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August 10, 2025

To: Riverside County Transportation Commission

Submitted by email to: publictransit@rctc.org

Attn: Transit Needs Public Hearing/ Comment on rail and transit in Riverside County

The Rail Passengers Association of California and Nevada (RailPAC) is pleased to offer these comments to the Riverside County Transportation Commission (RCTC) on the transit needs within Riverside County. These comments are largely same in a March 31, 2024 letter from RailPAC to RCTC on the draft Traffic Relief Plan (TRP). RailPAC is a 501c3 volunteer group of railroad professionals and advocates that has campaigned for improved personal mobility in California and the west since 1978.

Riverside County is a strategically important location for rail transportation in California, and the West. Both the Union Pacific (UP) Railroad and BNSF Railway's main lines east from Southern California to the rest of nation pass through the county. Therefore, investments in Riverside County rail infrastructure are key to maximizing the benefits of passenger and freight rail throughout Southern California, and along interstate rail networks far from California: the UP Sunset Route to New Orleans, and the BNSF Southern Transcon to Chicago. These vital transcontinental mainlines host the Amtrak *Sunset Limited* and the Amtrak *Southwest Chief*, respectively. Rail infrastructure investments will improve not only regional passenger rail such as Metrolink and the future intra-California passenger trains to the Coachella and Imperial valleys, but also new trains between Southern California and Arizona, and increased frequency on the *Sunset Limited* and other long-distance routes. Improved rail connections to the rest of the country will provide significant economic and environmental benefits to Riverside County.

Regional and intercity passenger rail must be developed as a cornerstone of Southern California's transportation and land use investments between now and the year 2050. RailPAC sees enhanced regional and intercity passenger rail as critical, along with complementary improvements in the freight rail system. Aside from the obvious publics benefits of reducing air pollution, getting cars off the road and providing additional transportation capacity, efficient passenger rail travel is vital to California's economic well-being. The livelihood and security of all Californians cannot be dependent upon increasingly congested and deteriorating highways, rail networks and airports. The needs of non-drivers are just as important as those of drivers. Millions of residents in Southern California do not drive because they are too young or too old, have a medical condition that prevents them from driving, or cannot afford a car/truck or the fuel needed for all trips. Rail and transit should be viewed in this context. Thus, representation of 'non-drivers' is needed in Riverside County's transportation decision-making.

RailPAC has always focused on intercity passenger service and regional rail. While it is important to move large numbers of people short distances by local transit, it is equally beneficial to move smaller numbers of passengers over relatively longer distances. An intercity train journey of 50 miles or more is the equivalent of a dozen or so local transit journeys in terms of vehicle miles avoided. Southern California is also behind in the fight against air pollution, including greenhouse gas emissions as transportation emissions rise while those of other sectors decline. Regionwide rail electrification is long overdue. Given the long timeline needed to implement rail projects, the more "front end" planning and initial rail project funding we do now, the better.

Coachella Valley Rail

RailPAC applauds this effort to advance additional intercity rail service between Los Angeles Union Station ("LAUS") and the Coachella Valley. This new rail service has long been a goal of our organization, the California State Rail Plan, and Riverside County, and has been studied at least seven times by public agencies since the early 1990s.

RailPAC has been pleased to see RCTC lead the development of the Coachella Valley-San Gorgonio Pass Rail Corridor Service Project. RailPAC also wants to emphasize how this project can open the door for future projects and goals much greater than the initially proposed new passenger rail service of two daily round-trip LAUS-Coachella Valley trains. We strongly encourage RCTC to initiate the service with more than two roundtrips per day (at least six), and to build the new third-mainline track to 90-110 mph train speed specifications. Our feeling is that these infrastructure enhancements would not add that much cost to the overall program but would more than double the benefit to the travelling public and to the regional economy and environment.

RailPAC believes that it is also essential for plans to upgrade rail capacity through San Gorgonio Pass and the Coachella Valley to include upgrading the existing Amtrak *Sunset Limited* (which goes from LA to New Orleans via Palm Springs) to daily service, up from the current three days per week. A daily *Sunset Limited* would greatly benefit the Coachella Valley. Amtrak should also add Indio as a stop on the *Sunset Limited/Texas Eagle.* New regional California-Arizona passenger trains (LA-Coachella Valley-Phoenix-Tucson) are needed as well.

RCTC will hopefully soon update the CVR Service Development Plan (and complete Step 2 of Corridor ID program), and then release the Tier II EIS/EIR and engineering phase to get the project 'shovel ready'. This year and next year will be the time for RCTC and its partners to secure as many passenger train slots as possible from the Union Pacific (UP) Railroad, utilizing the proposed new Colton-Coachella third mainline track (not just for CVR, but also daily *Sunset Limited* and new Arizona and Imperial Valley regional trains).

In the near term, RCTC should work with the LOSSAN Rail Corridor Agency, Caltrans, and Imperial County to expand existing Amtrak Thruway bus #39 service by adding more daily frequencies (up from the current 2/day) to Palm Springs/Indio, and an extension of at least one of these route #39 bus daily round trips to Calexico.

Coachella Valley special festival trains

Special trains to the Coachella and Stagecoach music festivals in Indio should be supported by RCTC and its partners. More than 125,000 people descend on the Coachella Valley each of the three weekends in April that the annual events take place, causing massive traffic jams Thursday through Monday that would be mitigated by passenger train service.

For the 2020 Coachella music festival, RCTC and the Los Angeles-San Diego-San Luis Obispo (LOSSAN) Rail Corridor Agency requested access to run special Amtrak trains to the music festivals. The 10-car train would have operated on *Pacific Surfliner* equipment, with each trip accommodating up to 750 passengers. The Coachella special event train was planned to have two daily round-trips between LAUS and a newly constructed platform in Indio, with a connecting shuttle to the festival grounds at the Empire Polo Club. A similar train operated in 2008, when festival promoter Goldenvoice cut a one-year deal with Amtrak for the Coachella Express between LA and Indio. The train featured a makeshift dance floor, and passengers were treated to live DJ sets. Amtrak management coordinated this with UP.

In 2019, the California State Transportation Agency awarded a $5.9 million State Rail Assistance program grant to RCTC for constructing a 900-foot train station platform, station siding track, and pedestrian facilities in Indio. RCTC contributed an additional $2.7 million to build the $8.6 million project, which included the station improvements along with operating expenses for the special event train between 2021 and 2025. While originally planned to start in April 2020, delays (including protracted negotiations with the host railroad Union Pacific) prevented it from taking off in time, even before the festivals were cancelled due to COVID-19. Based on the current circumstances and discussions with the host railroads, this project is currently on hold until some future date. RCTC should again work with Goldenvoice, Amtrak and UP to implement a festival train, before opening of the regular CVR service. It would be a great promotion for the future CVR service.

Palm Springs station sand management plan

In addition to stations listed below, a durable long-term solution is needed for the recurring sand issues at the Palm Springs station. Amtrak *Sunset Limited* service has been bypassing Palm Springs for extended periods in the past few years. When this happens, then there is no *Sunset Limited* train access at all in Riverside County, underscoring the importance of adding an Indio station to the *Sunset Limited*. Sand around the Palm Springs area could be a risk to higher track speeds for future passenger trains. Discussions on this issue are ongoing between the City of Palm Springs, Amtrak and UP. In late 2023, RCTC submitted an application for federal PROTECT climate resiliency grant in cooperation with Amtrak, although was not successful in receiving grant funds. RCTC must continue to work with UP, Amtrak and the City of Palm Springs on a permanent solution to the sand problem at the station.

New CVR stations

In addition to the stations listed below, there are ongoing efforts to address stations with a study work moving forward in the City of Coachella and the City of Palm Desert.

Loma Linda station-

In the Tier II studies, RCTC needs to work closely with San Bernardino County Transportation Authority (SBCTA) and local stakeholders on the Loma Linda station, which showed good ridership potential in the initial studies.

Corona station-

RCTC has not looked into a Corona North-Main stop for CVR service during the Tier I environmental studies, but RailPAC recommends that it should be investigated during the Tier II study and design work.

Indio station-

In February 2020, the Indio City Council approved a feasibility study of multimodal transportation center built around a future train station. The new full-service Indio passenger rail station is proposed to be built around an initial platform development for special music festival service. It is centrally located in downtown Indio, where Indio Boulevard intersects Jackson Street. The new Indio train station is a centerpiece of the city's plans to revitalize the downtown area. The site is the same location as the historic station opened by the Southern Pacific in 1876. It was a stop on the *Sunset Limited* until being discontinued in 1998 by Amtrak. It is presently a Greyhound/Flix bus station adjacent to sidings along Union Pacific's Sunset Route mainline currently used for storing freight cars. Bus services can also be expanded in the future.

Third Mainline Track from Colton to Coachella

RailPAC fully supports the construction of a new third mainline track along 76 miles of the existing UP Yuma Subdivision between Colton and Coachella. Given the capital costs of the third mainline track proposed from Colton to Coachella, RailPAC wants to emphasize the variety of benefits to passenger and freight rail that are possible with this investment in additional track capacity. Any proposed regional rail service in the CVR corridor, and the capital improvements associated with it, must be recognized as a building block for future expansion. The initiatives described below would add significant public value to any capital grant request for a Colton-Coachella third mainline track.

Greater frequency and speed of CVR passenger trains-

Improvements to the level of CVR service evaluated by the Tier 1 Program EIS/EIR recommended by RailPAC, would be enabled by the third mainline track: far greater frequency (minimum of 6 roundtrips per day, preferably 12 or more) and higher speed (a goal of at least 60 mph *average* speed, up from the roughly 40 mph initially proposed). Fast and frequent service, competitive with driving, is essential to attract a rail ridership significant enough to provide major public benefits of reduced traffic congestion and pollution on the I-10 corridor.

The new LA-Coachella Valley passenger service could potentially be operated by Amtrak, similar to other state intercity rail corridors within California. RCTC's draft plan has an initial proposed frequency of two or three daily round trips using conventional diesel locomotive technology, similar to that used by Amtrak and Metrolink. The initially proposed travel times would be about 3 hours, 15 minutes in each direction, or an overall average speed of about 40 mph due to the need to interface with freight traffic and climb over the San Gorgonia pass. This is 30 to 60 minutes slower than driving, depending on the day of the week and the time of day.

Fast, frequent, and reliable service is essential to attract a rail ridership significant enough to provide major public benefits of reduced traffic congestion and pollution on the I-10 corridor. Passenger rail advocates have called for a higher frequency than the two or three daily round trips proposed by the 2016 plan, along with high speeds. As stated by then-RailPAC President Paul Dyson in a commentary in the Q3 2017 of RailPAC's magazine *Steel Wheels*, "The County's draft plan to add just two or three round trips a day is a waste of money and will not be successful. Trains with an average speed of 40 mph are simply not competitive, given the additional first and last mile legs of any rail journey. …We must aim higher".

RailPAC recommends that 'higher speed' options (90-110 mph where feasible) be studied for CVR. The desert portion is a clear candidate since it's where several support elements for Class 7+ tracks (i.e. long straight stretches, fully grade-separated) already exist. And, of course, eight minutes here, five minutes there, seven minutes somewhere else all add up to more competitive and enticing travel times. The 34-mile segment of the UP Yuma Subdivision between Tipton Road in Whitewater and Coachella, which is already entirely grade separated, with an overall grade of 0.7% (dropping 1,200 ft. in elevation over those 34 miles), should be feasible for faster track. If UP resists any track rating more than 79 mph since UP crews would be doing maintenance ("don't want to do 'extra work' "/ "have more liability"), then RCTC and Amtrak should push back and seek funding to support this higher level of maintenance on the UP-owned right-of-way. There is an existing example of 110 mph trains on UP-owned track on the Chicago-St. Louis Corridor.

The Service Development Plan is separate but related to the EIS/EIR process and required by the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). It is focused on operations: costs, ridership. However, it should not be hard to update it with more than two roundtrips. With the Tier II

project-level document, environmental clearance should include additional service, an order of magnitude greater than two roundtrips per day. The plans for frequent service need to be in place long before the first CVR trains run.

Purportedly it is the Federal PRIIA law, relating to 'no impact' to freight operations, that is limiting RCTC to proposing only two roundtrips a day. This minimal level of service was initially proposed service from alternative analysis started in 2013-2014, using existing infrastructure (two existing UP mainline tracks between Colton and Coachella). The strategy at the outset was to follow PRIIA rules, while doing the new service with existing infrastructure. However, the Rail Traffic Controller models reportedly showed that even with just two roundtrips per day, the service was going to impact UP freight movement. Thus, it was determined that a third mainline track for passenger trains would be necessary for the full Colton-Coachella length of nearly 80 miles. If UP were to insist on a third Colton-Coachella mainline track for any new passenger rail service to begin, then this is yet again another opportunity to plan for far more frequency of passenger trains in the initial CVR service. RailPAC recognizes that there needs to be action on the Federal level (e.g. reforming PRIIA, Surface Transportation Board regulation of the Class Is) to provide greater speed and frequency that we advocates want. However, a $2 billion capital cost for CVR, and six to seven years for planning, is far too much to result in a service of two roundtrips per day and is likely to remain elusively uncompetitive for grants. To provide the most benefit to this huge public investment, RCTC should plan for further increases, which along with complimenting services, should total a dozen LA-Coachella roundtrips:

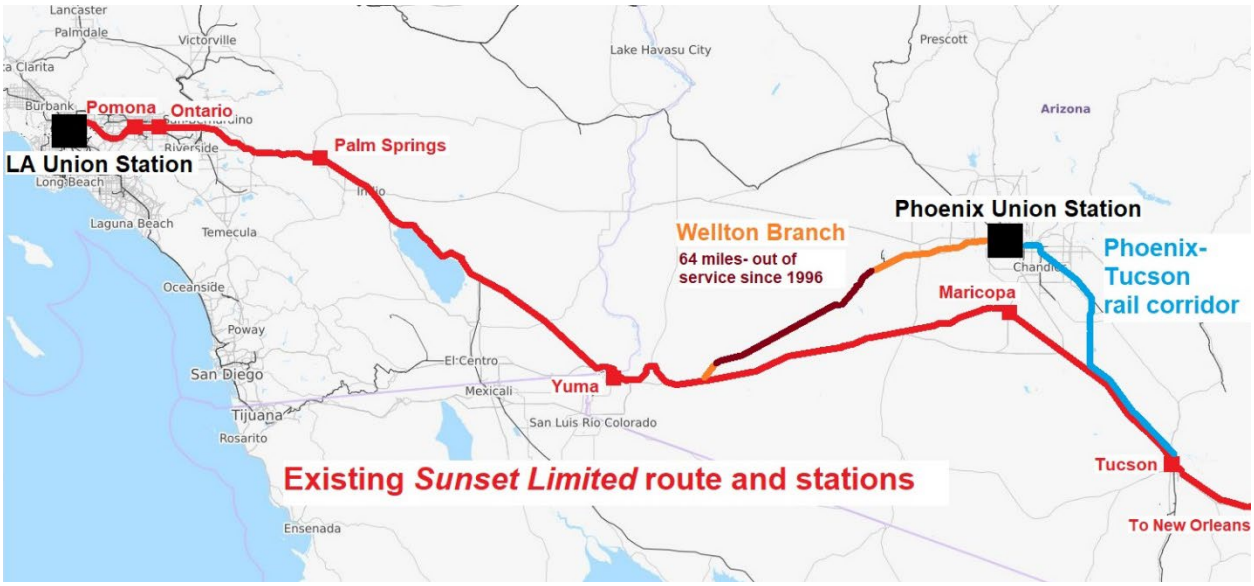
- (4) LA-Coachella (only)
- (5) LA-Coachella-Calexico
- (2) LA-Coachella-Phoenix-Tucson-(Nogales)
- (1) Daily Amtrak *Sunset Limited*

Three tracks between Colton and Coachella, combined with completion of double track in Imperial County (between Coachella and Yuma), and reopening of Arizona's Wellton Branch, should be more than enough capacity to allow all of the above services listed. In order for RCTC to "sell" the $2 billion capital cost of CVR to local taxpayers and to state and federal funders, it is helpful to emphasize that the more passenger train services enabled by the Colton-Coachella 3rd track, the better—especially those which connect Western Riverside County and the LA mega-region with not only the Coachella Valley but also the Imperial Valley, Arizona, and national network destinations via the Amtrak *Sunset Limited*.

Daily Amtrak Sunset Limited-

Increase of the frequency of Amtrak's *Sunset Limited* to New Orleans (via Tucson, El Paso, San Antonio and Houston) from tri-weekly to daily service has long been a goal of RailPAC. The train also provides through service to Chicago via Austin, Fort Worth, Dallas, Little Rock and Saint Louis on the *Texas Eagle* (with a section of cars splitting at San Antonio). Of the multiple congestion bottlenecks along the *Sunset Limited* route between LA Union Station and New Orleans, which purportedly need to be addressed to allow daily service of this long-distance Amtrak train, the San Gorgonio Pass/Coachella Valley segment in Southern California is among the most important. The Colton-Coachella third track proposed for CVR offers the solution. RCTC also has leased track access and slots from the freight railroads for Metrolink trains since the early 1990s on the BNSF San Bernardino Subdivision between LA, Fullerton, Riverside, Colton and San Bernardino, which has been proposed as the new routing for a daily *Sunset Limited*. There has long been wide-ranging support in the Coachella Valley for a daily *Sunset Limited*. Indio has been pushing for *Sunset Limited* service to return to their community as well, and a new station built for the CVR service should also serve Amtrak trains. *Sunset Limited* ridership to/from Palm Springs and Indio would increase once the route is restored through Phoenix via the Wellton Branch in Arizona[1] .

[1] RailPAC November 2022 article, "The Curious Case of the Union Pacific's Wellton Branch: Opportunity in the 'Phoenix West Line'":



A daily *Sunset Limited* would complement the regional CVR service. One of the markets served by Amtrak long-distance trains are shorter distance corridors. The *Sunset Limited* can add an extra schedule at off-peak times to add options and customer value to the CVR. The current schedule of the *Sunset Limited*, which serves the Palm Springs station late in the very late evening/very early morning, certainly offers such an opportunity. In February 2024, Amtrak received a Corridor ID grant for the daily *Sunset Limited*, and it was highlighted by the FRA Amtrak Long Distance Study[2].

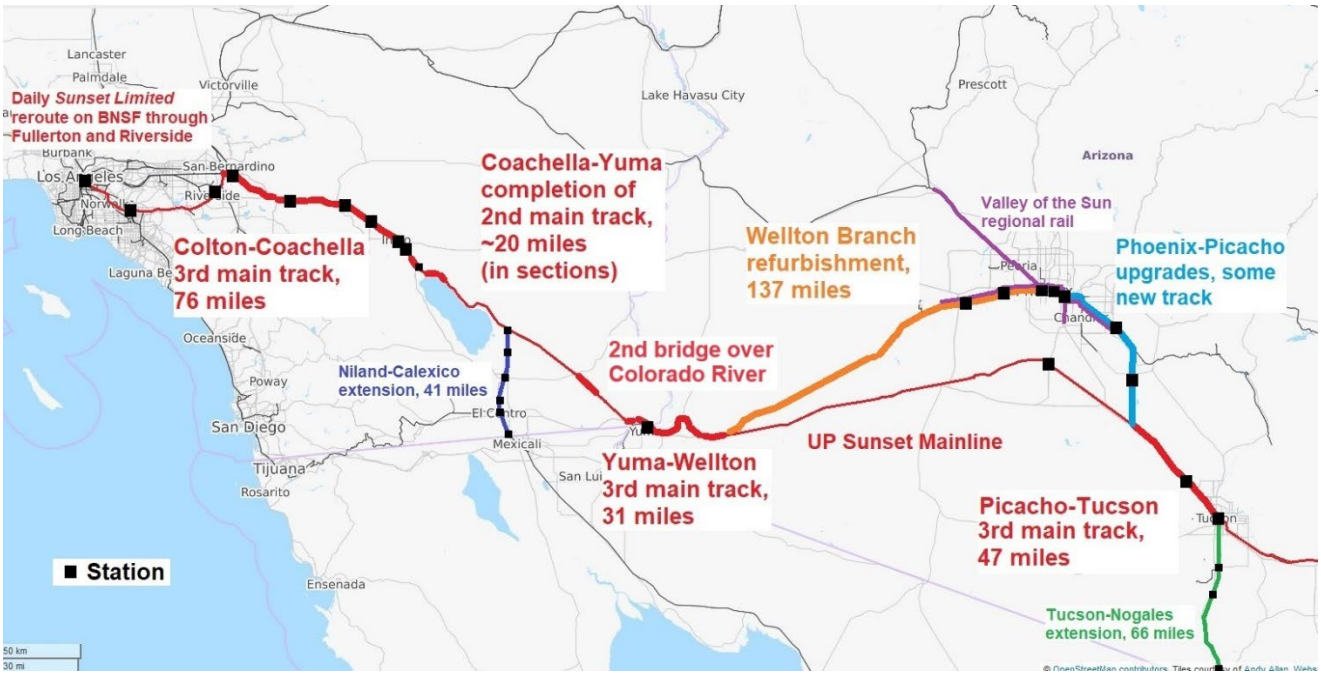
New California-Arizona regional passenger service-

Amtrak's May 2021 Connects US 'Corridor Vision' proposed one daily roundtrip of a LA-Arizona regional service, between LAUS, the Coachella Valley, Yuma, Phoenix and Tucson. For the long term, a daily *Sunset Limited* on its own is not sufficient to be the prime mover of rail passengers between LA, Coachella Valley, Phoenix and Tucson. RailPAC recommends that dedicated Southern California-Arizona corridor passenger trains should start with a minimum service of two daily trains each way, morning and early afternoon from both LA and Phoenix/Tucson (further complementing other future LAUS-Coachella Valley and Tucson-Phoenix trains). An important first step to improve passenger rail service between LA and Arizona would be for RCTC to reserve passenger train 'slots' on UP and BNSF tracks in Southern California, to accommodate a daily *Sunset* train (both ways) along with new Coachella Valley passenger trains. Securing these slots as part of the current RCTC Coachella Valley rail planning process would be early win for the daily *Sunset Limited* campaign.

The 2018 California State Rail Plan called for development of future electrified regional services and phased implementation of HSR services in the Inland Empire. Phase 2 of California High-Speed Rail plans to pass through Riverside County on the way to San Diego, and could connect to rail eastward to the Coachella Valley and Arizona.

https://www.railpac.org/2022/11/21/the-curious-case-of-the-union-pacifics-wellton-branch-opportunity-in-the-phoenix-west-line/

[2] https://fralongdistancerailstudy.org/



Proposed rail infrastructure improvements along the UP Sunset Route supported by RailPAC and All Aboard Arizona

Benefits to UP freight rail-

According to the CVR Tier I EIR documents, steady growth of UP freight traffic on the Yuma Subdivision is projected to increase to 88 daily one-way freight trips on the Colton-Coachella segment by 2044. The current 'practical capacity' of the Yuma Subdivision is estimated at around 47 trains per day. While UP has invested in many track capacity improvements on the Sunset Route over the years, one of its chokepoints remains the San Gorgonio Pass/Coachella Valley. With a new third main track dedicated to passenger service, UP could run more conventional long-distance freight trains on the existing two tracks between Colton and the Coachella Valley. Future short and medium-haul freight trains from LA/Inland Empire to the Coachella Valley and Arizona could be justified on public benefit of getting trucks off of I-10.

Imperial Valley extension

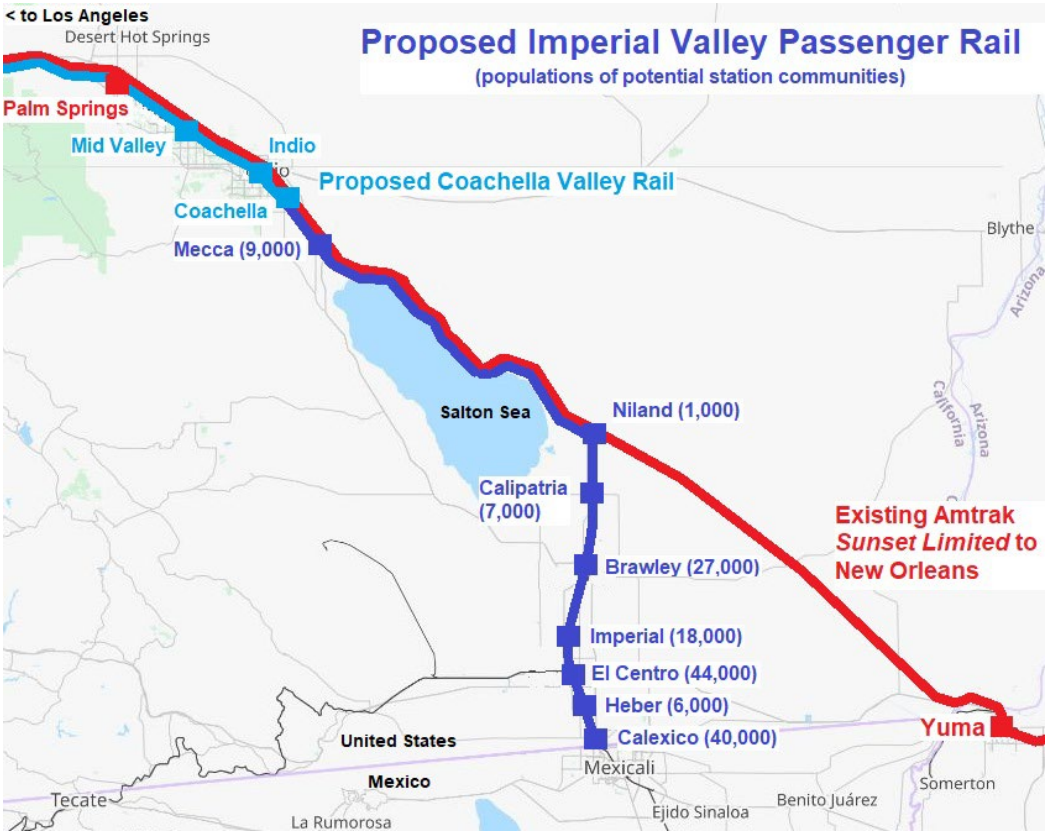
Some trains of the LAUS-Coachella Valley service should extend to Brawley, El Centro and Calexico in Imperial County (as described RCTC's 1991 *Los Angeles - Coachella Valley - Imperial County Intercity Rail Feasibility Study*)[3]. The 1991 RCTC study proposed new stations at the same sites as demolished historic Southern Pacific depots in El Centro (between Main Street and Commercial Ave.) and Brawley (Main Street). The 1991 study also described track and grade crossing improvements needed along the 41-mile Calexico Subdivision between Niland and Calexico (now owned by UP). RCTC should work with Imperial County pursue to Federal and state grants for a feasibility study of LA-Calexico passenger rail service.

The combined population of the bi-national region of Imperial County/Mexicali Municipality is over 1.2 million people, providing a valuable international connection opportunity and ridership driver for CVR service. In 2023, the Calexico West Port of Entry saw 8.2 million passengers in northbound personal vehicles, and over 3 million northbound pedestrian crossings. This works out to an average of nearly

[3] This 2022 article by RailPAC outlines the Imperial Valley Rail proposal: https://www.railpac.org/2022/08/11/passenger-rail-to-the-imperial-valley/

31,000 people per day, well over 8,000 of which are pedestrians. Travelers from all parts of Mexico (and beyond) take buses and airplanes to/from Mexicali, and walk across the border to connect to intercity buses originating in Calexico. Mexicali International Airport saw 1.6 million passengers in 2023. The border crossing is in downtown Calexico, adjacent to the railroad border crossing and walking distance from the potential/historic rail passenger depot site. While Calexico and other Imperial Valley communities are served by Greyhound/Flix and other private intercity bus and shuttle operators, public intercity transportation options are limited. Imperial Valley Transit provides local bus service between Imperial County cities and to Yuma, but not to any destinations in the Coachella Valley or elsewhere in Riverside County. As mentioned above, in the near term RCTC should work with the LOSSAN Rail Corridor Agency, Caltrans, and Imperial County to expand existing Amtrak Thruway bus #39 service with an extension of at least one of route #39 bus daily round trips to Calexico.

The Calexico East Port of Entry is where all truck traffic entering the United States from Mexicali is inspected. In 2023, Calexico East saw over 460,000 trucks cross into the U.S. (or an average of nearly 1,300 per day). Mexicali is a major manufacturing center, with most of the goods produced exported to the U.S. though the Imperial Valley. With track infrastructure improvements, much of this freight could be shifted from truck to rail, which would greatly reduce truck traffic and pollution. UP has also been promoting development of the rail-served Imperial Valley Industrial Park on the Northeast side of El Centro, and UP-delivered containers are already being stored along a loop track at rail-served All American Grain facility in Calipatria[4]. If the Salton Sea geothermal lithium mining industry takes off, sufficient freight rail capacity and reliability will be needed to support the industry. Moving bulk lithium by rail is much safer and more environmentally friendly than shipping it by truck, and should prove more economical.



[4] https://imperialvalleyrail.com/

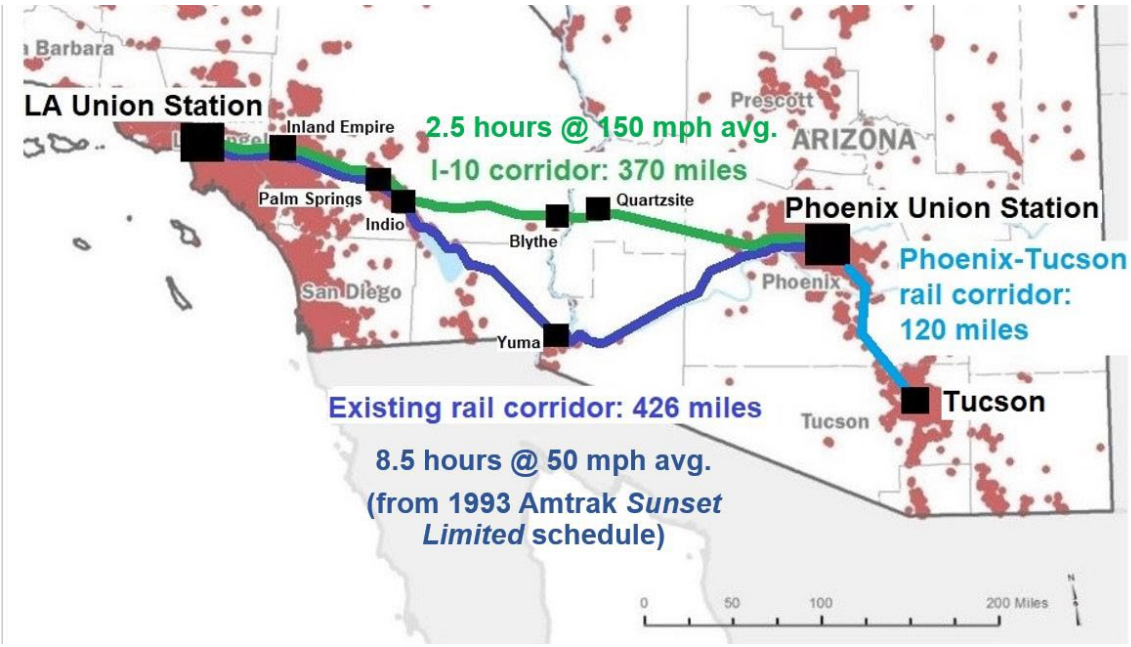
The Coachella Valley town of Mecca in Riverside County has a population of nearly 9,000 people, and should be investigated as a stop on rail service between Coachella and the Imperial Valley. The town is now benefiting from RCTC's Avenue 66 grade separation project, which opened to traffic in March 2022. A future passenger train station at Niland would serve as a connection point for train passengers changing between the Imperial Valley and interstate trains such as the *Sunset Limited* and future California-Arizona regional services.

CVR and future high-speed rail to Phoenix

The concept of future LA-Phoenix high speed rail through the Coachella Valley was described in a RailPAC article from 2022[5]:

> A new route along the I-10 corridor via Blythe would save about 55 miles of distance, or a 12% reduction in overall trip length. The new dedicated track on this very straight corridor could be designed to handle trains 200 mph or faster, several times the speed of the existing Sunset Route and Wellton Branch. As described by RailPAC President Steve Roberts:
>
> "If you operate more than four frequencies you are going to have add much capacity on the Sunset Route, then you might as well build a separate high-speed passenger railroad…. spending billions for a 50 mph railroad to get 3 or 4 frequencies does not make sense. In my opinion, beyond a daily Sunset and a couple of frequencies, Riverside County Transportation Commission ought to focus on high-speed rail as a solution utilizing an upgraded current Metrolink Riverside route through the urban area, then a Route 60 alignment Riverside to Beaumont (these segments publicly funded as a starter route) then let the private sector finish it to Phoenix."
>
> RailPAC's position is to support any operator, public or private, who can provide safe, reliable passenger rail service for a fair price, and would welcome discussion with Brightline or a similar company about the LA-Coachella Valley-Phoenix-Tucson corridor. In the future, both LA-Indio and Tucson-Phoenix service could be upgraded to 'higher speed' electrified service [on the existing Yuma Subdivision corridor], at speeds up to 125 mph, on 'blended' corridors which would also host trains going over 125 mph on the [Beaumont]-Indio-Phoenix segment [along the I-10 corridor]. …Between LA and [Beaumont or] the Coachella Valley, blended high-speed trains could run on the same tracks as non-high speed commuter/regional trains. Then east of Indio [or Beaumont], HSR trains could run at truly high speeds all the way to Phoenix. Assuming this new track would run along the existing I-10 freeway right-of-way (in a similar manner proposed by Brightline along I-15 to Las Vegas), the distance would be about 250 miles between Indio and Phoenix.

[5] https://www.railpac.org/2022/06/03/the-prospects-for-future-la-phoenix-passenger-rail/



Palo Verde Valley

A bus connection could be tested between Blythe and the Amtrak stations in Needles (served by the *Southwest Chief* between Los Angeles and Chicago) and Yuma (served by the *Sunset Limited*). Both of these bus rides would be less than two hours in length. Alternatively, an extension of the existing Fullerton/Palm Springs/Coachella Valley Route 39 Thruway service would also provide a connection to the rest of the county and greater Southern California region.

The Palo Verde Valley is also a potential stop on a future LA-Phoenix high speed rail corridor. As described in a June 2022 RailPAC article, "The Prospects for Future LA-Phoenix Passenger Rail"[6]:

> Even with a brand new HSR track corridor built from Indio to Phoenix (via Blythe) along I-10, the *Sunset Limited* and other passenger trains would still serve Yuma on the Sunset Route, and Phoenix on the Wellton Branch. The greater Yuma area has over 200,000 year-round residents (more in winter), and is worthy of daily train service to Phoenix and LA. The *Sunset* could also provide a useful late night/early morning compliment to LA-Coachella Valley or Phoenix-Tucson service.
>
> High speed train service between LA and Phoenix could make mid-point stops at Blythe and Quartzsite, which would be a great aid to the economic development of these desert towns. Quartzsite, Arizona has about 4,000 year-round residents but the area can swell to over a quarter million than in the winter months, with snowbirds bringing their RVs from colder climates. Quartzsite is the largest city, and gateway to La Paz County (pop. 20,500) and recreational sites on the Colorado River. Year round visitors and winter snowbirds alike are all attracted by boating and other activities along the river. From a future rail station, passengers could connect from the Quartzsite station by bus 35 miles north to the county seat Parker, and further north to Parker Dam and Lake Havasu. Blythe, California has about 21,000 people, in an area along the Colorado River also attracting hundreds of thousands long-term visitors in winter. Within a 50-mile radius of Blythe (which includes Quartzsite, Parker and the Parker Strip along the river) in the mid-winter there can be over half a million snowbirds! Thousands of winter RV residents in the Blythe and Quartzsite areas could make quick getaways to Phoenix, Palms Springs or LA via high speed rail.

[6] https://www.railpac.org/2022/06/03/the-prospects-for-future-la-phoenix-passenger-rail/

Western Riverside County

RailPAC is very supportive of the passenger rail goals listed on p. 16 of RCTC's draft 2024 Traffic Relief Plan. It is very encouraging that Traffic Relief Plan funds will enable the stated goals of:

- Increasing Metrolink 91/Perris Valley Line and Inland-Empire Orange County Line to eventually every 30 minutes each during peak periods.
- Expand new rail service into-areas of Riverside County such as the Beaumont/ Banning/Cabazon/Calimesa area, the Coachella Valley, and Hemet and San Jacinto.
- Construct new rail stations on existing lines, such as at the Ramona Expressway, at Madison St./Casa Blanca, at Magnolia Ave./Riverside Plaza.
- Maintain and enhance management of publicly owned railroad rights-of-way to ensure proper maintenance and safety.
- Maintain and enhance security and safety at rail stations.

Additional passenger rail needs, not stated above though worthy of funding support include:

- Near-term: improve bike and pedestrian connections to train stations (in surrounding neighborhoods) to lower travel time for those modes.
- Mid-term: advocate for early investments to align proposed projects with future California High-Speed Rail Phase 2 construction and operation.
- Long-term: support Phase 2 of the California High-Speed Rail project connection Los Angeles to San Diego via the Inland Empire.

Perris Valley Line

In July 2025, the Perris Valley Line (PVL) saw 2.7 miles of second track completed , along with improvements to the Moreno Valley/March Field station. In early 2026, construction is anticipated to begin on an additional 6.5 miles of added 2nd mainline track from Moreno Valley station to Perris. Building on these investments, funding needs to be identified for building the future Mead Valley Metrolink station and the South Perris Metrolink Maintenance Facility, along with a 4th track for South Perris layover facility[7].

PVL extension to Hemet and San Jacinto-

Extending Metrolink service on the PVL to Hemet and San Jacinto and the existing RCTC-owned rail corridor has long been discussed. RCTC's 2019 'Next Gen Rail Study' looked at PVL extensions to Hemet and San Jacinto[8]. The line is currently out of service beyond the redboard just past I-215. Many years ago it was used by Santa Fe freight trains for agricultural shipments as far as San Jacinto. The 2016 SCAG Regional Transportation Plan and 2019 RCTC Next Generation Rail Corridors Analysis estimated

[7] https://www.rctc.org/projects/perris-south-metrolink-station-and-layover-facility/

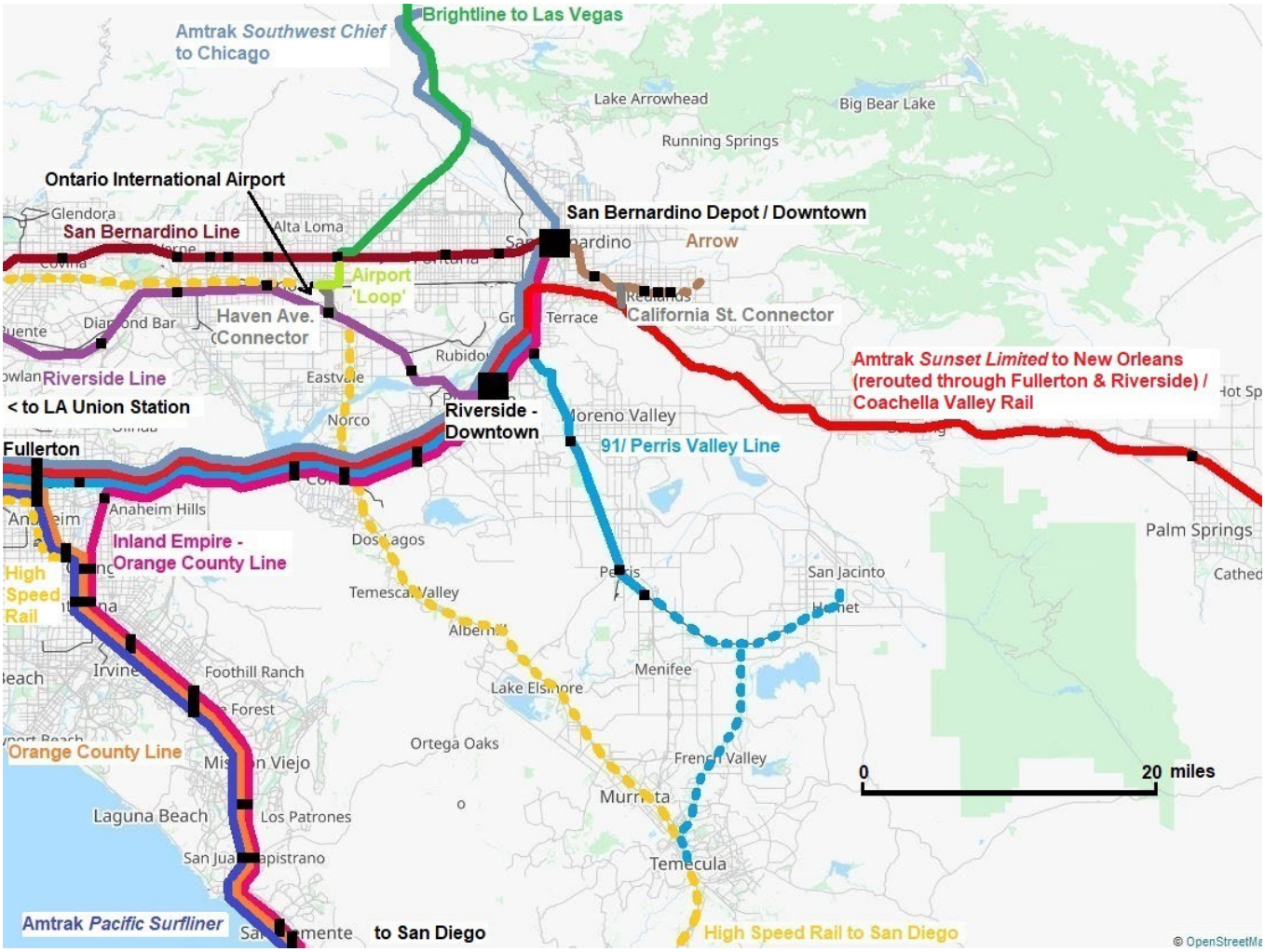
[8] https://www.rctc.org/wp-content/uploads/2022/04/Next-Gen-Rail-Study-Task-1-Report.pdf

a cost of $400 million to extend the PVL from Perris to San Jacinto, with an expected completion date of 2035.

PVL extension to Temecula-

South of Perris, the fast-growing cities of Menifee (pop. 95,000), Murrieta (pop. 116,000) and Temecula (pop. 115,000) lie along a historic rail corridor. The Santa Fe abandoned the line through Temecula Canyon to San Diego in 1900 due to washouts, and service to Temecula ended in 1935.

A 2005 study commissioned by RCTC determined that a new passenger rail line to Temecula via a brand-new trackage from Perris (via Winchester) would be feasible. The 2016 SCAG RTP/2019 Next Generation Rail Corridors Analysis estimated a cost of $500 million to extend the PVL to Temecula, with no expected completion date given. RailPAC recommends advancing design/environmental work for this corridor.



I-15 corridor/Corona to Lake Elsinore and Temecula

Rail service has also been studied along the I-15 corridor from Corona to Wildomar (pop. 37,000), Lake Elsinore (pop. 68,000) and on to Murrieta and Temecula. The 2019 Next Generation Rail Corridors Analysis estimated a cost of $600 million for a new Corona to Lake Elsinore rail line, with no expected completion date given. However, the I-15 corridor has been identified as the likely route between Ontario and San Diego for the Phase 2 of the California High Speed Rail project. The I-15 HSR alignment would allow CHSR through service from Northern California direct to San Diego via Riverside County. Thus, the I-15 portion for CHSR could serve double duty and provide a backbone for regional rail service in addition to the high-speed services, as has been posited in other studies by RCTC. This could also be pursued in tandem with neighboring agencies such as SBCTA to extend it farther north beyond Ontario. Such a passenger rail corridor could start as a shorter portion between Ontario, Corona and Temecula, which would provide travelers an opportunity to transfer to IEOC Line, 91/PV Line, Riverside Line, San Bernardino Line, Amtrak's *Southwest Chief* and *Sunset Limited*, and Brightline trains.

Additionally, because Brightline West and CHSRA are being designed to be interoperable, it would provide an opportunity for direct Las Vegas-San Diego trips for faster than if they went through LA, providing the opportunity for us to showcase our region to more people in the process.

Improvements to existing stations

We are pleased that the RCTC's passenger rail goals include enhancing Riverside County's nine existing rail stations improvements to provide better accessibility for persons with disabilities, and new train boarding platforms, pedestrian bridges, and crossings. However, construction of "new parking capacity at stations in Corona, Riverside, and Perris" may not be necessary, especially if there is improved connecting bus transit and investments into enhanced bicycle and pedestrian connections on station property and the surrounding neighborhoods.

Riverside-Downtown station improvements-

RailPAC fully supports the Riverside-Downtown Station Improvements project that was under development by RCTC and Southern California Regional Rail Authority (Metrolink), in collaboration with the Federal Transit Administration (FTA). Unfortunately, the approximately $50 million project was halted in 2023 due to community opposition, and lack of sufficient support by the county and public agencies. RCTC did not do the project any favors by proposing to build 500 additional parking spaces as part of the project. This seemed excessive given how much existing parking there already is at Riverside-Downtown station.

Adding a new platform and tracks will enable Riverside-Downtown Station to serve more passengers with increased train frequency, while reducing congestion and delays for both passenger and freight trains. Also planned was an extension of the existing pedestrian bridge with additional elevator and stair access, along with added sidewalks and parking. The pedestrian access improvements to be built as part of the project will improve the passenger experience, and make train travel more convenient and accessible. Hopefully RCTC can resurrect the Riverside-Downtown Station Improvements projects in the future.

Grade Separations

Road-rail grade separation projects greatly increase safety and reduce traffic congestion on city streets, but are also critical for maintaining reliable and very frequent train service. Riverside County has taken initiative on critical grade separations, with the Jurupa Road and McKinley grade separation projects now under construction and nearing completion.

However, RCTC, along with cities and Riverside County Public Works, need to keep a "rolling program" going of continual grade separation construction. State and federal grants, with local matching, need to be pursued for more Riverside County grade separation projects. With so many grade separation projects needed on ever-busier railroad mainlines in the county, costs for each project can be reduced if they are part of a larger phased program such as the Alameda Corridor-East Construction Authority in LA County.

Foremost for planning grade separations in Riverside County would be encouraging the City of Riverside to get more projects going, building upon the 3rd Street project getting underway in Downtown Riverside. There are at least 17 more grade separations needed on the BNSF and UP mainlines in the City of Riverside alone. All candidate road-rail crossings listed below are in the City of Riverside, unless otherwise noted:

UP:

- Brockton Avenue
- Palm Avenue
- Panorama Road

BNSF:

- Main Street (Highgrove)
- Center Street (Highgrove)
- Palmyrita Avenue
- Chicago Avenue
- Spruce Street
- 7th Street/Mission Inn Avenue
- Cridge Street
- Mary Street
- Washington Street
- Madison Street
- Jefferson Street
- Adams Street
- Jackson Street
- Gibson Street
- Harrison Street
- Tyler Street
- Pierce Street
- Buchanan Street
- Radio Road (Corona)
- Joy Steet (Corona)
- Sheridan Street (Corona)
- Cota Street (Corona)
- Railroad Street (Corona)
- Smith Avenue (Corona)

Some of the less-heavily used streets listed above could be candidates for crossing closures-a far less expensive option than a grade separation.

Rail-road grade separations greatly enhance safety for automobiles and trucks, and should be counted as 'local highway' projects in the planned project lists as opposed to 'passenger rail'. Grade separations should be chiefly funded from road and highway budgets, so as to not draw funds away from other rail and transit projects.

It is also essential that RCTC's road projects be designed and built in such a way as to **not** impair future rail projects. One future road crossing vital to the PVL extension is SR-79 in Winchester. At present, the proposed SR-79 realignment would sever the rail line to San Jacinto by building a "removable" bridge that would not be tall enough for trains to pass under and thus would require a two-week lead time to open and instead relies on the assumption that in the future, the effort to rehabilitate the line for rail service would also rebuild the bridge to be the correct height even though no such bridge currently exists. That is unacceptable. The SR-79 realignment project **must not** conflict with the rail line but rather should be planned and built with the appropriate structures for unimpeded train operations (including those powered by overhead catenary wire) from the very beginning.

Grade separations needed on the UP Yuma Subdivision/Sunset/Coachella Valley Rail-

UP Yuma Subdivision/Sunset/Coachella Valley Rail grade separations needed in Riverside County:

- Live Oak Canyon Road
- Main Street
- Center Street
- Palmyrita Avenue
- Pennsylvania Avenue (Beaumont)

RCTC should work w/ SBCTA to support grade separation projects in San Bernardino County on the line:

- Whittier Ave.
- Beaumont Ave.
- San Timoteo Canyon Road
- Alessandro Road

SBCTA and RCTC need to work collaboratively to make these grade separation projects a priority. RailPAC has supported both public agencies in their efforts acquire funding for grade separation projects, and we will continue to write letters of support for grant applications, etc.

There is some justified concern from San Bernardino County and Riverside County residents about the possible increased number of trains on the *Sunset Limited* Route (Yuma Subdivision) in the future. Of particular (and legitimate concern) is that of long freight trains blocking vehicle and pedestrian traffic at road crossings. We understand that the Inland Empire is heavily impacted by rail traffic growth and grade crossing improvement have lagged. Localities can be gridlocked by two-mile-long freight trains. This problem can only be solved with grade separation projects.

Rail Capacity Projects

The majority of intercity and regional/commuter passenger rail service in the U.S. is on tracks shared with freight trains. Therefore, sufficient capacity, safety and reliability of the nation's freight rail system is vital to the interest of rail passengers. These two different uses of railroad infrastructure need not be in conflict. Both passenger and freight trains sharing the same tracks will benefit from coordinated planning, efficient operations, and capital improvements.

Rail capacity projects in Western Riverside County that should also be included in the Traffic Relief Plan, but are not explicitly mentioned, include the completion of the Prado Dam-Riverside-San Bernardino 3rd and 4th mainline track, and of 2nd mainline track on UPRR Los Angeles and Alhambra subdivisions.

As described by a December 2023 Pacific Harbor Lines report on short-haul rail in Southern California[9], the UPRR Yuma Subidivsion in 2022 saw an average of 22 trains per day (one Amtrak *Sunset Limited* and 21 freight trains), though currenlty the line has an overall pratical capacity of 47 trains per day (a level-of-service grade of "C"). The BNSF San Bernardino Subdivision between Fullerton and San Bernardino (via Riderside) saw in 2022 an average of 82 total trains per day (26 passenger and 56 freight trains), with a practical capacity of 90 trains per day (and a much lower level-of-service grade of "E"). This bottleneck will be relieved Completion of the Fullerton Junction and Atwood-Esperanza 3rd track projects in Orange County, and 3rd and 4th mainlines through Riverside County (and into San Bernardino County), and the LA-Fullerton 4th mainline. Both the UPRR Los Angeles and Alhambra subdivsions- connecting LA to the Inland Empire via the San Gabriel Valley- were reported to have comparatively abundant capacity ('C' and 'B' ratings respectively).

Completion of 3rd and 4th mainlines on BNSF San Bernardino Subdivision in Riverside County is needed to increase Metrolink 91/PVL, Inland Empire-Orange County and Riverside Line service to Riverside County. A third mainline track between Fullerton, Riverside and San Bernardino has been proposed but is not yet fully funded. Part of the LOSSAN/ Metrolink SCORE program in collaboration with BNSF, the project will increase capacity, improve reliability, and reduce passenger-freight train congestion conflicts on one of the nation's busiest freight rail corridors shared with passenger trains. On the 46 miles between San Bernardino and Fullerton, BNSF has currently two main tracks and about 15 miles of third mainline track. Passenger trains operating on this segment include Amtrak (*Southwest Chief*) and Metrolink (91/Perris Valley Line and Inland Empire Orange County Line). Full completion of the remaining 31 miles of third main track from Fullerton to San Bernardino, with key fourth track segments at Corona and La Sierra, is being studied. A four-mile portion of third mainline track between Atwood and Esperanza in Orange County is moving forward due to a federal grant received by Metrolink.

BNSF San Bernardino Subdivision 3rd and 4th mainlines in planning stages

Section	3rd track	4th track	2021 cost est.
Section 1 - Prado Dam (MP 29.4) to East Porphyry (MP 22.50/East of Corona)	6.9 miles	2,640 track feet	$89 million
Section 2 - East Porphyry (MP 22.50) to La Sierra (MP 17.50)	5 miles	5,280 track feet	$45 million
Section 3 - Riverside-La Sierra (MP 17.50) to CP Ontario (MP 10.60/Riverside Downtown)	6.9 miles	Not proposed	$57 million
CP Highgrove to CP Colton	3.4 miles	Not proposed	

[9] *Feasibility and Benefits of Intermodal Service in Short-Haul Markets*, Prepared by Oliver Wyman and Leachman and Associates for the Pacific Harbor Line, December 2023. Exhibit 8-10 on pg. 15 : https://www.anacostia.com/wp-content/uploads/2024/01/Anacostia-Feasibility-and-Benefits-of-Intermodal-Service-in-Short-Haul-Markets-Report-final-rev.pdf

Increasing the mode share of freight rail-

Emissions from goods movement (particularly from diesel trucks) is a significant part of Riverside County's air pollution. Diesel exhaust is a major source of greenhouse gas, particulate matter and smog-forming NOx emissions. In addition, there are other forms of pollution, including non-exhaust particulate matter such as brake, tire, and road wear and dust. Although rail facilities are the subject of substantial pollution complaints, the larger problem is the truck traffic associated with the facilities. Reducing truck vehicle miles travelled (VMT) should be a major goal and guiding principle of national and state freight planning.

BNSF Railway is planning the Barstow International Gateway, a new intermodal railyard complex with warehouses and distribution facilities where imported goods in 40' international containers will be carried by train about 160 miles inland from the Ports of LA & Long Beach, and sorted to be put in 53' containers that will go by train the rest of the country. The goal is to reduce the need for drayage by truck between the ports and warehouses in the Inland Empire. In Riverside County, perhaps UP could build a similar complex along the Sunset Route in the Coachella Valley. UP's new container train service between the Ports of LA/Long Beach and the Phoenix Intermodal Yard (opened in 2024), has been very successful. As mentioned above, freight capacity upgrades as part of the investment in the Coachella Valley Rail project could be justified on public benefit of getting trucks off of I-10, by enabling more short and medium-haul freight trains from LA/Inland Empire to the Coachella Valley and Arizona.

Rail vs. freeway expansions-

In addition to reduced transportation emissions, the shift of traffic from highways to rail also helps lower the maintenance cost of roads as a result of reduced wear and tear. California continues to spend billions of dollars on freeway expansions, and has more unfunded freeway expansions in the planning stages. The 'induced demand 'of more traffic congestion caused by road capacity expansion, increased pollution, and the painful and unjust legacy of Californians displaced by freeway construction are well-documented. We could achieve greater reduction in greenhouse gas emissions if a portion of this money was spent on rail capital improvement projects instead. Highway funding needs to focus on repaving and maintaining existing highways and streets, and not expansion of the highway network. California has a tremendous backlog of street and road maintenance and repair projects, and will continue to for the foreseeable future.

North American freight trains are very long, heavy, and slow largely for business reasons (reducing operating at expense of speed and reliability). However, there is a large amount of lightweight and time-sensitive freight currently hauled by truck in the US that could be moved on shorter, faster freight trains similar to European freight trains, allowing more compatible shared use of track with passenger trains (even some high-speed trains). Freight-passenger combination trains should also be investigated for California. Express or lightweight freight/ passenger combined service could become part of the Coachella Valley Rail services, with possible extension to Imperial County and Arizona.

Rail Electrification

RCTC should work with Metrolink and other public agencies on a regional rail electrification program. Overhead catenary wire, or overhead contact system (OCS), rail electrification is mature and has been successfully used in all types of rail operations around the world for more than a century. The 2018 California State Rail Plan endorses electrification on California's key passenger rail lines. Rail electrification is a proven technology in use throughout the world, available today without expensive and lengthy technological development.

The electrification of the Caltrain corridor between San Francisco and San Jose, and subsequent California High Speed Rail Authority (CHSRA) plan, provides a national model for new rail electrification, by providing experience in electrification construction, implementation, and operations. The Brightline West line between Rancho Cucamonga and Las Vegas will be powered by 25 kV catenary on its new, dedicated tracks and construction of the 25 kV catenary on the initial operating segment of the CHSR project in the Central Valley is slated to begin soon. And, the sleek new Caltrain Stadler electric trainsets started carrying passengers in 2024 under 25 kV catenary wire between San Francisco and San Jose. California is thus emerging as a hub of 25 kV overhead catenary development in the United States, and Riverside County stands to benefit from this 'local know how'.

Electrification of the Burbank-LA-Anaheim corridor for the Phase 1 of California High Speed Rail presents a logical first step of electrifying much of the rail lines in Southern California. The LA-Fullerton segment of the LA-Anaheim Phase 1 HSR project is on BNSF-owned mainline right-of-way, part of the railroad's San Bernardino Subdivision from LA to Riverside and San Bernardino. The current plan for CHSRA to install 25 kV overhead catenary wire between Burbank, LA Union Station, Fullerton and Anaheim could also be utilized by Metrolink and Amtrak trains sharing the same tracks. As part of the "LOSSAN" corridor, it is used by dozens of passenger and freight trains every single day. Many of those trains continue east from Fullerton along the BNSF San Bernardino Subdivision, bringing them through Riverside County to points beyond. The heavy train traffic of this corridor would lead to improved economics and higher utilization of electric rail infrastructure, if used by both electric passenger and freight trains sharing the corridor. The significance of the fact that BNSF Railway has agreed to CHSRA's plan for a shared four-track corridor between LA and Fullerton should not be missed. The 25 kV overhead catenary wire above tracks on the BNSF-owned right-of-way between LA and Fullerton will be high enough to allow double-stack container trains to pass through on tracks shared with electric passenger trains. The fact that a Class I railroad has agreed to electrification on its tracks is a hugely significant development with national significance, as the overhead clearance for double-stack trains has often been used as an excuse in the U.S. for why catenary electrification cannot be used on tracks shared with freight.

By collaborating with the CHSRA, SCAG, and SCAQMD, RCTC could assist in extending the electrification from Fullerton through Riverside to Colton and San Bernardino[10], along the Perris Valley Line (including the eventual extension to San Jacinto and/or Temecula), and along the third track to be built for the Coachella Valley service. Building off that investment by extending electrification beyond Fullerton to Riverside would enable all-electric trains to run LA-Fullerton-Riverside-Coachella 'higher speed' electrified Metrolink service, potentially even at speeds above 100 mph. This would be a game changer for this densely-populated corridor as the more frequent and faster zero-emissions electric trains would provide an extremely competitive option to driving that would take tens of thousands of cars off the freeways each day. The 2018 State Rail Plan called for planning for "development of future electrified regional services and phased implementation HSR services in the Inland Empire". Phase 2 of CHSRA plans to pass through Riverside County on the way to San Diego, and should also be compatible with future high speed rail to Phoenix (as described above).

The superior performance, energy efficiency and reliability of conventional rail electrification has been proven for all types of rail operations around the world, with many different vendors and suppliers of the technology. Southern California's core rail mainlines should be electrified with 25 kV overhead catenary, the world standard. Around the world, there has long been a well-documented increase in passenger train ridership following electrification, nicknamed the "sparks effect". This is because electric trains have:

[10] https://calelectricrail.org/wp-content/uploads/2024/11/SoCal-IE-rail-electrification-BY-appendices-2023.08.29.pdf

- Increased train speed and frequency due to better acceleration
- Passenger comfort (quieter, smoother ride, no smoke)
- Increased reliability (fewer train breakdowns)
- Lower equipment, operation and maintenance (O&M) costs, so passenger railroads can instead invest resources in more frequent service.

One critical issue for regional planning of electric transportation is the overall electric energy consumption of transportation. Because rail transportation is on average three times more energy efficient than road transportation, it takes one third of the electric energy consumption to move the same amount of passengers/freight with an electric train, compared to an electric truck or bus. Electric trains, per passenger-mile, are even more energy efficient compared to electric cars. Metrolink and RCTC should be encouraging electric rail, in its most efficient form with overhead catenary, to make the most of energy available on the electric power grid.

Hydrogen rail propulsion is unproven, has very poor overall energy efficiency (less than 40%, compared to 90% for conventional overhead catenary electric trains), is inherently more complex (with more potential points of failure) with higher O&M costs. The first hydrogen trains introduced in Europe cost four times more than their electric equivalents and have been plagued with reliability problems, cost overruns and much-lower-than-promised range on a full tank of hydrogen. A major cost factor was that as a result of market forces (supply/demand/market speculation), the price of hydrogen skyrocketed just as these trains were introduced. In this case, the hydrogen was coming from Russian gas. In 2022, the EVB regional railroad in Lower Saxony, Germany was the first in the world to introduce a fleet of hydrogen-powered trains. Due to the resulting costs and negative effects on revenue passenger service, Lower Saxony's public transportation authority recently announced that no more hydrogen trains will be pursued, and that the remainder of the diesel fleet will be replaced with electric trains that use batteries combined with overhead wires[11]. Another state in Germany, Baden-Württemberg, has come to the same conclusion after an extensive study[12].

The price of hydrogen is also volatile as over 95% of it produced in the world comes from natural gas, a fossil fuel commodity highly vulnerable to market price swings and geopolitical risks. Fossil-generated hydrogen will also be subject to future carbon taxes. Green hydrogen made from renewable electricity is several times more expensive than dirty hydrogen from fossil fuels and requires large amounts of freshwater for its production. This will be a challenge in dry regions such as Southern California. International experts, informed by the actual performance of different zero emissions rail technologies in revenue service in Europe and elsewhere, are coming to consensus that improved battery and hydrogen technology will not replace the need for overhead wire electrification on the busiest rail lines. As concluded by a 2021 report by the UK Railway Industry Association[13]:

> Evidence does not support the view that [overhead wire rail] electrification is unnecessary, thanks to hydrogen and battery systems improving rapidly: hydrogen trains are inherently less efficient than electric trains, due to the physical properties of the gas. Expert opinion predicts that battery capability might double by 2035. *Yet, whilst this might affect the hydrogen / battery traction mix required for decarbonisation, it is unlikely to change significantly the requirement for electrification.*

[11] https://www.railtech.com/rolling-stock/2023/08/09/german-hydrogen-pioneer-opts-for-battery-trains-for-remainder-of-fleet/

[12] https://www.railjournal.com/fleet/baden-wurttemberg-rejects-hydrogen-as-diesel-alternative/

[13] https://riagb.org.uk/RIA/Newsroom/Publications%20Folder/Why_Rail_Electrification_Report.aspx

> The laws of nature make electrification a future-proofed technology that is a good investment, offering large passenger, freight, and operational benefits. Furthermore, railways cannot achieve net-zero carbon emissions without a large-scale electrification programme.

In a 2020 analysis of technical abilities of non-diesel rail traction technologies, from "Traction Decarbonization Network Strategy – Interim Programme Business Case –Executive Summary"[14] report by UK Network Rail, electric with overhead catenary was the only zero-emissions propulsion mode viable for all speeds of passenger and freight service. Hydrogen was only determined to be 'good' for passenger trains under 75 mph, fair for 100-125 mph, and poor for freight and passenger over 125 mph. Battery was judged to be 'fair' at best for passenger trains up to 100 mph, and poor for all other applications except certain freight (yard switching and short distances). The report concluded that, for the currently unelectrified lines in the UK, rail decarbonization requires overhead catenary electric, hydrogen and battery traction operating on respectively 86%, 9% and 5% of the rail network.

[14] https://www.networkrail.co.uk/wp-content/uploads/2020/09/Traction-Decarbonisation-Network-Strategy-Interim-Programme-Business-Case.pdf