

Responding after Serious and Fatal Traffic Crashes: A Rapid Response Program for the City of Alameda, California

A memo for the Planning, Building & Transportation Department for the City of Alameda,
California

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I. Executive Summary

Developing a Rapid Response Program will provide the City of Alameda (City) with a strategic approach to respond in the aftermath of traffic crashes resulting in severe injuries and fatalities. A Rapid Response Program is a pre-determined engineering and communication protocol. Standardizing a protocol will ensure that City staff have clarity on roles, responsibilities, and priorities when severe and fatal crashes occur.

Establishing a protocol will proactively reduce risk along the City's high injury corridors and show responsiveness to constituent concerns. Annually in the City of Alameda, approximately two people are killed in traffic crashes while ten people suffer severe injuries. By declaring a Vision Zero policy and adopting a Vision Zero Action Plan, the City has deemed these outcomes to be unacceptable and seeks to eliminate severe and fatal crashes by 2035. Crash analysis reveals that 76% of recent severe and fatal collisions are occurring on roadways identified as high injury corridors. Therefore, implementing engineering changes at crash locations will have an outsized impact on mitigating future risk.

A Rapid Response Program could meet the City's needs without incurring high costs. If present trends continue, Rapid Response would be invoked to respond to approximately 1-4 fatal crash sites per year. An initial estimate places these activations an average of \$150,000 per year (some years will be higher and some lower, depending on the number of activations) based on data from the Federal Highway Administration (FHWA).

A Rapid Response Program would complement other Vision Zero practices currently in place. The City is already engaging in a variety of strategies as part of its Vision Zero goals to improve safety, including capital improvements, the High Injury Corridor Daylighting Project, and efforts to encourage mode switch. The Rapid Response Program should be viewed as a complement to these proactive measures.

Research on the practices of 21 other U.S. cities found [five key approaches](#) have been used to address serious and fatal crashes. These policy alternatives were analyzed using a set of seven criteria including crash reduction potential, need for staff support, implementation timeline, cost, scalability, potential for evaluation, and aesthetic impact. A Rapid Response Program was found to be the best fit for the city's needs because it is responsive to new crash data and provides a degree of flexibility to tailor responses to specific circumstances. The City will streamline operations and be able to respond to sites more quickly through such an approach, saving limited staff time and resources.

A [Rapid Response Program](#) for the City of Alameda should include the following elements:

- **Investigation:** When fatal crashes occur, the Vision Zero Coordinator should convene representatives from the Alameda Police Department, Planning, Building & Transportation Department, Public Works Department, and Caltrans (depending on location). The City should develop a standardized form to document findings from these site visits and share them publicly.
- **Infrastructure Response:** If engineering needs are discovered during a site visit, the City should develop pathways to implement these changes quickly to limit future risk.
 - **Maintenance issues:** If maintenance needs are discovered during a site visit, the City should develop a system to fix these issues using internal Public Works resources as quickly as possible.
 - **Toolkit:** If no maintenance needs are identified, the next phase of Rapid Response would determine whether a quick-build countermeasure can be implemented at the site. This determination would be made by an engineer based on analysis from the interdepartmental site visit. The City should develop a [“toolkit” of potential interventions](#) to streamline decision-making. If a solution from the toolkit is not an appropriate fit for the site due to the complexity of engineering needs, the City should develop a system to elevate a potential capital project at the site in the next budget cycle.
 - **On-call contracting:** With the low number of collisions occurring on an annual basis, the City government cannot realistically staff a dedicated team solely for the purpose of responding to severe and fatal crashes. Using on-call contracting to design and implement engineering changes will reduce burden on limited staff resources, ensure timely implementation, and allow staff to focus on proactive traffic safety projects with the greatest potential to reduce future risk.
 - **Scope:** In the short-term, only fatal crash sites should be addressed through Rapid Response. Program scope can be expanded to include severe injuries as better data on severe crash outcomes becomes available. Rapid Response engineering changes will only apply to roadways owned by the City; Caltrans has its own procedures for responding to serious and fatal crashes.
 - **Prioritization:** Crash sites should be prioritized by the date of the crash; a more complex system is not needed while the program only responds to fatal crashes.
- **Proactive public communication:** In its public communications after crashes, the City should not share victim names out of concerns for privacy and ongoing criminal investigations. However, the Vision Zero Coordinator should work with the Police Department and Public Information Officer to develop narratives to help community members understand how, why, and where crashes are occurring on the island, and actions that are being taken in response.
- **Annual evaluation & reporting:** The Vision Zero Coordinator should report on the Rapid Response Program metrics in the Annual Report on Transportation, as part of the Vision Zero Action Plan reporting.

At this time, it is recommended that the City of Alameda develop a two-year pilot to demonstrate the efficacy of a Rapid Response Program. This will indicate to constituents that the City is committed to its Vision Zero goal, is willing to invest funding to achieve this goal, and is

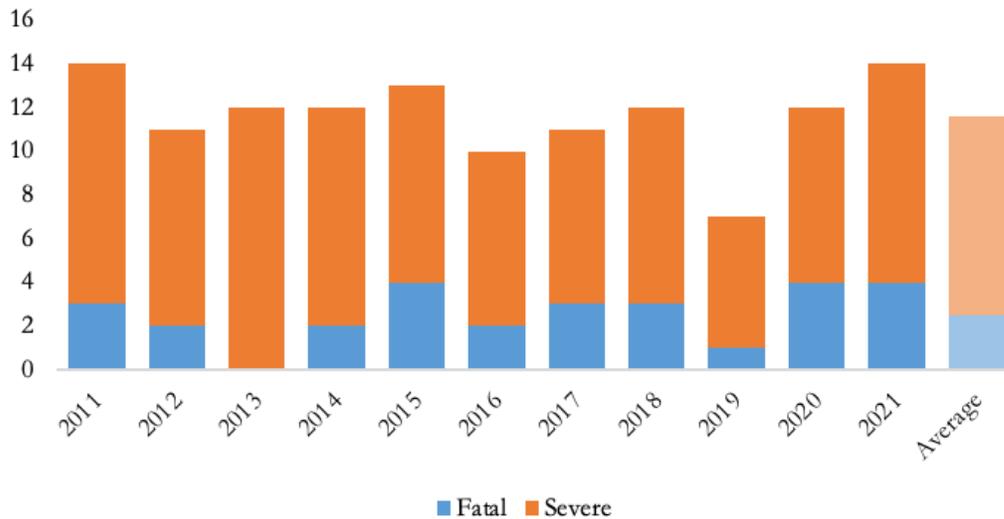
results oriented. In the medium- to long-term, the City should continue to employ a wide strategic portfolio to support its Vision Zero goals, through additional approaches such as speed limit reductions and systematic engineering interventions scaled across the city.

II. Rapid Response Needs in the City of Alameda

Collision Trends

According to data from the Statewide Integrated Traffic Records System (SWITRS) and the Alameda Police Department (APD), the City has had relatively consistent numbers of traffic fatalities and serious injuries over the last decade. **Figure 1** shows the number of people impacted by year for each type of crash.

Figure 1: Fatal and Severe Traffic Crashes 2011-2021¹



Community Impacts

Several recent high-profile, devastating traffic crashes in Alameda involving vulnerable road users have raised community members' concern about traffic safety issues. A former KTVU news anchor was killed in a crosswalk while he was walking at night in June 2021,² and an Alameda County Supervisor died after being struck by a vehicle while she was out walking her dog in November the same year.³ While it is hard to decipher trends for such a short period of time when measuring relatively rare events, fatalities were higher than usual in the pandemic years of 2020 and 2021 in Alameda, consistent with trends seen across the United States.⁴

Vulnerable road users face higher risks on Alameda roadways. Data analysis conducted by Toole Design, a planning and engineering consulting firm, found that while pedestrians & cyclists represent only 5% of the City's commute to work share,⁵ they were involved in 39% of crashes and 62% of severe crashes from 2008-2018.⁶ This is significant for two key reasons. First, this suggests that the most serious outcomes from traffic crashes are concentrated among a small percentage of

the population. Secondly, given Alameda’s strong commitment to reducing carbon emissions as outlined in its Climate Action Resilience Plan (CARP), the City plans to reduce commute vehicle miles traveled (VMT) by 2030, in part by encouraging mode shift to active transportation.⁷ In order to induce these changes, other modes of transportation beyond driving need to be safe and attractive options.

Responding with New Policy

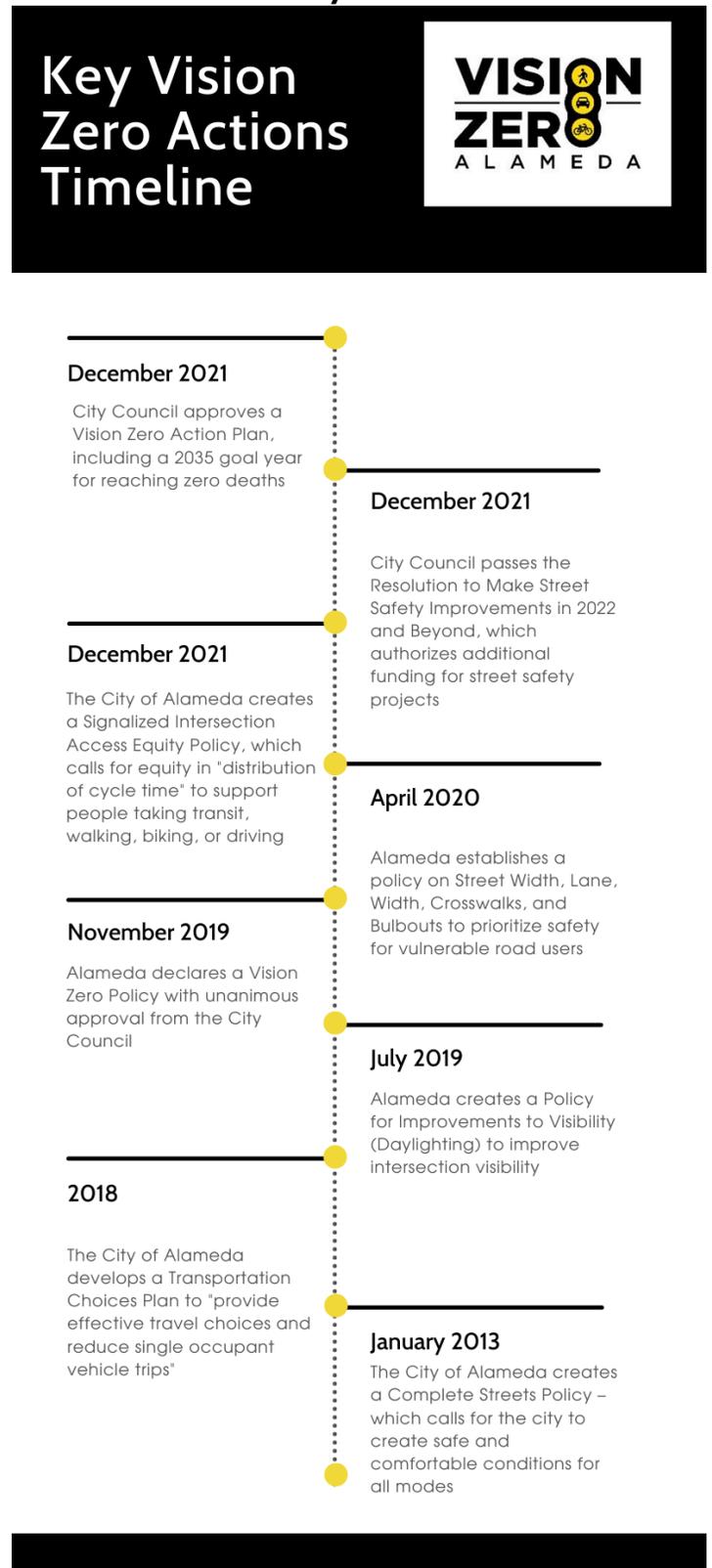
Within this context, in 2019, the City declared a Vision Zero policy, with the goal of eliminating severe traffic crashes and deaths. A Vision Zero Action Plan (VZAP), passed by the City Council in December 2021, established key actions to achieve this objective by 2035. **Figure 2** shows additional actions that the City has taken over time to improve traffic safety. These goals boldly declare that traffic fatalities are not an acceptable outcome for the community.

As a small city with similar patterns of crashes to others in California, the City of Alameda has an opportunity to demonstrate leadership by developing strong Vision Zero program management practices.

Building a Strategic Path Forward

The City of Alameda needs a strategic approach to help it respond in the aftermath of traffic crashes resulting in severe injuries and deaths. Given that there is a low number of these collisions occurring on an annual basis, the City government cannot realistically staff a dedicated team for the purpose of responding to severe and fatal crashes. However, to reduce the overall probability of such crashes in these locations in the future, as well as respond to constituent concerns, a new protocol is warranted to address serious and fatal crashes when they occur.

Figure 2: Timeline of Key Traffic Safety Initiatives in the City of Alameda



III. Fatal and Severe Injury Collision Locations

Alameda’s High Injury Corridor map, developed for the Vision Zero Action Plan based on 2009-2018 data, has been highly predictive of the locations where severe and fatal crashes have occurred in subsequent years. As shown in **Figure 3**, 76% of crashes resulting in death or severe injury occurring from 2019-2021 took place on High Injury Corridors.⁸ **Table 1** summarizes the high-injury corridor tiers where these crashes have occurred.

Figure 3: KSI Crashes 2019-2021 Overlaid on the High Injury Corridor Map⁹



Table 1: 2019-2021 Serious and Fatal Crashes on the High Injury Corridor¹⁰

Injury Tier Ranking	Number of Serious or Fatal Crashes (2019-2021)	Percent of Crashes
1 (Highest/worst, Red)	7	33%
2 (Orange)	3	14%
3 (Yellow)	6	29%

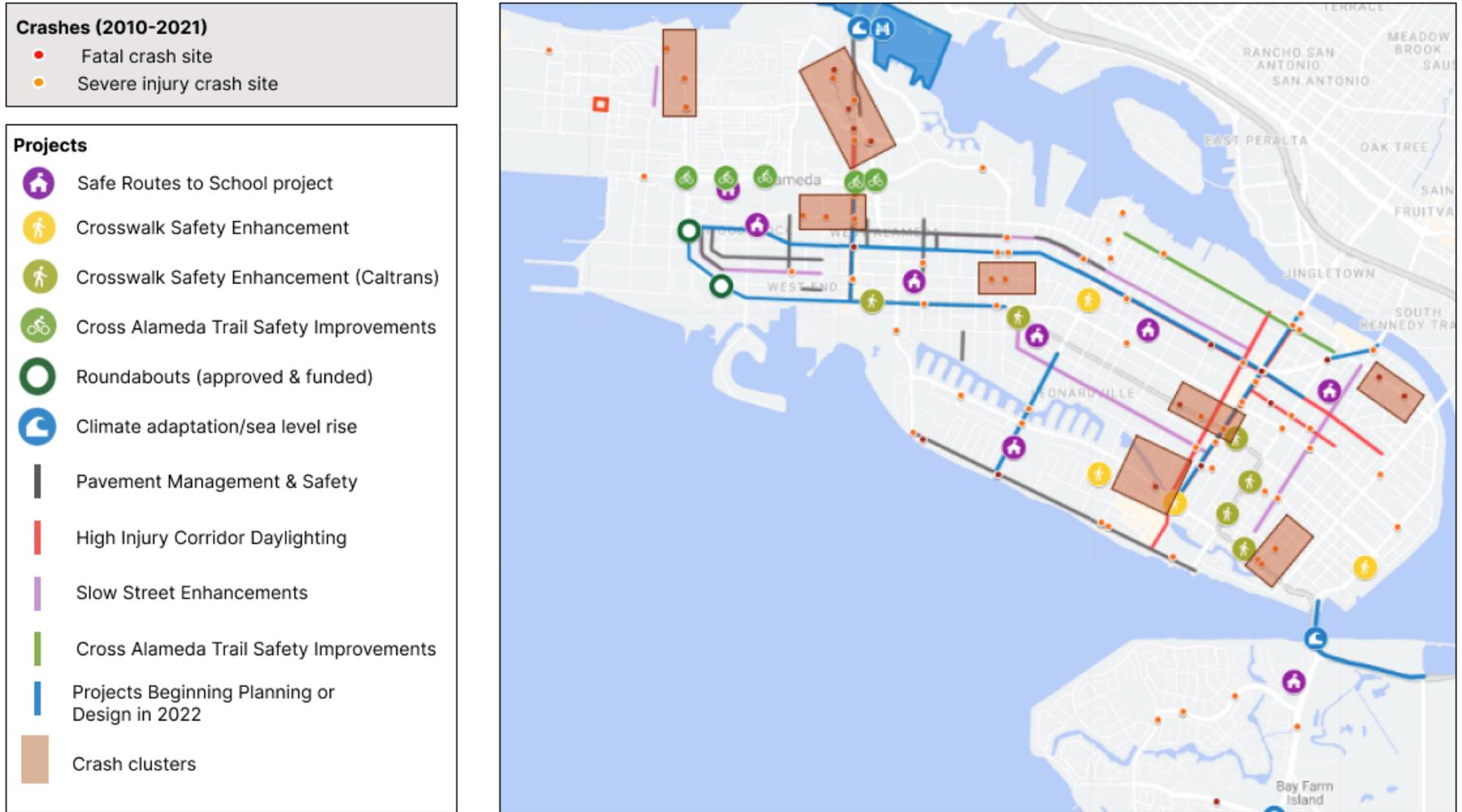
Streets not included on the high injury corridor	5	24%
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Subtotal on high injury corridor	16	76%
Total	21	100%

As part of its Vision Zero Action Plan, the City is taking action through existing channels to address traffic safety through capital projects. **Figure 4** outlines these planned projects. Given the recent adoption of Vision Zero, there are some intersections and corridors where severe or fatal crashes have taken place that do not currently have projects planned, indicated by the red boxes. A link to the digital version of this map is available in [Appendix F](#).

There is a consistent pattern to the locations where severe and fatal crashes are occurring within Alameda. Building a strategic response to address crash sites quickly will be beneficial over time due to the way that crashes are clustered throughout the community. Furthermore, given clustering patterns, there may be utility in retroactively addressing these sites.

Figure 4: Traffic Safety Projects in Alameda¹¹



IV. Alameda’s Existing Processes for Addressing Serious and Fatal Crashes

Current Procedures

The City of Alameda currently has a working draft protocol in place to deal with crashes. If a fatal crash occurs, or a serious crash where there is possibility that someone will die as a result of serious injuries, Alameda Police conducts a Major Accident Investigation (MAII). The Alameda Police Department issues a public notification with basic information, which may be also be shared by the City of Alameda’s Public Information Officer as appropriate. Then, the Vision Zero Coordinator convenes representatives from the Alameda Police Department, Planning, Building & Transportation Department, Public Works Department, and Caltrans (if the crash occurred on their roadway) for a post-collision site visit to understand whether any changes can be made at the site. Currently, findings from these site visits are not formally documented or broadcast to the public.

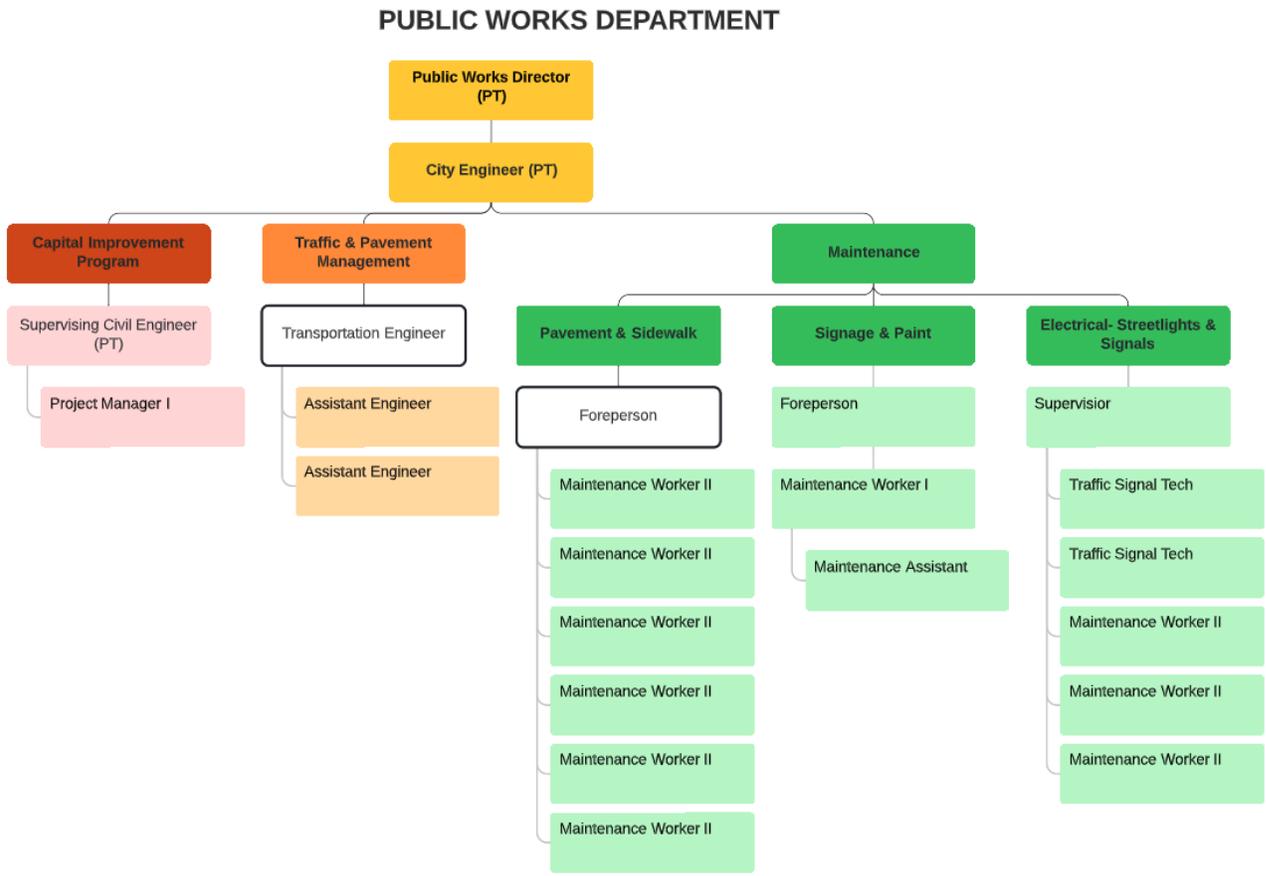
Ensuring that staff have clarity on roles, responsibilities, and priorities when severe and fatal crashes occur is key. A staff member voiced an important consideration: if a crash occurs at an intersection that is not already on a High Injury Corridor, should it be prioritized over other projects to address High Injury Corridors because it is a newer site? Another staff member echoed this concern around prioritization, citing an example of an instance where it was unclear whether to prioritize an existing portfolio of projects to address the needs of vulnerable road users or an intersection where a recent fatality had occurred. This memo is intended to address these questions, developing a standardized protocol that will allow staff members to complete their duties more quickly and efficiently.

Staff Capacity for Vision Zero Projects

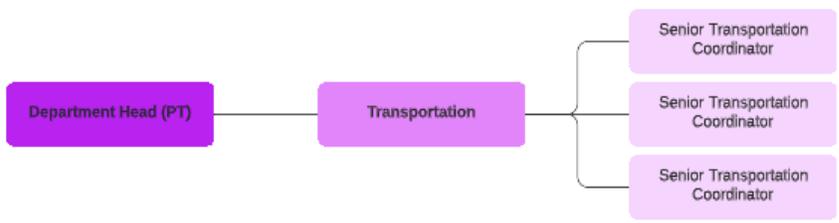
Figure 5 shows staff capacity related to Vision Zero work. No staff members work on Vision Zero goals on a full-time basis, but all staff shown on the chart play a role in this work to some degree. Staff indicated with a PT work on transportation issues on a part-time basis.

Field staff are specialized and require particular equipment to fulfill their duties. In other words, staff who work on painting and striping cannot be redeployed to make traffic signal changes. The COVID-19 pandemic has had two notable impacts on staffing: the Transportation team worked on the Commercial Streets and Slow Streets programs as part of the pandemic response, which stretched the capacity of a three-person team. Furthermore, engineers have been particularly difficult to hire in recent years,¹² a trend that has only been exacerbated in the context of the “Great Resignation.”¹³ Currently, the City of Alameda has no lead traffic engineer on staff. Public Works has ramped up its staffing to fill roles in recent months, but there are still gaps which impact day-to-day operations, as shown by the white boxes on the organizational chart.

Figure 5: Organizational Chart¹⁴



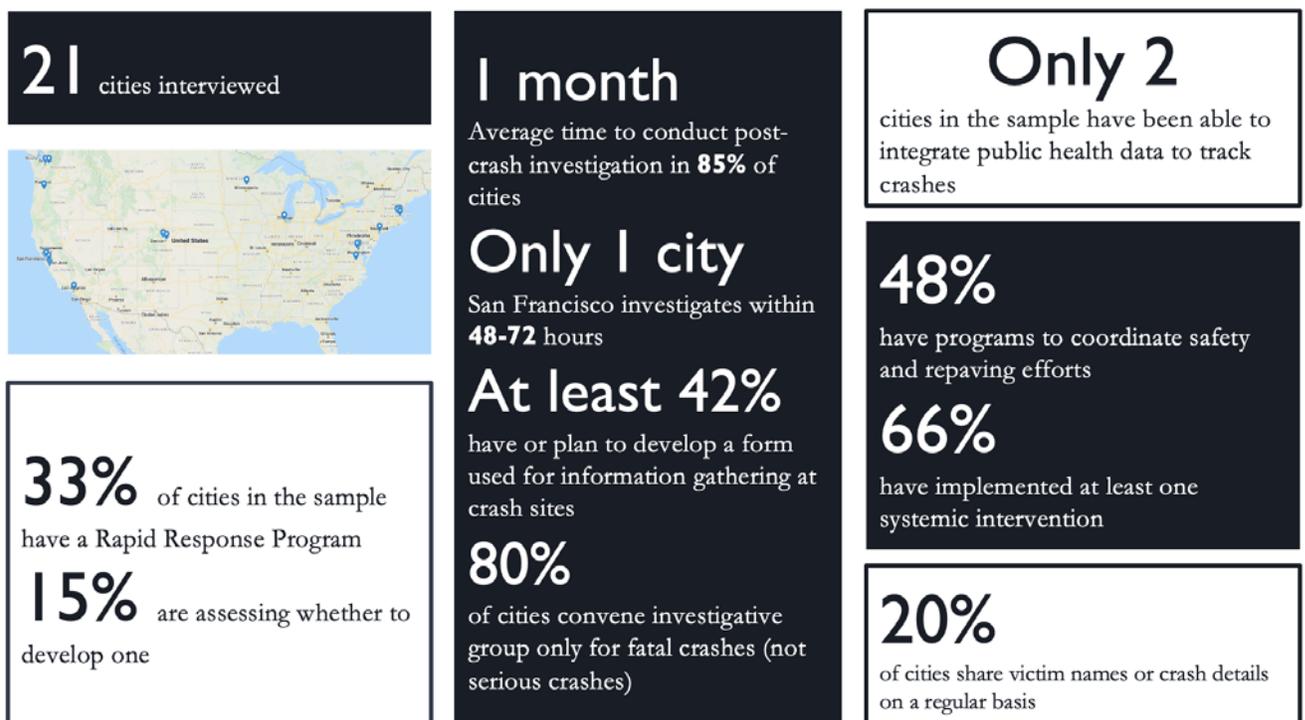
PLANNING, BUILDING & TRANSPORTATION



V. Evaluating Strategies to Respond to Severe & Fatal Crashes

To understand existing models used by other cities to respond in the aftermath of fatal and severe crashes within the context of a Vision Zero program, a best practices scan was conducted to identify strategies used by 21 U.S. cities. All cities included in the sample had set Vision Zero commitments, with the exception of Oakland, California which has extensive traffic safety programming carried out by the Oakland Department of Transportation (OakDOT). This scan consisted of semi-structured interviews with city planners, Vision Zero coordinators, and city engineers working on Vision Zero goals. In addition, publicly available sources for over 30 cities including Vision Zero Action Plans, annual reports, Vision Zero websites, project evaluations, and webinars were evaluated. [Appendix D](#) outlines how cities were selected. [Appendix E](#) includes the names and roles of all interviewees. **Figure 8** summarizes key findings from this sample of cities.

Figure 8: Key Top-Level Findings from Best Practices Scan¹⁸

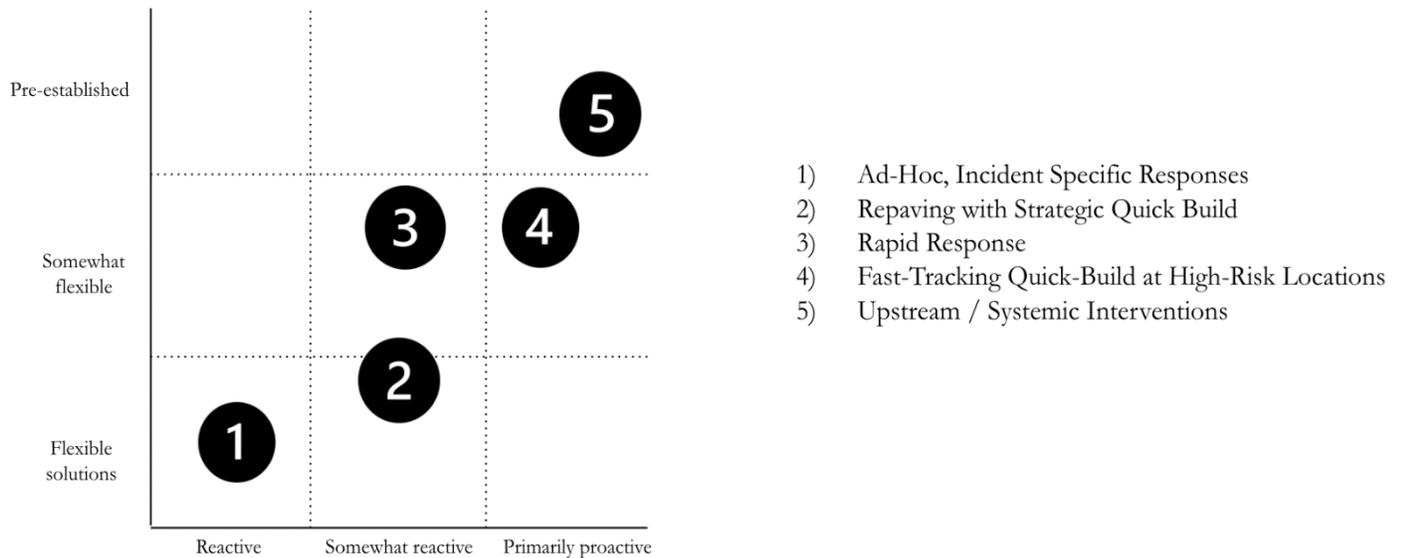


Five Key Strategies Used by Cities

Cities have taken diverse approaches to respond to severe and fatal crashes: there is no standard playbook, even among cities that have developed a stand-alone “Rapid Response” program. Through research and interviews, cities are primarily using five approaches to respond in the aftermath of crashes. **Figure 9** on the following page shows how these approaches vary along two

dimensions: the degree to which the strategies prescribe certain solutions (y-axis), and the degree to which they react directly to data on *new* crashes (x-axis).¹⁹ [Appendix C](#) provides an in-depth description of each of these approaches.

Figure 9: Comparing Strategies – Flexibility & Reactiveness



Program Types Considered

After conducting the best practices scan and considering plausible policy proposals, four alternatives met the prerequisites for formal evaluation: clear rules for engagement, standards alignment, and no differential equity impacts.

- **Alternative 1: Continue to Respond to KSI Crashes on Ad-Hoc Basis** (status quo)– The City continues to respond to KSI crashes as needed but should not invest resources in developing a systematized program.
- **Alternative 2: Develop Program to Coordinate Repaving with Strategic Quick-Build** – The City uses its repaving program to address crash sites, rather than creating a stand-alone program.
- **Alternative 3: Develop Rapid Response Program** – The City develops a systematic program to respond to KSI crash sites, with a delivery mechanism to ensure that changes can be made quickly at crash sites.
- **Alternative 4: Develop Quick-Build Program to Address High Injury Corridors** – The City rapidly rolls out a program to scale quick build interventions at as many locations as possible along high injury corridors.

Program Type Evaluation

The City of Alameda should pursue a strategy that allows it to respond to KSI crashes with a solution that has structured rules of engagement, is aligned with state and federal standards, and does not differentially burden equity communities. Furthermore, any solution should reduce crash

risk, require limited staffing resources to administer or implement, be able to be implemented within 12 months, and be low-cost. While not required, an ideal solution would be iterative and scalable, easy to evaluate, and have a minimal aesthetic impact.

Table 2 on the following page projects outcomes for each of these alternatives based on the criteria outlined in Appendix B. Boxes shown in green are awarded full points for the criterion, boxes shown in yellow are awarded half the points for the criterion, and boxes shown in red are not awarded points.

Table 2: Projecting Outcomes for 4 Alternatives

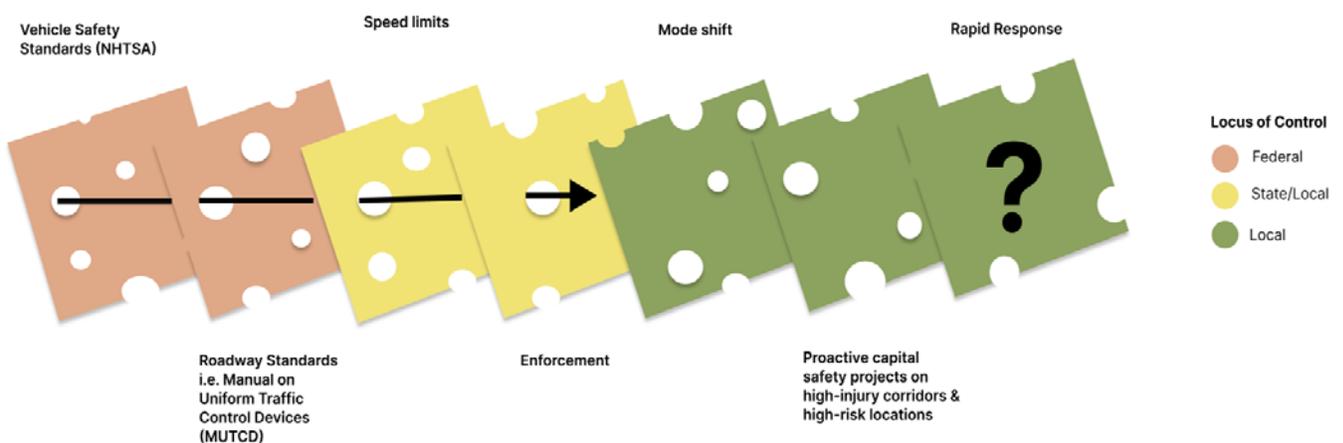
	Positive Crash Reduction Factor 25%	Limited Staff Time to Implement 20%	Quick Timeline to Implement 20%	Cost 20%	Iterative & Scalable 5%	Evaluation Potential 5%	Aesthetic impacts 5%	Score 100%
Alternative 1: Status Quo	Ad hoc projects may detract from ongoing proactive initiatives & changes may not be made at all crash sites	Staff time required to develop and implement response may be burdensome due to lack of protocol	Ad hoc projects may be difficult to quickly implement without protocol due to unclear priorities	Lowest cost alternative	May be difficult to iterate and scale if reacting to crashes differently each time	Ad hoc nature makes evaluation difficult	Moderate impacts at small number of sites	32.5%
Alternative 2: Coordinate Repaving with Strategic Quick-Build	Varies based on intervention but can select countermeasures with positive CRF/CMF factor	Time intensive to prioritize locations, develop plans, & implement on annual basis	Other cities address locations within 6-months to 2 years to once identified; however, not all crash sites may not be due for repaving	Low cost: synergies with equipment & staff already being deployed	City of Alameda's Pavement Condition Index (PCI) on its 125 miles of roadways high; plans to resurface ~3.5 miles annually, or ~3% of roadways ²⁰	Can evaluate by countermeasure implemented	Moderate impacts at small number of sites	62.5%
Alternative 3: Develop Rapid Response Program	Varies based on intervention but can select countermeasures with positive CRF/CMF factor	Time intensive upfront to establish protocol; saves time in long-term due to improved operations	Can scope protocol to drive desired timeline (ideally 6 months or less)	Low-cost solutions viable; implementing with contracting will increase cost but minimize timeline for delivery	Inherently iterative & scalable by design	Can evaluate based on crash sites or by countermeasure implemented	Moderate impacts at small number of sites	77.5%
Alternative 4: Stand Alone Quick-Build Program	Varies based on intervention but can select countermeasures with CRF/CMF factor	Time intensive to prioritize locations, develop plans, & implement, but duration of engagement limited	1-2+ years to develop and complete a round of projects	Each installation is low-cost but would want to scale across many locations, bringing up overall costs	Possible to iterate through additional rounds of implementation, but requires new funding each time	Can evaluate based on crash sites or by countermeasure implemented	Moderate impacts at significant number of sites	62.5%

VI. Rapid Response Recommendation for Alameda

Based on the evaluation above, the City of Alameda should develop a Rapid Response Program in the short to medium-term, rather than continuing the status quo, relying on strategic quick-builds with repaving, or developing a standalone quick-build program. The Rapid Response Program is recommended because it allows the City to develop clear priorities and procedures for responding in a post-crash context, deploys safety countermeasures in a manageable way, and can be implemented quickly. Furthermore, a Rapid Response Program could be developed in a way that does not require a stand-alone team or extensive burdens on staff resources, which is important given resource constraints. Lastly, a Rapid Response program is a good fit for Alameda Vision Zero's current level of program development – it will allow the Planning, Building, & Transportation and Public Works Departments to innovate new strategies without requiring the bandwidth needed to take on a larger initiative with potentially disruptive community impacts.

As shown in **Figure 10**, the City of Alameda is already engaging in a variety of strategies at the local level as part of its Vision Zero goals to improve safety, including ongoing capital projects to address needs along high injury corridors, other capital projects to promote street safety, and efforts to encourage mode switch away from single occupant vehicles. Developing a Rapid Response Program pilot would allow the City to add an additional layer traffic safety practices. A Rapid Response Program should be viewed as complementary to other more proactive measures that are being taken. However, because serious and fatal crashes have historically been tightly clustered along high injury corridors, this approach is ultimately less reactive than it may seem on its face. Furthermore, developing such a program will demonstrate to constituents that the City is committed to its Vision Zero goal, is willing to invest funding in street safety initiatives, and is results oriented.

Figure 10: Layers to Move Alameda Towards its Vision Zero Goal

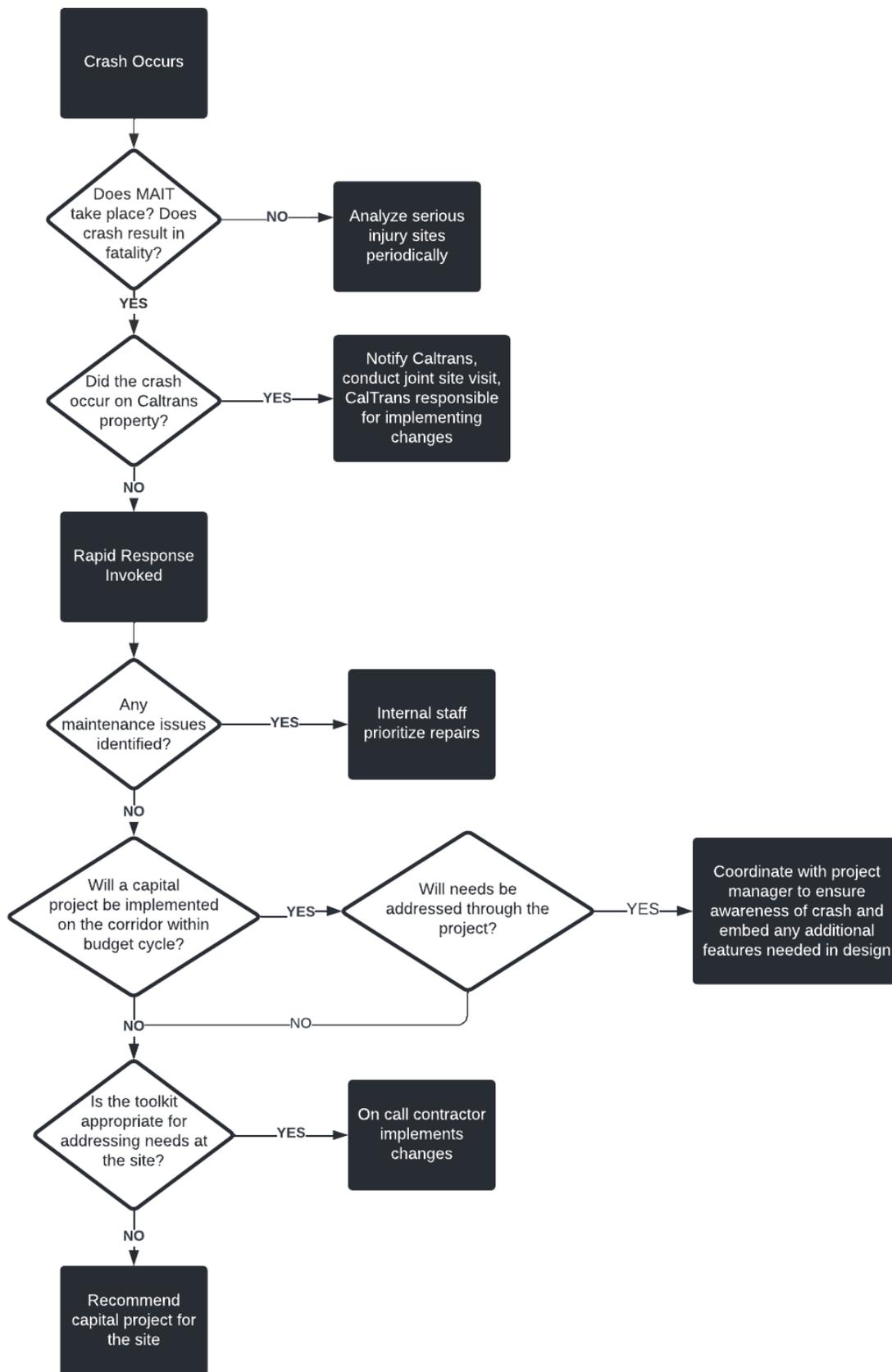


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Program Characteristics

Figure 11 on the next page shows a proposed protocol for the Rapid Response Program, with respect to infrastructure-based responses that can be taken by the City of Alameda. The rest of this section will outline the scope for which incidents and locations would or would not be included in the protocol, as well as other implementation considerations.

Figure 11: Rapid Response Program Protocol



Crash Types Addressed

At least for an initial pilot, the protocol should be invoked only for crashes where a fatality occurs or a Major Accident Investigation (MAIT) is conducted for a near-fatal crash. If present trends continue, Rapid Response would be invoked for approximately 1-4 crash sites per year; the average number of fatalities from 2009-2021 was 2.5 per year. This will limit the scope of the pilot.

While eliminating serious injury crashes is key to the goals of Vision Zero, one key reason why serious injuries should not be included in a Rapid Response Program at this time is that data from police sources paint an incomplete picture of crash outcomes. **Table 3** compares how serious injuries are defined in police data and hospital records.

Table 3: Discrepancies Between Police and Clinical Definitions of Serious Injury²¹

Police definition	Hospital definition
<ul style="list-style-type: none"> • Based on visual assessment • Defined by CHP 555 Collisions Investigation Manual: An injury, other than fatal, that includes the following: <ol style="list-style-type: none"> 1) Broken or fractured bones 2) Dislocated or distorted limbs 3) Severe lacerations 4) Skull, spinal, chest, abdominal injuries beyond “Other Visible Injuries” 5) Unconsciousness at or when taken from the collision scene 6) Severe burns 	<ul style="list-style-type: none"> • Based on clinical examination • Admission to a Level I Trauma Center and/or Injury Severity Score (ISS) > 15, as defined by the Abbreviated Injury Scale (AIS)

The discrepancies between these definitions have several important implications:

1. A wide range of outcomes are grouped together in the serious injury category.
2. Crashes causing internal injuries, such as head trauma, may be miscategorized as less serious injuries.
3. It is not easy to understand how serious injuries progress over time and whether they lead to life-changing outcomes.

“Within our program, it’s so difficult to understand and track crash outcomes, short of fatalities. It’s something that we struggle with here in Cambridge [a smaller city], especially because trauma centers are located in Boston.”

-Brooke McKenna, Assistant Director for Street Management, City of Cambridge

Hospital data can provide more detailed and accurate understandings of crash outcomes than police data. However, outside of New York City and San Francisco, cities have struggled to establish the extensive partnerships and data management required to integrate these data sources. The City of Alameda is considering the feasibility of integrating hospital data as part of its Vision Zero Action Plan (VZAP). The Alameda County Public Health Department is currently exploring a data sharing agreement with the City of Alameda and would be able to carry out this analysis. If data with hospital outcomes becomes available, the City of Alameda should reassess whether the Rapid Response Program can address serious crashes, in addition to fatal crashes.

Geographic Scope

The Rapid Response Program should not be used to respond to crashes on Caltrans-owned roadways, such as Route 61. The complexity of getting waivers for the purpose of responding to the site would likely prevent staff from being able to respond in a meaningful timeline and would detract from other more proactive efforts. Caltrans currently has a protocol to attend to any maintenance issues that are discovered in the wake of a crash within a one to two-month period, depending on supplies.²² Only maintenance changes that do not require geometric design work can be addressed. Examples of changes could include crosswalk striping, signage enhancements, bike markings at spot locations or along a corridor (but not new facilities), warning signs, regulatory signs, and occasionally Leading Pedestrian Intervals (LPIs), depending on capacity of existing signal equipment.²³

Maintenance Needs

If maintenance needs are identified during the interdepartmental post-collision site visit, the Public Works Department should address these needs as quickly as possible, using existing staff resources.

Developing a Toolkit

If no maintenance needs are identified at the site, the next phase of Rapid Response would be determining whether a quick-build countermeasure can be implemented at the site. This determination would be made by a City staff engineer, based on analysis from the interdepartmental site visit. This “menu” of quick-build countermeasures should have strong evidence backing their efficacy of for reducing crash risk. [Appendix A](#) shows criteria and a list of recommended elements for this tool kit, selected based on suitability from a larger group of over 50 interventions. If no elements from the toolkit are a fit for the crash site because deeper geometric changes are needed to address underlying issues, the City should develop a system for elevating these sites to become capital projects for future budget cycles.

Quick build projects should not be used in areas where a capital project will take place within the current budget cycle, but if there is a longer time horizon, changes should be made to the corridor. Given that these are intended as low-cost, light-touch measures, it would still be warranted to address needs at the crash site while waiting for larger changes to be made through the City’s capital project process.

Design Flexibility

In considering what countermeasures should be included in a Rapid Response Program, the City should not hesitate to deviate from the Manual on Uniform Traffic Control Devices (MUTCD) standards and use National Association of City Transportation Officials (NACTO) standards if local conditions warrant it. Not only is this acceptable under state law²⁴ but the Bipartisan Infrastructure Bill, the Infrastructure Investment and Jobs Act “contains a new provision granting cities authority to apply an approved design guide of their choice to federally-funded projects on locally-owned streets.”²⁵ Alameda’s Vision Zero Policy designates the National Association of City Transportation Officials (NACTO) guides as “nationally accepted best design practices and will reference and use as applicable these guides in the design of all transportation projects.”²⁶

Implementation Considerations

The City of Alameda should identify which staff positions will manage each aspect of this work, and it should develop on-call contract(s) to manage the design and installation of Rapid Response countermeasures program for two key reasons. First, the program should be implemented by contractors so that staff has time to focus on proactive projects related to traffic safety. Secondly, this will ensure that changes are able to be implemented quickly; provisions around timeline for project delivery can be built into the contracts themselves to ensure that constituents are able to see changes being made quickly. A Public Works official for the City of Berkeley, California, which is also exploring strategies for Rapid Response commented “[Meeting our goals for] Vision Zero requires us to move faster than our city systems are accustomed to working. We’re in the process of figuring out how to use procurement to fill this gap.”²⁷ Using procurement can be viewed as allowing the City to increase its short-term staffing capacity to reduce risk. Activities to be carried out by this contractor would include drafting designs for the site, as well as installation.

Evaluation

The program should be trialed for a two-year limited pilot to determine whether the approach is impactful. The following chapter will provide recommendations for key performance indicators to understand whether the program is successful.

Rapid Response Program Site Prioritization

According to the previously outlined criteria, it will likely only make sense for the City to pursue a Rapid Response program if it is able to be implemented quickly. Given that the number of fatal crashes that the City would need to respond to on an annual basis is relatively small, if present trends continue, the city should be able to address all fatal crash sites in the order in which they occur. This is consistent with practices used by other cities with Rapid Response programs²⁸— no city in the interview sample had a method they used to prioritize Rapid Response actions, but rather responded to events as they occurred. This is true even for cities that have strong equity goals for their overall Vision Zero programming. One reason that cities may not attempt to prioritize their rapid response efforts using equity metrics is that they see racial and income-based inequities as being strongly embedded in the locations where fatal crashes are occurring. For example, Mandana Ashti, an engineer leading OakDOT’s Rapid Response efforts, commented “Unfortunately, many of our collisions are happening in [equity priority neighborhoods]; by addressing these crash sites, we’re supporting our overall equity goals.”²⁹ While Alameda may follow this pattern less closely than surrounding cities, the overrepresentation of equity priority areas on Alameda’s high injury corridors suggests that addressing fatalities as they occur would be a warranted approach. From 2008-2018, 41% of KSI crashes occurred in an Equity Priority Area, representing only 30% of roadways within the community. Furthermore, this is likely to be feasible given the distribution of KSI crashes throughout the calendar year; analysis conducted for Alameda’s Vision Zero Action Plan found that crashes from 2009-2018 occurred in roughly equal numbers throughout the year.³⁰

However, if the City of Alameda were to expand the scope of its Rapid Response efforts to also address serious crashes, prioritizing based on equity may become a more serious consideration due to capacity. For a program addressing all KSI crashes, a weighted prioritization scheme is recommended, as shown in **Figure 12**, designed with the goal of addressing areas that are most likely to have the highest future risk first. Points are assigned according to various characteristics of the crash. Crashes would then be addressed according to their risk score unless operational constraints dictate a different order of priority (i.e. materials are unavailable to address the needs of highest priority sites).

As previously shown, the City’s High Injury Corridor Map has been very predictive of locations where crashes have occurred. Focusing on sub-areas tied to various populations with high crash risk would allow the City of Alameda to identify locations with the highest future likelihood of KSI crashes. If two crashes have the same risk score, crashes would be responded to in the order they occurred. The hypothetical examples below show which crash site would be addressed first using such an approach.

Figure 12: Prioritization Matrix in an Expanded Program Scenario & Example Scoring

Crash Characteristics				
Injury Level	High Injury Corridor	Equity Priority Area	Impacted Youth or Seniors	Impacted Active Mode
Fatality 10	Yes 5	Yes 3	Yes 3	Active Mode 3
Serious Injury 2	No 1	No 1	No 1	No 1

Vehicle-Vehicle Crash 1/22	Vehicle-Bicycle Crash 1/31
----------------------------	----------------------------

- Resulted in severe injury: 2
- Did not occur on the high injury corridor: 1
- Occurred in equity priority area: 3
- Involved a senior: 3
- Did not impact an active mode: 1

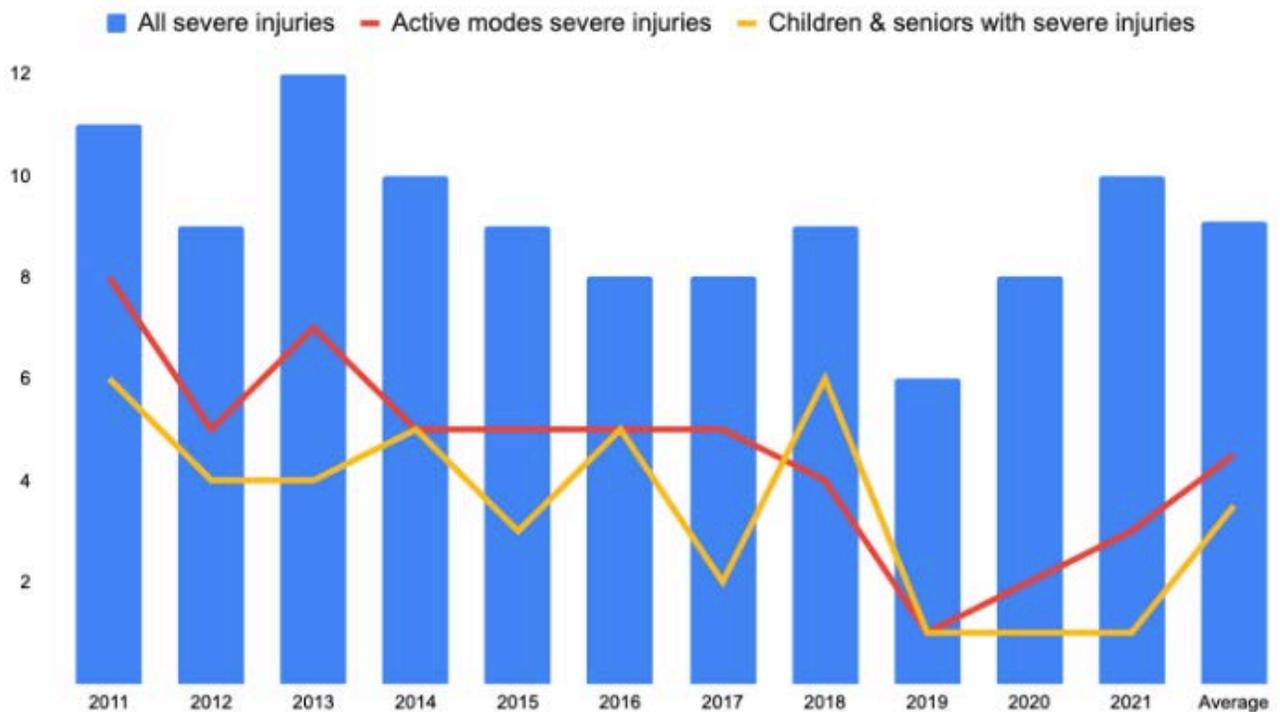
Score: 10

- Resulted in severe injury: 2
- Occurred on a high injury corridor: 5
- Not an equity priority area: 1
- Did not impact a youth or senior: 1
- Involved an active mode: 3

Score: 12

Ultimately, even in a scenario where crashes increase, a simple queuing system would likely be adequate for addressing crash sites. However, having such a prioritization system in place would ensure that the City has planned for all contingencies. Similarly, if the City of Alameda wanted to use a Rapid Response Program to retroactively address KSI crash sites for recent years, this prioritization method could also be used. **Figure 13** on the following page provides data on how many crashes causing severe injuries impacted various subgroups within Alameda from 2011-2021.

Figure 13: Severe Injuries Impacting Vulnerable Road Users, 2011-2021



Costs

Other cities' programs will likely not provide a good analogue for potential costs for a Rapid Response Program for the City of Alameda. Most Vision Zero cities that currently have Rapid Response plans in place are larger cities with specific teams dedicated to Rapid Response and are addressing a much larger number of crash sites on an annual basis.

However, to estimate potential costs for the City of Alameda, a simple back of the envelope calculation was carried out. First, using high-end estimates of countermeasure costs from the Federal

Highway Administration (FHWA),³¹ the percent of countermeasures that would fall within a given cost band was calculated.

Cost category	High-end estimate for cost category	Percent of countermeasures in proposed “toolkit”
\$	\$5,000	46.15%
\$\$	\$20,000	38.46%
\$\$\$	\$100,000	15.38%

Using the average value for a project, and multiplying by maximum number of fatal crashes seen historically: 4, as well as adjusting for situational factors results in the following estimate:

Expected value per project¹	\$25,385
Number of crash sites to address annually	4
Markup for contractor fees & high material costs due to inflation	50%
Total	\$152,310

While more robust analysis on the financial feasibility of a Rapid Response Program is needed, this initial figure suggests that the City could fund this work using existing channels, for example, a portion of the City of Alameda’s Capital Improvement Plan (CIP) projects dedicated to the category of “Street Safety.”³²

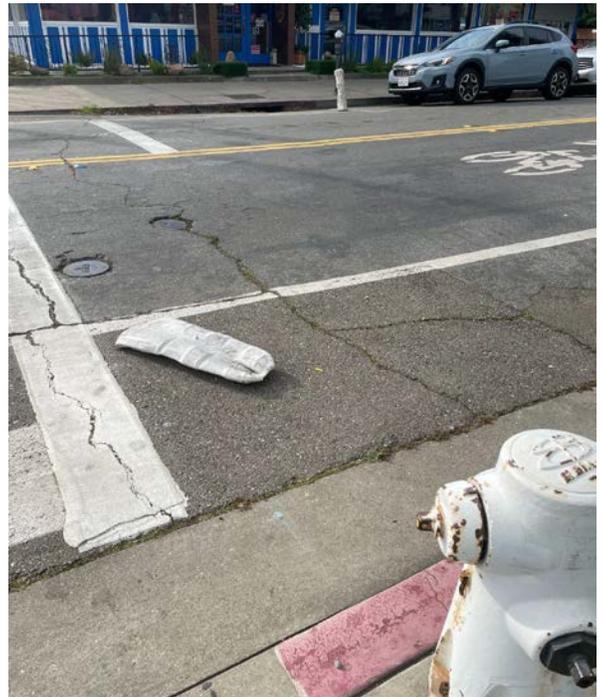
Potential Program Challenges

As with any new initiative, several risks should be considered and weighed against the potential benefits that could result from a Rapid Response program.

¹ The expected value figure was calculated by taking the probability of a project falling within a given cost band given the types of solutions in the proposed toolkit and multiplying by the cost of projects in that band.

- **Maintenance & total cost of ownership:**

The total cost of ownership for new quick-build infrastructure may be higher than initially shown in the back-of-the-envelope cost calculations. While quick-build is easy to deploy at low costs, it will be important for the City to establish a plan to make this infrastructure permanent or maintain it over time in a quick-build form. Many cities have opted not to replace quick-build infrastructure with permanent installations, at least in the short-term. Christine Mayeur, a Vision Zero Specialist in Washington, DC, succinctly summed up this challenge: “Our capacity is limited – we have to balance all the things we're trying to accomplish. If safety interventions are working in their tactical form, then does it make sense for us to spend more money in the same location, especially when we have a backlog of other safety issues to address? To move closer to Vision Zero, we have to [consider these tradeoffs carefully].”³³ With this perspective in mind, it is recommended that the City of Alameda develop systems to periodically maintain the quick-build infrastructure that would be deployed through Rapid Response.



Author's photo of a fallen quick-build bollard, taken in Alameda in January 2022, shows the importance of including maintenance in Rapid Response planning

- **On-call contracting:** Establishing a partnership with a contractor to ensure that Rapid Response can be quickly implemented may be challenging due to the scope of solutions included, and the small scale of the number of projects needed on an annual basis. Two potential solutions would be to look for opportunities to package these projects with other ongoing infrastructure initiatives or to expand the scope of the program so that more crashes are addressed on an annual basis.
- **Transportation funding:** Economic downturn could reduce tax revenue and impact Measure BB, and VRF funding that are currently providing part of the funding for Vision Zero work in Alameda.
- **Political feasibility:** While the City Council is expected to support additional measures to address Vision Zero goals, Council composition could shift over time. Similarly, while Rapid Response is intended to improve constituents' perceptions of the City of Alameda's responsiveness to crashes, if many crash sites are unable to be addressed through the protocol, the program's credibility could be impacted.
- **Quick-build offers safety improvements but not true separation:** Quick-build infrastructure is primarily designed to change driver behavior but may not offer vulnerable road users the same degree of physical protection provided by separated or permanent infrastructure. Crash Modification Factor (CMF) and Crash Reduction Factor (CRF) data is not available for most quick-build countermeasures. The City would either need to assume

that quick-build counterparts would have a similar outcome to more permanent installations or look to examples from other cities which have extensive quick-build pilots to understand potential outcomes.

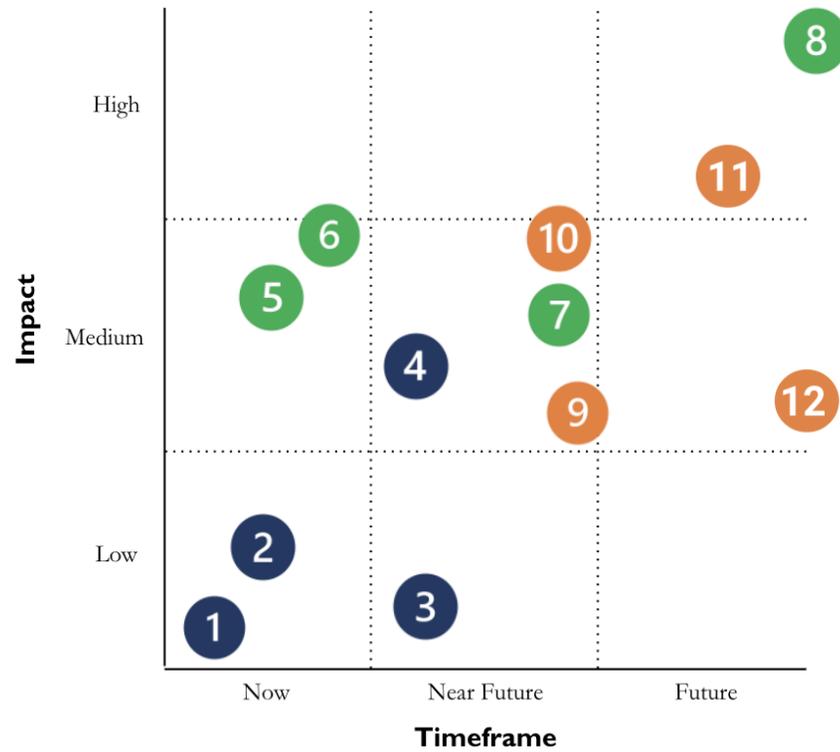
- **Severe and fatal crashes as a lagging indicator:** Ultimately, severe and fatal crashes should be interpreted as a lagging indicator for unsafe conditions along a corridor. The City of Alameda should continue to proactively identify areas to reduce risk to vulnerable users and consider what types of trips are not currently well-served by existing transportation infrastructure and systems on the island.

Future Considerations

A constellation of systemic factors influence the likelihood of a crash taking place, and whether its outcomes will be severe. **Figure 14**³⁴ highlights several factors that are likely to influence the future trajectory and severity of crashes in the City of Alameda across three domains: legal, technological, and community change. A more detailed description of the expected impact for each of these factors can be found in [Appendix H](#).

Figure 14: The Future of Traffic Safety

- Community change
 - 1 Base redevelopment ↑
 - 2 Micro-mobility trends ?
 - 3 Bike share ↑
 - 4 Mode shift goals ?
- Technological change
 - 5 Electric bicycles ?
 - 6 Electric vehicles (cars & trucks) ↑
 - 7 Enhanced vehicle safety features ↓
 - 8 Autonomous vehicles ?
- Legal change
 - 9 MUTCD reform ↓
 - 10 AB 43 passage ↓
 - 11 AB 550 passage ↓
 - 12 Police unbundling ?



VII. Evaluating Rapid Response Efforts

The City of Alameda should consider developing strategies to report on the effectiveness of its Rapid Response work and demonstrate to constituents how this work is aligned with its overall Vision Zero goals. Given that the Rapid Response Program is proposed as a pilot, the City will want to gather actionable data to understand what is working, whether funds are making an impact, and whether specific interventions that are part of the toolkit should be continued. Gathering data on the program will provide talking points for Alameda’s overall Vision Zero programming, highlighting the balance between proactive and reactive risk reduction measures.

The Challenge of Selecting Appropriate Performance Management Targets

Given Alameda’s small size and the statistical variation that can occur with a small sample size, the City may have years with higher-than-average fatalities and serious injuries. However, this does not mean that Vision Zero investments are not improving quality of life and safety. Because it is not possible to study a control group, there is no counterfactual for what would have happened on the island without these investments. Therefore, the Vision Zero team should develop indicators for Rapid Response that show progress towards goals in terms of risk reduction but are action-oriented and give a scale of the work that is taking place.

Through interviews with cities with Rapid Response programs, leaders cited that evaluation was a challenge due to the types of projects implemented,³⁵ staff bandwidth,³⁶ and the length of time that Rapid Response or Quick-Build programs had been operating.³⁷ While no indicators to specifically evaluate Rapid Response programming were identified for other cities in the sample, [Appendix G](#) provides information on how cities with strong cultures of evaluation are telling the story of their Vision Zero Efforts. Vision Zero leaders³⁸ also stressed the importance of selecting a few key indicators to consistently report on, so that members of the public can understand the narrative of the city’s high-level goals and how progress is being made to meet these goals.

“[In all of our annual messaging], we consistently focus on six key areas, to make it simple for [constituents] to follow up on changes over time. This has helped to make our action planning into more of a living document.”

-Jesse Mintz-Roth, Vision Zero Coordinator, San Jose

Recommended Key Performance Indicators for Rapid Response

The Planning, Building, & Transportation Department has limited bandwidth to conduct evaluation for a Rapid Response Program. However, to ensure that there is public accountability for the program, as well as a clear understanding of what is being done and why, the following key performance indicators (KPIs) are recommended. These metrics could be reported on as part of the City of Alameda’s “Annual Report on Transportation” in addition to providing information on overall traffic safety trends throughout the year:

Key Performance Indicator (KPI)	Rationale for Measuring this Indicator
Number of sites visited through multi-departmental post-collision site visits (out of total number of fatal crash sites), number of sites where Rapid Response Protocol was initiated (out of total number of fatal crash sites), and number of projects completed	<ul style="list-style-type: none"> ● Explain scope of the program and outcomes ● Identify % of fatal crash sites where Rapid Response is a fit ● Monitor whether toolkit is relevant for community needs ● <i>Note that the goal is not to manage for a higher number for this indicator; no fatal crashes would be a positive outcome</i>
Modes (pedestrian, bike, vehicle, motorcycle) involved in crash sites addressed by Rapid Response	<ul style="list-style-type: none"> ● Illustrate trends related to vulnerable road users to raise awareness of who is most impacted by fatal crashes
Average time from crash to project completion	<ul style="list-style-type: none"> ● Show results and responsiveness to community concerns
Number of crash sites addressed along high injury corridor and in equity priority areas	<ul style="list-style-type: none"> ● Continue to help Alameda residents understand the disproportionate impact that fatal crashes have on concentrated areas within the community; this will build a case for why deeper investments in these areas are justified given current trends
Average speed (before and after installation) → evaluate for new interventions related to speed only	<ul style="list-style-type: none"> ● This will allow the Planning, Building & Transportation and Public Works departments to understand if new interventions related to speed are working and should be scaled to new locations
Durability (for quick-build interventions only) → Internal- only metric for Planning, Building & Transportation and Public Works Departments	<ul style="list-style-type: none"> ● Monitor site at 2 months, 6 months, 1-year, and 2- years to determine whether maintenance is needed and what is a realistic maintenance timeline for quick-build installations

VIII. Remembering Victims & Communicating Key Vision Zero Messages

Cities have taken diverse approaches in the aftermath of serious and fatal crashes to remember victims, comfort families, and educate the public on the importance of upholding traffic safety.

Privacy Concerns around Sharing Victim Information in the Immediate Aftermath of Crashes

Reviewing the practices of 21 cities has revealed a variety of practices with respect to sharing personal information about victims. From this research, it is evident that departmental cultures and community context, as much as legal constraints, influence the information that is shared about victims. Practices identified ran the gamut from not disclosing any personal information about crash victims to sending out public local alerts with the name and age of the person who died.³⁹

Data Sharing Practices

10% of cities interviewed share simplified crash narratives without including personally identifiable information in annual or semi-annual reports*

10% of cities interviewed share names of victims publicly in annual or semi-annual reports*

Only **1** city, Portland, publicly shares name and age of victim in immediate crash aftermath

62% of cities interviewed only share crash statistics (i.e. number of crashes, travel mode) without including names in annual reports or online dashboards

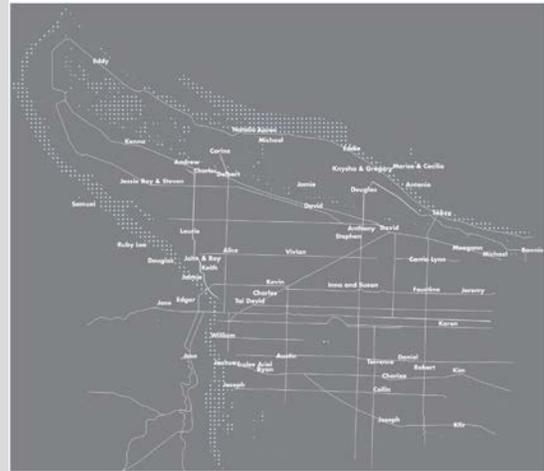
**Cities in the sample used one practice or the other – there was no overlap between these groups*

There are several key levels of privacy concerns around sharing names and circumstances of fatal crashes. First and foremost, next of kin need to be notified– a task that can sometimes be challenging, especially with the recently rise in traffic crash fatalities among people experiencing homelessness seen in many West Coast cities.⁴⁰ Secondly, especially for fatalities, there may be concerns related to criminal investigations that may make disclosure of a name infeasible, especially in the short-term. Lastly, there are often concerns raised around re-traumatizing families. It is important to allow families and friends to grieve on their own terms; this may be complicated if survivors are consistently seeing their loved one’s information in the public sphere. Stewart (2010) notes that the “suddenness, untimeliness, preventability, and violent, mutilating injuries” often involved in fatal crash deaths may contribute to “complicated bereavement syndromes” or to the development of posttraumatic stress disorder (PTSD) among survivors.⁴¹ While some survivors may be comfortable with or even want to see their loved one’s name shared publicly, being repeatedly contacted by a Vision Zero team to request permission would likely represent an undue burden. However, given the small-town context in Alameda and media disclosure of names, residents are likely to know who has been impacted by a crash. Ultimately, there are no easy answers to the question of how to balance these concerns. The following section provides examples of the extent to which other cities share personal information after crashes.

Portland, Oregon⁴²

Portland demonstrates how police department culture is a critical factor in determining what information is shared about victims in short-term and long-term outreach. Portland deploys a variable message sign saying “Someone was killed here, drive with care” after every fatal crash for two weeks. Portland’s Vision Zero Coordinator Clay Veka commented that “63 people died on Portland roads last year. We put out a variable message sign at the location of every fatal crash, where it's feasible...It's one way to try and raise awareness for people traveling throughout the city that that these traffic deaths are occurring and to localize them and personalize them.”⁴³ It should be noted that a recently published study by Hall and Madsen (2022) found that displaying fatality messages actually led to increased crashes in Texas.⁴⁴

People who died in traffic crashes in Portland in 2021



In addition to this post-crash response, Portland’s Vision Zero team also shares the names and ages of crash victims in an annual report. Veka noted that the Portland police “independently decided [sharing names for an annual report] was one way they could act.”⁴⁵ These reports appear to be received positively by community members, especially those most impacted by traffic fatalities; the Vision Zero team has not received any complaints that these reports violate their privacy. Veka related an example: “This year, I had a mom contact me who said ‘You've got my son's age wrong in your report. Can you please update it? I want to make sure that his information is correct.’ I found [this] to be interesting because she could have asked us to remove his name, but having his information correct was what mattered to her.”⁴⁶

A 79-year old person walking died in a traffic collision on 5th and Market on August 10, 2019.

We have made a commitment to eliminating traffic deaths in our city— zero deaths. There is still more we can do and this intersection is a high priority. We share these streets, San Francisco.

VISIONZEROSF.ORG



San Francisco, California⁴⁷

At San Francisco’s quarterly Vision Zero Task Force meetings, an “In Memorium” slide is shared with the names of people who have been impacted by traffic crashes in the last year, only if names were publicly available in the media and if next of kin had been notified.⁴⁸ San Francisco’s Vision Zero team also piloted a Post Fatality Street Team Response as part of its Rapid Response program. The pilot was interrupted by the COVID-19 pandemic but is likely to be revisited soon. Staff placed posters with simple crash narratives at the intersections nearest to the crash site and conducted in-person outreach at locations where fatal crashes have occurred. Uyen Ngo, SMFTA’s Vision Zero Education and Outreach Coordinator, described the program as “narrow and focused outreach” to “acknowledge that the fatality occurred” and “express care for the community.”⁴⁹

FATAL CRASH NARRATIVES

Understanding Safety Issues Is More Than Dots on a Map

This section describes each fatal crash that occurred on Fremont city streets between 2018 and 2020.

2018

On **2/5** at 6:56 pm (dark), a **18-year old male pedestrian**  crossing **Blacow Road** (4-lane, 40 mph, major street) at **Gatewood Street** was killed when hit by a vehicle traveling eastbound and driven by a 48-year old female. Pedestrian was walking across the roadway looking down at his cellphone and wearing headphones. Pedestrian did not see or hear a witness honking to warn him of the oncoming vehicle.

On **7/8** at 10:38 am, a **89-year old male pedestrian**  crossing **Decoto Road** (5-lane, 40 mph, major street) near **Mount Palomar Court** was killed when hit by a vehicle traveling westbound and driven by a 25-year old male. The pedestrian was crossing the roadway after disembarking from the AC transit bus. This collision occurred due to a multiple threat scenario when the vehicle closest to the pedestrian blocks the view of the driver in the adjacent lane.

On **12/11** at 3:51 am (dark), a **56-year old transient male pedestrian**  crossing **Paseo Padre Parkway** (4-lane, 45 mph, major street) near **Waugh Place** was killed when hit by a vehicle traveling northbound and driven by a 67-year old male.

On **12/18** at 10:05 pm (dark), a **33-year old male pedestrian**  crossing **Fremont Boulevard** (4-lane, 35 mph, major street) at **Clough Avenue** was killed when hit by a vehicle traveling northbound and driven by a 53-year old female.

Fremont, California

Fremont, California shares information about age, mode of travel and the activity that road users were engaged in their Vision Zero Action Plan documents to humanize victims. Public Works Director Hans Larsen notes “Our public works team prepares ‘crash narratives’ for each major crash and we publicize these to help promote understanding. We’ve found that ‘dot on the map’ narratives invite unproductive speculation.”⁵⁰

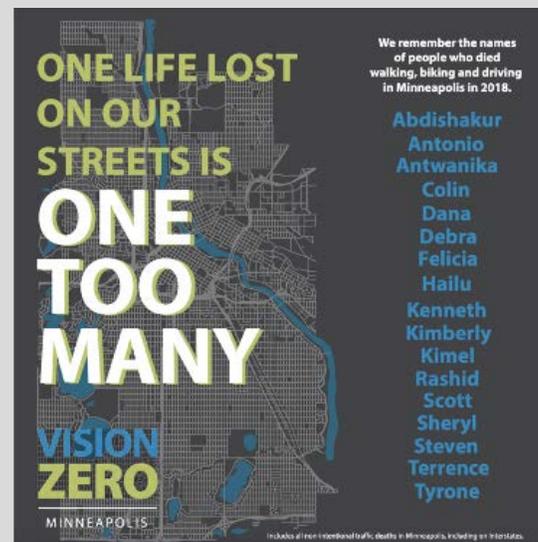
Minneapolis, Minnesota

Minneapolis shares the first name of traffic crash victims in its Vision Zero Action Plan and other reports.

Ethan Fawley, Minneapolis’ Vision Zero Coordinator commented that there had initially been a discussion around building a map similar to Portland’s to locate where victims died, but that ultimately, the city chose not to due to privacy concerns and to ensure that people are not defined by how and where they died. The city only shares the names of people whose information has been released to local media.⁵¹

Seattle, Washington

Allison Schwartz, Seattle’s Vision Zero Coordinator noted that Seattle is moving towards having greater acknowledgement of victims in its public presentations. Similar to the City of Alameda, Seattle partners with advocacy organizations to remember and honor victims on World Day of Remembrance of Road Traffic Victims. The Vision Zero team shares collision fatality information with advocacy organizations which gather photos and social media for the event, as advocacy organizations may be better poised to make trauma-informed outreach to families. However, as Uyen Ngo, San Francisco’s Vision Zero Education and Outreach Coordinator noted, active transportation advocacy organizations may not be well positioned to acknowledge vehicle and motorcycle fatalities, which are still an important aspect of Vision Zero goals.⁵² Working with advocacy groups can provide flexibility and agency for victims’ families and friends but is not a direct substitute for city-led responses.



Recommendations around Information Sharing for the City of Alameda

Given the sensitivity of the immediate post-crash context in a small-town environment, the City of Alameda's Vision Zero Team should continue not to share names in the immediate aftermath of crashes. However, it is recommended that the city share crash narratives in annual reports or on a similar basis to help community members build a better understanding of what types of road users are involved in crashes, what is leading to crashes, and how they can be prevented in the future. Sharing names is not necessary to convey these themes effectively.⁵³ The City should continue to partner with advocacy organizations such as Bike Walk Alameda to honor victims through annual events such as World Day of Remembrance of Road Traffic Victims.

Core Communication Goals for Rapid Response

In the immediate aftermath of crashes, Alameda's post-crash communication should help community members understand how events fit into a large frame. Communication around a Rapid Response Program should not be a radical departure from the steps the City of Alameda is already taking to communicate its Vision Zero goals. Informed by best practices from San Francisco's Rapid Response Street Outreach team, LaJeunesse et. al. (2020)⁵⁴, and Vision Zero Communications expert Barb Chamberlain's work on effective Vision Zero messaging⁵⁵, the following communications strategies are recommended:

- **Build a narrative around where, how, and why crashes are occurring:** Consistently explaining that most severe injuries occur on high injury corridors will help continue to make the case that investing in these areas, especially through a new Rapid Response Program, will be effective in reducing crash exposure, crash severity, and crash frequency. Describing any related patterns that are seen between this crash and other crashes that have taken place in the community, for example patterns around crashes severely impacting older pedestrians, are important for building this narrative.⁵⁶
- **Convey urgency and actions being taken:** San Francisco refers to “near-term solutions” in its Vision Zero outreach, to convey that changes being made will improve conditions in the near term, but that changes take time to materialize.⁵⁷ Messaging should emphasize the work the City of Alameda has already undertaken to improve safety along high injury corridors. With a new Rapid Response Program, the process that will be followed to assess the site through the protocol should be described. At the same time, centering the message that “one death is too many” shows empathy towards victims and shows the urgency around the city's Vision Zero goals.⁵⁸
- **Convey shared, but asymmetric responsibility:** As Barb Chamberlain noted, it is important to communicate that the Safe System Approach has five components: safe roads, safe speeds, safe vehicles, safe users, post-crash care; all these elements work in concert.⁵⁹ In the case of Alameda, the fact that vehicles driving at high speeds are a factor in so many crashes should be central to this messaging. Indicating how small differences in speed have a significant impact on outcomes is critical. At the same time, the city should push back against “nut behind the wheel narratives” that focus on the actions of individual speeders as they may present an individualization of systemic risks and detract from the overall narratives around crash patterns.
- **Connect back to larger aspirations:** Messaging should convey how taking action through Rapid Response supports traffic safety in addition to other goals related to building a strong, better community. In the context of Portland, Clay Veka describes the message in this way: “We have tools that we know work and advance not just our safety goals, but also our equity goals as a city.”⁶⁰

Case Study: Washington DC Crash Memos⁶¹

As part of its Rapid Response program, Washington DC publishes crash memos sharing circumstances that led to crashes and rationale for any changes made.

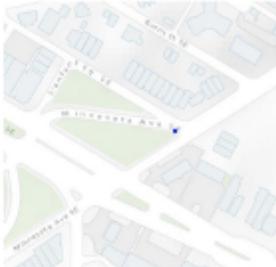
Fatal Crash Follow-up

Minnesota Ave SE and L'Enfant Square SE

MPD description of crash from [press release](#):
At approximately 4:17 am, a silver colored SUV was traveling southwest on Minnesota Avenue, Southeast. The vehicle failed to negotiate a turn and left the roadway. The vehicle struck a pedestrian who was on a sidewalk inside of a park area. The vehicle's occupants fled the scene and the striking vehicle remained on the scene. DC Fire and Emergency Medical Services responded to the scene and transported the victim to a local hospital. After all life-saving efforts failed, the victim was pronounced dead.

Crash information (Source: MPD)

Date of crash	1/1/20
Crash Complaint Number (CCN)	20000224
Type of crash	Vehicle/Pedestrian



Crash data, nearest intersection, 2017-19
(Source: MPD crash database)

Crashes	17
Fatalities	0
Injuries	2
Pedestrians involved	0
Bicyclists involved	0
Motorcyclists involved	0

Each memo includes notes from site visits, factors observed on the visit that may have contributed to the crash, short-term actions to be taken within 90 days, and additional longer term capital projects planned for the corridor.

IX. Closing Recommendations for the City of Alameda

The City of Alameda has already taken great strides to move its Vision Zero work forward since declaring a Vision Zero policy in 2019. Developing a Rapid Response program will help the city to further institutionalize and streamline this work, to ensure a balance between proactive and reactive measures is achieved.

Next Steps

In the short-term, Alameda should consider developing a Rapid Response program pilot. To work towards this goal, the Planning, Building & Transportation Department should take the following steps:

1. Share the findings of this report with stakeholders that would be impacted by a new program, such as the Public Works Department, the Alameda Police Department, and City Council members.
2. Define scope of a quick-build toolkit to be used for Rapid Response purposes, using the proposal in [Appendix A](#) as a starting point.
3. Specify staff position roles.
4. Conduct further analysis on the program's funding needs.
5. Develop an on-call contract for program implementation.
6. Create a system to catalog capital projects identified during Rapid Response protocol implementation.
7. Select key performance indicators and outline a plan for data collection and reporting.

The Road Ahead

While developing a Rapid Response protocol will enable the City of Alameda to better respond to traffic crashes, the city should consider long-term options that can provide additional layers of risk reduction towards meeting Vision Zero goals.



Author's photo from site visit to Alameda, January 2022

- The City of Alameda should research its options vis-a-vis AB 43 (2021) to lower speed limits, identifying locations where the law permits changes, whether this change would have an impact on high injury corridor areas, and what steps should be taken to mitigate equity concerns around such a change.
- Once the High Injury Corridor Daylighting Project concludes, Transportation and Public Works should identify a new intervention that could be feasibly scaled across intersections in the City. Potential scalable countermeasures include left-turn calming, leading pedestrian intervals or high-visibility crosswalks.
- As the City of Alameda gains a sense of how quick-build interventions carried out under Rapid Response are working and perceived by community members, a larger quick-build initiative at concentrated locations across the City should be considered, especially if more engineering staff capacity comes online.

Multi-faceted, coordinated, iterative work will help the City of Alameda move closer to its Vision Zero goals.

Glossary

- **Arterials:** Roads are classified according to a hierarchy, with arterials designed to move vehicles from one place to another at relatively high speeds.
- **Capital Project:** Defined for the City of Alameda as a project costing more than \$100,000 that involves infrastructure with a useful life of at least five years.⁶²
- **Countermeasures/Treatments:** Tactical installations, signaling changes, speed management, or other actions taken to improve road safety.
- **Daylighting:** Removing parking at intersections to improve visibility.
- **Equity Priority Area:** Alameda’s Vision Zero Action Plan defines these areas as “communities that are prioritized to increase equity due to experiences of racism, ableism, lack of economic resources, or similar.”⁶³
- **High Injury Corridors:** Roads with the highest density of injury crashes, weighted by severity. Data analysis conducted for Alameda’s Vision Zero Action Plan found that 73% of crashes occurred along 20% roads in the community.⁶⁴
- **KSI Crash:** Refers to a collision in which someone is killed or severely injured.
- **Manual on Uniform Traffic Control Devices (MUTCD):** Published by the Federal Highway Administration (FHWA), the MUTCD “defines standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public travel.”⁶⁵
- **National Association of City Transportation Officials (NACTO):** An association of major North American cities and transit agencies that has developed design guides to promote safe streets for all modes of transportation.
- **Quick-Build:** An approach to making changes to street design quickly with temporary installations rather than costly capital projects carried out in concrete or other permanent materials.
- **Vision Zero:** A global movement to end deaths and lifechanging serious injuries from traffic crashes.
- **Vulnerable Road User:** Alameda’s Vision Zero Action Plan defines vulnerable road users as “people who are physically vulnerable on the road because they have less crash protection than people in motor vehicles. In a crash with a car, people who are walking, wheeling, biking, or using a motorcycle are more likely to die or suffer a severely injury than those in motor vehicles. The degree of vulnerability can be compounded by age (young people or elders) or disability.”⁶⁶

Appendices

Appendix A: Matrix of Potential Rapid Response Interventions

This section outlines potential interventions in the physical Alameda streetscape that could form part of a Rapid Response tool kit. The purpose of the toolkit is to streamline decision-making: if a countermeasure from the toolkit is not appropriate for the crash site, a potential project could be elevated as a capital project. For 50+ countermeasures, data was collected on crash reduction potential,⁶⁷ use cases for different types of roadways, estimated durability, estimated cost, whether the strategy is compatible with transit and emergency response vehicles, and potential equity impacts. Large, medium, and small cities using these countermeasures as part of their Vision Zero work were identified. **Figure 15** lays out criteria used to vet these countermeasures:

Figure 15. Criteria Used to Evaluate Potential Road Safety Interventions for the "Toolkit"			
Crash Modification Factor (CMF) and Crash Reduction Factor (CRF) Evidence			
Decrease Reduction in reductions as a result of the countermeasure	Increase Increase in crashes as a result of the countermeasure	Poor Quality No high quality studies available (3 stars or higher in CMF Clearinghouse database)	N/A No CMF Clearinghouse studies available
Visit CMF Clearinghouse FAQ for additional information.			
Durability			
High Expected to last for 5 years or more	Medium May include quick build installations, but likely to last for longer period without maintenance	Low Quick build installation, may require maintenance within a year	N/A Non-infrastructure solutions
Cost			
\$ \$5000 or less	\$\$ \$5000-\$20,000	\$\$\$ \$20,000-\$100,000	\$\$\$\$ \$100,000+
Quick-Build Suitability			
Compatible Can be implemented through quick-build including paint, post, or other temporary solutions	Not compatible Requires capital project due to cost, extensive geometric design changes, concrete work, etc.	N/A Not an infrastructure change	
Impact for Emergency Vehicles			
No impact Solution would not impact emergency vehicles	Some impact Impact can be mitigated through design implementation, etc.	Not compatible Solution would bar emergency vehicles from accessing a street	
Compatibility with Public Transit			
No impact Solution has no impact on or is compatible with emergency vehicles	Some impact Impact can be mitigated through design implementation, etc.	Not compatible Solution cannot be deployed along transit routes	
Equity Impacts			
Positive impact Change is largely beneficial for equity groups considered below	Mixed impact Some groups benefit, others may be impacted by the changes	Negative impact Significant negative impacts for at least one equity group	N/A No safety impact on specific groups identified below
Groups considered: vulnerable road users (active transportation modes), age (youth/seniors), race/ethnicity, transit riders/people without a car			
Aesthetic Impacts			

Low Makes changes to the roadbed itself or enhances existing features	Medium Makes changes that may include vertical elements that are up to 3 feet high	High Makes changes to the streetscape, especially vertical elements, that are highly noticeable
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Using these criteria to weigh benefits, costs, and fit for the community, the following countermeasures are recommended for inclusion in the toolkit:

Bicycle Infrastructure	<ul style="list-style-type: none"> • Upgrade existing bicycle lane with flex posts, modular curb • Painted bicycle box
Crossing Treatments/ Tactical Urbanism	<ul style="list-style-type: none"> • Advance yield or stop markings • High visibility (continental or ladder) crosswalks • Painted curb extensions (quick-build) • Pinchpoint (quick-build) • Chicane (quick-build) • Bollard installation • Modular curbs
Signage	<ul style="list-style-type: none"> • Stop light backplates • Simplify confusing signage • Add clarifying signage, like “Cross traffic does not stop”
Signaling	<ul style="list-style-type: none"> • Extended Signal Time • Leading Pedestrian Interval (LPI), if traffic signal has capacity
Traffic calming	<ul style="list-style-type: none"> • Speed feedback signs • Speed cushion (temporary) • Speed tables (temporary) • Speed humps (temporary) • Traffic circle (temporary)
Turning treatments	<ul style="list-style-type: none"> • Left Turn Traffic Calming • No right turn on red • Centerline hardening/flexible post centerline

The next pages include a matrix showing how these tools were rated for each category described in Figure 15.

Tool	CRF Indicator - (Lower Bound)	CRF Indicator (Upper Bound)	CMF Indicator (Lower Bound)	CMF Indicator (Upper Bound)	Implemented in Alameda?	Suitable for Quick Build	Estimated Durability	Cost Category	Aesthetic Impact	Compatibility with Public Transit	Impacts for Emergency Vehicles?	Equity Impacts
Separated Bike Lane (delineated with flex posts or buffer)	26.6	49	0.435	0.734	Yes	Yes	Low	\$\$	Medium	No impact expected	Impact but could be mitigated	Mixed impact
Painted bicycle box	No studies available	No studies available	No studies available	No studies available	No	Yes	Medium	\$\$	Medium	No impact expected	No impact expected	No impacts identified
Advance Yield or Stop Markings	11.4	25	0.75	0.886	Yes	Yes	Medium	\$	Low	No impact expected	No impact expected	No impacts identified
High visibility (continental or ladder) cross walks	37	N/A	0.63	N/A	Yes	Yes	Medium	\$	Low	No impact expected	No impact expected	Positive impact
Painted curb extensions	No studies available	No studies available	No studies available	No studies available	Yes	Yes	Low	\$	High	No impact expected	Impact but could be mitigated	Positive impact
Pinchpoint	No studies available	No studies available	No studies available	No studies available	Yes	Yes	High	\$\$	Medium	No impact expected	Impact but could be mitigated	Positive impact
Rectangular Rapid Flash Beacons (RRFBs)	47.4	N/A	0.526	N/A	Plans to incorporate	Yes	High	\$\$\$	High	No impact expected	No impact expected	Positive impact
Recessed stopping lines	No studies available	No studies available	No studies available	No studies available	Yes	Yes	Medium	\$	Low	No impact expected	No impact expected	No impacts identified
Temporary Traffic Island	No studies available	No studies available	No studies available	No studies available	No	Yes	Medium	\$\$\$	Medium	No impact expected	Impact but could be mitigated	Positive impact
Improved Lighting	-39.1	41.9	0.581	1.391	Yes	N/A	High	\$\$\$	Medium	No impact expected	No impact expected	Positive impact
In-Street Pedestrian Crossing Sign	No studies available	No studies available	No studies available	No studies available	Yes	Yes	Medium	\$	Medium	No impact expected	No impact expected	Positive impact
Stop lights for back plates	15	N/A	0.85 (All crash types)	N/A	Yes	N/A	Medium	\$\$	Low	No impact expected	No impact expected	Positive impact
Simplify confusing signage	No studies available	No studies available	No studies available	No studies available	No	N/A	High	\$	Low	No impact expected	No impact expected	Positive impact
Extended Signal Time	No high quality studies available	No	N/A	High	\$	Low	No impact expected	No impact expected	Positive impact			

Leading Pedestrian Interval (LPI)	-9	58.7	0.413	1.09	Yes	N/A	High	\$	Low	No impact expected	No impact expected	Positive impact
Pedestrian Hybrid Beacon (PHB) or High Intensity Activated Crosswalk (HAWK)	-13.6	86	0.14	1.136	Plans to incorporate	N/A	High	\$\$\$	High	No impact expected	No impact expected	Positive impact
Bollards	No studies available	No studies available	No studies available	No studies available	Yes	Yes	High	\$\$	High	Impact but could be mitigated	Impact but could be mitigated	Negative impact for some groups
Modular curbs	No studies available	No studies available	No studies available	No studies available	Yes	Yes	Medium	\$	Medium	Impact but could be mitigated	Impact but could be mitigated	No impacts identified
Chicane	No studies available	No studies available	No studies available	No studies available	Plans to incorporate	Yes	High	\$\$	High	Impact but could be mitigated	Impact but could be mitigated	No impacts identified
Speed cushion	No studies available	No studies available	No studies available	No studies available	Plans to incorporate	Yes	Medium	\$\$	Medium	No impact expected	Impact but could be mitigated	No impacts identified
Speed Feedback Signs	5	7	0.93	0.95	Yes	Yes	Low	\$\$	High	No impact expected	No impact expected	No impacts identified
Speed tables	No studies available	No studies available	No studies available	No studies available	Plans to incorporate	Yes	Medium	\$\$	Medium	Not compatible with large emergency vehicles	Not compatible with large emergency vehicles	No impacts identified
Temporary Speed humps	No studies available	No studies available	No studies available	No studies available	Yes	Yes	Medium	\$\$	Medium	Not compatible with large emergency vehicles	Not compatible with large emergency vehicles	No impacts identified
Left Turn Traffic Calming	No studies available	No studies available	No studies available	No studies available	No	Yes	Low	\$	Medium	Not compatible with large emergency vehicles	No impact expected	Benefits pedestrians-less exposure
No right turn on red	No high quality studies available	Yes	N/A	High	\$	Low	No impact expected	No impact expected	Mixed impact			
Centerline hardening/ Flexpost centerline	45	N/A	0.55	N/A	Yes	Yes	Low	\$	Medium	Impact but could be mitigated	Impact but could be mitigated	No impacts identified

[The complete matrix with all 50 countermeasures considered can be found here](#), as well as rationale for why each countermeasure would or would not be a fit for the Rapid Response toolkit.

Appendix B: Rapid Response Program Criteria

This section will introduce a set of criteria developed to evaluate various types of rapid response programs, in order to select a recommended program type for Alameda. These were developed from interviews with internal stakeholders within city government and consultation with external stakeholders within the Vision Zero network. Three types of criteria were developed:

- **Prerequisites:** These criteria must be met for an alternative to be formally evaluated; no strategy should be pursued if it cannot meet these essential prerequisites for public safety.
 - Clear rules for engagement – Ideally, any solution should include clear thresholds about which types of crash incidents would be included in a response policy. This will ensure that the equity criteria outlined below can be met and that the program can be clearly communicated to community members.
 - Standards alignment – If an alternative that involves making infrastructure improvements is chosen, it must be in compliance with the Americans with Disabilities Act (ADA), and engineering standards including the Manual on Uniform Traffic Control Devices (MUTCD) or National Association of City Transportation Officials (NACTO) guides.
 - No differential equity impacts – Any proposed policy alternative must not have differential impacts on equity priority areas within the City of Alameda and should not create unfair burdens for historically excluded communities.

- **Hard Criteria:** These criteria are weighted more heavily as they have been consistently voiced as key considerations in interviews with employees and planners in other Vision Zero cities.
 - Positive crash reduction factor – A Crash Reduction Factor (CRF) expresses “the expected effect of a countermeasure in terms of the percentage decrease in crashes.”⁶⁸ The exact range of CRF factors that is ideal for this project remains to be determined through conversations with key stakeholders. Among heavily weighted standards, this element is weighted most highly, with the rationale being that if there are solutions that could reduce the risk of death and serious injury from crashes, they should be pursued above all other alternatives.
 - Staff resources needed for implementation – Engineering staff time from public works, oversight from Planning, Building & Transportation Department and Public Works staff working on Vision Zero projects, and implementation time from field staff are key constraints limiting potential solutions. The key issue is that any policy alternative ideally should not jeopardize existing workflows with respect to longer-term, proactive Vision Zero efforts. This requirement could be modified if it is possible to use on-call contracting to implement this alternative.
 - Quick timeline for implementation – A policy alternative should be able to be implemented within a timely manner, ideally within one year or less. Otherwise, the

City of Alameda should simply use existing capital project planning channels to address high injury corridors.

- Cost – Alameda receives countywide transportation sales tax funding from Measure BB and VRF which both support its Vision Zero work. Ideally, any action would be implemented using a portion of this funding, at least for foreseeable budget cycles. Action taken to respond to crashes would want to be balanced with other longer-term proactive projects; therefore, the cost of any program should not exceed the cost of taking more expressly proactive measures.
- **Soft Criteria:** These criteria were weighted less heavily or considered but not formally evaluated. They are factors that impact implementation feasibility but will not have the biggest impact on reducing crash risk, the central challenge for the City of Alameda.
 - Iterative/scalable – Any solution ideally would be able to scale as the City of Alameda grows in population, for example, as new housing is developed in the former naval base. Similarly, as mode share shifts to more active forms of transit, as called for by Alameda’s Transportation Choices and Climate Action plans, a viable policy alternative needs to be scalable if more incidents occur due to a greater volume of non-motorized travel. [Appendix J](#) provides an overview of factors that may influence the number of incidents annually.
 - Evaluation potential – Ideally, any potential solution can be studied before and after implementation to determine efficacy. Being able to report on project success as part of the City of Alameda’s “Annual Report on Transportation” will build community buy-in for Vision Zero activities.
 - Minimal aesthetic footprint – Ideally, any solution would have a minimal aesthetic footprint (bright color, height, disruption to existing street design) to function well in a small-town setting. Given extensive opportunities for public comment, designs with large aesthetic impacts are likely to be less politically palatable. However, the Public Works Director has the discretion to designate certain types of projects as unappealable if they are carried out for safety reasons.⁶⁹ Therefore, this would not necessarily hinder implementation as much as it might generate greater friction for Vision Zero programming overall.
- **Considered but not Scored:**
 - Alignment with City of Alameda Pedestrian Guidelines – In addition to national and state standards, Alameda also has local Pedestrian Design Guidelines established by its Public Works department, although these are not legally binding.
 - The City of Alameda has transferable experience implementing similar solutions – Given that the City has limited financial and staffing resources, any policy alternative will be most successful when it can draw upon existing expertise, whether in public works infrastructure implementation or program administration.

Appendix C: Additional Context on KSI Crash Responses Used in Other Cities

This appendix provides a brief description of strategies that cities use to address KSI crashes. Note that cities cited as exemplars for each section may be engaging in multiple responses. For example, the City of Alameda currently responds to fatal crashes on an ad hoc basis (Type 1 approach) but also has engaged in efforts to couple repaving with safety projects (Type 2) and is in the process of carrying out a systematic intervention (Type 5) through its High Injury Corridor Daylighting Project.

Type 1: Ad-Hoc, Incident Specific Response

Description: Simply put, this strategy involves making engineering changes at a site in response to a crash and is typically only employed for fatal crashes. These changes could involve quick build infrastructure or more permanent capital projects, depending on existing initiatives that the city has in place.

Example Cities: Most cities without a rapid response program employ this strategy in some instances.

Benefits & Drawbacks: Out of all the strategies identified, this approach gives cities the most flexibility to choose when, how, and which crashes to respond to. This flexibility in turn poses barriers to equity: city governments may be more likely to respond to crashes when there is community pressure to do so, which may mean investments are not made at the most high-risk locations. Furthermore, if cities do not have existing procedures, responding in this way may draw resources, particularly staff time, away from proactive project development.

Type 2: Repaving with Strategic Quick-Build

Description: This approach typically includes reviewing historical crash data & repaving plans to look for opportunities to incorporate quick-build safety features, install speed tables, or add restriping while carrying out repaving, typically on an annual basis.

Example Cities:

- Richmond, VA
- San Jose, CA

City of Alameda Example: Alameda has begun coordinating efforts to make these changes such as the repaving and safety improvements on Pacific Avenue and Shoreline Drive.

Benefits & Drawbacks: Because this process draws on existing resources, including labor, work crews & equipment that are already deployed, this approach is very low cost. Furthermore, due to the nature of this work, there is an opportunity to respond to new crash data annually. However, cities with this program in place have reported challenges in gathering community feedback in the timeline needed.⁷⁰ For example, Richmond, VA needs to gather community feedback in around 2 months as projects are planned within a 6-month window. Secondly, this approach doesn't address the issue of how to respond to future crashes if they occur at locations not due for repaving: it is

inherently geographically limited. Lastly, planners reported that it was time-intensive to establish procedures and coordinate these projects on an ongoing basis.⁷¹

Type 3: Rapid Response Program or Protocol

Description: Rapid Response Programs vary across cities but include at least two of the following elements: investigation of the crash scene with a multi-departmental team, quick fixes of any visible maintenance needs, quick build (usually from a pre-determined toolkit), or capital projects to address deeper structural challenges on the corridor as appropriate, community messaging, and supports for victims, families & community.

Example Cities:

- San Francisco
- Oakland
- Denver
- Washington, DC
- Berkeley (in development)

Benefits & Drawbacks: With a rapid response program, city governments are publicly accountable: the protocol articulates priorities and hierarchy for carrying out projects. As a result, the city is better poised to clearly communicate actions to the public; it may also increase the salience of activities that would have been carried out regardless of the program. While having a rapid response protocol provides structure, it can be less flexible to account for circumstances of individual crashes – for example, due to capacity, cities may have legitimate reasons to want to respond to some but not all serious crashes. Similar to other approaches, up-front staff or contractor time is needed to define parameters, especially to determine which countermeasures will be part of the protocol. Lastly, the protocol may still not provide a suitable set of responses for some crashes, including those on arterials or in locations where surface-level engineering changes are insufficient. 33% of cities surveyed had a Rapid Response Program, another 15% were evaluating whether to develop one. Most cities (except for Oakland which responds to severe injuries for active modes involving children and seniors) only responded to fatalities due to capacity.

Type 4: Fast-Tracking Quick-Build at High-Risk Locations

Description: With this approach, cities seek to scale quick-build infrastructure at as many locations as possible to rapidly increase the presence of safety countermeasures in the community. These locations are typically along the high injury corridor or other areas with a high presence of vulnerable populations, such as schools and senior centers. Most cities have used their internal public works capacity to install these countermeasures.

Example Cities:

- Fremont, CA
- Boulder, CO
- Cambridge, MA
- Minneapolis, MN
- San Francisco, CA

Benefits & Drawbacks: This approach establishes a clearly articulated goal and vision, through a data-driven equity-minded approach. Quickly implementing a high volume of projects implies an intensive period drawing on staff resources, but if treatments are successful, crashes should fall at these locations. Carrying out multiple rounds of implementation can be a way to pilot new interventions to identify which are best suited for the needs of the community. NACTO recommends that cities pilot new designs using low-cost materials to understand effectiveness before making designs more permanent.⁷² The biggest challenge with this approach, aside from identifying a sizeable funding source, is that it can be challenging to get authentic community engagement when moving at this pace; therefore, community momentum and buy-in toward Vision Zero goals is a prerequisite. Secondly, maintenance may be a challenge if the number of quick-build treatments in the community is rapidly increased.

Type 5: Upstream / Systemic Interventions

Description: Rather than focusing on engineering changes at crash sites or along high injury corridors, this strategy seeks to scale proven interventions across as much of the city as possible to reduce the risk of future crashes. The form this takes has varied based on the city. 66% of cities interviewed had implemented at least one systemic intervention while 64% of these interventions involved lowering speed limits across the city.

Example Cities:

- Portland, Seattle, Minneapolis, Denver, Cambridge → Lowered speed limits across the entire city with increased visual reminders (i.e. speed limit signs every ¼ mile instead of every mile)
- New York → Speed cameras in school zones
- San Francisco → Left Turn Calming
- Portland → Leading Pedestrian Intervals

City of Alameda Example: High Injury Corridor Daylighting Project

Benefits & Drawbacks: This approach consists of trying to quickly scale evidence-backed countermeasures – essentially, cities identify a strategy to pilot and work backward to find locations appropriate for implementation. However, as the least reactive of the five approaches, it may be perceived by constituents as not responding directly to KSI crashes.

Appendix D: City Size and Selection Methods for Best Practices Scan

Cities were selected for the best practices scan and interviews in the following way:

- Using the Vision Zero Plan Library, documents for 30+ cities were reviewed
 - Cities without an action plan were not included in the sample
- Cities with Rapid Response programs or Quick Build expertise were selected
 - City leaders working on Vision Zero were contacted in February 2022 to request interviews
- Despite not having set a Vision Zero policy, the City of Oakland was also included in the sample, as they have developed a Rapid Response Program

City Size

Determined by population

Size	Population
Small City	<100,000 inhabitants
Medium City	100,000 – 250,000 inhabitants
Large City	250,000 – 5 million inhabitants
Mega City	5 million+ inhabitants

Number of Cities Surveyed

Size	Number of Cities in Sample
Small City	3
Medium City	6
Large City	10
Mega City	2

Appendix E: Interviews Conducted



City Planning & Public Works Expertise

Bellevue, Washington- Franz Loewenherz, Mobility Planning and Solutions Manager, City of Bellevue– March 15, 2022

Cambridge, Massachusetts- Brooke McKenna, Assistant Director for Street Management, City of Cambridge – February 23, 2022

Chicago, Illinois- Michael Kent, Vision Zero Chicago Coordinator, Chicago DOT – February 17, 2022

Oakland, California

- Mandana Ashti, Transportation Engineer, OakDOT – March 3, 2022
- Leonardo Hernando, Engineer Assistant II, OakDOT – March 3, 2022

San Francisco, California

- Ryan Reeves, Senior Transportation Planner / Vision Zero Program Lead, SFMTA – April 4, 2022
- Jennifer Wong, Transportation Planner, SFMTA – April 4, 2022
- Uyen Ngo, Vision Zero Education Lead, SFMTA – April 13, 2022

Berkeley, California- Eric Anderson, Senior Transportation Planner/Vision Zero Program Manager, City of Berkeley – February 24, 2022

Boulder, Colorado- Amy "Liv" Lewin, Senior Transportation Planner, City of Boulder– March 22, 2022

Denver- Emily Kleinfelter, Safety/Regional Vision Zero Planner, DRCOG – March 30, 2022

Fremont, California- Hans Larsen, Public Works Director, City of Fremont– February 23, 2022

Los Angeles, California

- Lameese Chang- Transportation Planner, LADOT– March 29, 2022
- Christopher Rider- Transportation Engineer Associate, LADOT – March 29, 2022

Minneapolis, Minnesota- Ethan Fawley- Vision Zero Coordinator, City of Minneapolis – April 18, 2022

Portland, Oregon- Clay Veka, Vision Zero Project Manager, Portland Bureau of Transportation – March 21, 2022

San Jose, California- Jesse Mintz-Roth, Vision Zero Manager, City of San Jose – February 23, 2022

Seattle, Washington- Allison Schwartz, Vision Zero Coordinator – March 15, 2022

Somerville, Massachusetts- Alexandra Kleyman, Senior Transportation Planner, City of Somerville– April 8, 2022

Watsonville, California- Murray Fontes, Principal Engineer, City of Watsonville– February 17, 2022

Washington, DC- Christine Mayeur, Vision Zero Specialist, District Department of Transportation– April 22, 2022

- Also spoke to her experiences leading Vision Zero work in Alexandria, Virginia

Additional cities used in the 21-city sample, but not interviewed directly

Interviews with leaders from three additional cities were requested, but unable to be completed during the project timeline. Information for these city’s practices were gleaned from Vision Zero Network webinars, city Vision Zero websites, Vision Zero Action Plans, and annual reports.

- **New York City, New York**
- **Boston, Massachusetts**
- **Richmond, VA**

- Information from a February 24, 2022 Federal Highway Administration (FHWA) webinar which featured Richmond’s practices on the topic of “Pairing Pilot Quarterly Webinar: Quick Build Projects” was incorporated into findings.

Additional experts consulted

- Marcel Moran, UC Berkeley PhD student – February 17, 2022
- Sergio Ruiz, District Office Chief, Complete Streets Coordinator, Caltrans District 4 (Bay Area), email communication – March 3, 2022
- Barb Chamberlain, Director of Active Transportation, Washington State DOT, email communication – March 17, 2022
- Kyle R. Smith, Senior Associate at Coopers LLP – April 1, 2022
- Michael Stephenson, Bay Area Bicycle Law, P.C., email communication – April 1, 2022
- Steve Weissman, Emeritus Lecturer, University of California Berkeley, Goldman School of Public Policy – April 5, 2022

City of Alameda staff members interviewed

- Lisa Foster, Senior Transportation Coordinator, Planning, Building & Transportation Department and Vision Zero lead, provided oversight and input on the project through weekly meetings from January – May 2022
- Tawfic Halaby, Supervising Civil Engineer, Capital Improvement Program Manager, Public Works Department – March 31, 2022
- Lt. Erik Klaus, Traffic Commander, Alameda Police Department – March 15, 2022
- Gail Payne, Senior Transportation Coordinator, Planning, Building & Transportation Department – March 3, 2022
- Andrew Thomas, Director, Planning, Building & Transportation Department – March 17, 2022
- Areli Vazquez-Muñoz, Assistant Engineer, Public Works Department – February 28, 2022
- Rochelle Wheeler, Senior Transportation Coordinator, Planning, Building & Transportation Department – March 3, 2022

Vision Zero Webinars consulted

The following Vision Zero webinars were consulted to provide information on best practices. Links are available below.

[Not Just Big Cities: Vision Zero in Mid-sized & Suburban Communities](#)

[Promising Practices to Manage Speed for Pedestrian Safety](#)

[Vision Zero 101: Core Principles – How to Determine Priority Areas for Action](#)

[Words Matter: Effective Vision Zero Messaging](#)

[Safe Systems for Safe Mobility: A Deeper Dive](#)

[Are “Standards” Slowing Your Safety Efforts?](#)

[Promising Practices to Manage Speed in Cities for Pedestrian Safety](#)

[Public Health -Linking Transportation & Health Systems: Pioneering Collaborative is Model for Vision Zero](#)

[Restorative Justice Strategies for Safe Streets](#)

[Re-thinking the Role of Enforcement in Traffic Safety Work: City to City](#)

[Yes You CAN Manage Speeds in your Community: Portland Shows us How](#)

[Vision Zero 101 – Approach for Mid-Sized Cities](#)

[Cities Managing Speed for Safety: Learning from Seattle and Minneapolis](#)

[Centering Community in the Public Engagement Process](#)

[Addressing Unjust Financial Penalties in Traffic Safety, Vision Zero](#)

[Talking AVs & VZ: How Autonomous Driving Affects Vision Zero](#)

[Re-thinking the Role of Enforcement in Traffic Safety Work: Our Role Within Vision Zero](#)

[Don't be Distracted by Distracted Walking](#)

Appendix F: Mapping Safety Projects & Crashes

As part of this memo, a map was developed overlaying crash data with traffic safety projects that in progress. [The map can be accessed here.](#)

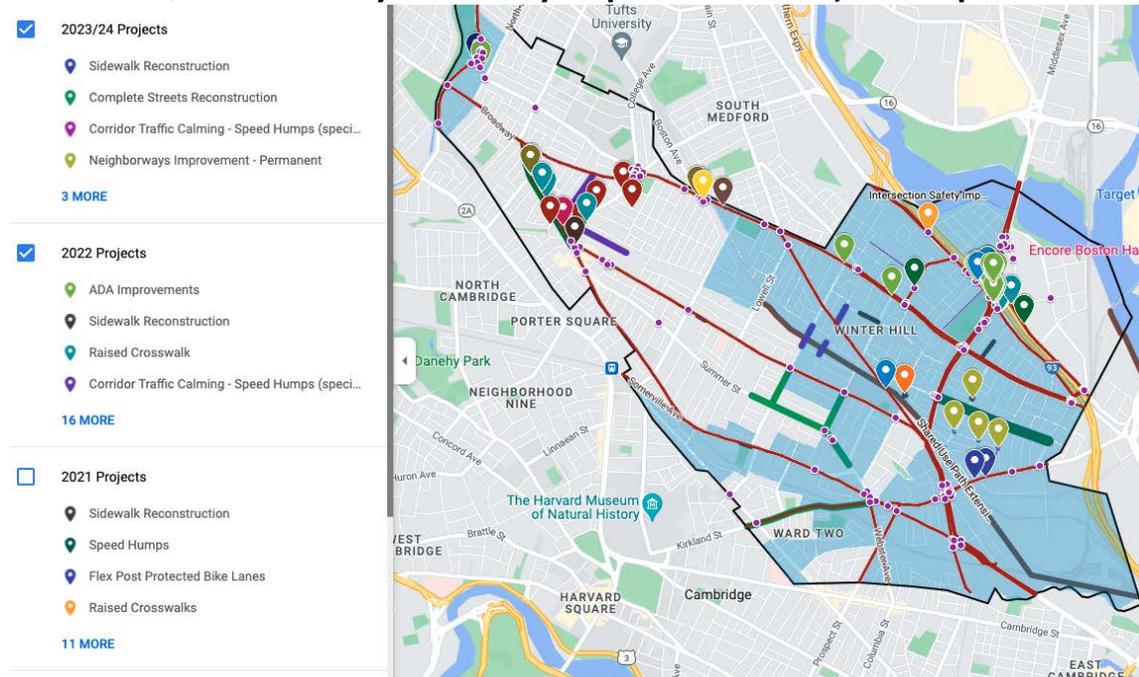
Note that this map includes crashes which did not cause serious injuries as a separate layer; these crashes are shown as yellow circles.

Transparency is Key to Success

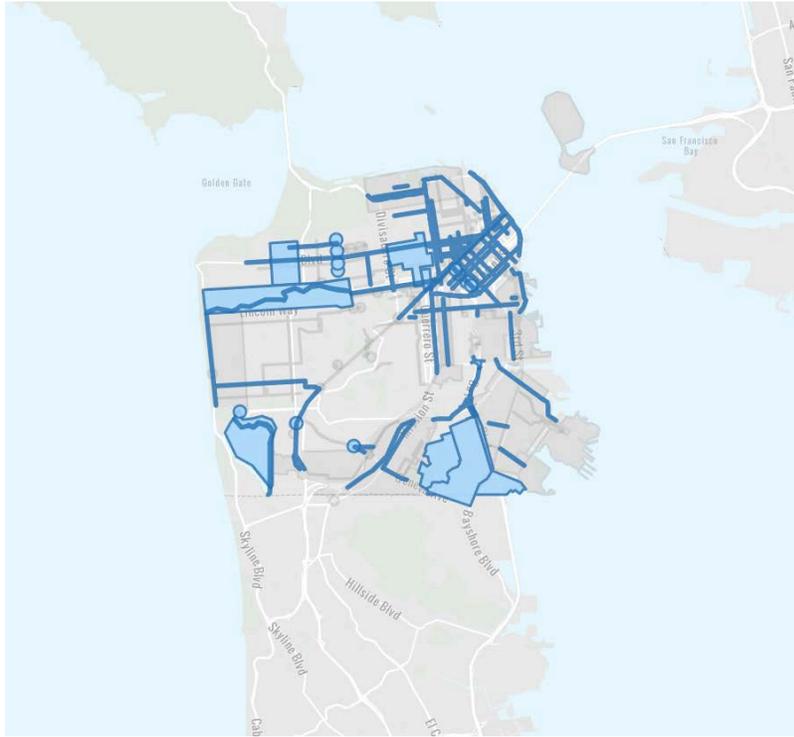
Public management literature consistently finds that making data publicly available positively impacts perceptions of governance. Buell, Porter, Norton (2014) find that giving constituents data about the scale of a public management problem (potholes in the case of their research) as well as how government employees are responding to the problem, is a “critical driver of trust and engagement” in government.⁷³ Many cities are incorporating a transparency-minded and visual approach to tracking how their Vision Zero work responds to high injury corridor locations. Somerville, Massachusetts, a small city with a similar population to Alameda, maintains a simple Google Map highlighting where ongoing projects are taking place, relative to high-injury corridors. San Francisco maintains a more sophisticated map showing ongoing Vision Zero projects along the high injury corridor.

These mapping projects serve a dual purpose: they communicate that the city is taking action, while telling a story about where the most serious crashes are taking place. This may help concerned constituents understand why their neighborhood may not be immediately prioritized for traffic safety or calming projects, despite requests.

Somerville, MA's Mobility and Safety Improvement Projects Map⁷⁴



SFMTA's Interactive Projects Map⁷⁵



Interactive Projects Map

Search SFMTA projects by name, mode, neighborhood, supervisor district, or by clicking on the map.

[Click here for the multi-agency SF STREETS project map.](#)

Name

Mode

Neighborhood

District

Vision Zero Projects

Vision Zero search results: 81 projects

Results below may also include citywide projects that do not appear on the map, as indicated by a gray header. Contact projectmap@sfmta.com with any questions or concerns regarding this map.

13th Street Safety Project

Description: Improving traffic safety along the 13th Street and Duboce Avenue corridor

Project mode/type: Accessibility, Bike, Drive & Park, Vision Zero, Walk

Project status: Current

Partner Agencies: Caltrans, Mayor's Office of Housing and Community Development, San Francisco County Transportation Authority, San Francisco Public Works, SF Planning Department, Vision Zero SF

More info: [Project web page](#)

16th Street Improvement Project, Phase 2

Description: Improving Muni reliability, travel time, safety and accessibility along 16th Street.

Project mode/type: Accessibility, Muni, Muni Forward, Walk

Project status: Implementation / Construction

Partner Agencies: Muni Forward, San Francisco County Transportation Authority, San Francisco Public Utilities Commission, San Francisco Public Works, Vision Zero SF

More info: [Project web page](#)

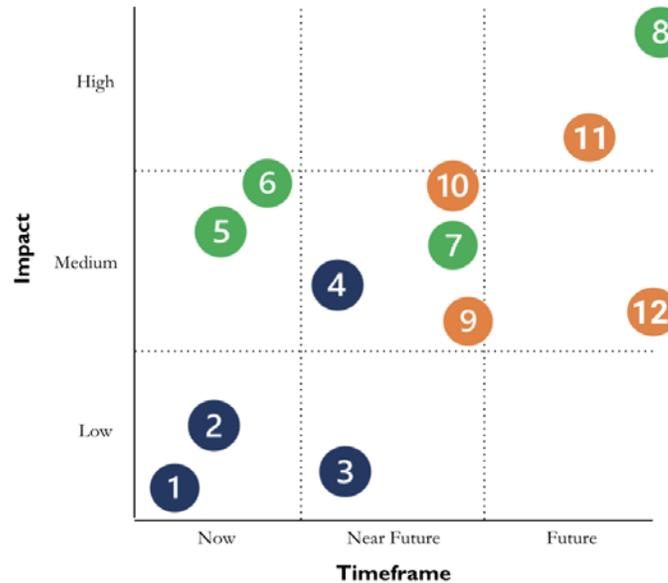
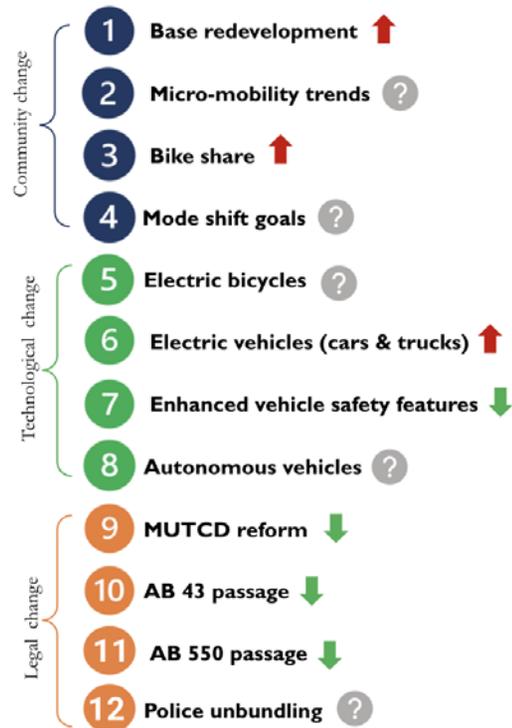
Appendix G: Key Performance Indicators (KPIs) used by Cities with Strong Evaluation Practices

City	Performance Metrics - Key Performance Indicators (KPIs)
Fremont, CA	<ul style="list-style-type: none"> ● Number of completed safe infrastructure features, ex: number of pedestrian flashing beacons; number of neighborhood speed bumps; % of signals with pedestrian countdown feedback; number of radar speed feedback signs. ● Number and nature (modes, ages, location) of fatal and severe crashes
Minneapolis, MN	<ul style="list-style-type: none"> ● Change in total combined number of traffic deaths and severe injuries, including breakdown by mode, age, race, and whether it was in an ACP50 (equity priority) area ● Percentage change in drivers exceeding 30 miles per hour and median traffic speeds on select streets ● Percentage of High Injury Streets with new traffic safety treatments ● Miles of four-lane undivided High Injury Streets converted to safer configurations ● Number of total intersections with new traffic safety treatments, listed separately by those with design changes and those with traffic signal-related changes ● Percentage of new street safety treatments in ACP50 (equity priority) areas ● Number of residents reached by Vision Zero engagement work, including breakdown of those reached by City staff-led engagement and engagement led by community- and culturally based organizations ● Percentage change in traffic stops that are of people of color ● Percentage of traffic stops focused on the top five unsafe behaviors on Minneapolis streets ● Percentage of Minneapolis public schools conducting traffic safety education programs for students
San Francisco, CA	<ul style="list-style-type: none"> ● The number of fatal and severe injuries by travel mode, age, sex, and race/ethnicity. ● The proportion of fatal and severe injuries in Communities of Concern. ● The outcomes of safety projects (including reductions in speed, close calls, etc.) in an Annual Safe Streets Evaluation Report ● Number of quick-build projects completed on the High Injury Network ● At least 50% of traffic citations annually are “Focus on the 5” enforcement ● Reach 15,000 people annually at community events and 250 million digital media impressions ● Eight outreach grants annually to community organizations ● At least 20% of community has awareness of Vision Zero ● Hold at least 45 community events annually with all materials translated
Seattle, WA	<ul style="list-style-type: none"> ● Total number of collisions, fatalities, and serious injuries ● Total number of pedestrian collisions, fatalities, and serious injuries ● Total number of bike collisions, fatalities, and serious injuries ● Speed and collision evaluations are conducted for major interventions (School Speed Camera Safety Program, Speed limit signs, etc.)

Appendix H: Responding to a Changing Technological, Legal, & Community Landscape

Crash trends are not static; the City of Alameda should think about the nuances of legal, technological and community change when making projections for a how many crashes might need to be addressed by a future rapid response program.

The Future of Traffic Safety



Time Frame

- **Now:** 1-2 years
- **Near:** 3-5 years
- **Next:** 5+ years away

Magnitude

- **Small impact:** low increase/decrease in crashes frequency or severity
- **Medium impact:** medium increase/decrease in crashes frequency or severity
- **Large impact:** high increase/decrease in crashes frequency or severity

The factors included on the table below could influence the number and severity of crashes that Alameda experiences annually. For some factors, it is difficult to project outcomes, as this development may both increase and decrease potential for crashes by displacing car use but increasing the number of vulnerable road users on roadways.

Factor	Projected direction of impact on crashes	Type	Expected timeline	Expected impact	Description of impacts
Base Redevelopment	Increase	Community Change	1- Now	1- Small	As Alameda’s population grows with the redevelopment of the former naval air station, the increase in population could lead to more opportunities for crashes. While speed limits in the areas under redevelopment are low, some roadways are very wide, which could lead to the potential for speeding. One of the largest areas under redevelopment, Site A, will have easy access via bike and pedestrian pathways to the ferry for commuters, and is designed as a Transit Oriented Development project. However, the distance from commercial areas of the City of Alameda may make car trips likely to meet some needs. Overall, this factor is not expected to have a large impact on the number of crashes.
Micromobility Trends	Unclear	Technological Change	1- Now	2- Small	Scooters and other micro mobility users are vulnerable road users. Neighboring cities, such as San Francisco, have seen a marked rise in scooter crashes leading to severe and fatal outcomes in recent years. ⁷⁶ Currently, scooter related crashes have not been a serious issue in the City of Alameda ⁷⁷ , especially since there has not been a company operating rentals in the city. Micro mobility devices, especially privately owned, could eventually have the potential to displace car trips on the island, especially as separated infrastructure makes these types of trips more attractive.
Electric Bicycles	Unclear	Technological Change	1- Now	2- Medium	E-bikes make it easier for more types of trips to be made by bicycle, such as shopping for groceries, moving cargo, and transporting children. Many advocates claim that e-bikes will be able to serve as a car replacement for many people ⁷⁸ or at a minimum, lead to overall increased numbers of bike trips. Unlike standard bicycles under City of Alameda code, e-bikes cannot be

Electric Vehicles (Cars/Trucks)	Increase	Technological Change	1- Now	3- High	<p>used on sidewalks, which could lead to more exposure to vehicles. However, e-bikes could easily replace car trips on a small flat island like Alameda, which would reduce risk.</p> <p>California has bold plans to eliminate the sale of internal combustion vehicles in the state; Executive Order N-79-20 calls for only Zero Emissions Vehicles (ZEVs) to be sold by 2035, and for zero-emissions medium and heavy duty vehicles by 2045.⁷⁹ According to the California Energy Commission, light duty zero emissions vehicles had 12.41% market share in the state in 2021;⁸⁰ this share is expected to rise over time as Executive Order B-48-18 called for 5 million ZEVs to be on the road by 2030.⁸¹ While the transition to electric vehicles is undeniably important for decarbonization, several key traffic safety issues may arise, especially as car owners become accustomed to a new technology. The quick acceleration possible with this technology may pose increased risks for crashes with vulnerable road users, particularly at intersections.⁸² Additionally, the additional weight from batteries may increase the risk to vulnerable road users, especially for SUV models with a tall front end such as the new electric Hummer, which weighs a whopping 9,046 pounds.⁸³ The quiet operation of electric vehicles may make decrease awareness among vulnerable road users who are hard of hearing. However, initial research in the space such as Cocron and Krems (2013) suggest that concerns around vehicles not being heard may be overstated.⁸⁴ Finally, Jevons' paradox, also known as the rebound effect, posits that EV owners may be more likely to drive more, as it is cheaper for them and viewed as less environmentally damaging.</p>
Bike Share	Unclear	Community Change	2- Near	1- Small	<p>The launch of a Bike Share in Alameda⁸⁵ could lead to more inexperienced riders on the roadways, increasing potential for crashes with serious outcomes.</p>

Enhanced Vehicle Safety Features	Decrease	Technological Change	2- Near	2- Medium	Enhanced vehicle safety features such as forward collision warning, auto emergency braking, lane departure warning, intelligent speed adaptation, lane keeping assistance, and blind spot warning are expected to reduce vehicle crashes, especially with other vehicles, in the coming years and decades. ⁸⁶ The magnitude of these effects may be limited due to the number of high-speed multi-lane roadways in the city. Furthermore, the ineffectiveness of enhanced safety features related to pedestrian detection in the United States vehicle market means that these technological advances may not address some of the leading causes of fatalities in the City of Alameda. ⁸⁷
MUTCD Reform	Decrease	Legal Change	2- Near	2- Medium	A new edition of the Manual on Uniform Traffic Control Devices (MUTCD) may revise controversial provisions, such as the 85th Percentile speed limit setting rule. ⁸⁸ If traffic engineers perceive that they have more flexibility to implement solutions that fit community context, crashes could be reduced.
Mode shift goals as outlined in the 2018 Transportation Choices Plan (TCP)	Unclear	Community Change	2- Near	2- Medium	The City of Alameda's 2018 Transportation Choices Planned called for an increase from 37% to 42% in the number of Weekday Daily Person Trips made in modes other than driving alone (Carpool, Bike, Walk, Transit), a 5 percentage point increase. Fewer people driving cars leads to fewer opportunities for KSI crashes, although increasing the number of vulnerable road users could have the opposite effect. ⁸⁹ The outcomes depend on the degree to which mode shift goals are accomplished and which modes become most popular.
AB 43: Traffic Safety	Decrease	Legal Change	2- Near	2- Medium	AB 43 allows cities more discretion to set speed limits based on safety and local context. ⁹⁰ More local control could allow the City of Alameda to explore reducing speed limits; even reducing speeds from 25 to 20 mph could lead to fewer crashes with severe and fatal outcomes. However, compliance and street design may pose barriers to successful implementation of lower speed limits.

AB 550: Vehicles: Speed Safety System Pilot Program passage	Decrease	Legal Change	3- Next	2- Medium	AB 550, if passed, would open the door for automated speed enforcement pilots in California, in Los Angeles, Oakland, San Jose, one additional southern California city, and San Francisco. If successful, potential for broader implementation
Autonomous Vehicles	Unclear	Technological Change	3- Next	3- High	Autonomous vehicles (AVs) could potentially lead to increased vehicle miles traveled (VMT) by reducing the opportunity costs of driving. ⁹¹ However, if AVs are programmed to respond to vulnerable road users deferentially, crashes could be reduced, particularly at intersections. ⁹² Ultimately, AV trends remain speculative due to multiple hurdles that still need to be addressed, including the technology itself, user adoption, cost structures, and legal frameworks. ⁹³ San Francisco has been a testing ground for AVs and is likely to provide evidence of their impact on vulnerable road users.
Police Unbundling	Unclear	Legal Change	2- Near or 3- Next	2- Medium	Unbundling traffic enforcement from the Alameda Police Department could open new avenues and models for traffic enforcement. It is unclear how road user compliance would change as a result. The City of Berkeley is currently exploring this approach ⁹⁴ ; results can inform cities interested in new models for traffic safety.

End Notes

II. The City of Alameda's Vision Zero Needs

¹ Author's own analysis of City of Alameda data downloaded from Transportation Injury Mapping System (TIMS), *Safe Transportation Research and Education Center, University of California, Berkeley*. 2022 and Alameda Police Department data, provided by Lisa Foster on March 16, 2022. Note that data from 2020 and 2021 are provisional and subject to change.

² "Update: Former KTVU News Director Fred Zehnder Struck, Killed by Vehicle in Alameda; Driver Arrested for Dui." CBS San Francisco, June 29, 2021.
<https://sanfrancisco.cbslocal.com/2021/06/28/pedestrian-fred-zehnder-killed-alameda-driver-arrested-dui/>.

³ KRON4. "Alameda County Supervisor Wilma Chan Hit, Killed by Car." KRON4. November 4, 2021.
<https://www.kron4.com/news/bay-area/alameda-county-supervisor-wilma-chan-dies-after-struck-by-car/>.

⁴ Meyer, Marshall W. "COVID Lockdowns, Social Distancing, and Fatal Car Crashes: More Deaths on Hobbesian Highways?" *Cambridge Journal of Evidence-Based Policing* 4, no. 3–4 (December 2020): 238–59.
<https://doi.org/10.1007/s41887-020-00059-8>.

⁵ It is worth noting that many Alamedans walk and cycle recreationally outside of their commutes to work. These trips are difficult to capture in official data sources.

⁶ City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1, p 11

⁷ City of Alameda. "Climate Action and Resiliency Plan (CARP)," 2019.
<https://www.alamedaca.gov/CITYWIDE-PROJECTS/Climate-Action-and-Environmental-Sustainability-in-Alameda/Climate-Action-and-Resiliency-Plan#:~:text=Through%20adoption%20of%20its%20award,neutral%20as%20soon%20as%20possible>, p 46

III. Geospatial Dimensions of Collisions in the City of Alameda

⁸ One fatal crash from 2022 is included on this map; data on serious crashes for the current year is not yet available. Note that data from 2019-2021 is available from the Transportation Injury Mapping System (TIMS) is provisional and is subject to correction.

⁹ High Injury Corridor analysis carried out by Toole Design as part of Alameda's Vision Zero Action Plan, with GIS shapefiles provided by Lisa Foster on April 25, 2022. *Overlaid with* author's own analysis of City of Alameda data downloaded from Transportation Injury Mapping System (TIMS), *Safe Transportation Research and Education Center, University of California, Berkeley*. 2022 and Alameda Police Department data, provided by Lisa Foster on March 16, 2022. Note that data from 2020 and 2021 are provisional and subject to change.

¹⁰ Transportation Injury Mapping System (TIMS), *Safe Transportation Research and Education Center, University of California, Berkeley*. 2022

¹¹ Author created map integrating crash data from Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2022 and the capital projects identified in City of Alameda, Transportation Annual Report 2022,
https://www.alamedaca.gov/files/assets/public/departments/alameda/transportation/quarterlyreports/annualreporttransportation_jan2022_final3.pdf

IV. Analysis of City of Alameda's Existing Processes & Resources for Addressing Serious and Fatal Crashes

¹² City of Alameda. "Work in Progress: 2019-2021 Capital Budget & Five-Year Capital Improvement Program." <https://www.alamedaca.gov/files/sharedassets/public/public-works/capital-budgets/2019-cip-work-in-progress-final.pdf>, p 4.

¹³ Smith, Carl. "Government Is Hiring, but Faces Tough Competition for Workers." *Governing*. Governing, October 6, 2021. <https://www.governing.com/now/government-is-hiring-but-faces-tough-competition-for-workers>.

¹⁴ City of Alameda Public Works Org Chart, provided by Lisa Foster, and City of Alameda, Transportation Annual Report 2022, https://www.alamedaca.gov/files/assets/public/departments/alameda/transportation/quarterlyreports/annualreporttransportation_jan2022_final3.pdf

¹⁵ Author created infographic using information from Alameda's SeeClickFix System's Street Safety Concern Reports. Provided by Lisa Foster via email, March 2, 2022.

¹⁶ Thomas, Andrew. Interview by Emily Clayton. Personal Interview. Alameda, CA, March 17, 2022.

¹⁷ Author created infographic using information from Alameda's SeeClickFix System's Street Safety Concern Reports. Provided by Lisa Foster via email, March 2, 2022.

V. Criteria

¹⁷ "Crash Modification Factors Clearinghouse." CMF Clearinghouse- About CMFs. Accessed May 6, 2022. <http://www.cmfclearinghouse.org/about.cfm>.

¹⁸ Author created infographic with analyzing interview themes. See Appendix B for cities included in the sample and interview dates.

¹⁹ Vision Zero planning is inherently data-driven, which typically involves analyzing *historical* crash data to determine where action should be taken. The degree to which *new* crashes are included in city responses are shown on the graph.

²⁰ City of Alameda. "Work in Progress: 2019-2021 Capital Budget & Five-Year Capital Improvement Program." <https://www.alamedaca.gov/files/sharedassets/public/public-works/capital-budgets/2019-cip-work-in-progress-final.pdf>

VII. Conceptualizing Rapid Response for Alameda

²¹ Vanterpool, Veronica. "Linking Transportation & Health Systems: Pioneering Collaborative Is Model for Vision Zero." *Vision Zero Network*, August 27, 2020. <https://visionzeronet.org/linking-transportation-health-systems-pioneering-collaborative-is-model-for-vision-zero/>.

²² Sergio Ruiz, email to author, March 2022.

²³ Ibid.

²⁴ "California Officially Endorses NACTO Urban Street Design Guide and Urban Bikeway Design Guide." National Association of City Transportation Officials. Accessed May 7, 2022. <https://nacto.org/2014/04/11/california-officially-endorses-nacto-urban-street-design-guide-and-urban-bikeway-design-guide/#:~:text=California%20Officially%20Endorses%20NACTO%20Urban,Association%20of%20City%20Transportation%20Officials>.

²⁵ "Infrastructure Investment and Jobs Act - NACTO." Accessed May 7, 2022. <https://nacto.org/wp-content/uploads/2021/08/NACTO-IIJA-City-Overview.pdf>.

²⁶ City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1

VIII. Evaluating Rapid Response Efforts

²⁷ Anderson, Eric. Interview by Emily Clayton. Personal Interview. Oakland, CA, February 24, 2022.

²⁸ Reeves, Ryan and Wong, Jennifer. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 4, 2022.

²⁹ Ashti, Mandana and Hernando, Leonardo. Interview by Emily Clayton. Personal Interview. Oakland, CA, March 3, 2020.

³⁰ City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1 Appendix F, p 14

³¹ Estimates are based on Federal Highway Administration (FHWA) information, available at the links to the matrix in Appendix E.

³² City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1, Appendix D, p 2

³³ Mayeur, Christine. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 22, 2022.

³⁴ A special thanks to Ziyang Fang for introducing me to the now, near, next framework for policy planning to address technological change.

VIII. Design Flexibility

³⁵ Reeves, Ryan and Wong, Jennifer. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 4, 2022.

³⁶ Ashti, Mandana and Hernando, Leonardo. Interview by Emily Clayton. Personal Interview. Oakland, CA, March 3, 2020.

³⁷ Lewin, Amy "Liv." Interview by Emily Clayton. Personal Interview. Oakland, CA, March 22, 2022.

³⁸ Schwartz, Allison. Interview by Emily Clayton. Personal Interview. Oakland, CA, March 15, 2022.

Fawley, Ethan. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 18, 2022.

Mintz-Roth, Jesse. Interview by Emily Clayton. Personal Interview. Oakland, CA, February 23, 2022

³⁹ Veka, Clay. Interview by Emily Clayton. Personal Interview. Oakland, CA, March 21, 2022.

⁴⁰ Ngo, Uyen. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 13, 2022.

⁴¹ Stewart, "Complicated Bereavement And Posttraumatic Stress Disorder Following Fatal Car Crashes."

⁴² City of Portland. "SAVING LIVES WITH SAFE STREETS: Vision Zero Traffic Crash Report 2021." January 2022. <https://www.portland.gov/sites/default/files/2022/traffic-crash-report-2021.pdf>

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⁴⁴ Hall, Jonathan D., and Joshua M. Madsen. "Can Behavioral Interventions Be Too Salient? Evidence from Traffic Safety Messages." *Science* 376, no. 6591 (April 22, 2022): eabm3427. <https://doi.org/10.1126/science.abm3427>.

⁴⁵ Veka, Clay. Interview by Emily Clayton. Personal Interview. Oakland, CA, March 21, 2022.

⁴⁶ Ibid.

⁴⁷ SF Rapid Response Talking Points, provided by Uyen Ngo via email April 20, 2022.

⁴⁸ Ngo, Uyen. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 13, 2022.

⁴⁹ Ibid.

⁵⁰ Larsen, Hans. Email communication. February 25, 2022.

⁵¹ Fawley, Ethan. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 18, 2022.

⁵² Ngo, Uyen. Interview by Emily Clayton. Personal Interview. Oakland, CA, April 13, 2022.

⁵³ Chamberlain, Barb. Email to author, March 2022.

⁵⁴ Seth LaJeunesse, Stephen Heiny, Wes Kumfer, Nancy Pullen-Seufert, Luke Morin, Sydney Nicolla, Teresa Tackett and Lucinda Austin. Shaping the narrative around traffic injury: A media framing guide for transportation and public health professionals (2020). Collaborative Sciences Center for Road Safety; project R29. <https://www.roadsafety.unc.edu/research/projects/2019r29/>

⁵⁵ Fox, Jenn. "Webinar Recap: Words Matter: Effective Vision Zero Messaging." Vision Zero Network, August 27, 2020. <https://visionzeronetwork.org/webinar-recap-words-matter-effective-vision-zero-messaging/>.

⁵⁶ Ibid.

⁵⁷ SF Rapid Response Talking Points, provided by Uyen Ngo via email April 20, 2022.

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⁵⁹ Chamberlain, Barb. Email to author, March 2022.

⁶⁰ Veka, Clay. Interview by Emily Clayton. Personal Interview. Oakland, CA, March 21, 2022.

⁶¹ Washington, District of Columbia. "Fatal Crash Follow Up: Minnesota Ave SE and L'Enfant Square SE." February 2020, https://ddot.dc.gov/sites/default/files/dc/sites/ddot/D20-01_Minnesota_Ave_L'Enfant.pdf

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⁶² City of Alameda. “Work in Progress: 2019-2021 Capital Budget & Five-Year Capital Improvement Program.”
<https://www.alamedaca.gov/files/sharedassets/public/public-works/capital-budgets/2019-cip-work-in-progress-final.pdf>, p 4

⁶³ City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1, p 35

⁶⁴ City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1, p19

⁶⁵ “Manual on Uniform Traffic Control Devices for Streets and Highways.” FHWA. Accessed May 6, 2022.
<https://mutcd.fhwa.dot.gov/>.

⁶⁶ City of Alameda, 2022, "Alameda Vision Zero Action Plan (2021). Alameda, California", <https://doi.org/10.15139/S3/SO9OQA>, UNC Dataverse, V1, p 32

Appendix A: Matrix of Potential Rapid Response Interventions

⁶⁷ Crash Reduction Factor (CRF) and Crash Modification Factor (CMF) were identified.

Appendix C: Additional Context on KSI Crash Responses Used in Other Cities

VI. Evaluating Strategies to Respond to Severe & Fatal Crashes

⁷⁰ McKenna, Brooke. Interview by Emily Clayton. Personal Interview. Oakland, CA. February 23, 2022

⁷¹ Ibid and Mintz-Roth, Jesse. Emily Clayton. Personal Interview. Oakland, CA. February 23, 2022

⁷² *NACTO Urban Street Design Guide: Overview*. New York: National Association of City Transportation Officials, 2012, p 6.

Appendix F: Equity Considerations

⁷³ Buell, Ryan W., Ethan Porter, and Michael I. Norton. "Surfacing the submerged state: Operational transparency increases trust in and engagement with government." *Manufacturing & Service Operations Management* 23, no. 4 (2021): 781-802. https://www.hbs.edu/ris/Publication%20Files/14-034_16ccb2b4-1a24-47b5-8bcf-dca2720bb96f.pdf

⁷⁴ City of Somerville, MA. *Mobility and Safety Improvement Projects*.

⁷⁵ <https://maps.sfmta.com/tppd/citywide/full/Index.html>

IX. Beyond Engineering: Remembering Victims & Communicating Key Vision Zero Messages

⁷⁶ Jarrett, Will. “Scooter Collisions in City Rose 58 Percent Last Year.” Mission Local, March 22, 2022.
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⁷⁷ Based on author’s analysis of City of Alameda data from Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2022.

⁷⁸ Martinko, Katherine. “An Electric Cargo Bike Can Replace the Family Car.” Treehugger. Treehugger, December 17, 2020. <https://www.treehugger.com/electric-cargo-bike-replace-family-car-5092791>.

⁷⁹ “Transportation Electrification.” California Public Utilities Commission. Accessed May 7, 2022.
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- ⁸² Trudell, Craig. Bloomberg.com. Bloomberg, December 2021. <https://www.bloomberg.com/news/articles/2021-12-16/why-the-ev-world-should-worry-about-unintended-acceleration>.
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- ⁹³ *Ibid*, p 143
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