2015/2016 MARIN COUNTY CIVIL GRAND JURY

Traffic Congestion in Marin

The Sir Francis Drake Boulevard Project Deconstructed

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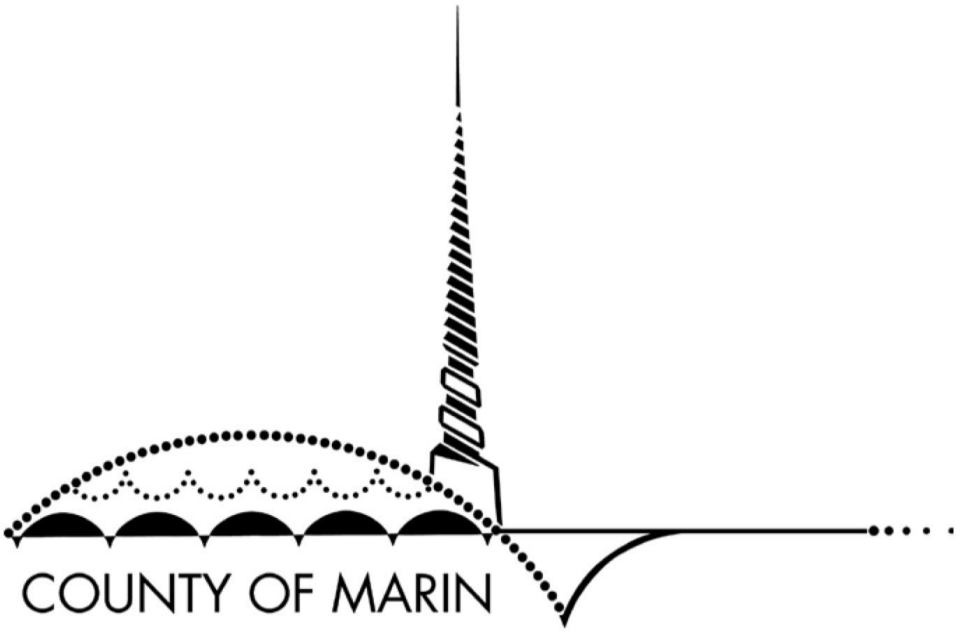


Traffic Congestion in Marin

The Sir Francis Drake Boulevard Project Deconstructed

SUMMARY

Traffic congestion is a top concern of Marin residents. Voters passed the Marin County Measure A sales tax in 2004 and the Measure B car registration fee in 2010 to fund projects that reduce traffic congestion. Marin residents, who pay about $140/year in local transportation taxes and fees,[1] have yet to see any significant traffic congestion reduction. To investigate why this is so, the Grand Jury focused on the current Sir Francis Drake Boulevard Rehabilitation Project (SFDB Project). Still in the planning stages, this project illustrates a number of recurring problems that arise from:

- Complex funding restrictions
- Fragmented and short-sighted planning
- Local politics and special interests
- Conflicting local interests

The SFDB Project's primary goal is to repair the deteriorated roadway surface of the County-maintained section of SFDB between Ross and Highway (Hwy) 101. When a major county road is to be repaired, the County tries to take the opportunity to improve traffic flow and better accommodate pedestrians, bicyclists, and mass transit. For this project, County planners propose to boost traffic flow by better coordinating traffic signal timing and adding a third eastbound lane through the most congested section. Modifications are also proposed to increase safety for pedestrians and cyclists (especially school children) by completing and widening sidewalks and road shoulders and improving bus shelters. Projections indicate that these proposed modifications can significantly reduce traffic congestion. However, the project cannot relieve congestion caused by bottlenecks to traffic merging onto Hwy 101 or flowing east to Larkspur Landing.

The Grand Jury findings and recommendations fall into three categories:

- **Community feedback & budget**: Based on community feedback and limited funding, focus on those potential improvements that maximize congestion relief and safety. Outside of this project, consider shifting planned budgets for multi-million Dollar pedestrian-bicycle pathways toward projects that benefit a larger population.
- **Project synergy with other initiatives**: School bus funding, Hwy 101 ramp metering, Larkspur Landing traffic improvements, and opening a third lane on the Richmond - San Rafael Bridge can provide congestion relief to SFDB.
- **Measureable goals**: Clearly-stated and publicly-shared goals for predicted project benefits in travel times and other congestion management measures are needed.

[1] Transportation Authority of Marin FY2015-16 Annual Budget, http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=9284

APPROACH

The Grand Jury researched hundreds of available documents, including but not limited to public agency agendas, minutes, website postings, and newspaper articles. Interviews were conducted with members, employees and consultants of the following organizations:

- Marin County Board of Supervisors (MCBOS)
- County Department of Public Works (MCDPW)
- Transportation Authority of Marin (TAM)
- Marin Transit Authority (MTA)
- Safe Routes to School (SR2S)

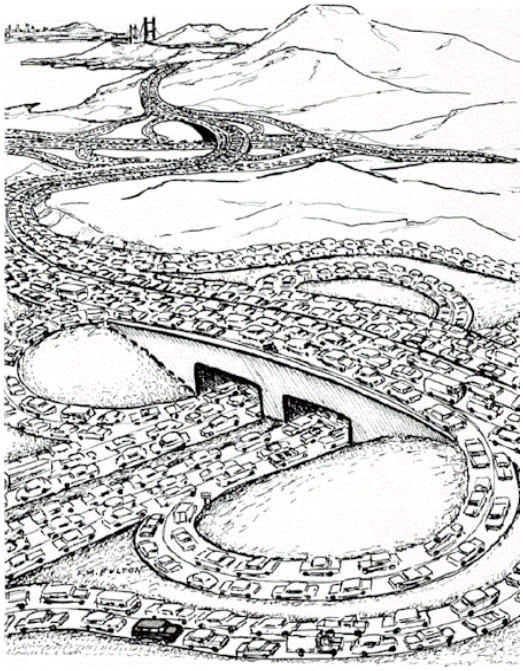
In addition, we attended and observed at least eight public meetings for this and similar projects.

BACKGROUND

Transportation Planning and Funding

Even though Marin County spends a large amount on its transportation systems, we never seem to get ahead of growing traffic congestion. Marin voters passed the Measure A[2] sales tax in 2004 and the Measure B[3] car registration fee in 2010 that generate $27 million per year to fund traffic mitigation projects (see **APPENDIX A - Local Transportation Funding**). Additionally, voters approved Regional Measure 2[4] in 2004, that increased toll charges by $1 on the seven Bay Area State-owned bridges to help finance highway, transit, bicycle and pedestrian projects. It provided over $5 million in funding for Marin transportation projects this year.[5] Further, Marin County spends $5-10 million annually from general funds on roadway maintenance and improvements.[6] Marin also benefits from over $5 million in highway funds from State and Federal taxes.[7]

So why can't we beat the traffic?



They're moving! I told you we should be in the other lane!

From "An Evaluation of Local Plans: Balanced Transportation Program", Marin County Planning Department, San Rafael, CA, 1970

[2] http://www.smartvoter.org/2004/11/02/ca/mrn/meas/A/

[3] http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=4265

[4] http://mtc.ca.gov/our-work/invest-protect/toll-funded-investments/regional-measure-2

[5] Op. Cit. Transportation Authority of Marin FY 2015-16 Annual Budget

[6] County of Marin Capital Improvement Program 2015-2016 http://www.marincounty.org/~/media/files/departments/ad/facilities-planning-and-development/capital-improvement-program/cip1516.pdf?la=en

[7] Information provided by Transit Authority of Martin (TAM)

Four major factors stand in the way:

1) **Complex funding restrictions.** Separate funding measures and sources, each with their own restrictions, limit the solutions that are available. Though many Marin residents and representatives favor expanding road capacity to reduce congestion, Federal, State, regional and even local policies and restrictions have discouraged the addition of more lanes to relieve congestion. Instead they favor and restrict funding to improve public transit, carpooling, bicycling and walking with roadway improvements often limited to better signal timing, ramp metering, carpool lanes, signage and tolls.

2) **Fragmented and short-sighted planning.** There is often a problematic disconnect between the broad-view, long-term outlook taken by State and regional agencies and the more immediate focus of the County and local cities. Most transportation projects arise to answer pressing local needs. Unless the County or a city is going to fund such projects directly, they depend upon funding from Transportation Authority of Marin (TAM), Metropolitan Transportation Commission (MTC), and State and Federal grant programs. But these agencies primarily act as clearing houses for allocating funds to local projects judged as fitting into their overall vision. They do not themselves produce, nor require, holistic integrated programs engineered to address traffic problems that span geographic, jurisdictional and political boundaries. As an example, albeit with a history of its own, TAM allocates funds to reduce congestion on SFDB without addressing the congestion caused by the narrowing of the exit from SFDB southbound to Hwy 101. Further fragmenting the ability to find integrated solutions, some Measure A funds are allocated to each Board of Supervisor district, and each city and town. (see **APPENDIX B - The Alphabet Soup of Transportation Planning, Funding and Implementation**)

3) **Local politics and special interests.** Marin has many county government agencies: 11 cities and towns and over 115 other agencies (school districts, special districts and joint powers authorities). Many of these have some control or interest in transportation issues with the ability to support, block, or slow changes that could have an overall positive effect but might not be favored by the individual agency and its constituents. With these many local agencies, the political process creates differentiation and conflict of positions for individuals seeking to win or keep elected government positions. Marin also has a population with the time and energy to support special interest causes. Prominent are bicycle and environmental groups that have a strong voice in transportation matters.

4) **Conflicting local interests.** As a planned "slow growth" county, Marin County population growth was just 0.6% per year from 2005 through 2014[8]. No substantial growth is projected for the future. Fearing increased housing development, tourism, and related change, many County residents have a longstanding resistance to expansion of our vehicular transportation systems while simultaneously desiring less traffic congestion.

The effort to maintain low growth and cultivate the existing perceived quality of life results in County residents blocking attempts to reduce congestion by building new roads or expanding existing roads. It translates into reluctance to invest in roads and instead, favors investing in world-class bikeways. While interest in better accommodating bicyclists is strong and supported by an influential bicycle lobby, the evidence is that neighborhood

[8] Marin County vs. California Comparative Trends Analysis, Regional Economic Analysis Project (https://california.reaproject.org/analysis/comparative-trends-analysis/population/tools/60041/60000/)

investment associated with Safe Routes to School[9] (SR2S) materially decreases rush hour traffic, but investment in pathways adjacent to Hwy 101 results in negligible displacement of automobile traffic.[10] In addition, there is substantial public transit support and reasonable bus service along SFDB. Nevertheless ridership has plateaued[11] at a level too low to materially ease traffic congestion, which is caused by about 50,000 vehicles per day.

The traffic congestion that persists exacts very real costs.

Costs of Traffic Congestion

For individuals and whole communities, traffic congestion can exact a severe toll on quality of life, health, economic vitality, and the environment.

1) Quality of Life. An obvious cost of traffic congestion is the negative effect it has on our quality of life. We not only waste time stressfully dealing with traffic, but we also allocate extra buffer time to ensure we arrive on schedule. This is time taken away from family, work and leisure. A less obvious impact is on public safety as roadway congestion risks impeding ambulance, fire and police vehicles.

2) Health Effects of Toxic Emissions. Air pollution from motor vehicle exhaust is recognized as a major health hazard resulting in 53,000 deaths annually in the US.[12] Near busy roadways (generally within 500 feet) traffic-related pollution is more concentrated and particularly high in toxic components. And as vehicle speed drops from 35 mph to 10 mph these emissions increase many fold per mile travelled.[13] Numerous medical studies have demonstrated that people traveling, living, working or attending schools near major roads are at higher risk for suffering negative health consequences,[14] including impaired lung and cardiovascular function, asthma and lung cancer.[15] Children and the elderly are particularly at risk.

3) Greenhouse Gas Emissions. Traffic congestion also impacts climate change by significantly increasing automobile greenhouse gas (GHG) emissions. In Marin about 33% of GHG emissions are due to transport of people and goods.[16] Carbon dioxide ($CO_{2)}$ is the main GHG component and emissions are almost directly proportional to fuel consumption. Roadway average speeds from about 25 through 70 mph consume almost the same amount

[9] *Safe Routes to School* (aka SR2S) is a program designed to increase the number of children walking and biking to school.http://www.saferoutestoschools.org/about.shtml

[10] See Sections on Safe Routes to School and Pedestrian-bikeways in later sections of this report.

[11] Marin Transit Monitoring Reports, http://www.marintransit.org/monitoringreports.html

[12] Air pollution and early deaths in the United States. Part I: Quantifying the impact of major sectors in 2005, Caiazzo, F, Ashok, A, Waitz, IA, Yim, SHL, and Barrett, SRH, Atmospheric Environment 79 (2013) 198e208

[13] Air pollution and health risks due to vehicle traffic, Kai Zhang and Stuart Batterman, Sci Total Environ, April 15, 2013 (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4243514/#SD1)

[14] Best Practices for Reducing Near-Road Pollution Exposure at Schools, United States Environmental Protection Agency, November 2015; and School Siting Guidelines, United States Environmental Protection Agency, June 2015

[15] Health Effects Institute Panel on the Health Effects of Traffic-Related Air Pollution, "Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects," Health Effects Institute Special Report 17 (January 2010). Available at http://pubs.healtheffects.org/view.php?id=334.

[16] A Consumption-Based Greenhouse Gas Inventory of San Francisco Bay Area Neighborhoods, Cities and Counties: Prioritizing Climate Action for Different Locations, December 2015, Jones, CM and Kammen, DM, Bay Area Air Quality Management District

of gasoline, but consumption rises sharply as average speeds decrease below 25 mph.[17] Acceleration in a congestion caused stop-and-go cycle consumes the most fuel.

4) Economic Vitality. Traffic congestion also acts as a major tax on individual, business and County economic vitality in terms of lost work time and productivity, and in wasted fuel and other business costs. According to the Texas A&M Transportation Institute and INRIX (a corporation compiling traffic statistics), the cost of congestion to the average car-owning household in the U.S. was about $1,700 per year in 2014.[18]

These four costs of traffic congestion should be taken into account when considering congestion reduction measures.

Change is Required

By studying the SFDB Project, the Grand Jury learned that there are incremental steps we can take to mitigate congestion while still preserving and even improving the Marin environment and quality of life.

The Sir Francis Drake Boulevard Project

SFDB follows the route of an ancient footpath first paved in 1929.[19] A 1960s plan to create a freeway along the route to support West Marin development was blocked by a coalition of concerned citizens.[20,21,22] The segment of SFDB between Hwy 101 and the Ross town limits now requires repaving and suffers from some of the worst congestion in Marin. The SFDB Project [23] was included in the original Measure A expenditure plan[24] which includes many specific aims beyond traffic relief or road maintenance. For instance it requires projects to be evaluated on such criteria as:

1. Condition of the roadway
2. Average daily traffic
3. Mass transit frequency
4. Bicycle and pedestrian activity
5. School access
6. Local geographic equity

[17] Traffic Congestion and Greenhouse Gases, Barth, M and Boriboonsomsin, KE, Fall 2009, ACCESS, 35:2-9

[18] 2015 Urban Mobility Scorecard, The Texas A&M Transportation Institute and INRIX, Schrank, D, Eisele, B, Lomax, T, and Bak, J, August 2015

[19] "Drake Boulevard renovation to be feted", San Anselmo-Fairfax Patch, Jan 30, 2014

[20] http://www.cahighways.org

[21] Wikipedia: "Unconstructed state highways in California"

[22] Dyble, L.N., "Revolt against sprawl: Transportation and the origins of the Marin County growth-control regime", J. Urban History, 34: 38-66, 2007

[23] Transportation Authority of Marin, Board of Commissioners Meeting Agenda, Item 18, June 27, 2013 http://marin.granicus.com/AgendaViewer.php?view_id=24&clip_id=6667

[24] Marin County Transportation Sales Tax Expenditure Plan, Approved Final Plan, May 6, 2004 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=279

Planning for the SFDB Project is now well underway toward "rehabilitating" the 2.5 miles of SFDB from the Ross town limits to Hwy 101 starting in 2018. A total of $13.2 million from Measure A has been allocated for paving and other improvements.[25] The SFDB Project is a substantial investment and will cause significant disruption as it is implemented. With limited funds, it may be many years before there is another opportunity to make material changes. It is important that Marin County makes the most of this opportunity.

DISCUSSION

The following provides an analysis of the SFDB Project and a number of related matters that have a direct or indirect impact on traffic congestion for this heavily-traveled roadway. This discussion provides the reasoning and justification for the Grand Jury Findings and Recommendations. Topics covered:

> The Sir Francis Drake Boulevard Rehabilitation Project (Hwy 101 to Ross): project scope, constraints, the public input process, priorities, agreements and controversy, what's missing, remaining issues and approvals required.
>
> Other Opportunities for Congestion Relief: weaknesses in the planning process, the stalled ramp metering project, opportunities for traffic relief through mass transit and school buses, projected congestion relief from the third eastbound lane on the Richmond – San Rafael Bridge, roadway improvements in Larkspur Landing and bicycle-pedestrian pathways.

The Sir Francis Drake Boulevard Rehabilitation Project (Hwy 101 to Ross)

SFDB Project: Scope and Background

The $13.2M project rehabilitates the section of SFDB between Hwy 101 and the Ross town limits, one of the most congested roadways in Marin County (see APPENDIX C - Marin's Key Roadway Network). Designed in the 1960s to handle 20,000 vehicles per day,[26] this portion of SFDB now carries 50,000 per day.[27] Peak hour traffic speeds on the westernmost segment average less than 10 mph while speeds on the segment at Larkspur Landing average less than 7 mph during the peak afternoon period.[28] The project's planners are comprehensively evaluating the corridor for potential improvements to vehicle flow, transit operations, and pedestrian and bicyclist circulation along and across this important arterial.[29] Fifty percent of the project budget is allocated to basic maintenance

[25] Of the $13.2 million allocated, $800,000 was authorized for the initial planning stage, now in progress

[26] City of Larkspur Staff Report: Regional Transportation Plan of the Metropolitan Transportation Commission, September 16, 2015 City Council Meeting

[27] Sir Francis Drake Boulevard Corridor Rehabilitation Community Meeting, May 2, 2015, page 28 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/2015_05_02_community_meeting r.pdf?la=en

[28] 2015 Congestion Management Program Update, Transportation Authority of Marin, September 24, 2015 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=9126

[29] Sir Francis Drake Boulevard Rehabilitation (101 to Ross), County of Marin, Raul M. Rojas, Director, Dept. of Public Works http://www.marincounty.org/depts/pw/divisions/transportation/sir-francis-drake-boulevard-rehabilitation

(primarily repaving). Both Transportation Authority of Marin (TAM) and the Marin County Board of Supervisors (MCBOS) approved the project's initial phase funding of $800,000.

The project work for this segment began in 2014 with consultant selection, topographic surveys, background research and report preparation. The project team provided a broad set of choices while diligently soliciting community input and incorporating it into the final solution. There have been numerous well-publicized and well-attended public workshops. These were focused on communicating the project's rationale and plans and eliciting community input.

May 2, 2015	Community Workshop
October 28, 2015	Kentfield Planning Advisory Board
November 18, 2015	Community Workshop
December 10, 2015	Greenbrae Property Owners Association
January 13, 2016	SFDB Walking Tour
January 25, 2016	SFDB Walking Tour
March 9, 2016	Kentfield Planning Advisory Board
March 15, 2016	Community Workshop
June 1, 2016	Community Open House

Environmental review, design, construction documents and bid packages are targeted for spring 2016 through summer 2017 with most of the construction commencing in 2018.[30]

SFDB Project: Constraints, Constituencies and (Lack of) Specific Goals

In addition to the fixed budget of $13.2M, three of the most significant project constraints are: 1) A limited right-of-way prevents making some significant improvements; 2) Project work will trigger the requirement to meet up-to-date ADA (American with Disability Act) requirements; and 3) Any changes to the lane striping and ramps for the Hwy 101 interchange fall under CalTrans which is not under County control.

Prominent constituencies and advocacy groups include, but are not limited to, Marin County Bicycle Coalition, Kentfield Advisory Board, Greenbrae Property Owners Association, Kentfield's Safe Routes to School Program, Bon Air Shopping Center, Marin General Hospital, Marin Catholic High School, Bacich Elementary School, Kent Middle School, and the College of Marin.

In addition, requirements of the California Environmental Quality Act (CEQA) must be met, including filing of an Environmental Impact Report (EIR).

While working with these constraints, and with the implicit goal of repaving SFDB, **both TAM and the Board of Supervisors failed to set any measurable goals and outcomes for the project**–including no quantitative goal for congestion relief. The funding request documents only indicated that:

> *"Development of alternatives will analyze the feasibility of modifications to the current right of way and existing infrastructure to improve accessibility for bicyclists and pedestrians as well as consider opportunities to improve transit access and vehicle operations on the*

[30] Grand Jury correspondence with Project personnel

congested arterial. The need and feasibility of installing additional street lighting and/or improved traffic signal operations will also be evaluated."[31]

SFDB Project: "Just a Paving Project"

The Department of Public Works (DPW) personnel interviewed characterized the project as first and foremost a paving project with some extra money available to do a modest amount of other improvements. They downplayed what could and would be done for congestion relief citing limited funds and a narrow right-of-way.

SFDB Project: Public Meetings and Project Details

There has been a series of four general community meetings, along with walking tours, four Citizens Advisory Committee meetings and written communications (including a project website).[32] These provided the public with information, presented a menu of improvements, solicited feedback and progressively refined the project proposal taking into account community feedback. See **APPENDIX D - Public Meetings and Project Details** for a summary and the Sir Francis Drake Boulevard Rehabilitation (101 to Ross) website for full project and meeting details.

The community meetings produced this summary of corridor priorities:[33]

1. Reduce vehicle congestion.
2. Improve safety of children going to school.
3. On street bicycle access along SFDB is not a priority (but there is a need to reinforce linkages to key alternative routes).

Additional priorities gathered on well-attended SFDB walking tours were:

1. Intersection modifications should not reduce vehicle capacity.
2. As children can and will bicycle on sidewalks, provide the widest accommodation possible.
3. "Guardrails" may not be necessary, but providing a fence to guide children on their walk or ride to school is important.

The project team presented a number of design strategies to address these priorities. An estimated cost was assigned to each. The total cost to implement all strategies including congestion relief and pedestrian safety would be $19.2M[34] – $6.0M above the existing budget of $13.2M. Therefore,

[31] TAM Board Agenda, Item 18 Page 2 of 4 June 27, 2013, page 240 https://docs.google.com/gview?url=https%3A%2F%2Fmarin.granicus.com%2FDocumentViewer.php%3Ffile%3Dmarin_3a4560852caef036a3a7839542237440.pdf%26view%3D1&embedded=true

[32] Op. cit. Sir Francis Drake Boulevard Rehabilitation (101 to Ross), County of Marin, Raul M. Rojas, Director, Dept. of Public Works http://www.marincounty.org/depts/pw/divisions/transportation/sir-francis-drake-boulevard-rehabilitation

[33] Sir Francis Drake Boulevard Corridor Rehabilitation Community Meeting #3, March 15, 2016 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/sfd_20160315_communitymeeting3.pdf?la=en

[34] Sir Francis Drake Boulevard Rehabilitation Project Open House, Marin County Subscriptions email, May 18, 2016

either some compromises will have to be made or more funds obtained. See the APPENDIX D - Public Meetings and Project Details and the presentation[35] for intersection details.

SFDB Project: Analysis

What's Working?

Despite Marin County Department of Public Works (DPW) management characterizing this as "just a repaving project", the engineers and consultants have found ways to generate what appears to be tangible congestion relief with very material improvements to pedestrian access and safety.

Conditions were ripe for serious community and special interest disagreement on priorities, but it appears that core needs and interests are well addressed by the March 15, 2016 proposals. The heads of three community organizations endorsed the current plan in a Marin Voice article.[36] Additionally, the Grand Jury believes that many of the safety issues that have prevented children from walking or biking to school will be resolved.[37] This should boost the SR2S ongoing effort to have students walk or bike rather than be driven to school, which will provide some relief.

Cumulatively the Project's improvements should materially reduce traffic delays. These include the addition of a third eastbound lane in Greenbrae, adding simultaneous left turns from Eliseo Drive and Barry Way to add green time for SFDB, several expansions of left turn lane capacity, and shortening of crosswalks to add green time for SFDB. And, the traffic planners believe that with careful synchronization of the traffic signals to the east and west, the surface crosswalk at Wolfe Grade (added because the overpass is not ADA compliant) will minimally impact SFDB congestion. The new crosswalks are manned by crossing guards at school start and release times allowing for a safe crossing for students.

The project team provided the public with comprehensive descriptions and costs of the many proposed components of the project at the June 1, 2016 Community Open House.[38] The recommended priority for funding components within the existing $13.2M budget was presented and included traffic congestion relief measures, and pedestrian and bicycle safety measures. A substantial portion of the lower initial priority items cover sidewalk improvement and gap closures. Project personnel indicated that there is a good possibility of acquiring additional funding for these items, and that their construction can be done after core pavement and intersection work is completed.[39]

[35] Sir Francis Drake Boulevard Corridor Rehabilitation Community Meeting #3 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/sfd_20160315_communitymeeting3.pdf?la=en

[36] Marin Voice: Sir Francis Drake Boulevard plan reflects community input, Greg Shaughnessy, Jack Valinoti and Anne Petersen, Marin IJ , March 24, 2016 http://www.marinij.com/opinion/20160324/marin-voice-sir-francis-drake-boulevard-plan-reflects-community-input

[37] Grand jury interview

[38] Community Open House, June 1, 2016 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/sfdb_openhousepassport.pdf

[39] Grand jury observation and interviews at June 1, 2016 Community Open House

What's Controversial?

11-Foot Lane Widths! The plan includes generally decreasing the 12- to 14-foot travel lane width to 11 feet but also includes keeping an outside 12.5- to 13-foot bus and truck lane where there is no shoulder or wide parking lane. Presenters in the public meetings have stated that this reduction should improve consistency and calm traffic to posted speed limits. Some critics have seized on these predictions to conclude that congestion will increase, not decrease, with these proposed changes. Furthermore, some critics claim that 11-foot lane widths will increase automobile accidents. In response the presenters reiterated that 11 feet is standard and the decrease will shorten crosswalk times and thereby increase green time for SFDB through traffic. The Grand Jury investigated concerns about possible accident increases and speed decreases due to using 11-foot rather than 12-foot lanes. According to professional literature there should be no accident increase and no material speed decrease from the proposed lane configuration. The Grand Jury also verified the claim that an 11-foot lane width meets current standards for this type of urban highway. See **APPENDIX E - Evaluation of 11-Foot Lane Width** for additional discussion.

In summary, the Grand Jury finds that the use of 11-foot lane widths is generally accepted as safe, will not materially slow traffic flow, is commonly used for roads with much higher traffic volumes and speed, does abide by standard guidance for this urban highway, and that the 12-foot standard used for high speed Interstate Highways is not needed for SFDB.

High-Speed Right Turn Lanes! There is also concern about "squaring up corners" to reduce the speed of vehicles making a right turn off of SFDB. Squaring improves pedestrian safety by slowing turning cars and shortening crosswalks to reduce the time pedestrians are exposed to turning traffic. In a few areas along the corridor, the number of school children is substantial and the additional sidewalk width proposed should discourage students from spilling over into the roadway. At some intersections right turn lanes are being created or preserved to minimize any through traffic impact. **It is the Grand Jury's opinion that a reasonable tradeoff is being made favoring pedestrian safety over maintaining high speed right turns.**

Bike Lanes! The public was not in favor of SFDB bicycle lanes within this project's boundaries. Concern was noted by a member of the public that bicycle lanes were, in fact, being added and referenced the chart showing the area just east of College Avenue. For this short stretch, lane boundaries will, as elsewhere, be painted to separate the right lane from the 12- to 15-foot parking-shoulder area. According to the presenters the shoulders are not being marked as bicycle lanes but will allow additional space and safety for parking and cycling. **The Grand Jury's agrees that traffic lanes should be separated from wide parking-shoulder areas with lane markings.**

Traffic Signal Controls! Traffic signal timing programs can be adjusted to manage vehicle flow throughout the day based on observed typical traffic volumes and patterns. Of course, the roadway and associated intersection configuration sets the ultimate limit on how efficient traffic flow can be. Adjusting traffic signal timing cannot substitute for adding roadway capacity or more effective design of lanes and intersections. The current signal system synchronizes the traffic lights with different programs by time-of-day and day-of-week with individual signal timing appropriate to each intersection's variable traffic

volumes. The SFDB project intends to update the programs once the roadway improvements are done and resulting traffic observed. Such basic synchronized and timed traffic light control usually has moderate payoff. Additionally, while the area is torn up for the rehabilitation project the intent is to bury conduit to allow future installation of fiber optic cable for a more advanced adaptive control system. The gains from an advanced system are predicted to be much smaller than for the basic system, and the expected $3 million or $4 million cost is beyond the current available funding. (See **APPENDIX F - Traffic signal light choices and benefits** for additional discussion.) **The Grand Jury agrees with implementing the basic traffic light synchronization now as well as installing infrastructure allowing for more sophisticated traffic signaling in the future**.

What's Missing?

There are a number of things missing from the publicly presented information that would be helpful in replacing instinctive reactions with facts and engineering estimates.

Levels of Service Scores(LOS)? This corridor has within it, a segment with a very low LOS score which is indicative of low speed and long travel time.[40] The public has indicated that congestion reduction is a high priority. Some intersections' LOS information has been made public (most notably the projected improvements at the Eliseo intersection with and without the third lane resulting in improvement of two grades from E to C). The sponsors and the public could make more informed decisions if the existing LOS for the entire corridor was modeled and publicized. **The Grand Jury believes that this should include, but not be limited to:**

- LOS with and without specific features selected that are within budget.
- LOS when selecting different combinations of features (for comparison of alternatives).
- LOS with recommended 11-foot minimum lane widths vs. 12-foot.
- LOS improvement available from basic signal improvements (as was done in 2012) vs. advanced signal technology.
- LOS with and without squared off right hand turn lanes.
- LOS if the Wolfe Grade overpass were replaced with one meeting ADA standards and eliminating the grade level crossing.

CO_2 and Toxic Emissions? According to Census 2010 block data reported by Human Impact Partners, over 20% of the population in Kentfield resided within 500 feet of a roadway handling over 10,000 vehicles per day.[41] They are subject to the particularly high concentration of toxic pollutants referenced in the background section of that report. In addition a 2013 publication indicates fuel efficiency falls by a factor of three when travelling at 10 mph vs 30 mph.[42] This threefold increase in consumption and CO_2 emissions at low speeds due to high congestion would pertain to conditions often found along SFDB during rush hours. The County has the ability to do the analysis of emission

[40] Final Report 2015 CMP Update, Marin County, September 2015, http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=9126

[41] Pathways to Progress 2013: Assessing the Healthcare Needs of Marin County, 2013 Marin County Community Health Needs Assessment, Sub--County Health Indicators, Human Impact Partners, 11/2012, http://www.humanimpact.org/downloads/marin-county-sub-county-health-indicators/

[42] The Cost of Speeding: Save a Little Time, Spend a Lot of Money, December 18, 2013 (http://blog.automatic.com/cost-speeding-save-little-time-spend-lot-money/)

impacts, as indicated by their analysis[43] of impacts from signal light changes implemented along this corridor in 2012. In that analysis estimates predicted a reduction of as much as 31% in nitrous oxide and carbon monoxide emission pollutants at midday and CO_2 emissions dropping by 9%. General research shows that reducing congestion for a given level of vehicle traffic can materially reduce both. **The Grand Jury believes that greenhouse gas (GHG) and toxic pollutant emission levels should be taken into account when evaluating options in County transportation projects.**

Next steps for Sir Francis Drake Boulevard Rehabilitation

Next Steps: Traffic Demand Projections, Other Projects and Consequences

There are a number of factors beyond the geographic boundaries of this corridor that could have material impact on traffic demands, traffic patterns, and congestion. If major changes are made in some of these by other transportation projects, then aspects of the current SFDB Project plan may prove to be less effective than projected. The public should be informed about the expected LOS with:

- Normal slow population growth in Marin County, but continued rapid growth in surrounding counties
- Introduction of traffic generators and impediments in San Rafael, (e.g. BioMarin and SMART)
- Additional development, including growth of retail businesses adjacent to Hwy 101 and the SFDB corridor
- Opening the San Rafael-Richmond Bridge third lane
- Improvements in the configuration of SFDB through Larkspur Landing and from Hwy 101 to Hwy 580
- Introduction of effective ramp metering on Hwy 101

Opening of a third lane on the Richmond-San Rafael Bridge plus the planned improvements to SFDB east of Hwy 101 are intended and expected to provide major congestion relief.[44]

Next Steps: Environmental Approval and Construction Approval

The third community workshop[45] included approximately $18M in project costs to complete the various SFDB Project components. (This was later revised to $19.2M.) The budget remains $13.2M. **The Grand Jury believes it was good to look at various high-payoff improvements, even though some are beyond the current budget**. But now the project must pare down the improvements to match the budget or identify reliable sources for funding the difference, and continue to do that with public input. The anticipated schedule is:[46]

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[43] Final Project Report with Benefit/Cost Analysis, Metropolitan Transportation Commission Program for Arterial System Synchronization (PASS) for Marin County, City of Larkspur and Caltrans, Tables VII and XII, July 20, 2012 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/pass--final-project-73112-2rossll.pdf?la=en

[44] Sir Francis Drake Boulevard Corridor Rehabilitation Community Meeting #3 March 15, 2016, page 25 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/sfd_20160315_communitymeeting3.pdf?la=en

[45] Ibid.

[46] Communication from DPW representative

- Summer/Fall 2016 - California Environmental Quality Act (CEQA) analysis and review
- By EOY 2016 - public hearing
- Fourth Quarter 2016 - funding approval to finalize the design, prepare construction documents, and conduct the bid process
- 2017 - Finalize design, prepare construction and bid documents
- 2017 - Funding approval for construction
- 2018 - Primary construction

As stated previously we encourage the project to include emission impacts in the environmental analysis.

The MCBOS and TAM must approve the remaining design and construction costs currently budgeted at $12.4M. And that approval will come during or after replacement of one member of the MCBOS and possibly TAM commissioners other than MCBOS representatives. A similar change of leadership was one reason that the Greenbrae-101 interchange project, also designed for traffic relief, was abandoned.[47] **The Grand Jury believes that the project team should be particularly diligent in outreach to community leaders and citizens during this period, addressing issues as they arise and clearly articulating project analysis, benefits and mitigations.**

Other Opportunities for Congestion Relief

Opportunity: Planning. Currently, the process of originating and implementing project plans is fragmented and often results in incomplete and conflicting solutions. MTC,[48] TAM[49] and the MCBOS[50] all craft long-term conceptual plans with attention to diverse local political and special interests and with periodic updates that include prior public input and discussion. Locally originated individual projects often suffer from a myopic view of traffic problems (ignoring issues that span jurisdictions). The results of this process regularly fall short of implied public promises. **The Grand Jury believes that the greater good would be served if these agencies exercised their ability to modify past fragmented planning and spending precedents and restrictions to better serve current and future needs if prudent to do so.** This is particularly applicable to the possibility that changing the Measure A expenditure plan might improve overall benefits.(See discussion of Measure A below)

Opportunity: Comprehensive Analysis and Solution Set. Thorough understanding of the cause of traffic and congestion in the local environment can potentially lead to more effective solutions, particularly when coupled with all constituencies represented. The Grand Jury discovered a local example where traffic and congestion issues are being addressed with a more comprehensive approach than is being taken with the SFDB Project. The Mill Valley Traffic and Congestion Reduction Advisory Task Force published a status report that includes:[51]

- Past Efforts and Results

[47] Grand jury interviews

[48] Plan Bay Area 2040 (in process) http://planbayarea.org

[49] TAM Strategic Vision Plan Update http://www.tam.ca.gov/index.aspx?page=79 (2016 Update in process)

[50] 2007 Marin Countywide Plan (Update in process) http://www.marincounty.org/depts/cd/divisions/planning/2007-marin-countywide-plan

[51] Mill Valley Traffic Task Force Report, April 2016 http://www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=16437

- Contributing Demographic Factors
- Existing Conditions Including Congestion vs. Capacity
- Historical Traffic Volume Trending (back to 1950)
- Vehicle Trip Purposes
- School Trip Origin - Destination and Trip Generation
- Specific Quantified Objectives and Measurements

In comparison to the more narrowly focused SFDB Project, a deeper and more comprehensive understanding of the issues was developed. The task force identified a wider and probably more effective set of solutions than just roadway operations and pedestrian and bicycle safety improvement possibilities. This was done in spite of the fact that the issues of limited right-of-way and limited funding are the same for both projects. The solution list contains both near and long term efforts with some actions in progress and others to be implemented in the near future in the following categories:

- Measures to Reduce Vehicular Demand
- Measures to Improve Traffic Operations
- Measures to Increase Vehicular Capacity

Opportunity: Ramp Metering. Ramp meters are traffic signals placed on freeway on-ramps. Just as signals at local intersections regulate traffic, ramp metering signals manage traffic entering a freeway by optimizing the use of available gaps for merging of vehicles. Ramp metering smooths the flow of traffic and enhances safety by balancing conflicting traffic demands. Smoother traffic flow decreases congestion and reduces the potential for accidents.[52] Actual freeway throughput increased by 2 to 5% and travel time was reduced by 5 to 57% after implementations in Santa Clara, Alameda, and San Mateo counties.[53] Ramp metering has not yet been implemented in Marin County.

MTC and TAM performed studies (March 2013, January 2014), issued information, and conducted public workshops on ramp metering for Hwy 101 at and south of SFDB. MTC funded Caltrans for implementation of the signal lights. As of November 2014, the predicted completion was early 2016, as Caltrans installed signal lights. TAM initiated additional work to even more thoroughly examine the risk and mitigation of backup on local streets (see **APPENDIX G - Ramp Metering for Hwy 101** for full details). The important conclusion is that a 24% decrease in travel time from Marin City to Bellam Boulevard/I-580 off ramp is predicted and that ramp configuration and sensors will prevent backup on local streets. In a December 2015 update, TAM indicated that CalTrans and MTC have suspended final design activities on the Phase I ramp metering project due to funding challenges. The project appears to be at a standstill.[54]

TAM and the County, with the support of the affected towns and cities, should work with MTC and Caltrans to expedite the implementation of ramp metering for Hwy 101 from Marin City through the SFDB intersection. This will not only ease congestion for Hwy 101 traffic but may provide some relief to congestion on SFDB.

[52] http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=7890

[53] Managing MRN US-101 Corridor TAM Workshop on Ramp Metering Dan McElhinney, Caltrans Chief Deputy District Director, November 20, 2014, page 19
http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=7956

[54] Ramp Metering in Marin, Transportation Authority of Marin, http://www.tam.ca.gov/index.aspx?page=347

Opportunity: Public Buses (nearly half of Measure A funding). SFDB has been a tough corridor for public transit for several reasons:

- Missing or substandard sidewalks along SFDB
- No speed advantage for buses over cars and no space for dedicated bus lanes[55]
- Hilly terrain north of SFDB makes walking to/from residences hard
- Insufficient ridership limits ability to offer highly frequent service

Improvements are anticipated both by the SFDB Project and by Marin Transit route changes:[56]

- Sidewalk repairs and elimination of gaps (SFDB Project)
- "Queue jumping" allowing bus to crossing of intersections to bus stops from right turn lanes (SFDB Project)
- Expanded service to South Eliseo Drive medical offices and apartments (Marin Transit)
- Twice per hour service for 10.5 peak hours and once per hour otherwise (Marin Transit)
- Detection of buses for signal priority (future possibility)
- Improve bus shelters and schedule signs (SFDB Project)

Prior to these changes, SFDB bus ridership has plateaued at less than 1,000 persons per day,[57] a level which while providing much needed transit services to residents, is too low to materially ease traffic congestion caused by about 50,000 vehicles per day. While the above changes should increase utilization, the increase is unlikely to cause a significant decrease in auto trips.

Opportunity: School Buses. In order to encourage College of Marin students to use mass transit, the college now issues bus passes to registered students. Travel by students on Route 228 was approximately 150 trips daily. COM bus passes were used for about 500 trips per day over the entire bus system.[58]

While the COM bus passes have been valuable in helping with traffic congestion, other "educational" traffic remains a problem. It is estimated that 21 to 27% of peak hour traffic in Marin County is related to school trips. This amounts to approximately 50,000 daily student trips made by automobile.[59] It is clear that a high percentage of the morning traffic on SFDB is related to College of Marin, Marin Catholic High School, Kent Middle School and Bacich Elementary School. *Safe Routes to School* (SR2S) has worked well at both Kent and Bacich schools to encourage "green" transport to and from school. These "green" methods include walking, biking and carpooling. Nonetheless, a survey done by SR2S in May 2015[60] showed that each school day family vehicles make 56 morning and 55

[55] Designing Bus Rapid Transit Running Ways, APTA STANDARDS DEVELOPMENT PROGRAM RECOMMENDED PRACTICE American Public Transportation Association 1666 K Street, NW, Washington, DC, 20006-1215 http://www.apta.com/resources/standards/Documents/APTA-BTS-BRT-RP-003-10.pdf

[56] Staff Report, Fixed Route Changes for June 2016, Marin Transit Board of Directors Meeting, March 28, 2016 http://marin.granicus.com/MediaPlayer.php?view_id=31&clip_id=8002&meta_id=835138

[57] Marin Transit Monitoring Reports, http://www.marintransit.org/monitoringreports.html

[58] Interview with Marin Transit official.

[59] Coordinated Countywide Student Transportation Study, December 2015.

[60] The data from this report was collected using the in-class Student Travel Tally questionnaire from the National Center for Safe Routes to School.

afternoon trips to Bacich and 45 morning and 40 afternoon trips to Kent. Most of these are round trips. To somewhat eliminate peak traffic, Bacich and Kent schools have instituted different start times and each grade level at Bacich has a different afternoon dismissal time to dissipate the problem.

A comprehensive survey in 2015 revealed that a primary reason parents don't have their children walk or ride to school is they consider conditions unsafe along their route.[61] But the SFDB Project along with the McAllister Avenue paving project and other small efforts would remove many of these safety hazards.[62]

The Coordinated Countywide Student Transportation Study done in December 2015 in partnership with TAM and Marin County Office of Education (MCOE) showed that the Kentfield District demonstrated strong potential for growth in bus ridership with Bacich having the second highest potential additional ridership in the County and Kent Middle School the ninth highest.[63] The Reed School District instituted a busing program last year and traffic on Tiburon Boulevard has been reduced by 46% during morning drop-off times and by 39% in the afternoon pick-up times.[64] Results of the Kentfield survey showed that 70% of respondents would take the bus and were willing to pay something for it.[65] The actual cost might be as much as $2000 per student so there would need to be some cost subsidies to increase ridership.[66] Estimates are that a school bus program could reduce morning vehicle trips on SFDB by 20-30%.[67] Kentfield would be interested in doing a pilot program in the Greenbrae area, but there is concern about the availability and costs of buses and drivers for a program.[68] Marin Transit does have discretion in the services they offer. They are increasing fixed route services by 19% in June 2016,[69] but none of that is allocated to school bus services.

The Grand Jury believes that there can be only marginal incremental gains by expansion of general mass transit along SFDB beyond those improvements being implemented in June 2016. However, continued focus on SR2S by the SFDB Project and the McAllister Avenue paving project to improve safety can increase the number of students walking and biking to and from school. And the introduction of school buses, particularly from the eastern sections of SFDB could materially reduce vehicle traffic.

We believe there is an opportunity for TAM to step forward and assign Measure A funds to school buses. School buses were a part of the original transit strategy

[61] 2015 Kentfield School District Safe Routes to School Survey, Grand Jury email correspondence, Q9, What concerns limit your ability to walk and bike to school (top 30) Answers (top 4) Speeding Cars, Dangerous Intersections, Lack of Sidewalks, Lack of Safe Bikeways

[62] Interview with SR2S official

[63] Coordinated Countywide Student Transportation Study, December 2015, page 26.

[64] Adrian Rodriguez, "Tiburon Peninsula Traffic Relief JPA Approved, Marin IJ, March 18, 2016. http://www.marinij.com/general-news/20160318/tiburon-peninsula-traffic-relief-jpa-deal-approved

[65] Safe Routes to School leader interview.

[66] Ibid.

[67] Grand Jury interviews and research

[68] Marin Transit Official interview.

[69] Nels Johnson, "Marin Transit Expands Service on Key Routes", Marin Independent Journal, March 30, 2016.

component of the Measure A expenditure plan.[70] We believe the total transit expenditure stream should be optimized for most effective service and traffic mitigation irrespective of whether it is accomplished by general public transit or school bus traffic. If there is need to reallocate overall expenditures amongst the Measure A strategies, the TAM board with a two thirds vote and agreement of a majority of the cities and towns of Marin can do this.[71]

Opportunity: Bicyclists and Pedestrians. Marin voters have included bikeways among their transportation improvement priorities with the passage of Marin County Measures A (sales tax) and B (registration fee) along with Regional Measure 2 ($1.00 bridge toll increase). Each has a category of expenditures that includes bikeways either explicitly or implicitly by funding projects that facilitate non-motorized transportation. In addition Federal and State grants are used to fund bikeways. TAM either has sole jurisdiction of the expenditure of such funds (e.g. Measures A and B) or some influence over what is done with other available funds.

There are a large number of bicycle and pedestrian projects funded or monitored by TAM.[72] The vast majority are moderate or low cost projects that provide material enhancements for walking or biking in and through the local environment. Many projects were done in support of the *Safe Route to Schools* initiative, which provides significant decreases in individual automobile trips to take students to and from school, thereby materially reducing congestion. Multi-use pathways have significant benefits for recreation, health, and community building, beyond any benefit of substituting motorized transportation. Marin benefited as recipient of $25M as one of four beneficiaries of the Federal funds available for the Nonmotorized Transportation Pilot Program (NTPP). The purpose of this program was to demonstrate "the extent to which bicycling and walking can carry a significant part of the transportation load, and represent a major portion of the transportation solution, within selected communities."[73]

Some pathways come at a very high cost. Projects completed or in the works include:

- Lincoln Avenue-Puerto Suello Hill Pathway ($13M)[74, 75]
- Cal Park Tunnel ($28M with $14M for SMART)[76]
- Central Marin Ferry Connector (bridge over SFDB) ($9.4M)[77]

[70] Marin County Transportation Sales Tax Expenditure Plan, Approved Final Plan, May 6, 2004 (see Figure 1 and other instances) http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=279

[71] Ordinance 2005-1,Transportation Authority of Marin, Section 103.7 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=36

[72] Final Report 2015 CMP Update, Marin County, page 26,September 24 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=9126

[73] What is WalkBike Marin? http://walkbikemarin.org/about.php

[74] Work-begins-on-bike-lanes-on-san-rafaels-puerto-suello-hill, Marin IJ, June 9, 2009 http://www.marinij.com/general-news/20090609/work-begins-on-bike-lanes-on-san-rafaels-puerto-suello-hill

[75] Lincoln Hill path complete, ready to be celebrated, Marinscope Newspapers, Feb 23, 2011 http://www.marinscope.com/news_pointer/news/lincoln-hill-path-complete-ready-to-be-celebrated/article_6f4ea330-6f69-5b42-87a1-51a09d4ed0c9.html

[76] Cal Park Hill Tunnel opens to the public amid cheers, Marin IJ, December 10, 2010 http://www.marinij.com/article/ZZ/20101210/NEWS/101219226

[77] Bridge spanning Sir Francis Drake in Larkspur nears completion, Marin IJ, August 18, 2015 http://www.marinij.com/article/NO/20150818/NEWS/150819806

- Planned North South Greenway (wide pathway over Corte Madera Creek), pathway along Redwood Highway, and southern route to Wornum Drive along Railway right of way ($19.8M)
- Planned Alto tunnel between Mill Valley and Corte Madera ($40M to $50M)[78]

Fortunately TAM sponsors transportation monitoring, including pedestrian and bicycle traffic.[79] The data for the three pathways already implemented shows only 0.2% to 0.4% of the adjacent Hwy 101 peak hour traffic is being diverted to bicycle or pedestrian travel, despite $35M in cost. See **APPENDIX H - Multi-Use Pathways Hwy 101 traffic diversion** for details of the analysis.

Funding for low-utilization pathways and bridges has had higher priority than an ADA compliant pedestrian-bicycle overpass at SFDB and Wolfe Grade serving the adjacent 700 student Bacich school. The current overpass is used by many of students in the peak periods, but the SFDB Project has to include a surface crossing because the existing overpass is not ADA compliant. (The SFDB Project will adjust traffic signaling to minimize traffic delays to the extent possible.) In general, large spending on low-utilization pathways diminishes the funds that could be spent on higher payoff local bicycle and pedestrian pathways that would get students out of cars and reduce congestion through SR2S, or pay for school bus programs, or even roadway improvements.

The Grand Jury recommends that existing planned, but not yet constructed, highly expensive bicycle-pedestrian pathways for which the justification and funding cites traffic relief or mitigation be reconsidered. Such projects should be funded and supported only if adequately justified on other grounds or if studies based on historically accurate and proven methods indicate cost effective substitution for motorized traffic can be realistically expected.

CONCLUSION

The Merriam-Webster Dictionary includes in its definition of "rehabilitate" either "to restore to a former capacity" or "to bring something back to a good condition." The Sir Francis Drake Boulevard Rehabilitation Project needs to bring SFDB back to good condition by today's standards. The improvements under consideration appear to strike a good balance of *decreasing* congestion and *improving* safety and access, while recognizing that constraints make establishing protected bike lanes impractical.

Challenges remain in selecting improvements that will: fit within the available funding, have local support (community, TAM commission, and MCBOS) and have measureable estimates of the improvement in travel times that can be predicted along with favorable reductions in emissions).

[78] Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study, June 2010 (page 2-56) http://www.walkbikemarin.org/documents/mv_cm_study/FINAL%20Study/Mill%20Valley%20to%20Corte%20Madera%20Bicycle%20and%20Pedestrian%20Corridor%20Study.pdf

[79] 2014 Transportation System Monitoring And 2015 CMP Update, Marin County, September 14, 2015, page 33, http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=8811

The Grand Jury's investigation revealed that County-wide transportation project planning and implementation processes tend to be too localized, fragmented and deficient. With regard to the SFDB Project, there are opportunities for congestion relief on or near the corridor being managed as separate projects, with different lead agencies, that are not formally underway, are on hold, and have long approval and implementation intervals. These include: school bus support, ramp metering, the third lane on the Richmond-San Rafael Bridge, and improvements to SFDB at Larkspur Landing. Examination of the results of expensive pedestrian-bicycle pathways show that the conversion of motorized to non-motorized travel in the critical peak congested hours for nearby highways has not happened.

In short, our deconstruction of the SFDB Project reveals that reductions in congestion can be achieved if made a priority while closing the project's funding-cost gap. It also reveals lack of leadership and conflicting goals in Marin transportation planning and operation that limits what is achieved.

FINDINGS

F1. The SFDB Project team provided extensive outreach and transparency with many public meetings and workshops, published information, and modified and sharpened direction based on the feedback received.

F2. There is no statement in the SFDB Project documentation of current congestion levels (except for specific intersections) and no quantified goals for congestion relief.

F3. The SFDB Project considered only roadway improvements for traffic operation, mass transit, and pedestrian and bicycle access and safety. More comprehensive analysis of traffic and congestion is possible as seen in the Mill Valley Traffic and Congestion Task Force Report. This could open the possibility for a wider range of solutions.

F4. The use of 11-foot traffic lane widths on SFDB is safe, will not materially slow traffic flow, is commonly used for roads with much higher traffic volumes and speeds and abides by standard guidance.

F5. Existing traffic signals are programmed and coordinated for multiple time-of-day and day-of-week schedules across 12 intersections. Adjustment of these programs to account for new and more efficient intersection configurations and new traffic patterns is expected to have moderate payoff.

F6. As demonstrated in the 2011-2012 project to synchronize traffic signals along SFDB,[80] the County has the ability to model Level of Service measures including elapsed time to travel the corridor, average speed, calculated fuel consumption as a function of congestion, cost of time lost, cost of fuel, CO_2 emissions, and toxic gas emissions before and after a project.

[80] Final Project Report with Benefit/Cost Analysis, Metropolitan Transportation Commission Program for Arterial System Synchronization (PASS) for Marin County, City of Larkspur and Caltrans, Tables VII and XII, July 20, 2012 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/pass--final-project-73112-2rossll.pdf?la=en

F7. The cost of all components under consideration for this project is $19.2M, but the budget is $13.2M. $800,000 has been allocated for the work already completed and the upcoming development and filing of an Environmental Impact Report.

F8. Future leadership changes on the Marin County Board of Supervisors, TAM Board of Commissioners, as well as city and town councils during design-approval stages can cause a previously well conceived and vetted congestion reduction project to fall out of favor and be abandoned or seriously curtailed.

F9. Funding and implementing school bus programs for Bacich Elementary School and Kent Middle School would reduce peak school traffic which makes up an estimated 20-30% of all peak hour morning trips on SFDB

F10. Measure A funds provide for school bus transportation as a part of its transit implementation strategy.

F11. TAM has the authority to change the Measure A expenditure plan with a two-thirds majority vote of the TAM Board of Commissioners and approval of a majority of the towns and cities of Marin County.

F12. Multi-use pathways constructed along Hwy 101 at a cost of $35M yielded insignificant conversion of motorized travel to biking and walking.

F13. Planning is underway for another bike bridge and pathway with a projected cost of $19.8M. And further south, studies are underway with vigorous advocacy support for converting the abandoned Alto Tunnel to a multi-use pathway at an estimated cost of $40M to $50M.

F14. Ramp metering on Hwy 101 from Marin City to north of SFDB is predicted to cut travel time by 24% for peak hour and reduce spillover and congestion on feeder streets (e.g. SFDB).

F15. MTC allocated funds to Caltrans for ramp metering in Marin but funding issues have the project suspended. Implementation is on hold even though lights have been installed.

F16. TAM manages and funds a set of separate projects based on their individual merits and the support of the TAM Commissioners, each representing their district of the County or their local town or city.

F17. TAM does not structure sets of integrated projects to produce cohesive programs that holistically solve traffic issues that cross jurisdictional and project boundaries.

RECOMMENDATIONS

R1. TAM and the County should reconcile the $19.2M in desired work along SFDB with the $13.2M budget by giving priority to the traffic congestion reduction measures.

R2. The County should publish current and expected post project Level of Service for the corridor: time to travel the corridor, average speed, fuel consumption, economic benefit and level of change in CO_2 and toxic gas emissions.

R3. TAM and the County should include and publish the Level of Service and other actual benefits achieved in the project scope of work.

R4. Marin County Board of Supervisors and TAM Board of Commissioners should facilitate the identification and publication of project facts and both qualitative and quantifiable benefits to better inform the public and guide their future decision making.

R5. TAM, Marin Transit District and the County should fund school buses for the Bacich Elementary and Kent Middle School population. Consider overall optimization of Measure A transit funds, including modification of the Measure A expenditure plan.

R6. TAM and the County should negotiate implementation of ramp metering with MTC and Caltrans.

R7. TAM and the County should evaluate the cost/benefit of adaptive signaling improvements in reducing congestion and fund once other more cost effective solutions have been implemented.

R8. Existing planned but not yet constructed highly expensive bicycle-pedestrian pathways should not be built if their only justification and funding depends on traffic relief or mitigation with no evidence indicating that peak traffic relief is reliably predicted to result. Such projects should be funded and supported only if justified on other grounds.

R9. TAM should coordinate with other agencies to produce sets of integrated projects prioritizing solutions that have engineered and predicted benefits for areas of the County, not just for individual road segments.

REQUEST FOR RESPONSES

Pursuant to Penal code section 933.05, the Grand Jury requests responses as follows:

From the following governing bodies:

- Marin County Board of Supervisors (R1-R9)
- Marin County Transit District (R5)
- Transportation Authority of Marin (R1,R3-R9)

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted in accordance with Penal Code section 933 (c) and subject to the notice, agenda and open meeting requirements of the Brown Act.

The following individuals are invited to respond:

- Director, Marin County Department of Public Works (R1-R4,R6-R9)
- General Manager, Marin County Transit District (R5)
- Executive Director, Transportation Authority of Marin (R1,R3-R9)

Note: At the time this report was prepared information was available at the websites listed.

Reports issued by the Civil Grand Jury do not identify individuals interviewed. Penal Code Section 929 requires that reports of the Grand Jury not contain the name of any person or facts leading to the identity of any person who provides information to the Civil Grand Jury. The California State Legislature has stated that it intends the provisions of Penal Code Section 929 prohibiting disclosure of witness identities to encourage full candor in testimony in Grand Jury investigations by protecting the privacy and confidentiality of those who participate in any Civil Grand Jury investigation.

GLOSSARY

CEQA	California Environmental Quality Act, a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
EIR	Environmental Impact Report, a process to provide the public and the decision-makers with detailed information about a project's environmental effects, ways to minimize the project's significant environmental effects, and reasonable alternatives to the project.
LOS	Level of Service, a California standard for grading roadway traffic conditions in levels from A (best) to F (worst)
MCBOS	Marin County Board of Supervisors
MTC	Metropolitan Transportation Commission, a Federally designated agency responsible for long-range integrated transportation and land-use/housing strategy for the greater San Francisco Bay Area
PASS	Program for Arterial System Synchronization - a traffic signaling program
SFDB	Sir Francis Drake Boulevard
SFDB Project	The Sir Francis Drake Boulevard Rehabilitation Project to upgrade the road between the Ross town limits and Highway 101
SR2S	*Safe Routes to Schools* is a program designed to increase the number of children walking and biking to school
TAM	Transportation Authority of Marin, the congestion management agency and the transportation tax authority for Marin County

APPENDIX A - Local Transportation Funding

For most funding of transportation projects, local governments and transit operators either use general revenue funds or apply for funding from their metropolitan or regional transportation planning organizations. County transportation authorities are responsible for developing expenditure plans for any self-imposed, voter-approved, local sales taxes, special fees or bond measures. Marin voters recently passed County Tax Measures A and B to raise local funds:

Measure A (2004) - a 20-year 0.5 cent sales tax generating about $25 million per year until 2024. The ballot measure ("Marin Traffic Relief and Better Transportation Act") stated:

> "To reduce local traffic congestion by implementing a 20-year Transportation Plan that: Maintains and improves bus service, including special services for seniors and disabled persons; Fully funds and completes Highway 101 carpool lanes through San Rafael; Maintains and improves roads, bikeways, sidewalks, and pathways; Reduces school related congestion and provides safe access to school."[81]

The Executive Director of TAM explained the rationale for the measure's components:

> "Marin County faced several challenges in gaining public acceptance of a local sales tax. First, the tax needed to be dedicated to a broad range of local needs to gain the necessary supermajority voter approval. Second, it was important that the tax be dedicated to priority local transportation needs, downplaying local funds dedicated to the regional traffic needs on Highway 101. Third, it was important that the tax address the needs of dedicated advocacy groups, particularly the needs of the transit-dependent community and the bicycle and pedestrian community."[82]

[81] http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=4265

[82] The Unique Challenges of Meeting Transportation Needs in Marin County, Dianne Steinhauser, in *Key Issues in Transportation Programming: Summary of a Conference*, Transportation Research Board Conference Proceedings 43, November 12–14, 2006, pages 37-39

Measure A - Expenditure Plan[83]

GOAL: Improve mobility and reduce local congestion for everyone who lives or works in Marin County by providing a variety of high quality transportation options designed to meet local needs		
Implementation Strategy	**%**	**Est. 20-year revenue** *($Millions)*
1. Develop a seamless local bus transit system that improves mobility and serves community needs, including special transit for seniors and the disabled (paratransit services). • Maintain and improve existing levels of bus transit service throughout Marin County • Improve the frequency of buses in high volume corridors • Implement small bus and community-based shuttles in many neighborhoods • Implement school bus service enhancements • Maintain and expand the rural bus transit system • Improve bus services between Marin County and San Francisco • Maintain and expand transit services and programs for those with special needs – seniors, persons with disabilities, youth, and low-income residents • Invest in bus transit facilities for a clean and attractive transit system • Provide matching funds for bus transit improvements	55.0%	$182.38 M
2. Fully fund and ensure the accelerated completion of the Highway 101 Carpool Lane Gap Closure Project through San Rafael.	7.5%	$24.87 M
3. Maintain, improve, and manage Marin County's local transportation infrastructure, including roads, bikeways, sidewalks, and pathways. • Maintain, improve, and manage our major roadways, bikeways, sidewalks, and pathways • Maintain, improve, and manage our local roadways, bikeways, sidewalks, and pathways	26.5%	$87.87 M
4. Reduce school related congestion and provide safer access to schools. • Maintain and expand the Safe Routes to Schools Program • Provide crossing guards at key intersections • Provide capital funding for Safe Pathways to School projects	11.0%	$36.48 M
TOTAL	**100%**	**$331.6 M**

[83] Marin County Transportation Sales Tax Expenditure Plan, Approved Final Plan, May 6, 2004
http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=279

<u>Measure B (2010)</u> - a 10-year $10 vehicle registration fee generating about $2 million per year. The ballot measure ("Marin County Transportation Improvement Measure") stated:

> "To help reduce traffic congestion, maintain roads, improve safety, and reduce air pollution by: maintaining local and residential streets and pathways; funding transportation options for seniors and disabled persons; funding local pothole repair; providing school crossing guards and providing safe access to schools; and, reducing commute trip congestion and supporting a cleaner environment."[84]

Measure B - Expenditure Plan[85]

1. Maintain local streets and pathways.	40%
2. Improve transit for seniors and people with disabilities.	35%
3. Reduce commute trip congestion and pollution.	25%

[84] http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=4265

[85] Transportation Authority of Marin, Marin County Vehicle Registration Fee Expenditure Plan, Figure 1, August 2010, http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=4258

APPENDIX B - The Alphabet Soup of Transportation Planning, Funding and Implementation

Background

Federal, state, regional and local governments fund, build and manage transportation networks. Metropolitan Planning Organizations (MPOs), Regional Transportation Planning Agencies (RTPAs) and local governments collaborate with federal and state agencies to meet transportation mandates. In California, Federal[86] and State[87] law established a set of 18 MPOs (for cities with populations greater than 50,000) and 26 RTPAs (for areas with populations less than 50,000 people).

These agencies develop 20-year regional transportation plans and five-year regional transportation improvement programs and are responsible for planning, coordinating and administering Federal, State and local transportation funds. Each agency is responsible for developing an overall work program (an annual document), a regional transportation plan (a 20-year planning and programming document), and a regional transportation improvement program (a 5-year financial document) that is included in Caltrans' State Transportation Improvement Program. The Regional Transportation Plan (RTP), also called a Metropolitan Transportation Plan (MTP) or Long-Range Transportation Plan is the mechanism used in California by both MPOs and RTPAs to conduct long-range (minimum of 20 years) planning in their regions. Countywide Transportation Plans (CTPs) provide a link between regional and county planning initiatives. Only MPOs are eligible for Federal Transportation Planning funds, and any transportation project, including pedestrian and bicycle facilities, that is not in an agency's transportation plans is at a disadvantage for funding.

Metropolitan Transportation Commission (MTC)

Marin's Federally designated MPO is the regional Metropolitan Transportation Commission (MTC), originally created as an RTPA under the Metropolitan Transportation Commission Act by the California Legislature in 1970[88]. MTC is responsible for a long-range integrated transportation and land-use/housing strategy for the greater San Francisco Bay Area. The next *Plan Bay Area* (available for comment in draft form)[89] sets goals through 2040. MTC administers State funds provided through the Transportation Development Act (TDA) and State Transportation Improvement Program (STIP). MTC also administers Federal funding through numerous programs, such as the Transportation for Livable Communities (TLC) Program, and, acting as the Bay Area Toll Authority (BATA), MTC oversees administration of toll revenue collected on the seven State-owned bridges in the Bay Area.

[86] Title 23 United States Code Section 134
[87] CA Government Code Section 29532 et. seq.
[88] CA Government Code Section 66500-66536.2
[89] http://planbayarea.org/plan-bay-area.html

APPENDIX B - The Alphabet Soup of Transportation Planning, Funding and Implementation (continued)

MTC determines a set of goals for our regional transportation system. Projects are evaluated for how well they meet these goals and are then prioritized for funding. MTC's goals in the current RTP are:

- Climate Protection
- Adequate Housing
- Healthy and Safe Communities
- Open Space & Agricultural Preservation
- Equitable Access
- Economic Vitality
- Transportation System Effectiveness
- Infrastructure Security

The MTC is composed of 21 commissioners. Marin is represented by a single commissioner (currently Steve Kinsey) appointed by the Marin County Board of Supervisors.

Transportation Authority of Marin (TAM)

Under each regional commission are local Congestion Management Agencies (CMAs). CMAs are countywide bodies (funded by the State gas tax and any local measures) that are charged with keeping traffic levels manageable. Under the nine-county MTC, our Marin County CMA is the Transportation Authority of Marin (TAM). Each CMA is responsible for a local *Congestion Management Program* (CMP) to be regularly updated with short-range plans aimed at achieving goals set by the RTP. A Metropolitan Transportation System (MTS) was defined by the MTC in the last *Plan Bay Area* adopted in 2013,[90] intended to facilitate cross-county consistency with broader regional goals. Transportation projects undertaken by local jurisdictions (e.g. TAM) must conform to CMP and MTS requirements to receive funding from State or Federal programs. As the transportation tax authority for Marin County, TAM also administers funds from Measures A and B. The TAM Board of Commissioners includes the 5 County Supervisors plus representatives from each of the 11 cities and towns in Marin.

Marin Transit

"Marin County Transit District (Marin Transit) was formed by a vote of the people of Marin County in 1964 and was given the responsibility for providing local transit service within Marin County. Marin Transit contracts with other providers, including Golden Gate Transit, Marin Airporter, MV Transportation and Whistlestop Transportation, for local bus and paratransit services. Marin Transit pays for services using Measure A Funds, State Transportation Development Act Funds, fares, property taxes and Federal Section 5311 rural transit funds."[91]

[90] Plan Bay Area, Strategy For A Sustainable Region, July, 2013, http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf
[91] http://www.marintransit.org/about.html

APPENDIX B - The Alphabet Soup of Transportation Planning, Funding and Implementation (continued)

Marin Transit is directed by a seven member Transit District policy board. The Transit District Board includes elected representatives from the County Board of Supervisors (all five districts), two city representatives, and an alternate city representative. City representatives are appointed by the Marin County Council of Mayors and Councilmembers (MCCMC) to two year terms

Though many of the functions assigned to Marin Transit are funded from distinct designated sources, the sources of the FY 2015/16 operating budget revenue of $29.7 million are:

Measure A Sales Tax	38%
Measure B Vehicle License Fee	3%
Property Tax	12%
State Transit Development Act	15%
State Transit Assistance	5%
Federal Transit Administration	4%
Fare Revenue	14%
Other Agency Reimbursements	8%
Advertising and other	1%
TOTAL	**100%**

California Environmental Quality Act (CEQA) Environmental Impact Report

A separate layer of regulation comes from CEQA regulations. These include the requirements for Environmental Impact Reports:[92]

> "An environmental impact report is an informational document which, when its preparation is required by this division, shall be considered by every public agency prior to its approval or disapproval of a project. The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."

[92] 2016 California Environmental Quality Act (CEQA) Statute and Guidelines(328 pages), Section 21061 Environmental Impact report, January 1, 2016
http://resources.ca.gov/ceqa/docs/2016_CEQA_Statutes_and_Guidelines.pdf

APPENDIX B - The Alphabet Soup of Transportation Planning, Funding and Implementation (continued)

There has been a shift from impact of traffic delay to impact on emissions. In particular, Senate Bill 732 (Steinberg, 2013) established:[93]

> "...revisions to the guidelines adopted pursuant to Section 21083 establishing criteria for determining the significance of transportation impacts of projects within transit priority areas. Those criteria shall promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses."

The Executive Summary notes that:[94]

> "Currently, environmental review of transportation impacts focuses on the delay that vehicles experience at intersections and on roadway segments. That delay is often measured using a metric known as 'level of service' or LOS. Mitigation for increased delay often involves increasing capacity (i.e. the width of a roadway or size of an intersection), which may increase auto use and emissions and discourage alternative forms of transportation. Under SB 743, the focus of transportation analysis will shift from driver delay to reduction of greenhouse gas emissions, creation of multimodal networks and promotion of a mix of land uses."

[93] http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743

[94] https://www.opr.ca.gov/docs/Final_Preliminary_Discussion_Draft_of_Updates_Implementing_SB_743_080614.pdf

APPENDIX C - Marin's Key Roadway Network

As required by State law (the *Transportation Blueprint for the 21st Century* approved by the voters in 1990) ,[95] the Marin Congestion Management Program (CMP) designated a key roadway network and segments in 1991. Performance of this network is required to be monitored by the County for Level of Service (LOS), so that network performance and the impacts of proposed projects on subsequent results can be measured. LOS is defined by roadway conditions in terms of traffic speed, travel times, volume and interruptions, as well as ease of maneuverability, comfort, convenience and safety. LOS is graded according to State standards in levels from A to F. For instance, arterial segments with traffic speeds of 7-10 mph would be graded E; speeds less than 7 mph would get an F. Every two years TAM is required to measure LOS on the defined network segments, determine whether they are conforming to State LOS standards, and update the CMP. CMP arterial segments are expected to achieve an LOS grade of at least D. Marin's CMP was last updated in 2015.[96]

Marin's CMP network comprises 10 freeway segments and 17 local arterial segments:

- Freeway segments include Marin portions of SR 1, SR 37, SR 131 and US Hwy 101.
- Principal local arterials include the following segments:
  - Novato Blvd = 3 segments,
  - Bel Marin Keys Blvd = 1 segment
  - Bridgeway/2nd St/Alexander Ave in Sausalito = 3 segments
  - Red Hill Ave/2nd St/3rd St in San Anselmo and San Rafael = 4 segments
  - SFDB in unincorporated parts of the County, parts of Fairfax, San Anselmo, Ross, Kentfield and Larkspur = 5 segments

Segments that operated in 1991 at a LOS score lower than the minimum standard set then (E for freeways; D for arterials) were "grandfathered" (i.e. not required to improve their LOS score over subsequent years). In Marin there are 3 such arterial segments on SFDB, 2 of which are in the SFDB Project.

[95] California Statute GOVERNMENT CODE SECTION 65070-65074 http://www.leginfo.ca.gov/cgi-bin/displaycode?section=gov&group=65001-66000&file=65070-65074

[96] Final Report 2015 CMP Update, Marin County, September 2015, http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=9126

APPENDIX D - Public Meetings and Project Details

- The initial public meeting introduced the project goals:[97] Repair pavement
- Close sidewalk gaps and improve pedestrian safety
- Improve traffic flow and reduce congestion
- Improve transit access
- Improve bicycle access and safety

A review of existing conditions highlighted:

- High concentration of residential neighborhoods, retail shopping, schools and the hospital
- Gaps in pedestrian and bicycle access
- Long pedestrian crossings and lack of safe refuges
- Poor bus stop locations,
- Poor intersection traffic phasing
- Existing vegetation and trees that will require attention
- Environmentally sensitive areas

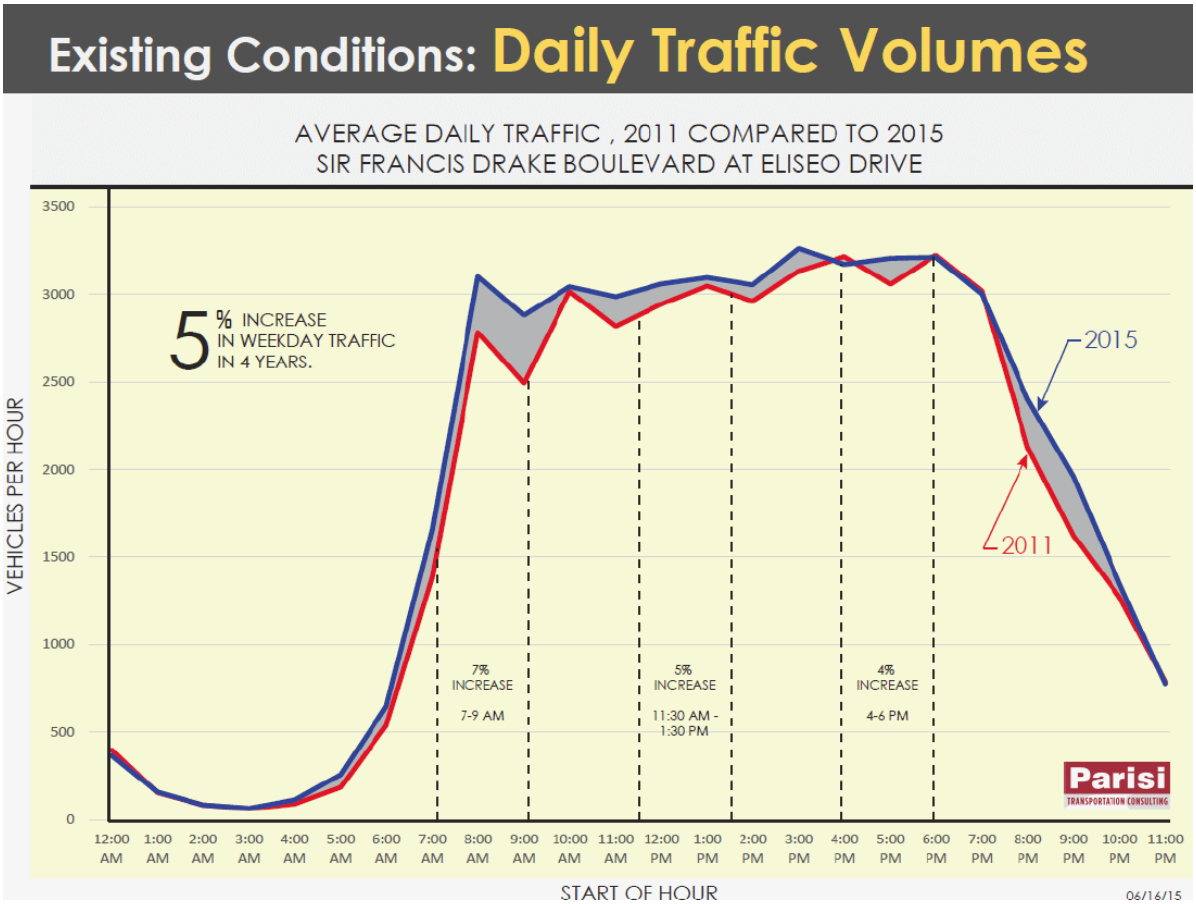
The review also included:

- Collision history by location and type
- Key routes to school
- Bicycle and pedestrian facilities
- Parking,
- Actual vehicle speeds by location at peak hours
- Bus stops

The review went on to show street layouts, including median and lane widths which vary significantly along the route as well as the pavement condition varying from poor (west of College Avenue) to fair (College Avenue to the Hwy 101 interchange). The right-of-way varies from 60 feet west of College Avenue to 110 feet east of College Avenue . There are two travel lanes west of College Avenue and four travel lanes east of College Avenue to Hwy 101. Travel lanes vary between 12 feet and 15 feet.

[97] Sir Francis Drake Boulevard Corridor Rehabilitation Community Meeting May 2, 2015 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/2015_05_02_community_meeting.pdf?la=en

APPENDIX D - Public Meetings and Project Details (continued)



The traffic volume increased only 5% from 2011 to 2015, but as the number of vehicles per hour approached and reached the maximum capacity of the roadway, traffic delay seemed to increase much more dramatically. Total traffic through this part of SFDB is now about 50,000 vehicles per day with 93% of that being automobiles or pickups, 5% trucks, 1% buses, 1% motorcycles and bicycles.[98] And as the above graph[99] shows, the traffic volume remains very high throughout the day.

The presentation described over a dozen types of changes that could be made with an *unlimited* budget and *unlimited* right-of-way. There was no discussion of the relative costs and benefits, nor which conditions might inevitably conflict with one another.

[98] Sir Francis Drake Boulevard Corridor Rehabilitation Community Meeting May 2, 2015 (page 28 of 67) http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/20151118_communitymeeting2.pdf?la=en

[99] Sir Francis Drake Corridor Rehabilitation Community Meeting presentation, November 18,2015 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/20151118_communitymeeting2.pdf?la=en

APPENDIX D - Public Meetings and Project Details (continued)

The workshop then went on to invite participant input at a variety of stations displaying individual sections of SFDB. Feedback from this activity was later summarized[100] and incorporated into plan revisions with the following indicated priorities:

1. Improve traffic flow & reduce congestion
2. Enhance crosswalks & reduce crossing distance
3. Improve sidewalks & address missing segments
4. Improve bicycle access
5. Corridor beautification
6. Improve bus stops

The group did not favor building bike lanes nor encouraging bike traffic along SFDB because of the high amount of vehicular traffic on this street. Also, there was consensus that increasing pedestrian safety and facilitating safe routes to school should be a high priority.

The latest information on priorities and potential improvements was provided at the third Community Meeting on March 15, 2016.[101]

The summary of priorities from previous community meetings were:

1. Reduce vehicle congestion.
2. Improve safety of children going to school.
3. On street bicycle access along SFDB is not a priority but there is a need to reinforce linkages to key alternative routes.

Additional priorities gathered at well-attended walking tours of SFDB were:

1. Intersection modifications should not reduce vehicle capacity.
2. As children can and will bicycle on the sidewalk, provide the widest accommodation possible.
3. "Guardrails" may not be necessary, but providing a fence to guide children on their walk to school is important.

The project team presented a number of design strategies to address the priorities. An estimated cost was assigned to each strategy. The total cost of all strategies was $18M compared to a budget of $13.2M, so not all of this can be accomplished. These included items for congestion relief and pedestrian safety (see the presentation for intersection details):

- Reduce congestion by providing 0.7 mile third eastbound traffic lane from El Portal to Hwy 101.
- Increase intersection throughput by enabling simultaneous left turns.

[100] Op. cit. Sir Francis Drake Corridor Rehabilitation Community Meeting presentation, November 18,2015

[101] Sir Francis Drake Corridor Rehabilitation Community Meeting presentation, March 15, 2016 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/sfd_20160315_communitymeeting3.pdf?la=en

APPENDIX D - Public Meetings and Project Details (continued)

- Provide standard lane widths to encourage better speed compliance and allow other improvements (including shortened crosswalks to increase green light time and greater turn lane capacity).
- Increase "green" light time for SFDB by reducing pedestrian crossing distances.
- Improve sight lines for motorists.
- Plan for future adaptive and responsive traffic signal control.

Items included for pedestrian safety and encouraging safe routes to schools include:

- Close gaps in sidewalk.
- Widen sidewalks to accommodate juvenile bike riders.
- Modify intersections to reduce crossing distance and increase pedestrian capacity.
- Convert high speed "slip lanes" into standard right turn lanes to improve safety while maintaining vehicle capacity.
- Add barrier between traffic and sidewalks.
- Meet ADA standards by adding a surface crosswalk in addition to the overpass at the Wolfe Grade intersection.

APPENDIX E - Evaluation of 11-Foot Lane Widths

Critics have charged that the 11-foot lane widths being proposed in the SFDB Project will cause accidents and increase congestion due to slower speeds than if the 12 or more feet current lane widths were maintained.

Investigation by the Grand Jury revealed several facts that support the proposed lane width change to 11 feet with wider outside lanes as a necessary compromise to reduce crosswalk width and increase SFDB green time. The first is that there are well known instances of 10 or 11 feet on highly traveled, high capacity roads with posted speeds in excess of the 40 mph maximum on SFDB. These include the recently redesigned Golden Gate Bridge[102] (10-foot inside and 11-foot outside lanes), Presidio Parkway (11-foot interior and 12-foot outside lanes)[103] and Hwy 101 just north of North San Pedro Road. Furthermore there is substantial literature that indicates that decreasing lane width from 12 feet to 11 feet does not lead to increased accidents.[104,105,106] There is sparse, but well researched, data on the effect of reduced lane width to 11 feet on traffic speed with some indication of a one or two mph decrease on high speed expressways with other findings of no statistically significant decrease. Any slight decrease in speed should be somewhat offset by increased traffic light green time due to shorter crosswalks, and, in any event, "travel times would not be impacted since the signalized intersections govern the progression of vehicles down the corridor and are synchronized to optimize the flow of traffic".[107]

The Grand Jury investigated the claim that the 11-foot lanes meet current standards. A DPW representative indicated that standard guidance comes from several sources. The California Highway Design Manual (Topic 308)[108] indicates the American Association of State Highway and Transportation Officials policy on the *Design of Highways and Streets* is applicable. It notes that, "Although lane widths of 12 feet are desirable on both rural and urban facilities, there are circumstances where lanes less than 12 feet wide should be used. In urban areas where pedestrian crossings, right of way, or existing development become stringent controls, the use of 11-foot lanes is acceptable." In addition, Caltrans has issued a design flexibility memo and adopted the NACTO (National Association of City Transportation Officials) standards for use on local roads. The NACTO guidance is for 11 feet or less.[109]

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[102] Golden Gate Bridge, Vehicle restrictions, http://goldengatebridge.org/tolls_traffic/vehiclerestrictions.php

[103] Presidio Parkway, Safer Roadway, http://www.presidioparkway.org/features/safer_roadway.aspx

[104] Relationship of Lane Width to Safety for Urban and Suburban Arterials, Potts, Harwood and Richard, TRB annual meeting, 2007 http://www.smartgrowthamerica.org/documents/cs/resources/lanewidth-safety.pdf

[105] The Influence of Lane Widths on Safety and Capacity: A Summary of the Latest Findings Theodore Petritsch, P.E. PTOE Director of Transportation Services Sprinkle Consulting http://nacto.org/docs/usdg/lane_widths_on_safety_and_capacity_petritsch.pdf

[106] Federal Highway Safety Administration, Lane Width http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_lanewidth.cfm

[107] Communication from Marin County Department of Public Works representative

[108] California Highway Design Manual, Chapter 300, December 30, 2015 http://www.dot.ca.gov/hq/oppd/hdm/pdf/english/chp0300.pdf

[109] National Association of City transportation Officials, Urban Street Design, Lane width http://nacto.org/publication/urban-street-design-guide/street-design-elements/lane-width/

APPENDIX F - Traffic Signal Light Choices and Benefits

Along SFDB in the vicinity of the Project there are 12 **coordinated traffic signals**. They are currently synchronized to promote smooth free-flow traffic in the most congested directions and times, with individual signal timing appropriate to each intersection and current traffic volumes. Video cameras above the intersections are aimed and programmed to detect and allocate "green times" for vehicles traveling along SFDB, as well as cars/trucks or bicycles waiting at cross streets and to adjust the green/red interval accordingly. These signal programs were last optimized in 2012[110]. The project did before and after measurements and projections of elapsed time to travel the route, average speed, fuel used, CO_2 emissions, toxic gas emissions, and from that estimated fuel costs, and cost of time lost. Pre- and post-implementation measurements of corridor travel times were recorded for east- and westbound directions at several hours across the day. While not enough measurements were taken for statistical confidence, the "after" report stated that travel times were observed to decrease by 9 to 16%. The full cost benefit analysis is shown in the accompanying report. Tuning is again due and scheduled for shortly after the Project is completed in order to take into account the proposed intersection capacity and efficiency improvements and the prevailing traffic volumes.

Adaptive signal control is a more advanced technology. It both has many more sensors and more advanced controllers that can dynamically select among available programs according to the current traffic situation, rather than depending on scheduled settings. A full system is estimated to cost $3-4 million, but would be likely to provide only slight benefit over the control system in place.[111] For congested periods since similar signal timing programs would run under either system; an adaptive system would be most effective during non-congested periods, and just before and after peak conditions. For maximum reliability of signal-to-signal communication, underground fiber optic cable is preferred. The current Project includes a plan to install conduits during construction that could later be used for fiber optic cables supporting adaptive signal technology

The Grand Jury believes that coordinated signaling has moderate cost and provides much of the benefit that more advanced systems can provide.

[110] Metropolitan Transportation Commission Program for Arterial System Synchronization (PASS) for Sir Francis Drake Boulevard, Final Project Report with Benefit/Cost Analysis, Prepared by TJKM Transportation for Marin County, City of Larkspur and Caltrans, July 20, 2012, Appendix F page 252 of 253 http://www.marincounty.org/~/media/files/departments/pw/transportation/proj_sfdb/pass--final-project-73112-2rossll.pdf?la=en

[111] Grand Jury interview

APPENDIX F - Traffic Signal Light Choices and Benefits (continued)

Metropolitan Transportation Commission

Program for Arterial System Synchronization (PASS) - 2011/12 Cycle

Measures of Effectiveness and Benefit-Cost Analysis

Project Title:	Marin County - PASS 2011/12		
Project Corridors:	Sir Francis Drake Boulevard		
Project Stakeholders:	Marin County, City of Larkspur, Caltrans; MTC		
Total # of Project Signals:	12	# of Caltrans Signals:	2
Local Agency Contact:	Amanuel Haile, ahaile@co.marin.ca.us, 415-499-7137		
Consultant Contact:	Joy Bhattacharya & Tony Chu, TJKM, jbhattacharya@tjkm.com, 925-463-0611		
MTC Contact:	Vamsi Tabjulu; vtabjulu@mtc.ca.gov; 510-817-5936		

Costs	
Consultant Costs (Basic Weekday Peak Period Signal Coordination)	$33,150
Consultant Costs (Additional Plans, TSP, IM Flush Plans, etc.)	$0
Other Project Costs (Traffic Signal Controller Upgrade Evaluation & GPS Clocks)	$2,485
Agency Staff Costs (Local agency, MTC, Caltrans, etc.)[8]	$8,288
Total Costs	**$43,923**

Benefits				
Measures	***Annual Average***		***Lifetime (5 Years)*** [7]	
	Savings	*Monetized Savings*	*Savings*	*Monetized Savings*
Travel Time Savings (hrs)	22,143	$396,709	110,714	$1,983,543
Fuel Consumption Savings (gal)	79,678	$301,886	398,390	$1,509,432
ROG Emissions Reduction (tons)	0.49	$610	2.47	$3,048
NOx Emissions Reduction (tons)	0.58	$10,243	2.90	$51,217
PM10x Emissions Reduction (tons)	0.10	$14,178	0.50	$70,890
CO Emissions Reduction (tons)	3.55	$269	17.74	$1,344
			Total Lifetime Benefits	**$3,619,473**

Overall Project Benefits	***Auto***
Average Decrease in Travel Time	**11%**
Average Speed Increase	**13%**
Average Fuel Savings	**9%**

Benefit/Cost Ratio	**82 :1**

Notes:

1. General methodology, fuel consumption factors, and health costs of motor vehicle emissions based on California Department of Transportation, Office of Transportation Economics. California Life-Cycle Benefit/Cost Analysis Model and Technical Supplement to the User's Guide, 2009.

2. Benefits claimed include travel time savings, fuel consumption savings, and health cost savings associated with emissions reductions for the coordinated peak periods indicated above. Yearly savings calculated based on 250 days of workdays in a year.

3. Value of time assumed to be 50 percent of the wage rate for off-the-clock travel or $17.92 in 2011 constant dollars. Bay Area average wage rate is $20.82 per hour in 1990 constant dollars, based on Travel Demand Models for the San Francisco Bay Area [BAYCAST-90] Technical Summary, Table 4, p. 28, June 1997. Adjusted for inflation using CPI, from US Dept of Labor, Bureau of Labor Statistics, CPI - All Urban Consumers, San Francisco-Oakland-San Jose, CA area, All Items, Not Seasonally Adjusted (Series Id:CUURA422SA0). Vehicle fleet assumed to be 100 percent automobiles.

4. Average vehicle occupancy assumed to be 1.118 persons per vehicle and is used in calculating travel-time savings in autos only. This is based on the San Francisco Bay Area Baycast Travel Model run for the RTP 2009 (using the 2010 network) developed by the Metropolitan Transportation Commission.

5. Average fuel cost is from US Dept of Labor Bureau of Labor Statistics, CPI - Average Price Data, San Francisco-Oakland-San Jose, CA area, Gasoline unleaded regular per gallon. Average of monthly prices in the Bay Area from January 2011 – December 2011 is $3.789.

6. Health cost of ROG Emissions ($1,234 per ton), NOx Emissions ($17,644 per ton), PM10x Emissions ($142,655 per ton), and CO Emissions ($76 per ton) are based on the California Department of Transportation, Office of Transportation Economics from Exhibit III-41, p. III-64 of the year 2007. The 2011 costs are calculated with a standard assumption of 2% increase per year from the 2007 costs.

7. Project life assumed to be five years. Benefits assumed to be 100 percent on first day after implementation, declining steadily to zero by end of the fourth year. Benefits equivalent to sum of discounted average annual benefits, where averages are 90% of First Year for year 0, 70% for year 1, 50% for year 2, 30% for year 3, and 10% for year 4.

8. All public agencies involved staff costs assumed to be 25% of the project consultant costs.

APPENDIX G - Ramp Metering for Hwy 101

In January 2014 MTC released the *Marin US 101 Northbound Preliminary Ramp Metering Assessment*.[112] The purpose of this study was to perform a high-level ramp metering feasibility assessment at eight northbound on-ramps along the Marin US 101 Highway. This assessment was based on a previous, more detailed evaluation of a longer section of the corridor conducted in March 2013. The main conclusions from this preliminary assessment included the following:

- Predicted 24% decrease in travel time from Marin City to Bellam Boulevard/I-580 off ramp (6.4 miles) between the hours of 5:00 and 6:00 p.m.
- A ramp metering strategy is feasible with the proposed ramp widening.
- The assumed on-ramp storage is sufficient to accommodate all vehicle queues.
- Backup on feeder streets will be prevented by sensors detecting ramp overflow and triggering the release of the held traffic.
- Travel times would decrease through the study segment during the most congested period.
- All on-ramps in the demand area will be metered, reducing any advantage for early exiting drivers.
- Ramp metering rates will be refined before implementation.

In November 2014, TAM hosted an information workshop to review the ongoing efforts to implement ramp metering in Marin. A Caltrans presentation at that workshop indicated that Phase I, from Golden Gate Bridge to Sir Francis Drake Blvd. (NB only) was in design and would be constructed by early 2016.[113]

In July 2015, the report *Existing Travel Conditions Along Key Corridors Prior to Northbound US 101 Ramp Metering* was prepared for TAM by Parisi Transportation Consulting.[114] This report calculated "before ramp metering" baseline travel times using existing travel conditions, travel speeds, vehicle queues, on-ramp service rates and vehicle collisions. Several local jurisdictions have expressed concern to TAM as to whether or not ramp metering will improve existing traffic conditions. Caltrans and MTC recognized funds are limited and recommended the project be implemented in phases. The first phase will consist of metering northbound Hwy 101 ramps from the Golden Gate Bridge to SFDB. That study presents data collected within its corridor to establish the baseline of existing weekday and Saturday peak hour traffic conditions along three specific roadways: Bridgeway, East Blithedale Avenue/Tiburon Boulevard, and Tamalpais Drive.

[112] Marin US 101 Northbound Preliminary Ramp Metering Assessment, Kittelson & Associates, Inc. ,January 2014 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=7884

[113] Ramp Metering Background and Informational Presentation, Transportation Authority of Marin Board Meeting October 23, 2014 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=7883

[114] Ramp Metering Update, (Informational), Agenda Item 9, Dianne Steinhauser, Executive Director, TAM, September 8, 2014 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=7623

APPENDIX H - Multi-Use Pathways Hwy 101 Traffic Diversion

Pedestrian-bicycle multi-use pathways continue to be justified as inducements for people to walk or bike rather than take automobiles to meet their transportation needs. If this were true, especially during the traffic peak hours, the pathways would reduce roadway congestion. But do we see such impact for the high cost pathways constructed along Hwy 101 in Marin?

Fortunately, TAM sponsors transportation flow monitoring,[115] including pedestrian and bicycle traffic. In 2014 monitoring, pedestrian and bicycle counts for key commute hours were 58 users during the two hour peak at the Lincoln Avenue-Puerto Suello Hill pathway and 56 for the Cal Park Tunnel. In comparison, 2014 Caltrans Traffic Volume Data for Hwy 101 at these same locations at North San Pedro Road near the Lincoln Avenue-Puerto Suello Hill pathway measured 16,500 vehicles per hour and at Sir Francis Drake 14,500 vehicles per hour.[116] These pathways are not diverting significant people from using Highway 101.

There are only estimates of the usage of the Central Marin Ferry Connector. According to TAM, 20 pedestrians and 145 bicyclists are projected to use the Connector in the two hour a.m. peak period.[117] This is an increase of only 115 over the numbers using the same route in 2013. So, using the same data and even assuming no increase in traffic on Hwy 101, the predicted diversion from automobiles is only expected to be 0.4%. No estimates of diverted automobile traffic could be found for the $19.8M *North South Greenway Project* nor for the *Alto Tunnel Project* (between Mill Valley and Corte Madera) $40M-$50M project.

[115] 2014 Transportation System Monitoring And 2015 CMP Update, Marin County, September 14, 2015, page 33, http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=8811

[116] 2014 Traffic Volumes on California State Highways, Caltrans http://www.dot.ca.gov/trafficops/census/docs/2014_aadt_volumes.pdf

[117] Central Marin Ferry Connection Project Use Projections and Benefit Assessment, Transportation Authority of Marin, Table 3 and Table 5 November 15, 2013 http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=6842