Route 96 Corridor Management Study

TECHNICAL REPORT #2

Prepared By:

Bergmann Associates
and
SRF Associates

in conjunction with
The Route 96 Technical Review Committee

TABLE OF CONTENTS

Route 96 Corridor Management Study
Technical Report #2

1.0 INTRODUCTION

1.1 Overview and Purpose

The purpose of the Route 96 Corridor Management Study is to help the Town of Ulysses, Town of Ithaca, City of Ithaca, Tompkins County, the Ithaca-Tompkins County Transportation Council (ITCTC), and the Tompkins Consolidated Area Transit (TCAT) define an appropriate approach to manage anticipated growth along the Route 96 corridor from the southern boundary of the Village of Trumansburg to the intersection of Route 96 and Route 13 at Fulton Street in the City of Ithaca. The Study is being guided by a Technical Review Committee consisting of representatives from each of the aforementioned communities and organizations.

The Study will serve as a guide to define a preferred development pattern for the corridor that is consistent with the goals and vision for each of the involved communities. It will recommend strategies to reduce anticipated traffic-related impacts caused by new development, as well as increased through traffic. The Town of Ulysses, Town of Ithaca and City of Ithaca are looking to update their comprehensive plans and have identified the need to analyze this corridor for housing and business opportunities as well as to mitigate associated increases in traffic.

Two development patterns are being compared. The first is a Nodal Development Scenario – a compact, mixed-use development strategy, and the second is a more conventional suburban style of development, referred to herein as the Trend Development Scenario. Both patterns will consider access management issues, improving transit services, incorporating transportation system improvements, and enhancing the overall aesthetic character of the corridor. The final product will recommend one style for future growth that protects livability within the Study area through sound land use and transportation management practices.

The Corridor Management Study is being developed as a series of four written Technical Reports, as summarized below:

- Technical Report #1 focuses on Existing Conditions within the Study area and lays the framework for later projections, analysis, and recommendations. Technical Report #1 provides a baseline of information relevant to the corridor from which to learn from, and build on.

- Technical Report #2 provides the transportation analysis portion of the study that is divided into three main components: traffic projections, traffic impact analysis, and opportunities and constraints analysis. Each of these sections helps to identify what opportunities, issues, and obstacles exist with regards to creating a more livable and desirable corridor.

- Technical Report #3 is the Recommendations document associated with the Study. Technical Report #3 will provide a range of recommendations which will cover topics relevant to the corridor including traffic, land use, quality of life, and others deemed important by local residents and Technical Review Committee members.

- Technical Report #4 will be an Implementation-based document that defines specific actions and activities desired to achieve and meet the recommendations and goals set forth in Technical Report #3.

1.2 The Study Area

State Route 96 in Tompkins County begins at the Seneca and Tompkins County lines in the northwest corner of the County and travels southeast through the Village of Trumansburg, Hamlet of Jacksonville, Town of Ulysses, Town of Ithaca, and culminates in the City of Ithaca at the confluence of State Route 13 at Meadow Street. The Route 96 Corridor Management Study examines the 10-mile stretch of road, including all lands within a mile the Corridor, from the southern municipal boundary of the Village of Trumansburg traveling southeast to the intersection with State Route 13.

The Corridor is rural in nature in the Town of Ulysses, reflecting its agricultural history. Traveling southeast into the Town of Ithaca, residential and commercial development increases, and upon entering the City of Ithaca dense housing lines the corridor as it descends.

The Study area is in the West Hill section of Tompkins County, one of the areas where increased housing development has occurred and where additional potential for development exists. Much of this area uses NYS Route 96 as the primary commuting route. The Route 96 corridor is also the location of most of the commercially-zoned property in the Town of Ulysses. Planned development in the corridor is seen as crucial to allowing economic development while mitigating traffic impacts of associated growth. It is a concern that increased development along the corridor will worsen congestion in the City of Ithaca and impact traffic flow and livability within the Study area.

1.3 The Planning Process

The Route 96 Corridor Management Study is a collaborative planning effort between Tompkins County, the City of Ithaca, the Town of Ithaca, the Town of Ulysses, the Ithaca-Tompkins County Transportation Council, and the Tompkins Consolidated Area Transit. Representatives from each of the organizations comprise the Corridor Management Study Technical Review Committee (TRC).

1.3.1. Work Completed To Date

The following tasks were completed to produce Technical Report #1. Additional information on each of the bulleted efforts may be found within Technical Report #1.

- Project Start-Up Meeting with Consultant Team
- Internal Committee Meetings
- Residential Community Survey
- Data Collection and Review
- Field Review and Analysis
- Windshield Survey
- Technical Review Committee Meeting
- Public Information Meeting
- Focus Group Sessions (2)
- Stakeholder Interviews (2)

The preparation of Technical Report #2 included the following tasks:

Identification of Measures of Effectiveness (Livability Benchmarks)

The consultant team, working and coordinating with the Technical Review Committee, developed a series of Measures of Effectiveness, or Livability Benchmarks, which were used to measure how two different development patterns (trend versus nodal) would impact various factors along the corridor, including traffic volumes, convenience, and accident rates.

Traffic Volume Modeling

ITCTC used TransCAD Transportation GIS Software for its modeling to help the consultant team determine future traffic volumes and conditions. The following bullets summarize the model used in association with this project.

- A classic 4-step model was used which consists of the following: trip generation (how many trips), trip distribution (the flow of trips), mode split (we only have 1 mode – drive alone), and traffic assignment (which roads).
- The trip purposes in the ITCTC model are home-to-work, work-to-home, home-to-other, other-to-home and other-to-other.
- The model uses trip rates based on a 1988 Household Travel Survey and socio-economic characteristics to estimate trip origins and destinations for 381 traffic analysis zones (TAZs). The estimated vehicle trips are then assigned to the highway network. External trips use 1997 Roadside Cordon Survey data.
- The model is for the afternoon (5-6 PM) peak hour ONLY. The model outputs are continually calibrated to existing traffic counts (2000-2008) for accuracy.
- The socio-economic characteristics (land use data) used for the model includes household size, auto ownership, and employment. The number of vehicles per household comes from 2000 Census Transportation Planning Package (CTPP) data – Part 2 [NOTE: the data used was for persons who drove alone to work ONLY in each TAZ]. The number of households per TAZ comes from 2006 Tompkins County Assessment data – with the 2000 CTPP vehicles per household ratios applied. The number of employees per TAZ comes from 2006 figures from Tompkins County Area Development.
- In 2004, the Tompkins County Planning Department (TCPD) published its Comprehensive Plan. For purposes of the County Comprehensive Plan, the TCPD projected the number of households and number of employees for each TAZ for the year 2030 for both Nodal and Trend scenarios. ITCTC uses the 2030 TCPD land use projections when doing future travel demand forecasting.
- For the Route 96 Corridor Management Study, SRF Associates provided ITCTC with the land use data (households-by-vehicles available and employment for the 26 TAZs in the Route 96 Corridor. ITCTC ran the future scenarios using the 2004 2030 Comprehensive Plan land use data – while substituting in the SRF land use data for the applicable 26 corridor TAZs for both the Trend and Nodal Scenarios. Additionally, SRF asked for model runs for 2 new scenarios: 1 scenario removed 20% of vehicle trips from Jacksonville area TAZs / and 25% from the Hospital area and the TAZ south of Trumansburg; the other scenario removed 25 and 33% respectively. The reason these scenarios were created was to predict the future mode shift to more non-drive alone trips (bus, walk, bike, car-pool) within the nodes.

Traffic Impacts Analysis

The consultant team, working with ITCTC, provided inputs and adjustments for calibrating the existing TransCad model to evaluate the existing traffic volumes within the Route 96 sub-area. Two long-term growth scenarios were evaluated using the model to generate future (2028) traffic volumes and various Measures of Effectiveness (MOEs) for comparison purposes. The consultant team provided ITCTC with adjustment factors to evaluate the effects of trend growth patterns as opposed to a nodal, or more compact mixed-use development. The future traffic volumes were then analyzed to determine specific impacts and to compare the impacts of the two future scenarios as they relate to the Measures of Effectiveness identified, working with the Technical Review Committee.

Opportunities and Constraints Analysis

The consultant team completed an Opportunities and Constraints Analysis for each development scenario. The benefits and issues associated with each scenario were identified for consideration by the TRC.

Preferred Development Scenario

Based on the findings of the Opportunities and Constraints Analysis, as well as the Measures of Effectiveness ranking exercise, a preferred development scenario for the corridor was determined and specific considerations to help further that development pattern were identified.

Technical Review Committee Meeting

The consultant team met with the Technical Review Committee on June 26th, 2008 to present the findings and recommendations from Technical Report #2. Copies of the report were distributed to the committee for their review and comment.

1.3.2. Next Steps

The next steps in the Route 96 Corridor Management Study planning process will include:

Public Meeting

A Public Meeting will be scheduled for October 2008. All findings that have been acquired to date will be presented and made available to the public. The format of the meeting will be discussed with the Technical Review Committee.

Technical Report #3

Technical Report #3 will include recommendations for traffic mitigation which will specifically include corridor management tools, techniques, and strategies for mitigating future impacts on travel and livability along the corridor. Recommendations will be from both a traffic and land use perspective and general design standards for the preferred development scenario will be prepared.

2.0 FUTURE DEVELOPMENT SCENARIOS

2.1 Introduction

The main objective of the Route 96 Corridor Management Study is to identify potential scenarios for growth along the corridor, to consider and analyze the potential impacts associated with each scenario, to define a preferred scenario, and to identify techniques and methods for achieving the preferred vision. Chapter 2.0 of Technical Report #2 discusses future population and traffic projections along the corridor and introduces two potential development scenarios. The population and traffic projections create a framework for considering, analyzing, and comparing both development scenarios.

The first scenario being considered is a Trend Development Scenario that would allow growth and development to continue along the corridor in a manner consistent with how it has occurred in the past. Future growth and development would likely occur on Route 96 occupying Route 96 frontage, with access directly from the corridor. The second development scenario, a Nodal Development Scenario, shows concentrated growth in three designated areas. A greatly reduced proportion of total growth is assumed to occur outside the designated nodes in this scenario.

The trend growth scenario assumes that the areas along Route 96 will grow in a pattern that is similar to the current development pattern. This results in spread out pockets of development generally having one type of use in a single location – in other words, housing is typically separated from retail and other commercial uses. Traffic traveling between developments in this scenario must use Route 96 to do so. In addition, the sprawling nature of these developments is not conducive to other modes or travel such as walking, bicycling, or transit use.

The nodal development, on the other hand, is a compact style of development that encourages a mixture of land uses and many internal multi-modal connections. According to a recent publication[1] "…compact development(s) help people live within walking or bicycling distance of some of the destination they need to get to every day – work, shops, schools, and parks, as well as transit stops." "…by building more homes as condominiums, townhouses, or detached houses on smaller lots, and by building offices, stores, and other destinations "up" rather than "out," communities can shorten distances between destinations. This makes neighborhood stores more economically viable, allows more frequent and convenient transit service, and helps shorten car trips."

2.2 Projected Population Growth

Projections for population growth in the corridor were developed for both the 10 and 20 year timeframes by the TRC. In order to arrive at population projections, two methods were used, with a mid- and high-growth rate applied to each outcome. Each of the methodologies/scenarios and findings are detailed further below.

Scenario #1 was based on 2000 Census population figures for the Route 96 travel shed, the boundaries of which were established in Cornell University's Transportation-focused Generic Environment Impact Statement (TGEIS). The travel shed, as shown in Figure 1, is the area surrounding the Route 96 corridor in

[1] *Growing Cooler The Evidence on Urban Development and Climate Change, Urban Land Institute, 2008.*

which most trips along the corridor are expected to originate. Scenario #2 was based on the County's 2006 population and applied the current County growth rate. Specific growth for the corridor was determined based on the findings of Cornell University's Transportation Generic Environmental Impact Statement (TGEIS), which allocated 8.4% of total growth in the County to the Route 96 travel shed.

FIGURE 1 – PROJECTED POPULATION GROWTH FOCUS AREA
Route 96 Travel Shed (also referred to as West Hill Travel Shed)

Both methods considered a mid-range 0.5% growth rate (or 10-year projection) and a higher-growth rate of 1% (20-year projection). To determine the fair estimate of population projected along the corridor, an average of the mid-range and high-range projections from both scenarios was determined as the baseline.

2.2.1. Projected Population – Scenario #1

The base population for the Route 96 travel shed, as derived by totaling the number of residents in all block groups within the TGEIS Rte 96 travel shed area, according to Census 2000 stats, is 6,017.

Considering a moderate growth rate of 0.5% over the next twenty years, the population within the travel shed would increase by 840 persons. Assuming a slightly more aggressive growth rate of 1% over the same twenty year period, the travel shed population would increase by 60 persons annually, resulting in a total population increase of 1,680 persons by 2028.

2.2.2. Projected Population – Scenario #2

The second population projection is based on a combination of both total County growth and travel shed assumptions identified within the Cornell University Transportation Generic Environmental Impact Statement (TGEIS). According to the American Community Survey, the base population for Tompkins County in 2006 was 100,407 persons. The projected annual growth rate for the County is 1%, resulting in 28,114 new residents in Tompkins County by 2028.

Using the methodology identified in the TGEIS, 8.4% of all new growth in the County is expected to occur within the Route 96 travel shed. Using this information, the projected 10-year (mid-range) population for the travel shed is 1,181 persons and the 20-year (high-range) population projection for the travel shed is 2,362 new residents.

2.2.3. Proposed Population Projection for Rte 96 Corridor

Using both population projections to inform the estimate for corridor population and developing nodal ratios, the results of each methodologies were averaged to arrive at final population projections for the corridor in both the mid-range (10-year estimates) and high-range (20-year estimates). This information is outlined in Table 1.

TABLE 1 – POPULATION PROJECTIONS, 2028
Route 96 Travel Shed

	Projected Population: Scenario #1	Projected Population: Scenario #2	Average Projected 2028 Population
Mid-Range	840	1,181	1,011
High-Range	1,680	2,362	2,021

2.2.4. Projected Housing Units

Using the average mid- and high-range population projections for the Route 96 travel shed it is possible to estimate the total number of new households and housing units that will develop within the travel shed over the next 20-years.

Based on 2000 Census data, the average household size in Tompkins County is 2.32 persons. Using this figure, an approximate new number of housing units can be identified:

TABLE 2 – PROJECTED NEW HOUSING UNITS, 2028
Route 96 Travel Shed

	Average Projected 2028 Population	Number of New Housing Units
Mid-Range	1,011	436
High-Range	2,021	871

2.3 Alternative Development Scenarios

2.3.1. Trend Development Scenario

Conventional development separates residential, commercial, and industrial uses. This design standard, seen in Tompkins County and throughout the United States, furthers our dependence on personal vehicles and creates unfriendly and unwelcoming environments for walking and bicycling, and as a result, increases traffic.

Conventional site development often occurs along roadway frontage, such as the 96 corridor, resulting in a loss of viewsheds and increasing safety issues associated with a greater number of curb cuts and access points. Trend development also tends to have a "sprawling" characteristic that results in the loss of important natural resources, agricultural lands, and rural qualities. This is of particular concern within the Study area, as the Towns of Ithaca and Ulysses are defined by their rural qualities and character and relationship to Cayuga Lake.

Under the Trend Scenario, the projected housing units identified in Section 2.2 would likely be developed haphazardly along the corridor, as single family homes on individual parcels or as part of larger-scale suburban style development. This will be the anticipated result if no new standards or guidelines are put into place to direct development.

2.3.2. Nodal Development Scenario

Nodal, or compact development, includes a variety of uses and associated amenities commonly found in village and Hamlets. Nodes of development would ideally offer a variety of housing types, mix of non-residential land uses, a pedestrian-friendly design, and a public transportation option within a neighborhood scale. The intention of nodal development is to create a walkable, affordable, accessible, and distinctive community. Maintaining rural character outside of the nodes - protecting natural resources, preserving rural and agricultural lands, and minimizing environmental impacts associated with new development - are all positive outcomes associated with Nodal Development Scenarios. Nodal development in small, rural areas is particularly appropriate when it revitalizes or expands upon existing hamlet, village, or employment centers.

When considering the implications of new housing growth within the Route 96 travel shed, a Nodal Development Scenario was identified as a potential alternative to the Trend Development Scenario. In order to get a realistic picture of how this development might occur, 75% of all projected new housing units were designated for one of three nodes on the Route 96 corridor – the Village of Trumansburg, Hamlet of Jacksonville, and in the immediate vicinity of Cayuga Medical Center. The City of Ithaca was not included as a node for the purposes of this Study, but is also a potential location for future development. The development potentials that exist within the City should be considered as part of other planning initiatives. Although the Village of Trumansburg is outside the northern boundary of the Study area, and the Village is not considered to be a part of this Study, it is an existing, developed node along the corridor and further increases to the density of the Village node would be expected.

POPULATION CONCENTRATION

In order for a mixed use node to successfully balance residential and supporting uses, such as commercial establishments, it needs to have an adequate population concentration to draw from to support those uses. In Tompkins County, successful mixed-use Village Centers have developed in locations with population concentrations of just over 1,500 people. The Village of Trumansburg, for example, has a population of 1,581 people and the Village of Dryden has a population of approximately 1,832 people.

Although neither the Cayuga Medical Center node nor the Jacksonville Hamlet node will likely reach a population density of 1,500 people by 2028, as exemplified in the established County nodes, they can still begin to develop during the 20-year study period, incorporating some retail or other ancillary, support uses. This is particularly true at the Cayuga Medical Center node where employees could likely help support new retail and restaurant offerings, and spin-off office uses may begin to emerge.

PROPOSED NODES

The nodes are defined, for the purpose of this Study, as the existing Village boundaries of Trumansburg, a 1/4-mile radius from the center of the Hamlet of Jacksonville (intersection of Route 96 and Jacksonville Road) and a 1/4-mile radius from the entrance of the Cayuga Medical Center along Route 96.

A ¼ mile radius is the typical standard for creating a nodal development that is intended to promote walkability. The average person is willing to walk about 5 minutes, or ¼ mile, to get to a specific destination, such as a bus stop, park, or retail establishment. Development focused within the defined nodal limits would be within a standard walking-distance. The boundaries of the node are intended to provide a baseline for where future redevelopment could occur. It is recognized that development consistent with the goals of the Nodal Development Scenario may occur outside the defined areas shown in Figures 2, 3 and 4 due to existing property lines, specific goals and objectives of individual developers, environmental constraints, and zoning regulations.

Table 3 shows the number of housing units, based on total travel shed projections, which will occur in the three designated nodes, assuming 75% of all new projected housing units for the travel shed occur within the nodal areas.

TABLE 3 – PROJECTED NEW HOUSING UNITS, 2028
Total, All Route 96 Travel Shed Nodes

	Number of New Households, Travel Shed	Number of New Households, Nodes (75%)
Mid-Range	436	327
High-Range	871	653

Based on current development trends, existing and likely infrastructure locations, and potential for growth, the ratios of growth shown in Table 4 were assigned for each of the three nodes along the corridor.

TABLE 4 – GROWTH RATIOS
Route 96 Nodes

Nodal Location	Growth Ratio
Cayuga Medical Center	50%
Village of Trumansburg	30%
Hamlet of Jacksonville	20%

Cayuga Medical Center

Based on the allocation of 50% of all new residential growth designated for the travel shed occurring at the Cayuga Medical Center node, a total of 164 housing units are anticipated in association with the mid-range projection, and a total of 319 new housing units are anticipated in association with the high-range projection. When considering infrastructure already in place and residential and employment potentials, it was determined that a reasonable housing to land ratio for the Cayuga Medical Center node is an average of 5 units per-acre. Based on the projected population growth and target development density, approximately 32.8 acres of land would be needed to support the mid-range housing units and 63.8 acres of land would be need to support the high-range housing projections. Required acreages for retail, office, and other commercial or ancillary uses have not been identified.

FIGURE 2 – NODAL BOUNDARY, ¼ MILE RADIUS
Cayuga Medical Center

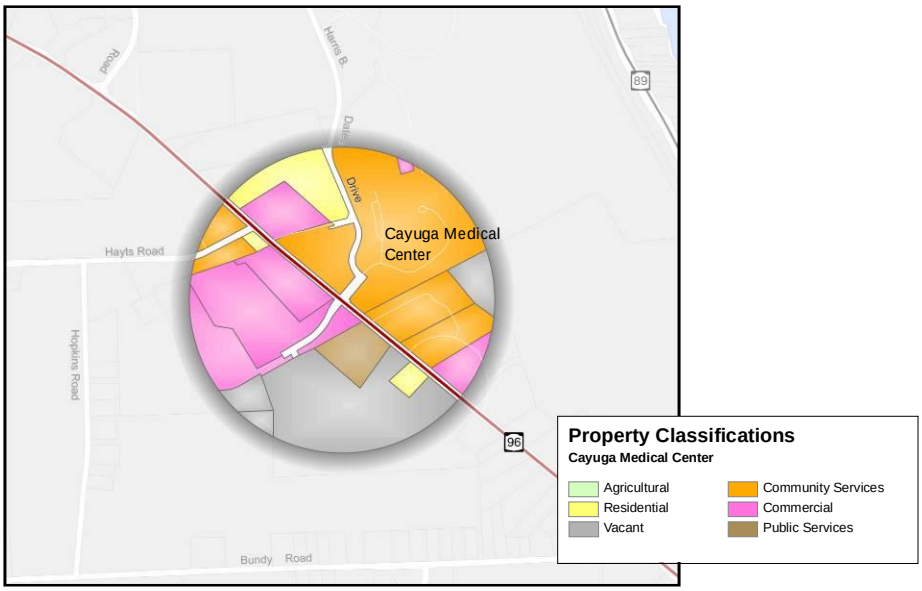


Figure 2 identifies the nodal boundaries based on a ¼ mile radius from the center of the node, which is considered to be the intersection of Route 96 and Harris B. Dates Drive. This node comprises approximately 125 acres of land. The vacant land within the node, as well as the vacant lands which are partially within the node but extend outside of the primary ring could

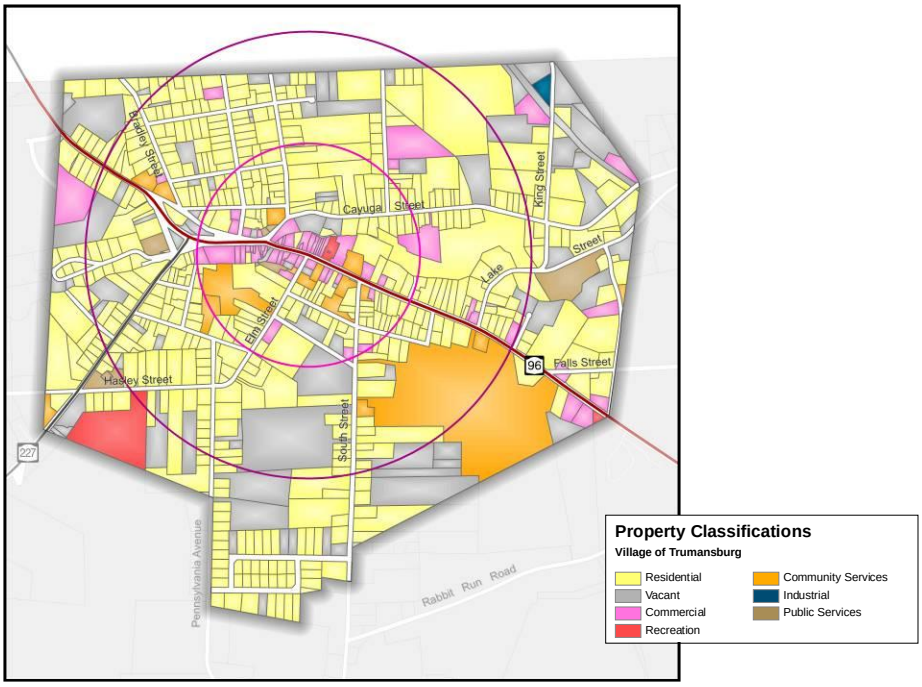
accommodate the high-projection residential build-out identified for this node - 319 housing units on 63 acres of land.

There is currently a development proposal before the Town of Ithaca Planning Board in which 106 cluster townhouse units are proposed just south and east of the Medical Center and behind PRI/Museum of the Earth. If the development is approved, 106 dwelling units could conceivably be built and occupied within the first five years of the forecast period of the study. This development is proposed to create a new intersection on Route 96 directly across from the Fire Station. Pedestrian and bicycle connections to other parts of the node would also likely be incorporated into this development.

Village of Trumansburg

The identified boundaries of the Village of Trumansburg node are shown in Figure 3. The inner pink ring shows a ¼ mile radius from the center of the Village, and the outer ring shows a ½ mile radius from the Village center. All lands within the Village boundaries have been included within the nodal boundaries even though it is greater than a ¼ mile ring, due to the fact the Village node is an established, mixed-use population center.

FIGURE 3 – NODAL BOUNDARY
Village of Trumansburg



Based on the allocation of 30% of all new residential growth designated for the travel shed occurring in the Village of Trumansburg node, a total of 98 housing units are anticipated in association with the mid-range projection, with a total of 191 new housing units anticipated in association with the high-range projection.

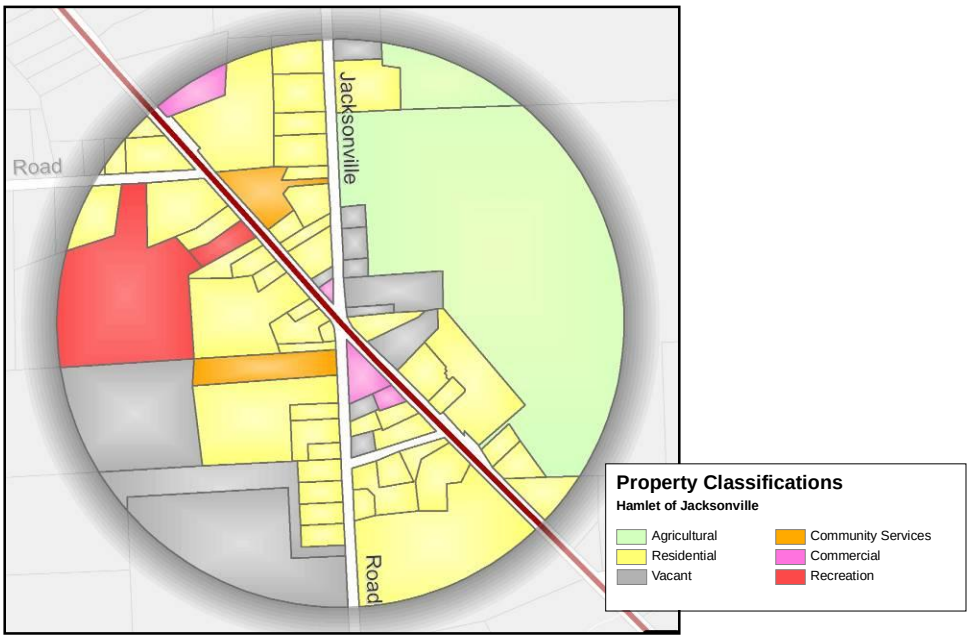
When considering infrastructure already in place, existing goods and services, and future employment potentials to maintain the node as a place where people can live, work, and recreate, it was determined that a reasonable housing to land ratio for the Village of Trumansburg was 5 units per-acre. Based on the projected population growth and target development density, approximately 19.6 acres of land would be needed in the Village to support the mid-range housing units and 38.2 acres of land would be need to support the high-range population and housing projections.

Within the ¼-mile ring, 13.9 acres of land are currently vacant within the Village and 92.8 acres are vacant within the ½-mile ring. The required acreage need to support the high-range build out for the Village could be supported within the ½-mile radius.

Hamlet of Jacksonville

The identified boundaries of the Hamlet of Jacksonville node are shown in Figure 4. The nodal center is at the intersection of Route 96 and Jacksonville Road around which the ¼ mile nodal boundary was drawn.

FIGURE 4– NODAL BOUNDARY, ¼ MILE RADIUS
Hamlet of Jacksonville



The Hamlet of Jacksonville node is allocated 20% of all new residential growth in the travel shed in the Nodal Development Scenario. This results in 65 new housing units (mid-range projection) and 128 new units (high-range projection) in the Hamlet. Based on the projected population growth and target development density, approximately 32.5 acres of land would be needed to support the mid-range housing units and 64 acres of land would be need to support the high-range population and housing projections.

Within the existing nodal boundaries, approximately 53.1 acres of land are classified as vacant. The available vacant land could support the mid-range build-out of 65 new housing units on 32.5

acres. However, available vacant land could not support the high-range build-out of 128 housing units on 64 acres. However, there is the potential to redevelop other parcels and increasing their density to allow more housing units on existing sites than already exists. This is true for each node within the Study area, not just Jacksonville.

When considering infrastructure already in place, existing goods and services, and future employment potentials to maintain the node a place where people can live, work, and recreate, it was determined that a reasonable housing to land ratio for the Hamlet of Jacksonville was a minimum of 2 units per-acre. The density in this node is lower due to the fact that only water service is currently available. Should sewer service become available in this area in the future, the density of this node may be increased, and less land area would be required to achieve the projected number of housing units.

Summary of Nodal Development Growth

Table 5 summarizes the distribution of housing units and Table 6 summarizes the land area requirements for the travel shed and identified nodes.

TABLE 5 – DISTRIBUTION OF HOUSING UNITS
Route 96 Travel Shed and All Nodes

Location	Mid-Range Projections	High-Range Projections
Total Travel Shed	436	871
Travel Shed - Nodes (75%)	327	653
Cayuga Medical Center*	164	327
Village of Trumansburg	98	196
Hamlet of Jacksonville	65	131

** If proposed development (106 units) is approved, it would account for 65% of the total mid-range projection for housing units in the Cayuga Medical Center node.*

TABLE 6 – LAND AREA REQUIRED FOR HOUSING UNITS, in Acres
Route 96 Travel Shed and All Nodes

Location	Mid-Range Projections	High-Range Projections
Total Travel Shed	TBD	TBD
Travel Shed - Nodes (75%)	84.9	170.1
Cayuga Medical Center	32.8	65.4
Village of Trumansburg	19.6	39.2
Hamlet of Jacksonville	32.5	65.5

In developing the projections for each of the nodes it should be noted that any existing commercial and industrial growth planned for the Town of Ulysses, outside the designated nodal areas was not considered. In-commuting from areas outside of the travel shed as well as anticipated moderate growth of the Cayuga Medical Center were also not considered as reliable

data related to these two items was not readily available. However, it is estimated from available NYSDOT data that approximately 30% of the traffic destined to the city on Route 96 originates from areas north of the county line. This will remain the same under both scenarios.

3.0 TRAFFIC IMPACT ANALYSIS

3.1 Introduction

Existing transportation data collected and documented in Technical Report #1 were used in conjunction with the Ithaca Tompkins County Transportation Council's (ITCTC) TransCad model provide input values and adjustments for calibrating the existing travel demand model to evaluate the existing traffic volumes within the Route 96 sub-area. Two long-term growth scenarios were evaluated using the model to generate future (2028) traffic volumes and various measures of effectiveness (MOEs) for comparison purposes. The following sections document the methodology for projecting future traffic volumes, the analysis of the future traffic volumes and transportation conditions, and the resulting impacts along the corridor.

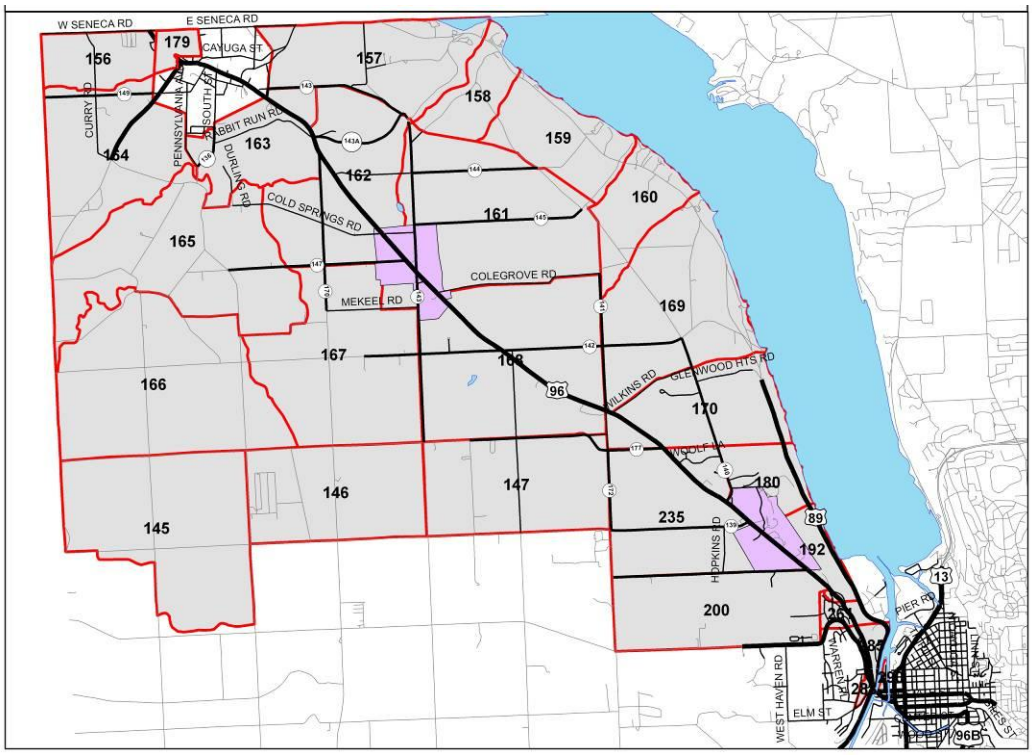
3.2 Trip Demand Estimates

3.2.1. Traffic Volume Modeling and Traffic Impact Analysis

The existing Ithaca-Tompkins County Transportation Council (ITCTC) regional travel demand model uses population and employment data to generate and distribute trips along the model's road network. The trip generation variables used in the model are households in four auto-ownership groups and three size categories along with four categories of employment for non central business districts (CBD). The trip distribution model uses a gravity model to estimate origin/destination tables. The network included all state roads and county roads and other roadways of major regional significance. The model was developed for the PM peak period only. The regional model zone system contains 364 internal zones. A review of the regional model revealed that it was better to run the entire regional model to forecast traffic volumes of the Route 96 travel shed area instead of creating a sub area model.

The consultant team, working and coordinating with Ithaca Tompkins County Transportation Council (ITCTC), provided inputs and adjustments for calibrating the existing TransCad model for the Traffic Analysis Zone's (TAZ's) included on the Route 96 Travel Shed area. The Travel Shed on Route 96 includes 25 TAZ's. In order to account for trips from the existing node at the Village of Trumansburg, an additional TAZ to the north of the Study area was included (TAZ 179) in this Study. Figure 5 displays a TAZ map on the Route 96 Travel Shed area.

FIGURE 5 – TRAVEL DEMAND MODEL HIGHWAY NETWORK AND TAZS
Route 96 Study Area



Pertinent employment data from the existing ITCTC regional model were adjusted to calibrate the model more accurately based on existing traffic count data collected by SRF & Associates in 2008. Two long-term growth scenarios were evaluated using the revised regional model. Future (2028) traffic volumes were projected for both growth scenarios. Household and employment projections obtained from the Tompkins County Planning Department for the year 2028 were used to distribute traffic between the Study area zones. The estimated increase in households and employment is approximately 871 households and 637 employees within the Route 96 travel shed for the future 2028 scenario.

Cayuga Medical Center is the major employer in the Study corridor. Information provided by the Tompkins County Planning Department from the stakeholder meeting held on April 21, 2008 with Cayuga Medical Center projected an employment growth of approximately 200 employees.

The 2028 future ITCTC regional Transcad model was used to estimate the households and employee data for the Trend Scenario. To compare both scenarios (trend vs. nodal), the difference between the total future and the total existing household and employment data was assumed to be the same. In order to balance the projection for 871 households and 637 employees, a multiplier was used to adjust from the trend scenario numbers within the existing model. The multiplier is based on difference between the total number of households added in the 2028 future regional model within the 26 study area TAZ's and the number of households projected for this Study.

The household projections (high-range) for the year 2028 under the Nodal Scenario are broken down to four categories

- 37.5% (327 households) of the household increase projected at the hospital node was distributed in the 180, 192 and 235 zones based on the land use and vacant land available.
- 15% (131 households) of the household increase projected at the Hamlet of Jacksonville node were distributed in the 161, 162, 167 and 168 zones based on the land use and vacant land available.
- 22.5% (196 households) of the household projections were added to Village of Trumansburg node. The Village of Trumansburg is not included in the study area. The Village is divided into 8 TAZ's. However, in order to adjust for trip's originating from the Village (north of the study area), TAZ 179 (one of the Village zones) was selected to apply all of the household and employment data. TAZ 179 only reflects that the trips are originating from north of the study area.
- The remaining 25% (217 households) of the projected population increase was distributed to the remaining TAZ's similar to the trend based method using a multiplier.

Table 7 below compares the household and employment data used for each TAZ within the Route 96 Travel Shed for the year 2028.

TABLE 7 – HOUSEHOLD AND EMPLOYMENT DATA
TAZs, Route 96 Study Area

TAZ	Household			Employment		
	Existing	Trend	Nodal	Existing	Trend	Nodal
145	45	62	52	10	12	11
146	47	59	55	0	0	0
147	124	139	145	12	13	13
156	95	117	111	4	4	4
157	44	56	51	74	84	80
158	17	20	20	16	17	17
159	83	94	97	4	4	4
160	26	32	30	0	0	0
161	110	134	164	18	20	61
162	101	119	140	27	29	37
163	37	52	43	59	71	69
164	116	164	135	40	48	43
165	98	120	114	4	4	4
166	49	70	57	10	12	11
167	85	103	94	15	17	16
168	177	210	206	46	50	50

169	148	170	173	71	76	77
170	118	134	138	231	247	250
180	69	128	118	1154	1486	1382
192	168	216	282	294	303	319
200	89	129	104	40	58	43
235	190	258	354	0	0	135
261	89	125	104	209	264	216
285	79	122	92	180	250	246
288	0	0	0	0	0	0
179	132	374	328	46	130	114
TOTAL	2336	3207	3207	2564	3201	3201

Table 8 shows the household and employment increase for the two nodes (Hospital and Jacksonville) over the next 20 years.

TABLE 8 – 2028 NODAL HOUSEHOLD AND EMPLOYMENT PROJECTED INCREASES
Cayuga Medical Center and Jacksonville Nodes

	TAZ	Household		Employment	
		Trend	Nodal	Trend	Nodal
Hamlet of Jacksonville	161	24	54	2	43
	162	18	39	2	10
	167	18	9	2	1
	168	33	29	4	4
	TOTAL	93	131	10	58
Cayuga Medical Center	180	59	49	332	228
	192	48	114	9	25
	235	68	164	0	135
	TOTAL	175	327	341	388

Traffic Volume Adjustments for Future Scenarios

The consultant team provided ITCTC with adjustment factors to evaluate the effects of traditional growth patterns as opposed to a nodal, or more compact mixed-use development. Using information derived from the Community Transportation Survey, and methodologies provided by the Institute of Transportation Engineers and the Transportation Research Board, trip reduction factors were derived to account for the positive effects of compact development under the Nodal Development Scenario. Vehicular trips can be expected to decrease (when compared to the Trend Development Scenario) by the following percentages:

- 5% to 10% as a result of increased transit usage
- 2% to 20% as a result of multi-use vehicular trips

- 2% to 5% as a result of increased bicycle trips
- 5% to 10% as a result of increased pedestrian trips

Taking all of these factors into consideration, overall trip reduction factors were developed for the two new nodes as well as Trumansburg. At the Cayuga Medical Center and at the Trumansburg node (TAZ 179) there were overall reductions in trips of 33% and at the Jacksonville node an overall trip reduction of 25% was used in the travel demand model.

Traffic volumes were then projected 20 years (2028) into the future for each growth scenario. Ten year traffic volumes were derived from the 20 year traffic volumes as the travel demand model does not currently provide interim projections. In addition, AM peak hour volumes were estimated using the same growth projections as the PM traffic volumes.

3.3 Comparison of Traffic Impacts for the Trend and Nodal Growth Scenarios

Various measures of effectiveness (MOEs) were used to compare the impacts resulting from the trend and nodal growth scenarios. The MOEs and their results are discussed in detail below.

3.3.1. Volume to Capacity Ratio (v/c ratio)

The V/C ratio provides an approximate indicator of the overall sufficiency of the travel roadway segment. Table 9 below expresses the operational status of the travel roadway segment for planning purposes using descriptive terms “over”, “at”, “near”, or “under capacity.

TABLE 9 – TRAVEL CHARACTERISTICS – V/C RATIO

Critical v/c Ratio	Relationship to Probable Capacity
$v/c \leq 0.85$	Under Capacity
$0.85 \leq v/c \leq 0.95$	Near Capacity
$0.95 \leq v/c \leq 1.00$	At Capacity
$v/c \geq 1.00$	Over Capacity

Figures 6, 7, and 8 compare “v/c ratio” for 2008 Existing, 2028 Trend, and 2028 Nodal base scenarios.

FIGURE 6 – 2008 EXISTING CONDITIONS – PM PEAK VOLUME (V/C RATIO)

Route 96 Study Area

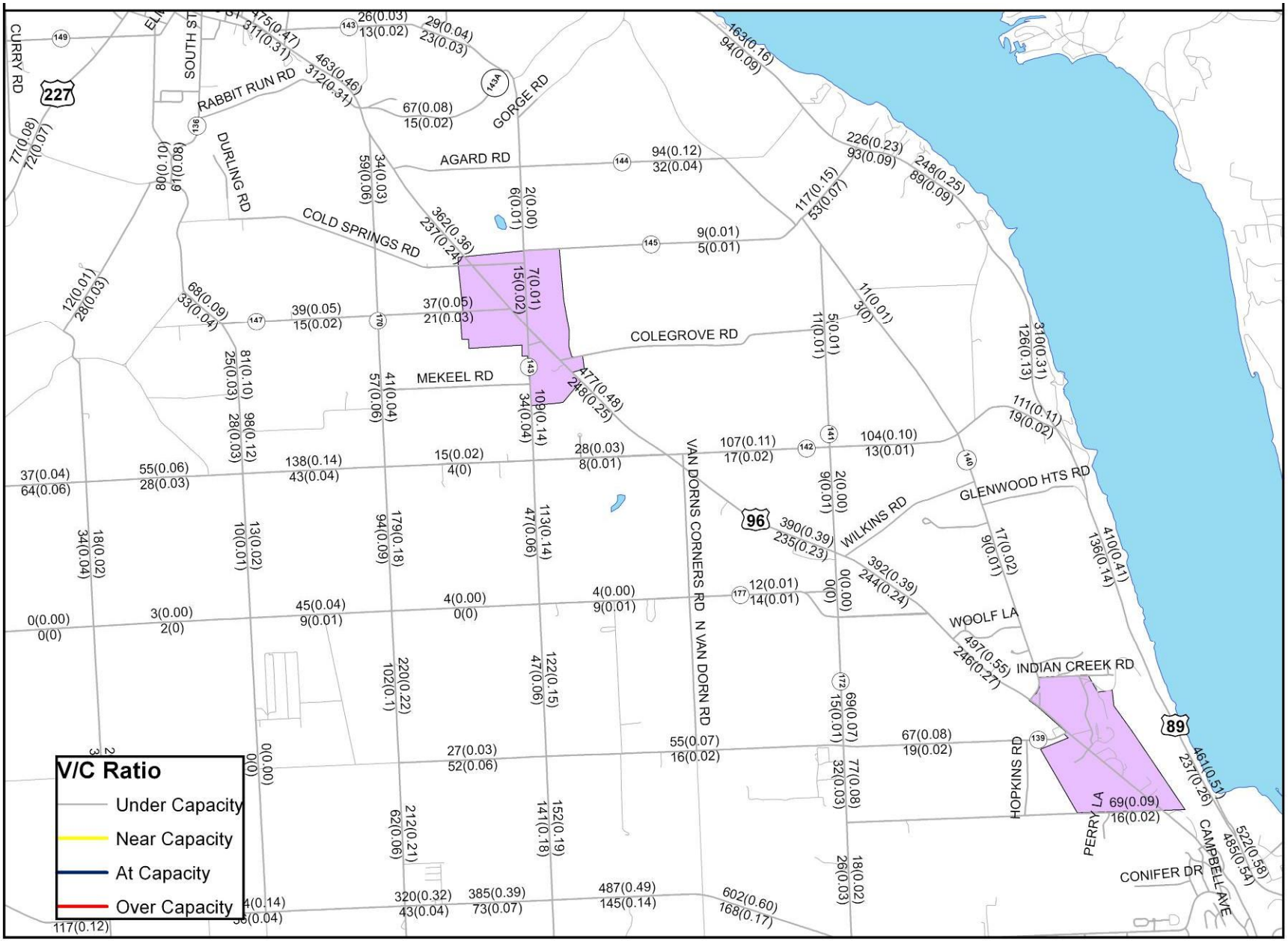


FIGURE 7 – 2028 TREND BASE CONDITIONS – PM PEAK VOLUME (V/C RATIO)
Route 96 Study Area

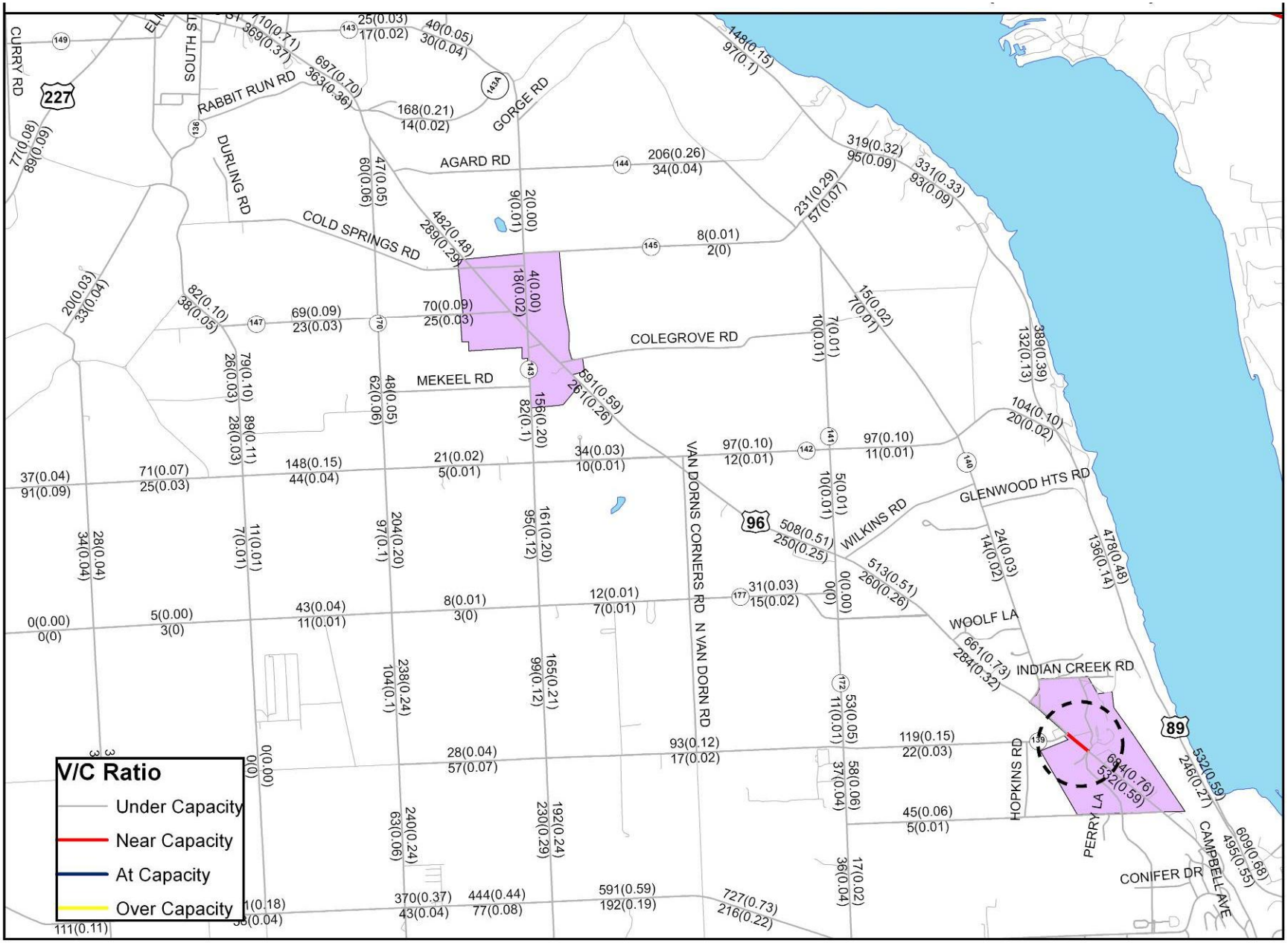
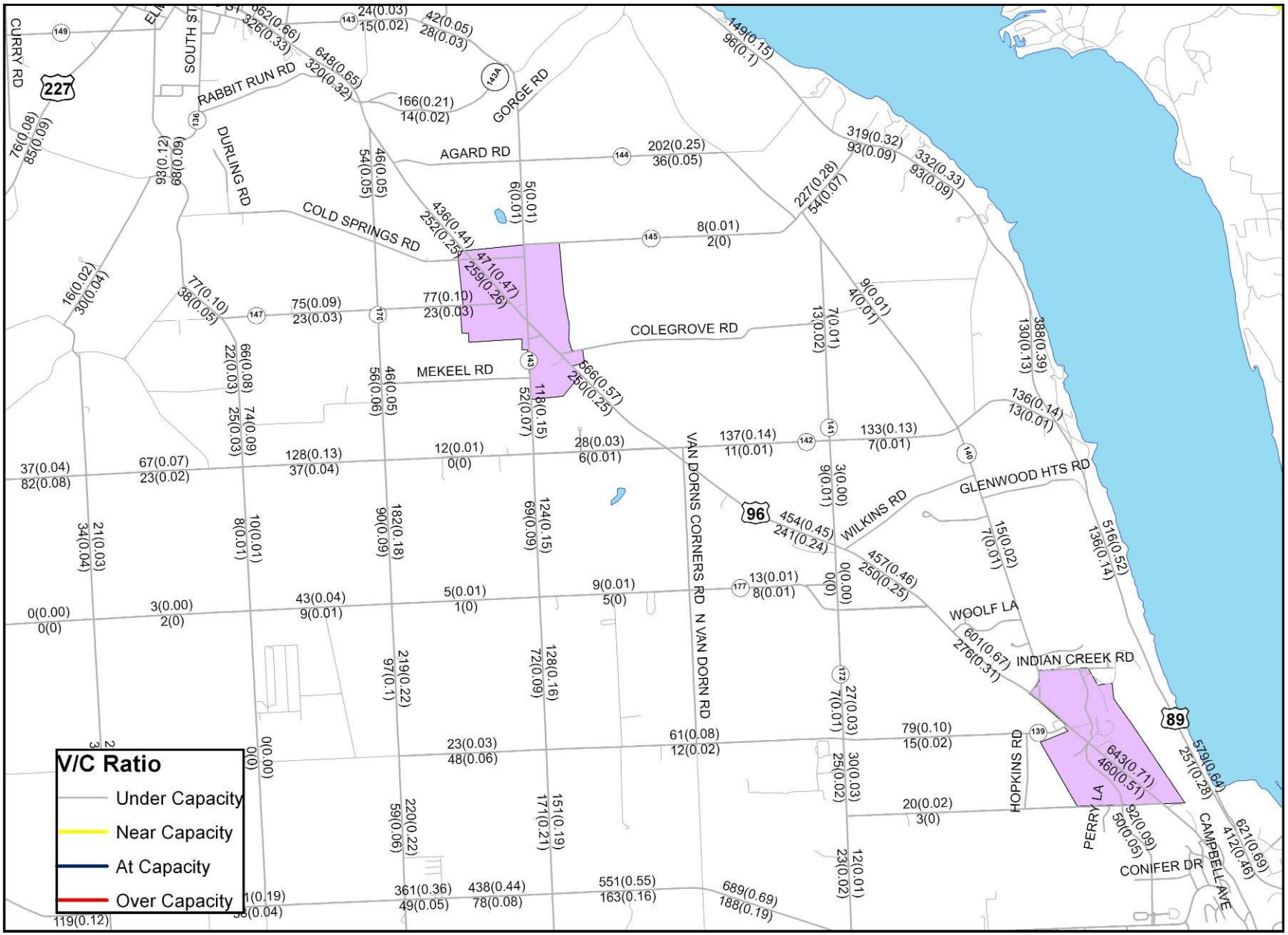


FIGURE 8 – 2028 NODAL BASE CONDITIONS – PM PEAK VOLUME (V/C RATIO)
Route 96 Study Area



As shown in the figures above, all links on the Route 96 Study corridor are "under capacity" during the PM peak hour with the exception of a link near the Cayuga Medical Center. This link is shown inside a circle under the trend conditions in Figure 7 and indicates that this link operates at "near capacity" conditions under the 2028 Trend Growth Scenario. It is noted that this link operates "under capacity" in the nodal scenario.

3.3.2. Vehicle Miles Traveled (VMT)

PM peak hour VMT is the volume of vehicle travel on the Study corridor (Route 96) multiplied by the total mileage of the segments. PM peak hour VMT was converted to yearly VMT on the Route 96 Study corridors. Under the nodal scenario, due to development occurring primarily at the two nodes (Hospital and Jacksonville) on the Route 96 corridor, the total miles of travel along Route 96 are expected to decrease (compared to the trend growth scenario) as shown in Table 10.

TABLE 10 – TRAVEL CHARACTERISTICS - VMT
Route 96 Study Area

	Total VMT * (miles/year) (in millions)
2008 Current Conditions	28.0
2028 Trend Development	34.8
2028 Nodal Development	32.0
Decrease between Trend and Nodal – Difference in VMT (% Decrease)	2.8 (8.0%)

** Transcad model is PM Peak only - Total VMT assumes PM Peak is 10% of AADT x 365 days per year*

The number of vehicle trips in the Route 96 travel shed area under the nodal scenario in 2028 (32.0 million miles/year) is less than that under the trend scenario (34.8 million miles/year). This equates to approximately 2.8 million miles (8.0%) fewer VMT between the trend and nodal growth scenarios each year.

3.3.3. Vehicle Hours of Delay (VHD)

Vehicle hours of delay is a measure of the amount of time it takes to travel a segment during peak times compared to the time it takes to travel the same segment at the free flow speed. This measurement provides a general indication of traffic congestion.

Table 11 shows, the total delay that Route 96 will experience in the Study corridor between the southern boundary of the Village of Trumansburg to the intersection of Route 96 and Route 13 in the City of Ithaca under 2008 Existing, 2028 trend and 2028 nodal growth conditions during the PM peak hour.

TABLE 11 – TRAVEL CHARACTERISTICS - VHD
Route 96 Study Area

	Link Delay (Minutes)
2008 Current Conditions	35.02
2028 Trend-Based Development	39.02
2028 Nodal- Based Development	36.75
Decrease between Trend VS Nodal - Difference (% Decrease)	2.27 (6%)

The total delay on the Route 96 travel shed area under 2028 nodal growth scenario is 2.27 hours less than the trend growth scenario during the PM peak hour. Figures 10 and 11 show the delay in hours along the corridor for each growth scenario during the PM peak hour.

FIGURE 9 – 2008 EXISTING CONDITIONS (DELAY IN MINUTES)
Route 96 Study Area

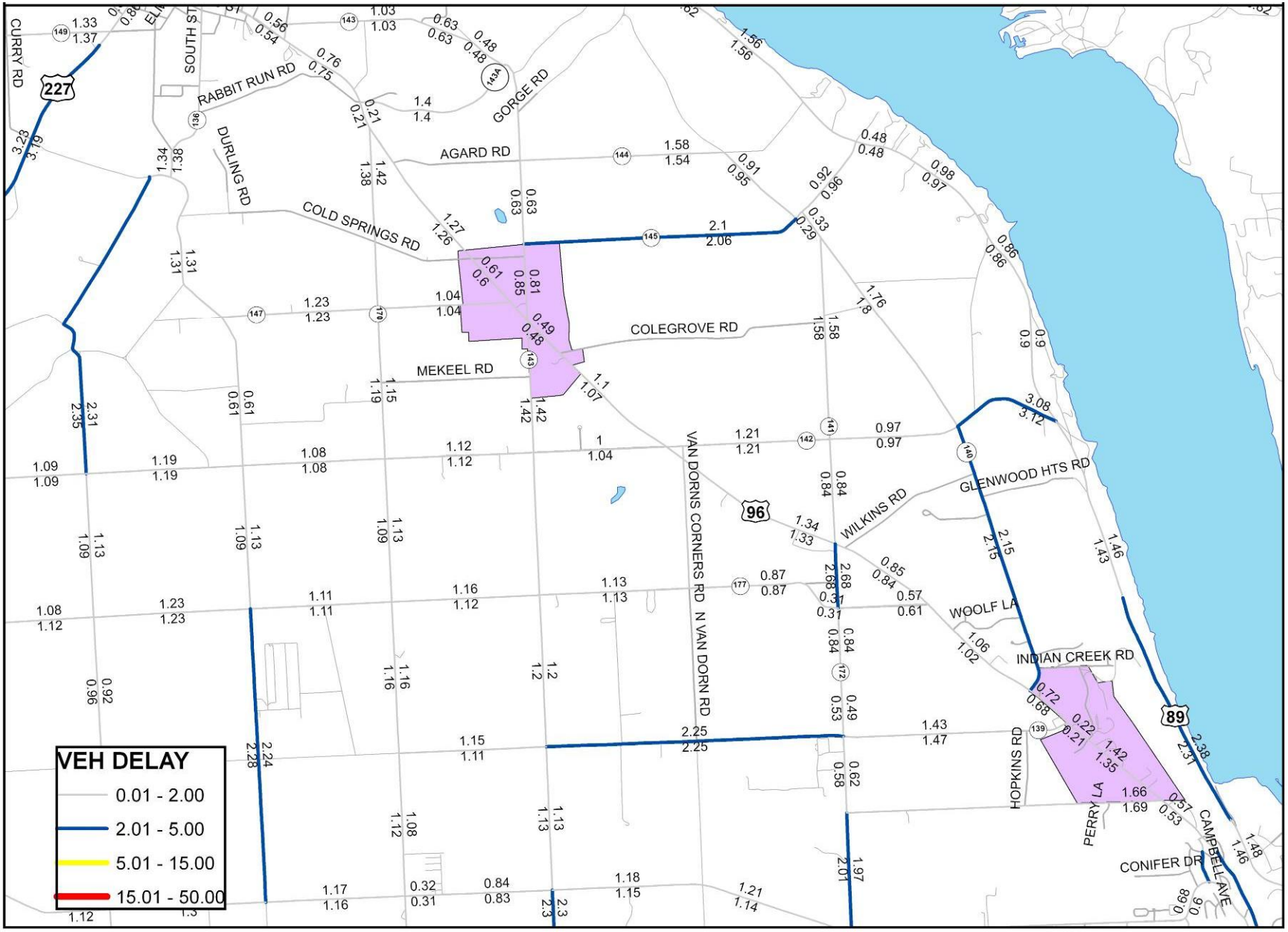


FIGURE 10 – 2028 TREND BASE CONDITIONS (DELAY IN MINUTES)
Route 96 Study Area

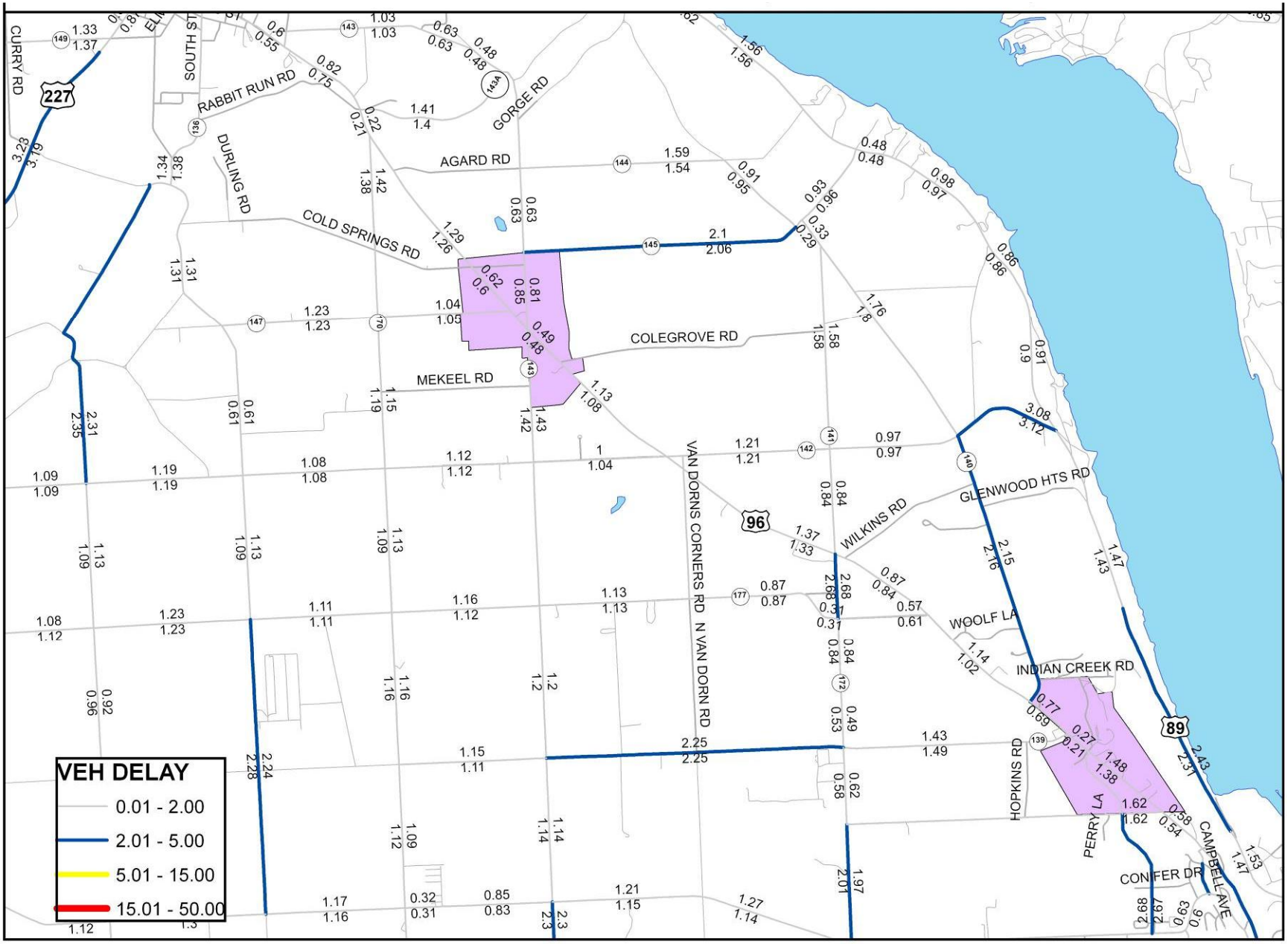
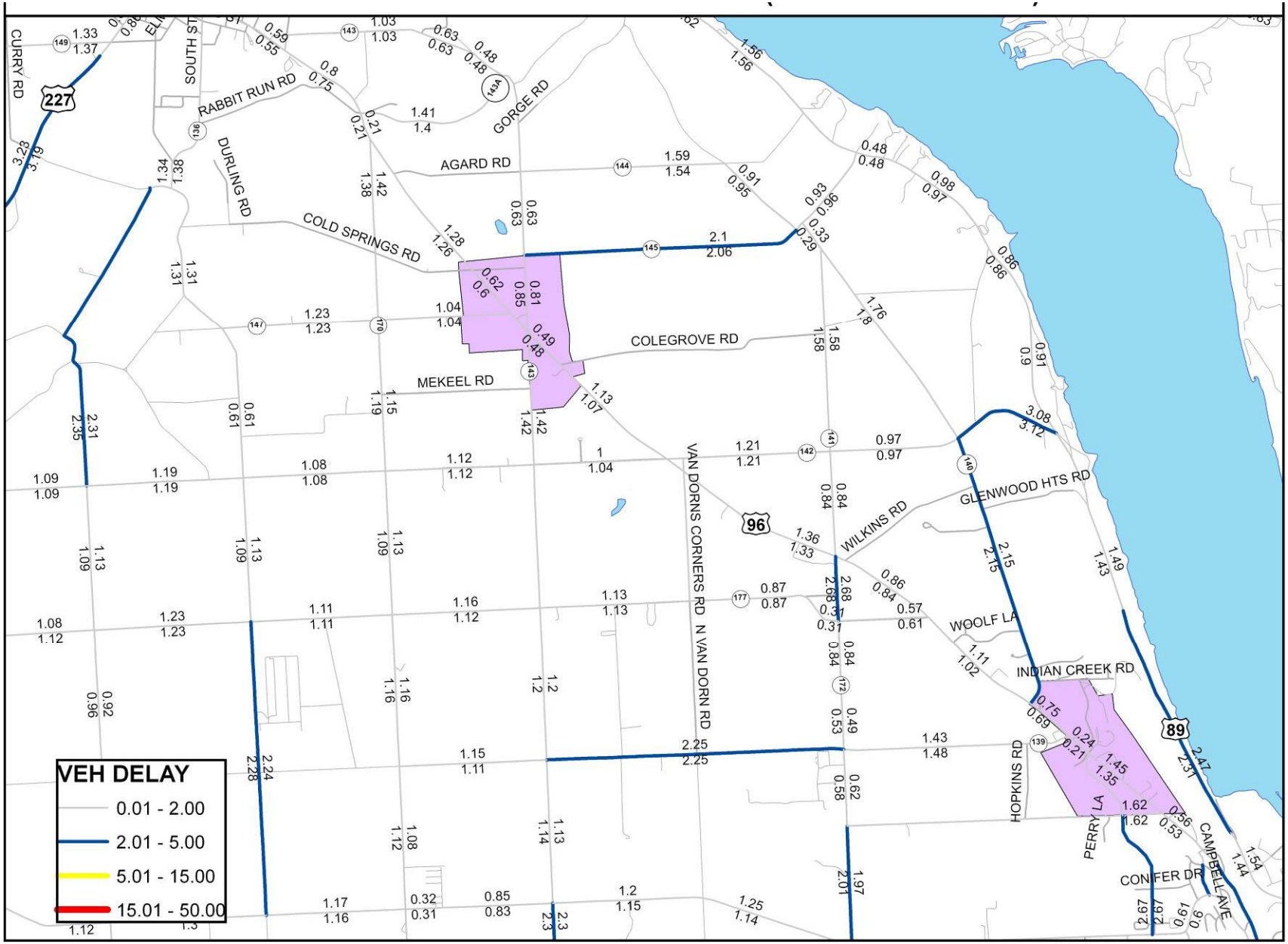


FIGURE 11 – 2028 NODAL BASE CONDITIONS (DELAY IN MINUTES)
Route 96 Study Area



3.3.4. Future Traffic Operations Assessment

The projected ten year (2018) and twenty year (2028) future traffic conditions were analyzed to assess the operations of the roadway network contained in the Study area under both the trend and nodal growth scenarios. Traffic analysis software, SYNCHRO (Build 614), which is based on procedures and methodologies contained in the HCM 2000, was used to analyze operating conditions at Study area intersections. The procedure yields a Level of Service (LOS) based on the HCM 2000 as an indicator of how well intersections operate. The intersection capacity results are shown in Table 12.

TABLE 12 – INTERSECTION CAPACITY ANALYSIS RESULTS – FUTURE CONDITIONS
Route 96 Study Area

Intersection	Future 2018 Projection				Future 2028 projection			
	Trend Base		Nodal Base		Trend Base		Nodal Base	
	AM	PM	AM	PM	AM	PM	AM	PM
Route 96/Taughannock Park Rd								
Eastbound - Rabbit Run Road	B	C	B	C	C	D	B	C
Westbound – Taughannock Park Rd	B	B	B	B	C	B	B	B
Northbound – Route 96	A	A	A	A	A	A	A	A
Southbound – Route 96	A	A	A	A	A	A	A	A
Route 96/Jacksonville Road								
Eastbound – Jacksonville Road	B	C	B	C	C	C	B	C
Westbound - Jacksonville Road	B	C	B	C	C	C	C	C
Northbound – Route 96	A	A	A	A	A	A	A	A
Southbound – Route 96	A	A	A	A	A	A	A	A
Route 96/Perry City Road								
Eastbound - Perry City Road	C	B	C	B	C	B	C	B
Westbound - Perry City Road	C	C	C	C	C	C	C	C
Northbound – Route 96	A	A	A	A	A	A	A	A
Southbound – Route 96	A	A	A	A	A	A	A	A
Route 96/Cayuga Medical Center(S)								
Eastbound – Overlook	B	A	B	A	B	A	B	A
Westbound - Cayuga Medical Ctr	C	C	C	C	C	C	C	C
Northbound – Route 96	A	B	A	A	A	B	A	B
Southbound – Route 96	A	A	A	A	A	A	A	A
Overall LOS/Delay in sec/veh	A(6.2)	B(12.6)	A(6.0)	B(12.2)	A(6.6)	B(13.7)	A(6.2)	B(12.7)
Route 96/Route 89(S)								
Eastbound – Route 96	C	B	C	B	C	B	C	B
Westbound - Route 96	B	B	B	B	B	B	B	B
Northbound - Route 89	C	D	C	D	C	D	C	D
Southbound -S Route 89	B	C	B	C	B	C	B	C
Overall LOS/Delay in sec/veh	C(20.3)	C(20.3)	C(20.3)	C(20.3)	C(20.5)	C(20.6)	C(20.5)	C(20.6)

(S) = signalized (i.e. traffic signal)

All Study intersections are projected to operate at levels of service equal to or better than average capacity levels (LOS "C") with the exception of these two approaches.

- Eastbound approach at Route 96/Taughannock Park Rd intersection during PM peak hour under trend base twenty year (2028) future conditions which is projected to operate at LOS D,
- Northbound approach at Route 96/Route89 intersection during both peaks under all scenarios which is projected to operate at LOS D.

The following intersection approaches improve in levels of service under the nodal base scenario compared to the trend base scenario

- Route 96/Taughannock Park Road intersection - Eastbound approach during both peaks and westbound approach during the AM peak hour under 2028 future conditions
- Route 96/Jacksonville Road intersection - Eastbound approach during the AM peak hour under 2028 future conditions
- Route 96/Cayuga Medical Center intersection - Northbound approach during the PM peak hour under 2018 future conditions

It is noted that the level of service results for the AM peak hour on the eastbound approach to the Route 96/Route 89 intersection are not reflective of actual operating conditions at this intersection. The travel time surveys and video indicate that motorists on the eastbound Route 96 approach are significantly delayed during the AM peak hour due to queuing from the upstream intersections which is beyond our scope to modify the regional model for this Study. However, comparing the two growth scenarios under the same condition results is no change in LOS during the AM peak hour on the eastbound approach.

Total Greenhouse Gas Emissions

The Clean Air and Climate Protection (CACP) Software was used in order to estimate the total greenhouse gas emissions under existing, future trend and nodal growth scenarios. The CACP software using the VMT output from the travel demand model as the input value for calculations. CACP software uses a passenger vehicle fleet average mile per gallon (mpg) figure to calculate fuel use and thus, greenhouse gas emissions.

CACP software estimates the following air pollutants based on the VMT estimated from the TransCAD model:

CO2: Carbon Dioxide
NOx: Oxides of nitrogen, primarily NO2
SOx: Oxides of Sulfur, primarily SO2
CO: Carbon Monoxide
VOC: Volatile Organic Compounds
PM: Particulate Matter

The software quantifies the benefit of actions that have the effect of avoiding or reducing carbon dioxide equivalent (ECO2) greenhouse gas emissions. CO2 equivalent is a common unit that allows emissions of greenhouse gases of different strengths to be added together and allows each greenhouse gas to be weighted according to its relative contribution to global climate change. For example, methane and nitrous oxide are much less abundant than carbon dioxide in the atmosphere, but because they have a greater potential to impact global climate change, conversion into ECO2 accords them much more weight than their abundance may suggest. All outputs from the CACP software used in the table below are in units of metric tons of ECO2.

Table 13 summarizes the air pollutants obtained from the CACP software for the Existing, 2028 trend and 2028 nodal growth conditions.

TABLE 13 – AIR POLLUTANTS
Route 96 Study Area

	Total VMT (miles/year) (in millions)	Total Greenhouse gas emissions					
		ECO2** (tons)	NOx (tons)	Sox (tons)	CO (tons)	VOC (tons)	PM10 (tons)
2008 Current Conditions	28.0	18,314	61	3	485	50	2
2028 Trend-Based Development	34.8	22,729	76	4	602	62	2
2028 Nodal- Based Development	32.0	20,901	70	4	553	57	2
Decrease between Trend VS Nodal - Difference (% Decrease)	2.80 (8.0%)	1828 (8.0%)	-6 (7.9%)	0 (0%)	49 (8.1%)	5 (8.1%)	0 (0%)

*** ECO2 = CO2 + CH4 + N2O*

The total air pollutant and greenhouse gases are approximately 8% lower under the nodal scenario compared to the trend growth scenario.

3.4 Travel Time and Safety Impacts (aka Access Management)

Access management is a comprehensive approach to improving corridor safety and access. Transportation systems are designed to complement existing and future land uses along the roadways. As a result, improved access and movement are achieved in a manner that respects the surrounding community and its plans for future development. Access management does more than preserve the safety and efficiency of travel. Well-designed access systems can help preserve community character, advance economic development goals, and protect the substantial public investment in roads and highways.

Whether it is applied to a single intersection or an entire region, access management is designed to address several key issues: safety; access to goods and services; efficiency of travel; economic impact. When each of the key issues is examined, it is important to consider their relationship to one another and their collective impact on the surrounding communities. Connectivity is an

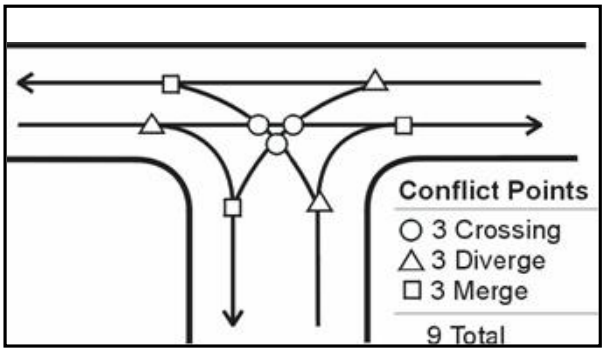
important aspect of access management. In addition to affecting how well motorists and pedestrians can access their respective destinations, access management is also inherently tied to a community's vision, sense of place and future success.

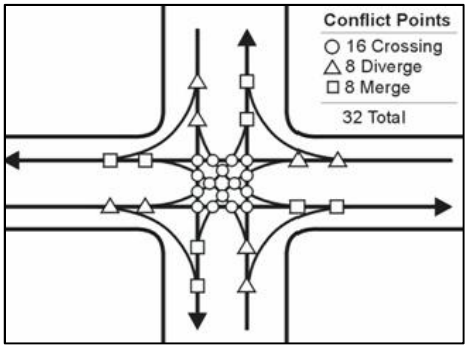
While Access Management techniques that might be appropriate in the Study area are further discussed in section 5.4.4., the following section compares the impacts of access changes resulting from the trend and nodal growth scenarios on safety and travel time within the corridor.

Safety

Safety is one of the primary goals of good access management. The safety of motorists and pedestrians is affected primarily by traffic speed and conflicts. Traffic conflicts occur when the paths of vehicles and pedestrians intersect. Merging, diverging, stopping, weaving or crossing movements create conflict points. As conflict points increase, driving conditions become more complex and drivers and pedestrians are more likely to make mistakes and have collisions. Figures 12 and 13 illustrate the typical vehicular conflict points present in three and four-way intersections, respectively. These diagrams do not factor in pedestrian and bicycle movements, which would only further complicate the driving conditions.

FIGURES 12 and 13 – CONFLICT POINTS
Three and Four Point Intersections





Using the Impacts of Access Management Techniques (IAMT) Calculator created by the Transportation Research Board, potential increases in accident rates for each growth scenario can be calculated and compared. The Route 96 corridor is divided into segments based on the locations of changes in posted speed limits. The following assumptions are made to provide input values in the Calculator:

- Access Density – under the Trend growth scenario, the number of driveways in each segment along Route 96 is increased by 10%. Under the nodal scenario driveways are only added in the segments that include the new nodes.

- Signal Density – no new traffic signals are assumed under the trend growth scenario as the driveways and traffic volumes will be spread out and unlikely to support the need for a traffic signal. One new traffic signal was added at each of the two nodes under the nodal development scenario.

- Speed Limit – No changes to speed limits are assumed under the trend growth scenario, the speed limits in the segments adjacent to the two nodes were reduced by 10 mph under the nodal scenario.

The analysis results from the IAMT Calculator estimate that the future accident rate per segment of Route 96 under the nodal scenario from 2-12% lower than under the trend growth scenario as shown in Table 14.

Travel Time

The IAMT Calculator can also be used to evaluate the impacts of the two development scenarios on travel times in the corridor. Table 14 also shows the travel time in minutes per mile for each segment and for the entire corridor. The travel time rate under the nodal scenario is approximately 12% to 15% higher in each direction than under the trend growth scenario as a result of two new traffic signals located at the Jacksonville and Medical Center nodes. It should be noted that while this calculator does not necessarily provide an exact estimate of the corridor travel time, it does provide an accurate comparison of the differences between the two scenarios.

TABLE 14 – TRAVEL TIME AND FUTURE ACCIDENT RATE

Per Segment

Northbound	Free-Flow Rate (min/mi)		Travel Time Rate (min/mi)		Speed Output (MPH)		Accident Rate change
	Trend	Nodal	Trend	Nodal	Trend	Nodal	Trend Vs. Nodal
Fulton St. to Rt. 89	2.00	2.00	9.70	9.99	6.20	6.00	-2%
Rt. 89 to Williams Glen Rd.	2.00	2.00	3.02	2.94	19.80	20.40	-3%
Williams Glen Rd. to Cayuga Medical Center	1.33	1.33	1.96	1.89	30.60	31.70	-5%
Cayuga Medical Center to Perry City Rd.	1.09	1.33	1.65	1.88	36.30	31.90	-12%
Perry City Rd. to Cole Grove Rd.	NA	NA	NA	NA	NA	NA	-4%
Cole Grove Rd. to Jacksonville Rd.	NA	NA	NA	NA	NA	NA	-6%
Jacksonville Rd. to Cold Springs Rd.	NA	1.71	NA	2.45	NA	24.50	0%
Cold Springs Rd. to Taughannock Park Rd.	NA	NA	NA	NA	NA	NA	-6%
Taughannock Park Rd. to South Village Line	NA	NA	NA	NA	NA	NA	-4%
Total	6.42	8.37	16.33	19.15			

Southbound	Free-Flow Rate (min/mi)		Travel Time Rate (min/mi)		Speed Output		Accident Rate change
	Trend	Nodal	Trend	Nodal	Trend	Nodal	Trend Vs. Nodal
Fulton St. to Rt. 89	2.00	2.00	7.76	7.13	7.70	8.40	-2%
Rt. 89 to Williams Glen Rd.	2.00	2.00	2.71	2.62	22.10	22.90	-3%
Williams Glen Rd. to Cayuga Medical Center	1.33	1.33	1.74	1.68	34.50	35.70	-5%
Cayuga Medical Center to Perry City Rd.	1.09	1.33	1.19	1.54	50.50	39.10	-12%
Perry City Rd. to Cole Grove Rd.	NA	NA	NA	NA	NA	NA	-4%
Cole Grove Rd. to Jacksonville Rd.	NA	NA	NA	NA	NA	NA	-6%
Jacksonville Rd. to Cold Springs Rd.	NA	1.71	NA	2.32	NA	25.80	-2%
Cold Springs Rd. to Taughannock Park Rd.	NA	NA	NA	NA	NA	NA	-6%
Taughannock Park Rd. to South Village Line	NA	NA	NA	NA	NA	NA	-4%
Total	6.42	8.37	13.40	15.29			

NA = The software does not provide a travel time calculation where there are no traffic signals.

4.0 CORRIDOR LIVABILITY AND QUALITY-OF-LIFE

4.1 Overview

Twelve (12) Measures of Effectiveness, or Livability Benchmarks, were developed as a means by which to consider and rank specific quality of life issues along the corridor under both the Trend and Nodal Development Scenarios. The measures of effectiveness were determined based on feedback generated by the community through the Residential Community Survey and from public comments received at the Public Information Meeting and Focus Group Meetings. Issues which were rated as high, as well as positive aspects of life on the corridor, were incorporated into the following list. Both the survey and information received at the various public meetings are summarized in further detail in Technical Report #1 of the Route 96 Corridor Management Study.

4.1.1. Measures of Effectiveness (MOEs)

Each of the Measures of Effectiveness are identified below and are followed by a brief summary outlining how they are intended to be used when being considered in association with each of the development scenarios.

Speeding

Implications of speeding to be identified with potential for remedying problem areas based on alternative development patterns.

Traffic Volume

Review of current volume versus projected volumes under each scenario. Consider impacts of other factors, such as likelihood of transit use, inter-nodal trips, etc. Bus and truck traffic impacts to be considered.

Convenience

Consider distance to standard and daily amenities, such as supermarkets, transit, shopping, community facilities, restaurants, recreation.

Rural and Scenic Character

Identify impacts of development scenarios related to current land use patterns, character of area, scenic viewsheds, etc.

Commute Time

Consider changes to commute time based on other determined factors, such as traffic volumes.

Access Density

Consider how to address access and identify whether access density will improve or be worsened under each development scenario. Analysis will consider impacts of access density on drive time, accident potentials, delays exiting driveways, etc.

Noise

Consider impacts of noise based on traffic projections.

Connectivity

Identify connections within nodes and to surrounding nodes, as well as connections to destinations under Trend Development Scenario. Compare results.

Transit

Compare distance to transit service and resulting frequency of service. Identify availability and accessibility to significant number of people.

Pedestrian Safety

Consider number of designated pedestrian crossings and ability to cross roads safely. Ability to implement designated pedestrian paths and sidewalks

Design Guidelines

Identify impacts that design guidelines may have on character of corridor. Consider ability to implement design guidelines and types that may be appropriate.

Accident Rates

Identify traffic calming or other safety measures to help reduce accident rates.

4.1.2. Methodology

Each of the Measures of Effectiveness have been ranked against each development scenario to determine which development pattern would have fewer negative implications on those living along, and using, the Route 96 corridor.

For both development scenarios, each Measure of Effectiveness has been given a ranking of 1 (one) – 5 (five). A score of 1 (one) would indicate very poor livability, while a ranking of 5 (five) would indicate high or positive livability. A rank of 3 (three) would indicate average or no impact on livability along the corridor. This methodology assumes that all Measures of Effectiveness are equally important for deliberation when considering the impacts associated with each development scenario.

4.2 Ranking Exercise

Table 15 identifies the overall ranking and scoring for both the Trend and Nodal Development Scenarios, accompanied by narrative descriptions and supporting information. The ranking was based on projected conditions under a 20-year timeframe / build out scenario.

TABLE 15 – MEASURES OF EFFECTIVENESS RANKING
Trend and Nodal Development Scenario

Measure of Effectiveness	Livability Ranking (1 - 5)	
	Trend	Nodal
Speeding	1	4
Traffic Volume	1	3
Convenience	2	3
Rural and Scenic Character	1	4
Commute Time	1	4
Access Density	1	4
Noise	2	3
Connectivity	2	5
Transit	2	4
Pedestrian Safety	1	5
Design Guidelines	4	4
Accident Rates	1	3
TOTAL	19 (of 60)	46 (of 60)

As indicated in Table 15, the Trend Development Scenario achieved a total ranking of 19 points and the Nodal Development Scenario received a ranking of 46 points. A summary and explanation for how the ranking was achieved for each Measure of Effectiveness is included below, including potential impacts.

Speeding

Speeding was the number one issue identified in the Residential Community Survey. The Trend Development Scenario would not provide any possibility for speed reduction, as it would not be warranted using NYSDOT guidelines. The Nodal Development Scenario, on the other hand, creates defined nodes along Route 96 where the introduction of greater density and activity more readily supports reduced speed limits. This scenario would likely meet DOT guidelines warranting reduced traffic speeds, particularly upon entry, traveling within, and when exiting the nodal areas.

The Nodal Development Scenario achieved a rank of 4 based on its effectiveness at controlling and reducing speeds. The Trend Development Scenario achieved a rank of 1 because it does not address speed reduction.

Traffic Volume

The Trend Development Scenario provides few opportunities for enhancing the built environment as it continues an existing development pattern that allows for haphazard development along the Route 96

corridor. As a result, this type of development promotes widely spaced individual driveways and a lack of land use integration and internal connections, which result in greater traffic volumes.

The Nodal Development Scenario provides a greater opportunity to enhance the built environment which in turn influences travel choices. Residents with shorter walk and bike times to and from destinations, (e.g. shopping, work, recreation) are more likely to walk and bicycle. People traveling through higher-quality environments are more inclined to utilize non-motorized means of travel. The Nodal Development Scenario promotes the creation of high quality mixed use, compact development which promotes internal trips (i.e. people can live/work/shop in one location), alternate travel modes both within the node and to external destinations (e.g. walk, bicycle, transit), and results in a reduction in the overall volume of traffic added to the adjacent highway network.

The Nodal Development Scenario achieved a rank of 3 based on its potential effectiveness at reducing traffic volumes along Route 96. The Trend Development Scenario achieved a rank of 1, as it is essentially a continuation of existing traffic volumes multiplied by a greater population. Today, traffic volume is already rated as the second biggest issue along the corridor according to the results of the Residential Community Survey.

Convenience

Under the Trend Development Scenario, daily conveniences such as drug stores, grocery stores, gas stations, shopping, restaurants, and recreation are all within a moderate drive from residences on the corridor. The Village of Trumansburg and City of Ithaca, at either end of the corridor Study area, offer the amenities needed by residents on a regular basis. However, under the Trend Development Scenario, few, if any, of these conveniences are within walking distance. If they are located within a distance that someone might feel comfortable walking or biking to, there are limited means to get there due to a lack of non-vehicular connections. Community recreation areas would continue to be located in outlying areas of the corridor and require residents to drive to them.

In the Nodal Development Scenario, it is anticipated that some concentration of retail and employment uses would be located within each node. Although non-residential growth would likely be limited until a population base has been established to support ancillary uses, there is short-term potential that smaller retail establishments could be developed as part of a residential development plan. In the long-term, there is significant potential for retailers, employers, and recreational uses to be sited in the nodes. As a result, the convenience for residents to these various uses is significantly enhanced due to the immediate proximity of these uses. Ancillary supporting uses would be within walking distance (1/4 mile – 1/2 mile) and designated multi-use paths would be available for use by residents within the nodal area. As a result, the convenience enjoyed by residents in a compact, nodal development increases because they are ultimately spending less time and money in order to enjoy the everyday amenities and services which they need. Nodal development also is characterized by the creation of community green spaces and gathering areas. Under the nodal development scenario, a community park or open space would ideally be located no more than ¼ mile from any residence, resulting in the ability for more residents to enjoy outdoor recreation.

Proximity to goods and services is enhanced under the nodal development scenario, as it is anticipated that a variety of goods and services would ultimately be provided within each node, requiring fewer outside vehicular trips. Goods and services may also be within walking distance, as a result they would not require personal vehicles to access daily conveniences. For these reasons, the nodal development

scenario received a higher livability ranking for “convenience” than the Trend Development Scenario, with a ranking of 3 and 2, respectively.

Rural and Scenic Character

The continuation of a Trend Development Scenario along Route 96 has the potential to have a significant impact on the rural and scenic beauty which characterizes the corridor. Views to the eastern shore of the lake, to woodlots, and across open farmlands are distinguishing features of the corridor. If conventional development were to continue to occur as it has in the past, for the next twenty years, there would be more fragmentation of the natural features currently enjoyed by residents and visitors. New buildings and developments would consume open space and farmland along the road, or result in the destruction of wooded areas which would need to be cleared for the construction of new buildings. In a trend scenario, there would be few restrictions or limitations on where this new development might occur, and as a result, large amounts of land along the corridor could be developed, with very little benefit to the greater community.

The nodal development scenario strikes a balance between allowing growth to occur along the corridor over the course of the next twenty years and protecting the unique resources and attributes that define the corridor today. By concentrating future development in designated nodes where there are no significant environmental or agricultural resources, areas located between the nodes are protected. As a result, existing scenic viewsheds, farmlands, woodlots, and other natural resources are provided a greater level of protection from destruction as a result of development and new construction. The concentration of development within the nodes would limit the impacts to these sensitive and unique features by minimizing the amount of new development occurring between nodal centers.

Persons interested in new residential developments, single family homes, commercial and business uses, and recreational service providers are not prohibited from building along the corridor, they are just guided to certain areas. Understanding that personal property rights may not prohibit any new development from occurring outside the nodes is tempered by the fact that the majority of development, through land use regulation updates in each of the Towns and City, can be focused in Trumansburg, Jacksonville, or around the Cayuga Medical Center. The Nodal Development Scenario achieved the highest possible ranking in this category due to its effectiveness in preserving the unique rural and scenic qualities that have historically drawn residents and visitors to the corridor.

Figure 14 shows the existing agricultural land and forest land along the corridor, with agricultural lands identified in tan and forest lands identified in dark green. Under the Trend Development Scenario, development could occur haphazardly along the corridor, resulting in a significant reduction in natural and agricultural lands. As a result, the Trend Development Scenario achieved a rank of 1 and the Nodal Development Scenario achieved a rank of 4.

FIGURE 14 – AGRICULTURAL LANDS AND FORESTED LANDS
Route 96 Corridor

Commute Time

Commute time increases as the amount of travel friction, i.e. number of traffic signals, driveways, turning vehicles, and traffic volume, on Route 96 increase. Increased travel friction and traffic volumes typically result in increased delay, lower speeds and ultimately increased travel times.

When considering land use changes associated with each development scenario, commute time under the Trend Development Scenario would continue to steadily increase over the next twenty years in association with development and population increases. Under this scenario, the number of driveways, turning vehicles, and traffic volume would increase and as a result, commute time would also increase.

Under the Nodal Development Scenario, curb cuts are reduced, traffic speeds have the potential to be reduced, and traffic volume is lowered as people choose to either make trips within the node or select alternative modes of transportation. As a result, commute times would typically decrease.

Considering the traffic and land use changes that will result from each type of development scenario, the Nodal Development Scenario achieved a rank of 4 and the Trend Development Scenario achieved a rank of 1.

Access Density

The frequency or density of access points along Route 96 directly impacts the generation of traffic, total vehicular movements, and the number of pedestrian and vehicular conflicts. As the number of access points increases, accident rates increase, vehicular and pedestrian conflicts increase, and speeds and travel times decrease.

The Trend Development Scenario will result in a significant number of additional access points, thus increasing the potential for accidents and vehicular and pedestrian conflicts. In contrast, the Nodal Development Scenario will significantly limit the number and location of new access points along the Route 96 corridor.

Based on the above findings, the Nodal Development achieved a rank of 4 and the Trend Development Scenario achieved a rank of 1.

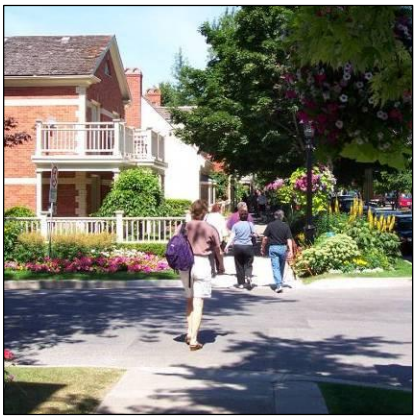
Noise

Noise along the corridor is typically generated by passing traffic, including vehicles, trucks, and busses. Traffic volumes, as indicated above, are higher for the Trend Scenario than the Nodal Scenario. The Nodal Development Scenario identifies fewer vehicular trips due to the increased use of alternative modes of transportation and internal trips. A reduced number of vehicular trips along the roadway effectively reduces the amount of noise that is being created and impacting adjoining residences.

Based on the above findings, the Nodal Development achieved a rank of 3 and the Trend Development Scenario achieved a rank of 2.

Connectivity

Trend development is defined by its heavy reliance on personal vehicles. Connectivity is largely by a complex road network which is intended to help transport vehicles from one destination to the next. Sidewalks and non-vehicle oriented connections are typically limited to larger-scale developments, such as a residential subdivision or employment center, such as the Cayuga Medical Center. There is typically little, or no consideration given to connections between these types of development. Building on past trends associated with this development pattern, it can be assumed that few new connections would be created over the next twenty years. While some regional trail initiatives are in progress that could help to create new connections, such as the Black Diamond Trail, the lack of concentrated population centers would make it difficult to define entry points and create trailhead enhancement areas that would be used enough to justify the investment in them. The very character of Route 96 today is conducive to car and truck traffic and unless major modifications were made to the roadway, it would not likely become a desirable, attractive, and safe option for heavy pedestrian usage. The distance from one destination to another would continue to be greater than ¼ mile, the standard threshold that has been established as a comfortable distance for pedestrians.



A combination of informal (above) and formal (below) pedestrian connections contribute to an attractive and desirable neighborhood setting.

When considering a Nodal Development Scenario, connectivity is a critical aspect of the design approach and one of the overarching goals and objectives for undertaking this type of design strategy. A nodal development scenario provides for designated connections for transit, personal vehicles, pedestrians, and bicyclists. Connections are both internal between residential, recreational, and commercial

areas, as well as between nodes, whether along the roadway or through the creation of connections to off-road, multi-use trails. The concentration of population within the nodes makes entry enhancements to off-road trails more feasible. A greater number of connections, for a wider variety of users, also has indirect, positive impacts including environmental and health benefits.

Connectivity, especially as it relates to pedestrians and bicyclists, is enhanced under the nodal development scenario. A concentration of people allows for additional transit opportunities. Inter-nodal connections, including sidewalks and formal walkways, will connect to regional trails and path networks, ultimately providing connections between each of the nodes. Because fewer connections are viable under the Trend Development Scenario, the nodal development scenario was assessed a higher livability ranking with regards to connectivity. The Trend Development Scenario achieved a rank of 2 and the Nodal Development Scenario achieved a rank of 5.

Transit

Existing transit service along the corridor includes bus stops in the Village of Trumansburg, Jacksonville, and Cayuga Medical Center. In addition to designated bus stops, TCAT provides "flag and stop" service which allows pedestrians along the corridor to flag down a passing bus anywhere between the Village line and the City line. Transit ridership is moderate along the corridor and Tompkins Consolidated Area Transit (TCAT) does not currently have plans for expanding services along Route 96. Trend Development Scenarios would not result in population centers outside of the Village that would create a clear argument or need for additional bus stops and service enhancements. The Trend Development Scenario scores low for this measure of effectiveness because the development pattern does not lead to increased transit usage, does not offer shorter distance to transit for the average resident, and does not provide for increased frequency or transit options for the average resident. The accessibility to transit service would remain similar as it exists today.

A nodal development scenario has the ability to warrant improvements to the transit system because it offers a significant concentration of people that may potentially use the system. The concentration of people residing within a node improves accessibility to transit for a greater number of people. As a result, availability of transit may improve, the frequency of transit may improve, and the distance to which people need to travel to a transit stop is reduced because the majority of riders live in the node in which they are seeking transit service. Park-and-ride lots also become a reasonable consideration in the nodes because the population is there to help support their use.

When considering transit and how it would be impacted under each scenario, the Trend Scenario achieved a rank of 2 and the Nodal Scenario achieved a rank of 4.

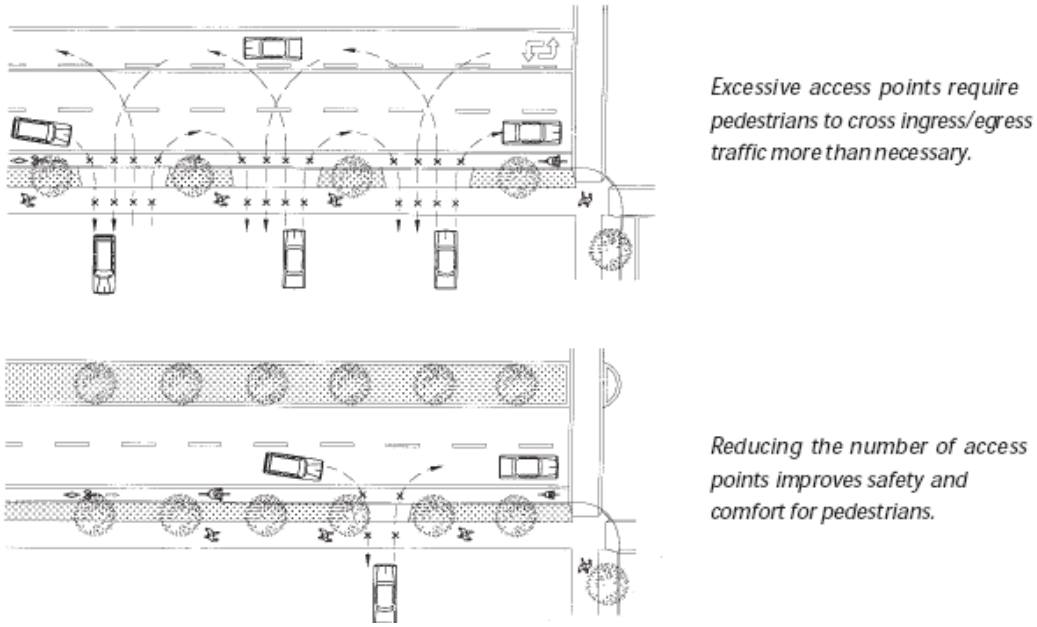
Highly utilized transit stops may include a building with amenities, such as restrooms and newsstands (far left). Smaller stops can be incorporated into the architecture of a building, and still offer shelter and relief from the elements (left).

Pedestrian Safety

High traffic volumes and vehicles traveling at higher speeds have the potential to negatively impact pedestrian safety. Under the Trend Scenario there are likely to be fewer pedestrian crossings along Route 96, fewer traffic signals to identify safe times for pedestrian crossing, and a greater number of access points, which increases potential vehicle/pedestrian conflicts. Figure 15 shows the potential impacts of access points as it relates to pedestrian safety issues.

The Nodal Development scenario provides for fewer driveways and points of conflict along Route 96 which concentrates traffic volumes and increases the potential need for a traffic signal. Signalized pedestrian crossings improve pedestrian safety. In addition, the Nodal Development Scenario provides a compact development which allows for internal pedestrian travel and reduces the need for pedestrians to access or travel along Route 96. The rankings result in 1 for the Trend Development Scenario and 5 for the Nodal Development Scenario.

FIGURE 15 – IMPACTS OF ACCESS DENSITY ON SAFETY



Excessive access points require pedestrians to cross ingress/egress traffic more than necessary.

Reducing the number of access points improves safety and comfort for pedestrians.

Design Guidelines

Design guidelines will have a positive impact on both development scenarios. Design guidelines, under the Trend Development Scenario, could help to minimize impacts associated with scattered, road frontage development styles by creating specific criteria for building size including width and height, placement on the site, materials, relationship to surrounding sites, landscaping, placement of parking and / or support facilities, in addition to other design considerations. Specific design guidelines and criteria would seek to mitigate impacts from development on viewsheds, farmlands, and environmental resources.

Design guidelines under the nodal development scenario would have similar benefits though may go one step further by being individualized for each of the nodes, allowing the character and history of each specific node to be recognized. For instance, design guidelines in Jacksonville may build on the historic

Hamlet character and charm which exists today and require a limited scale of building that is compatible with today's development.

Design guidelines under either scenario would be most beneficial if implemented through a partnership between the Town of Ulysses, Town of Ithaca, and City of Ithaca. All three entities would need to work together to develop design guidelines and individually incorporate them into their own land development or zoning regulations. Similar design guidelines for the corridor would help to give Route 96 a cohesive character. Due to the fact that design guidelines could improve development quality under either scenario, they both achieved a ranking of 4.

Design Guidelines and Standards can enhance and improve the aesthetic character of a development and ensure it meets the goals and objectives of the community

Accident Rates

In a national Study done by the Transportation Research Board, crash data showed a strong relationship between the number of access points per mile and the crash rate. There are generally 2.1 times more crashes when the number of access points increases from 10 to 40 per mile.

In the Trend Development Scenario, a greater number of access points has the potential to translate into more accidents and greater delays. There have also been recent studies that indicate that per capita traffic fatality rates are higher in trend (sprawling) development areas than areas where more compact mixed-use development occurs. This is likely a result of the need for greater vehicle travel in trend developments as well as an increase in elderly and teen driving and higher travel speeds and traffic volumes.

Increasing the spacing between access points and providing greater separations of conflicts is possible under the Nodal Development Scenario and will reduce the number and variety of events to which drivers must respond. This translates into fewer accidents, as well as shorter delays.

The Nodal Development Scenario receives a rank of 3 because it has the potential to reduce the number of access points on the corridor, thus reducing the accident rate. The Trend Development Scenario received a rank of 1 because of the increased access points that would occur in the development scenario and its implications on accident rates.

4.3 Summary of Results

Using the Measures of Effectiveness as a benchmark for determining the impacts of two types of development patterns on the quality of life within the Study area, it was determined that the Nodal Development Scenario has fewer negative impacts, and more overall positive impacts, on livability. Using the unweighted ranking system described above, the Nodal Development Scenario achieved a total of 46 points and the Trend Development Scenario achieved a total of 19 points.

5.0 OPPORTUNITIES AND CONSTRAINTS ANALYSIS

5.1 Introduction

The Opportunities and Constraints Analysis is intended to provide an overview of the potentials and limitations are for traffic and development along the corridor as related to each development scenario. This section of the Study also discusses strategies for minimizing traffic growth and addressing any negative implications associated with traffic growth.

5.2 Identification of Opportunities and Constraints

5.2.1. Trend Development Scenario

OPPORTUNITIES

The following opportunities / benefits are associated with a trend style of development:

- Requires few, if any, modifications to existing zoning and land use regulations.
- Provides greater perception of individual privacy.
- Commonplace in the market and therefore, a known commodity.
- Requires the same amount of municipal services.

CONSTRAINTS

As noted in the 2004 Tompkins County Comprehensive Plan, if past growth patterns are a model for future growth both within the County and along the corridor, expected implications include:

- Loss of population in centers, such as villages and city.
- More development along road frontages and in rural areas.
- Increased traffic along rural roads and urban centers.
- Increased taxes and fees associated with population sprawl for municipal services.
- Loss of agricultural lands, environmental resources, open space, and rural character.
- Increased number of personal vehicles and increased time spent in cars.

Additional constraints associated with a trend development may include:

- Sense of unique place for the region is lost.
- Potential impacts on tourism market as region no longer has a special, unique appeal.

5.2.2. Nodal Development Scenario

OPPORTUNITIES

The nodal development scenario offers compact, multi-use community centers that have the potential to offer existing and future residents social, environmental, economic, and health benefits. Opportunities and benefits associated with this type of development pattern are summarized below:

Social / Community

- Provides options that reduce the amount of time that people choose to spend in their cars.
- Offers shopping, conveniences, parks, and housing in close proximity to one another, resulting in more people and activity on the streets and in the parks and public spaces. When people are out they are more likely to gather and interact.
- Enhances the opportunities for community interaction.

Environmental

- Focuses development in areas with greatest infrastructure capacity.
- Reduces traffic volumes and sprawl, which, as a result, preserves and protects valuable agricultural land, environmental resources, and open space areas within the Town of Ulysses, Town of Ithaca, and City of Ithaca.
- Integrates natural areas, creeks, and surrounding views and open to provide residents with additional recreation areas and greenways.
- Reduces the number of vehicular trips that people are making, resulting in cleaner air.
- Creates opportunities for special grant funding for sustainable community planning and design – environmentally friendly buildings, bicycling and pedestrian features, or some type of green infrastructure could be made available and offset development costs.

Economic

- Creates economic opportunities for municipalities, developers, and residents. Concentrated development reduces municipal costs and allows developers to increase densities, thus reducing their costs. Lower taxes and lower purchase prices are spin-off benefits to buyers.
- Reduces infrastructure costs for municipalities by targeting growth.
- Allows developers to build more housing units, commercial structures, or other uses on a smaller area of land, therefore concentrating resources and requiring less land be purchased up front.
- Supplying a mix of housing types can stabilize a development by broadening the potential market base.
- Increases values of housing units because people understand the benefit of being close to businesses, shopping, and transportation alternatives.

Health

- Offers access to multiple destinations without a car, resulting in access that is more realistic for a wider range of people.
- Establishes a net community health benefit as more people walk and cycle to destinations.
- Promotes an active lifestyle, resulting in reduced medical costs, reduced obesity rates, and a reduction in stress levels.

CONSTRAINTS

The following constraints and/or issues may be associated with a Nodal Development Scenario:

- Create communities within the larger communities. This can result in a sense of place that in some instances may be perceived as separate from the surrounding community.
- Population density may not be large enough, especially in looking at 10-20 year estimates, to support the ancillary uses that are desired to make nodes place to live, work, shop, and recreate. Additional commercial and restaurant uses in Jacksonville and possibly at the Cayuga Medical Center may not be realistic in the next twenty years unless densities approach 8-10 units per acre.
- High cost of infrastructure to initiate development.
- Limited buy-in and acceptance from community - there are limited examples of this type of development in the regional marketplace.
- Requires new and improved regulations to ensure vision is implemented.
- Requires greater level of training for Planning Boards and Zoning Boards of Appeal.
- Upfront planning and design costs may be required, in part, by the municipalities or County government.
- Possible need for increased capacity for planning staff in the Town of Ulysses.

5.3 Preferred Development Scenario

The identification of a preferred development scenario for the Study area is based on findings from the Traffic Impact Analysis, Measures of Effectiveness Exercise, and Opportunities and Constraints Analysis. Based upon this information, the Nodal Development Scenario will have a greater chance of success to enhance the quality-of-life of residents and mitigate associated traffic impacts.

Nodal development is considered a viable option because it furthers the objectives of the communities and organizations involved in the planning process. A Nodal Development Scenario for the corridor also supports the principles, policies, and actions incorporated in the 2004 Tompkins County Comprehensive Plan. Specifically, the plan states "The development patterns reflected in the existing villages, Hamlets, and the City of Ithaca's downtown area and neighborhoods should be promoted as key components of the built environment that greatly contribute to the vitality of the local economy and community life". A Nodal Development Scenario fully supports the identified policies within the County Comprehensive Plan.

By concentrating development and uses in designated areas of the corridor, the Nodal Development Scenario encourages the reuse and rehabilitation of existing infrastructure while minimizing future extensions, conserves land, minimizes need for expanding infrastructure, opens opportunities for a greater variety of transportation options, promotes a stronger tax base, reduces development pressures in rural and open space areas, and creates a strong sense of place and community. The Nodal Development Scenario can increase the quantity and quality of accessibility of open space, enhance land conservation, and promote development that is respectful of the area's natural resources and agricultural lands.

The residential density provided in a nodal development, especially in a rural community, is critical. In addition to providing additional opportunities for pedestrian and bicycle movement, the increase in the number of residents in one designated area improves the viability of public transportation, specifically TCAT bus and van services within the Study area. Once a mix of uses has been established within each of the nodes, there is also the potential for trip reductions because people living in the nodes will have the opportunity to shop and work within the node.

5.4 Techniques for Advancing Preferred Development Scenario

This section provides broad recommendations and techniques that will serve as the foundation for the capital, operational, and regulatory implementation projects described in Technical Report #3.

5.4.1. Design Principles for Nodal Development

In order for the preferred nodal development scenario to be implemented within the Study area, each of the individual communities will need to pledge to promote this type of development. Design and land use regulations will need to be developed which require future development to adhere to the goals and principles associated with this pattern of new growth. Together, a series of design principles should be established that can help further the nodal development pattern of growth. The following can provide a framework for Nodal Development Design Principles:

- Plan nodes based on a ¼ mile radiating from the central core. Mixed use, transit, and higher density housing should be at the core with reductions in density as distance increases from the center.
- Create residential areas that offer a variety of densities and styles. Ensure a range of housing price points to ensure affordable and higher end residences.
- Provide access to active and passive open spaces within 1000' of every residence.
- Provide basic streetscape amenities to make walking a desirable alternative for a range of users – including ramps, medians, sidewalks, benches, street trees for shade, trash cans, bicycle lanes or shared use paths, transit stops and shelters, and cautionary signage.
- Design streets to control speeds. This could be done through a number of traffic calming measures including changes in paving materials to differentiate vehicular/pedestrian space or landscaped medians.
- Ensure public transportation is available within every core and a minimum of 1000' from 80% of all residences.
- Limit the size of commercial uses to maintain neighborhood scale, as well as reinforce the street edge which can help to create an outdoor room or public gathering space.
- Ensure all residential neighborhoods, mixed use areas, employment centers, commercial uses, and parks and open spaces are connected by a comprehensive sidewalk and trail network.
- Create multi-use, non-motorized connections to outlying areas, in addition to those within the node.
- Develop design guidelines for architecture, landscaping, and private development.
- Integrate and enhance existing natural features within nodes. Protect natural features with appropriate buffering and design controls.
- Site parking behind buildings to ensure it is not a dominant feature of the streetscape.

Refined area plans should be completed for each of the nodes to help identify specific design opportunities and constraints and to consider how the design principles could be realistically incorporated into the overall design and development of these areas. Moreover, these plans can

serve as the basis for the development of an official map that identifies future roads and easements required for implementation of the Nodal Plan.

5.4.2. Cayuga Medical Center Conceptual Plan

Preliminary conceptual renderings for the Cayuga Medical Center and Hamlet of Jacksonville nodes are shown in Figures 16 and 17. The renderings identify potential land use and site enhancements that accommodate the projected build out for each node and incorporate specific design principles intended to achieve the overall vision associated with the nodal development scenario.

FIGURE 16 – LAND USE AND SITE ENHANCEMENTS
Cayuga Medical Center

The conceptual rendering of the Cayuga Medical Center node identifies one build-out scenario that could occur over the next ten to twenty year period. As shown, the area would include commercial and mixed use buildings (red), single family residential (orange), and multi-family residential (yellow). The potential development scenario shown above includes 66 single family homes and 232 multi-family units (8 units per building), totaling 298 units, in addition to commercial and mixed use buildings. Additional residential units may be incorporated on the upper stories of any mixed use buildings.

On the east side of Route 96, a commercial, mixed use destination would be developed on the north side of Harris B. Dates Drive to service hospital visitors, employees, and area residents. A transit stop would be incorporated into this area and parking is intentionally located behind the buildings, off of the Route 96 frontage. North of the commercial mixed use area is a single-family residential development that is designed around a public green space and natural features. Existing woodlands create a strong visual and physical buffer around the neighborhood. An internal trail system provides direct connections internally and to surrounding uses, including the new commercial and transit area, Route 96, and Cayuga Medical Center. An indirect connection and tie-in to the Black Diamond Trail is also shown.

On the west side of Route 96, a new multi-family development is shown south of the Overlook at West Hill housing development. The development would mimic the scale of the Overlook and would also incorporate a commercial and mixed-use area to create a small-scale "Main Street" as a connector between Route 96 and the multi-family residential units.

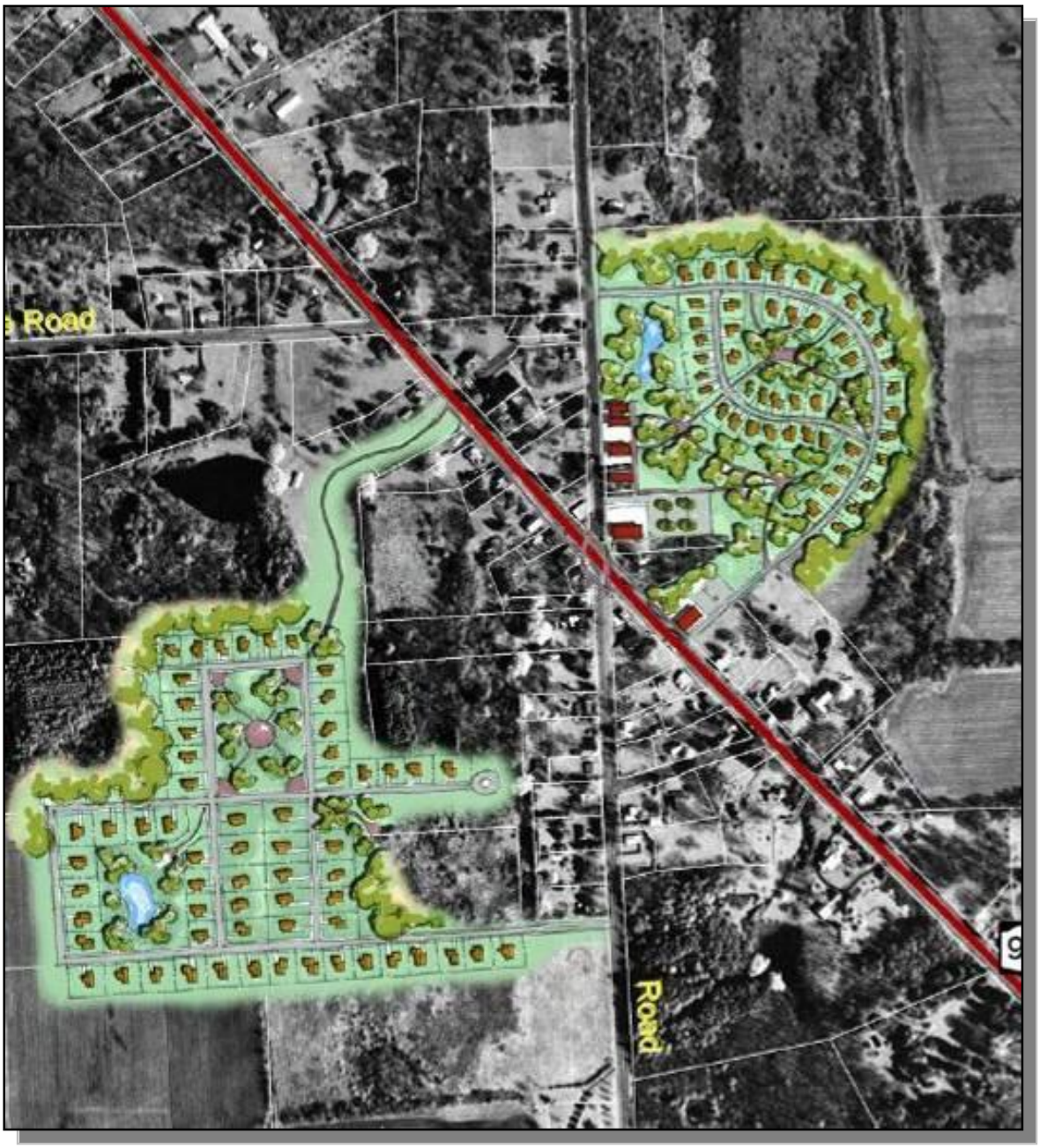
5.4.3. Jacksonville Hamlet Conceptual Plan

The conceptual rendering of the Jacksonville Hamlet node identifies a potential build-out scenario that could occur over the next ten to twenty year period. As shown, the area would include a limited amount of commercial uses (red) and single family residential uses (orange). The potential development scenario shown above includes 61 single family homes on the west side of Route 96 and 48 single family homes on the east side of Route 96, for a total of 109 units.

On the west side of Route 96 a residential development is shown that ties into the existing park, and ultimately to a connection along Route 96 south to the intersection of 96 and Jacksonville Road (the commercial node). The trend residential development has strong internal pedestrian linkages and a series of large park areas and natural features for residents to enjoy. The design of the residential neighborhood is formal, with right corners and square parks.

On the east side of Route 96, commercial development has been identified along the road frontage with parking at the rear of one building. Pedestrian links connect the parking area to other commercial structures. The character of this commercial development is intended to be consistent with the existing scale and architectural character of the historic Hamlet. Behind the commercial uses is a garden-style residential neighborhood with meandering streets, a strong trail system connecting to the commercial uses, and physical and visual buffers surrounding residences.

FIGURE 17 – LAND USE AND SITE ENHANCEMENTS
Jacksonville Hamlet



5.4.4. Traffic Demand Management Techniques

Transportation Demand Management (TDM), or Trip Reduction Strategies, includes techniques which are intended to improve the efficiency of existing transportation systems. These measures encourage the use of alternative transportation modes away from the single occupant car and may also include travel time flexibility as well as parking management techniques.

TDM measures that are appropriate for the Route 96 corridor include:

- Incorporating pedestrian-oriented design elements.
- Improving public transportation infrastructure, including bus stops and routes.
- Installing bicycle-friendly facilities.
- Offering active transportation facilities, including bike lanes and multi-use trails.
- Providing convenient pedestrian and bicycle connections.

As traffic increase along the corridor, the cost of gas continues to rise, and the negative impacts associated with vehicle greenhouse gas emissions continues to escalate, the need for viable alternatives to single-occupancy vehicles will continue to increase. Having an adequate selection of alternatives will maintain healthy air quality as well as the personal mobility that corridor residents desire and expect.

5.4.5. Land Use Strategies

General land use and site improvement recommendations for the nodal areas are identified above in Figures 16 and 17. Specific land use recommendations for the corridor, as well as development pattern recommendations, will be included in Technical Report #3 – Recommendations for the Route 96 Corridor: Traffic and Livability.

In broad terms, recommendations include:

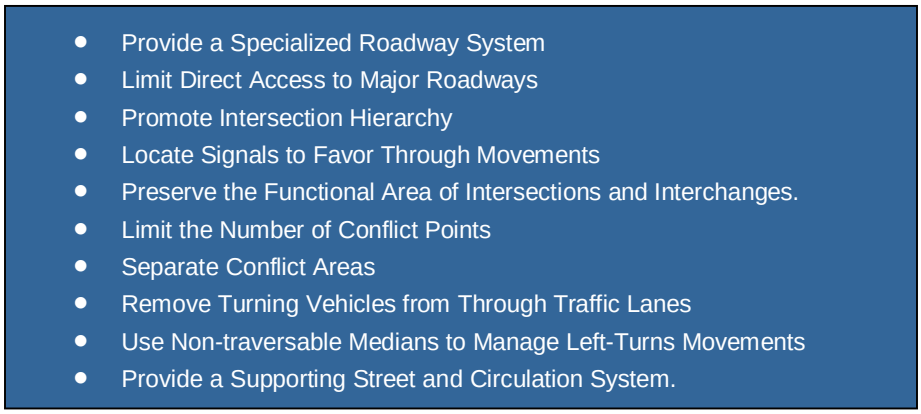
- Allowing and promoting a mix of uses and higher densities of development within the designated nodes;
- Maintaining outlying agricultural and farmland areas in their current use;
- Protecting important sight lines and viewsheds around the nodal areas;
- Working with TCAT to identify possible transit service expansions to accommodate a more diverse group of users;
- Creating a pedestrian circulation system within each node that allows for unhindered pedestrian movement to all destinations within node;
- Creating exterior linkages at each node to a regional trail system or existing off-road trail, such as the Black Diamond Trail, to provide a non-vehicular connection between nodes and outlying areas;
- Implementing of a signage program to alert drivers to the fact that they are required to share the road with bicyclists and pedestrians; and
- Delineating road shoulders to make them comfortable for pedestrian and bicyclist use.

5.4.6. Access Management Techniques

Safe and efficient transportation infrastructure and traffic operations are fundamental to local and regional economic development. Maintaining a safe and efficient transportation system, however, requires a careful balancing between the need to accommodate through traffic and the need to provide high quality access to properties abutting the roadway. Access Management is the planning, design and implementation of land use and transportation strategies that maintain a safe flow of traffic while accommodating the access needs of adjacent development. Access

management programs seek to limit and consolidate access along major roadways, while promoting a supporting street system and unified access and circulation systems for development. The result is a roadway that functions safely and efficiently for its useful life, and a more attractive corridor. Access management techniques coordinate the development of lands and their access points. This technique can reduce the need for future costly highway improvements required to address safety and capacity issues.

FIGURE 18 – PRINCIPLES OF ACCESS MANAGEMENT
Route 96 Corridor



Source: Access Management Manual by TRB, 2003

Land developments (large or small) occurring over time, slowly increase their effect on the safety and capacity of the roadway. Developing one parcel at a time may not have a significant effect. However, as the number of developments increase, the cumulative effect is much higher than that of the individual developments. Therefore, a comprehensive approach to land use and access management planning yield the highest return from state, local, and private investment in infrastructure and land development. A comprehensive land use and access management plan also provides the land developer and the community with a strategy for meeting their other, non-transportation objectives for the corridor.

DESIGN AND REGULATORY TECHNIQUES

The following two lists of techniques can be used to solve common traffic problems as they relate to access management. The first list provides design techniques that can be applied to the Route 96 corridor; the second list provides regulatory/land use changes that can be implemented by the municipalities that govern land use decisions throughout the Route 96 corridor.

Design Techniques to Solve Common Traffic Problems*

1. Limit Number of Driveways Per Lot to Reduce Intersection Conflict Points
2. Separate Driveway Conflicts
3. Minimize Left Turns
4. Promote Shared Access
5. Adopt Driveway and Street Spacing Standards
6. Promote Shared Driveway Residential Lot Design
7. Consolidate Driveways Where Possible
8. Reduce Speed Differential (speed limit reduction, turn lane and heavy duty shoulder improvements)
9. Locate Driveways Away From Intersections
10. Provide Adequate Corner Clearance
11. Maximize Sight Distance at Driveways
12. Limit Inadequate and Improper Driveway Offset
13. Utilize Bypass Lanes where appropriate
14. Promote Frontage and Reverse Frontage Roads (roads located behind buildings so that they are not visible from the main road) along Route 96
15. Promote Interconnected Sub-collector Street Network
16. Minimize Pedestrian and Vehicle Conflict Points at High Activity Areas (Parks, restaurants)

Local Regulatory Techniques/Strategies To Solve Common Traffic Problems*

1. Restrict the Number of Lots and Lot Types
2. Identify acceptable/desirable locations for new driveways and strictly hold new development to these locations.
3. Regulate the Location, Spacing and Design of Driveways
4. Increase Lot Width and Restrict Narrow Lot Design
5. Restrict Flag Lots
6. Design for Lot Configuration Along Local Roads and Sub-collectors
7. Promote Subdivision Access to Local Roads
8. Adopt Intensity of Use Restrictions
9. Promote Lots Fronting on Local Streets Instead of Route 96
10. Promote Deep Lots Along Route 96
11. Promote Compact Mixed Use Development
12. Designate Nonconforming Driveways
13. Develop Official Map
14. Revise Zoning & Subdivision Regulations Accordingly
15. Identify and Plan for Growth Areas

** Source: Access Management Manual by TRB, 2003*

IMPACTS OF ACCESS DENSITY

The density or intensity of land use directly impacts the generation of traffic, total vehicular movements, and the number of pedestrian and vehicular conflicts. As vehicular left-turn movements from Route 96 increase due to new development pressures, the greater the impact and delay is to motorists traveling Route 96, thus increasing the need for roadway widening.

Various design, safety, and land use elements restrict the opportunity for constructing dedicated left-turn lanes on Route 96 without significant impact to the adjacent environs. Such elements include limited horizontal and vertical sight lines, existing driveway and roadway locations, existing drainage structures, topography, right-of-way constraints, and existing land uses and sensitive natural features. The unplanned and uncontrolled use of left-turn lanes on Route 96 is detrimental to the residential and rural character of the corridor.

As shown in Figure 19, the number of conflict points along a corridor has a direct correlation with the accident rate of the facility. In other words, if the number of conflicts along a corridor can be kept to a minimum, the safer it will be to travel the corridor.

FIGURE 19 – CORRELATION BETWEEN ACCESS DENSITY AND ACCIDENT RATES
Average Figures