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**Project name:**  
North Valley Passenger Rail Strategic  
Plan

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**FINAL**

# Memo

**Subject:** Deliverable 3.1.3 (Initial Service and Operations Planning Analysis)

The Butte County Association of Governments (BCAG) is developing a strategic plan for new passenger rail service in the North Valley Region. The ultimate goal of this effort is to develop a blueprint for integrating Butte County's major population centers with the state's larger rail network within the mid-term planning horizon (i.e., service start date of around 2029). This technical memorandum summarizes the initial service and operations planning analysis conducted to develop key assumptions for the following topics:

- Route / station locations
- Service levels
- Conceptual timetable
- Layover facility locations
- Bus connections
- Rolling stock specifications

Each of these topics is discussed in detail in the following subsections.

The assumptions developed as part of the initial service and operations analysis and summarized in this technical memorandum were provided as key inputs into rail network modeling currently being conducted by Caltrans.

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## Route / Station Locations

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### Proposed and Alternate Routes

A map of the North Valley Rail route (including an alternate route) and proposed stations is shown in **Figure 1**. The "Proposed Route" extends north from the planned Natomas Station (part of the Valley Rail Sacramento Extension) and follows the Union Pacific (UP) Sacramento Subdivision to Marysville. At Binney Junction immediately north of Marysville, the route diverges from the UP Sacramento Subdivision and follows the UP Valley Subdivision to Chico.

In addition to the proposed route to Chico, an "Alternate Route" to Oroville is also under consideration. This route, also shown on **Figure 1**, continues along the UP Sacramento Subdivision north of Binney Junction to Oroville.

Figure 1. North Valley Rail Route



Source: AECOM.  
Base map by Esri, HERE, Garmin, FAO, NOAA, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, OpenStreetMap contributor, and the GIS User Community.

### Proposed Station Locations

Proposed stations were initially identified based on the location of key population and employment centers and the potential to capture important ridership markets to support the new service. The following stations are proposed:

- Plumas Lake
- Marysville
- Gridley
- Chico
- Oroville (Alternate Route only)

Specific sites for proposed stations were identified through an initial screening analysis, generally focusing on locations that offer the highest potential to capture ridership:

- Sites located in or near communities within the rail corridor with relatively high existing or projected households / populations
- Sites that offer good transit and active transportation connections to key local and regional destinations
- Sites that provide enough space to offer opportunities for expanded station amenities (e.g., bus bays, pick-up / drop-off areas, parking, etc.)
- Sites that provide opportunities for neighborhood revitalization (e.g., historic downtowns) and for transit-oriented development (or redevelopment), either within the station site footprint or in the surrounding areas

Additional consideration was also given to station sites located in the primary direction of travel. In the case of North Valley Rail, for example, a substantial share of passengers, particularly among commuters, are expected to head south on the outbound leg of their journey and north on the return leg. Therefore, stations located on or near the southern edge of communities along the route can offer some advantages in capturing these riders.

Once a shortlist of one or more potential station sites was identified based on the criteria above, additional consideration was given to other important criteria, such as design standards and requirements, location of potential layover facilities, and general engineering feasibility.

Specific locations for proposed stations are summarized in **Table 1** and discussed in further detail below.

**Table 1. Proposed Station Locations**

Station	Location	Subdivision	Approximate milepost (MP)	Approximate distance from Natomas (mi)
Plumas Lake	North of Plumas Lake Blvd.	UP Sacramento	170.0	24
Marysville	Downtown (between 5th St. and 10th St.)	UP Sacramento	178.9	33
Oroville (Alternate Route only)	South of Oro Dam Blvd. E.	UP Sacramento	204.2	58
Gridley	Downtown (south of Laurel St.)	UP Valley	157.7	50
Chico (2 options)	Barber Yard (development site)	UP Valley	183.3	75
	Downtown (existing Amtrak station)	UP Valley	184.1	76

Source: AECOM

## Plumas Lake

Plumas Lake is the first large community along the route north of Natomas and the first large community after entering Yuba County from the south. It is a master-planned development covering over 5,200 acres in unincorporated Yuba County, roughly spanning the area west of State Route 70 (SR 70) between Olivehurst and Yuba County limits (i.e., the Bear River). Plumas Lake functions as a suburb of Yuba County's primary population center (Marysville) and as an exurb of Sacramento, which is located only 30 miles away and is well within commuting distance.

Build-out of the community is guided by the Plumas Lake Specific Plan, which was adopted in 1993 and calls for a total of approximately 11,750 dwelling units, primarily in medium- and low-density neighborhoods (4 units per acre or less). The Specific Plan also includes a commercial cluster with a community shopping center and other commercial uses at the Plumas Lake Boulevard interchange. The Specific Plan's land use plan is illustrated in **Figure 2**.

According to the U.S. Census Bureau, the Plumas Lake census-designated place (CDP) currently has a population of 8,126 people spread across 2,305 households, with a total of 2,477 housing units and an employment rate of 66.7 percent. As part of the latest update to the Housing Element of its General Plan, Yuba County has also identified future changes to the Plumas Lake Specific Plan that will allow for high-density multi-family residential uses throughout the Specific Plan Area, which may allow for additional development capacity beyond what was originally allowed under the original Specific Plan adopted in 1993.

A station in Plumas Lake would also serve two key destinations located within a few miles of the station along Plumas–Arboga Road: the Toyota Amphitheatre (an outdoor concert venue with capacity for up to 18,500) and the Hard Rock Hotel & Casino. The city of Wheatland, with a population of 3,712, is also located due east of Plumas Lake, approximately 10 miles away (distance by road).

A Plumas Lake station would also capture potential markets from neighboring areas to the north that, due to their location south of the Yuba River, would require “backtracking” to / from the Marysville station. Several of these communities have sizeable populations, including Linda (21,654) and Olivehurst (16,595). Commuters and other time-sensitive riders originating in these areas would generally prefer a station located *en route* to their ultimate destination to avoid time loss while backtracking north to Marysville. A station in Plumas Lake and near the SR 70 corridor would be ideally located to capture these riders. The existing park-and-ride facility at the very southern end of Plumas Lake at the Feather River Boulevard interchange, which is used by Yuba–Sutter Transit commuter buses, indicates there is already a strong commuter market in Plumas Lake.

As shown in **Figure 3**, the proposed station location is immediately adjacent to the Plumas Lake Boulevard interchange on vacant, undeveloped land immediately west of the UP right-of-way. A total of two different potential sites were evaluated for the station:

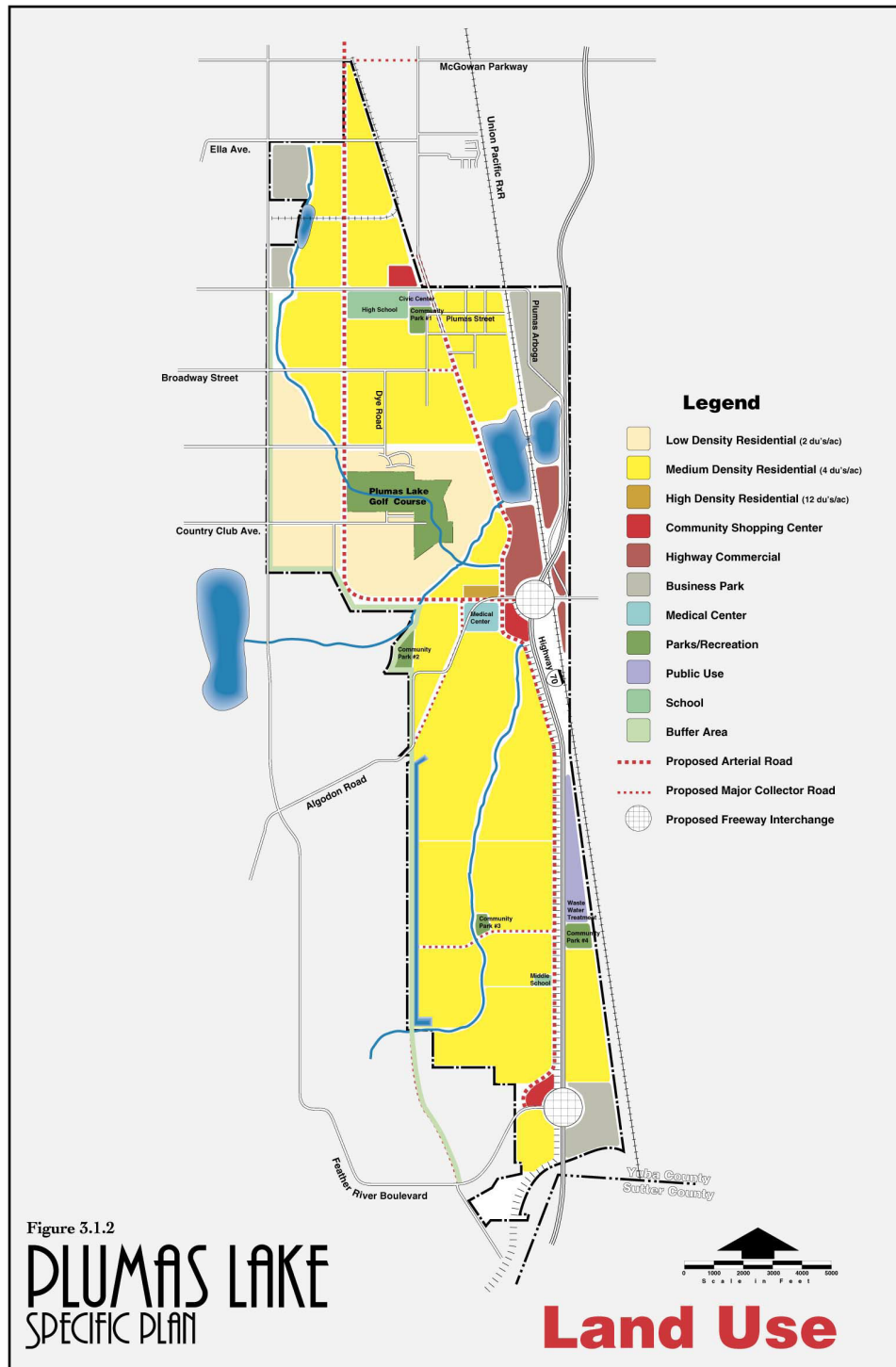
- **Plumas Lake Boulevard interchange.** This site would be located on vacant, undeveloped land on the northeast quadrant of the SR 70 / Plumas Lake Boulevard interchange. This site is on county-owned land, with ample space for expanded station amenities and opportunities for placemaking and transit-oriented development. The site is also centrally-located within Plumas Lake (at master plan full build-out), as shown in **Figure 2**, and the proximity to the freeway provides good access to / from neighboring communities. While residents living south of Plumas Lake Boulevard would need to back-track some distance, the associated travel time would be under 5 minutes for the vast majority of those residents and would max out at about 8 minutes for residents in the southernmost portion of Plumas Lake. This travel time loss is also balanced out by being closer to the communities to the north mentioned above.
- **Feather River Boulevard.** This site would be located at the east end of Feather River Boulevard, at the intersection with the UP right-of-way. This site is close to the existing park-and-ride facility and is located at the southern end of Plumas Lake, placing it in the direction of travel for the majority of passengers and avoiding potential backtracking. This portion of Plumas Lake is currently partially developed, with roads already constructed and individual residential lots currently under construction. A station at this location is space-constrained, between residential development and the railroad right-of-way. Additionally, there is



an existing electrical utility corridor and recently-completed recreational trail along the eastern edge of Plumas Lake at the site. As such, opportunities for expanded station amenities and placemaking may be more limited than at the Plumas Lake Boulevard interchange.

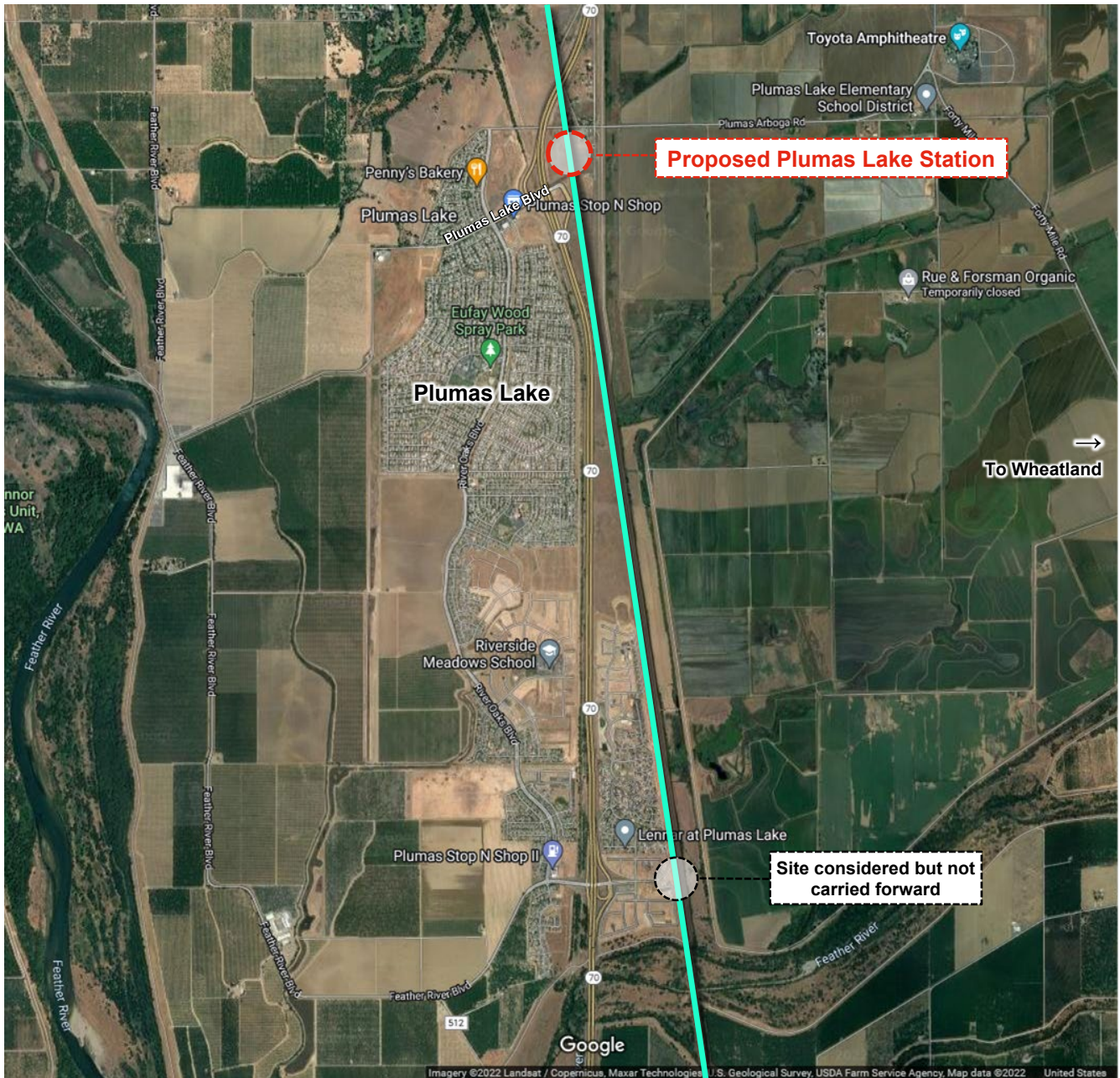
Based on these considerations, the site at the Plumas Lake Boulevard interchange was selected as the preferred location to be carried forward for further analysis.

**Figure 2. Plumas Lake Land Use Plan**



Source: Plumas Lake Specific Plan (October 1992).

**Figure 3. Plumas Lake Station Sites**



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Landsat / Copernicus, Maxar Technologies, USGS, USDA Farm Service Agency.

## Marysville

Marysville is the county seat of Yuba County and its primary population center. A station at this location would serve both Marysville and its larger counterpart to the west across the Feather River, Yuba City, which is the county seat and primary population center of Sutter County. According to the U.S. Census Bureau, the cities of Marysville and Yuba City currently have populations of 12,467 and 70,117, respectively. The U.S. Census Bureau considers the Yuba City Metropolitan Statistical Area (MSA), which consists of Yuba and Sutter counties, as part of the larger Sacramento Combined Statistical Area (CSA), and there is significant commuter activity between the Yuba City MSA and the Sacramento–Roseville–Folsom MSA (Sacramento, Yolo, Placer, and El Dorado counties).

Marysville previously had an Amtrak station on the *Coast Starlight* service along the former Southern Pacific Railroad's Shasta Route (San Francisco / Oakland – Portland). That station was located at 6th Street along what is now the UP Valley Subdivision, the eastern UP alignment through the city.

As shown in **Figure 4**, the proposed station location is between 5th Street and 10th Street. A total of three different potential sites were evaluated for the Marysville station:

- *South of 5th Street.* This site is near the city's historic Western Pacific Railroad depot and is located on a curve, with only approximately 1,300 feet of distance available from the start of this curve south to the single-track truss bridge over the Yuba River. As a result, this location may not have sufficient space to provide the necessary station turnouts and tangent track for a station. Although access is generally good (via J Street), the site is somewhat constrained, which may make it less ideal in terms of providing sufficient space for station facilities and opportunities for placemaking.
- *Between 5th Street and 10th Street.* This site is centrally located in Downtown Marysville along a stretch of tangent track adjacent to an existing underutilized shopping center and near the Yuba County Government Center. This site offers the possibility to provide a full-amenity station (e.g., bus station, parking, etc.) accompanied by significant transit-oriented development and opportunities for placemaking and neighborhood revitalization. The site also has very good access to / from Yuba City, with access via both 5th Street (Twin Cities Memorial Bridge) and 10th Street (Colusa Avenue).
- *Between 14th Street and Binney Junction.* This site is located on a section of tangent track on the northern outskirts of Downtown Marysville. Similar to the site south of 5th Street, this site has some physical constraints that generally make it less ideal for a station. Access may also require more in-depth consideration, as a significant portion of the eastern edge of the right-of-way consists of already-improved properties with existing buildings and facilities. Due to the proximity to Binney Junction (the intersection of the UP Sacramento Subdivision and UP Valley Subdivision), this location may not have sufficient space to accommodate the station platform and turnouts.

Based on these considerations, the site between 5th Street and 10th Street was selected as the preferred location to be carried forward for further analysis.



Figure 4. Marysville Station Sites



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Maxar Technologies, USGS, USDA Farm Service Agency.



## Gridley

The proposed Gridley Station is primarily intended to serve passengers heading to / from Oroville (the county seat of Butte County), as well as passengers in Gridley and nearby surrounding communities. According to the U.S. Census Bureau, Gridley currently has a population of 7,421 and is formally the third largest city in Butte County after Chico (101,475) and Oroville (20,042), although this is largely due to the 2018 Camp Fire and the resulting damage and displacement in Paradise and surrounding communities.

As shown in **Figure 5**, the proposed station location is in Downtown Gridley south of Laurel Street. A total of two different potential sites were evaluated for the station:

- *Downtown site.* This site would be located near the city's historic center, immediately south of Laurel Street (to avoid closure or blockage of street crossings). The site's central location provides good station access for all parts of the city and offers substantial opportunities for neighborhood revitalization and transit-oriented development in the surrounding blocks. East Gridley Road also provides convenient access for passengers heading to / from Oroville and neighboring communities.
- *FEMA site.* Under this option, the station would be located on the Gridley Industrial Park site, which was previously used by the Federal Emergency Management Agency (FEMA) as temporary housing for victims of the 2018 Camp Fire. As the site is at the southern edge of the city, within an area that is only lightly developed (primarily with light industrial or agricultural use), additional consideration would need to be given to station access and connectivity. An integrated redevelopment of the entire site, however, offers substantial opportunities for transit-oriented development.

Given these considerations, the Downtown Gridley site was selected as the preferred location to be carried forward for further analysis.

Figure 5. Gridley Station Sites



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Maxar Technologies, USGS, USDA Farm Service Agency.

## Chico

Chico is the primary population center of Butte County and home to California State University, Chico (“Chico State”). With an estimated enrollment of over 15,400 students for the Fall 2021 semester, Chico State is the second largest small-metro campus<sup>(1)</sup> in the California State University (CSU) system after the San Luis Obispo campus. According to the U.S. Census Bureau, the city itself currently has a population of 101,475, and is in close proximity to several other unincorporated communities with sizeable populations, including Magalia (7,795), Paradise (4,764), and Durham (5,834).

Two potential sites for a Chico station have been identified and are shown in **Figure 6**:

- *Downtown (existing Amtrak station)*. The existing Chico Amtrak station served by the Coast Starlight route (Los Angeles – Seattle) is located in Downtown Chico between West 3rd Street and West 5th Street. This location is within short walking distance of the Chico State campus and other destinations in Downtown Chico, making it ideal in terms of capturing the largest potential ridership markets in Chico. This location is already well established as Chico’s intercity transit hub, with an existing historic passenger depot, a parking lot, and a bus stop for Amtrak Thruway buses (for *San Joaquins* Thruway service) and Greyhound buses. Due to grade crossing spacing, however, securing a full-length platform would likely require closure of West 3rd Street at the intersection with the tracks.

A layover facility for this station option would ideally be located to the north of the station but may need to be placed a substantial distance away to avoid proximity to existing homes and impacts to existing businesses. A location north of Muir Avenue (discussed in detail later in this memo), for example, would be almost 4 miles from the station.

- *Barber Yard*. This site is located in the Barber neighborhood south of Downtown, adjacent to Barber Yard, a large, disused site that was originally a Diamond Match plant. The plant site has been designated as a Special Planning Area (SPA) by the City of Chico and offers a large opportunity for transit-oriented development and a full-amenity station with an adjacent layover facility. According to the Chico 2030 General Plan, the Barber Yard SPA measures approximately 150 acres in total and has development potential for approximately 1,100 dwelling units and over 400,000 square feet of non-residential (office, light industrial, and public) uses. As the site is surrounded by mostly undeveloped or rural / agricultural land along the city’s southwestern city limits, however, additional consideration will need to be given to ensure that there is good access and connectivity for a station at this location. Based on the latest information published by the development team, development of the Barber Yard site would take place within a timeframe of approximately 15 years (i.e., 2023–2038) following completion of environmental review and necessary project approvals.

Given the potential of the two sites, both are being carried forward for further analysis at this time.

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(1) Defined here as a campus not located in one of the State’s major metropolitan areas.



Figure 6. Chico Station Sites



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Maxar Technologies, USGS, USDA Farm Service Agency.

## Oroville

A station was explored in Oroville as an “alternate” station if the alternate route along the UP Sacramento Subdivision north of Binney Junction is selected.

Oroville is the county seat of Butte County. According to the U.S. Census Bureau, the city currently has a population of 20,042, but there are multiple large unincorporated communities nearby, including South Oroville (3,235), Palermo (5,555), Oroville East (8,038), Kelly Ridge (3,006), and Thermalito (7,198).

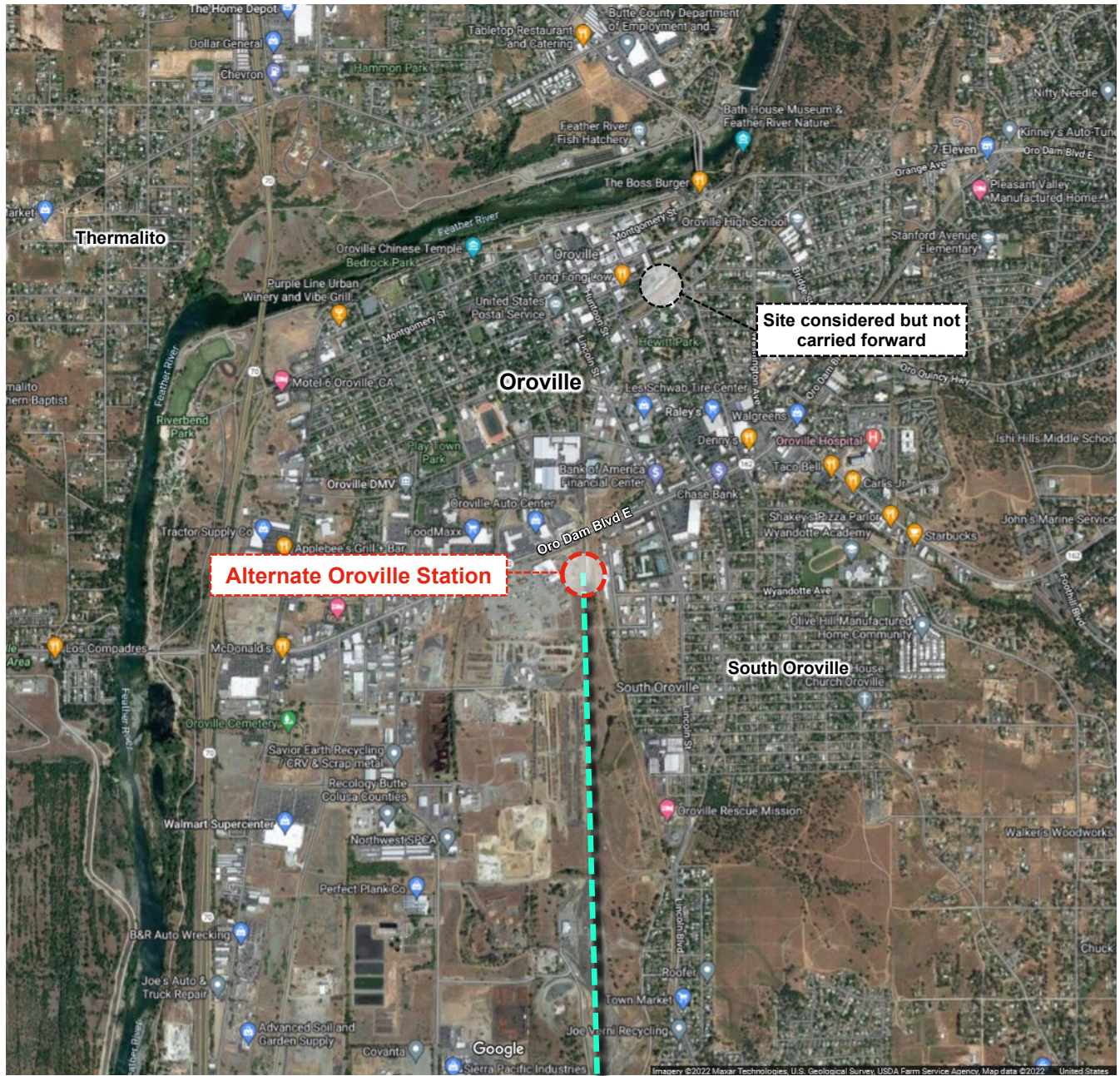
Two sites were evaluated for an Oroville station:

- *Historic Downtown depot.* Oroville’s historic passenger depot is located at the southeast corner of Downtown Oroville, at the intersection of Oliver Street and High Street. The site’s location within the city’s historic downtown offers substantial potential for neighborhood revitalization and for transit-oriented development in the surrounding area. The historic depot is currently being converted to office space, but includes a large parking lot. While there is more than 2,000 feet of distance between the two adjacent grade-separated crossings at Washington Avenue and Myers Street, the site’s location on a reverse curve and UP’s general policy against new-build stations on curves would likely make it difficult to provide sufficient tangent track to make this location feasible from an engineering perspective without requiring acquisition of neighboring properties and substantially increasing project costs. Additionally, much of the built-up area of Oroville is located south of this station site.
- *South of Oro Dam Boulevard East.* This station site would be located on the approach into the city from the south, in an area that is currently largely undeveloped or only lightly developed. There is substantial vacant land, particularly on the east side of the existing track between Oro Dam Boulevard East and UP’s Oroville Yard, that would offer a good opportunity for both a full-amenity station and adjacent layover facility. While the developed portions of the surrounding area are more suburban or rural in nature, the site’s location south of Downtown Oroville places it in the direction of travel for a larger share of riders than the historic passenger depot. Oro Dam Boulevard East (State Route 162) would also provide good regional access for the station.

Given the potential complications with the historic downtown depot, the site south of Oro Dam Boulevard East was selected as the preferred option to be carried forward for further analysis.



Figure 7. Alternate Oroville Station Sites



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Maxar Technologies, USGS, USDA Farm Service Agency.



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## Service Levels

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### Travel Markets

Based on existing travel patterns and an analysis of expected travel times to / from the North Valley Region, the following key travel markets were identified:

***Commuter trips to the Sacramento Region.*** The proximity of the North Valley Region to Sacramento, a major job center, makes commuters a key potential market for the new service. Typically, commuter markets are served by commuter rail, which is designed to get passengers to the job center or city center before the start of the workday (by 9:00 am) and then depart after the end of the workday (late afternoon or early evening). Service is usually provided on weekdays only (typically in the commute direction only), and is usually concentrated in the morning and evening peak periods (typically, 6:00–9:00 a.m. and 4:00–7:00 p.m.). Commuter markets are usually best served when door-to-door travel times are on the order of 90–120 minutes or less. Timed local and regional transit connections at stations are also desirable, including for first-mile / last-mile connections at the job center or city center terminal. Amenities and accommodations such as bicycle storage, in-seat power outlets, or quiet or dim-lit cars, may also be warranted. Given the distances and travel times involved, commuter markets beyond Sacramento are likely to be negligible.

It should be noted that the commute market into Sacramento is one of the major drivers behind plans for enhanced bus service in the North Valley corridor as a precursor phase prior to implementation of the North Valley Rail project. This initial bus service was evaluated in the Chico to Sacramento Inter-City Transit Strategic Plan published on January 4, 2022 by BCAG and partnering agencies. More information on this planned bus service is provided in the “Bus Connections” section later in this memo.

- ***Business and leisure travel to the Bay Area and San Joaquin Valley (with connections to Los Angeles).*** This market includes passengers heading to or from the San Francisco Bay Area, the San Joaquin Valley, Southern California, or other major areas of the state beyond the distances typically served by commuter rail. These passengers generally prefer a wide range of options in terms of time of day and day of week, including service on weekends and holidays (especially for leisure travelers) and during the midday and evening periods on weekdays. Regional or intercity connections, including high-speed rail in Merced and connecting bus services (to Los Angeles and other destinations), would also facilitate business and leisure travel by serving key population centers or tourist destinations not directly on the train route. Accommodations for baggage and on-board dining, as well as optional seat classes or special ticketing promotions (e.g., for families or groups or for special events), may also be warranted.
- ***Chico State University and Butte College affiliates and visitors.*** This market is fairly diverse, and can be considered a combination of smaller, overlapping subsets of the above two markets. Campus affiliates (i.e., students, faculty, and staff), for example, include both commuter submarkets (e.g., students, faculty, and staff living outside of Chico) and intercity submarkets (e.g., students living in on-campus housing returning home to other areas of the state for winter break or a long holiday). Visitors can also include a mix of shorter-distance submarkets (e.g., former alumni from Sacramento attending a home softball game or other athletic event) and longer-distance submarkets (e.g., out-of-state family visiting students, out-of-town visitors attending a conference).

To maximize cost effectiveness and potential benefits, the proposed service would ideally be focused on markets with the most promising ridership prospects. As in many other similar situations, this typically means commuter markets. However, the limitations of typical commuter rail (service during weekday peak periods only, in the commute direction only) make it less ideal in terms of trying to integrate the North Valley into the larger statewide rail network, including the goal of providing connections at Merced with the initial operating segment (Merced–Bakersfield) of the statewide high-speed rail (HSR) system. For example, a commuter service running only between Butte County and Sacramento would, at a minimum, require transfers in Sacramento for longer-distance

trips, and, at the worst, make those trips impractical for most passengers due to poor connections or poor options for time of day and day of week.

Thus, the proposed service plan for North Valley Rail would ideally serve commuter markets while at the same time securing a base service level for intercity travel related to business and leisure markets.

### Service Context

The proposed North Valley Rail would begin at the future Natomas terminus of the planned Sacramento Extension for ACE and the *San Joaquins*. Thus, it makes logical sense for a proposed service plan for the North Valley to begin with an extension of the Natomas trains north into the North Valley. The baseline service plan across ACE and the *San Joaquins*, which could be in operation by as early as 2029, is illustrated in **Figure 8**.

As shown in **Figure 8**, a total of 10 roundtrips per day would serve the northern terminus of the Sacramento Extension at Natomas, including 6 roundtrips on ACE and 4 roundtrips on the *San Joaquins*.

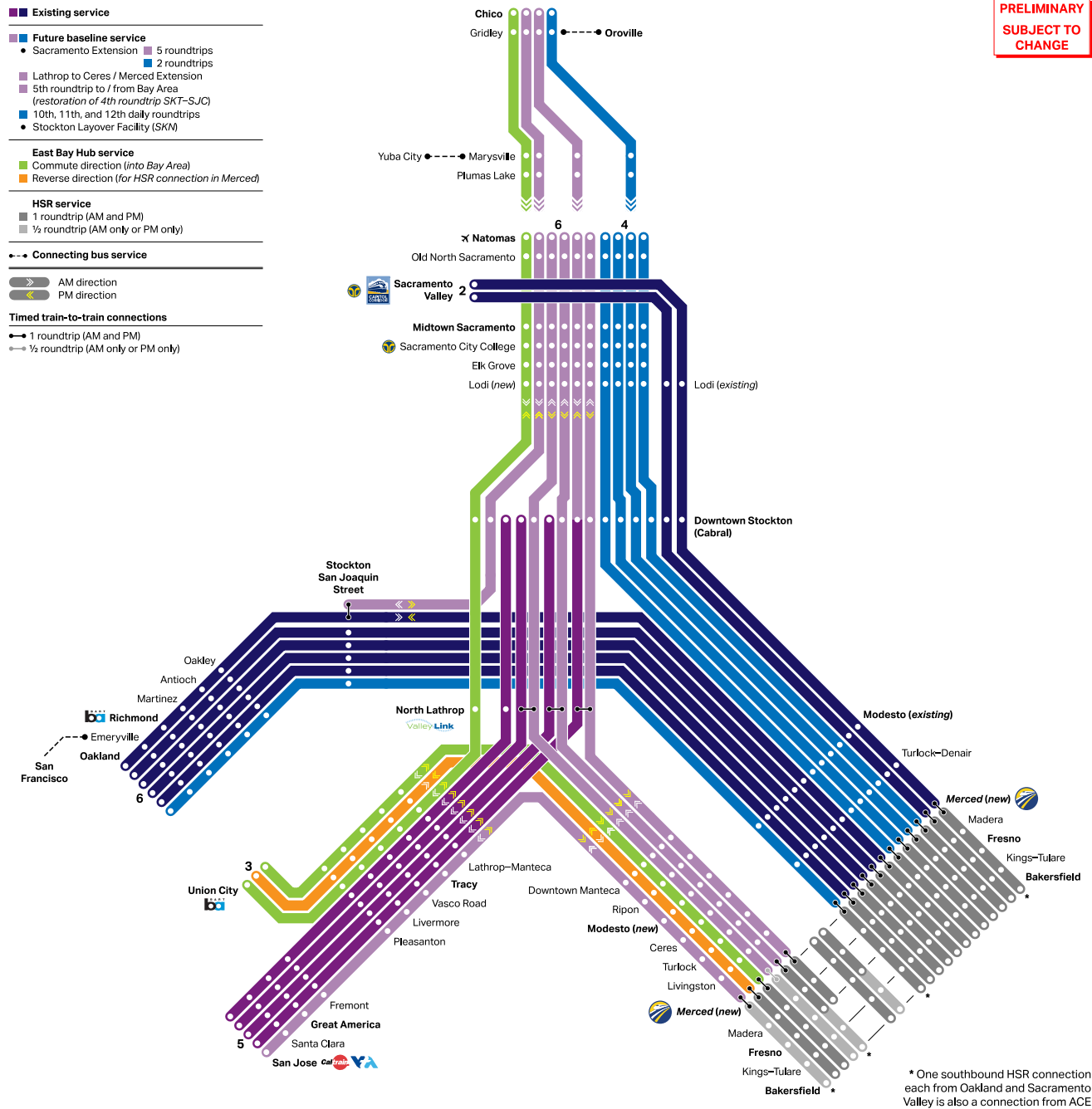
The Sacramento Extension is being implemented concurrently with several other major expansions to the ACE system, including the Lathrop to Ceres and Ceres to Merced Extensions, which will create a new southern branch of the ACE system to serve Modesto and Merced, where ACE will connect with HSR. The planned service for the Sacramento Extension, as described and analyzed in the associated environmental impact report, consists of up to 5 roundtrips/day for ACE and up to 2 roundtrips/day for the *San Joaquins*.

Other expansions to ACE and the *San Joaquins* are also in various stages of planning, including the following:

- Up to 5 additional roundtrips a day (over pre-COVID levels) for the *San Joaquins* (for a total of 12 roundtrips/day, 4 of which would serve the Sacramento Extension route)
- A new Merced Intermodal Track Connection (MITC) to bring *San Joaquins* trains directly to the new HSR station in Merced
- A new Bay Area branch for the ACE system connecting to a future East Bay Rail Hub at BART's Union City station, with 3 roundtrips/day

Figure 8. ACE and San Joaquins Mid-Term Service Vision

PRELIMINARY  
SUBJECT TO  
CHANGE



Source: AECOM

### Desired Service Levels

Based on discussions with BCAG staff, it has been determined that an initial service level target of 4 roundtrips per day for the mid-term planning horizon (service start around 2029) is appropriate based on the potential markets to be served, the baseline service at Natomas (10 roundtrips/day), and the overall cost to increase capacity along the UP Sacramento and UP Valley Subdivisions to accommodate the proposed passenger rail service.



### Trip Purpose

In particular, a service plan with 4 roundtrips/day provides a reasonable level of coverage over the entire service day, which, if spaced well, will secure at least some flexibility for passengers in selecting trip itineraries. It also offers good potential to capture multiple markets based on trip purpose and geography. For example, a sample service plan could be designed around 2 “commuter”-focused roundtrips and 2 regional- or intercity-focused roundtrips, providing a base level of service that is attractive to both commuter markets into / out of Sacramento and business or leisure markets at other times of the day.

- With 2 commuter-focused roundtrips, passengers would have 2 options to / from Sacramento in each of the morning and afternoon / evening commute periods (i.e., 2 southbound trains in the morning and 2 northbound trains in the afternoon / evening). In contrast, a service plan with only 1 commuter-focused roundtrip is unlikely to prove attractive, as it requires a rigid work schedule and does not provide sufficient flexibility on a day-to-day basis (e.g., earlier-than-usual work start in the morning or later-than-usual work end in the afternoon / evening).
- Similarly, with at least 2 regional- or intercity-focused roundtrips, business and leisure passengers would have multiple options to plan trips, instead of being limited to a single train per day (as is the current situation with the Coast Starlight). A base timetable of 2 roundtrips per day could, for example, be designed around 1 morning roundtrip and 1 afternoon or evening roundtrip, allowing passengers the option of a.m. or p.m. arrivals into and departures from the North Valley.

### Geography

As shown in **Figure 8**, there are at least 5 total branches at the outer extents of the combined ACE and *San Joaquins* network (excluding the Sacramento Valley and Natomas / North Valley branches), spread across 3 major geographic markets:

- *San Francisco Bay Area – Inner core and northeast*
  - Oakland via Richmond, Martinez, Antioch, and Oakley
- *San Francisco Bay Area – Silicon Valley, Peninsula, and southeast*
  - Union City via Pleasanton, Livermore, and Tracy
  - San Jose via Santa Clara, Fremont, Pleasanton, Livermore, and Tracy
- *San Joaquin Valley south of Stockton*
  - Merced via Turlock (Downtown), Modesto (Downtown), and Manteca
  - Merced via Turlock (Denair) and Modesto (east)

A proposed service of 4 roundtrips/day would at least provide some flexibility to capture multiple branches and geographic markets, providing more utility and convenience to the passenger and helping to ensure the success of the North Valley Rail service.

### Service Phasing

A service level target of 4 roundtrips/day also allows for a logical phasing of service if warranted by project timeline or costs. An initial rollout phase might, for example, consist of 2 roundtrips/day, with 1 roundtrip/day each for ACE and the *San Joaquins*. Operations can then be expanded to the target of 4 roundtrips per day as the service becomes established and ridership grows. In particular, capital and operating and maintenance (O&M) costs, as well as funding / financing constraints, may warrant a phased implementation that spreads budgetary commitments and risk over one or more phases and allows the service to at least begin operations before the full vision can be realized.

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## Conceptual Timetable

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### Methodology and Approach

A conceptual timetable for the North Valley Rail service was developed in conjunction with a conceptual systemwide timetable for ACE and the *San Joaquins* that incorporates the following key service expansions expected to be in place within the mid-term horizon (i.e., by 2029):

- *Sacramento Extension (new route via Midtown Sacramento and Natomas)*
  - ACE: Up to 6 roundtrips/day
  - *San Joaquins*: 4 roundtrips/day (in addition to the existing 2 roundtrips/day at Sacramento Valley Station)
- *Lathrop to Ceres and Ceres to Merced Extensions*
  - ACE: Up to 4 roundtrips/day
- *East Bay Hub service (extension to Union City BART)*
  - ACE: Up to 3 roundtrips/day, including 1 commute roundtrip originating from Natomas
- *Interim HSR service at new Merced intermodal hub*
  - *San Joaquins*: 10th, 11th, and 12th roundtrips (4 roundtrips/day total to / from Natomas)
  - Timed HSR connections for ACE and the *San Joaquins*

The development of a conceptual systemwide timetable establishes the approximate timepoints at Natomas in the baseline condition (i.e., prior to the North Valley Rail service).

For the extension north of Natomas, approximate running times were developed based on track speeds and mileposts (from California Region Timetable 20 by Altamont Press, 2009) and comparable station-to-station data (from the existing *San Joaquins* timetable). Starting with a theoretical extension of all service north of Natomas, recommendations for extension of specific trains were then developed by focusing on those trains that best served the potential ridership markets. Trains that were redundant or were likely to be less effective at serving these markets were removed from consideration through a process of elimination until arrival at the desired service level (4 roundtrips/day). In close coordination with SJRRC / SJJPA, iterative adjustments were also fed back into the systemwide timetable to balance the needs of the North Valley service with the rest of the ACE and *San Joaquins* networks.

### Conceptual Timetable

The conceptual timetable for the North Valley service is shown in **Table 2**. It illustrates the basic service pattern and time of day of the proposed service. The exact timepoints once the service actually enters operation will likely be different, as additional refinements may be incorporated as part of subsequent operations modeling and more detailed operations planning.

**Table 2. Conceptual Timetable**

Northbound						Southbound						
W01	D01	J04	J01	N06	C04	Station	C03	N01	J10	J07	D02	W02
**	**	OKJ	MCDA	**	**	Train Origin	MCDA	MCDA	OKJ	MCDA	SKN	UNC
UNC	SKN	MCDA	OKJ	MCDA	MCDA	Train Destination	**	**	MCDA	OKJ	**	**
5:45	6:45			10:09	16:49	Chico	CIC ▲	9:51	15:34		18:55	19:55
6:13	7:13			10:37	17:17	Gridley	GRD ▲	9:23	15:06		18:27	19:27
6:03	7:03			10:27	17:07	Oroville	ORV ▲	9:33	15:16		18:37	19:37
6:31	7:31			10:55	17:35	Marysville	MRV ▲	9:05	14:48		18:09	19:09
6:43	7:43			11:07	17:47	Plumas Lake	PLU ▲	8:53	14:36		17:57	18:57
7:08	8:08			11:32	18:12	Natomas	NAT ▲	8:28	14:11		17:32	18:32
7:18	8:18			11:41	18:25	Old North Sacramento	NSAC ▲	8:17	14:03		17:24	18:24
7:25	8:25			11:48	18:32	Midtown Sacramento	MDT ▲	8:10	13:57		17:17	18:17
7:31	8:31			11:54	18:38	Sacramento City College	SUT ▲	8:04	13:51		17:11	18:11
7:45	8:45			12:08	18:52	Elk Grove ( <i>new</i> )	EKGA ▲	7:50	13:38		16:57	17:57
8:07	9:14			12:30	19:14	Lodi ( <i>new</i> )	LODA ▲	7:28	13:16		16:35	17:35
8:22	9:28			12:47	19:28	Downtown Stockton (Cabral)	SKT ▲	7:11	13:00		16:19	17:19
	9:32	→	9:43	10:05		Stockton San Joaquin Street	SKN ▲			15:43	16:05	→ 16:15
8:34					19:41	North Lathrop	NLT ▲	7:00				17:07
8:41						Lathrop–Manteca	LTM ▲					17:01
8:53						Tracy	TRA ▲					16:42
9:22						Vasco Road	VAS ▲					16:13
9:27						Livermore	LIV ▲					16:08
9:35						Pleasanton	PLS ▲					15:59
						Fremont	FMT ▲					
						Great America	GAC ▲					
						Santa Clara	SCC ▲					
						San Jose (Diridon)	SJC ▲					
9:59						Union City	UNC ▲					15:34
			10:31			Oakley	OKY ▲			15:15		
			10:38			Antioch–Pittsburg	ACA ▲			15:07		
			11:03			Martinez	MTZ ▲			14:45		
			11:32			Richmond	RIC ▲			14:15		
			11:43			Emeryville	EMY ▲			14:04		
			11:52			Oakland (Jack London Square)	OKJ ▲			13:53		
					19:49	Downtown Manteca	DMT ▲	6:51				
					19:58	Ripon	RIP ▲	6:43				
					20:10	Modesto ( <i>new</i> )	MODA ▲	6:32				
					20:16	Ceres	CRS ▲	6:24				
					20:31	Turlock	TRKA ▲	6:15				
					20:38	Livingston	LVG ▲	6:08				
					20:42	Atwater	ATW ▲	6:04				
		10:13		13:18		Modesto	MOD ▲		12:27		15:26	
		10:26		13:31		Turlock–Denair	TRK ▲		12:13		15:13	
		10:56		13:56	20:56	Merced ( <i>new</i> )	MCDA ▲	5:50	11:50		14:50	
		↓		↓	↓			↑	↑		↑	
		11:08		14:08	21:08	Merced	▲	5:42	11:42		14:42	
		11:30		14:30	21:30	Madera	▲	5:21	11:21		14:21	
		11:41		14:41	21:41	Fresno	▲	5:09	11:09		14:09	
		11:58		14:58	21:58	Kings–Tulare	▲		10:53		13:53	
		12:30		15:30	22:30	Bakersfield	▲		10:19		13:19	
		<b>111</b>		<b>117</b>	<b>131</b>			<b>ST-2</b>	<b>110</b>		<b>116</b>	

Source: AECOM  
\*\* = Chico (CIC) or Oroville (ORV)



As shown in **Table 2**, the conceptual timetable incorporates several key features intended to effectively capture the North Valley's ridership markets:

- **Commuter market into Sacramento.** Two roundtrips/day via ACE to ensure attractive service for the commuter market from the North Valley into Sacramento. In the southbound direction, these correspond to trains W01 (to Union City) and D01 (to Stockton San Joaquin Street), with timepoints at Midtown Sacramento at 7:25 a.m. and 8:25 a.m., respectively. The return trips are D02 (from Stockton San Joaquin Street) and W02 (from Union City), with timepoints at Midtown Sacramento at 5:11 p.m. and 6:11 p.m., respectively. These trains also offer relatively attractive commute or day trips from Butte County to the Yuba–Sutter area, with arrivals into Marysville at 6:31 a.m. and 7:31 a.m. and return departures at 6:09 p.m. and 7:09 p.m.
- **San Francisco Bay Area service.** Two roundtrips/day connecting the North Valley with the San Francisco Bay Area, including one direct service to / from Union City via Stockton (W01 and W02) and one transfer at Stockton San Joaquin Street station to / from Oakland (D01+J01 and D02+J10). The one-seat service (W01 and W02) provides a 5½-hour window at the Union City end, or approximately 3–4 hours after deducting travel time on BART or other connecting modes, which would generally be sufficient to accommodate one to two business or lunch meetings. While travel time to / from the Bay Area may be longer than via the Capitol Corridor route, these trips provide an alternative route via Stockton that gives riders additional travel options to supplement the Capitol Corridor. The Union City service, in particular, offers better connectivity for the South Bay / Silicon Valley, in conjunction with a one-seat ride that avoids the hassle and penalties of transferring to / from the Capitol Corridor at Sacramento Valley Station.
- **HSR connections.** Three roundtrips/day connecting with HSR at Merced (1 of which requires a transfer in Stockton), with reasonable spacing throughout the day given the constraints imposed by running times (e.g., approximately 3 hours, 40 minutes by *San Joaquins* and 4 hours by ACE between Chico and Merced).
- **Stockton San Joaquin Street transfers.** One roundtrip/day (D01 and D02) with a transfer to / from both directions of the *San Joaquins* (Merced for HSR or Oakland for the Bay Area) at Stockton San Joaquin Street Station. This approach strategically expands the areas that have access to / from the North Valley by providing a second Bay Area connection and a third HSR connection combined in one train, while keeping potential capital and operating costs down by maintaining service north of Natomas at 4 roundtrips/day.
- **North Valley inbound market.** One roundtrip/day (C03 and C04) that provides almost a full-day window for passengers inbound into the North Valley area, such as commuters (e.g., students, faculty, or staff at Chico State) or tourists and other visitors.

### Service to / from Sacramento Valley Station

Direct service to / from Sacramento Valley Station was also considered from the early stages of this initial planning process. Sacramento Valley Station is currently Sacramento's main regional and intercity transit hub, with direct connections to local and regional transit services, including the Capitol Corridor and the Sacramento Regional Transit (SacRT) Gold Line light rail. Sacramento Valley Station is also closer to Capitol Mall and the major employment areas of Downtown Sacramento, which are easily accessible via the Gold Line or SacRT buses or on foot.

While the track connections and layout at CP West Haggin (where the UP Martinez Subdivision and UP Sacramento Subdivision cross) would allow for service to / from the station, this would likely require substantial additional coordination that would make North Valley Rail a longer-term endeavor. In particular, the UP Martinez Subdivision is an important corridor for both passenger and freight traffic, and UP may be averse to the idea of additional passenger trains—even on this relatively short segment to / from the station—without additional investment in infrastructure. Extensive coordination would also likely be necessary with the Capitol Corridor Joint Powers Authority, both to ensure adequate schedule coordination for passengers transferring with the Capitol Corridor and to secure an open track and platform for North Valley trains that serve the station.

Additional operational considerations include whether to terminate the train at the station or to have it continue to / from other routes. Terminating the service at the station would require consideration of adequate layover capacity, which may entail expansion of an existing layover facility or construction of a new layover facility. Similarly, continuing the service beyond the station, whether to / from the Capitol Corridor route or to / from Midtown Sacramento and Stockton, would also require substantial coordination and potential infrastructure investment that would increase scope and risk (and, likely, cost) for implementation of the North Valley service.

Given these considerations, it was deemed appropriate to focus on extension of the baseline ACE and *San Joaquins* service at Natomas for this mid-term effort, as opposed to introduction of a new service exclusively for the North Valley market. By building off of the Sacramento Extension and other existing efforts, this approach offers substantial benefits in terms of getting the service up and running as quickly and efficiently as possible while still allowing a Sacramento Valley Station service to be explored in more depth as part of a longer-term effort.

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## Layover Facility Locations

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A layover facility is needed for North Valley Rail to facilitate midday or overnight storage of trains in the vicinity of the northern terminus station in Butte County, as well as potentially accommodate various light maintenance duties (e.g., restroom cleaning). Heavy maintenance duties will be accommodated at other maintenance facilities, such as existing facilities in Stockton (for ACE) and Oakland (for the *San Joaquins*) or the planned facility in Merced (to be shared between ACE and the *San Joaquins*).

### Methodology and Approach

A layover facility would ideally be located near the terminal station in Chico (or Oroville for the alternate route) in order to minimize deadhead (non-revenue) travel distance and time, which can have substantial effects on day-to-day operations and costs. Placing the layover facility and station in close proximity to each other may also have a significant benefit in terms of reducing capital investment and costs, particularly if UP requests construction of an additional main track between the terminal station and the layover facility. In the case of North Valley Rail, a layover facility located north of the terminal station is also generally preferable from an operations perspective, as it eliminates the need to reverse the direction of the train when traveling between the station and the layover facility.

In terms of physical dimensions, the layover facility must be a sizeable site with sufficient aggregate track capacity to accommodate the required number of trains at their respective train lengths. The conceptual timetable in **Table 2**, for example, would generally require layover capacity for up to 3 trains simultaneously (W01, D01, and N06), with the fourth train (C04) operated as the return trip of C03 and based out of Merced. While the required dimensions for the facility have not been fully determined at this time and are somewhat flexible depending on the desired operations scheme, a conservative assumption in this early planning stage would assume up to 4 trains requiring layover space simultaneously, with a maximum train length of approximately 1,000 feet.

Areas along the rail corridor near the proposed terminal locations were reviewed based on aerial imagery and field visits, focusing on those sites with sufficient size located on vacant or lightly utilized land (in order to minimize potential costs and impacts to surrounding neighborhoods).

### Layover Facility Options

Options for the layover facility were evaluated for Chico and Oroville, which are described below.

#### Chico Layover Facility Options

Two options for a layover facility in or near Chico were identified, as illustrated in **Figure 9**:

- *North of Muir Avenue.* The closest potential layover facility site north of the Chico station options is on agricultural land north of Muir Avenue, along the north side of the UP right-of-way. This location is almost 4 miles from the existing Amtrak station in Downtown Chico and approximately 4½ to 5 miles from the

Barber Yard station option. Areas to the south closer to the existing Amtrak station are already largely built up or in close proximity to residential neighborhoods, likely making them unsuited for a layover facility with a mid-term service start by 2029 due to costs, impacts to surrounding residents, and other potential risks. This option would also result in the loss of existing agricultural land, although this loss would likely only be on the order of 1 to 2 acres.

- *Barber Yard.* This site is co-located with the Chico station option at Barber Yard and is approximately ½ to 1 mile south of the existing Amtrak station. It is located on vacant undeveloped or under-utilized land and is comparatively closer to both station options (existing Amtrak station in Downtown Chico or Barber Yard station) than the location north of Muir Avenue. Depending on the final siting within the Barber Yard area, this location may be slightly closer to existing and / or future residential uses, however, and may therefore have a marginally larger impact to surrounding residents than the option north of Muir Avenue.

Both options are being carried forward for further analysis.



**Figure 9. Chico Layover Facility Sites**



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Landsat / Copernicus, Maxar Technologies, USGS, USDA Farm Service Agency.

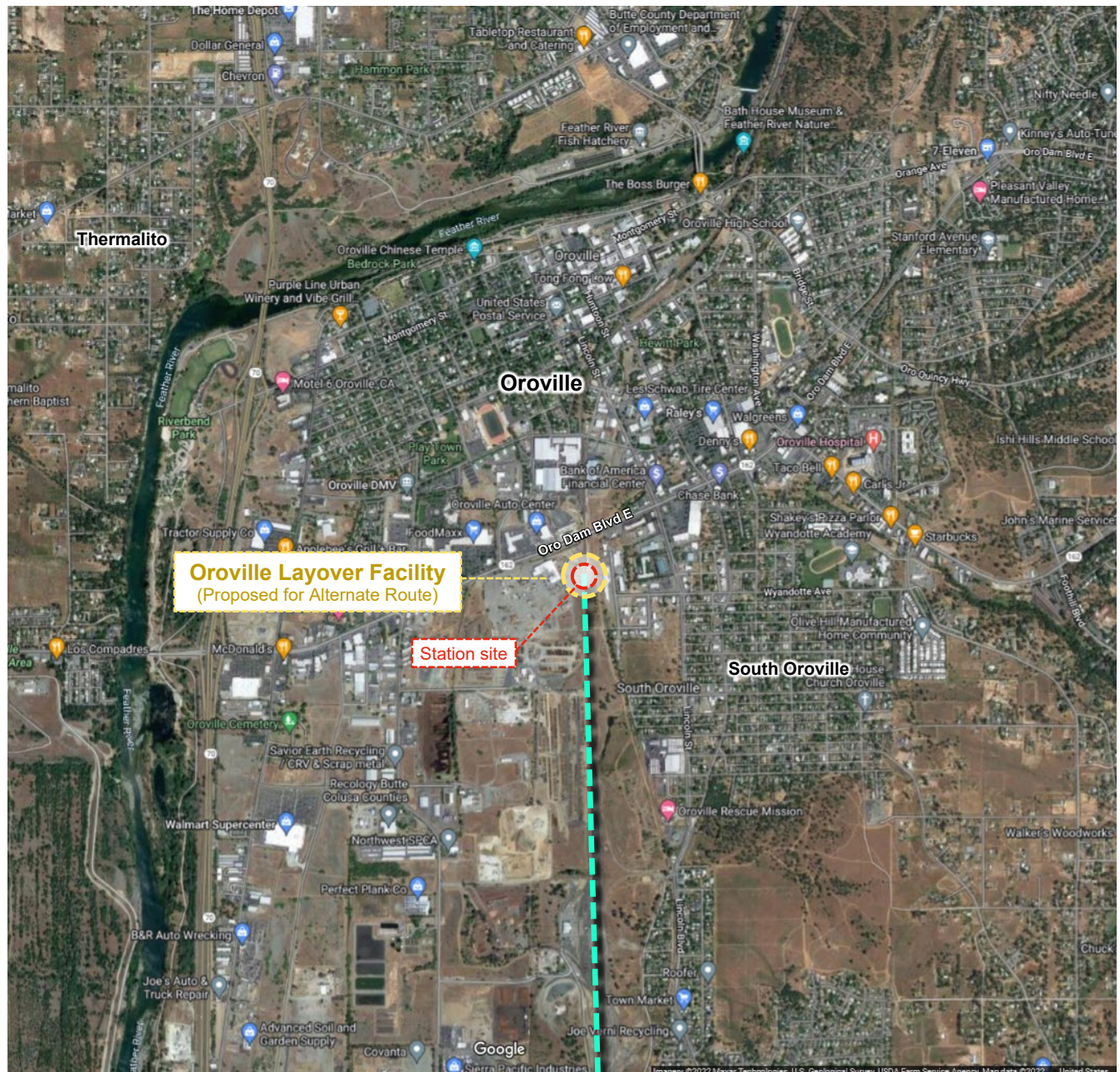


### Oroville Layover Facility Site

The proposed layover facility site for the Oroville Alternate Route would be co-located with the Oroville station on vacant or under-utilized land between Oro Dam Boulevard East and UP's Oroville Yard, as illustrated in **Figure 10**.

The proposed layover facility would be compatible with existing uses in the surrounding area, which are primarily industrial in nature. Areas north of Oro Dam Boulevard East are largely built up and do not offer sufficient space to accommodate the proposed facility.

**Figure 10. Oroville Layover Facility Site**



Source: Google Earth. Annotations by AECOM.  
Aerial imagery from Maxar Technologies, USGS, USDA Farm Service Agency.

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## Bus Connections

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Potential bus connections at each of the proposed stations were also evaluated at a conceptual level. Specific recommendations are discussed below.

### Yuba County Stations

Transit service within Yuba and Sutter Counties is provided primarily by Yuba–Sutter Transit. Existing bus service and recommendations for the two Yuba County stations (Plumas Lake and Marysville) are discussed below.

#### Plumas Lake

Currently, there are no local bus routes serving Plumas Lake, but regional commuter express buses operated by Yuba–Sutter Transit stop at a park-and-ride facility at the southeast quadrant of the SR 70 Feather River Boulevard interchange. These buses are primarily designed to get commuters to / from Sacramento, although some trips also allow for travel to / from Marysville:

- During the morning commute period, 4 bus trips (#170, #270, #370, and #470) serve Plumas Lake on their way from Marysville to Sacramento, 2 of which (#170 and #470) continue from Sacramento back to Marysville (without a return stop at Plumas Lake). Trip #370 is currently suspended until further notice due to COVID-19 service changes.
- During the afternoon commute period, 4 buses (#170, #270, #370, and #470) serve Plumas Lake on their way from Sacramento to Marysville, 1 of which begins in Marysville before heading to Sacramento (without an earlier stop in Plumas Lake). Trip #370 is currently suspended until further notice due to COVID-19 service changes.
- During the midday period, two buses (#1 MD and #3 MD) serve Plumas Lake on a loop route from Marysville to Sacramento and back. Trip #170 stops at Plumas Lake on both legs of the loop, while #370 only stops on the return leg from Sacramento.

As only a portion of Plumas Lake is currently built out, it is likely that bus service will warrant expansion in the future as the rest of the overall development is completed. This would likely include expanded regional / commuter service connecting to Sacramento and Marysville / Yuba City, as well as perhaps new regional service to / from Wheatland and local service within Plumas Lake. As development progresses, BCAG should coordinate with Yuba–Sutter Transit and other partners to consider potential improvements to bus service:

- **Park-and-ride facility relocation.** Relocate the Plumas Lake park-and-ride facility to the train station to provide a consolidated local and regional transit hub.
- **Plumas Lake circulator route.** Establish a local circulator route through Plumas Lake, with a terminal at the Plumas Lake station to provide good connections to / from trains and other bus routes.
- **Wheatland connection.** Establish a new regional bus connection between the Plumas Lake station and Wheatland. This could be operated as an all-new service or as a realignment of the existing Wheatland–Marysville service from SR 65 to SR 70.
- **Olivehurst and Linda connection.** Establish a new regional bus connection between the Plumas Lake station, Olivehurst, and Linda. This could be operated as an all-new service, with a potential extension north to Marysville, or as a realignment of the existing Wheatland–Marysville service from SR 65 to SR 70
- **Toyota Amphitheatre and Hard Rock Hotel and Casino shuttles.** Provide shuttle services connecting the Plumas Lake station with the Toyota Amphitheatre and the Hard Rock Hotel and Casino. This could include dedicated pre- and post-event shuttles (dependent on event time of day and alignment with train schedules).



- **Weekend and holiday service.** Expand bus service to weekends and holidays to ensure connections with train service are available outside of weekdays.

### Marysville

The Marysville station would be located within short walking distance of the Yuba County Government Center (I Street at 9th Street in Marysville), which is a major transfer point for Yuba–Sutter Transit local and regional buses. This stop is served by two local routes:

- **Route 1 (Yuba City to Yuba College).** Hourly daytime service on weekdays and Saturdays connecting Yuba City, Marysville, and Linda (Yuba College).
- **Route 4 (Marysville Loop).** Hourly daytime service on weekdays and Saturdays looping through Marysville.

The stop is also served by multiple regional routes, including commuter buses to / from Sacramento (both via SR 70 and via Yuba City and SR 99) and all three of Yuba–Sutter Transit’s “rural” routes:

- **Foothill route.** 2 roundtrips every Tuesday, Wednesday, and Thursday connecting Marysville, Loma Rica, Dobbins / Oregon House, and Brownsville.
- **Live Oak route.** 2 roundtrips/day Mondays through Fridays connecting Marysville, Yuba City, and Live Oak.
- **Wheatland route.** 1½ roundtrips/day Mondays through Fridays connecting Marysville and Wheatland.

As the existing bus coverage for Marysville and surrounding communities is quite good given the largely suburban and rural context of the Yuba–Sutter area, it is recommended that BCAG coordinate with Yuba–Sutter Transit on potential improvements to bus service that focus on enhancing the existing system:

- **Route extension to station.** Extend bus service closer to the train station to reduce walking distance and strengthen the train station’s role as a local and regional transit hub. In the short-term timeframe, this could include a simple extension of selected bus trips to the station (based on alignment with train timetables), but could be expanded to include a relocation of the Yuba County Government Center transfer point, with expanded amenities (e.g., bus shelters, seating, real-time information). In the long-term timeframe, the relocation could be combined with a larger transit-oriented redevelopment of the adjoining retail center.
- **Expanded service days and hours.** Expand service days and hours for local buses (Route 1 and Route 4) to ensure connecting service is available every day (7 days a week, including holidays) and for all scheduled trains. For the 3 rural routes that currently operate 1–2 roundtrips/day, this could be a focused expansion that only adds trips that are appropriately timed for train connections and keyed to the communities and travel patterns that would need to be served.

### **Butte County Stations**

Transit service within Butte County is provided primarily by Butte Regional Transit (B-Line), which operates bus service within the county’s two major population centers (Chico and Oroville), as well as service connecting to smaller communities such as Paradise, Magalia, Thermalito, Palermo, Gridley, and Biggs. It should be noted that B-Line is currently completing a Route Optimization Study that may propose modifications to its routes shown in the exhibits in the following subsections. BCAG and B-Line staff will coordinate on any associated changes that could impact the North Valley Rail service in the future.

As mentioned earlier, BCAG has also developed plans for an enhanced intercity bus service in the North Valley Rail project corridor, linking Chico, Oroville, Marysville, and Sacramento. This bus service would be a precursor to the North Valley Rail project, but is recommended for retention (with modifications) after the start of train operations to provide supplemental service within the North Valley Rail corridor. This is discussed in further detail later in this memo under “Other Bus Connections”.

For all Butte County stations, it is recommended that BCAG consider expanding service days and hours for bus routes serving stations to ensure that connections are available every day (7 days a week, including holidays) and for all scheduled trains. This can be a focused expansion that only adds trips that are appropriately timed for train connections and keyed to the communities and travel patterns that would need to be served. For example, additional trips on specific routes could be operated as short-turn trips terminating at the station, as there may not be sufficient demand on the remaining portions of the route to justify service beyond the station. Since North Valley Rail service would not begin until after completion of the Route Optimization Study, however, specific decisions to expand service days and hours for bus routes should be considered after implementation of the Route Optimization Study's recommendations based on ridership demand.

Existing bus service and additional recommendations specific to each of the three Butte County stations (Gridley, Chico, and Oroville) are discussed in further detail below.

### Gridley

Gridley is served by two B-Line bus routes:

- *Route 30 (Oroville–Gridley–Biggs)*. 3 roundtrips/day Mondays through Saturdays connecting Oroville, Palermo, Gridley, and Biggs.
- *Route 32 (Gridley–Chico)*. 1 roundtrip/day Mondays through Fridays connecting Chico, Durham, Gridley, and Biggs.

These routes currently travel along SR 99 and Spruce Street through Gridley and do not directly serve the proposed station location, although the closest stops—Spruce Street at Kentucky Street (Gridley City Hall) and East Gridley Road at SR 99—are within short walking distance. The following improvements to bus service are recommended:

- **Route extension to station.** Extend existing bus service closer to the train station. Route 30 can be extended by incorporating a branch of the route that loops to and from the station via Magnolia Street, between the existing stops at East Gridley Road at SR 99 and at Spruce Street at SR 99 (Orchard Hospital). Route 32 can be extended by adding a detour south to Laurel Street between the existing stops at Spruce Street at Kentucky Street and at Spruce Street at SR 99.

### Chico

Recommendations under each Chico station option are discussed below.

#### *Existing Station (Downtown Chico)*

Existing B-Line service in Downtown Chico is summarized in **Table 3** and illustrated in **Figure 11**. The existing Amtrak station in Downtown Chico is not directly served by B-Line buses, although many B-Line routes travel along West 2nd Street (within a block of the station). Additional B-Line service is available at the Chico Transit Center, 5–6 blocks east of the station at the West 2nd Street / Normal Avenue intersection.

**Table 3. B-Line Routes in Downtown Chico**

Route	Closest existing stop to station	Headways (minutes) (a)			Interlining
		Weekdays	Saturdays	Sundays	
2 (Mangrove)	Chico Transit Center	60	60	—	—
3 (Nord / East)	West 2nd Street at Cedar Street	60	60	—	Route 4
4 (First / East)	Chico Transit Center	60	60	—	Route 3
5 (East 8th Street)	Ivy Street at 5th Street	60	60	—	—
8 (Nord)	West 2nd Street at Cedar Street	30–60 (b)	—	—	Route 9
9 (Warner / Oak)	West 2nd Street at Cedar Street	30–60 (b)	—	—	Route 8
9c (Cedar Loop)	Warner Street at West 1st Street	(c)	(c)	—	—
14 (Park / Forest / MLK)	Chico Transit Center	20–60	60	—	Route 15
15 (Esplanade / Lassen)	Chico Transit Center	20–60	60	—	Route 14
16 (Esplanade / SR 99)	Chico Transit Center	60	—	—	Route 17
17 (Park / MLK / Forest)	Chico Transit Center	60	—	—	Route 16
20 (Chico–Oroville)	Chico Transit Center	60	120	120	—
32 (Chico–Gridley)	Chico Transit Center	(d)	—	—	—
40 (Chico–Paradise)	Chico Transit Center	(e)	(e)	—	—
41 (Chico–Paradise–Magalia)	Chico Transit Center	(f)	(f)	—	—
52 (Chico Airport Express)	Chico Transit Center	(g)	—	—	—

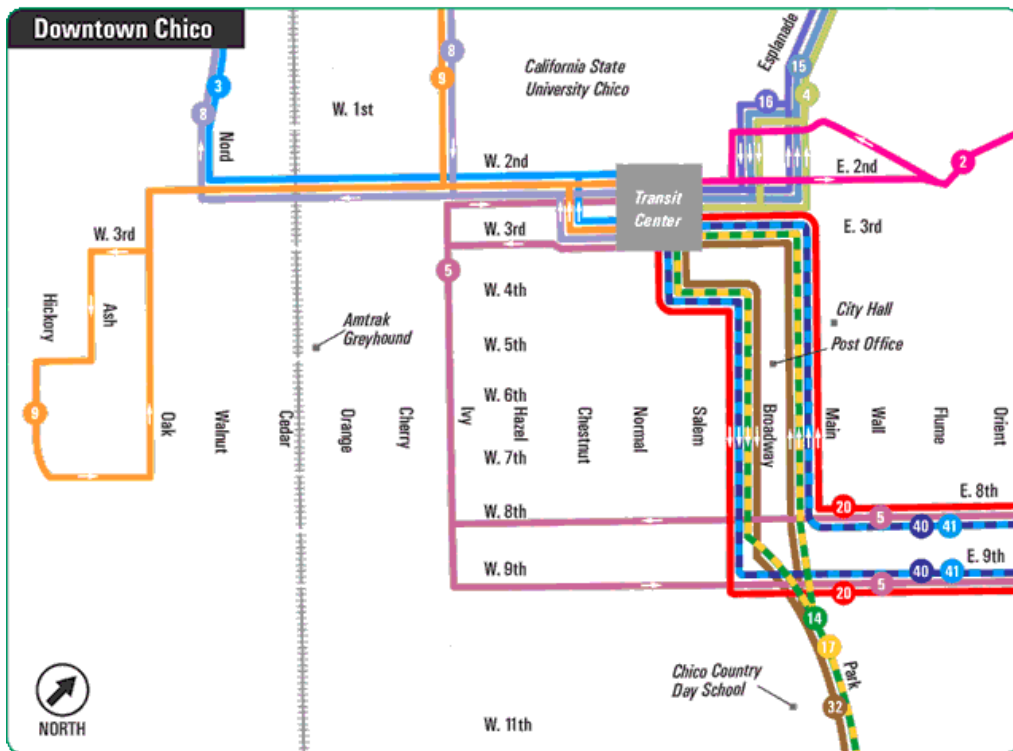
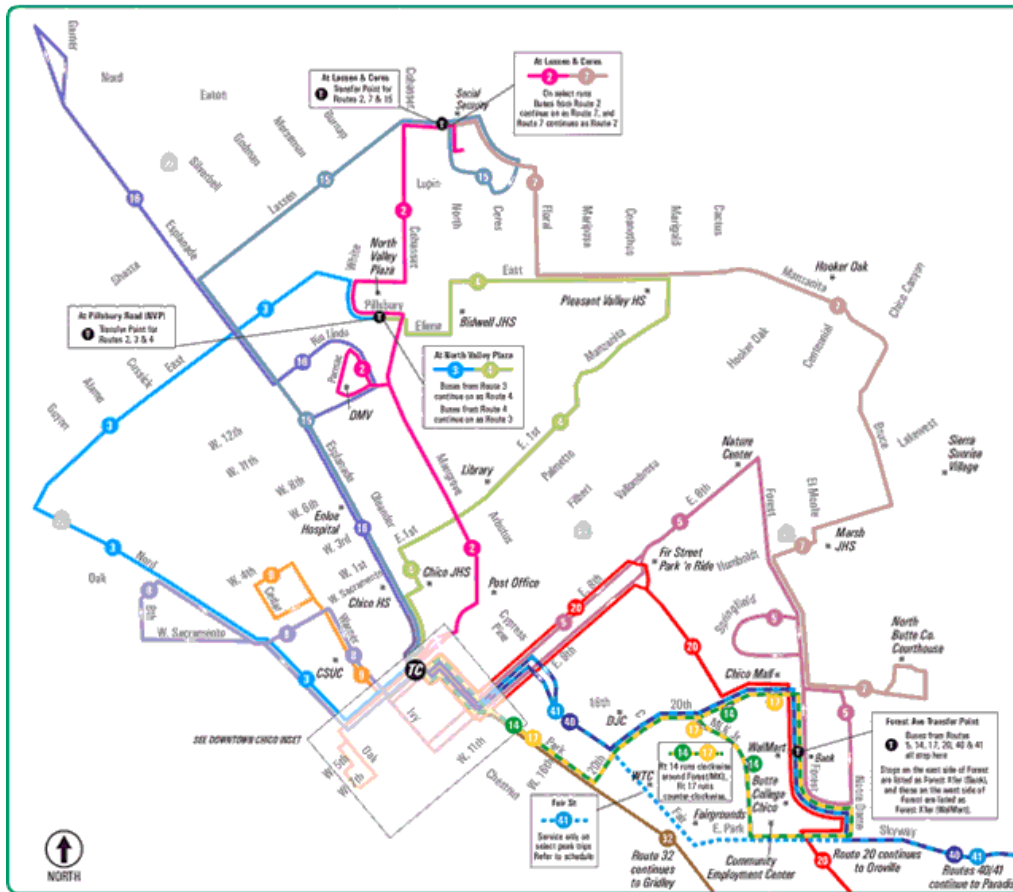
Source: AECOM, B-Line

Notes:

- (a) Headways are approximate and generally represent the minimum headway over the course of the service day. Some routes may have more frequent service during certain times of the day (e.g., AM and PM peak periods), and headways on some routes may differ between the AM and PM peak periods.
- (b) Route 8 and Route 9 only operate during the Chico State school year when classes are in session.
- (c) Route 9c is a supplementary service for Route 9. On Mondays through Thursdays, Route 9c operates 4 trips/day, only when Chico State classes are not in session. On Fridays when Route 9 does not operate, Route 9c operates 4 trips/day spread over the course of the day. On Fridays when Route 9 is operating, Route 9c operates 3 trips/day, all after 4 p.m. (Route 9 service ends early at 4 p.m. on Fridays). On Saturdays, Route 9c operates 5 trips/day.
- (d) Route 32 operates 1 roundtrip/day Mondays through Fridays.
- (e) Route 40 operates 4 roundtrips/day Mondays through Fridays and 3 roundtrips/day on Saturdays.
- (f) Route 41 operates 4 roundtrips/day Mondays through Fridays and 3 roundtrips/day on Saturdays. On Saturdays, 1 of the roundtrips continues as Route 40 to / from Chico, while the other 2 roundtrips require a transfer with Route 40.
- (g) Route 52 operates 5 roundtrips/day Mondays through Fridays.



Figure 11. B-Line Routes in Chico



Source: B-Line.

Existing transit service is fairly robust, but is tailored to existing demand markets (e.g., Chico State) and the Chico Transit Center at West 2nd Street / Salem Street. In particular, routes terminating at the Chico Transit Center and serving areas to the northeast, east, or southeast would, at first glance, appear to be candidates for extension to the station, but are actually interlined with other routes and would require substantial detours to serve the station.

Given these considerations, the following potential improvements to bus service are recommended under the existing (Downtown Chico) station option:

- **Pedestrian connection to West 2nd Street bus stops.** Coordinate with City of Chico to provide proper wayfinding and an attractive pedestrian connection between the station and the existing bus stops at West 2nd Street at Cedar Street. This could include treatments such as sidewalk widening, crosswalk enhancements (e.g., striping or pavement treatments, corner bulb-outs, installation of traffic signals or other traffic control devices, crosswalk daylighting, etc.), or pedestrian realm activation (e.g., street trees or landscaping, street furnishings, etc.).
- **Extension of local B-Line routes to station.** Extend local bus routes within Chico to the station to provide better first-mile / last-mile connections. Based on initial analysis and input from BCAG staff, Route 9, which has a portion of its west loop running along Oak Street, could be shifted closer to the station by continuing east along West 7th Street, and appears to be the best candidate for such an extension. Route 9 already has good on-time performance and could be extended to the station without major deviations from the existing route, resulting in the least impact to existing service and existing riders. Route 2 would also appear to be a potential candidate because it is not interlined with any other routes at the Chico Transit Center, but it already suffers from poor on-time performance and is therefore not recommended for extension to the station.

If extension of local bus routes is deemed infeasible, an alternative solution for consideration could involve establishing a new route to connect the train station and Transit Center. This alternative could be combined with a “circulator shuttle” concept, operating the connection as a one-way (or potentially two-way) loop through Downtown Chico. One potential loop route could be via West 2nd Street, Cedar Street or Orange Street, West 8th Street or West 9th Street, and Broadway Street or Main Street.

- **Extension of regional / rural B-Line routes to station.** In addition to local B-Line routes, extend regional / rural B-Line routes to the station. Based on initial analysis and input from BCAG staff, Route 20 (Chico–Oroville) appears to be the most promising candidate for such an extension, as it is one of B-Line’s best-performing routes in terms of ridership (although it does have some issues with on-time performance). In contrast, the other routes—namely, Route 32 (Chico–Gridley) and Route 40/41 (Chico–Paradise–Magalia)—have very low ridership. While connections to / from Oroville would already be provided at the Gridley station, Route 20 serves multiple stops within Chico proper, and extending it to the station significantly improves local access to / from the Downtown Chico station (given the complications of extending the local B-Line routes operating within Chico).

### *Barber Yard*

The Barber Yard site is largely vacant or unoccupied and is currently not well-served by transit, thus creating challenges with any proposed B-Line deviations to the site. The closest bus service is along Park Avenue to the northeast of the site (Routes 14, 17, and 32) and along the West 8<sup>th</sup> Street / West 9<sup>th</sup> Street couplet to the northwest of the site (Route 5). While an exact station location has not been identified, the walking distance to / from these stops would likely be over one half-mile. Eventual redevelopment of the Barber Yard site could, however, warrant new bus service that could directly serve both the station and the surrounding neighborhoods.

Given these considerations, the following potential improvements to bus service are recommended under the Barber Yard option:

- **Extension of local B-Line routes to station.** Extend local bus routes within Chico to the station to provide better first-mile / last-mile connections. Route 2, which is not interlined with any other route at the Chico Transit Center, could be a candidate for such an extension (e.g., via Broadway Street / Main Street, Park Avenue, and West 16<sup>th</sup> Street).

If extension of local bus routes is deemed infeasible, an alternative solution for consideration could involve establishing one or more new routes that would provide direct connections with the train station. This could be considered in conjunction with bus service improvements for the larger redevelopment of the entire Barber Yard site, which may warrant entirely new routes that could then be easily extended to the station without substantial disruptions to existing B-Line operations.

- Ensure a high-quality connection with the Chico Transit Center to allow for transfers to / from regional / rural B-Line routes.** Given the location of the Barber Yard site, extension of Chico’s existing regional / rural B-Line routes—namely, Route 20 (Chico–Oroville), Route 32 (Chico–Gridley), and Route 40/41 (Chico–Paradise–Magalia)—is likely infeasible due to substantial out-of-direction movement and added running time, which would likely have a substantial impact on operations and on-time performance. Therefore, an alternative solution should focus on ensuring a high-quality connection with the Transit Center, where passengers would then have the option of continuing their journey on other B-Line routes. As mentioned above, this connection could be provided by existing local B-Line routes or by new routes serving the larger Barber Yard development.

### Oroville

The proposed station in Oroville would be located immediately south of Oro Dam Boulevard East, which is already served by B-Line Route 20 (Saturdays only) and Route 25, with additional service provided nearby on Route 26 and Route 27. Although stops are not currently provided in the immediate vicinity of the proposed station, stops could be added along Oro Dam Boulevard East or, if desired, the buses could be extended directly to the station, assuming an access road is provided connecting into the south side of Oro Dam Boulevard East. B-Line’s existing Oroville Transit Center is located approximately one half-mile northeast of the station on Spencer Avenue at Mitchell Avenue. Existing B-Line service in Oroville is summarized in **Table 4** and illustrated in **Figure 12**.

Similar to B-Line service in Chico, B-Line service in Oroville is tailored to existing service demand and operation schemes, and includes interlining of local routes (Route 24 with Route 27, and Route 25 with Route 26) at the Oroville Transit Center. In addition, several of the routes (Routes 20, 24, and 25) are designed partially or entirely as large one-way loops, which may complicate the ability to provide adequate connections with train service. Existing bus service along Oro Dam Boulevard East, for example, is all oriented westbound. Passengers traveling from the Oroville Transit Center to the train station would have a short journey, but passengers in the opposite direction, heading from the train station to the Transit Center, would have to travel the entirety of the Route 20 or 25 loop.

**Table 4. B-Line Routes in Oroville**

Route	Closest existing stop to station	Headways (minutes)			Interlining
		Weekdays	Saturdays	Sundays	
20 (Chico–Oroville)	Oro Dam Boulevard East at Myers Street	60	120	120	—
24 (Thermalito)	Mitchell Avenue at Lincoln Street ( <i>to Thermalito</i> ) Oroville Transit Center ( <i>from Thermalito</i> )	60	—	—	Route 27
25 (Oro Dam)	Oro Dam Boulevard East at Myers Street	60	—	—	Route 26
26 (Olive Highway)	Myers Street at Mesa Avenue ( <i>flag stop</i> )	60	—	—	Route 25
27 (South Oroville)	Myers Street at Mesa Avenue ( <i>flag stop</i> )	60	—	—	Route 24
30 (Oroville–Gridley–Biggs)	Oroville Transit Center	(a)	(a)	—	—

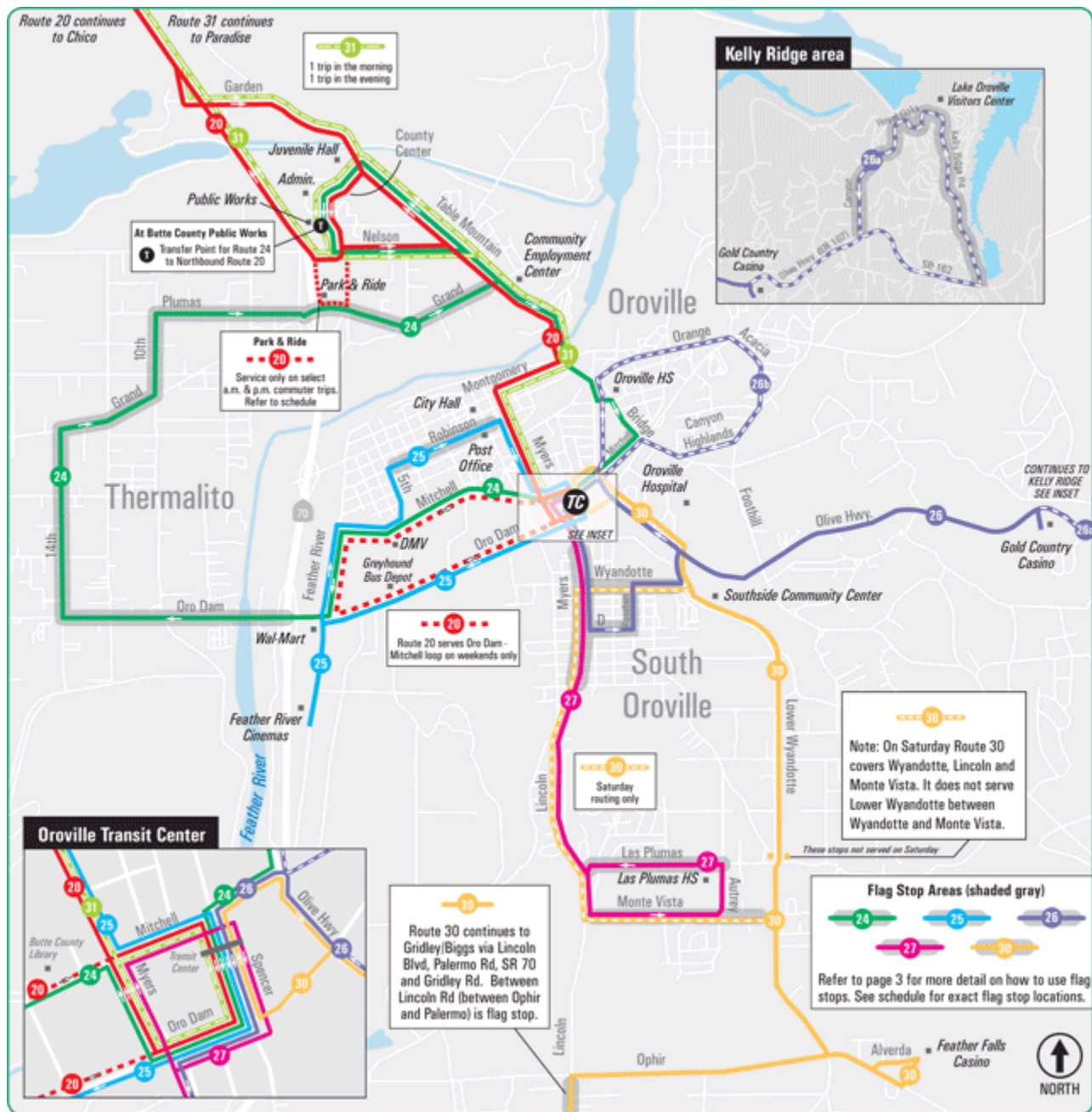
Source: AECOM, B-Line

Notes:

(a) Route 30 operates 3 roundtrips/day Mondays through Saturdays.



Figure 12. B-Line Routes in Oroville



Source: B-Line.

Given these considerations, the following potential improvements to bus service are recommended:

- Extension of local B-Line routes to station.** Extend local bus routes within Oroville to the station to provide better first-mile / last-mile connections. Given the complexities of the current interlining and route alignments, this may require a substantial redesign of the existing system, which would likely entail an in-depth analysis of ridership patterns to avoid loss of service and minimize impacts to existing riders. It should be noted that B-Line is completing a Routing Study that will likely propose new routing within Oroville.

If extension of local bus routes is deemed infeasible, an alternative solution for consideration could involve establishing a dedicated shuttle route between the train station and the Oroville Transit Center. This option

would force most passengers to make an additional transfer at the Transit Center, but allows the connection to be tailored to the train service (e.g., with coordinated schedules), while minimizing impacts to existing B-Line operations.

- **Extension of regional / rural B-Line routes to station.** Extend regional / rural bus routes to the station, including Route 20 (Chico–Oroville) and Route 30 (Oroville–Gridley–Biggs). In addition to providing regional connections to other communities in Butte County, these routes also serve multiple stops within Oroville proper. Given the complications of extending the local B-Line routes operating within Oroville, extending these regional / rural routes to the station therefore significantly improves local access to / from the station.

If extension of regional / rural bus routes is deemed infeasible, an alternative solution would involve ensuring that there is a high-quality connection between the station and the Oroville Transit Center, where passengers could make transfers to / from other B-Line routes. As mentioned above, this connection could be provided by local B-Line routes or by a dedicated shuttle route.

- **Expanded service days and hours.** Expand service days and hours to ensure connecting service is available every day (7 days a week, including holidays) and for all scheduled trains. For regional / rural bus connections that may only reasonably warrant 1–2 roundtrips a day, the service should be appropriately timed for train connections and keyed to the communities and travel patterns that would need to be served. However, high priority should be placed on Route 20 as the primary bus connection to / from Chico, and timed connections should be provided to the maximum extent possible for this route. Connecting service for the populous foothill communities (Paradise and Magalia) should also be a high priority, albeit lower priority than a Chico connection.

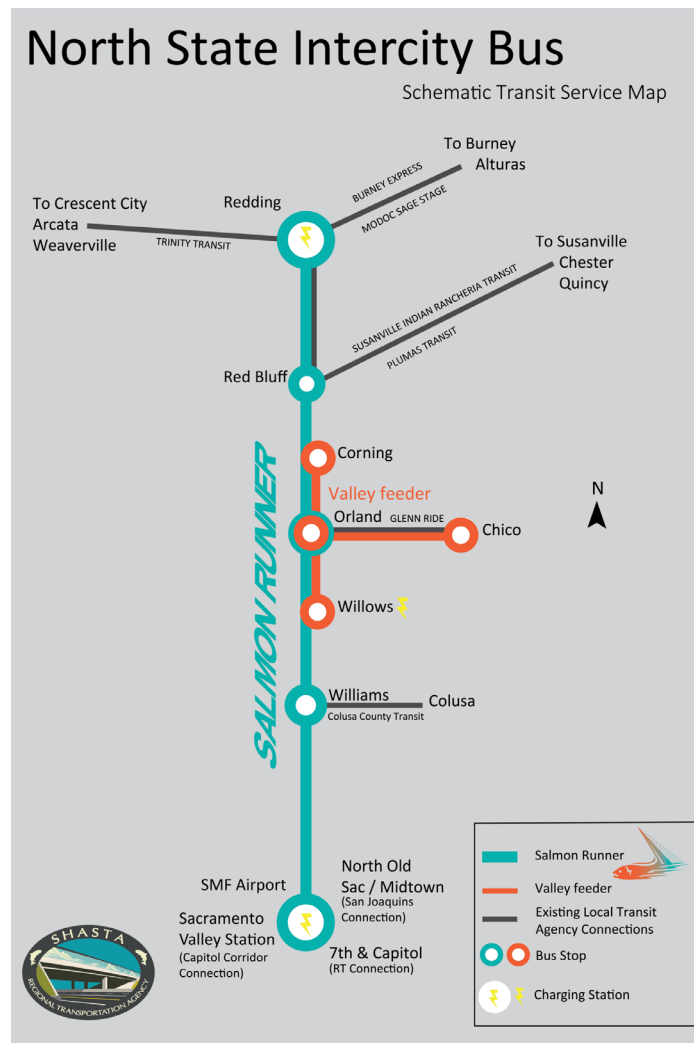
### Other Bus Connections

In addition to the local / regional bus connections described above, additional bus service improvements are recommended:

- **Glenn Ride improvements.** Work with County of Glenn on adjustments to the existing Glenn Ride service connecting Willows, Orland, and Chico, which currently provides 7 roundtrips/day Mondays through Fridays and 3 roundtrips/day on Saturdays and holidays. The route currently terminates at Chico Transit Center and could be extended relatively easily to either the Downtown Chico station or the Barber Yard station. Train connections should be provided every day and for all scheduled trains.
- **Red Bluff and Redding connection.** Work with the Redding Area Bus Authority (RABA), the Shasta Regional Transportation Agency (SRTA), and other partners on bus connections between Oroville, Chico, Red Bluff, and Redding. As illustrated in **Figure 13** below, the planned Salmon Runner service will run along Interstate 5 (I-5) between Redding and Sacramento, with intermediate stops at Red Bluff, Orland, Williams, and Sacramento International Airport. The Salmon Runner also includes proposed feeder service at Orland to provide connections for Chico, Corning, and Willows.

With the extension of trains north of Natomas, there will be partial overlap in ridership markets between bus and rail services, and the goal should be to ensure that the two services are complementary and synergistic, as opposed to duplicative and competitive. This may ultimately mean that the Salmon Runner remains separate from North Valley Rail, retaining its connections with ACE and the *San Joaquins* at the planned station in Old North Sacramento (in lieu of any of the new North Valley Rail stations). In that case, separate bus service out of Chico or Oroville would likely be needed to provide connections to / from Redding and Red Bluff.

**Figure 13. Salmon Runner Schematic Route**



Source: Shasta Regional Transportation Agency.

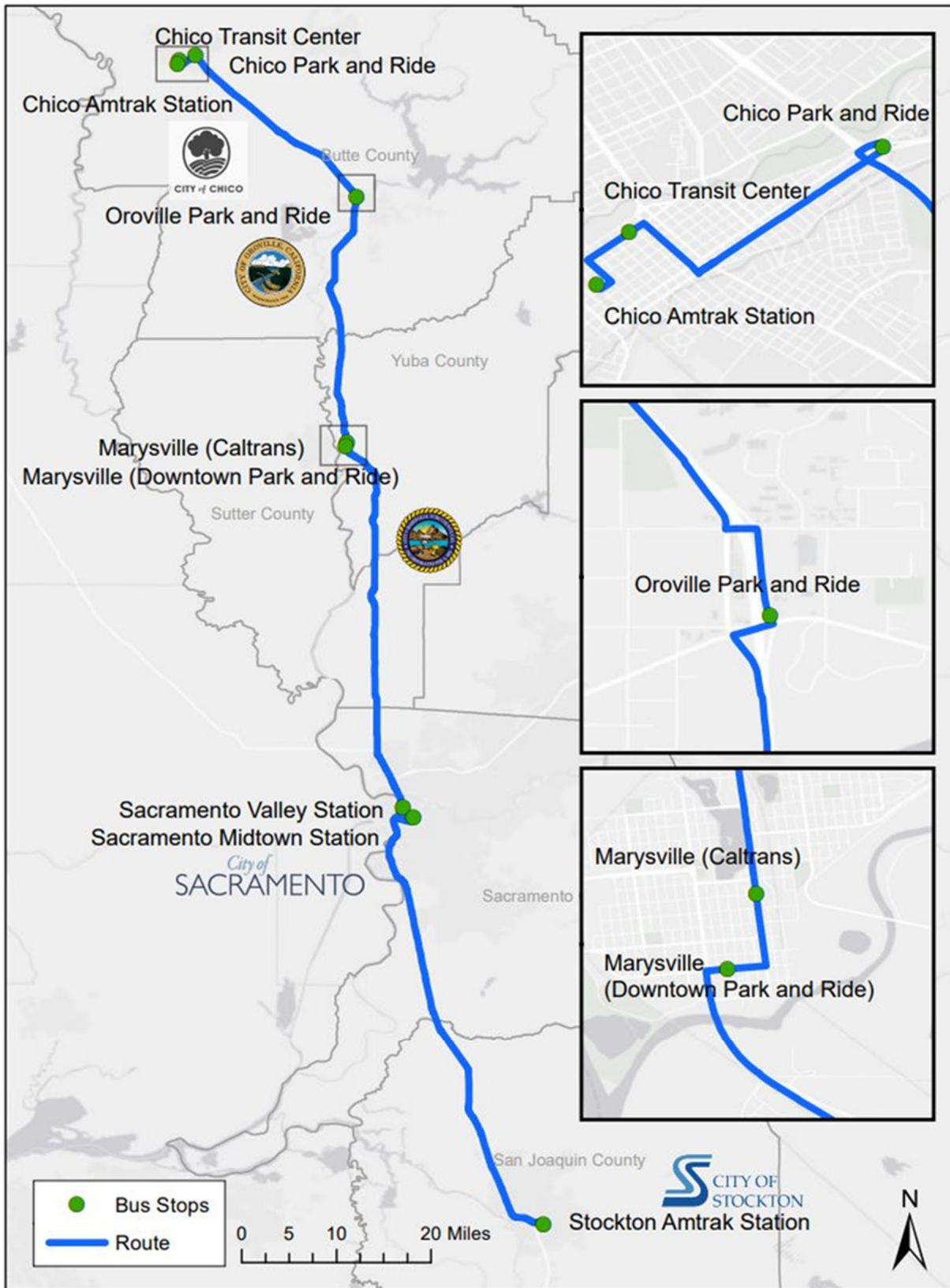
- **Supplementary parallel bus service.** As mentioned earlier, BCAG currently has plans to operate an enhanced intercity bus service within the North Valley Rail corridor as a precursor to the extension of train service north of Natomas. The basic parameters for this initial bus service were developed by BCAG (in partnership with B-Line, SJJPA, and Caltrans) as part of the Chico to Sacramento Inter-City Transit Strategic Plan (January 4, 2022).

The plan calls for 9 roundtrips/day on weekdays and 8 roundtrips/day on weekends on a route linking Chico, Oroville, Marysville, and Sacramento, with selected bus trips continuing to / from Stockton, as shown in **Figure 14**. All trips would connect with the Capitol Corridor at Sacramento Valley Station, with some also serving Midtown Sacramento Station (some trips could skip Midtown Sacramento Station if there is no train connection possible at the scheduled time).

As North Valley Rail only proposes to extend 4 roundtrips/day north of Natomas in the mid-term timeframe (as early as 2029), the remaining 6 roundtrips/day (3 roundtrips/day each for ACE and the *San Joaquins*) on the Sacramento Extension would continue to terminate at Natomas after the opening of North Valley Rail. Therefore, it is recommended that the Chico–Sacramento bus service be retained (with modifications as needed) after the start of North Valley Rail service to provide connecting bus service for the train slots terminating at Natomas.



Figure 14. Chico–Sacramento Intercity Bus Route



Source: Chico to Sacramento Inter-City Transit Strategic Plan (January 4, 2022).

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## Rolling Stock Specifications

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As North Valley Rail will build off of the Sacramento Extension, the proposed rolling stock will be the same as that for the larger ACE and *San Joaquins* systems for the mid-term horizon. As the terrain through the North Valley is mostly flat, there is no specific need for higher-specification equipment or double-heading of locomotives, and trains would generally consist of one locomotive plus a series of passenger cars, similar to the rest of the ACE and *San Joaquins* systems.

Station locations have been initially screened against a 705- to 810-foot design length for platforms, which accommodates the maximum expected consist length<sup>(2)</sup> of one locomotive plus 8 passenger cars. This consist reflects a requirement for up to 8 passenger cars for ACE trains and a less stringent requirement for up to 7 passenger cars for *San Joaquins* trains.

While ridership within the North Valley may not warrant the longest trains (i.e., with 8 passenger cars), the consist length is ultimately dependent on the ridership at the maximum load points of the overall routes, which would likely be on segments elsewhere in the system. In addition, future-proofing North Valley Rail to allow for operation of longer trains if and when warranted by ridership demand is a sound principle in the early planning and design stage and potentially avoids costly upgrades down the road.

Based on current SJRRC and SJJPA fleet plans, future locomotives will be rated for Tier 4 compliance or better in terms of emissions standards and will, at the very least, be powered by renewable diesel. However, SJRRC and SJJPA are currently in the process of working with the State to explore, test, and procure new rolling stock for ACE and the *San Joaquins* that could go beyond these specifications. This may include hybrid or zero-emissions trains powered by hydrogen fuel cells for both ACE and the *San Joaquins* and the use of distributed-power equipment (i.e., multiple-unit trains) instead of locomotives for ACE.

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(2) In railroad operations, a “consist” refers to a set of vehicles forming a complete train.