NESTS Transit Planning Project

Final Report

MULTISYSTEMS

· with ·

Creighton Manning Engineering

and

CAST of Cornell University

February 2003

Ithaca-Tompkins County Transportation Council

ITHACA-TOMPKINS COUNTY TRANSPORTATION COUNCIL

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1.0 Executive Summary

The primary goal of the NESTS Transit Planning Project was to determine the feasibility of encouraging people who currently drive in the northeast subarea of Tompkins County to use transit instead. The primary tools available were enhanced transit services and facilities and changes in local transportation policies. In the course of this study we attempted to determine what it would take to shift 3%, 5%, or 10% of person-trips in automobiles onto the transit system.

In order to design enhancements to the transit system successfully, an understanding of the needs and desires of the traveling public was required. This study included a significant market research effort: a telephone survey of 500 households. The survey was designed to learn about individuals who travel regularly in the study area, including regular users of the transit system and non-users. The survey was conducted by the Cornell University Computer-Assisted Survey Team, using a CATI (Computer-Assisted Telephone Interview) system.

The market research identified a number of areas upon which to focus in the service design, facilities design, and policy analysis. Service coverage and the frequency of service came out as the two most important factors in making transit attractive. Parking pricing appeared to be the most feasible policy lever available. The concept of a free remote parking lot and an express shuttle to their destination was attractive to many non-users, especially if parking fees at their destination rose.

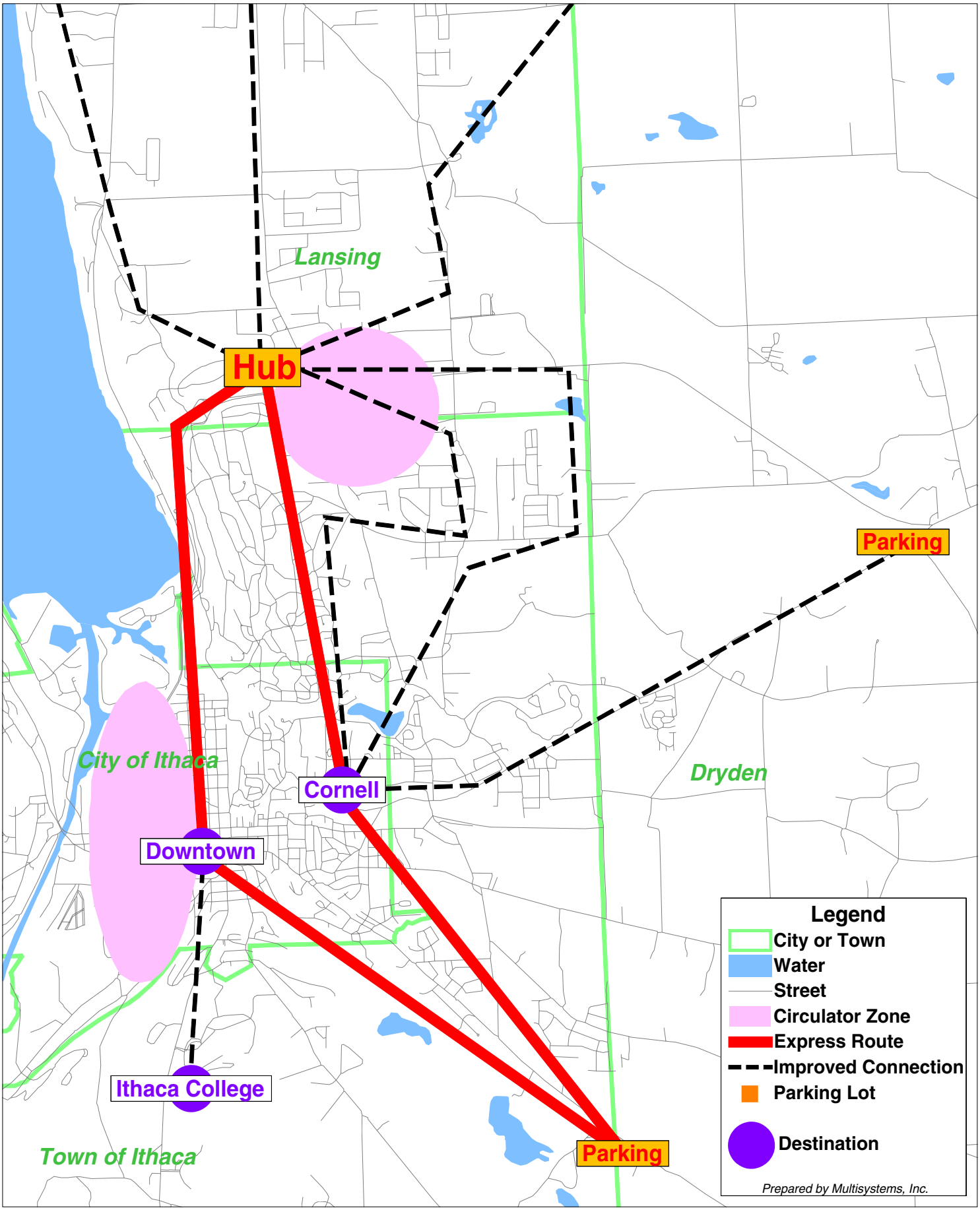
The service design process included new routes, improved service on current routes, and improved connections between routes. New routes were developed to serve areas that are not currently served and to offer faster and more direct service between specific locations. Current routes would be improved by expanding service hours on weekday evenings and weekends, and by increasing the frequency of service (i.e., decreasing the amount of time one must wait for a bus to arrive).

Public input offered guidance as the various service strategies were developed. Information gathered from local officials, the project committee, employers, and the general public was combined with route and segment-level ridership data, travel patterns, on-site local research, and data from the telephone survey to develop, and then to fine-tune, the proposed strategies. There are many potential service changes throughout the study area, including several new routes and major route modifications. Figure 1.1 shows schematically the overall recommended service concept. This concept includes the following elements:

- New routes
    - Express Routes (A, B, C and D)
    - Mall Area Circulators (Long and Short)
    - Downtown Area Circulators (A and B)

- Significant Route Modifications
    - Route 31
    - Route 32
    - Route 35
    - Route 37

Figure 1.1: Schematic map of recommended service concept



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- Slight Route Modifications
    - Route 11
    - Route 16
    - Route 36
    - Route 40
    - Route 41
    - Route 43

- Eliminated Route
    - Route 13

These route changes are described in detail in Chapter 4 and displayed in Figures 4.1 through 4.3.

An important part of the recommended service concept is a new suburban transfer facility, proposed to be located at Pyramid Mall. It would include a sheltered waiting area, and would serve as a convenient location for passengers to transfer between routes. Parking spaces currently provided for shoppers that are typically empty during the 9-to-5 period on weekdays would be available for park-and-ride customers. Other passenger amenities proposed to be available at the facility include transit information (including real-time bus arrival information), a telephone, a heater for winter weather conditions, and vending machines. Inside the Mall itself, a sign with real-time bus arrival information would be installed so that passengers could wait inside and know how much time they have before their bus arrives. Pyramid Mall management has been receptive to the proposed new transit hub.

The Pyramid Transit Hub is described in more detail in Chapter 5. That section of the report, primarily prepared by Creighton Manning Engineering, also contains information on other potential facilities improvements, including traffic signal priority, bicycle facilities, and various applications of Intelligent Transportation Systems (ITS) technology. One of the most valuable of these applications is the ability to inform riders about actual bus arrival times, as mentioned immediately above. Employment of this technology throughout the bus system and via the Internet can substantially reduce the amount of time riders spend waiting at bus stops.

Policy tools that can discourage people from driving include restricting the availability of parking and increasing parking rates. Two of the main policy tools that can be used to encourage transit include the Eco-pass program and the UPASS program, both of which eliminate the daily out-of-pocket payment for transit. Chapter 6 contains a number of sections describing the feasibility of changes in transportation-related policies and pricing. Section 6.1 describes current and future parking cost and availability in Downtown Ithaca. Section 6.2 discusses transit subsidies and parking cost and availability at Cornell University. Section 6.3 describes parking availability and transit subsidies at Ithaca College. Section 6.4 discusses opportunities to increase transit use to other major employers in the area. Finally, Section 6.5 provides examples of other places that are using policies to increase transit ridership and describes ways of changing attitudes toward transit.

In order to test the feasibility of the desired mode shift targets mentioned above, three tiers of the preferred strategy were developed. All of the tiers involve increases in service and in parking fees. The 3% Tier consists of the Enhanced service level (described in detail in Chapter 7) coupled with a $1 per day increase in parking fees at Cornell and Downtown Ithaca. The 5% Tier consists of the Enhanced service level coupled with a $3 per day increase in parking fees. Finally, the 10% Tier consists of the High service level coupled with a $3 per day fee increase.

The estimated cost for operating the Enhanced service level is roughly $1.3 million over the current cost of operating NESTS area routes, an increase of 91%, while the High service level represents a more than $3 million increment over existing service. The Enhanced level of cost increase may be feasible, assuming that TCAT is able to secure new revenue through the mortgage recording tax and that assistance from New York State increases (see discussion in Chapter 7), while the High service level appears to be financially infeasible using current potential funding methods. However, even if it were possible to fund the Enhanced service level, it appears that the parking fee increases are not a feasible option at Cornell.

The last time that Cornell raised parking fees for faculty and staff, the staff at the Cornell transportation office faced strong opposition to an increase of a few percentage points. An increase of $1 per day would be equivalent to an increase of at least 90%, and significantly more for some of the lower cost parking lots at the periphery of campus. Although $1 per day does not sound like a lot of money, since Cornell charges for parking as an annual fee, that cost increase would be perceived as a huge amount of money by Cornell faculty and staff, who already feel that they pay a lot for parking. It would be more feasible to change the parking fee structure at Cornell, as discussed in Chapter 6, than to implement significant parking fee increases for faculty and staff.

In contrast, the City of Ithaca is planning to increase parking fees to support a number of capital projects (as discussed in Chapter 6). To the extent that the City carries through on its proposed rate increases, transit ridership will increase. Ridership forecasts presented in Chapter 7 of this report take these parking fee increases into account. Nonetheless, given the infeasibility of changing parking rates at Cornell, the largest employer and trip generator (by far) in the NESTS area, it would be impossible to achieve the desired mode shifts, short of a gasoline crisis or some other external event.

This overall conclusion does not preclude the possibility, however, that significant mode shifts may be achievable in certain parts of the NESTS area. The favorable reception in surveys and public meetings to proposals for a new transit hub at Pyramid Mall and new express shuttles from there to Cornell and Downtown Ithaca suggests that there is a good chance of making some impact on the Triphammer Road/Pleasant Grove corridor through the Village of Lansing and Cayuga Heights. Another park-and-ride opportunity in Bethel Grove along State Highway 79 combined with an express shuttle to Cornell could reduce traffic along Pine Tree Road. If Cornell were to change its parking program to a daily fee structure, more significant mode shifts would be likely.

While it does not appear to be feasible to attain a 3%, 5%, or 10% modal shift through affordable transit improvements or acceptable policy changes, there are many improvements that can be

made that would have a positive impact on transportation in the NESTS area. This report proposes that the recommended strategy be implemented through the following five phases:

- Immediate term (1 to 2 years)
- Near term (3 to 4 years)
- Mid term (5 to 7 years)
- Long term (8 to 10 years)
- Future Period (year 11 and beyond)

Virtually all of the new routes and route modifications described in Chapter 4 would take place within the first two phases. In the remaining phases, service levels would be gradually increased to attract further ridership.

Chapter 7 presents the elements included in each phase and their associated costs and ridership estimates. That chapter also includes a full financial analysis of the implementation plan; a number of future scenarios are presented to allow for differing levels of funding from the state and federal governments. Under optimistic scenarios, the recommended plan can be implemented relatively easily. If funding from the state and federal governments drop, it will be much more difficult to support expanded service.

Now that the NESTS Transit Planning Project is at its conclusion, the responsibility for carrying out its recommendations falls mainly to TCAT and ITCTC. Detailed planning and scheduling work should commence as soon as possible for the service recommendations in the Immediate Term period. Next, a timeline should be set out for Near Term actions including the procurement of new vehicles, detailed planning of the new routes, and securing the cooperation of Pyramid Mall and others in setting up the park-and-ride arrangements. TCAT, in cooperation with Pyramid Mall, should begin the process of design and engineering for the new transit hub. ITCTC should work to get this project on its Transportation Improvement Program for FY2004. Federal funding should also be sought for the new vehicles necessary to operate the expanded service.

In terms of further study, Cornell University should seriously consider a full examination of moving from its current permit-based system to a daily-fee system employing smart card technology. In conjunction with continuous improvements in transit service, a change in the way Cornell handles parking could produce the most significant effects in reducing traffic and improving livability in the NESTS area.

2.0 Introduction

Transportation problems in the northeast section of the Ithaca Urban Area have been a major concern for the public and local leaders for many years going back to the early 1970s. Historical approaches suggested a single arterial roadway project—a new north/south connection—as the primary solution, but the Ithaca-Tompkins County Transportation Council (ITCTC) chose to take a more comprehensive look at the transportation problems and potential solutions in the Northeast Subarea.

The Northeast Subarea Transportation Study (NESTS) was conducted over an eighteen-month span from January 1998 to July 1999. The product of the study was the NESTS Transportation Plan, which took a broad look at transportation in the Northeast Subarea. An extensive public process helped to infuse the plan with livability and quality of life principles, beyond the more narrow focus of roadway improvements.

Of the nine major recommendations of the plan, the second called for the use of enhanced community-based transit service to alleviate congestion in the study area[1]. The plan set forth the following objectives under this recommendation:

- To provide a service sufficiently attractive and cost competitive to result in a significant reduction in use of personal vehicles
- To reduce traffic on neighborhood streets in the study area
- To provide an alternative to personal vehicles connecting residential areas with commercial areas on Triphammer Road, Cornell, Downtown Ithaca and employment locations on Warren Road.

While laying out some specifications of the enhanced transit service, such as bus service every ten minutes during peak hours and improved facilities, the NESTS Transportation Plan left it to this study to determine the design and feasibility of an enhanced transit system. It was hoped that this enhanced system would encourage people to use transit instead of driving and thus reduce traffic and the need for new roadways. The targets set forth for this study were mode shifts from automobiles to transit of 3%, 5%, and 10%.

This report describes the enhanced transit system designed during this study and offers conclusions on the feasibility of the target mode shifts. In addition, it provides an implementation plan and financial analysis of the recommended service concept.

In order to design enhancements to the transit system successfully, an understanding of the needs and desires of the traveling public was required. This study included a significant market research effort aimed at understanding the motivations and characteristics of travelers in the study area. Chapter 3 of this report highlights the key findings of a telephone survey targeting

[1] The study area is approximately the area bounded by Cayuga Lake and Route 13A on the west; E King Road and Coddington Road on the south; Ellis Hollow Road, Baker Hill Road, Sheldon Road, and Cobb Street on the east; and East Lansing Road, Searles Road, and Route 34B on the north.

individuals who travel regularly in the study area. Chapter 4 describes the recommended service concept, including maps and route-by-route descriptions. Chapter 5 describes the proposed suburban transit hub at Pyramid Mall and the feasibility of possible additional facilities and applications of technology. Chapter 6 discusses the feasibility of policy changes affecting parking cost and availability in Downtown Ithaca, transit subsidies and parking at Cornell University and Ithaca College, and opportunities to increase transit use among other major employers in the area. Chapter 7 discusses the feasibility of meeting the study goals of a 3%, 5%, and 10% modal shift from private automobiles to transit, and then lays out an implementation plan for and financial analysis of the recommended service concept. Finally, Chapter 8 presents overall conclusions and next steps.

3.0 Market Research

This chapter highlights the key findings from the telephone survey of 500 households conducted as part of this study. The survey was designed to learn about individuals who travel regularly in the study area, including regular users of the transit system and non-users. The survey was conducted by the Cornell University Computer-Assisted Survey Team, using a CATI (Computer-Assisted Telephone Interview) system. Complete survey results are available as a separate report which is available for download at http://www.tompkins-co.org/itctc/ntpp.html (Summary Report of Market Research). The survey questionnaire is included in that report as Appendix A.

While current non-users were the population of primary interest in the survey—in order to figure out how they may be encouraged to become users—valuable information was also gained from current users. User status was determined from the following question: "In the past 3 months, have you ridden any bus service in the local Ithaca area, such as that operated by TCAT?" One third of the respondents said they used a bus service in the study area (see Table 3.1).

Table 3.1: Distribution of respondents by user status

	Number	Percentage
Users	168	33.6
Non-Users	332	66.4
Total	500	100.0

There was a statistically significant difference in the marital status, age and household of users and non-users. More users reported being "single" (either never married, widowed, or divorced), under 35 years of age, and earning less than $40,000/year (see Figures 3.1, 3.2, and 3.3). Thus, in considering the responses to other questions, it must be remembered that the two populations in the survey are noticeably different.

Figure 3.1: Distribution of respondents by marital status and user status

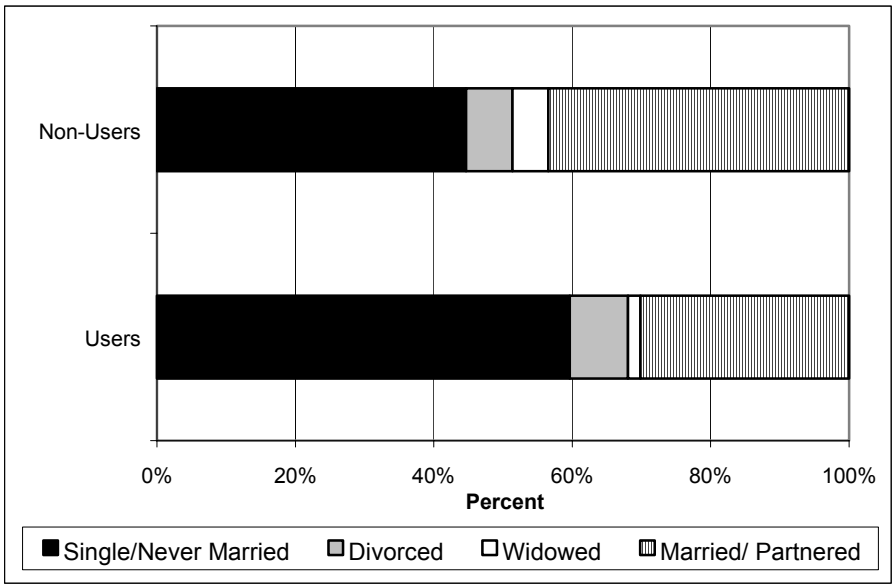


Figure 3.2: Distribution of respondents by age and user status

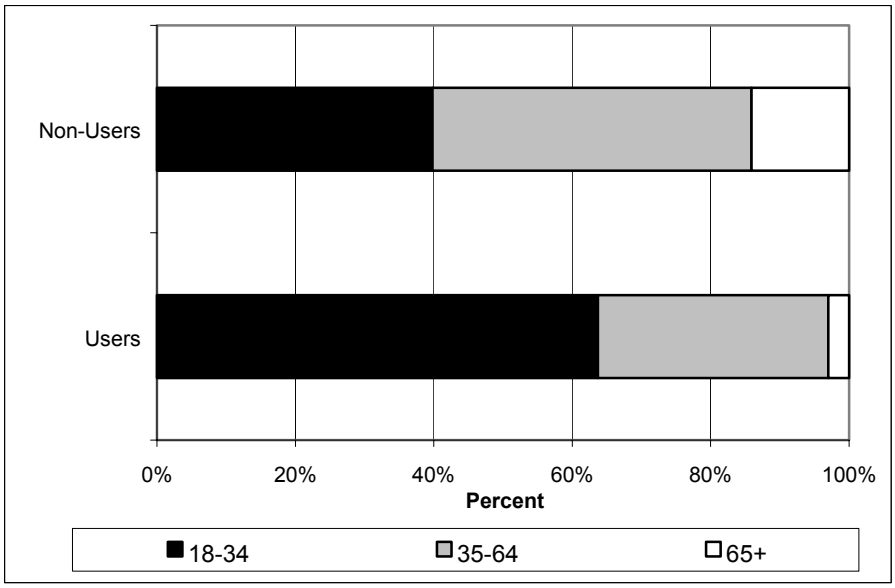
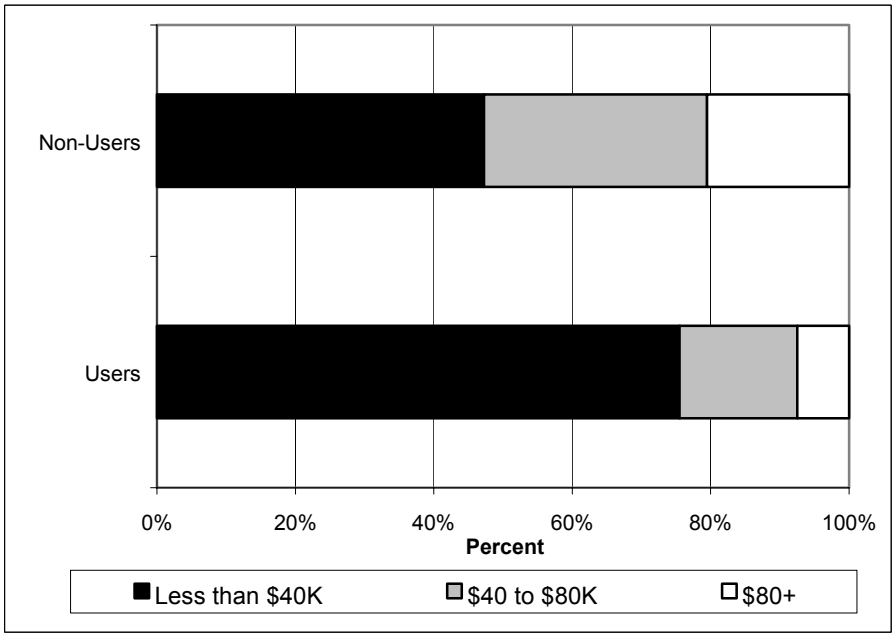


Figure 3.3: Distribution of respondents by income categories and user status



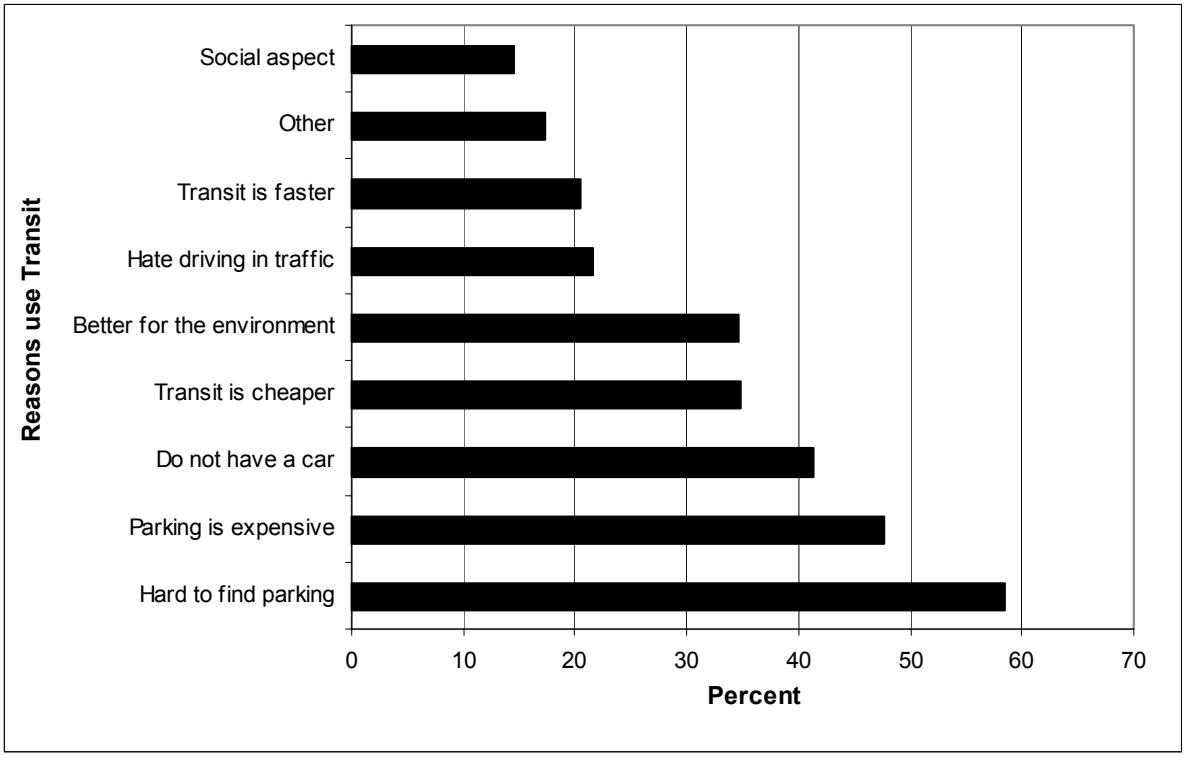
3.1 Users

Two of the questions posed to current users are of the greatest interest:

- Why do you use transit?
- What changes could be made to the transit system to encourage you to use it for more trips?

A majority of users took transit by choice, but many of their reasons relate to negatives associated with driving. As shown in Figure 3.4, almost six out of ten users said they use transit because it is hard to find parking, and approximately one out of two said they use transit because parking is expensive. Slightly more than one out of three users said that transit is cheaper than driving.

Figure 3.4: Reasons users use transit



There is potential for greater use of transit among the current user population. Seven out of ten users said they could use transit more than they currently do. Almost 80% of users said that if the service were more frequent they would make more trips on transit; 64% said that if the transit service ran later they would increase their usage; 58% said that if the fare were reduced or eliminated then they would use transit more often (see Figure 3.5). The most common purposes for these additional transit trips were shopping and social/recreational trips.

3.2 Non-Users

Of the 332 non-users in the survey, roughly half (178) said they work in the study area and about one in three (95) said they go to a university or college in the study area. Of non-users that work, three out of four drive their car alone to get to work (see Figure 3.6). More than half are offered free parking by their employer.

Almost half of all respondents who are non-users and go to school (meaning a university or a college) get there by car (driving alone) while another third said they walk to school. Driving alone to school was more common among females (65%) than males (29%). Approximately one in four non-users said their school offered them some type of parking assistance to them, which

is a much lower percentage than for workers. Few or none of these students would have been referring to Cornell, which offers no parking assistance to students.

Figure 3.5: Changes needed to increase current users' use of transit

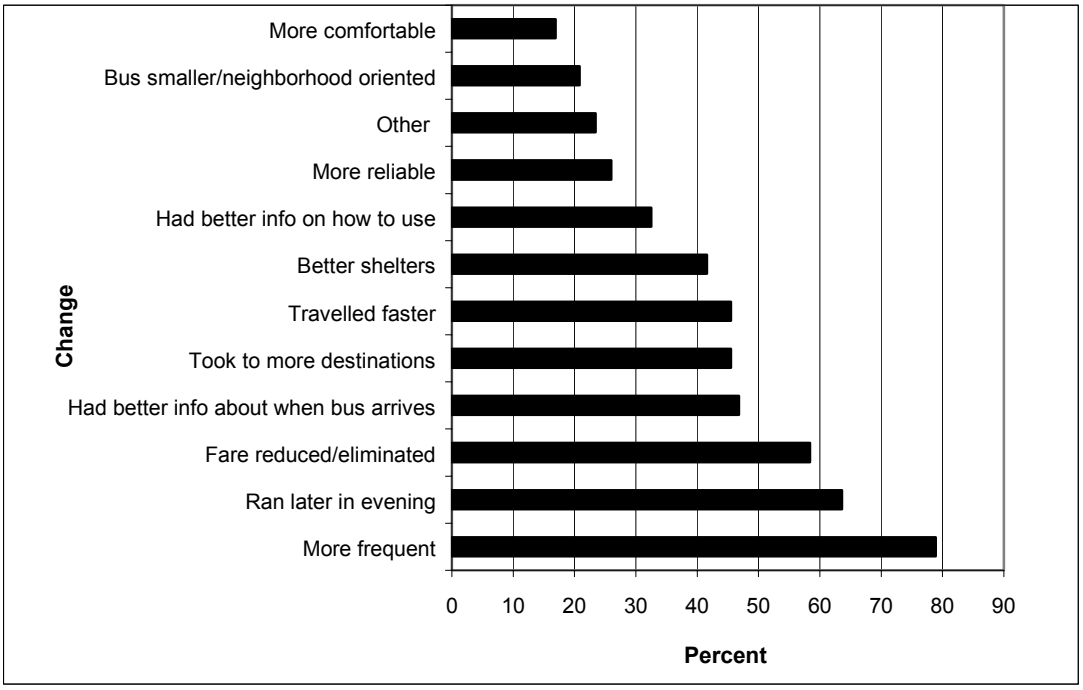
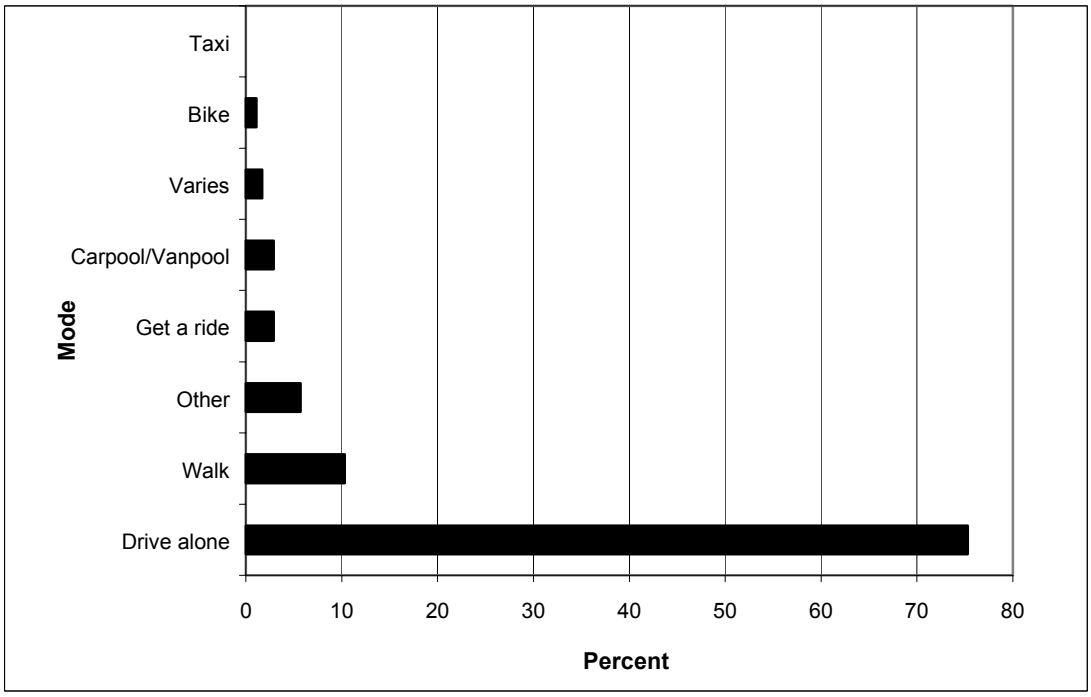
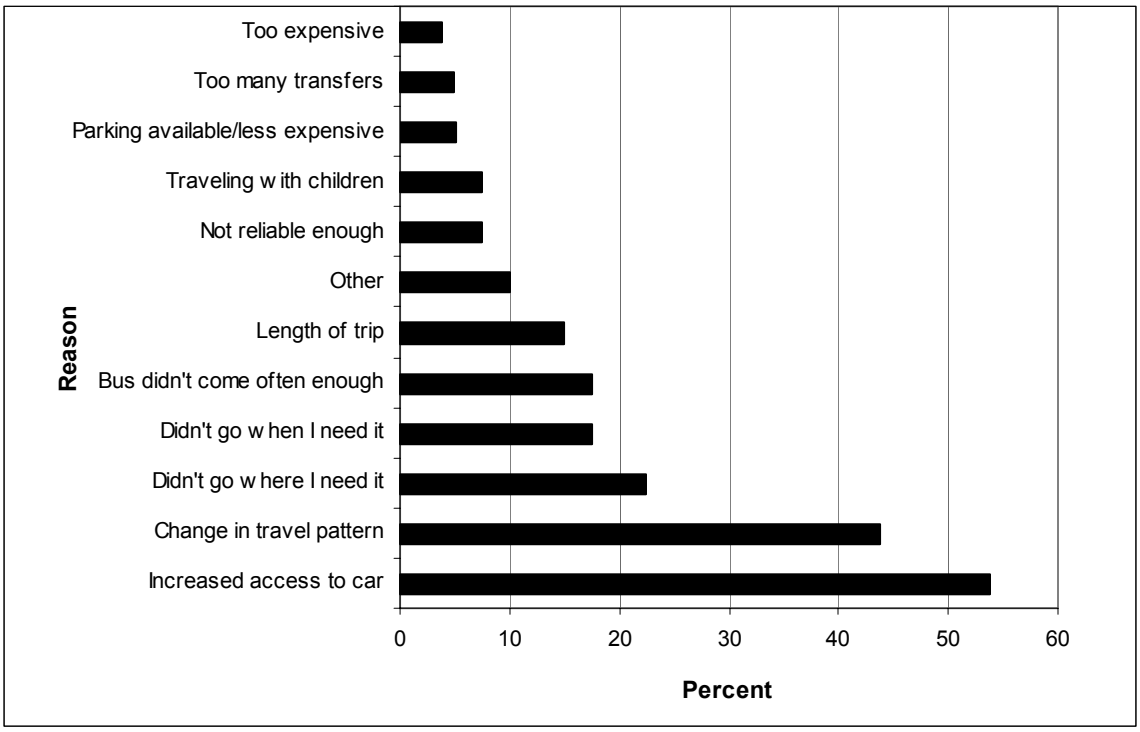


Figure 3.6: How non-users travel to work



The majority of the non-users, more than 70%, either never used transit in the Ithaca area or last used it over a year ago. People who had used transit within the last year, but no longer do, were asked why they do not now use it. The majority of respondents said that it was because they had increased access to a car (see Figure 3.7). This answer indicates that there was not a specific failing of transit that caused them to leave; rather a general inferiority to driving as a travel option. The second most common reason (43%) was because their travel pattern had changed. This answer, combined with the third-ranked response ("Didn't go where I need it"), indicates that the biggest problem with transit in the Ithaca area is the lack of convenient and direct connections to the places people want to go.

Figure 3.7: Reasons former users no longer use transit



Fifty-nine percent of non-users said they would use transit for at least some trips *if transit services were available so it was easy to use, convenient, inexpensive, and information about using it was readily available*. Of these, 72% said they would use it only occasionally or rarely. Between 35% and 45% of non-users said that they would be most likely to use public transit service for each of the following purposes: social/recreational, shopping, personal business, work, and school/university classes (see Figure 3.8).

In order to get more specific information about what changes to the transit system would make it more attractive, non-users were read a list of eleven possible changes and asked to indicate if each change would cause them to use the system at least for some trips. The results of this question are shown in Figure 3.9.

The top two responses are not surprising, given the findings discussed above: more than 70% of non-users would ride transit if it offered better connections between their origins and destinations

Figure 3.8: Type of trip for which non-users are most likely to use transit

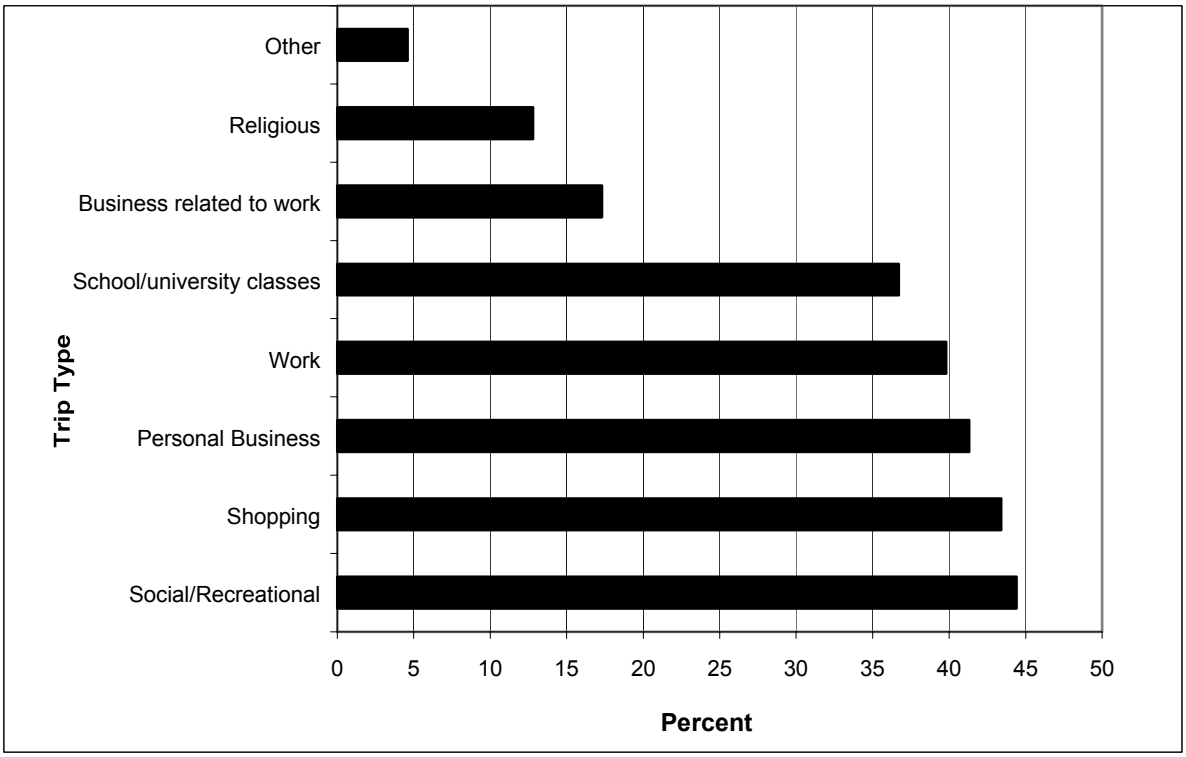
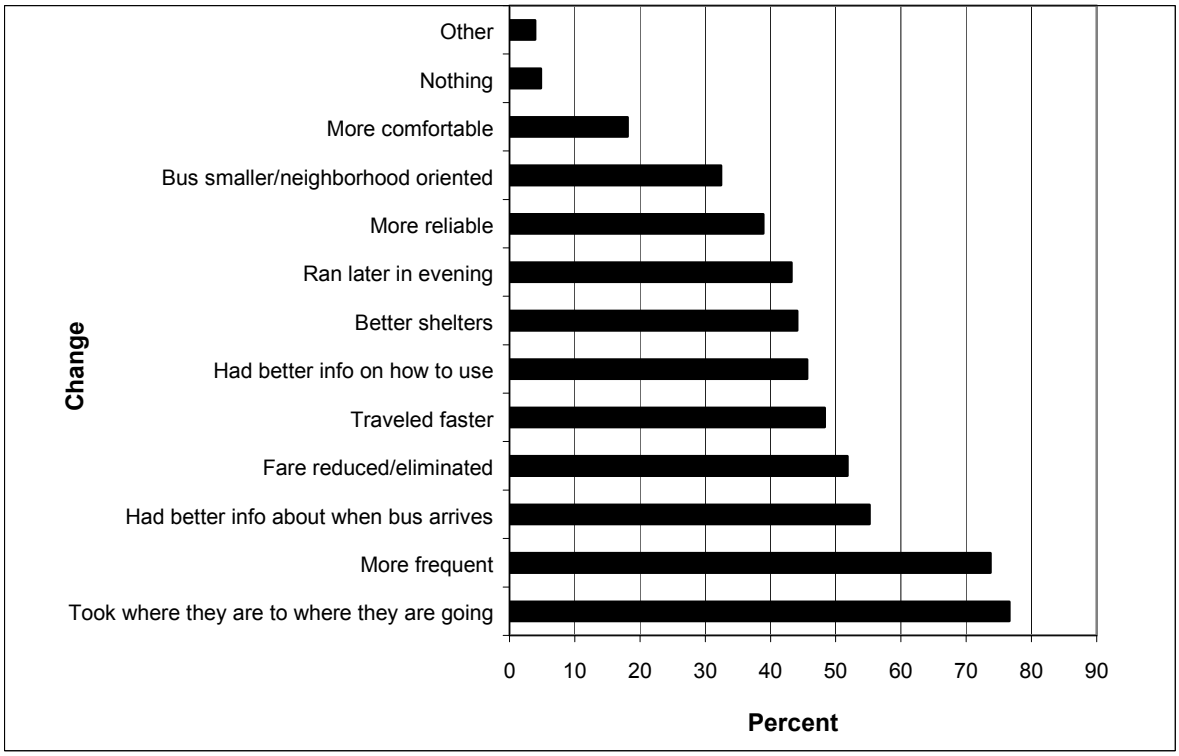


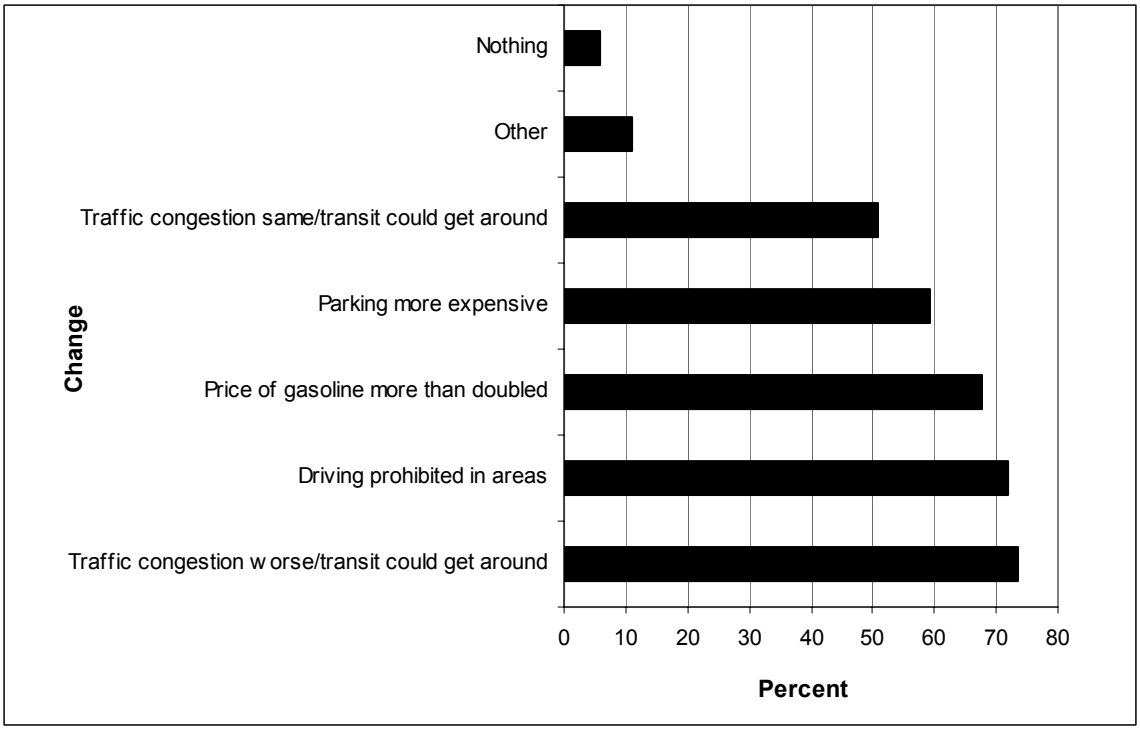
Figure 3.9: Transit system changes that would encourage non-users to use transit



and if it ran more frequently. The next two responses are somewhat more surprising: over 50% would ride if they had better information about bus arrival times and if the fare were reduced or eliminated. The value of better information, and ideally real-time information, supports TCAT's investments in technology and should add impetus to full implementation of an automatic vehicle location system and deployment of real-time bus arrival information signs. The next four items, clustered between 40% and 50% are also important, providing backing for new express services, more shelters, later service, and better static information about how to use the system.

Non-users were also asked about other transportation-related changes that would affect the relative attractiveness of transit and driving. Figure 3.10 shows that all of the five scenarios offered to the respondents, each of which would make driving much less attractive, would encourage more than 50% to become regular transit users. Having transit vehicles be able to get around congestion usually requires very expensive capital investments, ranging up to exclusive rights of way. This study examined several lower cost options for improving transit travel time compared to driving; Chapter 5 has more discussion of this analysis. The price of gasoline is mostly out of the hands of local authorities. While Ithaca already has an automobile exclusion zone at Ithaca Commons, expanding this zone or implementing an automobile ban on the Cornell campus were not judged to be feasible options. Parking pricing is an available policy lever, though significant increases in fees are also difficult to implement.

Figure 3.10: Other changes that would encourage non-users to use transit



Ten percent of non-users said that if they could park for free at a remote lot and have an express shuttle to their destination they would be willing to become a regular transit user, even if the daily charge for parking at their destination did not increase. Another 12% (22% total) said they

would be willing if the daily charge for parking increased only by $1 per day, 15% more (37% total) said they would be willing if the daily charged increased by $2, and another 9% (46% total) said they would be willing to become a regular transit user if the daily charge increased by $3 per day. These results were used extensively later in the study to gauge the effect of parking fee increases on mode choice.

Using home, work, and school addresses collected from respondents during the survey, origins and destinations of people who said they would use a park-ride shuttle were mapped. This effort indicated the potential for a new express shuttle to Cornell for people coming from the north in the Town and Village of Lansing. This service is among those recommended in Chapter 5.

Two other findings in the survey were of particular interest. Forty-three percent of non-users said they would ride the bus somewhat or much more often than they do now if an E-ZPass-type program were available. Such a program would establish accounts for transit users and instead of paying a cash fare or buying a monthly pass, their transit usage would be charged to their credit card. This type of program would require TCAT to install automated fare collection equipment, including smart card readers, on their vehicles.

Finally, more than half of all non-users would obtain information about transit routes and schedules from the Internet, while 44% said they call the transit agency to get information. This finding emphasizes the importance of an attractive and informative website.

3.3 Summary

The market research identified a number of areas upon which to focus in the service design, facilities design, and policy analysis. Service coverage and the frequency of service came out as the two most important factors in making transit attractive. Parking pricing appeared to be the most feasible policy lever available. The concept of a free remote parking lot and an express shuttle to their destination was attractive to many non-users, especially if parking fees at their destination rose.

All of the findings described above inform the following chapters of this report, which set forth the recommended service concept and associated facilities.

4.0 Service Design

This chapter describes the process used to generate service design proposals, followed by the proposed service design including maps and route-by-route descriptions. Details on the recommended level of service on these routes will be discussed in Chapter 7, Recommended Strategies. For purposes of this section, the study area has been divided into three portions: the northern portion extends northward from Pyramid Mall and includes the Town and Village of Lansing; the middle section extends between Cornell University and the Pyramid Mall; and the southern portion extends southward from Cornell and includes Downtown Ithaca.

4.1 Service Design Process

To encourage drivers to leave their cars and use public transit, new routes, improved service on current routes, and improved connections between routes were designed. New routes were developed to serve areas that are not currently served and to offer faster and more direct service between specific locations. Current routes would be improved by expanding service hours on weekday evenings and weekends, and by increasing the frequency of service (i.e., decreasing the amount of time one must wait for a bus to arrive). Both of these improvements were cited by respondents to the telephone survey (described in Chapter 3 above) as being among the most strongly desired. The construction and operation of a suburban transfer facility would improve connections between routes by providing a convenient, safe, and high visibility location for passengers to transfer between routes as well as between automobiles and transit. The schedules of routes serving this Hub would be coordinated to reduce waiting time.

Public input offered guidance as the various service strategies were developed. Information gathered from local officials, the project committee, employers, and the general public was combined with route and segment-level ridership data, travel patterns, on-site local research, and data from the telephone survey to develop, and then to fine-tune, the proposed strategies. There are many potential service changes throughout the study area, including several new routes and major route modifications. The proposed service concepts include the following:

- New routes
    - Express Routes (A, B, C and D)
    - Mall Area Circulators (Long and Short)
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- Significant Route Modifications
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- Slight Route Modifications
    - Route 11
    - Route 16
    - Route 36
    - Route 40

- Route 41
- Route 43

- Eliminated Route
  - Route 13

Section 4.2 describes the proposed service concepts in the northern portion of the NESTS area, Section 4.3 describes the proposed service concepts in the middle portion of the NESTS area, and Section 4.4 describes the proposed concepts in the southern portion. A suburban transfer facility (the "Pyramid Transit Hub"), would be constructed and operated in a portion of Pyramid Mall's parking lot, and is a key component of the service strategies. The Pyramid Transit Hub is described section 1 of Chapter 5.

4.2 Proposed Changes in the Northern Portion of the NESTS Area

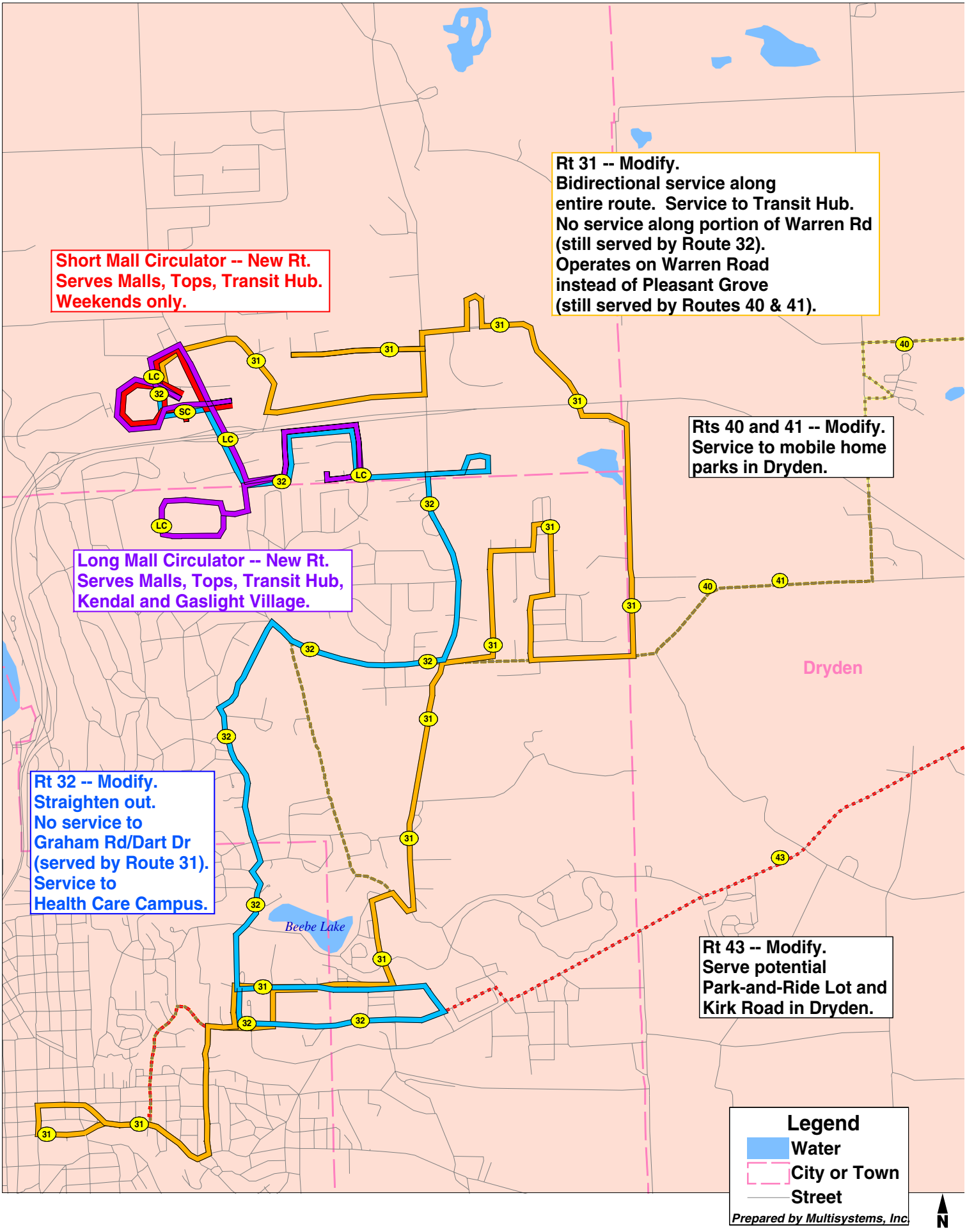
A few service changes are proposed for routes as they operate north of the Pyramid Transit Hub. The main purpose of these changes is to extend service to additional areas and to provide transfer opportunities at the Pyramid Transit Hub. Figure 4.1 illustrates these proposed service concepts, which are described below.

- ***Route 35.*** The proposed Route 35, a modification of existing Route 35, would operate between the Pyramid Transit Hub and the Ludlowville/Myers area via Triphammer Road, Horizon Drive, Bush Lane, Cherry Road, Warren Road and Hillcrest Road. This route would offer improved coverage of areas that do not currently have convenient service. It would also provide a higher level of service than the current Route 35.

- ***Route 36.*** Route 36 would be re-routed off State Rt. 34 to serve Oakcrest Road and the Pyramid Transit Hub before returning to Rt. 34 via Rt. 13. The route would not travel all the way around the Mall, but only stop at the Hub before continuing downtown. In the morning period, this re-route would take effect just prior to the opening of stores at the Mall (i.e., not during early morning hours). Additionally, service on this route should be extended later in the evening, either by delaying the last outbound departure from the Vet School until at least 5:30 p.m. (from the current 5:05 p.m.) or adding one more departure at approximately 5:45 p.m.

- ***Route 37.*** North of the Pyramid Transit Hub, Route 37 would be re-routed so that it would serve the Hub via Dart Drive and Graham Road. Other changes would occur farther south and are discussed in Section 4.3.

Figure 4.1: Immediate term actions



4.3 Proposed Changes in the Middle Portion of the NESTS Area

Many changes are proposed to improve service in the area between Downtown Ithaca/Cornell and the Pyramid Transit Hub, including four new routes (two express routes and two mall circulators), and changes to Routes 16, 31, 32, 37, 40, 41 and 43. Specific details on the proposed service concepts in the middle portion of the study area are shown on Figure 4.2 and are described below.

- ***Express A.*** Express route A, a new route, would operate between the Pyramid Transit Hub and Cornell University via Triphammer Road and Thurston Avenue. This would be a frequent service scheduled to allow for convenient transfers to and from other routes at the Pyramid Transit Hub. Passengers would be able to park-and-ride at the Pyramid Transit Hub, and would have fast, direct service to Cornell (the estimated travel time is 12 minutes from the Hub to central campus). In the telephone survey, people responded positively to the concept of an express shuttle from a remote park-ride lot. Those who now park in lots closer to Cornell (especially the A Lot) would be the primary target market for this remote park-and-ride location.

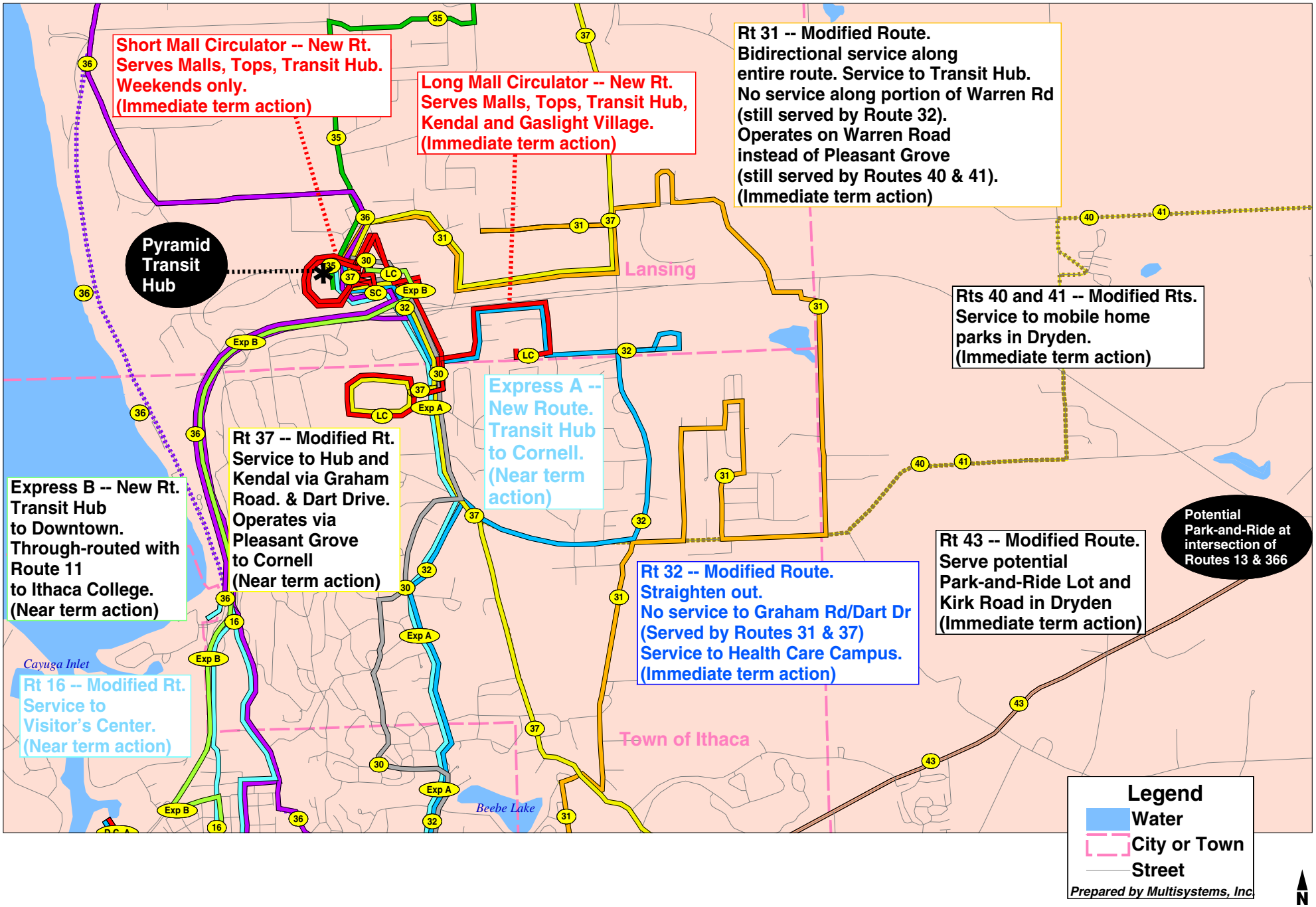
- ***Express B.*** Express route B, a new route, would operate between the Pyramid Transit Hub and Downtown Ithaca via State Rt. 13, Dey Street, Lincoln Street and Cayuga Street. The route could be interlined with Route 11 during off-peak periods to provide a one-seat-ride between Pyramid Mall, Downtown and Ithaca College. Passengers could use the park-and-ride lot at the Pyramid Transit Hub for direct service into the downtown area (the estimated travel time is 9 minutes from the Hub to downtown).

- ***Mall Circulators.*** Two new circulator routes are proposed to serve Pyramid Mall and its environs—a Long Mall Circulator and a Short Mall Circulator—both of which would be operated by small vehicles. The Short Mall Circulator would serve the Pyramid Transit Hub, several stops around Pyramid Mall, Tops Plaza, and Cayuga Mall. This route would operate only on weekends. The Long Mall Circulator would serve all locations served by the Short Mall Circulator, and would also provide service to Triphammer Mall, Kendal and Gaslight Village. The Long Mall Circulator would operate on weekdays as well as on weekends.

- ***Route 13.*** TCAT Route 13 would be eliminated. It would be replaced by two downtown circulators (described in Section 4.4), Route 16 (see below) and Express B.

- ***Route 16.*** Route 16 would be slightly modified to serve the Visitor's Center, which would no longer be served by eliminated Route 13. Route 16 would continue to be interlined with Route 51.

Figure 4.2: Proposed service concepts in the middle portion of the study area



- ***Route 31.*** Route 31 would undergo significant modifications to make it more direct and to offer a new connection from East Cayuga Heights to Pyramid Mall. This route currently provides service to the East Cayuga Heights neighborhood and to the Northwood Apartments via a long one-way loop. It is proposed that the route be extended from the Northwood Apartments to the Pyramid Transit Hub via Dart Drive and Graham Road (replacing service on a segment that is proposed to be removed from Route 32). Service would no longer operate along a section of Warren Road, but Route 32 would continue to operate along this segment. Service would operate in both directions along the entire length of the route (instead of the current one-way loop). Route 31 would no longer serve the Health Care Campus, which would be served by Route 32. To provide a more direct service, Route 31 would operate via Warren Road instead of Pleasant Grove between Hanshaw Road and Forest Home Drive. (Routes 37, 40 and 41 would provide service along Pleasant Grove Road between Hanshaw and Cornell University.) Route 31 would connect to Downtown Ithaca all day instead of terminating at Cornell during the midday, as it currently does.

- ***Route 32.*** It is proposed that Route 32 be simplified so that it operates directly between Sheraton Drive and the Pyramid Transit Hub – no longer doubling back down State Highway 13 to Dart Drive and Graham Road prior to arriving at Pyramid Mall. (As mentioned above, Route 31 would be modified to provide service along Dart Drive and Graham Road.) This Route 32 modification would provide more direct service for many passengers to and from the Pyramid Mall area.

- ***Route 37.*** In addition to the changes described for Route 37 north of the Pyramid Transit Hub (described in Section 4.2 above), there would be important changes south of the Pyramid Transit Hub, where the route would be extended to Kendal in order to provide direct and convenient service to Cornell for many retired and semi-retired faculty who live in Kendal. To provide more direct service between Kendal and Cornell, the route would operate via Pleasant Grove Road (it currently operates on Warren Road north of Cornell). It is proposed that this route continue to operate only during peak service hours.

- ***Routes 40 and 41.*** In Dryden, a slight modification of Routes 40 and 41 is proposed to provide bus service *within* the mobile home park located at the southeast corner of the intersection of Hanshaw Road and Etna Road. Routes 40 and 41, which currently travel on Hanshaw Road past this mobile home park, would be re-routed to travel into the mobile home park, via Lake Country Avenue and Schwan Drive.

- ***Route 43.*** It is proposed that Route 43 be modified so that rather than passing by Kirk Road (in the inbound direction) the bus would turn right onto Kirk Road, then left onto State Route 366 where it would continue on to Cornell. In the outbound direction, the same modification would be made in reverse. In addition, a new park-and-ride lot would be located near the intersection of State Highways 13 and 366. Route 43 would serve this lot, offering a direct connection to Cornell and Downtown Ithaca.

4.4 Proposed Changes in the Southern Portion of the NESTS Area

Several changes are proposed for the downtown area and points south. It is proposed that a new downtown circulator system be introduced, along with two new express routes from Bethel Grove along Route 79 in Dryden. Finally, Route 11 would be modified. Specific details on the proposed service concepts in the southern portion of the study area are shown on Figure 4.3 and are described below.

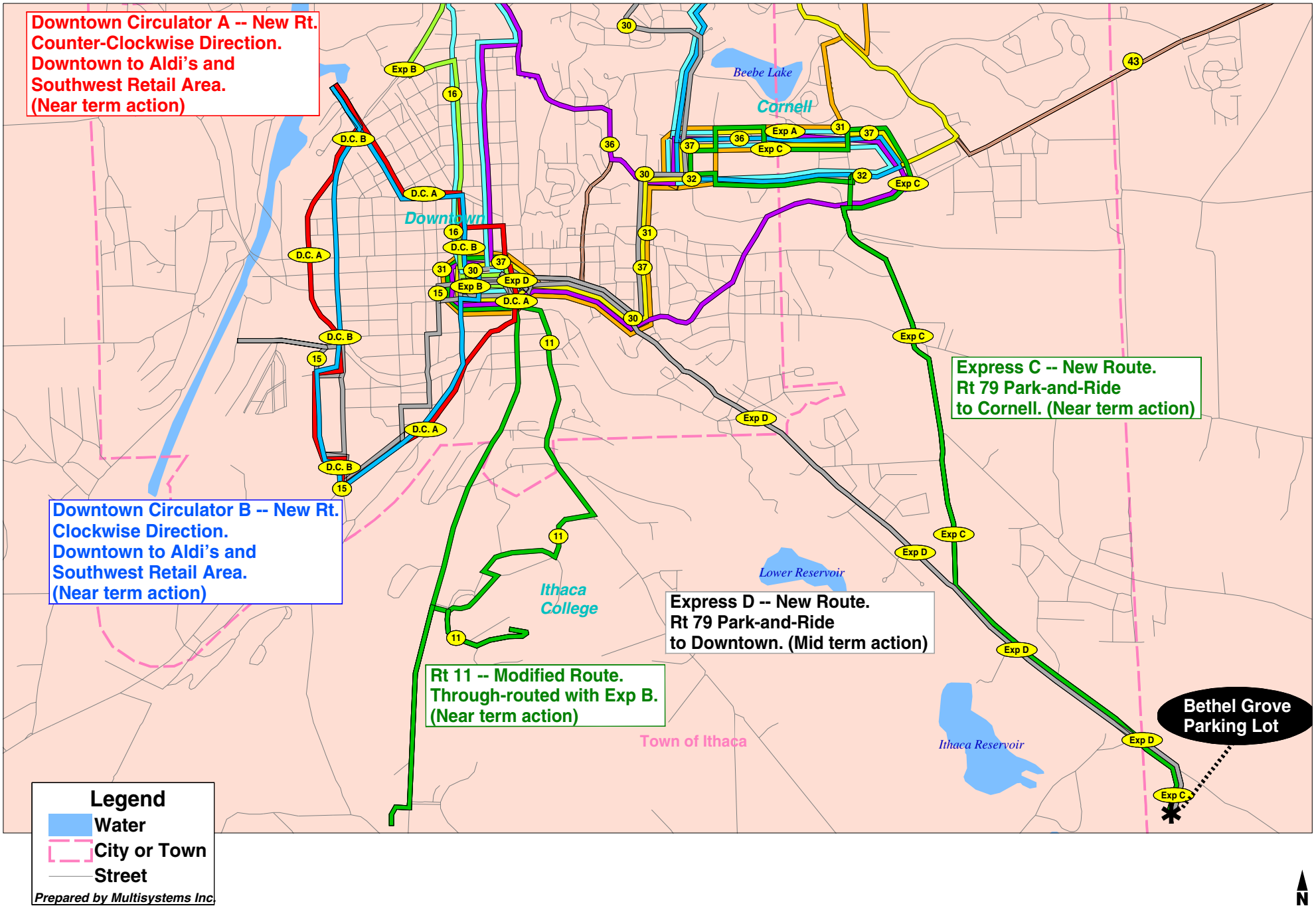
- ***Downtown Circulators.*** To provide better service within the Downtown Ithaca area, the new Downtown Circulator Route A would operate as a counter-clockwise loop, providing service among downtown, Aldi's, and the southwest retail area. The route would operate from the downtown transfer point, north on North Aurora Street, west on West Court Street, north on North Cayuga Street, west on Cascadilla Street, north on 3rd Street to Aldi's. From Aldi's the route would operate south on 3rd Street, south on State Highway 13, continuing south on South Fulton Street, south on South Meadow Street, and into the southwest retail area. From the southwest retail area, the route would operate south on South Meadow Street, northeast on Elmira Road, northeast on Spencer Street, east on Prospect Street, and north on North Aurora Street (This alignment assumes the reconstruction of Spencer Street to be two-way, a project that is scheduled to be completed before the time this route would be implemented.) The Downtown Circulator Route B would also operate as a one-way loop, but in the opposite direction (clockwise). From the downtown transfer point, the route would operate south on North Cayuga Street, southwest on West Spencer Street and Elmira Road, north on North Meadow Street, and into the southwest retail area. From the southwest retail area, the route would operate north on North Meadow Street, north on North State Hwy 13, north on 3rd Street to Aldi's. From Aldi's the route would operate south on 3rd Street, east on Cascadilla Street, and south on North Cayuga Street to the downtown transfer point.

- ***Express C.*** Express Route C, a new route, would operate between Cornell University and a park-and-ride lot which is suggested to be located at the Bethel Grove Church and Fellowship Center, located on Route 79 just over the Ithaca/Dryden line in the Town of Dryden. The route would operate via Route 79 and Pine Tree Road and would make a loop around the Cornell campus. This service would target people who live south and east of Cornell and drive to campus via Route 79.

- ***Express D.*** Express Route D, a new route, would operate between Downtown Ithaca and the Bethel Grove park-and-ride lot. The route would operate directly between the lot and the downtown transfer point via Route 79. The primary target market for this route is those who currently drive to work via Route 79 and park in downtown lots.

- ***Route 11.*** This route is proposed to incorporate two service improvements. The route would be through-routed with Express B to provide a one-seat-ride from Ithaca College all the way to the Pyramid Transit Hub. Additionally, the route would provide service every trip to both Longview and The Towers by using some slack time in the off-peak cycle for Express B. Currently, the route alternates between serving Longview and the Towers.

Figure 4.3: Proposed service concepts in the southern portion of the study area



5.0 Facilities Design

This chapter presents details on the Pyramid Transit Hub. It also reports the findings on the feasibility of possible additional facilities such as signal priority systems, queue jumpers and bus lanes which hold the potential to improve the efficiency of bus operations in the NESTS area. Key issues for all of these potential actions include relationships to the existing transportation system and traffic flows (the latter on both public roads and private property), community acceptance, and cost-effectiveness.

5.1 Pyramid Transit Hub

A suburban transfer facility is proposed to be located at Pyramid Mall. It would include a sheltered waiting area, and would serve as a convenient location for passengers to transfer between routes. Parking spaces currently provided for shoppers that are typically empty during the 9-to-5 period on weekdays would be available for park-and-ride customers. Other passenger amenities proposed to be available at the facility include transit information (including real-time bus arrival information), a telephone, a heater for winter weather conditions, and vending machines. Inside the Mall itself, a sign with real-time bus arrival information would be installed so that passengers could wait inside and know how much time they have before their bus arrives.

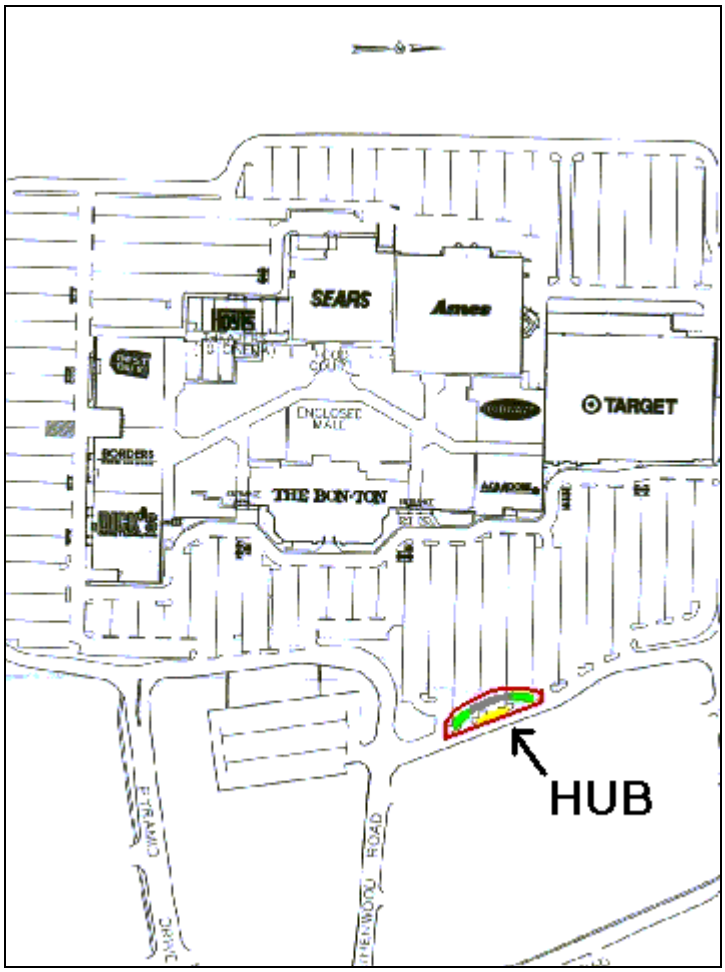
The Pyramid Mall area was selected as the location for the proposed transit hub for a variety of reasons. Pyramid Mall offers convenient access to State Highway 13 and North Triphammer Road, and is thus an excellent collection point for the Town and Village of Lansing. As one of the primary shopping and employment destinations in Tompkins County, Pyramid Mall already has significant bus service. It also already has ample parking availability during commuting hours (no new parking would have to be constructed). Being a major travel generator in its own right, Pyramid Mall is a natural location for a transit hub (not everybody would have to transfer to/from another bus at the Pyramid Transit Hub since the mall itself is the final destination/origin for many passengers). Finally, Mall management has been receptive to the idea of hosting the transit hub within the Mall's ring road.

Figure 5.1 displays a transit facility located adjacent to an entrance of a shopping mall near Albany, New York. (Pyramid Hub would be half the size of the one in the figure.) Rather than be located adjacent to a main entrance at Pyramid Mall, it is proposed that the Pyramid Transit Hub be constructed in the newly expanded portion of the parking lot, behind Lansing Village Place, and located south of the parking area of the new Target.

The Pyramid Transit Hub is proposed to be located along the inner edge of the Pyramid Mall ring road, between the Graham Road West and Catherwood Road intersections. Illustrated in Figure 5.2, this location would provide for quick bus access to and from the Pyramid Transit Hub, using Catherwood Road and Graham Road West. Since electric utilities are located nearby, heat, light and other electric/electronic amenities (i.e., real-time information) would be easily installed.

Figure 5.1: Transit center at Crossgates Mall, Albany, NY

Figure 5.2: Proposed location of Pyramid Transit Hub



It is recommended that TCAT be responsible for constructing, maintaining and policing the structure at the Hub. Discussions should take place with Pyramid management about routine cleaning, snow removal, and trash removal, which could be more efficiently performed by Mall staff.

It is expected that the buses that would serve the Mall and the Hub in the future would not all be the large, 40-foot buses operated today by TCAT; rather many of them (including more than half of the buses serving the Mall) would be 20 to 25 foot-long shuttle vans. Nevertheless, the design of the Hub is based on the standard of accommodating boarding and alighting activity related to two parked full-length buses at a time. The Hub would have three entryways facing the transit vehicle staging area providing access to the inside sheltered area; the front and rear entryways would line up with the locations of the front doors when two shuttle vans are parked at the Hub. The remainder of the front section of the shelter would be a series of tempered glass panels, to protect transit patrons from weather and exhaust. This two bus-length transit center would be expected to accommodate the flows of transit vehicles under the proposed Mall area transit service scheme; any long vehicle layovers could be accommodated in one of a number of lightly used sections of the Mall property.

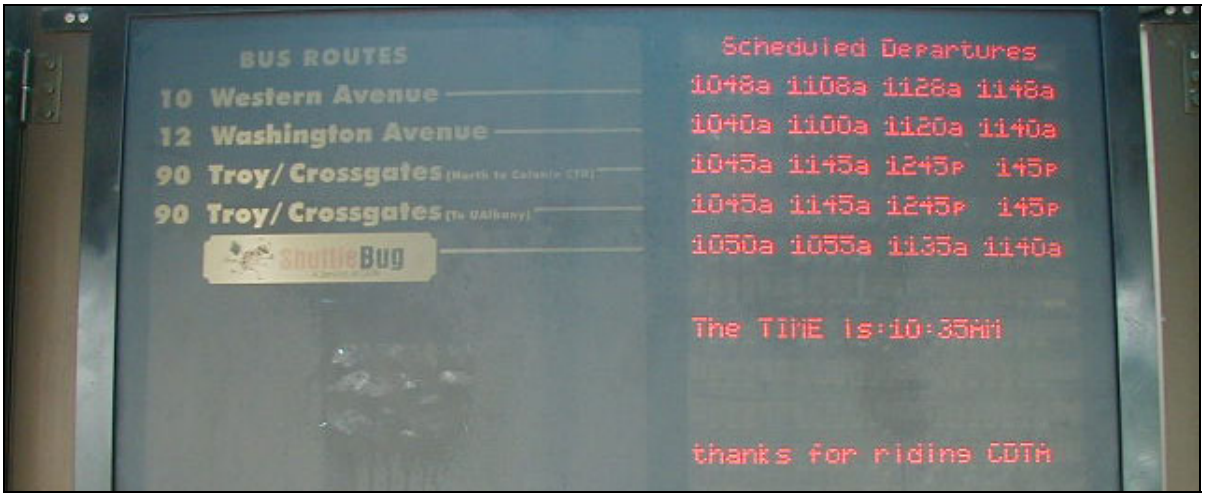
Park-and-ride spaces would be provided in the area between the Transit Hub and the Mall building. This area is just to the south of the parking for the new Target store. While the entire TCAT fleet is equipped with front end-mounted bike racks, bicycle parking accommodations should still be provided at the park-and-ride lot, for bus riders who use bicycles as their access mode. Given considerations of weather and security, lockers would be preferred over racks for bicycle storage at the lot; alternatively, pedestrian and bicycle advocates noted that conventional "open" bicycle racks would be acceptable if they were sheltered by a canopy or some other type of partial enclosure.

5.1.1 Passenger Amenities

Seating should be provided along the back wall of the proposed Hub, in the form of a series of separate benches distributed along the length of the structure. Waste receptacles, a coin/card-operated telephone, and built-in electric space heaters and lighting should be among the passenger amenities provided at the Hub, at a minimum.

TCAT route timetable information should be provided at the Hub and simultaneously within the Mall near the main entrance. As will be discussed in the section on automatic vehicle location (AVL), providing real-time arrival information at major transit stops is possible using a combination of AVL data and a "smart algorithm" to predict arrival times. TCAT has indicated a desire to develop AVL capabilities which will facilitate provision of such information to passengers at the Hub; a valuable interim step would be to equip the Hub with an electronic signboard such as that illustrated in Figure 5.3 below to provide scheduled departure information. A cellular modem-equipped signboard can minimize the level of effort required to update this information and/or advise passengers of special conditions; such signboards can usually be integrated into automated traveler information systems (including remote real-time updates) and otherwise "grow" with the technology available to TCAT at any given time.

Figure 5.3: Scheduled departure information at transit center



5.1.2 Traffic-Related Design Treatments

These treatments address two main concerns: the need to optimize interactions between pedestrians and transit, and the need to manage interactions between Hub-related traffic (pedestrian and vehicle) and Mall-related traffic.

Since many bus riders will have destinations in the Mall, it is anticipated that there will be significant pedestrian traffic between the Hub and the Mall entrance. While the location of the Hub on the inner side of the ring road minimizes overall pedestrian safety concerns, some additional treatments may be advisable. One possibility would be to paint a crosswalk or pathway from the Hub to the sidewalk along the Mall building. A further measure would be to separate the "head-to-head" parking spaces within one row and place a walkway between the two sides of the row. The walkway would need to be protected by asphalt or concrete berms to prevent cars from parking over the walkway.

Curbing and pavement markings should clearly distinguish the ring road and transit center access areas. Motorists proceeding southbound from the Graham Road West intersection should clearly see that the transit vehicle access to the Pyramid Transit Hub is not a general-use thoroughfare. These physical treatments should be complemented with a "BUSES ONLY" sign at the point at which transit vehicles would leave the ring road to access the Hub. The access for transit vehicles to the Transit Hub and the length of the vehicle staging area should be curbed off to clearly segregate it from southbound ring road traffic and the adjacent parking area.

The area in which transit vehicles will maneuver between the ring road and the Transit Hub structure should be at least wide enough to accommodate three buses, side-by-side, to ensure sufficient space for full-length bus maneuvers (including instances in which the rear bus leaves

the Hub before the front bus), maintenance vehicle maneuvers (including tow hook-ups) and personal motor vehicle clearances (in the event that motorists disregard or do not notice the "BUSES ONLY" sign).

The "footprint" of the Transit Hub will also create the need for some amount of pavement marking modification in the existing Mall lot to reflect the termination of three or four rows of parking a few spaces before the ring road. These rows could be terminated a sufficient distance from the Transit Hub to allow vehicles proceeding toward the ring road to turn left or right and travel parallel to the ring road until reaching a row clear of the Transit Hub to reach the ring road. While the shelter structure and the curbing of the Hub area will provide visual cues to motorists regarding the need to travel around the Hub, installation of a guiderail or other low barriers along the Mall side of the Hub would provide additional protection to transit patrons.

5.2 Traffic-Related Elements

5.2.1 Traffic Signal Priority

The market research effort in this study found that a considerable number of survey respondents pointed to a lack of predictability or reliability as the reason why they did not use transit. *Transit signal priority* is one approach to enhancing the reliability of transit service. Signal priority can improve schedule adherence by providing transit vehicles with either an early green light or an extended green phase at signalized intersections.

The potential to introduce signal priority capability was considered particularly for the existing signalized intersections near the Mall (and more specifically, the State Highway 13 ramp/North Triphammer Road intersections), other signalized intersections between the Pyramid Mall and Cornell areas, and at the unsignalized, one-lane bridges over Fall Creek. Analyses indicated that no benefit would be realized from introducing signal priority at the two Route 13/North Triphammer Road intersections at this time, and that there are few if any additional locations between the Pyramid Mall and Cornell areas at which signal priority could be considered. Furthermore, the bridges appear to function reasonably well without signalization, and while significant at times, delays at the bridges are currently not unacceptable by traffic engineering standards. More detailed information about traffic-related elements that were analyzed as part of this study is available as a separate report (Task 2 Deliverable: Service and Facility Strategies), available for download at http://www.tompkins-co.org/itctc/ntpp.html.

5.2.2 Queue Jumpers

Queue jumpers are most commonly applied to transit vehicles in conjunction with signal priority. Under such arrangements, transit vehicles would not only receive priority at a signalized intersection but would also have a short, exclusive use (i.e., "buses only") lane to allow them to bypass waiting vehicles either when a light turns green or when a signal only applying to the buses would turn green. An alternative queue jumper concept not incorporating signal priority would see an intersection approach configured with something more akin to a regular bus lane – buses would not have vehicles queued in front of them because they would have their own lane at the intersection.

Explorations of queue jumper concepts considered both forms discussed above. The findings were that queue jumper arrangements would not be expected to provide significant additional reductions of delay to the already modest reductions attendant to signal priority. Furthermore, bus lane configurations in themselves would not provide much benefit to transit vehicles absent priority systems.

5.2.3 Lane Use Restrictions

Two approaches to providing transit lanes were considered: a "take-away" basis, under which multi-lane roadways would have their outermost lanes redesignated from general use to transit-only, and the addition of new bus-only lanes. In examining the courses of the routes being reviewed or newly proposed in this effort, the findings were as follows:

- Based on traffic volumes, the only possibilities for "take-aways" were along limited stretches of some downtown streets, in some cases possibly requiring the prohibition of parking to ensure sufficient maneuvering space.

- Similarly, the only possibilities for the construction of new bus-only lanes were along short-distance non-continuous sections of some roads in the northern part of the study area.

- In conclusion, opportunities for exclusive bus lanes are not sufficient to justify pursuit.

5.3 Expanded Bicycle Facilities

In the discussion of the Pyramid Transit Hub in Section 5.1, it was noted that the proposed new Hub should include bicycle storage lockers, or at least bike racks to promote bicycle access to the Hub. Beyond TCAT's existing bicycles-on-buses program, additional bike storage facilities at other bus stops in the system would help to increase access to the system, thereby expanding the effective coverage area of the routes. TCAT should work with the Cornell Commuter and Parking Services office and the City of Ithaca Bicycle and Pedestrian Advisory Council to determine the best locations for new bicycle storage facilities at bus stops. As shown in Chapter 7, three new bike rack installations per year are assumed in the capital cost analysis.

5.4 Other Technologies and Accommodations

5.4.1 Automatic Vehicle Location

TCAT is exploring concepts for automatic vehicle location (AVL) systems and plans to implement this technology as soon as funding and coordination issues can be worked out. AVL deployment should be fast-tracked for Pyramid Transit Hub-related routes because it can provide significant benefits in addressing transit patrons' need for predictable service. As discussed previously, these systems can enhance the quality of traveler information by providing the knowledge base necessary for the generation of real-time transit information to be made available at major transit stops, including the proposed Hub; in addition, this information can be made available through TCAT's web site.

5.4.2 Automated Fare Collection

In the course of the telephone survey, respondents reacted very favorably to a concept of a "transit fare payment account" designed along the lines of the popular E-ZPass program for highway tolls in New York and other states along the eastern seaboard. In this concept, the rider would carry a smart card, and each time she boarded a bus, the fare would be deducted from her account. When the balance in the account reached a certain level, the account would be automatically replenished through a charge to her credit card or bank account. In this way, passengers would never have to carry change, and they would be charged only as much as they use the bus, reducing the risk of "over-paying" for a monthly unlimited-ride pass during periods when riders are not using the bus every day.

In order to implement such a fare payment program, TCAT would need to install automated fare collection equipment on all of its buses. This equipment would need to include smart card readers and communications equipment so that fare transactions could be transmitted to a central office. TCAT is already considering the purchase of such an upgraded fare system. Once the hardware is in place, it is only a matter of programming the software to allow for such an E-ZPass-type account structure.

This type of account structure is in place in Ventura County, CA, and Washington, DC. It is recommended that TCAT aggressively pursue this technology, since 43% of respondents in the survey said they would ride more often if they had such a transit fare payment account available to them.

6.0 Policy Analysis

The primary goal of the NESTS Transit Planning Project is to determine the feasibility of shifting 3%, 5%, or 10% of travelers in the NESTS area from driving their cars to using transit. Getting people to stop using their cars for their work, school and other travel needs, however, often requires changing the incentives that they face. Policy tools that can discourage people from driving include restricting the availability of parking and increasing parking rates. Two of the main policy tools that can be used to encourage transit include the Eco-pass program and the UPASS program, both of which eliminate the daily out-of-pocket payment for transit. This chapter highlights the feasibility of such policy changes. Section 6.1 describes current and future parking cost and availability in Downtown Ithaca. Section 6.2 discusses transit subsidies and parking cost and availability at Cornell University. Section 6.3 describes parking availability and transit subsidies at Ithaca College. Section 6.4 discusses opportunities to increase transit use to other major employers in the area. Finally, Section 6.5 provides examples of other places that are using policies to increase transit ridership and describes ways of changing attitudes toward transit.

6.1 Downtown Parking

One of the most effective ways to discourage driving is to decrease the availability or increase the price of parking. As parking becomes more difficult and/or expensive, people begin to seek alternatives to the single-occupant vehicle. High transit mode share usually occurs in places with high cost, constrained parking. The market research in this study confirmed that the lack of inexpensive parking was a major reason that current riders use the bus system, and that increases in parking prices were a strong incentive to switch from driving to transit.

The City of Ithaca currently operates about 3,000 public parking spaces in the Downtown area, including 1,159 spaces in the two downtown public garages and the surface lot (Lot D) just south of the Tompkins County Public Library. Parking downtown is generally acknowledged to be at or near capacity, especially at the Green Street Parking Garage and in Lot D, as shown in Table 6.1.

Table 6.1: Capacity and average usage of parking at three downtown facilities

Facility	Capacity	Average Use	% Used on Avg. Day
Green Street Parking Garage	443	437	99%
Seneca Street Parking Garage	441	321	73%
Lot D	275	272	99%
Total of 3 facilities	**1,159**	**1,030**	**89%**

There are several new developments currently proposed for Downtown Ithaca that all affect parking availability. One of the new developments is a 90,000 square foot office building to be used by 300 Cornell employees, and which will include space for another employer with 200-250 additional employees. Retail development, a proposed 115-bed hotel, and a conference center are also proposed in the vicinity. South of the public library, 20,000 square feet of new multi-use space is proposed. The Gateway development is another proposed downtown building rehabilitation, this one on the eastern edge of downtown.

To prepare for these new downtown developments, the Ithaca City Council recently voted to approve the construction of up to 1,100 new parking spaces. Though the plans are still in flux as of this writing, the City is considering building a new garage in 2003 with 697 spaces. Furthermore, the Green Street garage could be torn down and rebuilt by the year 2005 with a total of 1,025 spaces. These new parking spaces would provide Ithaca with adequate capacity for all currently forecast development. As a result of these recent parking policy decisions, therefore, the availability of parking downtown in the future cannot be considered "constrained."

While changes in the expected *availability* of parking downtown is unlikely to result in a measurable mode shift, the *cost* of parking downtown may. The city now provides two hours of free parking downtown for anyone parking in a public garage or lot, with a 50¢ per hour charge starting with the third hour. Thus, there is no charge currently to park downtown for less than 2 hours; a 50¢ charge for parking between 2 and 3 hours, up to a $3 charge for parking for 8 hours. Monthly rates are $40 (at the D Lot), $30 (on the upper levels of the two downtown garages) and $50 (on the lower levels of the two downtown garages).

There has been discussion about replacing the "two hour free" program in the public parking facilities with one hour free and increasing short term rates after the one free hour from 50¢ per hour (in 2004), to 65¢ per hour (2005), 75¢ per hour (2006), and $1.00 for the first hour and 75¢ per hour after that (2007). Parking meter rates would increase to 75¢ per hour (in 2004), and then increase to $1.00 per hour in 2005 or 2006. Monthly permits would cost $45/month (in 2004), increase by $5/year until it hits $60, and then increase by $2.50 every other year. The increased revenues that would accrue from increasing parking rates would be primarily used to pay for the construction of the new downtown parking. Note that these rates are currently only a proposal.

Because their parking costs are higher, daily or multi-hour commuters represent the best opportunity to shift trips from automobiles to transit, to increase TCAT's ridership, and to reduce traffic congestion in the study area. City officials also recognize that if people use transit instead of driving, the City would save funds since it would not have to construct as many parking spaces. More parking would also be available for shoppers, helping to keep downtown competitive with suburban shopping areas.

To the extent that increased parking rates downtown discourages downtown development and shifts it to suburban areas, the number of single occupant vehicle trips in the region would increase, and the region's transit mode share may ultimately *decrease* despite any increase in downtown parking rates. If Ithaca were able to cooperate with nearby jurisdictions to channel growth into the downtown area while increasing parking rates, transit mode share in Ithaca would probably increase. Ithaca does not exist in a vacuum; regional cooperation is the ultimate key to making transit service work efficiently. This would require leadership from the State and County to institute a regional "smart growth" program.

6.2 Cornell University Transit and Parking

As the largest employer by far in the Ithaca area and the greatest generator of trips, the policies set by Cornell have a large impact on travel in the NESTS area. For many reasons, Cornell has developed a progressive policy toward transportation over the years, with high subsidies for transit use, restrictions on the parking supply, and substantial fees for parking permits.

6.2.1 Transit

As one of the three partners that form TCAT (along with the City of Ithaca and Tompkins County), Cornell has a large stake in the local transit system. Cornell's subsidy for transit takes several forms. This includes promoting transit use, paying for faculty and staff fares, subsidizing student fares, and contributing funds to cover the TCAT net cost of service.

All faculty and staff ride free on weekdays within the "urban zone" (of the routes considered in this study, only Routes 35, 36, and 37 extend beyond the urban zone). They need only show a Cornell identification badge to board a TCAT bus. In return for parking at remote lots rather than the central campus, faculty and staff are eligible for countywide transit passes that are valid seven days per week. Approximately 1,800 employees take advantage of this program, or nearly 20% of the total number of faculty and staff.

For students, Cornell offers a subsidized Omniride pass, good for travel throughout the county. At a cost of $75 per semester or $150 per calendar year, students gain unlimited access to all TCAT routes. As of this past year, approximately 6,100 students purchased the semester or calendar year Omniride pass, which represents nearly one third of the total student population. In addition to this program, any student can ride for free on one of the "Blue Light" routes (Routes 91, 92, 93) that operate after 6:00 p.m., seven days per week. As part of a permit for parking at the remote B Lot, located at the eastern edge of the campus, students can receive the "PlusPass" which is equivalent to an annual Omniride pass.

TCAT records how many trips are taken by Cornell faculty, staff, and students, and then Cornell pays a subsidy to TCAT for each of those trips. The subsidy averages out to nearly $1.00 per trip (taking into account the different fare zones and the volume discount rate). In the most recent year, Cornell paid TCAT approximately $1.4 million for the 1.4 million trips taken.

A number of universities across the country have taken the concept of transit subsidy to the next step and implemented what is called a UPASS program. This program typically involves a mandatory student fee (incorporated into the tuition bill) which then allows all students to use local transit at all times with no further expenditure. In most cases, transit ridership has jumped after the UPASS program has been implemented and feedback has been very positive.

Cornell has considered a UPASS program in the past and decided not to proceed with it. This is because it is anticipated that the main effect of a UPASS program at Cornell would be to divert walking trips to the bus system, given the topography of the area and the tight restriction against student parking in the central campus area. The large increase in ridership would overwhelm the existing transit capacity and force TCAT to increase service and incur additional operating costs. The students would crowd out Cornell employees, who are strongly encouraged to use transit. In

addition, it was felt that adding to the already high burden of student fees would not be well received. Overall, it seemed that a UPASS program would have little benefit in reducing vehicular traffic around campus and would cost a great deal in terms of added transit service to accommodate the demand. Cornell is still considering a UPASS program limited to first-year students, in order to encourage them not to bring a car to campus at all, and to get them accustomed to riding on the system. This study endorses this more limited UPASS program proposal.

6.2.2 Current Parking Practices at Cornell

With a total student population of 19,300 and approximately 9,300 faculty and staff, Cornell has a total parking supply of just over 10,000 spaces. Of these, 6,000 are reserved for faculty and staff, 2,800 for students, and 1,300 for visitors and service vehicles. Among the students, faculty, and staff, only 3 out of 10 people are able to park on campus or in one of Cornell's remote lots.

Off-street parking facilities include both garage structures and open lots; some of these off-street facilities also contain metered spaces. Parking on the University grounds involves paying an annual permit fee or using parking meters. All students pay for parking. Students registered prior to Fall 2002 pay from $280 to $450 per year depending on the location of their parking space. For students entering in Fall 2002, the rate is $577.91 per year, and that rate will increase each year. By 2006, virtually all students will be paying the higher rate. This rate increase was explicitly undertaken as part of the overall policy of discouraging students from bringing cars to campus.

All of the parking in the central campus area is reserved for faculty and staff, as well as some short-term parking for visitors and service vehicles. All students park in the periphery, such as at the 1,100 space B Lot. Returning students get priority over new students for the scarce parking permits. The annual permit is affixed to a vehicle for visual verification by enforcement staff.

6.2.3 Modification of Parking Practices at Cornell

Although the constraints on parking supply and the high cost of permits generally discourages driving to campus, a restructuring of the parking permit program could be even more effective in discouraging driving. Currently, Cornell's annual permit program encourages drivers who have purchased a permit to drive every day because once the permit has been paid for, it is a "sunk cost". In other words, there is no incentive for the permit-holder not to drive, as there is no additional parking-related cost once the permit has been purchased, nor is there any savings if the driver does not use the parking permit.

Switching to a daily parking charge would alter the incentives since drivers would face a charge for each day they parked and would save the fee if they took transit instead. Intelligent Transportation Systems (ITS) technology can make daily parking charges nearly as convenient as a permit. For example, the driver may have a "smart card" or transponder in the car, which would be coupled with a toll booth type entrance to parking facilities. The result would be a payment system almost as convenient as is currently in place. The E-ZPass program itself could be used as a model for this implementation, as the New York State Thruway Authority has

worked with many entities (such as Albany International Airport) to allow E-ZPass transponders to be used for parking fee payment systems. As an added benefit, ITS technology would allow more flexible pricing options, as certain lots could charge more or less depending on demand. Not all lots could accommodate a tollbooth type entrance. Those that cannot could be set up with easy-to-use payboards using smart card technology. In addition, ITS technology could combine a parking card with a transit pass in one instrument.

In a technical memorandum (available in the separately bound Technical Appendices), the technology options available to Cornell were discussed in much greater detail. Initial unit costs for the necessary hardware were also provided. It is recommended that Cornell pursue a further study of the restructuring of their parking fee program.

6.2.4 Car sharing at Cornell

The large B Lot, mentioned above, is designed to be a place for students to store their cars during the week when the students typically have little need for driving. This concept of the "rarely-used" car raises the possibility that Cornell may be a ripe market for a car-sharing program, such as that offered by Zipcar, Inc. In such a program, a company provides a small fleet of cars that members can rent for short periods, such as for shopping or recreational trips that may be difficult or inconvenient to accomplish on transit. The benefit for members of the program is that they pay only for as much automobile access as they need, on an hourly basis, and incur no costs for maintenance, fuel, insurance, or parking. These programs are also designed to be much more convenient than standard car rentals, and for short rentals of an hour or two, much less expensive. In many markets where Zipcar operates, it works with a sponsoring company or institution, which may supply parking spaces and help subsidize the start-up of the operation. It is recommended that Cornell investigate the possibility of an association with Zipcar or similar organization to give students yet one more reason not to bring a car to campus.

6.3 Ithaca College Transit and Parking

Ithaca College, located south of this NESTS Transit Planning Project study area, is one of the major employers and traffic generators in the region. Currently, there are 1,386 employees who work on the campus and 6,843 students. While there are some commuters, a majority of students live on campus, at the College Circle Apartments, or in Downtown Ithaca. According to the campus traffic safety bureau, the amount of parking on campus is adequate to meet the demand.

A study conducted recently noted that 83% of vehicles entering the Ithaca College campus are occupied by one person[2]. The college has instituted several programs to encourage carpooling and transit use. The college and TCAT offer students a reduced-rate bus pass, costing $110 per semester ($200 for the full school year). There has been some discussion about further subsidizing the bus passes for students. Employees receive parking tags, which also allow employees to ride TCAT for free. The pass/permit is a single card with a TCAT bus pass imprinted on one side and an Ithaca College parking permit on the other. Even after registering a

[2] "Parking Survey Examined." Brooke Bennett. *The Ithacan*, October 5, 2000.

car, staff may choose to leave their car at home and take the bus to work for free. If employees don't register a vehicle with the college, they receive the bus pass only.

To further discourage parking on campus (and, thereby, encourage transit use), parking fees in September 2002 increased to $200 per year for freshmen. Fees will remain at $40 per year for sophomores, juniors and seniors, and free for staff, visitors and graduate students. There are some indications that college officials would like to eliminate or further restrict parking for freshmen.

In 2002, a new Master Plan has been approved for Ithaca College. The college plans a significant amount of growth over the next decade, adding 800,000 square feet of space (a 33% increase). The College Circle Apartments, will be expanded to house 350 more students. An important element of the new Master Plan is the relocation of parking lots to the periphery of the campus, potentially increasing the need for additional transit service.

Service improvements proposed in this study include changes to TCAT's Route 11, the most important route serving Ithaca College. It is proposed that during off-peak periods Route 11 serve the Towers and Longview on every run (it currently alternates), and be interlined with the proposed new Express B route to provide a one-seat-ride between Ithaca College and the Pyramid Transit Hub and Pyramid Mall. It is recommended that additional discussions occur with appropriate Ithaca College officials as its Master Plan continues to take shape. In light of parking and other changes, which will result from the plan's implementation, a UPASS program for Ithaca College students may be viable in the near future. It is recommended that TCAT staff continue working with Ithaca College officials on this issue.

6.4 Other Ithaca Employers

Transit agencies around the country have long pursued partnerships with employers to facilitate, if not to subsidize, employees' use of transit to commute to/from work. As a result of the increase in the tax-free benefit employees can receive and the emergence of electronic payment technologies, several employer-oriented transit benefit programs are now in place. In various parts of the country these programs have been referred to as "eco-pass" programs. One of the most popular eco-pass programs is the Annual Pass program.

The Annual Pass program involves employers purchasing annual transit passes for all of their employees at a price per employee much lower than the cost of 12 normal monthly passes. In most cases, the per-employee price can vary from one company to the next, based on a formula that considers such factors as company size, location and relative access to transit service. The transit agency can offer such a discounted price since not all employees will actually use the pass. However, because all employees receive passes, the potential exists for a dramatic ridership increase.

The Denver Regional Transit District's (RTD) Eco-Pass program, which started in 1991, was the first program of this type in the US, with pricing based on the "group insurance" concept (i.e., spreading the cost of employees' transit use among all employees at a company). Since then, a number of agencies have adopted similar programs. These programs typically seek to increase

commuter ridership while maintaining current fare revenue. Examples of annual pass programs of this type are as follows[3]:

- Dallas, TX (E-Pass)
- Denver, CO (Eco-Pass)
- Minneapolis/St. Paul, MN (Metropass)
- Portland, OR (Passport)
- Salt Lake City, UT (Eco Pass)
- San Jose, CA (Eco Pass)
- Seattle, WA (Eco Pass)

In general, the differences among these programs reflect the method of price determination, the minimum contract requirements, and the goals of the program. The design and pricing of the programs are highly dependent on the agency's goals and concerns.

To measure employer interest in participating in an Annual Pass program in Ithaca, over 20 of the largest employers in the area were contacted, including the following companies, organizations, schools or universities:

- Axiohm IPD
- Borg-Warner Automotive
- Cargill Salt
- CBORD Group
- Challenge Industries
- Collegetown Bagels
- Cornell University
- Emerson Power Transmissions
- Franziska Racker Center
- Ithaca College
- Ithaca Journal
- NYSEG
- Reconstruction Home
- Stork H & E Turbo Blading
- Therm Inc.
- Thomas Associates Architects Engineers
- Tompkins Cortland Community College
- Tompkins County Trust
- Tompkins-Seneca-Tioga BOCES
- Wegman's Foods
- Wilcox Press

[3] *Fare Policies, Structures and Technologies (Update), Interim Report*. TCRP Project A-25. Multisystems, Inc. January 2002, page 2-21.

Most employers contacted expressed no interest whatsoever in eco-pass or any other transit program. While many employers noted TCAT's benefits to some members of the community, they noted little or no transit use among their employees. Reasons given for the lack of transit use among employees included:

- Shift work, such that many employees work at times that TCAT does not operate;
- The need among some employees to travel to different locations throughout the day;
- Remote home or work locations, far from any transit route; and
- Plenty of available parking.

Many employers noted that no employee had ever mentioned or requested any transit subsidy. In short, it is not feasible to plan service improvements around those employers who *specifically* stated that their employees do not use, would not use, and cannot be persuaded to use transit service on a regular basis.

Two employers, Wegman's Foods and the Ithaca Journal, did express some interest in transit services, and may be interested in subsidizing transit passes for their employees. Experience shows, however, that in regions like Ithaca, with relatively low levels of congestion and abundant, free parking outside of downtown, few employees view transit as a viable option for getting to and from work. Under certain conditions, transit may be viewed as a viable option, particularly if a company has a high percentage of employees earning low or moderate wages, if there are parking constraints, or if employees are particularly environmentally conscious. In the above circumstances, some employees can be expected to use an enhanced transit system if the service concepts proposed in Chapter 4 are implemented, and they may request employer participation in a transit pass or subsidy program.

6.5 Changing Perceptions about Transit

In addition to providing an enhanced transit system, other ways to encourage employee interest in public transportation include increased marketing, promotion, and public outreach. Lowering the cost of taking the bus or increasing the cost of driving will also create interest in transit among employees. Strong leadership from local officials and institutions in promoting transit as an integral part of the community can over time transform the perception of transit from a transportation mode mainly for poor people to a mode of which everyone can take advantage. To forge a fundamental change in transit use in Ithaca, one must change the public's perception of transit.

Two college towns that implemented policy decisions affecting the use and perception of transit include Hanover, NH and Boulder, CO. Both communities can serve as examples of the types of policy changes TCAT, ITCTC, and the City of Ithaca can use to effect a change in the perception of transit and encourage greater transit use.

Dartmouth College and the Dartmouth Hitchcock Medical Center in New Hampshire made a policy decision to limit additional parking on their campuses and instead rely on peripheral lots.

This policy decision was made to preserve the rural and pedestrian-friendly character of the area.[4] They contracted with the local transit provider, Advance Transit, to shuttle passengers back and forth between the campus and the lots. As a result, transit ridership increased greatly.

In Boulder, Colorado, a city with a population of 100,000 people, 60% of residents have a bus pass. This very high ratio came about when the University of Colorado students voted to add a $15 fee each semester in exchange for a pass offering an unlimited number of rides on local buses (including service into Denver). Next, the municipal group that collects revenue from downtown Boulder parking passes used a portion of that revenue to buy transit passes for 6,000 employees who work in the city core. Employees reportedly love the program because they get to commute for free, don't have to find or pay for parking downtown, and can use their bus pass to shop on Saturday. Next, many private companies signed contracts, pledging an average of $50 per employee to obtain annual, unlimited passes. The up-front payments and predictable ridership allowed the bus company to plan the most effective routes to and from those workplaces.

A key feature of the Boulder program is the "safe ride home" guarantee. By allocating $2 from each $50 pass, the bus company arranged with city taxis to pick up, at no extra cost to the employee, any employee in the participating companies who needs an emergency ride during the day, or a ride home after bus operating hours. The same deal applies to all 1,200 employees of the city hospital. Nurses on shifts especially welcomed the low-cost bus service with taxi backup. The same type of program has subsequently been purchased by residential neighborhoods for members of each household, including teenagers.

To further encourage transit use, Boulder bylaws were changed to require that developers of new residential subdivisions purchase for, and provide to, each household three years' worth of unlimited transit passes, at an average cost of $50 each per year. After the third year, the resident may choose to drop the pass or pay the same fee to continue. There has been virtually no attrition in this program. The total number of bus passes in Boulder has increased from 4,000 in 1994 to 60,000 today.[5]

Boulder is well known as a community with many environmentally conscious residents; thus, it can be argued that its residents were already predisposed to support transit services. Ithaca, too, has its share of environmentalists and transit supporters, but with a much smaller population, it will probably be more difficult in Ithaca to change land use policies and employee preferences for driving alone.

TCAT is a successful transit agency by many measures, providing far more trips than many agencies serving larger communities. Some of the policy decisions and vocal community support that helped create such a remarkably successful, highly-used transit system in Boulder may be able to be replicated in Ithaca in order to change non-rider attitudes and behavior, resulting in even more ridership and lower congestion in the Ithaca area.

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[4] *Advance Transit Short Range Plan*, Tom Crikelair Associates, March 2000.

[5] www.ottawacitizen.com/cars/010531/5084061.html. Paul McKay, The Ottawa Citizen.

7.0 Recommended Strategy

This chapter considers the recommended strategy in two ways. First, three tiers of the recommended strategy are developed to be able to reach the desired mode shift targets of 3%, 5%, and 10%. After the assessment of the feasibility of reaching those targets, an implementation plan for the recommended strategy is set out. Following that is a financial analysis of the implementation plan.

7.1 Feasibility of Reaching Mode Shift Targets

7.1.1 Development of Three Tiers of the Recommended Strategy

For the purpose of determining what improvements would be needed to reach the goals set forth for this project, three levels of service for bus routes were established: Basic, Enhanced and High. The Basic level of service would be roughly consistent with current service levels, with a 12-hour span of service (7:00 AM to 7:00 PM) and a frequency on each route of every 60 minutes, except for the new express shuttles which would operate at 30-minute headways.[6] In the Enhanced level of service, the span would be expanded to 14 hours of service (7:00 AM to 9:00 PM) and route headways would be 30 minutes (with the new express shuttles operated at 15 and 20 minute headways). In the High level of service, the span would be expanded further, to 16 hours per day (6:00 AM to 10:00 PM). Headways would be 20 minutes during peak periods, and 30 minutes during off-peak periods. The express shuttles would operate every 10 minutes.

These three service levels are not the same as the three tiers of the recommended strategy. The three tiers correspond to the 3%, 5%, and 10% mode shift targets. In the process of estimating the ridership impacts of the three service levels, which was described in detail in the Task 2 report (available for download at htpp://www.tompkins-co.org/itctc/ntpp.html), it was found that even under the most optimistic forecasts, it would not be possible to achieve the 5% or 10% mode shift targets without some policy-related changes (i.e. parking fee increases).

Using a method described in the Task 2 report and expanded upon in a separate memorandum (included in the separately-bound Technical Appendices), combinations of service levels and parking fee increases were created that could achieve the desired mode shifts. The ridership and mode shift estimates derived from that process are shown below in Table 7.1.[7] For the sake of reference, the current transit mode share in the NESTS area, excluding transit riders on Cornell campus routes (the TCAT 80-series routes), was calculated to be between 3% and 4%.

[6] "Headway" is the technical term for the interval between consecutive buses on a route. It is equivalent to the service frequency.

[7] For those readers familiar with the earlier report, the figures shown in Table 7.1 reflect the "survey-based" forecast method, and thus are the more optimistic of the two sets of ridership forecasts prepared there. The mode shifts shown in the table use the total daily vehicle trips for the eastern part of Tompkins County from the ITCTC regional traffic model as the base number of vehicle trips (the denominator). This figure is 98,725 weekday vehicle trips. This eastern part of the county, which excludes Ulysses, Enfield, and Newfield, more closely approximates the area of interest; that is, the NESTS area and the immediately surrounding communities. If the entire county had been used for the base number of vehicle trips, the mode shifts would be significantly smaller.

Table 7.1: Ridership and mode shift forecasts

Daily Parking Fee Increase	Basic		Enhanced		High	
	Diverted Trips	*Mode Shift*	Diverted Trips	*Mode Shift*	Diverted Trips	*Mode Shift*
$0	900	0.9%	1,800	1.8%	3,600	3.7%
$1	1,400	1.4%	2,900	3.0%	5,700	5.8%
$3	2,400	2.5%	5,200	5.3%	10,100	10.3%

The table indicates that without any increase in parking fees at Cornell or Downtown Ithaca, the greatest mode shift that could be achieved would be 3.7%, assuming the High level of service is operated. The problem with offering this level of service is that it would more than triple the current operating cost for the NESTS routes, equivalent to an operating cost increase of more than $3 million annually. This magnitude of cost increase is infeasible, especially given the concerns about the future level of state aid (as discussed later in this chapter).

Given this conclusion, all of the tiers of the recommended strategy involve at least some increase in parking fees at the two major destinations in the NESTS area: Cornell and Downtown Ithaca. The selected combinations of service levels and parking fee increases is presented below.

3% Mode Shift

The most financially feasible way of achieving this shift would be to implement the ***Enhanced service level and increase parking fees downtown and at Cornell by $1 per day.*** The forecasts shown in Table 7.1 indicate that just under 3,000 trips per day would be diverted from automobiles onto transit. This diversion is equivalent to a 3% mode shift for the eastern part of Tompkins County.

5% Mode Shift

The most financially feasible way of achieving the 5% mode shift would be to implement the ***Enhanced level of service and increase parking fees by up to $3 per day.*** According to the forecasts, more than 5,000 weekday trips would be diverted from autos onto transit, equivalent to a mode shift of 5.3%.

10% Mode Shift

The table indicates that ***parking fees would need to increase by $3 per day and service on the preferred strategy routes would have to be at the High level*** in order to yield a 10% mode shift. This shift is equivalent to a diversion of more than 10,000 trips per day in the NESTS area. In this scenario, transit ridership would roughly triple, as would the operating cost of service.

7.1.2 Conclusions about Feasibility

All of the tiers involve increases in service and in parking fees. The estimated cost for operating the Enhanced service level is roughly $1.3 million over the current cost of operating NESTS area routes, an increase of 91%. This level of cost increase may not be infeasible, assuming that

TCAT is able to secure new revenue through the mortgage recording tax and that assistance from New York State increases (see discussion later in this chapter). However, even if it were possible to fund the Enhanced service level, it appears that the parking fee increases are not a feasible option at Cornell.

The last time that Cornell raised parking fees for faculty and staff, the staff at the Cornell transportation office faced strong opposition to an increase of a few percentage points. An increase of $1 per day would be equivalent to an increase of at least 90%, and significantly more for some of the lower cost parking lots at the periphery of campus. Although $1 per day does not sound like a lot of money, since Cornell charges for parking as an annual fee, that cost increase would be perceived as a large amount of money by Cornell faculty and staff, who already feel that they pay a lot for parking. It would be more feasible to change the parking fee structure at Cornell, as discussed in Chapter 6, than to implement significant parking fee increases for faculty and staff.

In contrast, the City of Ithaca is planning to increase parking fees to support a number of capital projects (also discussed in Chapter 6). To the extent that the City carries through on its proposed rate increases, transit ridership will increase. Ridership forecasts presented in the next section take these parking fee increases into account. Nonetheless, given the infeasibility of changing parking rates at Cornell, the largest employer and trip generator (by far) in the NESTS area, it would be impossible to achieve the desired mode shifts, short of a gasoline crisis or some other external event.

This overall conclusion does not preclude the possibility, however, that significant mode shifts may be achievable in certain parts of the NESTS area. The favorable reception in surveys and public meetings to proposals for a new transit hub at Pyramid Mall and new express shuttles from there to Cornell and Downtown Ithaca suggests that there is a good chance of making some impact on the Triphammer Road/Pleasant Grove corridor through the Village of Lansing and Cayuga Heights. Residents on Pine Tree Road may also see reduced traffic due to the Bethel Grove park-and-ride lot and Express C.

If Cornell were to change its parking program to a daily fee structure, more significant mode shifts would be likely. Without a thorough study of the potential impacts of such a change, it is difficult to estimate how much transit ridership would be affected. Further study of parking at Cornell is recommended.

7.2 Implementation Plan of Proposed Services

While it does not appear to be feasible to attain a 3%, 5%, or 10% modal shift through affordable transit improvements or acceptable policy changes, there are many improvements that can be made that would have a positive impact on transportation in the NESTS area. This section describes service improvements that *are* feasible and estimates the number of riders that would likely be shifted. This report proposes that the recommended strategy be implemented through the following five phases:

- Immediate term (1 to 2 years)
- Near term (3 to 4 years)

- Mid term (5 to 7 years)
- Long term (8 to 10 years)
- Future period (year 11 and beyond)

Virtually all of the new routes and route modifications would take place within the first two phases. In the remaining phases, service levels would be gradually increased to attract further ridership.

7.2.1 Phase Elements and Costs

During the **Immediate Term** (Years 1 and 2), it is recommended that TCAT make the following changes (see Chapter 4 for detailed descriptions):

- Revisions to Routes 31 and 32. These revisions include the extension of Route 31 to Pyramid Mall via Dart Drive, and the elimination of the "switchback" portion of Route 32. These routes would operate at the same frequency and for the same hours as at present.
- Introduction of the Long Mall Circulator to operate every day, at a frequency of 30 minutes
- Introduction of the Short Mall circulator to operate only on weekends during the Fall holiday shopping season. This route would run every 15 minutes.
- Minor changes to Routes 40, 41, 43, including more direct service to mobile home parks in Dryden and a park-and-ride lot near the intersection of State Highways 13 and 366.

These immediate term actions are illustrated in Figure 7.1.

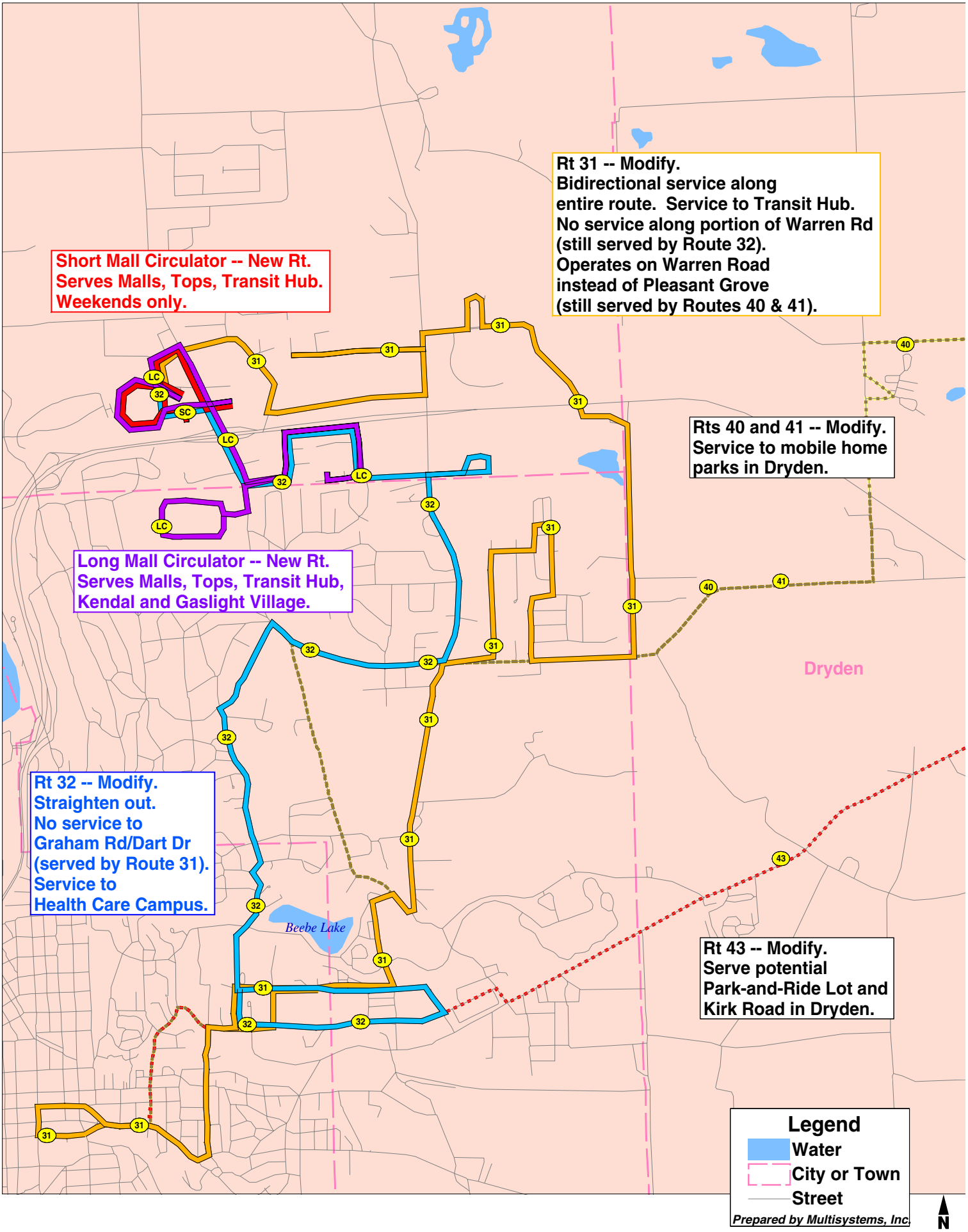
It is estimated that these service improvements would increase gross annual operating cost by $242,300 (in 2002 dollars rounded to the nearest hundred). Operating these services, however, should result in 210 new weekday riders and should generate $20,500 in additional annual farebox revenue. State funding through the STOA program would increase by $57,000 annually, based on the current formula[8]. Subtracting these additional revenues from the gross cost yields a net local operating cost increase of $164,700.

The total capital cost for the Immediate Term is estimated at $566,800, including the following:

- 1 small bus (at $125,000)
- 1 large bus (at $260,000)
- 6 shelters (at $4,000 each)
- 6 bike racks (at $1,300 each)
- The Pyramid Transit Hub, including related signage inside the Mall (at $150,000).

[8] Available STOA funds are distributed based on the number of passenger boardings and revenue miles operated. Currently, operators receive 40.5¢ per passenger boarding and 69¢ per vehicle revenue mile. The figures presented in this section assume that STOA funding will not be cut (see discussion later in this chapter).

Figure 7.1: Immediate term actions



During the **Near Term** (Years 3 and 4), it is recommended that TCAT make the following improvements (see Chapter 4 for detailed descriptions):

- Implementation of three new express park-and-ride shuttles: Express Route A from the Pyramid Transit Hub to Cornell; Express Route B from the Pyramid Transit Hub to Downtown Ithaca (including interlining with Route 11 during off-peak periods); and Express Route C from the Bethel Grove/Route 79 Parking Lot to Cornell. These would all operate from 6:30 a.m. to 6:30 p.m. Monday through Friday with 15-minute service in the peak periods (except for Express B with 20-minute service) and 30-minute service during the midday. Express B would operate on Saturdays with a frequency of every 30 minutes.
- Implementation of two new downtown circulators, the Downtown Circulator A (serving Aldi's and the southwest retail area in the counter-clockwise direction) and the Downtown Circulator B (also serving Aldi's and the southwest retail area but operating in the clockwise direction). These would both operate from 6:00 a.m. to 7:00 p.m. Monday through Saturday at a frequency of 60 minutes.
- Minor revision to Route 16 to serve Visitors' Center.
- Revisions to Routes 35, 36, 37 to provide service to Pyramid Transit Hub. Routes 36 and 37 would have service levels similar to at present (with one additional outbound trip on Route 36 in the evening), while Route 35 would have three round-trips per peak period.
- Elimination of TCAT's current Route 13.
- Elimination of Route 80 due to expected reduced demand at the Cornell's A Lot.[9]

These Near Term actions are illustrated in Figure 7.2.

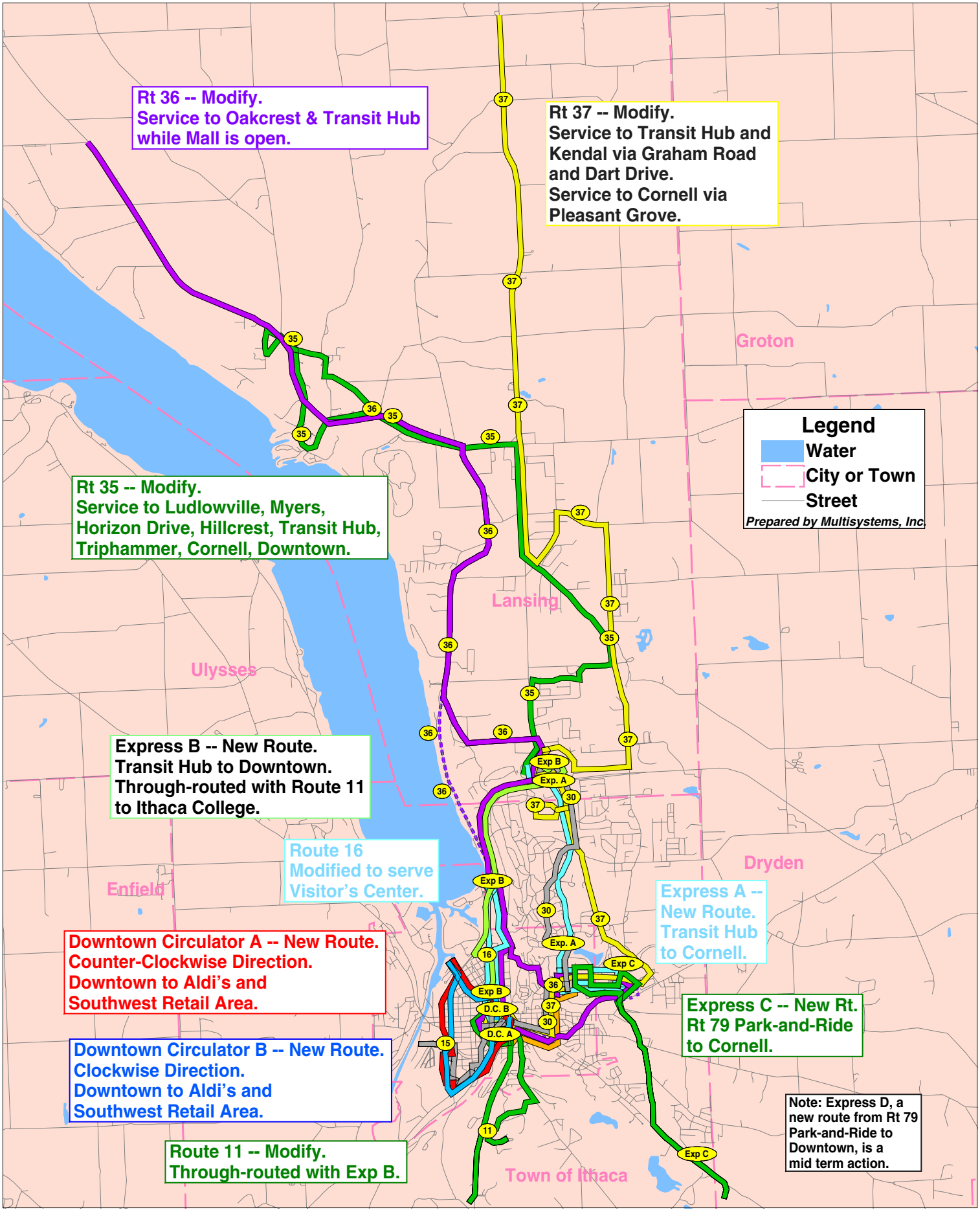
It is estimated that operating Immediate term actions and these service improvements would increase the gross annual operating cost by $772,900 compared to current levels. These cumulative actions should result in 620 new weekday riders, and should generate $91,200 in additional annual farebox revenue. State funding through the STOA program would increase by $236,100 compared to the current level, based on the current formula. Subtracting these additional revenues from the gross cost yields a net local operating cost increase of $445,500 over 2002 levels.

The total capital cost for the Near Term phase only is estimated to be $1,041,800 and includes the following:

- 6 small buses[10] (at $125,000 each)
- 1 large bus (at $260,000)
- 6 shelters (at $4,000 each)
- 6 bike racks (at $1,300 each).

[9] If Route 80 is eliminated, TCAT should consider evaluating the service level on Route 81 and assess whether articulated 60-foot buses may be more appropriate to the heavily peaked demand at the lot.
[10] This number of small buses includes one spare in order to maintain an appropriate spare ratio for the fleet as a whole.

Figure 7.2: Near term actions



During the **Mid Term** (Years 5 through 7), it is recommended that TCAT make the following service changes:

- Implementation of Express Route D from Route 79/Bethel Grove to Downtown Ithaca. This route would operate every 30 minutes during peak periods only.
- Expansion of the Short Mall Circulator to operate year-round, but still only on weekends.
- Two additional evening hours on the Long Mall Circulator.
- Improved frequency on Route 32 and Downtown Circulators A and B so that they operate every 30 minutes (instead of every 60 minutes).

It is estimated that operating Immediate term and Near term actions and these service improvements would increase the gross annual operating cost by $1,150,300 compared to current levels. These cumulative actions should result in 1,015 new weekday riders and should generate $166,600 in additional annual farebox revenue. State funding through the STOA program would increase by $365,300 compared to the current level. Subtracting these additional revenues from the gross cost yields a net local annual operating cost increase of $618,400 over 2002 levels.

The total capital cost associated with Mid Term actions is estimated to be $557,700, and includes the following:

- 2 small buses (at $125,000)
- 1 large bus (at $260,000)
- 9 shelters (at $4,000 each)
- 9 bike racks (at $1,300 each)

During the **Long Term** (Years 8 through 10), it is recommended that TCAT improve the frequency of service for Routes 15, 30, and 31, as shown in Table 7.2. The frequency during the previous period is shown in parentheses if different from the recommended frequency.

Table 7.2: Improved frequencies proposed for the Long Term (Years 8 through 10)

	Proposed Frequency (Current Frequency)			
Route	Peak	Off-Peak	Saturday	Sunday
15	30 (60)	60	30 (60)	60
30	20 (30)	30	20 (30)	30
31	30 (40)	60	90 (none)	None (none)

During the last public meeting for this project, it was suggested that the frequency on Route 15 be improved sooner than the Long Term period. This change was not made because the new Downtown Circulators cover much of the same area as Route 15 and thus provide a doubling of service in the Near Term. TCAT is also considering whether to increase service on Route 30 soon due to heavy ridership. If funding is available, this study would endorse earlier implementation of this improvement, especially given the proposed increase in Downtown Ithaca parking rates, but for the purpose of this report, this change remains in the Long Term period.

It is estimated that operating Immediate, Near, and Mid term actions and these service improvements would result in a cumulative gross annual operating cost increase of $1,550,100 compared to current levels. These cumulative actions should result in 1,610 new weekday riders compared to 2002 totals and should generate $278,500 in additional annual farebox revenue. State funding through the STOA program would increase by $484,600 annually compared to current levels, based on the current formula. Subtracting these additional revenues from the gross cost yields a net local operating cost increase of $787,100 over 2002 levels.

The total capital cost associated with the Long Term is estimated to be $1,087,700 and includes the following:

- 4 large buses[11] (at $260,000)
- 9 shelters (at $4,000 each)
- 9 bike racks (at $1,300 each)

Finally, in the **Future Period** (Year 11 and beyond), it is proposed that frequency on Express A and B be improved from every 15 minutes and 20 minutes, respectively, to every 10 minutes. Express D would improve from every 30 minutes to every 15 minutes. Also, the Downtown Circulators would be improved during weekday middays and Saturdays from every 30 minutes to every 20 minutes and Sunday service would be introduced at a 30-minute frequency. Route 35 would see increased midday service with a trip every 60 minutes instead of an isolated midday trip as is now operated.

It is estimated that operating all of the service improvements recommended in this implementation plan would result in a cumulative gross annual operating cost increase of $1,995,700. Over 1,900 new weekday riders would be attracted to the system, generating $342,100 in additional farebox revenue. This level of ridership is equivalent to a mode shift of 1.9%. State funding through the STOA program would increase by $631,600 over the current level, based on the current formula. Subtracting these additional revenues from the gross cost yields a net local annual operating cost increase of $1,022,000 over 2002 levels.

Capital costs during the future period are estimated to be $510,000 plus the ongoing cost of new passenger shelters and bike racks:

- 2 small buses (at $125,000)
- 1 large bus (at $260,000)

Of course, during this period, replacement buses would need to be purchased for those put into service in earlier phases. These replacement vehicles are not included in the estimate.

7.2.2 Benefits of Proposed Services

There are several benefits that would accrue from the proposed improvements, including rider time savings, and reductions in traffic volume, vehicle hours traveled, and vehicle miles traveled. Each of these benefits is discussed in turn.

[11] This number of buses includes one spare in order to maintain an appropriate spare ratio for the fleet as a whole

Rider Time Savings

Time savings for current riders would result mainly from more direct and more frequent routes. Routes 31 and 32 become more direct in the recommended service concept. Express Routes A and B offer faster service to Cornell and Downtown than Routes 30 and 13, and offer improved frequency. This results in less waiting time and less travel time. The total time savings for existing riders is displayed in Table 7.3. No time savings were found for riders that are diverted from autos to transit; it would still be faster to drive than to use the bus.

Table 7.3: Time savings for existing riders by phase

Phase	Time Savings Per Year
Immediate Term	18,600 hours
Near Term through Long Term	24,000 hours
Future Period	27,000 hours

Traffic Reduction

Improved public transit service offers the benefit of removing cars from the roads as people make more of their trips via public transit. The number of cars removed from roads crossing selected screenlines[12] on average weekdays is presented in Table 7.4, along with the base volumes crossing these screenlines. As shown, when compared to the base volume at each of these locations, the number of cars estimated to be removed due to transit improvements is relatively small, and all are within normal daily traffic variations.

Table 7.4: Average weekday traffic removed from roads

Phase	Immediately North of Route 13	Route 13 – Comm. Corners	Comm. Corners – Cornell	South of Cornell
Base Volume	*45,380*	*19,820*	*14,280*	*7,430*
Immediate Term	100	0	100	0
Near Term	370	150	250	100
Mid Term	520	300	250	100
Long Term	820	500	700	150
Future Period	870	500	720	150

In discussions of operating conditions at intersections, the term "level of service" is used to describe conditions using an A through F "letter grade" scale, with A representing minimal delay

[12] A screenline can be thought of as a line drawn across an area to capture traffic flows on all possible routes through the area. It is a more precise way of capturing the effects of an action than considering only one road since it accounts for the possibility that travelers may change their paths in response to congestion, incidents or the desire to make stop-off trips. The roads included in these screenline counts are as follows: **North of Route 13** - NY 34, Triphammer, Warren, and Hanshaw; **Route 13 to Community Corners** - NY 34, Triphammer, and Warren; **Community Corners to Cornell** - Cayuga Heights, Triphammer, Pleasant Grove, Warren, and Freese; and **South of Cornell** - Pine Tree and Thomas.

and F representing severe delay. As Table 7.5 illustrates, the effects of these traffic reductions on operating conditions are also expected to be minimal. Three future scenarios are shown: the Mid Term period, the Long Term period, and a 3% mode shift (for reference). While they will result in small reductions in travel time, fuel consumption and vehicle emissions, it is not expected that motorists will notice any difference. That is, there would be no perceptible difference in traffic conditions even with some of the longer-term service improvement strategies in place. In Table 7.5, numbers in parentheses are average delay in seconds per vehicle for the indicated movements on each approach or for the intersection as a whole.

Table 7.5: Effects of transit improvements on levels of service at selected intersections

Intersection	Traffic Control	PM Peak Hour			
		Existing Conditions	With Immediate through Mid term actions	With Immediate through Long term actions	3% Mode Shift
Rt 13 EB Ramp/ Triphammer Rd	Signal	C (25.8)	C (25.4)	C (25.2)	C (24.8)
Hanshaw Rd/ Pleasant Grove Rd	Stop Sign	F (51.8)	E (47.3)	E (47.3)	E (43.1)
Hanshaw Road/Warren Road	Stop Sign	C (23.34)	C (21.27)	C (20.57)	C (19.33)

Reduction in Vehicle Miles Traveled and Vehicle Hours Traveled

Vehicle miles of travel (VMT) and vehicle hours of travel (VHT) are expected to decrease as transit service is improved. As a result of a reduced travel mileage and a modest decrease in traffic congestion, the number of traffic accidents is also be expected to decrease. Table 7.6 displays an estimate of the number of vehicle miles and vehicle hours that is expected to decrease in each phase, and the associated cost savings based on reduced accidents and vehicle miles of travel.[13]

Table 7.6: Reduction in Annual Vehicle Miles and Vehicle Hours Traveled

Phase	VMT Reduction	VHT Reduction	Savings from Accident Avoidance and VMT Reduction
Immediate Term	175,000	20,000	$94,000
Near Term	691,250	97,500	$372,000
Mid Term	942,625	145,000	$507,000
Long Term	1,485,000	257,500	$799,000
Future Period	1,722,500	287,500	$927,000

[13] Annual accidents for each phase were estimated by multiplying annual vehicle miles of travel by the accident rates contained in NYSDOT's May 2002 summaries of accident rates by facility type. The estimated number of accidents was then multiplied by a weighted average accident cost of $46,900, based on NYSDOT's May 2002 summary of accident severity distributions by facility type. The cost savings related to VMT reductions were calculated based on the estimated average vehicle operating, insurance and depreciation cost of 36.5 cents per mile.

7.2.3 Net Cost per Diverted Rider

The net local cost per new rider diverted out of his or her automobile was calculated for each of the five phases. The calculation netted out fare revenue and state assistance and assumes that no fare would be charged on the Short Mall Circulator or on intra-mall trips on the Long Mall Circulator. The figures vary considerably by phase, depending on the specific improvements included in that phase. The cost per diverted rider for each phase appears in Table 7.7.

Table 7.7: Cost per diverted rider by phase

Phase	Incremental Cost of Improvements in this Phase	Incremental Cost of Cumulative Improvements Through this Phase
Immediate Term	$3.62	$3.62
Near Term	$2.28	$2.65
Mid Term	$1.17	$1.95
Long Term	$0.80	$1.50
Future Period	$2.45	$1.64

Currently, TCAT's net local cost per passenger boarding is 33¢. As shown in Table 7.7, the marginal cost of diverting additional riders out of their cars is substantially higher than that figure. Still, the overall net cost per rider in the future, assuming the proposed services are implemented, would only rise to 58¢.

7.3 Financial Analysis

Besides passenger revenues, there are currently several sources of government and institutional assistance for TCAT operating and capital funding. An examination of current sources of TCAT funding was completed and documented in a technical memorandum (included in the separately bound Technical Appendices). A summary of this funding information is presented below.

7.3.1 Current TCAT Funding

State Operating Assistance

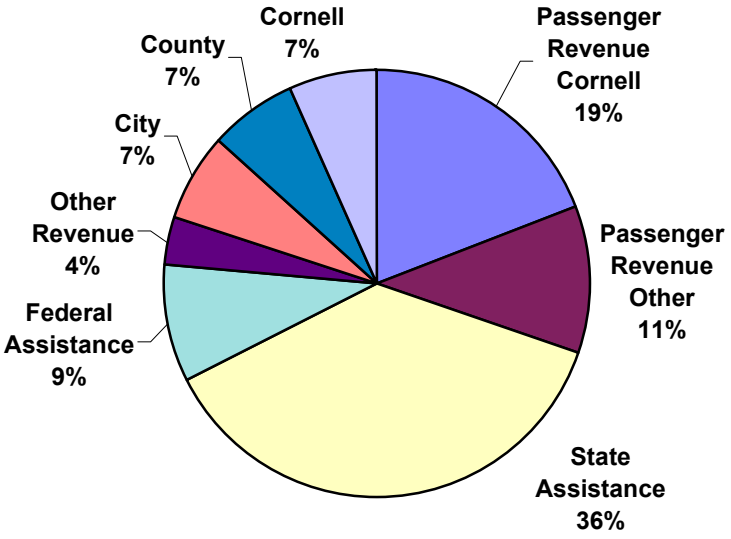
New York State's State Transit Operating Assistance (STOA) program is TCAT's single largest source of operating funding. Currently, this source accounts for about 36% of the TCAT budget (see Figure 7.3).

There are several sources of the STOA funds. These include the state general fund and dedicated sources including the Mass Transportation Operating Assistance (MTOA) Fund and the Dedicated Mass Transportation Trust Fund (MTTF). There are also enhancements to the above funding from general funds deriving from the motor vehicle fee and motor fuel taxes. The upstate funds provided under MTOA and MTTF derive entirely from the Petroleum Business Tax.

Ithaca's share of STOA funds is part of the "Formula Bus" allocation. This allocation is determined quarterly using an incentive-based formula: the base formula approved for use in the

state fiscal years[14] 2000-2001 and 2001-2002 was $0.405 per revenue passenger and $0.69 per revenue vehicle mile operated.

Figure 7.3: Current TCAT funding



The 2002 TCAT budget show $2.714 million from traditional STOA funding sources, of which $2.017 million is based on TCAT service formula funds. The 2002 TCAT budget also shows $40,000 in other state funds, including $35,000 in matching funds for the federal preventive maintenance funding and $5,000 for bus rehabilitation and the Rural Transit Assistance Program.

State Capital Funds

The State offers a dedicated fund (SDF) that provides agencies other than the MTA with 100% state funding to address priority capital needs that exceed available federal resources, including the normal replacement of buses and facilities. During the State FY01-02, Ithaca-Tompkins received $0.738 million in SDF funds. The state dedicated fund amounts are based on fleet condition and are primarily used for replacement vehicles. Generally, the needs exceed the funding available.

State Matching Funds

The State's Omnibus and Transit Purposes Program offers 50% of the non-federal match for federal transit fund programs and for flexible transfers of FHWA funding.

Federal Capital and Operating Funds

Section 5311 funding for rural and small urban (population under 50,000) areas is distributed to states based on their non-urbanized area population. The states then distribute these funds.

[14] Note that the fiscal years for TCAT and the state and federal governments are not the same; TCAT's fiscal year starts January 1, New York's starts April 1 and the federal government's starts October 1.

These funds provide an 80% federal share for capital projects and a 50% share for operating projects. The state will fund 50% of the non-federal share for capital projects. STOA funds may be used as a match for the federal funds for operating projects.

Section 5307, formerly known as Section 9, is the Urbanized Area Formula Grants Program. These funds are available for operating, preventive maintenance or capital expenditures for areas with populations between 50,000 and 200,000. For capital expenses, the federal share is 80% and the state will pay 50% of the non-federal share up to 10% of the total cost. For operating expenses, the federal share is 50% and the state operating assistance can be used as the local match. In FFY 03, Ithaca obtained $0.567 million under this program; in FFY02, Ithaca obtained $0.553 under this program. The 2002 TCAT budget shows $212,000 in urban funds and $280,000 in preventive maintenance funds plus $32,000 for grant administration, bringing the total federal urban funding to $0.524 million.

It may be possible to obtain a larger amount of 5307 funds in the future. Funding in FY2004 will take place under the new TEA-3 legislation; some proposals include a larger share of funding for transit-intensive small cities. The FTA report to Congress in September 2000 entitled *The Urbanized Area Formula Program and the Needs of Small Transit Intensive Cities* investigated possible changes to the formula program to meet the needs of small transit intensive cities. Ithaca was classified as such under four of eight criteria, all four of these being per capita measures of service (vehicle revenue miles and vehicle revenue hours) and ridership (passengers and passenger-miles); these measures were examined against the average for larger urbanized areas (population between 200,000 and 1,000,000.). Ithaca appeared to rank about 19 of 77 cities based on this evaluation. The recommendations of the study were to consider changes in the 5307 program that would consider the existing needs of small transit-intensive cities based on the service they currently provide; the report was viewed by FTA as a starting point for a dialogue with Congress, the industry, and the public regarding the federal transit assistance program.

Section 5309, formerly known as Section 3, is the Discretionary Capital program. Such funds are for specific projects. This program limits expenditures for Bus and Bus Facilities to only 20% of the total program. The funds for bus programs under this program are totally earmarked. The federal share is 80% and the State will fund 50% of the non-federal share. In FFY 02, Ithaca received $0.618 million of the TCAT Center and $1.485 million for TCAT replacement buses. According to TCAT's general manager, the agency has been fairly successful at obtaining Section 5309 funds. TCAT's capital needs include expansion of the TCAT operations base to have all enclosed bus storage and more office space, as well as the proposed transit center at the Pyramid Mall recommended in this study.

Another program that provides federal funding is the Jobs Access Reverse Commute (JARC) program, established through TEA-21; since TEA-21 ends in FY2003 (September 30, 2003), the continuation of the JARC program depends on the specifics of TEA-3. The JARC program uses a competitive grant application process. TCAT developed two FTA JARC proposals for $500,000 and $367,000. The 2002 budget shows a total of $124,000 in operating assistance from this program, the first year that this funding source has been used by TCAT. TCAT will have JARC funding in 2003 and is trying to extend it to 2004.

City, County and Cornell University Funding

Under the current agreements, the city of Ithaca, Tompkins County and Cornell University[15] contribute equally to the local share of funding based on the deficit after revenues, and state and federal funding. The city and county shares are funded in part through the local sales tax. The local funding has increased in the past but is currently constrained by the financial problems being experienced at all levels. In the 2002 TCAT budget, each entity contributes about $491,000 and the total local share is $1.474 million or just under 20% of the budget.

Overall, TCAT currently receives more than half of its operating funding from two sources: the state (36%) and Cornell University (26%).

7.3.2 Additional TCAT Operating Funding

Other funding sources were evaluated to help fund the proposed service improvements. Results were documented in a technical memorandum (included in the separately-bound Technical Appendices), and the key findings are reported in this section.

Based on the review of funding options, it was concluded that besides additional STOA funding based on increased passengers and revenue hours (subject to any limits or reductions on overall STOA funding at the state level) and increased local shares split among the City, County and Cornell as needed, the most likely new funding sources include local community contributions, private sector contributions, and the mortgage recording tax. These funding sources are described below. Other new funding sources that were examined and deemed less likely include:

- New dedicated taxes, including sales tax, property tax, payroll tax, utility tax, gasoline tax and commercial parking tax
- Municipal parking revenue
- Advertising revenue
- Development related revenues, including transportation impact fees, benefit assessment district fees and joint development fees
- Human service agency contributions/contracts
- Private sector revenues, including sale-leaseback or certificates of participation, and employer subsidies

Cost sharing/Contributions from Villages and Towns

Most of the recommended improvements are concentrated in the Lansing area and much of the benefit of reduced traffic accrues to Cayuga Heights. Parts of the Town of Ithaca would also see significant benefits from the improvements, including better accessibility from East Cayuga Heights to Pyramid Mall, Downtown Ithaca, and Cornell, and reduced traffic on Pine Tree Road.

[15] It should be noted that the local share that Cornell contributes does not constitute its total participation in funding TCAT. Cornell purchases the fares for its students, faculty and staff through a volume purchase. In FY 2002, this amounted to $1.42 million, which is more than twice the farebox and pass revenue generated by other riders and about three times the amount contributed by Cornell as its (one-third) share of the local funding. Cornell's total contribution including both fares and local share amounts to $1.91million or more than 25% of TCAT's total budget.

Given these considerations, it is logical to consider whether direct contributions to TCAT from the Town and Village of Lansing, the Town of Ithaca, the Town of Dryden, the Village of Cayuga Heights, and other municipalities are a potential future funding source. It is most likely that any contribution from these communities to the cost of operating TCAT would be at a fraction of the contribution made by Ithaca on a per capita basis.

In other cities, local community contributions have been employed as a way of funding improvements in particular communities. For example, in the Boston area, various communities including Lexington contribute the larger share of funding a community oriented bus service that is also supported in part by the regional transit authority. In St. Clair County, IL, various local communities provided contributions for stations and parking lots along the extended MetroLink (St. Louis area) light rail line.

Cost sharing/Contributions from Employers/Private Sector Businesses

Where there is a large employer who can directly benefit from the expansion of service, there would be opportunities for negotiating employer contributions. Cornell is by far the largest employer in Tompkins County and already contributes funds to cover one third of the operating deficit beyond its significant payment of fares for its students, faculty, and staff. Since no single large private employer is likely to derive large benefits from the recommended improvements, garnering employer contributions seems improbable.

Ithaca College is another large employer in the area and is currently paying fares for faculty and staff. The Ithaca student pass that is offered is not a college-funded pass like that provided for Cornell. Since the NESTS project does not have a large focus on Ithaca College, which is located south of downtown, the development of a larger contribution from Ithaca College does not seem to be an appropriate focus for this study.

A more likely source to be tapped for cost sharing is the group of retail centers that would see improved service. It might be possible to obtain some contribution from Pyramid Mall toward the proposed Pyramid Transit Hub. A non-cash, in-kind contribution would be the most likely, such as donating land for the Hub and providing snow removal and other maintenance at the site. These could be traded off for naming the Transit Hub and allowing information/advertising of Mall store events at the center. Another would be a one-time joint promotion of the Transit Hub and associated route changes.

Circulator services near the Pyramid Transit Hub and in the southwest retail area could also be partly funded by retailers that the routes would serve. The Short and Long Mall Circulators could be supported financially by Pyramid Mall, Cayuga Mall and the other retail centers that they serve. Similarly, the Downtown Circulators could be supported by existing stores and new “big box” stores (Wal-Mart, Lowe’s, etc.) in the southwest retail area.

Mortgage Recording Tax

New York State legislation (Tax Law Article 11) established several mortgage-recording taxes, which generate revenue for both the state and localities. The optional portion of the tax that provides local revenue is an important source of funding for both the MTA and the upstate transit

authorities. In Erie County for example, NFTA obtains about 28% of a ¾% mortgage recording tax as well as an additional Erie County mortgage tax specifically enacted to support the rail system. In Syracuse, CNYRTA obtained about $2.54 million in dedicated mortgage recording tax revenues in FY99 (generated from ¼% in Onondaga, Oswego and Cayuga Counties), using it for both the local share of capital projects and for operating assistance. [16]

The mortgage recording tax is not currently used to generate funding for TCAT. Counties can opt out of the local part of the tax for specified periods of time, as is the case in Tompkins County. TCAT has estimated that if the tax were reinstated in Tompkins County, it could yield up to $750,000 per year. With additional state legislation, TCAT would be able to claim all of this revenue. Legislation to claim this revenue could be tied in with state legislation to make TCAT a transportation authority like NFTA, CDTA, RGRTA, CNYRTA and MTA.

7.4 Operating Costs of Phases

As discussed earlier in this chapter, a series of five implementation phases were developed for the project recommendations. The estimated additional gross annual operating costs (in constant 2002 dollars) for each of the five phases are shown in Table 7.8 below. The additional annual cost for each phase is the increment above the annual cost of operating the Year 2002 service; the total operating cost in the 2002 TCAT budget for the current service is $7.39 million.

Table 7.8: Additional Annual Gross Operating Costs by Phase

Immediate Term Years 1-2	Near Term Years 3-4	Mid Term Years 5-7	Long Term Years 8-10	Future Years 11-15
$242,290	$772,928	$1,150,251	$1,550,119	$1,995,744

7.4.1 Assumptions About Existing and Potential Operating Funding

STOA funding plays a large role in financing current TCAT services. Although STOA funding has increased over the years, the level of STOA funding in the future is less clear. Funding that derives from the Petroleum Business Tax fluctuates with the economy. Funding that derives from the State General Fund is subject to political and fiscal changes. To consider the possible impacts of changes in STOA funding, we created two STOA funding scenarios—one scenario maintains STOA funding at the FY2002 level and another assumes that the portion of STOA funds that derive from the State General Fund would be eliminated; about 21% of upstate formula bus operating assistance derived from the State General Fund in SFY 2001-2002.

[16] Besides the mortgage recording tax, three local jurisdictions (Erie County, Broome County and certain towns in Suffolk County) as well as New York City impose real estate transfer taxes (Articles 31A, C and D) in addition to the State tax; in Erie County, this tax is 0.5%. The Erie tax revenue is dedicated to NFTA to be used for mass transportation services in the county as well as a reserve fund for repair of county roads and bridges.

The optional mortgage recording tax in Tompkins County could contribute funds that could be used to increase the local contribution. We have assumed that the maximum that could be achieved through this source is $750,000 annually.

We have assumed that, based on the service improvements, local municipal contributions toward the operating deficit could be expected from the Town and the Village of Lansing, the Town of Ithaca and the Village of Cayuga Heights. These contributions have been assumed to begin in the Near Term period and would be phased in (to a combined maximum of about $175,000); this assumes that the per capita contributions from the towns and villages would be smaller than the per capita contributions made by the City of Ithaca given the fact that the bus service that is (and would be) provided in the towns and villages is less intensive than in Ithaca. The per capita contributions for the towns and villages were assumed to be 25% and 50%, respectively, of the per capita contribution from the City of Ithaca.

We also assumed that Cornell, the City and the County would remain equal partners. We understand that the City feels this is inequitable. Any change in the current arrangement would need to be mutually agreed upon by all parties. This study has no recommendations with respect to this arrangement among the primary partners.

7.4.2 Funding Scenarios For Operating Costs

Table 7.9 shows how each phase could be funded and what the impact on the local partner subsidies would be. This analysis was done in constant (2002) dollars, as instructed by the Client Committee, representing the simplified scenario where fare revenue and subsidies increase at the same inflationary rates as the costs of operation; thus, inflation can be ignored.[17]

We have attempted to show how additional funding could be used to keep the local partner operating subsidies at their current level for the first few years. Then, assuming limits on new sources such as the local town and village contributions and the mortgage recording tax, we have shown the impact on the local partner shares of the remaining deficit for the later years of the plan.

The influence of possible changes in STOA funding is examined by comparing the two scenarios in Table 7.9. In the first scenario, we assume that STOA funding continues using the same formula and increases with ridership; this means that the STOA funding for the base service is unchanged and that additional STOA funds result from the service and ridership increases associated with the recommendations. In the second scenario, we assume that STOA funding is reduced; we have interpreted this to mean a reduction in the current level of funding for the base service and no additional funding as a result of service and ridership increases associated with the plan. Specifically, we have eliminated the more vulnerable portion of the STOA program that derives from general funds in the state budget. Figure 7.4 shows the results graphically.

[17] In reality, this is rarely if ever the case. Fares typically increase only from time to time (rather than annually) and often do not keep up with inflation. Funding from the state and federal governments is subject to other influences.

Table 7.9: Funding the Operating Costs Under Two Scenarios for STOA

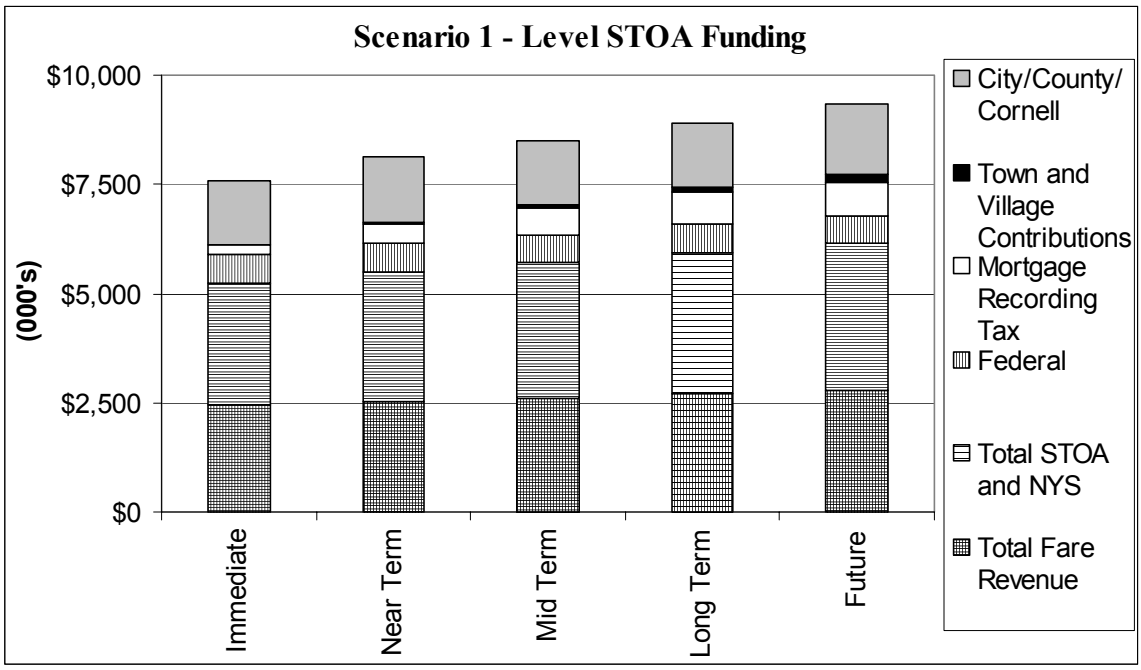
ANNUAL OPERATING COST AND FUNDING

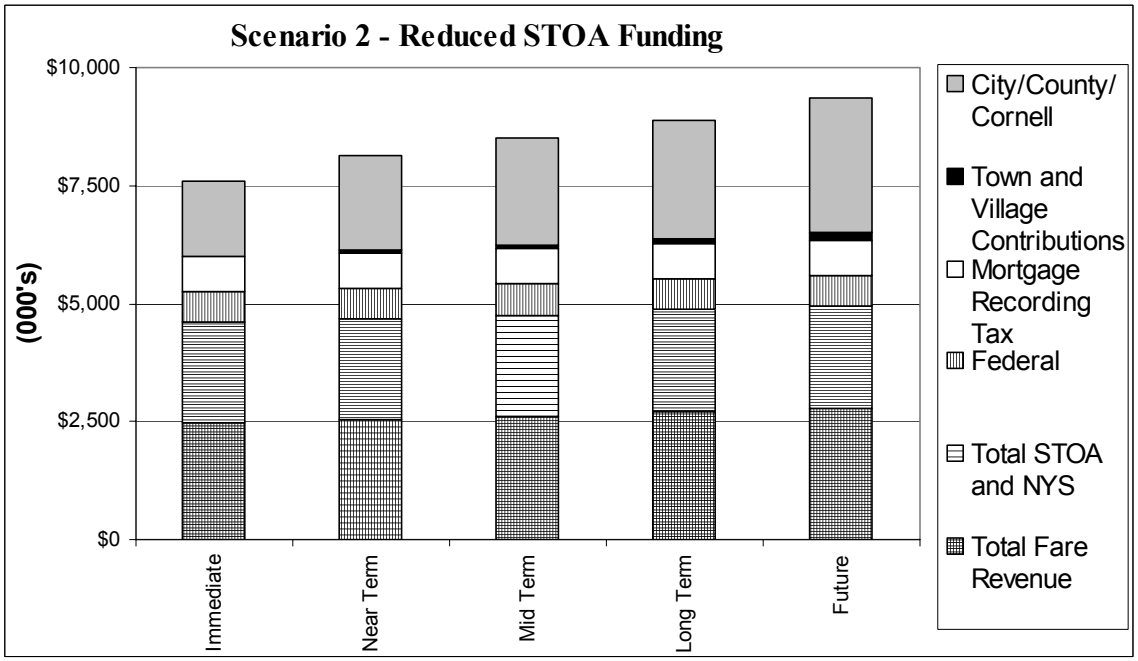
	Scenario I: Level STOA Funding					Scenario 2: Reduced STOA Funding				
Phase:	1	2	3	4	5	1	2	3	4	5
Years:	2	2	3	3	5	2	2	3	3	5
	Immediate	Near Term	Mid Term	Long Term	Future	Immediate	Near Term	Mid Term	Long Term	Future
TCAT BUDGET:										
Base Service Operating Cost	$7,391,956	$7,391,956	$7,391,956	$7,391,956	$7,391,956	$7,391,956	$7,391,956	$7,391,956	$7,391,956	$7,391,956
Base Service Fare Revenue	$2,450,200	$2,450,200	$2,450,200	$2,450,200	$2,450,200	$2,450,200	$2,450,200	$2,450,200	$2,450,200	$2,450,200
Federal Operating Assistance	$648,372	$648,372	$648,372	$648,372	$648,372	$648,372	$648,372	$648,372	$648,372	$648,372
STOA and Other NYS Funding	$2,759,394	$2,759,394	$2,759,394	$2,759,394	$2,759,394	$2,189,309	$2,189,309	$2,189,309	$2,189,309	$2,189,309
Net Local Operating Cost for Base Service (a)	$1,533,990	$1,533,990	$1,533,990	$1,533,990	$1,533,990	$2,104,075	$2,104,075	$2,104,075	$2,104,075	$2,104,075
STUDY RECOMMENDATIONS:										
Additional Operating Cost (b)	$242,290	$772,928	$1,150,251	$1,550,119	$1,995,744	$242,290	$772,928	$1,150,251	$1,550,119	$1,995,744
Additional Passenger Revenue (c)	$20,512	$91,202	$166,577	$278,464	$342,138	$20,512	$91,202	$166,577	$278,464	$342,138
Additional STOA (d)	$57,036	$236,224	$365,254	$484,595	$631,629	$0	$0	$0	$0	$0
Net Local Operating Cost of Recommendations (b-c-d)	$164,742	$445,502	$618,421	$787,060	$1,021,977	$221,777	$681,725	$983,675	$1,271,655	$1,653,606
Net Total Local Operating Cost (a+b-c-d)	$1,698,732	$1,979,492	$2,152,411	$2,321,050	$2,555,967	$2,325,852	$2,785,800	$3,087,749	$3,375,730	$3,757,680
Distribution of Local Shares:										
Mortgage Recording Tax Revenue Required*	$224,877	$455,638	$603,556	$747,195	$750,000	$750,000	$750,000	$750,000	$750,000	$750,000
Town and Village Contributions	$0	$50,000	$75,000	$100,000	$175,000	$0	$50,000	$75,000	$100,000	$175,000
Cornell Share	$491,285	$491,285	$491,285	$491,285	$543,656	$525,284	$661,933	$754,250	$841,910	$944,227
City Share	$491,285	$491,285	$491,285	$491,285	$543,656	$525,284	$661,933	$754,250	$841,910	$944,227
County Share	$491,285	$491,285	$491,285	$491,285	$543,656	$525,284	$661,933	$754,250	$841,910	$944,227
Total Municipal/Cornell Share	**$1,473,855**	**$1,523,854**	**$1,548,855**	**$1,573,855**	**$1,805,967**	**$1,575,852**	**$2,035,800**	**$2,337,749**	**$2,625,730**	**$3,007,680**
Ratio of Town&Village Share to City Share		*10.2%*	*15.3%*	*20.4%*	*32.2%*		*7.6%*	*9.9%*	*11.9%*	*18.5%*

*Maximum Available Per Year Assumed to be $750,000

NOTE: City, County and Cornell Shares maintained at current level if possible

Figure 7.4: Operating funding scenarios





7.5 Capital Costs of Phases

7.5.1 Summary of Capital Costs

Capital costs will be associated with the purchase of vehicles to operate additional service and new routes, construction of a transit hub at Pyramid Mall, and shelters and bicycle racks at various bus stops throughout the NESTS area. No land cost is included in the transit hub capital cost; an in-kind contribution from the Pyramid Mall consisting of a lease of the land for the transit center is assumed. There may be additional costs associated with automated vehicle location systems, automated fare collection systems and Cornell parking fee collection systems, but since these strategies are not explicitly incorporated in the proposed service plan and in some cases are more system-wide in nature, we have not included such costs in the capital costs of the recommended plan. Furthermore, we have not included any estimate for new vehicle storage capacity, but we understand that TCAT is already in the process of considering an expansion of its garage and maintenance facility.

Table 7.10 below shows the capital costs by phase. The unit costs and the assumptions regarding number of shelters and bicycle racks are shown in the table as well as the total costs of each item. The number of new buses shown in the table includes one spare small bus (in the Near Term) and one spare large bus (in the Long Term) in order to maintain an appropriate fleet-wide spare ratio.

Due to the fact that much of the recommended service increase occurs in the Near Term phase, the largest annual cost occurs in the Near Term period. (The costs shown are not annual but for the entire phase.) Despite the fact that the Immediate phase includes the Transit Hub at Pyramid Mall, the annual costs for this phase are lower than in the Near Term.

Table 7.10: Capital Costs

Capital Item	Phase:	Immediate		Near Term		Mid Term		Long Term		Future	
	Years:	1 and 2		3 and 4		5 to 7		8 to 10		11 and beyond	
	Unit costs	*Number*	*Cost*	*Number*	*Cost*	*Number*	*Cost*	*Number*	*Cost*	*Number*	*Cost*
Small bus	$ 125,000	1	$ 125,000	6	$ 750,000	2	$ 250,000	0	$ -	2	$ 250,000
Large bus	$ 260,000	1	$ 260,000	1	$ 260,000	1	$ 260,000	4	$ 1,040,000	1	$ 260,000
Transit Hub	$ 150,000	1	$ 150,000								
Shelters*	$ 4,000	6	$ 24,000	6	$ 24,000	9	$ 36,000	9	$ 36,000	0	$ -
Bike racks*	$ 1,300	6	$ 7,800	6	$ 7,800	9	$ 11,700	9	$ 11,700	0	$ -
* assume 3 per year											
TOTAL			**$ 566,800**		**$ 1,041,800**		**$ 557,700**		**$ 1,087,700**		**$ 510,000**

7.5.2 Funding Capital Costs

Possible funding scenarios for the capital costs associated with the recommened system are shown in Table 7.11. The three most likely sources are federal, state and local funding. Although it might be possible to obtain private sector contributions, none have been assumed.

As discussed earlier, federal funding programs cover 80% of capital costs while the state will cover 50% of the local share up to 10% of the total costs. The primary question is whether federal funds will be available. The federal capital program is discretionary rather than formula based. TCAT has been successful at obtaining discretionary funds in the past. Reauthorization

is now underway and we do not anticipate changes in the capital funding program approach. Nevertheless it is hard to predict whether specific capital projects will be approved for federal funding. To provide a range, we have examined three scenarios for federal funding. One scenario assumes all additional capital items for the recommended plan receive federal grants providing 80% of the cost. Another scenario assumes that only half the costs of capital items receive grants to cover 80% of those costs. The last scenario assumes that none of the capital items for the recommended plan receive federal grants. We have assumed that the state will pay 10% of the capital cost whether federal funding is available or not.

Local funding is assumed to make use of the mortgage recording tax that was also assumed in the earlier analysis of operating costs; only those funds not used to cover operating costs in a particular year are assumed available to cover capital costs for that year. (Note that the phases are multi-year so that any annual surplus from the mortgage recording tax for a given phase is multiplied by the number of years in that phase.) Because the operating scenarios affect the availability of mortgage recording tax funds to cover capital costs (since the use of the mortgage recording tax for operating funds varies with the availability of STOA funds), each of the three capital cost scenarios (based on availability of federal capital funds) must be examined under each operating cost scenario (based on the level of STOA funds). Therefore, we have examined capital costs for six (three times two scenarios), as follows:

SCENARIOS	**Level STOA Funding**	**Reduced STOA Funding**
Federal 80% Capital Grants (for Additional Capital Items Required by Recommendations):		
For all capital items	Scenario 1	Scenario 2
For half of the capital items	Scenario 3	Scenario 4
For none of the capital items	Scenario 5	Scenario 6

We have also assumed that unexpended funds from the mortgage recording tax can be carried over to future years. We have used these excess funds to cover future year capital costs only.

The resulting shortfall in capital funding in certain scenarios and phases would need to be covered by either additional local funding or possibly by the State Dedicated Fund (SDF) if such funding can obtained (we understand that SDF is primarily used for replacement vehicles rather than additional vehicles).

As can be seen in Table 7.11, there is no shortfall in Scenario 1 (available federal capital funding and level STOA funding) or Scenario 3 (partial federal capital funding and level STOA funding) during the 15-year time period that was examined. A shortfall occurs in the four other scenarios during different years. A shortfall occurs in the Immediate Term (years 1 and 2) in all three scenarios (2, 4 and 6) with reduced STOA funding. In Scenario 2 (available federal capital funding but reduced STOA funding), this shortfall is less than $30,000 per year during the Immediate Term and averages over $25,000 per year over the 15-year period. In Scenario 4 (partial federal capital funding and reduced STOA funding), this shortfall is considerably larger—

over $140,000 per year during the Immediate Term and averages over $125,000 per year over the 15-year period. In Scenario 6 (no federal capital funding and reduced STOA funding), the shortfall is even larger—over $250,000 per year in the Immediate Term and averaging over $225,000 per year over the 15-year period. In Scenario 5 (no federal capital funding and level STOA funding), a shortfall occurs in the Long Term period (years 8 through10). This shortfall is over $280,000 per year; the average shortfall over the entire 15-year period is almost $87,000 per year.

Of course, if SDF funds can be obtained, this shortfall would not affect the local share. If SDF funds cannot be obtained, the shortfall would presumably be the responsibility of the three local funding partners and any other municipalities that can be brought into the local funding formula.

A final caveat regarding the conclusions to be drawn from this analysis is that we have not incorporated inflation and have shown all dollar amounts in year of expenditure dollars; therefore the annual funds actually needed in any given future year would need to be adjusted to account for inflation effects.

Figure 7.5 shows the sources of the total capital funding over the 15-year time period for each scenario. The interactions between federal funding and either mortgage recording tax or other local sources can be easily seen in this figure.

7.5.3 Total Local Funding Needs for Operating and Capital Costs

The total local funding commitment for each phase for both capital and operating would be determined by adding 1) incremental operating funding needed per year for that phase and 2) any local capital funding for that phase to cover the shortfall after the mortgage recording tax surplus is used and after any SDF funds are assumed available. Table 7.12 below summarizes the combined additional local share per year per partner for each phase and scenario, assuming that no SDF funds are available to cover project capital costs (at 100%) and that the additional local costs continue to be shared equally among the three original partners (the City, County and Cornell University).

In Scenarios 1 and 3, there is no shortfall in capital funding until the Future Term (year 11) when the combined local share needs to increase by over $50,000 per partner (as shown in Table 7.12). In Scenario 5, the capital funding shows a shortfall in the Long Term and the operating funding in the Future Term (as described above). The result is an increase in the local share of about $93,000 per year per partner in the Long Term and about $83,000 in the Future Term.

In Scenarios 2, 4 and 6, in which STOA funding is reduced, increases in local shares are needed throughout the 15-year study period and these increases are considerably larger. In the Immediate Term, these increases (per year per partner) range from about $43,000 in Scenario 2 to $119,000 in Scenario 6; by the Future Term, these increases range from $456,000 to $483,000, respectively. Figure 7.6 shows the same results graphically.

Table 7.11: Capital Costs for 6 Funding Scenarios

CAPITAL FUNDING SCENARIOS

Phase:		1	2	3	4	5	1	2	3	4	5
		Immediate	Near Term	Mid Term	Long Term	Future	Immediate	Near Term	Mid Term	Long Term	Future
Years:		2	2	3	3	5	2	2	3	3	5
	Period:										
Capital Cost for Recommended Plan	Phase	**$566,800**	**$1,041,800**	**$557,700**	**$1,087,700**	**$510,000**	**$566,800**	**$1,041,800**	**$557,700**	**$1,087,700**	**$510,000**
WITH FEDERAL FUNDING		**Scenario I: Level STOA Funding**					**Scenario 2: Reduced STOA Funding**				
Federal Share (80%)	Phase	$453,440	$833,440	$446,160	$870,160	$408,000	$453,440	$833,440	$446,160	$870,160	$408,000
State Share (10%)	Phase	$56,680	$104,180	$55,770	$108,770	$51,000	$56,680	$104,180	$55,770	$108,770	$51,000
MRT Portion of Local Share	Phase	$56,680	$104,180	$55,770	$108,770	$51,000	$0	$0	$0	$0	$0
Other Local Funds or SDF	Phase	$0	$0	$0	$0	$0	$56,680	$104,180	$55,770	$108,770	$51,000
Other Local Funds or SDF	Annual	$0	$0	$0	$0	$0	$28,340	$52,090	$18,590	$36,257	$10,200
WITH PARTIAL FEDERAL FUNDING		**Scenario 3: Level STOA Funding**					**Scenario 4: Reduced STOA Funding**				
Federal Share (80% of Half)	Phase	$226,720	$416,720	$223,080	$435,080	$204,000	$226,720	$416,720	$223,080	$435,080	$204,000
State Share (10%)	Phase	$56,680	$104,180	$55,770	$108,770	$51,000	$56,680	$104,180	$55,770	$108,770	$51,000
MRT Portion of Local Share	Phase	$283,400	$520,900	$278,850	$543,850	$255,000	$0	$0	$0	$0	$0
Other Local Funds or SDF	Phase	$0	$0	$0	$0	$0	$283,400	$520,900	$278,850	$543,850	$255,000
Other Local Funds or SDF	Annual	$0	$0	$0	$0	$0	$141,700	$260,450	$92,950	$181,283	$51,000
WITHOUT FEDERAL FUNDING		**Scenario 5: Level STOA Funding**					**Scenario 6: Reduced STOA Funding**				
Federal Share (none)	Phase	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
State Share (10%)	Phase	$56,680	$104,180	$55,770	$108,770	$51,000	$56,680	$104,180	$55,770	$108,770	$51,000
MRT Portion of Local Share	Phase	$510,120	$937,620	$501,930	$137,047	$0	$0	$0	$0	$0	$0
Other Local Funds or SDF	Phase	$0	$0	$0	$841,883	$459,000	$510,120	$937,620	$501,930	$978,930	$459,000
Other Local Funds or SDF	Annual	$0	$0	$0	$280,628	$91,800	$255,060	$468,810	$167,310	$326,310	$91,800

Note: Figures shown are for entire phase; they are not annual costs. MRT is the Mortgage Recording Tax.

Figure 7.5: Fifteen-year capital costs by source

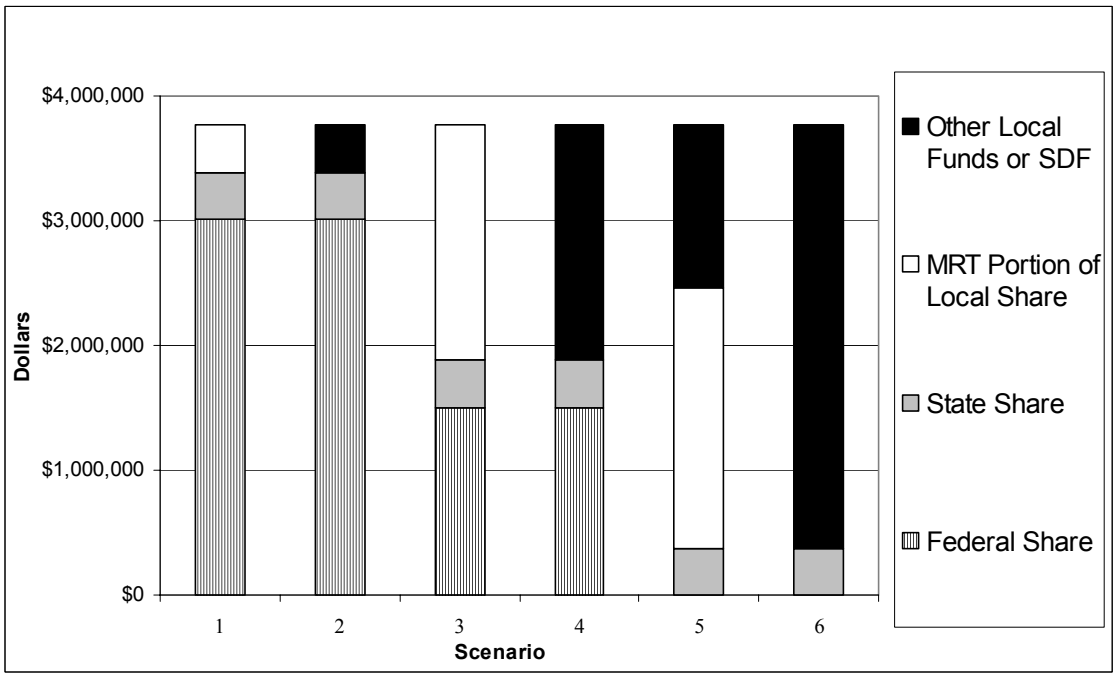


Figure 7.6: Growth in total additional annual local partner share by scenario

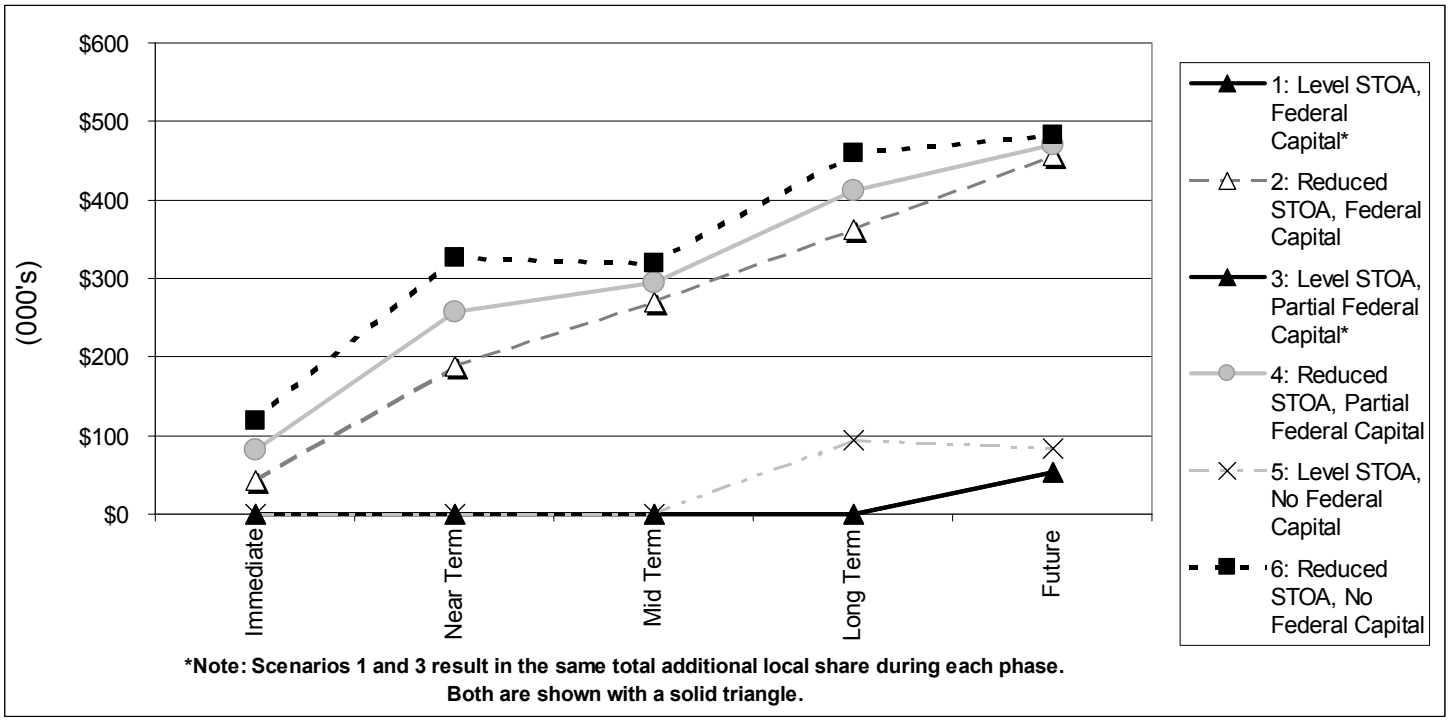


Table 7.12: Total Additional Annual Local Funding Requirements (vs. 2001)

TOTAL ADDITIONAL **ANNUAL** FUNDING REQUIRED FROM LOCAL SOURCES
ASSUMING NO STATE DEDICATED FUNDS AVAILABLE

Phase:	1	2	3	4	5	1	2	3	4	5
	Immediate	Near Term	Mid Term	Long Term	Future	Immediate	Near Term	Mid Term	Long Term	Future
Years:	2	2	3	3	5	2	2	3	3	5
WITH FEDERAL FUNDING FOR ADDITIONAL CAPITAL COSTS (80%)	**Scenario I: Level STOA Funding**					**Scenario 2: Reduced STOA Funding**				
LOCAL ADDITIONAL OPERATING SHARE PER PARTNER	$0	$0	$0	$0	$52,371	$33,999	$170,648	$262,965	$350,625	$452,942
LOCAL ADDITIONAL CAPITAL SHARE PER PARTNER	$0	$0	$0	$0	$0	$9,447	$17,363	$6,197	$12,086	$3,400
TOTAL ADDITIONAL LOCAL SHARE PER PARTNER	$0	$0	$0	$0	$52,371	$43,446	$188,012	$269,161	$362,710	$456,342
TOTAL ADDITIONAL LOCAL SHARE FOR ALL 3 PARTNERS	$0	$0	$0	$0	$157,112	$130,337	$564,035	$807,484	$1,088,131	$1,369,025
WITH 80% FEDERAL FUNDING FOR HALF OF ADDITIONAL CAPITAL COSTS	**Scenario 3: Level STOA Funding**					**Scenario 4: Reduced STOA Funding**				
LOCAL ADDITIONAL OPERATING SHARE PER PARTNER	$0	$0	$0	$0	$52,371	$33,999	$170,648	$262,965	$350,625	$452,942
LOCAL ADDITIONAL CAPITAL SHARE PER PARTNER	$0	$0	$0	$0	$0	$47,233	$86,817	$30,983	$60,428	$17,000
TOTAL ADDITIONAL LOCAL SHARE PER PARTNER	$0	$0	$0	$0	$52,371	$81,232	$257,465	$293,948	$411,053	$469,942
TOTAL ADDITIONAL LOCAL SHARE FOR ALL 3 PARTNERS	$0	$0	$0	$0	$157,112	$243,697	$772,395	$881,844	$1,233,158	$1,409,825
WITHOUT FEDERAL FUNDING FOR ADDITIONAL CAPITAL COSTS	**Scenario 5: Level STOA Funding**					**Scenario 6: Reduced STOA Funding**				
LOCAL ADDITIONAL OPERATING SHARE PER PARTNER	$0	$0	$0	$0	$52,371	$33,999	$170,648	$262,965	$350,625	$452,942
LOCAL ADDITIONAL CAPITAL SHARE PER PARTNER	$0	$0	$0	$93,543	$30,600	$85,020	$156,270	$55,770	$108,770	$30,600
TOTAL ADDITIONAL LOCAL SHARE PER PARTNER	$0	$0	$0	$93,543	$82,971	$119,019	$326,918	$318,735	$459,395	$483,542
TOTAL ADDITIONAL LOCAL SHARE FOR ALL 3 PARTNERS	$0	$0	$0	$280,628	$248,912	$357,057	$980,755	$956,204	$1,378,185	$1,450,625

8.0 Conclusion

The primary goal of the NESTS Transit Planning Project was to determine the feasibility of encouraging people who currently drive in the northeast subarea to use transit instead. In the course of this study we attempted to determine what it would take to shift 3%, 5%, or 10% of person-trips in automobiles onto the transit system.

The market research effort for this study identified a number of changes that could be made to the transit system so that it would be more attractive to people who currently drive, and also a number of changes that would make driving less attractive relative to transit. The two most important changes to the transit system were found to be increasing service coverage and improving the frequency of service. Express shuttles from remote park-and-ride lots were specifically identified as attractive new services.

In response to these findings, many service enhancements were developed that would move the TCAT system closer to the "ideal" transit service that would attract people out of their cars. Using the most optimistic ridership projections, it was estimated that a high-service-level system in the NEST area could achieve the 3% mode shift. The problem with this system is that it would be three times as expensive to operate as the current routes serving the NESTS area—an operating cost increase of more than $3 million annually. This magnitude of cost increase was deemed not to be feasible.

Four changes related to driving were found to have the potential for encouraging significant numbers of people to use transit:

- if traffic congestion got worse and transit could avoid the congestion
- if driving were prohibited in certain areas
- if the price of gasoline more than doubled
- if parking became more expensive.

The price of gasoline is beyond the control of the local authorities, except for marginal changes that might be possible by tinkering with the gasoline excise tax. While prohibiting driving in certain areas would be effective in getting people to use transit, there seems to be little possibility of banning cars from large sections of the Cornell campus or of expanding the downtown pedestrian mall beyond its current limits. Traffic congestion will likely get worse over time, and this study examined ways that transit vehicles could gain time advantages over general traffic. Given the strong community opposition to installing traffic signals at key points such as Community Corners and the one lane bridges in Forest Home, however, the potential applications for transit signal priority are limited. Likewise, constructing new transit-only rights-of-way or banning automobiles from certain thoroughfares was not deemed feasible.

These considerations left parking pricing as the most readily available means of affecting the comparative attractiveness of driving and transit. Using data from the market research, we were able to calculate the ridership impacts of increases in the daily parking rates at the two major destinations in the NESTS area: Cornell and downtown Ithaca. We found that a $1 per day parking fee increase, combined with the "enhanced" level of service on the improved transit

system, could achieve the desired 3% mode shift. The same service level combined with a $3 per day parking fee increase could achieve the 5% mode shift. Finally, the "high" service level combined with the $3 per day fee increase could achieve the 10% mode shift.

As noted earlier in this report, the City of Ithaca intends to raise parking fees in the downtown area to help fund capital projects, including the construction of new parking facilities. Prices for daily fee parkers would increase by $1 per day by 2005, and by nearly $3 per day by 2007. For monthly permit parkers in downtown, the fee increases would not be as steep: the effective daily rate would rise by $1 by 2007, but by 2015 would not yet have risen by $2 per day. If the City carries out these plans, gains in transit ridership would be expected. The ridership estimates presented in Chapter 7 of this report take these proposed fee increases into account.

Representatives from Cornell University indicated that parking fee increases of the magnitude being considered in this study were infeasible. In the past, much smaller increases in parking rates had been met with strong opposition; there would be no way of convincing faculty and staff to accept these much larger fee increases. Without this policy lever available at Cornell—by far the largest trip generator in the NESTS area—mode shifts in the range originally laid out for this study had to be judged infeasible.

Beyond studying the feasibility of these original goals, this study was also designed to produce practical, implementable transit improvements that would do as much as possible to encourage transit use in the NESTS area. While the full improved transit system at the "high" level of service is too expensive to be feasible, the recommended routes can be phased in over time, initially introduced at lower service levels and then gradually improved. Chapter 7 of this report presented a detailed description of these implementation phases, including their costs and ridership impacts.

By the time of the "Future" phase, in the year 2014, enough new riders would be attracted to the system to achieve nearly a 2% mode shift. This shift is not as high as originally hoped for, but it can be accomplished at a reasonable cost and without severe disincentives to driving. In that year, more than 1,500 automobile trips would be removed from the roads in the NESTS area each weekday, replaced by trips on transit.

The benefits of implementing the recommended services would likely be experienced most strongly at two key points in the study area: on Triphammer Road south of Route 13, and on Pine Tree Road north of Route 79. The proposed Pyramid Transit Hub and the new express services should be an attractive alternative to driving into the congested areas of the Cornell campus and downtown Ithaca, and the free parking at the hub could save riders significant money. From the south, the potential park-and-ride in Bethel Grove and new express shuttle to the campus should cause a reduction of traffic on Pine Tree Road. The traffic impacts analysis in Chapter 7 provides estimates of these impacts.

The ultimate financial feasibility of the recommended plan depends on the level of state funding through the STOA program, the success of TCAT in securing new revenue from the mortgage recording tax and in obtaining capital grants from the federal government, and the willingness of the local funding partners and additional municipalities to increase their support of the system.

Under most of the funding scenarios examined in Chapter 7, the increased burden appears manageable.

Now that the NESTS Transit Planning Project is at its conclusion, the responsibility for carrying out its recommendations falls mainly to TCAT and ITCTC. Detailed planning and scheduling work should commence as soon as possible for the service recommendations in the Immediate Term period. Next, a timeline should be set out for Near Term actions including the procurement of new vehicles, detailed planning of the new routes, and securing the cooperation of Pyramid Mall and the Bethel Grove Church in setting up the park-and-ride arrangements. TCAT, in cooperation with Pyramid Mall, should begin the process of design and engineering for the new transit hub. ITCTC should work to get this project on its Transportation Improvement Program for FY2004. Federal funding should also be sought for the new vehicles necessary to operate the expanded service.

In terms of further study, Cornell University should seriously consider a full examination of moving from its current permit-based system to a daily-fee system employing smart card technology. Some initial information was provided in this report on Cornell's technology options, but additional study is needed to determine the overall cost of implementation and to estimate the potential impacts on parking demand in the short and long range periods. In conjunction with continuous improvements in transit service, a change in the way Cornell handles parking could produce the most significant effects in reducing traffic and improving livability in the NESTS area.

9.0 List of Recommendations

In addition to service modifications, a wide variety of other types of actions were recommended throughout this report. The following list summarizes these recommendations.

- In the course of the telephone survey, respondents reacted favorably to the concept of a "transit fare payment account" designed along the lines of the popular E-ZPass program. It is recommended that TCAT aggressively pursue this technology.

- It is recommended that Cornell investigate the possibility of an association with Zipcar or similar organization to encourage students to avoid bringing a car to campus.

- It is recommended that Cornell implement a UPASS program for first-year students when it is judged feasible.

- In light of parking and other changes, which will result from the implementation of Ithaca College's Master Plan, a UPASS program for Ithaca College students may be viable in the near future. It is recommended that TCAT staff continue discussions with appropriate Ithaca College officials as the College's Master Plan proceeds.

- It is recommended that TCAT consider the use of articulated buses on campus Route 81 to serve peak demand more efficiently.

- It is recommended that TCAT aggressively pursue the implementation of automatic vehicle location technology, and that the implementation be fast-tracked for routes serving the new Pyramid Transit Hub.

- It is recommended that TCAT begin discussions with the Town of Lansing, the Town of Ithaca, the Village of Lansing, and the Village of Cayuga Heights on the topic of direct cooperation in the funding of TCAT services. Retailers in the State Highway 13/Triphammer Road area and the southwest retail area should also be contacted to see if they would be willing to help fund the circulator services described in this report.