

FLEXIBILITY IN COUNTY ROAD DESIGN

"Working Draft"

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This guideline is not intended to supersede existing County of San Diego Public Road Standards, procedures or practices, but is a compilation of possible options that may be used to enhance established traffic engineering and design practices, policies and standards. The purpose of this document is to provide additional information and guidance regarding designing County public roads that incorporate community values, provides adequate emergency access, are safe, efficient, and are effective mechanisms for the movement of people and goods. It is written for design engineers, transportation planners and project managers seeking additional flexibility when designing County roads. It can also be used by citizens who want to gain a better understanding of the County road design process.

The County of San Diego advocates enhancements to County roadways that promote a community's vision and needs. Various communities have expressed an interest in applying standards in a manner to better enhance and retain the character of their community. Examples might include landscaping, alternative curb design, decorative crosswalk or sidewalk materials, and provision of decomposed granite pathways rather than concrete.

The County's goal is that County roads safely and adequately serve all road users which include motorists, pedestrians, bicyclists, equestrians, transit, and trucks (heavy vehicles). The County strives to accommodate all road users in the design of new road improvement projects. The County Trails Master Plan also designates locations for pathways and trail crossings in the County right of way intended for shared and/or equestrian use. When referenced in this document, road user is defined to include all of the modes of transportation discussed above. Designers should consider the affects of the proposed design on all of the specific road users.

The Complete Streets Act (AB 1358) signed into law in California goes into affect January 2011. This new law requires cities and counties modify their General Plan Circulation Elements to plan for a balanced multimodal transportation network that meets the needs of all users of the road including motorists, bicyclists, children, persons with disabilities, seniors, movers of commercial goods and uses of public transportation in a manner that is suitable to the rural, suburban or urban context of the general plan. This guideline will assist in achieving this goal particularly in areas where there are competing interests for use of a limited amount of right of way.

Implementation or construction of County road improvement projects often result in significant environmental impacts. These include impacts to sensitive environmental features such as biological habitat, structures or features of community interest, residential buildings or areas. These impacts may be avoided or reduced through the selection of alternative designs. Alternative design features may also be selected to enhance or preserve environmental or cultural resources. Design features may also be provided to reduce or filter storm water runoff to assist in achieving low impact development goals.

Recognizing that meeting the above needs may require flexibility; a process for approving alternative designs exists. This process evaluates each requested deviation for its potential effects on roadway safety, regional needs, individual communities and the surrounding environment. Deviations from County of San Diego policy or standards to meet community requests may require approval of an exception to a policy or nonstandard design feature. Implementation of additional design features not addressed in a policy or a standard, such as the County's Public Road Standards may be considered by the Director of Public Works on a case by case basis provided they have reviewed by the Community Planning or Sponsor Group.

Background

The unincorporated area of San Diego County includes 26 individual community planning and sponsor groups. Each community planning or sponsor group represents a separate community, each with its own identity and development desire. Each community has a diversity of uses, residential, commercial, industrial, and public facilities developed over time within a distinct place, setting and surrounding environmental resources.

Village areas have been identified within each community. Designers should be aware of several issues when designing a roadway through a designated village and within a surrounding rural community. Issues such as on-street parking, speed, access, pedestrian and bicycle safety are very important to the local community. Concepts that help moderate speeds and induce bicycle and pedestrian activity should be considered.

The County of San Diego Public Road Standards contains the basic geometric design criteria that establish the physical features of a roadway. These standards are connected to a large extent to State and federal design guidelines.

The public road standards contain sections on functional classification, design controls, horizontal and vertical alignment, cross section elements, bridges, and intersections. The Public Road Standards also include provisions regarding the width of the roadway, on-street parking, sidewalks, lights, curbs, signs, medians and driveways.

County road standards are established to guide road development, ensure maximum safety, maintain road capacity and standardize costs. Flexibilities, however, are available within the public road standards for implementation that maintain safety for motorists while enhancing mobility for non-motorized transportation, and preserving community character, the environmental and cultural resources. If roadway designers are not aware of opportunities to creatively apply the public road standards and do not consider community values, then design may be out of context with surroundings. These guidelines are intended to help designers avoid impacts on important natural and human resources and encourage roadway designers to expand their consideration in applying the public road standards criteria. A comprehensive design process, involving the public and incorporating a multidisciplinary design approach early and throughout the process are encouraged.

County of San Diego Board Policy J-36 provides a procedure by which communities can deviate from the established County Public Road Standards, and replace or augment them with standards tailored to their community. Community Right-of-Way Development Standards can affect all features within the right-of-way except the travel lanes. The standards for width, type of materials and the geometrics of the travel lanes are fixed standards based on the capacity and safety of the roadway and can only be varied through the design exception process outlined in Section 9 of the County Public Road Standards. Other items in the road right-of-way, such as curbs, lighting, landscaping, and other design elements can be modified through adoption of Community Right-of-Way Development Standards. A basic premise of Policy J-36 is that Community Right-of-Way Development Standards must not compromise safety for any road user or increase liability, and must not alter or diminish the basic functional capacity of the roadway. In addition, the community and/or private individuals must bear any additional cost of administration, installation, and maintenance of roadway improvements resulting from implementation of the alternative community standards.

Design Speed

In many rural communities the speed of traffic on the roadway is a primary concern. Designers should consider this issue when selecting developing a road through a designated village area. They must also consider the roadway classification, prevailing speeds on current roads, traffic volume, on-street parking and importance as a regionally significant arterial in addition to the roadside characteristics of the community.

Designers should also understand the direct relationship between design speeds and roadway capacity. The selection of a particular design speed is influenced by the following:

- The functional classification of the highway
- Needs of all road users
- The terrain and topography
- The density and character of adjacent land uses
- The traffic volumes expected to use the highway
- The economic and environmental considerations.
- The provision of on-street parking
- Consistency with the adopted General Plan, Community Plans and/or Specific Plans for the area

Typically, an arterial highway warrants a higher design speed than a local road; a roadway located in level terrain warrants a higher design speed than one in mountainous terrain; a highway in a rural area warrants a higher design speed than one in an urban area; and a high volume roadway warrants a higher design speed than one carrying low traffic volumes.

The values presented in the County Public Road Standards are minimum acceptable design speeds for the various conditions of terrain and traffic volumes associated with new or reconstructed roadway facilities. Designers need to balance the advantages of a higher vehicle operating speed gained through the use of a higher design speed against the flexibility lost in design. A balance of safety, mobility for all modes of transportation, community and environmental goals may warrant a more flexible road design.

Although the County has adopted a range of allowable design speeds appropriate for each of the various functional classifications for use in the design of new or reconstructed roadway facilities, situations may arise where even the use of the lowest typically acceptable value would result in unacceptably high construction or right of way costs or unacceptable impact on communities and/or adjacent properties. In such instances, the design exception process outlined in Section 9 of the County of San Diego Public Road Standards can be employed. For example, construction of a four lane major road (widening of a two lane arterial route) through a village area or environmentally sensitive area might need to employ a design speed of 45 mph rather than the recommended value for this functional classification of 55 mph shown in Table 2 of the Public Road Standards for a Major Road.

Design speeds less than the minimum specified must be approved on a case by case basis. A design exception justifying the reason for lower design speed will be required.

Coordination with the local fire authority is required to ensure that adequate emergency response times are met. Design speeds less than those specified in the County Public Road Standards may increase overall emergency response times. A design exception to the fire code may be required. Local fire authorities may require additional measures or design features (mitigation) to offset any reduction in emergency response times. To reduce conflict when considering using lower design speeds use the current NFPA 1142-C.11 time –distance table using an average speed of 35 mph of concern when be any conflicts that may occur on General Plan Travel times and design speed for curves.

Lane Width

Lane width plays an important role for both motorized and non-motorized vehicle users. Wider lanes tend to improve driver comfort. The operation and physical dimensions of cars, recreational vehicles, trucks and buses, the classification or use of the roadway and prevailing speeds all influence the selection of the appropriate lane width. For roadways that serve as main streets, particularly those that operate at lower speeds, lane widths narrower than the standard 12 feet may be appropriate. Reduced lane widths in combination with other design features may encourage slower speeds, which is often desirable for a main street. Where existing right of way is limited, reducing lane widths can provide adequate shoulder width for bike lanes and sidewalks. When considering use of narrower lane widths, the designer should recognize that the narrower lane reduces vehicle separation and could induce certain types of collisions. Where there is significant recreational vehicle and truck traffic or the main street is a designated bus or truck route a standard 12-foot outside lane width is preferred. The gutter pan is not considered part of a travel lane.

Lane width below 12 feet is a non-standard design feature, which must be approved on a case by case basis. A design exception will be required for all cases where lane width is below the minimum standard.

Coordination with the local fire authority is required. Current fire code access on roadways for one way direction is 12 feet. A design exception to the fire code may be required. Any reduction of less than 12 feet may hamper fire equipment operational effectiveness by increasing equipment deployment. Local fire authorities may require additional measures or design features (mitigation) to offset any reduction in firefighting activities.

Reduced lane widths may preclude the provision of adequate clearance to fire apparatus. Visitor parking areas and other off-road parking areas may be required as a form of mitigation. The gutter pan may be included in the provision of adequate clearance for fire apparatus. For standard curbs, the curb to curb distance is used to determine the needed clearance. Rolled curbs can be used for part of the traveled way for fire apparatus as long as they support the loads of fire apparatus.

Medians

The design and width of medians require several considerations for designers. In locations where the total available right of way is restricted, a wide median may not be desirable, if the outside buffer area between the traveled way and private developments is reduced. A reasonable buffer width is required between private development along the road and the edge of the traveled way. Space will also be needed for sidewalks, highway signs, utilities, parking, drainage channels and structures, proper slopes and clear zones, and any retained native plant material. On the other hand, wider medians provide more space for plant material, offer a refuge for pedestrians at intersections, and help soften the look of the roadway.

Public input is required to find the design that meets the needs of the community when including and designing medians.

Medians may be depressed, raised, or flush with the surface of the traveled way. Medians should have a dimension that is in balance with the other elements of the total highway cross section. The general range of median widths is from 4 ft to 14 ft or more. A minimum offset of at least a 1.5 ft should be provided between any vertical element located within the median, such as a curb or barrier, and the edge of the adjacent traveled lane.

The use of two way left turn lanes in densely developed commercial areas has increased as an alternative to raised medians with left turn or U-turn bays. Although not as aesthetically pleasing as raised, medians, continuous left turn lanes maintain left ingress and egress to commercial businesses located along the road frontage and can increase capacity of the road-way. Two way left turn lanes generally are not recommended in residential areas because they do not afford a safe refuge for pedestrians. Also, the number of driveways can create unsafe vehicle maneuvers.

A raised median may prevent through and left turning traffic from side streets crossing the median. All left turn movements are diverted to the nearest signal or intersection where turns are permitted. Access to adjacent properties therefore is limited and the impacts should be taken into consideration. Designers must conduct proper analysis to ensure that these intersections can accommodate the added turning movements. Adequate left turn pockets will need to be properly sized to provide storage space for the additional vehicles making left turns and U-turns. Circulation from the side streets may be affected and could impact local businesses and neighborhoods.

If provisions for perpetual maintenance and watering are provided with design, landscaping in the medians can be considered. Access for maintenance workers and equipment should be considered in the design of medians and in the selection of paved surface treatments, plant materials and irrigation systems. Maintenance-efficient island design must include using water-efficient plantings. Additionally, paving narrow areas

less than four feet wide lessens exposure for maintenance personnel. It is also important to minimize obstructions that could impair sight distance. Paving the island far enough back from the intersection to provide adequate sight distance will do this. If the curbed island includes a gutter pan, a shoulder of at least two feet must be provided from the left edge of traveled way to the face of the island curb. The nose of the island shall terminate so that vehicles can easily complete turning movements without obstruction.

Coordination with the local fire authority is required for installation of raised medians. Medians will require additional fire hydrants on both sides of the street because of the inability to cross the streets to use other fire hydrants during emergencies because of restricted right of way.

Coordination with the local fire authority is also required for the placement of vegetation within a median. Certain types of vegetation placed within a median can reduce line of sight for fire apparatus especially when located in close proximity with an intersection. Certain types of vegetation may also be required to aide in evacuation during wildfire and reduce the potential of burning plant material or landscape materials within and along a roadway. The type, location and spacing of native and landscape material would require fire district approval. Trees should have a vertical clearance of 13'6" clearance when overhanging into the roadway

Access for maintenance workers on medians must also be provided. Space used for maintenance may not be adequate for access to fire hydrants or access to the other side of the street for the purpose of fire fighting and additional space may be required.

Shoulders

Although the physical dimensions of automobiles and trucks significantly affect the basic width of travel lanes, the treatment of that portion of the highway to the right of the actual traveled way, (the "roadway edge"), allows the designer a greater degree of flexibility. Existing shoulder widths typically vary from as little as 2 ft to 8 ft where the entire shoulder may need to be stabilized or paved.

The treatment of shoulders is important from a number of perspectives, including safety, the capacity of the highway section, impact on the surrounding environment, and both the initial capital outlay and ongoing maintenance and operating costs. The shoulder design should balance these factors. For example, a designer must consider the impact of the shoulder width and other roadside elements on the surrounding environment and, at the same time, how these dimensions will affect capacity. Even with an average lane width of 12 ft, the absence of a shoulder or the presence of an obstruction at the edge of the travel lane can result in a reduction in capacity of as much as 30 percent, compared to an area with shoulder or clear zone. On the other hand, significant environmental, scenic, or historic resources may be adversely affected by a widened shoulder.

Another consideration is the accommodation of pedestrians and non-motorized vehicles. In the absence of sidewalks or other designated pedestrian facilities, roadway shoulders provide an adjacent travel way for pedestrians, and others. In the absence of bike lanes, paved shoulders are often used by bicyclists, especially on rural roads. It should be noted that where paved or unpaved shoulders are to be used for substantial

pedestrian traffic, a minimum width of 5 feet is preferred. Where a shoulder is to be used for substantial bicycle traffic, the shoulder should be paved with a minimum width of 5 feet.

In addition to the dimensions of shoulders, designers have choices to make about the materials used. Shoulders may be surfaced for either their full or partial widths. Some of the commonly used materials include gravel, shell, crushed rock, mineral or chemical additives, bituminous surface treatments, and various forms of asphaltic or concrete pavements.

Grass or turf surfaces provided on top of compacted earth embankments may be considered. The advantages of grass shoulders are that they provide both a natural storm water detention system and are aesthetically pleasing. The disadvantages can be that they are often less safe than paved shoulders and force pedestrians and bicyclists to share the road with motorists, if no off street facility are provided.

Shoulders represent an important element in roadway drainage systems by carrying surface runoff away from the travel lanes into either open or closed drainage systems. A variety of design treatments have been used to accommodate roadway drainage across shoulder areas. In rural and suburban areas, the most common technique allows surface runoff to cross over the shoulder and go directly into drainage ditches running parallel to the roadway edge.

Coordination with the local fire authority is required for the implementation of a reduced shoulder. Adequate shoulder width is important for firefighting and emergency operation along roadways. Inadequate width will expose firefighters to vehicle traffic and not provide adequate fire fighting area (vehicle fires & vehicle accidents) and will require complete road closure for firefighter safety.

Curbs

Curbs may be concrete or asphalt. Deviation from County Regional Standards Drawings is not encouraged because reduction in storm runoff capacity can result. Designs that deviate from Regional Standards must be supported by appropriate hydraulic calculations.

Local fire authorities will consider rolled curbs as part of the roadway if they support the loads of fire apparatus

Street Landscaping

Street landscaping adds uniqueness to villages and communities and provides aesthetic quality to the surrounding roadway areas. Street trees provide shade and may increase comfort for pedestrians. Trees create comfortable spaces, soften lighting, cool streets in the summer, and provide a windbreak in the winter. Trees also create distinctive identity and seasonal interest. If provisions for perpetual maintenance and watering are provided with design, landscaping in the medians can be considered

Integrating trees into the design of a facility has many advantages. Trees provide a visual "edge" to the roadway that helps guide motorists. Quality landscaping along the roadway, close to the roadway or in medians can increase driver awareness of the immediate environment. A row of trees may make the road appear narrower and can alter driver behavior, resulting in slower speeds.

Single vehicle collisions with trees, however, account for nearly 25 percent of all fixed object fatal accidents annually. This problem is most apparent on roads that have existing trees, where designers do not have direct control over placement. For landscape projects, where the type and location of trees and other vegetation can be carefully chosen, the potential risks can be minimized and these important criteria must be considered.

For visibility, trees must be located and maintained properly, and must not impair corner sight distance. If sight distance is a concern, high canopy trees with few lower branches or low growing (shorter than 3 ft) herbaceous and woody plants can be considered along both the roadway edge and in raised medians. Designs must avoid blocking visibility for turns into and from intersections and driveways, obstructing driver's line of sight to oncoming traffic, blocking visibility of stop signs or other roadside signs, and decreasing visibility for pedestrians and bicyclists at intersections.

In addition to selecting a type of tree for its hardiness, the size and placement of trees is another important consideration. Generally, a tree with a trunk diameter greater than 4-inches measured 4-inches above the ground line is considered a "fixed object" along the roadway. Because most trees grow larger than 4-inches, their placement along the roadway needs to be carefully considered. Factors that affect this decision include the design speed, traffic volume, roadway cross section, and placement of guardrail.

Trees with trunks greater than 4 inches should not be placed in the clear recovery zone. For any new construction or major reconstruction, for roadways with curbs and speeds 40 mph or less the minimum recommended clear recovery zone is 18 inches from the curb. For other roadways the minimum recommended clear recovery zone is 8 feet from the edge of the traveled way.

The safe placement of trees to prevent errant drivers from hitting them should be considered in the selection of tree types and location of plantings. Trees with trunks greater than 4 inches should not be located within the middle of a curve or other locations where there may be an increased risk of run off the road collisions.

Trees are an important aspect of community identity and are generally considered to be valuable assets. If communities consider existing trees a valuable resource, alternatives should be pursued. These include installation of traffic barriers, lowering of the design speed, or even complete redesign of the facility. It is not unusual for a community to value one specific tree and desire to preserve it. In general, transportation designers must balance safety with other community values when considering facility design and tree preservation.

Public Safety (Fire) Coordination with the local fire authority is required. All street landscaping should have fire approval for type, location and spacing of the landscaping. The vertical clearance of 13'6" is required when overhanging into the roadway so as to not obstruct fire apparatus.

Street landscaping may impact evacuation routes during a wild land fire because of burning native plant material or landscape materials. Designated evacuation routes may necessitate landscaping consistent with a fire control plan for the area.

Parking

On-street parking may have a traffic calming effect. It should be noted, however, that while parking is necessary to support business and main street uses, parked vehicles cannot be allowed to obstruct a driver's clear line of sight to an intersection. This is especially important for bicyclists traveling on the outermost portion of a roadway and pedestrians or disabled persons who may not be tall enough to be seen above a parked vehicle.

Angled parking may accommodate more parking spaces on a street. Angled parking can be forward (nose-in) or reverse (back-in). Note that angled parking can create problems due to the varying length of vehicles and sight distance limitations associated with backing up against oncoming traffic.

Angled parking is most feasible when an adequate buffer zone exists allowing vehicles to enter or exit the space without interfering with a bicycle lane or the traveled way of the street. Back in diagonal parking has been implemented in some cities to increase sight distance and may be considered on a case by case basis. A painted buffer area is preferred, to separate the parking area from the through traffic and bicycle lane. Angled parking may be considered on a case by case basis and requires approval by the Board of Supervisors by resolution to implement. If a sufficient buffer area is not available, parallel parking should be used. Coordination with the local fire authority is required for implementation of angled parking. Angled vehicle parking size (length & width) impacts fire operation because vehicle backing into the travel lane without a buffer area can impact travel and response times during emergency response.

Corner Radius Design

The design for an intersection corner radius is based on the selection of a reasonable design vehicle for the specific location. Design vehicles can range from large (tractor trailer combinations) to small (private autos). There are a number of considerations involved in this decision. Designing the corner radius for large vehicles creates wider more open intersections, and increases cost, and such intersections are more difficult to mark, signalize, and operate. In addition, the larger the dimensions of the radius, the greater the distance across the intersection from one side of the street to the other which can make crossing the intersection more difficult for pedestrians, particularly people who are elderly or have mobility impairments. Conversely, designing the corner radius for small vehicles can create operational problems should a significant number of larger vehicles need to use the intersection.

Problems arise when all of the factors involved in the design decision are not considered. For example, if the primary intent of the intersection design is to move traffic through as quickly as possible, a higher corner radius would be selected. The dimensions of the corner radius send a message to drivers entering residential neighborhoods regarding the speed they can drive and should be designed with this in mind. Encouraging fast speeds around intersection corners into residential areas will undermine efforts to lower operating speeds within the neighborhoods themselves. In addition, faster speeds can create an unsafe environment for pedestrians.

The typical design vehicle for County roadways is a WB50 – Semi trailer combination truck. For many non- Circulation Element Residential and rural residential streets a SU30 single unit truck may be used as the design vehicle provided the local fire engine identified by the local fire district and its associated design parameters meet or exceed that of a SU30 single unit truck.

Coordination with the local fire authority is required. Current fire code required inside radius is 28 feet. A design exception to the fire code may be required. Smaller corner radii may necessitate the fire engine to turn into the opposing lane of traffic, slow the travel time to emergencies and become a public safety concern. Design exceptions for smaller corner radii should be tested in the field with a fire apparatus to insure adequate fire response operations can be accommodated.

Bicycles

Bicycles are recognized as a viable mode of transportation in the United States, both for commuting and recreation. Transportation designers should consider the needs of these users in the design of County roadways. The design of intersections should accommodate bicyclists in a manner that is safe and accessible.

Where demand for on-street parking is low and a parking restriction has been implemented, the paved shoulder may be designated as a bike lane. When the paved shoulder is designated as a bike lane, width shall be between 5 and 8 feet. Where demand for on-street parking is high and on-street parking is not restricted, the roadway may be designated as a bike route. If designated as a bike route, the paved auto parking/shoulder area should be 8 feet wide. In constrained areas without curb and gutter a 4 foot wide shoulder may be sufficient to accommodate bicyclists. When designated on the General Plan Bicycle Network, an additional 5 feet of right-of-way each side of the roadway may be obtained to provide a bike lane in addition to the paved shoulder.

In the determination of the design parameters regarding shoulder width for bicycle usage and the adjacent travel lane width, the designer should consider the relative speed of traffic adjacent to the proposed bicycle facility. In some instances increased lane width, shoulder width and/or additional design features, including those identified in the traffic calming section of this document, and may result in an improved overall design.

Local fire authorities prefer a minimum bike lane of 5 feet. Bike lane widths of 5 feet offer better operations for large fire apparatus when using the same street. In constrained areas, a 4 foot wide shoulder is generally an ineffective condition for both the fire apparatus and bicycles depending on roadside vegetation.

Sidewalks and Pathways

The safe and efficient accommodation of pedestrians along the traveled way is important. Too often, pedestrians have been a secondary consideration in the design of roadways, particularly in suburban areas. Although sidewalks are an integral part of county streets, they are limited in many areas of the county. Data, however, suggests that providing sidewalks or pathways along roadways in rural and suburban areas results in a reduction in pedestrian accidents.

When considering the placement of sidewalks or pathways, designers have several options. The sidewalk or pathway can be placed flush with the roadside edge (if a curb is provided) or next to a buffer area, such as a planted strip (usually of grass or plant material), located between the sidewalk or pathway and the roadside. The pros and cons of each option should be weighed and considered by the designer, using input from the community. For example, a planted strip has these advantages:

- Pedestrians are kept at a greater distance from moving vehicles and thus are safer.
- Planted strips tend to add to the aesthetics of the facility and help reduce the apparent width of hard surface space.

Buffers, or planted strips, may have the disadvantage of requiring additional right of way that may negatively affect width restricted right-of-way corridors.

Another important consideration, and one in which the designer is given some flexibility, is in the width of the sidewalk and planted strip. Typically, sidewalks in residential or low density commercial areas vary in width from 4 to 8 feet. The Americans with Disabilities Act Accessibility Guidelines of August 1992 set the minimum passing width on a sidewalk at 5 feet at least every 200 feet. If a planted strip is provided between the sidewalk and the curb, it should be at least 2 feet wide to allow for maintenance activities. This planted strip also provides space for street lights, fire hydrants, street hardware, and landscaping.

Sidewalks can also provide space for street furniture and necessary traffic poles and signals. Additional width should be included on sidewalks to accommodate these fixtures. The wider the sidewalk, the greater the number of pedestrians that can be accommodated and the less difficult it is for them to maneuver around fixed objects. Utility poles must not ordinarily be placed in sidewalks. This detail facilitates the movements of people with disabilities as well.

On-street parallel parking and landscaped sidewalk planting strips can provide a buffer between pedestrians and moving vehicles.

Pedestrian paths on both sides of a roadway are preferred. Pedestrian paths (including trails, pathways and sidewalks) on one side of the roadway, however, may be considered where right-of-way constraints and low pedestrian demand warrant the provision of pedestrian facilities on only one side of the roadway.

When designated on the County Trails Master Plan, pathways are used to provide equestrian and/or shared use trails. Additional design features and amenities may be considered for implementation within the County road right of way.

Local fire authorities prefer that sidewalks include sufficient space to allow fire hydrants to be installed with an adequate walking area. Pedestrian paths with a planted strip between the road and sidewalk provide a preferred condition because exhausts on fire engines are located on the side walk side of the roadway. A planted strip would reduce the amount of exhaust and dust and dirt from impacting the sidewalk area.

Pedestrian Crossings

The principles and practices described in this section apply to pedestrian crossings. However, they also may apply to other types of non-motorized crossings, such as equestrians and bicycles. This section does not apply to school crosswalks. Pedestrian crossings include: markings, signing, overhead signing where the main street displays numerous business signs and other distractions, raised islands for pedestrian refuge, and traffic control systems (e.g., flashing beacons with warning signs or in-roadway warning lights).

Sidewalk Bulbouts (Curb Extensions): Sidewalk bulbouts are extensions of the sidewalk into the roadway at intersections. They are designed to give pedestrians greater visibility as they approach the intersection crossing. They also decrease the distance pedestrians must cross and, if properly designed, they slow traffic. They often have textured/aesthetic surface treatment and are integrated into the streetscape design.

Sidewalk bulbouts must be approved on a case by case basis if they do not meet design standards. A design exception will be required in all cases where a bulbout reduces shoulder width below the minimum standard. Where a bicycle lane exists or is planned in the future, the bulbout must be designed so as not to extend into the area reserved for the bike lane. They must provide the proper turn radius so that trucks can turn without driving over the curb. They must allow for adequate drainage to avoid leaf and road debris buildup and to allow street sweeper accessibility.

Intersections: Pedestrian crosswalk markings may be installed where they are needed to concentrate and channelize pedestrians into a preferred path at intersections. This is typically done when the intended course is not readily apparent or when, in the opinion of the engineer, the crosswalk would minimize pedestrian-auto conflicts. Pedestrian crosswalk markings are not required at every intersection and should not be used indiscriminately.

Each of the various components of intersection design can cause conflicts between the need for a safe and adequate design, on the one hand, and the need to minimize impact to the surrounding physical and human environments, on the other. In addition, the need to accommodate pedestrians and bicyclists can sometimes cause conflicts with the need to provide an efficient operating environment for vehicular traffic. Within the physical and environmental constraints of a project, safety and operational efficiencies for all road users should be considered.

Mid-Block Crossings: Mid-block pedestrian crossings are generally unexpected by motorists and should be discouraged. Particular care should be given to roadways with two or more traffic lanes in one direction as a pedestrian may be hidden from view by a vehicle yielding the right-of-way to the pedestrian.

In-pavement Flashing Lights: In California, crosswalk-warning systems such as In-pavement flashing lights are considered traffic control devices. They can be installed in the pavement to warn highway users of a condition that is not readily apparent and may require the road user to slow or come to a stop. Such systems should be considered for use on a county roadway only after consultation with the Traffic Section of the Department of Public Works.

Coordination with the local fire authority is required for the implementation of pedestrian enhancements. Pedestrian crossings and sidewalk bulbouts have reduced turning radii and may cause issues for fire trucks negotiating turns at these locations. If not properly designed and tested these pedestrian enhancements may require large fire apparatus to go into opposing traffic lanes to make a right hand turn.

Midblock crossing should not ordinarily be allowed if the roadway is an emergency access route. If one has been determined necessary then an approved overhead or underground crossing may be much safer.

Traffic Calming and Visual Cues

Traffic calming design features may be considered to address community concerns, improve or enhance traffic operations for pedestrians and/or bicyclists and/or address specific traffic operational issues. Traffic calming design features may consist of physical measures and or visual cues to reduce vehicle speeds, direct traffic flow, reduce impediments to pedestrian and bicycle use and eliminate potential traffic conflict points.

Each of the various components of traffic calming design can conflict with the need for a safe and adequate design, on the one hand, and the need to minimize impact to the surrounding physical and human environments, on the other. The need to accommodate pedestrians and bicyclists can sometimes cause conflicts with the need to provide an efficient operating environment for vehicular traffic. Safe design for all road users, must always take priority. To help develop a successful traffic calming proposal County traffic engineers should be consulted prior to any proposal that brought forward to a community planning or sponsor group for consideration.

An important tenet of public participation is that communities understand what traffic calming tools are available, and have input in determining which traffic calming features are implemented. Traffic calming measures discussed throughout this booklet can be used to enhance livability of community village roadways and residential streets.

Extensive community involvement should guide the early planning and design of projects to ensure that projects address local issues and enhance the livability of communities. Identifying stakeholders and forming early partnerships are key to the success of these planning and design efforts. Early in the planning process, stakeholders should determine their financial commitment for the various elements proposed as part of the highway improvement. Additionally, stakeholders should agree to their role in the maintenance of the main street.

Visual cues help drivers recognize that they are entering an area of increased pedestrian, bicycle or other non-motorized activity, and in combination with other traffic calming measures may reduce vehicle speeds. Visual cues encourage motorists to park and experience the main street amenities. The provision of visual cues at transitions into a village area is encouraged.

Examples of traffic calming design features and visual cues that can reinforce this transition include the following (see Attachment A for illustrated examples):

- Textured Pavements
- Raised Intersections
- Raised Crosswalks
- Chicanes
- Neckdowns
- Realigned Intersections
- Center Island Narrowings
- Chokers
- Roundabouts
- Other Speed Control Measures
- Combined Measures
- Speed Humps
- Speed Tables

*Coordination with the local fire authority is required prior to implementation of any of the above traffic calming features. As per the current fire code (Section

503.4.1 Roadway Design Features), roadway design features (speed bumps, speed humps, speed control dips, etc.) which may interfere with emergency apparatus responses shall not be installed on fire access roadways, unless they meet design criteria approved by the Chief. Traffic calming devices should not be considered for main emergency response routes. Traffic calming devices could affect emergency response times and care of patients' enroute to the hospital. These devices may also and create maintenance concerns on fire apparatus. Additionally traffic calming devices impact travel time to a fire and medical emergencies

Clear Recovery Zones

An important consideration in defining the appropriate cross section for a particular roadway facility is the width of the clear recovery zone. As defined in Chapter IV of the AASHTO Green Book, the clear zone is ***"...the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles."*** The width of the clear recovery zone is influenced by several factors, the most important of which are traffic volume, design speed of the highway, and slope of the embankments.

Many fixed objects are currently located alongside County roadways. These fixed objects include power poles, trees, boulders, bollards, monuments, sign posts and light

poles. These fixed objects are often difficult to remove or relocate individually due to the lack of available right of way, funding and/or County resources. When new road improvements are being constructed, removal or relocation of fixed objects from the clear recovery zone, however, should be considered. New enhancements in the road right of way that can be classified as a fixed object, as noted above, should be set back from the island curb face. The County of San Diego Department of Public Works Terms of Reference identifies recommended clear zone recovery widths for the placement of new or relocated fixed objects.

ADDITIONAL REFERENCES

Main Streets: Flexibility in Design and Operations, January 2005, California Department of Transportation (Caltrans)

<http://www.dot.ca.gov/hq/oppd/context/main-streets-flexibility-in-design.pdf>

Flexibility in Highway Design, 1997, U.S. Department of Transportation, Federal Highway Administration (FHWA)

<http://www.fhwa.dot.gov/environment/flex/index.htm>

A Policy on the Geometric Design of Highways and Streets (Green Book), 2004, American Association of State Highway and Transportation Officials (AASHTO)

https://bookstore.transportation.org/item_details.aspx?ID=110 (Link is to AASHTO bookstore where document can be purchased, not available for free viewing online.)

Traffic Calming: State of the Practice, August 1999, Institute of transportation Engineers (ITE) and U.S. Department of Transportation, Federal Highway Administration (FHWA)

<http://www.ite.org/traffic/tcstate.asp#tcsop>

AASHTO Roadside Design Guide

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