBUTION
PM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PMVOL.dgn mrw 1/6/2012 4:58:03 PM



NOTE; TRIP GENERATION VOLUMES SHOWN ARE BASED ON FIGURE 4-2A "SCENARIO 3 - 2025 AM PEAK HOUR 100% DEVELOPMENT DISTRIBUTION" FROM THE BROAD STREET AQUEDUCT TRAFFIC IMPACT STUDY DEVELOPED BY T. Y. LYN INTERNATIONAL, 2009.

DATE: JAN 5, 2012

SCALE: NONE

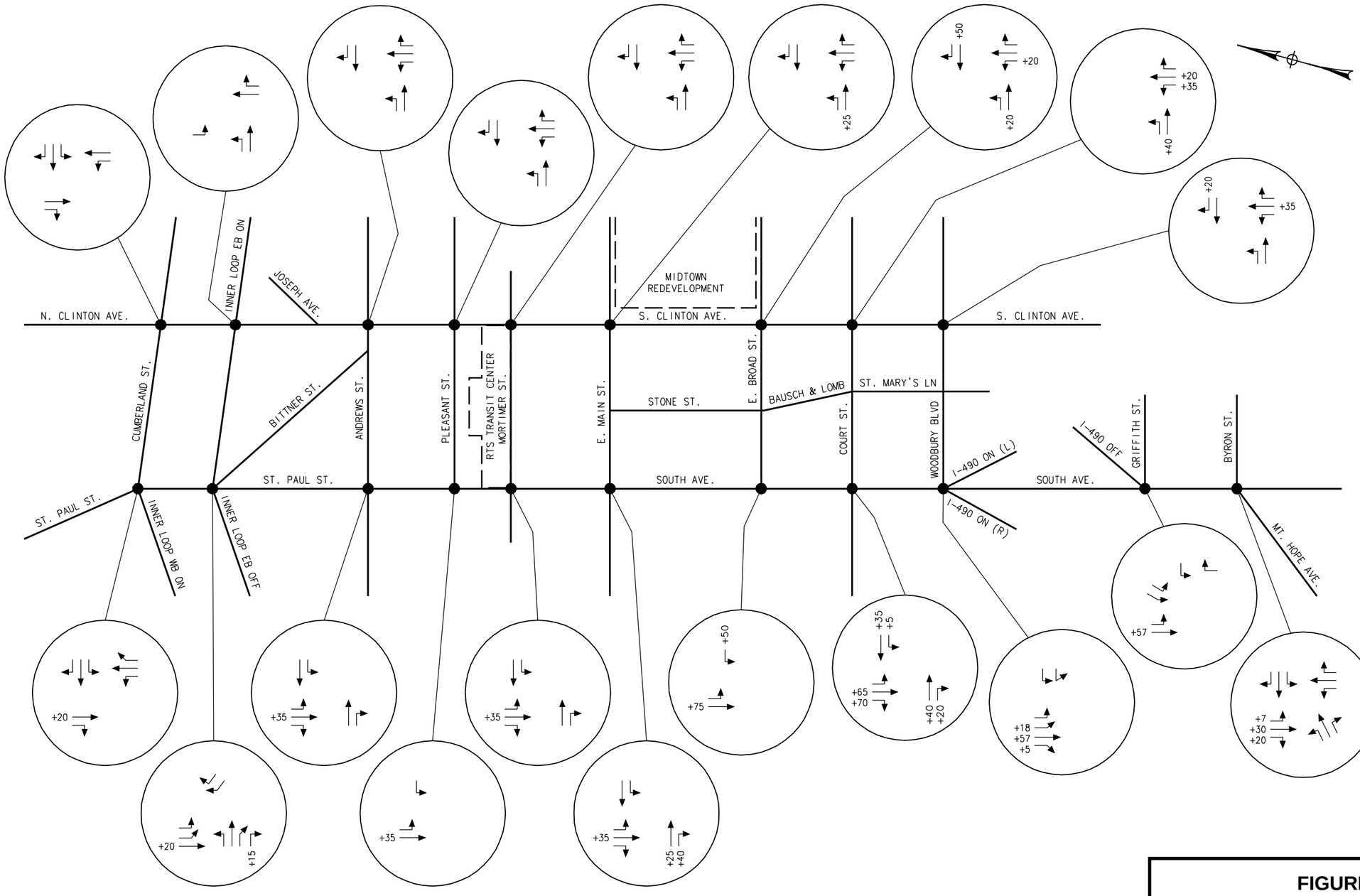
Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 24

ALTERNATE 1
BROAD ST AQUEDUCT PROJECT TRIP GENERATION
AM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/10/2012 10:35:00 AM



NOTE; TRIP GENERATION VOLUMES SHOWN ARE BASED ON FIGURE 4-2B "SCENARIO 3 - 2025 PM PEAK HOUR 100% DEVELOPMENT DISTRIBUTION" FROM THE BROAD STREET AQUEDUCT TRAFFIC IMPACT STUDY DEVELOPED BY T. Y. LYN INTERNATIONAL, 2009.

DATE: JAN 5, 2012

SCALE: NONE

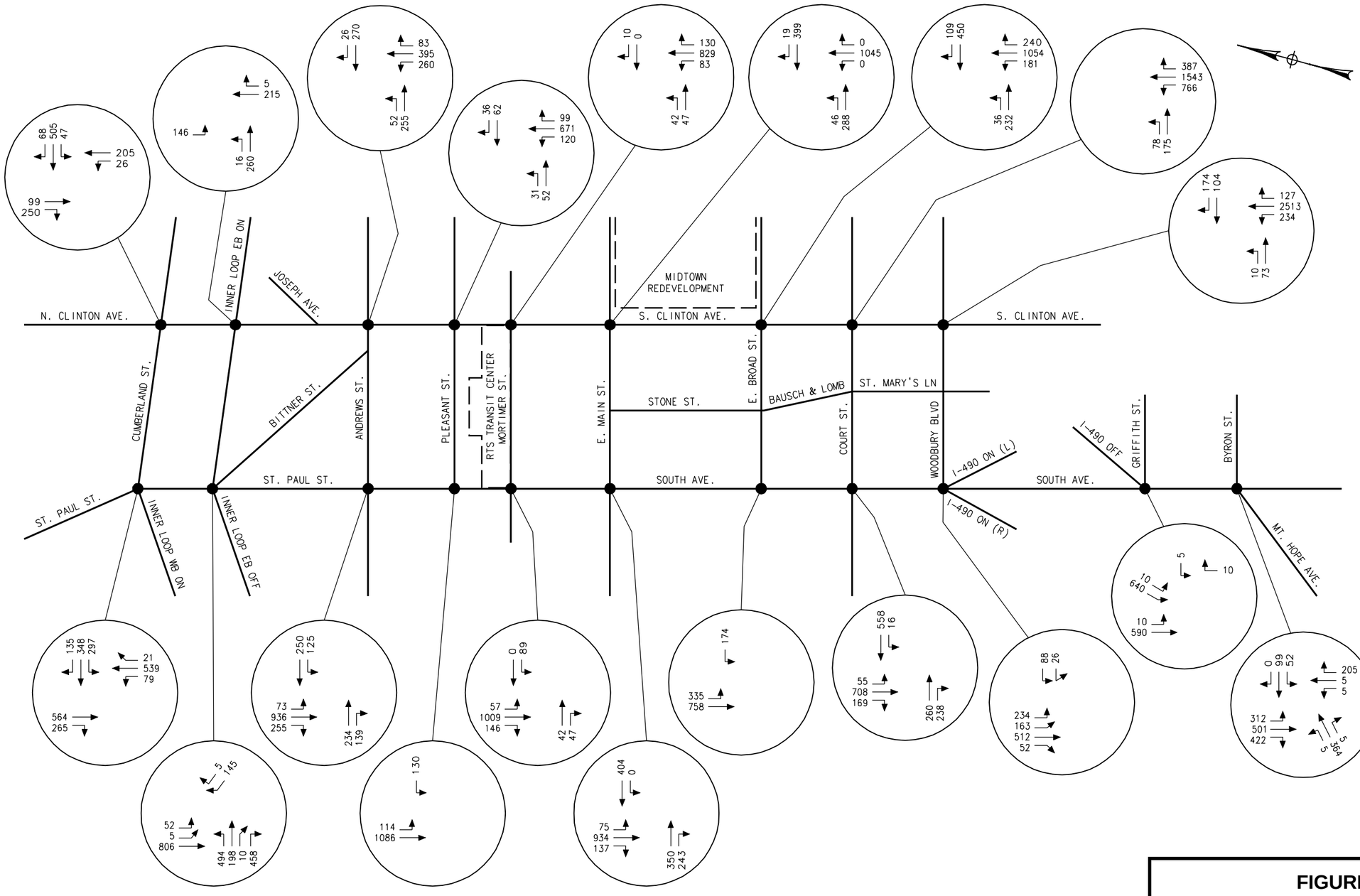
Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 25

ALTERNATE 1
BROAD ST AQUEDUCT TRIP GENERATION
PM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PMVOL.dgn mrw 1/6/2012 4:58:31 PM



LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/5/2012 4:29:06 PM

FIGURE 26

ALTERNATE 1 – FUTURE NO-BUILD
AM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

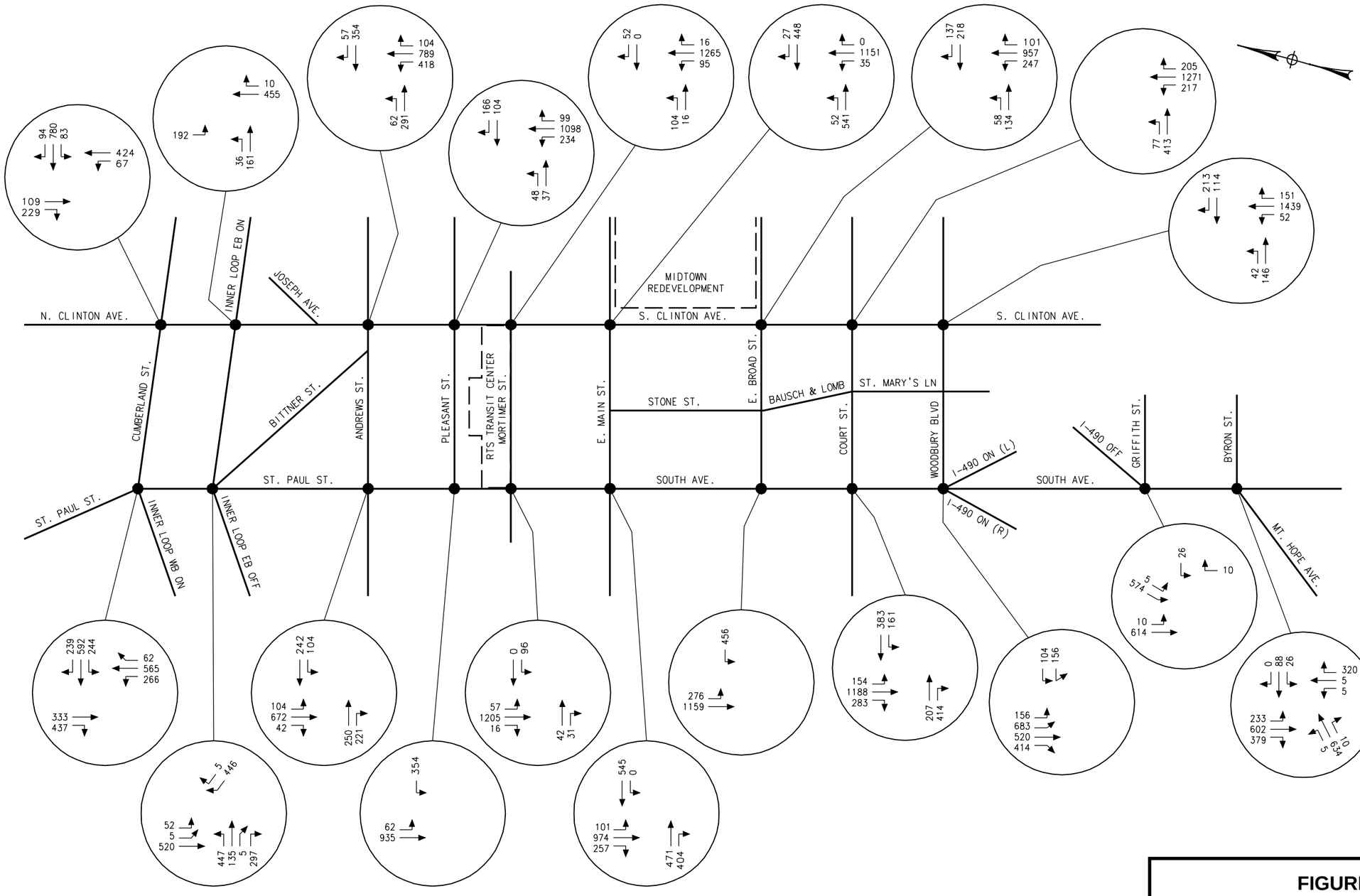


FIGURE 27

ALTERNATE 1 – FUTURE NO-BUILD
PM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-PMVOL.dgn mrw 1/6/2012 4:58:44 PM

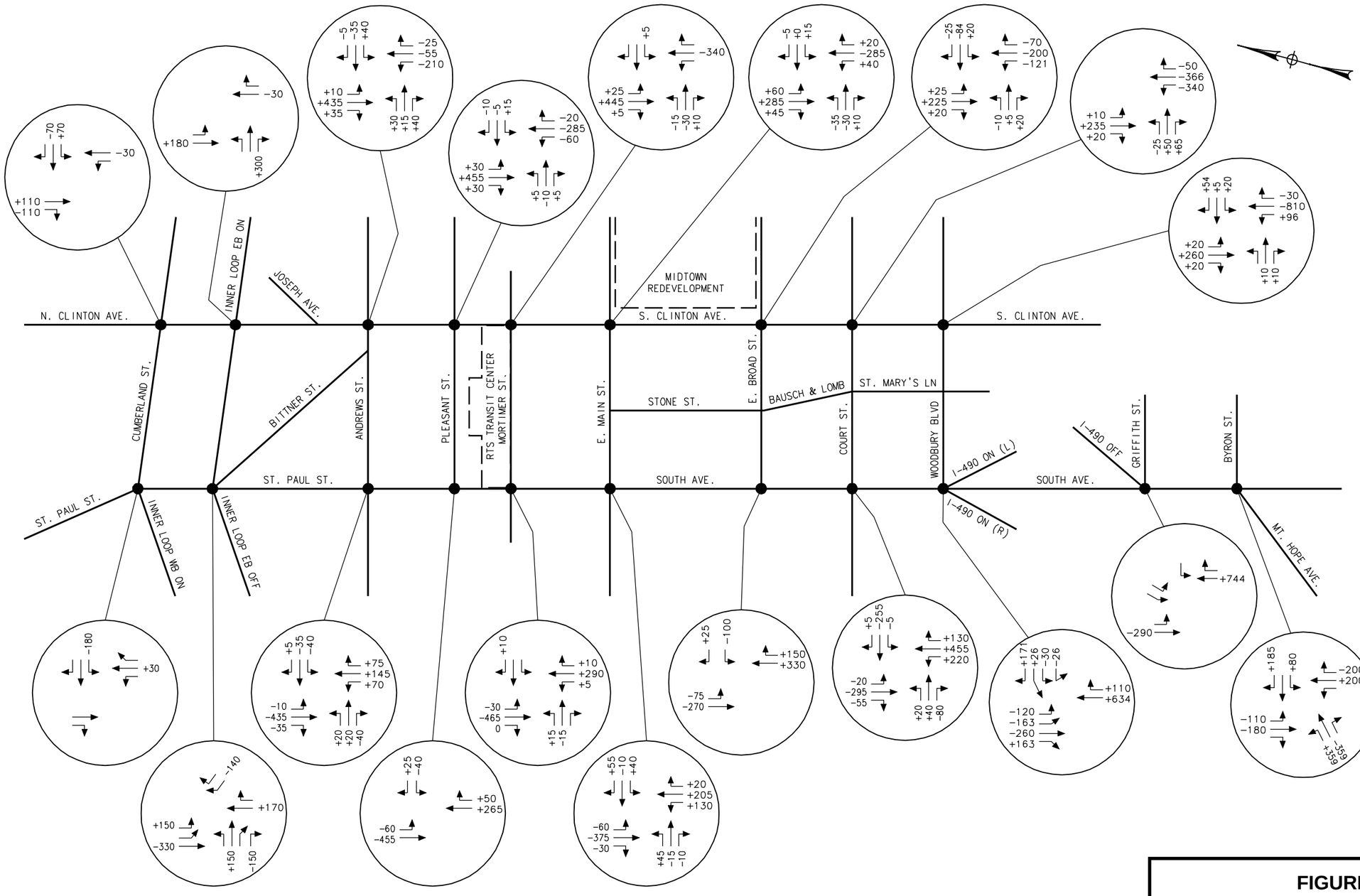


FIGURE 28

ALTERNATE 1
TWO-WAY CONVERSION TRAFFIC REDISTRIBUTION
FUTURE AM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/5/2012 4:29:24 PM

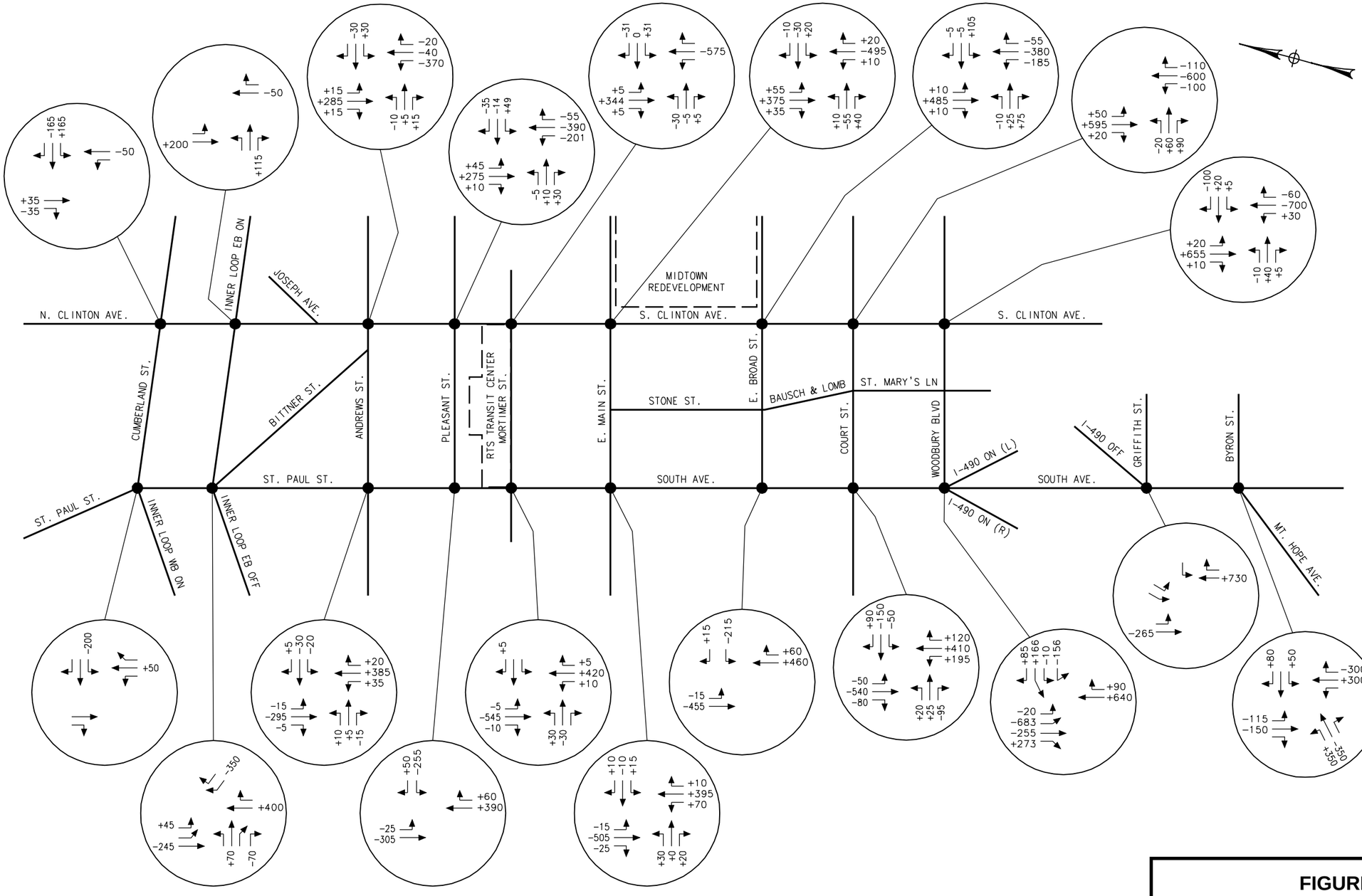


FIGURE 29

ALTERNATE 1
TWO-WAY CONVERSION TRAFFIC REDISTRIBUTION
FUTURE PM PEAK HOUR

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-PMVOL.dgn mrw 1/6/2012 4:58:57 PM

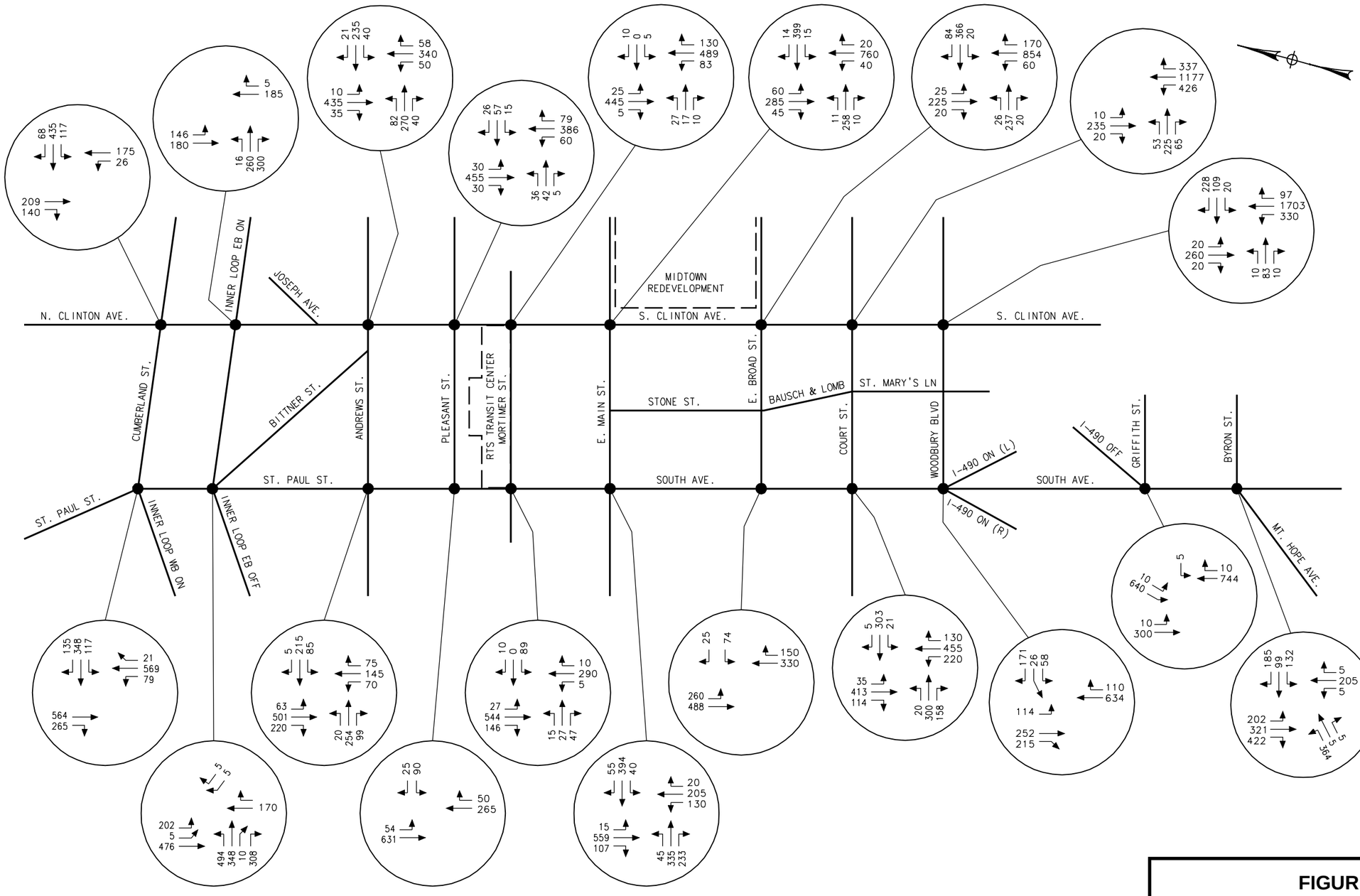


FIGURE 30

ALTERNATE 1 – FUTURE TWO-WAY CONVERSION
AM PEAK HOUR TRAFFIC VOLUMES

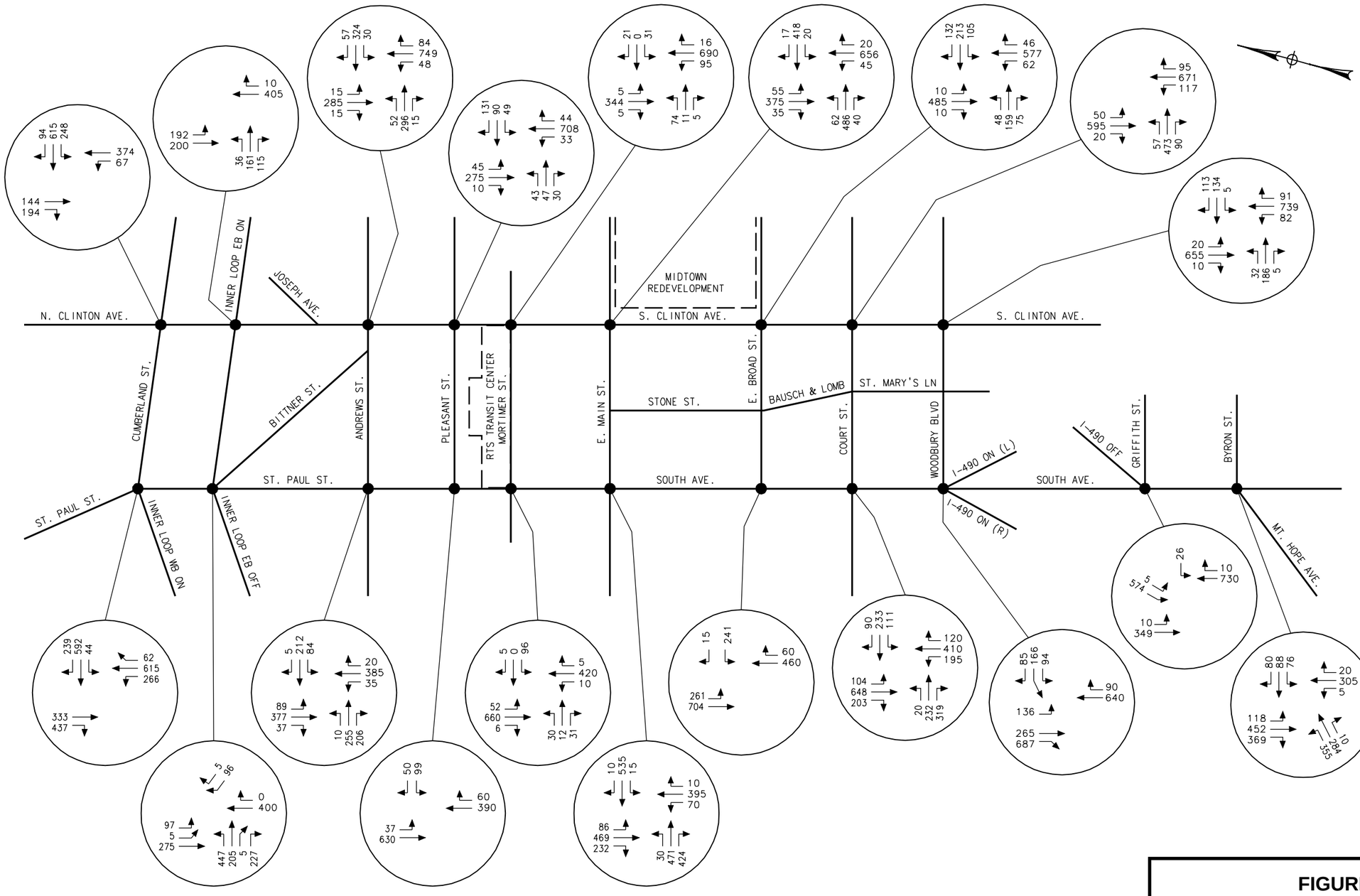
TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

LABERGE GROUP J:\2011035\Cadd\E-AMVOL.dgn mrw 1/5/2012 4:29:39 PM



DATE: JAN 5, 2012

SCALE: NONE

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

FIGURE 31

ALTERNATE 1 – FUTURE TWO-WAY CONVERSION
PM PEAK HOUR TRAFFIC VOLUMES

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\E-PM\VOL.dgn mrw 1/6/2012 4:59:12 PM

4.4 SUMMARY OF TRAFFIC FORECASTING

This Section discusses the methodology used to develop the traffic forecasts for the Future Two-Way Conversion condition. It contains figures that outline each step of the process for both the primary alternative and Alternate 1, which assumes the addition of the Broad Street Aqueduct Project. The traffic volume data contained in this Section will be used as a basis for all future condition analyses and feasible alternative recommendations, which will be presented in the Section 5.0 of the report. The following point should be noted concerning the traffic forecasting:

- Future No-Build Traffic Volumes were developed by adding and subtracting trips resulting from proposed developmental geometric changes; background traffic growth; and trip generation from known developments within the study area. The known developments include the Midtown Redevelopment and the RTS Transit Center.
- Future Build Traffic Volumes resulting from a conversion to two-way traffic along both North/South Clinton Avenue and St. Paul Street/South Avenue were developed by attempting to balance northbound and southbound traffic entering the study area between the two corridors and by ensuring side street volumes in and out of the study area were consistent with no-build conditions.
- Though northbound and southbound traffic are reasonably balanced between the two corridors at the local roadway entry and exit points, the location of Interstate ramps and the inability of both corridors to provide equally easy access, cause a significant skew in traffic between the two corridors at times. Most notably, the I-490 off-ramp skews northbound traffic to be much heavier on Clinton Avenue in the AM peak hour and the I-490 on-ramps skew southbound traffic to be higher along St. Paul/South Avenue in the PM peak hour. In addition, the positioning of Joseph Avenue and the heavy flow of traffic to that roadway skews northbound traffic at Andrews Street to be heavier at Clinton Avenue in both peaks.
- Pedestrian traffic was redistributed near the Main Street and Mortimer Street intersections to account for the RTS Transit Center and the removal of bus stops within the area, and the additional crossings expected for SUNY Brockport students. Other pedestrian changes are not expected as conversion to two-way traffic should not affect pedestrian routes.
- Alternate 1 trip distribution and traffic forecast development were based on geometric and traffic conditions resulting from the Broad Street Aqueduct Project being added to the future condition.

5.0 TWO-WAY CONVERSION FEASIBILITY ASSESSMENT

5.1 TWO-WAY CONVERSION OVERVIEW

The conversion of the St. Paul Street/South Avenue corridor and the North/ South Clinton Avenue corridor to two-way traffic will require extensive changes to the existing roadways. Signing, pavement marking and traffic signals will need to be modified throughout the project area and road geometry changes will be required in some areas. As the concept for two-way traffic operations within these corridors was being developed, issues such as parking, pedestrians, bicyclists and roadway capacity all needed to be considered.

Based on the projected future traffic volumes, it was determined that a single through lane, with a center turn median and other select turn lanes at the intersections, both northbound and southbound would generally be sufficient for capacity between Main Street and Andrews Street. For locations south of Main Street, South Avenue will generally require two southbound lanes to accommodate the high traffic entering the I-490 eastbound ramp at Woodbury Boulevard and South Clinton Avenue will generally require two northbound lanes to accommodate the high traffic coming off the I-490 westbound ramp.

A Conceptual Layout Plan for the proposed two-way conversion is included at the end of this Section. This concept plan depicts the striping layout necessary for the conversion and highlights the significant roadway improvements required. For the most part, the lanes required could be accommodated within the existing pavement width, but there are some locations that do require modification. The most significant of these roadway modifications include:

- Cut-back southwest corner radius at the Inner Loop & Clinton Avenue intersection to allow a smoother southbound transition through the intersection.
- Convert Bittner Street to one-way traffic traveling southeast. Though two-way operations could remain on Bittner if desired, the conversion to one-way traffic would provide operational and safety benefits by reducing conflicts at the Inner Loop / St. Paul intersection. This conversion would also allow for angled parking on Bittner, which would increase the number of spaces.
- Remove the east side parking lane being proposed by the Midtown Development project between Broad Street and Main Street in order to construct a full 3-lane roadway between the intersections. Parking will remain on the west side of the roadway and there may be a possibility of adding a small recessed parking area along the east side of Clinton between Broad and Elm to help reduce on-street parking reductions in this area.
- Remove traffic islands on South Avenue at the South Avenue Garage and reconfigure roadway in front of the structure. Internal circulation of the garage may be a significant issue that will need to be coordinated with the garage operator.
- Reconfigure Broad Street for two-way traffic between South Avenue and Clinton Avenue as proposed in the Midtown Redevelopment project. Construct bulbouts at the Broad Street / South Avenue intersection to improve pedestrian functions and increase parking.
- Eliminate bulbout on the northeast corner of Court Street & Clinton Avenue intersection to establish a 4-lane roadway section the entire length between Court Street and Broad Street.
- Reconstruct the South Avenue / Woodbury Boulevard intersection, removing the left side ramp to I-490 and the associated laneage, and constructing a raised right turn channelization island to shorten pedestrian crossing distances, maximize queue storage area, and reduce aggressive driving.
- Remove and reconstruct traffic islands at Mt Hope / Byron Street intersection and along South Avenue between Byron Street and Griffith Street.

A detailed discussion of all the recommended improvements and their associated costs are included in Section 5.4 of this report.

MATCHLINE A (SEE SHEET 2)

FIGURE 32

NOTEWORTHY ROADWAY MODIFICATIONS

- (A) CUT BACK CURB RADIUS TO ALLOW SMOOTHER TRANSITION THROUGH INTERSECTION.
- (B) CONVERT BITTNER STREET TO ONE-WAY WITH ANGLED PARKING ON NORTH SIDE.
- (X) WIDEN PAVEMENT TO ALLOW FOR BETTER MERGE TRANSITION.

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

DATE: JULY 16, 2012

SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 1 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\PLAN1_1.dgn mr● 7/16/2012 11:49:42 AM

MATCHLINE A (SEE SHEET 1)

MATCHLINE B (SEE SHEET 3)

NOTEWORTHY ROADWAY MODIFICATIONS

(B) CONVERT BITTNER STREET TO ONE-WAY WITH ANGLED PARKING ON NORTH SIDE.

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

FIGURE 33

DATE: JULY 16, 2012

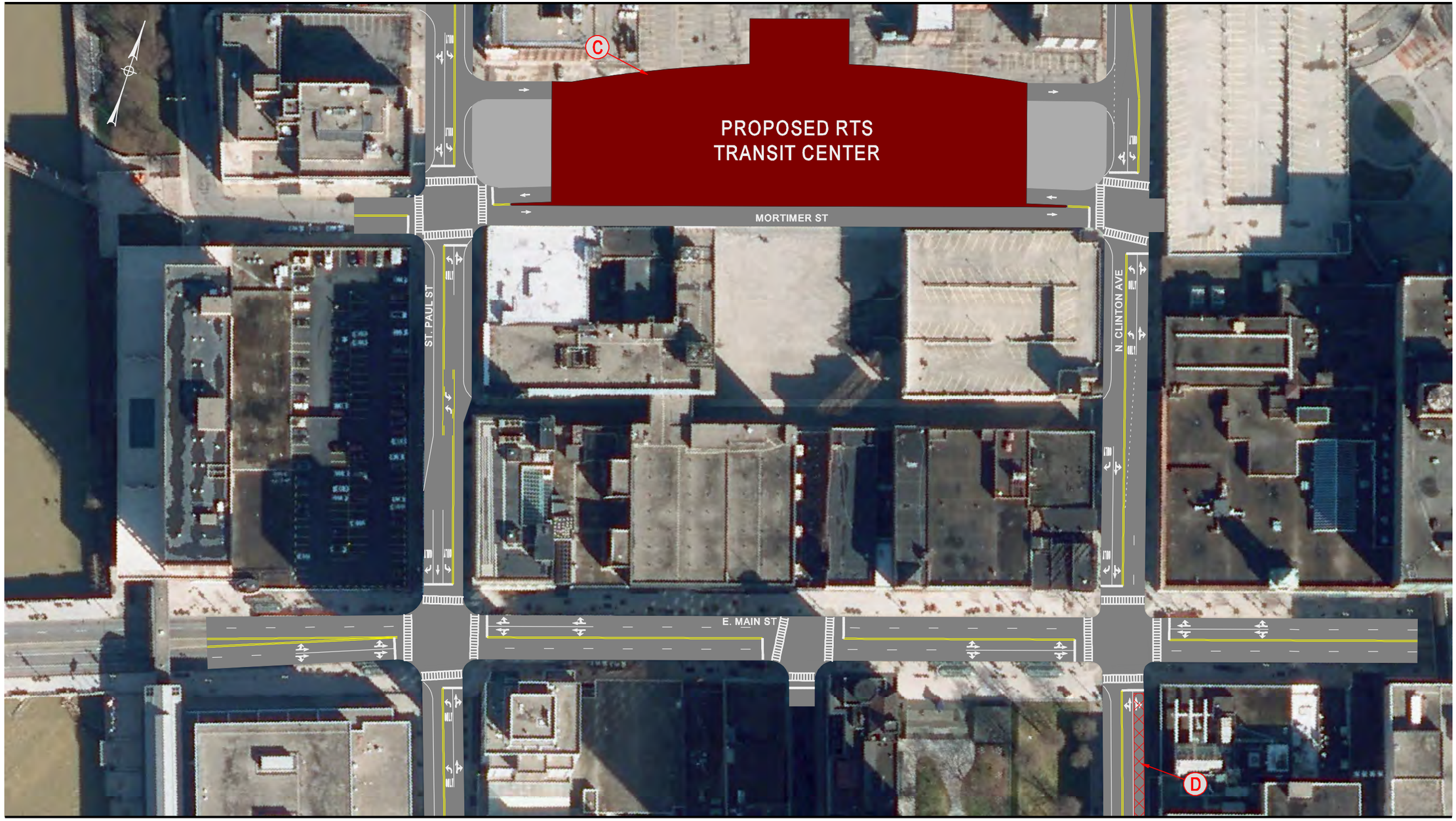
SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 2 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

MATCHLINE B (SEE SHEET 2)



MATCHLINE C (SEE SHEET 4)

NOTEWORTHY ROADWAY MODIFICATIONS

Ⓒ PROPOSED GEOMETRIC CHANGES ALREADY PLANNED FOR THE RTS TRANSIT CENTER CONSTRUCTION.

Ⓓ ELIMINATE EAST SIDE PARKING LANE BEING PROPOSED BY MIDTOWN DEVELOPMENT RECONSTRUCTION IN ORDER TO PROVIDE THREE (3) TRAVEL LANES BETWEEN E. MAIN STREET AND E. BROAD STREET.

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

FIGURE 34

DATE: JULY 16, 2012

SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 3 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

LABERGE GROUP J:\2011035\Cadd\PLAN1_3.dgn 7/16/2012 11:51:44 AM mrw

MATCHLINE C (SEE SHEET 3)

MATCHLINE D (SEE SHEET 5)

NOTEWORTHY ROADWAY MODIFICATIONS

- (D) ELIMINATE EAST SIDE PARKING LANE BEING PROPOSED BY MIDTOWN DEVELOPMENT RECONSTRUCTION IN ORDER TO PROVIDE THREE (3) TRAVEL LANES BETWEEN E. MAIN STREET AND E. BROAD STREET.
- (E) REMOVE SOUTH AVE GARAGE RAISED ISLANDS AND RECONFIGURE ENTRANCE.
- (F) RECONSTRUCT E. BROAD STREET TO ALLOW FOR TWO-WAY TRAFFIC AS PROPOSED BY THE MIDTOWN REDEVELOPMENT CONSTRUCTION PROJECT.
- (G) CONSTRUCT INTERSECTION BULBOUTS TO IMPROVE PEDESTRIAN MOVEMENTS AND ADD PARKING.

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

FIGURE 35

DATE: JULY 16, 2012

SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 4 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE & ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

MATCHLINE D (SEE SHEET 4)

MATCHLINE E (SEE SHEET 6)

NOTEWORTHY ROADWAY MODIFICATIONS

- (G) CONSTRUCT INTERSECTION BULBOUT TO IMPROVE PEDESTRIAN MOVEMENT AND ADD PARKING.
- (H) REMOVE BULBOUT AND PARKING LANE TO PROVIDE ADDITIONAL THROUGH LANE.
- (I) REMOVE EXISTING ISLAND.
- (J) CONSTRUCT CURBED SIDEWALK AREA WITH PARKING AND CHANNELIZATION ISLAND AS SHOWN.
- (K) CLOSE I-490 ON-RAMP ENTRANCE AND CONSTRUCT CURBED RADIUS AND SIDEWALK AREA.

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

FIGURE 36

DATE: JULY 16, 2012

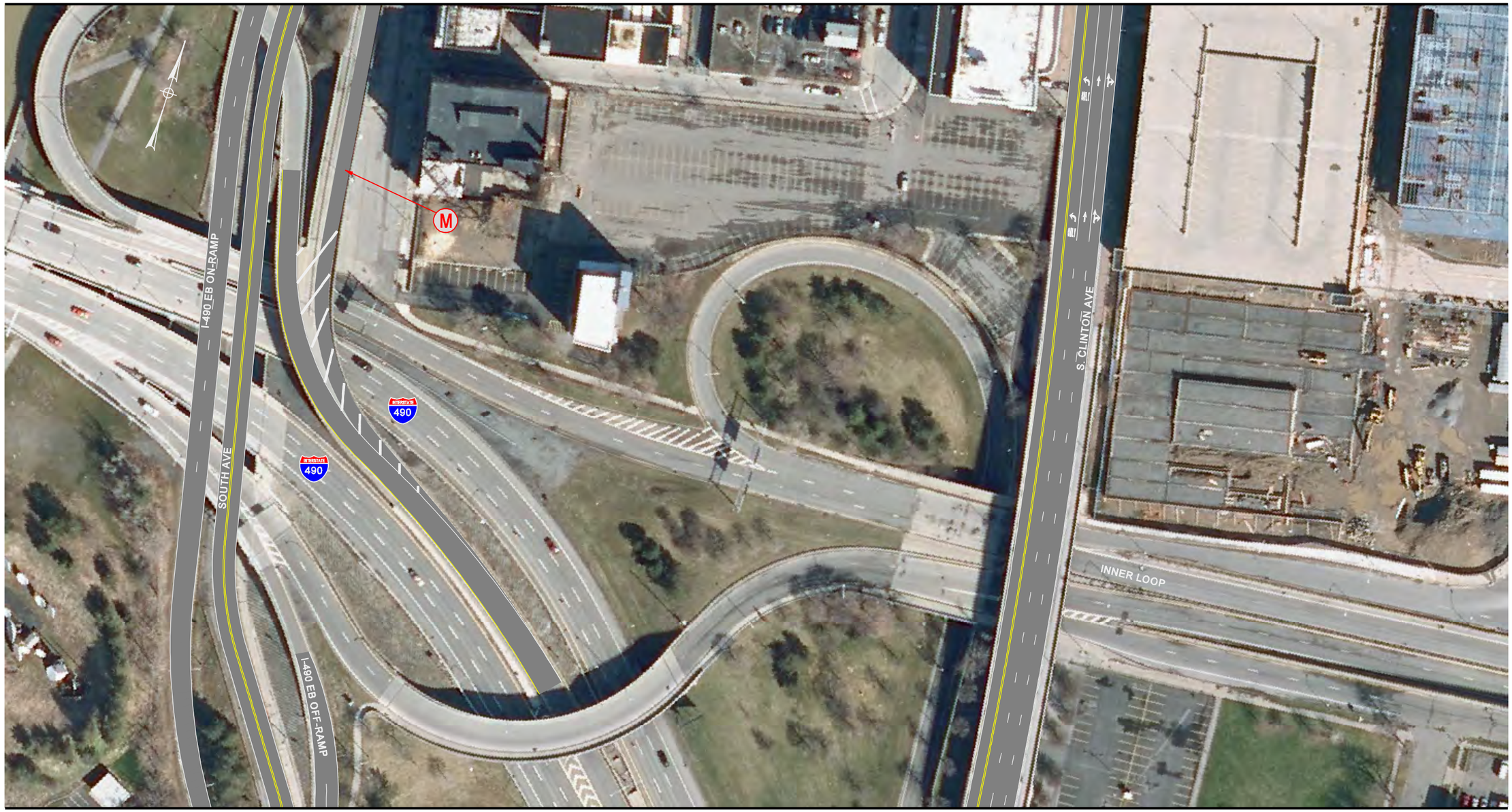
SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 5 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

MATCHLINE E (SEE SHEET 5)



MATCHLINE F (SEE SHEET 7)

NOTEWORTHY ROADWAY MODIFICATIONS

(M) **CLOSE I-490 ON-RAMP.**

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

FIGURE 37

DATE: JULY 16, 2012

SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 6 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

MATCHLINE F (SEE SHEET 6)

NOTEWORTHY ROADWAY MODIFICATIONS

- (N) REMOVE SPLITTER ISLAND AND RECONFIGURE INTERSECTION.
- (O) RE-OPEN SECOND THROUGH LANE FROM I-490 EB OFF-RAMP.
- (P) RECONFIGURE RAISED ISLAND.

NOTE: SIGNING, STRIPING AND SIGNAL CHANGES ARE EXPECTED AT ALL LOCATIONS AND ARE NOT DISCUSSED ABOVE.

FIGURE 38

DATE: JULY 16, 2012

SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN
PAGE 7 OF 7

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

5.2 FUTURE NO-BUILD TRAFFIC OPERATIONS

As part of the feasibility assessment for the two-way conversion, future "build" condition traffic operations were compared to the future "no-build" traffic conditions. "No-build" conditions refer to the continued one-way operations along both St. Paul Street/South Avenue and North/South Clinton Avenue, while "Build" conditions refers to the conversion of both arterials to two-way traffic. In order to make this comparison, future no-build AM and PM Peak traffic volumes, as defined in Section 4.0 of this report, were reviewed and analyzed. As discussed in that Section, a 20 year design horizon was used to determine future operations and the required roadway improvements to accommodate those operations.

For the No-build analysis, the operating conditions at each intersection were evaluated based on the relationship of their proposed traffic volumes to the theoretical capacity of each intersection, which is affected by various factors including traffic volumes, roadway geometry, grade, number and width of travel lanes and the type of intersection control. The current standards for evaluating capacity and operating conditions are contained in the *Highway Capacity Manual*, published by the Transportation Research Board. The procedures describe operating conditions in terms of Level of Service (LOS). In general, "A" represents the best operating condition and "F" represents the worst. Level of service "D" or better normally represents acceptable operating conditions during peak periods.

The future no-build traffic conditions within the study area are discussed below and capacity analysis results are summarized in the Future No-Build Peak Hour Level of Service Summary shown in Table 5.1 at the end of this section. The worksheets for the capacity analysis are provided in Appendix B.

5.2.1 St. Paul Street/South Avenue Corridor Operations

Future No-Build traffic operations at the intersections within this corridor are similar to the 2011 levels of service presented in the Existing Conditions Assessment shown in Section 3.0 of this report. Overall intersection levels of service are all LOS D or better in both the AM and PM peak hours, and all individual approaches at the intersections, except at the St. Paul / Inner Loop Eastbound Ramp intersection, operate at LOS D or better. At the St. Paul/Inner Loop Eastbound Ramp intersection, the southbound St. Paul approach in the AM peak hour and the Bittner Street approach in the PM peak hour are projected to operate at LOS E.

The Corridor as a whole was evaluated as an urban street using the methodologies outlined in the *Highway Capacity Manual* to obtain an overall Arterial Level of Service based on average travel speed throughout the corridor. The results of the analysis revealed that the St. Paul Street/South Avenue corridor will operate at LOS D in both the AM & PM future no-build peak hours with an average southbound travel speed of 11.8 miles per hour (mph) in the AM Peak Hour and 10.8 mph in the PM Peak Hour. This represents a 7% reduction in speed in the AM and a 4% reduction in speed in the PM compared to the existing conditions.

5.2.2 North/South Clinton Avenue Corridor Operations

Future no-build operations at the intersections within this corridor also operate similar to existing conditions with little to no change in level of service from the 2011 conditions analysis presented in Section 3.0. Overall, the intersections and all approaches are expected to operate at LOS D or better under future no-build conditions for both the AM and PM peak hours. The corridor overall experiences an arterial level of service of LOS D in both the AM and PM Peak Hour with average northbound travel speeds of 12.3 mph and 11.0 mph respectively. This represents a decrease of speed from the existing conditions of 9% in the AM and 10% in the PM.

TABLE 5.1
Future No-Build Peak Hour Level of Service Summary

Intersection	Approach	AM Peak Hour LOS(delay)	PM Peak Hour LOS(delay)
South Ave. at Mt. Hope Ave./ Byron St.	NB	A (6.8)	B (11.9)
	SB	A (9.8)	C (21.8)
	EB	C (20.3)	B (19.6)
	WB	C (27.1)	C (29.1)
	Overall	**B (12.8)**	**C (20.1)**
South Ave. at Griffith/I-490 EB Off-Ramp	NB	C (27.9)	C (27.4)
	SB	B (12.0)	B (16.0)
	SW	C (21.6)	B (17.1)
	WB	C (29.4)	C (28.8)
	Overall	**B (17.2)**	**B (16.9)**
South Ave. at Woodbury Blvd	SB	A (1.5)	B (11.2)
	WB	D (43.3)	D (45.7)
	Overall	**A (6.1)**	**B (15.6)**
South Ave. at Court St.	SB	A (6.8)	B (15.8)
	EB	B (17.6)	D (39.5)
	WB	A (8.0)	C (20.3)
	Overall	**B (10.1)**	**C (21.7)**
South Ave. at E. Broad St.	SB	B (15.8)	C (22.6)
	EB	C (29.4)	D (42.8)
	WB	B (16.1)	B (16.3)
	Overall	**B (19.0)**	**C (24.9)**
St. Paul St. at E. Main St.	SB	A (8.3)	A (9.5)
	EB	C (27.9)	C (22.8)
	WB	B (10.2)	B (18.9)
	Overall	**B (12.0)**	**B (14.5)**
St. Paul St. at Mortimer St.	SB	A (3.2)	B (14.5)
	EB	C (32.2)	C (22.5)
	WB	D (37.6)	B (19.5)
	Overall	**A (7.4)**	**B (15.2)**
St. Paul St. at Pleasant St.	SB	A (5.1)	A (8.1)
	WB	D (35.5)	D (43.8)
	Overall	**A (8.2)**	**B (17.9)**
St. Paul St. at Andrews St.	SB	B (20.0)	C (20.9)
	EB	C (21.1)	C (20.2)
	WB	C (27.6)	C (23.0)
	Overall	**C (21.7)**	**C (21.1)**
St. Paul St. at Inner Loop EB/ Bittner St.	SB	A (2.4)	A (0.8)
	EB	E (55.2)	D (42.3)
	NW	C (24.2)	E (74.0)
	Overall	**C (32.3)**	**D (37.6)**
St. Paul St. at Inner Loop WB/ Cumberland St.	NB	A (9.5)	B (12.9)
	SB	D (40.5)	D (48.1)
	WB	D (40.0)	D (43.0)
	Overall	**C (31.2)**	**C (34.4)**
S. Clinton Ave. at Byron St.	NB	D (35.7)	D (35.4)
	SE	C (31.1)	C (30.2)
	EB	A (5.7)	A (6.8)
	Overall	**B (16.3)**	**B (15.5)**
S. Clinton Ave. at Woodbury Blvd.	NB	B (18.1)	C (26.9)
	EB	D (41.0)	B (18.4)
	WB	C (32.7)	B (15.1)
	Overall	**B (19.6)**	**C (24.8)**
S. Clinton Ave. at Court St.	NB	A (8.3)	A (7.9)
	EB	C (25.6)	B (18.2)
	Overall	**A (9.7)**	**B (10.2)**
S. Clinton Ave. at E. Broad St.	NB	A (9.3)	A (3.5)
	EB	A (2.4)	C (24.0)
	WB	D (39.1)	C (33.3)
	Overall	**B (14.8)**	**B (12.5)**
N. Clinton Ave. at E. Main St.	NB	C (28.4)	C (27.4)
	EB	C (21.6)	D (42.7)
	WB	C (31.5)	C (32.0)
	Overall	**C (27.9)**	**C (32.4)**
N. Clinton Ave. at Mortimer St.	NB	A (4.3)	C (26.1)
	EB	D (41.8)	D (50.3)
	WB	D (36.8)	C (33.1)
	Overall	**A (7.5)**	**C (28.2)**
N. Clinton Ave. at Pleasant St.	NB	A (1.4)	A (5.5)
	EB	D (52.5)	C (34.8)
	WB	C (32.1)	C (33.8)
	Overall	**A (8.2)**	**B (11.3)**
N. Clinton Ave. at Andrews St.	NB	A (5.0)	A (4.4)
	EB	B (17.2)	C (28.9)
	WB	B (18.5)	C (29.4)
	Overall	**B (10.8)**	**B (13.6)**
N. Clinton Ave. at Inner Loop EB	NB	B (10.9)	B (11.9)
	SB	A (9.2)	B (15.7)
	EB	B (18.5)	C (27.1)
	Overall	**B (13.7)**	**B (16.4)**
N. Clinton Ave. at Cumberland St.	NB	A (1.5)	A (3.6)
	SB	C (29.0)	C (33.1)
	WB	A (3.6)	A (6.2)
	Overall	**B (10.5)**	**B (10.7)**

Notes:
Delay = Seconds per Vehicle
NB=northbound, NW=northwestbound, SB=southbound, SW=southwestbound, EB=eastbound, WB= westbound

5.3 FUTURE 2-WAY BUILD TRAFFIC OPERATIONS

Using the lane geometry shown in the Conceptual Layout Plan shown in Section 5.1, capacity analyses were performed for each of the studied intersections and both arterial corridors. These analyses were performed for each of the intersections using the methodologies outlined in the *Highway Capacity Manual*. Traffic volumes used in the analysis are shown in Section 4.0 of this report with some minor variations to account for geometric changes and traffic shifts expected to avoid queuing or delay.

For the future two-way build analyses, signal phasing was modified at each intersection to accommodate the new traffic approaches, turn phases were added where appropriate, signal timings were optimized for each intersection and the overall signal network was optimized to reduce delay along each arterial. In addition, pedestrian volumes were included in the analyses and pedestrian phases were included at each location to ensure that the impedance resulting from pedestrian crossings was addressed. Leading pedestrian intervals were included at five locations, as recommended by the Monroe County Department of Transportation. These locations include Clinton Avenue at both Main Street and Mortimer Street, and South Avenue at Main Street, Broad Street and Court Street.

It should be noted that the capacity analyses performed assume unrestricted left turn movements at the Main Street intersections. Given the limited number of anticipated left turn vehicles at these locations, level of service is expected to remain the same regardless of whether these movements remain unrestricted, or if they are converted to bus only movements. It is recommended that all movements within the study area remain unrestricted to the fullest extent possible to help facilitate ease of travel for drivers unfamiliar with the downtown area.

The future two-way build traffic operations are discussed below and capacity analysis results are summarized in the Future Build Peak Hour Level of Service Summary shown in Table 5.2. The worksheets for the capacity analysis are provided in Appendix C.

5.3.1 St. Paul Street/South Avenue Corridor Operations

Intersection levels of service within the St. Paul Street/South Avenue corridor remain within an acceptable range with the conversion to 2-way traffic as proposed. The analysis revealed that all intersections should operate at LOS C or better within the corridor and all individual approaches to those intersections operate at LOS D or better, with the exception of the Griffith Street approach to South Avenue, which is LOS E in the AM peak hour. However, since the expected traffic volume on this approach is 5 or less vehicles and the volume is less than half of capacity, it was decided that an LOS E on the approach was preferred over reducing the green time and increasing queue lengths on South Avenue.

For the St. Paul / Inner Loop Eastbound Ramp intersection, which saw some approaches operate at LOS E in the No-build condition, two options were reviewed for the future build condition. First was with the existing single lane approach on Bittner Street accessing the traffic signal at St. Paul and the other with Bittner Street converted to one-way, away from the intersection at St. Paul. In both cases, the intersection should operate at an overall LOS C with no approach dropping below LOS D, but converting Bittner to one way does reduce delay and has the added benefits of reducing queue lengths and reducing the number of conflicting movements at the intersection which should increase safety. In addition, the conversion of Bittner Street to one way will allow for angled parking on Bittner Street which will increase the number of on-street parking spaces.

Corridor operations were analyzed and the Arterial Level of Service was determined to be LOS D northbound in both the AM and PM peak hour, with travel speeds of 10.6 mph and 10.4 mph respectively. For the southbound direction, Arterial Level of Service is also LOS D with speeds of 11.4 mph in both the

AM and PM peak hours. The southbound speeds represent a less than one mile per hour difference from the future No-build conditions.

5.3.2 North/South Clinton Avenue Corridor Operations

For the Clinton Avenue corridor, the overall Level of Service at all but one intersection is LOS C or better with no approach falling below LOS D in either of the peak hours. The lone exception is the S. Clinton & Byron intersection, which is expected to operate at LOS D in the PM peak hour with the Inner Loop Ramp approach operating at LOS E. Though volume is approaching capacity at this location, the ability to now shift to South Avenue if congestion occurs may make actual operations better than projected. The Arterial Level of Service was determined to be LOS D southbound with speeds of 10.4 mph in both the AM and PM peak hours. For the northbound direction, the arterial level is also LOS D in both peak hours with travel speeds of 12.9 mph in the AM and 11.7 mph in the PM. The northbound build condition speeds along Clinton Avenue are within 1 mph of the speeds anticipated for the No-build condition.

TABLE 5.2
Future Build Peak Hour Level of Service Summary

Intersection	Approach	AM Peak Hour	PM Peak Hour	Intersection	Approach	AM Peak Hour	PM Peak Hour
		LOS(delay)	LOS(delay)			LOS(delay)	LOS(delay)
South Ave. at Mt. Hope Ave./ Byron St.	NB	C (34.6)	D (44.0)	S. Clinton Ave. at Byron St	NB	B (10.9)	A (9.5)
	SB	B (14.5)	A (7.4)		SB	D (51.0)	D (54.8)
	EB	D (42.8)	C (33.9)		SE	D (44.2)	E (66.5)
	WB	C (33.4)	D (50.9)		EB	B (15.2)	D (49.5)
	Overall	**C (26.3)**	**C (26.0)**		**Overall**	**C (29.1)**	**D (42.7)**
South Ave. at Griffith/I-490 EB Off-Ramp	NB	B (18.4)	B (15.6)	S. Clinton Ave. at Woodbury Blvd.	NB	B (17.7)	A (7.2)
	SB	B (10.6)	A (8.6)		SB	A (6.7)	A (8.5)
	SW	D (41.8)	D (49.4)		EB	C (31.0)	C (29.9)
	WB	E (56.9)	D (49.1)		WB	D (41.1)	C (32.8)
	Overall	**C (26.1)**	**C (26.4)**		**Overall**	**B (18.7)**	**B (13.1)**
South Ave. at Woodbury Blvd	NB	B (11.7)	A (6.8)	S. Clinton Ave. at Court St.	NB	A (5.6)	A (8.5)
	SB	A (8.7)	A (7.4)		SB	A (7.5)	B (13.5)
	WB	D (42.4)	D (35.3)		EB	C (32.7)	D (49.3)
	Overall	**B (15.7)**	**B (11.6)**		**Overall**	**A (9.2)**	**C (21.6)**
South Ave. at Court St.	NB	B (12.2)	B (16.3)	S. Clinton Ave. at E. Broad St.	NB	A (4.5)	A (5.0)
	SB	A (2.8)	A (5.5)		SB	C (29.1)	C (22.8)
	EB	C (31.4)	C (34.6)		EB	C (20.7)	B (16.3)
	WB	C (25.8)	D (39.1)		WB	C (34.7)	D (36.5)
	Overall	**B (15.5)**	**B (19.6)**		**Overall**	**B (16.2)**	**B (19.0)**
South Ave. at E. Broad St.	NB	C (27.4)	B (14.7)	N. Clinton Ave. at E. Main St.	NB	B (17.5)	C (27.4)
	SB	C (31.9)	C (26.4)		SB	C (24.8)	B (17.2)
	EB	D (48.8)	D (47.6)		EB	C (22.2)	C (21.7)
	WB	C (29.6)	C (27.8)		WB	D (36.6)	C (30.8)
	Overall	**C (33.9)**	**C (27.7)**		**Overall**	**C (24.0)**	**C (24.4)**
St. Paul St. at E. Main St.	NB	B (19.8)	C (27.6)	N. Clinton Ave. at Mortimer St.	NB	A (9.4)	B (15.9)
	SB	B (12.6)	B (17.2)		SB	A (3.0)	A (7.2)
	EB	C (30.0)	C (29.4)		EB	D (44.8)	D (54.6)
	WB	B (19.9)	C (21.6)		WB	D (39.4)	D (38.9)
	Overall	**B (19.0)**	**C (23.2)**		**Overall**	**A (8.9)**	**B (17.1)**
St. Paul St. at Mortimer St.	NB	A (5.1)	A (2.8)	N. Clinton Ave. at Pleasant St.	NB	A (2.9)	B (10.8)
	SB	B (18.2)	B (12.5)		SB	A (10.3)	A (1.9)
	EB	C (24.8)	C (25.9)		EB	D (36.5)	C (28.8)
	WB	D (40.0)	D (48.2)		WB	C (31.4)	D (37.8)
	Overall	**B (17.1)**	**B (12.8)**		**Overall**	**B (10.6)**	**B (15.2)**
St. Paul St. at Pleasant St.	NB	A (4.1)	A (3.2)	N. Clinton Ave. at Andrews St.	NB	A (5.1)	B (15.7)
	SB	B (10.6)	B (10.4)		SB	B (15.7)	C (24.2)
	WB	C (21.7)	B (13.0)		EB	C (27.7)	B (16.9)
	Overall	**A (9.9)**	**A (8.0)**		WB	C (30.0)	C (24.3)
					Overall	**B (18.3)**	**B (19.1)**

TABLE 5.2 continued
Future Build Peak Hour Level of Service Summary

St. Paul St. at Andrews St.	NB	A (3.4)	B (10.9)	N. Clinton Ave. at Inner Loop EB	NB	B (14.0)	B (14.9)
	SB	B (16.1)	C (27.5)		SB	A (1.8)	A (5.8)
	EB	D (49.2)	C (27.8)		EB	C (23.7)	C (21.9)
	WB	C (33.4)	B (12.0)		**Overall**	**B (13.0)**	**B (13.0)**
	Overall	**C (24.2)**	**B (18.7)**				
St. Paul St. at Inner Loop EB/ Bittner St.	NB	A (9.9)	A (9.8)	N. Clinton Ave. at Cumberland St.	NB	A (4.0)	A (3.2)
	SB	A (9.7)	A (9.2)		SB	D (36.4)	C (29.7)
	EB	C (31.2)	D (41.4)		WB	A (3.8)	A (6.5)
	Overall	**C (23.0)**	**C (26.5)**		**Overall**	**B (15.7)**	**B (10.6)**
St. Paul St. at Inner Loop WB/ Cumberland St.	NB	A (4.7)	A (4.9)				
	SB	C (26.1)	C (23.9)				
	WB	C (21.0)	C (22.4)				
	Overall	**B (17.0)**	**B (16.5)**				

Notes:
Delay = Seconds per Vehicle
NB=northbound, NW=northwestbound, SB=southbound, SW=southwestbound, EB=eastbound, WB= westbound

It should be noted that the overall delay for the study area is calculated to be 201 vehicle hours of delay (VHD) in the AM peak hour and 246 VHD in the PM Peak hour for the build condition. For comparison, 213 VHD for the AM peak and 250 VHD for the PM peak were calculated for the future no-build condition. As can be seen, build condition delay appears to be slightly reduced from the no-build delay. There are a variety of reasons that could account for this, one being that the traffic signal timings under the build condition were optimized for the forecasted traffic volumes while the no-build condition continued with existing timings, which may not be as optimal for the projected conditions. Another reason may be that build condition drivers would enter the project area on a roadway closer to their destination. This would reduce the number of turns needed and the number of traffic signals encountered.

5.3.3 Vehicular Queuing

With the introduction of opposing traffic along each of the studied corridors, there is an increased potential for the queue of vehicles stopped at a traffic signal to extend back and interfere with the operations of the adjacent signals. Signal coordination and timing optimization can be used to combat this to some degree, but wherever signals are closely spaced, the potential for queue overruns exist.

For comparative purposes, the queues for both the future no-build and future build conditions were reviewed. Queues for each condition were determined through the Synchro traffic analysis software, which determines queue length based on the vehicle arrival pattern at a particular location and the length of time vehicles are stopped at that location. Vehicles arriving during the green interval will not stop or be queued, so only vehicles arriving during red are accounted in the queue calculations. The software provides information for two separate queue conditions, 50th percentile and 95th percentile. The 50th percentile represents the average queue condition with 50% of the observed queues being longer and 50% of the observed queues being shorter than the number presented. The 95th percentile queue represents the maximum design queue for a particular location. This length will not be exceeded by 95% of the observed queues. For this study the maximum queue will be the primary focus. Detailed queuing reports can be found in Appendices B & C.

Based on the analysis outputs, the future no-build condition is anticipated to have individual maximum queues exceed the available storage back to the next signal or ramp terminus on one approach in the AM peak hour and on five approaches in the PM peak hour. The most significant of these include southbound South Ave. at Woodbury Blvd backing up to Court Street and westbound Cumberland Street backing up to Clinton Avenue from the St. Paul Intersection in the PM peak hour. The future no-build condition will also see back-ups on St. Paul between Cumberland St. and the Inner Loop Eastbound intersections in both peak hours. Less significant encroachments occur eastbound along Court St. and Main St., which back up past the garage access road (Stone/Bausch&Lomb/St. Mary's) between Clinton Ave. and South Ave.
For the future build conditions, the maximum queue is expected to exceed available storage on three approaches during each of the peak hours. These approaches include southbound Clinton at Cumberland,

southbound St. Paul at Andrews and northbound South Avenue at Griffith in the AM peak hour, and eastbound Court at Clinton, southbound Clinton at the eastbound Inner Loop ramp road and once again the northbound South Avenue approach to Griffith Street in the PM peak hour. A summary of the maximum queues, with queue overruns depicted in red, is shown in Table 5.3.

TABLE 5.3
Summary of Maximum Queues

Intersection	Appr.	Available Storage	No-Build AM Peak	No-Build PM Peak	2-Way Build AM Peak	2-Way Build PM Peak
South Ave. at	NB	875'	33'	131'	201'	337'
Mt. Hope Ave./	SB	260'	192'	256'	70'	87'
Byron St.	EB	1,200'	92'	161'	349'	289'
	WB	500'	83'	75'	272'	94'
South Ave. at	NB	200'	0'	0'	**419'**	**480'**
Griffith/I-490 EB	SB	1,000'	143'	161'	197'	113'
Off-Ramp	SW	450'	184'	138'	291'	293'
	WB	100'	12'	30'	17'	47'
South Ave. at	NB	1,000'	-	-	133'	91'
Woodbury Blvd	SB	350'	38'	**362'**	106'	212'
	WB	400'	103'	173'	96'	201'
South Ave. at	NB	350'	-	-	182'	227'
Court St.	SB	325'	39'	135'	28'	98'
	EB	950'	176'	301'	247'	182'
	WB	400'	114'	120'	128'	206'
South Ave. at	NB	325'	-	-	155'	286'
E. Broad St.	SB	625'	77'	353'	203'	250'
	EB	1,000'	276'	250'	363'	270'
	WB	300'	173'	51'	97'	124'
St. Paul St. at	NB	625'	-	-	185'	408'
E. Main St.	SB	325'	86'	58'	244'	231'
	EB	1,000'	120'	177'	127'	210'
	WB	300'	33'	190'	113'	143'
St. Paul St. at	NB	325'	-	-	80'	27'
Mortimer St.	SB	250'	25'	94'	226'	187'
	EB	200'	68'	53'	60'	58'
	WB	600'	122'	60'	117'	97'
St. Paul St. at	NB	250'	-	-	107'	26'
Pleasant St.	SB	300'	55'	68'	241'	240'
	WB	600'	157'	409'	84'	56'
St. Paul St. at	NB	300'	-	-	11'	157'
Andrews St.	SB	525'	258'	160'	**601'**	245'
	EB	1,300'	126'	154'	375'	353'
	WB	600'	165'	126'	157'	83'
St. Paul St. at	NB	525'	-	-	36'	74'
Inner Loop EB/	SB	150'	26'	6'	92'	71'
Bittner St.	EB	475'	273'	307'	313'	216'
	Bittne	**600'**	132'	534'	-	-
St. Paul St. at	NB	150'	**163'**	**177'**	143'	108'
Inner Loop WB/	SB	750'	566'	443'	344'	272'
Cumberland St.	WB	575'	372'	**648'**	111'	104'

Intersection	Appr.	Available Storage	No-Build AM Peak	No-Build PM Peak	2-Way Build AM Peak	2-Way Build PM Peak
S. Clinton Ave. at	NB	900'	138'	151'	121'	67'
Byron St.	SB	1,500'	-	-	253'	711'
	SE	1,500'	87'	45'	115'	113'
	EB	500'	163'	210'	79'	170'
S. Clinton Ave. at	NB	1,500'	525'	317'	847'	117'
Woodbury Blvd.	SB	375'	-	-	63'	118'
	EB	125'	53'	54'	65'	101'
	WB	450'	100'	70'	104'	78'
S. Clinton Ave. at	NB	375'	136'	46'	77'	103'
Court St.	SB	325'	-	-	96'	272'
	EB	125'	103'	**130'**	105'	**318'**
S. Clinton Ave. at	NB	325'	162'	43'	37'	44'
E. Broad St.	SB	725'	-	-	270'	463'
	EB	250'	5'	76'	128'	97'
	WB	500'	241'	195'	221'	211'
N. Clinton Ave. at	NB	725'	460'	468'	343'	269'
E. Main St.	SB	375'	-	-	179'	286'
	EB	250'	79'	**290'**	77'	85'
	WB	475'	178'	202'	204'	192'
N. Clinton Ave. at	NB	375'	24'	279'	109'	160'
Mortimer St.	SB	275'	-	-	41'	106'
	EB	600'	98'	145'	75'	119'
	WB	100'	0'	9'	23'	57'
N. Clinton Ave. at	NB	275'	10'	36'	39'	211'
Pleasant St.	SB	300'	-	-	154'	26'
	EB	600'	117'	81'	105'	110'
	WB	450'	90'	234'	82'	155'
N. Clinton Ave. at	NB	300'	44'	71'	24'	246'
Andrews St.	SB	425'	-	-	344'	259'
	EB	600'	136'	170'	167'	183'
	WB	550'	96'	165'	225'	290'
N. Clinton Ave. at	NB	425'	52'	56'	80'	312'
Inner Loop EB	SB	50'	21'	22'	27'	**63'**
	EB	475'	50'	26'	174'	116'
N. Clinton Ave. at	NB	50'	7'	22'	24'	32'
Cumberland St.	SB	275'	67'	73'	**318'**	180'
	WB	125'	23'	59'	28'	65'

5.3.4 Pedestrian Operations

Pedestrian traffic will operate much as it does under existing conditions. Future conditions do show a shift in pedestrian traffic from the Main Street intersections to the Mortimer Street intersections once the RTS Transit Center is constructed, but traffic analyses show that this shift can be accommodated without excessive delays in vehicular traffic. For the future two-way build condition, pedestrians will have to be more vigilant in their crossing, as they will need to pay attention to two directions instead of just one, but travel speeds under future build condition will generally be lower near the intersection because of the addition of vehicular conflicts created by the introduction of two-way traffic within each corridor. To reduce any issues with pedestrian operations, Leading Pedestrian Intervals (LPI's) were introduced where the heaviest pedestrian traffic would occur and bulbouts are proposed, where appropriate, to reduce crossing distances. High visibility crosswalks are proposed at all locations.

5.3.5 Bicycle Operations

It may be possible to add bicycle facilities along some of the road segments within the project area under the two-way traffic build condition. However, to remain within the existing pavement widths, travel lanes would need to be brought down to 10 feet in many areas, and even then only a few segments could accommodate these facilities without the removal of on-street parking.

With the need for minimal lane widths to accommodate bike facilities, it is critical to know exact road widths before a determination can be made concerning the feasibility of these facilities. As such, no specific recommendations concerning bike facilities along St. Paul/South Avenue or Clinton Avenue are being presented in this report. Bicycle facility locations can be better defined once a detailed survey is performed, at the time of design. Once surveyed, the designer should optimize pavement striping to accommodate bicycle facilities where possible.

With that said, a preliminary review of the project area was conducted and the following locations were identified for possible bike facilities:

- N. Clinton Ave. between Central Ave. and Cumberland St.: 5 ft wide bike lanes both directions
- N. Clinton Ave. between Cumberland St. and Mortimer St.: Sharrow[1] southbound only
- S. Clinton Ave. between E. Broad St. and Byron St.: Sharrow southbound only
- St. Paul between Cumberland and Inner Loop EB Ramp: Bike lane southbound/Sharrow northbound[2]
- South Ave. between Broad St. and Court St.: Sharrow northbound only
- South Ave. between Court St. and Woodbury Blvd: Sharrows in both directions

[1] Sharrow refers to a 14 ft wide travel lane shared by both vehicles and bicycles that has specialized pavement markings to increase driver awareness of bicycles in the road.

[2] A bicycle lane could be implemented northbound along this segment, but it would require the removal of an existing raised median on the bridge, which would need to be incorporated into a larger reconstruction project.

If it were decided to remove a parking lane to allow for bicycle facilities, the addition of Sharrows both northbound and southbound could be accommodated on St. Paul between the Inner Loop and Mortimer Street. However, this would eliminate approximately 40 on-street parking spaces. To provide northbound and southbound bike lanes along this segment of the road, on-street parking along both sides of St. Paul would most likely need to be removed, which would eliminate approximately 78 parking spaces.

To add any further bicycle facilities without the removal of on-street parking would require road widening, which would reduce the amount of sidewalk and could be detrimental to pedestrians. As such,

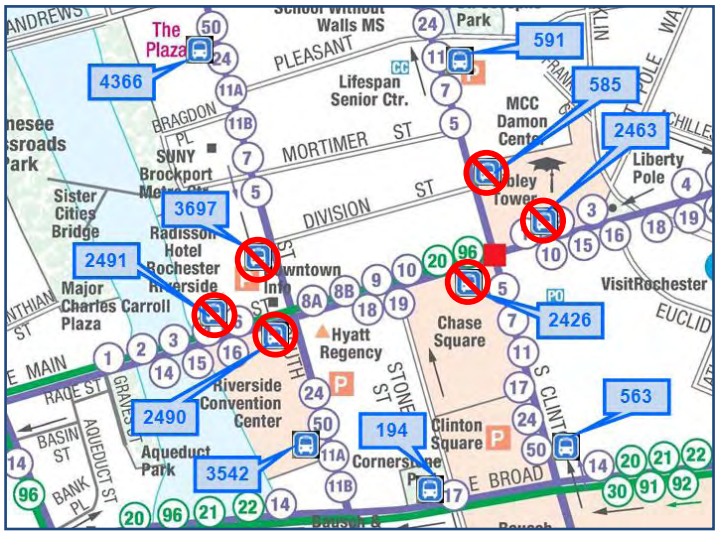
it is recommended that the City complete the Genesee Riverway Trail by constructing a permanent uninterrupted riverfront trail through the Center City. Such a trail would provide a high quality bicycle facility for cyclist wishing to travel through the Center City without reducing parking or sacrificing pedestrian operations.

5.3.6 Transit Operations

Transit operations under future two-way build conditions will consolidate around the proposed RTS Transit Center. With the addition of the Transit Center, several existing Bus stops will be eliminated, they include:

- Main & Clinton Westbound (#2463)
- Main & Clinton Eastbound (#2426)
- Clinton & Main Northbound (#585)
- St Paul & Main Southbound (#3697)
- Main & South (#2490)
- Main & St. Paul (#2491)

Indicates bus stop removal



The RTS Transit Center will be the hub of all transit activity within the area. Buses from all directions will access the Transit Center via St. Paul Street or Clinton Avenue. Westbound buses on Main Street will turn right onto Clinton to access the Transit Center and eastbound buses on Main Street will mostly turn left at St. Paul Street to access the Transit Center. The Transit Center itself will have one entrance and one exit to each of the corridors. For St. Paul Street the entrance will be an unsignalized driveway located north of Mortimer Street and the exit will be the westbound approach to the Mortimer Street traffic signals. For Clinton Avenue, the entrance will be at the Mortimer Street traffic signal and the exit will be located just north of that location at an unsignalized driveway. This could pose a situation where southbound queues at the signal block the transit driveway from exiting onto Clinton Avenue. However, given the anticipated headway between buses, with less than one bus expected to exit this driveway per minute, this should not be an issue. Buses exiting will have time to wait for the queue to dissipate before entering traffic without causing any backups within the Transit Center. If operational issues do occur once the Transit Center is operational, traffic controls such as "Do Not Block Intersection" signs and markings can be installed, but they are not recommended at this time.

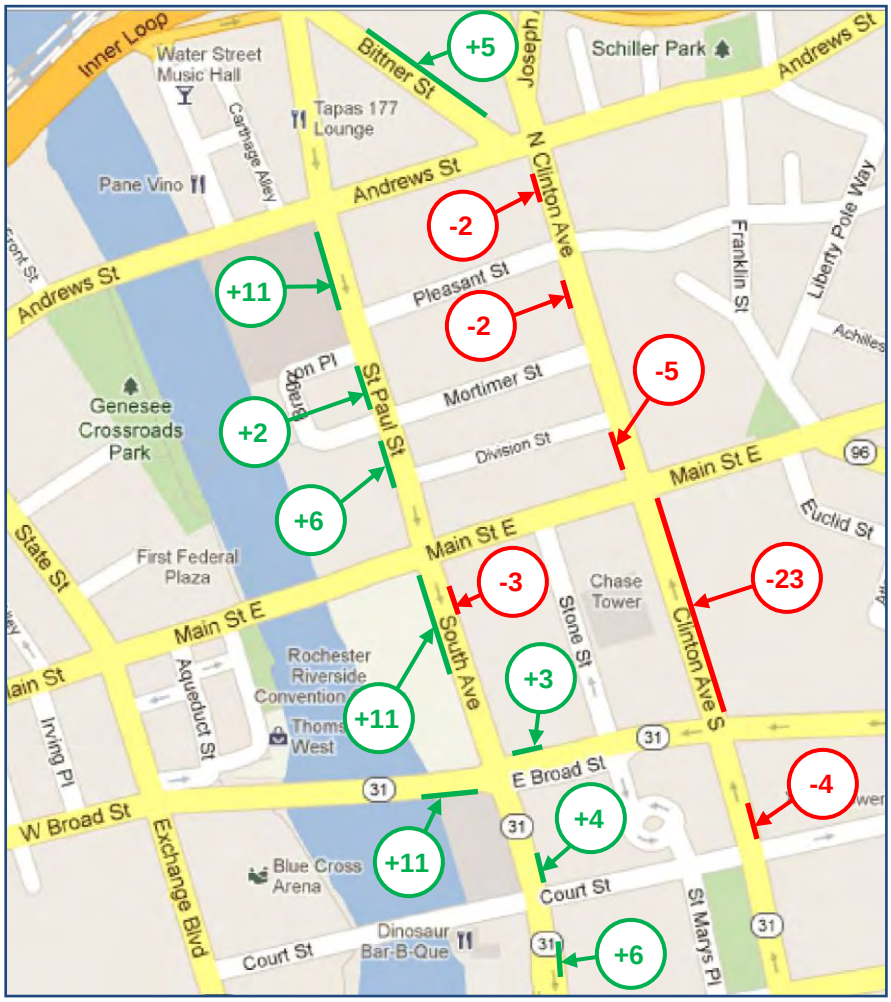
For the St. Paul Street entrance, there should be no operations concerns. A left turn lane will be available for buses to queue without impeding southbound through traffic, and gaps produced by the traffic signal at Mortimer Street will provide ample capacity to allow buses access to the Transit Center.

In general, consolidation of the transit facilities to this central location will reduce roadway delay under the future two-way build condition by eliminating a number of transit stops within the travel way and it will reduce pedestrian crossing conflicts along the roadway by moving all bus transfer operations to the Transit Center, away from Main Street. Overall, transit operations under future two-way build conditions should function better than under existing conditions.

5.3.7 Parking Operations

With the reconfiguration for two-way traffic some areas will see a loss of parking while others see an increase. Overall, Clinton Avenue has a more limited pavement width, which results in a loss of some parking to accommodate two-way traffic. St. Paul/South Avenue however, has excess width under two-way traffic conditions, which allows for the creation of additional parking. In addition, the conversion of Bittner Street to one-way allows for angled parking which increases the number of spaces along that roadway and provides a loading/unloading drop off area for the church on the north side of the road near St. Paul Street. The addition of bulbouts and restriping along Broad Street yields an increased number of parking spaces in that area.

Overall it is estimated that 36 spaces will be eliminated along Clinton Avenue, and 40 spaces will be created along St. Paul/South Avenue. Parking is proposed to increase by 5 spaces along Bittner Street and by 14 spaces along Broad Street. This yields a net increase in total parking of 23 spaces within the study area. The map below depicts the general locations of the parking space additions and subtractions.



5.4 PROPOSED ROADWAY IMPROVEMENTS

As discussed earlier, two-way conversion will require extensive changes to the existing roadway network. Most notably, nearly all pavement striping and markings will need to be removed and replaced. In addition, signing changes will need to be made along every block of the project area to remove one-way signing and to adjust sign locations, and each of the traffic signals will need to be modified to accommodate another traffic approach.

For the most part, improvements are contained within the existing pavement width, but as explained in Section 5.1, some roadway improvements are required to expand the pavement to achieve the required capacity. These improvements are depicted in the Conceptual 2-Way Traffic Layout Plan shown in Section 5.1.

The recommended improvements necessary for two-way traffic conversion of the studied corridors and a planning level assessment of their anticipated costs follows. Costs are also summarized in Table 5.4 at the end of this Section.

5.4.1 Traffic Signal Improvements

5.4.1.1 Inner Loop/Cumberland Street intersections

The two Inner Loop/Cumberland Street intersections along St. Paul Street are controlled by a single signal controller, and the two Inner Loop/Cumberland Street intersections along Clinton Avenue are tied to a single signal controller along with two additional intersections along Joseph Avenue. In both cases, the signals currently operate with two-way traffic operations. As a result, the required signal modifications at these locations are much less than at other locations within the study area. For these locations, the traffic signal poles and controllers should be adequate, but minor head reconfigurations will be necessary. Two signal heads will need to be added for the northbound approach on St. Paul Street and there may be some signal cable and vehicle detector modifications. The existing phase will need to be changed in both controllers and timings will need to be optimized. Overall, it is estimated that each of these four locations will require less than $10,000 each in signal modifications to accommodate two-way traffic.

5.4.1.2 Byron Street Intersections

Byron Street is the southern terminus of the existing one-way traffic operations for both South Avenue and Clinton Avenue. The Byron Street and Clinton Avenue intersection was not directly analyzed as part of this study, but it does need to be mentioned with regards to improvements. With the addition of southbound traffic at this location, the existing signal pole placement is inadequate to control all approaches without confusion, as the Inner Loop off-ramp sits side by side with the new approach. Signing, striping and signal improvements will be needed at this location. For the Signal improvements, the existing ground mounted controller appears in good condition and could be retained; however, the remainder of the signal equipment will need to be replaced. The cost of this replacement is approximately $100,000.

Similarly, the Byron Street at Mt. Hope/South Avenue intersection has a signal pole in an island being reconfigured and another with mast arm positioning that could block signal heads for some of the lanes in the proposed concept. It is recommended that the signal controller be retained but the remainder of the signal equipment be replaced. The cost of this replacement would also be approximately $100,000.

5.4.1.3 South Avenue at Griffith Street Intersection

Though this intersection looks very intimidating when converted to two-way operations, properly placed signing, striping and signal improvements should provide for acceptable operations. For the traffic signal, an additional signal pole will need to be installed to accommodate the northbound approach because of the extended intersection width. New loops will be required for the northbound approach and for a second through lane coming from the I-490 EB off-ramp, which is needed for capacity reasons. The existing controller and signal poles can remain, but signal head adjustments and controller modifications will be required. Overall, it is approximated that this intersection will require $25,000 in signal improvements for the two-way traffic conversion.

5.4.1.4 South Avenue at Woodbury Blvd Intersection

This location requires the most significant changes of all the intersections within the study area. The left side on-ramp to I-490 cannot remain open under two-way traffic conditions, and closure of this ramp will require considerable changes to the road geometry, which will be discussed later. The traffic signal equipment is old and poles are not positioned properly for the new lane configuration or for the proposed pedestrian crossings. A complete replacement of the signal equipment is required at this location. The estimated cost for this replacement is approximately $120,000.

5.4.1.5 All Other Traffic Signals

The remaining thirteen (13) signalized locations within the study area all require similar improvements to accommodate two-way traffic. In general, each location will need the addition of one mast arm pole and two signal heads, additional vehicle detectors and signal controller modifications. Many of the signals will continue two-phase operations, but a few locations will require the addition of turn phases. These locations include:

- Clinton Avenue / Woodbury Blvd - Add a northbound left turn phase
- Clinton Avenue / Court Street - Add a northbound left turn phase
- Clinton Avenue / Broad Street - Add a northbound left turn phase
- South Avenue / Broad Street - Add northbound and southbound left turn phases

In addition, Leading Pedestrian Intervals (LPI's), which will allow pedestrians to enter the roadway before vehicles receive a green light, are proposed to be installed at:

- Clinton Avenue / Main Street
- Clinton Avenue / Mortimer Street
- South Avenue / Court Street
- South Avenue / Broad Street
- South Avenue / Main Street
- and possibly St. Paul Street / Mortimer Street

Overall, it is estimated that each of the remaining traffic signals will require approximately $25,000 in traffic signal improvements to accommodate the two-way conversion of these roadways.

5.4.2 Traffic Signing Improvements

The existing roadway has numerous signs along each block to designate one-way operations. There are also large guide signs near the South Avenue and Woodbury Boulevard intersection and along Byron Street. A detailed sign inventory and replacement plan will be needed to assess the exact number of signs

and their removal and or replacement costs, but in general it can be assumed that standard regulatory signs removals and modifications will cost approximately $1,000 per block for 8 blocks along St. Paul/South Avenue and for 7 blocks along Clinton Avenue. This totals approximately $15,000 for regulatory sign improvements.

In addition, guide signs will need to be replaced along both Woodbury Boulevard and South Avenue near the I-490 on-ramp. It is estimated that sign replacements on the existing sign structures will equal approximately $2,500 for each of those locations. The placement of miscellaneous wayfinding and street name signs will be required at an assumed cost of $10,000, and single mast arm poles with lane designation signs should be installed northbound along both Clinton Avenue and St. Paul Street near the Inner Loop to help designated lane assignments. These sign structures will cost approximate $15,000 each. All totaled, these sign improvement within the study area will equal approximately $45,000.

5.4.3 Striping and Pavement Marking Improvements

The proposed striping for two-way conversion is shown in the Conceptual 2-Way Traffic Layout Plan. It features a center two-way left turn lane where possible to separate turning vehicles from the through travel lanes and to allow flexibility to the maximum queuing distance for left turn lanes at closely spaced intersections. Striping will consist of 4" wide epoxy longitudinally, with stop bars, crosswalks, arrows and letters being preformed thermoplastic. Crosswalks are proposed to be high visibility "ladder" type markings.

Removal of the existing pavement markings is required prior to restriping for two-way traffic. This can be done either by grinding the existing markings from the pavement, or performing a mill and overlay operation; removing the top inch and one half from the pavement surface and replacing with new asphalt. Though the mill and overlay option is much more expensive, it provides a clean look that gives clarity to the pavement markings and avoids confusion. With the grinding option, ruts are formed in the pavement. These ruts can be confused as stripes in low light or wet conditions causing confusion at times and provide a much rougher riding surface, especially for bicyclists.

Based on the conceptual layout, it is estimated that the pavement markings, assuming the grinding option, will cost approximately $150,000 north of Main Street and $180,000 south of Main Street for a total cost of $330,000.

To mill and overlay the entire area to provide a better striping design, it would be an additional $570,000 north of Main Street and $550,000 south of Main Street, for a cost increase of around $1,120,000. This would bring the total cost up to about $1,450,000 to restripe the roadways using a mill & overlay to remove markings and provide a better road surface.

5.4.4 Roadway Improvements

Improvement to the pavement and sidewalk areas are required at select areas along the studied corridors to accommodate two-way traffic. These areas are highlighted and given a letter designation on the Conceptual Layout Plan and are described below.

5.4.4.1 Inner Loop Westbound On- Ramp (Improvement X)

To accommodate two through lanes westbound at the Inner Loop westbound on-ramp some minor widening will be required on the ramp. This will require the addition of some full depth pavement, resetting of curb and the possible relocation of a drainage structure and a light pole. It is estimated that this modification would cost approximately $25,000.

5.4.4.2 Inner Loop Eastbound at Clinton Avenue (Improvement A)

The southbound movement through the intersection will require a lane shift to the left. Given the required shifting distance to make a smooth transition, the existing radius on the southwest corner will need to be cut back to accommodate the shifting distance. This will require excavation of the existing sidewalk and curb and construction of full depth pavement in this area. It is estimated that this modification would cost approximately $15,000.

5.4.4.3 Bittner Street One-Way Conversion (Improvement B)

The conversion of Bittner Street to one-way operations has several benefits, from reducing delay and driver confusion at St. Paul Street to increasing the number of parking spaces by allowing angled parking. To make this conversion, curb extensions will need to be constructed along both sides of the road near St. Paul Street and along the north side of the road near Andrews Street. These curb extensions, which will require excavation of the existing pavement and the placement of new curb and sidewalk, will help channelize traffic and protect parked vehicles. It is estimated that this improvement will cost approximately $40,000.

5.4.4.4 Proposed RTS Transit Center (Improvement C)

The roadway improvements associated with the addition of driveways and the reconfiguration of the Mortimer Street intersections for the RTS Transit Center are part of a separate project. It is assumed that the funding for that project has been secured and that the costs associated with those improvements have been detailed as part of that project.

5.4.4.5 Parking Lane Removal - Clinton Ave: Main to Broad (Improvement D)

In order to accommodate vehicular traffic volumes, two northbound and one southbound travel lane is required between Main Street and Broad Street. The Midtown Redevelopment, currently under construction, proposes two travel lanes with parking lanes on either side for this road segment. For conversion to two-way traffic, the east side parking lane will need to be removed and a third travel lane constructed. To accommodate this, it is assumed that bulbouts will need to be excavated and removed and the curb will need to be relocated 2 to 3 feet back from existing alignment to widen the parking lane to sufficient width for travel. Full depth pavement will be required for the pavement width increase and the overall lane should be milled and an asphalt overlay added to provide a smooth driving surface without rutting. There may be an opportunity to construct a new recessed parking area on the east side of Clinton between Broad and Elm, but this option was not included in the estimate. It is estimated that the parking lane removal improvement would cost approximately $50,000, and it is recommended that this improvement be constructed as part of the Midtown Redevelopment project to maximize efficiency and minimize cost.

5.4.4.6 South Avenue Garage (Improvement E)

Two-way traffic conversion on South Avenue will require removal of the traffic islands and curb extensions associated with the entrance to the South Avenue Garage and reconfiguration of their internal circulation. No information has been obtained concerning the internal issues of the garage, but to make the roadway improvements within the City right-of-way, the curb extensions will need to be excavated and replaced with full depth pavement and the sidewalks will need to be replaced or reconfigured along the frontage of the garage. It is estimated that this work would cost approximately $40,000. Changes to the internal garage operations pose an additional cost that will need to be determined by the City.

5.4.4.7 Broad Street Two-Way Conversion (Improvement F)

This improvement is proposed as part of the Midtown Redevelopment. Road configuration and associated costs have been detailed under that project.

5.4.4.8 Bulbouts at Broad Street and Court Street (Improvement G)

The installation of bulbouts (curb extensions) are proposed for all four corners of the Broad Street / South Avenue intersection. These bulbouts will shorten pedestrian crossing distances, have a traffic calming effect to reduce aggressive driving and will better define the parking areas, allowing for the addition of more spaces. This improvement will require excavation of the existing pavement at each of the radii and placement of sidewalk and curb as shown in the Conceptual Layout Plan. It is estimated that this improvement will cost approximately $30,000.

For Court Street, a bulbout is recommended for the northeast corner to convert the existing left turn lane into a new parking area. This will also reduce pedestrian crossing distances improving functionality. This improvement is estimated to cost approximately $10,000.00.

5.4.4.9 Clinton Avenue at Court Street (Improvement H)

The need for four travel lanes on Clinton Avenue the full length between Court Street and Broad Street will require the removal of a bulbout and four parking spaces at the northeast corner of Court Street. This improvement will require excavation of the bulbout and installation of full depth pavement along the radius. It is estimated that this work will cost approximately $15,000.00.

5.4.4.10 South Avenue at Woodbury Blvd (Improvements I, J & K)

Conversion to two-way traffic will require the closure of the left side ramp to I-490 at this location. Reconfiguring the intersection to accommodate this improvement requires the removal of the existing raised island and the two lanes east of that island. Curb and sidewalk will be extended out in this area to help guide drivers and to define a new on-street parking area. A raised channelization island is proposed for right turn traffic from Woodbury Boulevard. This island will calm traffic, reducing aggressive driving, and it will reduce pedestrian crossing distances and increase pedestrian visibility. In addition, the use of this island allows the southbound stop bar to be placed as far south as possible, maximizing queuing distance for vehicles. Overall, sidewalk, curb and pavement improvement at this intersection are estimated to cost approximately $85,000.00.

5.4.4.11 I-490 Ramp Closure (Improvement M)

As mentioned in section 5.4.10, the left side I-490 on-ramp will need to be closed with the conversion to two-way traffic along South Avenue. The cost to close the entrance of this ramp has been discussed previously; however, the ramp structure itself will remain in place. There are possibilities of repurposing this structure in a variety of ways. One suggestion would be to construct an elevated neighborhood park. However, the impact of this type treatment would need to be investigated separate of this study. There is also the possibility of converting this ramp to an I-490 westbound off-ramp, but this could pose several operational and safety issues that need to be investigated in detail by the NYS Department of Transportation before consideration.

5.4.4.12 Byron Street to Griffith Street (Improvements N, O & P)

For conversion to two-way traffic, this area will require the removal of the splitter island along South Avenue between the two intersections, and reconfiguration of the Mt. Hope splitter island to allow a better left turn movement. These improvements are estimated to cost approximately $25,000.00.

In addition, the I-490 westbound off-ramp approach will need to be reconfigured to allow for two travel lanes entering the Griffith Street intersection. There should be enough pavement width to do this by just restriping. However, signage may be needed to help direct drivers to the proper lane.

TABLE 5.4
Summary of Estimated Conceptual Improvement Costs

DESCRIPTION OF IMPROVEMENTS	APPROXIMATE COST[1]
Striping Modifications (if removal of existing by grinding)	
North of Main Street	$150,000
South of Main Street	$180,000
TOTAL	**$330,000**
Striping Modifications (if removal of existing by mill & overlay)	
North of Main Street	$720,000
South of Main Street	$730,000
TOTAL	**$1,450,000**
Signing Modifications	
Regulatory Sign Removal/Replacement	$15,000
St. Paul Mast Arm and Lane Designation Signs at Inner Loop	$15,000
Clinton Mast Arm and Lane Designation Signs at Andrews	$15,000
Guide Sign Panel Replacements at South and Woodbury	$5,000
Wayfinding/Street Name Sign Additions and Replacements	$10,000
TOTAL	**$60,000**
Traffic Signal Modifications	
St. Paul and Cumberland *(See Section 5.4.1.1)*	$10,000
St. Paul and Inner Loop *(See Section 5.4.1.1)*	$10,000
St. Paul and Andrews *(See Section 5.4.1.5)*	$25,000
St. Paul and Pleasant *(See Section 5.4.1.5)*	$25,000
St. Paul and Mortimer *(See Section 5.4.1.5)*	$25,000
St Paul/South and Main *(See Section 5.4.1.5)*	$25,000
South and Broad *(See Section 5.4.1.5)*	$25,000
South and Court *(See Section 5.4.1.5)*	$25,000
South and Woodbury *(See Section 5.4.1.4)*	$120,000
South and Griffith *(See Section 5.4.1.3)*	$25,000
South and Byron/Mt. Hope *(See Section 5.4.1.2)*	$100,000
Clinton and Cumberland *(See Section 5.4.1.1)*	$10,000
Clinton and Inner Loop *(See Section 5.4.1.1)*	$10,000
Clinton and Andrews *(See Section 5.4.1.5)*	$25,000
Clinton and Pleasant *(See Section 5.4.1.5)*	$25,000
Clinton and Mortimer *(See Section 5.4.1.5)*	$25,000
Clinton and Main *(See Section 5.4.1.5)*	$25,000
Clinton and Broad *(See Section 5.4.1.5)*	$25,000
Clinton and Court *(See Section 5.4.1.5)*	$25,000
Clinton and Woodbury *(See Section 5.4.1.5)*	$25,000
Clinton and Byron *(See Section 5.4.1.2)*	$100,000
TOTAL	**$710,000**

[1] Note: Approximate costs listed are "order of magnitude" costs for planning purposes only. Costs shown are for construction only. Design and Inspection would be additional.

TABLE 5.4 continued
Summary of Estimated Conceptual Improvement Costs

DESCRIPTION OF IMPROVEMENTS	APPROXIMATE COST[1]
Roadway Improvements	
X - Inner Loop Westbound On-Ramp Widening	$25,000
A - Inner Loop at Clinton Radius Improvement	$15,000
B - Bittner Street 1-Way Conversion	$40,000
D - Clinton Ave: Main to Broad Parking Lane Removal	$50,000
E - South Avenue Garage Area Improvements	$40,000
G - Bulbout Additions at Broad Street and Court Street	$40,000
H - Bulbout Removal at the Clinton and Court Intersection	$15,000
I/J/K - South at Woodbury Intersection Improvements and Ramp Closure	$85,000
N/O/P-Byron Street to Griffith Street Island Improvements	$25,000
TOTAL	**$335,000**

[1] Note: Approximate costs listed are "order of magnitude" costs for planning purposes only. Costs shown are for construction only. Design and Inspection would be additional.

Based on the information in Table 5.4 and assuming a 10% overhead cost for mobilization and contingencies, it is estimated that the northern section of the project area (north of Main Street) will cost $550,000 to convert to two-way traffic if pavement markings are ground off and $1.2M if a mill & overlay operation was used. The southern section (south of Main Street) would cost $1.05M with grinding and $1.6M with mill & overlay. Total project costs for the two-way conversion would be approximately $1.6M to $2.8M depending on whether the mill & overlay was performed.

5.5 ALTERNATE 1 - BROAD STREET BRIDGE CLOSURE

As part of this study, a design alternate was analyzed that assumes the Broad Street Bridge will be closed to traffic. This concept and the specific details concerning the improvements necessary to achieve this Alternate are discussed in the Broad Street Aqueduct Study, prepared by T.Y. Lin International in 2009.

5.5.1 Alternate 1 No-Build Traffic Operations

Using the Alternate 1 No-build traffic volumes developed as part of the forecasting report for this study and assuming no geometry changes outside of the Broad Street bridge closure, No-build traffic operations were analyzed for the Alternate 1 condition. As can be seen in Table 5.5, there is little to no change in level of service from the No-build condition for the primary concept analyzed in Section 5.2 of this report. The St. Paul and Inner Loop Eastbound Ramp intersection is the only location that operates with any approaches below LOS D and even at that location the overall intersection level of service is D for both the AM and PM peak hours. Capacity Analysis worksheets for the Alternate 1 No-Build Conditions are located in Appendix D.

5.5.2 Alternate 1 Two-Way Build Traffic Operations

Similar to the No-build condition, the levels of service for the Alternate 1 Build condition are reasonably close to the results for the primary concept. Generally speaking, intersection levels of service are all LOS D or above and no intersection operates significantly better or worse than if the Broad Street Bridge remained open. A summary of the Alternate 1 two-way build condition levels of service is shown in Table 5.6 and the capacity worksheets for these analyses can be found in Appendix E.

In general, the traffic impact from closing the Broad Street bridge can be absorbed by the other study area intersections without a significant change in intersection operations. The corridors operate generally within 0.5 mph from the primary build condition, except in the PM peak hour where the St. Paul/South Avenue corridor is slowed by about 1 mph. Overall the delay within the study area is approximated at 216 VHD in the AM peak hour and 330 VHD in the PM peak hour. This represents a 7% increase in delay in the AM peak hour and a 34% increase in delay in the PM peak hour over the primary build condition. This increase in delay is most likely attributed to the additional turn movements caused by rerouting traffic away from the Broad Street bridge, and the reallocation of signal green time necessary to accommodate the new traffic flow. These changes in delay appear minimal at each of the individual intersections, but the accumulative effect over the whole network appears to be more significant.

TABLE 5.5
Alternate 1 - Future No-Build Peak Hour Level of Service Summary

Intersection	Approach	AM Peak Hr. LOS(delay)	PM Peak Hr. LOS(delay)	Intersection	Approach	AM Peak Hr. LOS(delay)	PM Peak Hr. LOS(delay)
South Ave. at	NB	A (6.8)	B (11.9)	S. Clinton Ave. at	NB	D (35.7)	D (35.4)
Mt. Hope Ave./	SB	A (9.9)	C (21.8)	Byron St.	SE	C (31.1)	C (30.2)
Byron St.	EB	C (20.3)	B (19.6)		EB	A (5.7)	A (6.8)
	WB	A (9.8)	C (29.1)		**Overall**	**B (16.3)**	**B (15.5)**
	Overall	**B (11.5)**	**C (20.1)**				
South Ave. at	NB	C (27.9)	C (27.4)	S. Clinton Ave. at	NB	B (16.1)	C (27.3)
Griffith/I-490 EB	SB	B (12.1)	B (16.2)	Woodbury Blvd.	EB	D (37.7)	B (19.3)
Off-Ramp	SW	C (21.6)	B (17.1)		WB	C (34.7)	B (16.1)
	WB	C (29.4)	C (28.8)		**Overall**	**B (18.3)**	**C (24.9)**
	Overall	**B (17.2)**	**B (17.0)**				
South Ave. at	SB	A (1.8)	A (10.0)	S. Clinton Ave. at	NB	A (8.5)	B (13.0)
Woodbury Blvd	WB	D (41.8)	D (45.6)	Court St.	EB	C (25.0)	B (18.5)
	Overall	**A (6.0)**	**B (14.5)**		**Overall**	**A (9.9)**	**B (14.2)**
South Ave. at	SB	C (20.1)	B (15.5)	S. Clinton Ave. at	NB	A (8.6)	A (2.7)
Court St.	EB	B (18.5)	D (48.8)	E. Broad St.	EB	A (1.6)	C (23.7)
	WB	B (16.8)	B (15.5)		WB	D (39.9)	C (30.4)
	Overall	**B (18.7)**	**C (22.9)**		**Overall**	**B (15.4)**	**B (10.2)**
South Ave. at	SB	B (13.6)	B (18.6)	N. Clinton Ave. at	NB	C (28.5)	C (30.9)
E. Broad St.	WB	D (42.4)	C (34.7)	E. Main St.	EB	C (31.3)	D (46.2)
	Overall	**B (17.5)**	**C (22.5)**		WB	C (31.5)	C (32.4)
					Overall	**C (29.7)**	**D (35.3)**
St. Paul St. at	SB	A (9.0)	B (11.0)	N. Clinton Ave. at	NB	A (4.4)	C (26.2)
E. Main St.	EB	D (35.4)	C (34.6)	Mortimer St.	EB	D (41.5)	D (49.5)
	WB	B (12.6)	B (19.2)		WB	D (36.8)	C (33.1)
	Overall	**B (17.0)**	**C (20.1)**		**Overall**	**A (7.6)**	**C (28.2)**
St. Paul St. at	SB	A (3.1)	B (15.0)	N. Clinton Ave. at	NB	A (1.4)	A (5.5)
Mortimer St.	EB	C (32.2)	C (22.6)	Pleasant St.	EB	D (52.0)	D (35.1)
	WB	D (37.9)	B (19.5)		WB	C (32.1)	C (33.9)
	Overall	**A (7.2)**	**B (15.7)**		**Overall**	**A (8.2)**	**B (11.2)**
St. Paul St. at	SB	A (5.4)	A (6.8)	N. Clinton Ave. at	NB	A (5.0)	A (4.3)
Pleasant St.	WB	D (35.5)	D (52.9)	Andrews St.	EB	B (17.3)	C (28.9)
	Overall	**A (8.3)**	**B (18.9)**		WB	B (18.5)	C (29.4)
					Overall	**B (10.8)**	**B (13.5)**
St. Paul St. at	SB	B (19.8)	C (20.9)	N. Clinton Ave. at	NB	B (10.9)	B (11.7)
Andrews St.	EB	C (21.4)	C (20.5)	Inner Loop EB	SB	A (9.2)	B (16.1)
	WB	C (27.8)	C (23.1)		EB	C (22.0)	C (27.0)
	Overall	**C (21.6)**	**C (21.3)**		**Overall**	**B (15.3)**	**B (16.2)**
St. Paul St. at	SB	A (2.4)	A (1.0)	N. Clinton Ave. at	NB	A (1.5)	A (3.6)
Inner Loop EB/	EB	E (74.2)	D (42.2)	Cumberland St.	SB	C (29.0)	C (33.1)
Bittner St.	NW	C (23.3)	E (75.2)		WB	A (3.5)	A (6.2)
	Overall	**D (42.2)**	**D (37.5)**		**Overall**	**B (10.6)**	**B (10.5)**
St. Paul St. at	NB	A (9.4)	B (12.8)	Notes:			
Inner Loop WB/	SB	D (44.4)	D (49.1)	Delay = Seconds per Vehicle			
Cumberland St.	WB	D (44.2)	D (45.3)	NB=northbound, NW=northwestbound, SB=southbound,			
	Overall	**C (34.2)**	**D (35.6)**	SW=southwestbound, EB=eastbound, WB= westbound			

TABLE 5.6
Alternate 1 - Future Build Peak Hour Level of Service Summary

Intersection	Approach	AM Peak Hour LOS(delay)	PM Peak Hour LOS(delay)	Intersection	Approach	AM Peak Hour LOS(delay)	PM Peak Hour LOS(delay)
South Ave. at Mt. Hope Ave./ Byron St.	NB	C (34.6)	D (44.0)	S. Clinton Ave. at Byron St	NB	B (10.9)	A (9.5)
	SB	B (14.5)	A (6.9)		SB	D (51.0)	D (54.8)
	EB	D (42.8)	C (33.9)		SE	D (44.2)	E (66.5)
	WB	C (33.5)	D (50.9)		EB	B (15.2)	D (49.5)
	Overall	**C (26.2)**	**C (25.5)**		**Overall**	**C (29.1)**	**D (42.7)**
South Ave. at Griffith/I-490 EB Off-Ramp	NB	B (18.4)	B (15.6)	S. Clinton Ave. at Woodbury Blvd.	NB	B (14.9)	A (6.8)
	SB	B (19.5)	A (8.2)		SB	A (6.5)	A (4.9)
	SW	D (41.8)	D (49.4)		EB	C (30.0)	C (27.3)
	WB	E (56.9)	D (49.1)		WB	D (50.2)	C (33.0)
	Overall	**C (26.5)**	**C (26.0)**		**Overall**	**B (18.9)**	**B (11.6)**
South Ave. at Woodbury Blvd	NB	B (11.7)	A (6.8)	S. Clinton Ave. at Court St.	NB	A (7.6)	B (12.8)
	SB	A (8.7)	A (9.5)		SB	B (8.3)	B (10.1)
	WB	D (44.8)	D (35.5)		EB	D (38.2)	D (46.1)
	Overall	**B (15.9)**	**B (12.7)**		**Overall**	**B (11.8)**	**C (21.5)**
South Ave. at Court St.	NB	B (10.4)	B (17.0)	S. Clinton Ave. at E. Broad St.	NB	A (4.4)	A (3.6)
	SB	A (7.4)	C (31.6)		SB	C (29.1)	C (22.5)
	EB	C (32.1)	C (25.8)		EB	D (40.5)	C (26.7)
	WB	C (30.1)	D (54.3)		WB	C (33.2)	C (34.7)
	Overall	**B (17.4)**	**C (30.2)**		**Overall**	**B (18.8)**	**B (19.2)**
South Ave. at E. Broad St.	NB	C (26.3)	C (34.6)	N. Clinton Ave. at E. Main St.	NB	B (17.1)	C (30.1)
	SB	A (8.2)	A (9.44)		SB	C (24.6)	B (17.6)
	WB	D (54.7)	D (50.8)		EB	D (37.1)	D (46.5)
	Overall	**B (18.2)**	**C (23.0)**		WB	D (35.8)	C (30.9)
					Overall	**C (25.7)**	**C (32.0)**
St. Paul St. at E. Main St.	NB	C (25.1)	C (30.1)	N. Clinton Ave. at Mortimer St.	NB	A (9.9)	B (15.4)
	SB	B (15.9)	C (26.4)		SB	A (3.0)	A (7.0)
	EB	D (49.0)	D (35.5)		EB	D (39.0)	D (54.5)
	WB	C (28.5)	A (7.6)		WB	D (39.4)	D (38.9)
	Overall	**C (29.8)**	**C (26.3)**		**Overall**	**A (8.9)**	**B (16.8)**
St. Paul St. at Mortimer St.	NB	A (6.8)	B (15.7)	N. Clinton Ave. at Pleasant St.	NB	A (2.9)	B (11.9)
	SB	B (18.9)	B (14.6)		SB	B (10.3)	A (2.0)
	EB	C (25.6)	C (25.9)		EB	D (36.8)	C (28.7)
	WB	D (50.9)	D (47.4)		WB	C (31.4)	D (38.0)
	Overall	**B (19.0)**	**B (18.1)**		**Overall**	**B (10.6)**	**B (15.7)**
St. Paul St. at Pleasant St.	NB	A (2.5)	A (3.4)	N. Clinton Ave. at Andrews St.	NB	A (5.1)	B (17.3)
	SB	B (11.2)	B (10.8)		SB	B (15.7)	C (24.3)
	WB	C (22.2)	B (13.2)		EB	C (27.9)	B (16.1)
	Overall	**A (9.9)**	**A (8.5)**		WB	C (30.0)	C (24.2)
					Overall	**B (18.3)**	**B (19.3)**
St. Paul St. at Andrews St.	NB	A (5.5)	C (21.5)	N. Clinton Ave. at Inner Loop EB	NB	B (14.1)	B (16.0)
	SB	D (35.5)	C (24.8)		SB	A (1.8)	A (5.8)
	EB	D (47.3)	C (30.0)		EB	C (23.7)	C (21.9)
	WB	C (29.4)	B (12.3)		**Overall**	**B (13.0)**	**B (13.5)**
	Overall	**C (32.0)**	**C (22.8)**				
St. Paul St. at Inner Loop EB/ Bittner St.	NB	B (11.1)	B (15.8)	N. Clinton Ave. at Cumberland St.	NB	A (4.0)	A (3.2)
	SB	A (9.5)	A (8.6)		SB	C (36.4)	C (29.7)
	EB	C (31.3)	D (40.9)		WB	A (3.7)	A (6.5)
	Overall	**C (23.0)**	**C (27.7)**		**Overall**	**B (15.7)**	**B (10.5)**
St. Paul St. at Inner Loop WB/ Cumberland St.	NB	A (4.7)	A (5.0)				
	SB	C (28.0)	C (24.7)				
	WB	B (19.9)	C (20.7)				
	Overall	**B (17.6)**	**C (16.2)**				

Notes:
Delay = Seconds per Vehicle
NB=northbound, NW=northwestbound, SB=southbound, SW=southwestbound, EB=eastbound, WB= westbound

5.5.3 Alternate 1 Geometric Improvements

Geometric considerations were reviewed as part of the capacity analysis. Based on the results of the Alternate 1 two-way build condition analysis, it appears that reasonable and efficient operations can be maintained at all the studied intersections, with minimal additional changes from the concept proposed for the primary alternative. For Alternative 1, in additional to the modifications proposed in the primary concept, the following improvements will be necessary:

- At the Broad Street and South Avenue intersection, the closure of the bridge requires the removal of the west side approach to the intersection. This in turn will eliminate the need for the westbound through lanes. However, the westbound left turn traffic will increase significantly at this location, causing the need for a second left turn lane. It is proposed to convert the westbound approach to three westbound lanes. These lanes would be designated as two left turn lanes and a right turn lane. Work necessary for this modification includes additional pavement marking being added to designate the westbound turn only lanes and to hatch out what would have been the northbound left turn lane. However, the cost of these changes are minor and wouldn't significantly change the cost of striping within the corridor from what has been identified previously for the primary concept.

- At the Court Street and South Avenue intersection, a southbound right turn lane should be constructed. This lane will utilize the existing parking lane in front of the library to the fullest extent possible before continuing southerly to the Court Street intersection. This work will require some full depth reconstruction, and relocation of curb, drainage and street lighting. For planning purposes, the approximate cost of this improvement would be about $50,000.

These improvements are depicted in Figure 39 - Alternate 1 Conceptual Two-Way Traffic Layout Plan shown on the next page.

NOTEWORTHY ROADWAY MODIFICATIONS

(A) CLOSE BROAD STREET WEST OF SOUTH AVENUE AND CONSTRUCT AQUEDUCT PARK IS DISCUSSED IN THE BROAD STREET AQUEDUCT TRAFFIC IMPACT STUDY FROM AUGUST 2009.

(D) CONSTRUCT RIGHT TURN LANE.

ALTERNATE 1 GEOMETRIC VARIATIONS

(B) RESTRIPE APPROACH FROM 1 LEFT, 1-THROUGH, 1-THROUGH/RIGHT LANE TO 2-LEFTS & 1 RIGHT LANE

(C) RESTRIPE CENTER MEDIAN TO REMOVE LEFT TURN LANE.

FIGURE 39

DATE: JULY 16, 2012

SCALE: 1"=100' APPROX.

Laberge Group
ENGINEERING ARCHITECTURE SURVEYING PLANNING
4 Computer Drive West • Albany, New York 12205
(518) 458-7112 • www.labergegroup.com

ALTERNATE 1
CONCEPTUAL 2-WAY TRAFFIC LAYOUT PLAN

TWO-WAY CONVERSION STUDY
NORTH/SOUTH CLINTON AVENUE &
ST. PAUL STREET/SOUTH AVENUE
CITY OF ROCHESTER, NEW YORK

6.0 SUMMARY AND CONCLUSIONS

The preceding report integrates three previous reports that study the feasibility of converting the St. Paul Street/South Avenue corridor and the North/South Clinton Avenue corridor to two-way traffic operations. This report not only detailed the existing conditions and future condition traffic forecasting to estimate traffic volumes for a 20 year design horizon, but also detailed the feasibility of two-way conversion based on vehicular traffic operations, pedestrian, bicycle and transit operations, and the required improvements to the roadway, traffic signals, signing and pavement markings. The costs associated with these improvements are also discussed, as is an alternate concept that features the closure of the Broad Street bridge. A summary of the existing conditions assessment can be found in Section 3.9 and a summary of the traffic forecasting methodology is located in Section 4.4. A summary of the report findings concerning the feasibility of two-way conversion is below.

- The Future no-build condition levels of service are no worse than LOS D, which is typically considered a reasonable and acceptable level of service during peak traffic conditions, at all 21of the studied intersections. The only approaches that operate worse than LOS D are located at the St. Paul Street / Inner Loop Eastbound Ramp intersection. Arterial levels of service based on travel speeds within each corridor are LOS D for both the AM and PM peak hours.
- The future two-way build condition levels of service are also no worse than LOS D at each intersection during the AM and PM peak hours. The westbound Griffith Street at South Avenue approach in the AM peak hour and the Inner Loop ramp approach to Byron Street and S. Clinton Avenue in the PM peak hour are the only approaches the operate at LOS E. However, with the two-way conversion opening up the possibilities for rerouting if congestion occurs, actual operations will most likely be better than projected. Arterial levels of service for both northbound and southbound along both corridors are LOS D.
- The proposed concept includes the conversion of Bittner Street to one-way traffic moving southeast. This conversion will reduce the number of conflicting movements and will allow more green time for the northbound approach at St. Paul Street. It will also allow for an increase in the number of parking spaces along Bittner Street. Levels of service at the intersections are slightly improved with the Bittner Street approach removed from signal operations.
- Pedestrian operations should operate no worse than existing with the future two-way conversion. Heavier pedestrian traffic will shift from Main Street to Mortimer Street with the construction of the proposed RTS Transit Center, but capacity analyses show that the volumes of pedestrians can be accommodated. Improvements to Pedestrian facilities include leading pedestrian phases being implemented at five or more locations and curb extensions being installed at four locations to reduce crossing distances and calm traffic near the intersections.
- For bicycle facilities, there are some limited opportunities to provide 14 ft shared use travel lanes (Sharrows) if many of the other travel lanes go to a minimal width of 10 feet wide and with the possible removal of some on-street parking. However, because a detailed survey has not yet been conducted for the study area, pavement widths cannot be determined to the precision necessary to confidently recommend specific bicycle facility locations at this time. Every effort should be taken in design to optimize striping to provide these accommodations as appropriate. However, it is recommended that efforts be taken to establish a permanent uninterrupted riverfront bicycle trail to accommodate bicyclists traveling through the Center City.
- Future Transit operations will be consolidated at the proposed RTS Transit Center allowing for the removal of 6 bus stops on or near Main Street. This greatly reduces the need for pedestrian road crossings because of bus transfers. Eliminating these stops will improve traffic flow along the roadways.
- On-street parking under future two-way traffic conditions will be increased by approximately 23 spaces. Clinton Avenue is expected to lose 36 spaces, but 40 or more will be gained along St. Paul Street/South Avenue. Side street reconfigurations along Bittner Street and Broad Street will account for the remaining space increase.

- Operational analyses were performed for a concept alternate that includes the closure of the Broad Street Bridge (Alternate 1). The analysis showed that little to no change in level of service would occur if this alternate was implemented. However, delay within the Study area would increase by 7% in the AM peak hour and 34% in the PM peak hour. All improvements shown for the primary concept continue to apply for this alternative in addition to improvements at South Avenue and Broad Street and at South Avenue and Court Street, which would see striping changes compared to the primary concept and the additions of a southbound right turn lane at Court Street. Overall improvement costs for Alternate 1 would be about $50,000 higher than the primary concept.
- Roadway improvements required for two-way conversion are relatively minor, mostly being bulbout (curb extension) additions and removals and reconstruction of some intersection radii. The most significant improvements proposed include the removal of the east side parking lane between Main Street and Broad Street, and the reconstruction and ramp closure at the Woodbury Boulevard / South Avenue intersection. Roadway improvements as shown in this report should cost approximately $335,000 to construct.
- Two-way conversion will require traffic signal modifications or replacements at 21 locations. The cost of signal improvements at 18 of these locations is expected to be under $25,000 each, but three locations (South/Woodbury, South/Byron/Mt. Hope and Clinton/Byron) will require full or nearly full replacement at $100,000 or more. Overall, traffic signal improvements will cost approximately $710,000.
- Signing improvements will be required extensively throughout the project area to eliminate obsolete "one way" and "do not enter" signs and install other signs as appropriate. This includes the replacement of guide sign panels near Woodbury Blvd on both South Avenue and Clinton Avenue. The new lane geometry will also require new mast arm poles with lane designation signs be installed on St. Paul near the Inner Loop and Clinton near Andrews to help guide drivers to the correct lane. Overall, signing improvements will cost approximately $60,000.
- Reconfiguration of the pavement striping and markings will be a major component of the two way conversion. Two methods of removing the existing striping could be considered. Grinding, which would leave rutting and pavement damage that could cause confusion at night or during inclement weather and which would cause a rougher and noisier ride for vehicles; or mill and pavement overlay, which provides a much cleaner and smoother surface that allows markings to be seen more clearly, but is much more costly. Using the grinding method for removal, striping will cost approximate $330,000. If a mill and overlay were used, costs would jump to $1,450,000.

Overall, the study shows that two-way conversion is a feasible option for the full length of both the St. Paul Street/South Avenue and North/South Clinton Avenue corridors. This conversion would cause no noticeable detriment to traffic operations and would greatly improve driver way-finding, as well as business access within the study area. The study further shows that pedestrian mobility will improve slightly with the addition of bulbouts and leading pedestrian intervals at some locations, and that on-street parking could be increased.

Based on "order of magnitude" cost estimates for the improvements necessary for two-way conversion, it is estimated that fully converting both corridors to two-way operations would cost approximately $1.6M ($0.55M north of Main Street/$1.05M south of Main Street) if pavement markings are removed through grinding, and approximately $2.8M ($1.2M north of Main street/$1.6M south of Main Street) if milling and a pavement overlay is used. Of these two options, it is highly recommended that the milling and pavement overlay option be implemented if two-way conversion is performed. This will provide the best possible road surface and significantly reduce any driver confusion that may be caused by poor pavement surface.