TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES
(End of Text)

LIST OF APPENDICES

LIST OF REFERENCES

1. HIGHWAY CAPACITY MANUAL - SPECIAL REPORT 209, TRANSPORTATION RESEARCH BOARD, 1994.

2. 1985 HIGHWAY CAPACITY MANUAL, US DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D.C., 1985.

3. TRIP GENERATION, SIXTH EDITION, INSTITUTE OF TRANSPORTATION ENGINEERS, 1997.

4. TRIP GENERATION HANDBOOK, AN ITE RECOMMENDED PRACTICE, INSTITUTE OF TRANSPORTATION ENGINEERS, 1998.

5. FINAL SCOPING DOCUMENT, SOUTHWEST AREA LAND USE PLAN, CITY OF ITHACA, TOMPKINS COUNTY, NY.

6. 2015 LONG RANGE PLAN, ITHACA-TOMPKINS COUNTY TRANSPORTATION COUNCIL, 1995.

7. A GUIDEBOOK FOR RESIDENTIAL TRAFFIC MANAGEMENT, WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, DECEMBER, 1994.

8. TRAFFIC CALMING IN PRACTICE, COUNTY SURVEYORS SOCIETY, LONDON, 1994.

9. HUNTINGTON MEADOWS SPEED HUMPS, TECHNICAL MEMORANDUM, TOWN OF PENFIELD, BENWAY, GEOFFREY A., JUNE, 1998.

GLOSSARY

ADT – **Average Daily Traffic** – The estimate of typical daily traffic on a road segment for all days of the week (Saturday through Sunday).

Capacity – The maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified period of time under prevailing roadway, traffic, and control conditions, usually expressed as vehicles per hour or persons per hour.

Collector – Surface street providing land access and traffic circulation within residential, commercial, and industrial areas.

Congestion – The level at which transportation system performance is no longer acceptable to the traveling public due to traffic interference. The level of acceptable system performance may vary by type of transportation facility, geographic location, public tolerance, and/or time of day.

Corridor – A corridor is any major transportation route that indicates parallel limited access highways, major arterials, or transit lines. With regard to traffic incident management, a corridor may include more distant transportation routes that can serve as viable alternatives to each other in the event of accidents.

"K" Factor – **Design Hour Factor** – Proportion of 24-hr volume occurring during the design hour for a given location or area.

DHV – **Design Hour Volume** – The DHV is the total traffic in both directions of travel during the design hour (typically the afternoon peak commuter hour).

Functional Classification – The grouping of streets and highways into classes, or systems according to the character of service they provide. Facilities are divided according to the degree to which they provide access to places vs. mobility between places. The recognition that individual roads do not serve travel independently, and that most travel involves movement through a network of roads, is basic to functional classification.

GEIS – **Generic Environmental Impact Statement** – A SEQR (see definition below) document that examines the environmental impacts of a program of actions. A GEIS is done when an entire area, such as the Southwest Area, is rapidly developing and area-wide policies are called for.

Internal Capture Rate – The internal capture rate is the percentage reduction applicable to the trip generation estimates for individual land uses within a multi-use site, so that the analyst can account for internal trips at the site. These reductions are applied externally to the site (i.e., at entrances, at adjacent intersections, and on adjacent roadways).

Local Streets – The local street system comprises all facilities not included in one of the higher systems. It primarily permits direct access to abutting lands and connections to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through-traffic movement usually is deliberately discouraged.

LOS – **Level of Service** – LOS is a measure of congestion that compares actual or projected traffic volumes with maximum capacity of the intersection or road in question. LOS A indicates a free flow of traffic; LOS C is moderate congestion; LOS F is very congested, with a failure of the system to operate. LOS concepts can also be applied to other transportation services as an indication of the quality and quantity of transportation service provided. (A more detailed description is included in section T-A3 of the appendix to this report.

Mode – A mode is a particular form of travel, for example, walking, traveling by automobile, traveling by bus, traveling by train.

NYSDOT – **New York State Department of Transportation** – NYSDOT is the state transportation agency that is the owner/operator of the state highway system. NYSDOT also distributes state funds to transit operators. NYSDOT is organized into a Main Office, which deals with statewide issues, and regional offices. Tompkins County is entirely within Region 3 of NYSDOT.

Pass-by Trips – Pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator. Pass-by trips are not diverted from another roadway.

Peak – The period during which the maximum amount of travel occurs. It may be specified as the (AM) or evening (PM) peak.

Principal Arterial – The functional classification system at the federal level defines principal arterials for rural areas, urbanized areas, and small urban areas. In urbanized areas, the principal arterial system carries the major portion of trips entering and leaving the urban area, as well as the majority of through movements desiring to bypass the central city. Significant intra-area travel, such as between major inner city communities, or between major suburban centers, as well and continuity for all rural arterials which intercept the urban boundary are also included. 40-65% of the VMT (see definition below) is accounted for on this system. Because of the nature of travel served by the principal arterials system, almost all fully and partially controlled access facilities will be part of this functional system, however; this system is not restricted to controlled access routes.

Rural Area – Any area of a state not included in the Census-defined urbanized areas.

SEQR – **State Environmental Quality Review Act** – State law (6NYCRR 617) requires the review and evaluation of the environmental impacts of state and local discretionary actions, including the issuance of discretionary permits, licenses, and approvals; the undertaking of projects; and the adoption of resource management plans, rules, and policies that affect the environment.

TMODEL2 – Commercial traffic simulation model software package, used to develop and calibrate the regional traffic model.

TDM – **Transportation Demand Management** – A set of strategies to reduce the demand for transportation including, but not limited to, employer trip reduction, ridesharing, incorporation of flexible work schedules, and land use strategies to cluster development.

TMA – **Transportation Management Association** – Voluntary groups set up to manage and reduce the number of trips taken in an area. TMAs are often begun by employers in heavily congested corridors. TMAs are considered a benefit to employees to help relieve the stress of daily commuting.

Urbanized Area – An area with a population of 50,000 or more designated by the US Census Bureau, within boundaries to be fixed by responsible state and local officials in cooperation with each other, subject to approval by the Secretary of Transportation.

VMT – **Vehicle Miles Traveled** – The sum of distances traveled by all motor vehicles in a specified region. Travel demand forecasting (modeling) is used to generate the average trip lengths for a region. The average trip length measure can be used in estimating vehicle miles of travel, which in turn is used in estimating gasoline usage or mobile source emissions of air pollutants.

EXECUTIVE SUMMARY

OVERVIEW

This study is designed to evaluate the on and off-site traffic impacts on the highway system and the area neighborhoods that may be caused by implementation of the Southwest Area Land Use Plan. This area consists of over "three hundred fifty acres south of Clinton Street, bounded on the west by the Flood Control Channel and the City line, and on the east and south by Meadow Street and Elmira Road"[1].

The study's primary objectives are to determine what improvements are needed to the existing highway system to insure smooth and safe traffic operations; to recommend alternate methods of addressing traffic increases on area roadways and through neighborhoods; and to mitigate the potential adverse effects on area residents following development of the Southwest Area as outlined in this report. Several conditions are evaluated as a part of this report, and include:

- Existing 1998 traffic conditions during the P.M. peak traffic interval
- Generated traffic to and from the area for the identified peak
- Future traffic conditions during the same peak interval, following development as projected
- Access Investigation

The report that follows gives, in detail, study procedures, analyses and recommendations for implementation of a concept plan for the proposed access intersections and potential network improvements. Methods for reducing the number of external trips generated by development of the Southwest Area and for reducing the volume of traffic on neighborhood streets are also outlined in this report.

Six alternatives with differing land use mixes and sizes of development have been developed based on guidelines presented by City officials. The objective of a generic environmental impact statement (GEIS) is to establish maximum impact thresholds for future development. Preliminary analyses determined that Alternative 6 may require mitigation above and beyond improvements at spot locations and significant improvements to the South Meadow Street corridor. Therefore, Alternative 5 has been evaluated in detail for the purposes of this report. All other alternatives, with the exception of Alternative 6, are considered feasible alternatives and may be accommodated with an appropriate level of mitigation specific to each scenario.

Evaluation of traffic impacts for maximum development conditions rather than site by site analyses produce site design recommendations that stimulate cross connectivity and internal trips thereby reducing impacts and required mitigation. The results of such analyses provide a basis for allocation of mitigation costs.

[1] Final Scoping Document, Southwest Area Land Use Plan, City of Ithaca, Tompkins County, New York.

RECOMMENDED MITIGATION MEASURES

The following list summarizes mitigation measures involving highway improvements that will be necessary to maintain acceptable Levels of Service with construction of Alternative 5. Concept plans showing the intersection improvements described below are depicted in Figures T-12a and T-12b. Additional travel demand management strategies and traffic calming measures are also recommended to reduce traffic volumes overall and particularly through nearby residential neighborhoods. Detailed descriptions of all of the following mitigation measures are included in sections VII and VIII of this Report.

1. Intersection 2 N. Fulton / W. Buffalo, *signalized* – Construct a new bridge across the Cayuga Inlet between N. Fulton Street and Taughannock Boulevard *at Court Street* (see Figure T-2).

2. Intersection 6 Taughannock Blvd. / W. State St. , *signalized* – Add a northbound approach to the intersection, extending Taughannock Blvd. to the south, to create the access point for the "northern connector."

3. Intersection 9 S. Meadow / S. Fulton – W. Clinton, *signalized* – Option A: Prohibit eastbound left turns and through movements at the intersection and alter the traffic signal phasing to consist of two-phase operation. Option B: Widen the bridge crossing Six Mile Creek to provide an additional northbound through lane.

4. Intersection 10 W. Clinton / Albany, *signalized* – Add eastbound and westbound left turn lanes on W. Clinton St.

5. Intersection 12 S. Meadow / W. Clinton – S. Titus, *signalized* – Prohibit northbound and southbound left turns.

6. Intersection 15 S. Meadow / Wegmans, *signalized* – Add a southbound right turn lane entering the Wegmans driveway and an eastbound lane exiting Wegmans such that the eastbound approach would consist of one exclusive left turn lane, one shared left turn and through lane, and one exclusive right turn lane.

7. Intersection 18 N. Meadow / Elmira, *signalized* – Add a northbound right turn lane. Modify lane use on the westbound approach, Elmira Road, via pavement markings to provide an exclusive left turn lane and a shared left and right turn lane.

8. Intersection 24 Taughannock / W. Buffalo, *signalized* – Construct a new bridge across the Cayuga Inlet between N. Fulton Street and Taughannock Boulevard *at Court Street* (see Figure T-2).

9. Intersection 27 NY Route 13 exit ramp / East Shore Drive-Stewart Park, *unsignalized* – Install a three-color traffic signal.

10. Intersection 17 Albany – Elmira / Spencer St., *unsignalized* – Consider installation of a three-color traffic signal.

11. Provide two lanes exiting the side roads at the Route 79/Floral Avenue (Intersection 1), Turner Place/E. Clinton Street (Intersection 11), and Routes 13/34/Route 327 (Intersection 26) intersections. These intersections should continue to be monitored to determine if traffic signals may be warranted in the future.

Travel demand management strategies and traffic calming measures:

1. ***Public Transportation*** - It is anticipated that, with sufficient demand, either one of the two, new bus routes that will serve the retail area along South Meadow Street may be rearranged to include the Southwest Area or a new bus route may be added to service the future development. To facilitate transit use throughout the future development the following recommendations should be considered:

- *It is recommended that the design criteria for the Southwest Area include transit-friendly design features that encourage residents and shoppers to use transit as an alternative to the automobile for at least one or more trips between work, shopping, services, etc.*

- *It is recommended that an appropriate mix of concentrated commercial uses such as offices, and higher density residential be encouraged to sustain a market for retail uses and greater transit ridership. This in turn, reduces the number of auto-related trips to the area.*

- *A mix of uses that stimulate off-peak as well as peak travel, and helps create transit activity throughout the day are recommended.*

In addition to the above recommendations, the following strategies are supportive of transit use:

- Design the development such that shopping and employment centers are clustered together to promote ease and efficiency of transit service;
- Provide park and ride lots;
- Employer subsidized fares;
- Provide information on routes, schedules and fares and selling passes at shopping and employment sites;
- Design a transit oriented and pedestrian/bicycle friendly development;
- Provide a guaranteed ride home for employees who occasionally must work late or attend to a family emergency.

2. ***Transportation Management Association*** - Create a transportation management association (TMA) to solve transportation problems on a cooperative basis.

3. ***Traffic Development District*** – Create a traffic development district to allocate highway improvement costs to developers.

4. ***Ridesharing*** – Promote ridesharing, also known as carpooling and vanpooling.

The following strategies are supportive of ridesharing:

- Guaranteed ride home (a back-up ride for emergencies or overtime);

- Work vehicles available to employees for business trips;
- Preferential parking;
- Computerized programs matching potential poolers with others with similar commute patterns.
- Trip reduction ordinances, e.g. developments required to incorporate enhanced ridesharing (or other travel demand strategies) into the design and use of the facilities;
- Encourage services within the new development area to reduce the number of external vehicular trips.

5. ***Variable Work Hours and Telecommuting*** – examples include:

- Staggered Work Hours
- Flextime
- Compressed Work Weeks
- Telecommuting

6. ***Walking*** – May be encouraged by providing sidewalks and other pedestrian amenities.

7. ***Bicycling*** – May be encouraged by providing on-site bike paths or bikeways, locker rooms with shower facilities, lockable bicycle storage facilities or other bicycle parking equipment.

8. ***Neighborhood Traffic Calming Plans*** **-** An integral part of the recommended mitigation plan is the implementation of neighborhood traffic calming plans tailored specifically to the needs of each neighborhood, as endorsed by the local residents. The purpose of each plan is to enhance livability and to minimize the adverse traffic impacts. The following summarizes traffic calming concepts and strategies detailed in this report:

Elmira Road/S.Plain Street/S.Albany Street/Cayuga Street Area

- Conversion of Park Street to One-Way westbound.
- Install a channelized median on Spencer Street at Albany St.
- Install a gateway treatment along Albany Street extending from the 600 block south along Elmira Road approximately halfway to its intersection with Plain Street.
- Develop a comprehensive neighborhood arterial traffic calming plan
- Potential new bridge at S. Plain Street across Six Mile Creek.

Wood & South Streets

The City has recently approved the following measures for immediate implementation:

- a diverter will be installed across the intersection of Wood Street and Fair Street from northwest to southeast permitting travel between South Meadow Street and Titus Towers only (i.e. all through traffic will be prohibited;
- a second diverter will be installed at the intersection of South Street from northeast to southwest permitting travel between South Meadow Street

and the westernmost block of South Titus Ave. Again, all through traffic will be prohibited.

The following treatments should also be considered:

- Textured entry/exit pavement treatments;
- Supplementary speed humps;
- Mid-block slow points (narrowings), intersection bulb-outs or curb extensions;
- Pavement narrowings are recommended on both South and Wood Streets;
- Streescaping via addition of shade trees, wider tree lawn, and other visual enhancements;

West Buffalo Street Area

- Intersection curb extensions;
- Curb radius modifications;
- Enhanced crosswalk delineation;
- Related streetscaping;
- Mid-block bulb-outs.

CONCLUSION

Based upon the study results, as documented in this report, the network impacts on traffic operations may be mitigated to provide safe and acceptable operating conditions. The existing transportation network can adequately accommodate the combined projected traffic volumes with the recommended mitigation outlined in this report.

Implementation of the Transportation Demand Management strategies and Traffic Calming methods described in this report will minimize the volume of traffic on neighborhood streets thereby ensuring livability and minimizing adverse impacts associated with development of the Southwest area.

I. INTRODUCTION

The purpose of this report is to identify the on and off-site traffic impacts the implementation of the Southwest Area Land Use Plan may have on the highway system and the residents of nearby neighborhoods. The following evaluation considers impacts on the traveling public (including all modes of transportation such as motorists, pedestrians, and bicyclists) as well as on nearby neighborhoods to ensure that highway user and resident perspectives are considered.

In an effort to define traffic impact, this analysis determines the extent of existing traffic conditions and establishes newly generated traffic flow due to a mix of land use scenarios evaluated in this report.

II. SITE LOCATION AND STUDY AREA

"The Southwest Area Land Use Plan examines options for the use of over three hundred fifty acres south of Clinton Street, bounded on the west by the Flood Control Channel and the City line, and on the east and south by Meadow Street and Elmira Road."[2] Figure T-1 shows the approximate location of this area.

Development of this area can be expected to affect a number of intersections and neighborhoods throughout the City of Ithaca. Careful consideration was used in determining which intersections would be evaluated in detail for the purposes of this report. The Ithaca-Tompkins County calibrated T-Model Traffic Forecasting model was not used for analysis purposes as the model is relatively untested and the level of confidence in the output is considered insufficient for this evaluation. It is understood that the model is designed for regional forecasting and is not considered to be capable of producing detailed output at the local neighborhood level as required for the analyses contained in this report. Using these comparisons and through results of public hearings (scoping sessions) and conversations with the Public and City officials, the study area was narrowed and refined to the final study area evaluated in this report. The final study area is comprised of twenty-seven isolated intersections; including twenty-one signalized intersections and six unsignalized intersections. The intersections are listed below; the numbers corresponding to each intersection are used for identification purposes in this report. Figure T-2 depicts the locations of these intersections. It should be noted that the traffic study area is much larger than the area studied in the remainder of the GEIS as the impacts of traffic are geographically wider spread.

- Intersection 1 NY Route 79 / Floral Avenue, *unsignalized*
- Intersection 2 N. Fulton / W. Buffalo, *signalized*
- Intersection 3 N. Meadow / W. Buffalo, *signalized*
- Intersection 4 Albany / W. Buffalo, *signalized*
- Intersection 5 Cayuga / Buffalo, *signalized*
- Intersection 6 Taughannock Blvd. / W. State St. , *signalized*
- Intersection 7 N. Fulton / W. State, *signalized*
- Intersection 8 N. Meadow / W. State, *signalized*
- Intersection 9 N. Meadow / W. Fulton, *signalized*

[2] Final Scoping Document, Southwest Area Land Use Plan, City of Ithaca, Tompkins County, New York.

- Intersection 10 Albany / W. Clinton, *signalized*
- Intersection 11 Turner Pl. / E. Clinton, *unsignalized*
- Intersection 12 S. Meadow / W. Clinton, *signalized*
- Intersection 13 Albany / S. Titus, *signalized*
- Intersection 14 Cayuga / S. Titus, *unsignalized*
- Intersection 15 S. Meadow / Wegmans, *signalized*
- Intersection 16 S. Meadow / Tops, *signalized*
- Intersection 17 S. Albany / Park St., *unsignalized*
- Intersection 18 S. Meadow / Elmira, *signalized*
- Intersection 19 Commercial / Elmira, *signalized*
- Intersection 20 Spencer / Elmira, *signalized*
- Intersection 21 Five Mile / Elmira, *signalized*
- Intersection 22 Third / Route 13, *signalized*
- Intersection 23 N. Meadow / Cascadilla, *signalized*
- Intersection 24 Taughannock / W. Buffalo, *signalized*
- Intersection 25 NY Routes 13/34 / Dey-Willow, *signalized*
- Intersection 26 NY Routes 13/34 / NY Route 327, *unsignalized*
- Intersection 27 NY Route 13 exit ramp / Lakeshore, *unsignalized*

Figure T-2 also shows the following development area access points that are not included in those listed above:

- Intersection 28 NY Route 13/34 / Levee Parcels Drive, *signalized*
- Intersection 29 NY Route 13/34 / New Access Drive, *signalized*
- Intersection 30 N. Meadow / Existing K-Mart Access Drive, *signalized*

It should be noted that particular attention was paid to the neighborhood bounded by Buffalo Street on the north, Cayuga Street on the east, NY Route 13 on the west, and Old Elmira Road on the south. Comparisons of existing, future background and future full development traffic volumes are included as well as recommendations for traffic calming within the neighborhoods.

III. EXISTING HIGHWAY SYSTEM

The highway network within the study area is comprised of State arterials, City collectors and local streets. Four major transportation corridors were identified within the study area based on the large volumes of traffic carried daily by these highways. Three are north-south corridors, and one is an east-west corridor. The east-west corridor, NY Route 79 is functionally classified as an urban minor arterial highway within the City of Ithaca and throughout the study area. It connects Watkins Glen, to the west, via the City of Ithaca with Whitney Point, where there is an interchange with Interstate 81, and points south and east.

The three major north-south corridors include NY Route 96, NY Route 89, and NY Routes 13 & 34 which overlap throughout the study area. NY Route 96 connects the City of Ithaca with the City of Waterloo and points west via passage between Cayuga and Seneca lakes. It overlaps NY Route 34 to the south from the City of Ithaca to Spencer where it splits from NY Route 34 and continues south and west to the City of Owego and an interchange with Interstate 17. NY Route 96 is functionally classified as a rural principal arterial highway at the two

southernmost intersections in the study area, NY Route 327 and Five Mile Drive; it is classified as an urban minor arterial highway or an urban principal arterial highway throughout the remainder of the study area.

NY Route 89 is a north-south highway, which follows the westerly side of Cayuga Lake from the City of Ithaca north across the New York State Thruway. It is functionally classified as an urban collector highway within the study area.

NY Routes 13 and 34 are overlapped throughout the study area. The northernmost intersection in the study area, NY Route 13 exit ramp / Lakeshore, is the end of the overlapping section of the two highways. From this point, NY Route 13 continues north and west to the City of Cortland and beyond; NY Route 34 continues north along the westerly side of Owasco Lake through Auburn and Weedsport, where there is an interchange with the New York State Thruway. Approximately one half mile south of the southernmost intersection in the study area, NY Route 13 and 34 split apart and NY Route 13 continues south and west to Elmira and Interstate 17; NY Route 34 continues south to Sayre, Pennsylvania. The overlapping section of NY Routes 13 and 34 is classified as a rural principal arterial highway at the two southernmost intersections in the study area and an urban principal arterial highway throughout the remainder of the study area.

Operation of the highway network is based largely upon three, one-way pair systems. East/West Green Street and East/West Seneca Street compliment each other to create the east-west one-way pair system. East/West Green Street is one-way eastbound between Fulton Street and East State Street; East/West Seneca Street is one-way westbound between East State and West State Street.

The remaining two one-way pair systems traverse the City in a north-south orientation. The main pair, carrying the majority of the north-south traffic, is comprised of North/South Meadow Street northbound and North/South Fulton Street southbound between West Clinton Street and Cascadilla Street. The secondary one-way pair is comprised of North/South Aurora Street northbound and North/South Cayuga Street southbound between Court Street and Green Street.

Average Daily Traffic (ADT) and Design Hour Volumes (DHV) along the highways in the study area for which relevant data were available are shown on Figure T-3. Additional traffic data are included in the miscellaneous traffic data in section T-A2 of the appendix to this report. Figure T-4 shows existing geometry/lane use at each of the study intersections.

IV. EXISTING TRAFFIC CONDITIONS

A. Peak Intervals for Analysis

Given the functional characteristics of the highway system and the land use possibilities for the undeveloped area, it was determined that the P.M. and Saturday peak hours are the most critical in terms of volume and capacity at the selected intersections. Review of previous impact reports for various developments in the area revealed that traffic flow characteristics during the P.M.

and Saturday peak periods are very similar. Considerably more data were available for the P.M. peak time period than the Saturday peak time period and it is clear that the P.M. time period would be representative of both peak periods. After careful consideration it was therefore decided that only the P.M. peak time period would be studied in detail for the purposes of this report. During this time period, the combined commuter traffic and other traffic using these highways is the greatest and provides for a worst case analysis. Turning movement traffic counts indicate that P.M. peak period at the majority of the studied intersections occur between 4:30 and 5:30 P.M.

B. Existing Peak Hour Volumes

Peak hour volumes were obtained from various sources including an extensive turning movement count program initiated by the City of Ithaca. Data from previous impact studies in the area were used where available and the remaining data were obtained via field data collection performed by SRF & Associates (SRFA). Turning movement counts performed by SRFA were collected recently in 1998 during the selected peak time interval between the months of September and November; all schools and universities were in session during the traffic counts.

Signal timing data were obtained for each of the signalized intersection in the study area. Nineteen traffic signals in the City of Ithaca are currently coordinated. Eleven of the nineteen coordinated traffic signals are included in the study area for this report; these include intersection numbers 2, 3, 6, 7, 8, 9, 12, 15, 16, 23, and 24. It is understood that a new signal timing plan for these coordinated signals will be initiated by the New York State Department of Transportation (NYSDOT) sometime in the Spring of 1999. These new timings were not available at the time this report was completed, however it is understood that the background cycle length will be 75 seconds, therefore this cycle length was used in analysis of these intersections under future conditions. It should be noted that it is possible that in the future more traffic signals may be added to the coordinated grid.

Peak hour traffic volumes, depicting the existing vehicular movements at each study intersection, are illustrated in Figure T-5.

C. Comparison To Historical Data

Traffic data collected for this project were compared to available data from previous years obtained from the New York State Department of Transportation (NYSDOT), the City of Ithaca, and previous traffic impact studies. Continuous traffic counts (24 hour) taken along some of the highways within the study area, between 1995 and 1998, were checked to confirm the accuracy of the peak hour traffic counts. All volumes were within reasonable and acceptable variations. The actual differences may be attributed to a combination of growth, temporal variations (seasonal), and the single event nature associated with the turning movement counts.

V. HYPOTHETICAL LAND USE SCENARIOS

A. Land Use Alternatives

Large mixed use activity centers such as the future Southwest Area,

- Introduce a mix of compatible land uses that capture more trips on-site, thus reducing the number of external trips on the existing area-wide highway network;
- Encourage a mix of uses that generates off-peak directional traffic flows;
- Encourage a mix of uses that promotes greater transit, pedestrian, and bicycle use.

Transit Supportive Land Use Alternatives

With development of large activity centers such as the Southwest Area, an opportunity exists to balance the land use, transportation, and open space interests in an environmentally sensitive manner. "Transit friendly" planning is one of the community's most effective tools in achieving this balance and managing growth and change. It involves integrated design of large scale retail, employment, and residential land uses such that transit may effectively and efficiently serve them.

This is achieved by clustering buildings as indicated on the concept plan, and by creating a transit-friendly internal circulation system.

- *It is recommended that the design criteria for the Southwest Area include transit-friendly design features that encourage residents and shoppers to use transit as an alternative to the automobile for at least one or more trips between work, shopping, services, etc.*

It is also recognized that the more diverse the transit compatible uses within the Southwest Area activity center, the greater the potential for "trip linking". Shared trips among compatible primary and supporting uses decreases the auto-dependency and trip volume on the existing roadways, and increases walking and transit trips that contribute to potential reductions in traffic. Primary, or highly essential land use, supportive of greater transit use includes local and regional shopping, substantial suburban office use; and a mix of higher density residential (e.g. 7+ units per acre). Supporting or contributing land uses include local services, medical offices, hotels/motels, movie theaters, restaurants, convenience retail, day care centers and other desirable uses.

- *It is recommended that an appropriate mix of concentrated commercial uses such as offices, and higher density residential be encouraged to sustain a market for retail uses and greater transit ridership. This in turn, reduces the number of auto-related trips to the area.*

A mix of uses that also promotes ridership throughout the day will insure a level of constant activity within the Southwest Area, thus bringing vitality as well as a

sense of personal safety to the area, further supporting local retail uses. Off-peak travel land use generators such as destination retail, and entertainment uses combined with peak travel uses such as higher density residential, and retail uses are essential.

- *A mix of uses that stimulate off-peak as well as peak travel, and helps create transit activity throughout the day are recommended.*

Six alternatives with differing land use mixes and sizes of development have been developed based on guidelines presented by City officials. Single land use developments tend to increase dependence on automobiles thereby increasing traffic congestion on arterials. It is important that a compatible mix of land uses be developed to promote interaction between land uses and efficiency of trips. Pedestrian amenities on-site will encourage walking between different areas of activity within the development as well as transit use thereby reducing vehicular travel both on and off site.

All of the alternatives have one common development: the Levee Parcels. The Levee Parcels are located along the westerly side of NY Routes 13/34 between the Buttermilk Falls Road and Spencer Road intersections. The development scenario of these parcels may accommodate 200,000 s.f. of retail development which may be accessed via one full service signalized driveway along NY Route 13/34. These parcels are likely to be developed first as they have direct highway access. Therefore traffic generated by development of these parcels has been added to existing conditions prior to generating background conditions for analysis of future development alternatives.

The following alternative land use mixes were developed as a result of discussions with City officials, review of the Southwest Area Land Use Study, and review of public comments pertaining to the Study.

TABLE I
ALTERNATIVE LAND USE MIXES

Alternative	Residential (du)[3]	Office (ksf)[4]	Light Industrial (ksf)	Retail (ksf)	Total Non-Res. Dev. (ksf)
Alt. 1	0	250	200	600	1050
Alt. 2	600	100	100	400	600
Alt. 3	0	0	0	500	500
Alt. 4	0	250	0	500	750
Alt. 5	0	200	0	800	1000
Alt. 6	0	250	0	1000	1250

[3] Du is an abbreviation for dwelling units (the number of apartments or homes).
[4] Ksf is an abbreviation for thousands of square feet (a measurement of building size).

B. Background Conditions

The Ithaca-Tompkins County Transportation Council (ITCTC) prepared a study in 1995 titled the 2015 Long Range Plan to provide a twenty year vision for the metropolitan transportation system. County-wide population demographics were reviewed for a ten year period from 1980 to 1990. Some of the results of that review are listed below:

- The driver population increased approximately 10% over the interval, or one percent per year.
- The number of vehicles per household in the County was growing at a rate of two percent per year.

This is background growth, which occurs naturally and is not related to the construction of specific and/or additional traffic inducing generators. A growth rate was derived based on a comparison of historical growth rates in the area and information described above. Development of the Southwest Area can be expected to occur slowly over time. For the purposes of this Report, it was assumed that full build out may occur by the year 2018. A background growth rate of 1.2% per year, compounded over 20 years, was applied to all relevant movements throughout the network.

Closure of Wood and South Streets via traffic diverters is currently being undertaken (see description in traffic calming section). This will result in a significant decrease in traffic volumes using these local roads. Background traffic volumes at the S. Meadow St. intersections with South and Wood Sts. were diverted proportionately and according to existing trip patterns.

C. Traffic Generation

The objective of a GEIS is to establish maximum impact thresholds for future development. Preliminary analyses determined that Alternative 6 may require mitigations above and beyond improvements at spot locations and the creation of an additional internal north-south corridor. Therefore, Alternative 5 has been evaluated in detail for the purposes of this report. All other alternatives, with the exception of Alternative 6, are considered feasible alternatives and can be accommodated with an appropriate level of mitigation specific to each scenario.

The next step in the evaluation is to determine the additional traffic attributable to the future development under Alternative 5. The development may have access at five points including the driveway to the Levee Parcels (intersection 28). One new intersection may be constructed along Elmira Road just to the north of Commercial Drive (intersection 29). The new access roadway would form a

signalized "T"-intersection with Elmira Road. Two access points currently exist along South Meadow Street; they are the K-Mart driveway (intersection 30) and the Wegmans driveway (intersection 15). A roadway to the north, referred to as the "northern connector or Taughannock Boulevard extension" in this report, through the Southwest area would form the southerly leg of the West State Street/Taughannock Boulevard intersection (intersection 6). It should be noted that these access drives would be extended across the Relief Channel to access undeveloped lands. A concept plan showing the location of these access points and a possible configuration for development of the Southwest Area is shown in Figure T-6.

Data contained in Trip Generation, 6th Edition, published by the Institute of Transportation Engineers (ITE) in 1997, have been used to estimate driveway traffic for each alternative. Volumes generated during the peak hour of adjacent street traffic were used throughout the analysis.

Due to the variation of land uses, internal roadway system, and the overall size of the future development area, pass-by and internal trips must be taken into account for calculating generated trips.

1. Internal Capture Rate

One characteristic of large mixed-use developments, such as this one, is the ability to capture some trips on-site (internal trips) that may normally end up on the adjacent or external roadways. Based on information from the *Trip Generation Handbook,* An ITE Proposed Recommended Practice, 1998, an "internal capture rate" or percent reduction that may be applied to the trip generation estimates for individual land uses to account for trips internal to the development. The three most common generators for internal trips are office, residential, and retail, some or all of which may be developed in the Southwest Area. Based on proposed land uses and building sizes, an internal capture rate of 10% was estimated that may be expected at full build out under Alternative 5. Supporting data can be found in section T-A2 of the appendix to this report.

2. Pass-by Traffic

Inherent in the trip generation estimate for the area at full development under Alternative 5, is the "pass-by" component of traffic entering and exiting the undeveloped area. The pass-by traffic refers to the amount of existing traffic already on the roadway directly adjacent to the Southwest area that, as it "passes by" the site, enters the access drive. That portion of the total generated traffic attracted to the future development may pass on the adjacent street system whether or not the Southwest Area was developed and thus produces no new traffic at other study area intersections. Calculations based on information from the *Trip Generation Handbook*, An ITE Proposed Recommended Practice, 1998, show that the

undeveloped area may have a pass-by rate as high as 30 percent at full development. The pass-by rate expected for this project, however, is conservatively assumed as 20 percent of the total peak hour retail development volumes entering and exiting the development.

3. Transit Service

The compatible land uses planned for the future development are designed to support greater transit usage. Transit service is anticipated for this large development, and adjustments were made to account for expected usage. Ridership information provided by the Tompkins Consolidated Area Transit (TCAT) indicates that Ithaca has more transit trips per/capita than anywhere else in the State except for New York City. City officials indicated that new trips generated by development of the Southwest Area may be reduced by up to 7% due to transit usage. This reduction is supported by the 1990 Census data, which reports that approximately 6% of trips to places of employment were made via public transportation and approximately 8% were made via carpooling. It is also significant to note that approximately 23% of households in the City of Ithaca did not have access to a vehicle.

4. Pedestrian Traffic

An internal pedestrian circulation plan is also envisioned for this development which may further reduce the number of auto dependent trips generated by the future development. However, no adjustments to overall trip generation have been made for pedestrian traffic.

The trip generating characteristics of the mixed-use alternatives described above are shown in Table II.

TABLE II
TRIP GENERATING CHARACTERISTICS OF ALTERNATIVE MIXED LAND USES

Alternative	Residential (du)	Office (ksf)	Light Industrial (ksf)	Retail (ksf)	Total Non-Res. Dev. (ksf)	Total Adjusted Trips [5] (vph)		
						Enter	Exit	Total
Alt. 1	0	250	200	600	1050	826	1201	2027
Alt. 2	600	100	100	400	600	719	780	1499
Alt. 3	0	0	0	500	500	666	708	1374
Alt. 4	0	250	0	500	750	692	936	1628
Alt. 5	0	200	0	800	1000	959	1193	2152
Alt. 6	0	250	0	1000	1250	1259	1547	2806

[5] Total Adjusted Trips refers to adjustments made to account for pass-bys, internal trips, and transit usage.

The volume of traffic generated by Alternative 5 has been estimated and summarized in Table III. All trip generation calculations are included in section T-A2 of the appendix to this report.

TABLE III
GENERATED TRAFFIC VOLUMES – ALTERNATIVE 5

Description	PM Peak Hour		
	Enter	Exit	Total
Unadjusted Trips – 200 ksf Free-Standing Discount Superstore	374	390	764
Reduction of 20% peak hour trips that will be "pass-bys"	-75	-78	-153
Unadjusted Trips – 600 ksf Shopping Center	979	1063	2042
Reduction of 20% peak hour trips that will be "pass-bys"	-196	-213	-409
Reduction of 10% peak hour trips that will remain internal	-98	-106	-204
Reduction of 7% peak hour trips for transit usage	-68	-74	-142
Unadjusted Trips – 200 ksf General Office Building	53	254	307
Reduction of 0% peak hour trips that will be "pass-bys"	-0	-0	-0
Reduction of 10% peak hour trips that will remain internal	-6	-25	-30
Reduction of 7% peak hour trips for transit usage	-4	-18	-22
Total Adjusted Trips	959	1193	2152

D. Traffic Distribution

The cumulative effect of development related traffic on the transportation network is dependent on the origins and destinations of that traffic and the location of the access drives serving the future development.

The anticipated arrival/departure distribution of traffic to be generated by future development is considered a function of several parameters, including the following:

- Population centers in the area
- Travel Time considerations

- Existing highway network
- Existing traffic conditions and controls
- Access drive locations

Based on an evaluation of the above-mentioned parameters, the distribution of development related traffic is determined for the P.M. peak interval. It is estimated that the generated traffic will follow the patterns shown in Table IV:

TABLE IV
TRIP DISTRIBUTION PATTERNS

North along NY Routes 13/34	26%
North along NY Route 89	6%
North along NY Route 96	12%
West along NY Route 79	6%
South along NY Routes 13/34	15%
East along Old Elmira Rd/Spencer Rd	15%
East through the City Grid Network	20%

The directional splits shown above were applied to generated traffic resulting in the final trip distribution pattern illustrated in Figures T-7a and T-7b. Figure T-7a shows the distribution of traffic generated by development of the Levee Parcel only; Figure T-7b shows the distribution of traffic generated by the remainder of the future development.

It should be noted that the distribution of traffic generated by the Levee Parcel will change slightly once the connection to Taughannock Boulevard (the northern connector) and the internal connection between the Levee Parcels and the rest of the Southwest area are constructed. Traffic oriented to and from the north along NY Route 96 and along NY Route 89 will most likely use the "northern connector" rather than exiting the access drive onto NY Routes 13/34 and traveling through the City street system.

Given the proposed peak hour trip generations for the Levee Parcels (Table III) and anticipated trip distribution for the Levee Parcels (Figure T-7a), peak hour directional volumes are calculated and distributed to the adjacent roadway system as shown in Figure T-8. The peak hour volumes attributed to the Levee Parcels (Figure T-8) were added to the existing traffic volumes (Figure T-5) and background growth was applied over 20 years as described above. The resulting volumes are considered the background conditions for the development alternatives and are shown in Figure T-9.

The estimated peak hour trip generations for the balance of Alternative 5 (Table III) and anticipated trip distribution for the balance of Alternative 5 (Figure T-7b) were used to distribute generated traffic to the adjacent roadway system as shown in Figure T-10.

VI. FUTURE DESIGN HOUR VOLUMES

Future design hour traffic volumes are developed by combining the background traffic conditions (Figure T-9) and newly created traffic generations for the balance of Alternative 5 (Figure T-10). Resulting network design hour volumes (2018 Future Full Development Conditions), based on Alternative 5 development as described above, are depicted in Figure T-11.

VII. CAPACITY ANALYSES

The capacity of a highway system is predicated on two components: the capacity of the included roadway sections and the capacity of the affected intersections along the route. By inspection of the future volumes, the roadway sections involved may accommodate the proposed increase in traffic projected with mitigation described in this report.

Intersecting roadways generally provide the initial constraint on a system's capacity. Efficiency at the intersections becomes the critical constraint for capacity. Vehicle interactions at these points must therefore be analyzed to assess the projected capacity levels.

The standard procedure for capacity analysis of signalized and unsignalized intersections is that of the 1994 Highway Capacity Manual published by the Transportation Research Board. The procedure yields a Level of Service (LOS) as an indicator of how well intersections operate. Level of Service is defined in terms of delay that is a measure of driver discomfort, frustration, fuel consumption, and lost travel time.

The concept of Level of Service is defined as a qualitative measure describing operating conditions within a traffic stream, and their perception by motorists and/or passengers. Six Levels of Service are defined for analysis purposes. They are assigned letter designations, from "A" to "F", with LOS "A" representing the best conditions and LOS "F" the worst. Suggested ranges of service capacity and an explanation of Levels of Service are included in section T-A3 of the appendix to this report.

Capacity results of the 1998 existing conditions, initial Levee Parcel conditions, 2018 future background conditions (background growth projected twenty years into the future with the Levee Parcel fully developed) and 2018 Alternative 5 conditions with and without mitigation, are listed in Table V. All capacity analysis calculations are included in sections T-A4 through T-A7 of the appendix to this report.

ALTERNATIVE 5 NETWORK IMPACTS & RECOMMENDED MITIGATIONS:

As motorist delay and congestion increase on major highways, more traffic is diverted to highways less suitable for increased traffic and oftentimes in residential neighborhoods. It was determined through discussions with City officials that while any change in Level of Service is considered an impact, all approaches at all signalized intersections within the study area must be mitigated to Level of Service “E” or better. Based on these criteria, improvements are indicated at the following intersections. Figures T-12a and T-12b depicts a schematic diagram of the existing intersections and the recommended mitigations.

- Intersection 2 N. Fulton / W. Buffalo, *signalized* – A bridge crossing the relief channel between N. Fulton Street and Taughannock Boulevard at Court Street may be constructed to relieve the heavy southbound right turn from Fulton Street onto Buffalo Street. This new bridge may improve operations at the West Buffalo Street/Taughannock Boulevard and West Buffalo Street/North Meadow Street intersections as well by providing an additional route for motorists oriented to and from NY Route 89. Addition of a fourth southbound lane on Fulton Street to increase the capacity of the intersection is infeasible due to the proximity of the Conrail railroad tracks adjacent to Fulton Street.

- Intersection 6 Taughannock Blvd. / W. State St., *signalized* – This intersection must be modified to include a new northbound approach which will become the access point for the "northern connector". Turning movements on the eastbound and westbound approaches may be accommodated by sharing lanes with the existing movements. The new southbound through movement may be accommodated by sharing a lane with the right turn movement. The northbound approach will consist of an exclusive left turn lane and a shared through and right turn lane.

- Intersection 9 N. Meadow / S. Fulton – W. Clinton, *signalized* – The northbound through movement is failing due to lack of capacity. There are currently two northbound lanes approaching this intersection with a yield controlled right turn; the right turning vehicles cannot get to the intersection to make the right turn because they are blocked by a queue of northbound through vehicles. There are two options available for improving operations at this intersection. Option A: Prohibit eastbound left turns and through movements at the intersection; these movements may be made at the N. Fulton/W. Green Street intersection. This would allow for two-phase operation of the traffic signal providing more green time, and therefore capacity, for northbound traffic. Option B: Widen the bridge crossing Six Mile Creek to provide an additional northbound through lane and a northbound right turn lane. There are currently three lanes northbound to the north of the intersection therefore no additional widening would be necessary to accommodate the additional through lane.

TABLE V
CAPACITY ANALYSIS RESULTS

INTERSECTION NO. DESCRIPTION	***1998 EXISTING CONDITIONS***	***INITIAL LEVEE PARCELS CONDITIONS***	***2018 BACKGROUND CONDITIONS INCLUDING LEVEE PARCELS***	2018 - ALT. 5 FULL DEV. CONDITIONS		
				LOS W/O MITIGATION	***LOS WITH MITIGATION***	***MITIGATION***
1. Route 79 / Floral Ave.						Add an E/B
Northbound Left	C	B	C	B	B	lane to
Eastbound Left	B	F	F	F	F	separate left
Eastbound Right	B	F	F	F	B	and right turns
Overall	**A(4.7)**	**A(4.7)**	**E (33.4)**	**F (244.2)**	**E (33.4)**	
2. N. Fulton / W. Buffalo						Construct new
Southbound	C	C	E	*	D	bridge at
Eastbound	B	B	E	D	D	Court St. to
Westbound	B	B	E	D	D	relieve right
Overall	**C(16.4)**	**C(15.8)**	**E(53.9)**	***(*)**	**D(29.8)**	turn

INTERSECTION NO. DESCRIPTION	*1998 EXISTING CONDITIONS*	*INITIAL LEVEE PARCELS CONDITIONS*	*2018 BACKGROUND CONDITIONS INCLUDING LEVEE PARCELS*	2018 - ALT. 5 FULL DEV. CONDITIONS		
				LOS W/O MITIGATION	*LOS WITH MITIGATION*	*MITIGATION*
3. N. Meadow / W. Buffalo						
Northbound	B	B	B	C	---	None
Eastbound	B	C	C	C	---	
Westbound	D	C	C	D	---	
Overall	**C(15.3)**	**B(13.0)**	**C(17.3)**	**C(20.5)**	---	
4. Albany / W. Buffalo						
Northbound	B	B	C	C	---	None
Southbound	B	B	B	B	---	
Eastbound	B	B	B	B	---	
Westbound	B	B	B	C	---	
Overall	**B (10.6)**	**B (10.8)**	**B(12.6)**	**B(13.6)**	---	
5. Cayuga / Buffalo						
Southbound	B	B	C	C	---	None
Eastbound	B	B	B	B	---	
Westbound	D	B	B	B	---	
Overall	**C(15.9)**	**B(11.2)**	**B(12.6)**	**B(13.8)**	---	
6. Taughannock Blvd. / W. State St.						
Northbound (Northern Connector)	---	---	---	B	---	Construct new
Southbound	B	B	B	B	---	approach for
Eastbound	B	B	B	B	---	Northern
Westbound	B	B	B	B	---	Connector
Overall	**B(7.8)**	**B(8.7)**	**B(9.6)**	**B(9.5)**	---	
7. N. Fulton / W. State						
Southbound	B	B	B	C	---	None
Eastbound	C	C	C	C	---	
Westbound	B	B	B	B	---	
Overall	**B (12.2)**	**B (13.0)**	**C(15.3)**	**C(17.2)**	---	
8. N. Meadow / W. State						
Northbound	B	B	C	D	---	None
Eastbound	C	C	C	D	---	
Westbound	C	C	D	D	---	
Overall	**B(13.4)**	**B(13.7)**	**C(22.5)**	**D(27.2)**	---	
9. N. Meadow / W. Fulton					OPT A/B:	OPT A:
Northbound	B	C	E	*	B/D	Prohibit E/B
Eastbound	B	B	*	*	D/D	thru and left;
Westbound	C	C	*	*	E/E	OPT B: add 2
Overall	**B(12.5)**	**B(14.9)**	***(*)**	***(*)**	**C/D (22.5/33.7)**	N/B lanes on bridge
10. Albany / W. Clinton						
Northbound	B	B	B	C	C	Add E/B and
Southbound	B	B	C	B	B	W/B left turn
Eastbound	B	B	D	*	B	lanes on W.
Westbound	B	B	D	*	B	Clinton
Overall	**B (7.9)**	**B (8.3)**	**C(24.3)**	***(*)**	**B(13.1)**	
11. Turner Pl. / E. Clinton						Add a N/B
Northbound Left	F	F	*	*	F	lane to
Northbound Right	F	F	*	*	B	separate left
Westbound Left	B	B	C	D	D	and right turns
Overall	**A (3.6)**	**A (3.9)**	**F(380.5)**	***(*)**	***(*)**	

INTERSECTION NO. DESCRIPTION	*1998 EXISTING CONDITIONS*	*INITIAL LEVEE PARCELS CONDITIONS*	*2018 BACKGROUND CONDITIONS INCLUDING LEVEE PARCELS*	2018 - ALT. 5 FULL DEV. CONDITIONS		
				LOS W/O MITIGATION	*LOS WITH MITIGATION*	*MITIGATION*
12. N. Meadow / W. Clinton						
Northbound	A	C	*	*	B	Prohibit N/B
Southbound	A	A	*	*	B	and S/B left
Eastbound	C	C	E	E	C	turns
Westbound	C	C	C	C	B	
Overall	**B (5.7)**	**B (12.0)**	***(*)**	***(*)**	**B(7.4)**	
13. Albany / S. Titus						
Northbound	A	A	B	B	---	None
Southbound	A	A	B	B	---	
Eastbound	B	B	B	B	---	
Westbound	C	C	B	B	---	
Overall	**B(8.4)**	**B(8.4)**	**B(8.9)**	**B(11.2)**	---	
14. Cayuga / S. Titus						
Northbound Left	A	A	A	A	---	None
Eastbound	C	C	C	C	---	
Westbound	C	C	D	E	---	
Overall	**B(6.8)**	**B(7.6)**	**C(11.3)**	**D(21.2)**	---	
15. S. Meadow / Wegmans / South						Add S/B right
Northbound	B	B	B	C	B	turn lane; Add
Southbound	B	C	D	*	C	E/B right turn
Eastbound	B	B	B	C	D	lane to allow
Westbound	B	B	B	B	C	dual left turn
Overall	**B (10.5)**	**B (12.1)**	**C(19.1)**	***(*)**	**C(17.3)**	w/shared thru
16. S. Meadow / Tops / Wood						
Northbound	A	B	B	B	---	None
Southbound	B	C	D	D	---	
Eastbound	D	C	B	B	---	
Westbound	B	B	B	B	---	
Overall	**B(10.9)**	**B(13.2)**	**C(17.3)**	**C(17.1)**	---	
17. S. Albany / Spencer St.						
Northbound Left	A	A	A	A	D	Signalize
Southbound Left	A	A	B	B	C	
Eastbound	C	C	---	---	---	
Westbound	F	F	*	*	D	
Overall	**F (61.0)**	**F (159.4)**	***(*)**	***(*)**	**D(28.0)**	
18. S. Meadow / Elmira						Add N/B right
Northbound	B	C	C	C	B	turn lane; re-
Southbound	B	B	B	B	B	stripe W/B for
Westbound	C	D	D	*	C	left and shared
Overall	**B (10.3)**	**C (16.6)**	**B(13.3)**	***(*)**	**B(12.7)**	left/right lanes
19. Commercial / Elmira						
Northbound	A	A	A	A	---	None
Southbound	A	A	A	A	---	
Eastbound	C	C	C	C	---	
Westbound	C	C	C	C	---	
Overall	**A(2.7)**	**A(2.5)**	**A(3.9)**	**A(4.2)**	---	

INTERSECTION NO. DESCRIPTION	*1998 EXISTING CONDITIONS*	*INITIAL LEVEE PARCELS CONDITIONS*	*2018 BACKGROUND CONDITIONS INCLUDING LEVEE PARCELS*	2018 - ALT. 5 FULL DEV. CONDITIONS		
				LOS W/O MITIGATION	*LOS WITH MITIGATION*	*MITIGATION*
20. Spencer / Elmira						
Northbound	A	A	A	A	---	None
Southbound	A	A	A	A	---	
Eastbound	C	C	C	C	---	
Westbound	C	C	C	C	---	
Overall	**A(2.6)**	**A(2.9)**	**A(4.0)**	**A(3.8)**	---	
21. Five Mile / Elmira						
Southbound	C	B	C	C	---	None
Eastbound	A	A	A	A	---	
Westbound	B	B	B	B	---	
Overall	**B(7.4)**	**B(9.0)**	**B(11.8)**	**B(12.8)**	---	
22. Third / Route 13						
Northbound – Third St.	C	B	B	C	---	None
Southbound – Third St.	C	C	C	C	---	
Eastbound – NY 13/34	B	B	B	B	---	
Westbound NY 13/34	A	B	B	B	---	
Overall	**B(5.8)**	**B(9.3)**	**B(8.9)**	**B(9.2)**	---	
23. N. Meadow / Cascadilla						
Northbound	A	A	A	B	---	None
Eastbound	C	B	C	B	---	
Westbound	C	B	C	B	---	
Overall	**A(2.9)**	**B(5.4)**	**A(3.3)**	**B(6.5)**	---	
24. Taughannock / W. Buffalo						Construct new
Northbound	B	B	D	E	D	bridge at
Southbound	C	C	F	E	D	Court St.
Eastbound	B	B	D	D	B	between
Westbound	B	C	*	*	C	Fulton St. and
Overall	**B (11.9)**	**B (14.8)**	***(*)**	***(*)**	**C(17.7)**	Taughannock Blvd.
25. Route 13/34 / Dey – Willow						
Northbound	D	C	D	D	---	None
Southbound	B	B	B	B	---	
Eastbound	B	B	B	C	---	
Westbound	B	C	C	E	---	
Overall	**C (17.3)**	**C (12.6)**	**C(17.9)**	**C(18.5)**	---	
26. Route 13/34 / Route 327						
Northbound Left	B	C	C	D	D	Add an E/B
Eastbound Left	F	F	F	F	F	lane to
Eastbound Right	F	F	F	F	D	separate left
Overall	**A (0.9)**	**A (1.0)**	**C(11.6)**	**D(21.8)**	**C(15.0)**	and right turns
27. Route 13 exit ramp / Lakeshore						
Northbound	A	A	A	A	C	
Southbound Left	A	A	B	B	B	Signalize
Eastbound	F	F	*	*	C	intersection
Overall	**D (25.4)**	**E (39.3)**	**F(335.3)**	**F(482.4)**	**C(20.1)**	

INTERSECTION NO. DESCRIPTION	*1998 EXISTING CONDITIONS*	*INITIAL LEVEE PARCELS CONDITIONS*	*2018 BACKGROUND CONDITIONS INCLUDING LEVEE PARCELS*	2018 - ALT. 5 FULL DEV. CONDITIONS		
				LOS W/O MITIGATION	*LOS WITH MITIGATION*	*MITIGATION*
28. Route 13/34 / Levee Parcel Drive						
Northbound – NY 13/34	---	B	B	A	---	New Traffic
Southbound - NY 13/34	---	B	B	B	---	Signal
Eastbound – Levee Parcel Drive	---	C	C	C	---	
Overall	---	**B(7.8)**	**B(9.2)**	**B(7.4)**	---	
29. Route 13/34 / Access Drive						
Northbound – NY 13/34	---	---	---	A	---	New Traffic
Southbound - NY 13/34	---	---	---	B	---	Signal
Eastbound –Access Drive	---	---	---	C	---	
Overall	---	---	---	**B(11.3)**	---	
30. S. Meadow / K-Mart Drive						
Northbound	B	B	B	B	---	None
Southbound	B	B	B	B	---	
Eastbound	B	B	B	C	---	
Westbound	B	B	B	B	---	
Overall	**B(8.6)**	**B(9.3)**	**B(10.4)**	**B(12.6)**	---	

***** indicates oversaturated conditions

- Intersection 10 W. Clinton / Albany, *signalized* – Necessary improvements include addition of eastbound and westbound left turn lanes on W. Clinton St. These additional lanes increase capacity on W. Clinton St. thereby allowing more green time to be given to the north-south movements creating Levels of Service of "C" or better on all approaches.

- Intersection 12 S. Meadow / W. Clinton – S. Titus, *signalized* – Analysis of this intersection shows that the interior northbound and southbound through lanes may operate as "de-facto" left turn lanes although the respective left turn volumes (33 and 14 vph) will be very small. Delay to through traffic on S. Meadow Street can be minimized by prohibiting northbound and southbound left turns at this intersection. Left turns in both directions may, instead, be made at the S. Meadow / Wegmans – South St. intersection since the turns will be comprised of primarily local traffic.

- Intersection 15 S. Meadow / Wegmans, *signalized* – Necessary improvements include addition of a southbound right turn lane entering the Wegmans driveway, addition of an eastbound right turn lane exiting Wegmans such that the eastbound approach would consist of one exclusive left turn lane, a shared left turn and through lane, and an exclusive right turn lane. This configuration may require some widening on the east side of the intersection, South Street, to accommodate the realignment. South Street would still support only one lane in each direction.

- Intersection 18 S. Meadow / Elmira, *signalized* – A northbound right turn lane must be added to accommodate the heavy movement. Lane use on the westbound

approach, Elmira Road, should be modified via pavement markings to provide an exclusive left turn lane and a shared left and right turn lane.

- Intersection 24 Taughannock / W. Buffalo, *signalized* – Construction of a new bridge crossing the Cayuga Inlet between N. Fulton Street and Taughannock Boulevard at Court Street would provide an alternate travel path for some westbound right turns and some southbound left turns at this intersection. The volume of traffic that may be expected to use the new bridge and avoid this intersection has been estimated and calculations are included in section T-A2 of the appendix to this report. This new bridge may improve operations at the West Buffalo Street/North Fulton Street and West Buffalo Street/North Meadow Street intersections as well by providing an additional route for motorists oriented to and from NY Route 89. A westbound right turn lane may also improve operations at this intersection, however, it would have to be long enough to extend past the queue of westbound through vehicles which may necessitate widening the bridge over the Cayuga Inlet. It is therefore recommended that the new bridge be considered as mitigation as this may solve capacity problems at other intersections as well.

- Intersection 27 NY Route 13 exit ramp / Lakeshore, *unsignalized* – Capacity problems at this intersection may only be solved by installation of a traffic signal.

- There are five other unsignalized intersections in the study area. The Cayuga Street/S. Titus Avenue intersection (14) will operate at acceptable Levels of Service with no mitigation. The S. Albany Street/Park Street/Spencer Street intersection (17) is currently failing. The only mitigation capable of improving the Spencer Street LOS is signalization. Signalization of this intersection provides acceptable levels of service on all approaches although it significantly increases delay to motorists on Albany Street and Elmira Road. The three remaining unsignalized intersections (Route 79/Floral Avenue - 1, Turner Place/E. Clinton Street - 11, and Routes 13/34/Route 327 - 26) all show failures on the side roads. These failures are due to the left turns experiencing delays and impeding the flow of the right turns. The recommended mitigation for these three intersections is to provide two lanes exiting the side roads to allow right turns to exit the side roads unimpeded. The left turns will continue to experience moderate to long delays. However, the volume of left turns at these intersections is very small and may be accommodated by gaps in the through traffic on the major road. It is recommended that these intersections continue to be monitored to determine if traffic signals may be warranted in the future.

- Eight of the twenty-one signalized intersections in the study area require mitigation as described above. The remaining thirteen signalized intersections need no mitigation other than optimization of signal timings to provide adequate green times for each phase.

ACCESS IMPACTS:

Analyses show that the additional access drives (the new driveway to the Levee Parcel along NY Route 13/34 – intersection 28, the new access drive north of Commercial

Avenue along NY Route 13/34 – intersection 29, and the extension of the existing K-Mart driveway along South Meadow Street – intersection 30) will operate at Level of Service "C" or better at all times. Taughannock Boulevard will be extended to the south of W. State St. (intersection 6) to create the "northern connector." The northbound approach to the intersection will consist of a left turn lane and a shared thru and right turn lane. The southbound approach currently consists of a right turn lane and a left turn lane; the new thru movement can be accommodated by allowing the thru and right turn movements to share one lane. The westbound approach is currently one lane and can accommodate the new left turn movement within the existing lane. The eastbound approach to the intersection consists of a shared left turn and thru lane and an exclusive thru lane; the new right turn movement can be included in the exclusive thru lane. The other access point, the extension of the existing Wegmans driveway (intersection 15), is discussed above.

PHASING OF ACCESS POINTS AND MITIGATIONS:

Following is an estimate of which access points are required for each alternative. Also listed are which mitigations are necessary for each alternative. Cost estimates for construction of various internal roadways and for the mitigations described above are included in section T-A8 of the appendix to this report.

- The Levee Parcels may be constructed with one driveway along Elmira Road. A roadway connection between the Levee Parcels and the rest of the site will be required prior to full build-out of Alternatives 1, 2, 4, or 5. Mitigations described above for intersections 1, 11, 26, and 27 are recommended prior to full build out of the Levee Parcels and subsequent alternatives.

- Alternative 3 may be constructed using one access point, the southernmost driveway along Elmira Road (intersection 29), although two are preferable with the second driveway either being the "northern connector/Taughannock Blvd. extension" (intersection 6) or the K-Mart driveway (intersection 30). Widening of the Meadow St. bridge over Six Mile Creek (intersection 9 improvements) will be required at full build out. Construction of the Court St. bridge (recommended to improve operations at intersections 2 and 24) will be required prior to full build-out of this alternative.

- Alternative 2 requires three access points, one of which must be the "northern connector" (intersection 6). The southernmost driveway along Elmira Road (intersection 29) and the K-Mart driveway (intersection 30) are recommended to be the other two driveways. Widening of the Meadow St. bridge over Six Mile Creek (intersection 9 improvements) will be required at full build out. Construction of the Court St. bridge (recommended to improve operations at intersections 2 and 24) will be required prior to full build-out of this alternative.

- Alternative 4 requires four access points: the southernmost driveway along Elmira Road (intersection 29), the K-Mart driveway (intersection 30), the Wegmans driveway (intersection 15), and the "northern connector" (intersection 6). Widening of the Meadow St. bridge over Six Mile Creek (intersection 9 improvements) will be required at full build out. Construction of the Court St. bridge (recommended to

improve operations at intersections 2 and 24) will be required prior to full build-out of this alternative.

- Alternative 5 requires four access points: the southernmost driveway along Elmira Road (intersection 29), the K-Mart driveway (intersection 30), the Wegmans driveway (intersection 15), and the "northern connector" (intersection 6). Widening of the Meadow St. bridge over Six Mile Creek (intersection 9 improvements) will be required at full build out. Construction of the Court St. bridge (recommended to improve operations at intersections 2 and 24) will be required prior to full build-out of this alternative.

- Alt. 1 is similar in size to alternative 5 and will require the same mitigation measures.

- Alternative 6 is not feasible due to the magnitude of mitigations that would be required.

- Mitigations described for intersection 15 (the Wegmans driveway at S. Meadow Street) will be required when it is used for access to the Southwest Area.

- Mitigations described for intersection 18 (S. Meadow Street and Elmira Road) would be beneficial now.

VIII. OTHER MITIGATION MEASURES

A. Transportation Demand Management

Improvements to the highway system are required to accommodate growth in traffic. However, widening existing roads and building new roads cannot address all needs and may cause other adverse community impacts. Transportation demand management (TDM) provides a multi-faceted approach to address traffic increases on area highways. TDM creates alternatives for the most inefficient travel mode, the single occupant vehicle and range from encouraging transit use to promoting variable work hours and telecommuting.

Travel via private vehicle is convenient and people accept the financial cost of owning and operating a vehicle. Very strong incentives and/or disincentives are required to get significant numbers of people out of their single occupant vehicles and into an alternative mode of travel. For most people another mode would have to be more or equally: convenient, cost and/or time efficient.

Following are TDM measures that are possible to implement in the design and use of the Southwest Area.

1. Public Transportation

The City of Ithaca, Tompkins County, and Cornell University are all partners in the transit program identified as Tompkins Consolidated Area Transit (TCAT). There is no differentiation between vehicles servicing each partner; all mass transit

vehicles are now TCAT vehicles. TCAT provides collective public transit service to the City, rural and suburban areas of the County, Cornell University and Ithaca College.

Two bus routes currently service the Southwest Area of the City; they are Routes 4 and 55. TCAT will be introducing a new route structure in August, 1999 which will provide a route specifically aimed at servicing the retail area along NY Route 13/34 in the City of Ithaca seven days per week. Routes 4 and 55 will be replaced by routes 15 and 67 (shown in Figure T-13). Route 15, the "City Shopper Shuttle" will run between the Commons, Wegmans, Tops and K-Mart from 8 AM to 9 PM Monday thru Saturday and from 9:30 AM to 6 PM on Sunday. Route 67, the "Newfield Route" will run between Cornell University, the Commons, and Newfield from 5:35 AM to 6:30 PM Monday thru Friday.

It is anticipated that, with sufficient demand, either one of these three routes may be rearranged to include the future development or a new bus route may be added to service the area. Bus ridership rates are relatively high in Tompkins County and in the Town and City of Ithaca; Ithaca boasts more transit trips per capita than anywhere else in the State (except for New York City). The average number of vehicles per person in the Town and City of Ithaca, 0.40 and 0.52 vehicles per person respectively (according to 1990 Census Data), was considerably lower than the average for the County. Surrounding towns, such as Caroline, Danby, Lansing and Newfield were all equal to or in excess of 0.70 vehicles per person. This may be attributed to a higher reliance on mass transit and carpooling within the Town and City of Ithaca, which reduces the number of personal vehicles.

Transit Supportive Strategies

Providing a time, cost or convenience advantage to using transit is essential in encouraging people to use public transportation. Following are strategies, which support use of public transit:

<u>Park-and-ride lots</u>

Park-and-ride lots may enhance public transit use by:

- Extending transit's service area by providing a convenient transfer point;
- Allowing routes to be concentrated and thus offering more frequent service;
- Providing parking for car and van poolers and;
- Location in suburban areas where heavily used traffic arteries converge and traffic may be intercepted before heading toward major employment destinations.

<u>Fare Subsidies</u>

Employers may subsidize fares to encourage transit use, and use up to $60 per month in fares per employee as business tax deduction.

Information Services

Providing information on routes, schedules and fares and selling passes at employment locations makes using transit easier and more convenient. Generally done by a transit agency, transportation management association and/or employers.

Transit Oriented Development Design

Many activity centers do not easily accommodate transit vehicles on site, resulting in long walks to and from transit stops, often without safety and convenience of sidewalks and shelters. Relatively minor changes in design guidelines may significantly improve convenience and time of using transit.

Guaranteed Ride Home

The guarantee of a free or subsidized ride home for transit users assures employees who occasionally must work late or attend to a family emergency that they will not be stranded at work. Existing programs have found that very few rides are requested, resulting in low costs for this for this important strategy. Large employers, transit agencies or other public service agencies, may implement this program.

Land Use Management

Land use densities, designs and distribution have the most direct connection to the ability of an area to be serviced by transit. Densely developed urban areas are much easier to serve than are low-density suburban areas. Land use management policies, such as the concentration of jobs near existing or potential transit services, transit sensitive street and site design and parking policies which provide a disincentive to single occupant vehicle use, help to tie land use into the transportation system's demand capability.

2. Transportation Management Association

Transportation management associations (TMA) are organizations of developers, employers and the public working together to solve transportation problems on a cooperative basis. TMAs may give the private sector a voice in decision-making, develop a constituency for transportation improvements and serve as a forum for public/private discussions on the planning, implementation and funding of infrastructure improvements and demand management strategies.

TMAs may provide input to funding priorities, transit service improvements and routing, maintaining traffic during road construction, improving traffic operations and developing and implementing travel demand management strategies. Employers may share in ways in which they are trying to reduce the traffic they generate and possibly pool their resources to reduce costs. In other communities, TMAs have focused the public and private sectors on solving critical transportation problems. They have also successfully promoted public and private contributions to transportation improvements. Its strength is in its ability to share resources, information, and influence to develop and support common solutions.

Two possible shortcomings are that they are typically voluntary organizations with limited resources and its decisions are not binding on the members.

3. Transportation Development District

A Transportation Development District (TDD) may be established to provide funding for intersection and highway improvements that are required as a result of economic development and/or changes in land use. TDD's are similar to traditional special assessment districts, such as water and sewer districts, in that the property owners who benefit from the highway improvements are the ones who pay for them.

4. Ridesharing

Ridesharing, also known as carpooling and vanpooling, is the sharing of rides in a private vehicle. Carpooling is the most common alternative to driving alone in the United States and commuters provide the best market. Public agencies, employers and/or developers typically administer programs. Most carpools form from informal arrangements with relatives, roommates, friends or colleagues. Car-poolers view saving money (reduced fuel, parking and vehicle maintenance costs), time to relax and socializing as the most important benefits.

Carpooling is often better suited to the suburban employment market than transit, which either has not or cannot efficiently be served by public transit. Employment locations with a high proportion of professionals and no adjacent amenities and services, typically have lower carpooling success rates.

Support Strategies

The existence of incentives (eg. preferential parking), disincentives (eg. parking charges) or subsidies are the greatest motivation for car-pooling. Rideshare supporting strategies include:

- Guaranteed ride home (a back-up ride for emergencies or overtime);
- Work vehicles available to employees for business trips;
- Preferential parking;
- Reduced parking fees;
- Computerized programs matching potential poolers with others with similar commute patterns.
- Trip reduction ordinances, eg. developments required to incorporate enhanced ridesharing (or other travel demand strategies) into the design and use of the facilities;
- Encourage dining facilities within developments or business parks to reduce the need for lunchtime travel.

Carpooling often adds additional time to the trip to pick-up riders. Therefore, other supporting strategies that return the time incentive or provide other incentives are important.

5. Variable Work Hours and Telecommuting

Staggered Work Hours

Staggered work hours are staged start work times. The influence of this strategy is to spread out the peak traffic.

Flextime

Flextime allows employees to set their own arrival and departure times within established core work hours. It may encourage employees to avoid congested time periods, thereby spreading peak traffic. Where work hour differences are a barrier to ridesharing, it may help employees to coordinate arrivals and departures.

Flextime is most applicable to offices and administrative and information workers. It is less applicable to shift workers, assembly lines, or where continuous communication between workers is needed.

Compressed Work Weeks

Compressed workweeks allow employees to work more hours in fewer days than the traditional eight-hour workday (eg. four 10-hour days). This strategy may reduce the number of commuting trips made. Compressed workweeks are most applicable to office and administrative functions, especially government agencies.

Telecommuting

Telecommuting is becoming more popular with recent advancements in communications technology. With the use of personal computers, modems, fax machines, E-mail and telephone, the opportunity exists for employees to work part to full time at home. Like compressed workweeks, it reduces the number of home-to-work trips.

6. Walking

Distances between residences and activities are far and often not well served by pedestrian facilities, such as sidewalks and safe road crossings. Nevertheless, walking may serve as (1) a primary mode of travel for some people for some trips, (2) an important connection between modes, such as public transit or ridesharing, and (3) a method of circulating within an activity center or area. The provision of sidewalks and other pedestrian amenities is key to encouraging walking.

7. Bicycling

Although bicycle trips tend to be shorter than vehicular commute trips, the provision of facilities to accommodate bicycle travel contributes to alternate mode travel for commuters, as well as recreational users. Employers, retailers, multi-family housing facilities, entertainment facilities, transit agencies and community facilities (schools, health centers) may assist in this effort by encouraging employees and patrons to bicycle by providing on-site bike paths or bikeways, locker rooms with shower facilities, lockable bicycle storage facilities or other bicycle parking equipment.

B. Environmental Service Capacity (Livability) – Traffic Calming

In the traditional traffic engineering sense, capacity analyses are intended to estimate the maximum amount of traffic that may be accommodated by a roadway while maintaining prescribed operational qualities, or levels of service. The concept of Levels of Service as defined in the Federal Highway Administration's Highway Capacity Manual, represents " *a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and /or passengers."*[6]

While traffic flow measures in this context are solely from the drivers perspective, an equally important measure generally lacking in most Traffic Impact Studies involving residential areas, would also take into account, a resident viewpoint of traffic. The influence of traffic on the quality of life, or livability, for the residents within the vicinity of the project is considered more appropriately using this measure. As part of this report, the impacts from the future development of the Southwest Area were also considered in this context. Various traffic calming measures are identified for neighborhood areas to help mitigate the adverse affects of both existing and future traffic on the residential street segments affected by the project.

It should be noted that each person's concern for traffic and its impact on their quality of life is a function of numerous variables; traffic volume and speed, diversity of vehicle types (such as cars, trucks, and buses), temporal distribution of traffic, dwelling setback from the street, presence of children, and numerous resident demographic factors[7]. As such, no one single volume threshold at which residents normally become irritated may be generally applied. The type of roadway, and the perception the roadway exhibits to the residents greatly influences the threshold levels.

Residents' complaints about traffic impacts escalate whenever the actual conditions on the street differ from the residents' expectations as to what conditions on that particular street should be. Therefore, area roadways and neighborhoods were investigated in the context of their intended purpose based on the Tompkins County Highway Functional Classification map compiled by the Ithaca-Tompkins County Transportation Council (ITCTC). The neighborhood traffic impact study area is defined by Court Street on the north, Cayuga Street on the east, Route 13 on the west, and Spencer Street on the south. Traffic calming measures are tools to help mitigate the vehicular traffic in residential neighborhoods. However, overly stringent efforts to reduce traffic impacts on minor arterials (highway that are designed to carry more traffic than local streets) may result in adverse impacts to local streets.

Traffic Calming Mitigation

According to the Institute of Traffic Engineers, "*Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users.*"

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[6] U.S. Department of Transportation, Federal Highway Administration, 1985 Highway Capacity Manual, Washington, D.C.

[7] Washington State Department of Transportation, , *A Guidebook for Residential Traffic Management*, December, 1994

The overall goals and objectives of traffic calming mitigation are to:

1. Encourage greater use of multi-modal transportation (i.e. transit, bicycling, walking);
2. Maintain livability of neighborhoods and minimize congestion to reduce attractiveness of cut through routes;
3. Direct volume to routes more suitably designed to accommodate through traffic.

To achieve these goals traffic calming projects look at three kinds of possible solutions: education, enforcement, and engineering.

- **Education** alerts people to ways they may help ease traffic problems-for example, by reducing their speed or travelling by bus or bicycle instead of automobile.

- **Enforcement** enlists the help of the Police Bureau's Traffic Division to focus enforcement efforts on the project street and increase community awareness of speeding problems.

- **Engineering** tools include a variety of traffic calming devices that may reduce speed, decrease volumes, and/or improve safety. For example, speed humps and traffic circles may be used to slow traffic, and curb extensions may improve pedestrian safety.

While education and enforcement are important to attaining overall traffic calming goals, the focus of mitigation included in this report is directed toward engineering measures that when properly designed, more consistently ensure reduced speeds and cut-through traffic volumes. The existing road network configuration has concentrated traffic volumes on particular streets creating disparate impacts.

Traffic mitigation plans for future development:

- address existing areas of congestion which discourage traffic from using principal arterial routes,
- disperse traffic more uniformly over minor arterials,
- consider restricting through traffic on local streets if there is consensus on the neighborhood level to accept the resulting inconveniences.

The traffic calming devises identified as part of this report, are considered more effective in reducing vehicular volumes in comparison to other traffic calming measures.

As previously noted, no one single volume threshold at which residents normally become irritated may be generally applied, due to the many factors influencing resident perceptions of traffic, and its impact on specific individual resident situations. It is also generally understood that along with traffic volume, travel speeds most often influence resident perception of traffic, safety, and residential quality of life. The citywide speed limit of 30 MPH significantly influences the traffic volume range considered "liveable". The potential traffic calming applications pertinent to the neighborhood traffic impact study area are categorized according to roadway function, and percent change in volume attributable to the future Southwest Area development.

The existing average daily traffic volumes, and future traffic increases from the future development of the Southwest Area, along various study roadway segments are shown in Table VI below.

The results without traffic calming indicate that the principal arterials and minor arterials will service approximately 95% of the traffic increases generated by the future Southwest Area development. Upon implementation of traffic calming plans an even greater percentage of traffic will be diverted from residential areas to arterials depending on the extent of the traffic calming measures implemented. Travel on these roadways is consistent with the underlying functional purpose of these roadways, however, given the presence of residential land uses abutting many of the minor arterials, mitigation becomes necessary to help maintain the quality of life for the affected residents.

Inspection of Table VI shows that Albany Street and Elmira Road, both minor arterial roadways warrant the highest priority need for traffic calming action on minor arterials. Other minor arterials such as W. Clinton Street and W. Buffalo Street warrant less immediate action, based upon the projected traffic increases anticipated over twenty years as shown in Table VI.

Other local streets within the neighborhood traffic impact study area are projected to experience a 5% or less increase in average daily traffic.

Neighborhood Traffic Calming Plans

National experience suggests that traffic calming should be planned on an area-wide basis versus a spot or link basis, but not over such a wide area that it becomes difficult to achieve consensus on a plan. Spot or link measures tend to only divert traffic from one residential street to another adjacent street. More successful results are attained with sub-area traffic calming plans. The optimal scale for planning purposes is the individual neighborhood, thus neighborhood traffic calming plans are recommended to address the traffic volume increases exhibited in Table VI.

Based upon the projected traffic increases and potential impacts on livability resulting from the development of the Southwest Area, the following three areas are ranked in order of priority for developing and implementing neighborhood traffic calming plans:

- Elmira Road/Spencer Street/S. Plain Street/S. Albany Street/Cayuga Street Area
- Wood & South Streets
- West Buffalo Street & West Clinton Street

Ithaca’s commitment to traffic calming, currently in its initial stages, is one part of the City's commitment to the safety and livability of residential neighborhoods. Under the program, City staff will work with residents to identify traffic problems in their neighborhoods, find solutions that are acceptable and appropriate, and enforce implemented solutions. This report documents mitigation impacts following implementation of selected traffic calming measures. Actual results may vary based upon the type and extent of measures chosen in consultation with neighborhood residents.

Citizen involvement is an essential part of all traffic calming projects. The people who live and work in the project area must have the opportunity to become actively involved in the planning and decision-making process. Residents help identify specific neighborhood characteristics that should be taken into account when deciding what to do. Thus, the specific neighborhood traffic calming plan for each of the three recognized neighborhood areas should be developed by consensus of the affected residents, rather than prescribed in this report at this time.

TABLE VI
TRAFFIC VOLUME DATA

Street Segment	Located Between	Functional Classification	Directionality	Existing			Background		Site Generated		Future		
				Peak Hour	ADT	"K" Factor	Peak Hour	ADT	Peak Hour	% Change	ADT	ADT Delta	% Change
* Meadow St.	Wood St. & Elmira Rd.	Principal Arterial	Two-Way	1975	30175	0.07	2824	40343	279	10%	43329	2986	7%
* Meadow St.	W. Buffalo St. & W. Seneca St.	Principal Arterial	One-Way	1259	16800	0.07	1598	21324	356	22%	26074	4750	22%
* Meadow St.	W. State St. & W. Green St.	Principal Arterial	One-Way	1150	13017	0.09	1459	16515	370	25%	20703	4188	25%
Albany St.	W. Buffalo St. & W. Seneca St.	Minor Arterial	Two-Way	516	5160	0.10	655	6550	26	4%	6810	260	4%
Albany St.	W. Green & W. Clinton St.	Minor Arterial	Two-Way	566	5660	0.10	736	7360	135	18%	8710	1350	18%
Albany St.	Wood St. & Park St.	Minor Arterial	Two-Way	844	8863	0.10	1304	13040	165	13%	14690	1650	13%
Albany St.	Hyers St. & Wood St.	Minor Arterial	Two-Way	788	10055	0.08	1065	13312	174	16%	15488	2176	16%
Cayuga St.	W. Buffalo St. & W. Seneca St.	Minor Arterial	Two-Way	702	7020	0.10	891	8910	20	2%	9110	200	2%
Cayuga St.	N. Titus Ave & S. Titus Ave	Minor Arterial	Two-Way	438	4740	0.09	460	5111	0	0%	5111	0	0%
Elmira Rd.	Park & Plain Sts.	Minor Arterial	Two-Way	1011	11210	0.09	1554	17267	231	15%	19833	2566	15%
W. Buffalo St	N. Meadow St. & Corn St.	Minor Arterial	Two-Way	816	6477	0.13	1036	8223	43	4%	8565	341	4%
W. Buffalo St	Plain St. & Albany St.	Minor Arterial	Two-Way	607	8328	0.07	763	10468	43	6%	11058	590	6%
* W. Clinton St	N. Meadow St. & Corn St.	Minor Arterial	Two-Way	805	7114	0.11	1373	12482	150	11%	13845	1363	11%
* W. Clinton St	Fayette St. & Albany St.	Minor Arterial	Two-Way	577	8203	0.07	1084	15486	150	14%	17614	2128	14%
Spencer St.	Park St. & Cayuga St.	Collector	One-Way	428	4279	0.10	541	5410	66	12%	6070	660	12%
W. State St.	N. Meadow St. & Corn St.	Collector	Two-Way	495	5539	0.09	628	7027	15	2%	7195	168	2%
South St	S. Meadow St. & Fair St.	Local	Two-Way	355	3051	0.12	114	950	0	0%	950	0	0%
Wood St	S. Meadow St. & Fair St.	Local	Two-Way	227	2130	0.11	77	700	0	0%	700	0	0%

* Indicates streets without traffic calming.

The development of each specific neighborhood traffic calming plan should involve identifying education, enforcement, and engineering solutions that achieve the neighborhood goals and objectives and the necessary mitigation for the neighborhood as a whole. Formulation of the targeted mitigation should consist of the following steps:

- Identify neighborhood goals and objectives
- Identify mitigation criteria
- Develop alternative plans/solutions
- Identify recommended education and enforcement activities
- Identify recommended engineering solutions
- Implement recommended solutions with neighborhood endorsement

In addition to traffic volume, the ranking of needs and extent of the traffic calming plans should also be based upon other criteria including prevailing speeds, residential density along road segments, zoning, sidewalk conditions, elementary school crossings, presence of pedestrian generators within 1000 feet of the street, and street width.

The data indicate that under existing conditions, several roadways experience higher than expected volumes, in relation to the intended functional use of the roadway. For example, Albany Street is classified as a minor arterial street, and carries average daily traffic consistent with arterial roadways. However, the abutting land use in segments is largely residential, and thus the higher volumes more adversely affect residents' quality of life. Wood and South Streets, are local streets, intended for local service traffic. Yet, current traffic counts indicate that South Street carries additional through traffic, generally uncharacteristic of local streets, moreso than Wood Street.

Collaborative efforts among all stakeholders and all interested citizens are needed to find solutions that best serve the many uses of the neighborhood and the street system. To aid in furthering this goal, traffic calming measures that are potentially suitable for use in reducing volume foremost, and speed, are identified and categorized by roadway function, as shown in Table VII.

At a minimum, potential new devices should meet the following criteria:

- Devices must minimize conflicts between vehicles and bicycles.
- Devices must be well illuminated and visible.
- Appropriate markings and signs shall be used where applicable
- Devices must allow the traffic stream to maintain an acceptably consistent speed on minor arterial streets
- Pavement treatments must not pose a hazard to bicycles or pedestrians, or impede people with disabilities.
- Devices must ensure safety and visibility to pedestrians and other non-vehicular traffic.
- Devices cannot inappropriately restrict buses, emergency vehicles, and trucks from providing normal and necessary services to the neighborhoods.

TABLE VII
POTENTIAL RESIDENTIAL TRAFFIC CALMING MEASURES

	Minor Arterials	***Collectors***	***Local***
Potential Traffic Calming Measure	Albany/S.Plain/S.Cayuga Streets Area & W. Buffalo & W. Clinton Sts.	W. State Street	Wood, South Streets
Mid-Block Slow Points		✓	✓
Chicanes			✓
Pavement Narrowing			✓
One-way Entry/Exit Chokers			✓
One-way Streets	✓		✓
Parking Variants	✓	✓	✓
Raised Crosswalks		✓	✓
Speed Humps			✓
Speed Tables	✓	✓	✓
Modified Intersection Channelization	✓	✓	✓
Traffic Circles			✓
Related Streetscaping	✓	✓	✓
Entry Treatment	✓	✓	✓
22’ speed humps	✓	✓	✓
Textured Pavement	✓	✓	✓
Mid-Block Bulb-outs	✓	✓	✓
Curb Extensions at Intersections	✓	✓	✓

* Visual examples of these traffic calming measures are included in section T-A2 of the appendix to this report.

Elmira Road/S.Plain Street/S.Albany Street/Cayuga Street Area

This system of neighborhood streets is very different from local service streets in that they are part of the City's arterial street system. They are intended to serve as distributors of traffic between neighborhoods. In other words, they are the streets that are commonly called "through" streets. They serve as fire response routes, transit routes, and designated bike routes. On the other hand, like local service streets, they are also residential in nature. As residential streets, it is important that livability is maintained and enhanced to ensure the long-term viability of neighborhoods. The inherent conflict between the need to move traffic efficiently and the need to keep the neighborhood livable presents a unique challenge for the citizens and staff, that must balance the many different needs, interests, and uses of collector and minor arterial streets such as these.

Table VI indicates that segments of Albany Street currently experience average daily volumes ranging between 5,000-10,000 vehicles per day. Under the existing traffic circulation and control plan, normal traffic growth and potential full build-out design year traffic volumes are projected to approach 16,000 vehicles per day on the highest trafficked segment. Adjacent parallel roads, including S. Cayuga Street, Spencer Street, and S. Plain Street currently carry, and will continue to carry daily volumes at less than half the volume on Albany Street.

Plans to reduce the traffic on Albany Street have been undertaken by the City. The intent is to distribute existing and future volumes to South Meadow and West Clinton Streets. The following measures are currently planned:

1. **Reconfiguration of Spencer/Elmira/S. Albany /Park Street Intersection** – Under this plan, Park Street is being converted to one-way westbound. A timber and stone median treatment will be constructed on Spencer Street to better define the flow of traffic. And a gateway treatment will be constructed along Albany Street extending from the 600 block south along Elmira Road approximately halfway to its intersection with Plain Street.

2. **Development of a comprehensive neighborhood arterial traffic calming plan –** It is recommended that the highest priority be given to establishing a comprehensive neighborhood minor arterial traffic calming plan for this neighborhood sub-area. The purpose of the plan is to enhance livability for residents along the minor arterials by confronting traffic problems through the use of education, enforcement, and engineering tools. Traffic calming devices including, but not limited to those identified in Table VI should be further evaluated, and constructed where applicable. Devices applicable to this area include: one-way streets, parking variants, speed tables, modified intersection channelization, related streetscaping, entry treatment, 22’ speed humps, textured pavement, mid-block bulb-outs, and curb extensions at intersections.

3. **Potential S. Plain Street Bridge –** As a more long term measure, the potential construction of a new S. Plain Street bridge for motorists travel, north/south traffic may be more equitably distributed among the minor arterial streets.

Wood & South Streets

Wood and South Streets are considered local service streets that serve local circulation needs-auto, bicycle, and pedestrian-and provide access to local residences and businesses. Local service streets make up a large part of the City’s street system, and should not carry significant volumes of through-traffic.

Inspection of existing average daily volumes on these two streets indicates that South Street carries approximately 3,050 vehicles per day (vpd) versus 2,130 vpd on Wood Street. The higher traffic volumes on South Street reflect a larger non-local traffic component, whereas the lower Wood Street volumes are more representative of local traffic only. Speed humps situated on both Wood and South Streets have already been installed to help reduce the undesirable cut-thru volumes currently using the local streets.

The City has recently approved the following measures for immediate implementation: a diverter will be installed across the intersection of Wood Street and Fair Street from northwest to southeast permitting travel between South Meadow Street and Titus Towers only (i.e. all through traffic will be prohibited) and; a second diverter will be installed at the intersection of South Street from northeast to southwest permitting travel between South Meadow Street and the westernmost block of South Titus Ave. Again, all through traffic will be prohibited. These conditions have been considered part of the background and future conditions for analysis purposes in this report.

West Buffalo Street Area

The West Buffalo Street area, between S. Meadow Street and Albany Street, is another minor arterial city street targeted for higher priority traffic calming measures. While the projected traffic increase (4-6%) on West Buffalo Street from the future development of the Southwest Area is less than on other minor arterials roadways such as W. Clinton Street, other traffic calming mitigation criteria including the presence of elementary school crossings, multiple pedestrian generators, and the existing street width, all combine to further warrant a greater need for neighborhood traffic calming actions.

Traffic calming devices more applicable for achieving pedestrian safety in this area and for calming future traffic volumes include intersection curb extensions, curb radius modifications, enhanced crosswalk delineation, related streetscaping, and mid-block bulb-outs.

Resulting Volume Reductions due to Traffic Calming

Before and after studies of residential areas with traffic calming programs in place indicate that a volume reduction of approximately 11% is typical when traffic calming measures similar to those described above are employed [8]. A study in the Town of Penfield[9] (a suburb of Rochester, NY), yielded a 12% decrease in volumes through a residential neighborhood via traffic calming measures similar to those recommended in this report. Assuming that the traffic calming measures recommended yield an 11% decrease in volumes as expected, Table VIII shows net increase in volumes due to the future development. It can be expected that enforcement of implemented traffic calming measures by the City will yield an even greater decrease in volumes through the residential neighborhoods.

Table VIII also shows the annualized growth rate over 20 years. All streets listed in the table exhibit typical growth rates.

[8] County Surveyors Society, *Traffic Calming in Practice*, London, 1994

[9] Benway, Geoffrey A., *Huntington Meadows Speed Humps, Technical Memorandum*, Town of Penfeld, June, 1998

TABLE VIII
TRAFFIC VOLUME DATA WITH TRAFFIC CALMING

Street Segment	Located Between	Functional Classification	Directionality	Existing		Background		Site Generated		Future		Future w/Traffic Calming		Annualized Growth Rate
				Peak Hour	ADT	Peak Hour	ADT	Peak Hour	% Change	ADT	% Change	ADT	% Change	
* Meadow St.	Wood St. & Elmira Rd.	Principal Arterial	Two-Way	1975	30175	2824	40343	279	10%	43329	7%	43329	7%	1.8%
* Meadow St.	W. Buffalo & W. Seneca Sts.	Principal Arterial	One-Way	1259	16800	1598	21324	356	22%	26074	22%	26074	22%	2.2%
* Meadow St.	W. State St. & W. Green St.	Principal Arterial	One-Way	1150	13017	1459	16515	370	25%	20703	25%	20703	25%	2.3%
Albany St.	W. Buffalo & W. Seneca Sts.	Minor Arterial	Two-Way	516	5160	655	6550	26	4%	6810	4%	6090	-7%	0.8%
Albany St.	W. Green & W. Clinton St.	Minor Arterial	Two-Way	566	5660	736	7360	135	18%	8710	18%	7900	7%	1.7%
Albany St.	Wood St. & Park St.	Minor Arterial	Two-Way	844	8863	1304	13040	165	13%	14690	13%	13256	1.7%	2.0%
Albany St.	Hyers St. & Wood St.	Minor Arterial	Two-Way	788	10055	1065	13312	174	16%	15488	16%	14024	5.3%	1.7%
Cayuga St.	W. Buffalo & W. Seneca Sts.	Minor Arterial	Two-Way	702	7020	891	8910	20	2%	9110	2%	8130	-8.7%	0.7%
Cayuga St.	N. Titus & S. Titus Aves	Minor Arterial	Two-Way	438	4740	460	5111	0	0%	5111	0%	4549	-11%	-0.2%
Elmira Rd.	Park & Plain Sts.	Minor Arterial	Two-Way	1011	11210	1554	17267	231	15%	19833	15%	17934	3.9%	2.4%
W. Buffalo St	N. Meadow St. & Corn St.	Minor Arterial	Two-Way	816	6477	1036	8223	43	4%	8565	4%	7660	-7%	0.8%
W. Buffalo St	Plain St. & Albany St.	Minor Arterial	Two-Way	607	8328	763	10468	43	6%	11058	6%	9907	-5%	0.9%
* W. Clinton St	N. Meadow St. & Corn St.	Minor Arterial	Two-Way	805	7114	1373	12482	150	11%	13845	11%	13845	11%	3.4%
* W. Clinton St	Fayette St. & Albany St.	Minor Arterial	Two-Way	577	8203	1084	15486	150	14%	17614	14%	17614	14%	3.9%
Spencer St.	Park St. & Cayuga St.	Collector	One-Way	428	4279	541	5410	66	12%	6070	12%	5475	1.2%	1.2%
W. State St.	N. Meadow St. & Corn St.	Collector	Two-Way	495	5539	628	7027	15	2%	7195	2%	6422	-8.6%	0.7%
South St	S. Meadow St. & Fair St.	Local	Two-Way	355	3051	114	950	0	0%	950	0%	950	0%	-5.7%
Wood St	S. Meadow St. & Fair St.	Local	Two-Way	227	2130	77	700	0	0%	700	0%	700	0%	-5.4%

* Indicates streets without traffic calming

IX. CONCLUSIONS

This report has addressed the combined traffic impact that may be expected of the development of the Southwest Area. It has been shown that the existing transportation network may accommodate the projected traffic volumes, with the specific mitigating measures to the existing roadways as identified in this report.

Transportation demand management tools have been identified to minimize the number of vehicles driving through residential neighborhoods throughout the study area. Traffic Calming measures aimed at addressing the livability of various neighborhood streets have been outlined for use in minimizing volumes and adverse impacts associated with development of the Southwest Area.

Opportunity exists to balance land use, transportation, and open space interests in an environmentally sensitive manner. Analyses and recommendations contained in this report may aid in achieving that goal.