

Multi-Modal Green Hubs

March 2009

Key Transit Investment Components

- **Guaranteed Secure Bike Parking**
- **Additional Short Stay Pickup Capacity**
- **Added Drop-off Capacity**
- **Expanded Bus-Bus Transfer Capacity**
- **Neighborhood Shuttle/shared ride service transfer capacity**
- **Guaranteed Transit Parking Management Program**
- **Security, Lighting, Shelter, Facilities Package**

Purpose

- Expands bike access mode share to transit/discourage through auto trips
- Enables Transit to serve growing half day commute market
- Minimizes/capture current overflow parking
- Accommodates additional local-regional and local-local transfers
- Improves penetration of non-fixed route served neighborhoods
- Eliminates surface street overflow parking; generates local revenue through managing existing capacity
- Incentivizes ridesharing
- Creates a secure, attractive environment for transfers close the "perception gap" between current transit experience and auto alternative.
- Possibly solar-powered
- Improved pedestrian safety, access to transit, and ADA accessibility.



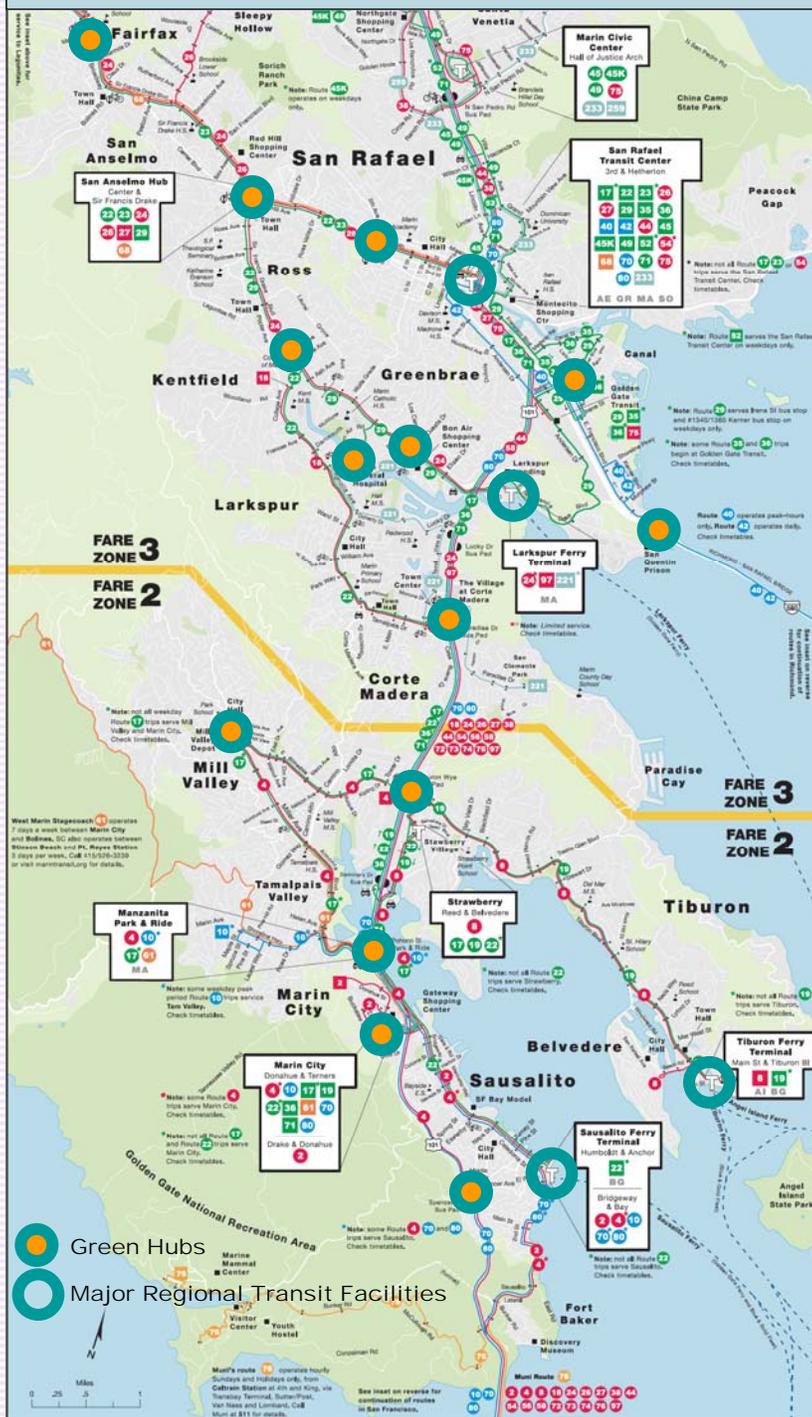
Transit Service

- Served by limited stop, express service on arterial corridors within Central and Southern Marin
- Connects with Hwy 101 regional services
- Strategically spaced
- Provides enhanced rapid service on arterial corridors
- Shorter, more reliable trip times
- Improved non-auto access to transit

Multi-Modal Green Hubs

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Potential Hub Locations



Capital Cost (\$000s, approx)

- Guaranteed Secure Bike Parking \$340
- Short Stay Pickup Capacity \$425
- Added Drop-off Capacity \$340
- Bus-Bus Transfer Capacity \$1,200
- Shuttle/shared ride transfer \$425
- Transit Parking Program \$680
- Lighting, Shelter, Facilities \$850

Benefits (qualitative)

- Makes transit more attractive to choice riders
- Improves service quality to local transit dependent markets
- Reduces congestion for other vehicular traffic along corridors
- Supports effective integration of limited-stop express and local services on same corridors.
- Establishes safe access environment for pedestrians, with ADA accessibility, and easier access to transit.

(Local Stop Enhancement Program labels not shown on map)

Hwy 101 Key Pads & Ramps Transit Program

March 2009

Key Transit Investment Components

- At Grade signal controlled pedestrian activated ramp crossings
- Ramp Transit Signal Priority (TSP)
- Bus Pad Access Reconfiguration

Purpose

- Establishes safe access environment for Bus Pad users, including disabled riders.
- Provides enhanced freeway transit access to mixed flow lanes improved travel time/reliability in congested conditions.
- At select locations, facilitates direct freeway access and at-grade connections with local service, while minimizing local arterial street impacts.

Potential TSP and Bus Stop Relocations

Existing Condition

- Stops between off-ramp and loop on-ramps
- Riders must cross on-ramp traffic to reach bus stop
- Buses must wait for on-ramp traffic gap after boarding

Current Condition

- Crossing On-Ramp to Reach Bus Stop Creates Auto-Pedestrian Conflicts
- Buses must wait for gap to re-enter freeway
- Buses must wait for gap to re-enter freeway
- Crossing On-Ramp to Reach Bus Stop Creates Auto-Pedestrian Conflicts

Option 1: Ramp TSP

Bus Flow

- Bus pads remain between off-ramp and loop on-ramps
- On-ramp traffic stops for few seconds for:
 - Riders receiving
- Bus path: pedestrian on-ramp receiving

Option 1: Ramp TSP

- Signal Holds Traffic for Pedestrian Crossing or Bus Entry
- Signal Holds Traffic for Pedestrian Crossing or Bus Entry

Option 2: Ramp TSP + Stop Relocation

Bus Flow

- Bus pads moved beyond loop on-ramps
- Riders do not cross ramp traffic to reach bus pad
- Riders closer to arterial street bus loading areas
- Buses from arterial streets may be able to stop at same loading area
- All on-ramp traffic stops for few seconds for:
 - Buses getting a jump ahead of on-ramp traffic
- Bus path:
 - Follow current path of exit ramp and bus-only ramp
 - Receive priority for continuing across loop on-ramp
 - Pull into new bus pad and board
 - After boarding, receive priority for continuing onto second on-ramp

Option 2: Ramp TSP + Stop Relocation

- Ramp Signal Holds Traffic for Bus Entry
- Relocated bus stop removes pedestrian conflicts at ramps
- Relocated bus stop removes auto-ped conflicts at ramps
- Ramp Signal Holds Traffic for Bus Entry
- Ramp Signal Holds Traffic for Bus Entry
- Ramp Signal Holds Traffic for Bus Entry

Option 3: Off-Ramp TSP + Stop Relocation

Bus Flow

- Bus pads directly adjacent to arterial loading areas
- Riders do not cross ramp traffic to reach bus pad
- Buses from arterial streets may be able to stop at same bus pad
- Off-ramp widened for bus-only through lane (with green extension TSP when buses are approaching)
- All on-ramp traffic stops for few seconds for:
 - Buses getting a jump ahead of on-ramp traffic
- Bus path:
 - Use exit ramp to exclusive bus-only lane on off-ramp
 - Receive priority for continuing across intersection
 - Pull into new bus pad and board
 - After boarding, receive priority for continuing onto on-ramp

Option 3: Off-Ramp TSP + Stop Relocation

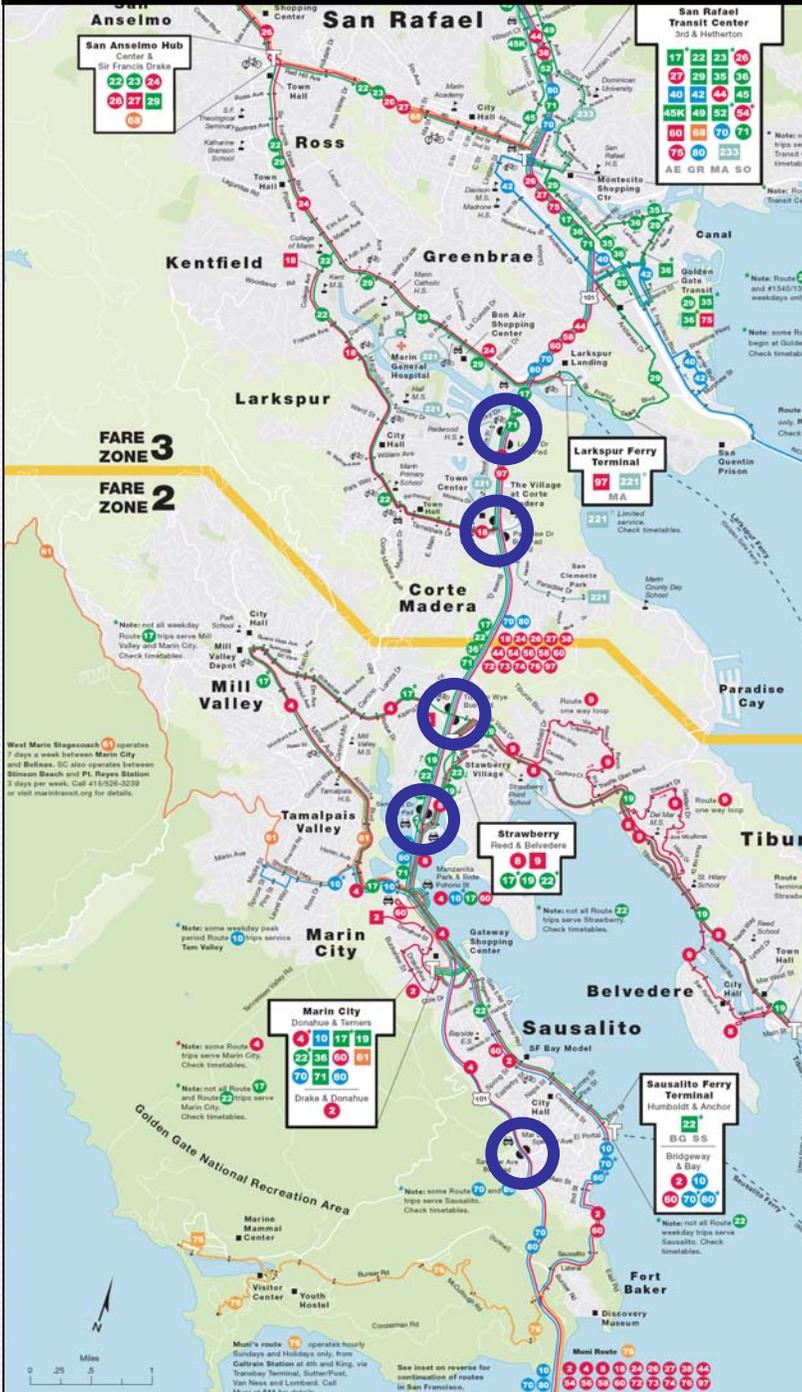
- Bus has exclusive lane with signal priority to cross street
- Ramp Signal Holds Traffic for Bus Entry
- Relocated Bus Stop removes auto-ped conflicts at ramps
- Relocated Bus Stop removes auto-ped conflicts at ramps
- Bus has exclusive lane with signal priority to cross street

Hwy 101 Key Pads & Ramps Transit Program

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Marin Hwy 101 Transit Signal Priority Analysis of On-Ramps

4.75	NB	Seminary/Frontage	4950	Maybe
4.75	SB	Seminary/Strawberry	7200	Maybe
5.66	NB	Blithedale/131 EB Loop	13200	Yes
5.73	SB	Blithedale/131 WB Loop	5200	Yes
7.33	NB	Tamalpais Drive EB Loop	8200	Yes
7.4	SB	Tamalpais Drive WB Loop	4550	Yes
8.18	SB	Fifer/Nellian	4350	Maybe (Greenbrae Interchange project)
8.45	NB	Industrial/Paradise	10600	Maybe (Greenbrae Interchange project)



Capital Cost (\$000s, approx)

- At Grade signal controlled pedestrian activated ramp crossings \$750
- Ramp Transit Signal Priority (TSP) \$600
- Bus Pad Access Reconfiguration \$4,800

Benefits (qualitative)

- Improves bus on time performance and reduces onboard travel times.
- Significant improvement in travel experience for regular bus pad users.
- Improves attractiveness of GGT service for existing and future riders.
- Enhanced pedestrian safety and access for disabled persons.

Arterial Speed and Reliability Program

March 2009

Key Transit Investment Components

- **Transit Signal Priority (TSP)**
- **Roadway/Intersection Reconfiguration**

Purpose

- Improves arterial transit running times and reduces intersection delay.
- Enables headway-based frequencies on congested corridors.
- Improves capacity for transit and other users.

Suburban Arterial TSP Is One of Several Strategies to Enhance Bus Operations

- Lengthening substandard bus stops to get buses around queued traffic.
- Limit need for bus to pull in/out of travel lane (e.g. bus bulb, boarding island).
- Stop spacing changes.
- Traffic engineering signing and striping (concrete or red “bus stop” markings, turn pockets, red curbs, etc).
- Signal retiming to minimize bus delays (passive transit signal priority).
- Active Transit Signal Priority (TSP)



Arterial Speed and Reliability Program

March 2009

Capital Cost (\$000s, approx)

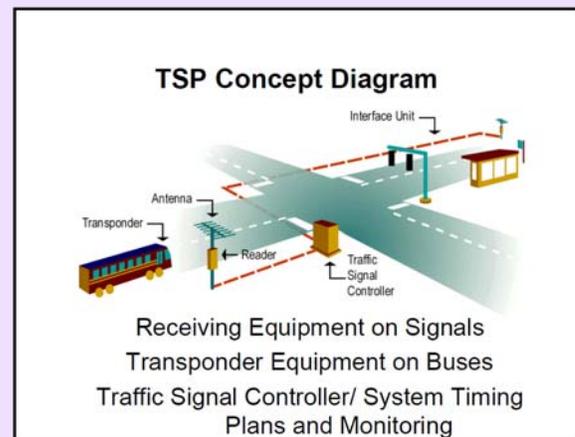
- Transit Signal Priority (TSP) \$3,900
- Roadway/Intersection Reconfiguration \$6,000

Benefits (qualitative)

- Improves bus on time performance and reduces onboard travel times
- Makes transit more attractive to choice riders
- Improves service quality to local transit dependent markets
- Reduces congestion for other vehicular traffic along corridors

Typical Active TSP Techniques

- Green Extension: Hold signal phase green until bus passes.
- Early Red: Change signal phase quicker for buses (such as swap left-turn/through movement phases when busses are present).
- TSP option mostly require far-sided stops to be most effective.
- Benefits greater for multi-phase intersections.
- Can work for all buses, or limited to express buses or buses running late.



Local Stop Enhancement Program

March 2009

Key Transit Investment Components

- Investment in Facilities for Priority Limited Stop Express Bus Stops
- Bus Stop Prioritization Investment Program
- Optimized Bus Stop Spacing (¼ mile to ½ mile for local stops, 1 mile to 2 miles for limited stop express).

Purpose

- Establishes standard level of enhanced facilities for most heavily used express and local stops (shelter, lighting, access and select elements of Multimodal Strategic Green Hubs)
- Establishes an annualized capital investment plan to guide bus stop enhancement strategy
- Bus stop hierarchy improves transit running time along corridors.
- Helps identify stop investment consistent with current Spacing Guidelines (actual spacing depends on: demographics, density, pedestrian access, topography, land uses).

Capital Cost (\$000s, approx)

- Investment in Facilities for Priority Limited Stop Express Bus Stops \$720
- Bus Stop Prioritization Investment Program TBD

Benefits (qualitative)

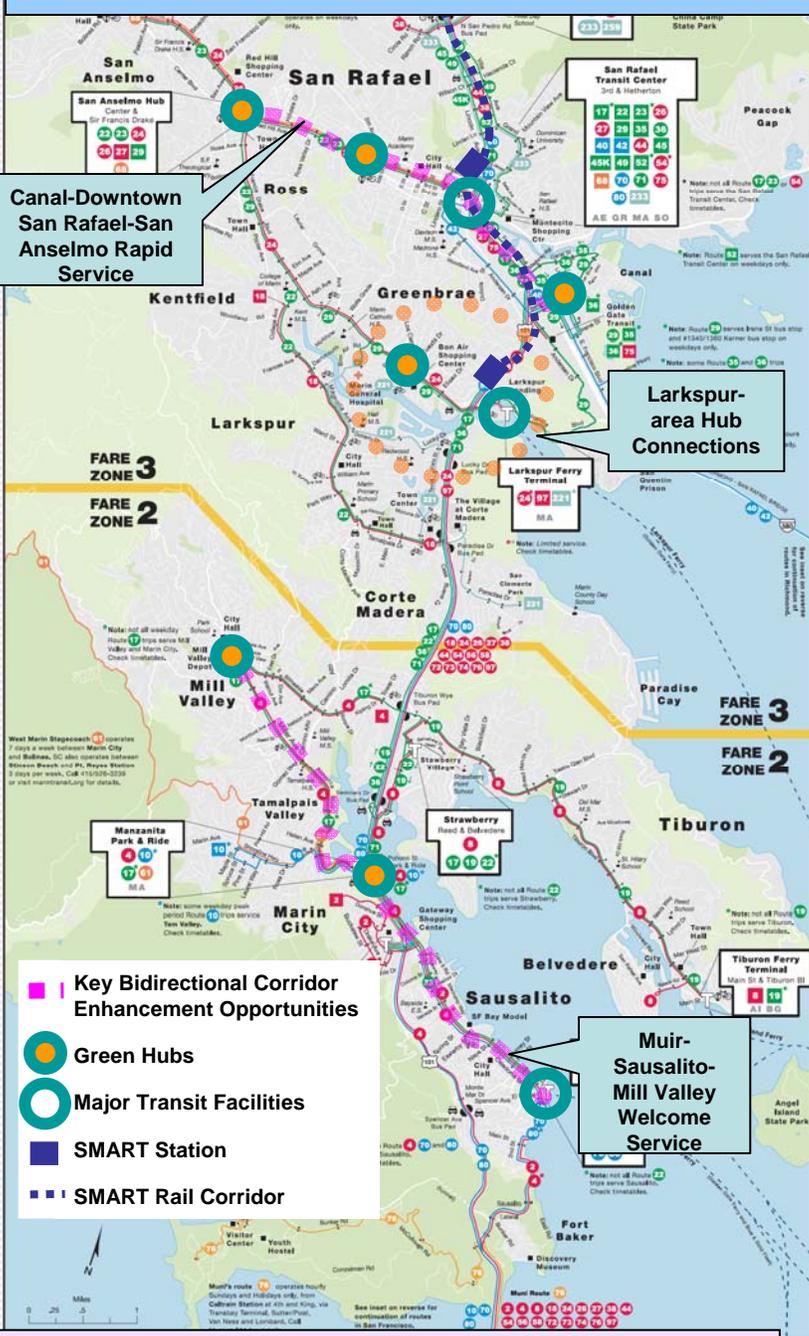
- Raises facilities standards at most used locations and improves attractiveness of transfers for MCTD and GGT users
- Improves bus on time performance and reduces onboard travel times
- Makes transit more attractive to choice riders
- Improves service quality to local transit dependent markets
- Reduces congestion for other vehicular traffic along corridors



Key Bidirectional Corridor Enhancement Opportunities

March 2009

Potential Bidirectional Transit Corridors



Key Transit Investment Components

- Muir-Sausalito-Mill Valley Welcome Service
- Canal-Downtown San Rafael-San Anselmo Rapid Service
- Larkspur-area Hub Connections

Purpose

- On Friday-Sunday basis, provides frequent transit connection for visitors arriving by ferry to Sausalito Downtown/Bridgeway and with Muir Woods service; extends frequent reliable tourist travel to Downtown Mill Valley; offers local riders enhanced level of service from Mill Valley to Manzanita and Sausalito.
- Establishes rapid bus priority corridor service (as first stage BRT) using headway-based service with SRTC/SMART connections to meet bi-directional all day needs between Canal district, Downtown San Rafael, San Anselmo and major So. Marin activity destinations.
- Establishes transfer facilities and shuttles to meet unique travel/transfer needs between SMART, GG Ferry terminal and MCTD local service.

Benefits (qualitative)

- Raises facilities standards at most used locations and improves attractiveness of transfers for MCTD and GGT users
- Improves bus on time performance and reduces onboard travel times
- Makes transit more attractive to choice riders
- Improves service quality to local transit dependent markets
- Reduces congestion for other vehicular traffic along corridors

Capital Cost (\$000s, approx)

- Muir-Sausalito-Mill Valley Welcome Service \$1,400
- Canal-Downtown San Rafael-San Anselmo Rapid Service \$2,800
- Larkspur-area Hub Connections TBD

Streetcar Feasibility Discussion

March 2009

Background

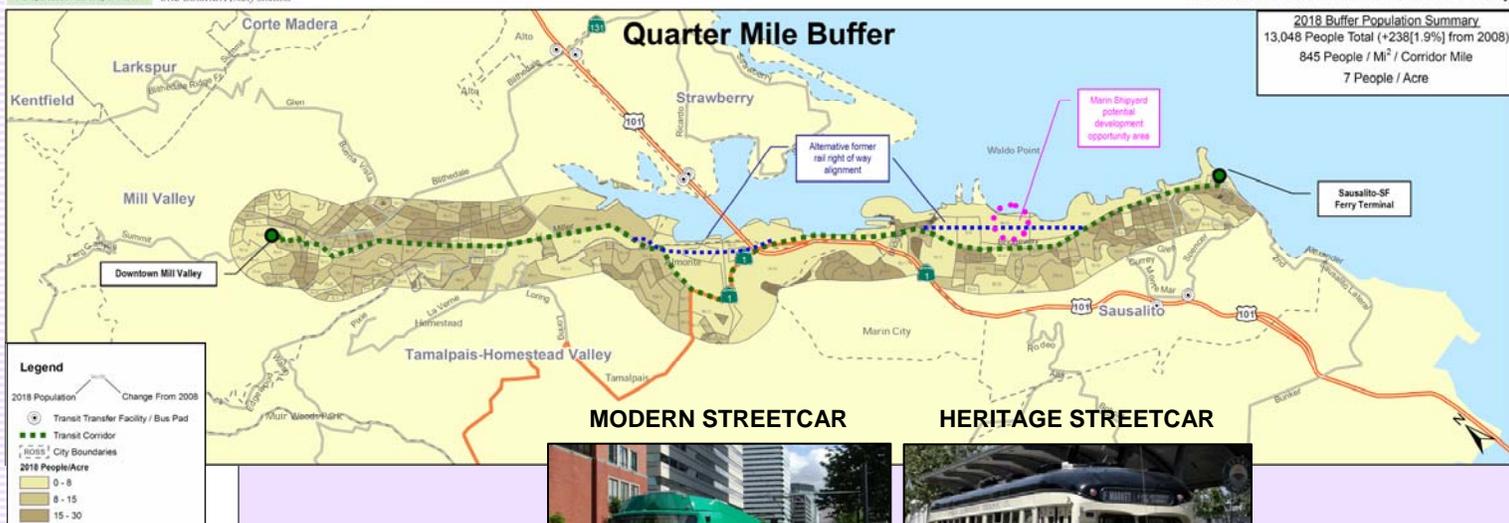
The Transportation Authority of Marin (TAM) has undertaken an initial feasibility discussion of Streetcar services in this Mill Valley-Sausalito corridor. The study was funded by Marin County and the cities of Mill Valley and Sausalito. This transit corridor is also the subject of a wider Central and Southern Marin Transit Study exploring potential near term (5-10 years ahead) transit solutions for corridor connections to the main Hwy 101 travel corridor. A task report has been prepared in parallel with this wider effort, using common data sources and planning assumptions, and is available from TAM at www.tam.ca.gov.

Purpose

- The corridor would connect Sausalito's main downtown with Mill Valley, via Bridgeway, Shoreline, and Miller Avenue.
- The southern end of the corridor would make a regional transit connection at the Sausalito ferry.
- A transportation and mobility benefit would result from improving the public transportation available in the corridor if direct service was provided.
- Bus service is available between Mill Valley and Sausalito by using two routes operated by Marin Transit requiring a transfer at the Strawberry Shopping Center. Together these routes provide service at 30-minute intervals, with additional frequency in commute hours.
- The current service for the six-mile trip between Mill Valley and Sausalito has low ridership and is not marketed to residents or visitors.



Mill Valley-Sausalito Transit Corridor: 2018 Population
Central and Southern Marin Transit Study



Streetcar Feasibility Discussion

March 2009



The former rail Right of Way (RoW) offers a non street-running alternative to Bridgeway, but requires shared use of the RoW with a Class I bike trail. The rail alignment passes under Hwy 101, avoiding a challenging roadway crossing of Hwy 101 and several signalized intersections on the street running alignment on Shoreline/Tam Junction. The support columns for Hwy 101 have crash protection installed for previous rail operations.

Capital Cost

- Using very broad estimates, a ten minute headway assumption, and assuming average travel speeds of 10 miles per hour end to end approximately twelve (12) vehicles may be required for the service. The twelve vehicles will cost between \$12 million (replica) and \$36 million (modern), total.
- The average cost per track mile for similar investments has been between \$10 million and \$15 million per mile.
- The project is about six (6) miles long and will require approximately \$60 to \$90 million, plus the cost of vehicles.

Benefits (qualitative)

- A streetcar link could create a reliable and comfortable “one-seat” ride.
- It would provide a new and expedited transit path through the Highway 101 interchange.
- It would attract users from their cars and could increase transit demand in both directions.

Findings

- At approximately 6 miles in length, the corridor is longer than most starter streetcar lines.
- Corridor density is considerably below the kind of thresholds which support streetcars.
- Little likely residential or commercial densification on the corridor is expected.
- Streetcar is not typically deployed as a transit solution to purely suburban travel needs.
- Impact of electrification on Bridgeway and Miller Avenue will require consideration.
- Costs may be high considering environmental impacts and possible structural costs in the 101 Interchange Area if the existing trail was to be expanded to accommodate a streetcar line or if the streetcar was placed on the congested existing road rights-of-way in this area.
- The current bike network could be impacted if the historic railway alignment was selected.
- Impacts on parking on Miller Avenue will need to be carefully reviewed.