Large Document Public Comments for Alternatives Analysis

From: Bruce Sawhill <brucesawhill@gmail.com>
Sent: Monday, April 29, 2019 3:43 PM
To: Ginger Dykaar <gdykaar@sccrtc.org>
Cc: Sawhill Bruce <brucesawhill@gmail.com>
Subject: First installment of documents

HI Ginger-

Here is the first installment of documents—these are studies from Michael Setty, one for regular passenger transit, one for excursion (tourist) operations, and an Appendix that includes direct service to Cabrillo College and a better link to downtown. He used the same methods as used by Fehr and Peers in 2015.

Cheers,

Bruce

Potential for Excursion Rail Service

SANTA CRUZ COUNTY

By Michael D. Setty, MUP[1]

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A. Introduction

The ridership estimates included in the recent paper *Optimized Rail Passenger Service for Santa Cruz County*[2] did not include estimates for potential usage by visitors to Santa Cruz County. Tourism is a key part of the local economy, serving about five million annual visitors and contributing a large share of the local economy. This paper examines tourism-related ridership potential, revenues from which could significantly reduce requirements for ongoing operating subsidies for rail service on the Santa Cruz Branch Line.

According to the publication *California Travel Impacts by County, 1992-2016p*[3], one of a series produced annually by Dean Runyon Associates as a "Joint Marketing Venture of Visit California and the Governor's Office of Business Development" (GO-Biz)[4], direct travel spending in Santa Cruz County totaled an estimated $849.1 million in 2016.

According to local sources[5], of the five million estimated annual visitors, three million visit the Santa Cruz Beach Boardwalk. An estimated two million visitors stay overnight in Santa Cruz County and three million are day trippers, the lion's share visiting the many beaches. The author estimates that there at least three million visits to Santa Cruz's Main Beach and Cowell Beach, each immediately adjacent to the Boardwalk.

The City of Santa Cruz estimates that there are 2.5 million annual visitors to the Santa Cruz Wharf,[6] located between Cowell and Main Beaches directly west of the Beach Boardwalk. A large portion of Wharf visitors also visit the beaches and Boardwalk, though there is no information about exactly how many visit two or all three attractions in one day. Many local residents visit the Wharf, a favorite spot with many restaurants.

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1 msetty@publictransit.us

2 Available at http://www.calrailnews.org/optimized-rail-passenger-service-for-santa-cruz-county/

3 deanrunyan.com/doc_library/CAImp.pdf

4 http://www.visitcalifornia.com/ and http://business.ca.gov/

5 Santa Cruz Beach Boardwalk (http://www.beachboardwalk.com) and Visit Santa Cruz (http://www.santacruz.org)

6 *Santa Cruz Wharf Master Plan, Revised Mitigated Negative Declaration/Initial Study,* page 3. Available at http://www.cityofsantacruz.com/government/city-departments/economic-development/development-projects/santa-cruz-wharf-master-plan

B. A Brief History of Rail in Santa Cruz

Santa Cruz has a long history of rail access to its beaches and the Boardwalk. According to a short history on the Beach Boardwalk website,[7]

> During the 1930s, tourists from the San Francisco Bay Area could take the Southern Pacific Railroad's [Suntan] Special right to the Boardwalk. Except for the years 1941 to 1947, trains ran from San Jose, Oakland, and San Francisco and also connected Santa Cruz to Watsonville and Los Angeles. In 1932 alone, the train delivered as many as thirty-five hundred people each Sunday to Santa Cruz, where train cars were greeted with a blast of brass from the Beach Band.

In the late 1990's, experimental Suntan Special trains were operated, attracting hundreds of passengers from the Bay Area. In July 1998, the Santa Cruz County Regional Transportation Commission (SCCRTC), partnering with the Transportation Agency for Monterey County (TAMC), published the *Around the Bay Rail Study***,** which included an analysis of reviving the Sun Tan Special. That study predicted weekend trains to the Santa Cruz Beach Boardwalk could very conservatively serve about 30,000 round trip passengers on 24 spring, summer and early fall weekends, e.g., 48 days each with 600+ round trip passengers per day.[8]

Reviving the Suntan Special is also a key part of Progressive Rail's recently approved operating contract with SCCRTC[9] to replace operations by Iowa Pacific Holdings. Based on Progressive Rail's proposal and other factors, this paper examines how trains could provide shuttle service to many Santa Cruz County beaches for potential patrons parking and taking the train, but also for potential visitors arriving via a reestablished Suntan Special via Watsonville.

A second focus of this paper is how seasonal operation of beach shuttles could evolve into public transit service for both visitors and Santa Cruz residents. A key conclusion is that visitors could provide sufficient fare revenues to make the economics of transit more feasible, greatly reducing or perhaps eliminating operating deficits.

C. Estimated Annual Visits to Santa Cruz County Beaches

Based on state park statistics and author estimates, there are almost four million annual visits to other beaches in Santa Cruz County besides the Main and Cowell Beaches. In a survey conducted on a typical summer Saturday, Capitola Beach was found to attract 1,333 people over the course of the day. This is captured as "the Capitola Rule": approximately one person trip per foot of beach on a typical summer Saturday. In Capitola, approximately 20% of beachgoers arrived by other means than motor vehicles such as walking, bicycling or transit, or on the same trip visiting destinations such as restaurants adjacent to the beach.[10] The author believes that shuttle trains serving the beaches can attract at least 8%-10% of beach visitors, depending on beach location, parking prices, levels of congestion and other factors.

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[7] http://memories.beachboardwalk.com/southern-pacific-railroads-sun-tan-special-1932

[8] Linked at http://sccrtc.org/projects/rail/rail-service-studies/ under "Past Rail Studies"

[9] For details, see http://sccrtc.org/projects/rail/draft-operating-agreement/

[10] *Parking Analysis for the Capitola Village Area.* Prepared for the City of Capitola, RBF Consulting, Monterey Bay. 2008. Linked at http://www.cityofcapitola.org/publicworks/page/parking-needs-analysis

Figure 1. Attendance, Santa Cruz County Shoreline Attractions, State Parks & Beaches Near Rail Line

Beach, North to South	Summer Saturday Daily Visits	Estimated Annual Visits*	Notes
Davenport Beach^	~600	120,000	
Shark Fin Cove Beach^	~250	230,000	
Bonny Doon Beach^	~500	90,000	
Panther/Seven Mile Beaches^	~900	170,000	
Laguna Creek Beach^	~1,300	230,000	
Four Mile Beach^	~800	150,000	
Other Beaches (poor access, private)^	~1,000	190,000	
Wilder Ranch State Park	1,300	474,949	
Natural Bridges State Beach	4,900	919,757	About 0.5 mile south of rail line
Santa Cruz Main/Cowell Beach	16,000	3,000,000	Same visitation as Boardwalk
Santa Cruz Wharf	--	2,500,000	Next to Boardwalk, Main Beach
Seabright/Twin Lakes State Beach	2,900	540,086	
Capitola Beach	1,333	250,000	
New Brighton State Beach	1,400	267,700	
Seacliff/Rio Del Mar State Beach	1,700	322,181	
Rio/Aptos Beaches	~3,000	520,000	Lack of access, parking
Manresa State Beach	1,200	222,535	
Grand Total	**36,100**	**9,280,000**	
Excluding Main Beach, Boardwalk, Wharf	20,100	3,780,000	

^ Beach visitation estimated based on measured visible beach length from Google Maps aerial photos. For beaches north of Wilder Ranch, Capitola Rule figure is reduced 50% due to undeveloped nature of these beaches, and relatively long walking distances from parking on Highway 1.

* Assumes Saturdays are 33% of weekly beach visits during summer season, e.g., May-October. Summer visitation is 2/3 of annual beach attendance. Rounded to nearest 10,000 unless actual counts available.

Figure 1 summarizes annual estimated visits to state beaches and other beaches in Santa Cruz County, plus Wilder Ranch State Park. Non-state beach attendance has been estimated by either reported figures (e.g., Santa Cruz Main and Cowell Beaches) or by using the "Capitola Rule" from above. For the undeveloped beaches mostly between Davenport and Santa Cruz, this estimate was reduced 50% to be conservative.

Based on the author's estimates, on a typical summer Saturday, about 40,000 people visit Santa Cruz County beaches located near the rail line owned by the Santa Cruz County Regional Transportation Commission. This is approximately 9.3 million Boardwalk, Wharf and beach visits per year. Of these, 21,000-22,000 are estimated to visit the Santa Cruz Main and Cowell Beaches, the Boardwalk and Santa Cruz Wharf on a typical summer weekend day; this is about 3.8 million visits per year when duplications are eliminated, e.g., it is assumed most Wharf and Boardwalk visitors also visit the Main and Cowell Beaches.

D. Visitor Ridership Rules of Thumb

While prognostication of potential excursion railroad ridership is more art than science, there are guideposts. Reat Younger (who unfortunately died in 1993), a tourist railroad consultant, was able to plan a large number of financially successful tourist railroads in the 1980's and early 1990's. Based on Younger's empirical observations, about 10% to 11% of the local population within 50 miles of the attraction can be expected to take a ride on a suitable rail line every year.

Figure 2. Reat Younger's Empirical Rules of Thumb for Tourist Railroads[11]

Daytrippers		
Local Residents	Within 0-25 miles	33% will ride attractive excursion service within 3 years
	Within 25-50 miles	29% will ride attractive excursion service within 3 years
	Within 50-100 miles	10% will ride attractive excursion service within 3 years
	Within 100-150 miles	4% will ride attractive excursion service within 3 years
Overnight Visitors	--	29%, exclusive of those who live within 100 miles but are staying overnight (e.g., 29% of visitors staying in immediate community only. *Total tourist market must be adjusted by length of operating season and number of visitors during that time.*

Although visitor shuttles that provide local trips to beaches and other non-work destinations have similarities to public transit, their goal of fun has more in common with the "joy ride" or "just to ride a train" purposes that traditional tourist trains cater to. Shuttles are especially able to attract visitor usage under conditions of high parking prices and serious traffic congestion, which can be worse on weekends. The scenic vistas and attractive destinations present along the Santa Cruz coastline are the elements that turn mere shuttle trips into true excursions.

In Monterey, Monterey-Salinas Transit (MST) operates the free "MST Trolley" shuttle, with buses disguised as early 20th century electric streetcars between large parking garages in Downtown Monterey, Cannery Row stops, and its terminal at the Monterey Bay Aquarium. The MST Trolley attracted 240,000 annual passengers in Fiscal Year 2016-17, and averaged between 1,500-2,000 daily boardings in July and August 2017, or 750-1,000 daily round trips[12] [13].

While only about 1%-2% of annual Monterey Peninsula visitors to all Peninsula attractions including Carmel, Pacific Grove, Carmel Valley and Big Sur currently use the MST Trolley, this

[11] *Basic Thinking*, 1992. Reat Younger. Self-published. This document is a comprehensive guide to planning, designing, financing and operating tourist railroads. Rules of thumb based on phone conversation between author and Mr. Younger in 1992, less than a year before he died.

[12] The MST Trolley is among MST's most productive services, carrying 50-60 passengers/revenue vehicle hour. Source: MST Board Meeting Reports, linked at http://mst.org/about-mst/board-of-directors/board-meetings/

[13] Daily parking rates in the downtown Monterey East Garages served by the MST Trolley are $7 daily, compared to $10-$15 daily at the Cannery Row garage. http://www.monterey.org/Services/Parking/Public-Garages-and-Lots

usage rate increases to about 3%-4% of all Monterey visitors during July and August. On peak ridership days in the late 1980's prior to the opening of the 1,000 space Cannery Row garage, MST shuttles serving Cannery Row and the Aquarium regularly served more than three times as many passengers as now.

Given the history of the MST Trolley, as well as shuttle buses in visitor areas such as national parks and major attractions, it is clear that under the right circumstances shuttle buses can attract large numbers of visitors.

Unlike faux trolley buses such as the MST Trolley, "real" trains and streetcars generally are more comfortable due to smoother rides on rails rather than rubber tires and pavements. Trains also are generally free from congestion, unlike buses. In Santa Cruz, the potential rail route would be much more direct in serving than road-based shuttle bus routes, which also would tend to get stuck in beach traffic. The rail line also would have much more scenic views that possible with buses, particularly at locations such as the Capitola trestle, San Lorenzo River Bridge and numerous other off-road locations.

If Younger's rules of thumb are applied to Santa Cruz County, persons residing within 50 miles of Santa Cruz County would make about 400,000 annual passenger round trips on potential excursion trains, since roughly four million people live within 50 miles of Santa Cruz, including Santa Cruz, Monterey, and San Benito Counties; however, most reside in the southern San Francisco Bay Area, e.g., Santa Clara County, southern San Mateo and southern Alameda Counties. Similarly, about 580,000 annual rides could be expected from the estimated 2 million overnight visitors to Santa Cruz County. These two theoretical sources of excursion train ridership total 1,080,000 potential riders making round trips. Based on this, the *Santa Cruz Beach Train* and Roaring Camp and Big Trees Narrow Gauge Railroad appears to currently serve roughly 18% of the theoretical potential with 60,000 and an estimated 140,000 annual (round trip) passengers, respectively[14].

Interestingly, the excursion trains from the Roaring Camp station in Felton to the Beach Boardwalk attracted that level of trips despite a price point of about $30 per adult. This translates to an average fare of about $2.00 per mile traveled, based on the eight miles in each direction between Roaring Camp and the Boardwalk.

The Durango & Silverton Railroad in southwest Colorado attracted 269,153 passengers in 2017[15]. Spending by train riders appears to constitute more than 40% of the annual estimated spending of almost $300 million from visitors in La Plata County during 2016.[16] Average fares are approximately $100 per person, and assuming visitors stay two nights with average overnight lodging rates of $75 per person, the average Durango & Silverton rider would spend $450- to $500 during their visit to La Plata County. While La Plata County's total visitor count is

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[14] From the Federal Railroad Administration (FRA): http://safetydata.fra.dot.gov/OfficeofSafety/Default.aspx. Also reports from local rail activists.

[15] Reported excursion train attendance in 2017, Heritage Rail Alliance http://www.atrrm.org/2018/03/heritage-rail-ridership-attendance/

[16] Colorado data from http://deanrunyan.com/index.php?fuseaction=Main.TravelstatsDetail&page=Colorado

not readily available, excursion rail riders appear to constitute at least 40% of spring, summer and early fall visits if these estimates are correct.

Recent tourism data from Cairns, Australia is consistent with Younger's estimates, e.g., 29% of overseas visitors (mostly from Asia) rode the local scenic train vs. 15%-16% of domestic visitors, who are mostly repeat visitors. Overall, the Kuranda Scenic Railway attracted about 340,000 visitors in 2014/2015, a combined usage rate of 20% by the estimated 1.7 million annual visitors to the Cairns area. Like Santa Cruz, Cairn's main attractions include numerous tropical beaches, as well as excursions to the Great Barrier Reef which compete directly with the Kuranda Scenic Railway for visitor spending. The railroad is the second busiest paid attraction in the area after Reef excursions.[17]

The Roaring Camp Railroads[18] has two separate operations. First, the Santa Cruz, Big Trees and Pacific Railroad (FRA reporting mark SCBG) operates the standard gauge *Santa Cruz Beach Train,* providing excursions from Felton to the Beach Boardwalk. Most passengers travel is during the May-October peak tourist season.[19] These excursions typically travel one hour in each direction, lay over at least one hour at the Boardwalk, and return in the third hour. The *Beach Train* attracts approximately 2% of all Boardwalk/Main Beach visitors, based on estimated total attendance.

The Roaring Camp and Big Trees Narrow Gauge Railroad (RCBT) company also operates the *Redwood Steam Train*, which operates on 3.25 miles of narrow gauge tracks (e.g., a 6.5 mile round trip) behind former logging industry steam locomotives. While data for this operation was not reported to the Federal Railroad Administration (FTA), there are an estimated 140,000 annual riders, totaling 200,000 annually for both railroads.[20] The SCBG and RCBT together constitutes the 5th largest tourist railroad operation in the U.S., not including museums that feature train rides.

E. Potential for Visitors Accessing Santa Cruz by Train

The off-peak and weekend ridership achieved by the ferry from Vallejo to San Francisco provides a useful example for estimating ridership to Santa Cruz. Currently the Vallejo Ferry attracts about 200,000 annual round trips, exclusive of commuters and workers traveling during the midday, and reverse direction travel from San Francisco, such as Napa Valley tour groups[21]. This corresponds reasonably well with the 800,000 residents living within 50 miles of the Vallejo Ferry Terminal, (e.g., the ferry's "hinterland" of Napa, Solano, and Yolo Counties), and another

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[17] *The Byron Line: Track plus Trail: From Billinnudgel to Bangalow.* Proposal, page 23. June 2016. Byron Bay, New South Wales, Australia. Available http://siricho.files.wordpress.com/2016/08/the-byron-line.pdf

[18] http://www.roaringcamp.com

[19] From the Federal Railroad Administration (FRA): http://safetydata.fra.dot.gov/OfficeofSafety/Default.aspx

[20] According to data collected by the Heritage Rail Alliance, there were 200,000 annual riders at the "Roaring Camp & Big Trees." See http://www.atrrm.org/2018/03/heritage-rail-ridership-attendance/ for a database of ridership on U.S. tourist railroads that provided data.

[21] Discussion with Water Emergency Transportation Authority (WETA) staff and author's personal knowledge.

2.4 million living between 50 and 100 miles from the Vallejo Ferry Terminal, e.g., the Greater Sacramento Region (Sacramento, Placer, El Dorado, Yuba and Sutter Counties).

There are relatively few overnight visitors staying in Vallejo, so these potential riders are discounted. The Vallejo Ferry demonstrates that an attractive conveyance to an attractive destination will attract ridership consistent with Younger' rules of thumb.

In the case of Santa Cruz, the *Santa Cruz Beach Train* and Roaring Camp and Big Trees Narrow Gauge Railroad is available to anyone living within 50 miles of Santa Cruz County who is interested in taking a train ride. Caltrain or BART to San Francisco are also attractive options, particularly for leisure trips. San Francisco is at least as attractive a leisure destination for area residents in its own way as Santa Cruz redwoods and beaches.

On the other hand, the fact that the Vallejo Ferry has been highly successful in attracting leisure visitors to San Francisco from its hinterland suggests that direct train service from the Bay Area to Santa Cruz County might also be successful, with potential ridership of up to 300,000 round trips annually–-in addition to ridership from Monterey, Santa Cruz and San Benito Counties. If the author's calculated annualization factor for Santa Cruz beach visits holds for *all* tourist visitation, this implies up to 1,600 daily visitors on peak summer Saturdays making round trips on a revived *Sun Tan Special* to Santa Cruz from Santa Clara County and southern San Mateo and Alameda Counties. Ridership may be higher that the 300,000 per year estimate–if good connections from San Francisco and Northern San Mateo County are provided at San Jose's Diridon Station from Caltrain and the Capitol Corridor.

As previously mentioned, the 1998 *Around the [Monterey] Bay Rail Study* sponsored by SCCRTC and TAMC conservatively predicted 30,000+ round trip passengers on a revived Suntan Special operating on 24 spring, summer and early fall weekends (e.g., 48 days per year) between San Jose and Santa Cruz via Gilroy and Watsonville. The *Around the Bay* study also predicted that similar weekend service to the Monterey Peninsula might attract more than 60,000 annual round trips, but that service was proposed to operate one round trip train per day, on weekend days year-round.

Like many other coastal areas within California, Santa Cruz County is a year-round destination due to California's mild Mediterranean climate. There often are relatively warm days in late fall, winter and early spring that attract people to Santa Cruz County's numerous beaches. Revival of the *Suntan Special* on weekends all year and on weekdays from May to October may be financially feasible, particularly if Diesel Multiple Units (DMUs) are used during lighter ridership such as summer weekdays and on winter weekends. Longer, locomotive-hauled trains would probably be needed on summer weekends May to October.

At least one study predicted that daily shuttle trains operating every 45 minutes from Salinas to San Jose via Watsonville (Pajaro) and Gilroy might attract up to 7,500 daily boardings in the year 2035. If such a service was implemented, it is clear that Bay Area residents accessing Santa

Cruz County and the Monterey Peninsula would constitute a large percentage of midday and weekend patronage.[22]

F. Matching Rolling Stock to the Market: Key to Visitor Rail Success?

The potential purchase, upgrading and operation of used DMUs from Germany may be a good fit to excursion train operations in Santa Cruz County. Another option would to be obtain newer, used DMUs from Europe. Since it is highly unlikely that freight trains will operate north of Watsonville more than once or twice per week for the foreseeable future even if future freight operators are able to rebuild the market for rail freight service west of Watsonville. With strict time separation between freights and passenger trains, it is not necessary to meet Federal Railroad Administration (FRA) crash standards for mixing passenger and freight trains operating concurrently on the same tracks.

Another option would to be obtain newer, used DMUs from Europe. Since it is unlikely that daily freight trains would be needed even if the new Santa Cruz Branch Line contractor, Progressive Rail, met its objective of 3,000 annual freight carloads in the near future. This is a relatively low volume of freight, only requiring one to two freight round trips per week north of Watsonville (e.g., assuming 2,000 annual carloads north of Watsonville, or 40 carloads per week. That requires 20 carloads per train for twice weekly service, or 40 cars per train for weekly freight service). IIt would not necessary to meet Federal Railroad Administration (FRA) crash standards for mixing passenger and freight trains operating concurrently on the same tracks if infrequent freights operate evenings or early in the morning when visitor shuttles wouldn't operate, at least during the first few years of service.[23]

These sorts of vehicles are ideal for operating on the Santa Cruz Branch Line during most of the visitor season, with locomotive-hauled trains to handle larger crowds on the busiest days and at major events.

An excellent example of the re-use of European DMUs is the *Train De Charlevoix*[24], an 89-mile railroad which operates along the St. Lawrence River estuary running east from Quebec City in Canada.

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[22] Caltrain Extension to Monterey County: Alternatives Analysis. Ridership Validation Report, January 2009. Linked at http://www.tamcmonterey.org/programs/rail/salinas-rail-extension/

[23] To avoid conflicts with non-FRA compliant passenger trains, strict time separation could be practiced per FRA regulations. If the proposed visitor beach shuttles are successful and evolve into regular daily rail service for both visitors and local residents, it is assumed that new, fully accessible low-floor rolling stock would be purchased that also meet the latest alternative FRA standards for crash-worthiness.

[24] http://traindecharlevoix.com/english/?___from_store=english

Figure 3. Former DB Vt628.1 DMUs used by Train De Charlevoix

As stated on the systems "About Us" page:

> Operated by Réseau Charlevoix, Train de Charlevoix's vision of sustainable, eco-friendly development builds partnerships and drives local economic and social spin-offs. Our goal is to offer alternate, safe, respectful public transit and a unique experience in tourism – a spectacular one in fact – between Québec City, Côte de Beaupré and Charlevoix's coastal towns and villages.

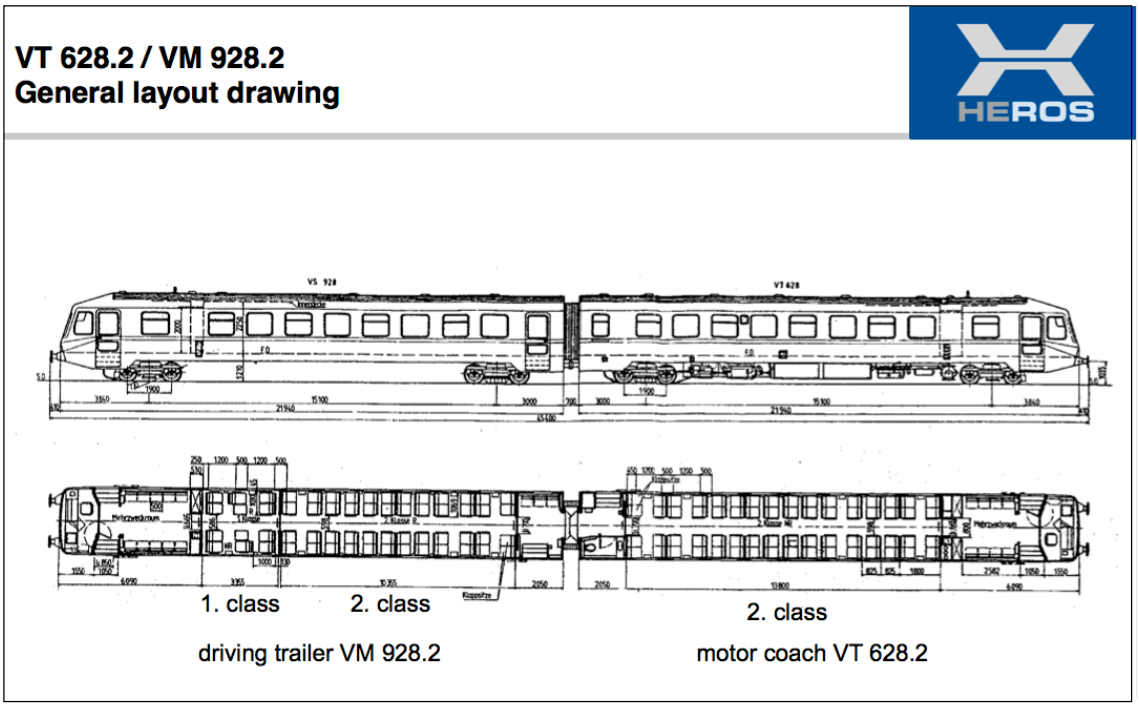
The *Train De Charlevoix* uses former Deutsch Bahn (DB) VT 628-1 DMUs, shown in Figure 5 above and Figure 6 below.

VT 628s are a good match to *Train De Charlevoix's* market. The railroad purchased two 2-car DMUs dating from the 1980's to the mid-1990's each have control cabs at each end, eliminating the need to turn a train around at each end of the schedule. Each train seats about 120-130 persons, suited to the traffic generated by the route. VT 628s typically achieve 4-6 miles per gallon in service, which is much higher than locomotive-hauled trains get.

Also, increasing numbers of VT 628 trainsets will become available as Deutsch Bahn replaces them with more modern low-floor trainsets. Though these cars have high floors–requiring mini-high platforms or wheelchair lifts to meet Americans with Disability Act (ADA) accessibility requirements, they are an order of magnitude less expensive to purchase and upgrade, generally less than $1 million per trainset including purchase, shipping and refurbishment (more details below)[25].

[25] This vehicle design can also be converted to hybrid operations, such as using battery propulsion in addition to the most modern diesel engines meeting Tier 4 EPA emissions requirements. There is sufficient space under the cars, though traction motors would have to be fitted at significant additional expense.

Figure 4. Layout Drawing of VT 628.2 Trainsets



G. Travel Within Santa Cruz County – Beach Shuttles?

Assuming that current visitors continue to patronage the Roaring Camp railroads at the current rate and assuming that up to 300,000 visitors (6%) of the annual total) access Santa Cruz County via revived *Sun Tan Special* service, theoretical usage of of tourist/excursion trains by 580,000 overnight visitors needs to be accounted for. The author presumes that this market would continue to be served by existing Roaring Camp railroads service, plus potential local beach shuttles such as those previously studied by SCCRTC.[26]

This analysis evaluates the potential for rail shuttle services along the Santa Cruz coastline. Another section discusses their future potential integration with the proposed revival of the *Sun Tan* Special by SCCRTC's new rail operator, Progressive Rail. Finally, we speculate how local rail services initially aimed at visitors could evolve into daily year-round rail passenger service, serving both visitors and local residents.

In San Francisco, there are 10 million overnight visitors, and 15 million day-trippers who travel from more than 50 miles away, exclusive of commuters.[27] According to National Transit Database ridership data for the San Francisco Municipal Railway,[28] 5.8 million one-way trips were made on cable cars and 7.46 million trips were carried on Muni's historic streetcars. In both cases, visitors comprised more than 50% of cable car and streetcar riders, e.g, roughly

[26] For example, see http://sccrtc.org/projects/rail/rail-service-studies/

[27] From http://www.sftravel.com/san-francisco-statistics-0 for 2017

[28] Linked at http://www.transit.dot.gov/ntd/transit-agency-profiles, Agency ID 90015

about 7 million annual riders. According to Younger's rules of thumb, San Francisco's 10 million overnight visitors theoretically would have made about 2.9 million trips.

The six million Bay Area residents who live within 50 miles of San Francisco would in theory make about 660,000 annual trips, and the additional 5 million residents who live between 50 and 100 miles from San Francisco (including from the Monterey Bay Area, the Sacramento region, and San Joaquin and Stanislaus Counties) would have made roughly 200,000 round trips annually on services roughly analogous to tourist trains, e.g., cable cars, historic streetcars and ferryboats.

Since attractions like the cable cars, historic streetcars, San Francisco Bay cruises, the ferry to Alcatraz and ferries from Marin, Solano, and Alameda Counties are readily available, an argument could be made that at least in the case of San Francisco, tourist usage of transportation analogous to tourist trains has actually been significantly exceeded. To the estimated 7 million visitor riders of the cable cars and historic streetcars, visitor ridership on ferries to Sausalito, Alcatraz and downtown Oakland can be added, as can Bay cruises. This also does not account for the heavy usage of BART and Caltrain by Bay Area residents to access San Francisco, and probably significant usage of these modes by visitors living more than 50 miles from San Francisco as well.

The *Capitola and Aptos Recreational Rail Study* conducted for SCCRTC between 2003 and 2005 evaluated a number of scenarios, for which the consultant[29] predicted between 10,000 and 25,000 annual riders for each scenario, regardless of location. In the author's view, this study was problematic. The proposed service between Cliff Drive in Capitola and Aptos Village would have operated over 120 days per year (which the author assumes would have been all weekend days from May to October, weekdays Memorial Day through Labor Day, and on weekends during the "shoulder" periods in April, May, September and October). The consultant assumed a total of 360 daily round trips annually, with trains operating between 11:00 a.m. and 5:00 p.m. This implies a total of three daily round trips when trains operate, or roughly a 180-minute (3 hour) headway.

With only 120 days of annual operation, a potential recreational rail service would be operating when about 50%-60% of total annual beach attendance between Capitola and Aptos Village occurs. As previously shown in Figure 1, an estimated total of 840,000 beach visits collectively occur each year at Capitola Beach, New Brighton State Beach and Seabright/Aptos State Beach. Assuming that 50% of beach visits occur when the beach shuttle trains were operating 3 round trips day, 420,000 visits would occur. With estimated shuttle ridership of

[29] According to the cover of the preliminary report, the report was prepared "at the direction of" the Sacramento law firm Hyde, Miller, Owen & Trost. The author must presume that this law firm was involved with SCCRTC's process for purchasing the Santa Cruz Branch Line, and hired Alta Transportation Consulting to actually conduct the study. This firm's or person's identity is not clear. This firm is now Alta Planning + Design, which specializes in active transportation including recreational trails, complete streets, as well as pedestrian and bicycle planning. Whatever their expertise is for tourist/excursion train planning is not clear.

between 10,000 and 25,000 annually, the *Recreational Rail Study* estimated a mode share of 2.4% to 6.0%,[30] which seems very low to the author.

One odd feature of the *Recreational Rail Study* is that it projected the same range of patronage for a potential Highway 1 intercept parking lot station to the Beach Boardwalk as it did for Capitola to Aptos Village. Existing *Santa Cruz Beach Train* service from Felton carried 60,000 annual riders in 2016 at fares averaging around $26-$31 round trip (e.g., child and adult fares, respectively) **plus** $10 parking.[31]

With the Boardwalk, Santa Cruz Main Beach and Santa Cruz Wharf serving 8.5 million individual visits–a net of 4 million visits estimated by the author when double-counting is eliminated–beach shuttle trains to the Boardwalk would be likely to serve an order of magnitude more riders than the *Santa Cruz Beach Train,* assuming frequent service, moderately-priced parking and fares of less that $10 for a round trip. Two DMUs could provide 20-minute frequencies from this location, though where nearby parking could be established is problematic.[32]

A more logical location for a rail shuttle station and parking lot for a Santa Cruz Main Beach/Boardwalk rail shuttle would be in West Santa Cruz, perhaps at Natural Bridges Drive, where SCRTC owns a large amount of railroad property sufficient for 400-600 parking spaces, plus parking on the surrounding streets in this industrial area.[33] From this West Santa Cruz location, two DMUs could provide service every 15-20 minutes since the distance is less than two miles each way. A passing track would need to be constructed at the midpoint of this potential shuttle route, roughly between the Almar Avenue and Bay Street crossings.

H. A West Santa Cruz to Beach Boardwalk Shuttle

Parking at the Beach Boardwalk is expensive and often very difficult on summer weekends ($10 per car at the Boardwalk-owned lots in the summer weekdays, $15 on "full [amusement] ride" days, and $20 per vehicle on summer weekend days and holidays). Thus there is a strong case for a potential shuttle serving the Beach Boardwalk.

The author estimates that VT 628 rolling stock would cost about $150/train hour for 2-person crews, roughly $1.50 per mile for fuel at $4.00/gallon (however, these trains are much more efficient at long station spacing compared to shuttle services), and say, $5.00 per train mile for ongoing maintenance, cleaning and other repairs (which would also be much less per train mile on a longer rail route). A 2-train shuttle is estimated to operate 10 hours per day

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[30] See pages 7-11 of the *Recreational Rail Study* for the study's logic behind the 10,000-25,000 annual estimates.

[31] http://www.roaringcamp.com/trainfares

[32] The largest nearby parking lots are at the Santa Cruz Costco north of Highway 1, and Gateway Plaza shopping center south of Highway 1 on River Street.

[33] To ensure usage of potential off-street parking at this location, the City of Santa Cruz could institute on-street parking charges for those staying more than two hours. Few residents would be impacted since this is mainly an industrial area.

each, totaling 20 hours per day for two trains during a 250-day operating season. This results in the calculations shown in Figure 5.

Figure 5. Estimated Operating Expenses – 2.0-mile West Santa Cruz-Beach Boardwalk Rail Shuttle

Category	Unit Cost	Factor	Total Cost, Category
Operating Crew	$150.00	6,000 hours*	$750,000
Train Fuel	$1.50	40,000 train miles	$60,000
Train Maintenance	$5.00	40,000 train miles	$200,000
Subtotal, "Above the Rail" Expenses			**$1,010,000**
Track, Parking Lot & Stations, Security	Lump Sum		$250,000
Insurance, Management, Promotion	Lump Sum		$750,000
Grand Total, Operating Expenses			**$2,010,000**
Estimated Farebox & Parking Revenues			$3,000,000 to $3,450,000
Potential Operating Margin			**$990,000 to $1,440,000**
EBITA Margins**			149% to 172%
Estimated Annual Carrying Cost - Capital			$512,000
Net profit including capital charges			$478,000 to $928,000
Potential Net Margin after capital charges			**16% to 27%**
Projected round trip passengers			350,000–400,000
* Including crew training, maintenance testing, and "deadhead" ** EBITA: Earnings before interest, taxes, depreciation and amortization			

Assuming this shuttle service operated every 20 minutes with two trains, it is projected to attract about 350,000-400,000 annual riders. Assuming an average fare of $7.00 per round trip, annual fare revenues would total between $2,450,000 and $2,800,000. Assuming a $5.00 average parking rate and 80% of shuttle users parked, annual parking revenues would range between $550,000 and $650,000.

Figure 6. Projected Capital Costs – 2.0-mile West Santa Cruz-Beach Boardwalk Rail Shuttle

Category	Unit Cost	Factor	Total Cost, Category
Upgrade track to Class II, upgrade crossings	Lump Sum	--	$3,000,000
Stations	$1,000,000	2	$2,000,000
Gravel parking lot – 500 cars	$2,000	500	$1,000,000
"Butler Building" storage & maintenance	Lump Sum	1	$1,000,000
25% Contingency, Engineering	25%	--	$1,750,000
Subtotal, Fixed Infrastructure			**$8,750,000**
Purchase 3 VT 628 trainsets, shipping	$700,000	2 in service, 1 spare	$2,100,000
Allowance for Vehicle Upgrades	Lump Sum		$750,000
Grand Total, Projected Capital Costs			**$11,600,000**
Annual carrying cost, 3.5% federal interest rate, and principal for FRA Railroad Rehabilitation and Improvement (RRIF) loan funding			**$512,000**

Annual fare and parking revenues are projected to total between $3,000,000 and $3,450,000, potentially providing an operating revenue/operating cost ratio of 149% to 172%, e.g., operating profit margins before capital carrying costs of 49% to 72%. Based on capital carrying costs as summarized in Figure 6, this operating margin could vary from 16% to 27%.

I. Expanding Beyond Basic Boardwalk Service

Unlke bus operations[34], transit and intercity passenger service experience very strong economies of scale with more trains operating and with longer routes. This is illustrated by calculating the economic and ridership impacts of two scenarios in which additional visitor services are added to a West Santa Cruz-Beach Boardwalk Shuttle route:

- West Santa Cruz to Davenport – round trips over 10.0 additional miles of route, serving multiple undeveloped beaches and scenic route. Approximately 1.1 million beach visits are estimated, plus about 475,000 annual visits to Wilder Ranch State Park.
- Extend beach and visitor shuttle services from the Beach Boardwalk to Seascape Resort over 11.0 miles, serving several beaches and tourist destinations such as Capitola Village and Aptos Village. According to State of California statistics and City of Capitola reports (e.g., the basis for Figure 1), there are approximately 1.9 million annual beach visits.

These extensions are assumed to operate 60-minute headways to Davenport and beaches west of Santa Cruz, and every 30 minutes east of the Beach Boardwalk as far east as Seascape Resort. The operating season would be similar to the proposed West Santa Cruz-Beach Boardwalk Shuttle, e.g., daily between May and October, and on shoulder weekends for 250 operating days per year.

[34] The cost of running buses consists mainly of "variable costs," e.g., costs that vary more-or-less proportionately with the level of service operated. For most bus systems the direct cost running buses is typically 80% or more of overall operating expenses. In contrast, rail systems have relatively low variable costs, and high fixed costs–primarily for infrastructure such as tracks, signals, stations and other fixed resources. The direct operating cost of trains is typically less than 50% of total rail system expenses.

J. Davenport Beaches Rail Shuttles

Figure 7 illustrates projected operating expenses for a combined operation, with the Davenport Beach Shuttle added to the Boardwalk Shuttle.

Figure 7. Estimated Operating Expenses – West Santa Cruz-Beach Boardwalk Shuttle + Davenport

Category	Unit Cost	Factor	Total Cost, Category
Operating Crew	$150.00	8,000 hours*	$1,200,000
Train Fuel	$1.50	65,000 train miles	$98,000
Train Maintenance	$5.00	65,000 train miles	$325,000
Subtotal, "Above the Rail" Expenses			**$1,623,000**
Track, Parking Lot & Stations, Security	Lump Sum		$500,000
Insurance, Management, Promotion	Lump Sum		$750,000
Grand Total, Operating Expenses			**$2,873,000**
Estimated Farebox & Parking Revenues			$4,440,000 to $4,794,000
Potential Operating Margin			**$1,567,000 to $1,921,000**
EBITA Margins**			155% to 172%
Estimated Annual Carrying Cost - Capital			$922,000
Net profit after capital charges			$645,000 to $993,000
Potential Net Margin after capital charges			**15% to 21%**
Projected round trip passengers			462,000–528,000

* Including crew training, maintenance testing, and "deadhead"
** EBITA: Earnings before interest, taxes, depreciation and amortization

Annual fare and parking revenues for the two shuttles are based on a Davenport Beach Shuttle with a $12 round trip fare because of longer travel distances, attracting a slightly lower percentage of beach goers than the Beach Boardwalk Shuttle because of lower frequencies, e.g., about 7%-8% of total beach and park visitors between West Santa Cruz and Davenport vs. 9% to 10% to the Beach Boardwalk. This is about 112,000 to 128,000 annual round trip passengers.

These estimates do not include projected expenses and revenues for non-shuttle excursion train services to/from Davenport, such as Sunset Trains, dinner trains, special operations such as the Polar Express, and other non-shuttle services.

Figure 8 summarizes projected capital costs with the addition of the West Santa Cruz-Davenport tracks.

Adding capital carrying costs as summarized in Figure 8, this operating margin could vary from 15% to 21% about the same or less as a Boardwalk Shuttle only. The potential operating margin after capital charges is projected to decline somewhat compared to the Boardwalk Shuttle due to the relatively fewer passengers carried to Davenport and the higher capital costs of a much longer route compared to the West Santa Cruz-Boardwalk shuttle.

Figure 8. Projected Capital Costs – 2.0-mile West Santa Cruz-Beach Boardwalk Rail Shuttle

Category	Unit Cost	Factor	Total Cost, Category
Upgrade track to Class II, upgrade crossings	Lump Sum	--	$6,000,000
Stations	$1,000,000	2+6*	$3,500,000
Gravel parking lot – 600 cars	$2,000	500	$1,200,000
"Butler Building" storage & maintenance	Lump Sum	1	$1,000,000
25% Contingency, Engineering	25%	--	$2,925,000
Subtotal, Fixed Infrastructure			**$16,625,000**
Purchase 4 VT 628 trainsets, shipping	$700,000	3 in service, 1 spare	$2,800,000
Allowance for Vehicle Upgrades	Lump Sum		$1,000,000
Grand Total, Projected Capital Costs			**$18,425,000**
Annual carrying cost, 3.5% federal interest rate, and principal for FRA Railroad Rehabilitation and Improvement (RRIF) loan funding			**$922,000**
* On Davenport line, estimated cost is $250,000 per station for low platforms. In this scenario, each vehicle would be equipped with on-vehicle lifts to maintain accessibility.			

K. Beach Boardwalk, Davenport Beaches & East Beach Rail Shuttles

The third scenario explored in this paper is a full beach shuttle service over the 23 miles between Davenport, the Beach Boardwalk and Seascape Resort in Rio Del Mar. The extension to Capitola, Aptos and Rio Del Mar is projected to cover up to 1.9 million annual beach visits, another 1,000,000 annual visitors to Capitola Village not duplicated with beach visitors[35] about 500,000 annual visitors projected for Aptos Village,[36] and about an estimated 150,000+/- annual visitors to the Seascape Resort area.

Total potential trips that could be served by extending a beach rail shuttle east to Seascape from the Boardwalk totals around 3.5 million annual round trips.

While parking at the Beach Boardwalk is difficult or expensive, overall parking at most of the beaches east of the Boardwalk is even more difficult, with very high occupancies, though parking rates are significantly lower. Furthermore, parking occupancy in Capitola Village is nearly 100% on summer weekends and weekdays. Similarly, parking occupancy in Aptos Village is tight. At Seascape Resort, off-street parking is restricted to guests and visitors, and on-street parking is very scarce during beach season.

Based on this, it has been assumed that a rail shuttle operating east would attract a similar mode split as the West Santa Cruz-Beach Boardwalk Shuttle, e.g., 9%-10% or 315,000 to 350,000 annual round trip riders. Figure 9 summarizes projected operating costs for the

[35] *Parking Analysis for the Capitola Village Area.* Prepared for the City of Capitola, RBF Consulting, Monterey Bay. 2008. Linked at http://www.cityofcapitola.org/publicworks/page/parking-needs-analysis

[36] Aptos Village Parking Study, July 2010. Linked at http://www.sccoplanning.com/PlanningHome/Environmental/AptosVillageProjectDocuments/Mixed-useCommercialResid/MitigatedNegativeDeclaration.aspx

complete 23-mile system, including a Davenport Beach Shuttle, West Santa Cruz-Beach Boardwalk Shuttle, and Eastern Beaches Shuttle.

Annual fare and parking revenues for the entire system are projected to total between $8,220,000 and $8,994,000 based on based on the East Beach Shuttle with a $12 round trip fare based on longer travel distances.

Figure 9. Operating Expenses – West Santa Cruz-Beach Boardwalk + Davenport + East Beaches

Category	Unit Cost	Factor	Total Cost, Category
Operating Crew	$150.00	16,000 hours*	$2,400,000
Train Fuel	$1.50	220,000 train miles	$330,000
Train Maintenance	$4.00	220,000 train miles	$880,000
Subtotal, "Above the Rail" Expenses			**$3,610,000**
Track, Parking Lot & Stations, Security	Lump Sum		$1,000,000
Insurance, Management, Promotion	Lump Sum		$1,500,000
Grand Total, Operating Expenses			**$6,110,000**
Estimated Farebox & Parking Revenues			$8,220,000 to $8,994,000
Potential Operating Margin			**$2,110,000 to $2,884,000**
EBITA Margins**			135% to 147%
Estimated Annual Carrying Cost - Capital			$1,485,000
Net profit after capital charges			$625,000 to $1,399,000
Potential Net Margin after capital charges			**8% to 15%**
Annual round trip passengers			777,000-878,000

* Including crew training, maintenance testing, and "deadhead"
** EBITA: Earnings before interest, taxes, depreciation and amortization

Figure 10. Projected Capital Costs – West Santa Cruz-Beach Boardwalk + Davenport + East Beaches

Category	Unit Cost	Factor	Total Cost, Category
Upgrade track to Class II, upgrade crossings*	Lump Sum	--	$11,000,000
Stations	$1,000,000	2+12**	$5,000,000
Gravel parking lot – 600 cars	$2,000	500	$1,200,000
"Butler Building" storage & maintenance	Lump Sum	2	$2,000,000
25% Contingency, Engineering	25%	--	$4,800,000
Subtotal, Fixed Infrastructure			**$24,000,000**
Purchase 6 VT 628 trainsets, shipping	$700,000	5 in service, 1 spare	$4,200,000
Allowance for Vehicle Upgrades	Lump Sum		$1,500,000
Grand Total, Projected Capital Costs			**$29,700,000**
Annual carrying cost, 3.5% federal interest rate, and principal for FRA Railroad Rehabilitation and Improvement (RRIF) loan funding			**$1,485,000**

***** Including construction of a 2nd pocket track at Boardwalk so rail shuttles could go around Santa Cruz Beach Trains laying over at the Beach Boardwalk station.
****** On Davenport line, estimated cost is $250,000 per station for low platforms. In this scenario, each vehicle would be equipped with on-vehicle lifts to maintain accessibility.

L. Evolution of Visitor-Oriented Rail Shuttles to Year-Round Rail Transit?

An underlying premise of this paper is that excursion services and beach shuttles for visitors would help pay for the ongoing operation and maintenance of the Santa Cruz Branch Line. Traditional excursion trains most often function as "rides to nowhere" that patrons ride for the enjoyment of the train ride itself and/or scenery along the route. For example, the Big Trees & Roaring Camp Railroad provides the experience of riding behind steam locomotives through a thick redwood forest, with no destination in mind other than returning to the origin station. The Beach Train currently operating from the Roaring Camp facility offers passengers the options of a round trip ride to the Beach Boardwalk without alighting, or a 3-hour layover since two daily trains are offered.

Unlike traditional excursion trains, proposed beach shuttles would bear a resemblance to transit service, with multiple schedules designed to carry passengers to and from multiple, varying destinations, in this case the many beaches along the route as well as other destinations such as Capitola Village, Aptos Village or the Seascape Resort. Based on this, the author believes that beach shuttles initially designed for visitors could evolve into regular, daily all-year rail transit. Unlike almost all public transit operations in the U.S., combining ridership by visitors with that by local residents could minimize ongoing operating deficits by providing larger average revenues per passenger compared to local residents. Developing such a system would require a well-thought out, very cost-conscious strategy and creation of a suitable and fair public-private partnership.

To estimate the potential costs of combining beach shuttle and regular rail passenger service, the following operating assumptions have been made:

- The levels of regular rail passenger service estimated in the author's April 2018 paper *Optimizing Rail Passenger Service for Santa Cruz County* has been assumed, e.g., every 30 minutes all day between West Santa Cruz, downtown Santa Cruz, and Watsonville, with 15-minute peak period headways between Seascape and downtown Santa Cruz.
- Between May and October, 15-minute headways between Seascape and downtown Santa Cruz via the Beach Boardwalk would be provided on Saturdays, Sundays and holidays to accommodate beach shuttle traffic.
- Major capital improvements would be needed, including new hybrid, battery electric or fuel-celled electric powered, accessible low floor vehicles. The author estimates that a total of 10 vehicles would be needed, with up to 8 in service and 2 spares. This proposed fleet could be supplemented by equipment purchased earlier for initial beach shuttle services, though wheelchair lifts or mini-high platforms for level boarding accessibility.
- Upgrading track from FRA Class 2 standards to FRA Class 3 or better (up to 60 mph allowed for passenger trains). Track upgrades including new passing sidings at appropriate locations between Seascape and the San Lorenzo River, and double-tracking of the existing in-street track in front of the Boardwalk and Beach, and on Chestnut Street north to the Downtown/City Hall station.
- Construction of new station platforms at various locations. Upgrading platforms constructed earlier for the beach shuttles.

- Expanded maintenance facilities for the rail car fleet.
- Multimodal connections, including development of bus stops adjacent to rail platforms to provide feeder bus service where appropriate.
- A new active transportation and automated minibus/pedestrian/bicycle bridge over Highway 1 to access Cabrillo College.
- Installation of the latest technology rail signaling and control systems that meet requirements to provide Positive Train Control (PTC).
- Additional tracks and other minor capital improvements to minimize conflicts between passenger trains and freight trains, such as additional sidings and a passenger bypass track in the Watsonville switching area.
- Other capital improvements as required.

Figure 11 shows estimated operating expenses and revenues for full rail transit service. Operating expenses are based on the total level of anticipated service, which incorporates earlier visitor-oriented beach shuttle services into the schedule. The estimate also includes a higher level of maintenance to meet FRA Class 3 standards, as well as a higher level of maintenance and security at upgraded and new stations. Higher costs for insurance, management and promotion are included, and for enhanced connecting bus service.

Estimated revenues from visitor services have been added to projected local fares, averaging $2.20 per boarding, which compares to an estimated $2.11 in operating revenues per boarding, including fares[37] for existing Santa Cruz Metro bus service. This calculation does not include establishment of zone fares for longer distances such as Watsonville, though zone fares should be considered for potentially faster service via rail compared to existing bus services.

It has been assumed that basic out-of-pocket cash fares for Santa Cruz Branch line rail transit services would be geared towards visitors. Local riders would obtain much lower average fares per boarding through pre-purchased season passes such as those available to University of California, Santa Cruz or Cabrillo College students, as well as available to middle and high school attendees.

Multi-ride tickets and passes would also be offered, such as heavily-discounted 20-ride tickets, weekly passes, two weekly passes, and monthly passes, e.g., fare media not likely to be used by visitors who stay only one to three days. For discounts to seniors, persons with disabilities and low income riders, user-side subsidies would also be explored.

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[37] Santa Cruz Metropolitan Transit District *FY18 &FY FY19 Final Budget.* June 17, 2017. Ridership figure on page 10, Table on page 28. Available online at http://www.scmtd.com/en/agency-info/administration/financial-reports

Figure 11. Operating Expenses – Full Rail Transit: West Santa Cruz – Downtown - Watsonville

Category	Unit Cost	Factor	Total Cost, Category
Operating Crew	$150.00	30,000 hours*	$4,500,000
Train Fuel	$1.50	500,000 train miles	$750,000
Train Maintenance	$4.00	500,000 train miles	$2,000,000
Subtotal, "Above the Rail" Expenses			**$7,250,000**
Track, Parking Lot & Stations, Security	Lump Sum		$2,500,000
Insurance, Management, Promotion	Lump Sum		$2,500,000
Enhanced Local Connecting Bus Service	Lump Sum		$2,000,000
Grand Total, Operating Expenses			**$14,250,000**
Fares & Parking Revenues - Visitors			$8,220,000 to $8,994,000
Fares & Parking Revenues – Residents ($2.20)			$7,650,000 to $8,975,000
Total Farebox & Parking Revenues			**$15,870,000 to $17,969,000**
Potential Operating Margin			**$2,620,000 to $4,719,000**
EBITA Margins**			111% to 126%
Estimated Annual Carrying Cost - Capital			$8,125,000
Net profit including capital charges			(-$6,505,000 to -$4,406,000)
Potential Net Margin after capital charges			**(-29% to -20%)**
Annual round trip passengers			2,517,000-2,918,000

* Including crew training, maintenance testing, and "deadhead"
** EBITA: Earnings before interest, taxes, depreciation and amortization

Figure 12 summarizes projected capital costs for implementing full rail transit service. A key assumption is that portions of existing rail are retained, since much heavyweight rail has already been installed, and some portions of the line have welded rail. The estimated cost also includes upgrading existing sidings in some locations, double-tracking in-street portions of the line in front of the Beach Boardwalk and along Chestnut Street to the vicinity of the proposed downtown station. This would eliminate conflicts with the Beach Train operated by the Santa Cruz, Big Trees and Pacific Railroad, and would allow operation of more frequent shuttle service between downtown and the Boardwalk if warranted.

The budget also assumes that previous fixed infrastructure investments would have been completed, such as bridge repairs and drainage improvements. A large lump sum for Positive Train Control (PTC) and related signaling improvements has been included, though the most advanced PTC technology could reduce the estimated expense by an order of magnitude.

Figure 12. Projected Capital Costs – – Full Rail Transit: West Santa Cruz – Downtown - Watsonville

Category	Unit Cost	Factor	Total Cost, Category
Upgrade track to FRA Class 3 & 4, crossings	Lump Sum	--	$40,000,000
Upgrade Stations, New Stations	$1,000,000	2+15	$15,000,000
Parking lot – 1,000 cars various locations	$5,000	1,000	$5,000,000
Storage & maintenance facility	Lump Sum		$10,000,000
Positive Train Control & Signaling	Lump Sum		$20,000,000
25% Contingency, Engineering	25%	--	$22,500,000
Subtotal, Fixed Infrastructure			**$112,500,000**
Purchase 10 GTW 2/6 trainsets	$5,000,000	8 in service, 2 spare	$50,000,000
Allowance for Vehicle Upgrades	Lump Sum		$0
Grand Total, Projected Capital Costs			**$162,500,000**
Annual carrying cost, 3.5% federal interest rate, and principal for FRA Railroad Rehabilitation and Improvement (RRIF) loan funding			**$8,125,000**
* Including construction of a 2nd pocket track at Boardwalk so rail shuttles could go around Santa Cruz Beach Trains laying over at the Beach Boardwalk station.			

As expected, full implementation of rail transit requires a significantly higher level of capital investment compared to visitor-oriented beach shuttles or other excursion services. While reasonable operating surpluses could be expected by combining tourism

M. Conclusion

It is clear from examining tourist train patronage near large cities that Reat Younger's rules of thumb for ridership are not strictly applicable, such as in Santa Cruz County. For example, tourist trains near Sacramento attract only about 20% of likely visitor usage of theoretical calculations using the Younger rules of thumb. On the other hand, "intervening opportunities" such as Capital Corridor passenger trains between Sacramento and the Bay Area, and Sacramento Regional Transit's light rail system may satiate desires for train rides by visitors.

In contrast, San Francisco visitor usage of cable cars and historic streetcars meets the estimated ridership from the Younger rules of thumb by themselves. If anything, usage of rail and analogous services, e.g., ferries, by visitors is much higher, given the availability of BART and Caltrain, ferries from Marin, Solano and Alameda Counties, as well as numerous Bay Cruise options including to/from Alcatraz.

Similarly, the Vallejo Ferry midday and weekend patronage serving recreational trips also more than matches the Younger rules of thumb for the approximately 800,000 residents in the ferry's immediate hinterland within 50 miles of the Vallejo Ferry Terminal, including the 2.5 million people in the greater Sacramento region who live 50 to 100 miles from the terminal.

These case studies give a high level of confidence that visitors will ride attractive rail and other services when provided. In Santa Cruz County, out of a theoretical total of at least

900,000 annual rides by visitors, 200,000 are currently made on the two existing Roaring Camp Railroad services. It seems likely that there is a large potential market for additional rail services such as the beach shuttles proposed in this paper. The key is that rail must directly serve major destinations and attractions–such as Santa Cruz County's numerous beaches–in order to be useful for visitors.

The rail shuttles proposed in this paper would serve very large visitor destinations. In addition to the 2 million annual visits to Santa Cruz's redwood parks, there is a total of 7-8 million+ annual visits to the Santa Cruz Beach Boardwalk (and beaches), the Santa Cruz Wharf, and numerous beaches between Santa Cruz and Davenport, and between the Boardwalk east to Capitola, Aptos and Rio Del Mar, as well as Capitola Village and Aptos Village.

Potential ridership at up to 878,000 annual round trips (plus potential Suntan Special ridership) meets the projections from Younger's rules of thumb, and appears to generate sufficient potential fare revenues to operate the proposed rail shuttles at a profit including coverage of capital costs, at relatively modest fares and parking charges. Such shuttles may provide a major public benefit in reducing congestion and parking shortages around Santa Cruz County's beaches, which opens major policy questions:

- Would reducing congestion and parking shortages around Santa Cruz County's beaches be a significant enough public benefit for SCCRTC to be willing to consider a public-private partnership that would construct and operate a beach shuttle system?
- Does it make sense for SCCRTC to pursue grants or tax-free government loans such as from the Railroad Rehabilitation and Improvement Financing (RRIF) program administered by the Federal Railroad Administration, to facilitate the construction and operation of a beach shuttle system, which presumably the private sector can run at an operating profit?
- Can this be a forerunner of a modern rail system that operates frequently year-round, with the revenues from tourists helping to pay for its operating costs?

Combining potential fare revenues from visitor shuttles with fares from rail trips by local residents may allow a modest operating profit margin, which would be more than offset by the capital carrying costs of full rail transit service. In turn, private investment combined with public investment from state and federal grants may be a feasible course of action.

It is also important to note that public-private partnerships can be structured in a way where the projected operating subsidy of a project could be reduced through direct payments, bulkpurchase of discounted tickets for local residents and other measures. Contracts between the public entity and private sector partners can be structured to incentivize the private sector partner to control operating expenses, since doing so would help increase potential profits.

OPTIMIZED RAIL PASSENGER SERVICE FOR SANTA CRUZ COUNTY
-Maximizing Ridership and Benefits of Rail Passenger Service

By Michael D. Setty, MUP[1]
April 9, 2018

Introduction

Santa Cruz County voters approved a 0.5% county-wide sales tax for transportation at the November 2016 election which included an 8% set-aside for maintaining the current tracks in the 31.48-mile rail corridor now owned by the Santa Cruz County Regional Transportation Commission (SCCRTC) since its purchase in 2012 from the Union Pacific Railroad.

SCCRTC is conducting a "Unified Corridor Study" during 2018 through early 2019. This study is examining various transportation options in the Highway 1 corridor between Watsonville and Santa Cruz. Transit options being studied include Bus Rapid Transit (BRT) on existing arterial street, Highway 1 and potentially along the railroad right-of-way. Rail options are also being considered along the existing right-of-way and potentially in the Highway 1 freeway alignment, along with active transportation improvements such as improved pedestrian and bicycle facilities, and auxiliary lanes along Highway 1. Figure 1 illustrates the selected Scenarios being studied in Phase 2 of the Unified Corridor Study.[2]

After adding a freeway lane in each direction on Highway 1 for either high occupancy vehicles (HOVs) or single-occupant vehicles, proposed rail service on the right-of-way purchased by SCCRTC is the most controversial potential transportation project in Santa Cruz County. Portions of the proposed pedestrian and bicycle trail that would parallel the existing tracks over the 31.48 miles between Davenport, Santa Cruz and Watsonville are now under construction.

However, there are two outspoken and apparently very well-financed groups, "Trail Now" and "Greenway Santa Cruz,"[3] that are attempting to convince SCCRTC to abandon current "Rail and Trail" plans in favor of a "Trail Only" option that would remove the existing tracks. The Trail Only proposal would convert the current rail alignment and embankment to a combination bicycle-pedestrian trail that would occupy most of the existing railroad right-of-way. These anti-rail groups claim that in addition to conventional bicycles, electric-assisted bicycles and scooters would be adequate substitutes for transit, including for long-distance commuting between Watsonville and Santa Cruz.

However, the Trail Only plans put forward by rail opponents suffer from two major shortcomings plus a major, potentially fatal oversight.

First, the anti-rail faction claims that the existing rail corridor can be "rail-banked." That is, existing tracks and ties can be removed now, in favor of using the corridor for a bicycle/ pedestrian trail, and then reinstalled at some (undetermined) future date when rail service is determined to be "feasible." However, to date in the United States no rail service has been

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[2] Unified Corridor Study information at: http://sccrtc.org/projects/multi-modal/unified-corridor-study/
[3] www.trailnow.org and www.sccgreenway.org

Figure 1.

Unified Corridor Investment Study - Step 2 Scenarios for Analysis
(Staff Recommendation - December 7, 2017)

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F	No Build
Highway 1 Projects							
buses on shoulders							
high occupancy vehicle lanes (HOV) and increased transit frequency							
auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D							
metering of on-ramps							
additional lanes on bridge over San Lorenzo River							
Mission St intersection improvements							
rail transit on Hwy 1 between Santa Cruz and Watsonville							
Soquel Avenue/Drive and Freedom Blvd							
bus rapid transit lite (faster boarding, transit signal priority and queue jumps)							
dedicated lane for bus rapid transit and bikes							
increased frequency of transit with express services							
buffered/protected bike lanes							
intersection improvements for auto							
intersection improvements for bikes/pedestrians							
Rail Corridor							
bike and pedestrian trail*							
local rail transit with interregional connections							
bus rapid transit							
freight service on rail			Only Watsonville				
Overall Project Area/Connections between Routes							
improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects will be evaluated in all scenarios.						
additional transit connections							
bike share, bike amenities, transit amenities, park and ride lots							
multimodal transportation hubs							
automated vehicles/connected vehicles**							
Transportation Demand and System Management							
employers and residences - incentive programs	These projects will be evaluated in all scenarios.						
education and enforcement - electric vehicle, motorist safety, and bike safety							

* "multiuse trail" and "bike trail separate from pedestrian trail" was combined into "bike and pedestrian trail" until more information was available to better define the ability to separate bikes from pedestrians in a trail only, a trail with rail, and a trail with BRT. See project tables in Attachment 1 for staff recommendations of the project descriptions for the various trail options.

** Qualitative evaluation for all scenarios

Oval represents projects that are recommended to be added to scenarios for analysis in Step 2

SCCRTC Kimley»Horn

bus transit
rail transit
auto
bike/ped
rail freight

reestablished in any "rail-banked" in the decades since "rail-banking" was established as a concept. In the few cases where service reestablishment was attempted, trail users and adjacent property owners united and stopped implementation. In short, the call for rail-banking seeks to eliminate the only remaining option to prevent Santa Cruz County's descent into total gridlock.

Second, rail opponents claim that likely rail ridership would be too low. Given the rapidly growing congestion in the Highway 1 corridor, this claim cannot be taken seriously. In SCCTC's 2015 *Passenger Rail Feasibility Report*, consultants estimated that the highest ridership option would carry from 6,150 to 6,800 daily riders under projected 2035 conditions, or roughly 5,000-5,500 daily riders under 2015 conditions.

These projections were based on a robust "direct demand forecasting model" method pioneered by the ridership consultants (Fehr & Peers) in the early 2000's. The study assumed no service to downtown Santa Cruz or Cabrillo College. The author examined how extending service to those destinations would affect ridership, and concluded that expanding the service area would double the projected ridership.

Third, rail opponents overlook another major problem, which is probably fatal to their Trail Only proposal. If a series of mixed Federal Court rulings including the Supreme Court regarding conversion of abandoned railroad rights-of-way to trail usage are any indication, removing the tracks would likely spark years of litigation. While SCCRTC has established outright ownership of 93.09 acres (31%) of the total land used for the railroad right-of-way, titles for the remaining 208.53 acres consist either of "rail only" easements that legally revert to adjacent landowners after abandonment of rail usage, or parcels for which no clear title could be established. Title searches and other real estate "due diligence" reports funded by SCCRTC were unable to establish clear ownership of 100+ parcels on which easements for rail usage existed when the Union Pacific Railroad transferred ownership of the Santa Cruz Branch Line to SCCRTC in 2012.

Part 1 of this paper outlines TRAC's proposed changes to the scenarios examined in the 2015 Rail *Passenger Rail Feasibility Report* that should be additional input into the Unified Corridor Study, designed to potential double ridership.

Part 2 examines the details of why years of litigation can be expected should Santa Cruz Branch Line tracks be removed to implement the Trail Only plan.

1. Optimizing Rail Passenger Service for Santa Cruz County

The author followed up on the *Passenger Rail Feasibility Report* by applying recent census employment and population data to our own rail patronage projections based on the direct demand forecasting model originally developed by the same consultant in 2003 for an analysis of proposed BART extensions in Eastern Alameda County ("tBART Bay Area Direct Demand Ridership Model").[4]

Population and employment located within 0.5 miles of proposed station stops are the most important factors in projecting rail ridership, followed by the number of bus arrivals and departures at a given station. These figures have been calculated by the author for the Marin-Sonoma, Santa Cruz County, and North San Diego County cases discussed in this paper.

Despite the original data being 15 years old, applying the model to new SMART rail service in Marin and Sonoma Counties that began in September 2017, it remarkably predicted current SMART ridership within +10%/-10%. Model inputs were adjusted by the author to account for:

- Less frequent a.m. and p.m. peak period services than originally promised, e.g., hourly southbound trains during the "peak of the peak" between 6:00 a.m. and 8:00 a.m., instead of the 30-minute frequencies promised.
- Limited midday service (e.g., only two mid-day round trips).

[4] *Forecasting Transit Demand in a Fast Growing Corridor: The Direct-Ridership Model Approach.* Also *tBART 580/680 Corridor Ridership Forecasting Methodology.* Gerald Walters & Robert Cervero [UC Berkeley transportation faculty]. Completed for BART, August 2003 for study of "tBART" service in the I-680 and I-580 corridors (extensions to preexisting I-580 BART service). Note: the equation for A.M. peak period ons+offs was developed and refined from this research; this information has been presented at a number of transportation conferences. The 2003 paper is not online but the author can provide a scan.

- Lack of SMART service after 8:00 p.m. on weekdays.
- Limited weekend service, e.g., only 5 round trips on Saturdays, Sundays and holidays at two to three-hour intervals.

SMART ridership has been averaging around 3,000 weekday one-way passenger trips during non-holiday periods since beginning revenue service last September. This compares to the 3,200+/- daily one-way passenger trips projected by the tBART Bay Area Direct Demand Ridership Model, with inputs adjusted as summarized in Figure 2.

Figure 2. SMART Projections Using tBART Rail Patronage Model

	Population 2010[5]	Employment 2009	Pop.+ Jobs	Projected A.M. Peak Period Ons+Offs	Projected All-Day Ons+Offs
CURRENT SMART SCHEDULE					
Current 10 Open Stations	37,231	32,745	69,976	3,063	6,400
				Projected Daily Riders	3,200
				Actual Daily Riders	**2,800-3,200**
Planned 16 Stations Open	52,119	41,707	93,826	Projected Daily Riders#	4,500
30-Min. Peak, 60-min. other times				Projected Daily Riders	9,653
15-min. Peak, 30-min. other times				Projected Daily Riders	14,093

Important note: To obtain total daily ridership, divide Total Ons+Offs in half, e.g., 6,400 Ons+Offs=3,200 daily one-way passenger trips, or 1,600 round trips

Current (April 2018) SMART's practical service capacity is severely limited by provision of 60-minute a.m. peak frequencies southbound peak direction between 6:00 a.m. and 9:00 a.m. and only 2 daily mid-day round trips. This limits total capacity and ridership. The fact that several SMART stations have not yet opened for regular service also reduces potential ridership. (Detailed spreadsheet available upon request).

The Santa Cruz Rail Corridor: Applying the Direct Demand Ridership Model

The tBART direct demand model was applied to the Santa Cruz County rail corridor under two scenarios with the following changes designed to increase ridership beyond the highest ridership scenarios studied in the 2015 *Passenger Rail Feasibility Report:*

- Service extended 0.7 miles north from the Santa Cruz depot, to two additional stations at Chestnut & Laurel and Chestnut & Locust Streets in Downtown Santa Cruz. The Laurel Street stop would connect directly to the Laurel Street buses to/from UCSC that operate every 7.5 minutes in each direction (16 buses per hour, plus other bus lines nearby)

[5] It should be noted that estimated population and employment near most SMART stations has not changed significantly since the Great Recession.

during the school year. The proposed Locust Street station location has sufficient room for a 2-track terminal within the railroad right-of-way, is less than a block from Santa Cruz City Hall, and is about 0.25 mile from the downtown core.

Figure 3. Example of Automated Minibus

- A new station near Cabrillo College across Highway 1 at the entrance to New Brighton State Beach. This stop would connect to Cabrillo College with a transit lane on McGregor Drive, and then across a new a pedestrian/bicycle bridge that includes a dedicated path for small, low axle-weight automated minibuses, as shown in Figure 3. The automated minibus would operate from the rail station through the heart of the Cabrillo College campus to the Metro bus stops on Soquel Drive. All scenarios include a Pajaro station.
- Several Census Tracts would be served by one station in a few locations, and there would be 2-3 local stations not evaluated in the 2015 rail study, in addition to the downtown, Cabrillo College and Pajaro stations.
- In Watsonville, all local buses would be extended beyond the existing downtown transit center to the West Watsonville rail station. This maximizes coordination and provides a choice of more than one route to transit patrons.

Appendix A illustrates the Census Tracts evaluated along the Santa Cruz Branch Line.

Two service scenarios were examined. Both assume usage of hydrogen or 100% battery-powered trains that would have acceleration comparable to current electric trains, but without overhead wires. For one example of this rapidly improving technology, see Figure 4. Scenarios examined were:

- Operate 30-minute frequencies all-day over the line between Downtown Santa Cruz and Pajaro.
- Operate 30-minute frequencies all-day over the line between Downtown Santa Cruz and Pajaro. Overlay additional service every 30-minutes during the morning (6:00 a.m.-9:00 a.m.) and afternoon (3:30 p.m.-6:30 p.m.) peak periods between Downtown and Rio Del Mar, resulting in 15-minute service between those points.

This exercise had positive results.

For the **30-minute all-day frequency scenario**, projected ridership was **11,156 daily riders,** of which about 4,500 came from downtown, Cabrillo College, and the Pajaro extension. These stations, plus 2-3 additional stops, explain most of the higher ridership compared to Option G1

in the *Passenger Rail Feasibility Study,* which ranged between 5,000-5,500 daily riders under 2015 conditions.

Figure 4. Hydrogen-Powered Train Being Tested in Germany

For the **15-minute peak, 30-minute frequency at other times scenario,** total projected ridership was **13, 737 daily riders.** Again, most of the difference from Option G1 in the rail study is due to two new stations in Downtown Santa Cruz, a new stop serving Cabrillo College with a direct pedestrian, bicycle and automated minibus connection, as well as a connection to Pajaro and train service to/from the Bay Area at that location. Figure 5 details projected ridership by Census Tract near the rail line. (Detailed calculations available in a spreadsheet upon request).

As an additional check, applying Santa Cruz parameters to North San Diego County's Sprinter rail service resulted in a Sprinter patronage estimate of 6,300 daily riders. As the Sprinter ridership actually averaged about 9,000 daily in Fiscal Year 2015-16, the model parameters are realistic[6]. Figure 5 illustrates projected ridership by stations serving identified Census Tracts.[7]

One area where the author's modeling significantly differed from the 2015 Passenger Rail Feasibility Study is for ridership origins and destinations in Watsonville. The author projects about 3,000 daily riders to and from Watsonville, versus less than 1,000 projected by the 2015 and earlier studies. The reasons for these low ridership projections are not obvious. The author assumes the following which may not have been included in earlier studies:

- Rail service would have about a 40-minute travel time between downtown Watsonville and downtown Santa Cruz (Chestnut & Locust station)–which is 5-10 minutes faster than Santa Cruz Metro's existing Route 93 express bus, and
- Apparently unlike earlier study scenarios, the author also assumes all local Watsonville buses and Monterey-Salinas Transit (MST) buses from Monterey County would connect to the downtown Watsonville station to serve that large concentration of employment and population (though MST would also serve the proposed Pajaro rail station).

[6] The actual Sprinter ridership included bus transfers and college ridership, which were not accounted for in the model.

[7] Based on data from U.S. Census Bureau, https://onthemap.ces.census.gov/, adjusted for estimated distance from proposed stations and assumptions regarding local bus connections.

Figure 5. Projected Ridership on Davenport-Santa Cruz-Watsonville Rail Line

			A.M. Peak Period Ons & Offs		Equivalent All-Day Ons & Offs, All Stations	
			Proposed Service Frequencies			
	Census Tract	Population + Employment within 0.5 mile	30 min. peak periods 30-min. all day	15-min. peak periods 30 min. all day	30-min. peaks, 30-min. all day	15-min. peaks, 30-min. all day
Davenport Coast	=	2,500	156	156	468	468
Natural Bridges	1012	6,000	332	332	996	996
Boardwalk West	1011	6,636	340	340	1,020	1,020
Downtown – Chestnut & Laurel, Chestnut & Locust	**1007**	**8,388**	**593**	**786**	**1,779**	**2,358**
Boardwalk	1010	12,609	392	518	1,176	1,554
River East	1008	7,500	293	388	879	1,164
Harbor North	1009	4,000	254	336	762	1,008
Twin Lakes	1215	6,467	411	544	1,233	1,632
Twin Lakes East	1216-part	8,091	354	468	1,062	1,404
Twin Lake North	1214.03-part	4,518	261	346	783	1,038
Twin Lakes Northeast	1214.02-part	3,300	153	203	459	609
Capitola Mall	1217-part	8,000	420	556	1,260	1,668
Capitola-Downtown/Beach	1218	7,543	356	471	1,068	1,413
New Brighton-Cabrillo College#	**1218**	**9,000**	**588**	**778**	**1,764**	**2,334**
Seacliff	1221	4,524	165	226	495	678
Aptos Village	1220.03-part	3,500	294	475	882	882
Rio Del Mar 1	1222.03-part	4,395	264	350	792	1,050
Rio Del Mar 2	1222.01-part	4,000	259	342	777	1,026
La Selva Beach	1223-part	3,600	186	186	549	549
Watsonville West	1104	8,000	427	427	1,281	1,281
Watsonville-Downtown	1103	9,958	564	564	1,692	1,692
Pajaro	**Pajaro CCD**	**4,189**	**377**	**377**	**1,131**	**1,131**
Total, Population + Employment		136,718				
Employment		39,218				
Population		97,500				
		A.M. ons+offs	7,439	9,171		
		Daily ons+offs			22,317	27,513
		Daily Riders			**11,156**	**13,757**
# Based on average student attendance per weekday, e.g., (14,000 x 3 days/wk)/5=8,500						

2. Removing Tracks Would Spark Years of Litigation Over Expiring Deeds of Easement & Unclear Parcel Ownership along the Santa Cruz Branch Line

As noted in the Introduction, of the 301.53 total acres included in the rail right-of-way, only 93.09 acres (31%) are "fee simple" properties, e.g., originally owned outright by the Union Pacific Railroad and passed on to SCCRTC when purchased in 2011. The remaining 208.53 acres (69%) consists of water and stream crossings, roadway grade crossings and most significantly, easements dedicated for railroad use from adjacent property owners originally in the 19th century.[8]

According to a 2006 appraisal report[9], out of a total of 228 legal land parcels estimated by the appraiser that comprised the right-of-way, there were 123 parcels owned outride by Union Pacific Railroad for which title insurance could be obtained (e.g., the 93.09 acres). There were many other parcels that consisted of easements for railroad purposes, or for which no record could be found by the appraiser in 2006. There were approximately 50 parcels included in the proposed sale by Union Pacific to SCCRTC that could not obtain title insurance because there were insufficient records at the County Recorder's Office. There were 10 parcels with railroad use only easements that had clear reversion clauses should rail usage be abandoned. There were 38 parcels for which title insurance was not to be issued as directed by SCCRTC. Finally, there were 43 parcels that were "…excluded from valuation for lack of recorded title evidence or other ambiguity about nature of title, if any."[10]

Most of the parcels with easements requiring reversion to adjacent property owners upon cessation of railroad usage were located in the 2006 report's Segment 3 from Watsonville to La Selva Beach, and Segment 7 in the City of Santa Cruz. The following is an example of reversion language in a deed of easement for the Santa Cruz Railroad Company from the 1870's:

> The condition providing for reversion of title set forth in the Indenture dated as of June 17, 1876, filed for record August 2, 1876 and recorded August 12, 1876 in Volume 21 of Deeds, Pages 372-374, Santa Cruz County Records, between S.W. Holladay and Georgiana C. Ord Holladay, and the Santa Cruz Railroad Company, viz:
>
> "In case said railroad should be removed to a different place or line from that upon which it is now built, so that said land should no longer be required of used for said purposes, **or if for any other reason the land above described shall become no longer necessary for railroad purposes, this grant shall cease and the rights therein hereby granted shall revert** to the said Georgiana C. O. Holladay or to her successors in interest" [emphasis added]. (Vol. 2, page 244, No. 38 Parcel V72-2, No. 13.)

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[8] *Appraisal Review Report and Appraisal Review Certificate of Appraisals and Related Valuation Analyses for the Santa Cruz Branch Line of the Santa Cruz Subdivision of the Union Pacific Railroad Company.* Pages, 7, 19. Linked at http://sccrtc.org/projects/rail/rail-line-purchase/rail-line-due-diligence/.

[9] *Final Report, Appraisal Report, Union Pacific Railroad Santa Cruz and Davenport Branch Lines (Watsonville Junction to Davenport). Volume One.* Arthur Gimmy International, April 20, 2006. Linked at http://sccrtc.org/projects/rail/rail-line-purchase/rail-line-due-diligence/.

[10] See pages 49-54 of the Gimmy report, Volume 2. Also refer to accompanying text in Volume Two.

Another deed of easement with clear reversion language should railroad usage be abandoned:

> The condition providing for reversion of title set forth in the Indenture dated as of March 17, 1892 and recorded March 18, 1892 in Volume 86 of Deeds, pages 108-109, Santa Cruz County Records, between Mrs. Jane Lynch, first party, and the Santa Cruz Railroad Company, second party, viz:
>
> "The land above described shall be used solely for railroad purposes and . . . **in the event said second party, its successors or assigns, shall cease to use it for railroad purposes, it shall revert** to the party of the first part[,] her heirs or assigns." [emphasis added] (Vol. 2, page 249, No 58. Affects parcels V72-1, No. 9)

While there were only 10 deeds of easement to the railroad with clear reversion clauses, the status of dozens of other parcels not apparently owned outright by SCCRTC is ambiguous at best. Should railroad usage be abandoned by removing current tracks in favor of a trail only, it is clear that additional funding would be required to obtain outright ownership of current easements that have clear reversion clauses. In addition, given the fact that dozens of additional parcels have unclear titles which are likely to lead to years of litigation to determine ownership and compensation required to adjacent property owners should railroad usage cease.

The proposal by Trail Now and Greenway Santa Cruz for **ripping out existing tracks on the Santa Cruz Branch Line in favor of a trail only would open up SCCRTC and taxpayer to great uncertainty, guaranteeing years of litigation.** In addition to the cost of removing tracks, constructing the proposal trail on existing rail embankments and the repair or replacement of bridges and other structures, this author's educated guess is that repurchasing existing easements intended for railroad use could cost $80-$100 million, or more. **Retaining the existing tracks is the least costly and most prudent action for SCCRTC, whether rail transit is implemented within the next few years or later in the 21st Century.**

The railroad easement reversion problem would also apply if a busway were developed on the right-of-way. It should also be noted that a key United States Supreme Court ruling on railroad right-of-way reversion disputes after abandonment was favorable to property owners though inconsistent with most rulings by other Federal courts. In the *Marvin M. Brandt Revocable Trust v. United States* case, the Court ruled that property ownership granted outright to a now abandoned railroad in Wyoming by the Federal government must revert to an adjacent property owner, despite the fact that their property was granted by the government a significant time **after** the railroad was granted full ownership through an earlier land grant. While not certain, this means that the current Supreme Court – and other Federal courts following its lead – is likely to be favorable to adjacent property owners, particularly where clear reversion clauses exist, and also in ambiguous cases such as those in Santa Cruz County.[11]

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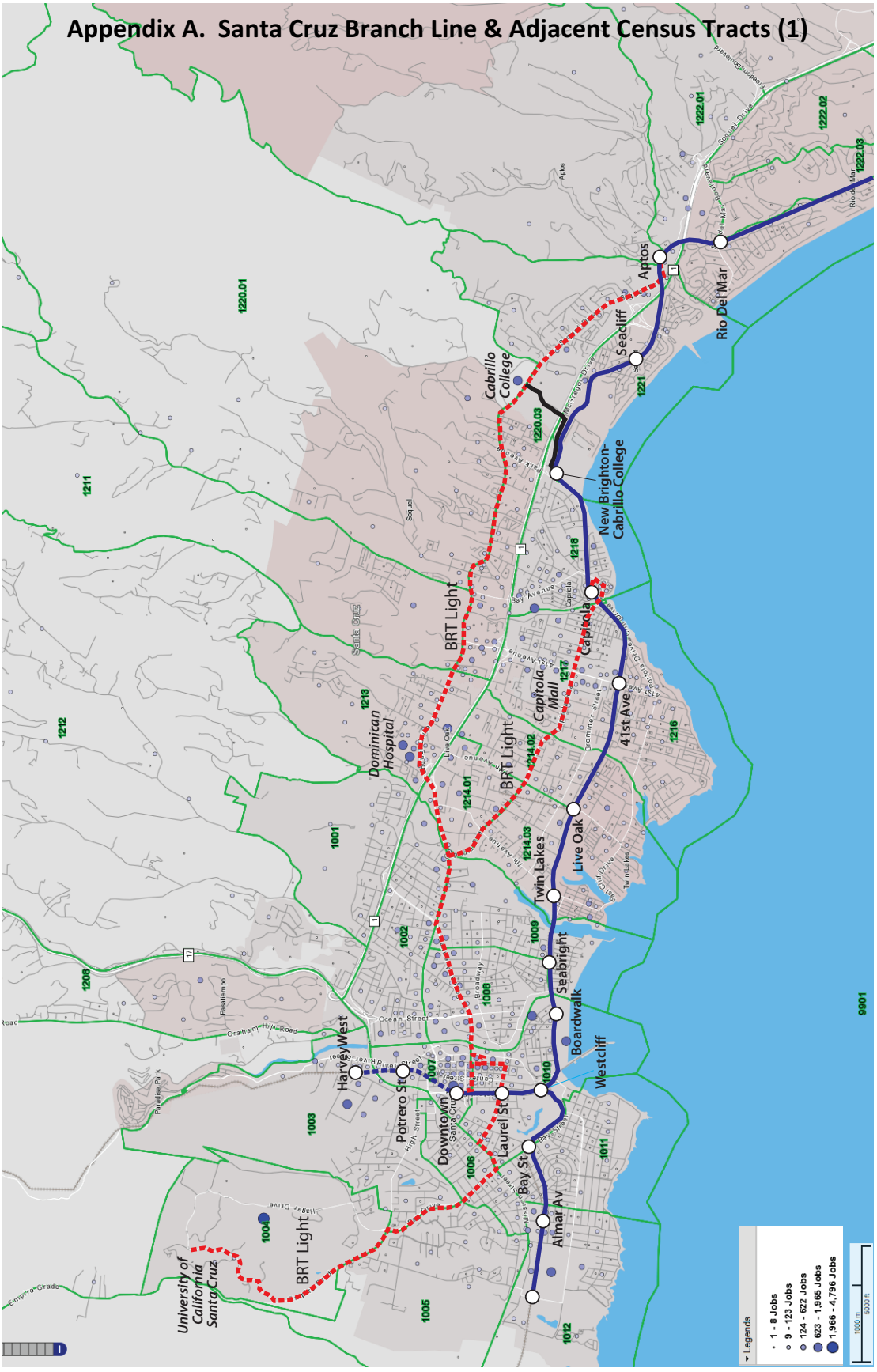
[11] The inconsistency between current Supreme Court proclivities on the topic of railroad property reversions and many rulings by lower courts is discussed in detail by the article, *Doing a Double Take: Rail-Trail Takings Litigation in the Post*-Brandt Trust *Era.* Levin School of Law, University of Florida. Legal Studies Research Paper Series No. 15-32. Also see *Vermont Law Review 2015, Vol. 39:703.* Danaya C. Wright.
Available at http://lawreview.vermontlaw.edu/past-issues/volume-39/volume-39-book-3/

Appendix A. Santa Cruz Branch Line & Adjacent Census Tracts (1)



Appendix A. Santa Cruz Branch Line & Adjacent Census Tracts (2)