



APPENDIX D:

**PROJECT PRIORITIZATION
METHOD AND RESULTS**

Appendix D: Project Prioritization Method and Results

Chapter 5 of the SR2S Plan provides a high-level overview of the Project Prioritization method and provides the ranking for **67** location-specific engineering recommendation bundles. This appendix provides the detailed prioritization methodology, and the rankings for all City of San Pablo (City) projects.

Prioritization Methodology

Keeping the number of prioritization criteria focused and streamlined can lead to clearer prioritization results. The Project Team selected the following set of criteria:

- Safety
- Proximity to Students
- Cost

The Project Team created a benefit score and cost score in order to generate a benefit-to-cost ratio for the projects for all ten (10) schools. Recommendations were sorted into three (3) buckets—high, medium, and low—based on the benefit-to-cost ranking. This process is intended to help the City prioritize investments in coming years; however, these rankings should also be viewed as flexible and not reflective of the true priority level of any given project. As opportunities arise (e.g., new development), a lower-ranked project may be ripe for implementation as a part of another process and/or funding opportunity.

Five-Step Process

Step 1 – Establish Universe of Projects for Prioritization

In response to walk audit observations, community input, and City staff feedback, the Project Team proposed **124** infrastructure recommendations across the ten (10) school sites. For implementation purposes, it is useful to group projects together - bundling projects by location allows the City to strategically pursue funding and implement construction and maintenance. The Project Team therefore bundled the infrastructure recommendations by location, resulting in a total of **67** site-specific recommendations. These recommendations include spot treatments (e.g., at an intersection), corridor-wide treatments, and school-wide treatments.

Step 2 – Assess Project and Bundle Benefits

This step focuses on quantitative measurements that assess each project's benefit based on its location in the City and along the roadway network. **Figure D1** on the following page outlines the criteria, metrics, and scoring system used to calculate a benefit score for each project. This step was implemented using scripted analysis and GIS software.

Once benefit scores were established for each project, the Project Team calculated a benefit score for each bundle. Bundle benefit scores were calculated as the average of the benefit scores of all projects within each bundle. Bundle benefit scores were normalized on a scale from 0 – 10 using proportional scaling.

Figure D1. Project Benefit Criteria

Project Benefit Criteria	Metric ¹	Scoring	Total Value
Does the project address a safety issue?	Severity-Weighted Bicycle and Pedestrian Collision History ²	Higher score for projects with a higher concentration of collisions along the project alignment (within a 50-foot buffer).	10 points
	Observed Speeds (85 th Percentile)	Higher score for projects that are on streets with higher recorded speeds (captures how fast <i>most</i> drivers are driving)	5 points ³
	Super-Speeding Vehicles (10mph or more over posted speed limit)	Higher score for projects that are on streets with higher percentages of vehicles exceeding the posted speed limit by more than 10 mph (captures <i>how many</i> drivers are “super speeding”)	5 points
	Crossing distance ⁴	Higher score for projects on streets with longer crossing distances	10 points
Does the project support locations where students are most likely to walk or bicycle to school?	Total number of student addresses within walkable and bikeable distance ⁵	Higher score for schools with greater number of addresses within 1 mile network distance of the school	10 points
	School type	Higher score for public schools versus private schools	10 points
Total Possible Score			50 points ⁶

- 1 Each metric was normalized by project length and/or area-weighted (based on the area of the geographical unit, such as census tracts or blocks, as appropriate). When applicable, proportional scaling was used to allocate points.
- 2 A weighted crash total of bicycle and pedestrian crashes that occurred between 2015 and 2019 along each project was calculated. Crashes were weighted based on the severity of the most severe injury resulting from the crash: fatal and suspected serious injury crashes were weighted 3x, and suspected minor injury crashes and possible injury crashes were weighted 1x.
- 3 Because we are including two measures of speed, each measure is assigned a 5-point value, for a total 10-point value. Speed is therefore weighted equal to the other metrics. Speed data acquired via Streetlight Data.
- 4 Crossing distance was only applied to spot projects (e.g., mid-block crossings and intersection improvements). It was not applied for corridor-level or school-wide projects.
- 5 School address data was not available for the private schools. Private schools had a higher proportion of non-San Pablo students than the public schools included in this Plan.
- 6 For projects for which certain data was not available (e.g., Streetlight speed data for projects located on school property, and crossing distance for school-wide or linear projects), the total possible score for those projects was reduced. This ensures all projects are ranked according to their available data only, and are not penalized due to data limitations. For example, projects for which we have all data are scored out of a total of 50. Projects for which we have data for 4 out of 5 metrics are scored out of 40. These scores are then normalized to be compared against one another.

Step 3 – Assess Project and Bundle Costs

For each of the 124 engineering projects, the Project Team provided a high-level cost estimate for construction or implementation. Cost estimates were developed using consultant experience on engineering and design projects in California and the Bay Area, as well as the Caltrans District 4 Cost Estimator (2021). The costs for all linear projects were estimated using an estimated measurement of linear feet, based on aerial imagery. Project costs developed were normalized on a logarithmic scale from 0 – 10 so they could be directly compared against project benefit scores.

Bundle costs were calculated as the sum of the individual project costs within each bundle. Bundle costs were normalized on a logarithmic scale to establish cost scores from 0 – 10.

Step 4 – Develop Aggregate Prioritization Score (Benefit-to-Cost Ratio)

To calculate a prioritization score for each project, the Project Team conducted a benefit-to-cost analysis (i.e., benefit/cost ratio). The benefit/cost ratio for each project functions as the final prioritization score. To understand the relative benefit/cost of each project, the Project Team normalized the benefit results from Step 2 using proportional scaling. Proportional scaling allows raw numeric values to be proportionately fit to a common scale. Using this method, the Project Team assigned the highest value in the common scale to the maximum raw value for a particular variable and assigned the lowest value in the common scale to the lowest scaled value. The Project Team scaled the other raw values proportionately based on their relationship to the highest and lowest raw values. Scores from Step 2 and Step 3 were expressed in a range from 0 – 10, which enabled calculation of benefit/cost ratio for each of the 124 projects. The bundle benefit score was divided by the bundle cost score to calculate a benefit/cost ratio for each of the 67 bundles.

Step 5 – Rank Projects and Bundles

The benefit/cost ratios developed under Step 4 were ranked and grouped into three (3) buckets:

5 STARS 
3 STARS 
1 STAR 

The City of San Pablo will use this ranking framework to identify priority projects, and to strategically pursue funding for high-benefit projects.

Special Cases

- **City-Wide Recommendations**
City-wide infrastructure recommendations were not included in the project prioritization process, and were not assigned a cost/benefit ratio or prioritization score. In Chapter 5 of the Plan, the Project Team provided high-level cost estimates, as well potential funding opportunities.
- **Policy and Program Recommendations**
Policy and program recommendations were not included in the project prioritization process, and were not assigned a cost/benefit ratio or prioritization score. The Project Team provided estimates for level of resources and staff time, as well potential funding opportunities.

Other metrics considered

In developing the project prioritization methodology, the Project Team considered the following metrics, and ultimately decided to exclude them from the quantitative analysis. The Project Team implemented a methodology in which all metrics are meaningful, readily measurable, and not duplicative of one another. The logic for excluding each of the following metrics is listed below:

- 1. Community Input:** Community input via the online survey and web-map, walk audits, and pilot recommendation directly informed project identification and locations. However, community engagement was designed to collect input on issues and opportunities, rather than preference and relative priority. The Project Team did not ask for community feedback on how residents would like to see projects prioritized. Using community input (such as a comment via the web-map) as a quantitative criterion during prioritization would constitute an invalid interpretation of the feedback, and could lead to unintended or biased results. In addition, the Project Team received vastly different response rates from different schools. This does not necessary reflect different levels of interest at different schools, but rather a concerted effort by teachers and staff to have students fill out the survey at some schools, but not others.
- 2. Implementation Timeline:** The Project Team identified a short- or long-term implementation timeline for each infrastructure recommendation, as well as opportunities for quick-build implementation. However, this metric was not included in the quantitative project prioritization since it would require assigning priority to either short-term or long-term projects. If the Project Team prioritizes short-term projects, residents of San Pablo may miss out on the benefits that come with long-term, permanent investments in infrastructure upgrades. If the Project Team prioritizes long-term projects, the City may miss out on near-term funding and implementation opportunities. In addition, project timeframe can be duplicative with project cost, as the more expensive projects tend to have longer construction and implementation timelines.
- 3. Project Feasibility, Readiness, and/or Level of Effort:** Within a prioritization context, metrics of project feasibility, readiness and level of effort tend to be duplicative, and confounding. Feasibility constraints are usually associated with lower project readiness and higher level of effort. High level of effort is usually associated with higher costs, and vice versa. For clarity, the Project Team selected estimated project cost as the singular criterion within the quantitative benefit/cost analysis.

Engineering Recommendations: Benefit to Cost Ranking

Benefit to Cost Ranking: 5 Stars (n=21) ★★★★★

School	Location	Engineering Recommendation	Cost Estimate
Bayview	Broadway Ave & 14 th St	Consider closing northbound access point to 14th Street	\$1,800
	Broadway Ave & 15 th St	Restripe as high-visibility crosswalks	\$2,000
	Broadway Ave & Rivers St	Install additional crossing signage	\$2,000
	Madrone Way & 14 th St	Install stop sign and stop bar across Madrone Way	\$650
	Rivers St & 15 th St	Install crosswalks on all legs	\$600
	Rivers St & 17 th St	Install crosswalks on all legs	\$600
	Rivers St & 17 th St	Restripe the SLOW SCHOOL ZONE pavement markings with shark teeth and sign with arrow	\$675
	Rivers St & 14 th St	Install crosswalks on all legs	\$600
	Rivers St & 14 th St	Restripe the SLOW SCHOOL ZONE pavement markings with shark teeth and sign with arrow	\$675
	Schoolwide	Update school signage from yellow to current standard fluorescent yellow-green	\$10,000
Dover	19 th St Student Loading Zone	Install NO LEFT TURN signage. Consider installing centerline delineators, either permanent or temporary	\$650
	Dover Ave & 20 th St	Consider preventing left turns into parking lot during pick-up and drop-off, as they cause congestion and increase conflict opportunities. This can be achieved by installing temporary centerline with stanchions or traffic cones.	\$150
	Market Ave (18 th to 22 nd)	Install advanced school zone signage	\$2,000
	Market Ave & 19 th St	Install advance yield lines and YIELD HERE TO PEDESTRIANS signage	\$2,000
	Market Ave & 21 st St	Install advance yield lines and YIELD HERE TO PEDESTRIANS signage	\$2,000
E.M. Downer	18 th St (Alfreda to Sanford)	Replace signpost	\$500
	Alfreda Blvd (18 th to 21 st)	Restripe pavement markings	\$3,600
	Schoolwide	Install dual language wayfinding, school zone, speed, and traffic control signage (e.g., NO LEFT TURN)	\$5,000
Richmond	Schoolwide	Install school zone and school zone speed limit signs in and around school zone.	\$5,000
Riverside	Amador St (Riverside Dr to Shasta Ave)	Install flexible posts in median	\$150
	Schoolwide	Install high visibility/reflective School Zone sign (from north and south approach)	\$450

Benefit to Cost Ranking: 3 Stars (n = 40) ★ ★ ★

School	Location	Engineering Recommendation	Cost Estimate
Bayview	14 th St & Midblock crosswalk	Add crossing signage	\$1,000
	Rivers St & 15 th St	Restripe as high-visibility crosswalks	\$2,000
	Rivers St & 16 th St	Restripe as high-visibility crosswalks	\$2,000
	Rivers St & 17 th St	Restripe as high-visibility crosswalks	\$2,000
	Rivers St & 14 th St	Restripe as high-visibility crosswalks	\$2,000
	Broadway Ave & 14 th St	Install additional high-visibility crosswalk on east leg of intersection, including constructing curb ramps and installing advance warning signage	\$13,000
		Install RRFB	\$30,000
	Broadway Ave & 15 th St	Install RRFB at existing raised crossing	\$30,000
Broadway Ave & Rivers St	Upgrade existing crosswalk to raised crosswalk	\$22,000	
Dover	19 th St Student Loading Zone	Add pick-up/drop-off zone signage	\$2,000
	Market Ave (18 th to 22 nd)	Install traffic calming along Market Avenue that is appropriate for emergency access routes, such as curb extensions (at intersections or mid-block), chicanes, rubber modular speed cushions, or RRFBs.	\$125,400
	Market Ave & 21 st St	Replace in-pavement flashing lights with RRFB	\$34,000
E.M. Downer	Alfreda Blvd (18 th to 21 st)	Relocate crosswalk from east leg to west leg and reconstruct curb ramps, as feasible	\$11,000
		Add crosswalks on all 3 legs at Alfreda/19 th (2 N-S High Viz, 1 E-W Outside Stipes)	\$2,300
	California Ave (15 th to 21 st)	Restripe pavement markings	\$7,200
	18 th St (Alfreda to Sanford)	Consider making 18 th one-way (southbound), including signage	\$7,700
	21 st St (California to Alfreda)	Consider relocating utilities and/or paving sidewalk around utilities to maintain 5-foot functional width	\$1,050,000
Lake	Broadway & 16 th St	Restripe as high-visibility crosswalks	\$1,000
	Lake St (10 th to Broadway)	Install advanced school zone signage	\$3,000
	Lake St & 16 th St	Restripe as high-visibility crosswalks	\$1,000
	10 th St	Restripe pavement markings	\$2,025

Benefit to Cost Ranking: 3 Stars (Continued) ★★

School	Location	Engineering Recommendation	Cost Estimate
Lake (Cont.)	Lake St (10 th to Broadway)	Install painted curb extensions at Lake/13th	\$2,400
		Convert side-street yields to side-street stop control	\$6,500
		Install painted curb extensions at Lake/15th	\$2,400
		Install painted curb extensions at Lake/14th	\$2,400
		Install corridor-wide traffic calming that is appropriate for emergency access routes, such as curb extensions (at intersections or mid-block), chicanes, rubber modular speed cushions, or RRFBs.	\$10,500
		Install crossings on all legs when feasible. Potential conflicts may include driveways, utilities, drainage, and private landscaping	\$10,600
Richmond	23 rd St (Emeric to Maricopa)	Restripe bicycle lanes to Class IV Bicycle Lanes (protected bicycle lanes).	\$13,000
		Install corridor-wide traffic calming such as raised crossings and/or speed humps	\$36,000
	23 rd St & California Ave	Remove pedestrian push button poles at curb ramps	\$600
	23 rd St & Wilcox Ave	Upgrade pedestrian crossing with high-visibility crosswalks and school crossing signs.	\$2,000
		Remove pedestrian push button poles at curb ramps and remove in-pavement flashers	\$5,200
	Emeric Ave (23 rd to 24 th)	Install school zone signs along Emeric Ave from 23rd to 24th	\$2,000
	Maricopa Ave (East of 23 rd St)	Install school zone signs along Maricopa Ave from 23rd to 24th	\$2,000
23 rd St (At school property)	Improve signage and striping for passenger loading zone and bus stop.	\$4,800	
Riverside	Amador St (south of school property)	Cut back tree	\$5,000
	Amador St (Riverside to Shasta)	Install Class III Bicycle Facilities (Bicycle Route)	\$10,500
	Amador St & Glenn Ave	Install curb ramps, yellow outer lines only for crosswalk, with centerline double yellow extended ~60ft back with yellow reflector, extend red curb along Amador to the south to daylight the crosswalk	\$10,500
	Amador St & Shasta Ave	Install curb ramps, yellow outer lines only for crosswalk, with centerline double yellow extended ~60ft back with yellow reflector, extend red curb along Amador to the south to daylight the crosswalk	\$10,500

Benefit to Cost Ranking: 1 Star (n = 40) ★

School	Location	Engineering Recommendation	Cost Estimate
Bayview	14 th St & Midblock crosswalk	Consider installing additional mid-block crossing, south of pick-up/drop-off loop	\$11,000
	Broadway Ave & 15 th St	Reconstruct curb line to build curb extension for SW corner of intersection, daylighting and red curb zone or painted curb extensions at NE corner	\$126,200
	Broadway Ave & Rivers St	Add curb extensions to shorten crossing distance at existing crosswalk	\$250,000
	Madrone Way & 14 th St	Install marked crosswalks at north, east, and south legs of intersection, including installing curb ramps	\$30,900
Dover	21 st St (Market to Dover)	Consider relocating utilities and/or paving sidewalk around utilities to maintain 5-foot functional width	\$3,500,000
	Market Ave & 19 th St	Install curb extensions to reduce crossing distances and encourage driver yielding	\$250,000
	Market Ave & 21 st St	Install curb extensions to reduce crossing distances and encourage driver yielding	\$250,000
	19 th St (Market to Dover)	Consider relocating utilities and/or paving sidewalk around utilities to maintain 5-foot functional width	\$3,500,000
E.M. Downer	18 th St Student Loading Zone	Install hardened centerline	\$5,100
	Alfreda Blvd (18 th to 21 st)	Painted or raised intersection, install north/south crosswalk	\$23,000
	California Ave (15 th to 21 st)	Install crossing on eastern leg of intersection at California/15th	\$11,000
		Relocate crosswalk from east leg to west leg and reconstruct curb ramps, as feasible	\$11,000
		Consider relocating utilities and/or paving sidewalk around utilities to maintain 5-foot functional width	\$5,600,000
Helms	Road 20 (west of El Portal Dr)	Cut back tree	\$5,000
	Road 20 & Abella Cir (unsignalized)	Relocate SCHOOL ZONE SPEED LIMIT signage closer to El Portal	\$500
	San Pablo Ave & Road 20 - 23 rd St	Include new tactile strips at crosswalks as part of intersection redesign	\$36,000
	Road 20 (at school property)	Install bicycle lanes or two-way cycle track	\$50,000
	Road 20 (west of El Portal Dr)	Realign Rd 20 as perpendicular to El Portal; develop signal coordination and add LPIs	\$500,000
	Road 20 & Abella Cir (signalized)	Repair/replace tactile strip	\$36,000
	Road 20 & Paseo Way	Install curb ramps, stripe high-visibility yellow ladder crosswalk	\$11,000
	San Pablo Ave & Road 20 - 23 rd St	Redesign intersection	\$1,000,000

Benefit to Cost Ranking: 1 Star (Continued)

School	Location	Engineering Recommendation	Cost Estimate
Lake	Broadway Ave & 16 th St	Install RRFB at existing crossing	\$30,000
	Lake St (10 th to Broadway)	Install speed feedback signage	\$7,500
	Manchester Ave & Trenton Blvd	Upgrade crosswalk, including high-visibility striping, curb ramps, and drainage	\$12,000
	Kelley Ave Crosswalk	Upgrade crosswalk, including high-visibility striping, curb ramps, and drainage	\$11,000
	Lake St (10 th to Broadway)	Install concrete curb extensions at Lake/11th	\$250,000
Richmond	23 rd St (At school property)	Install speed feedback sign	\$7,500
	23 rd St & California Ave	Remove in-pavement flashers and install RRFB	\$34,000
Riverside	Riverside Ave & Yuba St	Extend sidewalk and install curb ramps (3), improve crosswalk striping	\$16,800
Salesian	Schoolwide	Consolidate street sweeping signs with yield-for-advance-crossing signs on Vale Rd near Wildcat Creek Trail crossing	\$1,000
		City of San Pablo to install school zone and speed limit signs within school zone; prioritize placement close to San Pablo Ave	\$2,500
St. Paul	Church Ln (at school property)	Move CURVE AHEAD sign to west of Villa Dr crosswalk	\$500
	Church Ln (Dover to San Pablo)	Narrow Church Ln cross-section for through-traffic; convert perpendicular parking to angle parking; convert road to 1 lane in each direction	\$5,400
		Install curb extensions at Church Ln/ Dover Ave crosswalk	\$250,000
	Dover Ave & Pullman St	Install yellow outside striping on crosswalk	\$1,200
	Market Ave-Church Ln (26 th to Villa)	Restripe School Zone markings	\$1,710
		Install speed feedback sign and "CROSSWALK AHEAD" sign before curve	\$8,000
	Schoolwide	Install no parking signs or red curb along Class II Bike lane on curve to keep drivers out of bike lane	\$1,000
		Install school zone and speed limit signs within school zone	\$5,000
Student Loading Exit/Church Ln	Install flexible posts in median	\$150	

High-Level Cost Estimates

The following high-level cost estimates were used to calculate the cost per recommendation, and per recommendation bundle. The unit cost estimates are for the materials and installation of the specific treatment/countermeasure. Additional context-based work (e.g., removing old striping before applying new striping) is not included in the cost estimate

Category	Treatment/ Countermeasure	Unit Measurement	Unit Cost
Crosswalk	New/ Restriped High Viz Crosswalk	Each	\$1,000
	New/ Restriped Crosswalk - Outside Stripes Only	Each	\$300
	Crosswalk with Concrete Pedestrian Refuge or Median	Each	\$6,000
	Tactile Strips	Each	\$9,000
	Curb Ramp	Each	\$5,000
	Widen Curb Ramp	Each	\$3,000
	Add/ Reconstruct drainage	Each	\$3,000
Signage	Freestanding sign (with post)	Each	\$500
	Stop sign	Each	\$500
Signals	Rectangular rapid flash beacon (RRFB)	Each	\$30,000
	Speed Feedback Sign	Each	\$7,500
	Lead Pedestrian Interval	Each	\$2,500
	Pedestrian signal audible feature	Each	\$4,500
	Pedestrian push button	Each	\$2,000
	<i>Remove in-pavement flashers</i>	Each	\$4,000
	<i>Remove pedestrian push button pole</i>	Each	\$600
Bicycle Lanes	Class II Bicycle Lane	Linear foot	\$5
	Class III Bicycle Route	Linear foot	\$4
	Class IV Bicycle Lane - concrete	Linear foot	\$70
	Class IV Bicycle Lane - flex post verticals	Linear foot	\$10
	Separated, two-way cycletrack - concrete vertical element	Linear foot	\$25
	Separated, two-way cycletrack - flex post vertical element	Linear foot	\$5

Category	Treatment/ Countermeasure	Unit Measurement	Unit Cost
Traffic Calming	Speed Humps	Each	\$12,000
	Speed Bumps	Each	\$1,500
	Raised Crosswalk	Each	\$22,000
	Concrete Chicane	Each	\$35,000
	Curb Extension - Concrete	Each	\$125,000
	Curb Extension - Paint & Post	Each	\$1,200
	Centerline Delineator - Quick Build	Linear foot	\$85
	Retroreflective Centerline Striping	Linear foot	\$7
	Rubber Modular Speed Cushion	Each	\$3,500
	Traffic Calming - Quick Build	Meter	\$41,000
	Traffic Calming - Concrete	Meter	\$660,000
	Painted Intersection	Each	\$12,000
	Raised Intersection	Lump sum	\$85,000
	Median	Square foot	\$18
	Flex Posts	Each	\$15
Mini-Roundabout	Each	\$250,000	
Sidewalks/ Curbs	Construct Sidewalk	Square foot	\$16
	Relocate Utilities	Each	\$15,000
	Underground Utilities	Linear foot	\$3,500
	Painted curb (red, yellow, white)	Linear foot	\$2
	Convert Rolled Curb to Vertical Curb	Linear foot	\$60
Miscellaneous	Trim Vegetation	Square foot	\$50
	Secure bicycle parking (i.e., locker)	Each	\$6,500
	Close street to traffic (K-Rail)	Linear foot	\$60
	Chain Link Fence	Linear foot	\$50
	Wooden pedestrian foot bridge over levy	Square foot	\$325
	<i>Remove concrete bollards</i>	Each	\$250

Category	Treatment/ Countermeasure	Unit Measurement	Unit Cost
Roadway Striping/ Pavement Marking	Convert Two-Way to One-Way	Linear foot	\$5
	Road Diet/ Restripe Lanes	Linear foot	\$5
	School Zone Pavement Striping	Linear foot	\$5
	Yellow reflective centerline	Linear foot	\$3
	Add/ Restripe Parking	Linear foot	\$5
	Stop bar	Each	\$150
Lighting	Streetlight	Each	\$7,500
	Crosswalk light	Each	\$7,500
	Pedestrian-scale lighting	Linear foot	\$20
Labor	Design Consultant Hourly Rate	Hour	\$170
	City Public Works maintenance	Hour	\$125
Further Study	Speed Study	Each	\$10,000
	Turning Movement Counts	Each	\$2,500
	Vehicle Maneuver Study	Each	\$2,500
Intersection Redesign	Minor Intersection Redesign	Each	\$250,000
	Moderate Intersection Redesign	Each	\$500,000
	Major Intersection Redesign	Each	\$1,000,000