CHAPTER IX

Capital Alternatives

Before transit services can be provided, various capital items are required. These capital items required for public transit service include vehicles and passenger amenities such as shelters, benches, and park-and-ride facilities.

VEHICLE ALTERNATIVES

The current vehicle fleet for The Lift, Grand County Council on Aging, and Jackson County Council on Aging will require replacement in the upcoming years. In addition, depending on the service alternatives chosen, additional vehicles may be required.

Vehicle Fleet Consideration

One alternative is to purchase larger buses with additional seating capacity. This alternative would alleviate the overcrowding that occurs on the peak routes for The Lift. Overcrowding on these routes occurs in the morning peak hour and around 4:00 p.m. when the Winter Park Ski Area closes for the day. Another decision to be made is whether to request newer buses for The Lift service. Such buses would cost more for the Winter Park Ski Area service, but do provide a more updated look for the service.

Before 2006, the Grand County and Jackson County Councils on Aging will also have to purchase new vehicles. Grand County is currently holding fund-raisers to assist with the local match for a new vehicle. The majority of costs (80 percent) will be provided by federal funds.

Replacement of the Fleet

As mentioned previously, the Council on Aging in Grand County is pursuing funding for a new vehicle to be replaced within the next two years. The Jackson County Council on Aging is looking to replace their van within the next three years. The current van is in good condition, but will need to be replaced within the next six years. The long-range plan for both counties will be to plan for appropriate vehicle replacement every seven years until 2020.

The vehicle fleet for The Lift ranges from 1983 to 1994 buses. Ryder plans to continue in the short term with this type of vehicle model due to the

reduced cost of service for Winter Park Resort. However, if Winter Park Resort requests a vehicle type change from Ryder, Ryder is willing to make the change and will prepare cost comparisons for the different bus model.

The long-range vehicle replacement for The Lift will continue to be based on the decisions from Winter Park Resort. Winter Park Ski Area and Resort are slowly changing the facilities to become a destination resort. This usually will bring a different type of visitor to the area. To compete with other Colorado mountain resort areas and other states, Winter Park Resort may be forced to upgrade transit service with a new look. New, clean, and timely transit service is a large part of that look for the long range.

Fleet Expansion

Expansion of the transit fleet will depend upon the operating alternatives chosen as part of this planning process. The issue of fleet expansion will be evaluated in detail once the final plan is developed. All vehicles purchased for general public use should be equipped with bike and ski/snowboard carriers.

Alternative Fuels

To reduce pollution from mobile sources, the national Clean Air Act Amendments (CAAA) of 1990 encourage the use of clean fuels such as methanol, ethanol, and natural gas derivatives including Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), and Liquefied Petroleum Gas (LPG).

In order to develop a working concept of the different alternative fuels, their advantages and disadvantages, and their potential application for Grand and Jackson Counties, the following review of the five relatively common alternative fuels has been prepared.

Methanol

Most of the methanol used commercially in the United States is manufactured from natural gas, making it economical to use. The tailpipe emissions of methanol are generally considered to be about half as reactive as an equal mass of emissions from gasoline or diesel fuel, promoting its use to reduce urban ozone in urban areas, such as Los Angeles.

By volume, methanol has slightly more than half the energy content of diesel fuel and slightly more than half the energy content of gasoline. Due to the above characteristics, a methanol engine will consume a little over twice the volume of fuel per mile of service, as compared to a diesel engine.

In the past few years, transit authorities in Los Angeles and Seattle have retired their methanol programs due to the fuel=s highly corrosive properties. After spending $102 million since 1989 on methanol buses, Los Angeles County transit officials declared their methanol anti-pollution program a failure. Authorities from the Metropolitan Transportation Authority (MTA) cited that the buses are prone to costly mechanical repairs. Officials of the Seattle Metro eliminated their methanol demonstration program after a trial period of five years. Test results of the program indicated that severe engine malfunctions were experienced on the buses at 60,000 and 70,000 miles, largely attributed to the corrosive nature of the fuel.

Ethanol

While not being as corrosive as methanol, the major use of ethanol is currently limited as an octane additive and oxygenate for gasoline. According to *Information Update*, (Detroit Diesel Corporation, February 1992), the cost of ethanol is almost twice as much as that of methanol, making its use limited as a motor vehicle fuel. Aside from the fuel=s economic drawbacks, ethanol produces lower carbon monoxide (CO) emission rates than gasoline, has a higher energy density than methanol, and has a lower toxicity than either methanol or gasoline.

Compressed Natural Gas (CNG)

The strength of CNG as an alternative fuel for transit buses is that it is generally less expensive per unit of energy than gasoline or diesel fuels. The fuel also has the potential to reduce oxides of nitrogen (Nox) emissions, reactive organic hydrocarbons, particulate matter concentrations, and reduce carbon monoxide (CO) concentrations by as much as 90 percent (*Transportation Research Board*, Transit Cooperative Research Program, 1993).

Historically, the weakness of this fuel is its difficult storage requirements. CNG is typically stored in high pressure cylinders under maximum pressures. The high weight, volume, and cost of the storage tanks for CNG have been a barrier to its commercialization as an alternative fuel. The recent development of lighter aluminum tanks, however, has reduced this disadvantage to some degree. Over the last several years, CNG has become the alternative fuel of choice in US transit systems. The problems are primarily associated with the moisture in the compressed fuel freezing during the fueling process. The approximate time to fill a bus may be three hours. The advantages of a CNG bus are no visible pollution and quieter operation.

Other problems encountered nationally included the quality of local CNG supplies, limited testing of altitude effects on CNG, and limited CNG testing in extreme temperatures. Grand and Jackson Counties would face additional costs for vehicles and facilities to convert to an entire CNG fleet. CNG vehicles typically cost $30,000 to $35,000 more than diesel-powered equivalent buses. In addition, a CNG refueling facility with adequate capacity to fuel a substantial portion of the current fleet would cost between $600,000 and $1,000,000. Additional costs would be incurred to upgrade maintenance facilities with required safety features and provide emergency response equipment and training.

Liquefied Natural Gas (LNG)

LNG has only recently received attention as an alternative fuel. The potential advantages of the fuel lie in its economic considerations, where the fuel's processing costs are much less than that of the other gaseous fuels. LNG also has a greater potential to reduce Nox and hydrocarbon emissions when compared to diesel and gasoline fuels. Currently, the biggest obstacles facing LNG are the lack of availability and its storage and handling facility requirements.

Liquefied Petroleum Gas (LPG)

The advantages and disadvantages of LPG are similar to those of natural gas. The advantage of LPG is that gasoline engines can be easily converted, due to its high heating and high octane characteristics. LPG is also well established in its transit fleet applications. According to Alternative Transportation Fuel in the United States (R.F. Webb Corp., June 1989), approximately 350,000 LPG transit vehicles were in operation in the United States. In 1995, the Department of Transportation estimated over 750,000 LPG transit vehicles would be in operation by year 2000.

The disadvantage of the fuel is in the engine performance of transit vehicles using the fuel. According to the above citation, the conversion of a gasoline engine to LPG will usually cause a 10 to 15 percent power loss.

Diesel Fuel

Diesel-fueled engines have traditionally dominated the transit vehicle marketplace with their fuel efficiency and durability. From an air quality perspective, diesel engines have very low tailpipe emissions of carbon monoxide and other organic gases. The concern from an air quality perspective, however, has been the diesel emission rates of Nox and particulate matter.

Due to increasing environmental pressure to reduce the above emissions, the EPA, working in concert with the American Public Transit Association (APTA), has developed stringent Nox and particulate matter regulations. The final Clean Air Amendments permit the use of clean diesel in urban buses, provided that the clean diesel engines meet the particulate matter standards imposed by the CAAA. In partial response to the 1990 CAAA amendments for cleaner burning fuels and the continued development of the previously mentioned alternative fuels, the traditional diesel fuel engine has made great strides toward evolving with a cleaner burning particulate trap and catalytic converter technology.

Since the CAAA imposed regulations, diesel engine manufacturers have been successful in lowering Nox and particulate tailpipe emissions by employing the above-mentioned in-cylinder control techniques. Similarly important is that manufacturers have maintained the fuel=s economy.

Barring conversion to alternative fuels, a number of steps can be taken to substantially reduce the air quality impacts of diesel-fueled transit buses. Various transit systems have been successful in reducing particulate emissions through the application of Aclean-diesel@ technology. The utilization of a low sulphur fuel has proven to reduce the average annual particulate emissions of a transit coach from 935 pounds to 260-300 pounds**C**roughly a 70 percent reduction. In addition, installation of an electronically-controlled fuel injection system and specially-designed transmission has dropped emission levels by 120 pounds of particulate matter annually, for a total reduction in emissions of 87 percent. This technology appears to be very appropriate for Grand and Jackson Counties.

Transit providers in Grand and Jackson Counties are open to the idea of alternative fuels. However, without further research in high altitude and temperature conditions, providers would have a greater impact on local air quality through the purchase of new diesel equipment with Aclean-diesel@ standards. To pursue this route, each provider would eliminate the worst-polluting vehicles from the existing fleet. As research is completed, Grand and Jackson Counties should continue to investigate alternative fuel options.

GRAND COUNTY VEHICLE MAINTENANCE FACILITY

Several of the transit providers within Grand County have expressed interest in a coordinated vehicle maintenance facility. The need for this facility is evident for the East Grand School District, The Lift, YMCA, and for Silver Creek.

The current maintenance condition for the providers is barely "making it" through their busy winter season. A coordinated facility site is currently being discussed with the TAC. The YMCA has agreed to a site for such a facility providing adequate transit service is routed through their facility for their many guests and visitors.

The maintenance facility will provide for the administrative, drivers, supervisors, and dispatch. Space is assumed for AVL equipment to be implemented in the future. Adequate bus parking will be provided, along with employee and visitor parking. Adequate room will be provided for transportation operations, lockers, lunch room, meeting room, restrooms, and lobby area.

The maintenance area will include three bays and office space. Separate storage space will also be provided to operate the facility efficiently. The facility will include a bus service island and separate welding area. The cost of the facility is estimated to be approximately $1,500,000. This cost does not include land acquisition costs.

PASSENGER AMENITIES: SHELTERS, BENCHES, PULL-OUTS, LIGHTING

The Astreet furniture@ provided by the transit system is a key determinant of the system=s attractiveness to both passengers and community residents. In addition, they increase the physical presence of the transit system in the community. Bus benches and shelters can play a large role in improving the overall image of a transit system, and in improving the convenience of transit as a travel mode. More importantly, shelter is vital to those waiting for buses in harsh weather conditions.

Sample Transit Facility.

Adequate shelters and benches are particularly important in attracting ridership among the non-transit-dependent population**C**those that have a car available as an alternative to the bus for their trip. Preference should be given to locations with a high proportion of elderly or disabled pas-

sengers and areas with a high number of daily boardings. Many regional transit agencies have had benches provided by advertising firms at no cost to the agency. Lighting and safety issues are equally important along major highways. The passenger demand and future night service in Grand and Jackson Counties justify providing some type of lighting at all designated stops. This could range from overhead street lighting to a low power light to illuminate the passenger waiting area. The Lift currently has shelters located around the Fraser Valley communities.

The cost of modern glass and steel shelters averages approximately $8,000 for most areas. The customized shelters in Winter Park cost over $10,000 in the past few years. Maintenance and repair of vandalism to bus benches and shelter is a very minor cost. Modern benches and shelters are very durable and resistant to vandalism. As a result, cleaning and maintenance costs are minor. Additional shelters and benches will be provided, if needed, with the new service plan.

PARK-AND-RIDE FACILITIES

Existing and future transit alternatives for Grand and Jackson Counties may see a substantial increase in park-and-ride demand. This growth can be expected, because of the future circulation plans in the Winter Park Ski Area. In light of these factors, it will be important for park-and-ride facilities, such as at the Ski Area, to be maintained appropriately to the services provided. Providing convenient, efficient, and on-time transit services are key factors in the success of park-and-ride lots.

Promoting the park-and-ride lots and service must consist of a community effort. Adequate signing and marketing must be used for success of the lots. Grand and Jackson Counties may find that conditions are similar to those commonly found in major urban areas; transit ridership is limited more by the availability of park-and-ride parking than by the capacity of the transit vehicles. In light of these factors, it is important for park-and-ride facilities to be “sized” appropriately to the services provided.

BICYCLE / PEDESTRIAN FACILITIES

At one end of their trip or the other, virtually all transit passengers also travel on foot or on bicycle as part of their transit trip. A key element of a successful transit system, therefore, is a convenient system of sidewalks and bikeways serving the transit stops. Grand County and Jackson County Planning staff should continue to work with each of the local jurisdictions to review construction plans and scheduling priorities for pedes-

trian and bicycle improvements to best coordinate with transit passengers' needs. Several of The Lift's bus stops do not have adequate pedestrian facilities accessing transit stops and several aspects of bicycle usage need to be addressed. In particular, user-friendly bicycle lockers are an option to be installed.

ADVANCED PUBLIC TRANSIT SYSTEM TECHNOLOGIES

A key consideration in long-term planning is the impact of improvements in technology that can benefit transit services. In recent years, these technology research and development programs have been incorporated into the Intelligent Transportation System (ITS) concept. Although it sounds like it has little to do with transit and, in fact, its roots have more to do with military applications, ITS applications do hold promise for public transportation. The application elements of ITS for public transportation are known as Advanced Public Transportation Systems (APTS).

APTS basically have to do with the application of many high tech developments to the business of transportation. Most of the APTS developments come from the military and financial arenas. These include the use of Global Positioning Satellites (GPS) to determine the exact location of an object through triangulation, radio frequencies, and computers. The same concepts used to track nuclear warheads, submarines, and spy on other countries can be employed for other purposes, notably to improve our transportation systems. Likewise, from the financial arena, the same principles used in credit and debit cards and for building security systems can be applied to monitor persons using transit service by noting where they board, where they alight, debiting their fare from a bank account, or charging their fare to the appropriate human service agency.

Several key conditions have evolved to make APTS applications more attractive. Technology has progressed to the point that the applications are finding their way into the general market. The cutting edge applications of yesterday are now relatively commonplace. Currently, APTS applications are being used in many western states and are realistic options for Grand and Jackson Counties.

Advanced traveler information systems are intended to forewarn the public of delays on the transportation network. They may take the form of sign boards on the highway which advise travelers of congestion ahead, or they may be in the form of a traffic report accessed on television or over the phone.

Vehicle location systems employ one of several means of determining the location of a vehicle. By monitoring the location of a vehicle historically and in real-time, dispatchers and planners can better refine schedules or can dispatch the closest vehicle to a location. This application holds much promise for public transportation service, especially in suburban and rural environments.

A logical link to the **Automated Vehicle Location (AVL)** systems is real-time ride-matching and dispatching. Since the ability to know the location of vehicles exists through sophisticated matching and scheduling programs, it is now possible to dispatch transit vehicles on demand and to optimize the work load of all the vehicles in a system based on actual and historical demand. These systems function by examining where vehicles are, where the vehicles are heading, and how full the vehicles are at the time a ride-request call is received. Through a series of decision trees, the computer matches the ride request to a vehicle and dispatches the ride order to the driver or, if no capacity on the vehicle, schedules the ride request to be filled by the first available vehicle. Providing transportation services in this flexible format may have significant and fundamental impacts on how service is provided. The need to operate fixed schedules theoretically may yield in favor of an on-demand system. Most likely, a balance between the two, based on actual demand, will result.

The Regional Transportation District in the Denver area has recently implemented an AVL system for 833 fixed-route buses, as well as 66 supervisor vehicles, at an estimated cost of $10,400,000. The Dallas Area Rapid Transit system is installing an AVL system for a total of 844 buses, 216 commuter coaches, 245 demand-response vans, and 300 supervisor vehicles. Similar systems are being developed in Milwaukee and Baltimore. This latter system will include signal preemption for buses running behind schedule.

The existence of real-time dispatching and ridematching systems creates the need for linking the public to the service. The **smart traveler system** concept provides a quick link by phone, kiosk cable, computer, etc. to the service dispatching system. A caller would request a ride; the system would examine vehicle availability in response to the ride request and inform the caller where and when the rider would be met. The system may also suggest other mode choices available to the caller. The entire transaction need take only a few minutes. If an acceptable match cannot be made, the system may offer to fill the request with a taxi ride.

Potential Applications to Grand / Jackson Counties

A number of factors indicate that the innovations in transit technologies have a high potential for successful application for Grand and Jackson Counties.

- Inclement weather, construction delays, and traffic congestion make the study area a sometimes difficult area in which to maintain transit schedules. Again, AVL technology can help dispatchers respond to delays and reschedule services to minimize overall transit passenger delays.

- This often-inclement weather also increases the importance of real-time transit information, to allow passengers to wait as long as possible in sheltered locations before walking to the bus stop.

- Potential changes in The Lift, such as additional buses needed on a particular route, will increase the need for efficient, real-time dispatching to effectively direct vehicles. AVL technology will be important, if not critical, to the successful implementation of such service improvements.

- The fact that a large proportion of the area=s transit passengers are visitors makes the efficient dissemination of information regarding routes and schedules critical to the success of transit programs. The provision of an automated transit information system at the ski bases, Visitor's Center, and at the major lodging establishments would be a strong marketing tool for transit.

An estimate of the capital costs associated with an Advanced Public Transportation System for the entire transit system is approximately $500,000 for the total system. This would include AVL technology and messaging system to each of the vehicles, passenger information devices in 25 activity centers and also 25 bus shelters, and operations technology for dispatching. With the rapid evolution in this field, these costs could decrease substantially, depending on the technology.