

# CIRCULATION AND PARKING PLAN

## *Circulation and Parking Plan for the University of Alaska Fairbanks*

Fairbanks, Alaska  
March 2004

### *Section 7*

#### *Shuttle System Plan*

##### **Shuttle System Plan**

As UAF grows and parking facilities are shifted to the perimeter of campus, as identified in the Campus Master Plan, reliance on the shuttle system for internal campus circulation will increase significantly. Over time, system improvements, including an expanded fleet, will be needed to provide adequate convenience, safety, and efficiency to support the overall campus circulation and parking system. These changes will be needed as other planned projects are completed, including the completion of Tanana Loop and new residential development west of Kuskokwim Way. However, significant system-wide changes are not anticipated in the life of this Circulation and Parking Plan.



The strategies identified for the UAF shuttle system have been grouped into the following categories: Capacity and Frequency, Service Reliability, and Route Connectivity. A discussion of funding considerations follows these topics.

##### **Capacity and Frequency Considerations**

Over the past few years, UAF has seen a steady increase in its shuttle ridership. This trend is expected to continue as the number of students, faculty, and staff increase, and campus construction and university policies limit the availability of parking in close proximity to classrooms and offices. UAF Transportation Services identified as priorities the issues of fleet capacity and the “dwell time” for vehicles during passenger loading and unloading. Many buses are full during peak hours, and the need for passengers to embark and disembark the vehicle using one door lengthens the dwell time. There are several recommendations to mitigate capacity and frequency of service.

##### **1. Increase Fleet Size**

The UAF shuttle service plays an important role in connecting activity zones with each other and to major parking areas. As the campus population increases, with

simultaneous reductions of parking in the campus core, the need for expanded capacity of the shuttle system will also increase. Capacity deficiencies can significantly reduce quality of service. Especially frustrating for passengers are occasions when shuttles arrive but have no room for additional passengers, which is an issue during class changes. The most direct way to approach increased service frequency is through procurement of additional transit vehicles.

UAF should plan for increased shuttle fleet as population increases and parking shifts toward the campus perimeter. Additional vehicles would ensure frequency of service and/or new route options. It is estimated that with an additional one to three vehicles, UAF could continue to provide service with seven- to ten-minute headways, including adding new service routes or a bi-directional loop route.

Clearly, an increase in fleet size provides opportunities to expand shuttle service, which can in turn lead to increased ridership. Under the current routing system, shuttle service is provided with good frequency and generally good travel times. Increased vehicle fleet could alleviate capacity constraints during the peaks on West Ridge Express. However, the additional capacity is not needed for other time periods. The expense of additional vehicle procurement coupled with additional operating expenses may not be justified under the existing operating structure and campus layout. However, as UAF grows and parking shifts toward the perimeter of campus, increased shuttle service should be provided to ensure convenient and efficient connections throughout the campus.

## **2. Vehicle Design Considerations**

UAF Transportation Services should continue to incorporate the design considerations to increase vehicle capacity as part of the procurement process.

The capacity of the fleet vehicles is adequate for most conditions. However, as noted above, during class changes shuttles sometimes are full so that students waiting for the shuttle are passed up and must either wait for the next shuttle or forego shuttle service. As future shuttle vehicle procurement occurs, vehicle size and design considerations can increase system capacity. The existing vehicle fleet includes two vehicles that can accommodate 11 passengers, four vehicles that can accommodate 15 passengers, and one bus that can accommodate 33 passengers. Transportation Services staff have been investigating vehicles with “longitudinal seating,” with hopes of increasing seating capacity to 20 passengers per vehicle on new buses. There are several other vehicle design considerations that effect vehicle and system capacity. Some considerations are identified below:

- Procure vehicles with a second door to allow passengers to use the back door to disembark the vehicle while boarding passengers use the front door.
- Procure larger, low-floor vehicles. Low floor vehicles reduce boarding and alighting time by eliminating the need to go up and down stairs. They also make it easier for disabled passengers.
- Increase the seat pitch (the spacing between rows of seats). This allows persons with bulky winter clothing and daypacks to get in and out of their seats more quickly.
- Procure buses with longitudinal seating (seats facing the interior of the bus). This provides room at one's feet to store daypacks and provides more floor area for people to maneuver in when boarding and de-boarding.

Options such as dual doors, low-floor design, and seating layout can increase vehicle capacity and reduce dwell times, effectively increasing the overall system capacity. However, trade-offs have to be considered. Dual doors reduce seating capacity, as do increased seating pitch and longitudinal seating. Larger vehicles can increase vehicle capacity, but could negatively impact headways and travel times. Clearly, cost considerations will also be important. As noted above, Transportation Services staff have been investigating longitudinal seating design and are targeting vehicle capacity of 20 passengers for new procurement.

### 3. Handrails

UAF does not currently allow riders to stand while the shuttle is in motion for safety reasons. The shuttles are not equipped with rails or straps for standees to hold onto. Disallowing standees constrains capacity, and requires more (or larger) vehicles to serve the same number of passengers. Retrofitting vehicles with hand straps and allowing some passengers to stand would increase capacity of existing vehicles. Handrails and wrist straps could also be included as options when procuring new transit vehicles. These are relatively low cost options that can marginally increase vehicle capacity. UAF Transportation Services staff have expressed concerns about safety for standing passengers. Experience has shown problems in high-speed crashes. However, provided that shuttles maintain low travel speeds, standing with handrails and/or wrist straps should be considered.

### 4. Service Hour / Seasonal Modifications

UAF plans to increase summer service from one to three buses this year (2003), which should improve service during the summer break. To address staff and faculty needs, the following additional actions are recommended for consideration:

- Begin fixed-route shuttle service at 7:00 a.m., rather than 7:30 a.m. (this could also serve early-rising students who eat breakfast at the Lola Tilly Dining Commons).
- Monitor summer service and expand if needed.
  - Expand fixed-route service during winter and spring breaks.



Although a majority of shuttle riders are UAF students, faculty and staff also comprise a sizeable customer market. This group has slightly different, sometimes unmet needs for the shuttle service, which could be accommodated with some tweaking to the existing service schedule.

The Campus Master Plan identified shuttle improvements including increased evening and summer service. This is consistent with survey comments, which identified the need for shuttle service during student breaks, as well as in the morning. Most department offices open at 8:00 a.m., which puts staff on campus between 7:00 and 7:30 each morning. The existing shuttle service begins at 7:30 a.m., which does not provide sufficient time for all staff to get to their offices on time, especially if a transfer is required. Additionally, most offices operate year-round, yet UAF offers limited or no shuttle service during academic breaks. Demand for shuttle service may increase as changes in parking supply and location occur.

## Service Reliability Strategies

Service reliability can be a perceived or an actual issue. Lack of actual service reliability could mean buses not adhering to their schedule the majority of the time. Lack of perceived service reliability would include riders that the bus is off schedule, whether this is the case or not. Achieving both actual and perceived service reliability is critical to the success of any transit service.

Recent operating changes of the UAF shuttle system, most notably making the move to professional drivers, appear to have made significant improvements on the perceived reliability of the shuttle system. The web survey included several negative comments about service reliability, but these could be from infrequent riders who have not ridden the service since the switch to professional drivers. Nevertheless, there are several additional measures that could be considered to improve conditions further. These include improvements in shuttle information, as which was identified in the Campus Master Plan for shuttle system improvement.

### 1. Full-Time Dispatch Personnel

If more than one bus is assigned to a route in the future, faster drivers could catch up to slower drivers, causing bus bunching, particularly when schedules are headway-based, rather than time-point-based. Bus bunching results in increased wait times between buses and less efficient use of the available seat capacity. Even with consistent shuttle drivers, the strongly peaked nature of shuttle demand around class change times would result in dwell time differences that would cause shuttles to catch up to each other.

Currently, a Transportation Services staff person has primary responsibility for dispatching buses and taking calls requesting demand-responsive service. When she is not available, calls are forwarded to one of the shuttle drivers' cell phones. A full-time dispatcher could focus on maintaining shuttle headways and would relieve the drivers of the need to both drive and take requests for service.

Use of a full-time dispatcher could improve headway maintenance and service consistency. However, increased labor costs are an important consideration. Also, a dispatcher would reduce customer service for some cases (e.g., not waiting for late passengers), but improve it for others (e.g., reducing time required to request service). UAF Transportation Services should consider assigning a full-time dispatcher.

A few survey respondents noted a concern with different driver speeds and service standards. These concerns mainly relate to how long drivers would wait in a parking lot for more passengers to arrive before departing. Inconsistency in this area results in passenger uncertainty about day-to-day headways and travel times.

### 2. Centralize Demand-Response Requests

The *Campus Shuttle* and *Disabled Persons* shuttle operates on an on-call basis during the daytime and all shuttle service operates on an on-call basis in the evenings. Requests are either filtered through Transportation Services or are forwarded to the driver directly. This limits Transportation Services from being able to comprehensively

analyze service requests, for example, in planning future service expansion. Maintaining a central log of all requests, as well as shuttle usage and needs over time could assist Transportation Services in analyzing service demand and planning for future service.

UAF Transportation Services should seek ways to expand data collection and analysis of demand-response service to assist in planning for future service. A full-time dispatcher could achieve this task.

### 3. Phones in Warming Huts

Currently, warming huts at shuttle stop locations provide a phone *number* for demand-response service, but not a phone. Several survey respondents requested a way to contact dispatch from the shuttle stops, especially during evening hours when service is demand-response. Benefits of providing phones include increased rider confidence in reliability and safety. During non-peak periods, it could eliminate unnecessary trips to the Taku and Ballaine lots when no passengers are waiting.

The costs associated with wiring phone service to warming huts could be relatively high, and there would be additional maintenance costs. Another concern raised by Transportation Services was that a phone could be abused or vandalized. Providing a phone with a direct line to dispatch, and no keypad to allow other outgoing calls could mitigate this concern.

It is recommended that installation costs for this option be further investigated, and that if not prohibitive, this option should be implemented.

### 4. Time-Point Shuttle Scheduling

Time-point based scheduling is recommended whenever service headways exceed 10 minutes. Currently, evening service operates at 15-minute headways and would benefit from time-based scheduling. In general, time-point based schedules are not needed when headways are 10 minutes or less, as the wait for a bus is short. The regular daytime shuttle service currently is intended to operate at 7-10 minute headways.

When service headways are more than 10 minutes, a time-point based schedule improves rider confidence about shuttle arrivals times. This improvement can be provided at relatively low costs. Time-point scheduling requires testing and tweaking to ensure reliable service, and a lack of adherence can reduce riders' perceptions of service reliability.

### Route Connectivity Strategies



The current fixed-route shuttle system is oriented toward providing point-to-point connections: either from a specific parking lot to a specific activity center, or between West Ridge and Wood Center. Some pairs of campus activity zones are not directly connected by the shuttle system. For instance, there is no regular fixed-route service to the Residential Area. Instead, this area is served by dial-a-ride service. Service



connecting the Residential Area to the Commons during the dinner hour was tried in the past, but was discontinued because it only had two or three passengers per day. Also, there is no regular scheduled service connecting West Ridge to Taku or Nenana parking lots. This was not an issue as long as there was adequate parking in West Ridge. When construction activity forced temporary loss of large parking areas in West Ridge, Transportation Services initiated the We-Nana shuttle connection to the Nenana lots.

In general, the UAF shuttle provides frequent connections where there is demonstrated demand. Survey responses and discussions with Transportation Services staff indicate that the service is well run and well received. Under existing and near term conditions, minor routing changes may be sufficient to optimize the level of shuttle service. Toward this end, a Priority Connection Alternative was developed for future shuttle route changes. Priority connectivity options are summarized below.

### **Priority Connections Alternative**

Each of these potential connections is evaluated below with consideration of their benefits and potential disadvantages as new service connections.

#### **1. West Ridge to Recreation Area/Nenana Lots Connection**

UAF recently began temporary We-Nana shuttle service to connect the West Ridge academic and research buildings and the Nenana Parking Lots during West Ridge construction. This service does not have a formal connection to the Recreation Area, though drivers sometimes elect to detour through the SRC parking lot on the request of passengers. More frequently, riders need to get off at one of the Nenana Parking Lots and walk across Tanana Loop. Many survey respondents noted this lack of a direct connection as a concern, especially for faculty and staff wishing to use the Patty Center during the lunch hour.

This service gap was frequently mentioned in the web survey. The temporary We-Nana service has been provided using the existing vehicle fleet, without reducing the service to another dedicated route. UAF is considering maintaining the We-Nana service after current construction activities in West Ridge are complete.

The temporary We-Nana service should be made permanent. UAF should also consider scheduling regular shuttle stops at SRC, for which significant demand has been identified. This could have the added benefit of reducing pedestrian/vehicle conflicts on Tanana Loop, in addition to providing additional service. Capacity and travel time impacts will have to be evaluated.

#### **2. West Ridge and Lower Campus Connection**

A shuttle stop at the Bunnell East parking lot should be given consideration in conjunction with proposed parking removal. However, due to added travel time for additional stops, this may not be an effective measure under the existing route structure.

The Campus Master Plan identified a service goal of providing shuttle connections

between West Ridge and Lower Campus within 15 minutes, including waiting time. The current class schedule provides 15 minutes between classes, and some students need to use this time to move between classes on West Ridge and Lower Campus. Currently the West Ridge Express shuttles students back and forth between West Ridge and Wood Center, and students then walk from Wood Center to class. Some academic buildings are adjacent or very close to Wood Center, while others require a 5 to 10 minute walk. Running on 7.5-minute headways during the day, if a student does not catch a bus right away, he or she will be late for their next class. UAF has structured the shuttle service so that buses leave from both ends of the West Ridge Express route at class-change times. Survey respondents commented that this approach appears to be helping.

A new shuttle stop at the existing Bunnell East parking lot (see Figure 16) could be offered instead of or in addition to the existing Wood Center stop, depending on demand. The Bunnell parking lot was identified in the Campus Master Plan for potential removal of parking. As such, it could be a suitable shuttle stop serving Lower Campus. Extending the route would reduce the total travel time for some passengers, due to reduced walking distance. However, longer headways would also result from the longer route.

### **3. Fixed-Route Service to Residential Area: Future Roadway**

This connection should be considered as roadway connections, residential development, and parking facility construction occur near the new Tanana Loop extension. The 2002 Campus Master Plan calls for an extension of North Chandalar way westward to reach Kuskokwim Way. This roadway connection will provide an opportunity for UAF shuttle service to provide convenient and efficient fixed-route service into the residential area. This option may be especially effective as new residential development occurs west of Kuskokwim Way. Future service could loop north to Tanana Loop and back south through the future Natural Science building roadway. This service might also provide convenient connections to future parking lots near the Tanana Loop connection.

### **Shuttle Funding**

The assessment of the funding for the shuttle system showed that most colleges and universities with “prepaid” shuttle service rely on broader revenue sources, including student fees. UAF should consider charging student fees for shuttle service in order to ensure that convenient and reliable service can be provided.

In addition to student fees, some institutions obtain government grants for their shuttle programs. Most government transit funds for university programs similar to UAF are provided directly or indirectly through the Federal Transit Administration (FTA). FTA funds most frequently cover capital costs, but in some cases also include planning, engineering, evaluation and transportation studies. Other programs such as the Job Access and Reverse Commute program can cover operating and promotional costs as well as capital investments.

The FTA may directly provide capital assistance grants to states or local agencies through the Bus and Bus Related Capital Program – as allocated to the City of Fairbanks in 2002. Urbanized Area Formula Grants may also be provided to urbanized areas and

states that may then allocate funds for planning, engineering, evaluation, and capital projects to universities in publicly or cooperatively owned and/or operated arrangements. Most programs require a local match, usually at a minimum of 20% of project costs. UAF should work closely with FNSB and DOT&PF to seek out state local, and federal funds to support increased transit service to the campus as well as improved shuttle circulation service.

## **Future Transit Considerations**

The UAF transit system currently comprises the shuttle fleet owned and operated by UAF, with linkages to the FNSB transit system. As the Campus Master Plan goal of shifting parking to the campus perimeter is realized, it will be necessary to provide convenient and safe connections between parking areas and the campus core. This will require investments in the shuttle system to increase the shuttle fleet and provide additional services. As the general orientation of campus parking shifts toward the perimeter, and the internal campus becomes less auto-oriented, more significant changes may be warranted, as described below.

### **Bi-Directional Loop System**

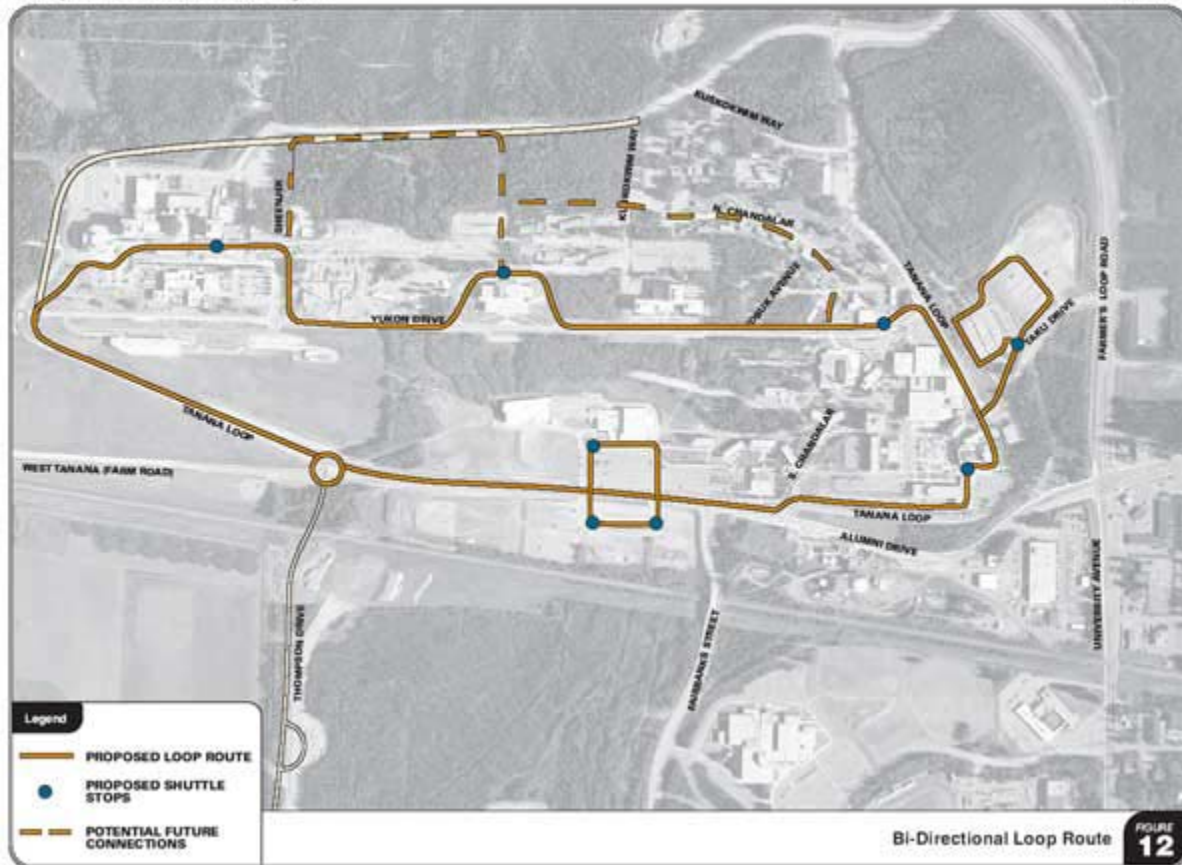
The UAF Campus Master Plan identifies a shift in parking toward the perimeter, away from the core, as a priority. As this vision is realized, increased reliance on the shuttle service should be anticipated. In addition, point-to-point service will become more difficult to maintain with more perimeter parking lots. The most direct way to connect all activity zones would be to use a loop service that serves several destinations across campus in addition to the major parking facilities. A bi-directional service (clockwise and counter clockwise routes) would be the most efficient, as it allows passengers the opportunity to choose the shortest route. Consideration of a bi-directional loop route is recommended, particularly as parking shifts to the perimeter.

One disadvantage of such a service is that it gives equal service to all locations without regard to different levels of demand. Nevertheless, as the campus parking system shifts away from the core and toward the perimeter, as personal motor vehicle use is diverted away from Yukon Drive, and as residential development increases west of Kuskokwim, a loop service may prove to be the most efficient route structure for the UAF shuttle service. Figure 12 shows a proposed route for a bi-directional loop route structure.

**Figure 12: Bi-Directional Shuttle Loop Service**

[\(larger map\)](#)





As the figure shows, the proposed route includes a new shuttle stop in the current Duckering parking lot east of Bunnell. This stop would replace the existing Nenana stop at Eielson, and is intended to save shuttle travel time.

Total travel time to cover one loop is estimated at between 22 and 25 minutes. UAF shuttle service managers indicated that this estimate is reasonable. If maximum route time of 30 minutes could be maintained, four vehicles could operate the service with 15-minute headways in each direction. Passengers able to take either direction of the loop would have on average 7.5-minute headways. At this frequency, time-based shuttle stops are recommended (i.e., scheduled stops at 15, 30, and 45 minutes after each hour, etc.). If six vehicles could be dedicated to a bi-directional loop route, the service headways would be 10 minutes per direction.

The time requirements to provide service to Taku Lot may be one of the principle challenges to schedule adherence.

Table 7 summarizes a comparison of travel times between major origin-destination pairs. The table shows estimated travel times under the existing system and the bi-directional loop route. Six vehicles providing 10-minute headways were assumed for the loop route.

**Table 7 - Shuttle System Travel Times Comparison**

Connections	Existing	Loop Route
West Ridge – Wood Center	10 to 12 minutes	10 to 12 minutes
West Ridge-Residential	15 to 20 minutes	10 to 12 minutes
West Ridge – Nenana Lots	10 to 12 minutes	10 to 12 minutes
West Ridge – Recreational Area	12 to 15 minutes	10 to 12 minutes
West Ridge - Taku Lots (w/ Transfer)	18 to 22 minutes	13 to 15 minutes
Wood Center – Taku Lots	6 to 8 minutes	8 to 9 minutes
Wood Center - Nenana	10 to 13 minutes	10 to 13 minutes
Wood Center – Recreational Area	14 to 16 minutes	10 to 12 minutes
Lower Campus (Eielson) - Nenana	8 to 10 minutes	9 to 11 minutes
Residential to Recreational	No service	13 to 15 minutes

As Table 7 shows, most connections would see neither a change nor a reduction in travel times. There would be increased service time to the Taku lots. It should be noted that the loop route assumes consolidating some shuttle stops, such as in West Ridge. It is expected that the precise routes and shuttle stops would be tweaked based on experience. It will be critical to maintain 30-minute round-trip travel times in order to sustain 10-minute headways.

UAF operated the shuttle service using a loop route approximately three years ago. There was very low ridership associated primarily with lack of schedule reliability, so this service configuration was discontinued. Recent service improvements may make this service a more viable option than when previously tried. Also, the service was provided in only one direction, which would tend to increase travel times for many trips.

### Public Transit Service

The Fairbanks North Star Borough (FNSB) operates the Red and Blue Lines with stops at Wood Center. FNSB Transit estimates that 40 to 50% of their total ridership is going to or from UAF. This translates to at least 400 to 500 trips per day, which corresponds to parking demand for approximately 200 vehicles. Providing better transit service to the campus could reduce the need for additional parking. UAF staff should work with FNSB Transportation staff to examine how ridership could be increased. One common suggestion from the public input process for the development of this report was to provide later evening and Sunday transit service. Others suggested that new routes be added to serve areas not presently served by the transit system. When the northern portion of Tanana Loop is constructed, perhaps additional transit stops could be provided around the perimeter of campus, to provide direct connections to areas of campus now requiring transfer to a shuttle (e.g., West Ridge).

### Fixed Rail Transit Service

Although the system currently is limited to shuttle buses, interest has been expressed in

developing a fixed-rail system to enhance campus circulation. The general layout of the campus may be well suited to such a system, potentially providing high-quality connections between east and west ends of Yukon Drive. However, the cost of such systems is probably prohibitive at this time. Future consideration may be worthwhile if technological advances increase the feasibility, or if a significant funding source is identified.