KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

COMMUTER RAIL — WHITE PAPER

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To: Jim Olson, City of Ashland

From: Paul Ryus, P.E. and Tom Lister, Otak

cc: Project Management Team, Planning Commission, Transportation Commission

DIRECTION TO THE PLANNING COMMISSION AND TRANSPORTATION COMMISSION

Five sets of white papers are being produced to present information on tools, opportunities, and potential strategies that could help Ashland become a nationwide leader as a green transportation community. Each white paper will present general information regarding a topic and then provide ideas on where and how that tool, strategy, and/or policy could be used within Ashland. You will have the opportunity to review the content of each white paper and share your thoughts, concerns, questions, and ideas in a joint Planning Commission/Transportation Commission meeting. Based on discussions at the meeting, the material in the white paper will be: (1) revised and incorporated into the alternatives analysis for the draft TSP; or (2) eliminated from consideration and excluded from the alternatives analysis. The overall intent of the white paper series is to explore opportunities for Ashland and increase the opportunities to discuss the many possibilities for Ashland.

COMMUTER RAIL WHITE PAPER INTRODUCTION

This white paper describes the commuter rail mode and its uses, lists a series of issues that should be investigated when considering commuter rail service, provides cost information for implementing commuter rail services, and summarizes other types of transit service that serve similar travel markets.

WHAT IS COMMUTER RAIL?

Commuter rail is the portion of passenger railroad operations that carries passengers within urban areas, or between urban areas and their suburbs, but differs from rail rapid transit in that the passenger cars generally are heavier, the average trip lengths are usually longer, there are few standing passengers, and the operations are carried out over tracks that are part of the railroad system in the area. In some areas it is called *regional rail*.[1] Some commuter rail services only operate during peak travel hours, and sometimes only in the peak commute direction. Where demand is strong enough, passenger rail service may operate throughout the day, but is still typically referred to as "commuter rail."

Longer-distance intrastate or interstate passenger rail operations, such as those operated by Amtrak, differ from commuter rail in that service is usually infrequent (typically operating once to a few times a day), stops are farther apart, and trains provide additional amenities, such as café or dining cars. The line between commuter rail and intercity passenger rail can be blurry and can depend on whether a transit agency or Amtrak operates the route.

Commuter rail has historically operated as one or more lines radiating out from the downtown of a region's major city into its suburbs, but in the last decade two suburb-to-suburb routes have opened in North America, in Ottawa, Canada and Portland, Oregon. Traditional radial commuter rail is currently operated in the following U.S. regions:[2]

- New York, NY (central city population 8.3 million)
- Los Angeles, CA (3.8 million)
- Chicago, IL (2.8 million)
- Philadelphia, PA (1.5 million)
- San Diego, CA (1.3 million)
- Dallas, TX (1.3 million)
- San Jose, CA (960,000)
- San Francisco, CA (815,000)
- Austin, TX (785,000)
- Boston, MA (645,000)
- Baltimore, MD (635,000)

[1] Kittelson & Associates, Inc., et al., *TCRP Report 100: Transit Capacity and Quality of Service Manual,* Transportation Research Board of the National Academies, Washington, D.C., 2003.

[2] Alaska Railroad passenger service and enhanced Amtrak service between Portland, ME and Boston and between Harrisburg and Philadelphia, PA receive federal transit funds and are classified as commuter rail by the Federal Transit Administration, but have intercity passenger rail characteristics.

- Seattle, WA (615,000)
- Nashville, TN (605,000)
- Washington, DC (600,000)
- Albuquerque, NM (530,000)
- Miami, FL (430,000)
- Minneapolis, MN (385,000)
- Salt Lake City, UT (183,000)
- New Haven, CT (123,000)

Portland's WES commuter rail line is a little over a year old. As noted above, it operates from suburb to suburb, connecting Wilsonville to Beaverton, with three intermediate stops. The combined population of the four cities in its corridor is 184,000. WES operates at half-hour intervals during weekday commute periods only, with 16 trips in each direction. As of November 2010, it carried 1,350 passengers per day and had annual budgeted operating costs of $5.7 million. In comparison, the combined population of the cities in the Medford–Ashland corridor is 102,000 and the total operations budget of the Rogue Valley Transit District in 2009 was $12.4 million.

Compared to traditional commuter rail systems, WES operates shorter trains with smaller rail cars. A WES train consists of two cars: a self-propelled diesel engine car with 74 seats and a trailer car with 80 seats, with 2 wheelchair positions also available. Most recent commuter rail systems operate with trains consisting of a diesel locomotive and multiple double-deck passenger cars. The cars used by the Sounder commuter rail line in Seattle, for example, provide seating for 136 passengers on two decks, plus four wheelchair positions, and a typical train operates with three passenger cars. Because passenger trips on commuter rail lines tend to be relatively long, most lines aim to give every passenger a seat.

WES train (Portland)

Sounder train (Seattle)

Two other regions ceased commuter rail operations during the last decade: Syracuse, NY (population 138,000) and Burlington, VT (population 38,000). In both cases, lack of ridership relative to the cost of operating commuter rail was the reason for ceasing operations.

The commuter rail mode combines relatively high operating speeds with few station stops, making it among the fastest transit modes when the overall trip is considered. In 2008, the average travel speed for commuter rail lines in the U.S. (including stops) was a little over 30 mph.[3] Achieving this average speed requires track conditions that allow for maximum passenger rail speeds of at least 60 mph. (Current track conditions between Ashland and Medford allow a maximum passenger rail speed of 30 mph.)[4] Hills, railroad–highway grade crossings, and other factors can also reduce operating speeds.

OPERATIONAL CONSIDERATIONS

Freight Railroad Considerations

In most cases, commuter rail operates on tracks owned by a freight railroad. Therefore, a necessary first step in any consideration of commuter rail is determining whether the freight railroad is (1) interested in allowing commuter rail operations on its tracks, (2) if so, how many trains might be allowed, and (3) what infrastructure improvements (e.g., tracks, signaling, grade crossing closures) might the freight railroad require as a condition of its approval. The tracks between Ashland and Medford are operated by a short-line railroad, Central Oregon and Pacific Railroad, which is owned by RailAmerica and which leases the tracks from the Union Pacific Railroad. Therefore, there are several different rail companies that would need to be involved in any discussions of implementing commuter rail service.

Train Operations Considerations

The line between Ashland and Medford is almost entirely single-tracked. In order to run passenger trains northbound and southbound simultaneously, one or more passing sidings would need to be provided, ideally at an intermediate station along the line. Scheduled freight service on the line is currently suspended, and only consisted of one train in each direction prior to that, but if service were to resume and be expanded in the future, additional passing sidings might be needed to accommodate the freight service, if it had a need to operate at the same times of day as the passenger service.

Land Use Considerations

Land adjacent to the railroad line is a mix of industrial areas (Medford), residential neighborhoods (Phoenix, Talent, and Ashland), and rural lands. Residential areas are particularly sensitive to noise and vibration generated by trains, particularly when previously infrequent

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[3] American Public Transportation Association. *2010 Public Transportation Fact Book.* April 2010.

[4] David Evans and Associates, Inc., et al. *2010 Oregon Rail Study.* Oregon Department of Transportation. July 2010.

freight trains are supplemented by relatively frequent passenger trains. A particular point of potential conflict is the noise created by trains blowing their horns when approaching highway–railroad grade crossings. Federal Railroad Administration (FRA) requirements require that a train's horn blow for 15–20 seconds when approaching a crossing. The FRA provides provisions for establishing quiet zones around crossings, but these require upgrading the crossing infrastructure to provide supplementary safety devices such as four-quadrant crossing gates (to prevent motorists from driving around lowered gates), medians or other channelizing devices (to prevent motorists from crossing into the other lane to bypass a lowered gate), one-way streets in combination with gates across all lanes, or permanent closure. Warning horns that can be heard in the vicinity of the roadway approaches to the crossing (but not farther away) may also need to be installed. Depending on the infrastructure already in place at a crossing, the cost of implementing a quiet zone can exceed $1 million per crossing.[5]

Existing land uses around potential train stations may also pose constraints. Stations in industrial areas (a typical land use near a railroad line) will generate little walk-up patronage. Stations in residential areas have potential walk-up patronage, but residents may object to the increased traffic associated with bus service to the station and any park-and-ride lots that may be constructed to serve the station. When station locations are not located close to potential passenger origins and destinations, feeder bus service (at origins and destinations), bicycle network upgrades (at origins and destinations), and/or park-and-ride lots (at origins) will be needed to get passengers to and from trains.

In the Ashland–Medford corridor, the Rogue Valley Transit District's main bus transfer center is located downtown adjacent to the railroad tracks and would be a logical point for a Medford station. The railroad tracks are less centrally located in Ashland, Phoenix, and Talent and station access would need to be more carefully evaluated in those communities.

When existing tracks are not located near desired trip generators, it may be possible to build new tracks to bring train service closer to where passengers want to go. Portland's WES, for example, constructed a ¼-mile spur track down a city street to bring trains to the Beaverton Transit Center, where passengers could transfer to light rail or buses, rather than make passengers walk the ¼ from the existing tracks to make the connection. There are cost and service tradeoffs in doing this, as running trains down a city street requires reconstructing streets and installing or modifying traffic signals—both of which are costly—and train speeds on the on-street segment will be low.

[5] Union Pacific Railroad. Federal Railroad Administration's Train Horn & Quiet Zone Rule. http://www.uprr.com/reus/roadxing/industry/process/horn_quiet.shtml. Accessed January 14, 2011.

Connecting Transit Considerations

Commuter rail is a high-capacity transit mode. A small commuter rail train, such as Portland's WES, is capable of bringing the same number of passengers to a station as can be carried by four standard 40-foot buses. Since many passengers' origins and destinations will not be located within walking distance of a station, bus service will need to be coordinated with train arrivals and departures. This may require adjusting bus routes and schedules to ensure that transfer times are minimized for train passengers, while maintaining desired bus route frequencies, which may mean changes in service for existing bus passengers. There also needs to be enough ridership demand throughout the commute period to justify operating a high level of bus service to meet the trains (it is generally not feasible to add bus service just to serve one high-volume train trip).

CONSTRUCTION COSTS AND CONSIDERATIONS

The capital cost of developing a commuter rail line depends on a number of factors, listed in the sections below. Table 1 presents total capital costs and the equivalent cost per mile for five recently opened commuter rail lines. It should be kept in mind that every commuter rail line is unique, and a detailed study of conditions along the Central Oregon & Pacific Railroad in the Rogue Valley would be required to develop an accurate cost estimate.

Table 1. Capital Costs for Recently Opened Commuter Rail Routes

Route	Location	Capital Cost ($M)	Length (mi)	Cost per Mile ($M)
WES	Portland	161	15	10.7
Northstar	Minneapolis	265	40	6.6
FrontRunner	Salt Lake City	611	44	13.9
Capital MetroRail	Austin	105	32	3.3
RailRunner	Albuquerque	390	97	4.0

Track and Signaling System

Where existing freight rail service is frequent (not the case in the Rogue Valley), new, parallel track(s) may need to be constructed to allow commuter rail to operate at its desired times and frequencies. Where freight rail service is infrequent or can be time-shifted from peak passenger-demand times, commuter rail can operate on existing tracks, but the track infrastructure (ballast, rail, bridges, curvature, etc.) may need to be upgraded to accommodate higher speeds. According to the 2010 *Oregon Rail Study*,[6] most of the track owned by the Central Oregon & Pacific Railroad is "Class 2" track, which allows maximum freight train speeds of 20 mph and maximum passenger train speeds of 30 mph. Upgrading the track to Class 3 conditions would allow passenger trains to operate at a maximum 60 mph. (Depending on the type of propulsion system used and the station spacing, trains may not reach the maximum speed allowed.) There will also be a cost to purchase or lease the tracks and right-of-way.

[6] Oregon Department of Transportation, *2010 Oregon Rail Study*, Salem, Ore., August 2010.

Signal systems are used to provide safe separations between trains. Not all freight railroads use signal systems, relying on dispatchers instead, but they are a requirement for passenger service. Even when a signal system is in place for freight operations, it often needs to be upgraded to accommodate higher passenger train speeds and meet other requirements specific to passenger service.

Vehicles

Vehicle costs depend in part on the type of service to be operated: when passenger trains mix with freight trains (as opposed to operating on separate tracks or at completely separate times of day), they must meet Federal Railroad Administration crashworthiness standards, which adds to the cost. Vehicles can also be self-propelled, or be a set of unpowered passenger cars pushed or pulled by a locomotive. Costs also depend on the size of the order. Example costs of new rail vehicles are: Minneapolis, passenger cars ($2.5 million each); Salt Lake City, locomotives ($5.5 million each); and Austin, self-propelled diesel multiple-unit car ($6 million each). It may be possible to lease vehicles from other commuter rail operators that are not using them at the moment, or to purchase used equipment, both of which can be cheaper, but have their own issues (e.g., leased vehicles may eventually be taken back, while used vehicles may need to be refurbished and may require more maintenance). The number of vehicles required to operate a route is dependent on the passenger demand needed to be served, the maximum service frequency provided, and the route length. Additional vehicles will be needed as spares.

Stations

Station infrastructure includes, at a minimum, platforms, lighting, shelters, ticket machines, information displays, pedestrian walkways and track crossings, and (frequently) park-and-ride lots and stops for feeder buses. There may also be a need for surveillance cameras, next-train arrival displays, bicycle storage facilities, and other amenities.

Maintenance Facility

A location adjacent to the rail line will be needed for a rail yard and maintenance building for storing and maintaining the rail vehicles. Associated costs include purchasing the land, installing track, and constructing the maintenance building. The size of the facility required will depend on the number of rail vehicles planned to be operated in the long term.

Grade Crossings

Existing grade crossings may need to be upgraded (e.g., installing crossing gates) or closed (e.g., low-volume private crossings) to allow safe passenger rail operations. As mentioned previously, quiet zones may need to be established in residential areas to avoid noise issues associated with train horns while maintaining safety.

ALTERNATIVES TO COMMUTER RAIL

Commuter bus can serve similar types of travel patterns as commuter rail when ridership demand does not justify constructing commuter rail or when rail infrastructure does not exist. Commuter bus service typically picks up most or all of its passengers at a single point (e.g., a park-and-ride lot or a bus transfer center), runs non-stop to its destination, and drops its passengers off at a limited number of stops. This type of service can therefore offer travel times that are very competitive with private automobiles.

Service is typically provided using motorcoaches (similar to those operated by charter bus operators and intercity bus services) that offer more comfortable seating than a standard transit bus, and potentially other amenities, such as storage racks, power for laptop computers or other devices, and wireless Internet.

Commuter bus is most competitive in situations where commute travel occurs along congested freeway corridors and buses can travel in carpool or bus-only lanes to avoid the congestion, and/or where parking in the destination city is expensive. As a rule-of-thumb, each bus operated on a route over the course of a year costs $300,000; the number of buses required depends on the length of the route and the service frequency provided (which depends in part on the ridership demand). A typical motorcoach can carry 45–50 seated passengers.

OTHER CONSIDERATIONS

Table 2 identifies actual 2010 ridership (within a year or two of start-up, when ridership would normally be expected to be building) and 20-year ridership forecasts for the five newer commuter rail lines identified in Table 1. Ridership represents boardings (i.e., one-way trips).

Table 2. Weekday Ridership for Recently Opened Commuter Rail Routes

Route	Location	2010 Actual (Q3)	Long-term*
WES	Portland	1,400	3,000
Northstar	Minneapolis	2,600	5,600
FrontRunner	Salt Lake City	5,400	11,800
Capital MetroRail	Austin	800	17,000
RailRunner	Albuquerque	4,100	Not available

*Typically 2025.
Sources: 2010 ridership: APTA ridership reports; long-term: FTA New Starts or local agency information

All of the above lines are new and opened during a recession, so it is difficult to read anything into the short-term ridership numbers. Nevertheless, the Portland, Austin, and Albuquerque lines have received some to considerable criticism to date about their operating costs relative to ridership, and a planned extension of the Minneapolis line has been put on hold. In terms of obtaining FTA funding, the New Starts and Small Starts programs take cost-effectiveness into account: a more expensive project will require more ridership to meet the FTA's cost-effectiveness criterion.

Interstate 5 serves approximately 37,000 vehicles per day just south of Medford, of which up to 14,000 vehicles represent non-local traffic, based on ODOT traffic volume data. In comparison, the freeways in the commuter rail corridors represented in Table 2 (not including Austin) served between 85,000 (Minneapolis) and 108,000 (Albuquerque) vehicles per day, with parallel non-freeway routes serving additional trips.

In the Rogue Valley, OR 99 serves 15,000 vehicles per day into Medford. For the sake of example, it is assumed that there are 38,000 local trips in the corridor (combination of I-5 and OR 99). According to the Oregon Office of Economic Analysis, Jackson County's population is expected to grow by 29% from 2010 to 2030. If travel demand increased at the same rate, there would be demand for approximately 50,000 trips in the corridor in 20 years. Commuter rail would need to capture 6–10% of these daily trips to reach a marginally justifiable ridership of 3,000 trips per day or a more typical ridership of 5,000 trips per day. Because a greater proportion of transit travel occurs during peak periods compared to vehicular travel, commuter rail's peak period mode share would need to be higher than the daily share. According to data in the *Highway Capacity Manual 2010* and ITE's *Traffic Engineering Handbook,* about 40% of vehicular trips occur during the peak six hours, while according to data in the Texas Transportation Institute's *Urban Mobility Report,* 75% of commuter rail trips take place during the peak periods. Therefore, commuter rail would need to capture 11–19% of peak-period trips (an unrealistically high proportion) to reach the needed daily ridership totals.

Working in favor of commuter rail is the fact that Southern Oregon University is located in Ashland, generating reverse-commute travel demand that many commuter rail lines do not have. Working against commuter rail is the fact that downtown Medford does not have the concentration of employment, relative to the rest of region, that larger cities do, meaning that many potential commuter rail passengers would need to transfer to buses to complete their trip.

As an alternative to commuter rail, commuter bus could be provided between Southern Oregon University, downtown Ashland, and downtown Medford using motorcoaches traveling along I-5 every 30 minutes. Three buses would be needed to serve the route, plus one spare vehicle, for a total capital cost of approximately $2 million. Assuming eight hours of service per weekday (i.e., peak periods only), the annual operations cost would be approximately $600,000. Additionally, a commuter bus could serve the Medford Airport, while commuter rail would not be able to given the existing rail does not reach the Medford Airport. Commuter bus service between the Medford Airport and Ashland would be more convenient for tourists or visitors to Ashland than a commuter rail line that requires a transfer from the rail to a bus to reach the airport (or the reverse to reach Ashland).

A new bus rapid transit route could also be provided between Southern Oregon University, downtown Ashland, Talent, Phoenix, and downtown Medford via OR 99. Six buses would be needed to operate the route at 15-minute headways, with one or two spares, depending on whether standard RVTD buses were used or more distinctive buses (e.g., different paint scheme or different bus model) were used. Assuming eleven stops at key locations along the route, 10 upgraded stops with shelters would be needed (the Front Street station in downtown Medford would not be upgraded). The total capital cost would be approximately $3.5–4 million for vehicles and $0.5 million for stop upgrades. Assuming service seven days a week, with 15-minute headways for 14 hours a day and 30-minute headways for 4 hours a day, the annual operations cost would be approximately $3.5 million.

With either bus rapid transit or commuter bus, it is assumed that Route 10 would be retained to provide local bus service in the OR 99 corridor.

NEXT STEPS

Recommended steps for pursuing commuter rail are presented below. It is recognized that there has been at least one previous exploratory study of commuter rail in the Rogue Valley (Grants Pass to Ashland); depending on the level of detail in that study and its age, some of the early steps described below may have already been accomplished.

- A key action throughout the process is involving the owner of the Central Oregon & Pacific Railroad—at the start of the process to confirm that the railroad has at least an interest in exploring commuter rail options, and later to identify potential costs and conditions of use.
- Another early step is to (1) forecast the 20-year future population for the Rogue Valley, (2) estimate long-term peak-period travel flows along the proposed rail corridor, and (3) estimate potential commuter rail mode share, based on the experience of lines besides the long-established lines in the Northeast, Chicago, and San Francisco.
- If the forecasted potential ridership compares favorably with commuter rail ridership projections for newer systems (see Table 2, below), continue with the rail planning process. If not (or as an interim measure until rail is constructed), consider commuter bus (described above) and/or bus rapid transit (described in the transit white paper).

- If a decision is made to proceed with rail, conduct a detailed planning study to develop potential station locations, operating characteristics, improved capital and operating cost estimates and ridership forecasts, and potential funding sources for both capital and operating costs. Many commuter rail projects are funded through the FTA New Starts program (smaller projects may now be eligible for the Small Starts program), which is competitive and time-consuming. Some projects have been funded entirely through state and/or local voter-approved transit taxes (e.g., Albuquerque and Austin).
- If funding is identified and obtained, proceed with preliminary and final engineering studies and, eventually, construction.

Looking strictly at a commuter rail line between Ashland and Medford (recognizing that past work has also considered commuter rail extending as far north as Grants Pass), logical station locations would be in central Ashland, Talent, Phoenix, and downtown Medford. The line would be approximately 13 miles long. If an average speed of 30 mph (including station stops and lower-speed travel through the curves between Ashland and Talent) could be maintained, the one-way travel time would be 26 minutes, barely enough time to allow two trains to operate at 30-minute headways and provide a crew break between trips. Adding additional stations (e.g., in South Medford) or lengthening the line (e.g., to Southern Oregon University) would likely require that three trains be operated and extra passing sidings provided. The Talent station would be located roughly halfway between Ashland and Medford timewise, and the station could be double-tracked to allow north- and southbound trains to pass each other, if 30-minute headways were to be operated. A more detailed study of track conditions would be required to determine the actual train speeds that could be operated.

The only other existing railroad tracks in the Rogue Valley connect to White City from north of Medford, so if any other destinations were to be served directly by commuter rail, new track would need to be laid and (unless trains operated directly in the street, as in Beaverton) right-of-way would need to be purchased.

The commuter rail line could be similar to WES in terms of the need for track and signaling upgrades, number of stations provided, and the number of vehicles operated. Assuming WES' cost-per-mile of $10.7 million, an Ashland–Medford route would cost approximately $140 million to construct. Annual operating costs could also be similar to WES, at $5.7 million per year, for eight hours of service per day on weekdays.