



Review of Shuttle Bus Operations

Report of

The President's Advisory Committee

on

Transportation and Parking (PACT&P)

August 30, 2005

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Review of Shuttle Bus Operations – PACT&P Report

1.0 Introduction

Following the recent organizational review of the Parking & Transit and Security Service Units, the *Final Report* included recommendations for the optimal leadership structure in both departments. Other matters that would enhance the effectiveness of these now-merged Units in meeting the needs of the campus community were also discussed in this *Report*. One of the other matters raised in the *Report* was the recommendation to undertake a review of the shuttle bus service. Such a review would be intended to assess possible opportunities for improved efficiency and effectiveness and to provide a service at a cost that is in alignment with the current financial environment at McMaster University.

The scope of this shuttle review was to assess the existing shuttle service and to make recommendations that will achieve the best utilization of University resources with the maximum efficiency and effectiveness. This review includes an analysis of current schedules of operation, shuttle routes, supply and demand, best practices employed at other Universities, health and safety, security and environmental issues, as well as any other issues deemed important by persons conducting this review. Other recommendations that may enhance operational effectiveness in meeting the needs of the campus community are included. A draft Terms of Reference provided a framework for the review.

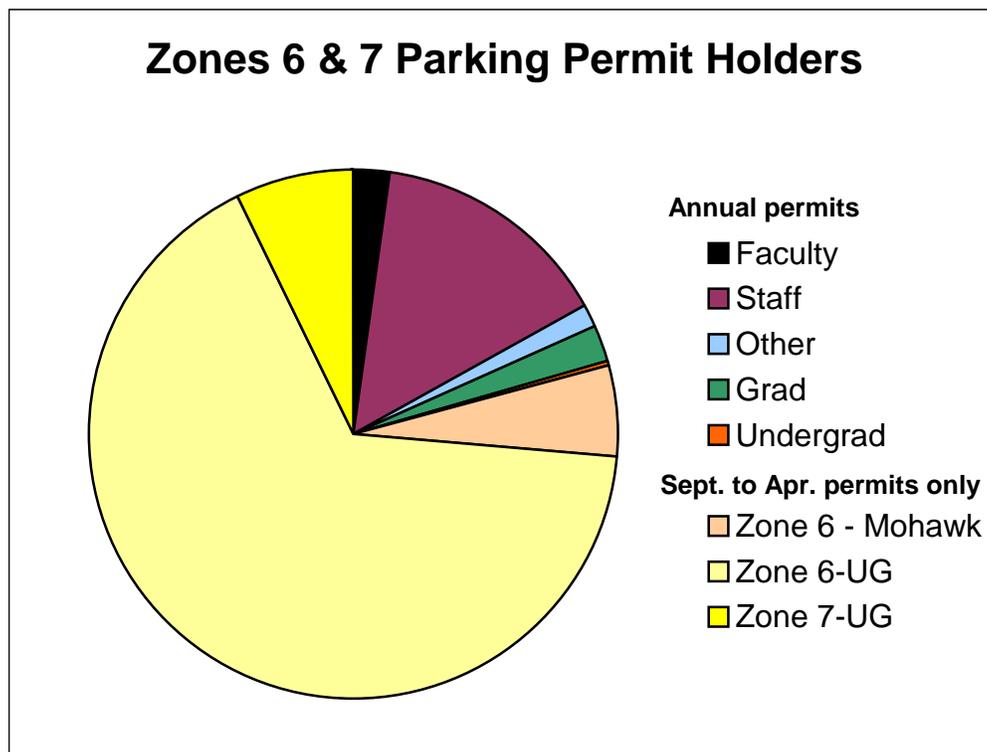
This report documents the early findings of this review, and incorporates materials that were presented at a meeting of the President's Advisory Committee of Transportation & Parking (PACT&P) on July 14, 2005. The timelines for this review have been scheduled to address the need to renegotiate a contract with the shuttle carrier and with the understanding that the start of the school year is only a few weeks away.

For the purposes of this report, the shuttle service to and from the Ward Avenue parking lot was not included.

2.0 Existing Service

2.1 The Users of Zones 6 & 7

The majority of Zones 6 and 7 parking permits are September-April permits sold to undergraduate and Mohawk students. Approximately 180 staff, faculty, and graduate students have been relocated to Zones 6 and 7 from Zone 1 since the following information was compiled, but even with this increase in staff/faculty and graduate students, undergraduate students remain the large majority of shuttle bus users during the school year. A detailed summary of Zone 6 and 7 permit holders is provided as follows:



Zones 6 & 7 Permit Holders**Annual Permits**

| | | |
|-----------|-----|-----|
| Faculty | 63 | 2% |
| Staff | 399 | 15% |
| Other | 37 | |
| Grad | 62 | |
| Undergrad | 3 | |

September to April Permits

| | | |
|----------------------|-------------|-------|
| Zone 6 - Mohawk | 158 | } 79% |
| Zone 6-UG | 1806 | |
| Zone 7-UG | 194 | |
| Total Permits | 2722 | |

Total Parking Stalls

| | |
|--------|-------------|
| zone 6 | 1694 |
| zone 7 | 675 |
| | 2369 |

2.2 Existing Service

Current levels of shuttle bus service are segregated into three distinct periods during the school year – the school year during classes, the school year during exams and the summer period. During the school year and exam periods, the minimum level of service is provided with two busses on the route. It takes a shuttle bus approximately 12 minutes to complete one circuit of the current route, thus this minimum frequency of service is one bus every six minutes. Service levels only drop to one bus every 12 minutes during the summer (May-August) after 6:00 p.m. During peak periods, busses arrive every 2.4 minutes, with 5 busses in operation. The following table provides a detailed breakdown of the service levels. Afternoon and evening service is adjusted on Fridays.

September to April - omitting exam periods

| time period | | # of busses | # of trips/hr * |
|--------------------|-------------|--------------------|------------------------|
| 6:30 -8:00 am | Mon - Fri | 2 | 10 |
| 8:00 - 11:00 am | Mon - Fri | 5 | 25 |
| 11:00 am - 2:00 pm | Mon - Fri | 3 | 15 |
| 2:00 - 7:00 pm | Mon - Thurs | 4 | 20 |
| 2:00 - 6:00 pm | Fridays | 4 | 20 |
| 7:00 - 11:00 pm | Mon - Thurs | 2 | 10 |
| 6:00 - 7:00 pm | Fridays | 2 | 10 |

Exam periods - December & April

| time period | | # of busses | # of trips/hr * |
|--------------------|-------------|--------------------|------------------------|
| 6:30 -7:00 am | Mon - Fri | 2 | 10 |
| 7:00 - 10:00 am | Mon - Fri | 3 | 15 |
| 10:00 am - 6:00 pm | Mon - Fri | 3 | 15 |
| 6:00 - 11:00 pm | Mon - Thurs | 2 | 10 |
| 6:00 - 7:00 pm | Fridays | 2 | 10 |

May to August

| time period | | # of busses | # of trips/hr * |
|--------------------|-------------|--------------------|------------------------|
| 6:30 -7:00 am | Mon - Fri | 2 | 10 |
| 7:00 - 10:00 am | Mon - Fri | 3 | 15 |
| 10:00 am - 2:00 pm | Mon - Fri | 2 | 10 |
| 2:00 - 6:00 pm | Mon - Fri | 3 | 15 |
| 6:00 - 11:00 pm | Mon - Thurs | 1 | 5 |
| 6:00 - 7:00 pm | Fridays | 1 | 5 |

*** 12 minutes per loop, or 5 loops per hour per bus**

2.3 Shuttle Bus Peak Operations

Parking Management consulted the shuttle bus operators regarding peak demand for the shuttle service. This information in addition to their own knowledge of the operations is the basis of the information summarized herein describing peak demands for the service. No quantitative exercise has been performed to obtain actual ridership and if requested, would need to commence in September.

Since this shuttle serves a community far more diverse than a standard “office hours” workforce, it has peak and low demand periods that tend to fluctuate. Due to staffing requirements, it is logistically limiting to have much variation in bus frequency to minimize the cost of this service.

School Year Demand

peak times - when people have to wait for the following bus

- 7:30 to 10:30 am
- 1:30 to 2:00 pm - an extra bus is added at 2:00 pm
- 3:30 to 6:00 pm
- 8:30 to 9:30 pm

times when there are empty seats

- 6:30 to 7:30 am - occasionally empty seats
- noon hour
- just before class changes in the early afternoon

Summer Demand

peak times - when people have to wait for the following bus

- 6:30 to 7:00 am - cramped due to construction workers
- 8:00 to 10:00 am - periodically

times when there are empty seats

- noon hour - from approximately 11:00 am to 2:00 pm

2.4 Current Budget

The University currently has a contract with Laidlaw Bus Co. to provide the shuttle service. This contract is awarded through a tender process which is reviewed annually. The total cost of this service from January to December 2004 was approximately \$478,000. This bill does not include the fuel expense of \$61,000. Therefore the total cost of this service is approximately \$539,000. Other expenses associated with Zones 6 & 7 parking operations include maintenance, enforcement and administration. The following table summarizes this cost in a few various ways and provides a comparison to the overall budget of McMaster's parking operations.

Combined Billing of Laidlaw Bus Co. & fuel costs:

| | | |
|---------------|----|------------|
| total year | \$ | 539,072.51 |
| avg per month | \$ | 44,922.71 |
| school year | \$ | 400,432.31 |
| avg per month | \$ | 50,054.04 |

Cost per loop:

| | | |
|---------------------------------|-----------|-------------|
| cost of staffing & bus per loop | \$ | 8.67 |
| cost of fuel per loop | \$ | 1.12 |
| total cost per loop | \$ | 9.79 |

Annual Income from Parking Fees for Zones 6 & 7:

| | | | |
|----------------------------|-----------|-------------------|------------------------------|
| daily permits | \$ | 209,172.00 | |
| permit sales (approximate) | \$ | 492,800.00 | |
| total | \$ | 701,972.00 | 20 % of total parking income |

Total Parking Services income
\$ 3,432,570.00

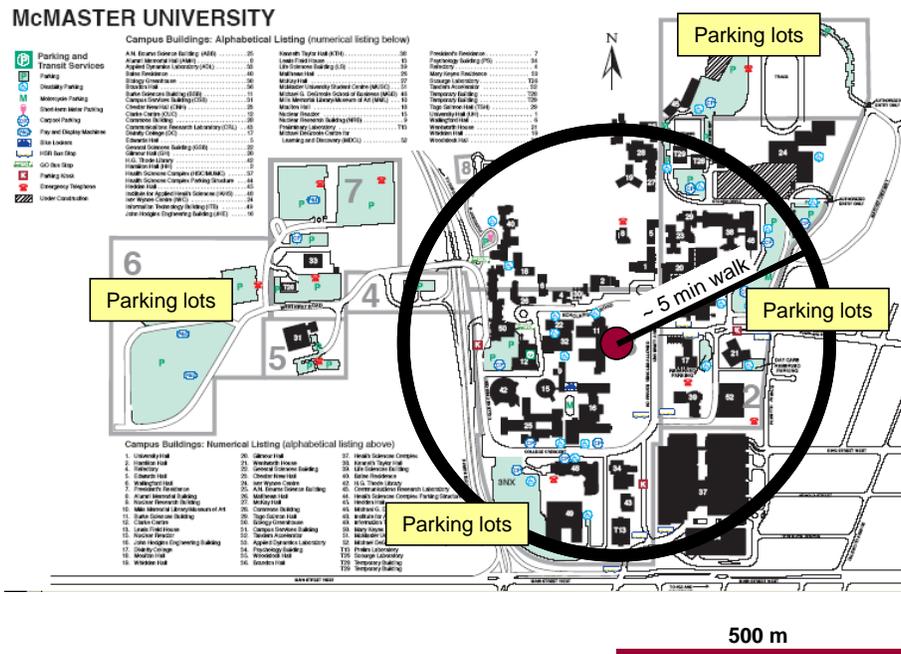
3.0 Other University Comparisons

The McMaster University Main Campus was compared to four other comparable Ontario campuses regarding the locations of their parking lots with respect to academic buildings and shuttle services. The following four maps include a dark circle with a radius representing an approximate five-minute walk according to a transportation industry standard of a walking speed of 1.2 m/s.

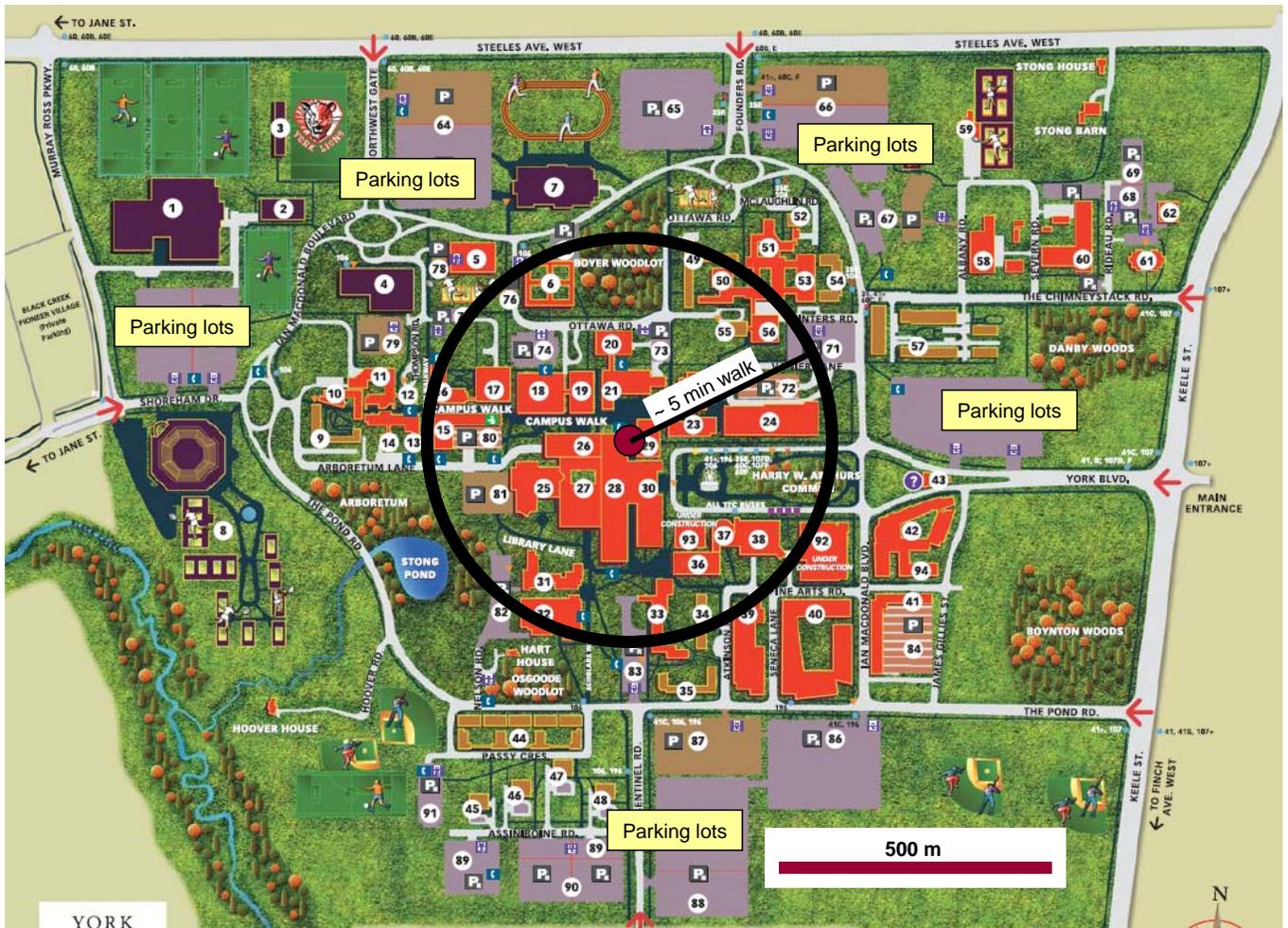
Members of the President’s Advisory Committee on Parking and Transportation (PACT&P) noted that while some parking lot distances may be comparable at other universities that do not offer shuttle service, the topography may differ, as the walk from Zones 6 and 7 at McMaster includes a fairly significant hill.

3.1 McMaster University

This map of the McMaster campus shows that the walking distance from some areas of Zones 6 & 7 could be in excess of 15 minutes, depending on the destination on campus.



increase this frequency for Sept '05. There is no charge to passengers for either of these services. The map of the York University campus shows that many of the parking lots are significantly further than the 5 minute walking radius of the centre of the campus.

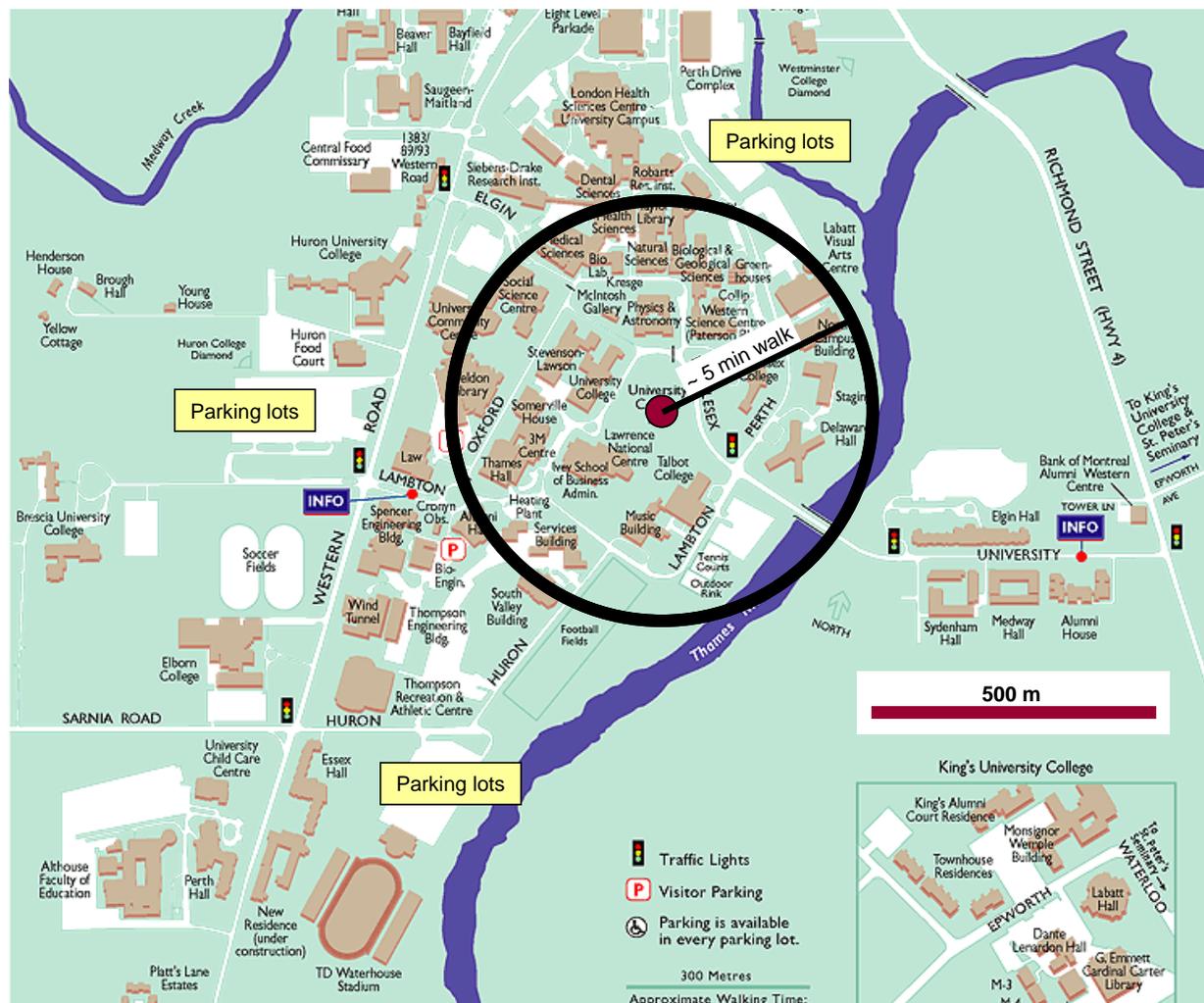


3.4 University of Western Ontario

The University of Western Ontario offers no regular shuttle service, though Brescia University College offers a shuttle service between Brescia University College, Main Campus, and King's University College. This service is financed through Brescia University College, rather than by the parking operations budget.

According to the University of Western Ontario's parking policy, "In most cases, permit parkers can be assured suitable parking within 10-15 minutes of their destination." The following map shows that the majority of parking areas are within a 10 minute walk of

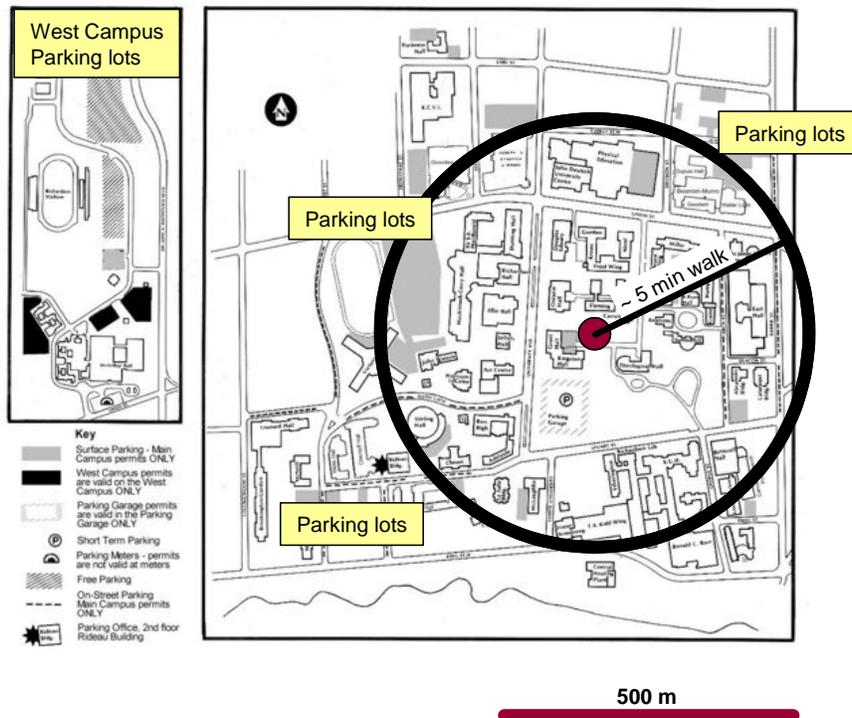
the centre of campus and these parking areas are located on the various sides of the academic core.



3.5 Queen's University

Queen's University is likely the most similar to McMaster University with respect to the size of the campus and the relative parking lot locations, though there are differences. Queen's offers a shuttle service between the Main Campus and West Campus (2.1 km from Main Campus). There is no charge to passengers for this service, which runs with 20-minute frequency. Some of the parking at their West Campus is free.

Like McMaster students, Queen's students have a U-Pass agreement with Kingston transit, but the transit network in Kingston is significantly smaller than Hamilton's city transit, the HSR.



4.0 Pedestrian Access Concerns

The following is a list of issues that have been identified that impede convenient pedestrian access between central campus and Zones 6 and 7.

- Pedestrian crossing of College Crescent at the east side of the bridge over Cootes Drive. Some sidewalks through this area are poorly defined and some sidewalk curbs are very high for people stepping onto the roadway to cross the intersections in this area.
- Access from Zone 7 to Westaway Road and the bridge over Cootes Drive, An informal footpath exists which the University has discouraged the use of through the use of signage and fencing.
- Access from Zone 7 by the Scourge Building to Westaway Road. A steep hill requires people to take a round-about walk to get to the sidewalk that runs along Westaway Road up this same hill.
- Pedestrian crossings of Cootes drive near Sanders Boulevard for people walking towards the south end of campus. The City plans to install a signalized pedestrian crossing of Cootes Drive in August 2005.

- Scholar's Road lacks sidewalks.
- Internal circulation in Zones 6 & 7. Pedestrian infrastructure improvements ongoing including new stairs and sidewalks.
- Security in Zones 6 & 7, in particular during non-daylight hours.
- Mobility for people that are less able to walk due to medical conditions.
- Cargo that some staff/faculty need to bring to campus such as large loads of books or equipment.

5.0 Options Considered

Five options were presented to PACT&P and discussed and they are herein listed as options A through E. The latter options were suggested by committee members during the meeting. Comments discussed for each option are also noted.

- **Option A** – Shorten the shuttle bus route to eliminate the stops in the central core of campus and reduce vehicle traffic through the central core
 - All members of PACT&P except one were in favour of this option.
 - The Committee reviewed the option to have two separate routes, one to the North end of campus and one to the South end; however these routes would require busses passing through the central core of campus.
- **Option B** – Reduce the frequency of service and/or periods of service
- **Option C** – Increase parking fees in Zones 6 & 7 to further fund the cost of the shuttle bus service
 - Current parking fees: monthly permit \$26 (\$27 in Sept 2005), daily permit \$3.50 (\$5.00 in Sept 2005)
- **Option D** – Maintain existing service (Do Nothing Option)
 - One member of PACT& P was in favour of this option.
- **Option E** – Eliminate the service
 - Health and safety concerns – EOHSS is concerned about the number of slips and falls, particularly in the vicinity of the bridge and increased pedestrian traffic. It was noted that the University's health and safety premiums are increasing.

- Students and employees would be required to carry heavy loads of books up the hill, however it was countered that non-drivers walk in from farther away carrying heavy loads of cargo.
- It was noted by a representative of the Central Joint Health and Safety Committee that concerns exist for the crossing at Sanders Blvd. and potential increased pedestrian volume if the shuttle service is significantly reduced or eliminated.
- Consensus of the committee was to reject Option E.
- **Option F** – Add a 25 cent per trip user fee
 - Enforcement of this user fee would be problematic – the contract costs would likely increase, as bus drivers would have to deal with checking tickets, confrontations, etc. which are not currently involved.
- **Option G** – Restrict service to permit holders exclusively
 - Everyone agreed that the use of the service to travel between bus stops in the centre core was unacceptable and that this practice contributes to capacity issues.
- **Option H** – Lengthen the route to provide more convenient access to some buildings not currently close to the route.
- **Option I** – Increase the service levels and the fees in order to pay for this increased service level
- **Option J** – Have a user fee bus pass whereby people parking in Zones 6 & 7 would have the choice of paying for a less expensive Park ‘n’ Walk permit or a more expensive Park ‘n’ Ride permit.
 - Enforcement of the bus pass could be problematic as noted in Option F.
- **Option K** – Use smaller vehicles such as carts, possibly hire student drivers.
 - Cost of labour could be prohibitive. Would have to operate on a cost recovery basis.
 - All members of PACT&P except one were in favour of this option

6.0 Recommendation and Preferred Option

6.1 Option A – One central stop on Central Campus

This option proposes to establish one central bus stop in the campus core centrally located to all the buildings. It would allow the elimination of the current shuttle bus stops at General Science (west side), Gilmour Hall, Psychology and Arthur Bourns Building. The estimated savings of this option would be approximately \$150,000 depending on the final details of the schedule of service.

The following table summarizes the comparison of the current and proposed routes.

| | |
|----------------------------|------------------------------|
| Current distance of loop | 3.3 km |
| Proposed length of loop | 2.55 km |
| Distance of route removed | 0.75 km |
| Number of stops removed | 3 (4 removed, 1 established) |
| Established cost/loop | \$9.80 |
| Established cost/km | \$2.97 |
| Estimated savings per loop | \$2.23 |

A central location for the bus stop on central campus is yet to be selected. Members of PACT&P stressed that this is a critical element of the support for this option. Currently there are two locations being considered for this bus stop:

- 1) On the Scholar's Road Traffic Circle adjacent to the established GO Transit platforms (two).
- 2) At the south side of the General Sciences Building on the asphalt circle across from the main entrance to the E.T. Clarke – near the NRB and BSB.

Other elements of **Option A** are as follows:

- It would shorten the route by 0.75km
- It would eliminate riders travelling merely between buildings in the centre core because stops at Gilmour Hall, the hospital, and ABB would be eliminated.
- The number of busses could be reduced, while maintaining comparable frequency of service to what currently exists.
- A more detailed schedule for the revised service would yet need to be developed.

6.2 Arguments for Option A

The following are aspects of the preferred option that support its implementation:

- Reduces centre core vehicle traffic – concept of the campus is a pedestrian campus – eliminating shuttle buses from the central core will greatly improve pedestrian movement through that area.
- Reduces vehicle emissions while maintaining a comparable frequency of service to Zones 6 and 7
- Cost savings while maintaining a comparable frequency of service to Zones 6 and 7
 - approx. \$600 per day
 - approx. \$150,000 per year

6.3 Option A Schedule Details

Annual Savings \$ 151,335

September to April - omitting exam periods

| time period | | Proposed Service | | | | Existing Service | | | |
|-------------------------|-------------|--------------------|-------------|---------------------------|-------------------|--------------------|------------|--------------------|-------------------|
| | | # of busses | trips/hr ** | cost/time period | trips/time period | # of busses | trips/hr * | cost/time period | trips/time period |
| 6:30 - 8:00 am | Mon - Fri | 2 | 13 | \$ 130.05 | 20 | 2 | 10 | \$ 130.05 | 15 |
| 8:00 - 11:00 am | Mon - Fri | 3 | 20 | \$ 390.15 | 60 | 5 | 25 | \$ 650.25 | 75 |
| 11:00 am - 2:00 pm | Mon - Fri | 2 | 13 | \$ 260.10 | 40 | 3 | 15 | \$ 390.15 | 45 |
| 2:00 - 7:00 pm | Mon - Thurs | 3 | 20 | \$ 650.25 | 100 | 4 | 20 | \$ 867.00 | 100 |
| 2:00 - 6:00 pm | Fridays | 3 | 20 | \$ 520.20 | 80 | 4 | 20 | \$ 693.60 | 80 |
| 7:00 - 11:00 pm | Mon - Thurs | 2 | 13 | \$ 346.80 | 53 | 2 | 10 | \$ 346.80 | 40 |
| 6:00 - 7:00 pm | Fridays | 1 | 7 | \$ 43.35 | 7 | 2 | 10 | \$ 86.70 | 10 |
| | | Mon - Thurs | | \$ 1,777.35 | 273 | Mon - Thurs | | \$ 2,384.25 | 275 |
| savings per week | | \$ 3,034.50 | | Friday \$ 1,343.85 | 207 | Friday | | \$ 1,950.75 | 225 |

Exam periods - December & April

| time period | | Proposed Service | | | | Existing Service | | | |
|-------------------------|-------------|--------------------|-------------|---------------------------|-------------------|--------------------|------------|--------------------|-------------------|
| | | # of busses | trips/hr ** | cost/time period | trips/time period | # of busses | trips/hr * | cost/time period | trips/time period |
| 6:30 - 7:00 am | Mon - Fri | 1 | 7 | \$ 21.68 | 3 | 2 | 10 | \$ 43.35 | 5 |
| 7:00 - 10:00 am | Mon - Fri | 2 | 13 | \$ 260.10 | 40 | 3 | 15 | \$ 390.15 | 45 |
| 10:00 am - 6:00 pm | Mon - Fri | 2 | 13 | \$ 693.60 | 107 | 3 | 15 | \$ 1,040.40 | 120 |
| 6:00 - 11:00 pm | Mon - Thurs | 1 | 7 | \$ 216.75 | 33 | 2 | 10 | \$ 433.50 | 50 |
| 6:00 - 7:00 pm | Fridays | 1 | 7 | \$ 43.35 | 7 | 2 | 10 | \$ 86.70 | 10 |
| | | Mon - Thurs | | \$ 1,192.13 | 183 | Mon - Thurs | | \$ 1,907.40 | 220 |
| savings per week | | \$ 3,402.98 | | Friday \$ 1,018.73 | 157 | Friday | | \$ 1,560.60 | 180 |

May to August

| time period | | Proposed Service | | | | Existing Service | | | |
|-------------------------|-------------|--------------------|-------------|-------------------------|-------------------|--------------------|------------|--------------------|-------------------|
| | | # of busses | trips/hr ** | cost/time period | trips/time period | # of busses | trips/hr * | cost/time period | trips/time period |
| 6:30 - 7:00 am | Mon - Fri | 1 | 7 | \$ 21.68 | 3 | 2 | 10 | \$ 43.35 | 5 |
| 7:00 - 10:00 am | Mon - Fri | 2 | 13 | \$ 260.10 | 40 | 3 | 15 | \$ 390.15 | 45 |
| 10:00 am - 2:00 pm | Mon - Fri | 1 | 7 | \$ 173.40 | 27 | 2 | 10 | \$ 346.80 | 40 |
| 2:00 - 6:00 pm | Mon - Fri | 2 | 13 | \$ 346.80 | 53 | 3 | 15 | \$ 520.20 | 60 |
| 6:00 - 11:00 pm | Mon - Thurs | 1 | 7 | \$ 216.75 | 33 | 1 | 5 | \$ 216.75 | 25 |
| 6:00 - 7:00 pm | Fridays | 1 | 7 | \$ 43.35 | 7 | 1 | 5 | \$ 43.35 | 5 |
| | | Mon - Thurs | | \$ 1,018.73 | 157 | Mon - Thurs | | \$ 1,517.25 | 175 |
| savings per week | | \$ 2,492.63 | | Friday \$ 845.33 | 130 | Friday | | \$ 1,343.85 | 155 |

** 9 minutes per loop, or 6.67 loops per hour * 12 minutes per loop, or 5 loops per hour
 yellow shading denotes revised number of busses

6.4 Central Campus Bus Stop Location

As stated in section 6.1, there are two locations being considered for the bus stop location in the centre core – the Scholar’s Road Traffic Circle and the roadway loop at the south side of General Sciences.

Scholar’s Road Traffic Circle

A well-defined area for pedestrians addressing health and safety concerns.

However:

This stop location would likely conflict with GO busses. GO busses are a large coach design and any vehicles in the traffic circle impede their access. Also there are two separate routes that service campus. Due to two-way routing, the Hwy 407 route has a bus travelling through campus four times per hour. The Burlington Train meet is planned to increase service starting this September, adding to its frequency through campus as well.

Less central than the second option - approximately 4 minutes 15 seconds walking time to the hospital.

Roadway Loop on the south side of General Sciences

More centrally located to the whole of campus – approximately 3 minutes 15 seconds walking time to the hospital and very close to the same distance to Gilmour Hall as the other option (about 2 minutes).

A slightly shorter trip for the shuttle busses.

An underutilized area of asphalt on campus.

However:

There may be significant construction scheduled in this area in the next few months.

6.5 Summary of Option A

- It will provide an estimated annual cost savings of up to \$150,000.
- It will reduce environmental impact (emissions).
- It will reduce the use of the shuttle by people travelling only across Central Campus, reducing the time factor of loading and unloading. More people will be able to get on for trips down to west campus.
- The bus stop could be improved by adding a bus shelter and benches.
- The walk to the majority of campus buildings is less than 5 minutes from either of the locations being considered.
- Consideration to be given for a formal walkway and stairway from Zone 7 to Westaway Road to enhance pedestrian travel opportunity from this location.