CHAPTER 700
MISCELLANEOUS STANDARDS

Topic 701 - Fences

Index 701.1 Policy and Purpose of Fences

(1) Policy. The type and location of fences should be as described herein and in the Standard Plans and Specifications, except in special situations for which provision is made below.

(2) Purpose of Fences.

(a) Fences on freeway and expressways are State-owned facilities placed within the right of way to help enforce observance of the acquired access rights.

(b) Fences on other highways are privately owned facilities along the right of way line which primarily serve the abutting property owners' needs.

(c) Median fences are constructed to help prevent indiscriminate crossings of the median by vehicles or pedestrians.

(3) Approval. The District Director has the authority and responsibility for approval of fence type and location within the policies stated herein.

701.2 Fences on Freeways and Expressways

(1) Policy. **Fences shall be provided on freeways and expressways to control access (except as otherwise provided under paragraph (3)(e)).** Freeway fencing or equivalent access control should extend to the limit of the legal access control on local streets at ramp termini.

(2) Standard Fence Types. The standard types of freeway fence are:

(a) Chain Link Fencing--Type CL-6 fence or equivalent access control should be used along the right of way and in the outer separation in urban or developed areas.

(b) Other Fencing--In rural areas, fences on freeways normally should be either Barbed Wire, (Type BW), or Wire Mesh, (Type WM), on either wood or metal posts. Wood posts may be more aesthetic than metal posts, depending on the surrounding terrain.

(c) Median Fencing--Type CL-4 fence, raised 6 inches above the ground, should be used where median fencing is required (see Index 701.1(2)).

(3) Exceptions to Standard Fence Types.

(a) If walls or fences equal to or better than the standard fence in durability, maintenance requirements, and dimensions exist along the right of way line, the standard fence may be omitted or removed. To avoid a gap in the access control, standard fences should be securely joined to the existing fence or wall at its terminals, if the access control line extends beyond these points.

(b) Fences of special design may be installed where needed for wild animal control.

(c) While standard fences are generally equal to or better than those normally constructed by ranchers for the control of their stock, construction of a different type of fence for this purpose may be appropriate in special cases. The property owner is required to pay any extra cost incurred unless the more costly fence is intended to:

- Match that by which the balance of the property is enclosed.
- Benefit the public.
- Be part of the consideration paid for the right of way.

(d) In special cases, where improvements are scattered, the area is aesthetically sensitive, and a lower fence would be in keeping with the height of adjacent property fence, a Type CL-4 fence may be substituted for Type CL-6 along the right of way in locations where Type CL-6 would otherwise be used.

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(e) Fencing may be omitted in remote areas where access control appears unnecessary.

(f) In special cases, nonstandard fencing may be considered at freeway ramp terminals on local streets when the adjacent property either is, or is proposed to be, developed in such a way that the owner feels that standard fencing is aesthetically objectionable. If it is concluded that the objection is valid, a more compatible facility may be substituted, subject to the following controls:

- Preference should be given to retaining the standard fence along the ramp to the end of the curb return or beginning of the taper on the local road. Where this is not reasonable, there may be substituted a fence or wall of equal or better durability and utility that is at least 4 feet high relative to the grade of freeway right of way line. Walls, ornamental iron fences with closely spaced members, or chain link fences are examples of acceptable possibilities.
- Along the local road, beyond the end of the curb return or the beginning of the taper, a facility of somewhat lower standards may be employed, if considered appropriate. The minimum allowable height is 2.5 feet above the grade at the edge of the right of way. In addition to the fence types suitable for use along the ramp, split rail fences, wooden picket fences, and permanent planter boxes are examples of possibilities. The intent is to delineate the access control line and discourage access violations in an effective manner.
- Generally, all costs for the removal of the existing freeway fence and the installation and future maintenance of a nonstandard fence are to be the property owner's responsibility under the terms of the encroachment permit authorizing the substitution. On new construction, the property owner is to assume similar costs and responsibilities subject to a credit for the value of a standard fence.

(4) Location of Fences. Normally, fences on freeways should be placed adjacent to, but on the freeway side of the right of way line.

Fences in the outer separation normally should be placed as shown in Figure 307.4 so that the area outside of the fence may be relinquished to the local agency.

When viewed at a flat angle, chain link fencing restricts sight distance. This fact should be considered in the location of such fencing at intersections. To eliminate hand maintenance, right-angle jogs should be avoided.

(5) Locked Gates. Locked gates may be provided in access control fences in special situations. The criterion should be necessity and not desirability. Although openings controlled by locked gates do not constitute access openings in the usual sense of access control, they must be included in the plans. Where locked gates are provided in the plans, each gate must be fully justified by specific reasons stated in the "General Features" section of the PS&E report. In addition, a statement is required as to who will hold the keys to each gate. Locked gates fall into two categories:

(a) Locked gates to be used exclusively by highway maintenance forces do not require FHWA approval and may be approved by the District Director if integrity of access is assured during construction in existing access fences, maintenance forces keep gates locked when not in actual use by person or equipment, and one or more of the following criteria apply:

- Circuitous routes would be eliminated.
- Parking on the freeway which may expose maintenance workers to freeway traffic and parking is available or can be developed near the gate.

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- Slow moving equipment could be kept off the freeway.
- Site not accessible to equipment from the freeway.
- Gates necessary for access to facilities outside the freeway right of way that cannot be reached from local streets or roads.

(b) Proposals for locked gates to be used by other public agencies or utility companies must be submitted to the Chief, Division of Design for approval. The submittal should give all the facts justifying approval and comparisons with alternate solutions.

Criteria for justification are generally the same as for gates used exclusively by highway maintenance forces except for parking. Safe and adequate parking is a necessary part of the solution to access by other agencies.

Locked gates to be used by non-utility entities require FHWA approval under any of the following circumstances:

- The gate is on an Interstate route.
- Federal-aid funds participated in the cost of right of way.
- Federal-aid funds participated or may participate in the cost of construction.

When proposals for locked gates requiring FHWA approval are included in the plans for new construction, including landscaping projects, FHWA approval of such gates will be included in FHWA approval of the project PS&E. Subsequent installations requiring FHWA approval will be submitted separately to FHWA by the Division of Design after approval by the Chief, Division of Design.

701.3 Fences on Other Highways

(1) Policy. The State will construct or pay the cost of fences on private property only as a right of way consideration to mitigate damages. State construction of such fences should be limited to:

(a) The reconstruction or replacement of existing fences.

(b) The construction of fences across property that had been previously enclosed by fences.

This policy applies to all private as well as public lands.

(2) Types of Fences. Only Type BW and Type WM fences on either metal or wood posts are to be constructed by the State on highways other than freeways and expressways.

(3) Location of Fences. Fences on other highways are placed along the right of way line inside the abutting property.

Topic 702 - Miscellaneous Traffic Items

702.1 References

(1) Guardrail and Crash Cushions. See Chapter 7 of the Traffic Manual.

(2) Markers. See Part 3 of the California Manual on Uniform Traffic Control Devices (California MUTCD).

(3) Truck Escape Ramps. See Traffic Bulletin No. 24, (1986) and the NCHRP Report 178.

(4) Mailboxes. See the AASHTO Roadside Design Guide, 3rd Edition, Chapter 11, "Erecting Mailboxes on Streets and Highways".

Topic 703 - Special Structures and Installation

703.1 Truck Weighing Facilities

The Division of Traffic Operations coordinates the design and construction of truck weighing facilities with the California Highway Patrol in Sacramento. Typical plans showing geometric details of these facilities are available from the Headquarters Division of Traffic Operations. Districts should refer truck weighing facility maintenance issues to their District maintenance units.

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See Index 107.1 for additional details on roadway connections for truck weighing facilities.

703.2 Rockfall Restraining Nets

Rockfall Restraining Nets are protective devices designed to control large rockfall events and prevent rock from reaching the traveled way. The systems consist of rectangular panels of woven wire rope vertically supported by steel posts and designed with frictional brake elements capable of absorbing and dissipating high energies. For additional information on the characteristics and applications for rockfall restraining nets, designers should contact the Division of Engineering Services - Geotechnical Services (DES-GS).

Topic 704 - Contrast Treatment

704.1 Policy

In general, delineation should be composed of the standard patterns discussed in Part 3 of the California MUTCD.

Markings include lines and markings applied to the pavement, raised pavement markers, delineators, object markers, and special pavement treatments.

Contrast treatment is designed primarily to provide a black color contrast with an adjacent white surface. Normally, contrast treatment should be used only in special cases such as the following:

(a) To provide continuity of surface texture for the guidance of drivers through construction areas.

(b) To provide added emphasis on an existing facility where driver behavior has demonstrated that standard signs and markings have proven inadequate.

When contrast treatment is applied, a slurry seal should be used.

See Part 3 of the California MUTCD for additional information on contrast treatment.

Topic 705 - Materials and Color Selection

705.1 Special Treatments and Materials

Special materials or treatments, such as painted concrete, or vinyl-clad fences, are sometimes proposed for aesthetic reasons, or to comply with special requirements.

The following guidelines are to be used for the selection of these items:

(a) Concrete should not be painted unless exceptional circumstances exist, due to the continuing and expensive maintenance required. Concrete subject to unintentional staining should be textured during construction to minimize the visibility of stains, if other methods of controlling stain-producing runoff or dripping cannot be accomplished.

(b) Vinyl-clad fences are sometimes specified for aesthetic reasons. The cost of this material is higher than that of galvanized steel. Special consideration should be given to the life-cycle cost and maintainability of vinyl-clad fencing prior to selection for use. The use of black or green vinyl-clad mesh for access control fencing, safety fencing at the top of retaining walls, and pedestrian overcrossing fencing is acceptable.

705.2 Colors for Steel Structures

Colors for steel bridges and steel sign structures may be green, gray, or neutral tones of brown, tan, or light blue.

Criteria for selection of colors are:

(a) General continuity along any given route.

(b) Coordination of color schemes with adjacent Districts for interdistrict routes.

(c) Requests from local agencies for improvement of aesthetics in their community.

Color selection for steel bridges should be mutually satisfactory to the Division of Engineering Services

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and the District. The Division of Engineering Services (DES) will initiate the color selection process by submitting the proposed color to the District Landscape Architect for review. The color for steel sign structures will be selected by the District Landscape Architect.

Topic 706 - Roadside Treatment

706.1 Roadside Management

A key concept in roadside management is that roadway and roadside design should consider the full life-cycle cost of transportation improvements including the long-term cost of maintenance. The design alternative with the lowest initial construction cost may not be the best solution if this approach will include high recurring maintenance costs. Designers should strive to select design approaches that do not require extensive recurring long-term activities.

A second key roadside management concept is that roadway and roadside design should contribute to the safety of Department maintenance workers by incorporating techniques that eliminate or reduce worker exposure to traffic. More specifically, these management concepts include the following techniques:

- Eliminate the need for recurrent maintenance activities such as vegetation control, herbicide application, pruning, mowing and graffiti removal;
- Facilitate the automation of recurrent maintenance activities such as herbicide application, mowing and litter collection;
- Locate facilities that require recurrent maintenance activity outside the clear recovery zone, or within protected areas;
- Provide safe maintenance worker access to facilities that require recurrent maintenance activity.

To implement this second roadside management concept, the following conditions must be considered in roadway and roadside design projects:

- Metal beam guardrail, including standard railing, terminal system end treatments, guard railing at structure approach and departures, and at fixed objects should include vegetation control. For more detailed information regarding placement of vegetation control consult with both the District Landscape Architect and District Maintenance. See the Standard Plans for minor concrete vegetation control.
- Thrie beam barrier, including single thrie beam barrier, double thrie beam barrier, at structure approach and at fixed objects should include vegetation control. For more detailed information regarding placement of vegetation control consult with both the District Landscape Architect and District Maintenance. See the Standard Plans for minor concrete vegetation control.
- Unpaved narrow strips often result from the construction of noise barriers or concrete barriers beyond the paved shoulder edge. Unpaved strips 15 feet or less in width, parallel and immediately adjacent to the roadway, should be paved to the barrier or wall. Paving these areas eliminates the need for manual vegetation control, and allows automated equipment to remove litter and debris. Pavement requirements are consistent with the guidance contained in this manual. Contrasting surface treatment such as markings, delineation, or color may also be provided so drivers can distinguish these areas from those intended for vehicular use.
- Unpaved areas greater than 15 feet in width may include vegetation control techniques such as weed control mats, patterned asphalt or stamped concrete paving, or the planting of low maintenance vegetation such as native grasses. Consult the District Landscape Architect and District Maintenance to select and appropriate vegetation control technique.
- Plants, which at maturity may encroach upon required site distances, should be removed. Consult the District Landscape Architect to identify potential encroaching plant material.
- Noise barriers should be designed with a textured aesthetic treatment or planted with vines to reduce maintenance required to control graffiti. Index 902.3 of this manual

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and the Project Development Procedures Manual contain information of the planting on noise barriers.

- Unpaved area beyond the gore pavement should be paved as per Index 504.2(2).
- Roadside facilities that require recurring maintenance, such as irrigation controllers, electrical controllers, backflow preventers, and valve boxes, should not be placed on the outside of horizontal curves, near gore areas, near auxiliary lanes, or near ramp termini. The designer should strive to place these facilities outside the clear recovery zone, or within a protected area if placement outside the clear recovery zone is not feasible.
- When placing roadside facilities that require recurring maintenance, the designer should strive to include improvements that facilitate safe maintenance access such as maintenance vehicle pullouts, maintenance access paths, walk gates and vehicle gates. It is preferred that access be provided from outside the right-of-way for all facilities that require maintenance access.
- When placing noise barriers in areas with a narrow right of way, the designer should consider locating a concrete safety shape barrier one meter from the face of the noise barrier to provide protected maintenance access to planting and irrigation facilities.

Formal safety reviews for roadside management issues should be accomplished as discussed in Index 110.8. Consult the District Landscape Architect and District Maintenance unit early during design development to identify and address potential roadside management issues, such as avoiding the redundant placement of roadside facilities, or allow for the consolidation of roadside facilities.

706.2 Vegetation Control

Weed control fabric or soil sterilant chemicals may be placed under pavement to prevent weed growth through medians, traffic islands, and other paved areas.

The Division of Maintenance is responsible for the selection of herbicides. Approval is required for any changes from the currently approved Standard Specifications and Standard Special Provisions for pesticides and herbicides.

Since soil sterilants may be transported by water, they should not be used where they may affect environmentally sensitive areas, habitat, native vegetation, landscape plantings, agricultural crops, adjacent residential, commercial or recreation areas, streams, or water bodies.

Before specifying soil sterilants, the District Landscape Architect should be consulted to determine the possibility of future planting.

706.3 Topsoil

In areas of new construction, quality existing topsoil should be stockpiled and spread during the final stages of construction. The native brush should be crushed or chipped and mixed with the stockpiled soil to maximize natural or organic matter in the soil. Since topsoil contains beneficial microorganisms and seed, it is best to stockpile it in shallow windrows and planted with temporary erosion control so that oxygen can penetrate the soil.

706.4 Irrigation Crossovers for Highway Construction Projects

Irrigation crossovers normally consist of a conduit with a waterline crossover and sprinkler control conduit with pull wire. Irrigation crossovers should be provided under new roadways and ramps when future highway planting is anticipated. The District Landscape Architect should be consulted to determine the need for such crossovers as well as size and location. Attention should also be given to extending existing conduits when widening or modifying roadways and ramps.

The following factors should be considered in sizing and locating crossovers:

(a) A standard irrigation crossover consists of a minimum size of 8-inch diameter nominal (DN) conduit, with a 3-inch DN water supply line and a 2-inch DN sprinkler control conduit with pull wire. Sizes of irrigation crossovers and water supply lines are usually larger when nonpotable water is to be used.

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(b) Irrigation crossovers are typically spaced 1,000 feet apart on freeways where future highway planting is anticipated. Undercrossings may be considered alternative crossing opportunities.

(c) Drainage facilities should not be used for waterline crossings.

Standard details and special provisions for the irrigation crossover should be furnished by the District Landscape Architect to the Project Engineer for highway construction projects.

706.5 Water Supply Line (Bridge) and Sprinkler Control Conduit for Bridge

Water supply line and sprinkler control conduit with pull wire should be provided in new bridge structures.

The District Landscape Architect should be consulted to determine the need for such water supply lines and sprinkler control conduits such as size and location.

Attention should also be given to modifying, changing existing, or installing new water supply lines and sprinkler control conduits when widening or modifying bridge structures.

The following factors should be considered in sizing and locating water supply lines and sprinkler control conduits:

(a) Generally, locate on the side of the bridge, nearest the water source.

(b) Consider the maximum water demand and number of irrigation controller stations anticipated to be used. The water supply line should be a minimum 3-inch DN and the conduit for the sprinkler control conduit should be a minimum 2-inch DN and contain a pull wire.

(c) Ductile iron pipe is required for the water supply line for pipes 4-inch DN or larger because of its superior strength and flexible joints.

706.6 Water Supply for Future Roadside Rest Areas, Vista Points, or Planting

Provision for a permanent water supply should be included in the major construction project. In the preparation of a major highway construction project, consideration should be given to using the water source needed for construction as part of a future permanent water supply system. If this appears to be a feasible solution, consider such factors as:

(a) Probability of a future planting, vista point, or roadside rest project.

(b) Economy.

(c) Possible reduction in the flexibility of the highway contractor's operation.

The District Landscape Architect should be consulted.

Topic 707 - Slope Treatment Under Structures

707.1 Policy

Structure end slope should be treated to:

(a) Protect slopes.

(b) Improve aesthetics.

(c) Reduce long term maintenance costs.

Slopes need to be protected. The District will determine where slopes are to be paved or the type of treatment to be used.

Caltrans maintenance, landscape architecture, materials, design, and other affected units will furnish input to determine slope treatment needed at each site. Local agency input should be obtained for urban undercrossings.

All types of slope treatments require adequate drainage facilities for water from the upper roadway. Inadequate drainage is a major source of slope erosion.

707.2 Guidelines for Slope Treatment

(a) Full slope paving shall be installed where it is anticipated that erosion by

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pedestrians, wind, storm water, or other causes will occur. High landscape maintenance costs caused by inadequate moisture, sunlight, instability to establish vegetation etc., may also justify the use of full slope paving in lieu of planting. The District Landscape Architect will provide aesthetic input and waterline crossover conduit as well as locations for slope paving.

(b) Landscaped structure end slopes may be justified when adjacent slopes are landscaped and when landscaping is compatible with adjacent development. Conditions must exist where plants would have a strong likelihood of survival.

(d) Bare slopes have minimum initial costs and higher maintenance costs which vary with the site. Bare structure end slopes may be justified at rural sites and other areas where anticipated maintenance activity will be low and there is little likelihood for erosion. Appropriate drainage design is critical when slopes are left bare.

(d) Adequate drainage facilities must be provided to prevent saturation of abutment foundation materials and damage to slope treatment.

(e) Additional protection may be required at stream crossings to provide for flow velocity.

707.3 Procedure

Based on consultation with the District Landscape Architect and Structures Bridge Architect and in consideration of economic and aesthetic factors, the District will determine, and set forth with the bridge site plan submittal, the type of slope treatment indicating whether:

(a) The Division of Engineering Services is to design the slope treatment with the bridge and include the cost in the Structure items; or

(b) The District will design the slope treatment and include the details with the road plans.

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