18-2 UTILITIES AND OPENINGS FOR FUTURE UTILITIES IN BRIDGE

Utilities

Our policy regarding utility encroachments is covered in this memo. The designer should also consult the Department of Transportation's *Manual of Encroachment Permits* because casing requirements, etc., can dictate the size of openings. The applicable portions of that policy are attached to this memo. Variations and problems should be discussed with the Encroachment Engineer of the Office of Structures Maintenance and Investigations.

General

The District makes the fundamental decision to permit an encroachment in accordance with the Department of Transportation's *Manual of Encroachment Permits*.

The District submits the information on proposed encroachments on or near bridges to the Office of Structure Design.

During the design stage, the bridge designer reviews the proposal for the following:

1. Structural adequacy of the bridge for the weight and location of the facility.
2. Compliance with the "Encroachments on Bridges" section in the *Manual of Encroachment Permits*.
3. Conflicts in construction sequence.

The District and bridge designer should work in close conjunction with the District's Permit Engineer to avoid commitments that conflict with the encroachment policy. The bridge PS&E should clearly show the utility work to be performed by the State's Contractor.

The minimum information necessary on the plans consists of the name of the owner, general description, and the location of the facility, openings and access openings (if required). In addition, all hardware and material to be furnished and/or installed by the State's Contractor must be shown.

Transversely reinforced deck and soffit slabs supporting pipes or conduits shall be designed by the strength design method given in Article 8.16 of Caltrans' *Bridge Design Specifications*.

Memo converted to metric.

If it becomes necessary to add utilities to a structure partially or completely designed, no change in the design need be considered unless the weight of the added utilities exceeds 10 percent of the combined weight of one of the girders and the slab carried thereon.

The District prepares the encroachment permits at the completion of the PS&E. Those involving bridges are submitted to the Office of Structures Maintenance and Investigations for approval. Upon approval, the District issues the permits.

During construction, inspection of the work is performed from the plans, specifications and the details of the permits.

Openings for Unanticipated Future Utilities

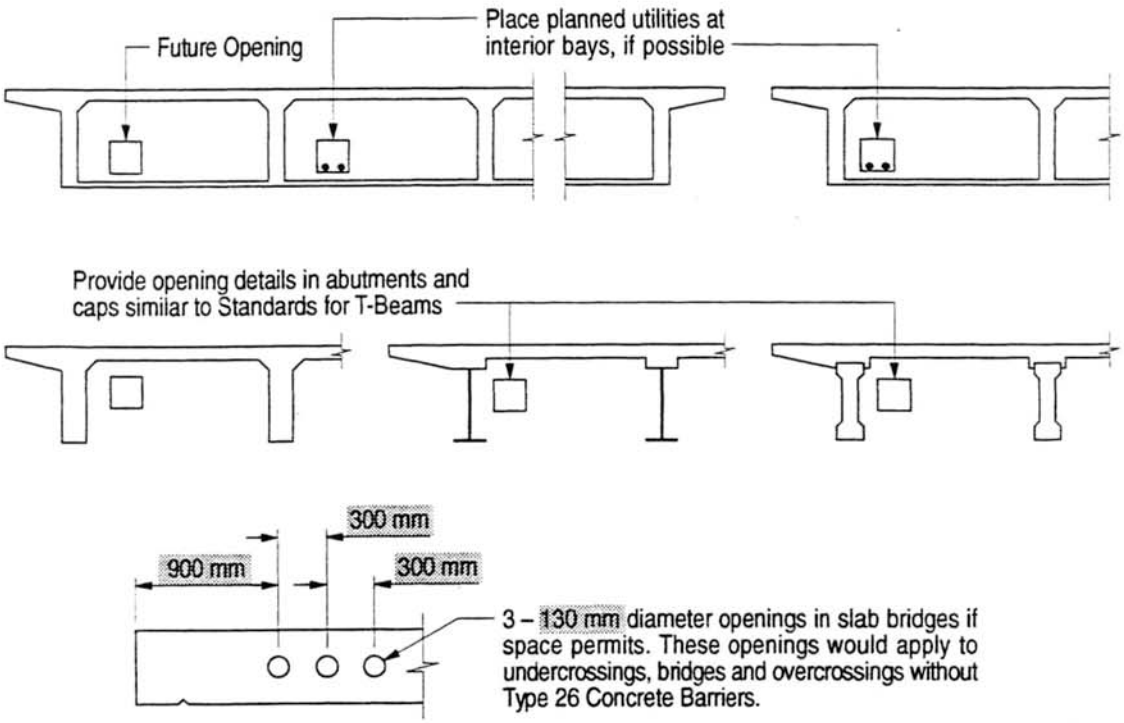
Designers are requested to make every effort to provide for future utilities. Requests are frequently made to carry utilities on completed bridges. These may include those belonging to others or State facilities such as irrigation lines and communication conduits.

Provisions should be made for unanticipated future utilities in all overcrossings and bridges over waterways. Future utility openings should be placed in the exterior bays at the outside of structures so that the utility can be placed under sidewalks or shoulders rather than within the traveled way. If the preferred locations are not available for structural reasons, provisions should be made to place openings at other locations.

Future utility openings should also be provided in undercrossings and other structures where this can be done easily. Exceptions to this policy might be: (1) ramp structures where it is unlikely that future utilities will ever be placed and (2) undercrossings with concrete approach slabs where future hookups would not be easy.

Openings should be provided in caps and diaphragms as per Standard Plans B6-10 and B7-10.

Provide for future utility openings in addition to any planned utilities. If this is not possible for structural reasons, consider enlarging the planned utility opening to accept future utilities.



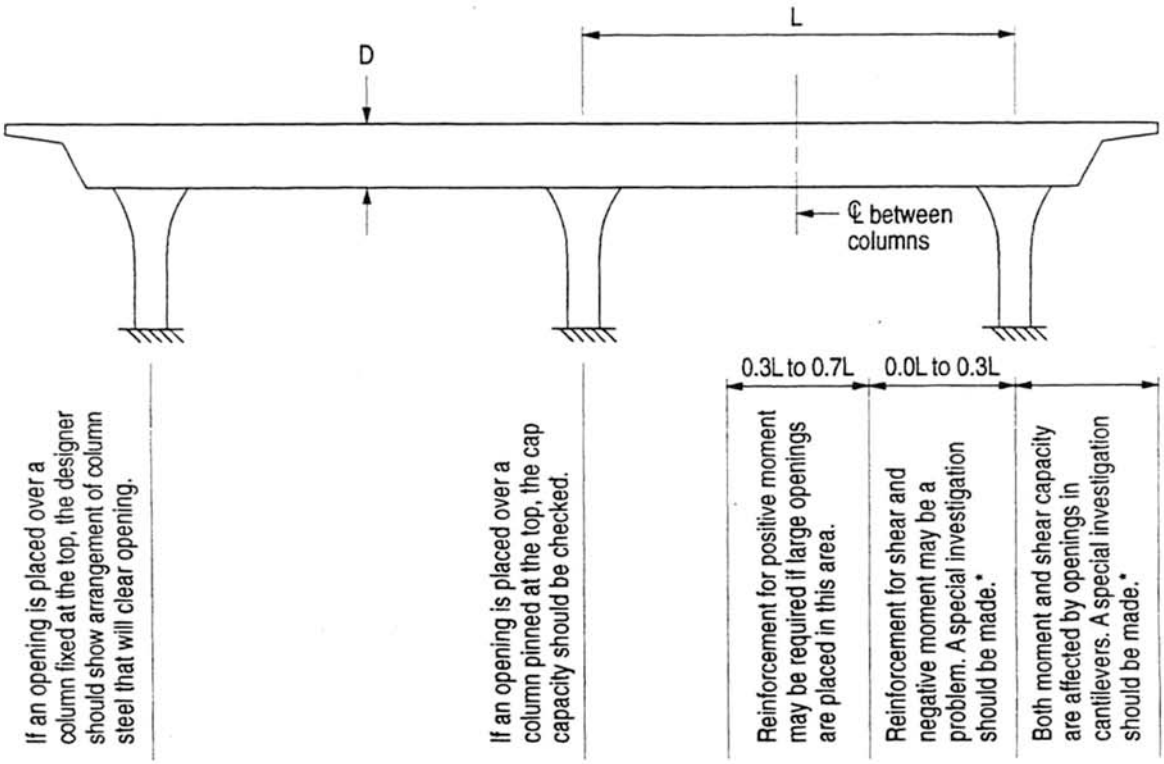
Typical Locations for Future Utilities
See Standard Plans B6-10, B7-10 for Sizing of Openings

Openings

The following comments apply to Standard Plans B6-10 and B7-10.

1. Openings which measure less than 0.5D (½ structure depth) for Reinforced Concrete Box Girders and T-Beams or 0.33D (⅓ structure depth) for Prestressed Box Girders do not usually require special investigation. Reinforcement on the "Utility Opening" sheets is sufficient.
2. Corner fillets are required for openings through bent caps. Check the width requirements of the utility and increase the width of openings at bent caps accordingly if the fillets conflict.
3. Openings which will be at or near the hinge or abutment bearing seat elevation should be investigated for conflicts between the opening and hinge or abutment reinforcement.
4. Openings through hinges with prestressing anchorages are not covered by the Standard Plans sheets.

5. Bent cap openings which measure larger than 0.5D for Reinforced Box Girders or 0.33D for Prestressed Box Girders should not be used unless thoroughly investigated, keeping the following points in mind:



* Shear capacity at openings should be checked. Shallow structure depths of prestressed structures and P-loads are two conditions which may require larger stirrups or closer spacing than designated on standard plan. Flared bottom slabs at bent caps may force the use of stirrups below the opening as well as above to provide capacity. When standard plan requirement is inadequate, detail required stirrups on contract plans.

Pay Quantities

There are two different conditions to consider:

1. Supports supplied by utility owners:

   Hangers, anchor bolt inserts, manhole frames and covers, sleeves, and other accessories required for utilities which must be cast in the concrete are usually furnished by the respective owners and are installed by the Contractor in accordance with details shown on the plans or as directed by the Engineer. Do not include the weights of items to be furnished by the utility and installed by the State's Contractor in the pay quantities for Miscellaneous Metal.

2. Supports to be supplied by the contractor:

   Weights of supports, cradles, hangers, etc., should be included in the pay quantities for Miscellaneous Metal.

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Attachment