Treasure Valley High Capacity Transit Study

2020 Update

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1 Background

The Treasure Valley High Capacity Transit Study (TVHCTS) initially completed in 2009 included three major elements; a downtown Boise multimodal center site selection and NEPA analysis, identification of a recommended mode and alignment for a downtown Boise transit circulator and an initial Alternatives Analysis (AA) for the Treasure Valley Corridor. The latter study was referred to and titled as the Treasure Valley High Capacity Transit Study, Priority Corridor Phase 1 Alternatives Analysis and was completed in December of 2009. This report serves as an update of the 2009 report, updating and refining the assessment of the previously recommended short list of mode and alignment alternatives.

The Treasure Valley Corridor includes transportation routes that parallel I-84 and the Boise Cutoff freight rail alignment that connects central Boise with Meridian, Nampa and Caldwell. Initial interest in exploring transit opportunities in this broad travel corridor focused on use of the Boise Cutoff rail alignment to potentially provide transit services to the rapidly growing corridor area. In order to address Federal Transit Administration (FTA) requirements plus the desire to investigate a full range of potential solutions, a full range of transit modes and alignments were considered as part of the corridor study.

This updated report provides background information from the 2009 TVHCTS study as well as updated information on current (2019) and projected (2040) demographics and demand in the corridor. This update describes the demographic context of the corridor and describes the short-list of potential high capacity modes and alignment alternatives recommended for further assessment in the 2009 report. This current study updates and provides the most currently available data that defines the transportation conditions and needs within the Treasure Valley Corridor. The study recommends refinements to the 2009 listing of mode and alignment options for further consideration and provides updated outlines of next steps to be considered to both select and advance a preferred alternative towards implementation.

1.1. History

Rapid Growth

The Treasure Valley region is characterized by rapid growth and a low density auto-oriented development pattern. The Treasure Valley region is made up of Ada County, which includes Boise and Meridian, and Canyon County, which includes Nampa and Caldwell. Census data shows that the region grew very rapidly between 2000 and 2019 with both Ada and Canyon Counties growing by 65 percent for a total population growth of over 279,000 residents.

Between 2010 and 2019, the region added over 130,000 new residents. As the table below shows, both counties grew rapidly between 2010 and 2019 with total growth of 23 percent. While Canyon County grew slightly faster than Ada County between 2000 and 2010, growth in Ada County outpaced Canyon County between 2010 and 2019, with 24% growth.

Table 1-1 *2000, 2010 and 2019 Population Data by County*

	2000 Population	2010 Population	2019 Population (Estimate)	Change in Population, 2010-2019	Percent Change in Population, 2010-2019
Ada County	300,904	391,737	487,670	95,933	+ 24%
Canyon County	131,441	188,920	224,530	35,610	+ 19%
Total	**432,345**	**580,657**	**712,200**	**131,543**	**+ 23%**

Source: Historic Population Estimates by City Limits, COMPASS, 2019

1.2. Transportation Facilities

Highways and Roadways

Geographically, the Treasure Valley is oriented in an east-west direction. As a result, its primary regional arterials are oriented in the same direction. Interstate 84 is the primary east-west route, with I-184 serving downtown Boise ID. This network is the primary regional connection. Other US Highways in the Treasure Valley include US 20/26 (W. Chinden Blvd) which connects Boise to Caldwell ID. Both US Interstate/Highway facilities are managed by the Idaho Department of Transportation (ITD). Other major interregional roadways include Franklin Blvd, Overland Road, Fairview Ave Eagle Rd and Meridian Rd

The Boise Cutoff

The Boise Cutoff is a branch freight railroad line that diverges from the Union Pacific Railroad (UPRR) main line in Nampa and continues east and southeast before rejoining the UPRR main line at Orchard. The freight rail service on the line currently only extends from Nampa to the vicinity of the Boise Airport. The freight rail service on the line is currently provided by the short-line operator Boise Valley Railroad (BVRR) which also retains trackage rights on the Union Pacific main line between Nampa and Caldwell. For some time, there has been considerable interest in using the Boise Cutoff between Nampa and the Boise Depot to provide some form of regularly scheduled passenger rail service to the cities in the valley. In 1997 a RegioSprinter self-propelled commuter passenger rail car was operated as a demonstration service between the Boise Deport and the Idaho Center. Interest in rail transit utilizing the Boise Cutoff also resulted in the commissioning of an April 2003 study titled the Rail Corridor Evaluation Study. This report examined the status of the right-of-way ownership and issues that could be associated with running a transit service within the existing freight rail alignment. The study included the development of an operations plan and an order-of-magnitude capital cost estimate.

Local Planning Context

The Treasure Valley encompasses the metropolitan area for the greater Boise region, including Ada and Canyon counties and the cities of Boise, Meridian, Nampa and Caldwell. Each of the cities and counties within the region has adopted a comprehensive plan as well as unique transportation and growth management plans. The Community Planning Association of Southwest Idaho (COMPASS) serves as the long-range transportation planning agency. Transit service is provided by Valley Regional Transit (VRT).

The Idaho Transportation Department (ITD) operates and maintains all interstate and designated state highways in the study area/corridor. All non-state roads within Ada County are under the jurisdiction of the Ada County Highway District (ACHD). Canyon County has four highway districts that cover the unincorporated areas of the county. All non-interstate roadways within the unincorporated areas of the county are governed by the applicable highway district. The cities of Nampa and Caldwell operate and maintain all non-state roadways within their city limits.

1.3. Transportation Context

Travel Markets

The districts that include central business districts are the largest work trip destinations now and in the future. The largest work trip destinations are Downtown Boise and West Bench. The districts that include Downtown Meridian, Nampa, and Caldwell are also significant work trip destinations.

According to the Communities in Motion 2040 2.0 plan, vehicle miles of travel (VMT) in the region is expected to increase by almost double, from 12.1 million miles per average weekday in 2013 to 20.3 million miles by 2040. Travel time between common destinations such as Caldwell to downtown Boise is also expected to grow, from 34 minutes in 2013 to 55 minutes by 2040. Due to significant growth in population and employment expected in the region, hours of delay in travel time will also significantly increase, from 28 thousand hours per average weekday in 2013 to 79 thousand hours per average weekday by 2040. There is growth in the distance

of work trips from 2008 to 2030. Travel for work from the Nampa/Caldwell sub-region to the Boise sub-region increases from 12% in 2008 to 23% in 2040, an increase from 9,300 to 28,000. Of particular note is the increase between 2008 and 2030 in the proportion of work trips destined for the Nampa/Caldwell sub-region from both the Meridian sub-region (increased from 1% to 24%) and the Boise sub-region (increased from 1% to 16%). In raw numbers these are increases from 1,300 to 33,000 from the Meridian sub-region and 700 to 14,000 from the Boise subregion. This is due to significant employment growth planned for the Nampa/Caldwell sub-region, particularly in the Nampa and North Nampa districts.

Overall, the model indicates a growth in trips between the Nampa/Caldwell area and Boise, particularly in work trips. The major work trip destinations tend to be the central business districts of Nampa, Caldwell, Meridian, and Boise. This travel market has the potential to be well served by a high-capacity transit line in this corridor.

Existing Transit Service

Valley Regional Transit (VRT), the transit provider for Ada and Canyon Counties, which includes the Boise metropolitan area, operates bus routes in the Treasure Valley study area. Routes in the study area provide service on or parallel to potential HCT alignments within the corridor, including four intercounty routes between Ada and Canyon Counties, and three routes providing service within Canyon County. Intercounty services are mostly bi-directional, peak-only express services connecting major destinations in the region, except for Route 43 – Caldwell Express which serves peak-hour commute trips into Boise from Caldwell, but not the reverse-commute trips into Caldwell. VRT and other local agencies operate several Park & Ride and Transit Centers in the region, including at Towne Square Mall, Ten Mile Park & Ride (Ada County Highway District), College of Western Idaho (CWI) Park & Ride, and Happy Day Transit Center.

In April 2018, the VRT Board adopted a new six-year capital and service plan, ValleyConnect 2.0, in anticipation of significant regional growth. The plan aims to take the following actions:

- Quadruple the amount of fixed-route service
- Provide more frequent, late night, and weekend service
- Implement over 100 miles of roadway investments
- Increase transit usage by 800%

ValleyConnect 2.0 also includes discussions on planning for high-capacity transit in the region, including rail-based transit between Nampa and Boise using the existing rail right-of-way.

Congestion

Estimates of the existing levels of congestion in the project area were completed using the Treasure Valley Annual Congestion Management System Report (2017). The report is updated annually and tracks peak hour congestion on major local roadways.

Table 3 from the Congestion Management System Report which documents the 10 most congested roadway segments in the study area is shown below. As indicated in the table, much of the peak hour congestion is concentrated on or near State Highway 55 (Eagle Road). The estimated congestion is based on a calculated Travel Time Index (TTI) which is defined as the ratio of the ideal free flow travel time to the actual measured peak hour travel time.

Table 1-2 *10 Most Congested Roadway Segments*

Rank	Roadway Segment	Length (miles)	Direction	TTI
1	Chinden Blvd US20/26 - Cloverdale to SH 55/Eagle Rd	0.96	Westbound	4.32
2	Caldwell Blvd - Middleton Rd to Karcher Rd.	0.67	Eastbound	3.33
3	SH 55 (Eagle Rd) US 20/26 - Chinden Blvd to SH 44	1.88	Southbound	3.21
4	SH 55 (Eagle Rd) - McMillan Rd to US 20/26 (Chinden Blvd).	1.01	Northbound	3.15
5	Caldwell Blvd - Orchards Ave to Canyon St	0.53	Eastbound	2.97
6	SH 55 (Eagle Rd) - Franklin Rd to Fairview Ave	1.00	Southbound	2.95
7	Garrity Blvd - Kings Rd to I-84 on ramp	1.15	Eastbound	2.94
8	SH 55 (Eagle Rd) – Fairview Ave to Ustick Rd	0.99	Northbound	2.92
9	SH 55 (Eagle Rd) – Middleton Rd to Caldwell Blvd	0.52	Eastbound	2.91
10	SH 55 (Eagle Rd) – I-84 EB off-ramp to Franklin Rd	0.51	Southbound	2.87

Source: Treasure Valley Annual Congestion Management System Report (2017), Table 3

Information provided in the Congestion Management System Report (2017) was also used to document congestion on I-84 through the project study area. As indicated in Figure 11 of the report, all I-84 freeway links through the study area have experienced increased daily traffic volumes with corresponding increases in peak hour travel times. The increases in average daily traffic volumes range between 5 and 35 percent between 2013 and 2017.

1.4. Federal Transit Administration Processes

One purpose of evaluating transit alternatives in the Treasure Valley Corridor is to position the corridor to potentially compete for future federal funding. Currently the Federal Transit Administration has two Capital Investment Grants (CIG) funding sources for the types of transit projects that are being evaluated as part of this report. These programs differ in the amount of grant funding that is available for specific projects and they also differ in the level of work that needs to be completed prior to applying for the funding. The CIG funding programs are:

Small Starts

The Small Starts program is reserved for transit projects where the total project cost is less than $300 million and total Small Starts funding sought is less than $100 million. Typically, Small Starts projects consist of new Bus Rapid Transit (BRT) routes or extensions to existing BRT routes. Small Starts funds can also be used for extensions for existing Light Rail or Commuter Rail systems provided that these types of projects remain within the funding range for Small Starts projects.

Projects competing for Small Starts funding must have successfully completed FTA's Project Development phase. This phase includes developing and evaluating a range of alternatives, selecting a Locally Preferred Alternative (LPA) and adopting it into the fiscally constrained Regional Transportation Plan (RTP), and completing the environmental review process. FTA also requires that the project gain a commitment for all non-Small Starts funding and complete a level of engineering and design to have some certainty on construction costs. Once these steps are completed and FTA has determined that the project will receive Small Starts funding, FTA will enter into a Full Funding Grant Agreement (FFGA) with the local agency. The project will be allowed to complete final design and move into construction.

New Starts

The New Starts program was established by congress to assist local agencies to fund large transit capital projects. New Starts is a discretionary and competitive grant program and over the years FTA has established guidance for applications that include extensive requirements regarding system planning, alternatives analysis and technical analysis. The FTA process is aimed at demonstrating the merits of the various projects and providing data and analysis with which to compare competing projects from across the country.

FTA requires that a proposed transit corridor be included in the regional transportation plan and that the local project sponsor perform a comprehensive alternatives analysis in the corridor. FTA also requires that the project complete the steps outlined in the section on Small Starts. In addition to those steps FTA generally requires more advanced engineering and design than what would be expected for a Small Starts Project.

1.5. Purpose & Need

The following Purpose statement was developed by the COMPASS High Capacity Working Group and is intended to update the previously adopted statement. This Purpose will be updated as needed as the TVHCT study progresses.

Project Purpose

Provide options/choices to the community to move throughout the region by various forms of public transportation, including simple, direct and convenient high capacity public transportation, to improve mobility and accessibility. Public transportation thresholds identify when major milestones/system components will be implemented. Stakeholders establish performance goals and measures and provide data to track progress toward achieving the goals.

Project Need

The need for the Treasure Valley HCT Project is grounded in the significant population and employment growth in the valley and the existing and forecast impact of growth on the performance of the transportation system.

Population Growth in the Corridor

- Canyon County almost doubled in population from 2000 to 2019. Canyon County's population increased 19% from 2010 to 2019. The population of Ada County increased 24% during the same timeframe.
- The population of greater Meridian grew from less than 83,000 in 2010 to over 113,000 in 2019, adding about 30,000 people to its population in less than a decade.
- Over two-thirds of the Boise region's current population and forecast growth is concentrated in this corridor.
- Corridor population is forecast to grow by 70% between 2010 and 2040. (Communities in Motion 2040 2.0. All population and employment forecast data presented here is based on this dataset).

Employment Growth in the Corridor

- Corridor employment is forecast to grow to over 420,000 by 2040, accounting for over 75% of the region's jobs.
- Nearly 83,000 new jobs are forecast in the western parts of the corridor (Caldwell and Nampa) by 2040, a growth of more than double.
- Job growth in the western parts of the corridor will lead to more balanced directional flow for commute trips.

Deteriorating Transportation Performance in the Corridor

- Travel time between Caldwell and downtown Boise is expected to grow, from 34 minutes in 2013 to 70 minutes by 2040.
- The reliability and overall travel times for commuter bus services in the corridor have degraded and are forecast to continue to degrade with the forecast growth in traffic and congestion in the corridor.

Change in Work Trip Patterns

- Both Nampa and Caldwell have seen a significant increase in commuters traveling to Ada county jobs.
- In the previous 2009 study, it was predicted that work trips traveling between the Nampa/ Caldwell area to downtown Boise are forecast to increase significantly by 2030. It is expected that the trend will continue into 2040.

Growth in Downtown Boise

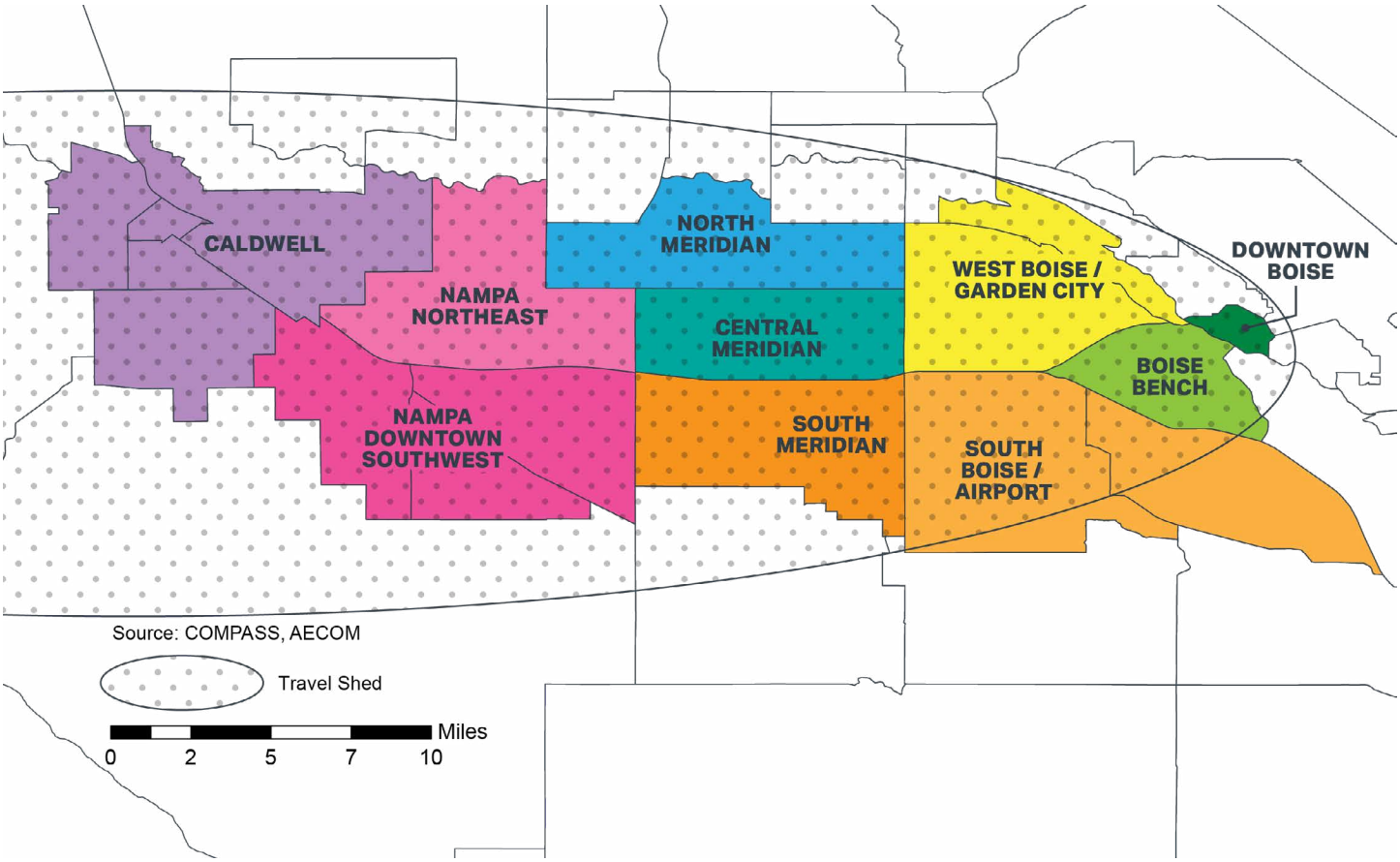
- Downtown Boise employment is forecast to grow by half by 2040, and downtown population is forecast to double and reach 10,000.
- Even with the significant employment growth in Caldwell, Nampa, and other areas, downtown Boise employment is forecast to exceed 50,000 by 2040 and to represent about 10% of regional employment.
- Downtown Boise will continue to be the major business, governmental, cultural, and educational center for southwest Idaho.

2 Study Corridor

The term "corridor" typically refers to a wide swath through which one or more transportation facilities travel in the same general direction. For FTA studies, the definition is a bit broader and typically includes the geographic area that would be served by bus routes that would function as feeder routes to an HCT station. In this case, a typical radial HCT corridor will result in a fan-shaped corridor which is wider further out and narrowing as it approaches the downtown or central city (see Figure 2-1).

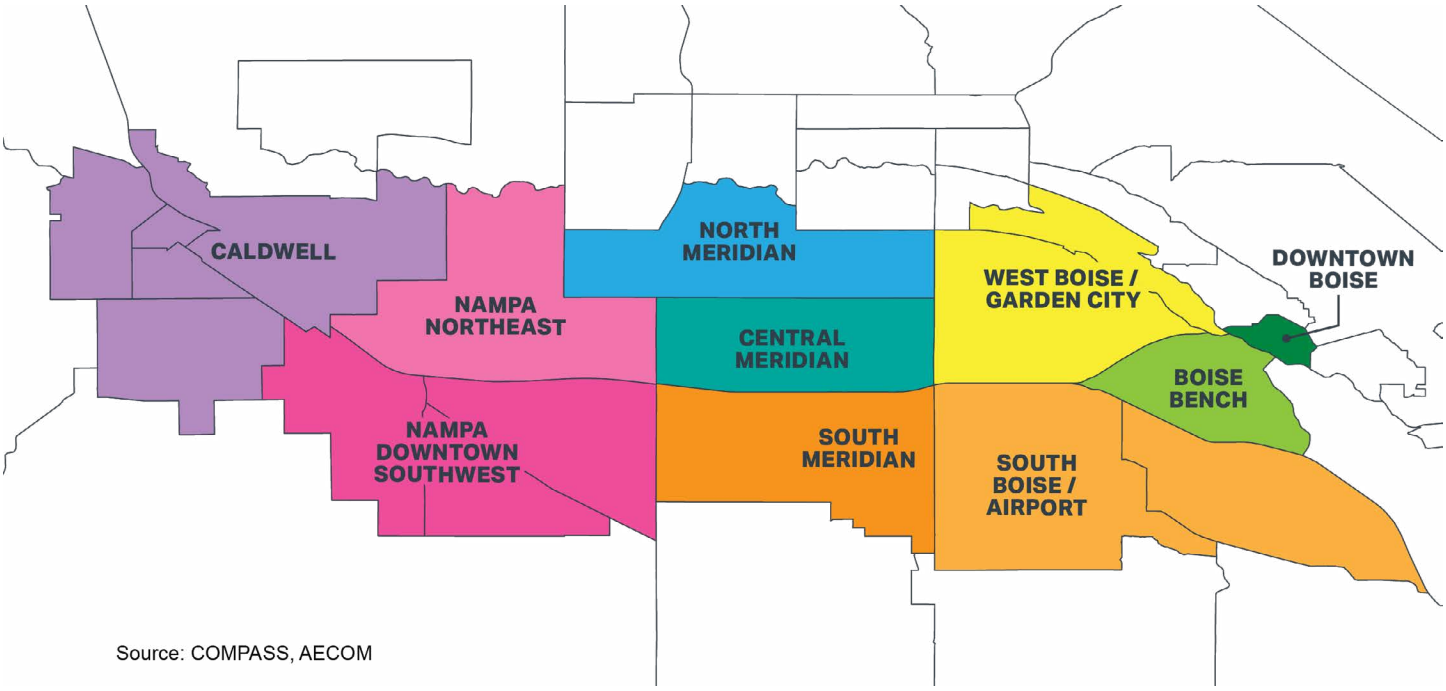
While Communities in Motion (CIM) recommended conducting an alternatives analysis focused on the Boise Cutoff rail alignment, other potential HCT routes that could serve the same general travel shed need to be considered in an FTA compliant alternatives analysis. To fully capture the travel corridor between Caldwell, Nampa, Meridian and Boise, a range of possible HCT alignments were considered for this study.

Figure 2-1 *Representative Corridor Travel Shed*



The study corridor has been defined using the Traffic Analysis Zones (TAZs) from the regional travel demand model, and demographic areas from COMPASS Communities in Motion 2040 2.0. Demographic areas are an aggregate of multiple TAZs. The study corridor includes 15 demographic areas comprising the Treasure Valley Corridor. For the purpose of this study, some demographic areas are combined with nearby demographic areas to be more comparable to the corridor district definitions used in the 2009 COMPASS HCT Study. The corridor districts are displayed in Figure 2-2.

Figure 2-2 *District/Corridor Map*



The initial narrowing of alignments was based on this corridor definition and demographic areas. It should be noted that demographic areas do not match either city limits or area of impact boundaries and are generally updated every ten years when the TAZ boundaries are updated. The use of city names is intended to provide a general sense of the geographic area being referenced; however, the districts do not match city boundaries.

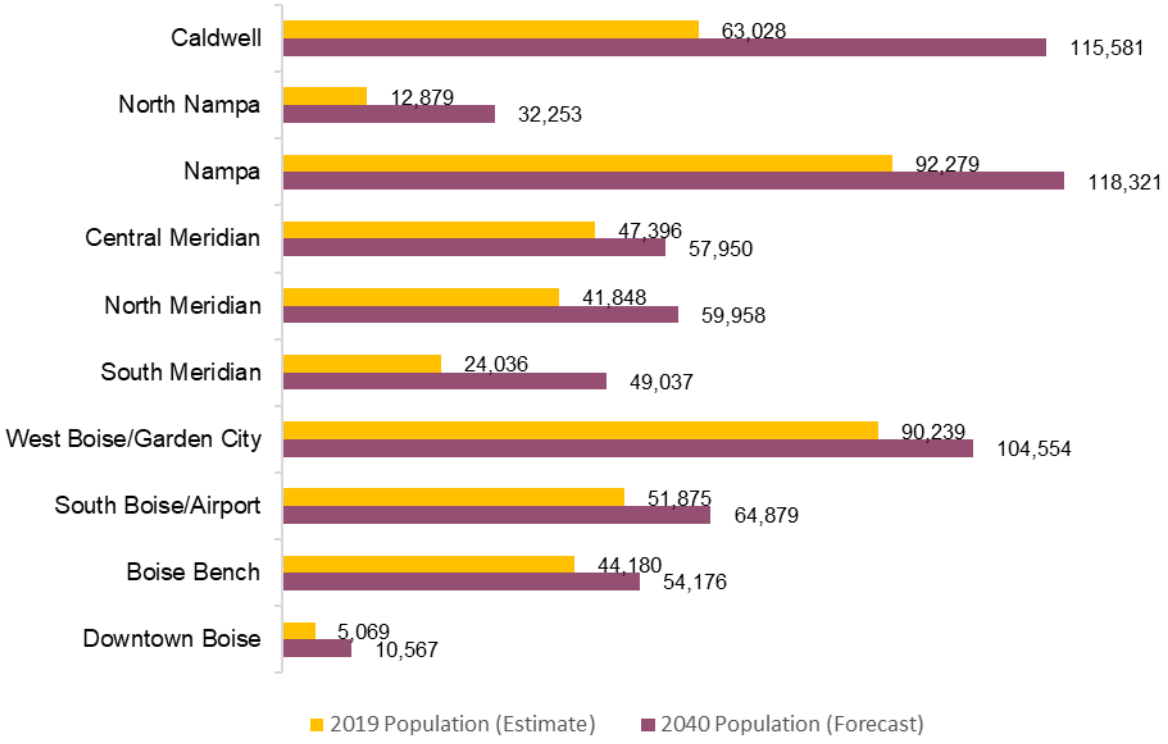
Initial travel market evaluation and population and employment data are based on the districts defined by this corridor definition.

2.1. Population and Employment

Census data shows that the region grew very rapidly between 2000 and 2010 and between 2010 and 2019. High growth in population and jobs are projected to continue. Figure 2-3 provides 2019 and 2040 population data using the HCT Corridor analysis districts described above. This data is used in the COMPASS regional travel demand model and reflects the most up-to-date information on population and employment growth within the corridor. The source of these data is the CIM 2040 Vision data set, published by COMPASS as part of the Communities in Motion 2040 2.0 planning process.

Figure 2-3 provides 2019 and 2040 population figures, and Figure 2-4 provides 2019 and 2040 employment figures using the HCT Corridor analysis districts and the CIM 2040 Vision data set.

Figure 2-3 *Treasure Valley Corridor Total Population and Population Growth by Analysis District (2019 & 2040)*



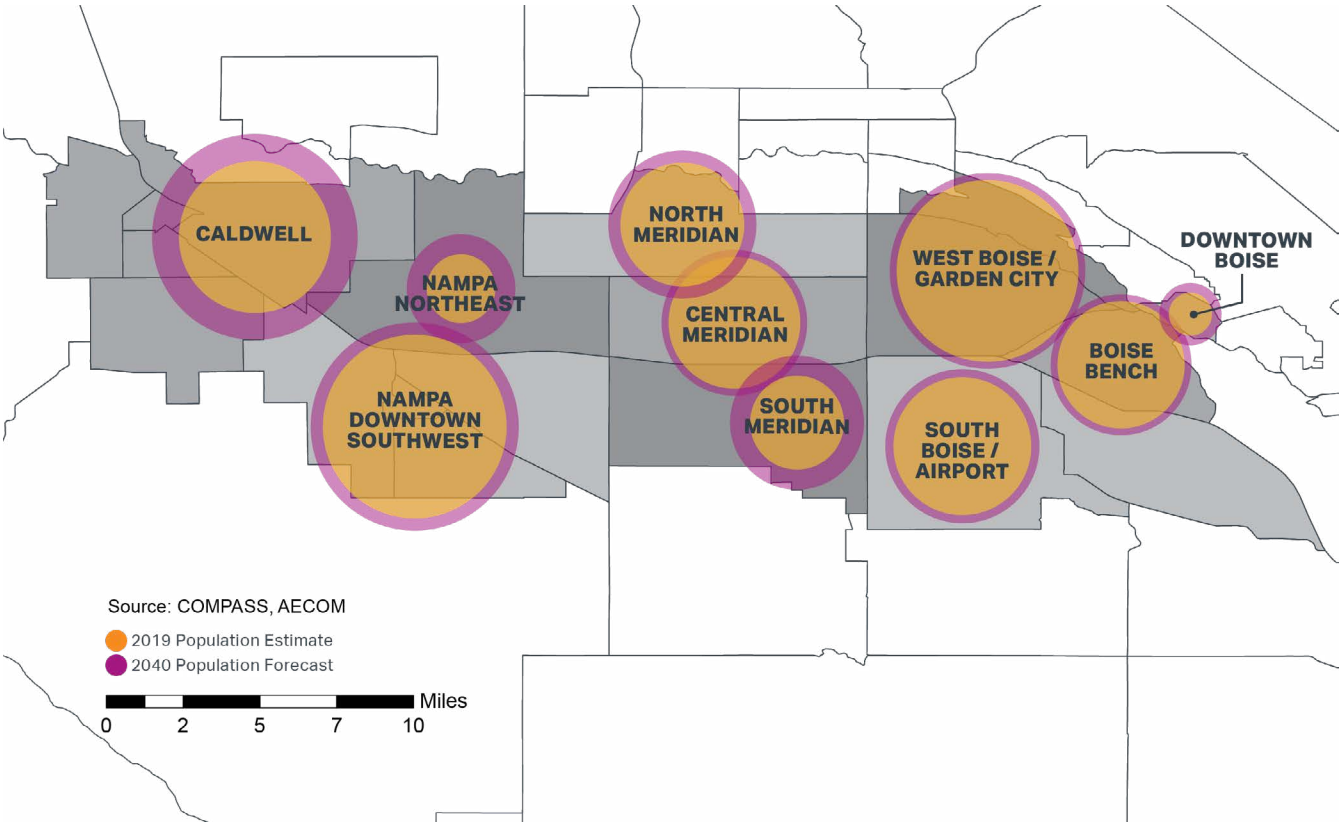
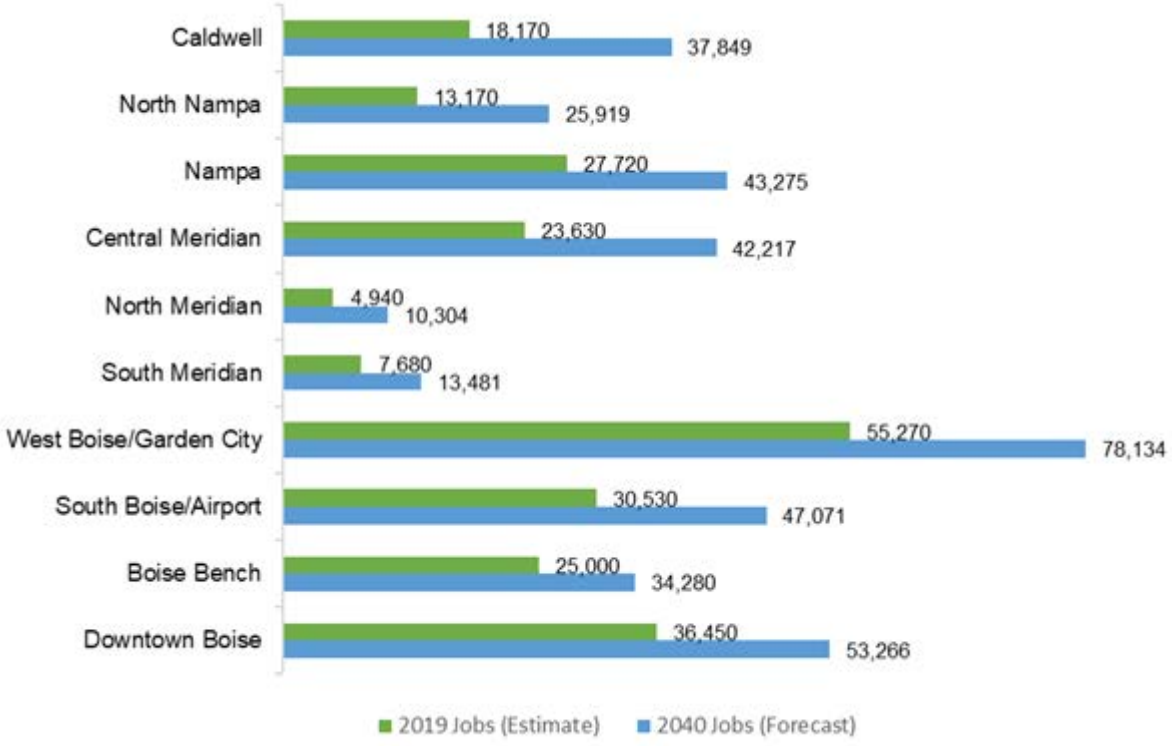
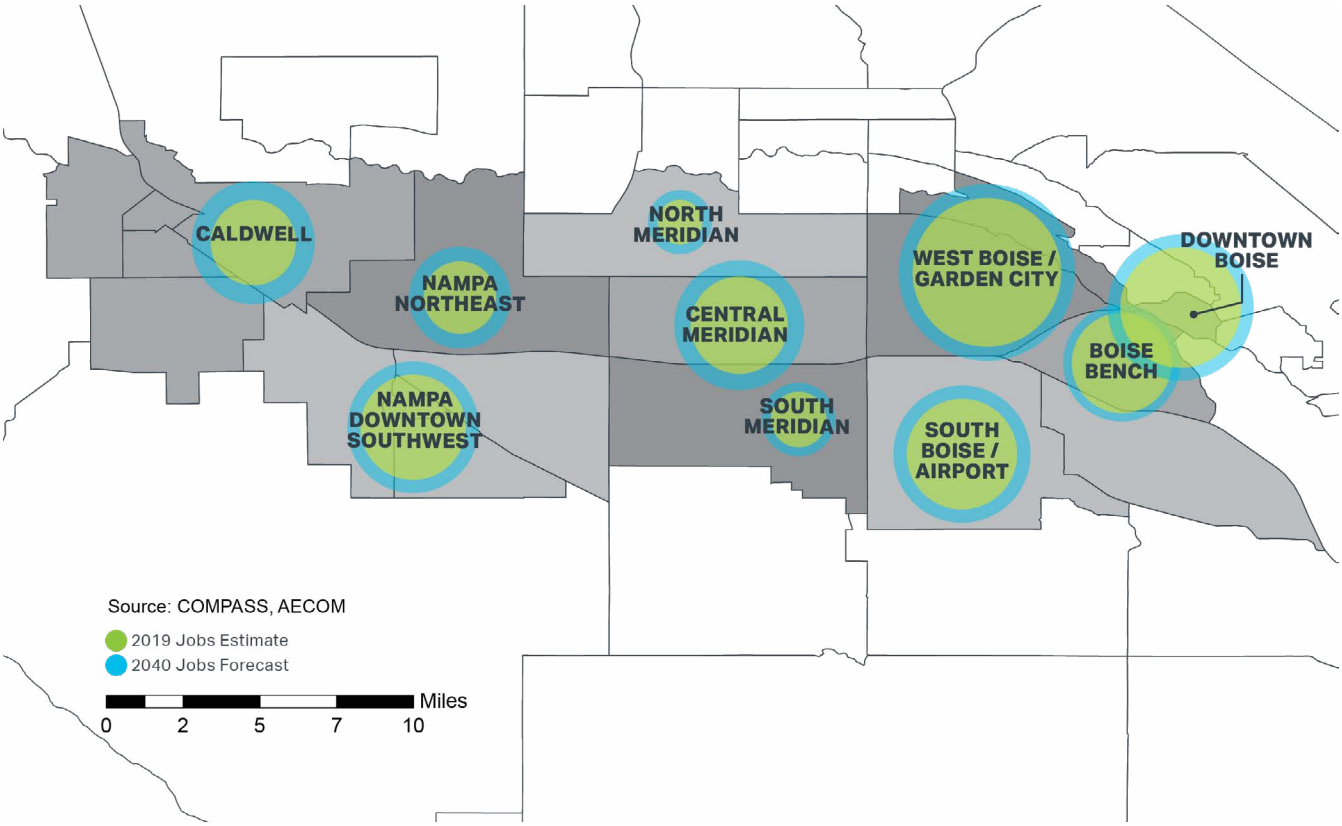


Figure 2-4 *Treasure Valley Corridor Total Jobs and Job Growth by Analysis District (2019 & 2040)*





As shown in Figure 2-3, the analysis districts with the largest projected increases in population are in Nampa and South Meridian, with over 25,000 additional persons each by 2040. The highest percentage increases in population are projected to occur in North Nampa, Downtown Boise, and South Meridian. While downtown Boise has a high percentage growth rate, the current population is relatively low. By 2040, even with a high percentage growth rate, downtown Boise is projected to remain among the lower population districts. The largest concentrations of population growth are projected to occur in Caldwell, Nampa, and Meridian.

As shown in Figure 2-4, the highest growth in number of jobs is projected to occur in Caldwell, with significant increases in jobs also occurring in West Boise/Garden City, Central Meridian, and South Boise/Airport. High percentage increases are projected to occur in North Nampa, North Meridian and Central Meridian.

While household and employment are projected to increase in every district between today and 2040, population growth is most pronounced in the western portions of the corridor, while employment growth is pronounced in both the western and eastern portions of the corridor. The net result of this pattern would be an overall increase in demand for east-west travel within the corridor in 2040.

3 High Capacity Transit Modes

This section describes the range of High Capacity Transit (HCT) modes under consideration for potential application in the Treasure Valley corridor. Not under consideration are certain high capacity transit modes such a monorail, personal rapid transit (PRT), Hyperloop and maglev. These specific modes are not currently considered applicable in the Treasure Valley due to either high costs or service characteristics not consistent with the anticipated future development in the valley.

The HCT modes described and evaluated in this report are all considered to be potentially appropriate alternatives for the Treasure Valley corridor serving the communities of Caldwell, Nampa, Meridian and Boise. Each mode would exhibit differing attributes which would result in differing travel times, service dependability, costs, and ultimately ridership. The modes under consideration in this report are:

- Bus Rapid Transit (BRT) - Mixed Traffic
- Bus Rapid Transit (BRT) - Exclusive
- Light Rail
- Commuter Rail

The following is a brief description of each of the above listed HCT applications:

3.1. Bus Rapid Transit (BRT) – Mixed Traffic

The Mixed Traffic BRT option would as its name suggests predominantly operate in mixed traffic lanes with general purpose traffic. Some communities have adopted the nomenclature of "BRT Light" to describe this option. To meet the FTA definition of BRT and be eligible for federal funding, this application would need to incorporate some combination of priority or queue bypass lanes at key points of congestion, unique stops including shelters, special branding of the buses or signage, and have wider station spacing than is typical of the regular bus service in the area. While travel times would be anticipated to improve over the regular bus system, the BRT Mixed Traffic option would have a slower travel time than the other mode options under consideration. This alternative would be anticipated to be the least cost of the options under consideration. It is the type of application several communities have adopted as an initial investment to improve operational performance in priority corridors.

3.2. Bus Rapid Transit (BRT) – Exclusive

Bus Rapid Transit (BRT) Exclusive differs from BRT Mixed Traffic in that some portion, if not all, of the alignment is in some form of an exclusive running way. The application would focus on a full range of measures intended to speed operations and provide a more competitive travel time to that experienced by the general automobile traffic. Wider station spacing coupled with special signaling at key intersections, off-board fare collection, more substantial stations, real time bus arrival information systems and specially branded and often larger buses can all be part of the mix of amenities to increase the competitiveness of the bus operations. In comparison to the BRT Mixed Traffic alternative, the travel times would be anticipated to be more competitive and the exclusive operation would add to the dependability of the service. Station spacing would be similar to a light rail operation and under a fully exclusive operation the travel times could approach those anticipated with a Light Rail Operation. While the cost of implementation would be higher than the BRT Mixed Traffic option, it would be less than any of the light rail alternatives.

3.3. Light Rail Transit (LRT)

Light Rail is an electrically powered medium capacity transit mode that in most applications utilized overhead wire to receive its power source. The most common practice is to provide an exclusive right-of-way which allows for greater speeds and a more reliable service. Stations are usually more robust than for the various bus modes with spacing in most systems in the range of one-half to one mile apart. Crossings of streets and arterials require positive protection with crossings of major roadways often grade separated. Light rail can be operated in either single vehicle configurations or with multiple units and serve higher levels of ridership than most bus applications. Of the alternatives under consideration it can be anticipated that the light rail options will cost more to implement largely due to creating the exclusive operating environment that defines light rail and allows for a higher speed operation. An emerging feature of light rail is the introduction of "off-wire" operation which currently is limited in distance but provides another option in areas where the overhead wires present an issue.

3.4. Commuter Rail

Commuter Rail is a rail transit application that offers a higher speed operation with higher passenger capacities. Many operations are initially focused on peak period hours with limited or no mid-day or evening services. Most all such operations in North America operate within existing or former freight rail environments. The right-of-way ownership often dictates elements of the service that can be offered to the public with railroad ownership typically resulting in more limitations than if the right-of-way is in public ownership. Station spacing is typically much wider than the other modes under consideration in this study and the service more oriented to work trips. While the operating cost per passenger is typically high, the overall capital cost is typically less a new fixed rail alignment, , particularly if the host railroad is cooperative. Commuter rail operations utilize a variety of vehicle types with the most common being a locomotive-hauled single or bi-level passenger unit. The number of passenger units can be adjusted to meet the level of passenger demand. Also available are Diesel Multiple Units (DMU) or Electrical Multiple Unit (EMU) which are self-propelled cars which can operate singularly or in connected train sets depending on the passenger demand levels. Also available are lighter commuter rail vehicles such as the Regio Sprinter which are similar in size and appearance to standard light rail vehicles. Because of federal crash worthiness standards, the latter vehicle type, if operating in an active freight rail corridor, must have a time separation or a defined physical separation from the freight operations.

3.5. Regional Transit Operations

There are numerous Northwest examples of each of the transit modes under consideration for potential implementation in the Treasure Valley. This allows for learning from the experiences of other communities and employing the best practices from multiple sources. The following is a brief outline of the various applications in communities that are relatively close to the Treasure Valley:

Eugene, OR
- Bus Rapid Transit - Exclusive

Portland, OR
- Bus Rapid Transit – Mixed Traffic (in design)
- Commuter Rail
- Light Rail

Vancouver, WA
- Bus Rapid Transit – Mixed Traffic

Seattle, WA
- Bus Rapid Transit – Mixed Traffic
- Bus Rapid Transit – Exclusive (in design)
- Commuter Rail
- Light Rail

Vancouver, BC
- Bus Rapid Transit – Mixed Traffic
- Commuter Rail

Salt Lake City, UT Region
- Bus Rapid Transit - Mixed Traffic
- Commuter Rail
- Light Rail

Table 3-1 shows high-level comparison of capacity and speed performance among different transit modes.

Table 3-1 *Transit Mode Comparison*

	Capacity		Speed	
HCT Alternative	**per vehicle**	**per hour**	**Max (mph)**	**Avg. (mph)**
BRT -Mixed Traffic (Standard)	63	252	45	17
BRT -Mixed Traffic (Articulated)	116	464		
BRT -Exclusive (Standard)	63	252	60	21
BRT -Exclusive (Articulated)	116	464		
LRT (Single car)	144	576	55	24
LRT (2-car consist)	288	1,152		
Commuter Rail (Single car)	192	768	60	31
Commuter Rail (2-car consist)	384	1,536		

Note: Peak hours assumes 15 minute frequency

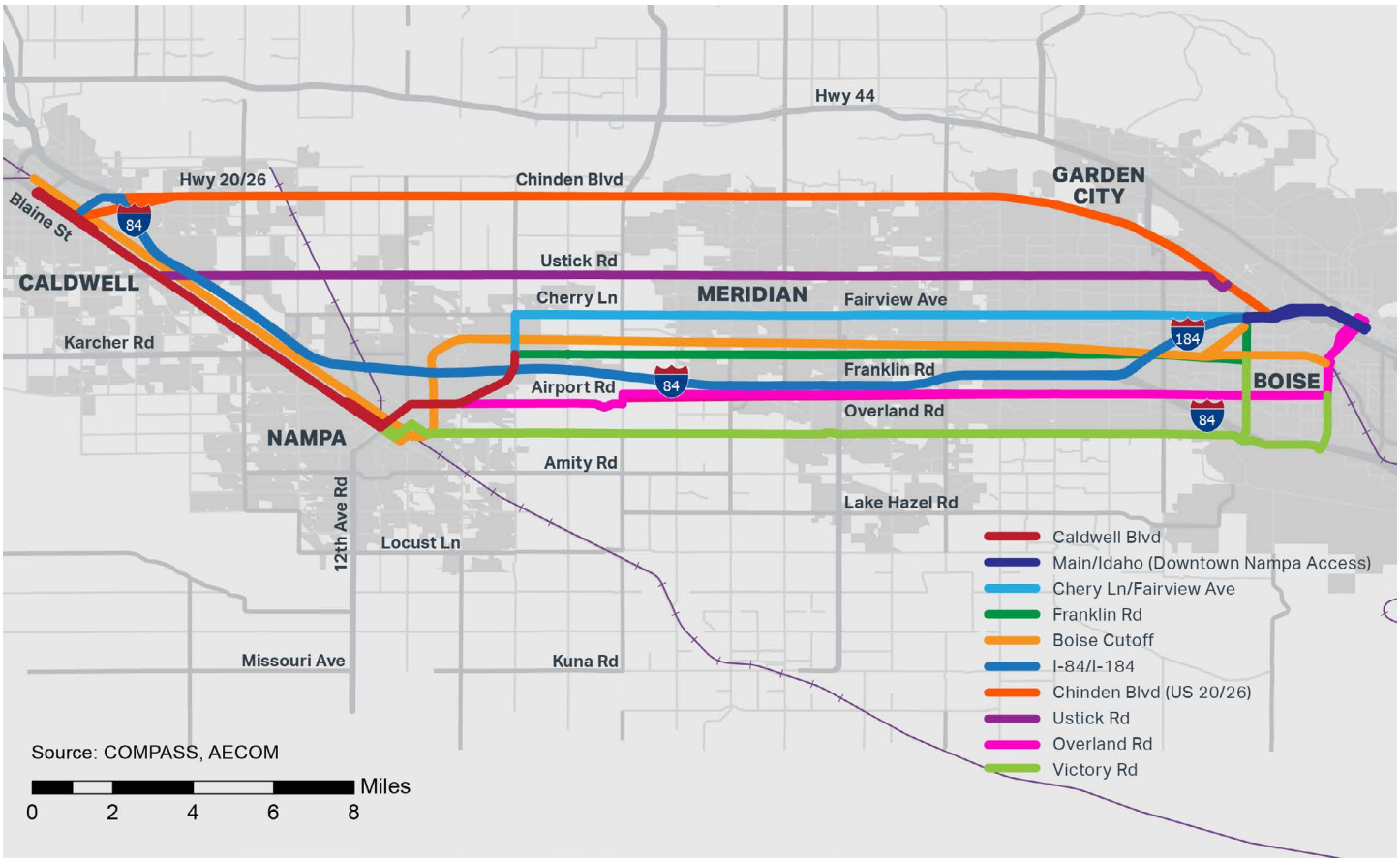
4 Initial Alignment Narrowing

The 2009 TVHCT study evaluated a range of potential alignments that could connect Boise, Meridian, Nampa, and Caldwell via the various HCT alignments. As an initial evaluation, this assessment looked at the full range of potential HCT alternatives to determine the most promising to be evaluated in more detail. Several potential HCT alignments that could serve the Treasure Valley were examined. The following alignments were evaluated:

- Chinden Boulevard (US 20/26)
- Ustick Road
- Fairview Avenue/Cherry Lane
- Boise Cutoff Railroad
- Franklin Road
- I-84/I-184
- Overland Road
- Victory Road/Powerline Road

Figure 4-1 shows the potential alignments and potential connections at the east and west ends of the project area.

Figure 4-1 *Potential Alignments*



The alignments evaluation process used a two-step approach to screen each alignment. The two-step screening process consisted of:

1. Evaluation of each alignment against the project's Purpose and Need Statement. This evaluation helped reduce the range of alignments to those that best met the overall project objectives.
2. Evaluation of the reduced set of alignments against the project's Goals, Objectives and Measurement / Evaluation criteria. This screen helped advance those alignments that best served the region's high capacity transit needs.

The initial screen was concerned with how well it met the project's Purpose and Need including connectivity to central business districts (CBDs) and activity centers, the general types of areas it would serve (residential, commercial, etc.) and its general right-of-way requirements. This initial screening resulted in the following recommendations;

- Chinden Boulevard and Ustick Road were determined to be too far north to adequately serve downtown Nampa and downtown Meridian. Since the Purpose and Need for the project includes serving these CBDs, these two alignments were removed from further consideration.
- Victory Road/Powerline Road was removed from further consideration because it does not connect to downtown Meridian and would require out-of-direction travel to reach downtown Boise. This roadway also has a relatively narrow right-of-way.[1]

The initial screen resulted in the elimination of three of the above identified alignment alternatives. The remaining five alignments were determined to have met the project's Purpose and Need and they were advanced to the second screening process. This second level screen evaluated against five adopted project goals and their corresponding objectives. The results of the second level of screening resulted in the recommendation for the elimination of one additional alignment, the Overland Road alignment. The primary reasons for the elimination of this alignment were as follows:[2]

- The Overland Road alignment would not connect directly to downtown Meridian and would require out-of-direction travel to reach downtown Boise.
- The Overland Road alignment would serve relatively few designated main activity centers and commercial activity centers.
- The Overland Road alignment would require significant additional right-of-way to add exclusive HCT lanes for Light Rail or BRT – Exclusive.
- Each alignment was given a weighted score based on its ability to address the project Goals, Objectives and Measures. The Overland Road alignment ranked significantly lower than the other alignments.

1 *Further detail on background, planning and demographic context, transportation context, and initial mode and alignment narrowing can be found in Priority Corridor Phase 1 Alternatives Analysis Technical Memorandum.*

2 *See Chapters 5, 6 and 7 of the 2009 Treasure Valley High Capacity Transit Study Priority Corridor Phase 1 Alternatives Analysis Report.*

5 Definition of Alternatives

Following the initial narrowing of alternatives, the 2009 report advanced five alignments with various mode options for further study. For this 2020 update, we advanced four out of five alignments identified in the previous study. The mode and alignment options were refined into HCT concepts for modeling and ridership analysis. The purpose of this initial modeling was to learn how each of the concepts would perform as an HCT line. In order to model the alternatives, the concepts were described to a moderate level of detail, however, ***it should be noted that more detailed design and analysis would be needed to determine the feasibility of each of the concepts in terms of routing, traffic impacts, right-of-way requirements, ridership and costs.***

The following mode and alignment concepts were defined and studied:

Fairview Avenue/Cherry Lane

- BRT – Mixed Traffic
- BRT – Exclusive
- Light Rail

Franklin Road

- BRT – Mixed Traffic
- BRT – Exclusive
- Light Rail

Boise Cutoff

- BRT – Exclusive
- Light Rail
- Commuter Rail

I-84/I-184

- BRT – Mixed Traffic
- BRT – Exclusive

Modes on Arterial Alignments

BRT – Mixed Traffic was assumed to operate in existing traffic lanes with general purpose traffic on the arterial alignments. Stations would be located on the curbside lane. Some signal priority and queue bypass lanes would be added where appropriate to facilitate transit movement through the most congested intersections. Station spacing for BRT – Mixed Traffic was assumed to be similar to that of BRT – Exclusive and Light Rail.

BRT – Exclusive would operate similarly to Light Rail. It was assumed to be in an exclusive running way in the median on the arterial alignments. Signal priority would enable both Light Rail and BRT - Exclusive to stay on schedule and maintain reliable service.

Light Rail on the arterial alignments (Fairview/Cherry and Franklin) was assumed to operate in an exclusive running way in the roadway median. At this early planning stage, it was assumed that exclusive guideway modes would not take away an existing traffic lane but would be added to the existing or planned roadway cross-section. Light rail stations would be located approximately every 2 miles, except in the downtown areas where they would be spaced more closely.

Modes on the Boise Cutoff

Light Rail or BRT – Exclusive on the Boise Cutoff would operate on a new exclusive guideway adjacent to the existing railroad tracks. UPRR policy requires any transit alignment adjacent to its tracks to be separated from the tracks by at least 50 feet (or use a crash-resistant wall). In Nampa, at the western end of the Boise Cutoff, Light Rail or BRT – Exclusive would need to cross over the Union Pacific main line tracks, most likely on a grade-separated structure, and operate on local streets in downtown Nampa. Details of this crossing and the alignment connecting Nampa and Caldwell via Nampa-Caldwell Boulevard have not been developed. As an option, light rail trains or BRT buses could utilize the short line stub tracks to Orchard Street to access downtown Boise from the west. Further discussion on routing for each alignment concept is provided in the following sections.

Commuter Rail on the Boise Cutoff was assumed to operate on existing tracks with an eastern terminus at the Boise Depot. Since the Boise Depot is located approximately one mile from downtown Boise, a shuttle bus was assumed to connect with the Commuter Rail line at the Depot to connect passengers to downtown Boise and Main Street Station. At the western end of the Boise Cutoff, this study assumed that Commuter Rail could be added alongside the Union Pacific Railroad (UPRR) main line between Nampa and Caldwell. This concept was not studied in detail and would require a more detailed study to determine its feasibility.

HCT Concepts on I-84

Two HCT concepts were developed for I-84 that are different from the concepts on the other alignments. One freeway HCT concept was BRT – Mixed Traffic, which would be an express-style bus route with a limited number of stops located either on interchange ramps or along the freeway shoulder. Referred to as flyer stops, these would enable a bus to save time by remaining on the freeway to avoid traffic on ramps or local streets. Park-and-ride lots would be designed to have a direct pedestrian connection to the flyer stops.

The other freeway HCT concept was BRT – Exclusive, which was assumed to operate in an exclusive guideway within the freeway right-of-way. This was analyzed as a new facility that would be added to the existing or planned general purpose lanes. This could take several forms, including an exclusive bus-only lane added to either the left or the right side of general-purpose lanes or an exclusive guideway entirely separate from the freeway lanes.

BRT buses on I-84 could take advantage of Bus on Shoulder System (BOSS) operation where buses are authorized to travel in select segments of the freeway shoulder when the mainline freeway is congested.

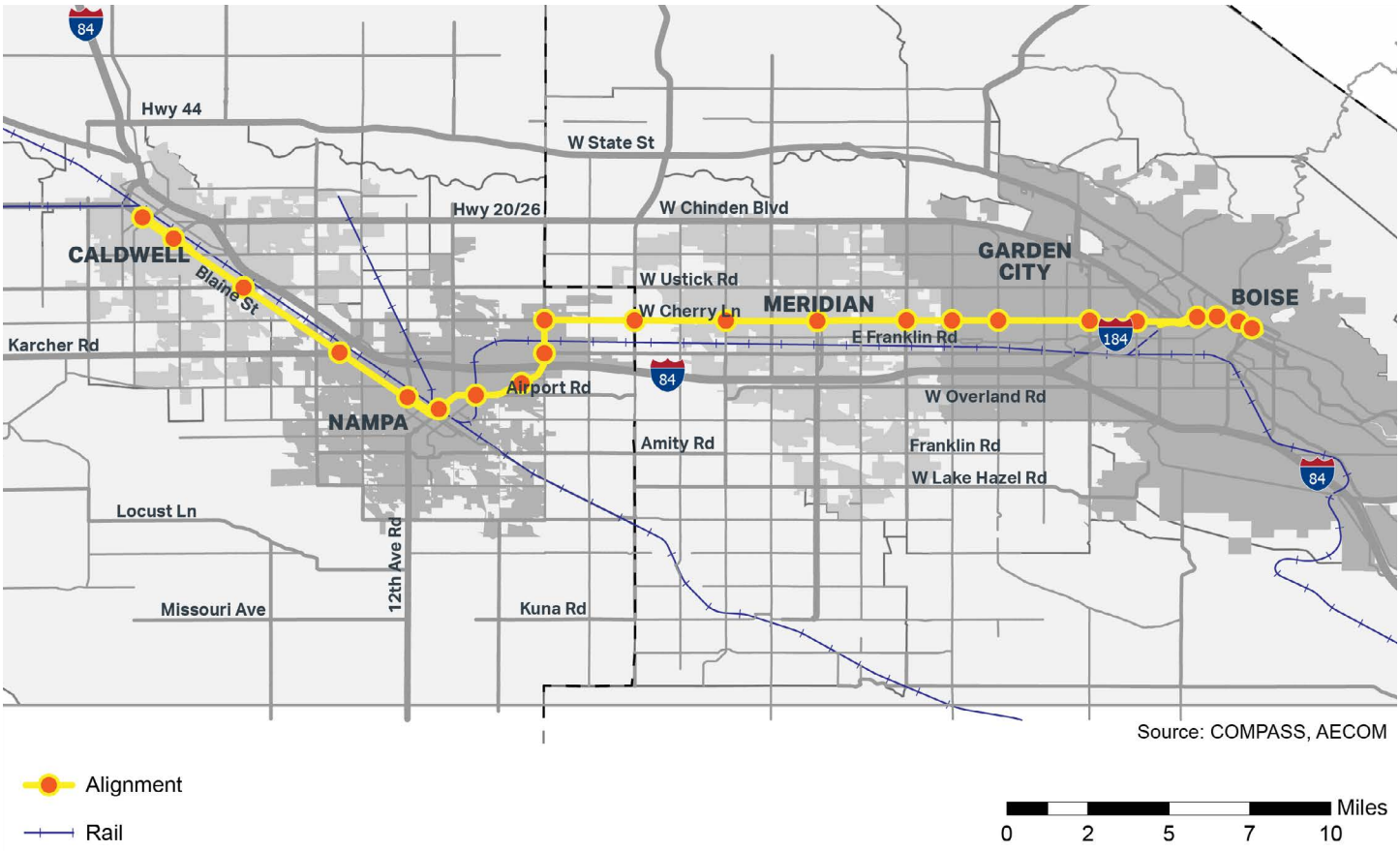
Figures 5-1 through 5-5 show the refined alignment concepts. These HCT concepts were developed only for analysis purposes and have not been fully designed. These concepts allow for comparisons among the various potential modes and alignments.

5.1. Fairview Avenue/Cherry Lane Alignment

Figure 5-1 shows the Fairview Avenue/Cherry Lane alignment concept that was analyzed for Light Rail, BRT - Exclusive and BRT - Mixed Traffic. The Fairview Avenue/Cherry Lane alignment would originate at Main Street Station in downtown Boise. It would utilize the Fairview and Main one-way couplet between downtown and Orchard Street. From there it would utilize Fairview Avenue/Cherry Lane as far west as Idaho Center Boulevard, then turn south on Idaho Center Boulevard, Garrity Boulevard, and 11th Avenue into downtown Nampa. From Nampa it would run northwest on Nampa-Caldwell Boulevard into downtown Caldwell. This routing is an initial concept for analysis purposes. Further study may find that this routing concept is not feasible due to right-of-way constraints or traffic impacts. As with any of these alignments, further study would need to be conducted to determine the feasibility and the routing details.

Possible station locations were identified based on local agency plans and bus transfer opportunities, however they do not necessarily represent the final station locations if an alignment were to move forward into project development. Further study that incorporates planned land uses and transit-oriented development opportunities would result in more refined station locations. West of Cole Road stations were located approximately two miles apart. East of Cole Road, in the more urban sections of the corridor, stations were spaced closer together.

Figure 5-1 *Fairview/Cherry Alignment Concepts: BRT (Mixed and Exclusive) and Light Rail*

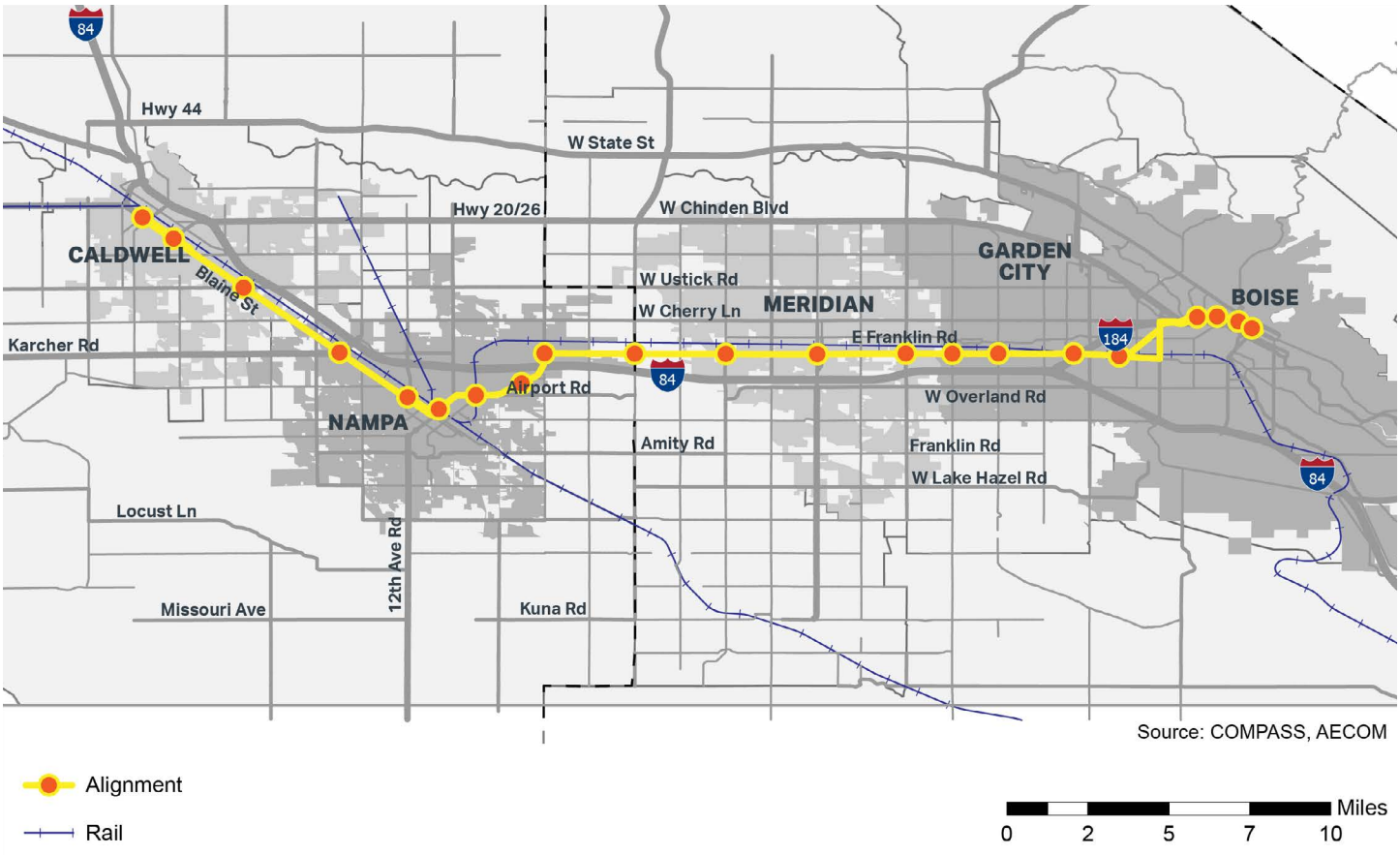


5.2. Franklin Road Alignment

Figure 5-2 shows the Franklin Road alignment concept that was analyzed for Light Rail, BRT - Exclusive and BRT – Mixed Traffic. The Franklin Road alignment would originate at Main Street Station in downtown Boise and utilize the Fairview and Main couplet as far west as Orchard Street. From here, Light Rail and BRT – Exclusive would run south on Orchard Street as far as Irving Street and then utilize the Boise Branch Line, a short line that branches off the Boise Cutoff line, to the southwest and connect with Franklin Road near Curtis Road. BRT – Mixed Traffic would continue south on Orchard Street to Franklin Road and turn west. All modes would follow Franklin Road to Idaho Center Boulevard and then turn south. From here, the Franklin Road alignment would be identical to the Fairview Avenue/Cherry Lane alignment, utilizing Garrity Boulevard, 11th Avenue and Nampa-Caldwell Boulevard. This routing is an initial concept for analysis purposes. Further study may find that this routing concept is not feasible due to right-of-way constraints or traffic impacts. As with any of these alignments, further study would need to be conducted to determine the feasibility and the routing details.

Possible station locations were identified based on local agency plans and bus transfer opportunities, however they do not necessarily represent the final station locations if an alignment were to move forward into project development. Further study that incorporates planned land uses and transit-oriented development opportunities would result in more refined station locations. West of Cole Road stations were located approximately two miles apart. East of Cole Road, in the more urban sections of the corridor, stations were spaced much closer together.

Figure 5-2 *Franklin Alignment Concepts: BRT (Mixed and Exclusive) and Light Rail*



5.3. Boise Cutoff Alignment

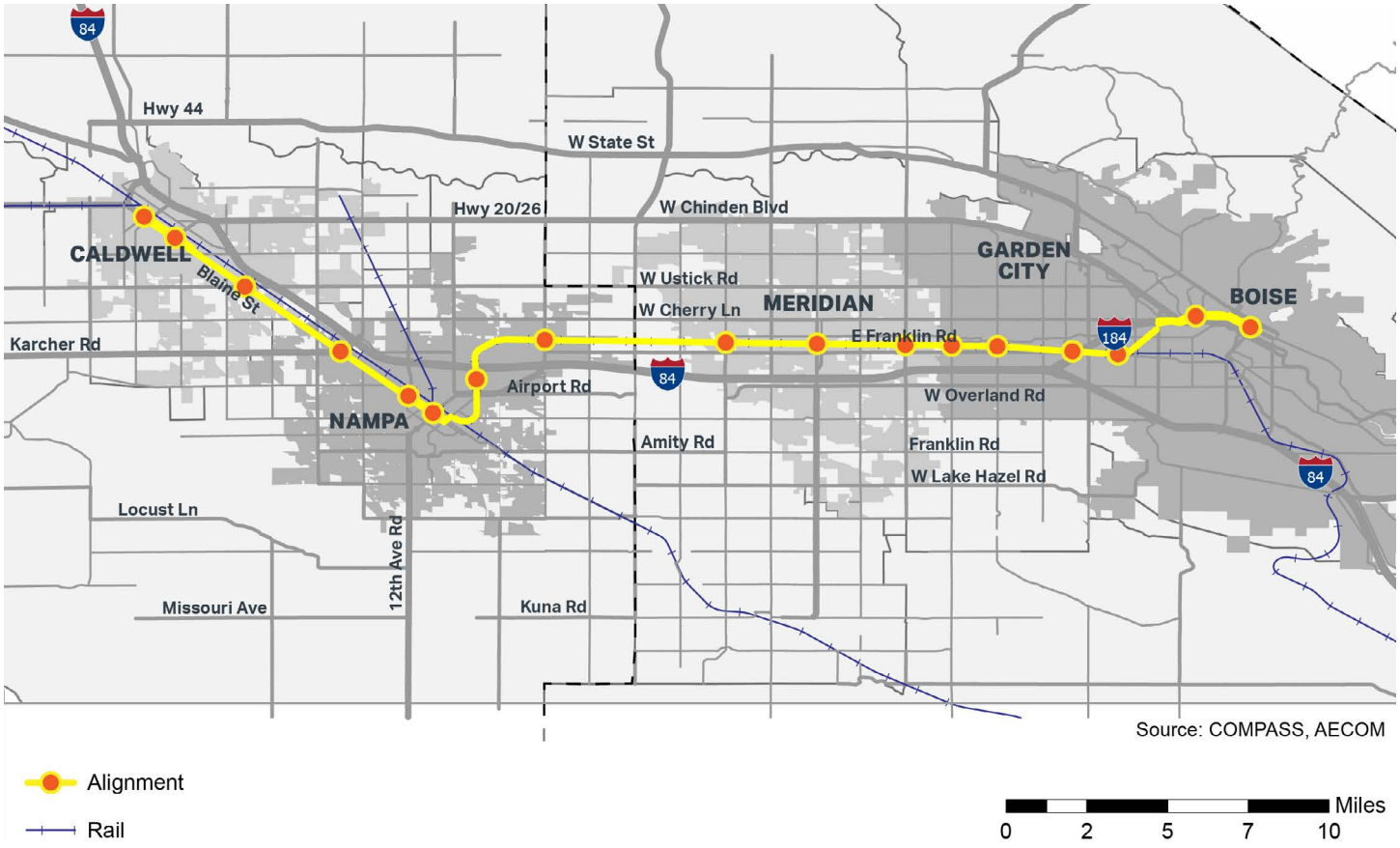
Three HCT concepts were analyzed on the Boise Cutoff: BRT – Exclusive, Light Rail, and Commuter Rail. The BRT – Exclusive and Light Rail concepts include more frequent station spacing and a direct connection to Main Street Station in downtown Boise. The Commuter Rail concept includes fewer stations (more typical of a commuter rail operation) and would require a shuttle bus connection between the eastern terminus at the Boise Depot and Main Street Station.

Figure 5-3 shows the concepts that were analyzed for Light Rail and BRT – Exclusive on the Boise Cutoff. These would both run in exclusive running ways adjacent to the existing tracks. Rather than connecting to the Boise Depot, Light Rail and BRT - Exclusive would directly serve Main Street Station in downtown Boise. These two concepts would originate at Main Street Station and run west along the Fairview and Main couplet as far as Orchard Street. They would turn south on Orchard Street to Irving Street, where they would enter the railroad right-of-way of the Boise Branch and run adjacent to the existing tracks. The Boise Branch meets the Boise Cutoff near Curtis Road, where the alignment would then follow the Boise Cutoff, running adjacent to the existing tracks to the western end of the Boise Cutoff in Nampa.

From the western end of the Boise Cutoff, Light Rail or BRT – Exclusive would cross the tracks and enter street operation in downtown Nampa. Further study would be needed to determine the feasibility of crossing the UPRR main line tracks including the feasibility of incorporating a grade-separation structure. Light Rail or BRT – Exclusive would then travel northwest on Nampa-Caldwell Boulevard to downtown Caldwell. As with the other alignments, further study would be needed to determine how this alignment would be routed through downtown Nampa, and whether Nampa-Caldwell Boulevard would be a feasible alignment.

There would be more stations on this alignment than with the Boise Cutoff Commuter Rail alignment. However, there would be slightly fewer stations than with the arterial alignments. This concept would test whether there is an advantage to running on the Boise Cutoff, which could provide for higher speeds than would be available on an arterial alignment.

Figure 5-3 *Boise Cutoff Alignment Concepts: BRT – Exclusive and Light Rail*

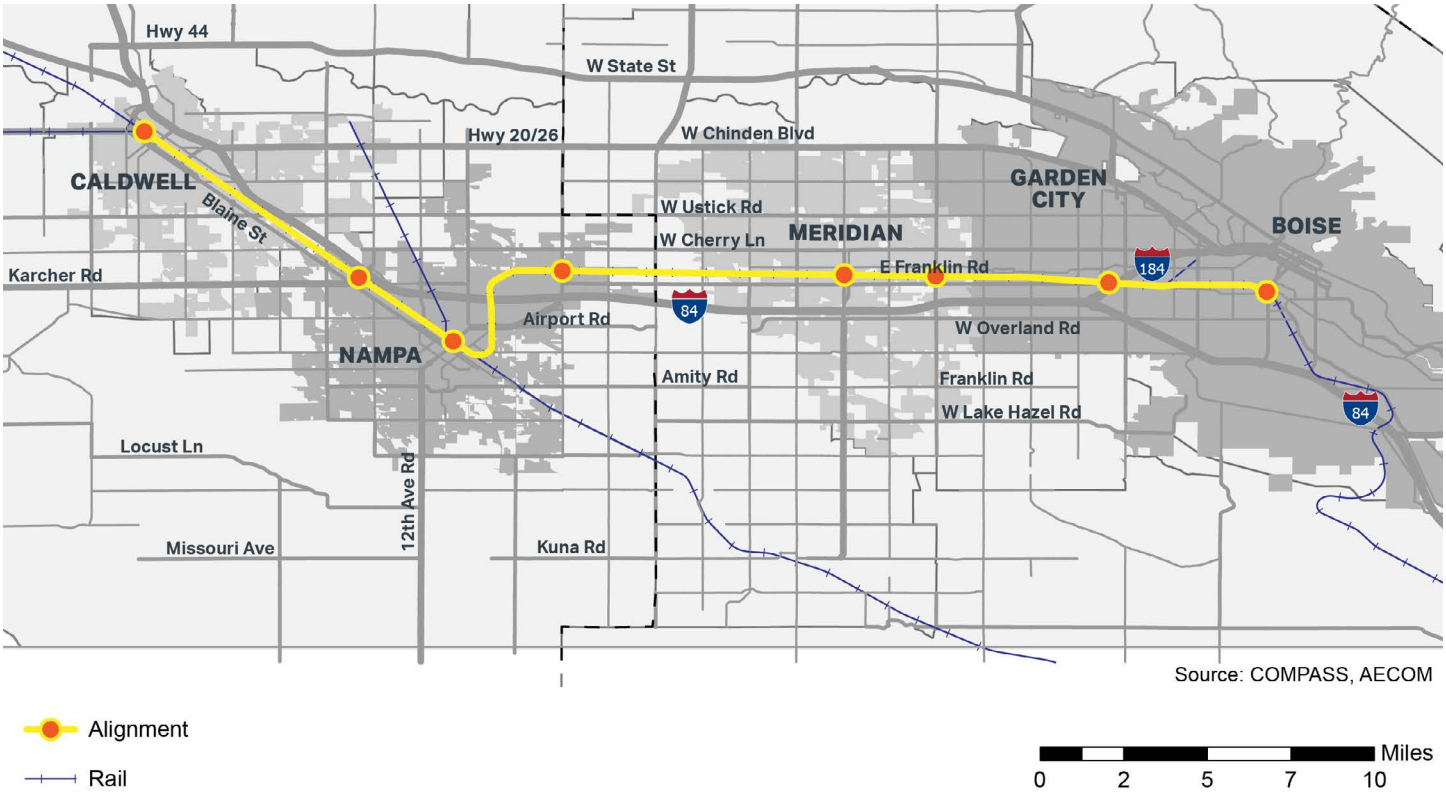


5.4. Boise Cutoff Alignment – Commuter Rail

Figure 5-4 shows the concept that was analyzed for Commuter Rail on the Boise Cutoff. The Commuter Rail would operate from the Boise Depot, with a bus carrying passengers between downtown Boise and the Boise Depot. The Commuter Rail concept includes passenger rail utilizing the existing Boise Cutoff railroad tracks to Nampa. From the western end of the Boise Cutoff in Nampa, the Commuter Rail concept would utilize new right-of-way adjacent to the UPRR main line right-of-way between downtown Nampa and downtown Caldwell. This segment would require further study to determine the feasibility of adding new right-of-way adjacent to the UPRR right-of-way. Additional study would also be needed to determine how the downtown Boise bus would operate and connect with the Commuter Rail line at the Boise Depot. It may be feasible, for example, to create a new transfer point slightly east of the Boise Depot, where more space could be available for bus staging. At this early phase in the study, the Boise Depot was assumed as the transfer point for analysis.

Station spacing for the Commuter Rail line was assumed to be much wider than for the arterial alignments. Stations for the Commuter Rail line were assumed to be 2 to 6 miles apart, enabling a relatively high-speed service.

Figure 5-4 *Boise Cutoff Alignment Concept: Commuter Rail*

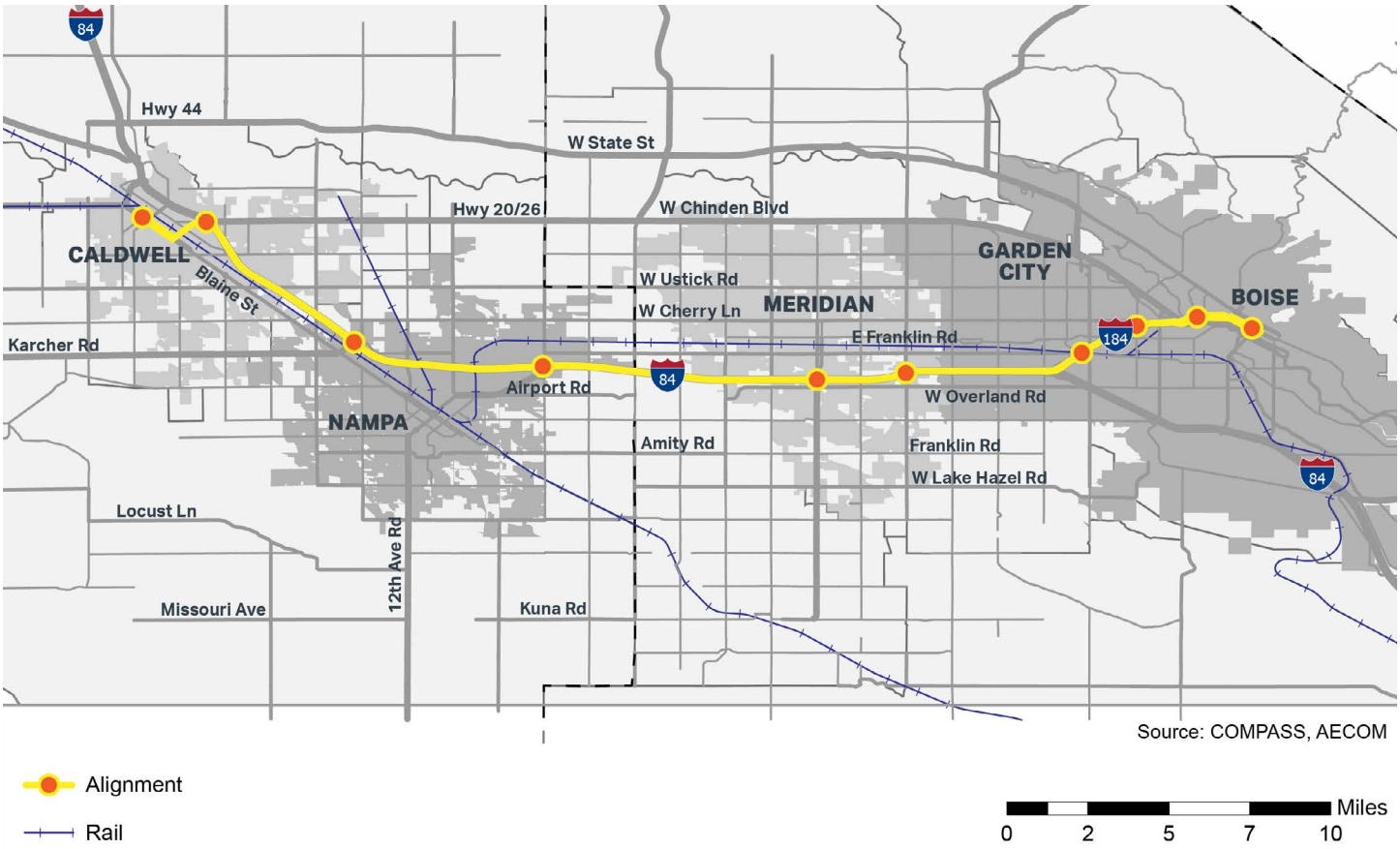


5.5. I-84/I-184 Alignment

Figure 5-5 shows the I-84/I-184 BRT alignment concept that was analyzed. Both BRT – Mixed Traffic and BRT – Exclusive concepts were developed along I-84/I-184. This alignment, like the Boise Cutoff Commuter Rail, would have fewer stops than the arterial alignments, which would allow for an express-style service operation. The alignment would begin at Main Street Station in downtown Boise and travel west along the Fairview and Main couplet, accessing I-184 at the Fairview interchange. It would follow I-184 and I-84 as far west as the Highway 20/26 interchange in Caldwell, where it would exit and use 21st Avenue and the Cleveland Boulevard/Blaine Street couplet to travel into downtown Caldwell. Further study would be needed to determine the exact routing details.

Stations would generally be located on interchange ramps in order to limit out-of-direction travel by buses on local streets to access park-and-ride lots. Park-and-ride lots would be located within walking distance to ramp stations with direct pedestrian overcrossings where needed to provide convenient access between park-and-ride lots and the stations.

Figure 5-5 *I-84 Alignment Concepts: BRT – Mixed Traffic and BRT – Exclusive*



These alignment and mode concepts were evaluated against the project Goals and Objectives. The following sections discuss the evaluation criteria and the results.

6 Evaluation of Alternatives

6.0 Evaluation of Alternatives

The initial project team and the RTAC subgroup developed goals and objectives to use in measuring the performance of each of the alternatives. As part of the TVHCTS Update, the project team met with the Public Transportation Workgroup (PTWG) on April 1, 2020 to re-evaluate and confirm the project goals, objectives and measures. The PTWG confirmed the following lists of the goals and objectives.

Goal 1: Improve Transit Connectivity

- **Objective 1.1:** Connect major city central business districts.
- **Objective 1.2:** Connect residential areas with major employment centers.
- **Objective 1.3:** Connect residential areas with major activity centers.

Goal 2: Improve Transit Mobility

- **Objective 2.1:** Provide dedicated transit right-of-way where possible.
- **Objective 2.2:** Provide good transit transfer opportunities with planned future bus system.
- **Objective 2.3:** Minimize transit travel time between major origins/destinations.

Goal 3: Manage Travel Demand

- **Objective 3.1:** Improve transit mode share.
- **Objective 3.2:** Provide service with good access for walk and bike.
- **Objective 3.3:** Provide potential park-and-ride sites with good auto access.
- **Objective 3.4:** Minimize impacts to traffic operations.

Goal 4: Support Transportation and Land Use Plans

- **Objective 4.1:** Provide transit improvements that are consistent with adopted local, state, and regional plans.
- **Objective 4.2:** Provide opportunities for transit-oriented development.

Goal 5: Financial Feasibility

- **Objective 5.1:** Develop high-capacity transit concepts that have the potential to be funded using a mix of federal, state, and local funds.
- **Objective 5.2:** Develop cost-effective high-capacity transit concepts.

For each objective, one or more measures were developed to assess how well each of the alternatives met each objective. The project team gathered information on the performance of each alternative relative to each measure in a technical matrix and assigned each alternative a ranking for each measure.

6.1. Technical Analysis

This section discusses the measures used to evaluate each objective and the methodology used to assign rankings to each of the alternatives.

Objective 1.1: Connect major city central business districts (CBDs)

Objectives 1.1, 1.2, and 1.3 relate to the Major Activity Centers identified by COMPASS as part of the Communities in Motion process. Further discussion of Major Activity Centers is provided in Major CBDs, Employment, and Activity Centers. Categories of major activity centers include the following:

- Main Activity Centers: Central business districts, Boise State University, College of Western Idaho, Ford Idaho Center, Boise Airport, and regional medical centers.
- Employment Activity Centers: Employment areas with a density of 5 employees per acre or more.
- Commercial Activity Centers: 500,000 square feet of commercial area within a ¼ mile radius, such as Boise Towne Square and The Village at Meridian.

Measure: Number of major city CBDs with direct HCT connection

The measure for Objective 1.1 was simply the number of CBDs that would be served by the HCT alignment. There are four total CBDs within the study area to be served: Boise, Meridian, Nampa, and Caldwell.

Key findings:

- The Fairview Avenue/Cherry Lane and Franklin Road alignments would connect directly to all four CBDs.
- The Boise Cutoff Light Rail and BRT - Exclusive alignment would connect directly to all four CBDs.
- The Boise Cutoff Commuter Rail alignment would connect directly to three of the four CBDs but would require a transfer to a bus to connect to downtown Boise.
- The I-84/I-184 alignment would not directly connect to downtown Nampa or downtown Meridian.

Objective 1.2: Connect residential areas with major employment centers

Measure: Number of major employment centers served with HCT

The measure for Objective 1.2 was the number of Employment Activity Centers defined in Communities in Motion that would be served by the HCT alignment.

Key findings:

- The Boise Cutoff, Fairview Avenue/Cherry Lane, and Franklin Road alignments would serve five designated employment centers.

Objective 1.3: Connect residential areas with major activity centers

Measure: Number of major activity centers served with alignment

The measure for Objective 1.3 was the number of Commercial Activity Centers and the number of Main Activity Centers other than CBDs that would be served by the HCT alignment.

Key findings:

- The Boise Cutoff, Franklin Road, and I-84/I-184 alignments would serve a relatively high number of designated main activity centers and commercial activity centers, including those located in Caldwell, Nampa, Meridian and Downtown Boise.
- The Fairview Avenue/Cherry Lane alignment would serve relatively few designated main activity centers and commercial activity centers.

Objective 2.1: Provide dedicated transit right-of-way where possible

Measure: Proportion of the alignment that would require additional right-of-way for HCT

Transit travel times and reliability can be significantly improved if a dedicated lane or running way is provided for a transit route. Existing and planned right-of-way widths along each alignment were examined to determine the relative ability of each alignment to accommodate the additional width required to provide a

dedicated running way for Light Rail or BRT - Exclusive. The result was an approximate proportion of each alignment that would require additional right-of-way in order to add an exclusive transit running way.

The right-of-way assessment was based on the existing right-of-way width and the existing roadway cross-sections, except for roadways that have planned widening projects included either in COMPASS's Financially Constrained Project List or the ACHD Master Street Map, 2018.

For Ada County roadways with planned widening projects, the right-of-way widths and cross-sections were assumed based on the ACHD Master Street Map. Canyon County does not have a similar cross-section typology, and as such, the same (ACHD) cross-sections were assumed on roadways in Canyon County where widening is planned.

Key findings:

- No additional right-of-way would be required for BRT - Mixed Traffic except some short sections where queue bypass lanes may be added.
- No additional right-of-way would be required for Commuter Rail on the Boise Cutoff because it would operate on existing tracks. Further study would be required to determine whether additional right-of-way would be required to run adjacent to the UPRR main line from Nampa to Caldwell.
- A relatively high proportion of the length of the Fairview Avenue/Cherry Lane alignment would require additional right-of-way to add exclusive HCT lanes for Light Rail or BRT - Exclusive.
- A relatively low proportion of the length of the Franklin Road alignment would require additional right-of-way to add exclusive HCT lanes for Light Rail or BRT - Exclusive.
- A relatively low proportion of the length of the Boise Cutoff alignment would require additional right-of-way to add exclusive HCT lanes for Light Rail or BRT - Exclusive, due to a wide existing right-of-way.
- The I-84/I-184 alignment would require additional right-of-way for nearly the entire length of the alignment if a lane were to be added for exclusive BRT.
- While certain alignments may require small amounts of additional right-of-way for operations, all alignments will need additional right-of-way for ancillary functions such as park and ride lots, maintenance and vehicle storage. The type and size of this additional right-of-way will vary according to the alignment and mode that is selected.

Objective 2.2: Provide good transit transfer opportunities with planned future bus system

Two related measures were used to evaluate Objective 2.2:

Measure: Number of locations where the HCT alignment would connect with one bus route

Measure: Number of locations where the HCT alignment would connect with two or more bus routes

This measure evaluated the number of locations where transfers could be made between the HCT line and local buses. This was measured using a 2040 future year bus network that was developed jointly by Valley Regional Transit and COMPASS and included in the regional travel demand model. The number of bus routes that would directly connect at each HCT stop were counted and used as a general indication of transit connectivity for each HCT alignment. If an HCT line is developed in the future, other local transit routes could be restructured to connect with the HCT line. This measure simply provides a general indication of the ability of each HCT alternative to connect with other bus routes.

Key findings:

- The arterial alignments would have a relatively high number of locations where transfers to local bus routes are possible, while the Boise Cutoff and I-84/I-184 alignments would have relatively few locations where transfers to local bus routes are possible. This is due to the number of stations on each of these alignment concepts.

Objective 2.3: Minimize transit travel time between major origins/destinations

Measure: 2035 transit travel times along HCT alignments (Caldwell to Boise Multimodal Center)

Transit travel times across the entire length of each alignment were used to evaluate the performance of each alternative against this objective. Data from COMPASS' regional travel demand model with a forecast year of 2035 were used to estimate transit travel times. The route, service frequency, number of stations, and travel speeds were defined for each mode and alignment alternative. Travel speeds for exclusive running modes (BRT - Exclusive, LRT, and Commuter Rail) were based on posted speeds, acceleration/deceleration of the HCT mode, number of stations, and dwell time at stations. Travel speeds for mixed traffic BRT modes were based on these same factors but reduced by a factor equal to the ratio of congested speeds to posted speeds in 2035. The model results include total travel times for each mode and alignment alternative based on these factors.

Measure: Transit Travel Time Reliability.

Research has shown that good transit travel times are important to attracting choice riders to use HCT service. In addition to good travel times, travel time reliability is equally important. The transit travel time reliability measure gives a higher score to alternatives that would operate in an exclusive right-of-way and, therefore, would be able to maintain a reliable schedule, and a lower score to alternatives that would operate in mixed traffic and be subject to traffic congestion.

Table 6-1 shows the relative in-vehicle transit travel times for each of the modeled alternatives.

Table 6-1 *2035 HCT In-Vehicle Transit Travel Times by Alternative (minutes) Caldwell to Downtown Boise Multimodal Center*

Alignment	Mode	Travel Time (Mins)
Boise Cutoff	Commuter Rail (includes shuttle service)	48
	Light Rail	56
	BRT – Exclusive	61
Fairview/Cherry	Light Rail	72
	BRT – Exclusive	79
	BRT – Mixed	87
Franklin	Light Rail	71
	BRT – Exclusive	77
	BRT – Mixed	87
I-84	BRT – Exclusive	54
	BRT – Mixed	67

Note: Travel time is shorter on Boise Cutoff alignments, on the actual Boise Cutoff portion, due to infrequent stops and dedicated, protected ROW. Travel time is shorter on I-84 alignments due to infrequent stops. This is consistent with data from existing express bus services currently in operation on HOV lanes and transitways with dedicated ROW.

Key findings:

- Several alignments under consideration offer competitive travel times compared to estimated auto travel times with 2035 demographics. Communities in Motion 2035 estimates auto travel time between Caldwell to downtown Boise to be within the range of 47 minutes for a fully-funded scenario to 72 minutes with the current program funding level.
- The Boise Cutoff alternatives would have among the fastest in-vehicle transit travel times ranging 48 to 61 minutes from Caldwell to the Boise multimodal center. Commuter Rail has fewer stations than the other Boise Cutoff HCT alternatives and it provides a relatively fast travel time between Caldwell and the Boise Depot (39 minutes).

However, in order to provide a connection to the multimodal center, the Commuter Rail alternative requires a transfer to a bus at the Boise Depot. The added transfer time and travel time on the bus results in a total travel time similar to the Boise Cutoff Light Rail and BRT - Exclusive alternatives.

- Travel times for the Light Rail and BRT - Exclusive alternatives on all three arterial alignments are similar, ranging from 54 to 79 minutes.
- Travel times for BRT - Mixed Traffic alternatives on the arterial alignments are also similar, ranging from 67 to 87 minutes.
- BRT on I-84/I-184 with fewer stops and higher speeds would have a shorter travel time than the arterial alignments. BRT - Exclusive on I-84/I-184 had the shortest travel time of all the alternatives at 54 minutes. Travel time for BRT - Mixed Traffic on I-84/I-184 was 67 minutes.
- Commuter Rail, Light Rail, and BRT - Exclusive alternatives would have high schedule reliability. BRT - Mixed Traffic alternatives would have lower schedule reliability.

Objective 3.1: Improve transit mode share

Measure: Daily boarding rides on HCT mode

Objective 3.1 was measured using the COMPASS travel demand model in 2009. Each alternative was modeled for the year 2035. (The 2020 Update did not develop new ridership projections; ridership will be updated with the next minor update in 2021. Data from the 2009 study is referenced as a temporary placeholder.) This measure indicates the number of boardings that are forecast with each HCT alternative on an average weekday, based on its transit travel time, connections to regional destinations, and station locations. Table 3-1 on page 15 should be referenced for total capacity of each mode option, as an alternative to ridership forecasts.

Key findings:

- The Boise Cutoff alternatives and the I-84/I-184 BRT - Exclusive would have the fastest travel times and would result in the highest ridership potential.
- Fairview/Cherry has higher ridership potential than Franklin.
- BRT - Mixed Traffic, due to slower travel times, has lower ridership potential than the alternatives with exclusive guideway operations.

Objective 3.2: Provide service with good access for walk and bike

Objective 3.2 was measured by evaluating the population and employment density that would be within walking distance of each alternative currently and in 2035, as well as a qualitative assessment of the quality of pedestrian and bicycle connections to the HCT route. The following three measures were used.

Measure: Existing and forecast year population and population density within 1/2 mile of alignment

This measure used demographic data from the Communities in Motion database to assess the total population and population density within ½ mile of the alignment for a 2008 base year and projected for 2035.

Measure: Existing and forecast year employment and employment density within 1/2 mile of alignment

This measure used demographic data from the Communities in Motion database to assess the total jobs and employment density within ½ mile of the alignment for a 2008 base year and projected for 2035. Due to the lack of data availability related to population and employment figures, this report used the same 2035 figures from the 2009 Treasure Valley High Capacity Transit Study.

Measure: Qualitative assessment of opportunities for and quality of walk and bike access

This measure was a qualitative evaluation of the presence and quality of pedestrian and bicycle facilities along each alignment. This included whether sidewalks and bicycle lanes exist or are planned and the level of interconnectedness of the street grid.

Table 6-2 shows the projected population and employment densities within one-half mile of each alignment in 2035. Note that there are two alignments on the Boise Cutoff. One is for the Commuter Rail to the Boise Depot. The other is for Light Rail and BRT - Exclusive running into downtown Boise. There are also two slightly different alignments for Franklin Road. BRT - Mixed Traffic is slightly different from Light Rail and BRT - Exclusive because it uses Orchard Street while Light Rail and BRT - Exclusive use the Boise Branch railroad line.

Table 6-2 *Projected 2035 Population and Employment Density - Developed in 2009**

Alignment	Mode	Population per Acre, 2035	Jobs per Acre, 2035
Boise Cutoff	Commuter Rail	5.1	6.7
	Light Rail	5.3	6.8
	BRT – Exclusive		
Fairview/Cherry	Light Rail	5.8	4.8
	BRT – Exclusive		
	BRT – Mixed		
Franklin	Light Rail	5.0	7.0
	BRT – Exclusive		
	BRT – Mixed	5.1	6.8
I-84	BRT – Exclusive	3.8	5.0
	BRT – Mixed		

Note: Data from the 2009 study is referenced as a temporary placeholder. The 2020 Update did not update this data; it will be updated with the next minor update in 2021.

Key findings:

- The highest population density in 2035 is projected to be along the Fairview Avenue/Cherry Lane alignment.
- Due in part to a large portion of the area being devoted to freeway right-of-way, the I-84/I-184 alignment would have the lowest population density and second lowest employment density in 2035.
- Due in part to concentrations of industrial uses along the railroad alignment, the highest employment density in 2035 is projected to be along the Boise Cutoff and Franklin Road alignments.
- The Fairview Avenue/Cherry Lane alignment has a relatively low employment density due to the concentration of residential uses.
- The arterial alignments tend to have significant sections with sidewalks and bicycle lanes and generally have better pedestrian connectivity than the Boise Cutoff or I-84/I-184.
- If Light Rail or BRT - Exclusive were to be constructed along an arterial, the roadway reconstruction would likely include upgrades to sidewalks and bicycle lanes where they do not currently exist.

Objective 3.3: Provide potential park-and-ride sites with good auto access

Measure: Ability to site major park-and-ride facilities

At this level of analysis, it is not yet practical to select potential park-and-ride sites. For purposes of this analysis, a qualitative assessment was conducted of the relative ability of each alignment to accommodate park-and-rides at locations that meet the following criteria.

- Land availability. A general rule of thumb assumes a surface parking lot can fit approximately 100 parking spaces in one acre.
- Direct connection to an HCT station with minimal walk distance to station.
- Proximity to regional highways. Park-and-rides should be sited relatively close to major regional arterials and highways in order to be convenient to access by travelers from a wide travel shed.
- Ease of access from regional highways and arterials. Park and-rides need to be sited at locations that are both convenient to regional highway interchanges and not overly congested.

Key findings:

- The Boise Cutoff, Franklin Road, and I-84/I-184 alignments are the most readily accessible from I-84.
- There are a relatively large number of vacant parcels currently available along the Boise Cutoff and Franklin Road alignments.
- The Boise Cutoff, Fairview Avenue/Cherry Lane, and Franklin Road alignments may have opportunities for shared park-and-ride lots with major existing facilities that have large, existing and underutilized parking lots. These shared-use opportunities could be considered at Boise Towne Square Mall, the Ford Idaho Center, and the College of Western Idaho.
- Siting park-and-rides with good walk access to HCT stations would be challenging along I-84 due to the need to cross to the other side of the freeway in interchange areas.

Objective 3.4: Minimize impacts to traffic operations

Measure: Potential impact of HCT concept on traffic operations and major signalized intersections

An initial planning-level assessment of the potential traffic impacts of each HCT alternative was prepared. The traffic evaluation used available information on existing traffic operations in the corridor (number of driveways, signalized intersections, congested areas, etc.) and noted any key issues that could be associated with any of the HCT alternatives.

Key findings:

- BRT - Mixed Traffic could degrade adjacent traffic operations compared with BRT-Exclusive due to buses weaving and merging to serve designated transit stations.
- Light Rail or BRT - Exclusive in a median along the Fairview Avenue/Cherry Lane, or Franklin Road alignment would restrict left-turn access to local streets and driveways.
- Franklin Road has fewer driveways and local street connections than Fairview Avenue/Cherry Lane.
- Restriction of left turns into and out of local streets and driveways along the arterial alignments would increase traffic volumes making left or U-turns at major signalized intersections.
- Alternatives on the Boise Cutoff alignment would have less direct traffic conflict than the arterial alignments but would have potential queuing and delay problems where railroad crossings are in close proximity to other busy intersections.
- Modifications to interchange ramps to give priority to BRT buses on the I-84/I-184 alignment could impact cross traffic and traffic entering or exiting the freeway.

Objective 4.1: Provide transit improvements that are consistent with adopted local, state, and regional plans

Measure: HCT improvements identified in local, state, and regional plans

Objective 4.1 was measured by reviewing local, state, and regional plans and noting whether they mention high-capacity transit for any specific alignments or modes.

Key findings:

- The Boise Cutoff alignment is specifically mentioned in multiple plans as a potential commuter rail or light rail corridor.
- Plans for future transit service improvements on the Fairview Avenue/Cherry Lane alignment are mentioned in Communities in Motion.
- The Franklin Road alignment is noted as a potential express bus route in Communities in Motion.
- Communities in Motion's recommendations for the I-84 corridor include studying corridor level operational improvements, such as high-occupancy vehicle lanes, ramp metering, expansion/enhancement of bus operations, and a fixed guideway transit system.
- HCT on any of the alignments would be supportive of broad comprehensive plan goals for improved transit service.

Objective 4.2: Provide opportunities for transit-oriented development

Measure: Mode and alignment support transit-oriented development

Objective 4.2 was measured qualitatively. Different modes and different types of alignments have the potential to support increased development intensity at different levels.

Investments in rail transit infrastructure tend to support an increased intensity of land use. With transit investments, the degree to which developers respond and build more intensively is often correlated to the level of investment in transit infrastructure. The more permanent the transit infrastructure is, the more likely it is to result in higher intensity development.

The ability of a transit line to influence development also depends on the accessibility of the transit line from adjacent land uses. Arterial alignments tend to have the highest accessibility from adjacent land, while railroad and freeway alignments would have lower accessibility from adjacent land due to the broad width of the right-of-way and limited crossings.

Key findings:

- Light Rail on the arterial alignments would be highly supportive of TOD opportunities.
- BRT - Exclusive on arterial alignment would be moderately supportive of TOD opportunities.
- BRT - Mixed Traffic on arterial alignments would offer lesser opportunities to support TOD.
- Any modes along the Boise Cutoff alignment would be moderately supportive of TOD opportunities. Investment in transit infrastructure would support TOD, but the limited access nature of the alignment would tend to limit these opportunities.
- The I-84/I-184 alignment would offer little support for TOD opportunities due to the limited local access opportunities within the freeway interchange areas.

Objective 5.1: Develop high-capacity transit concepts that have the potential to be funded using a mix of federal, state, and local funds

Measure: Order-of-magnitude capital cost

Objective 5.1 was measured by estimating order-of-magnitude capital costs for each alternative. The order-of-magnitude capital cost estimates provide a general range of costs that can be used to compare among the HCT alternatives being considered. At this early planning stage, the HCT concepts are not being developed in any significant detail and as such the order-of-magnitude costs should be used only for comparison among the alternatives and to provide a very general sense of the magnitude of the potential costs associated with each alignment and mode alternative being considered.

The order–of-magnitude capital cost ranges were estimated using a conceptual description of each HCT mode and alignment alternative and data on average cost per mile from a range of comparable HCT systems.

The average cost per mile was based on commuter rail, light rail, BRT - exclusive, and BRT - mixed traffic projects completed in the United States in the past 10 to 15 years. A representative sample of recent projects that were most similar to the characteristics of the Treasure Valley (primarily western U.S. cities) was used as the basis for a representative cost per mile for each mode and alignment type included in this study. Specific costs such as right-of-way acquisition are not individually estimated but are captured because the representative sample of recent projects include right-of-way acquisition.

Measure: Estimated annual operations and maintenance cost

Operations and maintenance costs were also used to measure Objective 5.1. Operations and maintenance costs for each alternative were estimated by applying industry average costs per vehicle hour by mode to each alternative. The assessment included vehicle capacity, route run time, and number of vehicles required per hour of service.

Two estimates of operations and maintenance costs were calculated. One is based on the 15-minute service frequencies for each mode that was modeled. Operations and maintenance costs at

the modeled frequencies were higher for Light Rail and Commuter Rail than they were for the BRT alternatives.

Light rail and commuter rail, however, have considerably higher passenger capacity than the bus-based BRT alternatives due to the ability to operate multi-car trains. The second method for estimating operations and maintenance costs provides a more realistic evaluation by estimating the number of buses (and light rail and commuter rail trains) that would be required to accommodate 1,000 passengers per hour.

In future phases of the AA, the frequency of service will be equilibrated in the model to determine the best service frequency for each mode. Operations and maintenance costs will then be calculated based on the ideal frequency for each alternative and if needed, adjusted based on modeled ridership estimates.

Table 6-3 *Order-of-Magnitude HCT Capital Cost by Alternative (in millions)*

Alignment	Mode	Capital Cost (MM, 2020)
Boise Cutoff	Commuter Rail (includes shuttle service)	$ 300
	Light Rail	$ 2,170
	BRT – Exclusive	$ 1,450
Fairview/Cherry	Light Rail	$ 2,160
	BRT – Exclusive	$ 1,300
	BRT – Mixed	$ 260
Franklin	Light Rail	$ 2,130
	BRT – Exclusive	$ 1,280
	BRT – Mixed	$ 260
I-84	BRT – Exclusive	$ 1,115
	BRT – Mixed	$ 220

Note: Per-mile capital cost is higher for Light Rail and BRT-Exclusive on the Boise Cutoff alignment due to additional cost of corridor protective barriers between the transitway and existing freight rail.

Key findings:

- Light Rail would be the most expensive mode to implement.
- BRT - Mixed Traffic, which includes only minor capital improvements would be significantly less expensive to implement than any of the other modes.
- Commuter Rail on the Boise Cutoff alignment could be implemented for less capital cost than the other exclusive guideway alternatives given much of the infrastructure currently exists.

Table 6-4 shows the relative operations and maintenance costs for each alternative based on operating frequencies that would provide the 1,000-passenger capacity per hour for each mode.

Table 6-4 *HCT Annual Operations and Maintenance Cost by Alternative (based on constant capacity of 1,000 spaces per hour for all modes) (in millions)*

Alignment	Mode	O&M Cost (MM, 2020)
Boise Cutoff	Commuter Rail (includes shuttle service)	$ 13.8
	Light Rail	$ 11.9
	BRT – Exclusive	$ 13.1
Fairview/Cherry	Light Rail	$ 14.3
	BRT – Exclusive	$ 15.5
	BRT – Mixed	$ 16.7
Franklin	Light Rail	$ 13.1
	BRT – Exclusive	$ 14.3
	BRT – Mixed	$ 16.7
I-84	BRT – Exclusive	$ 9.6
	BRT – Mixed	$ 13.1

Key findings:

- Commuter Rail typically requires a train operator and conductor and as a result would have higher annual operations and maintenance costs than the other modes.
- I-84/I-184 BRT - Exclusive could have lower annual operations and maintenance costs than other bus modes due to its short travel times, resulting in fewer vehicles needed per hour.
- All other alternatives have relatively comparable annual operations and maintenance costs.

Objective 5.2: Develop cost-effective high-capacity transit concepts

Objective 5.2 assesses the cost-effectiveness of each alternative by dividing the estimated annualized order-of-magnitude capital cost and the estimated annual operations and maintenance costs by the annual number of riders estimated by the model. In addition, a qualitative measure relating to the expandability of each alternative was included. This captures the advantage that rail modes have in being able to add additional capacity by coupling cars together without having to operate additional vehicles with additional drivers. The following three measures were used.

Measure: Annualized capital cost per HCT rider

This measure was evaluated by applying industry standard annualization factors to the order-of-magnitude capital cost and the estimated daily HCT ridership from the model and dividing the annualized capital cost by the annual riders.

Measure: Operating cost per HCT rider

This measure was evaluated by dividing the annual operating cost by the annual riders.

Measure: Readily Expandable

This measure captures the advantage of rail modes of being expandable by coupling cars together, without requiring an additional driver. In addition, BRT in an exclusive lane is somewhat more readily expandable than BRT in mixed traffic because the shorter travel times attainable with an exclusive lane reduce the number of

vehicles required to provide the same frequency and, therefore, increase the flexibility to add vehicles.

At this early stage of analysis, working with planning-level estimates of ridership and costs, the actual dollar amounts are not as important as the relationship among the alternatives.

Table 6-5 shows the relative differences among the alternatives in annualized capital cost per HCT rider.

Table 6-5 *Annualized Order-of-Magnitude HCT Capital Cost Per Annual HCT Rider by Alternative*

Alignment	Mode	Capital Cost Per Annual Rider
Boise Cutoff	Commuter Rail (includes shuttle service)	$ 1.74
	Light Rail	$ 10.70
	BRT – Exclusive	$ 7.13
Fairview/Cherry	Light Rail	$ 14.60
	BRT – Exclusive	$ 8.76
	BRT – Mixed	$ 1.96
Franklin	Light Rail	$ 17.04
	BRT – Exclusive	$ 10.22
	BRT – Mixed	$ 2.38
I-84	BRT – Exclusive	$ 6.80
	BRT – Mixed	$ 1.78

Note: We assumed 30-year amortization for annualized order-of-magnitude HCT capital cost

Key findings:

- Due to its high capital cost, Light Rail on the arterial alignments would have the highest annualized capital cost per rider. Light Rail on the Boise Cutoff alignment has a slightly lower capital cost per rider due to having higher annual ridership than the other light rail options.
- BRT - Mixed Traffic would have much lower capital cost than the exclusive guideway alternatives resulting in the lowest annualized capital cost per rider.
- BRT - Exclusive would have similar annualized capital cost per rider on any alignment.
- Commuter Rail on the Boise Cutoff would have similar annualized capital cost per rider to BRT – Mixed on the arterial alignments.

Table 6-6 shows the annual operations and maintenance costs per HCT rider for each alternative. As before, this is based on operating frequencies that would provide the same passenger capacity per hour for each mode.

Table 6-6 *HCT Annual Operations and Maintenance Cost Per Annual HCT Rider by Alternative (based on constant capacity of 1,000 spaces per hour for all modes)*

Alignment	Mode	O&M Cost Per Annual Rider
Boise Cutoff	Commuter Rail (includes shuttle service)	$ 2.41
	Light Rail	$ 1.77
	BRT – Exclusive	$ 1.94
Fairview/Cherry	Light Rail	$ 2.90
	BRT – Exclusive	$ 3.14
	BRT – Mixed	$ 3.78
Franklin	Light Rail	$ 3.16
	BRT – Exclusive	$ 3.44
	BRT – Mixed	$ 4.59
I-84	BRT – Exclusive	$ 1.75
	BRT – Mixed	$ 3.16

Key findings:

- Light Rail would generally be less expensive to operate per rider due to the ability to carry significantly more riders per driver than the bus modes.
- BRT - Exclusive would have a lower operations and maintenance cost per rider than BRT - Mixed Traffic due to higher ridership and faster travel times, which result in fewer vehicles needed per service hour.
- Light Rail and BRT - Exclusive on the Boise Cutoff would be less costly per rider than those same modes on other alignments due to high ridership.
- Commuter Rail on the Boise Cutoff would be the most expensive per rider to operate due to the requirement for two person crews on the Commuter Rail trains and the need to operate buses from Boise Depot to the multimodal center.

Finally, expandability was evaluated qualitatively.

Key findings:

- Light Rail on any of the alignments would be readily expandable by coupling cars together.
- BRT - Exclusive is somewhat readily expandable due to relatively short travel times allowing for greater flexibility in adding vehicles.
- BRT - Mixed Traffic is readily expandable by adding additional frequency.
- Commuter Rail would be readily expandable by coupling cars together, however this expandability would tend to be lessened by the need for additional staff.

6.2. Evaluation Summary

Each of the above objectives was ranked from 1 (Least Compatible) – 5 (Most Compatible) based on the relative performance of each alternative.

Table 6-7 *Summary Measures for Each Alternative by Goals and Objectives*

			Boise Cutoff			Fairview / Cherry			Franklin			I-84	
		Comments	CR	LRT	BRT-EX	LRT	BRT-EX	BRT-MIX	LRT	BRT-EX	BRT-MIX	BRT-EX	BRT-MIX
1.1	Central Business District Connection	CR requires a transfer, BRT-MIX is in mixed traffic	5	5	5	5	5	4	5	5	4	5	4
1.2	Residential - Employment Connection	A function of frequency of stops and general alignment access	4	3	3	3	3	4	3	3	4	1	1
1.3	Residential - Activity Center Connection	A function of frequency of stops and alignment type/location	4	3	3	4	4	4	4	4	4	4	4
2.1	Dedicated Transit ROW	Degree of separation from traffic and traffic levels	5	5	4	5	4	3	5	4	3	4	1
2.2	Transfer Opportunities with Future Bus System	Function of stop locations, ease of transfer and local service interface	3	4	4	4	4	4	4	4	4	4	4
2.3	Minimize Transit Travel Time	Frequency of stops, interface with traffic and degree of separation	5	4	4	3	3	3	3	3	3	4	3
3.1	Improve Transit Mode Share	Based on 2009 ridership estimates	4	5	5	3	3	3	3	3	4	4	3
3.2	Good Walk and Bike Access	Availability and ease of station access and station frequency	4	3	3	3	3	4	3	3	4	1	4
3.3	P&R with Good Auto Access	Anticipated ease/difficulty in providing auto access	4	3	3	3	3	4	3	3	4	4	3
3.4	Minimize Impacts to Traffic Operations	Separated alignment best, mixed traffic has the most interface with traffic	4	3	3	3	3	4	3	3	4	4	3
4.1	Transit Improvements Consistent with Plans	I-84 not planned for HCT, other corridors identified for some level of increased transit	3	4	4	3	3	3	3	3	3	4	1
4.2	Opportunities for TOD	Frequent rail transit rated highest, freeway an access issue	4	5	3	5	4	4	5	4	4	4	1
5.1	Funding Potentials	Assume FTA funds, high cost modest ridership an issue	4	1	4	1	4	5	1	4	5	3	4
5.2	Cost Effectiveness		5	4	4	1	4	5	1	4	4	4	5

5 Most Compatible
4
3
2
1 Least Compatible

7 Next Steps / Recommendations

7.1. Short Term

The following are some shorter-term actions (Next Steps) that can be considered for advancing the work in addressing HCT in the Treasure Valley:

- The current study will require updated ridership projection which will also impact the efficiency calculations presented in this study. Our recommendation is that the ridership be updated prior to sharing the information contained in this report with FTA.
- It is also recommended that the FTA be consulted regarding the next steps of advancing a corridor alternative.
- Develop of a set of thresholds / triggers that would allow the region to begin to proactively address transit needs in the corridor. Thresholds/ triggers could include travel times and congestion levels within the corridors.
- Explore with ITD on whether consideration for an I-84 BRT – Mixed solution could be a Bus on Shoulder System (BOSS) solution similar to what is being considered by other Pacific Northwest regions.
- Consider the potential for a phased implementation of HCT improvements.
- Develop a strategy and potential funding sources for moving the project into the next level of development which would include a level of conceptual design and environmental clearances.

7.2. Intermediate Term

A regional decision should be made on whether there is the desire and potential resources to move forward in pursuing the implementation of an initial HCT project to serve the rapidly growing Treasure Valley region. The previous (2009) study and current update provide the basis for a decision to narrow the range of options under consideration; much as the earlier study resulted in the elimination of the Chinden Blvd, Ustick Road, Overland Road and Victory/ Powerline Road alignments. While a decision is understood to involve multiple jurisdictions and public input our team would recommend further reducing the number of alternatives to be moved forward into the next phase of advancing a project towards implementation. Based on the data produced to date it would not appear the Light Rail alternatives would warrant further consideration from either the perspective of the level of investment required and the marginal advantages over other alternatives under consideration. It is also not likely the LRT alternatives would compete well for Federal Transit Administration funding. Also, to be considered would be the elimination of the BRT – Exclusive alternatives on the Fairview and Franklin alignments. These options would be highly disruptive and expensive to implement for marginal benefits. If the above recommendations were advanced the range of remaining alignment and mode alternatives would be as follows:

Boise Cutoff

- Commuter Rail
- BRT – Exclusive

Fairview

- BRT – Mixed

Franklin

- BRT – Mixed

I-84 / I-184

- BRT – Exclusive
- BRT – Mixed

The result would allow for a more focused and efficient process of moving towards implementation of a HCT application in the Treasure Valley. As a footnote, there would need to be a concerted effort in the next phase of advancing an evaluation of alternatives to find solutions which would result in further speeding up the BRT – Mixed travel times.

7.3. Long Term – Positioning for 2050

It is recommended that the COMPASS Regional Transportation Plan carry forward the designation of four corridor alignments in the Treasure Valley as candidates for the potential future implementation of High Capacity Transit. Those alignments are the Boise Cutoff, Franklin Road, Fairview Avenue and the I-84/I-184 corridor. Those corridor designations are recommended to be transit mode neutral. COMPASS should evaluate different project delivery models such as Public-Private Partnership (P3), Design-Build, Construction Management/General Contractor (CM/GC).