CITY OF PETALUMA

POST OFFICE BOX 61
PETALUMA, CA 94953-0061

November 19, 2020

Re: REQUEST FOR PROPOSAL (RFP) FOR ENGINEERING DESIGN SERVICES FOR THE NORTH MCDOWELL BLVD COMPLETE STREETS PROJECT.

INTRODUCTION

The City of Petaluma's Department of Public Works & Utilities is requesting technical proposals from qualified consulting firms interested in providing engineering design services for the North McDowell Blvd Complete Streets Project.

The City will enter into a Professional Service Agreement (PSA) with the top qualified firm to provide these services.

SCOPE OF SERVICES

The North McDowell Blvd Complete Streets project is to include the full rehabilitation of North McDowell Blvd from Sunrise Parkway to Old Redwood Highway. This corridor serves as one of the City's main arterials. There are core business, industry and residential hubs of the City located off it, as well as sites of significant future development.

Engineering design components will include plans, specifications and estimate (PS&E) which includes:

- Roadway surface reconstruction
- Pedestrian facilities (including ADA access, curb ramps, crossings, sidewalks and other safety improvements)
- Bicycle facilities (including Class I, II and IV bike facilities, wayfinding and other improvements)
- Traffic calming measures (including sidewalk bulb-outs, and other measures)
- Transit stop improvements
- Traffic signal connectivity, coordination and detection upgrades
- Design and schedule coordination with planned development

Public Works & Utilities

City Engineer
11 English Street
Petaluma, CA 94952
Phone (707) 778-4303

Environmental Services
Ellis Creek Water
Recycling Facility
3890 Cypress Drive
Petaluma, CA 94954
Phone (707) 776-3777
Fax: (707) 656-4067

Parks & Facility
Maintenance
840 Hopper St. Ext.
Petaluma, CA 94952
Phone (707) 778-4303
Fax (707) 206-6065

Transit Division
555 N. McDowell Blvd.
Petaluma, CA 94954
Phone (707) 778-4421

Utilities & Field Operations
202 N. McDowell Blvd.
Petaluma, CA 94954
Phone (707) 778-4546
Fax (707) 206-6034

E-Mail: publicworks@
cityofpetaluma.org

Funding for this project is provided by the Local Partnership Program Formulaic (LPP), a program sponsored by Senate Bill 1 (SB1) and the California Transportation Commission (CTC).

Oversight of this project will be provided through the Caltrans Local Assistance office, utilizing state-only funds processes as specified in the Caltrans Local Assistance Procedure Manual (LAPM), specific process details can be found in chapter 12. Respondents to this RFP will be expected to show experience in and comply with any applicable requirements therein.

The extents of this project are to remain within the City of Petaluma's right of way. The City does not anticipate that this project will require environmental permitting, encroachment permitting or right of way certification. Requirements and or exemptions will be determined by Caltrans Local Assistance and coordinated with the City of Petaluma, although the respondent should be prepared to assist with any permitting if requested.

The respondent should consider that this project will require special coordination with regards to schedule and/or select design components. This project will run concurrent with the extension of the Sonoma Marin Area Rapid Transit (SMART) Multi Use Path (MUP) which will include a new pedestrian crossing on North McDowell Boulevard at the SMART rail crossing, the Danco Development (formally Corona Station Development) and construction of SMART's second station on Corona Road.

Specific engineering design considerations:

- Paving techniques to include either full depth reclamation (FDR), paving fabric such as glass grid, or a redesigned AC section. New paving will remove any AC paved over lip of gutter. The road section shall have a 30 year design life.
- Geotechnical evaluation to achieve a road section with a 30 year design life.
- Installation of ADA compliant curb ramps through the corridor, designs shall be based off Caltrans standard plans utilizing directional ramps with flared wings and bulb-outs where possible.
- New signal interconnect: 3" conduit with 48SMFO from Sunrise Pkwy to Old Redwood Hwy. Conduit can be HDD or rock wheel and terminated in each cabinet. Coordination with SMART for track crossings and signal interconnect along Corona.
- Signal coordination timing; Caulfield Ln to Old Redwood Hwy.
- Sidewalk gap closure; south bound McDowell Blvd from Corona Rd to Lagunitas Brewery.
- Sidewalk gap closure; north bound McDowell Blvd at Corona Rd.
- Bicycle connectivity upgrades along corridor including the SMART multi-use path (MUP) to provide consistency.
- Wayfinding installation for pedestrians and bicyclists.
- Installation of video detection for traffic signals; the City to provide model and brand. Programing and phasing will be done in the field. City may consider purchasing equipment and having contractor install
- Consultant to provide sufficient survey for curb ramp design.

- Upgrades to existing uncontrolled crossings to be installed at Sunrise Pkwy and Rand St. Crossings include new enhanced treatments, curb ramps, median refuge island and a flashing crosswalk system such as overhead sign, beacon, RRFB or some combination that meets the MUTCD and safety recommendations for speeds and volumes. Crossing may need be relocated to accommodate new enhanced safety features and to avoid driveways, turning lanes or intersections.
- The City has available aerial images, title block and utility base maps previously completed for City utility upgrade project for the plan set.
- All improvements shall be in accordance with the Current edition of the MUTCD ca, Caltrans HDM, Caltrans Standard plans and City Standards.
- The Consultant shall review U.C. Berkeley SafeTREC report (PS19025) titled: City of Petaluma Complete Streets Safety Assessment dated September 2019

The City will be responsible for the following:

- Public outreach, with the assistance from the consultant for any necessary exhibits
- Coordination with Caltrans and specific grant requirements or submittals to Caltrans Local Assistance.

RESPONSE TO RFP

Proposals must be received by City of Petaluma by **2:00 PM, Thursday December 10, 2020.** Consultants shall send one bound copy and one electronic copy of proposal to: **City Clerk's Office at 11 English Street, Petaluma Ca 94952 Attn: Ken Eichstaedt.** The cost proposal and required exhibits shall be in a seal envelope. The cost proposal is confidential and will be examined after the proposals have been reviewed and consultant has been selected. Proposals shall be limited to a maximum of ten (10) pages, excluding appendices. Specific requirements are described as follows.

For question or clarifications contact Ken Eichstaedt by phone (707)210-2266 or by email at keichstaedt@cityofpetaluma.org.

1.0 TECHNICAL PROPOSAL REQUIREMENTS

1.1 COVER LETTER

Provide a cover letter signed by an official authorized to bind the firm and shall contain a statement that the firm is able to sign the City of Petaluma's standard PSA.

1.2 INTRODUCTION

Provide an overview of the firm's qualifications as they relate to providing surveying services to municipal agencies. Include a brief description of your understanding of the services to be provided for the City of Petaluma and your approach to provide the services identified in the scope of services. Include methods to incorporate the firm's work with existing municipal standards.

1.3 PROJECT TEAM ORGANIZATION

Identify proposed personnel. Include an organizational chart. List any sub-consultants including contact information and areas of expertise. Briefly describe the roles of the prime consultant and sub-consultants. It is not required that you have any sub-consultants. Provide information regarding the size and years in business of your firm and each sub-consultant.

1.4 TECHNICAL APPROACH / SCOPE OF WORK

Describe your technical approach for completing the scope of services. Identify and detail specific tasks as necessary to complete the work. Provide a description of the challenges and mitigation actions the consultant will take on the project. Proposers are encouraged to amplify the scope of work, to identify any supplemental tasks necessary, and to recommend any alternatives, which may enhance the project or reduce costs. It is recommended that the Consultant view

1.5 REFERENCES

Provide three (3) business related references with details including name, company, address, telephone number and business relationship.

1.6 COST PROPOSAL

The proposal shall define the total estimated contract price on a time-and-expenses basis. The price shall be an estimate of the time and expenses needed to complete the work as proposed. The estimate shall include:

- A listing of tasks required to accomplish the proposed scope of services;
- An estimate of the labor hours for each position classification and task;
- The proposed hourly fee schedule for calendar year 2021;
- All other reimbursable fees and expenses (noting that the City will **not** pay for lodging, vehicles and travel time);
- Assumptions upon which estimate is based; and
- Mark-up on other direct costs (ODC), not to exceed 5 percent.

2.0 SELECTION PROCESS

2.1 EVALUATION CRITERIA

The City's evaluation criteria for submitted proposals is detailed as follows, 100 points total:

- **Completeness of Response (Pass/Fail)**
  a. Responses to this RFP must be complete. Responses that do not include the proposal content requirements identified within this RFP and subsequent addenda and do not address each of the items listed will be considered incomplete and will receive no further consideration.

- **Qualifications & Experience (25 points)**
  a. Relevant experience, specific qualifications, and technical expertise of the firm and sub-consultants to conduct Complete Street design services on both federal and nonfederal-aid projects
  b. Recent project examples that have been built.

- **Organization & Approach (15 points)**
  a. Describes familiarity of project and demonstrates understanding of work completed to date and project objectives moving forward
  b. Roles and Organization of Proposed Team
    i. Proposes adequate and appropriate disciplines of project team.
    ii. Some or all of team members have previously worked together on similar project(s).
  c. Project and Management Approach
    i. Team is managed by an individual with appropriate experience in similar projects. This person's time is appropriately committed to the project.
    ii. Team successfully addresses Site Planning and Programming efforts.
    iii. Project team and management approach responds to project issues. Team structure provides adequate capability to perform both volume and quality of needed work within project schedule milestones.
  d. Roles of Key Individuals on the Team
    i. Proposed team members, as demonstrated by enclosed resumes, have relevant experience for their role in the project.
    ii. Key positions required to execute the project team's responsibilities are appropriately staffed.
  e. Working Relationship with the City of Petaluma
    i. Team and its leaders have experience working in the public sector and knowledge of public sector procurement process.
    ii. Team leadership understands the nature of public sector work and its decision-making process.
    iii. Proposal responds to need to assist the City of Petaluma during the project.

- **Scope of Services to be Provided (30 points)**
  a. Detailed Scope of Services to be Provided
    i. Proposed scope of services is appropriate for all phases of the work.
    ii. Scope addresses all known project needs and appears achievable in the timeframes set forth in the project schedule.
  b. Project Deliverables
    i. Deliverables are appropriate to the schedule and scope set forth in above requirements and include: Basis of Design Memorandum (10% design); 50% Design; 90% design; 100% design; and, Final
    ii. Consultant shall assemble complete bid package (General Requirements, Division 0, Division 1, Technical Specifications and Drawings)
    iii. Construction cost estimate shall be provided for each deliverable

- **Schedule of Work (15 points)**

a. Schedule shows completion of the work within
b. The schedule serves as a project timeline, stating all major milestones and required submittals for project management and Federal-Aid compliance.
c. The schedule addresses all knowable phases of the project, in accordance with the general requirements of this RFP.

- **Conflict of Interest Statement (Pass/Fail)**
  a. Discloses any financial, business or other relationship with the City of Petaluma that may have an impact upon the outcome of the contract or the construction project.
  b. Lists current clients who may have a financial interest in the outcome of this contract or the construction project that will follow.
  c. Discloses any financial interest or relationship with any construction company that might submit a bid on the construction project.

- **References (15 points)**
  a. Satisfactory references.

3.0 GENERAL INFORMATION

3.1 NEGOTIATION OF CONTRACT

After selection of the consultant, the City and the consultant shall negotiate the contract under which the work shall be performed. All items submitted in the consultant's proposal shall be subject to negotiation.

3.2 PROFESSIONAL SERVICES AGREEMENT

The successful firm will be required to execute the City of Petaluma's Standard Professional Services Agreement (see Attachment A) which includes Exhibit 10-R for federal contracting language. The consultant should assume that no exceptions to this agreement will be accepted and that any consultant submitting a proposal must be prepared to execute this agreement without modification. Though, if the consultant believes that a modification of the Agreement will benefit the City, the consultant can describe such modification in their proposal including a description of the perceived benefits. There is no obligation on the part of the City to accept such a modification.

3.3 ESTIMATED SCHEDULE

Advertisement Date		November 19 , 2020
Statement of Qualifications Due Date	2:00 PM	December 10, 2020
City Council Award		January 18, 2021
PSA Executed / Notice to Proceed Issued		February 8, 2021
Design Complete (Grant Requirement)		November 1, 2021
Construction Start (Grant Requirement)		May 1, 2022

If any further information is required, please contact me at (707) 210 - 2266. Your interest in this project is greatly appreciated.

Sincerely,

KEN EICHSTAEDT

Digitally signed by KEN EICHSTAEDT
DN: C=US, E=KEICHSTAEDT@CITYOFPETALUMA.ORG, O=CITY OF PETALUMA, OU=PUBLIC WORKS AND UTILITIES, CN=KEN EICHSTAEDT
Date: 2020.11.10 17:17:35-08'00'

Ken Eichstaedt P.E.
Traffic Engineer, City of Petaluma

Enclosures:
Attachment A: Standard Professional Services Agreement
Attachment B: Insurance Information
Attachment C: Prevailing Wage Information
Attachment D: Living Wage Information
Attachment E: Grant Application Including Location Map / Project Limits
Attachment F: CIP Project Budget Sheet
Attachment G: Complete Streets Safety Assessment

PROFESSIONAL SERVICES AGREEMENT

_____
(Title of Project)

FY _____ Fund # _____ Cost Center _____ Object Code _____ Project # _____ Amount $_____

For multi-year contracts or contracts with multiple accounts:

FY _____ Fund # _____ Cost Center _____ Object Code _____ Project # _____ Amount $_____
FY _____ Fund # _____ Cost Center _____ Object Code _____ Project # _____ Amount $_____
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THIS PROFESSIONAL SERVICES AGREEMENT ("Agreement") is entered into and effective as of _____, 20____ ("Effective Date"), by and between the City of Petaluma, a
(city use only)

municipal corporation and a charter city ("City") and _____, a _____ ("Consultant") (collectively, the "Parties").

WHEREAS, the Parties enter into this Agreement for the purpose of Consultant providing professional services to City under the terms and conditions set forth herein.

THEREFORE, in consideration of the mutual covenants contained in this Agreement, the Parties agree as follows:

1. **Services.** Consultant shall provide the services as described in and in accordance with the schedule set forth in Exhibit "A" attached hereto and incorporated herein ("Services").

2. **Compensation; Business Tax Certificate.**

   A. For the full performance of the Services as described herein, City shall compensate Consultant in accordance with the rates specified in Exhibit A.

   B. Consultant shall submit detailed monthly invoices reflecting all services performed during the preceding month and including a revised schedule for performance and additional documentation requested by City, as applicable.

   C. Consultant shall be compensated for services in addition to those described in Exhibit A, only if Consultant and City execute a written amendment to this Agreement describing the additional services to be performed and the compensation to be paid for such services. In no case shall the total compensation under this Agreement exceed $_____ without prior written authorization of the City Manager. Further, no compensation for a section or work program component attached with a specific budget shall be exceeded without prior written authorization of the City Manager.

   D. Notwithstanding any provision herein, Consultant shall not be paid any compensation until such time as Consultant has on file with the City Finance Department a current W-9 form available from the IRS website (www.irs.gov) and has obtained a currently valid Petaluma business tax certificate.

E. City's obligation to pay compensation to Consultant as provided herein is contingent upon Consultant's performance of the Services pursuant to the terms and conditions of this Agreement and any amendments thereto.

3. **Term.** The term of this Agreement commences on the Effective Date, and terminates on _____, unless sooner terminated in accordance with Section 4. Upon termination, any and all of City's documents or materials provided to Consultant and any and all of the documents or materials prepared for City or relating to the performance of the Services, shall be delivered to the City as soon as possible, but not later than fourteen (14) days after termination of the Agreement.

4. **Termination.** City may terminate this Agreement without cause upon ten (10) days' written notice. City may immediately terminate or suspend this Agreement for cause. Cause for immediate termination or suspension shall include, but not be limited to, any breach of this Agreement by Consultant or Consultant's bankruptcy or insolvency. Upon receipt of notice of termination or suspension for cause, Consultant shall immediately stop all work in progress under this Agreement. In the event of early termination of this Agreement by City, Consultant shall be entitled to payment for all Services performed to the date of termination to the extent such Services were performed to the satisfaction of City in accordance with the terms and conditions of this Agreement. If City terminates this Agreement for cause, Consultant shall be liable to City for any excess cost City incurs for completion of the Services.

5. **Consultant's Representation; Independent Contractor.** Consultant represents that Consultant possesses distinct professional skills in performing the Services. City has relied upon said representation as a material inducement to enter into this Agreement. Consultant shall, therefore, provide properly skilled professional and technical personnel to perform all Services under this Agreement. It is expressly understood that Consultant and its agents and employees, shall act in an independent capacity and as an independent contractor and not as officers, employees or agents of City. This Agreement shall not be construed as an agreement for employment.

6. **Facilities and Equipment.** Consultant shall, at its sole cost and expense, furnish all facilities and equipment that may be required for furnishing Services pursuant to this Agreement. City shall furnish to Consultant no facilities or equipment, unless the City otherwise agrees in writing to provide the same.

7. **Licenses, Permits, Etc.** Consultant shall, at Consultant's sole cost and expense, keep in effect at all times during the term of this Agreement any licenses, permits or other such approvals which are legally required for performing the Services.

8. **Time.** Consultant shall devote such time to the performance of the Services as may be reasonably necessary for satisfactory performance of Consultant's obligations pursuant to this Agreement.

9. **Inspection.** Consultant shall provide the City every reasonable opportunity to ascertain that the Services are being performed in accordance with the requirements and intentions of this Agreement. All work done and materials furnished, if any, shall be subject to inspection and approval by the City. The inspection of such work shall not relieve Consultant of any of its obligations pursuant to this Agreement.

10. **Progress Reports.** Upon the City's request, Consultant shall provide, in a form acceptable to City, written progress reports of all oral and written observations, opinions, recommendations, analyses, progress and conclusions related to Consultant's performance of the Services.

11. **Confidentiality.** In the course of Consultant's employment, Consultant may have access to trade secrets and confidential information, disclosure of which is protected or limited by law. Consultant shall not directly or indirectly disclose or use any such confidential information, except as required for the performance of the Services.

12. **Conflict of Interest.** Consultant represents that it presently has no interest, and covenants that it shall not acquire any interest, direct or indirect, financial or otherwise, which would conflict in any manner or degree with the performance of the Services hereunder. Consultant further covenants that, in the performance of this Agreement, it shall not employ any subcontractor or person having such a conflict of interest. Consultant represents that no one who has or will have any financial interest under the Agreement is an officer or employee of City. If such conflict of interest arises during this Agreement or any extension, Consultant will immediately advise City and City may, at its sole discretion, immediately terminate this Agreement. Certain Consultants are subject to the requirements, including the disclosure and reporting requirements, of the City's Conflict of Interest Code adopted pursuant to the Political Reform Act. Such Consultants subject to the City's Conflict of Interest Code include those whose work may involve: making government decisions regarding approval or adoption of rates, rules, or regulations, action on permits or other applications, authorization to enter into or modify contracts, or approval of plans, designs, reports, or studies. Consultant agrees to comply fully with all such requirements to the extent they apply to Consultant's performance of the Services.

13. **Consultant No Agent.** Except as City may specify in writing, Consultant shall have no authority, express or implied, to act on behalf of City in any capacity whatsoever as an agent. Consultant shall have no authority, express or implied, pursuant to this Agreement to bind City to any obligation whatsoever.

14. **Standard of Performance.** Consultant shall perform all the Services in a manner consistent with the standards of Consultant's profession. All instruments of service of whatsoever nature, which Consultant delivers to City pursuant to this Agreement, shall be prepared in a substantial, workmanlike manner and conform to the standards of Consultant's profession. All such instruments of service shall become the sole and exclusive property of City upon delivery of the same.

15. **Assignment/Transfer.** No assignment or transfer in whole or in part of this Agreement shall be made without the prior written consent of City.

16. **Subcontractors.** Consultant shall directly perform all Services, and shall not subcontract any portion of performance of the Services without the prior written consent of City. Any such subcontractors shall be required to comply, to the full extent applicable, with the terms and conditions of this Agreement, including but not limited to, procuring and maintaining insurance coverage as required herein and which shall name City as an additional insured.

17. **Compliance With All Laws.** Consultant shall fully comply with all applicable local, state and federal rules, laws, regulations and ordinances pertaining to the performance of the Services required hereunder, including but not limited to, the California Building Standards Code as in effect in the City, the Americans with Disabilities Act, and any laws and regulations related to any copyright, patent, trademark or other intellectual property right involved in performance of the Services. Consultant's failure to comply with any law(s) or regulation(s) applicable to the performance of the Services hereunder shall constitute a material breach of this Agreement. To the extent that any other government agency or entity provides compensation for any Services, Consultant shall comply with all rules and regulations applicable to such fiscal assistance.

18. **Prevailing Wages.** This Agreement is subject to the requirements of the California Prevailing Wage Law, California Labor Code Section 1720 et seq., and the Services as described in Exhibit A will be performed in accordance with all applicable requirements of the California Prevailing Wage Law, including, but not limited to, all applicable requirements contained in Exhibit _____, which is attached to and made a part of this Agreement.

19. **Living Wage Ordinance.** Without limiting the foregoing Section 17, Consultant shall comply fully with all applicable requirements of Petaluma Municipal Code, Chapter 8.36, Living Wage (the "Living Wage Ordinance"), as the same may be amended from time to time. Upon the City's request Consultant shall promptly provide to the City documents and information verifying Consultant's compliance with the requirements of the Living Wage Ordinance, and shall within fifteen (15) calendar days of the Effective Date of this Agreement, notify each of its affected employees as to the amount of wages and time off that are required to be provided to them pursuant to the Living Wage Ordinance. The Acknowledgement and Certification Pursuant to City of Petaluma Living Wage Ordinance, attached to this Agreement at Exhibit _____, shall be a part of this Agreement for all purposes, and Consultants that are subject to Living Wage Ordinance requirements, as determined by the City, must provide a properly completed Exhibit _____ in accordance with the requirements of the Living Wage Ordinance. Consultant's noncompliance with the applicable requirements of the Living Wage Ordinance shall constitute cause for City's termination of this Agreement pursuant to Section 4 hereof.

20. **Discrimination.** During the performance of this Agreement, Consultant shall not discriminate against any employee or applicant for employment because of race, religion, creed, color, national origin, ancestry, gender, sexual orientation, age or physical or mental disability in violation of any applicable law.

21. **Notice.** Except as otherwise specified in this Agreement, all notices to be sent pursuant to this Agreement shall be made in writing, and sent to the Parties at their respective addresses specified below or to such other address as a Party may designate by written notice delivered to the other Party in accordance with this Section. All such notices shall be sent by:

    (i) personal delivery, in which case notice is effective upon delivery;

    (ii) certified or registered mail, return receipt requested, in which case notice shall be deemed delivered on receipt if delivery is confirmed by a return receipt;

(iii) nationally recognized overnight courier, with charges prepaid or charged to the sender's account, in which case notice is effective on delivery if delivery is confirmed by the delivery service; or

(iv) facsimile transmission, in which case notice shall be deemed delivered upon transmittal, provided that (a) a duplicate copy of the notice is promptly delivered by first-class or certified mail or by overnight delivery, or (b) a transmission report is generated reflecting the accurate transmission thereof. Any notice given by facsimile shall be considered to have been received on the next business day if it is received after 5:00 p.m. recipient's time or on a nonbusiness day.

City:
City Clerk
City of Petaluma
Post Office Box 61
Petaluma, California 94953
Phone: (707) 778-4360
Fax: (707) 778-4554
Email: cityclerk@ci.petaluma.ca.us

And:

_____
_____
_____
_____
Phone: _____
Fax: _____
Email: _____

Consultant:
_____
_____
_____
_____
Phone: _____
Fax: _____
Email: _____

22. **Ownership of Documents.** All original papers, documents or computer material on disk or microfilm, and copies thereof, produced as a result of this Agreement, shall be the property of City and may not be used by Consultant without the written consent of City. Copies of such documents or papers shall not be disclosed to others without the written consent of the City Manager or his or her designated representative.

23. **Indemnification.** To the maximum extent permitted by law, Consultant shall, at its own expense, indemnify, defend with counsel acceptable to the City, (which acceptance will not be unreasonably withheld), and hold harmless City and its officers, officials, employees, agents and volunteers ("Indemnitees") from and against any and all alleged liability, loss, damage, claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, civil penalties and fines, expenses and costs (including, without limitation, claims expenses, attorney's fees and costs and fees of litigation) (collectively, "Liability") of every nature, whether actual, alleged or threatened, arising out of or in connection with the Services or Consultant's failure to

comply with any of the terms of this Agreement, regardless of any fault or alleged fault of the Indemnitees.

The Consultant's obligation to indemnify, defend and hold harmless under this provision shall not be excused because of the Consultant's inability to evaluate Liability, or because the Consultant evaluates Liability and determines that the Consultant is not or may not be liable. The Consultant must respond within 30 calendar days to any tender for defense and indemnity by the City, unless the time for responding has been extended by an authorized representative of the City in writing. If the Consultant fails to accept tender of defense and indemnity within 30 calendar days, in addition to any other remedies authorized by law, so much of the money due or that may become due the Consultant under this Agreement as shall reasonably be considered necessary by the City, may be retained by the City until disposition has been made of the matter subject to tender, or until the Consultant accepts the tender, whichever occurs first. In the event that the City must file responsive documents in a matter tendered to Consultant prior to Consultant's acceptance of tender, Consultant agrees to fully reimburse all costs, including but not limited to attorney's fees and costs and fees of litigation, incurred by the City in filing such responsive documents.

The Consultant waives any and all rights to express or implied indemnity against the Indemnitees concerning any Liability of the Consultant arising out of or in connection with the Services or Consultant's failure to comply with any of the terms of this Agreement. The Consultant's responsibility of such defense and indemnity obligations shall survive the termination or completion of this Agreement for the full period of time allowed by law. The defense and indemnification obligations of this Agreement are undertaken to, and shall not in any way be limited by, the insurance obligations contained in this Agreement.

Notwithstanding the foregoing, to the extent this Agreement is a "construction contract" as defined by California Civil Code Section 2783, as may be amended from time to time, Consultant's duty to indemnify under this provision shall not apply when to do so would be prohibited by California Civil Code Section 2782, as may be amended from time to time.

Notwithstanding the foregoing, to the extent that the Services include design professional services subject to California Civil Code Section 2782.8, as may be amended from time to time, Consultant's duty to indemnify shall only be to the maximum extent permitted by California Civil Code Section 2782.8.

24. **Insurance.** Consultant shall comply with the "Insurance Requirements for Consultants" in Exhibit B, attached hereto and incorporated herein by reference.

City reserves the right to review any and all of the required insurance policies and/or endorsements, but has no obligation to do so. City's failure to demand evidence of full compliance with the insurance requirements set forth in this Agreement or City's failure to identify any insurance deficiency shall not relieve Contractor from, nor be construed or deemed a waiver of, its obligation to maintain the required insurance at all times during the performance of this Agreement.

25. **Amendment.** This Agreement may be amended only by a written instrument executed by both Parties.

26. **Litigation.** If litigation ensues which pertains to the subject matter of Consultant's services hereunder, Consultant, upon request from City, agrees to testify therein at a reasonable and customary fee.

27. **Construction.** This Agreement is the product of negotiation and compromise on the part of both Parties and that the Parties agree that, notwithstanding Civil Code section 1654, any uncertainty in the Agreement shall not be construed against the drafter of the Agreement.

28. **Governing Law; Venue.** This Agreement shall be enforced and interpreted under the laws of the State of California and the City of Petaluma. Any action arising from or brought in connection with this Agreement shall be venued in a court of competent jurisdiction in the County of Sonoma, State of California.

29. **Non-Waiver.** The City's failure to enforce any provision of this Agreement or the waiver thereof in a particular instance shall not be construed as a general waiver of any part of such provision. The provision shall remain in full force and effect.

30. **Severability.** If any term or portion of this Agreement is held to be invalid, illegal, or otherwise unenforceable by a court of competent jurisdiction, the remaining provisions of this Agreement shall continue in full force and effect.

31. **No Third Party Beneficiaries.** The Parties do not intend to create, and nothing in this Agreement shall be construed to create any benefit or right in any third party.

32. **Mediation.** The Parties agree to make a good faith attempt to resolve any dispute arising out of this Agreement through mediation prior to commencing litigation. The Parties shall mutually agree upon the mediator and shall divide the costs of mediation equally.

33. **Consultant's Books and Records.**

A. Consultant shall maintain any and all ledgers, books of accounts, invoices, vouchers, canceled checks, and other records or documents evidencing or relating to charges for services, or expenditures and disbursements charged to the City for a minimum period of three (3) years or for any longer period required by law, from the date of final payment to Consultant pursuant to this Agreement.

B. Consultant shall maintain all documents and records which demonstrate performance under this Agreement for a minimum period of three (3) years or for any longer period required by law, from the date of termination or completion of this Agreement.

C. Any records or documents required to be maintained pursuant to this Agreement shall be made available for inspection or audit, at any time during regular business hours, upon written request by the City Manager, City Attorney, City Finance Director, or a designated representative of these officers. Copies of such documents shall be provided to the City for inspection at Petaluma City Hall when it is practical to do so. Otherwise, unless an alternative is mutually agreed

upon, the records shall be available at Consultant's address indicated for receipt of notices in this Agreement.

D. Where City has reason to believe that such records or documents may be lost or discarded due to dissolution, disbandment or termination of Consultant's business, City may, by written request by any of the above-named officers, require that custody of the records be given to the City and that the records and documents be maintained in Petaluma City Hall. Access to such records and documents shall be granted to any party authorized by Consultant, Consultant's representatives, or Consultant's successor in interest.

34. **Headings.** The headings used in this Agreement are for convenience only and are not intended to affect the interpretation or construction of any provisions herein.

35. **Survival.** All obligations arising prior to the termination or expiration of this Agreement and all provisions of this Agreement allocating liability between City and Consultant shall survive the termination or expiration of this Agreement.

36. **Entire Agreement.** This Agreement, including the exhibits attached hereto and incorporated herein, constitutes the entire agreement between the Parties with respect to the Services, and supersedes all prior agreements or understandings, oral or written, between the Parties in this regard.

IN WITNESS WHEREOF, the parties hereto have executed this document the day, month and year first above written.

CITY OF PETALUMA

_____
City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

CONSULTANT

By_____
Name

_____
Title

_____
Address

_____
City State Zip

_____
Taxpayer I.D. Number

_____
Petaluma Business Tax Certificate Number

file name:

EXHIBIT B
INSURANCE REQUIREMENTS
FOR ALL AGREEMENTS

Contractor's performance of the Services under this Agreement shall not commence until Contractor shall have obtained all insurance required under this paragraph and such insurance shall have been approved by the City Attorney as to form and the Risk Manager as to carrier and sufficiency. All requirements herein provided shall appear either in the body of the insurance policies or as endorsements and shall specifically bind the insurance carrier.

Contractor shall procure and maintain for the duration of the contract all necessary insurance against claims now and in the future for injuries to persons or damages to property which may arise from or in connection with the performance of the Services by the Contractor, the Contractor's agents, representatives, employees and subcontractors.

A. Required Minimum Scope of Insurance

☐ Coverage shall be at least as broad as:
Insurance Services Office Commercial General Liability coverage:
a. Personal injury;
b. Contractual liability.

☐ Insurance Services Office form covering Automobile Liability (any auto).

☐ Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance.

☐ Professional Liability/Errors and Omissions

☐ Crime/Employee Blanket Fidelity Bond

☐ Property Insurance against all risks of loss to any tenant improvements or betterments.

☐ Pollution Liability Insurance

☐ Garage Liability

☐ Garagekeepers Insurance

☐ Technology Professional Liability Errors and Omissions Insurance (IT Consultant)/Cyber Liability

☐ Abuse or Molestation Liability Coverage

A.1 Required for All Contracts

☒ Policy Endorsements or Excerpts from the Policy Pursuant to Section D

☒ Copy of the Declarations and Policy Endorsements Page for the CGL Policy

B. Minimum Limits of Insurance

Consultant shall maintain limits no less than:

☐ General Liability: $1,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate liability is used, either the general aggregate limit shall apply separately to this Agreement or the general aggregate limit shall be twice the required occurrence limit.

☐ Products/Completed Operations: $1,000,000 per occurrence/aggregate.

☐ Automobile Liability: $1,000,000 per accident for bodily injury and property damage.

☐ Employer's Liability: Bodily Injury by Accident - $1,000,000 each accident.
Bodily Injury by Disease - $1,000,000 policy limit.

Bodily Injury by Disease - $1,000,000 each employee.

☐ Professional Liability/Errors and Omissions: $1,000,000 per occurrence or claim. If the policy provides coverage on a claims-made basis, the retroactive date must be shown and must be before the date of the Agreement or the beginning of the contract work.

☐ Crime/Employee Blanket Fidelity Bond - $1,000,000: Contractor, at its own cost and expense, must maintain a Crime/Employee Blanket Fidelity Bond in the amount of $1,000,000 per employee covering dishonesty, forgery, alteration, theft, disappearance, destruction (inside or outside).

☐ All Risk Property Insurance: Full replacement cost.

☐ Pollution legal liability with limits no less than $1,000,000 per occurrence or claim and $2,000,000 policy aggregate. If the policy provides coverage on a claims-made basis, the retroactive date must be shown and must be before the date of the Agreement or the beginning of the contract work.

☐ Garage Liability: $1,000,000 per occurrence.

☐ Garagekeepers Insurance: $1,000,000 per occurrence.

☐ Technology Professional Liability Errors and Omissions Insurance appropriate to the Consultant's profession and work hereunder, with limits not less than $1,000,000 per occurrence. Coverage shall be sufficiently broad to respond to the duties and obligations as is undertaken by the Vendor in this agreement and shall include, but not be limited to, claims involving infringement of intellectual property, copyright, trademark, invasion of privacy violations, information theft, release of private information, extortion and network security. The policy shall provide coverage for breach response costs as well as regulatory fines and penalties as well as credit monitoring expenses with limits sufficient to respond to these obligations.

1. The Policy shall include, or be endorsed to include, **property damage liability coverage** for damage to, alteration of, loss of, or destruction of electronic data and/or information "property" of the City in the care, custody, or control of the Consultant. If not covered under the Consultant's liability policy, such "property" coverage of the City may be endorsed onto the Consultant's Cyber Liability as covered property as follows:

2. **Cyber Liability coverage** in an amount sufficient to cover the full replacement value of damage to, alteration of, loss of, or destruction of electronic data and/or information "property" of the City that will be in the care, custody, or control of the Consultant.

3. The Insurance obligations under this agreement shall be the greater of 1) all the Insurance coverage and limits carried by or available to the Consultant; or 2) the minimum Insurance requirements shown in this Agreement. Any insurance proceeds in excess of the specified limits and coverage required, which are applicable to a given loss, shall be available to the City. No representation is made that the minimum Insurance requirements of this Agreement are sufficient to cover the indemnity or other obligations of the Consultant under this agreement.

☐ Abuse or Molestation Liability Coverage: $1,000,000 per occurrence; $2,000,000 aggregate.

C. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-

insured retentions as respects the City, its officers, officials, employees, and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses. Policies containing any self-insured retention (SIR) provision shall provide or be endorsed to provide that the SIR may be satisfied by either the named insured (Contractor) or the City.

City reserves the right to review any and all of the required insurance policies, declaration pages, and/or endorsements, but has no obligation to do so. City's failure to demand evidence of full compliance with the insurance requirements set forth in this Agreement or City's failure to identify any insurance deficiency shall not relieve Contractor from, nor be construed or deemed a waiver of, its obligation to maintain the required insurance at all times during the performance of this Agreement.

D. Other Insurance Provisions

The required general liability and automobile policies are to contain, or be endorsed to contain the following provisions:

1. Additional Insured: The City, its officers, officials, employees, agents and volunteers are to be covered as Additional Insureds as respects: liability arising out of activities performed by or on behalf of the Consultant; products and completed operations of the Consultant; premises owned, occupied or used by the Consultant; or automobiles owned, leased, hired or borrowed by the Consultant. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees, agents or volunteers.
2. Primary and Non-Contributory: For any claims related to this project, the Consultant's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees, agents and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees, agents or volunteers shall be excess of the Consultant's insurance and shall not contribute with it.
3. Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the City, its officers, officials, employees, agents or volunteers.
4. The Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought except, with respect to the limits of the insurer's liability.
5. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.
6. Waiver of Subrogation: Consultant agrees to waive subrogation rights for commercial general liability, automobile liability and worker's compensation against City regardless of the applicability of any insurance proceeds, and to require all contractors, subcontractors or others involved in any way with the Services to do likewise.
7. It shall be a requirement under this Agreement that any available insurance proceeds broader than or in excess of the specified minimum insurance coverage requirement and/or limits shall be available to the additional insured. Furthermore, the requirement for coverage and limits shall be (1) the minimum coverage and limits specified in this Agreement, or (2) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the named insured; whichever is greater.
8. The limits of insurance required in this Agreement may be satisfied by a combination of primary and umbrella or excess insurance. Any umbrella or excess insurance shall contain or be endorsed to contain a provision that such coverage shall also apply on a

primary and non-contributory basis for the benefit of the City of Petaluma before the City of Petaluma's own insurance or self-insurance shall be called upon to protect it as a named insured.

E. Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII.

F. Verification of Coverage

NOTE: The City of Petaluma is now using an online insurance program, PINS Advantage. Once you have been awarded a contract with the City of Petaluma, you will receive an e-mail from PINS Advantage/City of Petaluma requesting that you forward the e-mail to your insurance agent(s). Consultant shall furnish the City with Certificate of Insurance along with Declarations and Endorsements effecting coverage required by this clause. The endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All endorsements are to be received and approved by the City before the Services commence.

PREVAILING WAGE EXHIBIT C

HOURS OF WORK:

A. In accordance with California Labor Code Section 1810, eight (8) hours of labor in performance of the Services shall constitute a legal day's work under this Agreement.

B. In accordance with California Labor Code Section 1811, the time of service of any worker employed in performance of the Services is limited to eight hours during any one calendar day, and forty hours during any one calendar week, except in accordance with California Labor Code Section 1815; which provides that work in excess of eight hours during any one calendar day and forty hours during any one calendar week is permitted upon compensation for all hours worked in excess of eight hours during any one calendar day and forty hours during any one calendar week at not less than one-and-one-half times the basic rate of pay.

C. The Consultant and its subconsultants shall forfeit as a penalty to the City $25 for each worker employed in the performance of the Services for each calendar day during which the worker is required or permitted to work more than eight (8) hours in any one calendar day, or more than forty (40) hours in any one calendar week, in violation of the provisions of California Labor Code Section 1810 and following.

WAGES:

A. In accordance with California Labor Code Section 1773.2, the City has determined the general prevailing wages in the locality in which the Services are to be performed for each craft or type of work needed to be as published by the State of California Department of Industrial Relations, Division of Labor Statistics and Research, a copy of which is on file with the City and shall be made available on request. The Consultant and subconsultants engaged in the performance of the Services shall pay no less than these rates to all persons engaged in performance of the Services.

B. In accordance with Labor Code Section 1775, the Consultant and any subconsultants engaged in performance of the Services shall comply Labor Code Section 1775 which establishes a penalty of up to $50 per day for each worker engaged in the performance of the Services that the Consultant or any subconsultant pays less than the specified prevailing wage. The amount of such penalty shall be determined by the Labor Commissioner and shall be based on consideration of the mistake, inadvertence, or neglect of the Consultant or subconsultant in failing to pay the correct rate of prevailing wages, or the previous record of the Consultant or subconsultant in meeting applicable prevailing wage obligations, or the willful failure by the Consultant or subconsultant to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the Consultant or subconsultant had knowledge of their obligations under the California Labor Code. The

Consultant or subconsultant shall pay the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate. If a subconsultant worker engaged in performance of the Services is not paid the general prevailing per diem wages by the subconsultant, the Consultant is not liable for any penalties therefore unless the Consultant had knowledge of that failure or unless the Consultant fails to comply with all of the following requirements:

1. The Agreement executed between the Consultant and the subconsultant for the performance of part of the Services shall include a copy of the provisions of California Labor Code Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.

2. The Consultant shall monitor payment of the specified general prevailing rate of per diem wages by the subconsultant by periodic review of the subconsultant's certified payroll records.

3. Upon becoming aware of a subconsultant's failure to pay the specified prevailing rate of wages, the Consultant shall diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subconsultant for performance of the Services.

4. Prior to making final payment to the subconsultant, the Consultant shall obtain an affidavit signed under penalty of perjury from the subconsultant that the subconsultant has paid the specified general prevailing rate of per diem wages employees engaged in the performance of the Services and any amounts due pursuant to California Labor Code Section 1813.

C. In accordance with California Labor Code Section 1776, the Consultant and each subconsultant engaged in performance of the Services, shall keep accurate payroll records showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in performance of the Services. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

1. The information contained in the payroll record is true and correct.

2. The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any Services performed by the employer's employees on the public works project.

The payroll records required pursuant to California Labor Code Section 1776 shall be certified and shall be available for inspection by the Owner and its authorized representatives, the Division of Labor Standards Enforcement, the Division of Apprenticeship Standards of the Department of Industrial Relations and shall otherwise be available for inspection in accordance with California Labor Code Section 1776. In addition, Consultant and sub-consultant shall be required to be registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. Consultant

and any sub-consultant shall submit certified payroll records to the Department of Industrial Relations Labor Commissioner online: https://apps.dir.ca.gov/ecpr/DAS/AltLogin. Consultant is responsible for ensuring compliance with this section.

D. In accordance with California Labor Code Section 1777.5, the Consultant, on behalf of the Consultant and any subconsultants engaged in performance of the Services, shall be responsible for ensuring compliance with California Labor Code Section 1777.5 governing employment and payment of apprentices on public works contracts.

E. In case it becomes necessary for the Consultant or any subconsultant engaged in performance of the Services to employ on the Services any person in a trade or occupation (except executive, supervisory, administrative, clerical, or other non manual workers as such) for which no minimum wage rate has been determined by the Director of the Department of Industrial Relations, the Consultant shall pay the minimum rate of wages specified therein for the classification which most nearly corresponds to Services to be performed by that person. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

file name:

EXHIBIT D

ACKNOWLEDGEMENT AND CERTIFICATION PURSUANT TO CITY OF PETALUMA LIVING WAGE ORDINANCE PETALUMA MUNICIPAL CODE CHAPTER 8.36

The City of Petaluma Living Wage Ordinance ("Ordinance"), Petaluma Municipal Code Chapter 8.36, applies to certain service contracts, leases, franchises and other agreements or funding mechanisms providing financial assistance (referred to hereafter as an "Agreement") between the City of Petaluma ("City") and/or the Petaluma Community Development Commission ("PCDC") and contractors, lessees, franchisees, and/or recipients of City and/or PCDC funding or financial benefits ("covered entities").

Pursuant to Petaluma Municipal Code Section 8.36.120, as part of any bid, application or proposal for any Agreement subject to the Ordinance, the covered entity shall:

- Acknowledge that the covered entity is aware of the Ordinance and intends to comply with its provisions.

- Complete the Report of Charges, Complaints, Citations and/or Findings contained in this Acknowledgement and Certification by providing information, including the date, subject matter and manner of resolution, if any, of all wage, hour, collective bargaining, workplace safety, environmental or consumer protection charges, complaints, citations, and/or findings of violation of law or regulation by any regulatory agency or court including but not limited to the California Department of Fair Employment and Housing, Division of Occupational Safety and Health (OSHA), California Department of Industrial Relations (Labor Commissioner), Environmental Protection Agency and/or National Labor Relations Board, which have been filed or presented to the covered entity within the ten years immediately prior to the bid, proposal, submission or request.

Pursuant to Petaluma Municipal Code Section 8.36.120, before the beginning of the term of any covered Agreement, or prior to the execution of said Agreement by the City or the PCDC, each covered entity shall certify that its employees are paid a living wage that is consistent with Petaluma Municipal Code Chapter 8.36.

By executing this Acknowledgement and Certification, the covered entity (i) acknowledges that it is aware of the Ordinance and intends to comply with its provisions, (ii) attests to the accuracy and completeness of information provided in the Report of Charges, Complaints, Citations and/or Findings contained herein, (iii) certifies that it pays its covered employees a Living Wage as defined in Petaluma Municipal Code Chapter 8.36 and (iv) attests that the person executing this Acknowledgement and Certification is authorized to bind the covered entity as to the matters covered in this Acknowledgment and Certification.

SO ACKNOWLEDGED and CERTIFIED:

Project or Contract I.D: _____

_____ Date: _____
(Print Name of Covered Entity/Business Capacity)

By _____
(Print Name)

/s/_____
(Signature)

Its _____
(Title /Capacity of Authorized Signer)

REPORT OF CHARGES, COMPLAINTS, CITATIONS AND/OR FINDINGS PURSUANT TO PETALUMA MUNICIPAL CODE SECTION 8.36.120

FOR EACH WAGE, HOUR, COLLECTIVE BARGAINING, WORKPLACE SAFETY, ENVIRONMENTAL OR CONSUMER PROTECTION CHARGE, COMPLAINT, CITATION, AND/OR FINDING OF VIOLATION OF LAW OR REGULATION BY ANY REGULATORY AGENCY OR COURT, INCLUDING BUT NOT LIMITED TO THE CALIFORNIA DEPARTMENT OF FAIR EMPLOYMENT AND HOUSING, DIVISION OF OCCUPATIONAL SAFETY AND HEALTH (OSHA), CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS (LABOR COMMISSIONER), ENVIRONMENTAL PROTECTION AGENCY AND/OR NATIONAL LABOR RELATIONS BOARD, WHICH:

- AFFECTS YOU AS A PROSPECTIVE CONTRACTOR, SUBCONTRACTOR, LESSEE, FRANCHISEE AND/OR PARTY TO ANY CITY OF PETALUMA AND/OR PETALUMA COMMUNITY DEVELOPMENT COMMISSION-FUNDED AGREEMENT OR BENEFIT SUBJECT TO PETALUMA MUNICIPAL CODE CHAPTER 8.36 (LIVING WAGE ORDINANCE), AND
- HAS BEEN FILED OR PRESENTED TO YOU WITHIN THE TEN YEARS IMMEDIATELY PRIOR TO THE BID, PROPOSAL, SUBMISSION OR REQUEST FOR WHICH THIS ACKNOWLEDGEMENT AND CERTIFICATION IS MADE.

PLEASE PROVIDE THE DATE, THE REGULATORY AGENCY OR COURT MAKING THE CHARGE COMPLAINT, CITATION OR FINDING, THE SUBJECT MATTER AND THE MANNER OF RESOLUTION, IF ANY, FOR EACH SUCH CHARGE COMPLAINT, CITATION OR FINDING.

IF NONE, PLEASE STATE "NONE": _____

ATTACH ADDITIONAL PAGES IF NEEDED.

Date: _____

Regulatory Agency or Court: _____

Subject Matter: _____

_____

Resolution, if any: _____

_____

Expected resolution, if known: _____

_____

CITY OF PETALUMA

POST OFFICE BOX 61
PETALUMA, CA 94953-0061

Teresa Barrett
Mayor

D'Lynda Fischer
Mike Healy
Gabe Kearney
Dave King
Kevin McDonnell
Kathy Miller
Councilmembers

May 30, 2019

RE: Local Partnership Program 2020 Project Proposal

Dear Sonoma County Transportation Authority:

On behalf of the City of Petaluma I wish to express my approval and support for the submission of this application for the Road Repair and Accountability Act (SB-1), Local Partnership Program. The proposed project will allow the City of Petaluma to enhance safety for pedestrians, cyclists, regional transit users, and motorists along the North McDowell Boulevard corridor. The business center through which this roadway passes includes the U.S. Postal Service North Bay Processing & Distribution Center, the Petaluma Health Center, Lagunitas, and many other companies and organizations important to City and County. The adjacency of this project to the future Corona SMART station and bike paths along the rail line, and future and existing housing developments makes it an important thoroughfare serving multi-modal transportation for residential, commercial, and industrial components. The benefits of proposed project will be far-reaching as the project promotes increased safety, accessibility, and connectivity for all users.

Thank you for your consideration of this proposal. Please contact Jeff Stutsman at (707)776-3673 or jstutsman@cityofpetaluma.org, if you have any questions.

Sincerely,

Peggy Flynn
City Manager

cc: Jeff Stutsman, Senior Civil Engineer
file

City Manager's Office
11 English Street
Petaluma, CA 94952

Phone (707) 778-4345
Fax (707) 778-4419
E-Mail:
citymgr@ci.petaluma.ca.us

Economic Development
Phone (707) 778-4549
Fax (707) 778-4586

Housing Division
Phone (707) 778-4555
Fax (707) 778- 4586

Information Technology Division
Phone (707) 778-4417
Fax (707) 776-3623

EQUAL HOUSING OPPORTUNITY

CITY OF PETALUMA

POST OFFICE BOX 61
PETALUMA, CA 94953-0061

Public Works & Utilities

City Engineer
11 English Street
Petaluma, CA 94952
Phone (707) 778-4303

Environmental Services
Ellis Creek Water
Recycling Facility
3890 Cypress Drive
Petaluma, CA 94954
Phone (707) 776-3777
Fax: (707) 656-4067

Parks & Facility
Maintenance
840 Hopper St. Ext.
Petaluma, CA 94952
Phone (707) 778-4303
Fax (707) 206-6065

Transit Division
555 N. McDowell Blvd.
Petaluma, CA 94954
Phone (707) 778-4421

Utilities & Field Operations
202 N. McDowell Blvd.
Petaluma, CA 94954
Phone (707) 778-4546
Fax (707) 206-6034

E-Mail: publicworks@
ci.petaluma.ca.us

Road Repair and Accountability Act (SB-1), Local Partnership Formulaic Program (LPP) Call for Projects

Project Title: McDowell Boulevard Complete Streets

Project Limits: The Project Limits are McDowell Boulevard North from Old Redwood Highway to Caulfield Lane as shown in Attachment A.

Time Frame: The City of Petaluma is applying for the SB-1, LPP call for projects for fiscal year 21-22 to line up with the proposed McDowell project which is in the City's CIP program. (The timing coincides with SMART funding for Multi Use Path.

Project Description: The project is a complete streets project that is designed to increase safe access for all users including pedestrians, bicyclists, motorist and transit riders along the corridor. The scope of the work includes signal coordination along the corridor, pavement rehabilitation, striping, curb ramps, uncontrolled crosswalk improvements including refuge areas and flashing beacons, and improves pedestrian and bicycle access by closing the gaps and increasing the connectivity along the route.

Amount Requested: $551,000 for fiscal year 21/22

Matching Funds:

Fund FY21/22	Source	Amount
Street Maintenance	State	$860,000
RMRA	Local	$2,462,000
Water	Local	$100,000
Matching fund Subtotal		**$3,422,000**
SB-1	State	$551,000
State fund Subtotal		**$551,000**
Total Funds		**$3,973,000**

Capacity Increasing: This project does not increase the capacity of the roadway.

Project Purpose: McDowell Boulevard North is one of the main arterials in town connecting north and south with an average daily traffic of approximately 11,000 vehicles per day. Petaluma Transit, Sonoma County Transit, and Golden Gate Transit utilize the 23 transit stops along this route. Many new developments along the corridor are in construction or pending development application such as Brody Ranch, Deer Creek and Corona Station Developments. SMART's proposed station

is at McDowell Boulevard at Corona Road and SMART's proposed multi use path will have a connection to McDowell at Southpoint Blvd. McDowell Boulevard has also become the home of Lagunitas Brewing, Henhouse Brewing and Sonoma
Coast Spirits. As the north east side of Petaluma develops and becomes more of a destination, the vehicles, transit, pedestrian and bicycle trips grow.

Currently McDowell Boulevard is a 40 mph arterial and there has been limited work along the corridor to improve bicycle and pedestrian connectivity and safety. The roadway has fallen beyond repair, the City is unable to maintain the existing striping for bike lanes and travel lanes as paint will only last a year. There are two existing uncontrolled crosswalks along corridor and one additional being proposed to connect the breweries along either side of the corridor. The existing uncontrolled crosswalks lack safety treatments that are suitable for the speed and number of travel lanes. The bike facilities vary from class I bike path to class II bike lane along the corridor; there is currently no consistency or adequate signage along the route. Between Corona Road and Old Redwood Highway some of the sidewalks have been constructed with new developments but the sidewalk gaps prevent users from using the full corridor.

Project Scope: The project includes signal coordination along McDowell Boulevard North from East Washington St to Caulfield Lane which includes 13 traffic signals, reconstructing and striping from Old Redwood Highway to Sunrise Parkway, construction of 38 new curb ramps, sidewalk gap closures from Old Redwood Highway to Corona Road, as well as at the railroad crossing and widening of an existing sidewalk to create connectivity for class I bike path.

The signal coordination would include developing a traffic signal timing plan for the morning, midday and afternoon peak periods for McDowell Boulevard to reduce traffic congestion and traffic delays which in turns will reduce the greenhouse gas emissions. With the new developments, breweries, distilleries, proposed SMART station and multi use path will benefit from new sidewalks and more well defined bike lanes to encourage more non-motorized travel.

Current Status: Project is in the preliminary scoping phase. Expected Completion Fall 2022

Cost Estimate: See Attachment B- Cost Estimate

Caltrans Life-Cycle Benefit-Cost Analysis Model 6.0: See Attachment C- LCBC Analysis. Both an active transportation analysis and corridor analysis was completed for this project to properly portray the benefits and costs associated with each aspect of the project.

Transportation, Land use and Housing Element: McDowell Complete Street project is consistent with the key aspects of the Sustainable Communities Strategies (SCS) by constructing biking and walking infrastructure to improve active transportation options. The project improves the connectivity of bicycle and pedestrians infrastructure, improves access to local and regional bus routes, regional connectivity with SMART train and connectivity to the west side of Petaluma via

future SMART multi use pathway and the City's existing Lynch Creek Trail. The improvement of the bicycle and pedestrian infrastructure. The project will also include signal coordination of 13 intersection to achieve speeds that are suitable to the corridor and improve efficiencies to minimize emissions and energy consumption and make optimal use of the street capacity.

Greenhouse Gas Impacts: The SB-1 Emission Calculator and the Arterial Management Projects work sheet typically used for TFCA projects were utilized to analyze the greenhouse house gas reduction of the project. Both worksheets analyzed the greenhouse gas reduction for the signal coordination of 13 intersections / 3.71 miles along McDowell Boulevard. Greenhouse gas reduction was quantified for pedestrian and bicycle improvement as part of the cost benefit analysis of active transportation. See attachment C for greenhouse gas reduction for bicycle and pedestrian improvements and attachment D for the SB-1 Emissions Calculator and

SB-1 Emissions Calculator

(2)

INVESTMENT ANALYSIS

SUMMARY RESULTS

EMISSIONS REDUCTION	Short Tons Total Over 20 Years	Short Tons Average Annual	Value (mil. $) Total Over 20 Years	Value (mil. $) Average Annual
CO Emissions Saved	195	10	$ 0.0	$ 0.0
CO_2 Emissions Saved	72,183	3,609	$ 2.1	$ 0.1
NO_X Emissions Saved	57	3	$ 0.7	$ 0.0
PM_{10} Emissions Saved	1	0	$ 0.1	$ 0.0
$PM_{2.5}$ Emissions Saved	1	0		
SO_X Emissions Saved	1	0	$ 0.0	$ 0.0
VOC Emissions Saved	12	1	$ 0.0	$ 0.0

Arterial Management

Cost Effectiveness Inputs	
# Years Effectiveness:	2
Total Project Cost:	$50,000
TFCA Cost 40%:	$20,000
TFCA Cost 60%:	$30,000
Total TFCA Cost:	$50,000

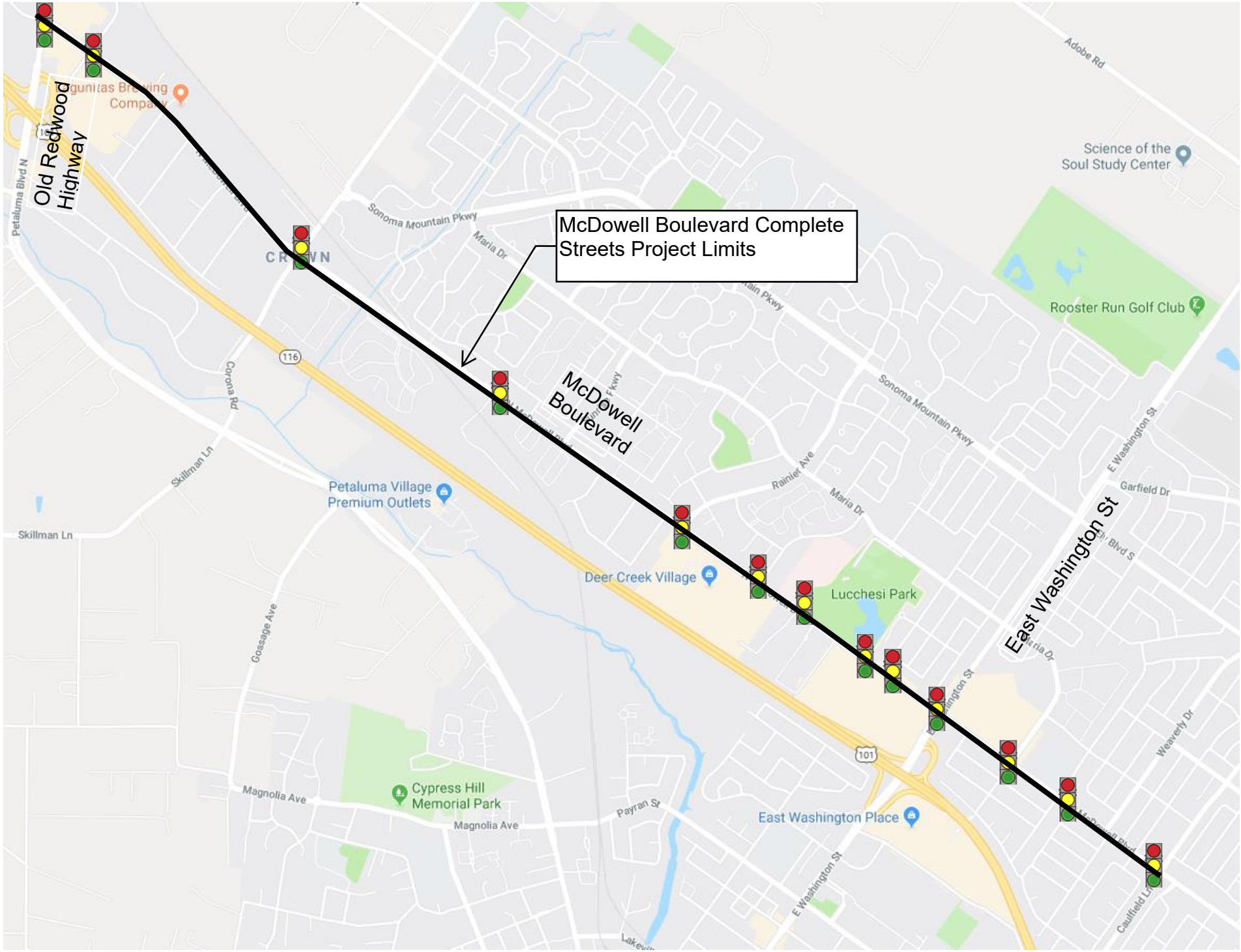
Cost Effectiveness Results	Annual	Lifetime	
1. ROG Emissions	0.56	1.11	Tons
2. NOx Emissions	0.62	1.24	Tons
3. PM Emissions	0.12	0.23	Tons
4. Weighted PM Emissions	2.34	4.67	Tons
5. CO2 Emissions Reduced	894.51	1789.02	Tons
6. Emission Reductions (ROG, NOx & PM)	1.29	2.58	Tons
7. TFCA Project Cost - Cost Effectiveness (ROG, NOx & PM)		$19,352	/Ton
8. TFCA Project Cost - Cost Effectiveness (ROG, NOx & **Weighted** PM). **THIS VALUE MUST MEET POLICY REQUIREMENTS.**		**$7,121**	/Ton

Attachments:

Attachment A: Project Limits Map
Attachment B : Cost Estimate
Attachment C: Life-Cycle Benefit-Cost Analysis Model 6.0
Attachment D: SB-1 Emission Calculator and the Arterial Management

Attachment A
Project Location Map

Attachment A- Project Location Map



Attachment B
Cost Estimate

Attachment B - Cost Estimate McDowell Boulevard Complete Streets Project				Engineer's Estimate	
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
	Signal Coordination- Consultant	1	LS	$50,000	$50,000
1	Mobilization / Demobilization	1	LS	$125,000	$125,000
2	Temporary Traffic Control	1	LS	$100,000	$100,000
3	Storm Water management and Erosion control	1	LS	$25,000	$25,000
4	Minor Concrete - Curb and Gutter	304	LF	$70.00	$21,280.00
5	Minor Concrete - Sidewalk curb ramps	2,432	SF	$30	$72,960.00
6	Curb Ramps	38	EA	$7,500	$285,000.00
7	Video Detection Cameras	16	EA	$8,000	$128,000.00
8	8" Full Depth Reclamation-foamed Asphalt	45000	SY	$6	$270,000.00
9	asphalt binder (full depth reclamation foamed asphalt)	480	Ton	$835	$400,800.00
10	Grading Support	45000	SY	$2	$99,000.00
11	3" HMA Overlay	7843	Ton	$120	$941,143.73
12	Uncontrolled Xwalk Upgrade	2	EA	$100,000	$200,000.00
14	Sidewalk - Gap Closure	16,000	SF	$23	$368,000.00
16	Pothole	150	EA	$800	$120,000.00
17	Adjust Utilities	120	EA	$800	$96,000.00
18	Water Service Replacements	1	LS	$100,000	$100,000.00
19	Striping	1	LS	$150,000	$150,000.00
			Total Construction		**$3,552,184**

Planning/Environmental	$1,000
Land & Easements	$0
Design (3.5%)	$124,326
Legal Services	$1,000
Administration	$1,000
Construction Contracts	$3,552,184
Construction Mgmt (3%)	$106,566
Contingency (5%)	$183,924
CIP Overheads	$3,000
Total uses	**$3,973,000**

Street Maintenance	$860,000
RMRA	$2,462,000
SB1 Formulaic	$551,000
Water	$100,000
Total Funds	**$3,973,000**

Project Title: **Pavement Restoration – Future Projects**

PROJECT PURPOSE AND DESCRIPTION

This annual project will reduce the continued degradation of the City's street system by implementing pavement maintenance measures as much as funding allows. Projects will consist primarily of seal coats and overlays with associated dig-outs of failed areas and crack sealing. The Americans with Disabilities Act improvements to sidewalks and curb ramps will be included either as part of the paving project or as a separate project whenever possible. It is anticipated that there will be one project per year.

McDowell Blvd North

FINANCIAL OVERVIEW

	Expenses and Funds Received			BUDGET					
					PROJECTED				
USES (dollars in $000)	Actual Life to Date thru FY 18	Estimate FY 18-19	Estimate Life to Date thru FY 19	Adopted Budget FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	Total Project Estimate
Planning/Environmental			-		1	1	1	1	4
Land & Easements			-						-
Design			-		53	88	64	60	265
Legal Services			-		1	1	1	1	4
Administration			-		2	2	2	2	8
Construction Contracts			-		1,762	2,933	2,134	2,886	9,715
Construction Mgmt			-		88	147	107	150	492
Contingency			-		88	147	107	150	492
CIP Overheads			-		3	3	3	3	12
TOTAL USES	$ -	$ -	$ -	$ -	$ 1,998	$ 3,322	$ 2,419	$ 3,253	$ 10,992
SOURCES (dollars in $000)									
Street Maintenance			-		831	860	890	921	3,502
Road Maint & Rehab Acct (RMRA)			-		1,733	1,836	1,918	2,003	7,490
TOTAL FUNDS	$ -	$ -	$ -	$ -	$ 2,564	$ 2,696	$ 2,808	$ 2,924	$ 10,992

Attachment C
Life-Cycle Cost Analysis Model 6.0

District: 4

PROJECT: McDowell Complete Streets

EA:
PPNO:

3

INVESTMENT ANALYSIS

SUMMARY RESULTS

Life-Cycle Costs (mil. $)	$0.4
Life-Cycle Benefits (mil. $)	$0.7
Net Present Value (mil. $)	$0.3
Benefit / Cost Ratio:	1.7
Rate of Return on Investment:	36.9%
Payback Period:	3 years

NON-INFRASTRUCTURE IMPLEMENTATION COST

Per Bike Program Impact Score	N/A
Per Ped Program Impact Score	N/A

ITEMIZED BENEFITS (mil. $)	Total Over 20 Years	Average Annual
Journey Quality	$0.2	$0.0
Additional Delay Savings	$0.2	$0.0
Additional Safety Benefits	$4.6	$0.2
Health Benefits	-$4.3	-$0.2
Emission Cost Savings	-$0.0	-$0.0
TOTAL BENEFITS	**$0.7**	**$0.0**

SRTS-SPECIFIC BENEFITS (mil. $)		
Journey Quality	$0.0	$0.0
Additional Delay Savings	$0.0	$0.0
Additional Safety Benefits	$0.0	$0.0
TOTAL SRTS BENEFITS	**$0.0**	**$0.0**

Factors that Differentiate Benefits and Performance Measures

Safe Route to School	Yes
Intersection Improvements on SRTS	No
Programmatic Initiatives	No
Recreational Benefits	1

(enter 1 for Yes, 0 for No)

	Tons		Value (mil. $)	
EMISSIONS REDUCTION	Total Over 20 Years	Average Annual	Total Over 20 Years	Average Annual
CO Emissions Saved	-1	0	-$0.0	-$0.0
CO_2 Emissions Saved	-296	-15	-$0.0	-$0.0
NO_X Emissions Saved	0	0	-$0.0	-$0.0
PM_{10} Emissions Saved	0	0	-$0.0	-$0.0
$PM_{2.5}$ Emissions Saved	0	0		
SO_X Emissions Saved	0	0	-$0.0	-$0.0
VOC Emissions Saved	0	0	-$0.0	-$0.0

Attachment D
SB-1 Emission Calculator and the Arterial Management

District: 4

PROJECT: McDowell Boulevard Complete Streets

EA:
PPNO:

PROJECT DESCRIPTION: Signal Coordination along McDowell Boulevard

1A PROJECT DATA

Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)	2
Length of Construction Period (years)	1

1B HIGHWAY DATA

Average Daily Vehicle-Miles Traveled (VMT)

	No Build	Build
Base (Year 1)	40,810	40,810
Forecast (Year 20)	44,520	4,452

Percent of VMT

	No Build		Build	
	Default	User Override	Default	User Override
Percent Truck	9%		9%	
Percent Bus	0%		0%	

Trip or Route Length (miles)

	No Build	Build
Average Trip Length for Passenger Vehicles	4	4
Average Trip Length for Trucks	4	4
Average Route Length for Buses	4	4

1C SYSTEM USAGE BY MODE

Vehicle-Miles Traveled (Passenger Vehicles)

	No Build	Build
Base (Year 1)	37137	37137
Forecast (Year 20)	40513	4051

Vehicle-Miles Traveled (Trucks)

	No Build	Build
Base (Year 1)	3673	3673
Forecast (Year 20)	4007	401

Service-Miles (Buses)

	No Build	Build
Base (Year 1)	0	0
Forecast (Year 20)	0	0

Ton-Miles (Freight Locomotives)

	No Build	Build
Base (Year 1)		
Forecast (Year 20)		

1D AVERAGE SPEED/FUEL CONSUMPTION

Average Speed (Passenger Vehicles)

	No Build	Build
Base (Year 1)	26	30
Forecast (Year 20)	24	29

Average Speed (Trucks)

	No Build	Build
Base (Year 1)	26	30
Forecast (Year 20)	24	29

Average Speed (Buses)

	No Build	Build
Base (Year 1)	26	30
Forecast (Year 20)	24	29

Average Ton-Miles/Gallon (Freight Locomotive)

	No Build	Build
Base (Year 1)	468	468
Forecast (Year 20)	468	468

District: 4

PROJECT: McDowell Boulevard Complete Streets

EA:
PPNO:

2

INVESTMENT ANALYSIS

SUMMARY RESULTS

EMISSIONS REDUCTION	Short Tons		Value (mil. $)	
	Total Over 20 Years	Average Annual	Total Over 20 Years	Average Annual
CO Emissions Saved	195	10	$ 0.0	$ 0.0
CO_2 Emissions Saved	72,183	3,609	$ 2.1	$ 0.1
NO_X Emissions Saved	57	3	$ 0.7	$ 0.0
PM_{10} Emissions Saved	1	0	$ 0.1	$ 0.0
$PM_{2.5}$ Emissions Saved	1	0		
SO_X Emissions Saved	1	0	$ 0.0	$ 0.0
VOC Emissions Saved	12	1	$ 0.0	$ 0.0

ARTERIAL MANAGEMENT PROJECTS

FYE 2014 TFCA Progam Manager Fund Worksheet

Version 1.0, updated 11/26/12

Calculations Tab: Complete areas shaded in yellow.

Cost Effectiveness Inputs	
# Years Effectiveness:	2
Total Project Cost:	$50,000
TFCA Cost 40%:	$20,000
TFCA Cost 60%:	$30,000
Total TFCA Cost:	$50,000

TFCA Regional Fund Proj. #: 11-SON-04 (If applicable)

Emission Reduction Calculations

A	B	C	D	E	F	G	H	I	J	K	L
Name of Arterial, Direction	Segment Length (miles)	Days/Yr.	Time Period	Traffic Volume During Time Period	Travel Speed w/o Project	Travel Speed w/ Project	Percent Speed Increase	ROG Emission Reductions (lbs/yr)	NOx Emission Reductions (lbs/yr)	PM Emission Reductions (lbs/yr)	CO2 Emission Reductions (lbs/yr)
SAMPLE--San Pablo, Northbound	4.5	250	7AM - 9AM	7,000	21.5	25.0	16.3%	338.24	375.10	71.55	546393
N. McDowell Boulevard, Northbound	3.71	250	6:30AM - 10:00AM	3,786	26.0	29.0	11.5%	87.01	98.23	17.79	139223
N. McDowell Boulevard, Northbound	3.71	250	11:45AM - 13:00PM	3,786	26.0	30.0	15.4%	116.02	130.71	23.98	185631
N. McDowell Boulevard, Northbound	3.71	250	15:00PM - 19:00PM	3,786	31.0	38.0	22.6%	131.88	137.29	28.62	211155
N. McDowell Boulevard, Southbound	3.71	250	6:30AM - 10:00AM	3,786	26.0	32.0	23.1%	174.03	196.46	35.58	278446
N. McDowell Boulevard, Southbound	3.71	250	11:45AM - 13:00PM	3,786	23.0	30.0	30.4%	259.50	288.89	54.53	417669
N. McDowell Boulevard, Southbound	3.71	250	15:00PM - 19:00PM	3,786	22.0	31.0	40.9%	345.35	384.80	73.09	556892
						Total Emission Reductions		1113.78	1236.38	233.59	1789016

Cost Effectiveness Results	Annual	Lifetime	
1. ROG Emissions	0.56	1.11	Tons
2. NOx Emissions	0.62	1.24	Tons
3. PM Emissions	0.12	0.23	Tons
4. Weighted PM Emissions	2.34	4.67	Tons
5. CO2 Emissions Reduced	894.51	1789.02	Tons
6. Emission Reductions (ROG, NOx & PM)	1.29	2.58	Tons
7. TFCA Project Cost - Cost Effectiveness (ROG, NOx & PM)		$19,352	/Ton
8. TFCA Project Cost - Cost Effectiveness (ROG, NOx & **Weighted** PM). **THIS VALUE MUST MEET POLICY REQUIREMENTS.**		**$7,121**	**/Ton**

STATE OF CALIFORNIA ● DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (Revised June, 7 2018 v7.09) *General Instructions*

Amendment (Existing Project) Y/N					**Date:**	6/3/19
District	**EA**	**Project ID**	**PPNO**	**MPO ID**	**Alt Proj. ID / prg.**	
04						

County	**Route/Corridor**	**PM Bk**	**PM Ahd**	**Project Sponsor/Lead Agency**	
Son				City of Petaluma	
				MPO	**Element**
					Capital Outlay

Project Manager/Contact	**Phone**	**E-mail Address**
Jeff Stutsman	707-776-3673	Jstutsman@cityofpetaluma.org

Project Title

McDowell Boulevard Complete Streets

Location (Project Limits), Description (Scope of Work)

The Project Limits are McDowell Boulevard North from Old Redwood Highway to Caulfield Lane. he project is a complete streets project that is designed to increase safe access for all users including pedestrians, bicyclists, motorist and transit riders along the corridor. The scope of the work includes signal coordination along the corridor, pavement rehabilitation, striping, curb ramps, uncontrolled crosswalk improvements including refuge areas and flashing beacons, and improves pedestrian and bicycle access by closing the gaps and increasing the connectivity along the route

Component	**Implementing Agency**
PA&ED	
PS&E	City of Petaluma
Right of Way	
Construction	City of PEtaluma

Legislative Districts

Assembly:	10	**Senate:**	3	**Congressional:**	2

Project Benefits

See Page #2

Purpose and Need

See Page #2

Category	**Outputs/Outcomes**	**Unit**	**Total**
Local streets and roads	Operational improvements	Miles	3.71
Local streets and roads	Pedestrian/Bicycle facilities miles constructed	Miles	0.5

ADA Improvements Yes	Bike/Ped Improvements Yes	Reversible Lane analysis No
Inc. Sustainable Communities Strategy Goals Yes	Reduces Greenhouse Gas Emissions Yes	

Project Milestone	**Existing**	**Proposed**
Project Study Report Approved	NA	
Begin Environmental (PA&ED) Phase		NA
Circulate Draft Environmental Document **Document Type**		NA
Draft Project Report		NA
End Environmental Phase (PA&ED Milestone)		NA
Begin Design (PS&E) Phase		01/01/20
End Design Phase (Ready to List for Advertisement Milestone)		11/01/21
Begin Right of Way Phase		08/01/21
End Right of Way Phase (Right of Way Certification Milestone)		02/01/22
Begin Construction Phase (Contract Award Milestone)		09/01/22
End Construction Phase (Construction Contract Acceptance Milestone)		09/01/22
Begin Closeout Phase		09/01/22
End Closeout Phase (Closeout Report)		02/01/23

PROJECT PROGRAMMING REQUEST

Date: 6/3/19

Additional Information

Project Purpose: McDowell Boulevard North is one of the main arterials in town connecting north and south with an average daily traffic of approximately 11,000 vehicles per day. Petaluma Transit, Sonoma County Transit, and Golden Gate Transit utilize the 23 transit stops along this route. Many new developments along the corridor are in construction or pending development application such as Brody Ranch, Deer Creek and Corona Station Developments. SMART's proposed station is at McDowell Boulevard at Corona Road and SMART's proposed multi use path will have a connection to McDowell at Southpoint Blvd. McDowell Boulevard has also become the home of Lagunitas Brewing, Henhouse Brewing and Sonoma Coast Spirits. As the north east side of Petaluma develops and becomes more of a destination, the vehicles, transit, pedestrian and bicycle trips grow.

Currently McDowell Boulevard is a 40 mph arterial and there has been limited work along the corridor to improve bicycle and pedestrian connectivity and safety. The roadway has fallen beyond repair, the City is unable to maintain the existing striping for bike lanes and travel lanes as paint will only last a year. There are two existing uncontrolled crosswalks along corridor and one additional being proposed to connect the breweries along either side of the corridor. The existing uncontrolled crosswalks lack safety treatments that are suitable for the speed and number of travel lanes. The bike facilities vary from class I bike path to class II bike lane along the corridor; there is currently no consistency or adequate signage along the route. Between Corona Road and Old Redwood Highway some of the sidewalks have been constructed with new developments but the sidewalk gaps prevent users from using the full corridor.

Project Scope: The project includes signal coordination along McDowell Boulevard North from East Washington St to Caulfield Lane which includes 13 traffic signals, reconstructing and striping from Old Redwood Highway to Sunrise Parkway, construction of 38 new curb ramps, sidewalk gap closures from Old Redwood Highway to Corona Road, as well as at the railroad crossing and widening of an existing sidewalk to create connectivity for class I bike path.

The signal coordination would include developing a traffic signal timing plan for the morning, midday and afternoon peak periods for McDowell Boulevard to reduce traffic congestion and traffic delays which in turns will reduce the greenhouse gas emissions. With the new developments, breweries, distilleries, proposed SMART station and multi use path will benefit from new sidewalks and more well defined bike lanes to encourage more non-motorized travel

STATE OF CALIFORNIA ● DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (Revised June, 7 2018 v7.09)

Date: 6/13/19

District	County	Route	EA	Project ID	PPNO	Alt. ID
04	Son	, ,				
Project Title:	McDowell Boulevard Complete Streets					

Existing Total Project Cost ($1,000s)									
Component	Prior	18-19	19-20	20-21	21-22	22-23	23-24+	Total	**Implementing Agency**
E&P (PA&ED)									
PS&E									City of Petaluma
R/W SUP (CT)									
CON SUP (CT)									City of PEtaluma
R/W									
CON									City of PEtaluma
TOTAL									
Proposed Total Project Cost ($1,000s)									**Notes**
E&P (PA&ED)				1				1	
PS&E				129				129	
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON					3,843			3,843	
TOTAL				130	3,843			3,973	

Fund No. 1:	**Local Funds (Street Maintenace, RMRA, Water)**								**Program Code**
Existing Funding ($1,000s)									
Component	Prior	18-19	19-20	20-21	21-22	22-23	23-24+	Total	**Funding Agency**
E&P (PA&ED)									City of Petaluma
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									
Proposed Funding ($1,000s)									**Notes**
E&P (PA&ED)				1				1	Local Funds
PS&E				129				129	
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON					3,292			3,292	
TOTAL				130	3,292			3,422	

Fund No. 2:	**SB-1 Formulaic**								**Program Code**
Existing Funding ($1,000s)									
Component	Prior	18-19	19-20	20-21	21-22	22-23	23-24+	Total	**Funding Agency**
E&P (PA&ED)									State of California
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									
Proposed Funding ($1,000s)									**Notes**
E&P (PA&ED)									SB-1 Formulaic
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON					551			551	
TOTAL					551			551	

Pavement Restoration – Future Projects

Purpose and Description

This annual project will reduce the continued degradation of the City's street system by implementing pavement maintenance measures as much as funding allows. Projects will consist primarily of seal coats and overlays with associated dig-outs of failed areas and crack sealing. The Americans with Disabilities Act improvements to sidewalks and curb ramps will be included either as part of the paving project or as a separate project whenever possible. Funding for this work is a combination of Street Maintenance Funds along with Utility Fees to compensate for damage done to the streets due to placement and maintenance of sewer and water facilities. It is anticipated that there will be one project per year. The program will look to balance pavement preservation projects, i.e. keeping good roads in good condition where limited funding has more impact and reconstructing failed roads which is more costly and where the limited funding does not go as far. The current proposed program includes reconstruction of North McDowell Blvd in FY21/22 followed by a mix of pavement preservation projects and reconstruction project.

Financial Overview

	Expenses and Funds Received			BUDGET					
	Actual Life to Date thru FY 19	Estimate FY 19-20	Estimate Life to Date thru FY 20	Adopted Budget FY 20-21	PROJECTED FY 21-22	PROJECTED FY 22-23	PROJECTED FY 23-24	PROJECTED FY 24-25	Total Project Estimate
USES (dollars in $000)									
Planning/Environmental			-		1	1	1		3
Land & Easements			-						-
Design			-		86	75	78		239
Legal Services			-		1	1	1		3
Administration			-		2	2	2		6
Construction Contracts			-		2,882	2,499	2,606		7,987
Construction Mgmt			-		144	125	131		400
Contingency			-		144	125	130		399
CIP Overheads			-		4	3	3		10
TOTAL USES	$ -	$ -	$ -	$ -	$ 3,264	$ 2,831	$ 2,952	$ -	$ 9,047
SOURCES (dollars in $000)									
Street Maintenance			-		878	913	949		2,740
Road Maint & Rehab Acct (RMRA)			-		1,836	1,918	2,003		5,757
SB-1 Formulaic (PW Grant)			-		550				550
TOTAL FUNDS	$ -	$ -	$ -	$ -	$ 3,264	$ 2,831	$ 2,952	$ -	$ 9,047

Berkeley SafeTREC

SAFE TRANSPORTATION RESEARCH AND EDUCATION CENTER

PS19025

CITY OF PETALUMA

COMPLETE STREETS SAFETY ASSESSMENT

Issues, Opportunities, and Suggested Strategies

Assessment Team

Afsaneh Yavari, T.E.
John Ciccarelli

September 2019

(Final Report Submitted on 01-06-2020)

This report was produced in cooperation with the City of Petaluma. Funding for this program was provided by a grant from the California Office of Traffic Safety, through the National Highway Traffic Safety Administration. Opinions, findings, and conclusions are those of the authors and not necessarily those of the University of California and/or the agencies supporting or contributing to this report.

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CITY OF PETALUMA
COMPLETE STREETS SAFETY ASSESSMENT

FINAL REPORT

SEPTEMBER 2019

(Final Report Submitted on 01-06-2020)

ASSESSMENT TEAM

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EXECUTIVE SUMMARY

The City of Petaluma requested that SafeTREC at the University of California, Berkeley conduct Complete Streets Safety Assessment (CSSA) study for various locations within the City. A team of two safety experts conducted the CSSA field visit for the City of Petaluma in July 25, 2019 and prepared this report. The objectives of the CSSA are to improve pedestrian and bicycle safety and to enhance walkability and accessibility for all pedestrians and bicyclists in in Petaluma.

Based on the 2016 California Office of Traffic Safety (OTS) Petaluma has a population of approximately 62,000 residents, which puts it in Group C, with 103 other California cities in the same population group. Based on the OTS Collision Rankings, Petaluma ranked 30 out of 104 for the number of pedestrian collisions, and 22 out of 104 for the number of bicyclists collisions (with 1st being the worst and 104 the best). This ranking is based on a number of weighted factors including population, daily vehicle miles traveled, collision records, collision trends, and others. For more information on OTS rankings, please refer to https://www.ots.ca.gov/media-and-research/collision-rankings/.

This report is organized into the following chapters:

- Chapter 1 is an introduction to the Complete Streets Safety Assessment for City of Petaluma.
- Chapter 2 presents background information on bicyclist and pedestrian safety in the City.
- Chapter 3 presents benchmarking analysis results and suggestions for potential improvement from the benchmarking analysis.
- Chapter 4 presents field walking audit results and suggestions for potential improvements from the audit.

BENCHMARKING ANALYSIS OF POLICIES, PROGRAMS, AND PRACTICES

To assess pedestrian safety conditions in Petaluma, the expert team first conducted a benchmarking analysis to understand how the City's existing conditions compared to current best practices. Through a pedestrian and bicycle safety assessment interview conducted with City staff, the expert team identified the City's pedestrian policies, programs, and practices and categorized these into three groups:

- Key strengths (areas where the City is exceeding national best practices)
- Enhancement areas (areas where the City is meeting best practices)
- Opportunity areas (areas where the City appears not to meet best practices)

While suggestions are provided for each category, cities have differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions than others. Ultimately, City staff may determine where resources and efforts are best placed for meeting local development and infrastructure goals for pedestrians.

A discussion of the City's pedestrian and bicycle safety policies, programs, and practices, and suggestions for potential improvement or further enhancement to the City's existing programs and policies are presented in *Chapter 3*.

WALKING AUDIT SUGGESTIONS FOR POTENTIAL IMPROVEMENT

Per City's request, the following 5 locations were studied in this assessment:

1. Lynch Creek Trail
2. McDowell Boulevard between Madison and SMART rail crossing
3. McDowell Boulevard at SMART rail crossing
4. Petaluma Boulevard South
5. 5th & 6th Streets downtown

Positive practices, as well as pedestrian and bicycle safety and accessibility issues were identified at the field audit.

Many of the strategies suggested in this report are appropriate for grant applications, including Office of Traffic Safety (OTS) or Active Transportation Program (ATP) funding. The strategies may also be incorporated into a bicycle or pedestrian master plan, documents that could set forth bicycle, pedestrian and streetscape policies for the City, identify, and prioritize capital improvement projects.

The suggestions presented in this report are based on limited field observations and time spent in Petaluma by the CSSA evaluators. These suggestions, which are based on general knowledge of best practices in bicycling design and safety, are intended to guide City staff in making decisions for future safety improvement projects in the City, and they may not incorporate all factors which may be relevant to bicycling safety issues in the City.

As this report is conceptual in nature, conditions may exist in the focus areas that were not observed and may not be compatible with suggestions in this report. Before finalizing and implementing any physical changes, City staff may choose to conduct more detailed studies or further analysis to refine or discard the suggestions in this report, if they are found to be contextually inappropriate or appear not to improve bicycling safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other potential safety concerns.

1 INTRODUCTION

1.1 OBJECTIVE OF THE ASSESSMENT

The City of Petaluma (the City) requested that the Safe Transportation Research and Education Center (SafeTREC) at University of California, Berkeley conduct a Complete Streets Safety Assessment (CSSA) for the City. The objective of the CSSA is to improve safety and accessibility for all people walking and biking in the City of Petaluma. This assessment emphasizes safety and mobility issues associated with pedestrians and bicyclists, including a focus on older and younger road users.

The City adopted a Complete Streets policy in 2016 and is working hard to incorporate the Complete Streets concepts into upcoming developments and projects currently in the planning, design, and development stages. Over the last 5 years City has incorporated a complete streets approach in many of the projects. City's objective is to tie all these smaller localized projects into a larger integrated plan or vision for the City as a whole.

The City staff is looking to inventory and prioritize safety issues within the City and would like to use the information from this CSSA study embrace a consistent concern for safety and integrated transportation as the City continues to design from a Complete Streets perspective. UC-Berkeley had conducted a Traffic Safety Assessment (TSA) in January 2009 and a Pedestrian Safety Assessment (PSA) in September 2012 for City of Petaluma.

1.2 ASSESSMENT APPROACH

The SafeTREC Safety experts conducted a pre-visit telephone interview with City staff on June 10, 2019. The results from this interview provided the basis for the benchmarking analysis.

The experts met with City staff and conducted a walking audit at various locations in Petaluma City on July 25, 2019. Before the field visit, the experts conducted an introductory meeting to discuss initial results from the benchmarking analysis and logistics for the field visit. A walking audit was conducted at locations as requested by the City staff.

Positive practices, as well as pedestrian and bicycle safety and accessibility issues were identified at the field audit. The safety experts held an exit meeting with the participants from the audit at the end of the visit. This meeting included a discussion of the observations and suggestions made during the Complete Streets audit and potential site-specific improvements based on what the group discussed during the field visit.

1.3 ACKNOWLEDGEMENTS

City of Petaluma staff members participated in the field visit and contributed to the wide range of topics addressed in this report. In particular, they organized a successful field visit on July 25, 2019. We would like to thank the following individuals who participated in the meetings and/or field audit other than the safety experts:

- Mario Traverso, Engineer Technician, City of Petaluma Public Works and Utilities Department
- Jeff Stutsman, Senior Civil Engineer, City of Petaluma Public Works and Utilities Department

- Ken Eichstaedt, Senior Civil Engineer, City of Petaluma Public Works and Utilities Department
- Jason Beatty, Assistant Director, City of Petaluma Public Works and Utilities Department
- Gina Benedetti-Petnic, City Engineer, City of Petaluma Public Works and Utilities Department

1.4 DISCLOSURES

The benchmarking analysis aims to provide the City with information on current best practices and how the city compares. Cities have differing physical, demographic, and institutional characteristics that may make certain goals or policies more appropriate in some jurisdictions than others. Ultimately, City staff will determine where resources and efforts are best placed for meeting local development and infrastructure goals for people walking and biking.

The suggestions presented in this report are based on limited field observations and limited time spent in the City of Petaluma by the CSSA evaluators. These suggestions, which are based on general knowledge of best practices in pedestrian and bicycle design and safety, are intended to guide City staff in making decisions for future safety improvement projects in the city, and they may not incorporate all factors, which may be relevant to the pedestrian and bicycle safety issues in the city.

As this report is conceptual in nature, conditions may exist in the focus areas that were not observed and may not be compatible with suggestions in this report. Before finalizing and implementing any physical changes, City staff may conduct more detailed studies or further analysis to refine or discard the suggestions in this report if they are found to be contextually inappropriate or appear not to improve pedestrian and bicyclist safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other potential safety concerns.

2 BACKGROUND

The City of Petaluma is located 37 miles north of San Francisco in Sonoma County, which is part of the North Bay of the San Francisco Bay Area. .Per Wikipedia its population is about 80% White and 20% Hispanic or Latino.

The City has been exploring ways to enhance access and safety for everyone, especially for pedestrians and bicyclists. The following lists the City's efforts:

- General Plan 2025 adopted May 19, 2008
- Bicycle and Pedestrian Plan, An Appendix to the General Plan 2025, May 2008
- Safe Routes to School Plan, July 10, 2015
- ADA Transition Plan, 2010
- Complete Streets Policy, adopted in 2016

2.1 PEDESTRIAN AND BICYCLISTS SAFETY OVERVIEW

The Office of Traffic Safety (OTS) collision rankings facilitate funding decisions and identify emerging traffic safety problem areas. The rankings allow cities to compare themselves to other cities with similar-sized populations and help them identify potential disproportionate traffic safety issues. OTS rankings are indicators of historical collisions; there are many factors that affect collisions in a city.

Victim and collision data for the rankings are taken from the California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS), California Department of Transportation (Caltrans), California Department of Justice (DOJ), and the Department of Finance (DOF). Collision rankings are based on the Empirical Bayesian (EB) Ranking Method that gives weights to many different factors, such as population, daily vehicle miles traveled, collision records, collision trends, etc.

With a population of approximately 62,000 residents, Petaluma is categorized as one of the 104 cities in Group C, population 50,001-100,000 people as shown in Table 2-1. The 2014, 2015, and 2016 OTS safety rankings for Petaluma are shown in Table 2-2.

TABLE 2-1. PETALUMA SUMMARY STATISTICS

Year	County	Population	Population Group	Daily Vehicle Miles Traveled (VMT)
2016	Sonoma	61,657	C	53,8474

Source: California Office of Traffic Safety, https://www.ots.ca.gov/media-and-research/collision-rankings/

Based on the OTS 2016 statistics, Petaluma ranked 35 out of 104 California cities in Group C, in total fatal and injury collisions (with a ranking of "1" being the worst). It ranked 30 for pedestrian collisions, and 22 for bicyclist collisions. It should be noted that City of Petaluma ranked 20 out of 104 for "Alcohol Involved" collisions and 6 out of 104 for "Had Been Drinking Driver 21 – 34", which puts Petaluma in the top worst 10% of all the 104 cities for this category.

TABLE 2-2: CITY OF PETALUMA TRAFFIC COLLISIONS AND RANKINGS, 2014, 2015, 2016

	2014		2015		2016	
Type of Collision	**Victims Killed & Injured**	**OTS Ranking (of 105 cities)**	**Victims Killed & Injured**	**OTS Ranking (of 105 cities)**	**Victims Killed & Injured**	**OTS Ranking (of 104 cities)**
Total Fatal and Injury	317	30	403	24	387	35
Alcohol Involved	23	63	34	35	44	20
Had Been Drinking Driver < 21	1	71	0	96	3	19
Had Been Drinking Driver 21 – 34	11	35	12	30	22	6
Motorcycles	15	28	21	35	21	33
Pedestrians	19	39	25	30	26	30
Pedestrians < 15	4	29	3	39	4	18
Pedestrians 65+	4	25	5	18	2	62
Bicyclists	21	31	27	24	26	22
Bicyclists < 15	3	31	2	50	3	35

Source: California Office of Traffic Safety, https://www.ots.ca.gov/media-and-research/collision-rankings/

2.2 PEDESTRAIN AND BICYCLE COLLISION DATA

The collision data for Petaluma from January 2014 to the end of 2018 was taken from the SafeTREC Transportation Injury Mapping System (TIMS) database. In this five-year period, 1,359 total collisions (including vehicular, pedestrian, and bicycle) occurred in City of Petaluma, 10 of which were fatal. There were 101 collisions that involved pedestrians and 109 collisions that involved bicyclists.

Pedestrian Collisions:

Within the 5-year period analyzed from TIMS data, 101 collisions involved pedestrians, 3 of which were fatal. Of all the collisions, 59 were crossing in crosswalk at an intersection. Six (6) were crossing in crosswalk midblock, and 17 were crossing not in a crosswalk. Most collisions happened on Tuesdays. The following charts depict this data:

Chart 2.1: Number of Pedestrian Collisions by Collision Severity

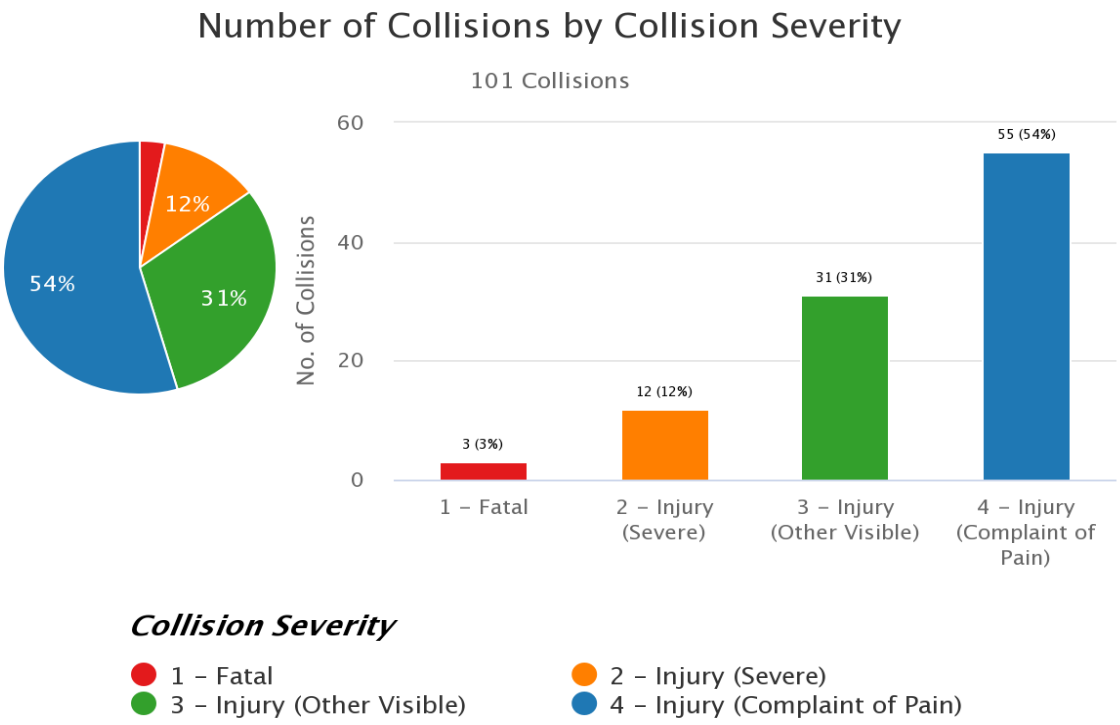


Chart 2.2: Number of Pedestrian Collisions per Day of Week per Time

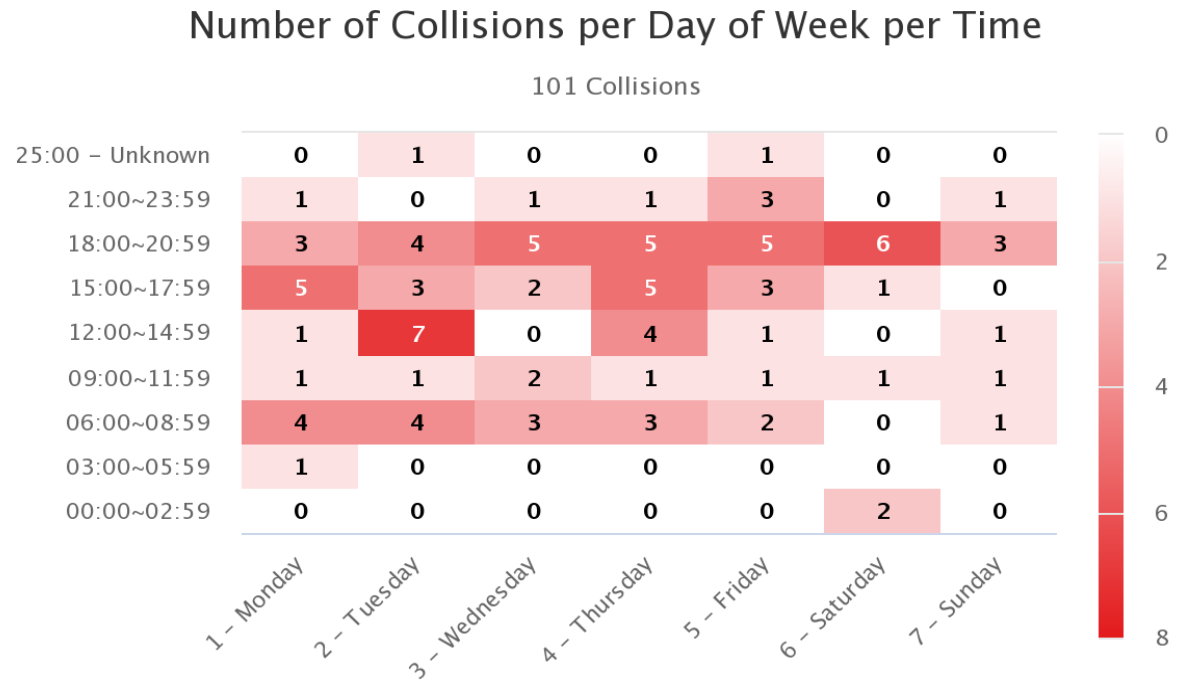
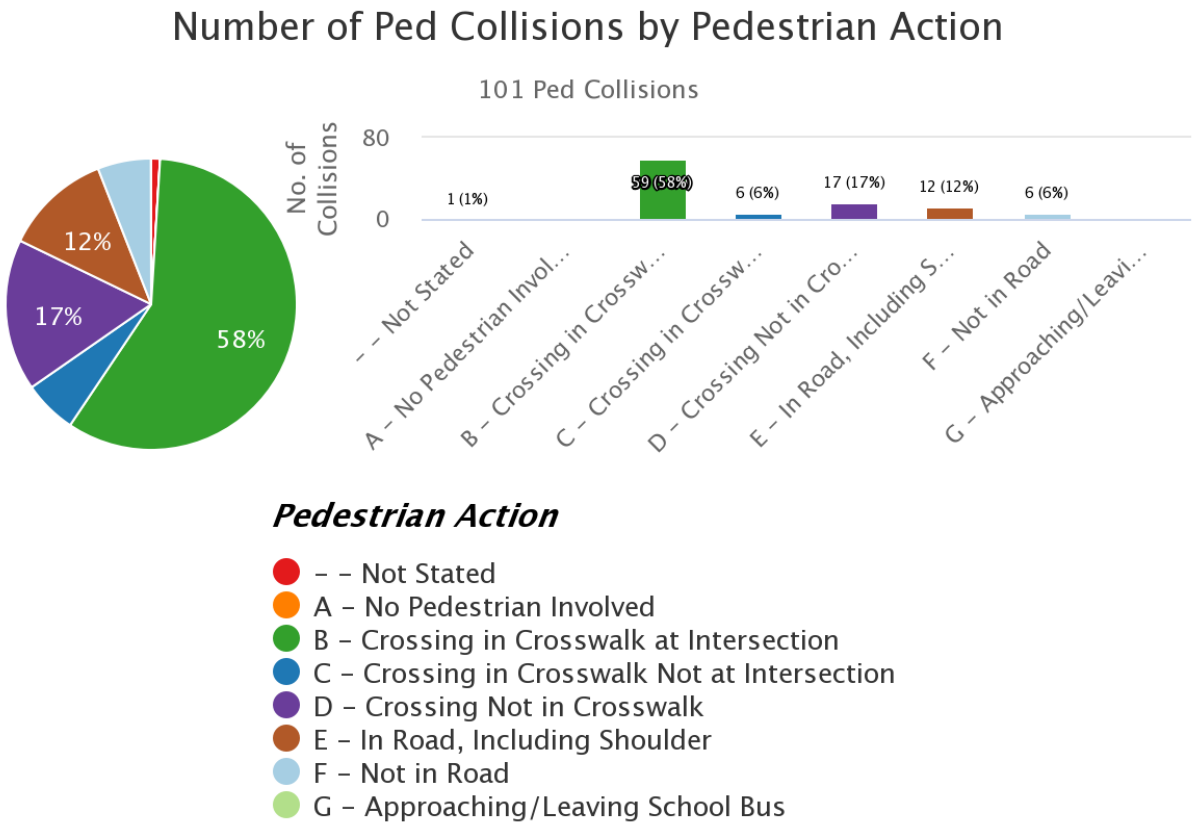


Chart 2.3: Number of Pedestrian Collisions by Pedestrian Action



Pedestrian Action	Count	%
- - Not Stated	1	0.99%
B - Crossing in Crosswalk at Intersection	59	58.42%
C - Crossing in Crosswalk Not at Intersection	6	5.94%
D - Crossing Not in Crosswalk	17	16.83%
E - In Road, Including Shoulder	12	11.88%
F - Not in Road	6	5.94%

Bicycle Collisions:

Based on the TIMS data, within the 5-year (2014-2018) period, there were 109 collisions involving bicyclists. There was one fatality. 33 (30%) of collisions were caused by the bicyclist riding on the wrong side of the road. 4 of the collisions happened due to bicycling under influence of alcohol or drugs. The highest number of collisions happened on Tuesdays and Thursdays. The following charts depict this data.

Chart 2.4: Number of Bicycle Collisions by Collision Severity

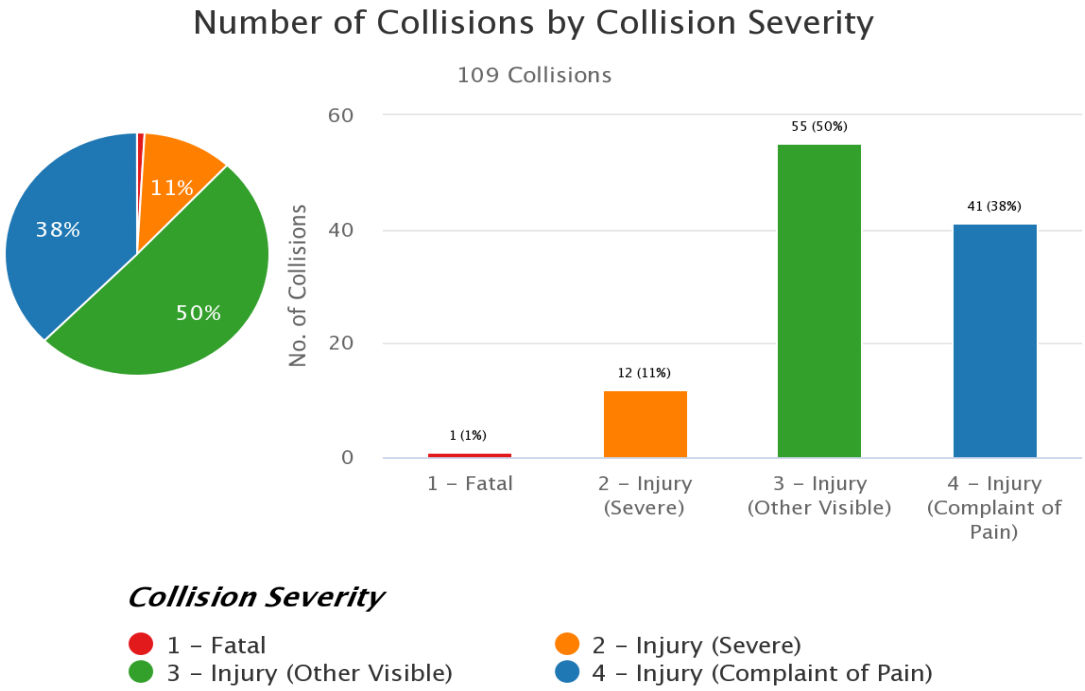


Chart 2.5: Number of Bicycle Collisions per Day of Week per Time

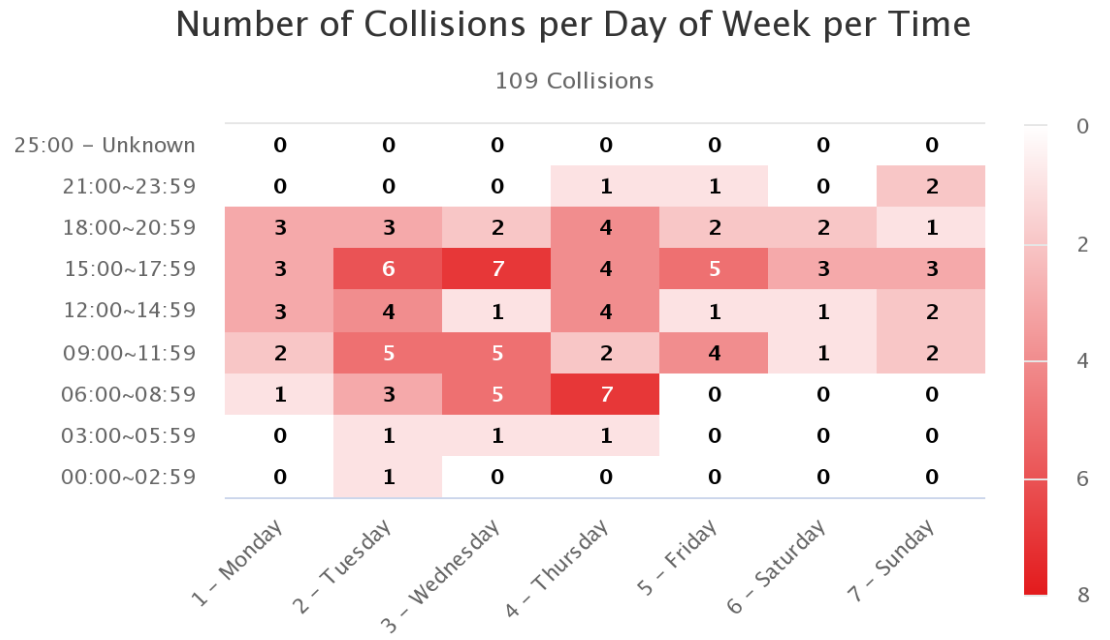
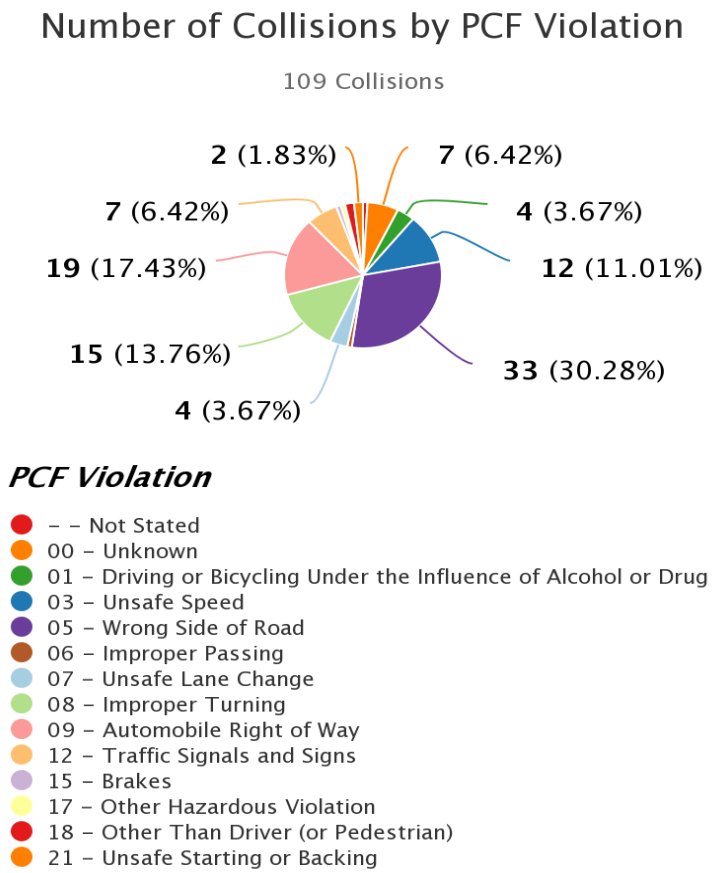


Chart 2.6: Number of Bicycle Collisions by Primary Collision Factor (PCF) Violation



PCF Violation	Count	%
- - Not Stated	1	0.92%
00 - Unknown	7	6.42%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	4	3.67%
03 - Unsafe Speed	12	11.01%
05 - Wrong Side of Road	33	30.28%
06 - Improper Passing	1	0.92%
07 - Unsafe Lane Change	4	3.67%
08 - Improper Turning	15	13.76%
09 - Automobile Right of Way	19	17.43%
12 - Traffic Signals and Signs	7	6.42%
15 - Brakes	1	0.92%
17 - Other Hazardous Violation	1	0.92%
18 - Other Than Driver (or Pedestrian)	2	1.83%
21 - Unsafe Starting or Backing	2	1.83%

The type of information provided above which is obtained from SafeTREC's TIMS (https://tims.berkeley.edu/) can help City Police Department in decision making in regards to their enforcement efforts.

2.3 STREET STORY

The Street Story program (https://streetstory.berkeley.edu/) is a relatively new tool developed by UC Berkeley's Safe Transportation Research and Education Center (SafeTREC) with OTS support. Street Story is a community engagement tool that allows residents, community groups and agencies to collect information about transportation collisions, near-misses, general hazards and safe locations to travel. To promote access to the tool, SafeTREC conducts technical assistance with communities and organizations on using Street Story. Street Story is free to use and publicly accessible.

Street Story features a survey where people can record travel experiences. Once a record has been entered, the information is publicly accessible on the website with maps and tables that can be downloaded. City staff can use this information for local needs assessments, transportation safety planning efforts, safety programs and project proposals.

SafeTREC staff spoke with City of Petaluma Department of Public Works staff on June 4th, 2019 about using Street Story to collect community feedback about transportation safety issues. Although the City of Petaluma staff was very supportive of the Street Story effort, and interested in introducing the tool at community events, on their Facebook and Nextdoor sites, and their newspaper and Pedestrian and Bicycle Advisory Committee (PBAC), they cannot allocate adequate time to help with outreach at this time.

3 BENCHMARKING ANALYSIS RESULTS AND SUGGESTIONS

Prior to the field visit, the CSSA Team conducted an interview with City staff regarding the pedestrian and bicyclist safety policies, programs, and practices on June 10, 2019. The Team also reviewed the documents provided by the City staff. Responses were analyzed with a benchmarking matrix, as shown in Table 3-1. The City's policies, programs, and practices were then compared with national best practices. This benchmarking analysis categorizes the results into three groups:

- Key Strengths (areas where the City is exceeding statewide best practices)
- Enhancement (areas where the City is meeting best practices)
- Opportunity (areas where the City appears not to meet best practices)

This analysis shares information on current best practices and how the City compares. With differing physical, demographic, and institutional characteristics, certain goals or policies may be more appropriate in some jurisdictions than others may. Ultimately, City staff may determine where resources and efforts are best placed for meeting local development and infrastructure goals for pedestrians.

The items in Table 3-1 are further elaborated in the following sections. The City may select strategies for implementation based on local priorities.

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR THE CITY OF PETALUMA

Benchmark Topic	Key Strength	Enhancement	Opportunity
Implementation of Americans with Disabilities Act (ADA) Improvements			
Implementation of Americans with Disabilities Act (ADA) Improvements	Uses state-of-the-practice (PROWAG) ADA improvements with consistent installation practices	Has clear design guidelines but no regular practices for ADA compliance	Has minimal design guidelines and practices related to ADA requirements
ADA Transition Plan for Streets and Sidewalks	Has ADA transition plan in place and an ADA coordinator	Partial or outdated ADA transition plan or an ADA coordinator	No transition plan or ADA coordinator
Policies and Programs			
Pedestrian/Bicycle Coordinator	Has a Coordinator on staff who manages the agency's pedestrian and bicycle programs	Occasionally uses a part-time contract coordinator	Does not have a pedestrian/bicycle coordinator
Formal Advisory Committee	Has a formal, active Transportation Advisory Committee that address bicycle/pedestrian issues	Has an ad-hoc Transportation Advisory Committee	Does not have a Transportation Advisory Committee

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR THE CITY OF PETALUMA			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Traffic Calming Program	Has a significant traffic calming program with a dedicated funding source	Has a traffic calming program but no dedicated funding source	Does not have a traffic calming program, or the program only includes speed humps
Speed Limits and Speed Surveys	Employs comprehensive practice to proactively review speed limits such as USLIMITS2. Considers traffic calming before raising speed limits in pedestrian or bicycle zones	Reviews data only in response to reported concerns or frequent collisions	Does not have set practices for speed limit reviews
Safe Routes to Schools	Has an ongoing Safe Routes to Schools program and funding for recent projects.	Has obtained funding for recent projects, but has no community-wide Safe Routes to Schools program	Does not have a Safe Routes to Schools program and has not obtained recent funding
Crosswalk Installation, Removal, and Enhancement Policies	Has a crosswalk policy that reflects best practices for signalized and uncontrolled crosswalk treatments (FHWA Field Guide), including consideration of Pedestrian Hybrid Beacons	Has no policy, but has an established crosswalk installation, removal, and enhancement practice in place	Does not have a policy or set practices for addressing crosswalk installation, removal, or enhancement
Shared Mobility Services	Has curbside management, shared mobility, or micromobility policies (e.g. permitting, enforcement) in place that prioritize pedestrian and bicyclist safety	Has curbside management, shared mobility, or micromobility policies in place, but without a focus on safety	No curbside management, shared mobility, or micromobility policies in place
Funding			
Funding	Has a dedicated annual funding stream for pedestrian and bicycle projects and local grant matches	Depends on grant funding for projects, and is successful in obtaining grants	Only moderately successful in obtaining grant funding or has trouble spending funds when given grants
Data Collection			
Collection of Pedestrian and Bicyclist Volumes	Collects pedestrian and bicyclist volumes routinely with intersection counts and has a GIS database of counts	Collects some pedestrian and bicyclist volumes, but not routinely	Does not collect pedestrian and bicycle volumes

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR THE CITY OF PETALUMA			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Inventory of Bikeways, Parking, Informal Pathways, and Key Bicycle Opportunity Areas	Maintains an inventory of missing and existing bikeways in GIS and includes bikeway projects in the CIP	Maintains an inventory of missing facilities and opportunity areas	Does not have an inventory of missing/existing bikeways, parking, informal pathways, or key bicycle areas
Collision History and Collision Reporting Practices	Employs a data-driven systemic safety or Vision Zero approach to regularly analyze collision data citywide	Reviews data only following fatalities or other high-profile incidents	Does not have set practices for data review
Pedestrian and Bicycle Network Implementation			
Complete Streets Policy	Has a Complete Streets policy that includes all users and modes, affects new construction and maintenance, considers local context, and provides guidance for implementation	Has a Complete Streets policy that is narrow in scope or applies only to public works projects	Does not have a Complete Streets policy
Active Transportation Plans	Has a recently-updated Active Transportation Plan (or similar) with strategic prioritized list of projects that reflects current best practices (e.g. Level of Traffic Stress analysis, inclusion of Class IV protected bicycle facilities)	Has a Pedestrian or Bicycle Master Plan but it may be outdated and/or no recent projects from the Plan have been completed	Does not have a Pedestrian or Bicycle Master Plan
Existing pedestrian facilities	Includes current best practice ADA and safety features such as high visibility crosswalks and advance stop bars, PHBs or RRFBs, bulbouts, etc.	Narrow sidewalks or sidewalk gaps, crosswalks with few or no safety enhancements, with some pedestrian countdown signals	Missing key marked crosswalks and sidewalks, with few ADA improvements and no safety enhancements, and no pedestrian countdown signals
Bicycle Network Implementation Practices	Age 8 to 80 bicyclist considerations are applied and/or level of traffic stress is considered	Some traffic calming measures are implemented in conjunction with bikeway installation	Treatments are implemented where they fit within the right-of-way and vehicle LOS is not affected

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR THE CITY OF PETALUMA			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Design guidelines and standards	Uses national best practices focused on bicycle and pedestrian safety for roadway and facility design guidelines and standards	Local standards reference national best practices, but are static or out of date, with minimal customized design policies for pedestrian and bicycle accommodations	Does not have a comprehensive design guidelines or standards for pedestrian or bicyclist treatments
Roadway Surfaces	Roadway resurfacing projects and debris removal are prioritized for bicycle routes.	Roadway surface is acceptable on bicycle routes and routine maintenance, including debris removal, occurs.	Roadway surface conditions are poor on some bicycle facilities and maintenance is not prioritized for bicycle facilities
Attention to Bicycle Crossing Barriers	Colored bike lanes and other innovative treatments, including geometric enhancements, are provided at intersections and interchanges	Bike treatments are installed at some intersections and interchanges	Bike treatments are not installed at intersections or through interchanges
Attention to Pedestrian Crossing Barriers	Has a recently updated policy and comprehensive inventory of barriers. Has design guidelines for addressing barriers	Has no policy, but has identified some barriers and taken steps to improve pedestrian access	Does not have a policy or practices for pedestrian crossings at railroads, freeways, and so on
Traffic Signal	Uses relaxed warrants for traffic signals and/or all-way stops	Uses relaxed warrants for traffic signals or all-way stops	Uses MUTCD Warrants
Pedestrian and Bicycle Support Program			
Bicycling Supportive Amenities and Wayfinding	Bicycle supportive amenities (parking, routing/wayfinding, water fountains, repair stations) are found community-wide	Some bicycle supportive amenities are found in key areas	Bicyclist supportive amenities are not provided in the community
Pedestrian and Bicycle Safety Education Program	Pedestrian and bicycle education programs are data-driven and focused on local safety context; education programs are customized for different groups	Has some traffic safety education programs that include pedestrians and bicyclists	Does not have pedestrian and bicycle safety education programs

TABLE 3-1: SUMMARY OF PROGRAMS, POLICIES, AND PRACTICES BENCHMARKING ANALYSIS FOR THE CITY OF PETALUMA			
Benchmark Topic	**Key Strength**	**Enhancement**	**Opportunity**
Enforcement	Police Department conducts sustained and data-driven enforcement efforts focused on behavior and locations related to most severe bicycle and pedestrian crashes; enforcement activities are designed to consider equity implications	Police Department conducts some enforcement activities related to bicyclist and pedestrian safety	Police Department does not have Traffic Safety Officer(s)

3.1 KEY STRENGTHS

Implementation of Americans with Disabilities Act (ADA) Improvements and ADA Transition Plan for Streets and Sidewalks

Implementation of ADA improvements is key to making walking accessible and safe for everyone in Petaluma, regardless of ability or age. ADA Transition Plans identify gaps and issues in the City's current ADA infrastructure, prioritize projects for implementation, and set forth the process for bringing public facilities into compliance with ADA regulations.

The City of Petaluma has an ADA Transition Plan (2010), and a designated ADA coordinator on staff.

The City does not have any local design guidelines for ADA improvements; they use Caltrans Highway Design Manual (HDM) as well as California Building Code. The City has practices related to installation of some of the ADA improvements such as audible pedestrian signals and high-contrast truncated domes. They also use brick red truncated domes and follow Caltrans standard curb ramps. The City tries to install directional ramps whenever feasible.

Suggestions for Potential Improvement

- Consider updating the ADA Transition Plan.
- Prioritize areas within the City that exhibit greatest pedestrian activity for ADA improvements
- Provide ADA standards and best practice training for engineering staff at all levels.
- Add ADA ramps at intersections that currently lack them and continue upgrading non-complaint ramps (replacing one ramp to two directional ramps at each corner, whenever feasible).

Pedestrian/Bicycle Coordinator

A pedestrian/bicycle coordinator provides guidance for pedestrian/bicycle planning efforts and oversees implementation of plans. Petaluma has a designated Pedestrian/Bicycle Coordinator that spends at least 20% of their time on active transportation.

Suggestion for Potential Improvement

- Utilize the designated pedestrian/bicycle coordinator to write grants for both capital improvement projects and ongoing funding for walking and biking related programs as well as to act as a liaison with local non-profit advocacy groups, and schools.

Formal Advisory Committee

Advisory committees serve as important sounding boards for new policies, programs, and practices. Responding to public concerns through public feedback mechanisms represents a more proactive and inclusive approach to bicycle and pedestrian safety compared to a conventional approach of reacting to collisions.

City of Petaluma has Pedestrian and Bicycle Advisory Committee and Transit Advisory Committee. Per City's website, "The Pedestrian and Bicycle Advisory Committee (PBAC) is charged with making recommendations for bicycle and pedestrian facilities in accordance with the Petaluma Bicycle and Pedestrian Plan. PBAC reviews development applications, solicits public comment and forwards bicycle and pedestrian related improvement recommendations to the Planning Commission and City Council".

Suggestion for Potential Improvement

- Continue with regular scheduled meetings to bring all transportation projects to the general committee to give opportunity for focused complete streets discussion.

Safe Routes to Schools Program

Safe Routes to School (SRTS) programs encourage children to safely walk or bicycle to school. The Marin County Bicycle Coalition was an early champion of the concept, which has spread nationally (refer to best practices at *www.saferoutestoschools.org*). SRTS programs are important both for increasing physical activity (and reducing childhood obesity) and for reducing morning traffic associated with school drop-off (as much as 30% of morning peak hour traffic).

City of Petaluma has a Safe Routes to School plan (July 10, 2015) for its 14 elementary and junior high schools. The City also has Safe Route to School engineering evaluation prepared for each of the high schools in Sonoma County, including the two high schools in Petaluma.

Suggestion for Potential Improvement

- Form an ongoing steering committee for the program (or each school) comprised of City staff, school district staff, PTA leaders, and other stakeholders to monitor efforts and identify new opportunities.

- Consider a plan for all Petaluma schools to conduct walk audits, identify potential safety improvements, and secure funding for those improvements.

Funding

A dedicated, annual funding stream for bicycle and pedestrian projects ensures that these types of projects will be implemented regularly. Bicycle and pedestrian projects can also be integrated in the other work that the City does, including repaving and other routine maintenance of the roadway network.

Petaluma uses a combination of General City Funds, County tax measure funds, Surface Transportation Program Funding, as well as competitive grants, such as Highway Safety Improvement Program (HSIP), Congestion Mitigation and Air Quality Improvement Program (CMAQ), and Active Transportation Plan (ATP), and Safe Routes to School (SRTS) grant. Grant funds are the main source for any bicycle and Pedestrian improvements.

Suggestion for Potential Improvement

- Collaborate with other agencies and continue applying for grant funding for both infrastructure and non-infrastructure projects.
- Integrate bicycle and pedestrian projects into the site plan review process for new developments.
- Secure additional funding for repaving projects to allow for "quick build" projects and other bicycle and pedestrian safety improvements to be integrated into those projects.
- Establish a dedicated funding source for pedestrian and bicycle projects.

Complete Streets Policy

Complete Streets Policies are formal statements showing a City's commitment to planning and designing for all modes of travel and travelers of all ages and abilities.

The City of Petaluma has adopted a Complete Streets policy in 2016, and plans to tie all smaller localized projects into a larger integrated plan for the City as a whole.

Suggestion for Potential Improvement

The following jurisdictions have established practices for complete streets, including implementation of these policies through multimodal level of service thresholds, and may serve as reference for Petaluma:

- Boston, Massachusetts, Boston's Complete Streets: http://bostoncompletestreets.org/about/
- Philadelphia, Pennsylvania, Philly Free Streets: http://www.phillyfreestreets.com/
- Baltimore, Maryland, Complete Streets Ordinance: https://transportation.baltimorecity.gov/completestreets
- Town of Ashland, Massachusetts, Complete Streets Policy: https://www.smartgrowthamerica.org/app/legacy/documents/cs/policy/cs-ma-ashland-policy.pdf

Active Transportation Plan

This type of plan includes a large menu of policy, program, and practice suggestions, as well as site-specific (and prototypical) engineering treatment suggestions. Bicycle and Pedestrian Master

Plans document a jurisdiction's vision for improving walkability, bikeability, and bicycle and pedestrian safety; establish policies, programs, and practices; and outline the prioritization and budgeting process for project implementation.

Petaluma has a Bicycle and Pedestrian Plan, dated May 2008, as an Appendix to the General Plan 2025.

Suggestion for Potential Improvement:

- Consider updating the Bicycle and Pedestrian Plan. City may use City of San Leandro Bicycle and Pedestrians Master Plan (2018 Update) as an example: http://sanleandro.org/civicax/filebank/blobdload.aspx?blobid=28158
- Provide design guidelines for bicycle and pedestrian facilities that address the needs of bicyclists and pedestrians of all ages and abilities.
- In the future, develop high injury networks for walking and biking to identify routes with the highest incidences of fatal and severe injuries for pedestrians and bicyclists. This will create a systematic safety analysis that can help in prioritizing limited resources.
- Identify existing and missing bicycle and pedestrian infrastructure for safety improvements.

Existing Pedestrian Facilities

The City has already an ADA Transition Plan. They use curb extension/bulb outs, reduced curb radii, Rectangular Rapid Flashing Beacons (RRFB), Advance Yield Limits, and high visibility crosswalks striping to enhance pedestrian safety.

Suggestion for Potential Improvement:

Include potential sidewalk improvements with all City projects

- Create a GIS database for existing pedestrian infrastructure to identify gaps, inventory assets, and create opportunities for systemic safety analysis of all sidewalks and crosswalks in the City.
- Identify funding sources for enhancement of sidewalks and crosswalks to include safety features and provide ADA compliance.

Bicycle Network Implementation Practices

In designing bicycle facilities, city of Petaluma tries to, as much as possible, consider reducing vehicle speeds, removing on-street parking, improving the usability of the network by bicyclists aged 8 to 80, improving access to key destinations, intersection safety, and driver intrusion into bicycle facility. The City's Bike Plan does not address the Bicycle Level of Traffic Stress (LTS) concept. Bicycle Level of Traffic Stress (LTS) was originally developed by researchers at the Mineta Transportation Institute. LTS assesses the comfort and connectivity of bicycle networks.

Suggestion for Potential Improvement:

- Consider prioritizing bicycle projects to align with roadway resurfacing and projects that are near school sites.

- Secure enough funding for repaving and other complete streets projects to allow for installation of protected bike facilities and intersection improvements.

- Consider using LTS to strategically implement bikeways and traffic calming treatments that would improve LTS of existing bikeways.

Design Guidelines and Standards

Design guidelines and development standards create a clear set of documents that guide how all transportation improvements could be installed citywide. As a result, they can create a consistent, high-quality biking and walking experience.

In addition to City standards, City of Petaluma relies on CA MUTCD, Caltrans DIB 89 Class IV Bikeway Guidance, and Highway Design Manual (HDM) when making design decisions.

Suggestion for Potential Improvement

Other useful design guidelines and standards include:

- NACTO Urban Street Design Guide: http://www.nyc.gov/html/dot/downloads/pdf/2012-nacto-urban-street-design-guide.pdf
- FHWA Separated Bike Lane Planning and Design Guide https://nacto.org/wp-content/uploads/2016/05/2-4_FHWA-Separated-Bike-Lane-Guide-ch-5_2014.pdf
- MassDOT Separated Bike Lane Planning & Design Guide https://www.mass.gov/lists/separated-bike-lane-planning-design-guide
- ITE Recommended Practice for Accommodating Pedestrians and Bicyclists at Interchanges https://www.fehrandpeers.com/bicycle-pedestrian-interchanges/

Traffic Signal

Providing signal control at an intersection may improve pedestrian safety by reducing speeds and controlling pedestrian-vehicle conflicts. Installing bicycle signals and limiting stop signs on bicycle routes may enhance bicycle mobility and safety. The MUTCD defines warrants for installing signals. Although following MUTCD warrants for installation of traffic signals is a good practice, the City may choose to define relaxed pedestrian criteria to encourage pedestrian safety.

The City considers bicycle detection on all actuated phases, additional time to the green phase to account for bicyclist speeds, separation of through bicyclists from right-turning vehicles, and dropping of bikeways facilities when free-right turns are present.

The City is upgrading existing detection (loops) to Video detection that has proven bicycle detection capabilities.

Suggestion for Potential Improvement:

- Develop City-specific signal and stop sign warrants that are pedestrian- and bicycle-friendly.

- Consider installing bicycle detection at all signalized intersections. Install stencil marking (Caltrans Revised Standard Plan A24C, “BICYCLE LOOP DETECTOR SYMBOL”) to guide bicyclists to place their bicycle on the detector’s sensitive area.

3.2 ENHANCEMENT AREAS

Crosswalk Installation, Removal, and Enhancement Policies

A formal policy for crosswalk installation, removal, and enhancement provides transparency in decision-making and adopts best practices in pedestrian safety and accommodation. It includes consideration of all kinds of crosswalks, including uncontrolled and controlled locations.

Petaluma does not have an officially adopted crosswalk policy. They use Ladder crosswalks only.

Suggestion for Potential Improvement

- Develop a citywide crosswalk policy for installation, removal, and enhancement of crosswalks at controlled and uncontrolled intersections citywide. Ensure that it is consistent with best practices and recent research. This includes removing crosswalks only as a last resort. Consider providing midblock crossings where they serve pedestrian desire lines.
- Consider developing a treatment selection "tool" to assist staff with the identification of applicable treatments in a given context.
- When crosswalk enhancements are identified, consider adding them to a prioritized list that will be upgraded over time, as funding is available.

Crosswalk policy resources include:

- National Cooperative Highway Research Program Application of Pedestrian Crossing Treatments for Streets and Highways: http://www.trb.org/Publications/Blurbs/175419.aspx

Collision History and Collision Reporting Practices

Safety is typically approached through both proactive and reactive measures. Identifying and responding to collision patterns on a regular basis is an important reactive approach to bicycle and pedestrian safety, which may be combined with other proactive measures. This is the traditional way most cities have approached safety. However, many are now looking to proactive safety to address safety issues on a system wide basis. This is often paired with a policy goal of getting to zero fatality or severe injury collisions (commonly referred to as "Vision Zero").

Police Department has Crossroads for collision data collection and reporting. Public Works collaborates with Police Department and utilizes the Crossroads data. Public Works Department only uses the local data from Police Department, they do not use SWITRS or TIMS.

City of Petaluma does not regularly review bicycle and pedestrian collision information, they only review it if there is any complaints or if the City is pursuing grants.

Suggestion for Potential Improvement

- Adopt a data driven systemic safety approach, which would include a systematic approach to identifying, prioritizing, and ultimately implementing safety countermeasure and/or a formal commitment to Vision Zero.

- Work with elected officials and department heads to adopt a Vision Zero policy formally stating the City's commitment to reducing the number of traffic-related fatalities and severe injuries to zero.

- Additionally, with sufficient pedestrian and bicycle volume data, the City could prioritize collision locations based on collision rates (i.e., collisions/daily pedestrian or bicycle volume), a practice that results in a more complete safety needs assessment. Treatments could then be identified for each location and programmatic funding allocated in the City's Capital Improvements Program (CIP).

- Consider utilizing SafeTREC's Transportation Injury Mapping System (TIMS) https://tims.berkeley.edu/. TIMS provides quick, easy and free access to California collision data, the Statewide Integrated Traffic Records System (SWITRS) that has been geo-coded by SafeTREC to make it easy to map out collisions.

Attention to Bicycle and Pedestrian Crossing Barriers

Crossing barriers - such as railroads, freeways, and major arterials - may discourage or even prohibit pedestrian and bicycle access and are often associated with collisions. Large intersections and interchanges and uncontrolled crossings can often deter pedestrians and bicyclists due to high speeds, high number of conflict points with vehicles, and high level of exposure. Identifying and removing barriers and preventing new barriers is essential for improving pedestrian and bicyclist safety and access.

In City of Petaluma the major barriers for crossing for bicyclists and pedestrians are major arterials and large intersections. The City uses the following crossing treatments at uncontrolled crossings: Rectangular Rapid Flashing Beacons (RRFB), high visibility crosswalk striping, and advance yield limit lines.

Suggestion for Potential Improvement:

- Use green color routinely to highlight conflict zones at large intersections and interchanges. See Oakland's bicycle lane striping guidance for more information: http://www2.oaklandnet.com/government/o/PWA/o/EC/s/BicycleandPedestrianProgram/OAK024653

- Coordinate with Caltrans and address interchange barriers in the City as well as barriers on local Caltrans-operated streets.

- To slow speeds at critical intersections, use smaller corner radii using small design vehicles appropriate for urban areas and updated standard plans to reflect this.

- Review design of slip/trap-right lanes at intersections and implement improvements.

- Implement best practice guidance on bicycle accommodation through interchanges and expressways, as appropriate, using the ITE's *Recommended Practice: Guidelines to*

Accommodate Bicyclist and Pedestrians at Interchanges plus consideration of protected bike lane design.

- Identify and create an inventory of pedestrian barriers with targeted suggestions for phased improvements.

Bicycling Supportive Amenities and Wayfinding

In addition to designating roadway or paths in a bicycle network, supportive amenities (including parking, water fountains, and maintenance stations) can encourage bicycling. Wayfinding can both encourage bicycling and enhance safety by navigating cyclists to facilities that have been enhanced for bicyclists' use or to local retail opportunities for economic growth.

Petaluma provides racks for bicycle parking and lockers. The City does allow removal of on street parking to install bike parking. The City requires new multi-family residential developments to provide long-term bicycle parking for residents.

Suggestion for Potential Improvement:

- Develop a pilot program for bicycle supportive amenities at key locations in the city, such as schools; include bicycle fix-it stations, water fountains, and similar amenities.
- Create and deploy a bicycle wayfinding strategy citywide.
- Update the Bicycle and Pedestrian Plan to include bicycle locker and rack locations.

Pedestrian and Bicycle Safety Education Program

Engineering treatments are often not enough on their own to realize full safety benefits associated with the treatment. Safety education programs complement engineering treatments and increase compliance. Education campaigns target people of all ages, especially school-age children where safe walking and biking habits may be instilled as lifelong lessons.

The City of Petaluma Police Department holds various safety campaigns and provides bicycling and pedestrian safety education within schools in the City.

Suggestion for Potential Improvement

- Continue conducting formal education campaign targeting people driving, walking, and biking about street safety. This includes advertisements on buses and bus shelters, an in-school curriculum, community school courses, public service announcements, and many other strategies. Consider a focus on speed and safe driving.

The Street Smarts program in San Jose, CA, provides a model pedestrian safety education program (see http://www.getstreetsmarts.org for details).

Inventory of Bikeways, Bike Parking, and Key Bicycle Opportunity Areas

A GIS-based bicycle infrastructure inventory enables project identification and prioritization, as well as project coordination with new development, roadway resurfacing, etc. This data set can be available on the City's website for knowledge sharing with the public as well as agencies.

City of Petaluma maintains an inventory of missing/existing bikeways, parking, informal pathways, or key bicycle areas, and there is potential for use of GIS for this purpose.

Suggestion for Potential Improvement

- Consider establishing a system of inventory of missing infrastructure for bicycle facilities, and create a GIS-based inventory.

3.3 OPPORTUNITY AREAS

Traffic Calming Program

Traffic calming programs and policies set forth a consensus threshold on neighborhood requests and approvals, as well as standard treatments and criteria. Petaluma does not have a Traffic Calming Program.

Suggestion for Potential Improvement

- Establish a Traffic Calming Program.
- Expand the City's traffic calming toolbox to include other tools, such as raised crosswalks, raised intersections, chicanes, and traffic diverters.
- Expand the City's practices to include proactive traffic calming measures. The City could consider allocating a portion of funding to proactive traffic calming, such as bicycle boulevards or safe routes to schools, and then allocate the remaining funding to react to specific community requests.
- Refer to the following resources for traffic calming best practices:

– https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures/

– *https://safety.fhwa.dot.gov/ped_bike/univcourse/pdf/swless11.pdf*

Speed Limits and Speed Surveys

Local municipalities have the authority to set the posted speed limit based on current speed data. The speed limit is rounded to the nearest five mile per hour (MPH) increment based on the 85th percentile speed of free-flowing traffic. School zone speed limits in California are a de facto 25 miles per hour or less, where specified. Speed is also critical for complete streets safety. Pedestrian fatality rates increase exponentially with vehicle speed. Thus, controlling vehicle speeds is one of the most important strategies for enhancing pedestrian and bicyclist safety.

City of Petaluma sets speed limits per CAMUTCD guidelines. Speed studies are completed regularly as required by the California Vehicle Code and speed surveys are done in response to complaints from community.

Suggestions for Potential Improvement

- Install traffic calming measures, signal coordination, and similar tools to maintain slower speeds appropriate for an urban community, particularly on streets that will be reviewed

in the next speed survey. Please refer to: https://www.transportation.gov/mission/health/Traffic-Calming-to-Slow-Vehicle-Speeds

- After complete streets improvements and other safety improvements are installed, conduct off-cycle speed surveys to review the speed limit and see if it needs to be reduced based on the improvements.
- Consider pedestrian volumes and known complete streets safety issues when setting speed limits and employ traffic calming strategies in locations where speed surveys suggest traffic speeds are too high for pedestrian and bicyclist safety.
- Ensure complete streets design standards have appropriate target design speeds for urban areas and do not contribute to a routine need for traffic calming.
- Consider the use of 15 MPH for school zones, as well as any area with a population of senior citizens.

Shared Mobility Services

Shared mobility services are transportation services – typically offered by private companies – that offer ride-share services (e.g. Lyft or Uber) for both solo and pooled trips, bike share, and scooter share. Policies for shared mobility services can allow cities to encourage, prohibit, or direct how they want shared mobility to work in their city. They can allow for curb space management, clear organization of sidewalk space, and encourage (or discourage) private vendors to come to the city. Curb space management is a practice that requires curb access to be planned, designed, operated, and maintained to enable curb utilization with safe, convenient, and multimodal access for all transportation users.

City of Petaluma does not have any policies in regards to use of shared mobility services, although it is expected that bike share will be deployed very soon by Sonoma County Transportation Authority (SCTA).

Suggestion for Potential Improvement

- Adopt a curb management plan to designate how the City will prioritize and proactive plan for curb uses (e.g. parking, passenger loading, commercial loading, ADA loading and parking, bicycle parking, bus-only lanes) and to make sure that the curb has the highest and best use of space.
- Consider micromobility policies (e.g. permitting, enforcement) in place to prioritize pedestrian and bicyclist safety and keep the sidewalk organized and usable for people of all abilities.

Collection of Pedestrian and Bicyclist Volumes

Pedestrian and bicyclist volume data is important for understanding where people walk and bike. This establishes baseline data prior to project implementation and can help prioritize projects, develop collision rates, and determine appropriate bicycle and pedestrian infrastructure.

Petaluma does not collect pedestrian and bicycle counts, although they are installing new video detection cameras at some intersections that can collect this data.

Suggestions for Potential Improvement

- Consider establishing a program to collect pedestrian and bicycle volumes routinely.

- Geocode pedestrian and bicycle volume data with GIS software along with other data such as pedestrian and bicycle control devices and collisions to analyze data for trends or hotspots related to safety.

Roadway Surfaces

The quality of a roadway surface along bikeways is an important consideration when choosing to bike. Rough surface in a bike lane creates an uncomfortable bicycling experience and may pose safety hazards.

When prioritizing resurfacing or repaving projects of roadways, the City does not consider the existing or proposed bikeway facilities in their criteria.

Suggestion for Potential Improvement:

- Prioritize maintenance of roadways where bicycle facilities are present, particularly for closing gaps in the bikeway network or where improved pavement quality is needed on popular bicycle routes.

- Prioritize debris removal on roadways where bicycle facilities are present.

Enforcement

Enforcement of pedestrian and bicycle right-of-way laws and speed limits is an important complement to engineering treatments and education programs.

The City's Police Department has a traffic division which is tasked to reduce property damage, injuries, and deaths caused by traffic collisions. They do this by enforcing safety laws, educating the community, and working with City engineers to make streets safer. The City does not have any trained traffic safety officer assigned to bicycle and pedestrian safety-related responsibilities and they don't conduct bicyclist and pedestrian oriented enforcement activities.

Suggestion for Potential Improvement

- Consider allocating and training officers to conduct bicyclist and pedestrian oriented enforcement activities.

- Implement sustained bicyclist and pedestrian safety enforcement efforts and involve the media. Use enforcement as an opportunity for education by distributing safety pamphlets in-lieu of, or in addition to, citations.

4 COMPLETE STREETS AUDIT RESULTS AND SUGGESTIONS

4.1 OVERVIEW

This chapter is organized as follows:

Section		Description
4.1	Overview (this section)	The Complete Streets Safety Assessment (CSSA) process
4.2	Background and Context	Context and objectives provided by City staff Review of active transportation plans, policies and related documents
4.3	General Citywide Suggestions	Suggestions for topics identified during the audit that can be applied citywide
4.4	Bikeway and Trail Network	Review of existing, planned, and proposed bikeway and trail network, and related City and County plans and policies
4.5	Focal Areas	Detailed subsections for each focal area: existing conditions, issues and analysis, and suggestions

Complete Streets audits are typically conducted as an initial step to improve the street environment for all travel modes within the selected area. Many individuals can participate: residents, stakeholders, and affiliated individuals. During the audits, positive practices are observed and issues and opportunity areas are noted. Observations are made of the interactions among motorists, pedestrians, and bicyclists. Observations are based on the behavior of these different road users, particularly at intersections. For each opportunity area, the group discusses possible suggestions to address safety and operational concerns. Complete Streets audits are highly interactive, with many observations noted in the field. The audits are a means to observing and learning how to “see through the eyes of pedestrians and bicyclists.”

This chapter presents observations and suggestions made during the kickoff meeting and field audit conducted on Thursday, July 25, 2019. Participants in addition to the evaluators included:

Name	Title	Agency
Gina Benedetti-Petnic	City Engineer	City of Petaluma
Mario Traverso	Engineering Technician, Public Works	
Ken Eichstaedt	Sr. Civil Engineer, Public Works	
Jeff Stutsman	Sr. Civil Engineer, Public Works	

Suggestions in this chapter are based on best practices and discussions with the participants regarding local needs and feasibility. Suggestions are based on limited field observations and time spent in Petaluma by the CSSA evaluators. These suggestions, which are based on general knowledge of best practices in street design and safety, are intended to guide City staff in making decisions for future safety improvement projects in the City; they may not incorporate all factors relevant to pedestrian and bicycling safety issues in the City. This report is conceptual in nature, and conditions may exist in the focus areas that were not observed and may not be compatible

with suggestions presented below. Before finalizing and implementing any physical changes, City staff may choose to conduct more detailed studies or further analysis to refine or discard the suggestions in this report, if they are found to be contextually inappropriate or appear not to improve bicycling or pedestrian safety or accessibility due to conditions including, but not limited to, high vehicular traffic volume or speeds, physical limitations on space or sight distance, or other potential safety concerns.

4.2 BACKGROUND AND CONTEXT

4.2.1 Background

City staff shared the following information relevant to Complete Streets:

- The City has an Urban Growth Boundary. All peripheral projects have been developed; growth is 100% infill projects.
- Emphasis is on walkability and pedestrian access as density increases, with special focus on downtown.
- Increased emphasis on Transit Oriented Development (TOD). The City has two SMART (Sonoma-Marin Area Rail Transit) stations, with Station Area Master Plans.
- Streets have little or no opportunity for widening (their “width budget” is fixed).
- There is a need for increased pedestrian and bicycle connectivity, including access to Petaluma’s two SMART rail stations and the Petaluma Transit Mall adjacent to the Downtown station.
- Two longer-term projects will add connections across US-101, a key barrier for bicycle and pedestrian trips:
    - Rainier Avenue: The SCTA (Sonoma County Transportation Authority) widening of US-101 will raise the freeway so a pedestrian-bicycle undercrossing can be added at Rainier Avenue. The connection will go under US-101 and over the SMART rail line and the Petaluma River. The City is currently seeking the remaining funds to construct this project.
    - Caulfield Crossing at the southern end of the City is also a key project to be funded.

4.2.2 Field audit focal areas

City staff requested that the field audit address the following corridors and locations. These are examined in detailed in Section 4.4 (Focal Areas).

#	Location	Issues
1	Lynch Creek Trail	Safety and usability improvements to access points on McDowell Boulevard near Lynch Creek Way signal Connections to park on west side of US-101 How to improve surface quality Design guidelines for lighting, surfaces, etc. to be maintainable affordably within the City's limited budget.
2	McDowell Boulevard between Madison and SMART rail corridor	Evaluate feasibility of cycle track or shared use path along east side
3	McDowell Boulevard at SMART rail corridor	Advise on accommodating bicycles across angled SMART tracks
4	Petaluma Boulevard South	Advise on road diet to add bike lanes south of E Street Advise on initial feasibility of shared use path on north side between Mountain View and Crystal Lane (roundabout)
5	5th & 6th Streets downtown	Advise on selection of bicycle boulevard candidate

4.3 GENERAL CITYWIDE SUGGESTIONS

The following general suggestions for physical enhancements are appropriate either City-wide or in two or more of the focal areas. These are discussed in detail below.

TABLE 4-1: GENERAL SUGGESTIONS FOR PHYSICAL ENHANCEMENTS

Pedestrian	**Details**
Left-side signs on medians	At uncontrolled locations where it is feasible to add a raised median to protect a sign, do this so that each approach sees a pair of warning signs on its side of the street.
Left-side warning signs: symbol orientation	Pedestrian symbol (W11-2) or trail crossing signs (W11-15) installed on the left side of should depict users approaching, just as the W16-7p Downward Pointing Arrow always points into the approach. (MUTCD 2A.06 Design of Signs specifically allows mirror images. However, sign catalogs may not designate a unique product code.)
Upstream sightlines	Prohibit parking for at least 1 car length upstream of crosswalk, to keep sightlines open to approaching traffic. A curb extension can ensure compliance and is a good place for crosswalk warning signs. "Bike corrals" (in-street racks) can also utilize this area.
Advance Limit Lines	Install 4' in advance of controlled crosswalks, to deter motorists from encroaching.
Yield Lines	Install on multi-lane approaches to uncontrolled crosswalks, 20'-50' before the crosswalk.
Curb extensions	Enable pedestrians to make a starting decision where they can see and be seen. Calm inbound right turns by reducing the physical radius. Shorten crosswalks.
Interim curb extensions	Consider Painted Safety Zone / Interim Curb Extension treatments at locations where the need is current but hardscape curb extensions are subject to future funding.
Crosswalk markings	At uncontrolled crosswalks, incorporate wide longitudinal elements (e.g. "ladder rungs") for long-distance visibility by approaching drivers.
Center islands on side streets	Calm inbound turns. May enable bicyclists preparing to turn left or proceed through to wait further forward than they otherwise would.
Directional curb ramps	Provide 2 ramps per corner, aligned with sidewalks, rather than diagonal ramps.
Accessibility	Ensure that signal actuation is ADA compliant.
Leading Pedestrian Interval ("LPI")	Display WALK phase (typically) 3 seconds before same-direction green indication, so pedestrians can occupy the curb lane.
Centerline	Install no-passing (double yellow) centerline 50' before crosswalk.
Bicycle	**Details**
Detection	Install bicycle and motorcycle detection at through, left turn, and bicycle lanes at all actuated approaches.
Right turn lanes	Where total width is insufficient for marking an adjacent bike lane, install sharrows left-aligned in the lane and add a R118 (CA) "Except Bicycles" plaque to right-turn only signs.
Wayfinding	Install bicycle guide signage to destinations served by bike routes, with the name of the destination, the direction, and optionally the distance.

Advance Limit Lines

At approaches to controlled crosswalks (i.e. at signals or STOP signs), installing an advance limit line a short distance (typically 4 feet) before the crosswalk can remind motorists to stop far enough back that their vehicle's front end does not encroach into the crosswalk. Such encroachment can be a safety issue at multi-lane approaches when the front end of a vehicle waiting hides a low pedestrian (child or wheelchair user) approaching across another lane.

One example in Petaluma is the intersection of East Washington Street and Ellis Street / Johnson Street.

Corner curb extensions

At intersections with conventional corners and no curb extensions, pedestrians preparing to cross a street typically make their crossing decisions before stepping off the curb, i.e. while on the sidewalk. Due to substantial corner radii at most intersections, this places them over 10 feet outside of the first travel lane they will enter. Corner curb extensions (bulb-outs) enable pedestrians to safely make their decision near the outside travel lane, where they are more visible to approaching motorists and also have a considerably shorter distance to cross. Raised curb extensions also enable crosswalk warning sign assemblies to be installed closer to the travel lanes where they are more visible to motorists. One resource for curb extensions is NACTO's Urban Street Design Guide section:

https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/

Curb extensions attached to the street's existing curb can be expensive to construct because they must preserve drainage along the street and provide accessible slopes and curb ramps. However, the same safety benefits can be obtained with less expense and without modifying drainage if the extension area is segmented into "floating" islands between which pedestrians including wheelchair users travel at existing street grade.

"Temporary Traffic Calming Curbs" (Calgary, AB)

Figure 4-1: Segmented floating corner island treatment

Interim curb extensions

Many cities are now deploying treatments consisting only of painted lines, colored paint or epoxy fill, and tubular delineators to rapidly and inexpensively create corner-bulb installations in advance of funding availability for hardscape versions (Figure 4-3). These go by various names such as "Painted Safety Zones" (San Francisco), "Painted Curb Extensions" (Pasadena), "Painted Bulbouts" (Denver) and "Interim curb bulbs" (Seattle).

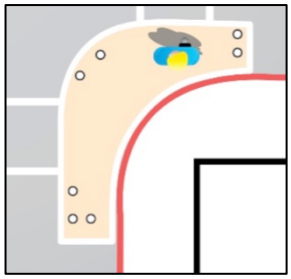
San Francisco MTA writes:

> Painted safety zones are painted road areas that wrap around sidewalk corners to make pedestrian crossing intersections more visible to people driving. Painted safety zones are often flanked by delineators (white posts) and encourage people who drive to slow down, especially when making turns.
>
> https://www.sfmta.com/getting-around/walk/pedestrian-toolkit

Seattle DOT (SDOT) writes:

> Interim curb bulbs may be appropriate in locations where there is a safety need and a permanent solution is not feasible in the short term, and/or where there is a planned capital improvement within 5 years. At intersections with curb and gutter, an interim curb bulb can only be done [where] there are existing curb ramps. In some cases, curb bulbs may also be integrated with bioretention to manage storm water runoff from the right-of-way.
>
> https://streetsillustrated.seattle.gov/urban-design/adaptive-design/intersection-treatments/

Los Angeles (Cesar Chavez & St Louis)



Pasadena Street Design Guide

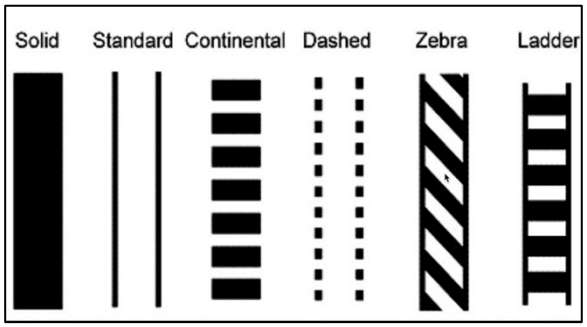
Los Angeles – Pico & Curson

San Francisco (16th St & Kansas St)

Seattle (Burke-Gilman Trail & 40th Ave NE & NE 52nd Pl)

Figure 4-2: Paint-and-delineator curb extensions

Crosswalk marking patterns – high visibility and contrast edge



(Figure 12 from FHWA report HRT-04-100, "Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines")

Figure 4-3: Crosswalk marking patterns (FHWA)

The standard crosswalk-marking scheme at controlled approaches has 2 transverse lines and no fill pattern. Many cities use the standard pattern at controlled approaches and a high-visibility pattern at uncontrolled approaches. The following description from San Francisco MTA's crosswalk design guidelines describes the safety advantages of high-visibility markings:

> Because of the low approach angle at which drivers view pavement markings, the use of longitudinal stripes in addition to or in place of the standard transverse markings can significantly increase the visibility of a crosswalk to oncoming traffic. While research has not shown a direct link between increased crosswalk visibility and increased pedestrian safety, high-visibility crosswalks have been shown to increase motorist yielding and channelization of pedestrians, leading the Federal Highway Administration (FHWA) to conclude that high-visibility pedestrian crosswalks have a positive effect on pedestrian and driver behavior.

Table 4-2 lists suggested treatments for several crosswalk elements.

TABLE 4-2: SUGGESTED CROSSWALK TREATMENTS

	Approach	Controlled		Uncontrolled	
Elements	**Median**	**None or painted**	**Raised**	**None or painted**	**Raised**
Crosswalk markings		2-line		High-visibility (ladder)	
Warning signs at crosswalk		None		Curbside, 2-sided ("2-sign")	Curbside: 1-sided Median: 2-sided ("4-sign")
RRFBs on crosswalk signs		None		If needed	
Advance markings & signs		Advance limit line 4' upstream		Yield line 20'-50' upstream R1-5 Yield Here signs at yield lines	
Advance warning signs		None		If needed, per MUTCD	

Low-vision pedestrians (persons who are not completely blind) benefit from a continuous "contrast edge" for guidance when crossing streets. The solid transverse lines in the "solid", "standard", "zebra" and "ladder" patterns provide this; the "continental" and "dashed" patterns do not. For all crosswalks at uncontrolled approaches that currently use the continental pattern, it is suggested to add two solid transverse lines to create a ladder pattern.

In prior decades, "artistic" crosswalks were constructed in which the transverse border was a wide cast concrete strip with no retroreflective white marking (12-inch line). Over time the contrast between these strips and the middle of the crosswalk is reduced so the strips no longer provide an effective contrast edge for low-vision pedestrians. 12-inch transverse lines (white for non-school crosswalks, yellow for school crosswalks) should always be incorporated.

Leading Pedestrian Interval

Leading Pedestrian Interval (LPI) traffic signal phasing displays the pedestrian signal's WALK indication for 3-7 seconds before the green indication for same-direction traffic. LPI gives pedestrians a head start to occupy the crosswalk before turning vehicles. A 2000 study by the Insurance Institute for Highway Safety (IIHS) found that LPI reduces conflicts between turning vehicles and pedestrians.

> *Field evaluation of a leading pedestrian interval signal phase at three urban intersections*. Van Houten, Retting, Farmer, Van Houten. Transportation Research Record (TRR) 2000.

It is suggested that the city consider implementing LPI at signals with high pedestrian activity, prohibiting right-turn-on-red as needed per recent research findings.

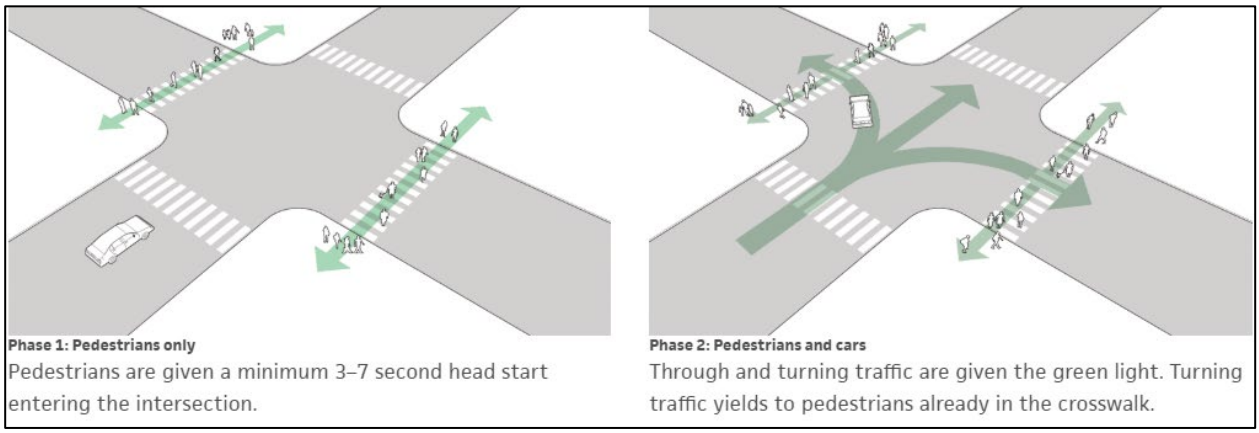


Figure 4-4: Leading Pedestrian Interval phases

Center islands on side streets

Adding pill-shaped center islands just behind the crosswalks side streets at some intersections can improve safety in several ways:

- Calm right turns from the major street
- Calm left turns onto the major street

- Calm through movements on the side street
- Provide a modest refuge for pedestrians crossing the side street, especially slow ones
- Enable the limit lines to be moved forward for better sightlines
- Provide a sheltered place for bicycle users approaching on the side street to prepare to cross or enter the major street

Figure 4-6 shows such an island on a 40-foot residential street in Sunnyvale CA (Canary Drive, at Inverness Way). The island is 6 feet wide and 20 feet long.

Figure 4-5: Median island on residential street (Canary at Inverness, Sunnyvale CA)

Bicycle guide signage

A city's bicycle route network can be enhanced with state-of-the-practice MUTCD-compliant bikeway network guide signage as shown in Figure 4-7. The example shows BIKE ROUTE signs customized with the City of Oakland's "Oak Tree" logo in one corner. Custom (non-MUTCD) city-identity plaques can also be added atop the BIKE ROUTE sign, either citywide or on particular high-profile routes.

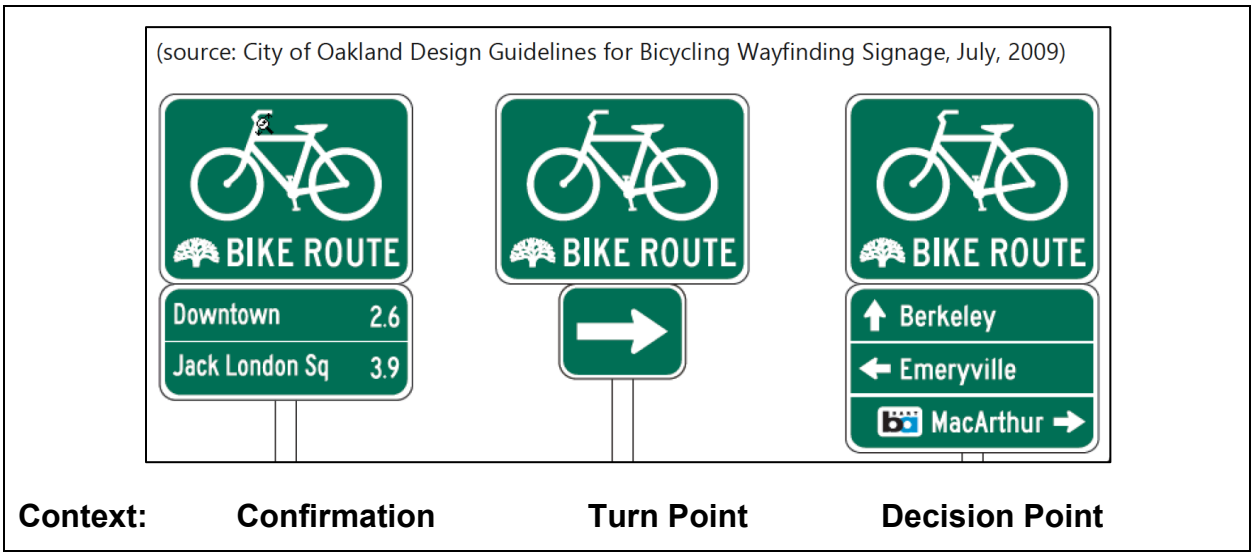


Figure 4-6: Bicycle guide signs (2017 BMP, Figure 7-13)

Decision Point signs are installed in advance of a street or path intersection where travelers may want to change course to continue on their current route or follow a different route.

Confirmation signs are installed after the decision-point intersection, to reassure users that they made the correct choice.

Turn Point signs are used as needed wherever the route does not continue straight. The destination plaques below the BIKE ROUTE signs can have arrows and optional distances as appropriate.

4.4 BIKEWAY AND TRAIL NETWORK

To inform Section 4.5's review of focal areas, this section examines the City and County's plans and policies related to active transportation (bicycling and walking) in Petaluma, and reviews the City's current, planned and proposed bicycle circulation network.

TABLE 4-3: ACTIVE TRANSPORTATION PLANS AND DOCUMENTS - PETALUMA

Year	Title	Notes
2008	Petaluma Bicycle and Pedestrian Plan (Appendix to General Plan 2025)	Written by City's volunteer Pedestrian-Bicycle Advisory Committee (PBAC)
2014	Sonoma County Transportation Authority (SCTA) Bicycle-Pedestrian Plan Update	Addresses segments of county-level significance
2015	Petaluma Safe Routes to Schools (SRTS) Plan	Addresses only schools and feeder areas
2016	Petaluma Complete Streets Policy	

4.4.1 2008 Bicycle and Pedestrian Plan

The 2008 Petaluma Bicycle and Pedestrian Plan ("An Appendix to the General Plan 2025") was written for the City during 2004-2007 by members of its Pedestrian and Bicycle Advisory Committee (PBAC), a group of citizen volunteers with personal expertise in active transportation. The prior Bicycle Plan was adopted in 2000 as a component of the 1987-2005 General Plan.

The 2008 Plan includes the bikeway types that existed in the lexicon at that time:

- Caltrans Class I (Bike Path, a.k.a. Shared Use Path)
- Caltrans Class II (Bike Lane). At the time this did not include Buffered Bike Lanes. Colored bike lanes were mentioned though they were not yet incorporated in the US Manual on Uniform Traffic Control Devices (MUTCD).
- Caltrans Class III (Bike Route, a.k.a. Signed Shared Roadway). Included discussion of Shared Roadway Bicycle Markings, a.k.a. Shared Lane Markings and "sharrows".
- Bicycle Boulevard, a type of Signed Shared Roadway that prioritizes bicycle travel on low-traffic streets through a combination of removing STOP signs in the corridor direction and adding traffic calming as needed
- Recreational Trail, with the Plan defined as a path in an area of high demand where constraints prevent the construction of Caltrans Class I-compliant path

Cycle tracks (now designated as "Caltrans Class IV") had not yet become part of the lexicon.

Its top bicycle facility projects were:

Street	Segment	Notes / Needs
Petaluma Boulevard	Entire corridor	"Central Petaluma Specific Plan recommends eliminating two [travel] lanes to make room for bike lanes."
Washington Street	Entire corridor	Bike lanes were already in place between Sonoma Mountain Parkway / Ely Boulevard and the eastern city limit, and in the vicinity of the McDowell Boulevard intersection.
Lakeville Street / Highway	Entire corridor	Specific locations: • Highway 101 ramps (bike lanes to left of right turn lanes) • Adobe Creek Trail (mid-block crossing needed) • NWP Railroad angled crossing (flange way filler needed)

Additional priority projects:

Street	Segment	Notes / Needs
East D Street	Payran - Lakeville	Bicycle Boulevard candidate
Bodega Ave	Webster-Howard	Bike lanes
Corona Rd	Petaluma Blvd North to Adobe Road and on US-101 overpass	Bike lanes
D Street	Bridge	Enhance sidewalks for bicycle use due to stressful traffic lanes
Keokuk St	Washington – Magnolia	Bike lanes
Magnolia Ave	Petaluma Blvd North – city limit	Bike route (Signed Shared Roadway)
Redwood Hwy	Highway 101 overpass	Bike lanes
Western Ave	Benjamin Lane to Chileno Valley Road	Bike lanes

Figure 5-2 from the 2025 General Plan's Mobility Element (revision date May 2008), titled "Proposed and Existing Bicycle Facilities", is reproduced here as Figure 4-8.

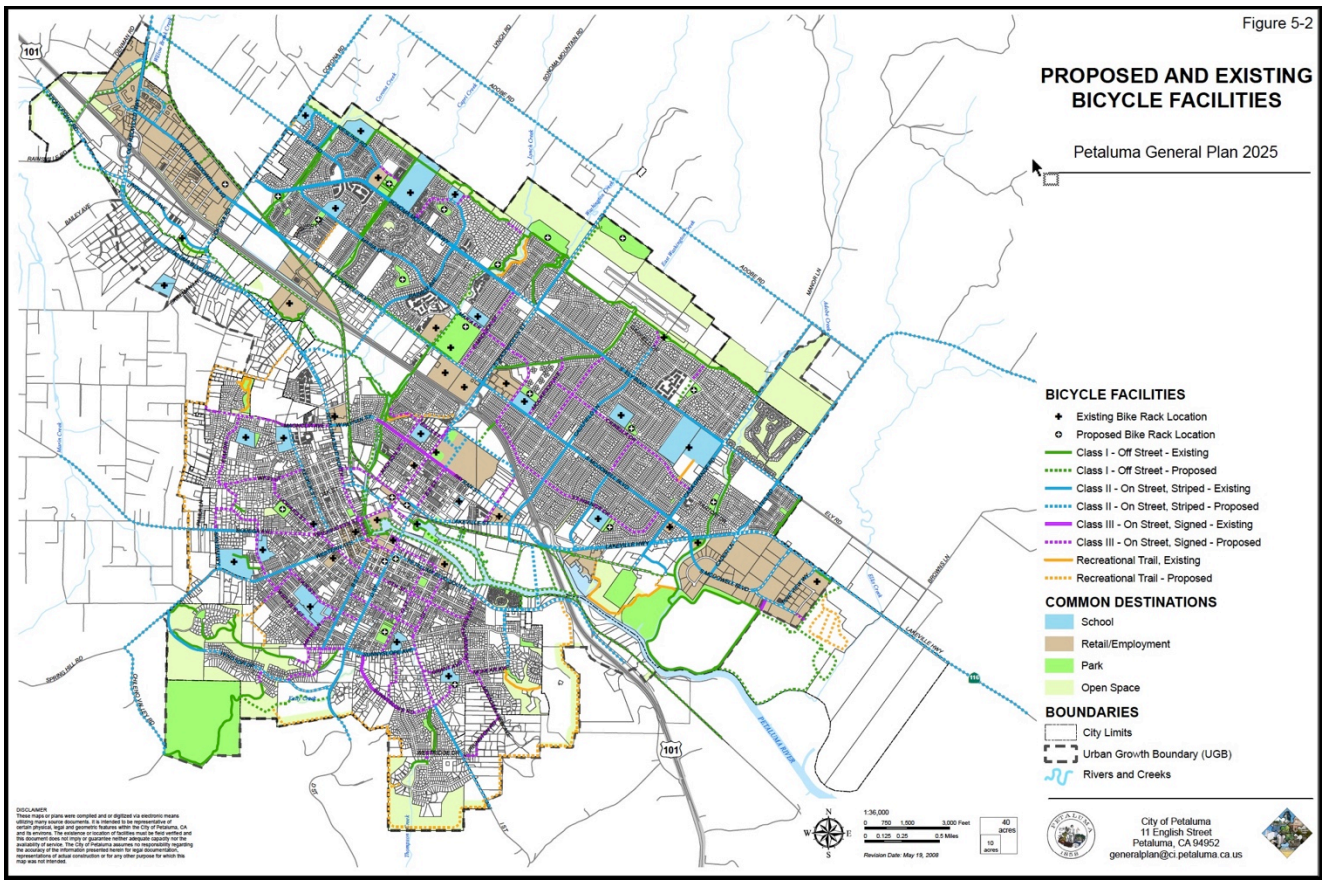


Figure 4-7: 2025 General Plan Figure 5-2: Proposed and Existing Bicycle Facilities

Petaluma is roughly divided by US-101, which according to Caltrans' state-wide highway convention for long-distance roads runs "north-south" although its longest segment within Petaluma is oriented approximately 50 degrees to the northwest. As such, the City refers to streets parallel to that segment of US-101 as "north-south" and cross streets as "east-west".

East of US-101 the terrain is mostly level and the street network forms a largely idealized grid with 90-degree intersections. In contrast, the street network west of US-101 largely responds to natural and artificial constraints (the river and its feeder streams, the Northwest Pacific Railroad (NWP) / SMART rail corridor, and the western hills).

The following north-south streets, listed from east to west, are significant to the bikeway network:

- Adobe Road is a rural 2-lane street that runs along the toe of the eastern foothills, east of the general aviation airport. It is mostly a recreational route segment for bypassing the residual area east of US-101. 2008 (Bicycle Plan): Proposed bike lanes. **2019 (Google Earth): Existing bike lanes, Frances Way – Frates Rd**.

- Garfield Drive (Washington St – Casa Grande Rd). Bicycle boulevard candidate. 2008: Not identified as network segment. **2019: No change.**

- Sonoma Mountain Parkway (N. of Washington) / Ely (S. of Washington). 4-5 lane arterial. 2008: Existing bike lanes Corona-Madison, Washington-Casa Grande. Proposed bike lanes Madison-Washington and Casa Grande - south city limit. **2019: No change.**

- Maria Drive (N. of McKenzie Avenue / Crinella Drive (S. of McGregor Avenue). Low stress residential collector and local streets. Bicycle boulevard candidate. 2008: Existing bike lanes on Maria N. of Monroe, proposed bike route on remainder of Maria and on Crinella. **2019: Sharrows on Crinella north of Bungalow Lane**.

- McDowell Boulevard. 5-lane arterial. Closest continuous street to US-101 on east side. 2008: Bike lanes, Existing: Old Redwood Hwy – Southpoint Blvd and Maria-Cader, Proposed: remaining segments. **2009: Bike lanes from between Bond and Lakeville, to McNeil (1 block south of Washington). East-side side path from Petaluma Public Works driveway (150' N of Madison) to Commerce St. Bike lane (NB only, Commerce-Candlewood (1 block). Wide east sidewalk, Candlewood-Sunrise Parkway (1/2 concrete, 1/2 asphalt). Palo Verde Way – Southpoint Blvd and just north of Southpoint - 500' east of SMART railway (near Corona Road SMART station site).**

- Lakeville Street / Highway (CA-116) (D Street – southern city limit and beyond). 2008 Proposed: Bike lanes. **2019: Wide striped shoulders, southern city limit – US-101 east ramps. *Mostly wide shoulders, US-101 east ramps – Caufield*. Bike lanes, Caufield Ln – East D St.** Shared Roadway to the north. Westbound between Washington and the Petaluma River (Lynch Creek Trail) there is a shoulder stripe with sharrows to the left. Consider eliminating the shoulder stripe.

- Petaluma Boulevard (southern continuation of Old Redwood Highway): Width and lane configuration varies. 2008: Bike lanes proposed, Old Redwood Highway – Payran and D Street – Kastania Road. Share Roadway proposed, Payran – D Street (i.e. through downtown). **2019: Bike lanes, Old Redwood Hwy – Stony Point Rd, Bailey Ave – Shasta Ave / Sycamore Ln (SB gap at Corona/Skillman). Wide (parking?) striped shoulder with sharrows adjacent, Kent St - Martha St. Sharrows through downtown to E St. Road diet potential south of E St. Bike lanes S. of McNear Circle.**

- 6th Street (West Street – Mountain View Avenue): 2008: Shared Roadway proposed. **2009: Sharrows (sparse) most of distance**.

These east-west streets and paths, listed in north-south order, are significant to the bikeway network:

- Old Redwood Highway (continuation of Petaluma Boulevard to the north), Petaluma Boulevard to Ely Road. 2008: Proposed bike lanes, Petaluma Boulevard – McDowell (across US-101 interchange), Existing (McDowell – northern city limit west of Ely). **2019: Bike lanes north of McDowell to and beyond Ely Rd.**

- Corona Road (Petaluma Blvd North – Adobe Rd). 2008: Proposed bike lanes**. 2019: Wide striped shoulders, Petaluma Blvd North – McDowell EXCEPT narrow on US-101 Bridge and approaching McDowell. Nothing past McDowell.**

- Rainier Avenue (Petaluma Boulevard – Pembridge Street). 2008: Existing bike lanes, McDowell – Pembridge. Proposed bike lanes, Petaluma Boulevard – Pembridge

(including new US-101 over- or under-crossing, to become possible around 2021 with SCTA US-101 widening project). **2019: Connection across US-101 planned.**

- Lynch Creek Trail, Petaluma Boulevard – Castle Drive. 2008: Existing, Payran – McDowell including US-101 undercrossing, and Sonoma Mountain Parkway - Castle. Proposed trail, McDowell – Sonoma Mountain Parkway.

- Washington Avenue, Howard St (downtown) – Adobe Road, including US-101 interchange. 2008: Bike route proposed (Howard – Kenilworth), Bike lanes proposed (Kenilworth – Ely), Bike lanes existing (Ely – Executive Drive / airport entrance), Bike lanes proposed (Executive – Adobe). **2019: Bike lanes Kenilworth – McDowell (across US-101 interchange), north of Maria – Executive.**

- Caufield Lane (Hopper St / SMART corridor – Garfield Dr). 2008: Bike lanes existing (Hopper-Ely), Proposed (Ely-Garfield), Bike Route proposed (Garfield – path along airport). **2019: No change**. **Suggest road diet and bike lanes, Ely-Garfield**.

4.4.2 2014 Sonoma County Transportation Authority (SCTA) Bicycle-Pedestrian Plan Update

Table 5 in the SCTA Plan Update is a Project Cost Estimate Summary for cities within the county. For Petaluma it says the following (costs include pedestrian projects):

Total #projects	Mileage				Estimated Cost
	Class I	Class II	Class III	Total	
84	22.37	43.28	17.94	83.59	40,765, 600

Several of the 84 projects are listed as high priority:

- NWP (Northwestern Pacific Railroad -- the SMART rail corridor) trail
- Petaluma River Trail
- Lakeville Highway bike lanes
- Petaluma Boulevard bike lanes (approx. 5 miles), and bike route Lakeville – D Streets
- Washington Street bike lanes, 1.81 miles and bike route Lakeville-Howard (0.62 miles)
- $15.27 MM of unspecified (may be sidewalks)

4.4.3 2015 Safe Routes to Schools (SRTS) Plan

This plan describes existing conditions, recommended routes and improvements for 14 schools (11 elementary, 2 junior high, and 1 alternative). For each school an Existing Conditions map shows crosswalks and Class I, II and III bikeways and a Recommendations map shows City of Petaluma proposed Class I, II and III bikeways.

4.4.4 2016 Complete Streets Policy

The California Complete Streets Act of 2008 (a.k.a. AB 1358) required that requires that when

cities or counties revise general plans, they identify how they will provide for the mobility needs of all users of the roadways.

4.5 FOCAL AREAS

The following sections address each of the 5 focal areas/corridors.

4.5.1 Area #1: Lynch Creek Trail

Lynch Creek Trail is a key off-street active transportation corridor that connects under US-101. It connects with trail segments that extend east beyond Sonoma Mountain Parkway to Prince Park. On the west side of US-101 it extends to Lakeville Road not far from the SMART Downtown Petaluma train station.

City staff requested input on the following items related to the Trail:

- Crossing of McDowell Boulevard near Lynch Creek Way signal
- Design guidelines for lighting, surface quality, etc., to be maintainable affordably within the City's limited budget
- Connections to park on west side of US-101

Crossing of McDowell Boulevard near Lynch Creek Way signal

Existing conditions

The Lynch Creek Trail intersects McDowell Boulevard from the east 240 feet south of the south crosswalk of Lynch Creek Way, and from the west 125 feet south of that crosswalk. Trail users currently connect between the two legs of the Trail using that crosswalk as shown in Figure 4-9

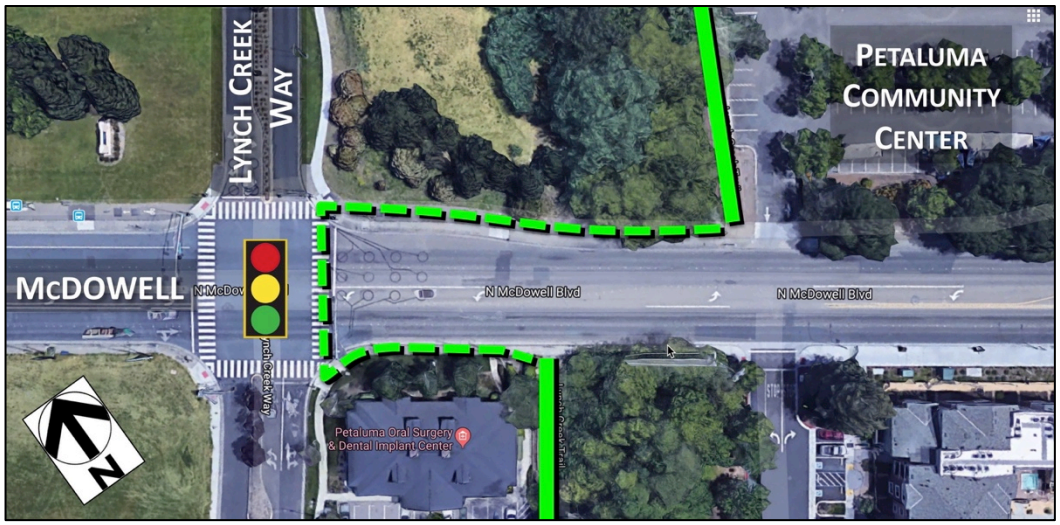


Figure 4-8: Lynch Creek Trail at McDowell – context and existing user route

On the east side there is a 10-foot wide asphalt area usable for bicycling adjacent to the attached sidewalk. On the west side there is only a conventional sidewalk.

Several issues were observed concerning the west-side trail access and its sidewalk connection to the Lynch Creek Way intersection.

a) View from street

b) View from path. Hedge blocks sightlines. Hedge, boulder, bin, sign pole and wood post block turns.

c) Sign clutter.
BIKE LANE & BEGIN do not apply

Figure 4-9: Lynch Creek Trail west access at McDowell

TABLE 4-4: LYNCH CREEK TRAIL AT MCDOWELL – WEST ACCESS ISSUES

Item	Issue	Suggestion
West sidewalk	Too narrow for shared use by bicyclists and pedestrians	Widen to 10 feet between trail and Lynch Creek Way south crosswalk. Will require moving monument sign of corner property. Install diamond obstacle marking around utility pole visible at right edge of Figure 4-10(a).
Trail junction geometry	Right-angle corner does not support turns by bicyclists	After removing obstructions (see below) and widening the sidewalk to the north, radius the northwest corner for bicycle speeds appropriate to sight distance. Radius the southwest corner a smaller amount because bicycle traffic is less expected from the south unless the sidewalk is widened in that direction as well.
Trail junction obstructions (Figure 4-10(b))	Wood post and guide sign pole are in the way of sidewalk bicyclists turning in and out	Remove wood post Relocate guide sign pole to south of junction, out of pedestrian and bicycle travel paths
	Deep hedge beside transformer obstructs bicycle access	Cut back hedge behind new corner radius
	Recycling bin obstructs access	Relocate out of pedestrian and bicycle travel paths
Center bollard	Impalement hazard (when a following bicyclist does not see and avoid the pole). Car and truck access is already effectively prevented by the barrier and curb.	Remove
BIKE LANE (R81 CA) & BEGIN (R81A CA) signs	Not applicable – a shared use path (Caltrans Class I bikeway) is not a bike lane	Remove
Clustered regulatory signs (Figure 4-10(c))	Sign clutter is unattractive and ineffective – too many adjacent messages for simultaneous comprehension.	Retain prohibition sign near entrance, but relocate sign post off new radiuses corners. Relocate “slow down and call out” sign further down the trail after the corner radii.
Trail centerline	Faded solid yellow	Refresh and maintain solid yellow for 50 feet starting at sidewalk, to deter passing near access point. Consider dashed yellow away from access points wherever passing sight distance is sufficient.

Figure 4-10: Lynch Creek Trail west access - suggestions

Alternative concept for crossing McDowell

A more direct crossing of McDowell Boulevard could be considered, that would eliminate the need to circulate to and from the south crosswalk at Lynch Creek Way. A "dog-leg" median refuge could be placed in the center turn lane just south of the northbound left turn lane and just north of the shorter left turn area that serves the north driveway of the Community Center parking lot.

A dog-leg refuge has a pair of L-shaped fences that prevent crossing the entire street in one move, instead forcing users to pause halfway and turn toward oncoming traffic before they cross the other half.

Traffic control of each half-crossing depends on conflicting street volume (mainly), approach speed (secondarily), and proximity of traffic signals (a factor in this case given that Lynch Creek Way is just 125 feet from the Trail's west access point). Potential devices are:

- Rectangular Rapid Flashing Beacon (warns roadway users to yield)
- Pedestrian Hybrid Beacon (stops traffic). Could be operated as two half-crossings. The west half-crossing (across southbound McDowell) could be coordinated with the Lynch Creek Way signal.

Figure 4-12 is a sketch of the dog-leg refuge concept without any details (signs, flashers, Pedestrian Hybrid Beacons) except for Yield Lines, which would not be applicable in a Pedestrian Hybrid Beacon setup (which uses straight limit lines like a traffic signal). To evaluate this concept further several factors could be examined, including:

1. Westbound queue length from Lynch Creek Way signal during red phase. (The north crosswalk leg as sketched is 150'-160' from the signal's east crosswalk.)
2. Eastbound queue length from south-leg crosswalk toward signal during eastbound green. (The south crosswalk leg as sketched is approximately 130' from the signal's east crosswalk, not counting the eastbound advance yield line offset)

3. Interaction with the Community Center's west driveway of, given the proximity of the westbound advance yield line

4. Interaction with westbound left turn movements from the south-side driveway of the Vintage Chateau senior residence just east of the creek (#325-#333)

Items #1 and #2 may benefit from coordination between the Pedestrian Hybrid Beacon and the signal.

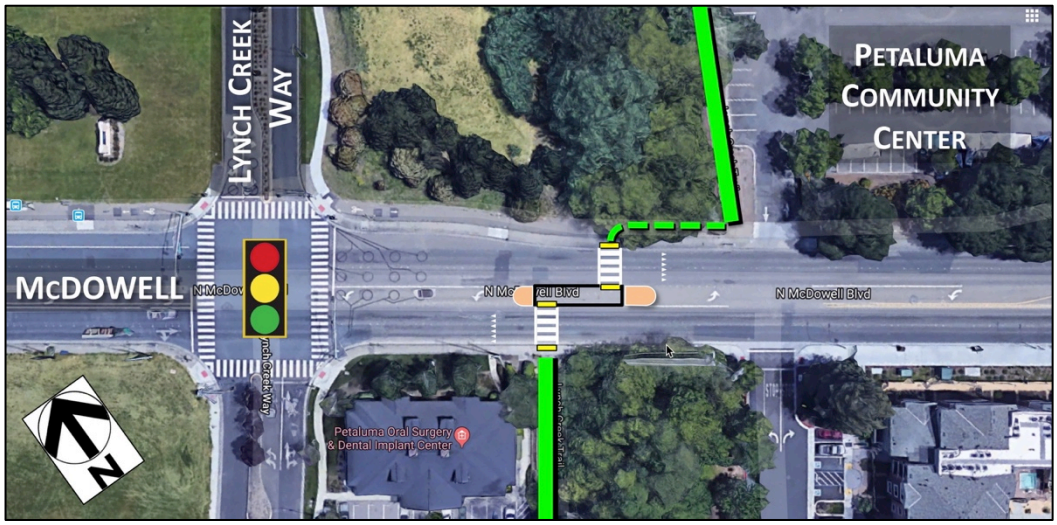


Figure 4-11: Lynch Creek Trail crossing of McDowell Boulevard – alternate concept

Design guidelines for trail lighting, surface quality, etc.

City staff requested input on design guidelines for trail lighting, surface material, etc. with an eye toward affordable maintenance on a limited budget.

The evaluators do not have experience with these topics. For trail best practices in general, especially given Petaluma's climate, we suggest visiting peers at the City of Davis and touring its many well-engineered trails, undercrossing (tunnels) and overcrossings (bridges) on bicycles, which can be rented on the UC Davis campus.

We understand that the City of Davis uses Portland Cement Concrete for its major trails because of the Central Valley's wide temperature swings. Concrete has a higher initial cost compared to asphalt but is cost-effective for Davis because its service life is much longer and it does not develop heaves and cracks.

Connections to park on west side of US-101

The evaluators did not have sufficient time to research the context of the trail on the west side of US-101 in order to provide informed input.

4.5.2 Area #2: McDowell Boulevard between Madison St. and SMART rail corridor

City staff requested input on ways to facilitate active transportation along McDowell Boulevard between Washington Street and Corona Road, the latter being the location of Petaluma's second (northern) SMART train station.

Purpose and need (2-way connectivity)

Bicycle accommodation within the McDowell right of way is essential on this segment because there are no nearby parallel streets on which bicycle users can travel most of the way to destinations along McDowell, in contrast to McDowell south of Washington where Park Lane and Daniel Drive create that option.

North of Washington the only continuous parallel street is Maria Drive, between 1,500 feet (0.29 mile) and 1,850 feet (0.35 mile) to the east via connecting streets and trails. In addition, adjacent subdivisions between McDowell and Maria north of Madison Street are mostly not connected to each other by streets or paths so many short-distance bicycle and pedestrian trips involve traveling out to McDowell or Maria.

On this segment two trail corridors connect McDowell to Maria and beyond: Lynch Creek Trail, which bisects the Petaluma Community Center / Petaluma Valley Hospital superblock between Madison and Professional Drive, and the linear park along Sunrise Parkway, Northstar Drive, and the northern edge of the Santa Rosa Junior College (SRJC) Petaluma campus.

Existing conditions

Along most of this segment McDowell Boulevard's paved width is 60 feet except for spot widening for turn lanes and bus stops at several intersections. The layout is 5-lane (2 travel lanes plus center lane). The center lane is 12 feet wide and has a raised landscape median curb in many locations. The paved width from the median curb to east outside curb is generally 24 feet.

The widths and conditions of sidewalks and the portion of the public right of way behind them widely. On the west (southbound) side between the SMART tracks and Rainier Avenue there is a standard sidewalk, typically attached though landscape-buffered on some segments, and with relatively little excess depth for widening to serve as a shared use path. Along the Deer Creek Village shopping plaza frontage south of Rainier the sidewalk is widened. Between the shopping plaza and Lynch Creek Trail's west leg the sidewalk is conventional width. It widens again along an apartment complex, then returns to conventional width along the next large retail plaza frontage ("The Plaza North") which continues to Washington.

The sidewalk corridor on the east (northbound) side of the street is generally considerably wider than on the west (southbound) side, and for much of the 1.5-mile distance between Madison and the SMART tracks there is an asphalt path adjacent to the concrete sidewalk, as detailed in Table 4-5.

TABLE 4-5: MCDOWELL EAST-SIDE SIDEWALK CORRIDOR CONDITIONS, MADISON - SMART LINE

SW = Sidewalk (5'-6'), BL = Bike Lane (typically 5'), SH = shoulder, LS = Landscape (width varies)

Segment	Len	Existing facility	Suggestion
NE corner property at E. Madison St	95	4' SH + attached SW. NB street 28' wide; travel lanes 12' + 16' for one parcel only	Remove SH, move curb out 4', widen SW
Between Public Works (PW) driveways	115	Attached SW + wide LS behind	Use some landscape width for path
PW north driveway – opposite Commerce St	3,900	Attached SW + 10' asphalt path	OK as-is
Commerce - Candlewood	425	BL and SW, no asphalt path	Remove BL, realign curb, add path
Candlewood - Sunrise	780	Attached SW + 10' asphalt path	OK as-is
Sunrise NE corner parcel	132	Attached SW + bus stop	Add buffer and path behind bus shelter
Sunrise NE corner parcel – Palo Verde Way	450	Attached SW + LS	Add asphalt path adjacent to SW
Palo Verde Way – Southpoint Blvd	500	Buffered SW	Widen SW to at least 10' (12' preferred)
Southpoint Blvd – 270' north	270	Attached SW (bus stop) North half-street 29' wide beyond	Add buffer and path behind bus shelter
270' N of Southpoint – 850' S of SMART tracks	350	Buffered SW (rolling landscape) BL in wide gutter pan	Widen SW to at least 10' (12' preferred)
850' S of SMART tracks – SMART tracks	850	Attached SW (property wall beyond – area width varies widely) BL in 5' PCC gutter pan	Widen SW to at least 10' (12' preferred)
TOTA)	**7,867**	**= approximately 1.5 miles**	

Analysis

On-street bikeway (bike lanes or wide shared outside lane)

24 feet (the median-to-outside paved width except as noted) is unworkable for retrofitting bike lanes without widening. The only bike lane option is 10-10-4, but a 4-foot bike lane adjacent to a 10-foot travel lane – especially one used by buses and trucks – is not comfortable even for adult bicyclists accustomed to riding on arterials. Transit buses are approximately 9 feet wide.

The other option is a wide shared outside lane (10-14); 14 feet is generally accepted as the minimum lane width in which motor vehicles can pass bicyclists within the lane without encroaching into the adjacent lane.

Because on some segments between Madison and the SMART line the half-street width is sufficient for a bike lane, it is suggested that following options be considered:

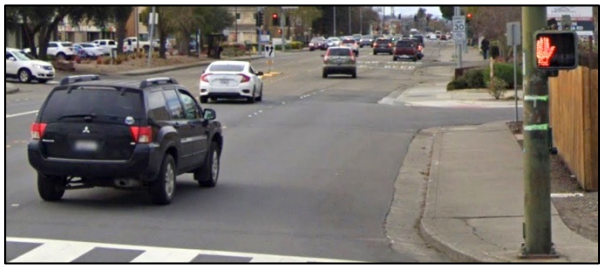
Half-section width (median curb – outside curb)	**Inside lane**	**Outside lane**	**Markings**
< 26	10	Remainder	Sharrows centered 10' from left lane Optional green rectangles beneath sharrows R4-11 BIKES MAY USE FULL LANE signs OR R117 (CA) PASS BIKES 3 FT MIN signs
>= 26	10	11	Bike lane (use remaining width)

Only traffic-tolerant bicyclists will use these options on an arterial like McDowell. Traffic-averse adults, pre-teen children, and families will generally prefer off-street travel despite its greater conflicts at intersections unless mitigated by design or vehicular movement restrictions.

Off-street bikeway (side path)

A side path is a shared use path (inherently 2-way) adjacent to a street that uses the street's crosswalks at intersections. McDowell's east side between Madison and the SMART line already has many side path segments, varying in width, obstacles and maintenance status. It appears that by addressing challenges on each segment, continuity can be provided. The resulting facility can comfortably convey users of a wide range of ages and abilities in both directions between the Corona SMART station and destinations south as far as Madison.

Figure 4-13 shows Google StreetViews of the east side, looking logical north except as noted.



1 – Madison NE corner

2 - Public Works north driveway, facing south

3 – Community Center south driveway

4 – Community Center Way

Figure 4-12: McDowell east side sidewalk & side path, Madison – SMART line

5 – Hospital bus stop

6 – Hospital north driveway, facing south

7 – Lynch Creek Trail, east leg

8 – Lynch Creek Way, facing south

9 – Lynch Creek Way

10 – Approaching Professional Drive

11 – Professional Drive, facing south

12 – Professional Drive

Figure 4-13: McDowell east side sidewalk & side path, continued

13 – Rainier Ave facing south

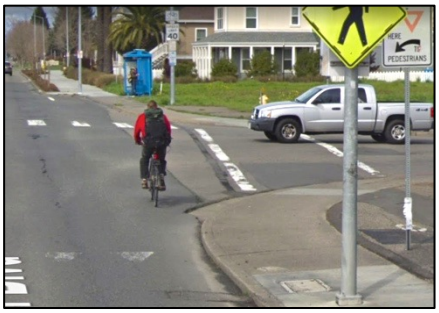
14 – Rainier Ave

15 – Beyond Rainier – BIKE LANE sign

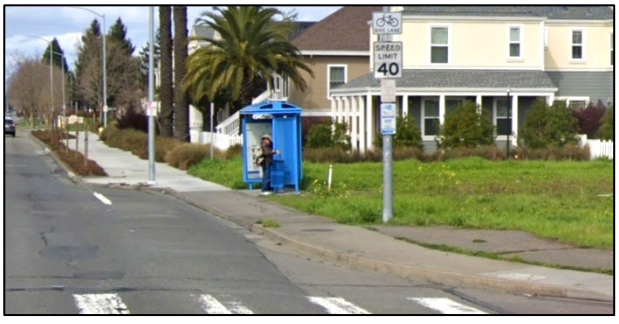
16 – Beyond Rainier – widening for bike lane

17 – Bike lane ends (Cottages of Petaluma)

18 – Vent pipes north of Cottages



19 – Sunrise Parkway



20 – Sunrise north bus stop

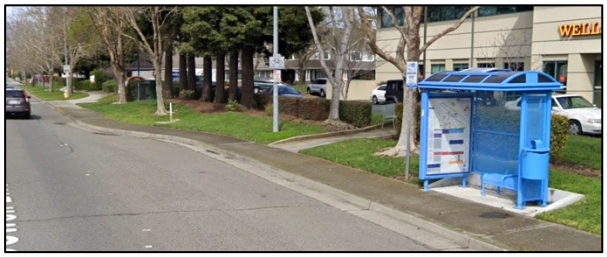
Figure 4-13: McDowell east side sidewalk & side path, continued

21 – Homes south of Palo Verde

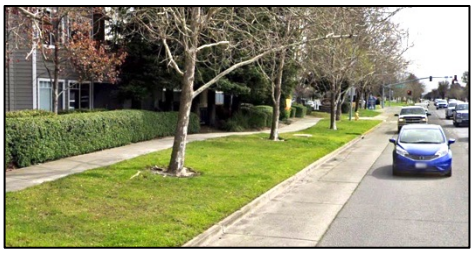
22 – North of Palo Verde

23 – Approaching South Point

24 – South Point



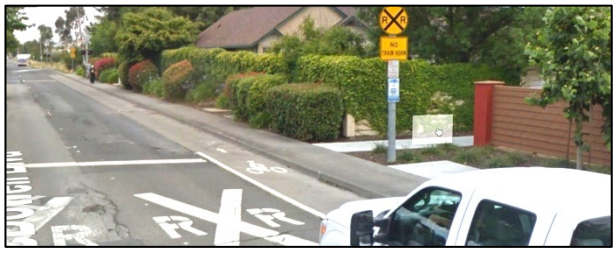
25 – Bus stop beyond South Point



26 – Sunrise facing south

27 - Sunrise

28 – Beyond Sunrise – low wall with space behind



29 – Beyond narrow sidewalk

30 – At railroad path to north

Figure 4-13: McDowell east side sidewalk & side path, continued

As shown in the photos, issues and challenges include the following:

- Some segments only have a sidewalk, though in most cases there is ample width behind the sidewalk for a path. In many cases this will require modifying landscaping.

- Intersection corners generally have 45-degree curb ramps even when there is no crosswalk across McDowell. At those points it is suggested to provide directional ramps parallel to McDowell, wide enough for shared use by opposite-direction bicyclists (8').

- In many cases corner curb radii appear to be larger than necessary. Reducing corner radii will help with providing curb ramps oriented parallel to McDowell.

- Sign posts, streetlight poles, and some vent pipes and traffic cabinets are located within the paved path area. Those that cannot be relocated should be provided with obstacle markings -- yellow [if centered] or white, diamond with long axis in the travel direction -- per MUTCD Figure 9C-8 "Examples of Obstruction Pavement Markings". At such obstacles the safe travel width is reduced by 12 inches on either side, so additional paved width should accordingly be provided around the obstacle and tapered on each approach based on bicycle operating speeds (15 MPH suggested).

- Bus stops do not all have paved bypasses behind. Bus shelters, especially with opaque end panels, create blind spots that hide pedestrians. Passengers waiting or accessing the bus may also obstruct the path. NACTO's Transit Street Design Guide has guidance for bikeways behind transit shelters – see topic "Side Boarding Island Stop".

  https://nacto.org/publication/transit-street-design-guide/stations-stops/stop-configurations/side-boarding-island-stop/

- In at least one location a BIKE LANE sign (R-81 CA) is present where there is no on-street bike lane (image #15). Those should be removed -- a path is not a bike lane.

- Path markings are inconsistent as to lateral position (left or right half) and direction. The most straightforward operating rule for a shared use path, for pedestrians and wheeled traffic, is "Keep Right Except To Pass", the wording of the MUTCD R4-16 sign. It is suggested to post R4-16 signs on the sidewalk+path area and also install directional pavement markings (symbol + arrow).

  Where at least 8 feet of asphalt is present in addition to the sidewalk, wheeled traffic should use it so pedestrians can have exclusive use of the sidewalk. For this condition it is suggested to provide a dashed single yellow centerline and mark each half of the asphalt surface with a bike-and-rider symbol and directional arrow.

  Where the asphalt width adjacent to the sidewalk is narrower, the combined concrete-asphalt width will function as a shared use path. "Keep Right Except to Pass" still applies, and the eastern (asphalt) area can have a northbound directional marking, but it is suggested not to mark the sidewalk with a southbound marking.

Lastly, in addition to widening the sidewalk across the Public Works parcel and the Madison corner parcel, consider adding a path along the south edge of the Community Center lake (north edge of Public Works parcel) to the Novak Drive circle, to enable side path users traveling to/from Madison east of McDowell to avoid the driveway conflicts at Public Works.

4.5.3 Area #3: McDowell Boulevard at SMART Rail Corridor

City staff requested suggestions for safely accommodating pedestrians and bicycle users across the SMART rail line's sharply skewed grade crossing of McDowell Boulevard.

Existing conditions

The single-track Northwest Pacific (NWP) / Sonoma-Marin Area Rail Transit (SMART) railroad track crosses McDowell Boulevard left-to-right at a 15-degree angle 1,900 feet south of Corona Road / 1,400 feet north of Southpoint Boulevard. The crossing has rubberized panels with wide flange way gaps on the inside face of each rail because trains operate at commuter speeds (skewed crossings on low-speed freight lines can use narrow flange way gaps).

McDowell's north and south sidewalks are interrupted for approximately 250 feet across the railroad right of way. Sighted pedestrians and those using wheelchairs and mobility scooters currently continue along the roadway edge and can cross the tracks relatively safely because the flange way gaps do not present a tripping hazard and will not trap a wheelchair's caster if it crosses at a perpendicular angle.

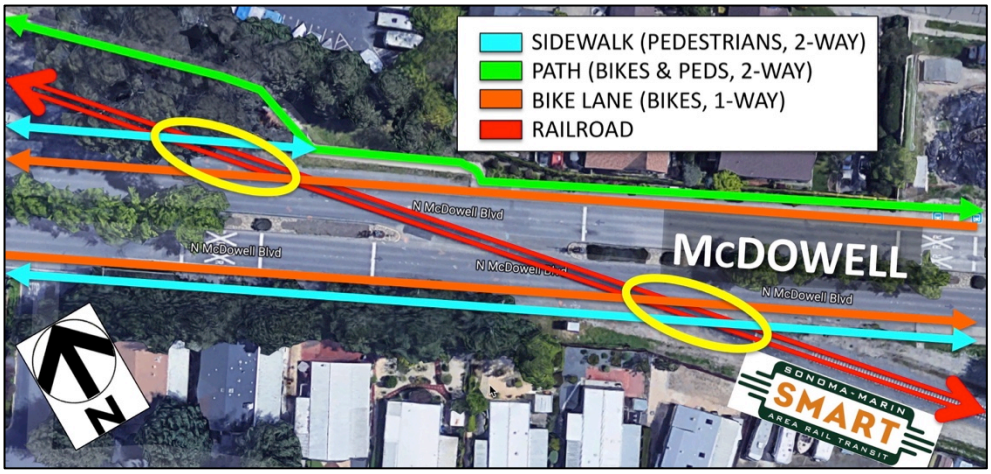


Figure 4-13: Sidewalk and on-street bicycle conflict areas at angled rail crossing

During the field observation day the evaluators happened to be at the rail crossing on the west side of McDowell when an elderly resident who uses a 3-wheel low-speed tricycle to travel along McDowell approached. He demonstrated and explained that he had to dismount in order to safely traverse the tracks and the crossing area.

Analysis

An improved railroad grade crossing in a context such as McDowell extends sidewalks to near the tracks, where it provides a way for pedestrians to cross at right angles, controlled by pedestrian gates, typically with an adjacent "escape" (push-out) gate for use by pedestrians who are within the gated area when a train approaches.

Bicycle users who attempt to cross tracks at a shallow angle risk having the bicycle's front wheel either trapped in the flange way gap or steered out from under them by the steel rail – a "diverting

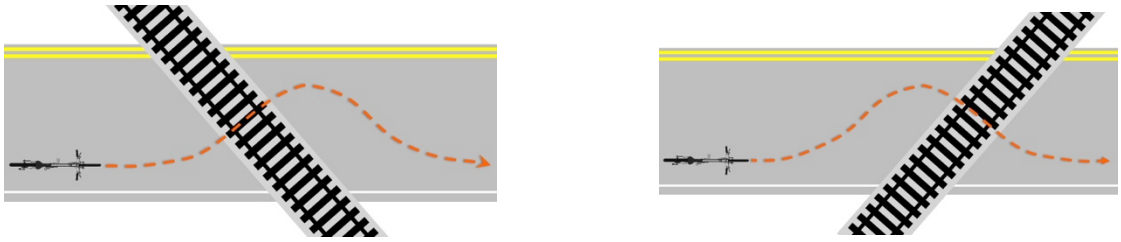
fall" that is sudden and unrecoverable. Some bicyclists will dismount (i.e. become pedestrians) and use a pedestrian crossing if provided, but most will want to remain mounted.

a) Rubber grade crossing panels; 2 northbound pedestrians on south side

b) Resident walking tricycle southbound through McDowell rail crossing area

Figure 4-14: McDowell railroad grade crossing area

For bicyclists to safely cross tracks without dismounting, they must be able to approach at a minimum angle of 60 degrees (90 degrees is optimal), cross, and then resume their original line of travel. Figure 4-16 shows how bicyclists do this – *with cooperation from motorists* -- if a widened pavement area is not provided to facilitate the maneuver.

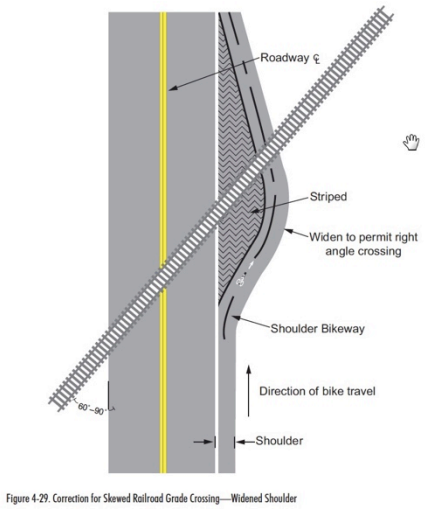


a) Tracks angled rightward (like McDowell)

b) Tracks angled leftward

Figure 4-15: How mounted bicyclists cross tracks without pavement widening

Figure 4-17 shows how a widened approach area facilitates a right-angle or near-right-angle crossing by mounted bicyclists when tracks are angled left-to-right, as is the case at McDowell. The left-hand figure is from the AASHTO 2012 Guide for the Development of Bicycle Facilities, 4th Edition (Figure 4-29, Correction for Skewed Railroad Grade Crossing – Widened Shoulder). SMART's skew of just 15 degrees relative to McDowell is sharper than the figure, but the design principle is the same. The right-hand photo from Madison, WI shows a left-to-right skewed crossing with an approach accommodation for bicycles (a combined upright-and-recumbent tandem bicycle is crossing).



AASHTO Bike Guide figure

Madison, WI

Figure 4-16: Edge widening to facilitate bicyclist crossing

Figure 4-18 applies the AASHTO figure's principles to McDowell. The bicycle alignments (dashed orange) locate the track crossings far enough to each side that the "recovery" after crossing is gentle and bicycles can rejoin the street without pausing. The proximity of the sidewalk/trail on the east side (white line at upper left) and of backyard walls on the west side (lower right) precludes generous widening as depicted in the AASHTO figure.

Figure 4-17: Conceptual bicycle alignment for McDowell railroad grade crossing

The design of such railroad grade crossings, including pedestrian gate systems and warning sign/flasher assemblies, is beyond the scope of this report. Design resources include:

- FHWA Railroad-Highway Grade Crossing Handbook
  https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/07010/index.cfm
- California MUTCD Part 8, Traffic Control For Railroad And Light Rail Transit Grade Crossings

The City may also wish to consult rail agencies that have implemented such crossings, such as:

- San Francisco Municipal Railroad (“Muni”)
- Peninsula Corridor Joint Powers Board (PCJPB)
  (operates the Caltrain line that runs between San Francisco and Gilroy)
- Capitol Corridor Joint Powers Board (CCJPB)
  (operated the commuter line between San Jose and Sacramento)

4.5.4 Area #4: Petaluma Boulevard South

Petaluma Boulevard South, south of E Street, has a 4-lane cross section (2 travel lanes in each direction + on-street parking). City staff requested input on street reconfiguration to add bike lanes between E Street and McNear Avenue, beyond whit the street has bike lanes.

The evaluators examined conditions at E Street, and at and beyond Mountain View Avenue.

At E Street

Existing conditions

Petaluma Boulevard South appears to be 52 feet wide south of E Street, with two travel lanes in each direction and parallel parking on both sides. In this part of Petaluma the street runs roughly east-west. At E Street its sidewalks are 9 feet wide on the north side and 6 feet on the south side. Petaluma Boulevard keeps this width almost to Mountain View Avenue except near I Street where parking is dropped and left turn lanes squeezed in. Approaching Mountain View Avenue its width increases and varies for several blocks, reaching 84 feet at McNear Avenue.

EXISTING
At E Street

Parking both sides
4 travel lanes
No bike lanes
No turn lane

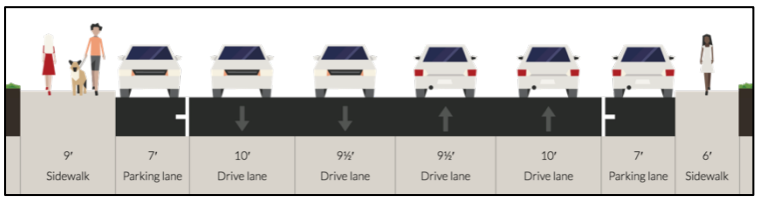


Figure 4-18: Petaluma Boulevard South at E Street, facing south (52' + sidewalks)

Note that the center lanes are less than 10 feet wide and the parking lanes are only 7 feet wide.

Potential layouts

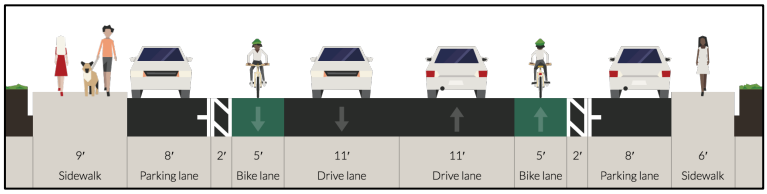
Given the 52' curb to curb width at E Street and the City's desire for 11 foot minimum travel lane widths, a road diet can add bike lanes by removing one travel lane in each direction. At intersections, parking could be retained on the departing side if neither bike lane has a traffic-side buffer (Intersection Suggestion #1 below).

If parking was removed on both sides at intersections, the departing bike lane could have a traffic-side buffer and the approach could have a right turn area, which could improve intersection performance for motor traffic. That right turn area could be configured either as a wide bike lane as depicted in Intersection Suggestion #2 below, or as a right turn lane with left-justified shared lane markings ("sharrows"), not depicted below. The former treatment is MUTCD compliant (extra-wide bike lanes are not prohibited). The latter treatment is explicitly sanctioned by FHWA in its MUTCD Part 9 (Bicycle Facilities) FAQ.

The following concept figures incorporate a door zone buffer extending to 10 feet from curb face where parking is present, and optional green pavement color in bike lanes for emphasis.

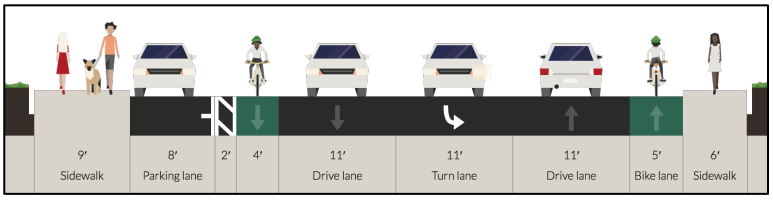
SUGGESTION
Mid-block

Parking both sides
No turn lane



SUGGESTION #1
At intersections

Center turn lane
Bike lanes
Parking one side



SUGGESTION #2
At intersections

Center turn lane
1 buffered bike lane
1 bike / right turn lane

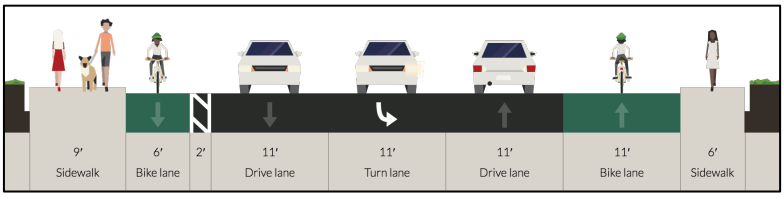


Figure 4-19: Concepts for road diet with bike lanes

Adding a turn lane and retaining parking on both sides would require 9.5 foot travel lanes and 7-foot parking with 5-foot bike lanes (about 50% would be door zone). This is unworkable.

NO GO

X

Parking 2 sides
Center turn lane

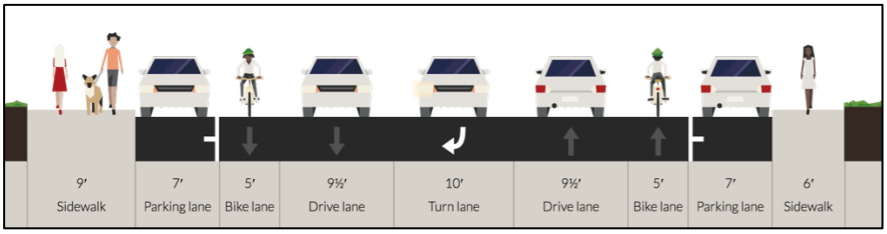


Figure 4-20: Center turn lane parking both sides squeezes travel and bike lanes

The above figures address the street cross section but do not show corner curb extensions, which greatly enhance to safety and convenience for pedestrians, and enable features such as bike parking corrals. Downtown Petaluma has several good examples, for example 2nd Street between C and D Streets. Section 4.3 (General Citywide Suggestions), topics “Corner Curb Extensions” and “Interim Curb Extensions” has several resources.

Mountain View Avenue – Crystal Lane

City staff requested input for extending the wide sidewalk (shared use path) on the north side of the street at the Crystal Lane roundabout 1/2 mile north to Mountain View Avenue, north of which a Bicycle Boulevard is envisioned on 5th or 6th Street.

Existing conditions and options – north side

Figure 4-22 shows conditions on the north side of Petaluma Boulevard between Crystal Lane and Mountain View Avenue. The 1/2-mile distance roughly divides into 4 segments:

Segment		North edge	Notes
1	Crystal Lane – first townhouses	Wide side path	
2	Townhouses along Easton Drive	Sidewalk & parking	Wide bike lane
3	Hill below Brighton View Circle	Sidewalk & landscape	Ample space to widen sidewalk
4	Townhouses on Addison Circle; businesses close to Mtn View Ave	Sidewalk & parking	Perpendicular access to service bays at Northbay Automotive

1 – South end (Crystal Lane at upper right): existing side path along Heritage Salvage and Truck Max

2 – Townhouses along Easton Drive: standard sidewalk, parking lane, wide bike lane

3 – Hill below Brighton View Circle: standard sidewalk; ample space to widen with a cut and retaining wall

4 – North segment: curbside parking at townhouses, PEP Housing, Mr. Mom's Café. Head-in at auto service.

Figure 4-21: North side of Petaluma Boulevard, Crystal Lane – Mountain View Avenue

Figure 4-22 shows existing conditions along the north side of this 1/2-mile segment. The potential appears sufficient to justify doing a preliminary dimensioned plan and budget.

Segment 1 (Heritage Salvage and Truck Max yards) has a wide side path (trail) in place.

On Segment 2 (south townhouses) there may be sufficient space to widen the existing sidewalk but this would involve considerable impacts to landscape that may not be acceptable to the property owners. However, the continuous center turn lane is not needed and could be replaced with a narrow painted median or raised median barrier. This would free up width to convert the north sidewalk into a side path by reconstructing curb and gutter closer to the center of the street.

On Segment 3 (hill below Brighton View Circle), a cut with a retaining wall would create the needed width.

On Segment 4 the townhouses are set back behind a deep landscape area through which the sidewalk meanders. There appears to be ample area available to widen the sidewalk into a side path without detracting from the character of the landscape area.

To the north of the townhouses the PEP Housing parcel has internal off-street parking lot and also 3 parking spaces along the street curb, which is set back considerably on what appears to be a historical alignment. The remainder of the curb line to the north is red-curbed for a bus stop. There appears to be ample total width to reconstruct the curb and parking lane closer to the center of the street, creating space to widen the sidewalk into a side path.

To the north of PEP, Mr. Mom's Café has mostly off-street parking. It appears that there may also be a single curbside parking space, however it might be possible to remove that in order to move the curb line outward to widen the sidewalk. Along this parcel, as with the adjacent PEP parcel, the curb line is also not parallel to the street centerline so there is some available width.

Northbay Automotive, the last parcel before Mountain View Avenue, has a parcel-wide driveway for straight-in access to its service bays – not the best situation for a pedestrians or bicyclists on a sidewalk but it is the only parcel on the 1/2-mile segment with such an issue. Here too there is some excess depth from the street edge that could be used to provide separation between the side path and the few internal parking spaces in front of the service bays. Colored conflict markings across the wide driveway could alert both side path users and crossing drivers, and warning signs on the sidewalk/side path could warn users of the special condition ahead.

Existing conditions and options – south side

Existing south-side edge conditions on Petaluma Boulevard along the 1/2-mile segment south of Mountain View Avenue are largely conventional -- a bike lane, a pavement edge or curb line parallel to the street, and a standard sidewalk.

The key exception is the South City Market parcel on the southeast corner at Mountain View Avenue, which has 7 head-in parking spaces along the building. Vehicles pulling into and backing out of these spaces conflict with pedestrians and bicycle users traveling along the street.

The parking lot depth may be sufficient to replace the head-in parking with diagonal stalls served by a one-way eastbound driveway, with a landscape separator and sidewalk. An enter-only driveway would be near the corner at Mountain View Avenue. The east driveway could be 2-way.

a) South City Market lot facing west

b) South City Market lot facing east

Figure 4-22: South City Market lot, SE corner of Mountain View Avenue

Figure 4-24 is a sketch concept for reconfiguring the lot with a curb, sidewalk and landscape buffer, created without consulting a parking lot design handbook. Car images are the same size as those visible on the aerial photo base. Their orientations and positions are intended only as starting points for discussion.

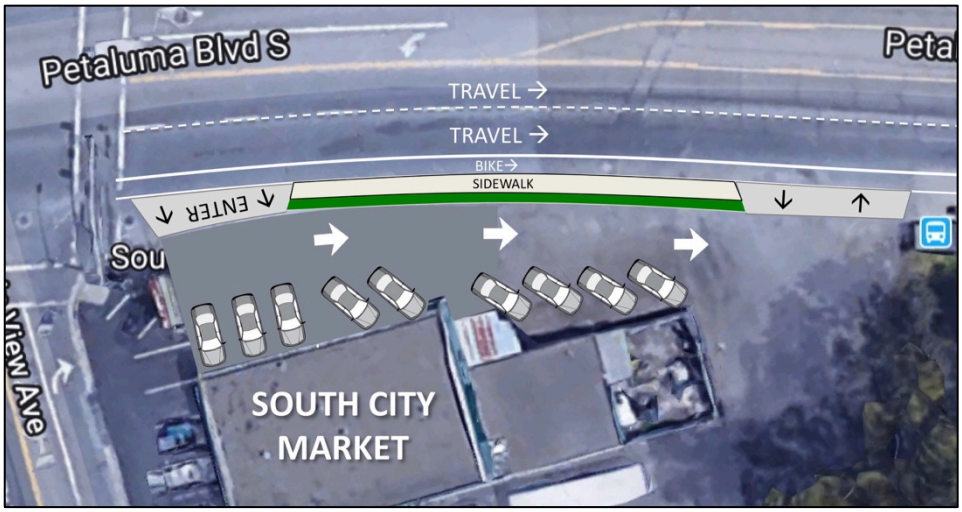


Figure 4-23: South City Market parking lot – sketch concept

4.5.5 Area #5: Selection of 5th or 6th Street (downtown) for Bicycle Boulevard

City staff requested input on selecting either 5th Street or 6th Street as a Bicycle Boulevard through downtown. Both streets' southern endpoints are at Mountain View Avenue. At A Street, 5th bends to the right and becomes Keller St; 6th forks and the right (northward) leg becomes Liberty Street, which parallels Keller; its left (northwest-ward) street becomes Howard.

Traffic volume and passing behavior

Successful bicycle boulevards are low-speed, low-traffic, typically residential streets on which non-stop bicycle travel is facilitated by removing STOP signs at many intersections. To prevent the transformed street from attracting motor vehicle cut-through traffic, traffic calming measures are applies as needed; these may include bicycle-permeable vehicle barriers or mandatory turns, half-closures, and one-way blocks with "contra-flow" bike lanes in the opposite direction. All properties on all blocks remain accessible by motor vehicle, but access may involve one block of out-of-direction travel.

A key contributor to a low-stress bicycling experience is that motor vehicle volumes are kept low enough that bicycle users – including those riding two-abreast – can comfortably be passed by motorists using the other half of the street without long waits for gaps in oncoming traffic.

A rough threshold is 1,500 vehicles per day, a.k.a. ADT (Average Daily Traffic, i.e. 2-way trips in 24 hours). In suburban areas the peak hour volume (PHV) is generally about 10% of ADT, in this example 150. Assuming 50% of the trips are in each direction that is 75 vehicles per hour per direction. Assuming vehicles arrive evenly throughout the hour, dividing 3,600 seconds per hour by 75 gives 48 seconds per oncoming vehicle. 48 seconds is a comfortable passing interval. In comparison, ADT = 3,600 would imply 20 seconds per oncoming vehicle, which is a slightly rushed passing interval.

The City of Portland, Oregon, which has several bicycle boulevards, aims for ADTs around 1,500 and periodically conducts traffic counts. If volume rises toward 3,000 it applies a round of traffic calming with the intent of lowering volume.

Staff said daily volume on 6th Street was over 3,000, and the volume on 5th Street was considerably lower. However, because 6th connects with Howard Street, it functions as a collector and applying sufficient traffic calming to deter driving on it would impact adjacent streets. This key difference supports 5th Street as the preferred candidate for a bicycle boulevard.

Crossing of D Street

One other consideration is how to cross D Street. At D, 6th has a signal but 5th has a 2-way STOP (5th stops, D does not). If 5th was selected as a bicycle boulevard, its intersection with D Street would need to become a 4-way STOP or a signal, to minimize delay along 5th Street. A 4-way STOP would have to meet minimum All-Way Stop (AWS) warrants, but the intersection currently lacks sufficient volume.

(This is similar to a situation that arose when Palo Alto, California extended its Bryant Street Bicycle Boulevard northward through its downtown area. For crossing Embarcadero Road – a residential arterial – Waverley Street one block away already had a signal. Rather than force Bryant Street bicycle users to jog over to Waverley and back – involving not only turning

movements but more traffic volume and also interacting with buses on Waverley, Palo Alto installed a coordinated signal at Bryant.)

Other than the difference at D Street, 5th-Keller and 6th-Liberty have similar numbers and spacing of STOP signs.

Suggestions

5th Street's volume is within the desirable range for a bicycle boulevard. 6th Street's is considerably higher, and its collector role means that volume probably cannot be calmed sufficiently into that range. For this reason 5th is suggested as the boulevard candidate.

This will necessitate a traffic control change at D Street, where 5th currently stops. Options are:

a) A 4-way STOP

b) A new signal coordinated with the 6th Street / D Street signal

c) A narrow raised median on D Street, forcing bicycle traffic on 5th to use crosswalks to proceed through. 5th would become right-in / right-out only for motor traffic. Prohibiting parking on D near the intersection and angling the travel lanes away from the centerline would create the width for the median.

d) [Suggested] A wider median on D Street, with center openings that enable bicycles to proceed through without using a crosswalk, and wait halfway if needed (8' required for standard 6-foot bikes). A small island in the gap would prevent motor vehicle through movements. Bicycles on 5th would stop before proceeding into the gap. As with (c), 5th would become right-in / right-out only for motor traffic.

Figure 4-25, from a British Columbia plan, shows the configuration described in (d). Angling the small center island in the bicycle gap also enables bicycle left turns from the major street.

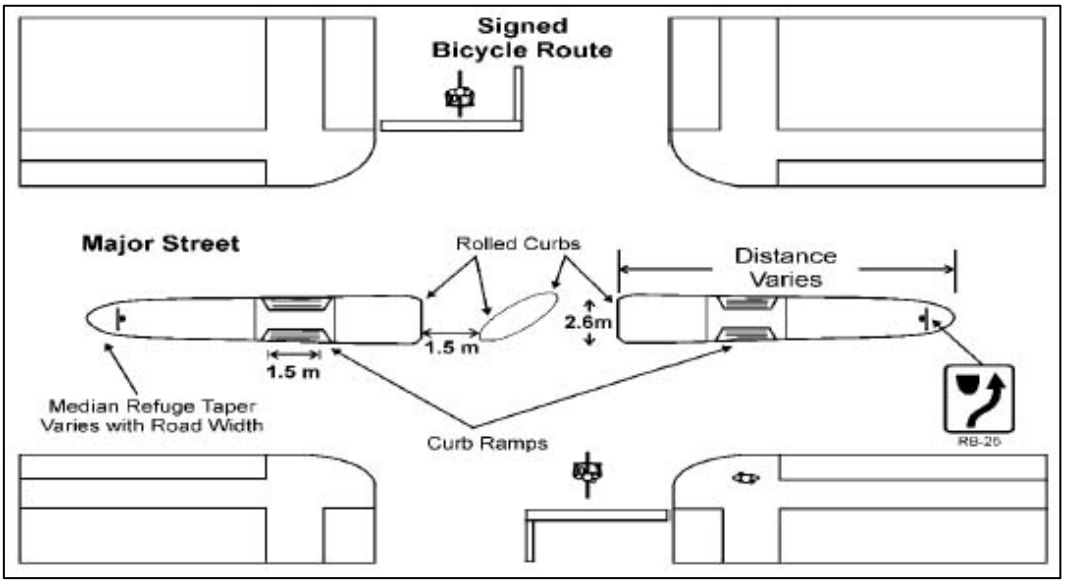


Figure 4-24: - Median with openings for crosswalks and bicycles (B.C.)

Figure 4-26, from NACTO, shows a similar configuration. The major street has four lanes but the principle is the same except for the previous figure's small angled island in the bicycle gap.

Figure 4-25: - Median with openings for crosswalks and bicycles (NACTO)

Figure 4-27, from FHWA's traffic calming websites, shows an installation in Eugene, Oregon.

Figure 4-26: - Median with openings for crosswalks and bicycles (Eugene, OR)

Appendix A: Glossary of Pedestrian Improvement Measures

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Traffic Control Countermeasures			
Traffic Signal or All-Way Stop	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD).	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Must meet warrants based on traffic and pedestrian volumes; however, exceptions are possible based on demonstrated pedestrian safety concerns (collision history).
HAWK Beacon Signal	HAWK (High Intensity Activated Crosswalks) are pedestrian-actuated signals that are a combination of a beacon flasher and a traffic control signal. When actuated, HAWK displays a yellow (warning) indication followed by a solid red light. During pedestrian clearance, the driver sees a flashing red “wig-wag” pattern until the clearance interval has ended and the signal goes dark.	Reduces pedestrian-vehicle conflicts and slows traffic speeds.	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied. Appropriate for multi-lane roadways.
Overhead Flashing Beacons	Flashing amber lights are installed on overhead signs, in advance of the crosswalk or at the entrance to the crosswalk.	The blinking lights during pedestrian crossing times increase the number of drivers yielding for pedestrians and reduce pedestrian-vehicle conflicts. This measure can also improve conditions on multi-lane roadways.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers.
Stutter Flash	The Overhead Flashing Beacon is enhanced by replacing the traditional slow flashing incandescent lamps with rapid flashing LED lamps. The beacons may be push-button activated or activated with pedestrian detection.	Initial studies suggest the stutter flash is very effective as measured by increased driver yielding behavior. Solar panels reduce energy costs associated with the device.	Appropriate for multi-lane roadways.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
In-Roadway Warning Lights	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian detection.	This measure provides a dynamic visual cue, and is increasingly effective in bad weather.	Best in locations with low bicycle ridership, as the raised markers present a hazard to bicyclists. May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight. The lights may cause confusion when pedestrians fail to activate them and/or when they falsely activate.
High-Visibility Signs and Markings	High-visibility markings include a family of crosswalk striping styles including the “ladder” and the “triple four.” One style, the zebra-style crosswalk pavement markings, were once popular in Europe, but have been phased out because the signal-controlled puffin is more effective (see notes). High-visibility fluorescent yellow green signs are made of the approved fluorescent yellow-green color and posted at crossings to increase the visibility of a pedestrian crossing ahead.	FHWA recently ended its approval process for the experimental use of fluorescent yellow crosswalk markings and found that they had no discernible benefit over white markings.	Beneficial in areas with high pedestrian activity, as near schools, and in areas where travel speeds are high and/or motorist visibility is low.
In-Street Pedestrian Crossing Signs	This measure involves posting regulatory pedestrian signage on lane edge lines and road centerlines. The In-Street Pedestrian Crossing sign may be used to remind road users of laws regarding right of way at an unsignalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign if applicable. The legends STOP FOR or YIELD TO may be used in conjunction with the appropriate symbol.	This measure is highly visible to motorists and has a positive impact on pedestrian safety at crosswalks.	Mid-block crosswalks, unsignalized intersections, low-speed areas, and two-lane roadways are ideal for this pedestrian treatment. The STOP FOR legend shall only be used in states where the state law specifically requires that a driver must stop for a pedestrian in a crosswalk.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Pedestrian Crossing Flags	Square flags of various colors, which are mounted on a stick and stored in sign-mounted holders on both side of the street at crossing locations; they are carried by pedestrians while crossing a roadway.	This measure makes pedestrians more visible to motorists.	Appropriate for mid-block and uncontrolled crosswalks with low visibility or poor sight distance.
Advanced Yield Lines	Standard white stop or yield limit lines are placed in advance of marked, uncontrolled crosswalks.	This measure increases the pedestrian's visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian conditions on multi-lane roadways. It is also an affordable option.	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat collision on multi-lane roads.
Geometric Treatments			
Pedestrian Overpass/ Underpass	This measure consists of a pedestrian-only overpass or underpass over a roadway. It provides complete separation of pedestrians from motor vehicle traffic, normally where no other pedestrian facility is available, and connects off-road trails and paths across major barriers.	Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic.	Grade separation via this measure is most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials. This measure should be considered a last resort, as it is expensive and visually intrusive.
Road Diet (aka Lane Reduction)	The number of lanes of travel is reduced by widening sidewalks, adding bicycle and parking lanes, and converting parallel parking to angled or perpendicular parking.	This is a good traffic calming and pedestrian safety tool, particularly in areas that would benefit from curb extensions but have infrastructure in the way. This measure also improves pedestrian conditions on multi-lane roadways.	Roadways with surplus roadway capacity (typically multi-lane roadways with less than 15,000 to 17,000 ADT) and high bicycle volumes, and roadways that would benefit from traffic calming measures.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Median Refuge Island	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian path.	This measure allows pedestrians to focus on each direction of traffic separately, and the refuge provides pedestrians with a better view of oncoming traffic as well as allowing drivers to see pedestrians more easily. It can also split up a multi-lane road and act as a supplement to additional pedestrian tools.	Recommended for multi-lane roads wide enough to accommodate an ADA-accessible median.
Staggered Median Refuge Island	This measure is similar to traditional median refuge islands; the only difference is that the crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk towards traffic to reach the second half of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Benefits of this tool include an increase in the concentration of pedestrians at a crossing and the provision of better traffic views for pedestrians. Additionally, motorists are better able to see pedestrians as they walk through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility or with off-set intersections.
Curb Extension	Also known as a pedestrian bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider.	Curb extensions narrow the distance that a pedestrian has to cross and increases the sidewalk space on the corners. They also improve emergency vehicle access and make it difficult for drivers to turn illegally.	Due to the high cost of installation, this tool would only be suitable on streets with high pedestrian activity, on-street parking, and infrequent (or no) curb-edge transit service. It is often used in combination with crosswalks or other markings.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Reduced Curb Radii	The radius of a curb can be reduced to require motorists to make a tighter turn.	Shorter radii narrow the distance that pedestrians have to cross; they also reduce traffic speeds and increase driver awareness (like curb extensions), but are less difficult and expensive to implement.	This measure would be beneficial on streets with high pedestrian activity, on-street parking, and no curb-edge transit service. It is more suitable for wider roadways and roadways with low volumes of heavy truck traffic.
Curb Ramps	Curb ramps are sloped ramps that are constructed at the edge of a curb (normally at intersections) as a transition between the sidewalk and a crosswalk.	Curb ramps provide easy access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs.	Curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act and 1990 Americans with Disabilities Act). Where feasible, separate curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks.
Raised Crosswalk	A crosswalk whose surface is elevated above the travel lanes.	Attracts drivers' attention; encourages lower travel speeds by providing visual and tactile feedback when approaching the crosswalk.	Appropriate for multi-lane roadways, roadways with lower speed limits that are not emergency routes, and roadways with high levels of pedestrian activity, such as near schools, shopping malls, etc.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Improved Right-Turn Slip-Lane Design	Right-turn slip lanes (aka channelized right-turn lanes) are separated from the rest of the travel lanes by a pork chop-shaped striped area. This measure separates right-turning traffic and streamlines right-turning movements. Improved right-turn slip lanes would provide pedestrian crossing islands within the intersection and be designed to optimize the right-turning motorist's view of the pedestrian and of vehicles to his or her left.	This measure reduces the pedestrian's crossing distance and turning vehicle speeds.	Appropriate for intersections with high volumes of right-turning vehicles.
Chicanes	A chicane is a sequence of tight serpentine curves (usually an S-shape curve) in a roadway, used on city streets to slow cars.	This is a traffic-calming measure that can improve the pedestrian environment and pedestrian safety.	Chicanes can be created on streets with higher volumes, given that the number of through lanes is maintained; they can also be created on higher-volume residential streets to slow traffic. Chicanes may be constructed by alternating parallel or angled parking in combination with curb extensions.
Pedestrian Access and Amenities			
Marked Crosswalk	Marked crosswalks should be installed to provide designated pedestrian crossings at major pedestrian generators, crossings with significant pedestrian volumes (at least 15 per hour), crossings with high vehicle-pedestrian collisions, and other areas based on engineering judgment.	Marked crosswalks provide a designated crossing, which may improve walkability and reduce jaywalking.	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day. Enhanced crosswalk treatments (as presented in this table) should supplement the marked crosswalk.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Textured Pavers	Textured pavers come in a variety of materials (for example, concrete, brick, and stone) and can be constructed to create a textured pedestrian surface such as a crosswalk or sidewalk. Crosswalks are constructed with the pavers, or can be made of stamped concrete or asphalt.	Highly visible to motorists, this measure provides a visual and tactile cue to motorists and delineates a separate space for pedestrians, as it provides a different texture to the street for pedestrians and motorists. It also aesthetically enhances the streetscape.	Appropriate for areas with high volumes of pedestrian traffic and roadways with low visibility and/or narrow travel ways, as in the downtown area of towns and small cities.
Anti-Skid Surfacing	Surface treatment is applied to streets to improve skid resistance during wet weather. This is a supplementary tool that can be used to reduce skidding in wet conditions.	Improves driver and pedestrian safety.	Appropriate for multi-lane roadways and roadways with higher posted speed limit and/or high vehicle volumes or collision rates.
Accessibility Upgrades	Treatments such as audible pedestrian signals, accessible push buttons, and truncated domes should be installed at crossings to accommodate disabled pedestrians.	Improves accessibility of pedestrian facilities for all users.	Accessibility upgrades should be provided for all pedestrian facilities following a citywide ADA Transition Plan.

PEDESTRIAN IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
Pedestrian Countdown Signal	Displays a "countdown" of the number of seconds remaining for the pedestrian crossing interval. In some jurisdictions the countdown includes the walk phase. In other jurisdictions, the countdown is only displayed during the flashing don't walk phase.	Increases pedestrian awareness and allows them the flexibility to know when to speed up if the pedestrian phase is about to expire.	The forthcoming 2009 MUTCD is expected to require all pedestrian signals to incorporated countdown signals within ten years. The signals should be prioritized for areas with pedestrian activity, roadways with high volumes of vehicular traffic, multi-lane roadways, and areas with elderly or disabled persons (who may walk slower than others may).
Transit			
High-Visibility Bus Stop Locations	This measure should include siting bus stops on the far side of intersections, with paved connections to sidewalks where landscape buffers exist.	Provides safe, convenient, and inviting access for transit users; can improve roadway efficiency and driver sight distance.	Appropriate for all bus stops subject to sight distance and right-of-way constraints.
Transit Bulb	Transit bulbs or bus bulbs, also known as nubs, curb extensions, or bus bulges are a section of sidewalk that extends from the curb of a parking lane to the edge of the through lane.	Creates additional space at a bus stop for shelters, benches, and other passenger amenities.	Appropriate at sites with high patron volumes, crowded city sidewalks, and curbside parking.
Enhanced Bus Stop Amenities	Adequate bus stop signing, lighting, a bus shelter with seating, trash receptacles, and bicycle parking are desirable features at bus stops.	Increase pedestrian visibility at bus stops and encourage transit ridership.	Appropriate at sites with high patron volumes.

Appendix B: Glossary of Bicycling Improvement Measures

BICYCLING IMPROVEMENT MEASURES			
Measure	**Description**	**Benefits**	**Application**
LINKS /ROADWAY SEGMENTS			
A. Road Design and Operations to Slow Traffic			
Traffic Calming	There are a variety of measures too numerous to list here. See ITE Institute of Transportation Engineers, "Traffic Calming: State of the Practice".	Reduces motor vehicle speeds, which improves safety for all modes and increases bicyclist's comfort.	Urban and suburban settings; suggested for urban major streets with prevailing speeds of 35 mph and higher and for suburban major streets with prevailing speeds 45 mph or higher; and for all local streets with speeds of 30+ mph.
Bicycle Boulevard	A minor street on which traffic control devices are designed and placed to encourage cycling; these include: unwarranted stop signs along bike route are removed; crossing assistance at major arterials is provided (see examples in Nodes-Section E below).	Allows cyclists to maintain their travel speeds, significantly reducing their travel time; provides cyclists with a low volume, low speed street where motorists are aware that it is a bicycle-priority street.	On minor streets with less than 3000 vehicles per day especially useful when Bike Blvd is parallel to and within ¼ mile of a major arterial with many desirable destinations.
Signal Coordination at 15 -25 mph	The signal timing along a corridor is set so that traffic which receives a green light at the first intersection will subsequently receive a green light at all downstream intersections if they travel at the design speed; aka a "green wave."	Encourages motorists to travel at slower speeds, provides a more comfortable experience for cyclists and increases overall traffic safety; also allows cyclists to hit the green lights, so that they can maintain their travel speeds, significantly reducing their travel time.	Urban settings, typically downtown and other areas with relatively short blocks and with traffic signals at every intersection.
Woonerf/Shared Space	A shared space concept where the entire public right of way is available for all modes, often with no sidewalks, and with no lane striping, and little if any signage.	Access for motor vehicles is maintained, unlike a pedestrian zone, but motor vehicle speeds are constrained to 5 mph by design and the presence of other modes. Safety for all modes is improved.	Low volume residential streets where families can gather and children are encouraged to play; also commercial areas with high pedestrian volumes, bicyclists and transit.

B. Road Design to Provide Bicycle Infrastructure			
Bike Lanes	A painted lane for the exclusive use of bicyclists; it is one-way and is 5 feet minimum in width. They can be retrofitted onto an existing street by either a) narrowing existing wide travel lanes; b) removing a parking lane; c) removing a travel lane, or d) widening the roadway. A common method to retrofit bike lanes is described below.	Provides cyclists with their own travel lane so that they can safely pass and be passed by motor vehicles.	Roadways with over 4000 vehicles per day (if less than 4000 vehicles per day see Bicycle Boulevards above).
Road Diet (aka Lane Reduction)	One to two travel lanes are replaced with a bike lane in each direction, and in most cases by also adding left-turn lanes at intersections or a center two-way left-turn lane; variations include widening sidewalks, and replacing parallel parking with angled or perpendicular parking.	Improves traffic safety for all modes by: a) eliminating the double-threat to pedestrians posed by the two or more travel lanes in each direction; b) providing bike lanes for cyclists; c) providing a left-turn pocket for motorists, reducing rear-end collisions and improving visibility to oncoming traffic.	Classic application is a four-lane undivided roadway with less than 15,000 to 17,000 ADT though conversions of four-lane streets may work up to 23,000 ADT. Also applies to three-lane roadways and to 5 or 6-lane undivided roadways
Buffer adjacent to bike lanes	A three to five-foot buffer area is provided on one or both sides of the bike lane.	Right-side buffer (between bike lane and on-street parking): Removes cyclists from the door zone; Left-side (between bike lane and adjacent travel lane): provides greater separation from passing motor vehicle traffic.	This measure is particularly beneficial in the following conditions: Right-side: on streets with parallel on-street parking particularly in cities with a collision history of dooring; Left-side: on streets with traffic with prevailing speeds of 40 mph and higher.
Cycle Tracks	A bikeway within the roadway right of way that is separated from both traffic lanes and the sidewalks by either a parking lane, street furniture, curbs or other physical means.	Reduces sidewalk riding, provides greater separation between motorists and cyclists.	Urban settings with parallel sidewalks and heavy traffic.
C Other Traffic Control Devices			
Except Bicycles placard	A Regulatory sign placard for use with other regulatory signs.	Increases or maintains the access and circulation capabilities of bicyclists.	Used at locations where the restriction in question does not apply to bicyclists, such as No Left Turn or Do Not Enter.

Sharrows	A pavement legend that indicates the location within the travel lane where bicyclists are expected to occupy.	The sharrow encourages cyclists to ride outside of the door zone and studies have shown that sharrows reduce the incidence of cyclists riding on the sidewalk and wrong-way riding.	Two or more lane city streets where the right-most lane is too narrow for a motor vehicle to safely pass a cyclist within the travel lane.
Bike Lanes May Use Full Lane sign (MUTCD R4-11)	Regulatory Sign	Informs motorists and cyclists that cyclists may be travelling in the center of a narrow lane.	Two or more lane city streets where the right-most lane is too narrow for a motor vehicle to safely pass a cyclist within the travel lane.
Share the Road sign (MUTCD W-11/ W16-1p)	Warning sign and placard	Informs motorists to expect cyclists on the roadway.	Two-lane roads particularly in rural areas where shoulders are less than four-feet.
Bike Directional Signs (MUTCD D1 series or similar)	Informational signs indicating place names and arrows, with distances as a recommended option (D1-2C)	Informs bicyclists of the most common destination served by the bike route in question.	Particularly useful to direct cyclists to a facility such as a bike bridge or to use a street to access a major destination that might not otherwise be readily apparent.
D. New infrastructure to improve bicycle connectivity			
Bike Path	A paved pathway for the exclusive use of non-motorized traffic within its own right of way;	Provides additional connectivity and route options that otherwise would not be available to bicyclists.	Wherever a continuous right of way exists, typically found along active or abandoned railroad ROW, shorelines, creeks, and river levees.
Pathway connections	Short pathway segments for non-motorized traffic, for example, that join the ends of two cul-de-sacs or provide other connectivity not provided by road network.	Provides short-cuts for bicyclists that reduce their travel distance and travel time.	Varies by community; suggested at the end of every newly constructed cul-de-sac.
Bicycle Overpass/ Underpass	A bicycle overpass or underpass is a bridge or tunnel built for the exclusive use of non-motorized traffic and is typically built where at-grade crossings cannot be provided such as to cross freeways, rivers, creeks and railroad tracks. They can also be built to cross major arterials where, for example, a bike path must cross a major roadway.	A bike bridge / tunnel complement a local roadway system that is discontinuous due to man-made or natural barriers. They reduce the distance traveled by cyclists, and provide a safer conflict-free crossing, particularly if it is an alternative to a freeway interchange.	Grade separation via this measure is most feasible and appropriate when it would provide direct access to major bicyclist destinations such as a school or college, employment site, major transit station or would reduce the travel distance by one mile or more.

NODES / INTERSECTIONS			
Measure	**Description**	**Benefits**	**Application**
E. Intersection Design For Motor Vehicles			
Reduced Curb Radii	The radius of a curb is reduced to require motorists to make the turn at slower speeds and to make a tighter turn.	Shorter curb radii reduce the speed of turning traffic thereby enabling a more comfortable weave between through cyclists and right-turning motorists.	This measure is suitable for downtown settings, at all cross streets with minor streets, all residential streets and all roadways that are not designated truck routes.
Remove/Control Free Right-Turn Lanes	Where a separate right-turn lane continues as its own lane after the turn, it may be redesigned to eliminate the free turn. A short-term solution is to control the turning movement with a stop sign or signal control and to redesign the island as discussed below.	Improves bicyclist safety since this design forces through cyclists on the cross street to end up in between two lanes of through motor vehicle traffic.	All locations where there are free right-turn lanes except those leading onto freeway on-ramps.
Remove/Redesign Right-Turn Slip-Lane Design	Right-turn slip lanes (aka channelized right-turn lanes) are separated from the rest of the travel lanes by a pork chop-shaped raised island which typically is designed to facilitate fast right turns, and right-turning vehicles are often not subject to the traffic signal or stop sign.	Improves bicyclist safety by slowing right-turning motorists and facilitates the weave between through bicyclists and right-turning motorists.	All locations with a channelized right-turn.
Remove Optional Right-Turn Lane in Combination with a Right-Turn Only Lane	At locations where there is an optional right-turn lane in combination with a right-turn only lane, convert the optional right-turn lane to a through-only lane.	Improves bicyclist safety since cyclists have no way of knowing how to correctly position themselves in the optional (through /right turn) lane.	All locations where there is an optional right-turn lane in combination with a right-turn only lane per HDM 403.6(1) (except on freeways).
Redesign Ramp Termini	Redesign high speed free flow freeway ramps to intersection local streets as standard intersections with signal control.	Improves bicyclist and pedestrian safety on intersections of local streets with freeway ramps.	All freeway interchanges with high speed ramps

F. Intersection Design Treatments - Bicycle -Specific			
Bicycle Signal Detection and Pavement Marking	Provide signal detectors that also detect bicyclists in the rightmost through lane and in left-turn lanes with left-turn phasing. Provide pavement marking to indicate to cyclists where to position themselves in order to activate the detector.	Enables cyclists to be detected when motor vehicles are not present to trigger the needed signal phase. Improves bicyclists' safety.	Per CA MUTCD 4D.105 and CVC 21450.5, all new and modified traffic detection installations must detect bicyclists; All other traffic-actuated signals may be retrofitted to detect bicyclists as soon as feasible.
Bicycle Signal Timing	Provides signal timing to account for the speed of cyclists to cross an intersection.	Improves bicyclists' safety by reducing the probability of a bicyclist being in an intersection when the phase terminates and being hit by traffic that receives the next green phase.	Signal timing that accounts for cyclists is particularly important for cyclists on a minor street approach to a major arterial which crosses a greater distance due to the width of the arterial, hence requiring a longer time interval.
Bicycle Signal Heads	A traffic signal indication in the shape of a bicycle, with full red, yellow green capability.	Improves bicyclist safety by providing a bicycle -only phase, where appropriate, given the geometry and phasing of the particular intersection.	Where intersection geometry is such that a bicycle-only phase is provided and/or bicycle signal heads would improve safety at the intersection. See also CA MUTCD for warrants for bicycle signal heads.
Widen Bike Lane at Intersection Approach	Within the last 200 feet of an intersection, widen the bike lane and narrow the travel; for example from 5 foot bike lane and 12 feet travel lane would become a 7 foot bike lane and 10 foot travel lane.	Improves cyclist safety by encouraging right-turning motorists to enter the bike lane to turn right, (as required by the CVC), which reduces the chance of a right-turn hook collision in which a through cyclist remains to the right of a right-turning motorist.	On roads with bike lanes approaching an intersection without a right-turn only lane and there is noncompliance with right-turning vehicles merging into the bike lane as required by the CVC and UVC.
Bike Lane inside Right-Turn Only Lane ("Combined Bicycle/Right-Turn Lane")	Provide a bike lane line inside and on the left side of a right-turn only lane.	Encourages cyclists to ride on the left side of the right-turn only lane thus reducing the chance of a right hook collision, where a cyclist remains to the right of a right-turning motorist.	On roads with bike lanes approaching an intersection with a right-turn only lane and there is not enough roadway width to provide a bike lane to the left of the right-turn lane.

Bike Boxes	Area between an Advance Stop Line and a marked crosswalk which is designates as the queue space for cyclists to wait for a green light ahead of queued motor vehicle traffic; sometimes painted green.	Primary benefits are to reduce conflicts between bicyclists and right-turning traffic at the onset of the green signal phase, and to reduce vehicle and bicyclist encroachment in a crosswalk during a red signal phase.	Locations where there are at least three cyclists at the beginning of the green phase and moderate to high pedestrian volumes.
Marked Crosswalk with Distinct Marked Area for Bicyclists separate from Pedestrians	A marked crosswalk that has two distinct areas, one for pedestrians and one for bicyclists.	Reduces conflicts between bicyclists and pedestrians by indicating the part of the crosswalk intended for the two different modes.	At a typical intersection, cyclists would not be riding within the crosswalk, so this measure is intended for those few locations where the intersection design is such that bicyclists are tracked into a crosswalk such as at a midblock bike path crossing or possibly a cycle track.
Pedestrian Countdown Signal	Displays a “countdown” of the number of seconds remaining for the pedestrian crossing interval. In some jurisdictions the countdown includes the walk phase. In other jurisdictions, the countdown is only displayed during the flashing don’t walk phase.	While designed for pedestrians, this measure also assists bicyclists in knowing how much time they have to leave to cross the intersection.	The 2012 MUTCD requires all pedestrian signals to incorporated countdown signals within ten years
Measure	**Description**	**Benefits**	**Application**
G. Geometric Countermeasures to Assist crossing a Major Street			
Median Refuge Island	A raised island placed in the center of a roadway, separating opposing lanes of traffic, with ramps for cyclists and ADA accessibility	This measure allows bicyclists to cross one direction of traffic at a time; it allows drivers to see bicyclists crossing from the center more easily.	Suggested for multilane roads at uncontrolled crossings where an 8-foot (min.) wide by 15-foot (min.) long median can be provided.
Staggered Refuge Pedestrian Island	This measure is similar to traditional median refuge islands; the only difference is that the crosswalk is staggered such that a pedestrian crosses one direction of traffic street and then must turn to their right facing oncoming to reach the second part of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Benefits of this measure include forcing the bicyclists and pedestrians to face the oncoming motorists, increasing their awareness of the impending conflict. Additionally, can improve motorists’ visibility to those persons in the crosswalk.	Best used on multilane roads with obstructed pedestrian visibility or with off-set intersections

Raised Crosswalk/Speed Table	A crosswalk whose surface is elevated above the travel lanes at the same level as the approaching sidewalk. For bicyclists, a typical location would be at a bike path crossing, where the bike path elevation would remain constant while roadway cross traffic would experience a speed-hump type effect.	Attracts drivers' attention to the fact there will be non-motorized users crossing the roadway, and slows traffic by providing a speed-hump effect for motorists approaching the crosswalk.	Appropriate for multi-lane roadways, roadways with lower speed limits that are not emergency routes, and roadways with high levels of pedestrian activity, such as near schools, shopping malls, etc.
Measure	**Description**	**Benefits**	**Application**
H. Traffic Control Countermeasures to Assist Crossing a Major Street			
Traffic Signal or All-Way Stop Sign	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD)	Provides the gap needed in traffic flow so that cyclists can cross the street, reducing bicycle-vehicle conflicts and risk-taking by cyclists to	Must meet warrants based on traffic/ pedestrian / bicycle volumes, collision history, and/ or other factors.
Modern Roundabout	A traffic circle combined with splitter island on all approaches and entering traffic must YIELD to traffic within the roundabout; typically designed for traffic speed within the roundabout of between 15 and 23 mph.	Slows traffic on cross street so that cyclists can more easily cross.	Roundabouts are a better alternative than an All-Way Stop signs when the side street volume is approximately 30 % of the total intersection traffic volume and total peak hour volume is less than 2300 vehicles per day.
Hawk Beacon Signal	HAWK (High Intensity Activated Crosswalks) are pedestrian-bicyclist actuated signals that are a combination of a beacon flasher and a traffic control signal. When actuated, HAWK displays a yellow (warning) indication followed by a solid red light. During the cross street phase, the driver sees a flashing red “wig-wag” pattern until the clearance interval has ended and the signal goes dark.	Provides the need gaps in traffic so bicyclists can safely cross the street, can be timed separately for bicycles and pedestrians. Reduces pedestrian-vehicle conflicts and slows traffic speeds	Useful in areas where it is difficult for bicyclists /pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied. Appropriate for multilane roadways.
Rectangular Rapid Flashing Beacon (RRFB/Stutter Flash)	A warning sign that also contains rapid flashing LED lamps. The beacon may be push-button activated or activated with pedestrian detection.	Initial studies suggest the stutter flash is very effective as measured by increased driver yielding behavior. Solar panels reduce energy costs associated with the device.	Locations not controlled by any measures listed above. Appropriate for multi-lane roadways.

In-Roadway Warning Lights	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian detection.	This measure provides a dynamic visual cue of the uncontrolled crosswalk, and is especially effective at night and in bad weather.	Locations not controlled by any measures listed above. Best in locations with low bicycle ridership on the cross street, as the raised markers may present difficulty to bicyclists. May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight.
Bicycle Crossing Sign (MUTCD W11-1) or Trail Crossing sign (MUTCD W11-15/W11-15p)	Warning Sign and placard.	Alerts motorists to a location where bicyclists or bicyclists and pedestrians will be crossing the roadway at an uncontrolled location.	Typical application is at bike path crossing of a roadway. (At a typical pedestrian crosswalk at an intersection, use the Pedestrian warning sign W11-2)
In-Street Pedestrian Crossing Signs (MUTCD R1-6)	This measure involves posting this regulatory sign on road centerlines that read, “YIELD for Pedestrians in crosswalk”. (Depending on state law, the word STOP may replace the word YIELD).	This measure improves the visibility of the crossing to motorists and has a positive impact on pedestrian safety at crosswalks.	Mid-block crosswalks, unsignalized intersections, low-speed areas, and two-lane roadways.
Advanced Yield Lines	Standard white stop or yield limit lines are placed 20-50 feet in advance of marked, uncontrolled crosswalks.	This measure increases the pedestrian’s visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian conditions on multi-lane roadways. It is also an affordable option.	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat collision on multi-lane roads.
Transit			
Bike Racks on Buses	A rack on the front of the bus that typically holds two or three bicycles.	Increases the trip length distance that a person can make.	Appropriate for all buses; most urban transit agencies have already implemented this measure.
Bikes allowed inside buses when bike rack is full	A policy adopted by a transit agency that allows passengers to bring bicycles inside the bus when the bike rack is full and there is room inside.	Prevents cyclists from needless being left behind to wait for the next bus if the bike rack is full yet there is room inside the bus.	Appropriate for all buses; most urban transit agencies have already implemented this measure.

Folding bikes allowed inside buses	A policy adopted by a transit agency that treats a folding bicycle as luggage, thereby allowing it inside the bus at all times.	Removes cyclists' uncertainty as to whether they will be able to fit their bike either on the bike rack or inside the bus; thus they can reliably plan on being able to catch their intended bus.	Appropriate for all buses; most urban transit agencies have already implemented this measure.

Appendix C: Resource List and References

RESOURCE LIST	
➔ Pedestrian and Bicycle Information Center ("PBIC") http://www.bicyclinginfo.org	Along with walkinginfo.org, a resource site maintained by UNC Highway Safety Research Center (UNC-HSRC)
➔ Pedestrian and Bicycle Crash Analysis Tool ("PBCAT") http://www.walkinginfo.org/facts/pbcat/index.cfm	Crash typing software product intended to assist planners and engineers with improving walking and bicycling safety through the development and analysis of a database containing details of crashes between motor vehicles and pedestrians or bicyclists
➔ FHWA On-Demand Bicycle Safety Training Courses http://www.bicyclinginfo.org/training/ondemand-training.cfm	FHWA University Course on Bicycle and Pedestrian Transportation National Highway Institute Bicycle Facility Design Course Safe Routes to School National Course APBP National Complete Streets Workshops
➔ FHWA University Course on Bicycle and Pedestrian Transportation, Report No. FHWA-HRT-05-085 http://www.tfhrc.gov/safety/pedbike/pubs/05085	A detailed 24-lesson course in planning and design for non-motorized transportation.
➔ FHWA Official Rulings website http://mutcd.fhwa.dot.gov/orsearch.asp	List of FHWA communications regarding experiments, and interpretation of documents (Requests To Experiment / RTEs, response letters, progress reports, final reports, changes).
➔ FHWA Interim Approvals webpage http://mutcd.fhwa.dot.gov/res-interim_approvals.htm	List of all Interim Approvals granted by FHWA. Interim Approvals enable states and local agencies to request approval to use a new device without experimentation before the device is incorporated into a future edition of the MUTCD.
➔ FHWA "Bicycle Facilities and the Manual on Uniform Traffic Control Devices" webpage http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/mutcd_bike.cfm	Status in the 2009 US MUTCD of various bicycle-related signs, markings, signals, and other treatments (e.g. can be implemented, Interim Approval, currently experimental).
➔ FHWA DRAFT Accessibility Guidance for Bicycle and Pedestrian Facilities, Recreational Trails, and Transportation Enhancement Activities (2008) http://www.fhwa.dot.gov/environment/recreational_trails/guidance/accessibility_guidance/guidance_accessibility.cfm	Summary of current accessibility standards, pending standards, guidelines under development, program accessibility, accessibility design criteria for sidewalks, street crossings and shared use paths and trails
➔ FHWA Bollards, Gates and other Barriers (webpage) http://www.fhwa.dot.gov/environment/recreational_trails/guidance/accessibility_guidance/bollards_access.cfm	Current guidance on the hazards of bollards, gates, fences and other barriers to restrict unauthorized use of paths. Alternatives to bollards and gates.
➔ California Traffic Control Devices Committee (CTCDC) http://www.dot.ca.gov/hq/traffops/signtech/newtech/	Committee agendas, minutes, annual reports, experiment status and reports, experimentation guidelines and requests, implementation of FHWA-issued Interim Approvals.
➔ *Caltrans Complete Streets webpage* *http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html*	*Complete Intersections guide and other resources*

➔ *Road Safety Audits: Case Studies (FHWA-SA-06-17)* *http://safety.fhwa.dot.gov/rsa/rsa_cstudies.htm*	
➔ *Bicycle Road Safety Audit Guidelines and Prompt Lists FHWA-SA-12-018* *http://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa12018/*	
➔ *National Center for Safe Routes to School* *http://www.saferoutesinfo.org/*	*Resources for Infrastructure (engineering, safety, planning, design) and non-infrastructure (education, promotion, outreach) in support of Active Transportation in school commutes*

Adapted from FHWA Pedestrian Road Safety Audit Guidelines and Prompt Lists

RESOURCES FOR EXPERIMENTATION AND INTERIM APPROVALS	
➔ FHWA "Bicycle Facilities and the Manual on Uniform Traffic Control Devices" webpage http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/mutcd_bike.cfm	Status in the 2009 US MUTCD of various bicycle-related signs, markings, signals, and other treatments (e.g. can be implemented, Interim Approval, currently experimental). Start here to determine whether a device requires experimentation.
➔ FHWA Interim Approvals webpage http://mutcd.fhwa.dot.gov/res-interim_approvals.htm	List of all Interim Approvals granted by FHWA. Interim Approvals enable states and local agencies to request approval to use a new device without experimentation before the device is adopted in a future edition of the MUTCD.
➔ FHWA Official Rulings website http://mutcd.fhwa.dot.gov/orsearch.asp	List of FHWA communications regarding experiments, and interpretation of documents (Requests To Experiment / RTEs, response letters, progress reports, final reports, changes).
➔ California Traffic Control Devices Committee (CTCDC) http://www.dot.ca.gov/hq/traffops/signtech/newtech/	Committee agendas, minutes, annual reports, experiment status and reports, experimentation guidelines and requests, implementation of FHWA-issued Interim Approvals.
➔ FHWA (U.S.) Manual on Uniform Traffic Control Devices (MUTCD) (2009), Section 1A.10 http://mutcd.fhwa.dot.gov/ *NOTE: All US MUTCD content appears in-line in the California MUTCD, with California differences shown in blue, and California tables and figures identified with (CA).*	Section 1A10 Interpretations, Experimentations, Changes and Interim Approvals covers the design, application and placement of traffic control devices other than those adopted in the MUTCD. Figure 1A.1 Process for Requesting and Conducting Experimentation for New Traffic Control Devices is a flowchart of the federal (FHWA) process. Figure 1A.2 Process for Incorporating New Traffic Control Devices into the MUTCD is a flowchart of the process after successful experimentation, a research study, or a request from a jurisdiction or interested party
➔ California Manual on Uniform Traffic Control Devices (MUTCD) (2012), Section 1A.10 http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca_mutcd2012.htm NOTE: All US MUTCD content appears in-line in the California MUTCD	Figure 1A.1 (CA) Process for Requesting and Conducting Experimentation for New Traffic Control Devices in California is a flowchart of the California (CTCDC) process. Figure 1A.101 (CA) Process for the Use of Traffic Control Devices Approved as Interim Approval (IA) by FHWA is a flowchart of additional steps in California before a device granted Interim Approval by FHWA may be used.

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Appendix D: Street Connectivity

Importance of Street Connectivity

Providing direct paths for bicyclists and pedestrians via well-connected street networks is important for encouraging bicycling and walking by helping people overcome real and perceived senses of distance.

Street connectivity is also associated with public health benefits. The SMARTRAQ Project analysis in Atlanta, Georgia, found that doubling the current regional average intersection density, from 8.3 to 16.6 intersections per square kilometer was associated with a reduction in average per capita vehicle mileage of about 1.6 percent. Furthermore, the Frank et al. (2006) study of King County, Washington, found that per-household VMT declines with increased street connectivity, all else held constant.

Policies for Street Connectivity

A network of safe, direct, and comfortable routes and facilities: A 2004 PAS report recommends that pedestrian (and bicycle) path connections should be every 300 to 500 feet; for motor vehicles, they recommend 500 to 1,000 feet.[1] [2] For new development, such standards can be implemented through ordinances, like those of the regional government of Portland Oregon, Metro, which requires street connectivity in its Regional Transportation Plan and in the development codes and design standards of its constituent local governments.[3]

Measuring Connectivity

The following discussion of measuring street connectivity is provided as a resource and not officially a part of regular BSA processes. However, individuals are certainly encouraged to make such calculations.

Jennifer Dill (2004) presents the following measures of street connectivity:

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[1] Susan Handy, Robert G. Paterson, and Kent Butler, 2004, *Planning for Street Connectivity: Getting from Here to There,* PAS Report #515 (Chicago: APA Planners Press).

[2] For more information on this topic, see American Association of State Highway and Transportation Officials (AASHTO), *AASHTO Guide for the Design of Pedestrian Facilities* (Washington, D.C., AASHTO, 2004); *AASHTO Guide for the Development of Bicycle Facilities* (Washington, D.C., AASHTO, 1999; updated 2009); Institute of Traffic Engineers (ITE), Traffic Calming Guidelines and ITE *Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*? (Washington, D.C.: ITE, 2006), http://www.ite.org/bookstore/RP036.pdf (accessed September 3, 2008).

[3] The regional government of Portland Oregon, Metro, requires street connectivity in its Regional Transportation Plan and in the development codes and design standards of its constituent local governments as follows: local and arterial streets be spaced no more than 530 feet apart (except where barriers exist), bicycle and pedestrian connections must be made (via pathways or on road right of ways) every 330 feet, Cul de sacs (or dead-end streets) are discouraged and can be no longer than 200 feet, and have no more than 25 dwelling units.

- Intersection density
- Street density
- Average block length
- Link/node ratio
- Connected node ratio = intersections/ (intersections + cul-de-sacs)
- Alpha index = number of actual circuits/ maximum number of circuits

  Where a circuit is a finite, closed path starting and ending at a single node
- Gamma index = number of links in the network/ maximum possible number of links between nodes
- Effective walking area = number of parcels within a one-quarter mile walking distance of a point/ total number of parcels within a one-quarter mile radius of that point
- Route directness = route distance/ straight-line distance for two selected points

Dill suggests that route directness (RD) is perhaps the best connectivity measure to reflect minimizing trip distances, but may be difficult to use in research and policy. However, it may be applied in practice by randomly selecting origin-destination pairs and calculating a sample for the subject area.

Susan Handy, Robert G. Paterson, and Kent Butler, 2004, *Planning for Street Connectivity: Getting from Here to There,* PAS Report #515 (Chicago: APA Planners Press).

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(SAFETREC)

UNIVERSITY OF CALIFORNIA, BERKELEY

About the Safe Transportation Research and Education Center (SafeTREC)

Founded in 2000, SafeTREC is part of the University of California, Berkeley, affiliated with the School of Public Health and the Institute of Transportation Studies, with additional partnerships with the Department of City and Regional Planning, Public Policy, and Transportation Engineering. SafeTREC helps the California Office of Traffic Safety (OTS) administer its Community Pedestrian and Bicycle Safety Training workshops and support various safety initiatives from other California agencies, including the California Department of Transportation (Caltrans), by providing programs such as:

- Community Pedestrian and Bicycle Safety Program
- Complete Streets Safety Assessments
- Global Road Safety
- Tribal Road Safety
- Collaborative Sciences Center for Road Safety

SafeTREC's mission is to reduce transportation-related injuries and fatalities through research, education, outreach, and community service.

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