

McDonough County Public Transportation Program Service Audit and Analysis

December, 2007

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Introduction.

The McDonough County Public Transportation Program consists of fixed-route services provided by Go West and paratransit services provided by McDonough County Red Cross, Bridgeway, and Barry's Taxi. Go West Transit is a division of Western Illinois University's Student Services Department. Service is provided by a contract between First Transit and Western Illinois University.

Macomb is a city of 20,050 people located in rural western Illinois. Western Illinois University has a student population of 11,219. Funding for bus service comes a variety of sources including FTA Section 5311, State of Illinois Downstate Funding, Student fees, Older Americans Act, McDonough County, Mental Health funding through Bridgeway, and passenger fares.

Go West operates an extensive bus service in Macomb that benefits Western Illinois University and the residents of Macomb. It has an extensive route network and provides service seven days per week, excluding some holidays. In comparison to other Midwestern transit systems, Go West is efficient and effective. There are opportunities for minor service additions that will eliminate inconsistencies within the schedule and enhance the ability of people to live easily in Macomb without the expense of maintaining an automobile. It also allows families full mobility with only one vehicle in the household.

The purpose of this document is to conduct a service audit and analysis of the fixed route services provided by Go West. Seven topics have been defined and are analyzed in accordance with the terms of the contract between the City of Macomb and Bourne Transit Consulting, LLC of Ames, Iowa.

The seven tasks that have been defined are:

- A. Number of Routes
- B. Number of Buses per Route
- C. Bus Frequency per Route
- D. Hours of Operation per Route
- E. Number of Buses in the Fleet
- F. Route Design
- G. Audit of Ridership Statistics

Data was collected during two visits. The first visit was October 24 to 26, 2007 and the second visit was October 30 to November 3, 2007.

The table below compares some key indicators of other Midwestern bus systems in comparison to Go West.

Table 1: Peer Group Comparison.

| Go West Peer Group | | Nov. 2007 | | | | | |
|--------------------|------------|-----------|----------|------------|--------------|-----------|--------|
| | | | Pass per | | | Cost per | Rides/ |
| City | Passengers | Rev-Mi | Rev Mi | Population | Fixed OP Exp | Passenger | Capita |
| Ames | 4,162,493 | 1,022,237 | 4.07 | 50,726 | \$5,295,844 | \$1.27 | 82 |
| Champaign | 9,817,486 | 2,493,850 | 3.94 | 123,938 | \$18,715,919 | \$1.91 | 79 |
| Macomb | 1,567,694 | 269,659 | 5.81 | 20,050 | \$1,207,729 | \$0.77 | 78 |
| Lafayette | 4,326,202 | 1,404,946 | 3.08 | 125,738 | \$6,989,652 | \$1.62 | 34 |
| Blmington IN | 2,363,526 | 891,972 | 2.65 | 92,456 | \$4,231,835 | \$1.79 | 26 |
| Blmington IL | 1,545,326 | 1,011,084 | 1.53 | 74,593 | \$4,438,360 | \$2.87 | 21 |
| St Cloud | 1,723,166 | 977,064 | 1.76 | 91,305 | \$4,018,625 | \$2.33 | 19 |
| La Crosse | 1,059,544 | 753,484 | 1.41 | 89,966 | \$3,634,919 | \$3.43 | 12 |
| Peoria | 2,507,461 | 1,669,223 | 1.50 | 247,172 | \$11,812,419 | \$4.71 | 10 |
| Lincoln | 1,772,712 | 1,406,667 | 1.26 | 226,582 | \$7,036,609 | \$3.97 | 8 |

Common transit industry indicators that compare dissimilar sized systems are cost per passenger and rides per capita. Rides per capita measures system effectiveness in broad numbers over the entire population of a community. Cost per passenger measures the cost efficiency of the system. Go West has one of the highest rides per capita ratios in the Midwest. Cost efficiency is the strongest in the peer group indicating that Go West is providing service at a very low cost.

The Federal Transit Administration issues performance reports each year. For cities with populations between 200,000 and 999,999, there are six indicators that provide a funding basis for formula programs in cities with populations between 50,000 and 199,999. While Macomb is a rural FTA Section 5311 system, it is not eligible for these funds. However, it is enlightening to make comparisons between national averages and Go West performance.

Go West outperforms the average large city bus system in five of the six categories. While exact passenger miles are not surveyed at Go West, a reasonable assumption is 1.1 miles per passenger and is the basis for calculating Go West performance.

Table 2: National Comparison.

| Go West National Comparison | | | | | | |
|-----------------------------|--------------------------|-------------------------|----------------------|----------------------|-----------------------|-----------------------|
| | Pass-miles/ Rev-miles | Pass-miles/ Rev-hour | Rev Miles/ Capita | Rev-hours/ Capita | Pass-miles/ Capita | Passengers/ Capita |
| Large City Avg | 5.561 | 95.935 | 10.951 | 0.729 | 72.57 | 13.348 |
| Go West | 6.395 | 70.34 | 13.449 | 1.223 | 86.01 | 78.189 |

With the strong performance of the system, Go West is meeting many transportation needs at WIU and within the City of Macomb. However, opportunities for small improvements exist and they are documented in the following tasks.

Task A: Number of Routes.

Go West operates eleven routes at various times of the day and various days of the week. Go West has marketed the bus service to specific market segments and has provided separate route numbers to routes which may overlap other similar services. Several of the routes operate only for short time periods. Examples are Rt. #4, a Thursday, Friday, Saturday late night route, and Rt. #10 that operates two trips per day to take students to the AMTRAK connection at the Macomb train station.

Routes consist of two configurations, either a loop route or a point-to-loop route. There are no point-to-point routes. In small cities, loop routes are common to provide maximum area coverage. Loop routes are also used in many campus bus systems, usually constrained by road availability. Point-to-loop routes are also common in campus communities with a loop near campus and an outlying terminal. Point-to-point routes are generally the most efficient route type and are typically used in larger cities.

During weekdays, there are usually seven or eight routes operating at any one time, with a short peak of ten routes operating at 5:00pm when Rt. #5 and Rt. #10 overlap with other routes. The number of routes in Macomb is appropriate for the size of the community and university. Service hours on some routes are inadequate and this issue is discussed in Task D.

Table 3 illustrates the hours of services on each route and shows that some routes have limited service. On weekdays, there are typically eight routes operating during the day. In the evening, three routes operate Monday through Thursday. Weekend service is greatly reduced with no service in the morning and four routes operating for a short time on Saturday afternoon. On Sundays one bus is able to provide service on the three routes that operate.

Table 3: Routes and Hours of Operation.

| Go West Operating Hours | | | | | | | | | | | | | | | | | | | | |
|-------------------------|-------------------------|-----|-----|------|------|-----|------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| Weekdays | | | | | | | | | | | | | | | | | | | | |
| Rte | 7am | 8am | 9am | 10am | 11am | 12n | 1pm | 2pm | 3pm | 4pm | 5pm | 6pm | 7pm | 8pm | 9pm | 10pm | 11pm | 12m | 1am | 2am |
| 1 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | | |
| 2 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 3 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | ThFS | ThFS | ThFS |
| 5 | | | | | | | | | | | x | x | x | x | x | x | | | | FS |
| 6 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 7 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 8 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 9 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 10 | | | | | | | | | | | x | | | | | | | | | |
| 11 | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | |
| 3-11 | Monday through Thursday | | | | | | | | | | | | | | | | | | | |
| Rtes | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 10 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 |
| Saturdays | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | x | x | x | x | x | | | |
| 4 | | | | | | | | | | | | | | | | x | x | | | |
| 5 | | | | | | | x | x | x | x | x | | | | | | | | | |
| 6 | | | | | | | Break Only | | | | | | | | | | | | | |
| 7 | | | | | | | x | x | x | | | | | | | | | | | |
| 8 | | | | | | | x | x | x | | | | | | | | | | | |
| 9 | | | | | | | x | x | x | | | | | | | | | | | |
| Rtes | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | | | |
| Sundays | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | x | x | x | x | x | | | |
| 5 | | | | | | | x | x | x | x | x | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | x | | | | | |
| Rtes | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 1 | | | |

Go West has efficiently designed Rtes. #1 and #2 as campus loop routes and these two routes carry almost 75% of the total ridership. These loop routes connect a variety of activity centers on campus with residential areas near central campus and the high density dormitories. In contrast, city routes #6, #7, #8, and #9 carry only five per cent of the total ridership. However, many of the passengers on these routes have no alternative transportation.

Frequencies of service are proportional to demand. Rt. #1 operates at 4 to 6 minute intervals; Rt. #2 operates at 7 to 8 minute intervals; Rt. #4 operates at 12 to 15 minute intervals. Rtes. #5 and #11 operate at 15 minute intervals and Rtes. #6, #7, #8, operate at 30 to 60 minute intervals. Rt. #9 operates at 90 minute intervals.

The hours of service also reflect the demand and the busiest routes have the longest span of service hours during the week. Table 4 shows the proportional share of each route compared to total weekly ridership for the first 12 weeks of the current school year.

Table 4: Ridership Proportions, First 12 Weeks, Fall Semester, 2007.

| Go West Ridership | | |
|----------------------------|-------------------|-----------------|
| 2007 12 Week Totals | | |
| Route | Passengers | Per cent |
| 1 | 244,662 | 38.8% |
| 1 night | 33,309 | 5.3% |
| 1 weekend | 8,933 | 1.4% |
| 2 | 184,046 | 29.2% |
| 3 | 31,319 | 5.0% |
| 3 night | 5,123 | 0.8% |
| 4 | 49,883 | 7.9% |
| 5 | 15,070 | 2.4% |
| 6 and 9 | 14,227 | 2.3% |
| 7 | 8,152 | 1.3% |
| 8 | 9,664 | 1.5% |
| 10 | 638 | 0.1% |
| 11 | 25,604 | 4.1% |
| | 630,630 | 100.0% |

Some routes are point-to-loop routes. In general, they circulate in a loop around campus and then travel to a destination point or they loop through residential areas of Macomb. With the geography of central campus, this type of routing is efficient for Rts. #4 and #5 which circulate through campus and connect to downtown and the East Jackson commercial areas.

Rt. #4 does not meet all the needs of students traveling late at night on weekends. Drivers indicated many requests for service to Aspen Court and that some students are walking to Aspen Court from Adams St. A new service, Rt. #4A, is proposed to operate between West Jackson residential areas and downtown from 10:00pm to 3:00am on Fridays and Saturdays only. This would be a complementary service for the existing Rt. #4 and would reduce the chances of an intoxicated pedestrian being injured crossing W. Jackson late at night.

Large loops serving only residential areas tend to provide maximum area coverage, but tend to require long travel times for passengers. Travel time and cost are the two key factors in choosing transit and long travel times tend to keep transit ridership low.

Rt. #6 is a large dual loop route with an endpoint at Lamoine Village and may be more efficient if it was reconfigured into a point to point route between Lamoine Village and downtown Macomb. Ridership surveys by route segment can determine if the route can be easily modified. Specific route segments that need to be analyzed are Pierce St. and service on W. Jackson to Aspen Court.

Rts. #6 and #9 operate as bidirectional routes on West Jackson, Adams, and Pierce, but also serve other areas of Macomb. The 90 minute headway on Rt. #9 makes it incompatible for two way travel with the 30 minute headway on Rt. #6. Rationalization of these two routes is needed with more even headways to make them a complementary pair.

The major traffic generator for these two routes should be campus, but the routing and frequencies make easy access to campus difficult for passengers who must rely on either of these routes. It is difficult to use either of these routes for bidirectional travel on the loop portions of the routes or using them as a combination. While ridership is up recently and Rt. #9 serves the Bridgeway market well, the Rt. #6-9 combination is operating at less than full potential. Routing changes or frequency changes are needed.

Rt. #7 is another loop to point route and it works fairly well. It connects downtown with the commercial areas of East Jackson and also serves low and moderate income housing areas in northeast Macomb. It is scheduled to make a convenient connection with Rt. #8 at K-Mart which makes travel to and from the High School and medical area convenient.

Rt. #8 is a large loop route that is not as effective as it could be. It covers a large area of southeast Macomb. Passengers who use this route for origins and destinations have a long (30 minute) ride for either the start trip or the return trip. Passengers transferring to and from other buses at the Transfer Center also have a long trip on one leg of their journey. It does work well with Rt. #7 for connecting housing areas with the High School and medical center.

Rt. #9 serves southwest Macomb and the south edge of campus. Its infrequent service makes it difficult to attract significant numbers of passengers other than captive riders such as those traveling to and from Bridgeway. More frequent service and better pairing with Rt. #6 would be more logical and would increase ridership on this route and Rt. #6.

Rt. #10 is a specialty route that is effective in moving students to the AMTRAK connection. On Sunday night, a bus is diverted from Rt. #1 to meet the train. A dedicated bus would provide more flexibility for times that the train is late and would not interrupt Rt. #1 service.

Rt. #11 is a loop route connecting residential areas in southwest Macomb with the western edge of campus. Operating at a 15 minute interval, it is effective in moving students to and from campus from residential areas southwest of campus.

The evening Rt. #3 - 11 combination is unusual in that it does not have its own route number. It may also be confusing for passengers because the circulation pattern is not the same in the daytime as in the evening. Separate route identification, such as Rt. #3N, would provide a distinct identity for this route and reduce confusion among passengers.

Current data collection procedures do not include documentation of ridership by route segment. An ongoing program of sampling passenger boardings along route segments would provide information regarding lightly used route segments. Route segments for survey purposes should be less than one mile and generally consist of no more than two streets. Segment analysis can also consist of individual stops. Segment analysis must have adequate staffing to conduct and analyze the surveys.

A time series over several years will show ridership patterns and can be used to analyze changes in activities that impact the bus system. It can also provide general information such as the number of students that use Go West for trips to and from the High School or other destinations that future marketing programs may target.

While the current number of routes is adequate; with additional data, future decisions can be made regarding the optimum number of routes. Lightly used segments may be combined with other routes. Heavily used segments may require a separate route to balance demand and vehicle size.

Some route segments that require further analysis include:

- Rt. #5: Lafayette/Washington to Calhoun/Randolph
- Rt. #6: Central Transfer to Pierce/Charles
- Rt. #6: Pierce/Charles to Adams/Normal
- Rt. #6: Adams/Normal to W. Jackson/Wigwam Hollow
- Rt. #6: Adams/Ward to Johnson/W. Jackson
- Rt. #6: Spoon River to Central Transfer
- Rt. #7: Central Transfer to Pierce/White
- Rt. #8: Eisenhower Tower
- Rt. #8: Macomb H.S.
- Rt. #8: Edison School
- Rt. #9: Johnson/W. Jackson to Adams/Ward
- Rt. #9: Adams/Ward to Pierce/Charles
- Rt. #9: Pierce/Charles to Central Transfer
- Rt. #11: Turnberry Village 2 and Robin/Adams

Route survey procedures are time consuming and will require additional labor. An intern or part time planner who would work approximately 20 hours per week for ten to twelve weeks per semester would provide adequate labor to collect and analyze route data.

Task A: Number of Routes Recommendations:

- **Add new Friday/Saturday late night Rt. #4A between downtown and West Jackson.**
- **Conduct route segment boarding surveys each semester.**
- **Add part time employee to conduct surveys.**

Task B: Number of Buses per Route.

On the campus routes, three buses are scheduled on school days on Rts. #1 and #2 to handle the current passenger loads. Go West has a unique low tech system to space buses, where drivers radio their positions to each other and space themselves accordingly. However, pass-ups due to overcrowded buses occur resulting in long waits for some passengers. When two buses are late and overloaded, the wait times for some passengers can be as much as 15 minutes.

When the normal expectation is no more than a five minute wait on Rt. #1, the 15 minute gap is unacceptable from an operations perspective and a passenger perspective. Recovery time can be as much as 30 minutes to return to normal intervals after buses have bunched.

Go West has used “crunch” buses to accommodate the overloading that occurs immediately before and after class times. A “crunch” bus is a second bus operating immediately before or after the scheduled bus. The crunch buses are often used in conjunction with driver reliefs for lunch and shift changes. This is the most efficient way to meet the peak demands with minimum costs. Rt. #3 also uses a crunch bus on Mondays and Wednesdays. Crunch buses require a vehicle, but no significant costs because those costs are usually built in to the lunch relief schedule for the drivers and there is only a marginal increase in time.

Table 5: Crunch Bus Usage

| Crunch Bus Usage by Route | | | |
|----------------------------------|------------------|------------------|---------------|
| Time | Mon. Wed. | Tue. Thu. | Friday |
| 900am | 1,2,3 | | |
| 930am | | 1,2 | |
| 1000am | 1,2 | | 2 |
| 1030am | | | |
| 1100am | 1,2 | 1,2 | 1 |
| 1130am | | | |
| 1200n | 1,2 | | |
| 1230pm | | 1 | |
| 100pm | 1,2 | | |
| 130pm | | | |
| 200pm | 1,2 | 1,2 | |
| 230pm | | | |
| 300pm | 1 | | |
| 330pm | | 1 | |
| 400pm | | | |
| 430pm | | | |

Crunch buses are an effective way to meet the peak demands for a short period of time before and after classes. Bus mileage is minimized to the exact location where repetitive high demand occurs and can be varied by day of the week. Operating costs are low, but capital costs must be considered when planning the use of these buses. The need for crunch buses will be greater in inclement weather in the winter or times when student attendance at class is high, such as first and last days of class.

The current schedule of Rt. #9 is accomplished by eliminating some trips from Rts. #6, #7, and #8. Three buses are used to provide service on four routes. This creates 60 minute gaps in service on Rts. #6, #7, #8 at unexpected times for passengers. As an example, on Rt. #7 is a 7:00am and 8:00am trip, but there is no 7:30am trip. This could be a good time for low and moderate income workers traveling from northeast Macomb to the businesses on East Jackson St. for an 8:00am work start time. One additional small bus is needed on the city routes to eliminate this problem.

Similarly, the service level on Rt. #9 is not very good with only seven trips per day. Taking a bus from the other routes to serve this route has a negative effect on the routes that give the bus and it provides poor service on the route that uses the bus. Adding 30 minute interval service from 7:00am to 9:00am and from 3:00pm to 5:30pm would make Rt. #9 more viable.

A crunch bus is used on Rt. #3 at 8:42 am when Rt. #6 does not operate. During the fall it is used two days per week, but can be expected to increase to three or four days per week during the winter. This requires one additional small vehicle at the peak time.

The perceived savings of not operating Rt. #6 at this time is not realized. A crunch bus is required to meet passenger demand on Rt. #3 when Rt. #6 is not operating. Using a crunch bus saves some money because the service does not operate every day, but it does not save a vehicle. Scheduling a Rt. #6 bus at 8:30am would move the crunch bus into the regular schedule and provide better service for passengers of Rt. #6 at all locations on the route. There is a cost savings for Rt. #6 in operations by reducing the number of trips, but there is no capital cost savings. The 60 minute gap in Rt. #6 service is an impediment to frequent customers.

Task B: Number of Buses per Route Recommendations:

- **The number of buses per route is appropriate for the passenger loads and no change is needed in the current number of buses per route.**
- **Expand use of crunch buses to meet demand and to provide safe passenger loads and maintain appropriate service intervals.**
- **Schedule crunch bus on Rt. #3 into the Rt. #6 schedule.**

Task C: Bus Frequency per Route.

The campus routes have frequent service appropriate for a campus circulator type of service. Rt. #1 was observed operating at a 4 to 5 minute interval and Rt. # 2 was observed operating at a 6 to 8 minute interval during peak times immediately before and after classes. In the slow parts of the clock hour, buses operate less frequently. Frequency is determined by the drivers and they respond with the highest level of frequency at the peak times. They reduce the frequency from approximately 10 minutes after the hour until approximately 30 minutes after the hour. This process provides the drivers with a short break and also reduces fuel usage.

This process can be improved slightly by operating scheduled service from the North Quad from the end of the peak period to the beginning of the next cycle. This would produce a consistent headway, give drivers a scheduled break, and produce a more consistent interval for passengers during the slow periods between peaks. Drivers would have a defined break and mileage may be reduced slightly. The times should not be published to allow maximum flexibility for unusual events, such as blizzards or activities on campus that affect travel patterns.

The current process of drivers spacing themselves works well at the peak times from about 30 minutes after the hour to the top of the hour and should be continued. The Monday and Wednesday pattern is different from the Tuesday and Thursday pattern and should be continued. This process maximizes the number of trips and keeps buses evenly spaced.

Evening service on Rt. #1 could also be a scheduled service. A 15 or 20 minute scheduled interval would provide a predictable schedule for passengers and for the drivers. This schedule should be published for easy access for passengers.

An analysis of afternoon travel patterns was conducted for three days from approximately 3:00pm to 5:00pm. Travel is busy on the Wednesday and Thursday sample days, but is much lower on the Friday sample day.

Table 6: Afternoon Service Observations.

| Afternoon Service Observations | | | | | | | |
|---------------------------------------|-------------|-------------|-------------|---------------|-------------|-------------|-------------|
| Rt. #1 | Wed. | Thu. | Fri. | Rt. #2 | Wed. | Thu. | Fri. |
| Trips | 18 | 18 | 20 | Trips | 12 | 13 | 13 |
| Passengers | 363 | 470 | 267 | Passengers | 199 | 254 | 155 |
| Pass/Trip | 20.2 | 26.1 | 13.4 | Pass/Trip | 16.6 | 19.5 | 11.9 |
| Minimum | 10 | 7 | 1 | Minimum | 10 | 8 | 2 |
| Maximum | 34 | 48 | 75 | Maximum | 27 | 60 | 20 |

Removing one bus from Rt. #1 and one from Rt. #2 on Fridays would save some fuel, mileage, and labor costs. There were two peak trips on the Friday sampled (45 and 75 passengers) and these peaks would still be accommodated with a scheduled service. The interval on Rt. #1 would be approximately eight minutes and the interval on Rt. #2 would be approximately ten minutes. There will be a savings of approximately four labor hours per week and a mileage savings of approximately 40 miles per week.

Task C: Bus Frequency per Route Recommendations:

- **Improve frequency on Rts. #6, #7, #8 to 30 minute intervals all day.**
- **Improve frequency on Rt. #9 to 30 minutes in early morning and late afternoon periods.**
- **Reduce frequency on Rts. #1 and #2 after 3:00pm on Fridays.**
- **Implement scheduled departures on Rts. #1 and #2 at non busy times and reduce total number of trips per hour.**
- **Schedule evening service on Rt. #1.**

Task D: Hours of Operation per Route.

Table 1 shows the hours of operation on each route and a wide variation in operating hours on each route. With the recent addition of more AMTRAK service, more students will be able to attend WIU without the extra expense of maintaining a car in Macomb. Additionally, continually increasing gas prices put a burden on low and moderate income families. A good bus system can alleviate these cost burdens and Go West has the structure in place to meet many of the transportation needs of people in Macomb who do not have a car in Macomb or who cannot afford to maintain a car.

To be effective in those markets, service frequency is as important as route coverage. Many part time workers do not have traditional 9:00 to 5:00 jobs. Many work less than eight hours per day and often work in the evening and on weekends. Many of these jobs are entry level jobs for people of limited means or people who have been unemployed for prolonged periods due to illnesses or temporary disabilities. The current bus service meets some of these needs, but can be enhanced to meet a greater variety of transportation needs. The hours of operation of some of the routes makes travel independence difficult.

For students living in university housing, the campus shuttles meet many of their academic travel needs. Rts. #4 and #5 can meet many of their social and shopping transportation needs when those routes are operating.

ROUTE #4: The evening Rt. #4 service works well in connecting university housing with downtown businesses and provides a safe alternative to drunk driving in Macomb. Observation of the service on two evenings indicated that there are large groups of people traveling from the North Quad to destinations along Adams St. These groups ride one Rt. #4 bus to Charles/Pierce, and then transfer to a bus outbound from downtown to complete their trip. This creates unnecessary confusion for passengers late at night.

Extension of Rt. #1 service on Friday and Saturday nights to 2:00am would eliminate the transferring and provide direct service to Adams St. from the North Quad. It would also reduce total cycle times for Rt. #4 buses as they would not be using two to three minutes per trip to sort out passengers who are traveling downtown from those traveling to destinations on Adams St.

NEW ROUTE #4A: Drivers have indicated numerous requests for detours to student oriented housing along West Jackson. Students are walking long distances at night to and from these housing units or are driving after drinking. A safe, low cost solution would be to add one vehicle operating on a new route between downtown and West Jackson St. to Aspen Court.

ROUTE #5: Rt. #5 is a busy route with limited service. During the daytime hours, passengers can use Rts. #6 and #7 to connect university housing with the shopping areas downtown and on the East Jackson commercial strip. However, the routing on Rt. #6 is circuitous for this purpose as that route is designed to connect residential areas west of campus with campus and downtown. From Lamoine Village to Wal-Mart, a trip on Rt. #6 and Rt. #7 will take 33 minutes, assuming the times chosen are when both routes are operating at 30 minute intervals. At other times, the trip may take more than one hour. The same trip on Rt. #5 takes 18 minutes on the Saturday/Sunday route.

Passengers traveling from the North Quad to Wal-Mart are required to take three buses when Rt. #5 is not operating. They must take Rt. #1 to Rt. #9 to Rt. #7. With the wide headways on Rt. #9 and Rt. #7, this trip could also take up to one hour at certain times of the day. Transferring between buses, even when timed, is a common impediment to transit usage and minimizing or eliminating transfers will increase usage of a through route such as Rt. #5.

Connecting students with the shopping areas is primarily an afternoon and evening market. As more students choose not to bring a car to campus, it will become increasingly important to have a route to connect, not only shopping trips, but also work related trips. There are many part time job opportunities on East Jackson St. for students and permanent Macomb residents.

Starting Rt. #5 earlier in the afternoon will accommodate these needs. Initially service should start two hours earlier, then be extended incrementally one hour each year with the goal of a 12:00 noon start time. Additional survey work during the next year on travel patterns and needs will help make decisions whether this route should be extended to Lamoine Village on weekdays and the intervals reduced to 30 minutes.

The current 45 minute schedule is difficult to maintain and buses were observed more than five minutes late on several occasions. High ridership peaks, frequent stops, and passengers with shopping bags make schedule adherence difficult. Ridership fluctuates daily which is common on shopping focused routes and this variability make scheduling difficult.

The Saturday/Sunday Rt. #5 service is extended to Lamoine Village and operates at a 46 minute interval. It is difficult for passengers to easily remember a 46 minute interval. It is recommended that the route operate bi-directionally through Hy-Vee and Wal-Mart with an end point at JC Penney on Saturdays. This will add time to the schedule and require approximately 50 to 55 minutes for the complete cycle.

A second bus should be added on Saturday and Sunday and the frequency would be reduced to 30 minutes. As has been proven many times at Go West, improving frequency will induce more trips and ridership will increase. People will make more trips to the shopping areas on E. Jackson.

The span of service on Rt. #5 on weekends is inadequate. Connecting people with part time jobs on weekends is critical for many students as well as community people who are only able to work part time or are entering the workforce with limited economic resources. There is no bus service on weekends before 1:00pm, yet there are many employment opportunities in Macomb.

The Saturday service should start at 9:00am and operate until 10:00pm. Initial service levels should be 60 minute intervals in the morning and then 30 minute intervals from noon to the end of service. Sunday service should start at 11:00am and continue until 9:00pm with 30 minute intervals from noon to 5:00pm and 60 minute intervals at other times.

Trip by trip data should be maintained and the 30 minute interval extended as ridership increases. A new service such as this normally takes a minimum of one year to become established and often takes two to three years before it matures. Establishment of a strong Rt. #5 weekends will meet many transportation needs of the Macomb and WIU community and create a strong east-west route that will be the core of weekend service.

Additionally, Rt. #5 should be the primary summer and break route on weekends during the summer and during breaks. While the student population is lower, there are still students in Macomb and community people also need transit service all year. Frequency can be hourly during the summer and breaks and survey work can determine if more frequent service is needed.

ROUTES #6, #7, #8, #9: Rts. #6, #7, #8 form the core of the community service and primarily serve permanent Macomb residents, although there are many students using Rt. #6 in the areas that it provides convenient service to and from campus. Service to Spoon River Community College is also provided on Rts. #6, #8, and #9.

Rts. #6, #7, and #8 end service at 5:30pm. Ridership counts for a three day sample indicated that some of the 5:00pm trips have up to eight passengers. A 5:30pm departure can be justified on routes that are consistently above the route daily trip average. These extra trips are experimental in nature and should be operated for a one year period. A minimum number of passengers should be established as a basis to continue the added service. Incrementally adding service is an appropriate response to passenger usage.

Similarly, morning trips that have a higher than average first trip indicate that service should start at 6:30am on those routes. A one year experiment with extensive ridership surveys should provide good decision making information.

Rt. #9 is a limited service route that provides service to southwest Macomb. Currently, three buses circulate among the four routes and create unexpected 60 minute gaps in a normal 30 minute service. Rt. #9 operates at 90 minute intervals. Generally 90 minute intervals provide only the minimum of service and are not conducive to work trips or trips for classes.

To make the service more user friendly and make better connections for work trips, Rts. #6, #7, and #8 should operate at 30 minute intervals at all times. Rt. #9 should operate at 30 minute intervals in the morning and afternoon, with a few mid day trips.

Table 7: Service Improvement Recommendations.

| Service Improvement Recommendations | | | | | |
|-------------------------------------|---------|----------|--------------------------------------|--|--|
| | Daily | | | | |
| Route | Rev Hrs | Days | Service Element | | |
| 1 | 2.0 | Friday | Extend to 2:00am | | |
| 1 | 2.0 | Saturday | Extend to 2:00am | | |
| 4A | 5.0 | Friday | New Route; 10:00pm to 3:00am | | |
| 4A | 5.0 | Saturday | New Route; 10:00pm to 3:00am | | |
| 5 | 2.0 | Weekdays | Start at 3:00pm | | |
| 5 | 8.3 | Saturday | Start at 9:00am; end at 10:00pm | | |
| 5 | 10.0 | Saturday | 30 minute interval noon to 10:00pm | | |
| 5 | 5.3 | Sunday | Start at 11:00am; end at 9:00pm | | |
| 5 | 5.0 | Sunday | 30 minute interval noon to 5:00pm | | |
| 5 | 16.0 | Summer | Sat/Sun: 10:00am to 6:00pm | | |
| 6 | 1.5 | Weekdays | Add 8:30am; 3:00pm; 4:30pm | | |
| 7 | 1.0 | Weekdays | Add 7:30am; 1:30pm | | |
| 8 | 1.0 | Weekdays | Add 10:30am; noon | | |
| 9 | 4.0 | Weekdays | Add 8 trips in morning and afternoon | | |
| 10 | 0.5 | Sunday | Dedicated bus for AMTRAK connection | | |

An alternative schedule that would be less expensive would be to operate Rts. #6 and #9 at 60 minute intervals and operate Rts. #7 and #8 at 30 minute intervals all day. This would be a temporary adjustment until complete funding is available to operate all routes at 30 minute intervals.

Task D: Hours of Operation Recommendations:

- **Implement service improvements in Table 6.**

Task E: Number of Buses in the Fleet.

LARGE BUS FLEET: The Go West fleet consists of two separate fleets of buses. Large, heavy duty 35 and 40 foot buses are assigned to the busiest routes (#1, #2, #4, #5, #10, #11). The medium duty bus fleet is assigned to the other routes (#6, #7, #8, #9). The peak vehicle requirement for the large bus fleet is eleven buses and the peak requirement for the small bus fleet is five.

Table 8: Large Bus Fleet

| Go West Large Bus Fleet | | | | Nov, 2007 | |
|-------------------------|------|----------|--------|-----------|------------|
| 18 buses | | | | | |
| Bus | | | | | |
| Number | Year | Mfr | Length | Duty | Notes |
| 1 | 2004 | Gillig | 35 | heavy | new |
| 2 | 2004 | Gillig | 35 | heavy | new |
| 3 | 2004 | Gillig | 35 | heavy | new |
| 4 | 2004 | Gillig | 40 | heavy | new |
| 5 | 2004 | Gillig | 40 | heavy | new |
| 6 | 2004 | Gillig | 40 | heavy | new |
| 12 | 2001 | Bluebird | 30 | medium | new |
| 36 | 1992 | Orion | 35 | heavy | Appleton |
| 38 | 1992 | Orion | 35 | heavy | Appleton |
| 33 | 1990 | Orion | 35 | heavy | PACE |
| 34 | 1990 | Orion | 35 | heavy | PACE |
| 35 | 1990 | Orion | 35 | heavy | PACE |
| 31 | 1989 | Orion | 35 | heavy | PACE |
| 32 | 1989 | Orion | 35 | heavy | PACE |
| 30 | 1988 | Flxible | 40 | heavy | BiState |
| 37 | 1987 | Orion | 35 | heavy | Broome Cty |
| 15 | 1981 | Gillig | 30 | heavy | Norwalk,CA |
| 77 | 1981 | Gillig | 30 | heavy | Norwalk,CA |

Of the eighteen buses available, eleven are used in peak daily service (at 5:00pm) and four are used on Rt. #4 on Thursday, Friday, and Saturday nights. Current operating policy is to segregate the Rt. #4 buses from the rest of the fleet due to vandalism and vomit spills that occur.

With the addition of bus monitors, vandalism has been reduced. The newer buses (#1 - #6) can be used on this service and the fleet size can be reduced. By using the new buses on Thursday, Friday and Saturday evenings, the large bus fleet can be reduced to 13 or 14 buses, depending on the maintenance protocols used by First Transit.

One or two buses should be stored in serviceable condition and be placed in an energy contingency pool for future unexpected growth.

Table 9: Large Bus Peak Vehicle Requirement.

| Peak Vehicle Requirements | | | | Nov. 2007 | |
|---------------------------|-----------|----------|-----------|-----------|--------|
| | | | | | |
| Large Bus Fleet | | | | | |
| Route | Morning | Midday | Afternoon | Evening | Notes |
| 1 | 4 | 3 | 4 | 1 | |
| 2 | 4 | 3 | 4 | 0 | |
| 4 | 0 | 0 | 0 | 4 | Th F S |
| 5 | 0 | 0 | 1 | 1 | |
| 10 | 1 | 0 | 1 | 0 | |
| 11 | 1 | 1 | 1 | 0 | |
| Peak | 10 | 7 | 11 | 6 | |

A review of mileages for the last year shows that bus #15 did not accumulate any mileage; bus #77 operated 1,645 miles; bus #30 operated 3,898 miles. Most of this mileage was accumulated on Rt. #4. By using the new buses on Rt. #4, Buses #77, #30, and #15 can be sold.

However, before this can occur, it is recommended to implement some changes in current operating policies. A cleanup recovery charge can be implemented and billed to any person who becomes sick on the bus and vomits. A bus monitor program has been implemented in September, 2007 which has reduced vandalism. The concern over costs of clean up and vandalism can be easily solved.

SMALL BUS FLEET: The small bus fleet consists of five buses that are used on Rts. #3, #6, #7, #8, #9 and the evening Rt. #3-11 combination. All five buses in the small bus fleet are required at the peak morning period when a crunch bus is used on Rt. #3 at 8:30am

Table 10: Small Bus Fleet.

| Go West Medium Duty Bus Fleet | | | | Nov. 2007 | |
|-------------------------------|------|---------------|---------------|-----------|--------|
| | | | | | |
| Bus | | | | | |
| Number | Year | Chassis | Body | Length | Notes |
| 20 | 2006 | International | International | 25 | |
| 21 | 2006 | International | International | 25 | |
| 22 | 2006 | Ford | Star Trans | 23 | leased |
| 23 | 2006 | Ford | Star Trans | 23 | leased |
| 24 | 2006 | Ford | Star Trans | 23 | leased |

Table 11: Small Bus Peak Vehicle Requirement.

| Peak Vehicle Requirements | | | | Nov. 2007 |
|------------------------------|----------|----------|----------|-----------|
| | | | | |
| Medium Duty Bus Fleet | | | | |
| 3 | 2 | 1 | 1 | 1 |
| 6 | 3/4 | 3/4 | 3/4 | 0 |
| 7 | 3/4 | 3/4 | 3/4 | 0 |
| 8 | 3/4 | 3/4 | 3/4 | 0 |
| 9 | 3/4 | 3/4 | 3/4 | 0 |
| Peak | 5 | 4 | 4 | 1 |

The current small bus fleet is strained. There are five buses in the fleet, but there is limited flexibility in bus assignments. Bus #20 or #21 is assigned to Route #3 because this is the busiest route of the medium duty bus routes and the City of Macomb will not permit a large bus to operate on this route. A crunch bus is used two times per week on Rt. #3 when Rt. #6 is not operating and the demand is greater than the capacity of a medium duty bus. At those times, there are no spare buses. If there is a vehicle problem, then a large bus is used on one of the small bus routes. Usually, the Bluebird, (#12) which is the smallest large bus, is utilized for this function.

Preventive maintenance must be scheduled around the crunch bus usage and this limits the flexibility needed for this important maintenance function. When mechanical problems occur on buses, during the limited hours that buses are available for scheduled maintenance, the chances of missing or delaying scheduled maintenance is increased. The current peak scheduling situation increases the possibility of deferred maintenance or an increase in mechanic's overtime to perform scheduled maintenance.

The smaller buses (#22, #23, #24) are used on Rts. #6, #7, #8, #9. When one of these buses is not available for service, either Bus #20 or #21 is used for service. The Bluebird (#12) can also be used. With specific bus assignments, due to passenger loads, it is difficult to put a smaller bus on Route #3 when there is a shortage of available buses. At these times, it is necessary to use the Bluebird (Bus #12) or one of the 35 foot heavy duty buses if the Bluebird is not available.

It is possible to also put a larger bus on Rts. #6, #7, #8, #9 such as the Bluebird or a 35 foot bus when there is a shortage of small buses. One additional medium duty 25 to 30 foot bus should be added to the fleet for the current schedule in order to have a spare bus available. The recommendation in Task B to add more frequent service on the city routes will also require one additional bus.

Additions are needed to the small bus fleet to meet the schedule recommendations in Task B. An additional spare bus will increase the small bus fleet to seven vehicles.

Even with two additional vehicles it will often be difficult to have enough buses for scheduled service and the Bluebird will continue to be used periodically when there is scheduled maintenance and a simultaneous mechanical problem on one of the small buses.

The medium duty buses are new, but can be expected to have more mechanical problems as they age. A second spare bus should be purchased in 2009 when the new buses are approaching mid-life and mechanical problems can be expected to increase.

Task E: Number of Buses in the Fleet Recommendations:

- **Acquire one additional medium duty 25 ft. bus to provide a scheduled spare bus for the small bus fleet.**
- **Acquire a second additional medium duty 25 ft. bus for improved schedule on Rts. #6, #7, #8, #9.**
- **Reduce large bus fleet by using new buses on Rt. #4.**
- **Sell buses #15, #30, #77.**
- **Establish contingency fleet of one or two buses stored in a ready and serviceable condition.**

Task F: Route Design and Bus Stop Locations.

ROUTE DESIGN: The Go West route system is designed to serve traditional transit markets in a university community with a combination of campus-focused routes and citywide routes that serve campus and other areas within Macomb. Most of the community is served with a route that is reasonably close to those areas that will generate reasonable numbers of bus passengers. Major traffic generators have a route that connects these locations with residential areas. The central transfer stop is located in a good location near downtown. While the route structure generally provides good area coverage, although with limited service hours on some routes, there are minor changes that will enhance the bus service.

Rts. #1, #2, and #3 are well designed for the purpose of moving people around campus and to university housing. The Rt.#2 extension to University Services requires additional time and is the reason that cycle times are longer on Rt. #2 than Rt. #1. The travel activity to this area is adequate to justify this extension, although it does add time to the passenger's trips from the North Quad. No changes are recommended for Rts. #1, #2, or #3.

Rt. #4 has been moved in the past years from Lafayette to Randolph to Campbell to Dudley for a variety of reasons. It would be most efficient to move it back to Lafayette to reduce overall travel times between downtown and university related housing areas which generate most of the ridership on this route. Rt. #4 would continue to Carroll St, then north on Campbell and make the stop for the Pace bar at the northwest corner of Calhoun and Campbell. Rt. #4 would then continue west on Calhoun and north on Lafayette.

Safety concerns have been expressed about changing Rt. #4 regarding stopping for the railroad tracks. Current state law requires the driver to make a stop within 15 to 50 feet of a rail crossing. The cross hatch markings should be reviewed with the Illinois DOT to determine an adequate safe location for drivers to make their safety stop and proper bus stop procedures at this railroad crossing. If the Illinois DOT and Go West can agree on a safe stop procedure that meets state requirements and safety concerns, the route can be changed. This change will reduce travel time and allow for more trips per evening without compromising safety.

Rt. #5 currently operates eastbound on E. Jackson and westbound on Washington between downtown and the commercial area on E. Jackson. Rt. #5 should operate both directions on E. Jackson in this corridor. The primary market is connecting students with the commercial area, but there are also many community residents who use this route especially on weekends when the other community routes do not operate. The commercial activities on E. Jackson between Dudley and Prairie would be better served by moving the westbound route to E. Jackson. At Dudley, Rt. #5 would continue south on Dudley to Washington, then west on Washington and follow the current route to campus.

Rt. #8 serves Eisenhower Tower on outbound trips. It is perceived that ridership is low. By eliminating this deviation, mileage and time will be saved. This will allow the timepoint to be moved up one or two minutes at K-Mart. The time will be distributed after K-Mart and it will equalize average speed on the entire trip. This change will reduce the tightness in the schedule and provide higher reliability in arrival times at the central transfer point. Eisenhower Tower residents can use Rt. #9 or walk to the new bus stop at Johnson/Piper. Ridership patterns on Rt. #8 need to be thoroughly surveyed and analyzed to determine if a point to point route would be more effective than a loop route.

BUS STOPS: Currently there are 126 bus stop locations shown on the Go West transit map. Several stop locations have multiple routes stopping at them. Table 12 shows route length and the number of bus stops on each route.

In most urban bus systems, bus stop spacing on fixed routes is generally at four to six stops per mile. In high density urban areas, stops may be as close as eight per mile. The high activity levels of central campus are similar to high density urban areas. On Rts. #1 and #2, stops are spaced at 5.0 per mile; appropriate for the high density activity level of central campus.

On the City routes, traffic density is much less than the Campus routes. However, the current marked bus stop spacing is inadequate and requires passengers to walk excessive distances along the route. With many passengers walking a distance perpendicular to the route to access the bus, the additional distance along the route increases travel time and distance to access the bus, two factors that can discourage ridership. There is a concentration of stops in the downtown area and the stop spacing away from downtown is as much as one half mile between stops.

Table 12: Bus Stop Spacing.

| Go West Bus Stops | | | | | | |
|-------------------|-----------|------------|------------|---------------|------------|-----------|
| | | | | | | |
| | | Loop or | | | | |
| | | Round Trip | | | Cycle Time | Part Time |
| Route | Bus Stops | Rte length | Stops/mile | Route Type | Minutes | Stops |
| 1 | 12 | 2.4 | 5.0 | loop | 10 - 12 | |
| 2 | 17 | 3.5 | 4.9 | loop | 12 - 15 | |
| 3 | 11 | 3 | 3.7 | point to loop | 15 | |
| 4 | 20 | 5.4 | 3.7 | point to loop | 8 - 10 | |
| 5 | 28 | 9 | 3.1 | point to loop | 45 - 46 | 1 |
| 6 | 26 | 7 | 3.7 | point to loop | 30 - 60 | |
| 7 | 22 | 5.3 | 4.2 | point to loop | 30 - 60 | |
| 8 | 23 | 6.5 | 3.5 | loop | 30 - 60 | 4 |
| 9 | 20 | 5.4 | 3.7 | point to loop | 60 -90 | 1 |
| 10 | 10 | 3.3 | 3.0 | point to loop | 2 trips | |
| 11 | 11 | 3.4 | 3.2 | loop | 15 | |
| 3 - 11 | 17 | 7.4 | 2.3 | point to loop | 30 | |

Discussion with drivers and passengers indicated that drivers are making courtesy stops at locations between marked bus stops to discharge passengers. For boardings, most passengers walk to marked bus stops; but some passengers, with disabilities, are picked up at non marked locations. This high level of value added service by the Go West drivers is not required, but common in many small urban bus systems.

The official operating policy is that drivers should pick up or drop off passengers where safe to do so and point out the nearest stop. Management will assist drivers when passengers consistently abuse the bus stop policy. The current operating experience is that courtesy stops are common. Providing additional marked bus stops will reduce and possibly eliminate this practice. Using only safe, marked bus stops reduces liability and exposure to boarding and alighting claims.

An additional problem for pedestrian access to the bus system is that there are no sidewalks in parts of Macomb. When there are no sidewalks, pedestrians will use the traveled portion of roadways. A person in a motorized wheelchair was observed traveling in the roadway at the exit road from Wal-Mart.

Rt. #4, the late evening Thursday through Saturday bus, allows many intermediate stops; but this is a good policy given the extreme behaviors of some inebriated passengers. Most of the non marked bus stop activity is along Charles St., Adams St., and Pierce St. Auto traffic is light, passenger volumes are high, and many passengers are intoxicated. Boarding at marked stops should be encouraged, but the informal discretionary stop policy should continue on this route.

An additional 31 bus stop locations are recommended at the following locations:

Route #1: No additional stops

Route #2: No additional stops

Route #3: Indian Trail/Wigwam Hollow (both sides)

Route #4: Phi Sigma Sigma

Route #5: Edwards/E. Jackson (both sides); College/E. Jackson (eastbound); Monroe/E. Jackson (eastbound); Prairie/E. Jackson (both sides); Star Motel; Burger King (at #7 stop); Wal-Mart exit/E. Jackson.

Route #6: Wigwam Hollow/Indian Trail (northbound, same as #3)

Route #7: Wheeler/Griffin (both sides); Star Motel (same as #5); Edwards/E. Jackson (same as #5)

Route #8: Jefferson/Mechanic; Jefferson/White; Jefferson/Piper; Jefferson/Bobby; Jefferson/Grant; Grant/Pearl; Grant/Dudley; Grant/Randolph; Randolph/entrance to Macomb H.S.; Johnson/exit from Macomb H.S.; Johnson/Kelly; Johnson/Chase; Johnson/Piper;

Route #9: Piper/Charles (both sides); Ward/Chase (both sides); Derry/Grant (westbound); Debbie/Grant (westbound)

Route #11: Adams/Wigwam Hollow (same as #4)

A well designed bus stop and adequate sign and pad maintenance are important for the safety of the passengers and the image of the system. Concrete pads at most bus stop locations will provide a firm surface for people with disabilities and will provide a consistent location for drivers to make safe stops. A program of adding concrete pads to approximately 30 locations per year will have all stops properly identified within five years. Replacing signs and posts at these locations is also recommended when the stop is upgraded.



GRAVEL BUS STOP WITH SLOPE VARIATION



ACCESSIBLE BUS STOP WITH ADEQUATE WALKWAY



LOW BUS STOP SIGN AND MAKE SHIFT BENCH

Bus stop appearance is another issue that should be addressed over the next five years. Bus stop signs are often mounted on short posts, much lower than other street signs in the city. The location of the signs is frequently close to the traveled portion of the road. It appears that many signs have been damaged or the posts are bent.



PROPER SIGN HEIGHT AT ACCESSIBLE BUS STOP

Bus stop location at an intersection is also an important consideration. Near side stops are located at the corner where the bus approaches the intersection and far side stops are located approximately 50 feet past the intersection.

In slow speed areas where there is significant traffic near campus, the near side stops at stop signs work well. In residential areas where traffic flow is faster, consideration should be given to establishing far side stops. This methodology generally requires people to walk behind the bus to cross streets and inhibits passengers from stepping in front of the bus after exiting. Traffic passing a stopped bus often moves at or above the posted limits and the potential for a passenger-auto collision is higher with near side stops.

Additional bus stop signs increase the visibility and awareness of Go West by the public and reinforce the comprehensive service that is provided by Go West. The additional stop locations will reduce the courtesy stops and provide safer locations for passengers to wait for buses. A program of bus stop shelters at high ridership locations or where there are difficult environmental conditions should also be planned for the future.

Task F: Route Design and Bus Stop Location Recommendations:

- **Improve bus stop location spacing to be equal to a minimum of five per mile.**
- **Install concrete pads at 30 locations per year.**
- **Replace damaged signs and install new sign posts to a height consistent with other signage in the city.**
- **Move Rt. #4 to Lafayette if consultation with Illinois DOT satisfies safety concerns.**
- **Rt. #8 should be analyzed in depth to determine if a point to point route would be more effective than the current loop route.**

Task G: Audit of Ridership Statistics.

Ridership numbers are generated by drivers counting passengers on a counter provided in each bus. At the end of the day, the last driver enters the final total for that bus on the post trip sheet that is part of the closing procedures for each bus each day. That number is transcribed by the line supervisor on to a spread sheet. The WIU Transit Passenger Count spreadsheet provides a daily total of passengers on each bus. Buses are generally assigned to one route during the day and a daily route total can be compiled from the buses that operated on the route on each day.

The compilation of data and the transcription of data is a manual process and there are several opportunities for errors. The first possible error is in the driver’s count of passengers. When a boarding passenger asks the driver a question, often other passengers will pass behind the first passenger and the driver may not accurately count all boarding passengers. This is a common problem with manual systems and usually results in an undercount.

An audit of several trips was conducted with the following results. For the seven observations, there was no significant source of error in driver counts.

Table 12: Driver Count Audit.

| Driver Count Audit | | |
|--------------------|---------------|----------------|
| | Driver | Auditor |
| Route | Count | Count |
| 1 | 82 | 81 |
| 1 | 124 | 124 |
| 1 | 100 | 99 |
| 2 | 111 | 111 |
| 2 | 147 | 146 |
| 2 | 130 | 131 |
| 11 | 30 | 30 |
| Total | 724 | 722 |

The second possible source of error is the transcription of the daily total from the passenger counter to the Post Trip sheet. It is possible, but highly unlikely, that drivers would enter an inflated number. After nine years of operation, Go West is an established system with stable funding and ridership. It has the highest per capita ridership of any university community in Illinois and has higher ridership than many other transit systems in the state. Inflated numbers do not result in increased service, job security, or compensation for drivers or management. There is no incentive for drivers or management to enter inflated numbers because funding for the service is not proportional to ridership.

A third possible source of error is in the transcription of data from the Post Trip sheets to the WIU Transit Passenger Count spreadsheet. An audit of the numbers reported to WIU by First Transit was conducted.

Table 13: Audit of Ridership Reporting.

| Audit of Reported Ridership | | | | Oct. 2007 | | | |
|-----------------------------|--------------|------------------|-----------------|------------|--------------|------------------|-----------------|
| Date | Day | Driver Post Trip | Reported to WIU | Date | Day | Driver Post Trip | Reported to WIU |
| 10/1/2007 | Monday | 0 | 32 | 10/8/2007 | Monday | 902 | 912 |
| 10/2/2007 | Tuesday | | | | | 1342 | 132 |
| 10/3/2007 | Wednesday | | | 10/9/2007 | Tuesday | 145 | 105 |
| 10/4/2007 | Thursday | 0 | 55 | 10/10/2007 | Wednesday | 170 | 160 |
| | | 0 | 43 | | | 60 | 608 |
| 10/5/2007 | Friday | | | 10/11/2007 | Thursday | 41 | 241 |
| 10/6/2007 | Saturday | | | 10/12/2007 | Friday | 0 | 65 |
| 10/7/2007 | Sunday | | | 10/13/2007 | Saturday | 0 | 47 |
| | | | | 10/14/2007 | Sunday | | |
| | Total | 0 | 130 | | Total | 2660 | 2270 |

For the week of October 1, 2007, 50,547 passengers were reported. There was an over reporting of 130 passengers. The over reporting was caused by drivers who did not enter a ridership total on buses that were used for only one trip. In each instance the bus was a switchout for mechanical reasons and drivers may fail to record numbers while making a smooth transition to another vehicle. The submitted report represents an estimate by First Transit based on historical averages. Using this data, there was an over reporting of 0.26%.

For the week of October 8 to October 14, 2007, 50,981 passengers were reported. There was an under reporting of 390 passengers, an error of 0.76%. Review of the data submitted indicates that there were some transcription errors. As an example a driver reported 1,342 passengers and the number was transcribed as 132. There were also two instances of bus switchouts where the driver reported no riders and First Transit estimated the ridership based on historic averages. For the two week period sampled, there were 101,528 passengers and an under reporting of 260 passengers. The two week average is an under reporting of 0.26%.

The fourth source of error could be the transcription from the WIU Transit Passenger Count spreadsheet to the Weekly Ridership Summary. The total ridership reported by First Transit is sent via e-mail to the Transit Director. He enters the data into a spreadsheet that compiles weekly ridership. He uses the data to compile totals and analyze ridership patterns. A review of the two weeks of data from October 1 to October 14 shows that numbers were correctly entered into the WIU data reporting system.

There are no obvious sources of over counting errors. Examining all data transmission occasions show an under reporting of less than one percent. The ridership numbers are very high at Go West. The counts are reasonable and valid and comparable with other systems that use manual counting systems.

Task G: Audit of Ridership Statistics Recommendations:

- **Audit weekly report from First Transit each semester.**
- **Audit driver counts randomly each semester.**

SUMMARY: Go West operates an effective and efficient bus system. Service is extensive and meets many of the travel needs of Western Illinois University students and Macomb residents. System performance is better than many large cities in Illinois and the Midwest and compares favorably with national averages for cities with populations between 200,000 and one million.

Go West offers the students and staff of Western Illinois University and the Macomb community a reliable, convenient, and safe mode of transportation that allows residents a viable alternative to dependence on an automobile.

Statistical analysis, first hand observation and one-to-one interviewing have allowed strengths to be identified and commended, and weaknesses to be uncovered and analyzed.

The improvements outlined in the included recommendations can be made with minimal effort, time, and cost. With the changes recommended in this report, Go West will enhance its service and create a comprehensive alternative to the automobile that will benefit both Western Illinois University students and Macomb residents.