2024

Traffic Calming Program

City of Belmont

One Twin Pines Lane, Belmont, CA

94002

7/23/2024

Contents

Traffic Calming Program Document

1.0 Introduction

The City of Belmont receives regular requests from residents to implement solutions to both real and perceived traffic issues. These often consist of requests to install speed humps or stop signs at uncontrolled intersections to reduce the speed of traffic. Most of these requests are processed through the City's Parking and Traffic Safety Committee (PTSC), which is comprised of staff from the Belmont Police Department (BPD), San Mateo Consolidated Fire Department (SMCFD), and the Belmont Public Works Department. The Parking and Traffic Safety Committee is responsible for evaluating and implementing traffic safety improvements, and primarily uses standard traffic control rules, traffic engineering principles, and local/state regulations to determine what traffic controls can be implemented. Among these regulations are the requirements that standard warrants be met for installation of stop signs and other traffic control measures. In Belmont, where they don't currently exist, the requirements for vehicular volume or collision rate warrants cannot usually be met to place new stop signs at uncontrolled intersections. It is a common misconception that stop signs are speed control devices, rather than a tool to determine which entry leg has the right of way to proceed first. This has led to some concern among Belmont residents, and a call for other solutions to traffic speeding issues.

To address speeding and other driver behavior issues, the City of Belmont formed a Traffic Calming Task Force in 2000 and adopted the Neighborhood Traffic Calming Program. The Task Force was comprised of a mix of City staff, School District staff and citizen members. The Parking and Traffic Safety Committee (PTSC) created this new program document to replace the Neighborhood Traffic Calming Program document dated July 25, 2000. This will be a living document that will be maintained by the Belmont Public Works Department.

Responses to concerns regarding traffic congestion, pedestrian and bicycle safety, speeds and cut-through traffic volumes can be addressed by using the "5 E's" important tools: Education, Enforcement, Engineering, Emergency Response, and Emerging Technologies. Many problems can be solved through relatively low-cost educational and enforcement activities. However, some problems do require more expensive engineering or design solutions.

The final solution will also take some time to implement as different measures are proposed and refined through a trial-and-error methodology. The most successful solution will not focus on just one type of solution but will involve the implementation of a combination of measures from all the 5 E's.

1.1 What is Traffic Calming?

> *"Traffic Calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users." – Institute of Transportation Engineers (ITE)*

1.2 The 5 "E's"

Educating the public, regular and visible enforcement of the vehicle code, context sensitive traffic engineering, emergency response consideration, and emerging technology concepts comprise the “5 E’s.” The “5 E’s” are widely accepted as the key components to implementation of a successful traffic calming program. All five E’s are necessary to create safety in public travel ways.

- **Education** – Communicating information to the public is necessary to create a safer environment. Education through multiple outreach methods will help encourage better driving behavior.
- **Enforcement –** The Belmont Police Department will enforce laws with targeted events and through public outreach and education.
- **Engineering –** Physical features are designed to force drivers to slow or use alternative routes to travel. These features can be seen in Appendix B.
- **Emergency Response –** Emergency response must be considered in any level of traffic calming. Concerns from emergency responders must be considered, and where specified, their approvals obtained, before proceeding with any projects.
- **Emerging Technologies –** Technology can enhance the effectiveness of traditional methods of traffic calming, as well as help to manage and improve road safety.

If a request from the public to the PTSC does not meet the requirements for an engineered traffic calming measure, then the PTSC may review the request for the applicability of education and/or enforcement alternatives.

2.0 Program Objectives

The Neighborhood Traffic Calming Program addresses residential and collector streets only. Residential (local) streets typically connect or feed into collector streets and collectors typically connect or feed into arterial streets. Traffic on the arterial roadways is currently monitored and regulated by sophisticated traffic control systems. Arterial roadways carry high volumes of vehicular and multimodal traffic, are primary emergency response and evacuation routes, and are not appropriate roadways for implementing traffic calming measures. The primary objective of this program is to enhance the safety and livability of Belmont’s neighborhood streets. The program enables the City of Belmont to respond to neighborhood traffic issues using a defined formal process.

The primary objective of a Traffic Calming Program is to calm traffic, as opposed to control traffic. Devices such as signs, striping, pavement messages, traffic signals, and police enforcement control traffic, according to laws, rules, and regulations passed to legally control the conduct of drivers. Chicanes, bulb outs, roundabouts, neighborhood traffic circles, speed humps and lane narrowing on the other hand, are examples of measures used to calm traffic.

2.1. Travel Speed

Traffic calming can alter the physical shape of the roadway to reduce vehicular travel speed. This is accomplished by vertical measures (such as speed humps) and horizontal measures (such as narrowing the street) that make the roadway more difficult or uncomfortable to travel at high speed, either because of friction of objects adjacent to the roadway or the need to maneuver the vehicle more to negotiate roadway features.

There are several methods to measure speed trends for neighborhood streets. The most used method is the "85th percentile" or "critical speed," which is the speed that 15% of drivers exceed per Section 2B.13 (12) of the Manual on Uniform Traffic Control Devices (MUTCD). Speed studies routinely use this method to determine the speed limit; therefore, often "Critical" speeds do not exceed the speed limit by more than 7 mph. Traffic calming programs often use this measurement method as criteria for determining whether to implement traffic calming. If the 85th Percentile speed exceeds the speed limit, usually 25 mph on residential streets, by a set amount, traffic calming measures may be appropriate.

2.2. Traffic Volume

Another objective of traffic calming installations is to reduce traffic volumes by making a route less attractive as a higher volume street. By redesigning a street to have more neighborhood or pedestrian friendly attributes and increasing vehicular travel times (reducing speeds) along a corridor, motorists will be less inclined to use the street as a through roadway. This can be accomplished by measures which add pedestrian linkages and landscaping along the roadway, among other tools.

Residential streets are designed to accommodate peak hourly volumes of approximately 1,000 vehicles per day (vpd). Volumes in excess of this amount tend to cause aggressive behavior in drivers and congestion at local intersections. They also tend to create difficulty in safe pedestrian crossings of the street. Collector roads are designed to handle 3,000 vpd. This program seeks to reduce street volumes.

2.3. Cut-Through Traffic

Both speed and volume reduction measures apply to streets with significant "cut-through" volumes. By making the residential street vehicular speeds lower, travel times increase, and "cut-through" traffic will return to the collector or arterial which was designed to accommodate higher traffic volumes.

It is harder to measure "cut-through" volumes because each vehicle's origin and destination (O/D) must be determined. This is measured by several types of O/D studies, such as license plate surveys (compare plates at each end of the street), manual surveys (stop each car and ask), and post-card surveys (mail-in of post-cards handed out at checkpoints along the route), although new technologies like "Streetlight Data" and "Inrix" real-time traffic services are able to use GPS and cell-phone data to determine O/D more accurately than surveys.

When evaluating "cut-through' volumes, the percentage of traffic originating outside the neighborhood going to a destination outside the neighborhood is measured. The evaluation must also include whether there is an alternative route using arterial roadways which should be used. Traffic calming can then be considered as a tool to encourage use of the appropriate route.

2.4. Emergency Response Routes

In Belmont, accommodation of emergency response routes has a significant effect on the ability to install traffic calming measures. Many of Belmont's neighborhood streets can serve as collectors and are also emergency response routes. Many neighborhood streets connect directly to the arterial roadways, Ralston Avenue, Alameda de las Pulgas, El Camino Real and Old County Road. Therefore, many residential streets are designated primary emergency response routes.

Emergency vehicles are affected most by vertical measures, those which cause a vehicle to experience an uncomfortable vertical movement. Measures sufficient to cause discomfort to automobiles delay emergency response times and cause a serious effect on much larger vehicles, such as fire engines. These measures can also negatively affect medical emergency vehicles carrying patients.

The result of these increased effects on emergency vehicles is that the vehicles must slow down to negotiate the vertical measures. This in turn will increase the emergency response time. In urban portions of San Mateo County, the maximum, mandatory (i.e., contractual obligation) response time for the first-responding Paramedic-staffed fire company is 6 minutes, 59 seconds to 90% of all medical emergencies. In Belmont, San Carlos, and the Harbor Industrial Area, the governance-adopted performance standard for emergency response is a maximum travel time for the first-arriving fire company of 5 minutes to 80% of all emergency incidents. Failure to meet these response/travel times may require the creation of an additional staffed fire company, the construction of an additional staffed fire station, or similarly costly remedies.

2.5. Impacted Areas

Another factor in determining where to apply traffic calming is to determine the area which has a traffic problem. Sometimes it is a single "spot" location, such as an intersection; sometimes an entire street; but it may also be a network of parallel or interconnected streets (a street system). Normally the application will determine the extent of the area impacted. Staff will review the application to determine if a smaller or larger impacted area is appropriate. A traffic calming measure installed to solve a problem in one location may move the problem to another location. This is not a desirable or acceptable result, except when traffic is moved from residential streets to arterials, which are designed to carry higher volumes of traffic.

An application to the PTSC to implement a traffic calming measure will usually specify a particular area be considered. City staff will evaluate the impact of implementing traffic calming at the requested location or area on adjacent intersections, street sections or street systems. If installation of the measure will merely move the problem, either a more comprehensive traffic calming system will be considered, or no traffic calming will be allowed. If a more comprehensive system is required to solve the problem, the larger system must meet all the requirements of this program and must be fundable.

In some cases, the impacted area may include another jurisdiction, such as San Carlos, San Mateo, Redwood City, San Mateo County, or the State of California. In those cases, every effort will be made to involve the other jurisdiction, both staff and residents, to evaluate impacts.

3.0 Program Guidelines

3.1. Eligibility

When an application for traffic calming is received by the PTSC, it will be evaluated to determine if the impacted area is eligible for traffic calming. Eligibility for a traffic calming program includes meeting threshold criteria that determine whether traffic calming is likely to be the solution. It will also evaluate the engineering aspects to determine if there is a practical, safe solution at a reasonable cost which solves the problem without creating more problems. The solution may also be modified by special considerations, especially emergency response needs and Safe Routes to School (SRTS).

3.1.1. Criteria

As discussed in the Objectives section above, the minimum base criteria for installation of traffic calming measures are:

- "Critical" speed in excess of posted speed by 7 mph
- Average Daily Traffic (ADT) over 1,000 vehicles per day for Local roadways
- Average Daily Traffic (ADT) over 3,000 vehicles per day for Collector roadways

Either of these base criteria can be adjusted by each of the following:

- Every 1 mph of "Critical" speed in excess of 5 mph over posted can equal 200 vpd
- Every 200 vpd over 1,000 for local or 3,000 for collectors can equal 1 mph of "Critical" speed
- Every 5 mph of peak speed over the posted speed can equal 2 mph or 400 vpd.
- Every 5% of cut-through volume over 20% can equal 1 mph or 200 vpd

If a street were not over the speed criteria, but well over the volume criteria, the additional volume would compensate for the lack of a speeding problem. Likewise, if the volume criteria is not met, but the critical or peak speeds are well in excess of the posted speed, the traffic calming criteria may be met by using the excess speed to equate to volume. City staff will calculate the eligibility criteria in the most favorable manner to promote eligibility for applications.

3.1.2. Engineering

A focused speed and volume survey may be conducted when an application is received at the location of the requested traffic calming installation.

City engineers, or consultants hired by the City, may prepare a traffic engineering study, evaluating the impacts and effectiveness the desired traffic calming measure, and combinations of measures, towards solution of the problem. The study will evaluate the geometry of the intersections and street sections to determine where and how measures can practically be installed. The study will include a cost estimate.

The study will evaluate the ability of vehicles, including large trucks, emergency vehicles, motorcycles, and bicycles to negotiate the traffic calming system. Specialized computer programs, such as AutoTurn may be used for this evaluation. The study will also evaluate travel paths for bicycles and pedestrians. The engineering study will also evaluate the potential for impacts at locations other than the location being considered. If traffic calming measures are determined to be warranted and are fundable, further engineering will be done to produce final plans and specifications for permanent construction.

3.1.3. Safety

The eligibility criteria will also study the safety of the installation. The safety study will examine all aspects of improving safety and assuring that other safety aspects are not diminished. At a minimum, the safety study will examine:

- Traffic safety, such as visibility of obstructions.
- Sight distance, such as the ability to see objects in the road ahead of a vehicle and traffic at corners.
- Pedestrian safety; and
- Bicycle safety

3.1.4. Other Considerations

American with Disabilities Act (ADA)

A situation could arise in which a person with a disability protected by the ADA would be denied ingress or egress to the person's place of residence because of the impact of a traffic calming measure. That person should be able to reasonably demonstrate that the measure would aggravate the protected disability. In that situation, any traffic calming plan under consideration would need to be modified to provide an unobstructed route of ingress and egress to the person's residence.

Safe Routes to School (SRS)

Roadways that are designated as Safe Routes to School will have special consideration due to the high pedestrian traffic.

Speed Cushion Policy

The City of Belmont passed a Speed Hump Policy on April 9, 1996, which sets specific criteria for speed humps eligibility based on street section and grade. The policy prohibits speed humps on designated local emergency vehicle routes and streets designated as collector or arterial roads. This policy has been interpreted to apply to all vertical traffic calming measures and is maintained in this program.

The policy was updated and revised to the Speed Cushion Policy (formerly Speed Hump Policy) in consideration of newer standards and regulations. The updates to the standalone policy were incorporated and reviewed by PTSC on October 4, 2023, for implementation and installation of speed cushions.

The Speed Cushion Policy may be revisited in the future based on new technologies for vertical measures, such as split speed humps, speed tables, and raised intersections. As an existing traffic calming tool, implementation of speed cushions may be considered for local streets and the procedures to request, apply, fund, and install speed cushions will comply with the separate Speed Cushion Policy.

SamTrans

There are several bus routes through the City of Belmont on residential streets. Impacts to SamTrans equipment fleet will also be considered. Traffic calming measures are typically not appropriate for bus routes.

Visual Concerns

The traffic calming measures resulting from high aesthetic designs can be visually pleasing by introducing landscaping into formerly paved areas. However, since these measures are intended to pose obstacles to drivers, they must be well signed, striped, and reflectorized to avoid safety problems and limit potential liability exposure for the City. Some measures integrate visibility with aesthetics better than others. Traffic circles offset the reflectorized delineator poles and signs with landscaped features. Speed humps only increase visual clutter, with highly visible striping on the hump and warning signs. Long term future maintenance costs will also be considered in determining the most appropriate measure.

Negative visual concerns should be considered in the development of a traffic calming plan, especially considering the multiplication of the effect from a series of measures when viewed from the end of the street. Likewise, a positive aesthetic will multiply into an overall neighborhood enhancement. These visual considerations should be a part of residents' decision-making process in requesting traffic calming measures.

4. Implementation Process

When a request for traffic calming is received through the PTSC, staff first considers the validity of the request and perceived traffic problem, as well as whether the traffic problem is a traffic control issue. The Parking and Traffic Safety Committee will seek to resolve an identified traffic issue in the most cost-effective, timely manner, prior to embarking on the traffic calming evaluation process.

Multiple requests for locations on a street may be combined by staff into a single request for a street project. All requests will follow the implementation process chart as shown on Figure 1.

4.1 Application

A Parking and Traffic Safety Committee request form should be submitted to the Public Works Department for an eligibility determination. A traffic calming request may pertain to real or perceived problems of speeding, volume, or accidents on residential or collector streets. The PTSC will review existing pertinent collision, speed, and volume data, and may conduct a basic speed and volume survey to understand each specific issue. Accident history will also be reviewed for the area of concern. If the PTSC deems the request warranted for the Traffic Calming Program, a petition will be needed from the applicant.

4.2 Petition

A petition must be signed by 66 percent of the households in the area where action is requested showing support for the program. A household is defined as any owned or rented living unit with its own street address, regardless of how many people live in the unit.

4.2. Study Phase

Impact Area

Staff first determines the location or street segment(s) where traffic calming measures might be placed. Staff also determines whether any cross streets or adjacent parallel streets might be affected by any traffic calming actions implemented in the area. This larger area, consisting of the traffic calmed street, cross streets and/or adjacent parallel streets, is termed the “impacted area”.

Collect Data

Traffic data, including speeds, volumes, and accident history will be collected as necessary for the request.

4.3. Survey Phase

Depending on the traffic calming method selected, a consultant or the City may prepare designs for a possible improvement. The preferred plan and in some cases alternative(s), are mailed to impacted area residents along with announcement of a meeting. Residents are asked to email comments back to the City and/or attend the meeting. The plans are presented to residents at the meeting. It is desirable for impacted area residents to reach consensus on accepting traffic calming measures in their neighborhood by this point in the process.

Staff prepares a survey for residents that describes the traffic calming measures proposed to be placed and asks if they would support either implementation or in some cases, undertaking a pilot evaluation phase. The survey is conducted based on the type of traffic calming project.

One response is allowed per household, regardless of the number of people in the household. Non-resident property owners and households on other project area streets will not participate in the survey at this time. For a pilot project to be considered for approval, a simple majority (50+ percent) of survey responses must indicate support for the trial.

If alternative plans are included in the survey, the total support for all plans must be a simple majority, and the alternative with the most support will be considered for a trial. Based on the survey results, staff will decide if a trial can proceed.

If the required resident support described above is not obtained, the process ends at this point.

4.4. Trial Phase

Staff prepares a recommendation report for City Council to request approval to conduct a trial traffic calming program. If the Council does not approve the trial, the process will end at this point unless other direction is given. Council will also need to provide approval of funding for larger scale projects. Funding is further described in Section 5. For smaller projects, City staff can design and construct the trial improvement. Larger scale projects will need to be solicited for bids for design and then construction.

4.5. Permanent Installation

Evaluate trial results

After a pilot evaluation period is completed, staff evaluates the results of the trial program. Residents of the impacted area may be solicited for input and will be notified of the trial results. An optional meeting may be held at which the results of the trial are discussed. The trial installation will remain until the permanent measures are installed or the decision is made to remove the measures.

If staff determines that the trial was clearly not successful (e.g., traffic diversion is excessive, substantial resident complaints, concerns around safety, substantial delays to emergency services, etc.), and it appeared that modifications could not be developed that would resolve the problem(s), staff would recommend to the City Council that the trial be abandoned. Further information about removing traffic calming measures is included below.

Conduct survey of residents regarding results of trial.

Staff distributes a survey to determine if residents believe that the trial was successful and if the project should be considered for permanent installation. The survey area includes residents and property owners in the entire impacted area. For staff to consider recommending to the City Council that the project be approved for permanent installation, support must be indicated by a super majority (66.6+ percent) of survey responses from the same households as surveyed for the trial installation.

Review results of trial plan and decide on permanent installation.

Staff prepares a report to the City Council on the outcome of the pilot program. If the trial was successful, staff will recommend permanent installation to City Council. If the minimum project area support is not obtained, or if the plan was clearly not successful, staff will recommend removal of the trial traffic calming measures.

If the Council does not approve proceeding with permanent installation of the traffic calming plan, the project ends at this point and the trial installation is removed, unless Council directs that the process returns to select another alternative. If City Council approves of the permanent installation, they will also need to approve the budget for design and construction.

Design and implement permanent plan and conduct follow-up evaluation.

Following the approval for design and construction, the permanent installation is constructed. A follow-up evaluation of the effectiveness of the plan may be conducted up to three years after permanent installation.

4.6. Removal

Removal of a previously approved traffic calming plan, either of a trial before the trial period expires, or of a permanent installation after it is constructed, will require the same process be followed that was used to install the plan initially. This means that a constructed improvement will require 66.6+ percent of impacted area household to approve the removal.

Traffic calming measures may also be subject to removal at either the trial or permanent stages for various reasons, including conformity with the Americans with Disabilities Act (ADA), impacts on emergency services, collision problems, or safety problems determined by the Parking and Traffic Safety Committee. Depending on severity, all or a part of a traffic calming plan may be removed for these reasons.

5.0 Funding

Depending on the type of traffic calming method used, engineering traffic calming measures is generally expensive and does not have a dedicated funding source. Smaller projects may be able to be done by the City without seeking outside funding, design, or construction. Larger and more complex projects ($50,000 and over for construction) will require approval from City Council for funding and be included in the annual Capital Improvement Program. There will also be cases where the City staff can install the temporary trial program, but not the permanent improvements. The types of traffic calming improvements can be seen in Appendix B along with descriptions on which work the City may be able to perform in-house. Along with the cost to construct the improvement, there are recurring costs to the City for maintenance.

Participation in funding by grant programs or by others will be considered in expediting permanent construction of a project.

If residents desire to expedite the final construction process, the City will consider full (not partial) resident or property owner funding of a traffic calming project. Project area or primary street residents and property owners would determine how to collect the funds. Any number of residents or property owners may contribute, and residents are solely responsible for collecting the entire amount before requesting the City begin construction. Resident funding will be received only for approved traffic calming projects, with the purpose being to speed up permanent construction. Resident funding will not be used to speed up the qualification and study process or to qualify otherwise unqualified projects.

5.1 Maintenance

There are several different levels of design of traffic calming measures which can affect long-term maintenance requirements. The City has determined that high aesthetic/low maintenance designs are preferred to reduce the future burden on City resources to maintain traffic calming measures. These types of measures will include landscaping and irrigation systems, both of which require continuous maintenance.

These added costs or added staffing requirements if performed with City resources need to be estimated at the time the fiscal impact of constructing a traffic calming measure is determined and approved by City Council. The ability of existing staff to perform the work needs to be evaluated. If staffing is not sufficient, alternative annual costs of outside maintenance services should also be evaluated.

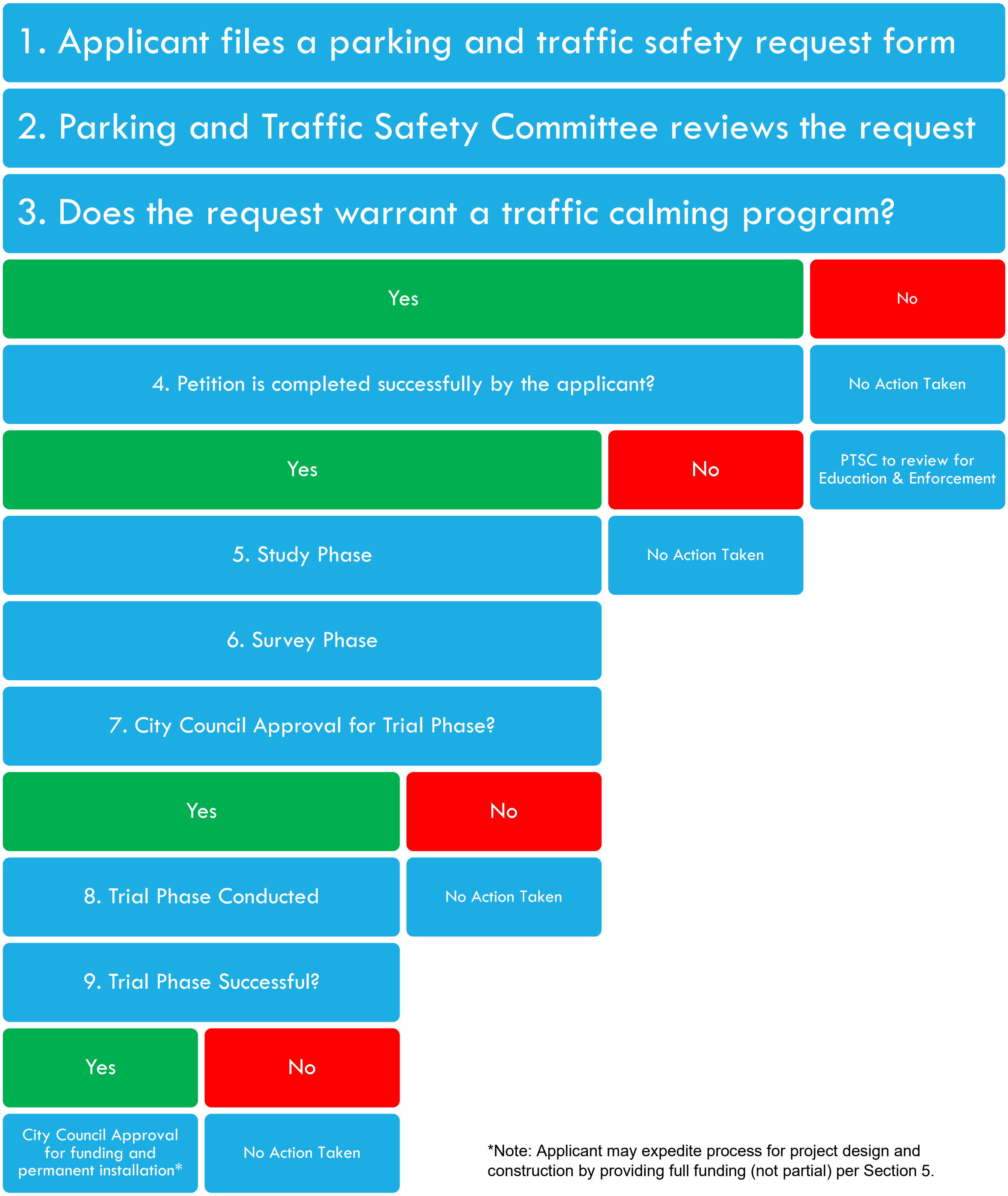
If residents desire to reduce the long-term fiscal impact of the project, individual property owners, groups of property owners, or a homeowners' association may "adopt" the traffic calming landscaping and irrigation. This will be accomplished by a written agreement between the property owners or homeowners' association and the City. A part of the agreement will be that the responsibility under the agreement passes to subsequent property owners.

This can be a benefit as well as a burden. By "adopting" the traffic calming measures, the neighborhood takes control of the aesthetics of their street. With extra care, such as planting annual flowers, seasonal signing, or a community bulletin board, the traffic calming measures can become focal points of the community. As with landscaping and other improvements on private property, all "adopted" measures will be subject to traffic safety review by the Parking and Traffic Safety Committee.

5.4. Cost Estimates

For each project, the initial costs will be determined based on quantity calculations and staffing time. The final cost estimate will be based on detailed quantities for all constructed items based on a final set of construction plans and specifications along with accounting for any necessary construction management/inspection time, as well as on on-going annual maintenance estimates. When the final costs of a project are being determined, an estimate of the long-term maintenance burden on the City Public Works Department and Parks and Recreation Department shall be estimated by consultation with both departments. By approving funding, the City is also undertaking this additional maintenance burden unless otherwise stated.

Implementation Process Chart

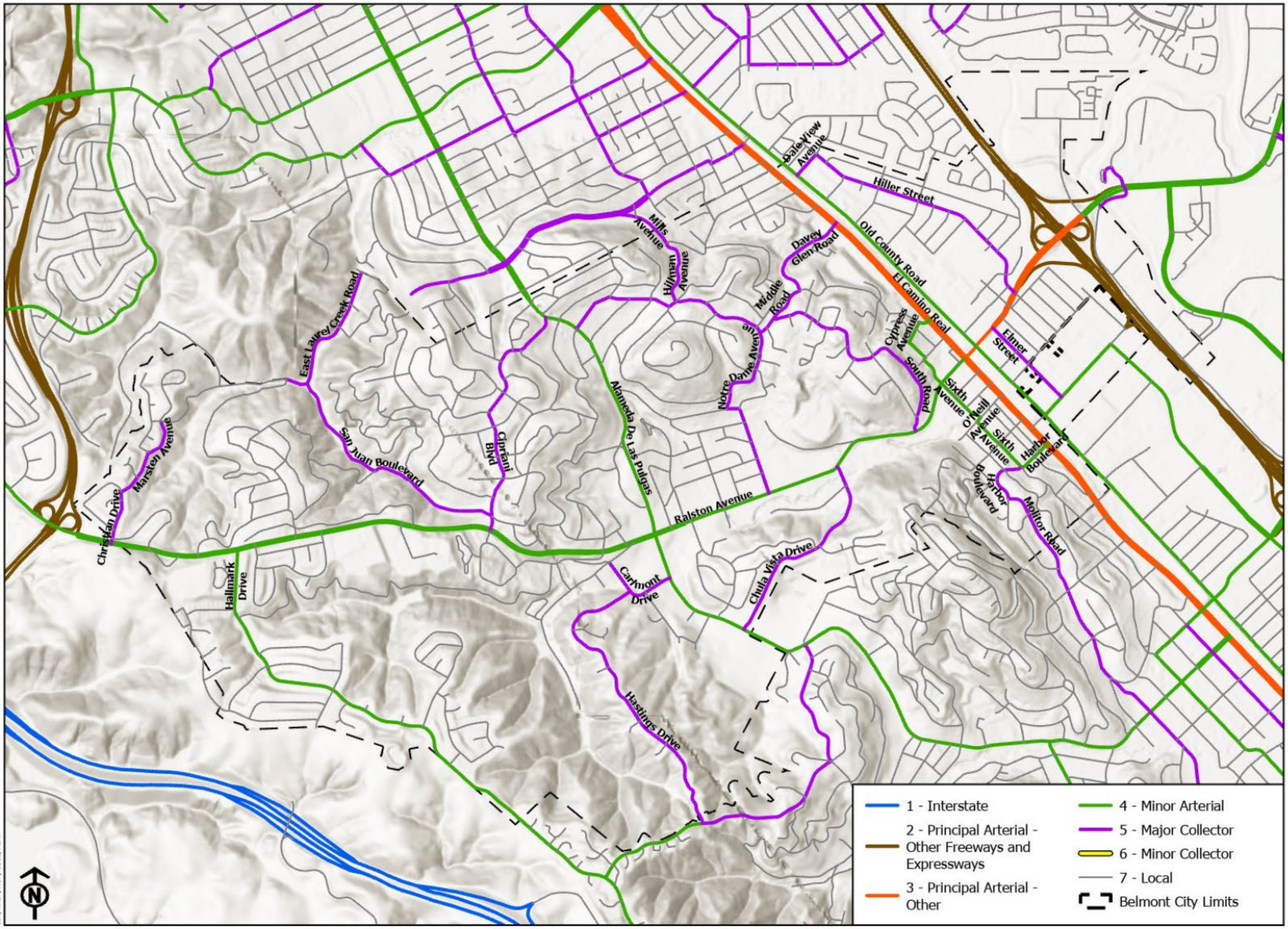


*Note: Applicant may expedite process for project design and construction by providing full funding (not partial) per Section 5.

Figure 1 - Implementation Process Chart

APPENDIX A – Roadway Classification Map

Belmont Streets - Functional Classification



APPENDIX B – Education and Enforcement Alternatives

EDUCATION

Description

The city's Public Works and Police Departments provide education with the purpose of bringing public awareness to areas of traffic safety and roadway engineering. Education occurs through community outreach with programs emphasizing traffic and safety issues, along with review of requests made through the Parking and Traffic Safety Committee. Community outreach may be in the form of neighborhood meetings, correspondence, workshops, social media messages, website postings, weekly newsletters etc. to help better inform and educate the communities and public.

Advantages

- Helps provide a means of communication between neighborhood representatives and City Staff to identify locations of traffic issues.
- Allows for discussion regarding traffic and safety concerns
- Cost-effective

Disadvantages

- Limited effectiveness, can't reach everyone
- Uncertain attendance for public meetings
- It takes significant time for City Staff and residents

DIRECTED TRAFFIC ENFORCEMENT (DTE)

Description

Police enforcement of traffic laws citywide and with targeted enforcement of certain laws in certain parts of the city helps to bring awareness to areas of traffic and safety concerns. Enforcement of speed limits, stop sign compliance, yielding to people biking and walking, and application of all traffic laws is provided by the Police Department. Areas with recurring traffic concerns may have officers deployed for targeted enforcement and citations. Increased police presence increases drivers' awareness and compliance with traffic laws.

Advantages

- Effective temporary solution to traffic concerns
- Quick to implement
- Cost-effective

Disadvantages

- Needs to be repeated consistently and frequently
- Subject to availability
- Behavior may return to prior patterns in absence of PD presence

SPEED DISPLAY UNIT

Description

Portable radar unit that measures and displays oncoming vehicle speeds. Portable unit displays vehicle speed in real-time, adjacent to posted speed limit. The unit may be located on street for limited or extended amount of time in focused areas.

Advantages

- Quick to implement
- Displays actual speeds immediately for increased driver awareness

Disadvantages

- Does not provide enforcement without an officer present
- Limited effectiveness once removed from area

SPEED LIMIT SIGN

Description

Install new regulatory sign for posted vehicular speed limit. Traffic analysis must be provided to justify posted speed limit.

Advantages

- Defines posted speed limit and provides transparency for motorists
- May reduce speeding with enforcement

Disadvantages

- Requires supplemental enforcement to be effective
- Motorists can ignore posted speed limit

APPENDIX C – Toolbox of Traffic Calming Measures

*Note:
Cost Ranges:

$:	$0 - $1,000
$$:	$1,001 - $10,000
$$$:	$10,001 - $100,000
$$$$:	$100,000 and above

SPEED CUSHIONS

Description

A variation of a speed hump, speed cushions are shorter in height and placed across the width of the travel lane. Speed cushions have tapered edges and are wide enough to force cars to pass over at least part of the hump, while allowing access for vehicles with larger axle widths such as buses, firefighting apparatus, and other emergency vehicles.

Advantages

- Slows vehicles
- Emergency vehicles may drive over speed cushions without issue

Disadvantages

- Aesthetically displeasing
- Easily damaged over time
- Frequent maintenance issues
- Can be noisy for nearby residents

Trial and Permanent installation can be performed by City staff.

Estimated Cost: $

STRIPING [Centerline, Narrow Lane, Etc.]

Description
On wider right-of-way areas, striping for centerline and travel lane edges may be provided along the roadway. Striping may help to delineate and designate travel lanes with narrow lanes more conducive for slower vehicle speeds. Narrow lane striping is to provide 10-foot minimum travel lanes each way. Pavement areas outside of the lane striping may be used for parking or Class II bike lanes if widths and sufficient ROW exist.

Advantages
- Easy to install and implement
- Helps to slow traffic speeds
- Improves safety with designated travel lanes for vehicles

Disadvantages
- Striping is a guideline for motorists but does not prevent vehicles from potentially crossing the designated striping
- Requires regular maintenance

Trial and Permanent installation can be performed by City staff.

Estimated Cost: $-$$

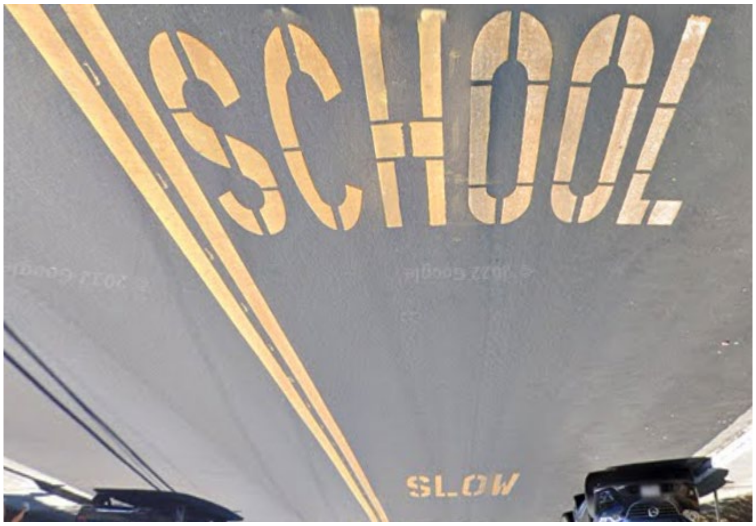
SUPPLEMENTAL SIGNS / PAVEMENT MARKINGS

Description

Where appropriate, additional signage and/or pavement markings may be utilized to bring attention to potential safety concerns. Signage for upcoming pedestrian crossings, share the roads with bicyclists, or schools may be effective to slow vehicles and improve safety when implemented correctly.

Advantages

- Relatively inexpensive
- Helps to increase awareness to improve safety
- Easy to install and implement



Disadvantages

- May cause confusion if too many signs or incorrectly installed
- Requires engineering study/plans to justify location of sign or pavement markings
- Requires frequent maintenance once installed

Trial and Permanent installation can be performed by City staff.

Estimated Cost: $

HIGH VISIBILITY CROSSWALK

Description
Standard pedestrian crosswalks provided at roadway intersections to provide safe travel for pedestrians and/or bicyclists. Improvements for a High-Visibility Crosswalk include high contrast signage, wide striping (e.g., Shark Teeth, Ladder-striping or similar, etc.), and additional pavement markings. Proposed crosswalks will require engineered plans to be submitted prior to implementation.

Advantages
- Brings awareness for potential pedestrian crossing
- Designates location for preferred pedestrian crossing
- May slow travel speeds

Disadvantages
- Pedestrians may not notice or see incoming traffic before crossing
- May require proper lighting for after hours

Trial program can be performed by City staff. Permanent design/construction may require City Council Approval.

Estimated Cost: $$$

FIXED SPEED DISPLAY FEEDBACK SIGN

Description

A speed display sign measures actual speed of incoming vehicles and displays the speed in real time. The actual speed is displayed adjacent to the posted speed limit and sometimes includes a flashing light to help remind motorists to slow down if exceeding the speed limit. The sign is a permanent installation and cannot be relocated compared to the Tier 1 – Speed Display Unit.

Advantages

- Helps bring awareness to motorists of the posted speed limit
- Helps slow vehicle speeds
- Provides real-time feedback to motorists

Disadvantages

- Does not enforce speed limit
- Requires regular maintenance

Trial program can be performed by City staff. Permanent design/construction may require City Council Approval.

Estimated Cost: $$

CURB EXTENSIONS / BULBOUTS

Description

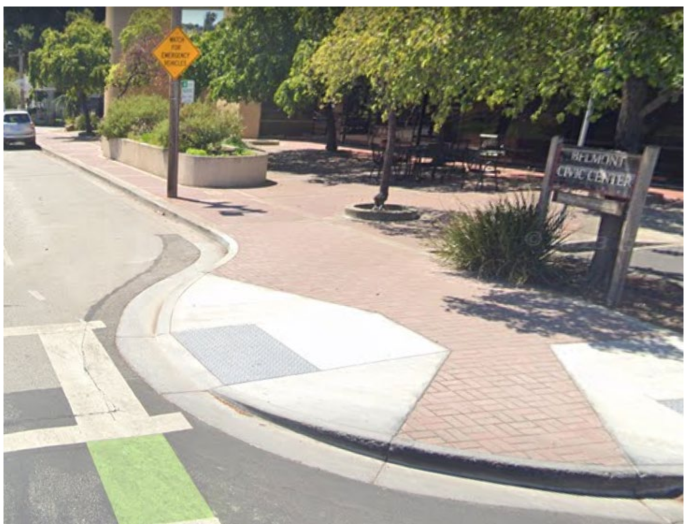
Curb extensions or bulbouts are installed at corners of intersections and extended further into the intersection to reduce roadway width. Extension of the curb to reduce roadway width at intersections help slow vehicle speeds and improve safety for pedestrian crossing.

Advantages

- Helps slow vehicle speeds vis engineering improvements
- Reduce crossing distance for pedestrians
- Improve safety and circulation for pedestrians
- Provides opportunities for landscape or green infrastructure

Disadvantages

- May require removal of on-street parking
- Increased maintenance
- Difficult for larger vehicles to maneuver corner turns
- Bicyclists may need to merge into travel lane
- Drainage must be analyzed and addressed



Trial program can be performed by City staff. Permanent design/construction require City Council approval.

Estimated Cost: $$$

CHOKERS

Description

Chokers are curb extensions on one or both sides of the roadway and are typically installed along the mid-block instead of intersections. Chokers create pinch points that provide a physical barrier for vehicles to maintain within travel lanes.

Advantages

- Helps slow vehicle speeds via engineering
- Provides opportunities for landscape or green infrastructure

Disadvantages

- May require removal of on-street parking
- Increased maintenance
- Bicyclists may need to merge into travel lane
- Drainage must be analyzed and addressed

Trial program can be performed by City staff. Permanent design/construction may require City Council Approval.

Estimated Cost: $$$

GATEWAYS

Description

Gateways, similar to curb extensions / bulbouts, are treatments to streets to bring dramatic features to entrances to local neighborhood area. Gateways implement curb extensions / bulbouts to reduce width of travel lanes but bring character and additional aesthetic value to the residential area.

Advantages

- May help slow vehicle speeds
- Brings awareness to motorists with change in street appearance
- Improves aesthetic value
- Provides opportunities for landscape or green infrastructure

Disadvantages

- May require removal of on-street parking
- Requires regular maintenance
- Expensive to implement
- Not all residents/neighbors may like the proposed look of gateway treatment

Trial program can be performed by City staff. Permanent design/construction may require City Council Approval.

Estimated Cost: $$$

MEDIAN ISLANDS

Description

Median islands are raised barriers located along the centerline of roadway with varying widths to prevent certain vehicle movements. Median islands are most used along roadways with higher speeds and traffic volumes to prevent fatal collisions. When used with crosswalks, the median may act as a barrier for pedestrian refuge in the mid-crosswalk locations.

Advantages

- May reduce potential collisions
- Provides pedestrian refuge at crosswalks
- Provides opportunity for landscape and green infrastructure
- Provides aesthetic value
- Restricts turning movements and prevents left-turn collisions

Disadvantages

- May impede emergency vehicles
- Increased maintenance
- May limit certain vehicular turns

Trial program can be performed by City staff. Permanent design/construction may require City Council Approval.

Estimated Cost: $$$

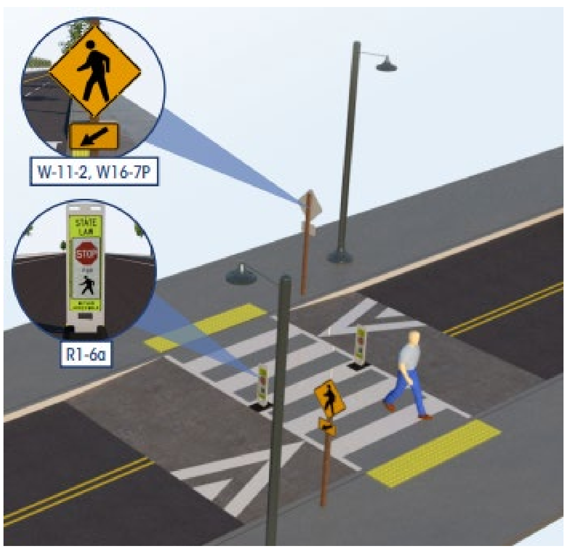
RAISED CROSSWALK

Description

Raised crosswalks are speed tables that provide an elevated street crossing. Raised crosswalks help to reduce vehicle speeds and make pedestrians more visible to motorists when crossing the roadway. Additional signage, striping, and pavement marking are required as supplemental to the raised crosswalk.

Advantages
- Helps slow vehicle speeds
- Improves safety for pedestrian crossing
- Raises pedestrian visibility to motorists
- Designates location for safe pedestrian crossing

Disadvantages
- Can not be used along an emergency route
- Drainage must be analyzed and addressed



Trial program and permanent installation require City Council approval for the project/construction.

Estimated Cost: $$$

RAISED INTERSECTION

Description

Raised intersections are similar in concept with raised crosswalks. Intersections are raised to match the grade elevation of adjacent ramps. The intersection should use a visually different material than the street pavement to encourage motorists to yield to crossing pedestrians.

Advantages

- Helps slow vehicle speeds
- Improves safety for pedestrian crossing
- Raises pedestrian visibility to motorists
- Designates location for safe pedestrian crossing

Disadvantages

- Can not be used along an emergency route
- Drainage must be analyzed

Trial program and permanent installation require City Council approval for the project/construction.

Estimated Cost: $$$

RECTANGULAR RAPID FLASHING BEACON (RRFB)

Description

Rectangular Rapid Flashing Beacons (RRFB) are a treatment option for pedestrian crossing signage. RRFBs are pedestrian actuated where the light beacons flash to alert approaching vehicles along both vehicular travel directions of pedestrian crossing when activated. RRFBs help to improve safety at uncontrolled marked crosswalks and are typically used along high-volume traffic roadways.

Advantages

- Alerts approaching motorists of pedestrian
- Helps improve safety for pedestrian crossing
- Encourages motorists to yield to pedestrians

Disadvantages

- Requires electrical installation and connection
- Expensive to install
- Requires regular maintenance
- Requires additional striping, signage, and pavement markings to be effective

Trial program can be performed by City staff. Permanent design/construction may require City Council Approval.

Estimated Cost: $$$

HIGH-INTENSITY ACTIVATED CROSSWALK (HAWK)

Description

High-Intensity Activated Crosswalk (HAWK) are traffic signals for pedestrian and bicyclist use only that improves safety and accessibility. When the signal is activated, it directs approaching traffic to safely come to a complete stop through its multi-phases and allow for safe crossing. HAWK crossings are most appropriate in high-volume traffic roads and located

Advantages
- High visibility
- Improved safety
- Promotes multi-modal travel
- Signal controlled and reduces delays for improved circulation

Disadvantages
- Expensive
- Requires regular maintenance
- Requires education if motorists are unfamiliar with the signal

Trial program and permanent installation require City Council approval for the project/construction.

Estimated Cost: $$$$

BELMONT

NEIGHBORHOOD TRAFFIC CIRCLES

Description

Traffic circles are raised islands placed at the center of intersections for traffic to circulate around. The circle island is large enough to prevent vehicles to speed through the intersection but allows minimum widths for vehicles to circulate around. Traffic circles can be controlled with yield signs and are most appropriate when used in local streets with wider right-of-way widths, and low volumes/speeds.

Advantages

- May reduce collision conflict points
- Can add aesthetic value
- Effective to reduce vehicle speeds
- Improves safety

Disadvantages

- Requires adequate space to install
- May require removal of parking
- May be difficult for emergency vehicles to navigate around
- Requires regular maintenance
-

Trial program and permanent installation require City Council approval for the project/construction.

Estimated Cost: $$$$

MODERN ROUNDABOUTS

Description

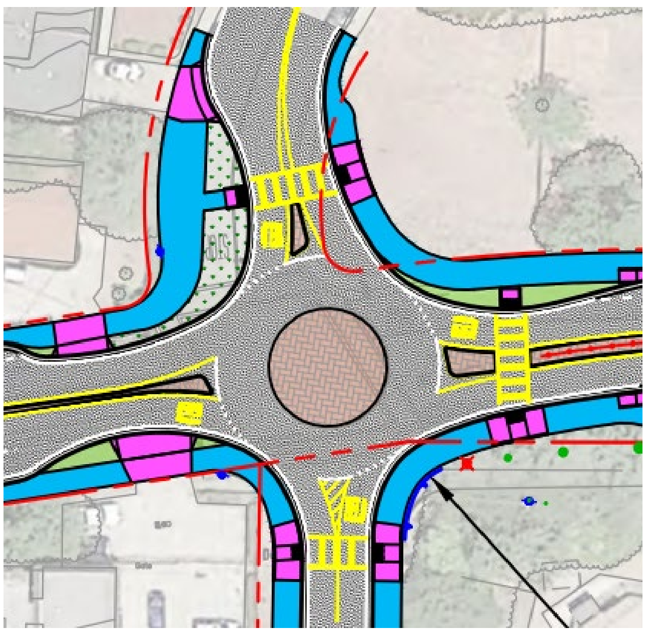
Roundabouts are most appropriate for streets with higher volumes of traffic. Circular raised islands are located at the center of the roundabout that may be mountable by emergency vehicles only. The roundabouts improve efficiency and safety by utilizing deflection angles to reduce speeds upon approach, yield signs to encourage motorists to yield for crossing pedestrians and bicyclists. The yield signs also allow vehicles opportunities to safely merge without impeding the traffic circulation.

Advantages

- Improved circulation
- Improved safety for all users (less collisions and less severity)
- Reduces conflict points for potential collisions
- Encourages multi-modal transportation

Disadvantages

- May require removal of parking
- Requires large space and right-of-way to construct
- Expensive since ROW is required and capital costs are higher than traffic signals (maintenance costs are lower)
-



Trial program and permanent installation require City Council approval for the project/construction.

Estimated Cost: $$$$

APPENDIX D – Petition for Traffic Calming

CITY OF BELMONT
PETITION FOR TRAFFIC CALMING

To: PARKING AND TRAFFIC SAFETY COMMITTEE Date: ___________
One Twin Pines Lane, Suite 385
Belmont, CA 94002
(650) 595-7425

The undersigned residents of properties bordering on: _____________________________
(Name of Street)

between the intersection of ______________________ and _______________________ hereby request assistance with traffic related problems (e.g., speeding, shortcutting, high volumes, etc.)

Petition submitted by:

NAME__________________________ ADDRESS____________________________
PHONE__________________________

NAME (Signature)	ADDRESS (include Apt. #)	Comments

(attach sheets if necessary)