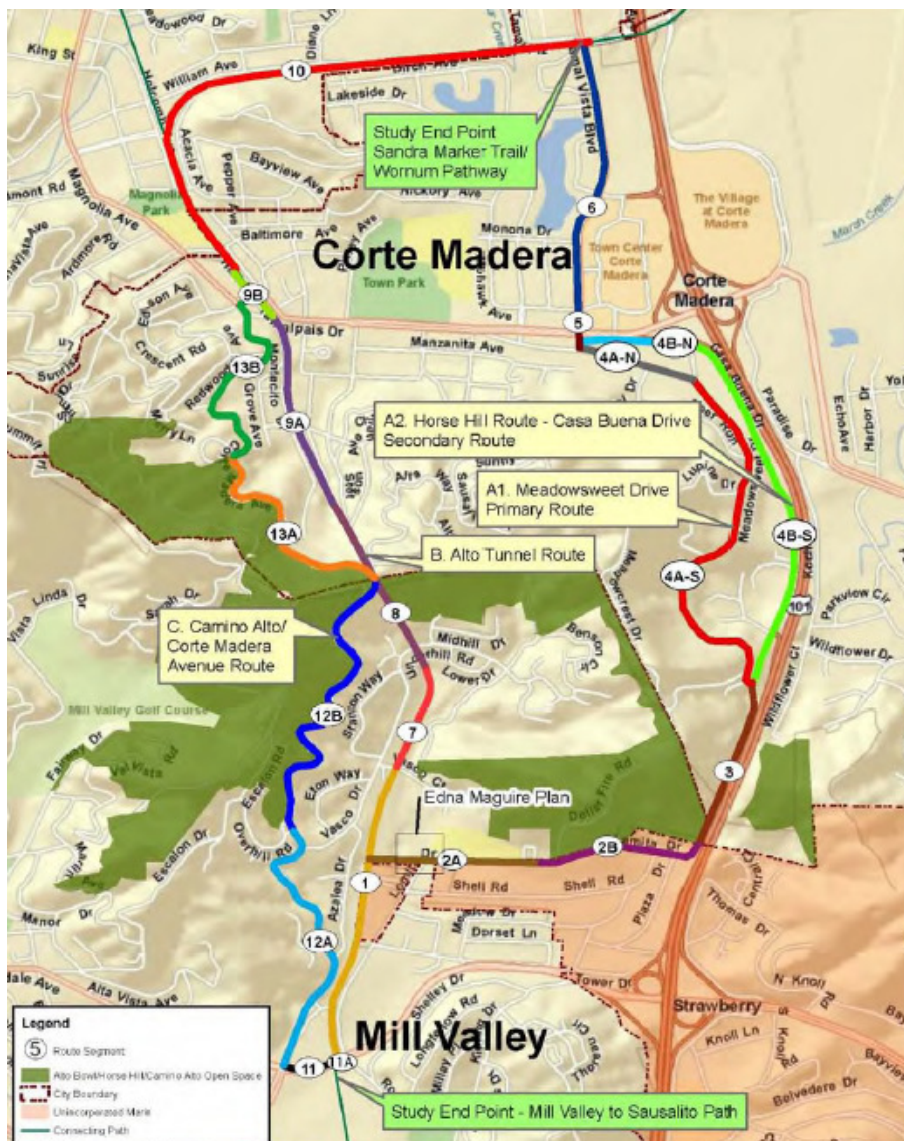




# Closing the Safety Gap: Response from the Marin County Bicycle Coalition

to the Mill Valley to Corte Madera  
Bicycle and Pedestrian Corridor Study

Submitted January 26, 2010







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Marin County Board of Supervisors  
c/o Ms. Carey Lando, Senior Transportation Planner  
[clando@co.marin.ca.us](mailto:clando@co.marin.ca.us)  
County of Marin  
3501 Civic Center Drive  
San Rafael, CA 94903

**Re: Comments on the December 2009 administrative draft Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study**

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*Safe Routes Instructor*

Dear Marin County Board of Supervisors and Ms. Lando:

The Marin County Bicycle Coalition (MCBC) is writing to provide this 64 page Report with six additional appendices as public comment in response to the December 2009 Administrative Draft for the Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study (the Study).

The stated purpose of the Study is, "to provide useful information for future discussions and decisions" on the three routes that were studied for their feasibility in improving bicycle and pedestrian access between Mill Valley and Corte Madera: Horse Hill, the Alto Tunnel and Camino Alto. MCBC appreciates that the County of Marin appropriated funding to conduct this \$225,000 Study, and we're grateful for the County's commitment to improving non-motorized transportation.

While the consultant-prepared Study provides an initial first step, it unfortunately falls short of achieving the County's goals. The next draft will require substantial revisions, and additional research and documentation, especially in the sections related to projected use and costs. The Marin County Bicycle Coalition has numerous concerns that are detailed in our attached Report some of which include:

1. The "use methodology" for each alternative does not take into account latent facility demand or best-practice methodologies for forecasting the use of bicycle and pedestrian facilities.
2. The cost section of the Study does not include narratives to accompany the budgets, shows several different cost numbers for Alto Tunnel, and doesn't use consistent contingency figures for each route.
3. The Study fails to adequately address the potential for the Alto Tunnel to further collapse if it is not repaired, and how this could create major damages to homes, roadways and utilities.

4. The Study analysis fails to analyze several critical issues including emergency egress, health, the cost of roadway collisions, and more.

Since part of the stated scope of the Study is to facilitate meaningful public participation, MCBC respectfully requests that the Study's Technical Advisory Committee (which currently includes the County of Marin, the City of Mill Valley, the Town of Corte Madera, and the Transportation Authority of Marin) be expanded to also include the Marin County Bicycle Coalition, Transportation Alternatives for Marin, and stakeholder neighbors from Mill Valley and Corte Madera.

In the spirit of public process for this high profile project, we also request that a draft of the revised Study be brought before the Board of Supervisors for a public hearing before the final Study is adopted. As changes might occur at that hearing, we recommend bringing forward the revised Study draft at a meeting by early July 2010, to allow enough time for the consultants to revise the Study before the July 31, 2010 deadline. We recommend that the revised Study draft be released at least 30 days before the scheduled Board of Supervisors hearing to allow ample time for analysis.

We are grateful that the County of Marin created ambitious goals in its 2007 Countywide Plan update related to improved bicycle and pedestrian transportation, health, and reductions in greenhouse gas emissions, and that the County of Marin is one of only four communities with the honor of participating in the federal Nonmotorized Transportation Pilot Program (NTPP). It is critical that the County of Marin take the opportunity to ask its consultants to revise the Study so that policy makers will have the necessary data to determine the best ways to complete Marin's bike/ped network to fulfill the goals of the NTPP without additional studies. The County should get its \$225,000 "money's worth" from the consultants it hired for this important task.

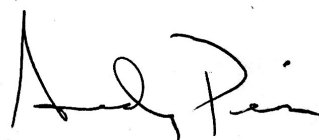
Finally, the MCBC's Report includes a section on "Next Steps". In addition to having the consultant answer all of the underlined questions and requests included throughout our Report, we respectfully recommend that the County of Marin allocate additional Pilot Program funding to conduct preliminary engineering and an environmental assessment of all three routes.

Thank you for your careful consideration of our comments in the attached Report. The MCBC looks forward to continuing to assist the County of Marin in making Marin County a model bicycle and pedestrian community for the nation, as this will improve public health, reduce traffic, increase safety, decrease greenhouse gas emissions, and benefit communities, residents, and the economy throughout Marin.

Sincerely,



Deb Hubsmith  
Advocacy Director



Andy Peri  
Advocacy and Outreach Coordinator

# **Closing the Safety Gap: Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study**

***Response from the Marin County Bicycle Coalition  
Submitted January 26, 2010***

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## **Appendices**

- Appendix A- Alta/Land People Evaluation Matrix from the Study
- Appendix B- Promoting Safe Walking and Bicycling to Improve Public Health
- Appendix C- Forecasting Pedestrian and Bicycle Demands
- Appendix D- Tunnels on Trails Report
- Appendix E- Funding Sources for Bicycle and Pedestrian Projects
- Appendix F- Over and Under- A Practical Guide to the Condemnation of Aerial Guideway Easements and Tunnel Easements



# **1. Goals of the Nonmotorized Transportation Pilot Program and this Study**

To begin our comments on the *Administrative Draft for the Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study* (the Study), the Marin County Bicycle Coalition will review the stated purposes of the funding source for this \$225,000 study, the Nonmotorized Transportation Pilot Program, and of the Study itself.

## ***Nonmotorized Transportation Pilot Program Purpose***

In August of 2005, Congress passed the Safe, Accountable, Flexible, Efficient Surface Transportation Act: A Legacy for Users (SAFETEA-LU), the \$286.5 billion five-year federal transportation bill. Included within SAFETEA-LU was section 1807, the Nonmotorized Transportation Pilot Program (the Pilot Program).

The goal of this program is to demonstrate how improvements to walking and bicycling can increase mode share for these modes. Four communities (Columbia, MO, Marin County, CA, Minneapolis Area, MN, and Sheboygan County, WI) each received \$25 million to improve, plan and promote their walking and bicycling networks.

According to SAFETEA-LU, "The purpose of the program shall be 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."

To fulfill the purpose of the Pilot Program, the four communities meet every two weeks along with the Federal Highway Administration, the Volpe Institute, the Centers for Disease Control and Prevention, and the Rails-to-Trails Conservancy to coordinate efforts, program evaluation, and reports to Congress. The County of Marin is the agency that administers Marin County's Pilot Program; its official website for this purpose is [www.walkbikemarin.org](http://www.walkbikemarin.org).

## ***The Study Purpose***

Page 1-1 of the Study states in the first paragraph: "Marin County commissioned Alta/LandPeople to conduct a corridor study of three specific bicycle/pedestrian routes connecting the cities of Mill Valley and Corte Madera (the Study). The scope of the Study is to facilitate planning and public participation and conduct preliminary engineering and design work to identify the relative feasibility of each route. The Study does not include commitments to proceed – this would occur later through separate processes. The Study is intended to provide useful information for future discussions and decisions."

The Study Purpose currently does not express the fundamental Pilot Program purpose regarding mode share. Please include a mode share clause as per section 1807 of SAFETEA-LU as part of the stated purpose of this Study.

While the December 2009 draft of the Study is a start, it unfortunately, does not meet its intended purpose. To help fulfill the purpose of the Study and the goals of the Nonmotorized Transportation Pilot Program, the Marin County Bicycle Coalition is providing the County of Marin with this 64 page report and six Appendices. We believe that these documents will be useful to the County of Marin in directing the consultants on how to revise the Study draft to fulfill the Study goals.

As Alta/LandPeople's contract was extended by the Board of Supervisors on January 12, 2010 to conclude on July 31, 2010, the consultants now have ample time to write the substantial revision, which is needed. As recommended in our cover letter, we also request that the County of Marin expand the Technical Advisory Committee and schedule a public hearing on the revised Study before it is accepted by the Board of Supervisors.

## ***Conclusion***

The Mill Valley to Corte Madera gap closure represents a key component of Marin County's planned bicycle and pedestrian network. The County of Marin has spent \$225,000 on this Study to provide policy makers with the tools to make future decisions. However, at this point, the Study raises as many questions as it answers, and in many cases does not provide information about the methodologies used to draw conclusions.

To get its money's worth and to fulfill the purposes of the Pilot Program and the Study, the County of Marin should ask Alta/LandPeople to conduct a major revision of the Study and to address and answer all of the comments and questions raised in this Report prepared by the Marin County Bicycle Coalition.

## 2. Vision for Marin County's Future

Through its 2007 Countywide Plan Update (*Sustainable Marin: Nature, Built Environment and People*), the 2008 Bicycle and Pedestrian Master Plan, and additional policy decisions made by the Board of Supervisors, the County of Marin has put forward ambitious and worthy goals for creating a sustainable and healthy future and a reduced ecological footprint.

The foreword of the Countywide Plan Update states the following: “Although largely completed before the passage of California’s landmark environmental legislation, the Countywide Plan comprehensively addresses climate change and other sustainable development issues, in addition to all legally required topics. To our knowledge, it was the first local general plan in the nation to calculate its ecological footprint and substantively confront the climate change issue. The Plan also establishes the longer-term goal of reducing our footprint by at least half, to a level similar to that of Western European countries. Toward that end, the Plan was substantially reformatted to focus on nature, the built environment, and people.”

The Countywide Plan also includes a goal that 20% of trips in Marin County be made by walking or bicycling by the year 2020. The current trip percentage, measured by the Pilot Program in 2006 was 13.6%.

The purpose of the Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study is to provide solid evidence and factual information for enabling policy makers to make future decisions about building bicycle and pedestrian infrastructure between Mill Valley and Corte Madera, which represents one of the biggest non-motorized transportation gaps and safety hazards in all of Marin. MCBC looks forward to seeing the purpose of this Study realized in the revised version.

Bicycle and pedestrian infrastructure can provide a cornerstone for leading the County and its residents to co-create a more sustainable future. The very act of getting out of one’s car to walk or bicycle puts people in direct contact with nature, our neighbors, and the fact that our behaviors are directly connected to our own health and that of the ecosystem. As transportation represents 62% of greenhouse gas emissions in Marin County, there is huge potential to decrease our collective ecological footprint by planning and building bicycle and pedestrian infrastructure that will get a maximum number of people out of cars for short trips.

The Marin County Bicycle Coalition is grateful for the leadership that County policy makers are providing to improve the environment, health and safety, and looks forward to working with the County of Marin to fulfill the stated goals in the Countywide Plan update.

### 3. Executive Summary

## Marin County Bicycle Coalition's Report on the Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study

**1) The Purpose of the Study Has Not Been Met:** A primary goal of this Study was to develop comparable assessments of Horse Hill, Alto Tunnel and Camino Alto routes, so that the routes could be compared. Unfortunately, it is impossible to do this analysis as the Study does not have accurate cost estimates or use projections for the Alto Tunnel, and it lacks analysis of many important issues.

**2) More Information and Revisions are Needed:** The Marin County Bicycle Coalition believes that the following information must be clarified, included, and/or expanded upon in the Study. We have labeled these issues below to correspond with the papers we have included in chapter five of our Report.

**A) Collapse issues:** The Study lacks adequate information on the liability that the County may incur if the Alto Tunnel continues to collapse. The tunnel is degrading, and homes, roads and utilities above the tunnel could be seriously damaged if nothing is done to prevent this (either through re-constructing the tunnel or stabilizing it from further collapse). The Alto Tunnel has a history of tunnel collapse and resulting property damage. Appendix B of the Study only includes one sentence detailing the costs about this major concern, and the main Study does not provide details about the estimated cost of \$11.5 million to stabilize the tunnel.

**B) Alto Tunnel Costs are Inflated:** There are several reasons why MCBC believes the estimated \$40-\$52\* million projected costs for Alto Tunnel reflect inflated numbers, here are a few:

\* These revised costs were reported at the December 9, 2009 meeting slide presentation to correct errors in the existing draft Study.

1. To develop the costs for Alto Tunnel, the Study uses Cal Park Hill Tunnel costs as a "base unit" and then applies a multiplier for surface area (while Alto Tunnel is twice as long as Cal Park, it is narrower; the Alto Tunnel is only 30% larger in surface area). Using Cal Park as the base creates the initial flaw because Cal Park was designed to accommodate the SMART train, which required additional, costly features that won't be needed in Alto Tunnel.
2. A 40% contingency cost is then added to the already inflated base cost for most sections of the tunnel, when other routes

only display a 20% contingency. Plus, on top of this contingency, a 20% cost estimate accuracy allowance is added for Alto Tunnel, without any description or justification for this line item which is not included for the other routes.

3. Then non-construction costs (usually about 20-25% of total construction costs) are factored in at an additional 37% for Alto Tunnel.
4. Additionally, the cost estimate uses unit costs from the summer of 2008 (before the economic recession began). Current construction projects are being bid at up to 45% lower than engineer's estimates, but this is not factored into the Study, instead it adds additional inflation costs.

There is additional cause to raise questions on the Alto Tunnel cost estimates because the Study lists three different conflicting sets of costs for Alto Tunnel on pages 2-58, 4-2 and in Appendix B. In each of these sections more detail is needed to describe why cost estimates vary, and what the methodologies were for developing the cost estimates.

Further, in Appendix B on Page B1, the Tunnel Support and Rehabilitation Types listed in the table contain apparent errors and inconsistencies with Page 14 of that same Appendix. The Tunnel Support and Rehabilitation Types are mislabeled in the table making it unclear as to which costs are attributed to which sections of the tunnel.

**C) Number of Alto Users is Underestimated:** The Study seriously underestimates the number of people who will use Alto Tunnel. To project use, it examines the current number of people riding bicycles and walking on pathways on either side of the tunnel and then divides this number in half to estimate the number of people that would use the tunnel (the Study estimate reflects 50% less than the current number of bicyclists and pedestrians in the area). Based on other studies throughout the United States, it is well known that bicycle and pedestrian numbers increase (not decrease) when facilities are connected. Over the past 10 years in Marin County, bicycle use has more than doubled, even with an incomplete network. In addition, bicycle use in Portland, Oregon increased four-fold over the past 15 years because they are building an inter-connected system. Use numbers for the Alto Tunnel need to be representative of industry standards and should be presented as a range, as are the Study's cost estimates. There are a variety of methodologies used for estimating use numbers; the Study should justify whatever methodologies are used.

- D) Mode Shift through Building the Nonmotorized Network:** The Study should go into more detail about how mode shift to increase bicycle and pedestrian use takes place through building a network. It should include comparisons to European countries, showing the potential for increased use when there are accessible, safe facilities.
- E) Safety:** The Study does not do a detailed analysis of the costs related to injuries and potential deaths from collisions with motorists on the Horse Hill and Camino Alto routes, and how these tragedies could be averted if the Alto Tunnel were opened.
- F) Emergency Egress:** The Study does not address the potential threat of fire and how the Alto Tunnel could be used as an emergency egress route, saving lives in the event of a necessary evacuation. Roadways will quickly become clogged if an evacuation is needed and people will need to retreat on foot or bicycle.
- G) Economic Benefits:** The Study does not detail the economic benefits of increased property values near the trail, and associated increases in patronizing local businesses from more people walking and bicycling through Alto Tunnel. The real estate industry has documented that homes are frequently sold at premium prices because of ease of access to public non-motorized transportation corridors/facilities.
- H) Operations and Maintenance:** The Study seems to overestimate operations/maintenance costs. As one example, it indicates that the Alto Tunnel would be closed from dusk until dawn, and it does not acknowledge that the Cal Park Hill Tunnel will be open from 5 AM until 11 PM, and that this policy will be reviewed to consider 24-hour access, six months after the tunnel is open. All other tunnels in the U.S. are open 24 hours/day, which significantly reduces operations costs. Operations and maintenance costs should therefore be detailed and presented as a range, including the 24 hour open tunnel option for means of cost comparison. In addition, maintenance costs due to slides, other structural failures and wear on the roadways are not included in Section 4.2 of the Study.
- I) Greenhouse Gas Emissions:** Table 3.1 makes mention to a reduction in greenhouse gas emissions, but does not go into enough detail about the County of Marin's goals to reduce its ecological footprint and state legislation mandating reductions. With revised use figures, the greenhouse gas emission reductions will also change.
- J) Right of Way issues:** In Appendix G, the Study makes sweeping statements about parcels "affected" by Alto Tunnel, when these parcels are *above* the tunnel, not "on" the right-of-way; the vast majority of land contained within these parcels will not be adversely affected by a re-

opened tunnel; in fact the homes will become stabilized. Appendix G should discuss in more detail easement acquisition and costs in addition to the need to research current easement status. The Study cites an opponent's comments in Appendix G paragraph 4, without any reference to whom it is or their credentials, etc.

**K) ADA Accessibility:** Table 3.1 briefly mentions the value of the Alto Tunnel for serving people with disabilities, but needs to go into more detail about this need.

**L) Funding Sources:** The Study currently does not detail potential funding sources for building the routes. This should be included as an appendix.

**M) Health:** The Study does not analyze the health benefits associated with increased physical activity and how this varies for the routes. There is a growing body of literature on this subject and how improvements to the built environment can improve health and physical activity.

**N) Adjacent Project Impacts and Overall Community Benefits:** The Study should detail how neighborhood concerns about the Alto Tunnel could be alleviated through public process and design issues, and the Study should reference the 2001 *Tunnels on Trails* study by the Rails-to-Trails Conservancy (RTC) which documents tunnel use within 78 tunnels on 36 trails. The RTC study indicates, "All trail managers responded that the local community had concerns prior to opening their tunnels, yet 97% (35/36) reported overwhelmingly positive community feedback after the tunnel(s) opened. The Study should also detail that there are some tunnel neighbors in favor of the project. All concerns should be balanced with overall community benefits related to health, safety, and reducing greenhouse gas emissions.

**O) Transparency:** The Study included two public meetings and at least one private meeting with local residents opposed to the tunnel. The Technical Advisory Committee (TAC) meetings were all held in private, and this is where the majority of the decision making for the content of the study took place. In addition, the Study details certain elements for some routes, and not others, presenting a need for more balance in the next draft. We recommend that private meetings with stakeholder groups be balanced between supporters and opponents of the Alto Tunnel and we recommend that the TAC be expanded to include the MCBC and other additional stakeholders. Further, *copies* all

written public comments submitted to the County should be included in an appendix.

**3) Next Steps and Benefits Should Be Detailed:** The County of Marin spent \$225,000 on this Study, and had been applying for grants to conduct such a Study since the year 2000 – for 10 years. At this point, however, the draft Study will simply lead to the need for another Study. Before it is finalized, the cost estimates and use numbers should be revised and further qualified, and missing or incomplete sections of the Study (as detailed in #2 above) should be addressed.

The Study should also expand on the information included in the Route Alternatives Evaluation Matrix Table 3-1 to include missing information (we have included a revised Matrix as Chapter 4 of our Report to assist in this process).

Further, MCBC requests that the Study provide a list of next steps for each of the three projects to bring them all to 30% preliminary engineering design and environmental clearance. This should include the associated costs for each of the steps and a more detailed timeline for completing these steps. This should be included in a separate section of the Study for ease of reference. Next steps are also needed – all in one section of the Study.

In conclusion, the final Study should be revised to address the aforementioned concerns and to provide policy makers with clear, factual and adequate information for making decisions.

## 4. Route Alternatives Evaluation Criteria Matrix

Chapter 3, Table 3.1 of the Study provides an evaluation of several criteria comparing the three routes, Horse Hill, the Alto Tunnel and Camino Alto. The Marin County Bicycle Coalition finds this evaluation lacking justification for many of the performance values used (Poor, Fair, Good, Excellent, and Underdetermined.).

Below are our recommendations for Table 3.1 followed by questions or comments. In most cases we have re-evaluated, justified using different performance values - in many cases they are different from what appear in the current draft of the Study. The Alta/LandPeople Evaluation Matrix “assessed” various qualities arbitrarily for some routes and not others.

The Marin County Bicycle Coalition recommends that the County replace the current contents in the Table 3.1 Evaluation Matrix with the content below, and that the use and cost sections in the Evaluation Matrix below be adjusted to include revisions in the final Study.

### ***Emergency Access and Response***

**Horse Hill- Fair.** While the roadways that lead to the Horse Hill Pathway have good emergency access, the existing width of the Class 1 Horse Hill Pathway limits emergency vehicles. Concepts that would widen the path to widths that would allow emergency vehicles along the pathway would improve emergency access.

**Alto Tunnel- Good/Fair.** The Alto Tunnel, which is proposed to be reconstructed at 12 feet in width, could present access challenges for some emergency vehicles, which could be easily be remedied by utilizing appropriate vehicles that have adequate width clearance. Emergency access challenges could be significantly mitigated by safety improvement concepts both structural and non-structural. Telephones in the tunnel could help reduce emergency response times. The Alto Tunnel would also provide a substantial new emergency egress route between communities in the event of disaster - a significant benefit to both adjacent communities. It also would provide for an alternative route for emergency access if roadways were clogged with automobile traffic.

**Camino Alto- Fair.** All portions are along narrow, winding roads and are prone to traffic back-ups that could develop in the event of an emergency. Such traffic back-ups can impede access for emergency vehicles; this is especially true if confounding factors such as a fire, mudslides or other natural disaster create debris or result in a mass exodus of residents.

## ***User/Public Safety – Separation from Traffic***

**Horse Hill- Fair/Poor.** Only 0.4 miles of the 3.2-mile route between Madera Avenue at Wornum Drive and Lomita Road at East Blithedale Avenue is a Class 1 separated pathway. The remaining parts of the route are on roadways with some areas of significant concern for car/bike or car/pedestrian conflicts. Of particular concern are the Sanford Street and Madera Street intersection at Tamalpais Drive, Lomita Drive and the freeway onramp on Casa Buena Drive. Additionally, the Horse Hill route is not lighted and many users do not perceive this route to be safe, especially at night. The Class 1 segment has bicycle and pedestrian user conflict challenges too.

**Alto Tunnel- Excellent/Good.** This route is entirely separated from roads and automobiles, eliminating potential automobile conflicts for pedestrians, bicyclists and disabled people. With proper lighting, security camera systems, call boxes and mode separation regimes provided through stencils, pavement coloration and signage in the tunnel, collisions can be minimized and personal safety maximized.

**Camino Alto- Poor.** All portions of this route are along a busy, winding, narrow, sometimes degraded public road with dozens of driveways and intersections creating significant potential for conflicts. Safety data shows bicycle and pedestrian injuries and deaths on this route. Widening the roadway would improve safety to some extent, but safety improvements might be offset by increased automobile speeds, which could present increased dangers to bicyclists and pedestrians due to faster moving cars. In addition, standard bike lane widths cannot likely be accomplished due to slope, private property, driveway configurations and other physical constraints.

## ***Bikeway and Community Connections***

**Horse Hill- Fair.** A less direct route from central Mill Valley to central Corte Madera, but does connect to a route near the Town Center shopping area and to improvements planned in the Highway 101 (the TAM Greenbrae Corridor Improvement Project). Despite this route being a good connector geographically for some trips, it is problematic because of safety issues, and does not provide a direct route for people bicycling or walking along the North-South Greenway route between the town centers. Safety concerns exist at the Sanford and Madera Street intersection at Tamalpais Drive, at the freeway onramp on Casa Buena Drive, and on Lomita Drive. Additionally this route is not suitable for young or weak riders, or the disabled as a community connector, due to steep slopes along the separated pathway portion of the route.

**Alto Tunnel- Excellent.** A direct, virtually flat route linking Mill Valley and Corte Madera between the two of the most popular pathways in the County - the Mill

Valley multi-use pathway and the Sandra Marker Trail. This route is especially valuable as a connector if it is left open 24 hours per day, as is the case with all other bicycle and pedestrian tunnels in the nation.

**Camino Alto- Fair.** This route links central Mill Valley and Corte Madera but is a longer, winding route that is not suitable as a connector for young, disabled or weak riders.

### ***Functionality/ Efficiency – Bicycles***

**Horse Hill- Poor.** Involves two steep hills of 10% and 8% slope; not suitable for weak, young, many elderly or disabled users. This is a longer and less direct route. This route has exposure to freeway traffic noise, view and nighttime glare. This route does not efficiently connect the southern portion of the North/South Greenway (the Mill Valley multiuse path) with the Sandra Marker trail at Redwood Avenue in Corte Madera, two very popular bicycle routes which are also used for bicycle commuting.

**Alto Tunnel- Excellent.** This route is flat and relatively straight and provides ease of connection between communities. It provides ease of use by weak, young and disabled users - this is the only route that can be made ADA compliant. Potential conflict with other users in the tunnel can be minimized by mode separation and signage regimes. Efficiency of use can be maximized with the tunnel being available to users 24 hours per day.

**Camino Alto- Poor.** Involves climbing a steep hill and mixing with cars on a winding road. Even with climbing lanes or bike lanes, many bicyclists would feel uncomfortable on this route. This is a scenic and challenging route for avid bicyclists but has low levels of functionality and efficiency for everyday commuting due primarily to slope.

### ***Functionality/ Efficiency – Pedestrians/ Persons with Disabilities***

**Horse Hill- Poor.** Southern and northern portions have sidewalks or pathways and low gradients. Horse Hill Path and part of Casa Buena have steep slopes. Southern Meadowsweet, Casa Buena and some of Lomita lacks sidewalks or pathways, and use patterns and adjacent land uses and resources do not support adding pedestrian improvements. Automobile/pedestrian conflicts are significant for the disabled on this route. Many of these issues could be partially addressed by improvements.

**Alto Tunnel- Excellent.** Excellent relative to grade - this is the only route that can meet ADA requirements for people with disabilities. Potential conflicts with bicyclists in the tunnel can be remedied with mode separation regimes, including

striping, signage, colored pavement as well as education.

**Camino Alto- Poor.** A steep route exposed to heavy traffic with discontinuous sidewalks and path. Extension of sidewalk on Camino Alto north to Overhill Road and improvements to the Corte Madera Avenue path would improve access on those portions, but not for through-access. Use patterns, slope and adjacent land uses and resources do not support adding pedestrian improvements that would support disabled access.

### ***Mode Shift/Use Levels***

**Horse Hill- Poor.** An estimated 10% increase in use due to limited ability to improve existing route conditions, and current relatively low popularity. This route provides the lowest level of mode shift of the three routes.

**Alto Tunnel- Excellent.** Estimated use and vehicle miles travelled savings are approximately five times the projected level for Horse Hill Route, and twice the level for Camino Alto/Corte Madera Avenue route (based on capturing the conservative estimate of 50% of users of adjacent existing paths). The Alto Tunnel provides an important gap closure in a pathway system that is more than 91 miles in length between Cloverdale and the Golden Gate Bridge. If current and expected future increases in bicycle and pedestrian use are factored-in along with additional ridership growth that would occur when this route is opened, mode shift for the Alto Tunnel could increase from the very conservative estimate of five times to 10, 15, 20 or more times the use level of Horse Hill.

**Camino Alto- Good.** An estimated 25% increase in use, primarily by bicyclists, on this already popular route, due to potential significant improvement in safety and conflict with vehicles. This value could be less if the Alto Tunnel is opened.

### ***COMMENTS FOR CONSULTANTS***

The Alto Tunnel eliminates the most significant barrier in the 91-mile North-South Greenway in Marin and Sonoma counties and as a result of the completion of this regional network; use numbers could be far higher (please see Chapter 5C in this report on pathway usage).

### ***QUESTIONS FOR CONSULTANTS***

1. If the Alto Tunnel were opened, how would that affect the Camino Alto and Horse Hill usage numbers? Would these numbers drop due to increased use of the Alto Tunnel? Please evaluate this.

2. Please complete an assessment that evaluates how the development and completion of the regional bicycle/pedestrian network would impact use number estimates for all three routes. In addition to local improvements such as the Central Marin Ferry Connection Project and many other local projects, there is the wider network that will be built by SMART that will essentially connect the Golden Gate Bridge to Cloverdale in northern Sonoma County. As non-motorized transportation grows in general, along with Marin continuing to grow as a bicycling Mecca, what kind of increases of use can be expected? This fundamental question needs to be assessed before any use numbers are finalized in this report.
3. What is the best way to manage likely significant increases of bike traffic through corridor communities regardless of which improvements are made? If numbers continue to increase, what are the impacts with respect to noise, traffic congestion and safety for the routes that riders *will be* using over time (with or without the opening of the Tunnel) and how can they be mitigated?

As per Chapter 5C in this Report, use numbers in the County Study for the Alto Tunnel are very conservative and should be re-calculated using national best-practice estimating methods and should be expressed as a range. The use number methodology is not explained or justified and does not take into consideration current trends here in Marin County and the implications for significant construction of new routes being created through the local and regional nonmotorized networks planned and funded in Marin and Sonoma Counties. Use numbers should be several times higher than what are presented in this report.

5. Please justify the methodology used for the projected bicycle and pedestrian use numbers on all routes and please present other methodologies that have been used for similar projects elsewhere and present use numbers as a range.

### ***Roadway Crossings, Intersections and Driveways***

**Horse Hill- Fair/Poor.** Most of this route avoids *major* crossings but there are significant exceptions, including the freeway on-ramp on Casa Buena, and the complex/dangerous intersections at Sanford Street and Madera Avenue at Tamalpais Drive in Corte Madera. There are also potential conflict areas in Mill Valley along Lomita near Edna Maguire School and toward East Blithedale, especially during high traffic times. The crossing at East Blithedale (common to all three routes) is also problematic.

**Alto Tunnel- Excellent.** This route is a Class 1 route separated from cars except for two major crossings, one at East Blithedale (which is problematic to all routes)

and one at Redwood Avenue in Corte Madera (which is also problematic for the Camino Alto route). The only other crossing is Vasco Court - a cul-de-sac, which has very low traffic volumes. There are no driveways and therefore minimal conflict points with autos along this route. Opening this route would likely reduce bicycle traffic on Camino Alto, possibly below the current levels thereby decreasing the potential for accidents on Camino Alto.

**Camino Alto- Poor.** Crossing at East Blithedale (common to all three routes) and at Redwood Avenue (common to the Camino Alto and the Alto Tunnel route) is problematic. There are several intersections on Camino Alto and dozens of driveways with very short sight-distance lines making this route particularly dangerous for bicyclists.

### ***QUESTION/COMMENT TO CONSULTANTS***

East Blithedale is common to all three routes. Please treat it identically for each route in this matrix or eliminated from the matrix as it does not play into the overall comparison of the three routes.

### ***Right-of-Way Availability/ Issues***

**Horse Hill- Fair.** Requires Caltrans permission and permits to make improvements on Horse Hill path and improvements at the Casa Buena freeway on-ramp. Acquiring right-of-way from the adjacent landowner(s) and permits from Caltrans is a formidable process and presents a challenge for these improvements.

**Alto Tunnel- Good/Fair.** Although there are seven properties above the tunnel, easements can be acquired/purchased from property owners. In Appendix B of the Study, Jacobs Associates indicates that, "Tunnel excavation and support can be carried out without having to condemn or acquire properties adjacent to the tunnel portal." Regarding acquisition, a 2005 lawsuit in the Seattle area resulted in easement being priced at 1% of property values above a Sound Transit train tunnel being constructed (see Appendix F). There will be significant study and negotiation processes to resolve easement issues for some of these seven properties.

**Camino Alto- Poor.** Involves changes to private property along the right-of-way as noted under Adjacent Property Issues (in this Matrix). Thirty-six or more driveways would need to be modified and retaining walls, tree removal and other modifications would need to occur impacting parking, walls, fencing and landscaping on private property all along the route (see pages 2-86 and 2-90 of the Study). Such work would require purchase of easements or land from private property owners. There is limited available ROW for improvements making some areas very difficult to widen.

## **QUESTION/REQUEST FOR CONSULTANTS**

The law firm, Graham and Dunn in Seattle, Washington produced a paper, *Over and Under- A Practical Guide to the Condemnation of Aerial Guideway Easements and Tunnel Easements*, which describes the history and body of law surrounding a recent lawsuit regarding the building of a rail tunnel in the Seattle area. This is a very useful document for understanding issues that pertain to ROW and easement issues on all three routes but is especially relevant to the Alto Tunnel route.

1. Please include in the Appendix of the final Study, *Over and Under A Practical Guide to the Condemnation of Aerial Guideway Easements and Tunnel Easements*  
<http://www.grahamdunn.com/download.cfm?DownloadFile=7D5A7957-3048-56D1-FE15FBD3C1EA3FDC>
2. Please detail adjacent property impacts for all routes in contrast to what you have provided in Appendix G, which only discusses the Alto Tunnel route. Specifically, evaluate the costs of property acquisition, potential lawsuits costs and community opposition to widening Camino Alto and Corte Madera Avenue. The report dedicates the entire Appendix G to the seven properties *above* the tunnel, most of which would have little or no direct impacts from the Alto Tunnel being open, but does not do the same for the 36 properties that would be directly affected by widening Camino Alto and Corte Madera Avenue. Historically there has been opposition by neighbors regarding road widening on the Camino Alto route; this too should be discussed.

## **Environmental Issues**

**Horse Hill- Good.** There would be changes to native grassland and scrub habitats if Horse Hill Path is widened. Potential cultural resources along Highway 101 need to be evaluated. Construction noise and freeway traffic interruptions during construction could impact traffic.

**Alto Tunnel- Poor.** Environmental impacts include removal of native trees and vegetation along the right of way near tunnel portals, construction in potential wetland habitat, potential soil contamination along rail route. Construction noise and activity, and safety and community impacts need to be assessed, as do potential cultural resource impacts. At the same time, however, there will be environmental benefits after the tunnel is constructed through providing a means to reduce greenhouse gas emissions by replacing car trips with bicycle and pedestrian trips.

**Camino Alto- Poor.** Changes to adjacent hillsides from roadway widening, including removal of native trees, shrubs, grassland adjacent to open space, and visual changes regarding retaining walls. Potential cultural resources and regulatory waters constraints and other geologic, soils and hydrologic issues need to be assessed, as do noise and traffic impacts from construction.

### ***COMMENTS/QUESTIONS FOR CONSULTANTS***

1. Please indicate the potential for cultural resource impacts with widening Camino Alto?
2. Please detail tree removal on Camino Alto as was done in Appendix F, Tables A and B for the Alto Tunnel, including listing of heritage/native trees, etc. How many oaks, redwoods, and other natives would need to be removed on the Camino Alto route. What sort of mitigation costs might be necessary for the removal of native plants for work on Camino Alto?
3. Are there any other habitat implications for work on Camino Alto?

### ***Adjacent Property Issues***

**Horse Hill- Fair.** Major bike route passing Edna Maguire Elementary School campus is a concern. There may be concerns about impacts on the freeway during construction.

**Alto Tunnel- Good.** Homes are set back for most of the route on both the Mill Valley and Corte Madera sides of the tunnel, helping to minimize potential visual and noise impacts. Significant increases in property values along public trail systems are well noted throughout the country. There are concerns about the increase of users using the pathway, including the pathway near Edna Maguire School however, such concerns could be mitigated with fences or wall construction in these areas. Construction noise and activity will have an adverse affect on neighbors, but will have no lasting impact. The ultimate need to stabilize the tunnel by filling it would potentially result in similar construction-caused impacts to neighbors and communities, depending on the methods used for stabilization. Simply filing the tunnel, however, would provide little overall public benefit and no transportation benefits.

#### **Camino Alto- Fair.**

Construction noise and activity will affect residents and have traffic impacts in the area, but there will be no lasting impact on adjacent properties on the southern 3/4 of the route. There will be localized changes in neighborhoods along Corte Madera Avenue and the loss of some parking. The potential 25% increase in bicycle traffic could affect drivers and homeowners along this route creating

increased noise and activity on Camino Alto. There would also potentially be a loss of parking for people accessing the trail system.

## **COMMENTS TO CONSULTANTS**

### *Increased Property Values*

With pathways, the real estate industry notes an increase of property values along such trails and often uses the trails/pathways as a selling point in their literature and on signage. Please include a discussion and reference to this in the final Study.

### *Meetings with Residents Opposed to Alto*

County staff met with property owners opposed to the Alto Tunnel after the March 4, 2009 public meeting, but there is no indication that this meeting took place in the Study, minutes were not provide, nor was there any indication that the County or consultants met with potentially impacted property owners along either the Camino Alto or Horse Hill route's. Are property owners along these other routes aware of the implications of widening Camino Alto?

There is no indication that the County Staff met or made themselves available for smaller private meetings with the *supporters* of the Alto Tunnel living in these same neighborhoods.

Additionally, there is no indication that the County/consultants communicated with homeowners adjacent to existing Marin County multi-use trails in other communities such as Larkspur. Such communication would provide valuable information for policy-makers regarding views and opinions about multiuse pathway benefits, etc. Despite the listing and use of, *Tunnels on Trails- A Study of 78 Tunnels on 36 Trails in the United States*, as a source of tunnel feasibility criteria (section 3.3 in the Study), there is no mention of this important report being used to evaluate that report's findings that indicate that residents adjacent to multi-use trails generally view trails as positive assets with respect to their home value and the community, despite (in many cases) residents being originally opposed to pathway creation.

## **QUESTIONS FOR CONSULTANTS**

1. For the tunnel route, please evaluate the *positive* benefits from increased property values from the creation of a new bicycle/pedestrian pathway for homes adjacent to the multiuse pathway leading up to the tunnel portals.
2. Please detail, compare and evaluate the costs of stabilizing the tunnel with respect to the public benefit that would be realized from opening the tunnel.

3. Please detail the means by which tunnel stabilization would be completed and where adjacent property impact would occur. Please evaluate construction impacts to communities, including construction noise, traffic and other impacts from stabilizing the tunnel.
4. Please evaluate the impact from increased bike traffic along Camino Alto/ Corte Madera Avenue.
5. Please detail the meeting date, location and provide minutes from the meeting that took place regarding the meeting with opponents of the Alto Tunnel in the Spring of 2009.
6. Please revise the Study to assess the wider community benefits of the projected 850,000-plus annual users of Alto Tunnel against any negative impact on a couple of dozen residents living near the portals- this should include mode shift, safety, GHG emission reduction, health, etc.
7. In a spirit of equity, MCBC is requesting a special meeting with the County of Marin along with pro-Alto-Tunnel community members, prior to completion of the final Mill Valley to Corte Madera corridor study as was conducted with tunnel opponents.
8. Please evaluate the use of fencing and/or walls along the pathway as a means of addressing neighborhood concerns in the Scott Valley area about crime and trespassing adjacent to the multi-use pathway.
9. Please evaluate future changes in bicycle/pedestrian traffic on Horse Hill and Camino Alto with and without the Alto Tunnel being opened, and what impacts this would have.
10. Please include the Rails-to-Trails Conservancy *Tunnels on Trails* study in the "Previous Studies" section of Appendix B as a reference. We have included a link to it in Appendix D below.

### ***Cost/User\****

*\* We recommend this section be Cost per User as opposed to just Cost. And we recommend revising all of the costs based on the questions we raised in the cost section 5B. Please also see notes below.*

#### **Horse Hill- Good/Fair.**

\$4.4 - \$5.5 million Route 4A or 4B Sunken Path Option \$9 - \$10.2 million E.  
Blithedale separated crossing: add \$3.4 - \$4 million

**Alto Tunnel- Good.**

\$40 - \$52 million E. Blithedale Separated Crossing: add \$3.4 - \$4 million. The Alto Tunnel cost per user figure may be the lowest of the three routes (depending on cost and use adjustments in the final report).

**Camino Alto- Good.**

\$4.6 million with sidewalk extension to Overlook Road: \$5.5 million E. Blithedale Separated Crossing: add \$3.4 - \$4 million

**COMMENT FOR CONSULTANTS**

We have changed the \*title of this section to cost per user as it more accurately reflects what policy makers need to consider regarding investing improvements on these three routes. Costs by themselves tell only part of the story. By using cost/user over time, policy makers can evaluate the true value of their investment of public funds for the lifetime of the investment. The time frame of the cost per use should be 50 to 75 years.

MCBC has analyzed that the lower cost estimate for the Alto Tunnel is excessively high and the use numbers in the Study, which are reported as being conservative, are excessively low (please see Chapters 5B and 5C in our Report). Using the lower costs consistent with Class 4 AACE guidelines, generating bicycle and pedestrian use estimates consistent with current bicycle and pedestrian growth trends here in Marin, and considering a conservative tunnel lifetime of 50 years, the cost per user over the tunnel lifetime will be extremely low for the Alto Tunnel, and will also have health, transportation and economic benefits.

**QUESTIONS FOR CONSULTANTS**

1. Please revise the cost estimates for widening Camino Alto to take into account the cost of land and/or easement purchase, and provide a line item budget and budget narrative for each item, including land and easement purchases.
2. Please include the process and estimates regarding any legal challenges or lawsuits from property owners that are opposed to Camino Alto widening as you have done so thoroughly in Appendix G for the Alto Tunnel.
3. Please detail the process and costs of stabilizing the tunnel to prevent further collapse.
4. Please evaluate the cost/user benefit of stabilizing the tunnel if any.

5. Please evaluate potential funding sources to cover the estimated \$11.5 million to stabilize the tunnel.
6. Please evaluate the legal costs to the County or local jurisdictions to settle lawsuits and repair damage should further tunnel collapses occur.
7. Please detail the County's plan for making a decision on how to ensure that future collapses of Alto Tunnel do not harm property, utilities and people.
8. Please evaluate the cost per collision with cars, including emergency service and the cost of injury and death for all three of the respective routes over a 50-75 year period with consideration of bicycle and pedestrian use trends.
9. Please evaluate a cost per user for all three routes over a 50-75 year time period. Please use a range of operations and maintenance values for the tunnel not solely the high value you used in the Study. Please use metrics that are comparable between each of the three routes. Many of the Horse Hill and Camino Alto improvements will have a very limited life, while the reconstructed tunnel will have a useful life of 50-75 years before any substantial reconstruction or maintenance will need to take place - please account for this and summarize in your evaluation.

### ***Permitting and Agreement Requirements***

**Horse Hill- Fair/Poor.** Requires Caltrans permission through a permit to make improvements on the Horse Hill path. Caltrans permits can be an expensive and very arduous process and there is no guarantee that Caltrans will move forward on such a project even if there is wide community or local agency support.

**Alto Tunnel- Fair/Poor.** Requires delineation of potential wetlands, permits from state and federal environmental agencies, and agreement between the County and two cities. As further study is conducted and information is gathered, more answers to the myriad of question that still exist for this route can be answered. The County can build on experiences and agreements created for the Cal Park Hill Tunnel to help guide this process.

**Camino Alto- Fair.** Requires delineation of potential wetlands/drainages and/or permits from state and federal environmental agencies. Otherwise requires only approval of Mill Valley and Corte Madera.

### ***QUESTIONS FOR CONSULTANTS***

1. Lowering the Horse Hill route has the potential to impact the freeway. Please describe challenges that could arise in getting permits from Caltrans.

2. What slope stability issues could arise from lowering the Horse Hill Pathway, have these been addressed? Will Caltrans, who owns the pathway, be willing to accept maintenance for a pathway that could be more susceptible to landslides?
3. What if any condemnations or acquisitions would be required for work on the Camino Alto route?
4. Please evaluate potential slope stability impacts from widening Camino Alto. What are the long-term implications for slope stability from such widening.

### ***Consistency with Local Plans***

**Horse Hill- Undetermined.** Listed as an option in County Unincorporated Area Bicycle and Pedestrian Master Plan, but not in City plans. Lomita portion is in the unincorporated area. Part of the route is an adopted County bike route.

**Alto Tunnel- Excellent.** Incorporated in adopted bicycle plans for the County of Marin. Adopted plans in Corte Madera and Mill Valley cite this current Study and the need to close the gap.

**Camino Alto- Good.** Consistent with County, Mill Valley, and Corte Madera adopted bicycle and pedestrian plans.

### ***Maintenance and Operation Requirements***

**Horse Hill- Good/Fair.** Basic improvements are primarily additions and modifications to existing facilities, but the sunken path option brings added maintenance (drainage; retaining walls and long-term maintenance responsibility). Proper maintenance of this route will require sweeping and periodic pathway repair. As Caltrans is the owner of the pathway, they are required to conduct this maintenance.

**Alto Tunnel- Good/Fair.** The tunnel, connecting pathways and passive drainage facilities would require some maintenance. If the tunnel remained open 24 hours per day like the 78 tunnels listed in the *Tunnel on Trails* study commissioned by the County of Marin in 2001, operations costs would be dramatically reduced. Tunnel safety and emergency features could be designed to require minimum maintenance, thereby reducing costs. Public safety personnel needs should not increase for Mill Valley or Corte Madera if the tunnel were opened. Maintenance of this route will require sweeping and periodic pathway repair but because there is no automobile traffic on this route, pathway degradation impacts would be significantly less than the other routes.

**Camino Alto- Fair.** Primarily additions and modifications to existing road and drainage facilities, but extensive retaining walls would be a long-term maintenance responsibility. Potential landslides, debris and vehicular traffic damage will require considerable maintenance the Camino Alto routes. Proper maintenance of this route will require sweeping and periodic pathway repair.

### ***Economic Benefits***

**Horse Hill- Fair/Poor.** Improvements on the Horse Hill Route are not expected to produce a significant increase in bicycle traffic (10%, according to the Study), and therefore provide minimal potential for increased economic benefit to local communities.

**Alto Tunnel- Excellent.** The Alto Tunnel route use estimates, which are very conservative, present a significant increase in the number of nonmotorized users riding between Mill Valley and Corte Madera and beyond to other communities. Use of more sophisticated use methodologies (such as those included in Appendix C of this Report) could show significantly greater projections for Alto Tunnel use over time, resulting in substantial economic benefits to surrounding communities. Please see Section 5G of this Report for more detail on economic benefits that are associated with the closure of gaps in regional bicycle networks and how this benefits property owners, businesses owners, and generates more sales tax revenue for government agencies.

**Camino Alto- Fair.** The Study projects increases of 25% for bicycle use on an improved Camino Alto route. Such an increase will provide some increase in economic activity. However, because this route is steep and challenging it will not provide a wide variety of users, as would a flat route, as such, the benefits of economic activity associated with shopping and family activities will not be realized from this route.

### ***COMMENTS TO CONSULTANTS***

This is a new section that was not included in the Study draft. Please add this section to the evaluation matrix to the final Study.

## **5A. Alto Tunnel Collapse Issues**

### ***Brief Tunnel Collapse History***

The Alto Tunnel, which was first constructed in 1884, is in an advanced state of decay as evidenced by collapses that began as early as December 1981. Some portions of the tunnel have been partially filled to prevent further collapse but only in limited areas. In the Copple Foreaker Associates Study conducted in July 1981, nearly 29 years ago, recommendations were presented regarding next steps for tunnel stabilization.

Shortly after that the Foreaker Study was completed, in December 1981, a large collapse occurred near the south portal destroying a home and affecting utilities above the collapse. Emergency measures were undertaken to stabilize that collapse and prevent further collapses in that area. While the work that was done provided some stability in the immediate area, a March 1982 letter by Copple Foreaker Associates indicates that because post-repair inspections were not possible, large voids could still be present at or adjacent to the repair areas where gravel was used to partially fill the tunnel.

The north portal of the tunnel was rebuilt in 1958 and 31 feet of concrete lining was constructed. Beyond that point there is 139 feet of gunite (sprayed concrete) lining. The gunite is reinforced with 8 inch steel sets and reinforcing steel. In 1975 the 124 feet beyond the gunited section was filled with low-strength concrete after some caving had occurred.

Since 1982, there has been nothing done to stabilize the Alto Tunnel and tunnel engineers believe that redwood supports are continuing to rot throughout the tunnel due to the wet environment and the lack of air circulation in the tunnel as a result of the collapses and plugs. As a result, the tunnel is at ever increasing risk of collapse.

### ***Current Status***

The lack of any efforts to reconstruct or stabilize the tunnel over the past 29 years since the Underhill Road collapse occurred has left the tunnel in a continually degrading condition as predicted in studies that took place during the 1980's. As far back as 1981, the Foreaker study indicated that, *"In the event that the Alto Tunnel is not developed for bicycle and pedestrian use, it is likely that the existing tunnel supports will continue to deteriorate, and in areas where ground conditions are poor, this will likely lead to further instability and collapse in the tunnel. Such instability and collapse could propagate to the ground surface and impact or otherwise damage surface structures and utilities above and adjacent to the tunnel alignment"*.

## ***Next Steps***

As per the Copple Foreaker Associates letter dated the July 15, 1981, the “alternative recommendations, which should be considered” are as relevant today as they ever were:

- 1) Do nothing and accept the risk that the tunnel will have large cave-ins which may reach the surface
- 2) Replace the deteriorating timber support system
- 3) Fill the tunnel in order to stabilize it

Doing nothing could result in high costs related to property damage, and liability due to the significant potential for personal injuries. Twenty-nine years ago, in 1981, the potential cost of a collapse was estimated at \$1 million. Today with home values alone being far higher than in 1981, the cost of property damage, liability and injury would be many times that value. With respect to collapse, MCBC believes that prevention should be the preferred approach.

While this Report does briefly discuss some of the history related to tunnel collapse, this information needs to be expanded upon in the Study prepared for the County of Marin. Please detail collapse potential for all of the at-risk sections of the tunnel and the likely consequences, including potential damage to structures, utilities and personal injury. We request that the costs for each of these areas be carried over into cost sections of the Study. Please also detail the process of tunnel stabilization, including methods that would be used, private property impacts from borings, construction noise, vibration and visual impacts, etc. as you have done for tunnel reconstruction

There are serious safety issues associated with doing nothing to stabilize the Alto tunnel. MCBC believes that to prevent collapse, the County of Marin will need to either: A) repair the tunnel for bicycle and pedestrian use or B) permanently fill/stabilize the tunnel (which is estimated to cost \$11.5M). Our preference is to repair the tunnel for bicycle and pedestrian use, as this will solve the problem of collapse, and provide a needed alternative transportation corridor. The Study should detail how the County of Marin will come to a decision on how to handle this hazardous situation.

MCBC further requests that the cost of stabilizing the tunnel be factored into the cost of reconstructing the tunnel. If \$11.5 million is going to be spent regardless, then it is reasonable that a discussion of the costs of tunnel reconstruction vis-à-vis the costs of tunnel stabilization appear in the Study. If the tunnel needs to be stabilized, then the Study could conclude that the total cost of reconstructing the tunnel should be reduced by \$11.5 million (the cost to stabilize by filling the tunnel).

We further request there be a discussion in the Study regarding potential funding sources for stabilizing the tunnel. We are aware of many funding sources (as

detailed in our Appendix E) that can be used for bicycle and pedestrian transportation projects, but MCBC is unaware of available funding sources for closing a transportation corridor.

## 5B. Costs Issues

### **Summary:**

Throughout the study, there are differing numbers provided for Alto Tunnel cost estimates and environmental review, and the study includes high contingencies, cost estimating allowances, and non-construction costs which are not backed up by sufficient explanatory narratives. In one spreadsheet, the environmental study cost estimates are listed as more than 10 times higher than the appendix on environmental review – adding further doubt as to how the cost estimates were prepared. There are also questions about the original unit costs used (because Cal Park Hill Tunnel was bid in the pre-recession economy, and Cal Park Hill Tunnel includes rail features that will not be included in Alto Tunnel). In addition, in recent months, several large Bay Area construction contracts have been awarded at 20-50 percent lower than the engineer's estimates, which are also lower than 2008 construction costs. All of these questions and inconsistencies raise the need for a major clean-up and detailed review and narrative of the methodologies for the costs estimates. In addition, the MCBC recommends that the County award a contract for consultants to go inside and investigate the conditions in the tunnel to better detail cost estimates, and to develop preliminary engineering design and environmental review documents for all three of the routes.

### **Comments and Questions:**

**Horse Hill and Camino Alto routes:** Have the estimated costs per foot for these routes been compared with recent construction projects in Marin County, such as Los Ranchitos road and Alameda del Prado? The County should ask the consultants to answer this question and provide further back up on these construction costs as well as maintenance costs on the roads related to slides and weathering pavement. Cutting into hillsides and installing retaining walls could add significantly to long-term maintenance costs for these routes.

**Alto Tunnel:** We have several questions and comments about the Alto Tunnel cost estimates.

1. **Varying cost estimates throughout the study:** The study and appendices B and L currently include several different cost estimates for the Alto Tunnel project. Is there an explanation as to why the cost estimates are different on different pages, or are there mistakes? Please correct or clarify. Different estimates can be found in four different locations:

- a. Page 1-5 lists the cost range as \$48-\$52 million. In the December 9, 2009 meeting, Randy Anderson stated that this estimate should have been listed as \$42-50 million.
  - b. Page 2-58 lists the cost range as \$42,900,000 to \$50,700,000 million.
  - c. Appendix B page 20 lists the cost range as \$40,157,000 to \$49,258,000. A sentence just prior to this cost range listing states that the estimate “does not include the costs for planning, land acquisition and right of way, environmental evaluation and permitting, engineering and design, procurement assistance, construction management, and engineering support during construction”; however, the estimated summary *does* include \$10,952,000 for estimated engineering, environmental, project administration, and construction management, so the statement about these costs not being included is incorrect.
  - d. Appendix B on page B1 and Appendix L page 14 show how the consultants used Cal Park Hill Tunnel bids to arrive at the Alto Tunnel cost estimate. These costs should be added together to provide readers with the actual estimate range (right now the numbers are simply listed by not added together). When adding, the range is: \$40,156,280 to \$49,237,818 (a fourth set of different numbers).
2. **Methodology for cost estimates:** We believe that the County should request adjustments and better explanations regarding the development of the cost estimates for the Alto Tunnel. What follows are specific questions:
- a. Please describe how the unit costs for Cal Park Hill Tunnel were developed. Were the unit costs used to estimate the Alto Tunnel based on *actual costs*, an average of the bids, or the LOW bid for the Cal Park Hill Tunnel? Did the consultant team make adjustments to *subtract out* the extra costs from Cal Park which are unique to the *SMART rail (ventilation systems, fire, power, etc.)*, and if so what were those adjustments, and if not, why not? Please explain how the unit costs were derived in more detail and review the consultant’s methodology so it can be followed more easily.
  - b. Since mid 2008, when the Cal Park Hill Tunnel project was bid, construction costs in the Bay Area have dropped considerably, in the range of 20 to 50 percent depending on the project. As such, instead of including a two percent escalation of costs, the Alto

Tunnel estimate should include a percentage decrease to reflect the actual market. Please make adjustments for these economic conditions. For example:

- i. The Contractor on the BART Warm Springs subway extension recently won with a bid of \$136 million which was 45 percent below the agencies' estimate of \$249 million.
  - ii. The first major contract for the new Doyle Drive “high viaduct” replacement work was recently bid by eight Contractors, with a low bid of \$48.5 million, over 40 percent below the engineer’s estimate of \$84 million.<sup>1</sup>
  - iii. Here in Marin County, the contract bid for Alameda del Prado bike lanes was accepted at \$398,000 in January 2010 while the engineer’s estimate from October 2009 was \$690,000. This represents 42 percent below the estimate.
- c. Figure 14 – Tunnel Alignment Cross Sections show a Type 1 and Type II cross section, but not a Type III and Type IV. Please ask the consultant to include cross sections for all of the types and to detail what elements are included in each type of tunnel ground support. Also, it appears that the label for Type II should actually be Type IV (based on the description of construction for Type IV).
- d. The Item Descriptions for the cost estimate on pages B1 and L14 show Types I, I, II and I\ (which we presume was meant to be I, II, III and IV); however, the unit cost values that follow don’t seem to make sense because Type IV (the best case scenario for construction) is listed as having a higher unit cost than Type III. Again, please ask the consultant to include exactly what elements are included in the “Tunnel Support and Rehabilitation” Unit Costs for both the Cal Park Tunnel cost basis and the unit costs used for the Alto.
- e. Page B1 – Verify that the “Furnish Steel Sets and Precast Concrete Block Footings” aren’t double counted by also being included in the “Tunnel Support and Rehab” values.
- f. Page 19 of the Tunnel Feasibility Study - In Paragraph 2, it is stated that the lowest cost ground support Types are II and III; however, the unit costs on Page B1 shows that Type III is the least expensive, not one of the most costly (assuming Types are mislabeled per Item 2 D above). Please explain this inconsistency.
- g. Section 5.1.2 (Pages 15-16) of the Tunnel Feasibility Study has inconsistencies in the text as the first paragraph cites that from

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<sup>1</sup> [http://www.sfgate.com/cgi-bin/blogs/cityinsider/detail?blogid=55&entry\\_id=49141](http://www.sfgate.com/cgi-bin/blogs/cityinsider/detail?blogid=55&entry_id=49141)

Station 270+70 to 273+17 Type II ground support is assumed; however, in the second paragraph a similar section from Sta. 271+75 to 273+17 is assumed to have Type III ground support. Please explain the inconsistencies.

- h. For both the low range and the high range cost estimates, please provide a detailed narrative about the assumptions and methodologies used. Presently, the cost estimates are very difficult to follow because this narrative is not complete.

### 3. Contingencies:

- a. “Construction Cost Contingency” The study says that it uses a 20 percent contingency for Alto Tunnel where ground conditions are known and 40 percent where there are more questions. For both the high and low estimates, the report should include a table explaining what percentage contingency is used for the different sections of the tunnel. Right now it is impossible to determine how the contingency was developed. The current overall price for the contingency is about 34 percent. Please ask the consultants to detail what contingency rate was used on which sections of the tunnel.
- b. The study then adds an additional “cost estimate accuracy allowance” of 20 percent, without any explanation as to what this is. We question why this needs to be included on top of an already high 34 percent construction contingency. If this is a high range estimate based on the accuracy of the cost estimate, then a low range should be provided as well (-15% to -%30 per AACE Class 4, see below.)

From AACE, see Class 4

Estimate Class	Level of Definition Completion	End Usage Type of Estimate	Methodology Typical Estimating Method	Expected Accuracy Range Low & High Ranges
Class 5	0% to 2%	Conceptual Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs w/ Assembly Level Line Items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 70%	Control or Bid/Tender	Detailed Unit Cost w/ Forced detailed Take-Off	L: -5% to -15% H: +5% to +20%
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost w/ Detailed Take-Off	L: -3% to -10% H: +3% to +15%

- c. For the high range cost estimate, the consultant uses higher unit costs for estimating poor ground conditions, but then adds the additional 34 percent contingency followed by the 20 percent cost estimate accuracy allowance. This seems to be double (or triple counting). Why would the cost estimating be done in this manner? This is escalation upon escalation.

#### 4. Non-construction Costs:

- a. For most large construction projects, non-construction costs are in the range of 20 to 25 percent. For the Alto Tunnel project, however, the non-construction costs are added in at an additional 37 percent. Why are these non-construction costs so high when usual contracts are in the range of 20-25 percent? Design usually costs 5-10 percent of the project but design costs here are listed at 12.5 percent. Why?
- b. There should be line-item summaries for each of the non-construction costs, with details to back up the estimates. At present, the consultant lists three of the items with the same estimated costs, and these estimated costs are simply a percentage, based on already inflated contingency estimates. Please ask the consultant to provide line item summaries for each

of the non-construction costs.

- c. The environmental costs used in Appendix B and L should be the costs that are noted in Appendix F page 25 which shows exactly what reports are possibly needed and puts the cost for environmental in the range of \$165,000-\$270,000. Instead, Appendix B and L use a high percentage and put the environmental and permitting costs at \$2,433,714 to \$2,984,110. Why are the environmental costs listed as more than 10 times higher in one appendix than another? Please ask the consultants to explain this and to detail all of the costs.

### **Next Steps:**

#### **On this contract:**

- 1) The County should ask the consultant to address all of the comments and questions we have raised about costs, and include a detailed cost estimate backed up with narratives in the final report.
- 2) Because the Tunnel Feasibility study describes the Alto Tunnel as “being in an advanced state of decay as a result of moisture and neglect” and says that “Such instability and collapse could propagate to the ground surface and impact or otherwise damage surface structures and utilities above and adjacent to the tunnel alignment”, we believe that it’s critical for the County of Marin to factor this into the cost estimates. We ask for the County of Marin to detail plans for how to factor the threat of tunnel collapses into decision-making criteria so that this can be used for a future cost-benefit analyses for all of the routes.

**For future contracts:** To truly provide policy makers with a comparison of the routes, the County of Marin should:

- 1) Provide a contract to have a contractor or geotechnical investigation company get inside the tunnel to finalize the geotechnical work and detail unanswered questions about the condition of the tunnel. This is needed to reduce the contingencies and also to provide a better understanding of the risks of collapse to public and private property.
- 2) Provide a contract to perform preliminary engineering (20 to 35% design level) and to secure NEPA and CEQA environmental clearance on all three routes.

## **5C. Review of Projected Use Methodology**

## **Introduction**

*The Mill Valley to Corte Madera Bicycle and Pedestrian Corridor Study* (Draft, December 2009), (the “Study”), examined the current and projected future bicycle and pedestrian use of two routes, “Camino Alto” and “Horse Hill”, and additionally examined the potential use that might result from opening of the historic Alto Tunnel. Alta/LandPeople (ALP) conducted this portion of the Study.

This document examines the methodology and rationale employed to arrive at the projected use of all three routes and offers an alternative data set recommended for use in the revised version of the Study.

## **Methodology Implemented in the Study**

The methodology for estimating current bicycle and pedestrian use as well as projected future use along all three routes studied is contained in Appendix H of the Study. ALP used the National Bicycle and Pedestrian Documentation Project (NBPD) methodology for determining annual counts by taking a sampling of bicycle and pedestrian counts during peak hours, and then extrapolating and projecting annual facility usage. The Marin County Bicycle Coalition (MCBC) asks for the consultants to provide details to explain the methodologies used to extrapolate the estimates for use on Horse Hill and Camino Alto.

What follows were the projections Appendix H, Table 4 (page 5) that ALP used for each of the three routes:

**Table 4 Project Area Estimated Annual Users, Average Daily Traffic (ADT) <sup>2</sup> and Benefits**

Location	Facility Type	Annual Estimate	Daily Use and Benefits				
			ADT	Pedestrians	Bikes	Transportation Purpose	VMT Saved
Alto Tunnel	Class I	850,000	2,329	466	1,863	894	7,201
Camino Alto	Class II	450,000	1,233	197	1,036	470	3,962
Horse Hill Path	Class I-III	165,000	452	72	380	172	1,453

MCBC strongly believes that the projected use numbers for Alto Tunnel do not fully embrace the local and historical trends in bicycle and pedestrian use, as opening of the Alto Tunnel will enable users who previously would not have used either the Camino Alto or Horse Hill Pathway to bicycle or walk between communities.

The Study (Appendix H, page 5) states that,

“A forecast of estimated users of the three project alternatives is based on the analysis of existing bicycle and pedestrian users on facilities within the

project area's vicinity. As **Table 4** shows, an estimated 850,000 annual users would use the Alto Tunnel. This is based on the assumption that the volume of bicyclists and pedestrians using the Alto Tunnel would be approximately half the volumes on the Mill Valley-Sausalito Pathway and the Sandra Marker Trail in Larkspur. This is a conservative approach, considering that the Alto Tunnel will provide a new level route between Southern and Central Marin County."

MCBC asks that a range of numbers be included for the Alto Tunnel use estimates instead of a "conservative approach". These numbers would show current use and projected future use based on the predication that bicycling and walking mode share will continue to rise as demonstrated in the section below.

### ***Current Trends in Bicycling and Walking***

The Study has been funded by the federal Non-Motorized Transportation Pilot Program (NTPP) – whose purpose is to fund infrastructure, planning and design projects that when completed will enable mode shift from automobiles to bicycling and walking. Recently, the County of Marin released data, which shows that since 1999 walking rates have increased by 51% and bicycling rates have increased by 118% on weekdays in Marin over a ten year time period.<sup>2</sup> Marin County and its local municipalities have only been investing in bicycle and pedestrian projects in any sort of meaningful way since about 1999. By comparison, Portland, OR has been investing in bicycle and pedestrian infrastructure for more than 30 years. Portland now boasts one of the highest bicycling and walking rates in the country, shared with only a few other cities such as Davis, CA. Marin County is closely following the Portland model of transforming and building major non-motorized transportation corridors, and is in a similar position with regards to mode share and infrastructure as Portland was only a few years ago, with key non-motorized connectors either under construction, being built soon, or in the planning stages.<sup>3</sup>

A recent December 2009 report, Portland Bicycle Counts 2009, shows the increase in bicycling trends in Portland, OR.<sup>4</sup> This report is complemented by another Portland-area study, the Columbia River Crossing Memorandum, which shows projected bicycle and pedestrian use for the Columbia River over I-5.<sup>5</sup> In the Columbia River study, bicycle and pedestrian use is projected out 20 years into the future to the year 2030. The Columbia River study includes a methodology detailed at the Pedestrian and Bicycle Information Center which

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<sup>2</sup> <http://walkbikemarin.org/news.php?id=142>

<sup>3</sup> Personal conversation with Bicycle Transportation Alliance, <http://www.bta4bikes.org> - 12/20/2009

<sup>4</sup> <http://blogs.wweek.com/news/files/2009/12/SKONICA-60009121713470.pdf>

<sup>5</sup> [http://www.columbiarivercrossing.org/FileLibrary/Memorandums/Pedestrian\\_Bicycle\\_Forecasting\\_Memo.pdf](http://www.columbiarivercrossing.org/FileLibrary/Memorandums/Pedestrian_Bicycle_Forecasting_Memo.pdf)

includes tools for forecasting bicycle and pedestrian future demand<sup>6</sup>, and is especially good for forecasting demand for tunnels and bridges. A formal paper, *Forecasting Pedestrian and Bicycle Demands Using Regional Travel Demand Models and Local Mode Share/Trip Distance Data*<sup>7</sup> that was presented at the Transportation Research Board (TRB) conference in January 2010 and will be imminently published on the Columbia River Crossing has been included with this Report as Appendix C. Of note, David Parisi of Parisi Associates, a sub-contractor to the Study is listed as a contact for more information on the Columbia River study and TRB paper.

Nationally, bicycling and walking trends are consistently going up. This is due in large part to three factors, all of which are expected to continue to play a significant role in transportation choices for years to come. These factors are:

1. Increased pressure on transportation costs, include fuel prices and transit fares,
2. Projections for increased traffic congestion, which will increase the demand for alternatives to the automobile,
3. An increased focus on active transportation as a way to increase physical fitness and promote healthy lifestyles, and
4. The need for a reduction of greenhouse gas emissions (GHG) as one method of reducing human impact on global warming.

We ask that the County of Marin include all of these factors into creating revised use estimates for the Alto Tunnel, and that the use estimates for all three routes be extrapolated for 50 to 75 years (showing an increase in use over time, starting with a base number for when the improved facility would open).

### ***Proposed Methodology for Forecasting Facility Demand***

As noted above, the ALP model essentially took the existing bicycle and pedestrian counts, divided them in half, and then used that 50 percent total count number as the base number for forecasting Alto Tunnel demand and use. MCBC feels that this methodology is incomplete. It does not adequately incorporate factors that contribute to mode shift due to closing a key gap closure project. It also does not factor that use will increase initially when a facility is opened, and trends show that bicycle and pedestrian use will continue to rise over time.

MCBC recommends that the County of Marin ask the consultants to use the Columbia River demand forecasting model be used for creating the Alto Tunnel range of use, for several reasons:

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<sup>6</sup> <http://www.walkinginfo.org/library/details.cfm?id=4461>

<sup>7</sup> Forecasting Pedestrian and Bicycle Demand Using Regional Travel Demand Models and Local Mode Share/Trip Distance Data, (Horowitz, Parisi, Replinger, 2010), submitted for presentation and publication to the 89<sup>th</sup> Annual Meeting of the Transportation Research Board, January 10-14, 2010.

- 1) A sub-contractor on the current Study is familiar with the methodology.
- 2) The model looks at the local population, and forecasts the number and types of trips in radii of less than a mile to several miles, based on local land use.
- 3) The model looks at the change in mode shift by examining nearby facilities that connect to the facility in question, thereby helping to complete the non-motorized transportation system.
- 4) The model looks at radii of 0-10 miles, and produces a continuous range of users based on willingness of users to make trips of “X” miles.
- 5) The model contains the flexibility to calculate projected use on any number of demand scenarios (the Columbia River example uses five different scenarios).

The Columbia River model, along with contact information, can be found in Appendix C and the footnotes of this document.

### ***Additional Benefits and Calculations***

Increased non-motorized use will result in lower greenhouse gas (GHG) emissions and provide safety benefits (better facilities mean less conflicts and injuries). MCBC requests that these calculations be added to the final cost-benefit analysis. The addition of these very real benefits will help to bring the true cost and benefit of each of the three routes examined in the Study.

Rationale for these added calculations and cost-benefit analyses are found in nearly every congestion mitigation project. For example, Caltrans looks at several factors for providing increased travel lanes based on the amount of time that motorists spend idling in traffic, level of service, and most importantly, projection of future demand. These concepts can be readily applied to the Study by examining the total amount of GHG reduction that can be achieved by converting automotive trips to bicycling or walking, as well as how this might affect local automotive traffic patterns around schools, shopping, and employment areas by converting automotive trips to ones taken by foot or bicycle within the radii defined by the Columbia River Crossing methodology.

As the ALP study took an extremely conservative approach to forecasting demand by taking the total number of non-motorized users between the Camino Alto and Horse Hill Pathway routes and then applying 50% of that total number towards the projected use of the Alto Tunnel, MCBC expects that the numbers for use of the Alto Tunnel based on pent-up demand and better available facilities will likely be several multiples higher than the ALP projected number. The chart below shows what potential demand for the Alto Tunnel may look like if the forecast demand model used for the Columbia River Crossing is employed in this Study.

ALP estimate (50% of current users)	850,000 users/year
100% of "current users on either side of the tunnel"	1,700,000 users/year
200% of current users	3,400,000 users/year
300% of current users	5,100,000 users/year

### ***Next Steps***

We recommend that the County of Marin:

- 1) Ask the consultants to provide the methodology that they used for determining the Horse Hill and Camino Alto use numbers.
- 2) Ask the consultants to utilize a best practices methodology (such as the Columbia River Crossing model indicated in this paper) for projecting Alto Tunnel use, and to revise the Study accordingly. The Study should describe what methodology is used, and project a range of numbers for use over a 50-75 year time period (projecting increased use each year, based on current trends related to increasing prices of fuel, increasing concerns on greenhouse gas emissions, increasing concerns about health, and increasing traffic congestion leading to people choosing transportation alternatives that are safe and accessible.

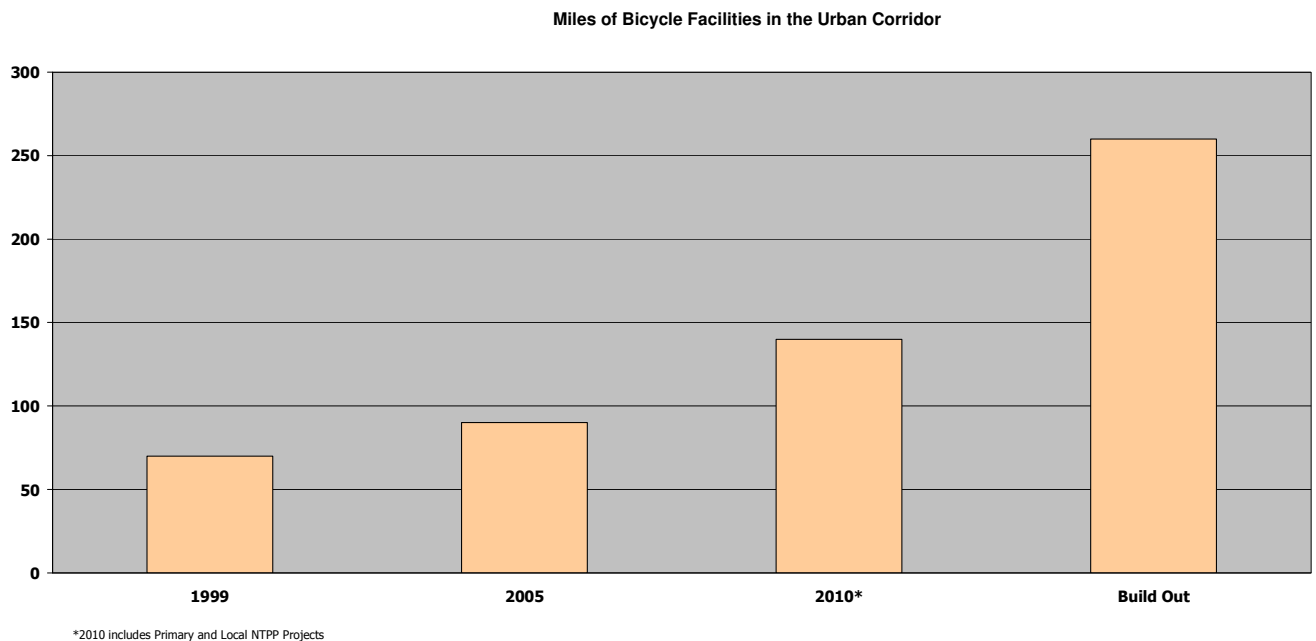
## 5D. Mode Shift through Building-Out Marin's Nonmotorized Network

### *Introduction*

The Study should more completely address how closing the Mill Valley – Corte Madera gap in the non-motorized transportation system could results in tremendous mode-shifts away from automobile use and to bicycle and pedestrian use. This needs to first be addressed through modifying the use sections of the report and Appendix H to include verifiable and documented methods for projecting use, such as the Columbia River Study (Appendix C of this Report).

### *Building-Out of Marin's Nonmotorized System*

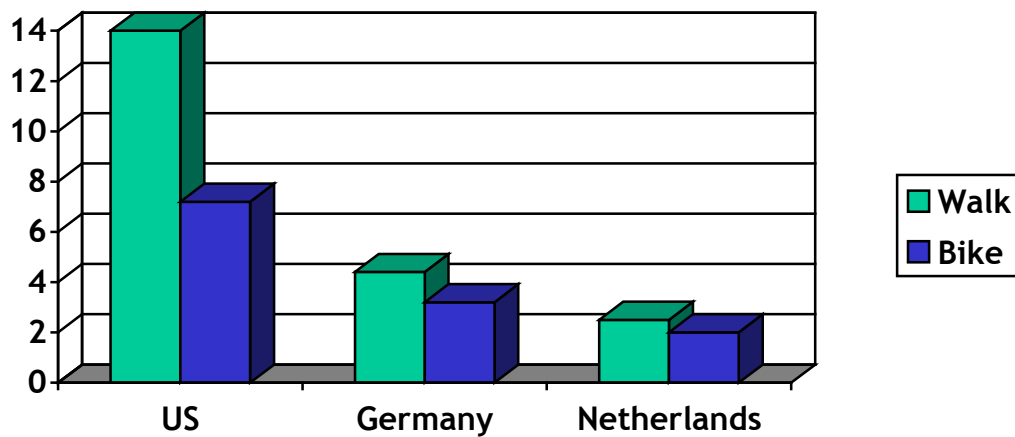
Walkbikemarin.org produced the following chart to show current miles of bicycle and pedestrian facilities, and the amount of miles that would be constructed through build out of the full system. This chart should be included in the final Study:



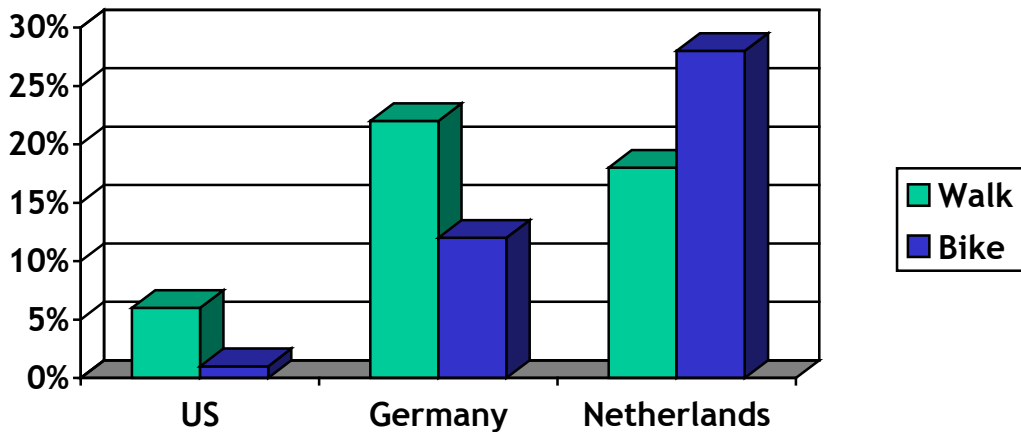
## Comparisons to Other Countries

We also request that the Study cite comparisons to other countries, including graphs, which show the potential for increased mode shift to bicycle and pedestrian use when a complete system is built, and when key gaps are eliminated, and how this affects safety. For example, the Professor Pucher study cited in Appendix D of this Report indicates through the following charts that Europe has more bicycle and pedestrian trips and far fewer deaths:

### Deaths per 100 million km travel



### Portion of all trips



## 5E. Safety

The Study as it is currently written does not adequately assess and quantify issues associated with safety. The MCBC requests that the revised Study address the following issues.

### ***Collisions***

Appendix D, Multi-Modal Traffic Analysis, prepared by Parisi and Associates, addresses issues related to collisions in the Figure 2: Collisions Map. MCBC requests that the following information be provided and that these questions be answered in the revised Study:

- 1) All references to “accidents” should be changed to “collisions”; this is the terminology that is now used as “accidents” has a “light and preventable” connotation.
- 2) Figure 2 shows the collisions that occurred between the five-year 2004 and 2008. The revised Study should indicate which collisions could be prevented if Alto Tunnel is opened, as many travelers would switch to using the tunnel route.
- 3) If “improvements” are made on Camino Alto to widen the roadway to create bicycle lanes, this will very likely increase the speed of automobile traffic on the roadway, turning it into a major arterial. If this takes place, how will this affect collisions? MCBC expects that a widening to create bicycle lanes may actually increase collisions and the severity of collisions between cars and bicyclists, due to increased speeds.
- 4) Please calculate the cost per collision that is incurred. We recommend three types of collisions categories: minor, moderate and severe, and that these costs be extrapolated for 50 to 75 years along each of the routes. The Study should also address the projected costs related to collisions be over 50 to 75 years if Alto Tunnel is not opened, versus if it is opened. Please note that costs for collisions could be incurred for: emergency response, health costs, and potential lawsuits. In addition, for projecting collisions for the Alto Tunnel route, the engineering techniques for user separation noted below should be included, which will vastly decrease the rate and severity of collisions between bicyclists and pedestrians.
- 5) With these additional costs associated with the roadway routes, what are the savings in costs if Alto Tunnel is opened and people can chose a route separated from cars instead of a roadway route?

- 6) What are the collision hot-spots common to all three routes, and how can these regions be modified to create safety improvements?

### ***Neighborhood Concerns***

MCBC understands that some neighbors have safety concerns regarding the opening of Alto Tunnel. We request that the consultants 1) detail how these concerns could be alleviated, and 2) that the Study cite the Rails-to-Trails Conservancy (RTC) report Tunnels on Trails: A Study of 78 Tunnels on 36 Trails in the United States (Appendix D) which addresses these very issues through how tunnels operate in many regions throughout the United States. Page 12 of this RTC report notes that “All trail managers responded that the local community had concerns prior to opening their tunnels, yet 97 percent (35/36) reported overwhelmingly positive community feedback after the tunnel(s) opened.” Page 13 indicates, “The results of this study indicate that when trail managers take steps to address concerns, they often do not materialize once the tunnels are opened.”

We also request that the Study analyze neighborhood concerns about widening Camino Alto as MCBC has heard concerns about the loss of parking, increase of speed, and increase of crashes due to increased speed.

### ***Edna McGuire School***

MCBC understands that some parents have concerns about how the tunnel would change the grounds, safety and character of the Edna McGuire School. We recommend that suggested improvements be addressed in the Study, such as a fence around the school grounds. It would also be prudent to recommend next steps such as a public community meetings with parents and school officials.

### ***Personal Safety***

The Study should go into more detail associated with personal safety for all three routes, with a focus on collisions. Based on the RTC Tunnels on Trails report and the safety of tunnels, MCBC believes that the greatest personal threats are the potential for collisions on the roadway routes.

### ***Tunnel Collapse Issues***

The potential for collapse of the tunnel is only covered in a minor way in Appendix B of the Study.

Pages 10 and 11 of Appendix B of the Study indicate the following about the current decaying and dangerous condition of the tunnel:

*The 1981 Copple Foreaker Associations study “described the tunnel as being in an advanced state of decay as a result of moisture and neglect.”*

*The Alto Tunnel “has been abandoned for 38 years. “The tunnel is in an advanced state of disrepair and collapse.”*

*“In the event that the Alto Tunnel is not developed for bicycle and pedestrian use, it is likely that the existing tunnel supports will continue to deteriorate, and in areas where ground conditions are poor, this will likely lead to further instability and collapse in the tunnel. Such instability and collapse could propagate to the ground surface and impact or otherwise damage surface structures and utilities above and adjacent to the tunnel alignment.”*

The collapse information should be expanded upon in the main report, and the collapse potential should be carried over into cost sections. There are serious safety issues associated with doing nothing to fix the structural issues associated with the tunnel. We believe that to prevent collapse, the County of Marin will need to either: A) repair the tunnel for bicycle and pedestrian use or B) permanently close the tunnel (which is estimated to cost \$11.5M). Our preference is to repair the tunnel for bicycle and pedestrian use, as this will solve the problem of collapse, and provide a needed alternative transportation corridor. The Study should detail how the County of Marin will come to a decision on how to handle this hazardous situation.

MCBC further requests that the cost of stabilizing the tunnel be factored into the cost of reconstructing the tunnel. If \$11.5 million is going to be spent regardless, then it is reasonable that a discussion of the costs of tunnel reconstruction vis-à-vis the costs of tunnel stabilization appear in the study. If the tunnel needs to be stabilized, then the Study could conclude that the total cost of reconstructing the tunnel should be reduced by \$11.5 million (the cost to stabilize by filling the tunnel).

### ***User Conflicts in the Tunnel***

The Study references the potential for user conflicts within the tunnel, but does not indicate that there are proven engineering methods to reduce these conflicts. We recommend that the Study be amended to include the following for the tunnel route:

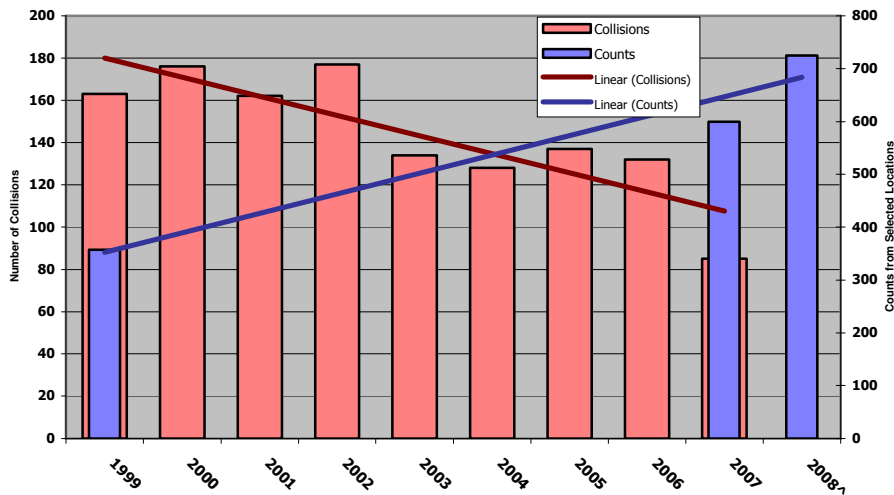
- A) Striping and stencils inside the tunnel to separate pedestrians from bicyclists
- B) Colored pavement to indicate the pedestrian portion of the tunnel
- C) Signage for users about sharing the path
- D) Speed limits for bicyclists inside the tunnel

Safety can be vastly improved through engineering modifications to show user separation. These safety counter measures should be carried over to any estimates related to collisions.

### ***Improved Safety Associated with Increased Use***

The Study should also address how safety along the routes could improve with increased use of the routes (please note however, that MCBC still believe that if Camino Alto is widened that it could result in increased crashes because of faster automobile speeds).

Appendix B of our Report indicates how bicycle and pedestrian collision rates in The Netherlands and Germany are many times less than that of the United States, and how the amount of users corresponds to safety. We have also seen this trend over the past 10 years in Marin County as is evidenced by the following chart which was created for the Pilot Program by walkbikemarin.org. This chart should be included in the Study, and numbers and charts from European countries should be referenced.



\*No 2008 collision data is available at this time

## 5F. Emergency Egress

### *Introduction*

While the Study looks at a variety of emergency response issues for all three routes in Appendix E it does not evaluate the potential for each of the routes to serve as an emergency egress in the event of a major emergency, such as a fire, where residents would be forced to evacuate. Both the City of Mill Valley and the Town of Corte Madera have had public forums to look at issues around emergency egress, so this issue should be covered in the Study.

### **RECOMMENDATIONS FOR CONSULTANTS**

**Evaluation Matrix:** We recommend that a section on emergency egress be added to the evaluation matrix. In our version of the evaluation matrix we have included text, which we recommend for inclusion.

**Safety:** We recommend that the Study go into detail about lives that could be saved if the Alto Tunnel were opened, and if a fire presented a need for a mass emergency egress. Neither the Horse Hill nor Camino Alto routes can serve this need, as in the event of a fire, the roadways will immediately become clogged with automobiles, and people will be able to leave only via foot or bicycle. Moreover, residents with disabilities impairing their mobility—which includes a large proportion of elderly residents—will need a flat, weather-protected staging area and route, which only the Alto Tunnel can provide. FEMA now requires cities to arrange for as many disabled residents as possible to be able to evacuate themselves (“Interim Emergency Management Planning Guide for Special Needs Populations,” Federal Emergency Management Agency and DHS Office for Civil Rights and Civil Liberties, August 15, 2008).

**Coordination with the Cities:** For a next step, we recommend additional coordination with fire departments in Mill Valley and Corte Madera to learn more about how they are preparing for possible emergencies and how an opened Alto Tunnel might serve residents, city evacuation plans, and FEMA requirements.

## 5G. Economic Benefits

### ***Introduction***

There have been numerous studies indicating how increased bicycle use leads to economic benefits for the community. MCBC requests that the consultants revise the Study to include sections within the evaluation matrix and the Study itself on the economic benefits that the County and the cities could incur due to improvements on the three routes. Because there will be relatively little change in use on the Camino Alto and Horse Hill routes, the majority of economic benefits that would be incurred would result from opening the Alto Tunnel.

The Marin Convention and Visitors Bureau ([www.visitmarin.org](http://www.visitmarin.org)) which is the official travel resource for Marin County encourages people to visit and vacation in Marin County, as it results in increased revenues being spent at local businesses, and the resulting revenues in sales taxes which can be used by jurisdictions for much needed general fund purposes. The website promotes bicycling in Marin County. In addition, a January 17, 2010 newspaper article in the *Marin Independent Journal* indicated that the newly renovated Larkspur Hotel Mill Valley, located on the existing Mill Valley pathway, is targeting outdoor enthusiasts including runners and bicyclists.

### ***Relevance to the Marin Bicycle Network***

Marin County, California is home to some of the best bicycling in the country. Over the past ten years, the Marin County Bicycle Coalition has been working with the County of Marin and its cities and towns to expand and enhance the bicycle network within the County. As the network continues to expand, local merchants and businesses are seeing the positive revenue of increased bicycle traffic. Bicycling along Marin County's North-South Greenway as well as feeder routes in to the system serves all manner of bicycling: transportation (to and from work), commerce (trips to and from local merchants), recreation (for fitness and leisure), and as a means of reducing an overall ecological footprint. And just as motorists will stop and spend money during any of these types of trips, so will bicyclists. As the number of bicyclists increases in Marin County, so does their economic impact along routes that serve them. In addition, studies that property values near trails increase.

### ***Bicyclists Spend Money***

Research on economic benefits, by Rutgers University<sup>8</sup>, University of California Davis<sup>9</sup>, University of Minnesota<sup>10</sup>, University of Colorado<sup>11</sup>, University of

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<sup>8</sup> "Socioeconomics of Urban Travel: Evidence from the 2001 National Household Travel Survey," *Transportation Quarterly*, Vol. 57, No. 3, summer 2003, pp. 49-78. (with John Renne).

Michigan<sup>12</sup>, the National Bicycle Tour Directors Association<sup>13</sup>, Local Government Commission<sup>14</sup> and numerous state Departments of Transportation<sup>15 16 17 18</sup> all echo these basic findings: bicyclists riding through a town will stop and spend money. The Rails-to-Trails Conservancy ([www.railstotrails.org](http://www.railstotrails.org)) has demonstrated that re-purposing abandoned rail lines into bicycling and walking trails increases tourism dollars spent in each community through which the trail passes<sup>19 20 21</sup>. In addition, the International Mountain Biking Association (IMBA) ([www.imba.org](http://www.imba.org)), and the Bikes Belong Coalition ([www.bikesbelong.org](http://www.bikesbelong.org)) have both conducted studies concluding that are positive economic impacts to communities when bicycling increases<sup>22</sup>.

For example, the Rails-to-Trails Conservancy cites many examples from all over the country, such as:

- Trails and bikeways in Pittsburgh, PA contributing significantly to downtown revitalization, including millions of dollars in economic development.
- After opening of a bikeway in Leadville, CO, the city reported a 19% increase in sales tax revenue.
- The average cyclist that stops to eat spends nearly \$18 in Ohio, \$23 in Colorado, and \$34 in California.

One factor repeatedly cited by studies is that bicycling is an activity that occurs on a “human scale” – that is, at a speed that allows the cyclists to take in their surroundings and interact with their environment. Within an urban area, this means that cyclists will frequently stop to shop, investigate, and/or discover the area that they are in. Inevitably, this leads to more money being spent within a

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<sup>9</sup> <http://stc.ucdavis.edu/research/>

<sup>10</sup> <http://www.lrrb.org/pdf/200450.pdf>

<sup>11</sup> <http://www.americantrails.org/resources/economics/biketourismcolo.html>

<sup>12</sup> Antonakos, Cathy. (1993). Environmental and Travel Preferences of Cyclists. University of Michigan Doctoral Thesis.

<sup>13</sup> Personal conversations between 2004 and 2005.

<sup>14</sup> Better Models For Development in California: Ideas for Enhancing Small Towns and Suburban Communities, By: Edward T. McMahon with Shelly Mastran; Published by The Conservation Fund and Local Government Commission

<sup>15</sup> [http://www.ncdot.org/transit/bicycle/safety/safety\\_economicimpact.html](http://www.ncdot.org/transit/bicycle/safety/safety_economicimpact.html)

<sup>16</sup> [www.dot.wisconsin.gov/business/econdev/docs/impact-bicycling.pdf](http://www.dot.wisconsin.gov/business/econdev/docs/impact-bicycling.pdf)

<sup>17</sup> [www.maine.gov/mdot/opt/pdf/biketourismexecsumm.pdf](http://www.maine.gov/mdot/opt/pdf/biketourismexecsumm.pdf)

<sup>18</sup> [http://www.railstotrails.org/resources/documents/resource\\_docs/tgc\\_economic.pdf](http://www.railstotrails.org/resources/documents/resource_docs/tgc_economic.pdf)

<sup>19</sup> Economic Benefits of Trails and Greenways, published by the Rails to Trails Conservancy

<sup>20</sup> Link to:

[http://www.railstotrails.org/resources/documents/whatwedo/TrailLink%2007%20program\\_Economic%20Develop.pdf](http://www.railstotrails.org/resources/documents/whatwedo/TrailLink%2007%20program_Economic%20Develop.pdf)

<sup>21</sup> <http://www.railstotrails.org/whatwedo/trailadvocacy/ATFA/index.html>

<sup>22</sup> <http://www.bikesbelong.org/economicstats>

community. Ease of bicycle parking in areas congested with cars further increases the incentive to stop to shop.

For example, in communities that have bicycle facilities within a commercial area (such as the proposed Alto Tunnel), some of the benefits might be incurred through:

- Convenience and drug stores where commuters can pick up items on their way to and from work, or while running errands
- Entertainment establishments within a couple miles of the main bicycle route – such as movie theaters or venues with live music
- Food establishments, especially those offering quick and nutritious meals
- Coffee houses and bakeries for quick and pick-me-up snacks
- Bicycle retail outlets for sales and repairs
- Lodging facilities within two miles of the main bicycle route, through bicycle tourism
- Boutique stores

Communities such as Portland Oregon, Boulder Colorado, Madison Wisconsin, and Davis California have all seen the economic benefits of bicycling.

- In Portland OR, cyclists spend more time and money in the downtown area, as noted by the Bicycle Transportation Alliance. Downtown shoppers report feeling less pressed for time due to worries about time remaining on parking meters or hourly rates at parking garages.
- Madison, WI strategically placed bike racks outside many of their businesses in the downtown area and saw a 3% overall increase in sales tax revenues in the areas where they deployed the new bike racks.
- Davis CA shops command a rent premium along major cycling routes.

### ***Next Steps***

Bicycling brings business, and Alto Tunnel will result in the greatest increase in use along the Mill Valley - Corte Madera corridor. This benefit should be included in the Study, and numbers for increased tourism and sales tax revenue should be estimated and evaluated. The Study should also analyze how property values will increase near improved trails.

## 5H. Operations and Maintenance

### *Introduction*

There are several issues associated with maintenance that need to be further clarified within the study. MCBC recommends that additions and changes be made for the following topic areas.

### ***Tunnel Maintenance Costs***

**Removing the Proposed Night Closure of the Alto Tunnel:** The *Rails-to-Trails Conservancy's Tunnels on Trails* study indicates that all bicycle and pedestrian tunnels within the United States are open 24 hours/day. The fact that all other bicycle and pedestrian tunnels are open 24 hours/day should be included in the County's Study, as closing a tunnel is the exception, not the norm.

The Cal Park Hill Tunnel will be closed from 11 PM to 5 AM during the first six months after the tunnel is opened in 2010; after those six months of time, an assessment will be conducted regarding the hours of operation to see if the tunnel can be opened 24 hours/day (to be consistent with other tunnels throughout the United States). The cost of opening and closing the doors for the Cal Park Hill tunnel was estimated at \$75,000/year. If the Cal Park Hill tunnel and the Alto Tunnel were left open 24 hours/day the following would transpire:

- 1) It would considerably save on operation costs.
- 2) It would be consistent with other non-motorized tunnels throughout the United States.
- 3) It would improve safety by providing an alternative to routes where conflicts with cars could occur.
- 4) The *Tunnels on Trails* study indicates that areas are made safer through having transportation access on a regular basis. By keeping the tunnel open 24 hours/day it could actual help *reduce* the number of homeless, etc. near tunnel portals and on along pathway approaches, as homeless people tend to avoid areas where there is high public scrutiny.
- 5) It would reduce liability concerns (closing a transportation facility could incur liability if a collision with an automobile takes place on an alternative route).

We request that the Study detail these cost savings in an operations and maintenance estimate for the Alto Tunnel, which should include a spreadsheet and narrative. It is not adequate to simply state that since the Cal Park Hill

Tunnel operations and maintenance is projected to cost \$150,000/year, that Alto Tunnel would cost 1.5 times that amount. The \$150,000 estimate for Cal Park Hill tunnel should also be detailed with a spreadsheet and narrative. In both spreadsheets, please detail all maintenance and operations costs with particular attention to which features in the Cal Park Hill Tunnel might not be needed in the Alto Tunnel.

**Tunnel Amenities:** Additional operations and maintenances costs could be saved through:

- 1) Using solar powered lights, phones, etc within the tunnel
- 2) Coating the tunnel with vandalism proof materials
- 3) Creating volunteer neighborhood watch groups

We ask that the requested spreadsheet and narrative for operations and maintenance include this analysis.

### ***Roadway Maintenance Costs***

**Roadslides:** The Study does not currently address that there will be maintenance costs incurred through slides along Camino Alto and Horse Hill. This should be included within the Study.

**Pavement Maintenance:** The Study also does not address the need for major pavement maintenance along Camino Alto and Horse Hill, and the fact that roadways need to be resurfaced approximately every 20 years. The pavement condition of these roadways will deteriorate much more quickly that the tunnel because of the weight and volume of the automobile and truck users.

### ***Next Steps***

We request that the Consultants provide a detailed spreadsheet indicating annual maintenance and operations costs for each of the three routes, and that the Alto Tunnel route be shown with and without a nighttime closure. The maintenance and operations costs should be extrapolated over a 50 to 75 year time period.

## **5I. Greenhouse Gas Emissions and Meeting SB375 Targets**

### ***Introduction***

It has been widely documented by scientists that Marin County, the United States, and the world face major economic, ecological and other threats due to climate change.

The State of California has been leading efforts in the United States to address climate change issues, and the County of Marin and many cities and towns are also taking actions through policies set forth in their General Plans and other plans. In fact, mapping by the Bay Conservation and Development Commission showed that much of Marin County could be underwater if sea levels rise due to greenhouse gas-caused climate change.

As there are such major interests in addressing climate change in Marin County, we request that the Study go into this topic in much more detail, and analyze the impacts that each of the routes would have on reducing greenhouse gas emissions (after the use estimates are updated and quantified). These reductions should be quantified and explained in a narrative.

### ***State Laws***

The Study should detail AB32 and SB375. MCBC has provided a brief summary of both pieces of legislation below.

AB32, the Global Warming Solutions Act (state law passed in 2006) aims to reduce greenhouse gas emissions to 1990 levels by 2020 – that’s about 35% below business as usual. It also commits the state to reducing greenhouse gas emissions to 80% below 1990 levels by 2050. To achieve this goal, the Governor’s Climate Action Team identified “smart land use and intelligent transportation” as a key strategy. The California Air Resource Board (CARB) is the state agency responsible for regulation of AB32. See this link for details: <http://www.arb.ca.gov/cc/ab32/ab32.htm>

The CARB website also indicates California state law ([Senate Bill 375 \(SB 375\)](#), Statutes of 2008) requires the California Air Resources Board (ARB) to set regional targets for the purpose of reducing greenhouse gas emissions from passenger vehicles, for 2020 and 2035. If regions develop integrated land use, housing and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain review requirements of the [California](#)

[Environmental Quality Act](#). The targets apply to the regions in the State covered by the [18 metropolitan planning organizations \(MPOs\)](#).

### ***Key Facts Related to Climate Change and Transportation***

Transportation is the largest single source of greenhouse gas emissions in California (38%) and in Marin County (62%). Cars and light trucks contribute the majority of these emissions.

Unless we change our growth and development patterns, vehicle miles traveled in California (VMT) will increase by 70% in the next 30 years, canceling out the emissions benefits of improved fuel economy and low carbon fuels.

According to numerous studies, planning walkable, bikeable, transit-friendly communities can reduce greenhouse gas emissions 20 to 40%.

### ***Next Steps***

The Study should quantify emissions reduced through mode shift from each of the three routes, using the revised and documented use numbers. It should also detail AB32 and SB375 legal issues and how Marin County will need to reduce its greenhouse gas emissions, 62% of which come from the transportation sector.

## 5J. Right-of-Way Issues

### ***Introduction***

As with many types of capital improvements involving transportation infrastructure, each of the routes in the Study have right-of-way (ROW) implications of one kind or another. ROW issues can be complex and expensive to resolve; this is especially true if encroachment is required for improvements on or under private property.

### ***Easement Issues- Mill Valley to Corte Madera Routes***

The 3 routes currently under study by the County of Marin- Camino Alto, Horse Hill and the Alto Tunnel each have various ROW issues associated with them.

The Horse Hill ROW issues are the least problematic in terms of the number of ROW impacts, but there would be acquisition or purchase requirements for widening the Horse Hill Pathway.

The Alto Tunnel has various ROW issues as are detailed in Appendix G in the Study. The Alto Tunnel would go under seven privately owned ROW's, and easements would need to be verified/acquired for tunnel reconstruction to go forward.

Camino Alto has significant ROW issues as indicated in the Study. These include changes to private property along the ROW as noted in Chapter 2 of the Study. The Study indicates that modifications to 36 driveways would need to be made to conform to a widened road and/or path. Such modifications would require acquisition/purchase of easements for land from private property owners. Some property owners are not in favor of losing land or parking on Camino Alto/Corte Madera Avenue.

### ***Next Steps***

Appendix G details issues pertaining to ROW issues for the Alto Tunnel route but does not do so for the other routes. Many of the same or similar issues exist on the other routes, and as is the case with the widening of Camino Alto/Corte Madera Avenue and may be equally or more complex and expensive to resolve.

1. Please expand Appendix G in the Study to include right-of-way issues and challenges for all three of the routes. Please include for all routes:
  - a. Maps of affected parcels
  - b. A table of parcels that includes the assessors parcel numbers, the owner and other appropriate information such as parcel location (as you have done in Appendix G for the Alto Tunnel)

- c. A discussion of the potential costs of any needed negotiations or potential litigation for easement acquisition
2. In Appendix G of the Study the cost of title research and mapping is in the range of \$6,000 to \$12,000 for the Alto Tunnel parcels in Table 1. MCBC request that this title research be done as part of this study for both the Alto Tunnel parcels and for any other parcels on the other routes where such needs may exist.
  3. Please correct Page 1 in Appendix G, paragraph 3 by removing the word “on” in the following sentence, “Some portions of the route, including the tunnel, are on/under private parcels”. Based on the map in Appendix G, all of the Alto Tunnel route is under private parcels.
  4. Please remove paragraph 4 in Appendix G or cite the identity and qualifications of the “neighboring resident”. This paragraph as written is hearsay and is not appropriate for this Study.
  5. Please cite in Appendix G the quote from Appendix B by Jacobs Associates that says, “Tunnel excavation and support can be carried out without having to condemn or acquire properties adjacent to the tunnel portal.” This is critically important for community members and policy-makers to understand as tunnel opponents frequently state that homes will need to be condemned/removed to build the tunnel.
  6. Please detail the cost estimate on Appendix G, page 2 of \$500,000 to \$1.5 million for parcel/ROW acquisition negotiation, documentation and purchase and do the same for estimated costs for the Camino Alto and Horse Hill routes. For the Camino Alto and Horse Hill routes please include these costs in the overall route cost estimates.
  7. Please include the paper- Over and Under- A Practical Guide to the Condemnation of Aerial Guideway Easements and Tunnel Easements in the Appendix of the Study. This is included in our Report as Appendix F and can be found at:  
<http://www.grahamdunn.com/download.cfm?DownloadFile=7D5A7957-3048-56D1-FE15FBD3C1EA3FDC>

This paper looks at easement acquisitions that took place in 2005 in the Seattle area for a tunnel project and contains a comprehensive discussion about jury findings that resulted in the value of the acquired underground easement being priced at 1% of the value of properties above the tunnel.

## **5K. ADA Accessibility Issues**

### ***ADA Background***

With the passage of the Americans with Disabilities Act (ADA) in 1990, Congress indicated in its findings that, “the continuing existence of unfair and unnecessary discrimination and prejudice denies people with disabilities the opportunity to compete on an equal basis and to pursue those opportunities for which our free society is justifiably famous.”<sup>23</sup>

It is the intent of the ADA to assure the equality of opportunity, full participation, independent living and economic self-sufficiency for people with disabilities. With respect to access on publicly-owned right-of-ways, “it is the long-term intent of the ADA that publicly available services along public streets be accessible to people with disabilities via a continuous unobstructed pedestrian circulation network.”<sup>24</sup>

### ***ADA and the Mill Valley to Corte Madera Corridor Study- Camino Alto and Horse Hill***

Roadway and pathway improvements between Mill Valley and Corte Madera are subject to ADA requirements as are all capital improvement projects. On the Camino Alto and Horse Hill routes, natural terrain such as the steep slopes, constrained widths and other right-of-way constraints make this route impractical and infeasible as an ADA compliant route. Despite the possibility that the Horse Hill Class 1 pathway could be made ADA compliant by constructing the “Sunken/Raised Path Concept,” there are many other challenges/issues on the roads that connect to this pathway that would need to be overcome in order to make this *route* ADA compliant. As a result, the Camino Alto and Horse Hill routes cannot be considered as ADA-compliant routes between these two communities; please cite this in the Study.

### ***The Alto Tunnel Route***

Of the three routes in the Study, the Alto Tunnel is superior in that it provides a safe, relatively level ADA accessible route between Mill Valley and Corte Madera. This route allows all non-motorized users (pedestrians, bicyclists and mobility impaired) the ability to travel independently between Corte Madera and Mill Valley. This would be the first time that people with disabilities could travel

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<sup>23</sup> Americans with Disabilities Act: 1990. Title 42, Chapter 126, Section 12101 Congressional Findings 1990. United States Code

<sup>24</sup> Kockelman, Kara, et. al 1999: The Nature of ADA’s Sidewalk Cross-Slopes Requirements: A Review of the Literature. University of Texas at Austin, November 1999.

between these communities under their own power.

### ***Next Steps***

1. Please provide an overall assessment of ADA needs for the Study area and provide more detail and evaluation regarding ADA access for the three routes beyond what you have provided in the Evaluation Matrix, Table 3.1. Please include in your evaluation issues related to safety, slope and other pedestrian/ADA needs.
2. Please indicate, as part of your assessment, which of the three routes provide the best ADA access with respect to the intent of ADA– “to assure the equality of opportunity, full participation, independent living and economic self sufficiency for people with disabilities.”
3. Please compare and evaluate any other potential community benefits that would be realized from having an ADA-accessible route between Mill Valley and Corte Madera.

## 5L. Funding Sources

### *Introduction*

The Study should include information about funding sources for transportation projects (such as we have detailed in Appendix E of our Report), and it should detail how the Cal Park Hill Tunnel, a \$25 million project was funded. In addition, the Study should make it very clear that funding these transportation routes would not be taken from other funding needs such as schools.

### *Cal Park Hill Tunnel*

MCBC requests that the Study include a summary of how the Cal Park Hill Tunnel was funded, to show that funding a large capital project is possible. We understand that costs for the \$25M project are being split by the County of Marin and SMART and that funding sources came from the following:

- ✓ **Federal:** Transportation Enhancements
- ✓ **State:** Bicycle Transportation Account
- ✓ **Regional:** Transportation Funds for Clean Air (through Bay Area Air Quality Management District)
- ✓ **Regional:** Regional Measure 2 (Bridge Tolls through Bay Area Toll Authority)

The Transportation Authority of Marin's fact sheet for Cal Park Hill Tunnel can be found here: <http://www.tam.ca.gov/index.aspx?page=92>.

### *Cost Comparisons to Freeway Improvements*

We also request that for comparison purposes that the Study include the costs of recently completed and proposed freeway projects in Marin County. This is necessary so that policy makers and the public can develop a deeper understanding about the relative costs of capital projects and so they can further quantify and compare the costs of transportation projects. For example:

- ✓ **HOV Larkspur to San Rafael:** It cost approximately \$200 million to widen Highway 101 one lane in each direction for the 4.5 miles from the Larkspur Ferry Terminal to the Civic Center.

- ✓ **Sonoma Marin Narrows:** The Transportation Authority of Marin projects an estimated cost of \$745 million to widen Highway 101 one lane in each direction for 17 miles from Novato to Petaluma:  
<http://www.tam.ca.gov/index.aspx?page=92>.

### ***Creating a Nonmotorized Network and Average Costs***

MCBC also requests that the revised Study detail that costs for specific projects within the context of the overall non-motorized transportation system. For example, studies on highway projects do not highlight only the most costly bridge or tunnel element, they detail the cost of the overall system. Likewise, a similar approach should be utilized for the Mill Valley to Corte Madera Gap Closure. This gap closure represents an expensive piece of the planned non-motorized system in Marin County, but when combined with the hundreds of miles of additional existing and planned facilities, it becomes clear that that cost per mile of the entire system is much less. In addition, there are synergistic benefits associated with increased bicycle and pedestrian use when gaps are closed within a system. These benefits (including health, greenhouse gas emission reductions and safety) should be considered within the context when discussing costs.

### ***Other Potential Funding Sources***

In addition to the sources of funding detailed in Appendix E (which was prepared by Alta Planning and Design for the Town of Ross' proposed Bicycle and Pedestrian Master Plan), the following sources of funding should be included:

**Active Transportation Funding:** Congress will soon be considering a new bill, which will make funding available for communities implementing complete bicycle and pedestrian networks.

**Climate:** Funding could become available through the result of existing state and proposed federal legislation associated with abating climate change.

**Other:** Major donors or companies might be interested in funding an innovative project like the Alto Tunnel if their name could be associated with the final construction.

## 5M. Health

### ***Introduction***

The Study should be revised to more thoroughly vet issues and costs associated with health, physical activity and obesity, and the need to improve the built environment to increase safe opportunities for Marin County residents to engage in healthy physical activity.

According to the Marin County Health Department:

<http://www.co.marin.ca.us/depts/HH/main/epi/pdf/key/obesity.pdf>

- ✓ 30% of Marin County women and 58% of Marin County men are overweight or obese, having BMIs above 25.6, and
- ✓ 34% of Marin county children between the ages of 2 and 17 are overweight, at risk of overweight, or obese.

### ***Studies Linking Infrastructure with Physical Activity and Health***

The organization Active Living Research, which is funded by the Robert Wood Johnson Foundation, provides detailed information and studies showing the correlation between the built environment, physical activity, and costs incurred related to obesity:

<http://www.activelivingresearch.org/alr/resourcesearch/summaries>

For example, the Active Living Research Brief titled *Active Transportation* includes the following findings, which are referenced in the document itself

[http://www.activelivingresearch.org/files/ALR\\_Brief\\_ActiveTransportation.pdf](http://www.activelivingresearch.org/files/ALR_Brief_ActiveTransportation.pdf):

- ✓ More and better-quality sidewalks are associated with adults having both higher rates of walking and of meeting physical activity recommendations, and with a lower likelihood of being overweight. Similarly, the presence of bicycle lanes and paths is positively related to cycling and to more adults meeting physical activity recommendations.
- ✓ Cities that invest in bicycle facilities exhibit higher levels of bicycle commuting.
- ✓ A survey of more than 11,500 participants in 11 countries found that residents of neighborhoods with sidewalks on most streets were 47 percent more likely to get moderate-to-vigorous physical activity at least five days per week for at least 30 minutes each day than were residents of neighborhoods with sidewalks on few or no streets.

- ✓ A review of 16 studies found that people who reported having access to sidewalks were 20 percent more likely to be physically active than those reporting no access to sidewalks.
- ✓ One study of cities across the country estimated that, for every 1 percent increase in the length of on-street bicycle lanes, there was a 0.31 percent increase in bicycle commuters.

### ***Next Steps***

The Study should be revised to include more information about health and physical activity benefits for each of the routes, and should attempt to quantify how the cost of the investment in improving the routes might be offset through increases in physical activity (using the revised use numbers for the Study).

## 5N. Adjacent Property Impacts and Overall Benefits to the Community

### *Introduction*

The Study goes into great detail about the projected negative impacts that the Alto Tunnel would provide to adjacent property owners but does adequately quantify the benefits to these property owners, or to the rest of the residents of Marin County, Mill Valley and Corte Madera. There would be significant benefits to creating a flat non-motorized transportation network in Marin County. The Study also does not currently include a similar analysis of concerns associated with Camino Alto and Horse Hill routes. These issues should be addressed in the revision.

### *Alto Tunnel*

The Study should be revised to address the following:

- 1) Potential property value increases associated with opening the tunnel in the Scott Valley and Chapman Meadows neighborhoods. As noted in section 5G of this Report, numerous studies show that improvements to trails result in property value increases..
- 2) The benefits for public utilities and facilities (power, water, gas and roadways) that would come with a reconstructed Alto Tunnel.
- 3) Overall benefits to all of Marin County through increased bicycle and pedestrian commuting which would results through opening of the Alto Tunnel and benefit public health and a reduction in greenhouse gas emissions.
- 4) Impacts to neighbors above the tunnel from stabilizing the tunnel (filling it), including construction noise from boring holes near homes, any safety issues that might arise from such work, construction equipment (trucks, drilling rigs, etc.) traveling through and across neighborhoods, etc. (Note: if something must be done to stabilize the tunnel, the impacts of filling it must also be addressed).

While the concerns of the immediate neighbors must be addressed for a reconstructed Alto Tunnel (many of which can be addressed through design and nonstructural means), the overall benefits to Marin County of opening the Alto Tunnel must also be factored into the decision-making process.

The report should also note that there are Alto Tunnel supporters who live within Scott Valley and Chapman Meadows.

Please evaluate by what means Alto Tunnel concerns might be addressed, including the use of fencing, sound barriers and/or non-structural measures that mitigate neighbor concerns.

### ***Camino Alto***

The Study should be revised to address the following:

- 1) How the proposed widening of Camino Alto would affect automobile speeds, collisions, and the character of the community.
- 2) How Camino Alto neighbors feel about the potential impact to driveways and the loss of parking due to roadway widening, and how this might be mitigated.
- 3) Maintenance issues associated with the potential for increased landslides.

### ***Horse Hill***

The Study should be revised to address the following:

- 1) Maintenance issues associated with the potential for increased landslides.
- 2) How the implementation of this route would involve Caltrans.

### ***Next Steps***

The questions raised in this section of the Report, and other issues associated with localized impacts and overall community benefits, should be addressed in the revised Study.

## 50. Transparency

### *Introduction*

“Transparency in government means that citizens are able to “see through” its workings, to know exactly what goes on when public officials transact public business. Transparency is a way of protecting fairness and ensuring the common good... when citizens know what their government is up to, they have a better chance of ensuring that decisions treat everyone equally and protect the common conditions that are important to everyone's welfare.”<sup>25</sup>

### ***Transparency and the Mill Valley to Corte Madera Corridor Study***

The Marin County Bicycle Coalition has concerns regarding transparency throughout the process and preparation of this Study. There are several areas where there is a lack of transparency and which is therefore a cause for concern.

These include:

- 1 The Study team held at least one private meeting with some local residents opposed to opening the Alto tunnel; these meetings were not mentioned, explained or justified in the Study and similar meetings were not held with Alto Tunnel proponents, or people concerned about the other two routes.
- 2 The Technical Advisory Committee (TAC) meetings were all held in private. These important meetings are where the majority of the decision-making for the context and the content of the Study took place. Had the meetings been more transparent, a more balanced treatment of each of the routes might have been presented in the Study draft.
- 3 At the March 4, 2009 public meeting, County staff indicated that public comments letters submitted to the County would be included

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<sup>25</sup> Nadler, Judy and Miriam Schulman, 2006: Open Meetings, Open Records, and Transparency in Government prepared for the Markkula Center for Applied Ethics program in Government Ethics  
[http://www.scu.edu/ethics/practicing/focusareas/government\\_ethics/introduction/open-meetings.html](http://www.scu.edu/ethics/practicing/focusareas/government_ethics/introduction/open-meetings.html)

in the Study but only a summary of comments was included. In the spirit of sharing important public information, MCBC believes letters should be made available on the website or in the report appendices.

4. At the December 9, 2009 public meeting, LandPeople's presentation included a summary of all three routes, but the projected costs only for the Alto Tunnel, not the other routes.
5. Appendix B of the Study lists:

*"Articles by John Palmer-* Mr. John Palmer prepared a series of articles describing the Alto Tunnel history, the technical studies completed through 2003, and his opinion of the issues associated with reopening the tunnel."

While Mr. Palmer's document contains a well-written summary of the history of the tunnel, its collapses and engineering studies, his work can hardly be construed as a "study". The actual studies to which Mr. Palmer refers are already included on the walkbikemarin.org website and are already referenced in the Study. *Articles by John Palmer* contains a chapter entitled, "Reconstructing the Alto Tunnel – Pro and Con", which is a strongly biased anti-Alto tunnel chapter. For the reasons above, the Marin County Bicycle Coalition believes this kind of document should not be referenced in the Study.

## ***Next Steps***

The Marin County Bicycle Coalition requests that the County of Marin make the remaining process for finalizing this Study more transparent. Below are MCBC's recommendations for doing so:

1. Expand the Mill Valley to Corte Madera Corridor Study TAC to include MCBC, Transportation Alternatives of Marin and other additional stakeholders from each respective community.
2. Please describe the circumstances regarding any private meeting(s) that took place with stakeholder groups in the final Study, and include meeting minutes, attendees, and the location and date of the meeting(s)
3. Explain or develop (and include in the Study) a County policy for holding private stakeholder meetings so that other Mill Valley/Corte Madera Corridor stakeholders have an opportunity to meet with consultants and/or County staff prior to the Study being finalized.

4. Describe the criteria for including documents as part of this Study. If the County cannot justify having a document referenced that contains strong opinions such as does, "Articles by John Palmer" that document should be removed from the reference list in Appendix B. If, on the other hand, such documents fit within the County criteria for inclusion, the Marin County Bicycle Coalition requests that some MCBC documents about the corridor be referenced in the Study some of which can be found on our website.
5. MCBC requests that all letters and public comments that were submitted before and after the March 4, 2009 meeting and comments that are currently being submitted be included in an Appendix in the final Study.

## 6. Summary of Recommendations for Next Steps

### ***A) Existing Study***

The Marin County Bicycle Coalition recommends that the County of Marin direct the consultants to perform the following next steps for the existing Study:

- A) Address Underlined Issues in this Report:** MCBC has underlined the specific questions and recommendations throughout our Report that we believe should be addressed in the Study revision.
- B) Expand the Technical Advisory Committee:** The TAC currently only includes public agencies. It should be expanded to include the Marin County Bicycle Coalition, Transportation Alternatives for Marin, and other stakeholders including neighbors near all three of the routes.
- C) Resolve the Property Issues:** Appendix G indicates that it could cost \$6,000 - \$12,000 to research title issues associated with property ownership. This research should take place as part of the current \$225,000 study, and should be included in the final Study.
- D) Board of Supervisors Hearing:** The revised Study should be released 30 days prior to a hearing before the Board of Supervisors where the final Study would be heard and public comment would be accepted. To ensure that the Study is completely finalized by July 31st, the Board hearing should take place in early July, and the revised Study should be released by early June.
- E) Next Steps:** The final Study should clearly delineate in one location the next steps that should be undertaken to further the process for evaluating, designing and building the three routes.

### ***B) Future Analysis***

The Marin County Bicycle Coalition recommends that the Board of Supervisors release a request for proposals as soon as possible (this Spring) to conduct the following tasks:

- 1) **Preliminary Engineering:** Funds should be appropriated to bring all three of the routes to preliminary engineering (30% design is the recommended level).
- 2) **Environmental Review:** NEPA and CEQA environmental clearance should be undertaken for all three of the routes analyzed in the Study.

## **Appendix A**

Alta/Land People Evaluation Matrix from the Study

Table 3-1: Route Alternatives Evaluation Matrix

Route Alternatives Performance			
Criteria	Horse Hill Route	Alto Tunnel Route	Camino Alto/Corte Madera Ave Route
<b>Emergency Access and Response</b>	<b>Good</b> , except along the Horse Hill Path. Concepts to widen path would improve access.	<b>Fair</b> . Tunnel would present access challenges for emergency personnel, partially mitigated by safety improvement concepts. Tunnel would provide a new emergency egress route between communities.	<b>Excellent</b> . All portions are along public roads.
<b>User/Public Safety – separation from traffic</b>	<b>Good</b> . Separated from traffic or on low volume roads, but Sanford and Madera Street intersection is challenging.	<b>Good</b> . Entirely separated from roads if Montecito pathway improvements are implemented, but mixing user types in tunnel is a concern, as is sense of personal safety.	<b>Fair</b> . All portions are along busy, winding, narrow public roads, but widening will significantly improve safety from current.
<b>Bikeway and Community Connections</b>	<b>Good</b> . A less direct route from central Mill Valley to central Corte Madera, but connects directly to Town Center shopping area and to improvements planned in the Highway 101 Twin Cities Corridor Study by TAM.	<b>Excellent</b> . A direct, virtually flat link between the two most popular pathways in the County, and between central MV and CM.	<b>Fair</b> . Links central MV and CM, but a longer, winding route.
<b>Functionality/ Efficiency – Bicycles</b>	<b>Fair</b> . Involves two steep hills of 10% and 8% slope. A longer and less direct route. Exposure to freeway traffic noise, view and nighttime glare. May be partially addressed by improvements.	<b>Good</b> . Flat and relatively straight. Potential conflict with other users in the tunnel, aesthetic and safety concerns may deter some users.	<b>Fair</b> . Involves climbing a steep hill and mixing with cars on a winding road. Even with climbing lanes or bike lanes some bicyclists would feel uncomfortable on this route. But scenic and challenging for avid bicyclists.

Route Alternatives Performance			
Criteria	Horse Hill Route	Alto Tunnel Route	Camino Alto/Corte Madera Ave Route
<b>Functionality/ Efficiency – Pedestrians/ Persons with disabilities</b>	<b>Poor/Fair.</b> Southern and northern portions have sidewalks or path and low gradients. Horse Hill Path and part of Casa Buena have steep grade. Southern Meadowsweet and Casa Buena lack sidewalk or path, and use patterns and adjacent land uses and resources do not support adding pedestrian improvements.	<b>Good.</b> Excellent relative to gradient and surface, but potential conflicts with bikes in tunnel and concerns about personal comfort and perceived safety in the tunnel pertain.	<b>Poor.</b> A steep route exposed to heavy traffic with discontinuous sidewalks and path. Extension of sidewalk on Camino Alto north to Overhill and improvements to Corte Madera Avenue path would improve access on those portions, but not through access. Use patterns and adjacent land uses and resources do not support adding pedestrian improvements.
<b>Mode Shift/Use Levels</b>	<b>Fair.</b> An estimated 10% increase in use due to limited ability to improve existing route conditions, and current relatively low popularity.	<b>Excellent.</b> Estimated use and vehicle miles travelled savings approximately five times the projected level for Horse Hill Route, and twice the level for Camino Alto/Corte Madera Ave. Route, based on capturing 50% of users of adjacent existing paths.	<b>Good.</b> An estimated 25% increase in use, primarily by bicyclists, on this already popular route, due to potential significant improvement in safety and conflict with vehicles.
<b>Roadway Crossings and Intersections</b>	<b>Fair.</b> Most of route avoids major crossings, but conflicts at freeway on-ramp on Casa Buena, and complex intersection at Sanford Street.	<b>Excellent.</b> Crossings at E. Blithedale and Redwood Avenue comparable to other 2 routes; only other crossing is Vasco Court.	<b>Fair.</b> Crossing at and connection from E. Blithedale and at Redwood Ave. could be improved, no other major road crossing issues, but many intersecting roads .

Route Alternatives Performance			
Criteria	Horse Hill Route	Alto Tunnel Route	Camino Alto/Corte Madera Ave Route
<b>Right-of-Way Availability/ Issues</b>	<b>Good.</b> Requires Caltrans permission, permit to make improvements on Horse Hill path.	<b>Poor.</b> Parts of the route in a variety of ownerships. Requires significant study and negotiation process to resolve.	<b>Fair.</b> Involves changes to private improvements in the R.O.W., as noted under Adjacent Property Issues. Limited available ROW for improvements requires careful design
<b>Environmental Issues</b>	<b>Good.</b> Changes to grassland and scrub if Horse Hill Path widened, Meadowsweet connection implemented. Potential cultural resources and hazardous materials (along Highway 101) constraints. Construction noise and activity.	<b>Poor.</b> Removal of native trees and vegetation along the right of way near tunnel portals, construction in wet area habitat, potential soil contamination along rail route. Geologic and hydrologic considerations. Construction noise and activity, and safety and community impacts to be assessed. Potential cultural resources constraints.	<b>Fair.</b> Changes to adjacent hillsides by path widening – removal of trees, shrubs, grassland adjacent to open space, visual changes with retaining walls. Potential cultural resources and regulatory waters constraints. Construction noise and activity.
<b>Adjacent Property Issues</b>	<b>Fair.</b> Major bike route passing Maguire Elementary School campus a concern. May be concerns about impact on freeway.	<b>Poor.</b> Improvements and introduction of up to 850,000 annual users a significant change to the character of the neighborhoods to the south and north of the tunnel portal. Construction noise and activity will affect.	<b>Good/Fair.</b> Construction noise and activity will affect, but no lasting impact on adjacent properties on southern 3/4 of route. Localized changes in neighborhoods along Corte Madera Avenue, loss of some parking.
<b>Cost</b>	<b>Good/Fair.</b> \$4.4 - \$5.5 million Route 4A or 4B Sunken Path Option \$9 - \$10.2 million E. Blithedale Separated Crossing: <u>add</u> \$3.4 - \$4 million	<b>Poor.</b> \$48 - \$52 million E. Blithedale Separated Crossing: <u>add</u> \$3.4 - \$4 million	<b>Good.</b> \$4.6 million With sidewalk extension to Overlook Road: \$5.5 million E. Blithedale Separated Crossing: <u>add</u> \$3.4 - \$4 million

Route Alternatives Performance			
Criteria	Horse Hill Route	Alto Tunnel Route	Camino Alto/Corte Madera Ave Route
<b>Permitting and Agreement Requirements</b>	<b>Fair.</b> Requires Caltrans permission, permit to make improvements on Horse Hill path.	<b>Poor.</b> Requires delineation of potential wetlands, permits from state and federal environmental agencies, agreement between County and two cities.	<b>Fair.</b> Requires delineation of potential wetlands/drainages and/or permits from state and federal environmental agencies. Otherwise requires only approval of Mill Valley and Corte Madera.
<b>Consistency with Local Plans</b>	<b>Undetermined.</b> Listed as an option in Co. Unincorporated Area Bike and Ped. Master Plan, but not in City plans. Lomita portion is in unincorporated area. Part is an adopted County bike route.	<b>Good.</b> Incorporated in adopted bicycle plans. Adopted plans direct current study.	<b>Good.</b> Consistent with County, Mill Valley, and Corte Madera adopted bicycle and pedestrian plans.
<b>Maintenance and Operation Requirements</b>	<b>Good/Fair.</b> Basic improvements primarily additions and modifications to existing facilities, but Sunken Path option brings added maintenance (drainage; retaining walls long-term maintenance responsibility).	<b>Poor.</b> Tunnel and connecting pathways, drainage facilities, and tunnel safety and emergency features would be a large operation and maintenance responsibility.	<b>Fair.</b> Primarily additions and modifications to existing road and drainage facilities, but extensive retaining walls would be a long-term maintenance responsibility.



## **Appendix B**

Promoting Safe Walking and Bicycling to Improve Public Health:  
Lessons from The Netherlands and Germany, by John Pucher,  
PhD, and Lewis Dijkstra, PhD

# Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany

John Pucher, PhD, and Lewis Dijkstra, PhD

**Objectives.** We examined the public health consequences of unsafe and inconvenient walking and bicycling conditions in American cities to suggest improvements based on successful policies in The Netherlands and Germany.

**Methods.** Secondary data from national travel and crash surveys were used to compute fatality trends from 1975 to 2001 and fatality and injury rates for pedestrians and cyclists in The Netherlands, Germany, and the United States in 2000.

**Results.** American pedestrians and cyclists were much more likely to be killed or injured than were Dutch and German pedestrians and cyclists, both on a per-trip and on a per-kilometer basis.

**Conclusions.** A wide range of measures are available to improve the safety of walking and cycling in American cities, both to reduce fatalities and injuries and to encourage walking and cycling. (*Am J Public Health.* 2003;93:1509–1516)

Improving conditions for walking and bicycling in our cities is vital for America's public health. The measures described in this article would not only reduce pedestrian and cycling fatalities and injuries but also allow millions of people, many of them dangerously overweight, to bike or walk for some of their short trips and thus obtain healthful exercise in the course of daily life. More walking and cycling would yield further public health benefits by reducing the use of automobiles, thus diminishing air and noise pollution and the overall level of traffic danger.

The United States is gripped by a worsening epidemic of obesity. Nationwide surveys based on self-reported weight and height indicate an increase in obesity from 12% of adults in 1991 to 20% in 2000.<sup>1</sup> Estimates of obesity based on clinical measurements of weight and height are considerably higher, indicating that in 2000, 31% of the adult population was obese (body mass index [BMI]  $\geq$  30) and 64% was overweight (BMI  $\geq$  25).<sup>2</sup> Many studies suggest that lack of physical exercise is one important reason for the alarming trend toward increased obesity. Several articles and editorials in the leading medical and public health journals have explicitly advocated more walking and cycling for daily travel as the most affordable, feasible, and dependable way for people to get the additional

exercise they need.<sup>3–7</sup> Similarly, the US surgeon general specifically recommends more walking and cycling for practical, daily travel as an ideal approach to raising physical activity levels.<sup>8</sup>

Even in the sprawling metropolitan areas of the United States, 41% of all trips in 2001 were shorter than 2 miles, and 28% were shorter than 1 mile.<sup>9</sup> Bicycling can easily cover distances of up to 2 miles, and most people can walk at least a mile.<sup>10</sup> Yet Americans use their cars for 66% of all trips up to a mile long and for 89% of all trips between 1 and 2 miles long.<sup>9</sup> Clearly, there is enormous potential for increased walking and cycling over these shorter trip distances.

There are 2 problems with proposals to increase walking and cycling: their current danger and inconvenience in most American cities. As documented in this article, walking and cycling in the United States are much more dangerous than car travel, both on a per-trip and per-mile basis. Moreover, the lack of proper pedestrian and bicycling facilities makes walking and cycling not only unsafe but also inconvenient, slow, unpleasant, and unfeasible in most places.

The good news presented in this article is that it is indeed possible to achieve safe and convenient walking and cycling conditions, as demonstrated by the experience of Germany and The Netherlands. Those 2 countries have

implemented a wide range of policies over the past 2 decades that have simultaneously encouraged walking and cycling while dramatically lowering pedestrian and bicyclist fatalities and injuries and keeping auto use at only half the American level. The Netherlands and Germany provide valuable lessons for integrating more physical exercise into the lives of Americans.

This article first examines variations in walking and cycling levels among North American and Western European countries and then focuses on The Netherlands, Germany, and the United States in particular. We examine differences in travel behavior, fatality and injury rates, and trends over time. Most importantly, we describe the 6 categories of policies in The Netherlands and Germany that have made walking and cycling such safe and attractive alternatives to driving: better facilities for walking and cycling, urban design sensitive to the needs of nonmotorists, the traffic calming of residential neighborhoods, restrictions on motor vehicle use in cities, rigorous traffic education of both motorists and nonmotorists, and strict enforcement of traffic regulations protecting pedestrians and bicyclists.

## DATA AND METHODS

We relied on secondary sources for all the data series discussed in this article. They are the official national sources of statistics on travel behavior and traffic accidents in each country. For the United States, the data for travel behavior came from the 1995 Nationwide Personal Transportation Survey and the 2001 National Household Travel Survey, both conducted by the US Department of Transportation (Federal Highway Administration).<sup>11</sup> The data on traffic fatalities also came from the US Department of Transportation (National Highway Traffic Safety Administration),<sup>12</sup> while the injury data came

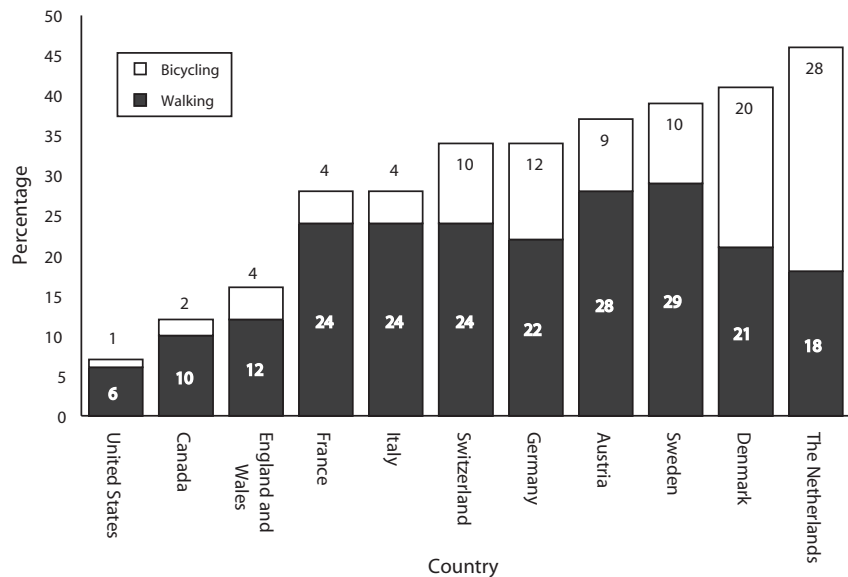
from the Centers for Disease Control and Prevention (CDC).<sup>13</sup>

For Germany, the data on travel behavior came from the German Ministry of Transport<sup>14,15</sup> and the German Institute of Economic Research.<sup>16</sup> The German fatality and injury data came from the Federal Statistical Office<sup>17</sup> and the Federal Traffic Institute.<sup>18</sup>

The data for The Netherlands came from Statistics Netherlands<sup>19</sup> and the Dutch Ministry of Transport.<sup>20</sup> Each of these surveys and other data collection procedures relied on extensive underlying methodologies that cannot be discussed here. Interested readers can consult any of the individual sources for detailed information. We note in the text and figures the specific sources and any important differences among the countries in definition or methods.

Some of these data series are more comparable across countries than others. The travel surveys measuring usage of different means of transportation rely on basically the same definitions of transport modes but use varying methodologies for sampling and trip measurement. The data on traffic fatalities are quite reliable. Studies indicate that roughly 95% of all traffic fatalities are reported to the police and thus appear in official records.<sup>21</sup> Moreover, all the countries that we examined define traffic fatalities as occurring within 30 days of the crash.

Traffic injury data are far less comparable. Underreporting of pedestrian and cyclist injuries is a problem in all countries. For the United States, we used the CDC injury estimates from WISQARS, which are based on a representative survey of injuries reported by hospital emergency rooms.<sup>13</sup> Even those estimates underreport total injuries since they exclude minor injuries not requiring a hospital visit. The Dutch and German injury estimates are based on police reports. One study estimated that Dutch police reports captured only 15% of minor injuries to pedestrians and cyclists but 60% of all injuries requiring a hospital visit.<sup>22</sup> German police reports captured 16% of minor injuries but 48% of injuries requiring a hospital visit.<sup>21</sup> Thus, the Dutch and German estimates of injuries should be roughly doubled to make them comparable to the hospital-based injury estimates of the CDC.



Note. Modal split distributions for different countries are not fully comparable owing to differences in trip definitions, survey methodologies, and urban area boundaries. The distributions given here are intended to show the approximate differences among countries and should not be used for exact comparisons.

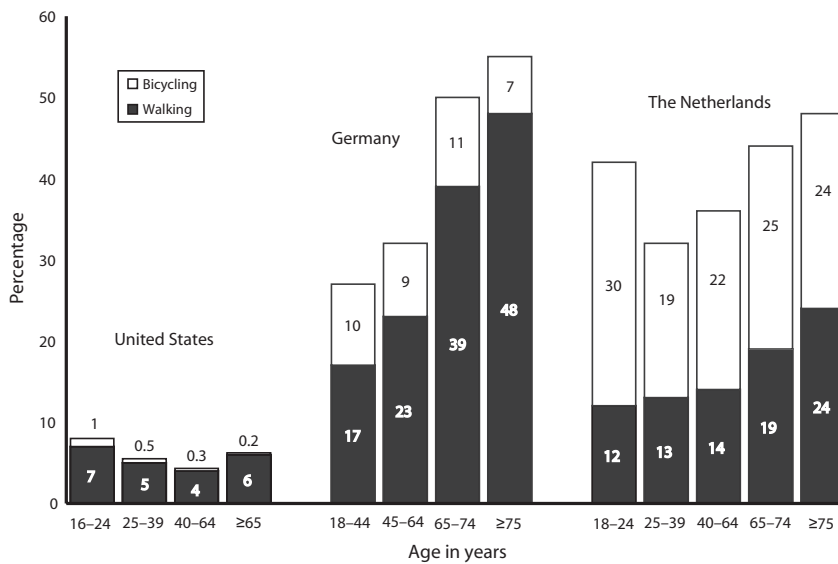
Source. Transportation Research Board,<sup>29</sup> Table 2-2, p. 30.

**FIGURE 1—Percentage of trips in urban areas made by walking and bicycling in North America and Europe, 1995.**

### VARIATION AMONG COUNTRIES IN LEVELS OF WALKING AND CYCLING

Unfortunately, trends in travel behavior in the United States could hardly be worse for public health. The journey-to-work section of the US Census indicates that the percentage of all work trips made by walking fell from 10.3% in 1960 to only 2.9% in 2000.<sup>23</sup> Including all trip purposes, the Nationwide Personal Transportation Survey shows that the percentage of urban trips made by walking and cycling fell from 10.0% in 1977 to only 6.3% in 1995, which is far lower than in most other countries.<sup>9,10</sup> Figure 1 shows the percentage of all urban trips made in 1995 by walking and cycling in the United States, Canada, and 9 European countries.<sup>24</sup> Even Canada has almost twice the percentage of walk and bike trips as in the United States. In most European countries, at least a fourth of urban trips are made by walking or cycling, and a few countries—like Denmark and The Netherlands—report a nonmotorized travel rate of over 40%.

Perhaps even more striking are the large differences in travel behavior between countries as their populations get older. As shown in Figure 2, walking increases with age in both The Netherlands and Germany, while cycling falls off only slightly. Indeed, the Dutch and Germans who are 75 and older make roughly half their trips by foot or bike, compared with only 6% of Americans aged 65 and older. While cycling is almost nonexistent among the American elderly, it accounts for a fourth of all trips made by the Dutch elderly and for 7% of trips made by the German elderly. Equally stunning, walking accounts for 48% of trips by Germans aged 75 and older and 24% of trips made by Dutch aged 75 and older. This not only provides them with valuable physical exercise but also ensures them a level of mobility and independence that greatly enhances their quality of life. It also may contribute to both the longer life expectancy and the longer healthy life expectancy in the Netherlands and Germany—2 years longer than in the United States.<sup>25</sup> As the Dutch and German examples clearly show, the physical and men-



Source. US Department of Transportation,<sup>11</sup> German Ministry of Transport,<sup>14,15</sup> and Statistics Netherlands.<sup>19</sup>

**FIGURE 2—Percentage of trips in urban areas made by walking and bicycling in the United States, Germany, and The Netherlands, by age group, 1995.**

tal limitations that come with aging are not the main impediments to walking and cycling by the American elderly.

For both the elderly and the nonelderly, walking and cycling are discouraged in the United States by longer trip distances, the low cost and ease of auto ownership and use, and a range of other public policies that make walking and cycling inconvenient, unpleasant, and, above all, unsafe.

The more compact land-use patterns in European cities lead to average trip distances that are only about half as long as in American cities and thus are easier to cover by foot or by bike.<sup>26</sup> As explained in previous studies<sup>27</sup> and by other articles in this issue, planning for more compact, mixed-use development in American cities would enhance the feasibility of walking and cycling by reducing trip distances to likely destinations. However, that is a long-term approach that will take many years to implement, if it can be adopted at all. Moreover, as noted earlier, 41% of all urban trips in the United States are already shorter than 2 miles, and 28% are shorter than 1 mile. The potential for more walking and cycling already exists. Thus, the extraordinarily low 6% of trips made by walking or cycling in American

cities cannot be attributed mainly to long trip distances.<sup>28</sup> Indeed, if distance were the overriding factor, one might expect more cycling than walking in American cities, since cycling covers longer distances faster and easier. In fact, walk trips outnumber bike trips 6 to 1.

The much higher cost of auto ownership and use in Europe also helps explain the higher levels of walking and cycling there. High taxes on gasoline and new cars, as well as higher prices for parking, make the overall cost of auto use at least double what it is in the United States.<sup>29</sup> In addition, roadway and parking facilities are much more limited than in American cities. From a political perspective, it has been very difficult to raise taxes on auto ownership and use in the United States, even slightly, let alone to the dramatically higher levels in Europe. With over 95% of all parking free of charge, and with gasoline taxes, roadway tolls, licensing fees, and vehicle taxes among the lowest in the developed world, the United States makes driving a car almost irresistible.<sup>29</sup> That, in turn, discourages walking and cycling.

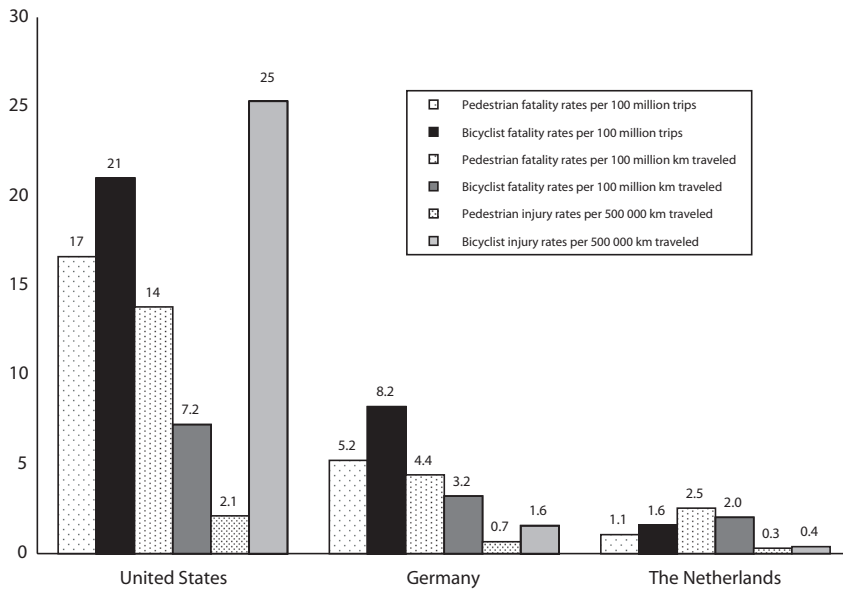
Clearly, however, one of the biggest impediments to more walking and cycling is the appallingly unsafe, unpleasant, and inconven-

ient conditions faced by pedestrians and bicyclists in most American cities. As shown in the next section, the perceived risk of walking and cycling in American cities is based on real dangers. Even without dramatic changes in American land-use and transportation systems, much could be done in the short term to improve walking and cycling conditions to make them both safer and more attractive.

## DANGERS OF WALKING AND CYCLING IN THE UNITED STATES

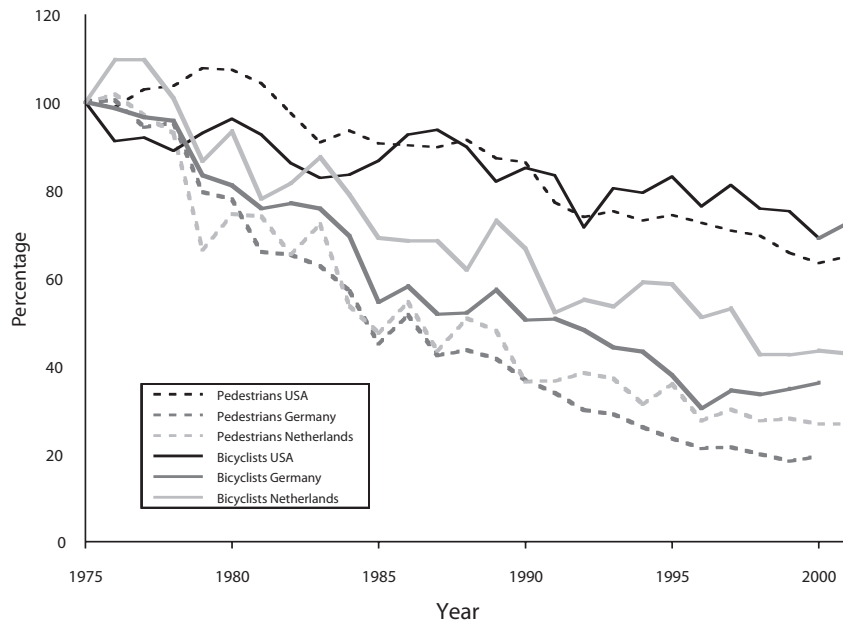
It is much more dangerous to walk or cycle in American cities than to travel by car. Per kilometer traveled, pedestrians were 23 times more likely to get killed than car occupants in 2001 (140 vs 6 fatalities per billion kilometers), while bicyclists were 12 times more likely than car occupants to get killed (72 vs 6 fatalities per billion kilometers).<sup>30</sup> Walking and cycling in American cities are much more dangerous than in many other countries. As shown in Figure 3, nonmotorist fatality rates in the United States are much higher than in The Netherlands and Germany. Per kilometer and per trip walked, American pedestrians are roughly 3 times more likely to get killed than German pedestrians and over 6 times more likely than Dutch pedestrians. Per kilometer and per trip cycled, American bicyclists are twice as likely to get killed as German cyclists and over 3 times as likely as Dutch cyclists.

Because of the unreliability of injury data in all countries, it is far more difficult to compare differences in pedestrian and cyclist injury rates. Nevertheless, they also appear to be much higher in the United States than in The Netherlands or Germany. The CDC data based on hospital reports capture a larger percentage of total injuries than the Dutch and German injury data, which are based on police reports. As noted earlier, studies indicate that the Dutch and German police reports capture only about half of all serious injuries requiring hospitalization.<sup>21,22</sup> Thus, the Dutch and German injury rates shown in Figure 3 should be roughly doubled to make them more comparable to the CDC rates for the United States. Even after



Source. US Department of Transportation<sup>11,12</sup>, Centers for Disease Control and Prevention<sup>13</sup>, German Institute of Economic Research<sup>14</sup>, German Federal Statistical Office<sup>17</sup>, German Federal Traffic Institute<sup>18</sup>, Statistics Netherlands<sup>9</sup>, and Dutch Ministry for Transport, Public Works and Water Management.<sup>20</sup>

**FIGURE 3—Pedestrian and bicycling fatality rates and nonfatal injury rates in the United States, Germany, and The Netherlands, 2000.**



Source. US Department of Transportation<sup>12</sup>, German Federal Statistical Office<sup>17</sup>, German Federal Traffic Institute<sup>18</sup>, Statistics Netherlands<sup>9</sup>, and Dutch Ministry for Transport, Public Works and Water Management.<sup>20</sup>

**FIGURE 4—Trends in pedestrian and bicycling fatalities in the United States, Germany, and The Netherlands, 1975-2001 (1975 = 100%).**

such an upward adjustment, American pedestrians are about twice as likely to get injured as German pedestrians and 4 times as likely as Dutch pedestrians. American cyclists are at even greater risk: they are 8 times more likely to get injured than German cyclists and about 30 times more likely than Dutch cyclists.

Some good news to offset that bad news is that a great deal could be done to make walking and cycling safer in the United States. Germany and The Netherlands, for example, have drastically cut the number of pedestrian and bicyclist deaths over the past 25 years by implementing a wide range of policies to improve safety. Figure 4 shows that from 1975 to 2001, total pedestrian fatalities declined by 82% in Germany and by 73% in The Netherlands. Over the same period, cyclist fatalities declined by 64% in Germany and by 57% in The Netherlands. The drop in cyclist fatalities in Germany is especially impressive because it came during a boom in cycling there, with a doubling in the number of bike trips and 50% growth in the share of total trips made by bike.<sup>10</sup> By contrast, the 27% fall in cyclist fatalities in the United States was due almost entirely to the sharp decline in cycling by children.<sup>31,32</sup>

### HOW TO MAKE WALKING AND CYCLING SAFER

However dangerous walking and cycling currently are in the United States, it is definitely possible, and essential, to make them much safer. As shown by the wide range of coordinated policies in The Netherlands<sup>33,34</sup> and Germany,<sup>35</sup> the necessary techniques and programs already exist and have been proven to work extremely well. They include better facilities for walking and cycling, traffic calming of residential neighborhoods, urban design sensitive to the needs of non-motorists, restrictions on motor vehicle use in cities, rigorous traffic education of both motorists and nonmotorists, and strict enforcement of traffic regulations protecting pedestrians and bicyclists. American cities lack only the political will to adopt the same strategies.

Owing to space limitations, we can only briefly summarize here the 6 categories of

public policy measure implemented in The Netherlands and Germany. For detailed descriptions and illustrations of the Dutch and German measures, readers can consult a range of publications about walking and cycling in Europe.<sup>10,26,36–39</sup>

### Better Facilities for Walking and Cycling

One emphasis of Dutch<sup>40</sup> and German<sup>35</sup> policy has been to improve the transportation infrastructure used by pedestrians and bicyclists. For pedestrians, that has included extensive auto-free zones that cover much of the city center; wide, well-lit sidewalks on both sides of every street; pedestrian refuge islands for crossing wide streets; clearly marked zebra crosswalks, often raised and with special lighting for visibility; and pedestrian-activated crossing signals, both at intersections and midblock crosswalks.

Dutch and German cities also have invested heavily to expand and improve bicycling facilities. From 1978 to 1996, the Dutch more than doubled the extent of their already massive network of bike paths and lanes (from 9282 km to 18 948 km). From 1976 to 1995, the Germans almost tripled the extent of their bikeway network (from 12 911 km to 31 236 km).<sup>10</sup> In addition, there are an increasing number of so-called “bicycle streets,” where cars are permitted but cyclists have strict right-of-way over the entire breadth of the roadway. Unlike the sparse and fragmented cycling facilities in the United States, the bike paths, lanes, and streets in The Netherlands and Germany form a truly coordinated network covering both rural and urban areas. Importantly, Dutch and German bikeway systems serve practical destinations for everyday travel, not just recreational attractions, as with most bike paths in the United States.

The provision of separate rights-of-way is complemented by various other measures: special bike turn lanes leading directly to intersections, separate bike traffic signals with advance green lights for cyclists, bicyclist-activated traffic signals at key intersections, and modification of street networks to create deliberate dead ends and slow, circuitous routing for cars but direct, fast routing for bikes.<sup>10</sup>

### Traffic Calming of Residential Neighborhoods

Traffic calming limits the speeds of motor vehicle traffic, both by law—30 km per hour (19 mph) or less—and through physical barriers such as raised intersections and crosswalks, traffic circles, road narrowing, zigzag routes, curves, speed humps, and artificial dead ends created by midblock street closures.<sup>10</sup> Traffic calming gives pedestrians, bicyclists, and playing children as much right to use residential streets as motor vehicles; indeed, motor vehicles are required to yield to these other users. In both The Netherlands<sup>41</sup> and Germany, traffic calming is area-wide and not for isolated streets. That ensures that faster through traffic gets displaced to arterial routes designed to handle it and not simply shifted from one local road to another.

The most important safety impact of traffic calming is the reduced speeds of motor vehicles. This is crucial not only to the motorist’s ability to avoid hitting pedestrians and bicyclists but also to the survival of nonmotorists in a crash. The British Department of Transport, for example, found that the risk of pedestrian death in crashes rises from 5% at 20 mph to 45% at 30 mph and 85% at 40 mph.<sup>42</sup>

Area-wide traffic calming in Dutch neighborhoods has reduced traffic accidents by 20% to 70%.<sup>43</sup> Traffic calming in German neighborhoods has reduced traffic injuries overall by 20% to 70% and serious traffic injuries by 35% to 56%.<sup>44</sup> A comprehensive review of traffic calming impacts in Denmark, Great Britain, Germany, and The Netherlands found that traffic injuries fell by an average of 53% in traffic-calmed neighborhoods.<sup>45</sup> In short, traffic calming greatly reduces the danger of traffic deaths and injuries in residential neighborhoods. Traffic calming greatly improves not only pedestrian safety but also the safety of bicycling, since much bike use—especially by children—is in residential neighborhoods.

### Urban Design Oriented to People and Not Cars

New suburban developments in The Netherlands and Germany are designed to provide safe and convenient pedestrian and bicycling access.<sup>10</sup> Residential developments

almost always include other uses such as cultural centers, shopping, and service establishments that can easily be reached by foot or bike. Both residential and commercial developments have sidewalks and bicycle paths to serve nonmotorists. Parking lots almost never surround buildings, as in the United States; instead, they are built next to or behind buildings, thus permitting easy access to pedestrians and bicyclists. When an obstacle such as a highway, railroad, or river must be traversed, Dutch and German cities usually provide safe and attractive pedestrian and bicyclist crossings. By comparison, strip malls in American suburbs are difficult and dangerous to reach by foot or bicycle, and most bridges lack provisions for pedestrians and bicyclists.

In the United States, the separation of residential from commercial land uses increases trip distances and makes the car a necessity. Suburban cul-de-sacs further discourage walking and bicycling by making trips circuitous and excessively long. Residential roads often feed directly into high-speed traffic arteries, increasing the danger of any trips outside the neighborhood. The lack of sidewalks in most American suburbs further exacerbates the problem.

### Restrictions on Motor Vehicle Use

Dutch and German cities restrict auto use not only through traffic calming, auto-free zones, and dedicated rights-of-way for pedestrians and cyclists.<sup>10,26,29</sup> They also enforce lower general speed limits for motor vehicles in cities—usually 50 km per hour (31 mph). Parking is much more limited and more expensive than in American cities. In addition, most Dutch and German cities prohibit truck traffic and through traffic of any kind in residential neighborhoods. Motor vehicle turn restrictions are widespread; moreover, right turns on red are illegal.

### Traffic Education

Driver training for motorists in The Netherlands and Germany is much more extensive, thorough, and expensive than in the United States.<sup>46,47</sup> A crucial aspect of that training in The Netherlands and Germany is the need to pay special attention to avoiding collisions with pedestrians and cyclists. Motorists are required by law to drive in a way

that minimizes the risk of injury for pedestrians and cyclists even if they are jaywalking, cycling in the wrong direction, ignoring traffic signals, or otherwise behaving contrary to traffic regulations.

Traffic education of children has high priority in both The Netherlands and Germany.<sup>46,47</sup> By the age of 10, all schoolchildren have received extensive instruction on safe walking and bicycling practices. They are taught not just the traffic regulations but how to walk and bicycle defensively, to anticipate dangerous situations, and to react appropriately. That sort of safety education is completely lacking in the United States.

### Traffic Regulations and Enforcement

Traffic regulations in Germany and The Netherlands strongly favor pedestrians and bicyclists. Even in cases where an accident results from illegal moves by pedestrians or cyclists, the motorist is almost always found to be at least partly at fault. When the accident involves children or the elderly, the motorist is usually found to be entirely at fault. In almost every case, the police and the courts find that motorists should anticipate unsafe and illegal walking and cycling.

In addition, German and Dutch police are far stricter in ticketing motorists, pedestrians, and cyclists who violate traffic regulations. Thus, walking against the light is not allowed in any German city and can easily result in a ticket and fine. Likewise, cyclists caught riding in the wrong direction, running red lights, making illegal turns, or riding at night without functioning lights can expect at least a warning notice and possibly a ticket and fine.

The most significant contrast with the United States is the much stricter enforcement of traffic regulations for motorists in Germany and The Netherlands. Penalties can be high even for minor violations. Not stopping for pedestrians at crosswalks is considered a serious offense and motorists can get ticketed for noncompliance, even if pedestrians are only waiting at the curb and not actually in the crosswalk.<sup>10</sup> Similarly, red traffic signals are strictly enforced, and some intersections in German and Dutch cities have cameras that automatically photograph cars running red lights and stop signs.<sup>37</sup> Finally, the punishment for traffic violations by mo-

torists is far more severe in The Netherlands and Germany than in the United States.<sup>45</sup>

### CONCLUSIONS

The neglect of pedestrian and bicycling safety has made walking and cycling dangerous ways of getting around American cities. Walking and cycling can be made quite safe, however, as clearly shown by the much lower fatality and injury rates in The Netherlands and Germany. There is no good reason why American cities could not adopt many of the same measures to enhance safety. The necessary methods and technology are already available, with decades of successful experience in Europe.

It is important to package safety-enhancing programs in a way that dramatizes their benefits to everyone. The most obvious benefit would be the reduced risk of death and injury from walking and cycling. The safety issue must be brought home to Americans by public campaigns emphasizing the direct impacts on individuals, their families, and their friends. Improved safety also would encourage more people to walk and cycle on a regular basis, providing them with valuable exercise, mobility options, independence, and even fun.

The European countries with the highest levels of walking and cycling have much lower rates of obesity, diabetes, and hypertension than the United States.<sup>25,48</sup> The Netherlands, Denmark, and Sweden, for example, have obesity rates only a third of the American rate, while Germany's rate is only half as high.<sup>48</sup> Moreover, the average healthy life expectancies in those 4 European countries are 2.5 to 4.4 years longer than in the United States,<sup>25</sup> although their per capita health expenditures are only half those of the United States.<sup>49</sup>

Of course, many factors affect differences between Europe and the United States. Nevertheless, the dramatically higher levels of walking and cycling for daily travel certainly contribute to better public health in countries such as The Netherlands, Denmark, Germany, and Sweden. Repeated waves of fad diets, rising memberships in health clubs, exercise equipment in more homes, diet pills, and liposuction have all been total failures in

fighting the current obesity epidemic. Why not try integrating walking and cycling into the daily travel routines of Americans? That clearly would be the cheapest, most reliable, and most practical way to ensure adequate levels of physical exercise.

Walking and cycling also help alleviate traffic congestion, save energy, reduce air and noise pollution, conserve land, and produce various other environmental benefits. It is the broad spectrum of benefits from walking and cycling that explains the widespread public support in The Netherlands and Germany for the impressive range of policies they have adopted to make walking and cycling safer, more convenient, and more pleasant.

The same synergistic benefits have the potential for energizing a broad coalition of groups in the United States to advocate better walking and cycling conditions in American cities. Public health experts should be working together with bicyclist and pedestrian advocates, traffic engineers, urban planners, environmentalists, architects and private developers, community leaders, and government officials at all levels. The public health community probably has the most potential to encourage the necessary changes at the grass-roots level. Unless individual Americans can be convinced that they will directly benefit from better walking and cycling conditions, politicians are unlikely to support the necessary policies. Self-interest is likely to be the strongest motivation to effect changes in travel behavior. Getting enough physical exercise is quite literally a matter of life or death. Health care professionals must convince their patients that walking and cycling on a regular basis for daily travel will help them live longer and healthier lives.

Of course, the public health community cannot do it alone. Transportation professionals, urban planners, architects, and private developers must provide the improvements in walking and cycling conditions so desperately needed to reduce the dangers of walking and cycling in American cities. Those efforts will require the support of local, state, and federal government officials. Public policymakers at all levels must not only provide the necessary funding for better bicycling and pedestrian facilities but also adopt and implement a range of policies to encourage more compact,

mixed-use development that naturally permits and encourages walking and cycling as a part of daily life.

If for no other reason than their large numbers and extensive network of contacts, public health experts have a crucial role to play in mobilizing political support for the necessary policy changes. At the very least, they should publicize more prominently the disastrous public health consequences of an automobile-dependent transportation system and a land-use pattern that make walking and cycling dangerous, inconvenient, unpleasant, and, in some cases, impossible.

In fact, the public health community has already begun developing programs and partnerships to achieve more walkable and bikeable communities that encourage higher levels of physical exercise. The CDC, for example, has developed the Active Community Environments (ACE) program, a multidisciplinary initiative to promote walking and cycling through better urban design, transportation, and land-use policies.<sup>50</sup> The federal CDC program links up with state health departments to encourage similar efforts at the state and local level. For example, the ACE program in the California Department of Human Services funds organizations such as California Walks, the California Bicycle Coalition, the Local Government Commission, and the Rails-to-Trails Conservancy to encourage local community policies that promote walking and cycling.<sup>51</sup> California's ACE also coordinates the state's Safe Routes to School initiative by providing technical assistance and funding community-based projects that promote walking to school.

Complementing such government initiatives, the Robert Wood Johnson Foundation has already spent \$84 million financing a family of Active Living programs, all of which are intended to increase physical activity.<sup>52</sup> Active Living by Design, for example, is funding 25 communities throughout the country to promote changes in urban design, architecture, land use, and transportation that encourage more walking and cycling. Active for Life focuses on incorporating increased exercise into the daily life of adults. The foundation's Active Living Network is intended to integrate the public health agenda into a wide range of other professions crucial to improv-

ing walking and cycling conditions, thus explicitly fostering the necessary partnership and teamwork.

However admirable these initial efforts are, they remain exceedingly modest compared with the enormity of the problem. Public health organizations should publicize far more widely the worsening obesity epidemic in the United States as the national crisis it is. They need to mount massive media campaigns to encourage and improve the conditions for walking and cycling. Only when the public and politicians become fully aware of the severity of the obesity problem—and the huge potential of walking and cycling to mitigate the problem—will public policies change enough to make a real difference.

Some studies predict that obesity will soon overtake smoking as the most important cause of premature death in the United States.<sup>53–55</sup> It is time for the public health community to undertake as vigorous a campaign to promote more physical exercise and improved diet as the decades-long campaign against smoking. ■

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J. Pucher had primary responsibility for the study design, data collection for Germany and the United States, and writing the text of the article. L. Dijkstra shared in the study design, collected data for The Netherlands, and produced the graphics.

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## **Appendix C**

Forecasting Pedestrian and Bicycle Demands Using Regional  
Travel Demand Models and Local Mode Share/Trip Distance Data

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## **Forecasting Pedestrian and Bicycle Demands Using Regional Travel Demand Models and Local Mode Share/Trip Distance Data**

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## ABSTRACT

Columbia River Crossing (CRC) staff, with input from the CRC's Pedestrian and Bicycle Advisory Committee (PBAC), developed a methodology for forecasting year 2030 pedestrian and bicycle travel demands for an improved non-motorized facility proposed for the replacement Interstate 5 (I-5) Bridge across the Columbia River. Forecasts took into account three primary factors related to pedestrian and bicycle demand: existing and future land uses, percentage of trips by mode, and walking and bicycling trip lengths.

During peak summer conditions in 2007, about 80 pedestrians and 370 bicyclists crossed the I-5 Bridge daily. Many other pedestrians and bicyclists are discouraged from doing so because of the existing non-standard facilities on the bridge and connecting multi-modal infrastructure.

Future pedestrian and bicycle trips over the I-5 Bridge were forecast using a variety of data, including mode share data from the US Census, information from local travel surveys, results from a bicycle trip study conducted by Portland State University, and travel characteristics associated with the Hawthorne Bridge, the heaviest traveled bridge by pedestrians and bicyclists in the region.

Average travel times by mode were converted into trip distances by mode, creating a matrix of pedestrian and bicycle mode shares by trip length. Future scenarios, developed for sensitivity testing, considered the forecasted number of trips from the regional travel demand model and factored them by the respective pedestrian and bicycle mode share percentages. The results were a range of daily pedestrian and bicycle forecasts, all of which showed a substantial increase in travel demand.

## INTRODUCTION

The Columbia River Crossing (CRC) is a five-mile long bridge, highway, transit, and pedestrian and bicycle project in the Portland-Vancouver metropolitan area (Figure 1). The CRC's Purpose and Need statement (1), created by the CRC's 39-member Task Force, defines the transportation goals of the CRC project. One of the six stated goals is to improve mobility and safety for pedestrians and bicyclists on and connecting to the Interstate 5 (I-5) Bridge across the Columbia River (1). Enhancing pedestrian and bicycle facilities is necessary because the current pathways (Figure 2) do not conform to the Americans with Disabilities Act (ADA) accessibility guidelines or to current Washington and Oregon departments of transportation engineering and design standards. Connections to the regional and local pathway network on either side of the river are circuitous or non-existent. In addition, existing bridge pathway users feel unsafe and uncomfortable crossing the river in close proximity to highway traffic. To address these issues and others, and to make recommendations to the CRC Task Force, the CRC Pedestrian and Bicycle Advisory Committee (PBAC) was formed to further the goal of improving the pedestrian and bicycle transportation facilities (Figure 3) as part of the overall CRC project (2).

CRC staff developed a methodology for forecasting pedestrian and bicycle demands across the Columbia River with input and advice from the PBAC (3-9). Changing land uses and forecasted increases in population and employment density in North Portland and Vancouver are expected to have a significant effect on pedestrian and bicycle travel over the Columbia River. The rise in employment and population in these areas will increase the potential for short trips, those that are most attractive to walking and bicycling travel, to be made. In addition, other issues such as higher energy prices and increased public awareness of the health benefits of walking and bicycling may further increase demand for non-motorized travel between Portland and Vancouver.

This paper describes the methodology for forecasting pedestrian and bicycle travel demand for the CRC project's design year of 2030. First, the data sources and inputs into the forecasting model are described, followed by a discussion of the modeling approach. An explanation of the model calibration process and validation of the methodology is provided. Then, the various scenarios that were modeled for future pedestrian and bicycle demand forecasting are discussed. Finally, results and conclusions are provided.



Figure 1: The Columbia River Crossing project is multi-modal. It includes an improved pedestrian and bicycle path across the Columbia River, as well as enhanced connections.



**Figure 2: The pathways on the existing I-5 Bridge are four feet wide and do not meet Americans with Disability Act guidelines.**



**Figure 3: The proposed I-5 Bridge would include covered pedestrian and bicycle facilities, including a recreational multi-use pathway and directional bicycle commuter lanes.**

## DATA SOURCES

Data for the pedestrian and bicycling forecasting includes information about mode shares and trip distances, and outputs from the regional travel demand model developed by Metro, the Portland region's metropolitan planning organization (MPO), and RTC, Vancouver's MPO. Other data sets included: pedestrian and bicycle count data on the I-5 Bridge, as well as on the Hawthorne Bridge in Portland, Oregon. The Hawthorne Bridge is the bridge with the highest existing pedestrian and bicycle volumes in Portland and a substantial set of historic daily and hourly volume data. Both counts were completed during the summer of 2007.

### Mode Share Data

One data source for the pedestrian and bicycle forecasting was the Census Transportation Planning Package (CTPP) data from the 2000 US Census (10). The CTPP contains information about the average travel times, by mode, for journey to work trips. The mode share by travel time data was converted to mode share by travel distance, by using an assumed speed of ten miles per hour for bicyclists (similar to the Portland Bureau of Transportation's (PBOT) methodology for determining travel times for bicycle route signage), and an average walking speed of four feet per second. The CTPP bicycle mode share relationship by trip length for the Portland region is shown in Figure 4, and the pedestrian mode share by trip length is shown in Figure 5.

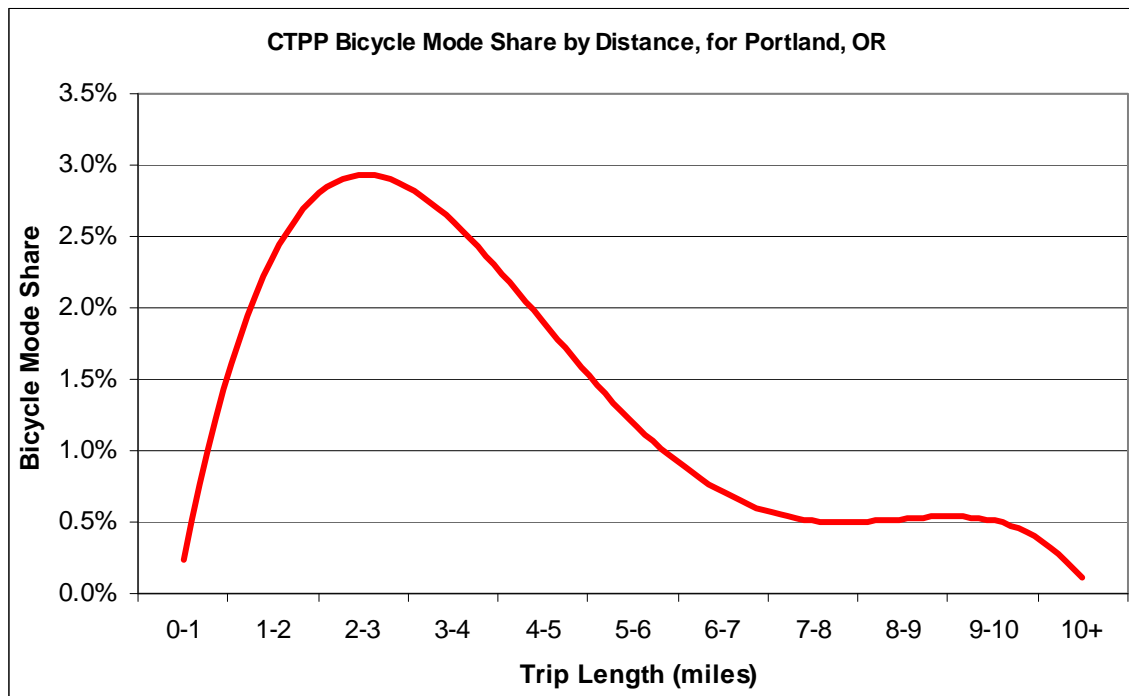


Figure 4: 2000 CTPP Bicycle Mode Share by Distance for Portland, OR

Though the CTPP data is statistically reliable for the year 2000, bicycling in the Portland area has increased substantially throughout the last decade, and it was thought that the mode share to trip length relationship could be different today. Additional information was needed to confirm that the year 2000 data was still an accurate measure of bicycling behavior in Portland in 2007.

The Bicycle Transportation Alliance (BTA), a local bicycling advocacy organization, sponsors the annual Bicycle Commute Challenge (BCC). The BCC event takes place annually during the month of September and encourages people to bicycle to work. As part of the event's registration process, BCC participants enter their one-way trip length data into an on-line database. After the BCC event ended, the BTA provided the BCC trip length data to the authors for the purposes of this study. The data set included information from over 7,000 participants. An analysis of the data reveals that the most common one-way bicycle commute trip among the participants is approximately three miles long, and a histogram of bicycle trip lengths is quite similar to the Portland CTPP data for the year 2000.

In addition to the CTPP and BCC data, results from a bicycling study, Bike-GPS: Understanding and Measuring Bicycle Behavior, conducted by Dr. Jennifer Dill at Portland State University (PSU), provided additional confirmation of the mode share and trip length relationships from the CTPP and BCC bicycle data. Dr. Dill's results show that the average length of all bicycle trips in her Portland-based study was approximately three miles long and that the average length of a journey to work bicycle trip was about four miles long (11). Both measurements are consistent with CTPP and BCC information.

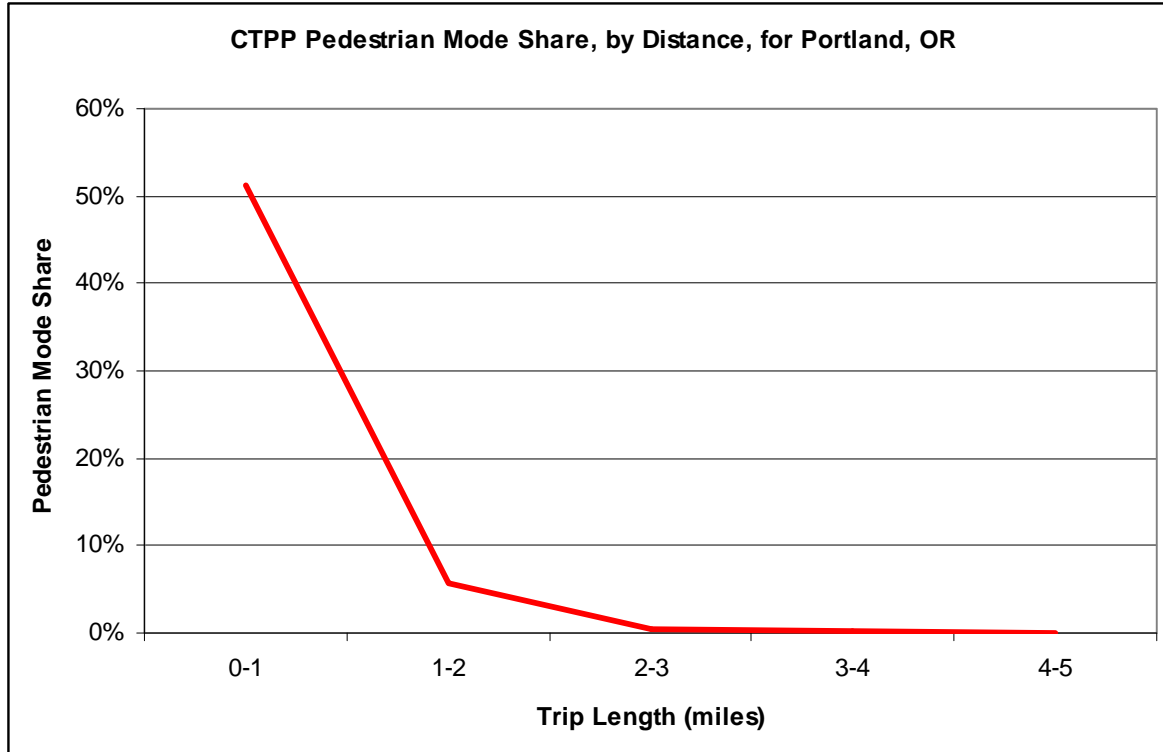


Figure 5: 2000 CTPP Pedestrian Mode Share by Distance for Portland, OR

Finally, bicycle trip distance data from The Netherlands was compared with the information from the Portland-Vancouver region. The Netherlands has among the highest mode share of bicycle trips of all developed countries, possesses excellent bicycle system connectivity within its cities, and is a world leader in bikeway design and safety. The Netherlands data reveals that 40 percent of all trips less than three miles long are made by bicycle. For all trips between 3.0 and 4.5 miles long, bicycle mode share declines to 26 percent, and drops to seven percent for trips longer than 4.5 miles (12). This data provides further confirmation that the majority of bicyclists' one-way trip distances peak near the three- to four-mile mark and experiences a sustained drop-off over longer trip distances.

The trip lengths by pedestrian mode share were assumed to have remained consistent with the year 2000 CTPP data. Pedestrian mode share is only significant for trips less than two miles (10), and it was deemed unlikely that these values would have changed much since 2000.

### Regional Travel Demand Data

The forecast for the number of overall person-trips across the I-5 Bridge, by distance traveled, is an output from the Metro/RTC regional travel demand model. The travel demand model determines travel patterns and demands based upon population and employment forecasts, the region's land use patterns, existing and planned transportation facilities, and numerous other factors.

### Bridge Count Data

Fourteen-hour pedestrian and bicycle counts on the I-5 Bridge were conducted in September 2007 during the Bicycle Commute Challenge event. Existing count data from the City of Portland for the Hawthorne Bridge was used to develop expansion factors to extrapolate the 14-hour counts into estimated daily totals. Data from the Hawthorne Bridge was used because it has the highest volume of pedestrian and bicycle activity on bridges in the Portland-Vancouver region, and is one of the few locations that have multiple days of 24-hour count data available.

After applying the expansion factors to the I-5 Bridge count data, the bridge was estimated to serve about 80 pedestrians and 370 bicyclists daily in 2007.

## **FORECASTING METHODOLOGY**

Pedestrian and bicycle forecasts for the I-5 Bridge were developed by combining mode share and trip length data with outputs from Metro's regional travel demand model. The mode share data includes estimated percentages of pedestrians and bicyclists that would make trips over the bridge. The regional travel demand data contains the forecasted total number of trips for all modes of travel that would be made over the bridge. The combination of the mode share and travel demand data produces a forecast of daily pedestrian and bicycle volumes for the I-5 Bridge.

### **Mode Share by Travel Distance**

The CTPP data measures mode share by travel time. As previously discussed, these travel times were converted to trips lengths by using an average bicycling and walking speed. Data from the PSU bicycle study found that bicyclists in that study averaged ten miles per hour (11), which is consistent with the approach used to convert travel times to trip distances. Mode share decreased for both pedestrians and bicyclists as the length of a trip increased, with the pedestrian trips exhibiting a faster rate of decline as trip length increased.

### **Number of Trips by Travel Distance**

The regional travel demand model was used to forecast the number of trips, by all modes, using the I-5 Bridge to cross the Columbia River. Forecasted trips were output from the model for two four-hour peak periods, i.e., 6 a.m. to 10 a.m. and 3 p.m. to 7 p.m. Trips were converted to person-trips by applying an auto-occupancy rate of 1.2 persons per vehicle; this figure was derived from field measurements of auto occupancy conducted for the CRC project.

### **Pedestrian and Bicycle Trip Forecasts**

To calculate the forecasted number of trips for pedestrians and bicyclists, the mode shares for each one-mile trip distance increment were multiplied by the corresponding number of person-trips (from the regional model) for that one-mile increment. This process produced a forecasted number of pedestrian and bicycling trips for each trip length increment. The results for each trip length increment were then summed together to create the total number of forecasted trips for each of the two four-hour peak periods.

The two directional four-hour peaks were then summed together, and then multiplied by a factor of 2.1 to derive the 24-hour, bi-directional forecast. The factor of 2.1 was chosen because it exactly reflects the relationship between the sum of the two four-hour directional peaks on the Hawthorne Bridge, and the daily number of bicyclists using that facility. Hour-by-hour bicycle counts (and daily totals) were available for the Hawthorne Bridge, which enabled an observation to be made as to the relationship between the four-hour peaks and the daily total.

Furthermore, as the Hawthorne Bridge is the most-widely used bicycle facility in the Portland-Vancouver area, it is thought that applying data derived from an analysis of its traffic patterns may serve as a reliable estimating tool for other facilities, especially facilities that have similar characteristics, such as other bridges, or other locations with high bicycle volumes.

## **MODELING VALIDITY TESTING**

To confirm the validity of the forecasting methodology, its ability to correctly predict an already known number bicycle and pedestrian trips on the I-5 Bridge was tested. The methodology applied the existing conditions pedestrian and bicycle mode share and trip length data to the four-hour peak direction, peak period travel demand data from the regional model. The results were then compared against actual pedestrian and bicycle count data for the I-5 Bridge.

Applying this methodology to the morning peak period for southbound travel produced an estimate of 24 pedestrian and 96 bicycle daily trips. The actual counts during this time were nine pedestrian and 62 bicycle trips. While the forecasting methodology slightly overestimated the total number of trips, the actual difference was relatively small in magnitude.

The difference may be explained by the unmet latent demand for higher quality pedestrian and bicycle facilities than currently exist in the I-5 corridor, and specifically, along the I-5 Bridge. That is, the methodology appears to account for travel that is not occurring because pedestrians and bicyclists are unwilling to use the existing poor quality, non-standard facilities on the I-5 Bridge. There is an abundance of prior evidence in Portland for unlocking bicycling latent demand by improving facilities. As the number of bikeway miles in Portland has more than tripled since 1991, ridership on the Willamette River bridges has increased nearly six times. More specifically,

as the bikeway network feeding the Broadway Bridge over the Willamette River has approach 100 percent completion over a 15-year period, ridership has increased almost eight times.

The results for the afternoon peak period for northbound travel estimated 61 pedestrian and 125 bicycle trips. The actual year 2007 counts during this time were 19 pedestrian and 100 bicycle trips. As in the morning peak period, the methodology slightly overestimated the number of trips, but the magnitude of the difference is similar. In addition, the estimate again appears to capture latent demand, as the actual counts are less than the predicted numbers. In the case where the new and improved pedestrian and bicycle facility were to be sized based on an overestimation of demand in the future, this methodology would constitute a conservative approach in providing adequate capacity.

A second test of the validity of the CTPP data and the forecasting methodology was conducted for the Hawthorne Bridge, a popular multi-modal bridge spanning the Willamette River between east Portland and downtown Portland. The analysis of bicycle trips made over the Hawthorne Bridge reveals that the CTPP mode share is an accurate predictor of bicycle traffic on the Hawthorne Bridge, but only after the mode share was increased by a factor of three across all trip lengths in the peak travel direction (i.e., towards downtown in the mornings and departing from downtown in the afternoons). The CTPP mode shares require the factor to account for the fact that the Hawthorne Bridge is the most heavily traveled bridge by bicyclists in Portland, has wide, directional separated bicycling facilities, and has the most complete network of bicycling infrastructure leading towards and away from any Willamette River bridge in Portland.

Ultimately, measuring the validity of the CTPP data, and understanding its usefulness in forecasting demand through the calibration process, led to the development of multiple modeling scenarios where assumptions about future travel demand and mode share could be fully tested.

## SCENARIOS MODELED

Five bicycle and two pedestrian mode share scenarios were modeled based upon input and the desire for sensitivity testing from the PBAC. More bicycle mode share scenarios were examined than pedestrian scenarios. This was done because of the greater variance in mode share by travel distance that occurs with bicycling relative to walking. The potential for increased variance at the bicycle mode share level produces a greater range of forecasted traffic volumes.

It has been noted that the last decade has seen enormous growth in pedestrian and bicycle use throughout the Portland-Vancouver metropolitan region. For example, non-motorized traffic along Vancouver's Waterfront Trail has risen rapidly to over 260,000 yearly users since the trail was constructed several years ago. Downtown Portland's Eastbank Esplanade has been a major success in attracting pedestrian and bicycle traffic along the east bank of the Willamette River, and use of the Esplanade has increased since it opened in 2001. The Hawthorne Bridge is arguably Portland's most visible example of the growth in bicycle traffic, as average summer bicycle volumes have grown from about 1,900 daily riders in 1995 to over 6,400 daily riders in 2007, which constitutes almost an 11 percent compounded annual growth rate. Pedestrian volumes have also grown substantially throughout the region, and on the Hawthorne Bridge they have been estimated at more than 8,000 daily walkers in the year 2007. These examples of growth in pedestrian and bicycle traffic influenced the development of the pedestrian and bicycle forecasting scenarios.

### Bicycle Forecast Scenarios

Five different scenarios for bicycle demand for the I-5 Bridge in the future year 2030 were modeled based upon input from the PBAC committee (Table 1).

**TABLE 1 Bicycle Scenarios**

Scenario	Description
B1	No change in existing mode share for all trip lengths
B2-a	300% of existing mode share for all trip lengths
B2-b	50% of all trips 3 miles or less are made by bicycle, and 300% of existing mode share for all trips longer than 3 miles
B3-a	500% of existing mode share for all trip lengths
B3-b	50% of all trips 3 miles or less are made by bicycle, and 500% of existing mode share for all trips longer than 3 miles

The first scenario assumes no change in existing mode share percentages. The second scenario assumes that the bicycle mode share over the I-5 Bridge in the year 2030 will mimic the high use seen on the Hawthorne Bridge

today. The third scenario is similar to the second, except it assumes that 50 percent of all trips crossing the I-5 Bridge that are three miles or less would be made by bicycle.

The fourth scenario assumes that the bicycle mode share will be five times the existing mode share or 66 percent higher than the mode share for all travel distances on the Hawthorne Bridge today. The fifth scenario is similar to the fourth, but assumes that 50 percent of all trips three miles or less will be made by bicycle.

The bicycle mode share curves for three of the five scenarios can be seen in Figure 6 (note that scenarios B2-b and B3-b are not displayed in Figure 6 for graphical clarity). The different scenarios were developed to account for a wide range of possible land uses, behavior and travel conditions in 2030 that might affect bicycle ridership. The 300% and 500% existing mode share means that for each trip length increment, the respective scenario has increased the mode share for that increment by three and five times, respectively.

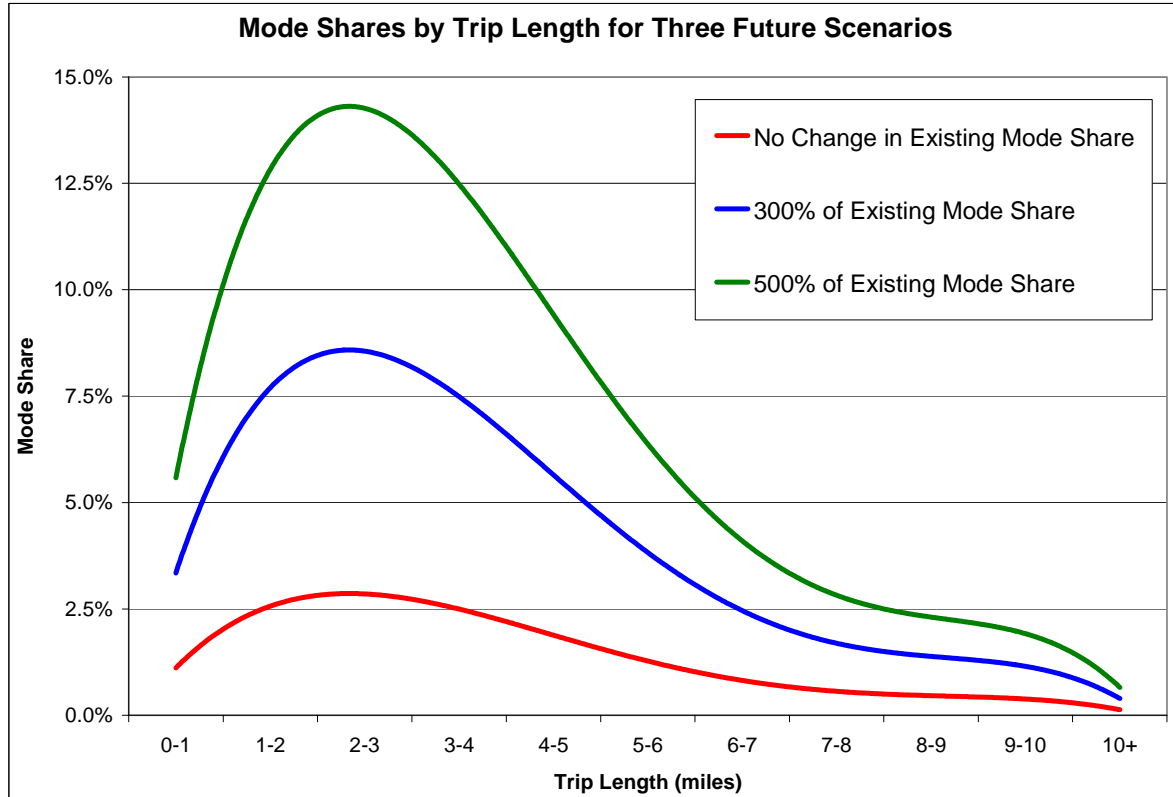


Figure 6: Bicycle Mode Share Future Scenarios

**Pedestrian Forecast Scenarios**

Two scenarios were modeled for pedestrians for the I-5 Bridge in the future year 2030. The mode share curves for these two scenarios can be seen in Figure 7. Fewer scenarios were used for pedestrian forecasting in this case because there is a narrower set of variables that might affect walking conditions across the Columbia River. Two pedestrian scenarios were modeled for year 2030 conditions, as shown in Table 2:

**TABLE 2 Pedestrian Scenarios**

Scenario	Description
P1	No change in existing mode share for all trip lengths
P2	150% of existing mode share for all trip lengths

The first scenario assumes that there will be no change in the existing pedestrian mode share. The second scenario assumes a 50 percent increase in walking mode share across all trip distances five miles or less.

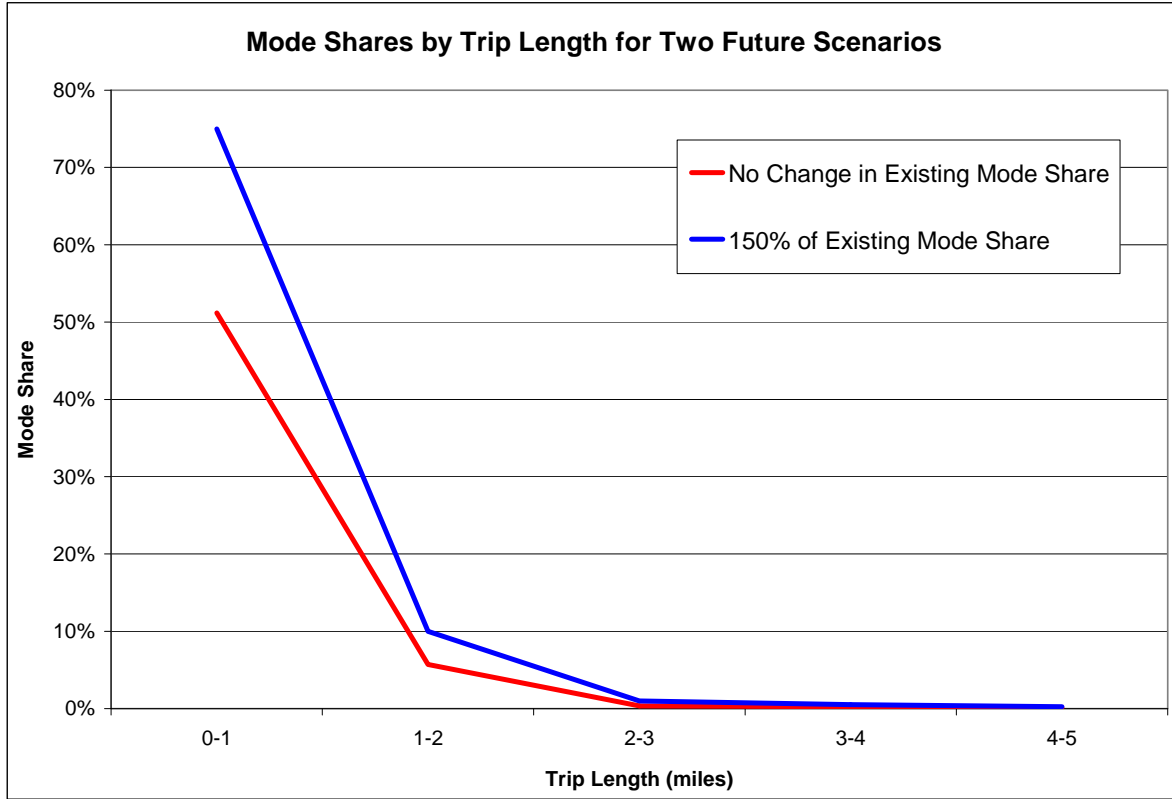


Figure 7: Pedestrian Mode Share Future Scenarios

**PEDESTRIAN AND BICYCLE FORECASTING RESULTS**

The results of the pedestrian and bicycle forecasts for year 2030 are presented in Figure 8. For comparison, year 2007 volumes on the existing I-5 Bridge are shown. The year 2030 pedestrian forecasts show a range of between 600 to 1,000 daily walkers on the I-5 Bridge, a substantial increase from the 80 pedestrians observed in 2007. The more optimistic of the two pedestrian scenarios would result in a 1,150 percent increase in daily pedestrian volumes.

The year 2030 bicycle forecasts show a range of daily usage between 900 and 6,400 riders, a significant amount of growth from the 370 bicyclists observed in 2007. This would represent an increase of between 150 and 1,625 percent over the existing count of 370.

The two scenarios that assumed half of all trips three miles or less across the I-5 Bridge would be made by bicycle would produce between 4,800 daily bicycle trips (for scenario B2-b) and 6,400 daily bicycle trips (for scenario B3-b). These scenarios were modeled to measure how sensitive the forecasts are to a drastic change in bicycle mode share for short trips.

In the summer of 2007, the majority of peak hour bicycle traffic during the morning peak period, about 65 percent, traveled in the southbound direction on the I-5 Bridge. In the afternoon, the reverse was true, with about 65 percent of bicyclists traveling northbound. Forecasted changes in land use, population and employment patterns are expected to have an effect on commuting patterns by 2030.

These changes would be expected to produce a bicycle commute pattern where southbound and northbound trips would be more evenly distributed during the peak periods. It is thought that this would occur because, according to results from the travel demand model, year 2030 vehicle traffic patterns on the I-5 Bridge would experience a shift towards a more balanced distribution. This reflects the expected growth in bicycle trips originating in North Portland as housing density increases and employment opportunities increase in Vancouver. In addition, growth in recreational and other non-commute trips would be expected to increase substantially; this would further create a more even distribution of trips between the peak commuting and off-peak hours compared to conditions in 2007. The forecasting results reflected this sensitivity, and showed a directional distribution that narrowed from a 65/35 southbound/northbound AM peak period split in 2007, to a ratio that is much closer to a 55/45 southbound/northbound AM peak period split in 2030.

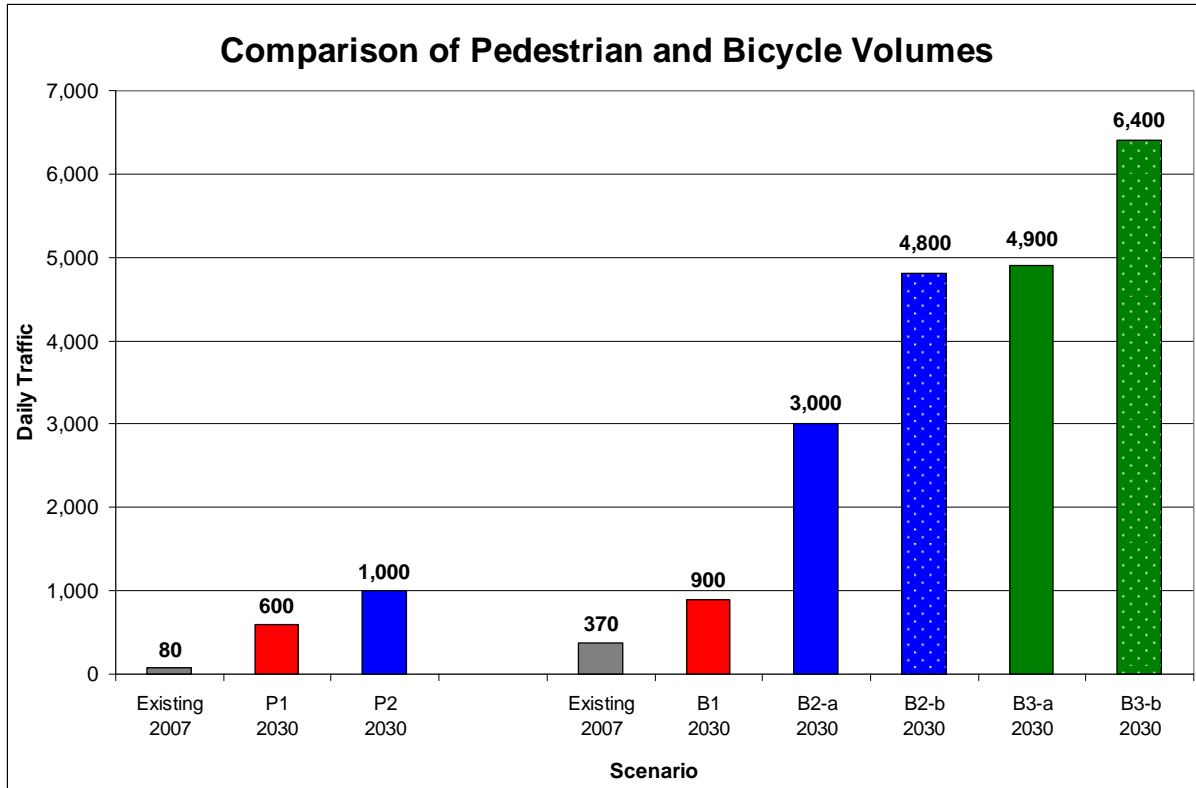


Figure 8: Comparison of Pedestrian and Bicycle Volumes and Forecasts

**CONCLUSIONS**

The existing non-standard pedestrian and bicycle facilities across and connecting to the I-5 Bridge discourage many pedestrians and bicyclists from crossing the Columbia River. The facilities proposed as part of the CRC project would provide vast enhancements facilities for pedestrians and bicyclists. The CRC project proposes to improve connections in Vancouver and in North Portland that would enhance safety, wayfinding and the quality of the experience of crossing the Columbia River as a pedestrian and bicyclist. These improvements, based on the experience of similar changes provided to other bridges, multi-use pathways and their connections in the Portland-Vancouver area, would be expected to induce a significant increase in pedestrian and bicycle trip-making across the bridge.

The results of the forecasting scenarios reveal that pedestrian and bicycle travel demands would increase substantially for the I-5 Bridge by 2030. Pedestrian travel across the bridge would be expected to increase from 80 pedestrians today to between 600 and 1,000 daily walkers, an increase of 650 to 1,150 percent over current conditions. The number of bicyclists predicted to use the crossing would increase from 370 today to between 900 and 6,400 riders, an increase of between 150 to over 1,625 percent. Generally, the I-5 Bridge would be expected to serve about five bicyclists to every one pedestrian, which is logical based on the length of the bridge and the location of developed and planned land uses.

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## **Appendix D**

Tunnels on Trails Report, by the Rails-to-Trails Conservancy

<http://www.americantrails.org/resources/railtrails/Tunnels.html>



## **Appendix E**

### Funding Sources for Bicycle and Pedestrian Projects

This document is from the "Funding Sources" section from the Draft Town of Ross Bicycle Master Plan prepared by Alta Planning and Design in 2008

## FUNDING OPPORTUNITIES

### FEDERAL FUNDING SOURCES

The primary federal source of surface transportation funding—including bicycle and pedestrian facilities—is SAFETEA-LU, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. SAFETEA-LU is the fourth iteration of the transportation vision established by Congress in 1991 with the Intermodal Surface Transportation Efficiency Act (ISTEA) and renewed in 1998 and 2003 through the Transportation Equity Act for the 21st Century (TEA-21) and the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA). Also known as the federal transportation bill, the \$286.5 billion SAFETEA-LU bill was passed in 2005 and authorizes Federal surface transportation programs for the five-year period between 2005 and 2009.

SAFETEA-LU funding is administered through the State (Caltrans and the State Resources Agency) and regional planning agencies. Most, but not all, of these funding programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. SAFETEA-LU programs require a local match of 11.47%. SAFETEA-LU funding is intended for capital improvements and safety and education programs and projects must relate to the surface transportation system.

Specific funding programs under SAFETEA-LU include:

- Congestion Mitigation and Air Quality (CMAQ) – Funds projects that are likely to contribute to the attainment of national ambient air quality standards
- Recreational Trails Program—\$370 million nationally through 2009 for non-motorized trail projects
- Safe Routes to School Program—\$612 million nationally through 2009
- Transportation, Community and System Preservation Program—\$270 million nationally over five years
- Federal Lands Highway Funds—Approximately \$1 billion dollars are available nationally through 2009

### FEDERAL LANDS HIGHWAY FUNDS

Federal Lands Highway Funds may be used to build bicycle and pedestrian facilities in conjunction with roads and parkways at the discretion of the department charged with administration of the funds. The projects must be transportation-related and tied to a plan adopted by the State and MPO. Federal Lands Highway Funds may be used for planning and construction.

#### FUNDING GLOSSARY

**CTC** *California Transportation Commission*

**FHWA** *Federal Highway Administration*

**MPO** *Metropolitan Planning Organization*

**RTIP** *Regional Transportation Improvement Program*

**RTP** *Regional Transportation Plan*

**RTPA** *Regional Transportation Planning Agency*

**SAFETEA-LU** *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*

**STIP** *State Transportation Improvement Program*

## **TRANSPORTATION, COMMUNITY AND SYSTEM PRESERVATION PROGRAM**

The Transportation, Community and System Preservation (TCSP) Program provides federal funding for transit oriented development, traffic calming and other projects that improve the efficiency of the transportation system, reduce the impact on the environment, and provide efficient access to jobs, services and trade centers. The program is intended to provide communities with the resources to explore the integration of their transportation system with community preservation and environmental activities. TCSP Program funds require a 20% match.

## **REGIONAL SURFACE TRANSPORTATION PROGRAM**

The Regional Surface Transportation Program (RSTP) is a block grant program which provides funding for bicycle and pedestrian projects, among many other transportation projects. Under the RSTP, Metropolitan Planning Organizations, such as MTC, prioritize and approve projects which will receive RSTP funds. TAMC distributes the RSTP funds to local jurisdictions. Metropolitan planning organizations can transfer funding from other federal transportation sources to the RSTP program in order to gain more flexibility in the way the monies are allocated. In California, 62.5% of RSTP funds are allocated according to population. The remaining 37.5% is available statewide.

## **REGIONAL TRANSPORTATION IMPROVEMENT PROGRAM**

The Regional Transportation Improvement Program (RTIP) is a derivative of the STIP program and identifies projects which are needed to improve regional transportation. Such projects may include bicycle and pedestrian facilities, safety projects and grade separation, among many others. RTIP project planning, programming and monitoring may be funded up to .5% of total RTIP funds in urbanized regions and 2% of total RTIP funds in non-urbanized regions. Each RTPA prepares a RTIP, consisting of projects to be funded through STIP. The RTPA's Regional Transportation Plan helps prioritize projects for the RTIP. RTIPs must be approved by the CTC. Projects to be funded by RTIP funds must be identified in the current or next Regional Transportation Plan.

## **RECREATIONAL TRAILS PROGRAM**

The Recreational Trails Program of SAFETEA-LU provides funds to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized as well as motorized uses. In California, the funds are administered by the California Department of Parks and Recreation. RTP projects must be ADA compliant. Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails;
- Purchase and lease of trail construction and maintenance equipment;
- Construction of new trails; including unpaved trails;
- Acquisition of easements or property for trails;
- State administrative costs related to this program (limited to seven percent of a State's funds); and

- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds).

## **LAND AND WATER CONSERVATION FUND**

Land and Water Conservation Fund is a federally funded program that provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. The Fund is administered by the National Parks Service and the California Department of Parks and Recreation and has been reauthorized until 2015.

Cities, counties and districts authorized to acquire, develop, operate and maintain park and recreation facilities are eligible to apply. Applicants must fund the entire project, and will be reimbursed for 50% of costs. Property acquired or developed under the program must be retained in perpetuity for public recreational use. The grant process for local agencies is competitive, and 40% of grants are reserved for Northern California.

In 2006, approximately \$480,000 was available for projects in Northern California.

## **RIVERS, TRAILS AND CONSERVATION ASSISTANCE PROGRAM**

The Rivers, Trails and Conservation Assistance Program (RTCA) is a National Parks Service program which provides technical assistance via direct staff involvement, to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for planning assistance—there are no implementation monies available. Projects are prioritized for assistance based upon criteria which include conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation and focusing on lasting accomplishments.

## **STATEWIDE FUNDING SOURCES**

The State of California uses both federal sources and its own budget to fund the following bicycle and pedestrian projects and programs.

### **BICYCLE TRANSPORTATION ACCOUNT**

The Bicycle Transportation Account (BTA) provides state funding for local projects that improve the safety and convenience of bicycling for transportation. Because of its focus on transportation, BTA projects, including trail, must provide a transportation link. Funds are available for both planning and construction. BTA funding is administered by Caltrans and cities and counties must have an adopted Bicycle Transportation Plan in order to be eligible. Town Bicycle Transportation Plans must be approved by the local MPO prior to Caltrans approval. Out of \$5 million available statewide, the maximum amount available for individual projects is \$1.2 million.

### **WILDLIFE CONSERVATION BOARD PUBLIC ACCESS PROGRAM**

Funding for the acquisition of lands or improvements that preserve wildlife habitat or provide recreational access for hunting, fishing or other wildlife-oriented activities. Up to \$250,000 dollars available per project, applications accepted quarterly. Projects eligible for funding include interpretive trails, river access, and trailhead parking areas. The State of California must have a proprietary interest in the project. Local agencies are generally responsible for the planning and engineering phases of each project.

## **CALIFORNIA CONSERVATION CORPS**

The California Conservation Corps (CCC) is a public service program which occasionally provides assistance on construction projects. The CCC may be written into grant applications as a project partner. In order to utilize CCC labor, project sites must be public land or be publicly accessible. CCC labor cannot be used to perform regular maintenance, however, they will perform annual maintenance, such as the opening of trails in the spring.

## **SAFE ROUTES TO SCHOOL (SR2S)**

In September 2004, with the passage of SB 1087 (Soto), the State extended Safe Routes to School legislation for three additional years. The bill is scheduled to sunset on January 1, 2008. This program is meant to improve the safety of walking and cycling to school and encourage students to walk and bicycle to school through identification of existing and new routes to school and construction of pedestrian and bicycle safety and traffic calming projects. Caltrans is currently evaluating California's SR2S funding, in light of the new federal SR2S Program. Recent SAFETEA-LU legislation which requires each state's Department of Transportation to designate a SR2S Coordinator, also contains a SR2S program, but as of this writing, whether or not these programs will be combined in California or will remain autonomous has not yet been determined.

## **ENVIRONMENTAL JUSTICE: CONTEXT SENSITIVE PLANNING GRANTS**

The Caltrans-administered Environmental Justice: Context Sensitive Planning Grants promotes context sensitive planning in diverse communities and funds planning activities that assist low-income, minority and Native American communities to become active participants in transportation planning and project development. Grants are available to transit districts, cities, counties and tribal governments. This grant is funded by the State Highway Account at \$1.5 million annually state-wide. Grants are capped at \$250,000.

## **OFFICE OF TRAFFIC SAFETY (OTS) GRANTS**

The California Office of Traffic Safety distributes federal funding apportioned to California under the National Highway Safety Act and SAFETEA-LU. Grants are used to establish new traffic safety programs, expand ongoing programs or address deficiencies in current programs. Bicycle and pedestrian safety are included in the list of traffic safety priority areas. Eligible grantees are: governmental agencies, state colleges, and state universities, local Town and County government agencies, school districts, fire departments and public emergency services providers. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation or construction. Grants are awarded on a competitive basis, and priority is given to agencies with the greatest need. Evaluation criteria to assess need include: potential traffic safety impact, collision statistics and rankings, seriousness of problems, and performance on previous OTS grants. OTS expects to have \$56 million in funding available statewide for FY 2006/07.

## **COMMUNITY BASED TRANSPORTATION PLANNING DEMONSTRATION GRANT PROGRAM**

This fund, administered by Caltrans, provides funding for projects that exemplify livable community concepts including bicycle and pedestrian improvement projects. Eligible applicants include local governments, MPO's and RPTA's. A 20% local match is required and projects must demonstrate a transportation component or objective. There are \$3 million dollars available annually statewide.

## **COASTAL CONSERVANCY NON-PROFIT GRANTS PROGRAM**

The Coastal Conservancy provides grants to non-profit organizations for projects which provide access to the California coast and preserve coastal lands, including the construction of trails, public piers, urban waterfronts, and other public access facilities.

## **REGIONAL FUNDING SOURCES**

Regional bicycle and pedestrian grant programs come from a variety of sources, including SAFETEA-LU, the State budget and vehicle registration fees.

## **AB 2766 MOTOR VEHICLE EMISSION REDUCTION GRANT PROGRAM**

The Bay Area Air Quality Management District provides a grant program in accordance with Assembly Bill 2766 which authorized air districts in California to impose a two to four dollar motor vehicle registration fee to be used for the purpose of reducing motor vehicle emissions in order for air districts to meet their responsibilities under the California Clean Air Act. Projects include bicycle facility improvements, safety and enforcement. Proposals must demonstrate the relationship between reduced motor vehicle emissions and improved air quality.

## **TRANSPORTATION FOR LIVABLE COMMUNITIES PROGRAM**

The Transportation for Livable Communities Program (TLC) provides grant monies to public agencies to encourage land use decisions that support compact, pedestrian and bicycle friendly development near transit hubs. MTC administers the TLC program with funds from the Regional Surface Transportation Project. TLC grants are capped at \$400,000 and are competitive.

## **TRANSPORTATION ENHANCEMENT PROGRAM**

The Transportation Enhancement Program provides funds for the construction of projects, beyond the scope of typical transportation projects, which enhance the transportation system. Transportation Enhancement Projects may include landscaping, bicycle facilities and streetscape improvements. Transportation Enhancement projects are programmed as part of the STIP. Annual apportionment averages around \$800,000.

## **TRANSPORTATION FUND FOR CLEAN AIR PROGRAM (TFCA)**

TFCA funds are generated by a four dollar surcharge on automobile registration fees in the nine-county Bay Area. Approximately \$20 million is collected annually which funds two programs: 60 percent of the TFCA monies go to the Regional Fund and 40 percent go to the County Program Manager Fund.

The Regional Fund is administered by the Bay Area Air Quality Management District (BAAQMD). Pedestrian infrastructure improvements are eligible for TFCA funds through the Smart Growth funding category.

BAAQMD, TFCA Program: [www.baaqmd.gov/pln/grants\\_and\\_incentives/tfca/](http://www.baaqmd.gov/pln/grants_and_incentives/tfca/)

## **REGIONAL BICYCLE AND PEDESTRIAN PROGRAM (RBPP)**

The RBPP was created in 2003 as part of the long range Transportation 2030 Plan developed by the Bay Area Metropolitan Transportation Commission. The program—currently funded with

Congestion Mitigation and Air Quality funds—funds regionally significant pedestrian and bicycle projects, and bicycle and pedestrian projects serving schools or transit. \$200 million dollars are committed to this program over the 25-year period. Seventy five percent of the total funds are allocated to the county congestion management agencies based on population. The remaining 25 percent of funds are regionally competitive, with the county CMAs recommending the projects to be submitted to MTC for funding consideration.

Metropolitan Transportation Commission, RBPP Program

[www.mtc.ca.gov/planning/bicyclespedestrians/regional.htm#bikepedprog](http://www.mtc.ca.gov/planning/bicyclespedestrians/regional.htm#bikepedprog)

## **SAFE ROUTES TO TRANSIT (SR2T)**

Regional Measure 2 (RM2), approved in March 2004, raised the toll on seven state-owned Bay Area bridges by one dollar for 20 years. This fee increase funds various operational improvements and capital projects which reduce congestion or improve travel in the toll bridge corridors.

Twenty million dollars of RM2 funding is allocated to the Safe Routes to Transit Program, which provides competitive grant funding for capital and planning projects that improve bicycle and pedestrian access to transit facilities. Eligible projects must be shown to reduce congestion on one or more of the Bay Area's toll bridges. The competitive grant process is administered by the Transportation and Land Use Coalition and the East Bay Bicycle Coalition. Competitive funding is awarded in five \$4 million grant cycles. The first round of funding was awarded in December 2005. Future funding cycles will be in 2007, 2009, 2011 and 2013.

Transportation and Land Use Coalition, SR2T Program:

[www.transcoalition.org/c/bikeped/bikeped\\_saferoutes.html](http://www.transcoalition.org/c/bikeped/bikeped_saferoutes.html)

## **THE BAY TRAIL PROJECT**

The Bay Trail Grant program offers competitive grants to local governments, special districts and qualified nonprofit groups to build or design new Bay Trail segments. The program is structured to: speed Bay Trail construction by targeting high-priority, ready to build sections and closing critical gaps; leverage state dollars with significant matching funds and in-kind contributions; foster partnership by encouraging cooperative partnerships and creative design solutions; and employ the California Conservation Corps for construction, landscaping and maintenance where possible. The amount of available funding varies, depending on State bonds and grants to the Bay Trail Project. Beginning Fall 2007 the Bay Trail has a new funding program that will distribute \$2.5 million in Proposition 84 funds for the planning and construction of Bay Trail spine segments in the 9-county area. Another \$2.5 million grant program is anticipated in 2009.

Bay Trail Project Grant Program: [http://baytrail.abag.ca.gov/grants\\_2003.htm](http://baytrail.abag.ca.gov/grants_2003.htm)

## **LOCAL FUNDING SOURCES**

### **TDA ARTICLE 3**

Transportation Development Act (TDA) Article 3 funds are state block grants awarded annually to local jurisdictions for transit, bicycle and pedestrian projects in California. Funds for pedestrian projects originate from the Local Transportation Fund (LTF), which is derived from a ¼ cent of the general state sales tax. LTF funds are returned to each county based on sales tax revenues. Eligible

pedestrian and bicycle projects include: construction and engineering for capital projects; maintenance of bikeways; bicycle safety education programs (up to 5% of funds); and development of comprehensive bicycle or pedestrian facilities plans. A Town or county is allowed to apply for funding for bicycle or pedestrian plans not more than once every five years. These funds may be used to meet local match requirements for federal funding sources. 2% of the total TDA apportionment is available for bicycle and pedestrian funding.

## **MEASURE A - LOCAL ROADS**

The funds (approximately \$43.9 M) will be distributed on an annual basis to each city, town, and Marin County based on a combination of miles of roads to be maintained and population. Each project will be required to consider the needs of all roadway users. Where feasible, locally defined bicycle and pedestrian projects will be implemented at the time a roadway is improved. Improvements could include striping and signing for bicycle lanes and bikeways, sidewalk improvements, curb ramps, and other accessibility and safety improvements.

## **MEASURE A - SAFE PATHWAYS FUNDING**

Safe Pathways to School is the capital improvement element of the Transportation Authority of Marin's Safe Routes to Schools program. Where the Safe Routes program identifies circulation improvements needed for safe access to schools, the Safe Pathways program will provide funding for the engineering, environmental clearance, and construction of pathway and sidewalk improvements in all Marin County communities, including safety improvements at street crossings.

Safe Pathway projects are expected to attract matching funds from other sources and may be used in combination with road funds to accelerate pathway improvements in school areas.

Safe Pathways Projects are selected based on performance criteria that focus on improving safety throughout the County. All projects will come from approved Safe Routes plans, supported by parents, school officials, and the local jurisdiction.

- Relieves an identified safety or congestion problem along a major school route
- Completes a "gap" in the bicycle and pedestrian system along a major school route
- Maximizes daily uses by students and others
- Attracts matching funds
- Respects geographic equity

## **MARIN NONMOTORIZED TRANSPORTATION PILOT PROGRAM**

Marin County is one of four communities nationally that has been selected by Congress to participate in a Nonmotorized Transportation Pilot Program under Section 1807 of the 2005 federal transportation bill, SAFETEA-LU. Section 1807 provides for \$20 million to each of the four communities for fiscal years 2006 through 2009. The legislation states that "The Secretary shall establish and carry out nonmotorized transportation pilot program to construct, in the following four communities selected by the Secretary, a network of nonmotorized transportation infrastructure facilities, including sidewalks, bicycle lanes, and pedestrian and bicycle trails, that connect directly with transit stations, schools, residences, businesses, recreation areas, and other community activity centers:

1. Columbia, Missouri
2. Marin County, California
3. Minneapolis-St. Paul, Minnesota
4. Sheboygan County, Wisconsin

The purpose of the program shall be 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."

As of this writing Marin County is determining the process by which funding will be distributed and local agencies will apply or submit projects for consideration.

## **NON-TRADITIONAL FUNDING SOURCES**

### **AMERICAN GREENWAYS PROGRAM**

Administered by The Conservation Fund, the American Greenways Program provides funding for the planning and design of greenways. Applications for funds can be made by local regional or state-wide non-profit organizations and public agencies. The maximum award is \$2,500, but most range from \$500 to \$1,500. American Greenways Program monies may be used to fund unpaved trail development.

### **CALIFORNIA CENTER FOR PHYSICAL ACTIVITY GRANT PROGRAM**

The California Center for Physical Activity runs several programs related to walking and offers small grants to public health departments. Grants are in the amount of \$4,999 dollars or less and are offered intermittently.

## **REQUIREMENTS FOR NEW DEVELOPMENTS**

With the increasing support for "routine accommodation" and "complete streets," requirements for new development, road widening and new commercial development provide opportunities to efficiently construct pedestrian facilities.

### **IMPACT FEES**

One potential local source of funding is developer impact fees, typically tied to trip generation rates and traffic impacts produced by a proposed project. A developer may attempt to reduce the number of trips (and hence impacts and cost) by paying for on- and off-site pedestrian improvements designed to encourage residents, employees and visitors to the new development to walk rather than drive. Establishing a clear nexus or connection between the impact fee and the project's impacts is critical to ensure legal soundness.

### **MELLO-ROOS COMMUNITY FACILITIES ACT**

The Mello-Roos Community Facilities Act was passed by the Legislature in 1982 in response to reduced funding opportunities brought about by the passage of Proposition 13. The Mello-Roos Act allows any county, Town, special district, school district or joint powers of authority to establish a

Community Facility Districts (CFD) for the purpose of selling tax-exempt bonds to fund public improvements within that district. CFDs must be approved by a two-thirds margin of qualified voters in the district. Property owners within the district are responsible for paying back the bonds. Pedestrian facilities are eligible for funding under CFD bonds.

## **VOLUNTEER AND PUBLIC-PRIVATE PARTNERSHIPS**

Volunteer programs may substantially reduce the cost of implementing some of the proposed pathways. Use of groups such as the California Conservation Corp (who offers low cost assistance) will be effective at reducing project costs. Local schools or community groups may use the bikeway or pedestrian project as a project for the year, possibly working with a local designer or engineer. Work parties may be formed to help clear the right of way where needed. A local construction company may donate or discount services. A challenge grant program with local businesses may be a good source of local funding, where corporations ‘adopt’ a bikeway and help construct and maintain the facility.

Other opportunities for implementation will appear over time that may be used to implement the system.

## **Appendix F**

Over and Under  
A Practical Guide to the Condemnation of  
Aerial Guideway Easements and Tunnel Easements

<http://www.grahamdunn.com/download.cfm?DownloadFile=7D5A7957-3048-56D1-FE15FBD3C1EA3FDC>