CHECKING PROCEDURE

In order to increase productivity, the following design checking guidelines will continue to be applied. The intent of this procedure is to increase efficiency without appreciably affecting the quality of the plans.

There are undoubtedly many areas in which we can achieve efficiencies and shorten design times. Although this memo specifically addresses design checking, we are interested in obtaining greater efficiencies in the overall project development and design process. Any innovative ideas which were found successful when implemented should be brought to the attention of the Design supervisors. With your cooperation and common sense we will accomplish our goal without sacrificing overall quality of structure plans.

These guidelines will be updated from time to time, based upon your suggestions and recommendations. If you have any short cut methods, computer programs, tables, charts, graphs, etc., applicable to design checking, we would like to have them to augment this memo.

Philip C Warriner

Guy D. Mancarti

GDM:mp
Attachment A

Supersedes Memo to Designers 1-3 dated November 1986

CHECKING PROCEDURE

I. General

Use of this checking procedure will be our standard practice for reinforced and for prestressed concrete bridges. Full, in-depth checking will continue to be used but only on an exception basis. Appropriate exceptions would be for: (a) checking unusual or complex designs, (b) checking designs performed by inexperienced personnel, (c) checking performed by inexperienced personnel (d) training, (e) checking revised design specifications, computer programs or other special one time situations.

II. Individual Duties & Responsibilities

Designer - Has the primary responsibility for layout, structural design, and for producing a complete set of plans following current design practice.

Detailer - Under the general direction of the Designer and Structural Drafting Technician III, is responsible for preparing neat, easy to follow plans conforming to current detailing practice. Use *Bridge Design Details* manual checklist for each sheet.

Checker - Is responsible for checking layout and plans to confirm structural adequacy and to assure that details are complete and constructible. Performs the check using this procedure or carries out an in-depth check if so directed by the Design Senior. Checks design as presented and does not redesign. Redesign, if required, is the responsibility of the designer.

Project Designer - Is responsible for compatibility of design and details within the project. Investigates the use of similar designs for the design or check and makes recommendations to the Design Senior relative to checking in-depth. Gives designers architectural and structural details to be used on the project and executes any appropriate instruction prior to commencement of design. Looks for opportunities to standardize details or component designs (i.e.: abutments, columns, etc., within a project). Monitors the design and detailing process and provides guidance and assistance as required; accomplishes timely reviews of the details and progress to insure completion of the P & Q by the assigned date. Makes in-depth review of all plans within the project and also insures their compatibility with the road plans. Is responsible for handling construction problems in conjunction with the Structure Representative and recommends CCO solutions to the Design Senior. (See Memo to Designers 1-39 for other duties.)

Design Senior - Is responsible for determining if an exception to the checking procedure is to be used and will so instruct the Project Designer. Insures compliance with these instructions and makes a final review of all structure plans prior to signing the plan sheets.

III. Checking Procedure

1. Make a complete check of the geometric layout. Scaling is acceptable for simple structures. (Falsework clearance and space required for construction operations are part of the layout check.)

2. Make a general review of the plans for any obvious omissions, conflicts, or incompatible structural framing or details.

3. Check the typical section.

4. Check the girder layout for variable girder spacing, slab thickness, and agreement with the typical section.

   No structural design check should be started until items 1 thru 4 are completed and any differences are resolved with the Designer. Consult with the Project Designer if necessary. If revisions are necessary, the Designer should revise the design and details before the Checker proceeds.

   The check of a design may be done using the checked details of a similar structure. The structure used for comparison must have been designed using Load Factor Design. The General Plan files, maintained in Bridge Design Section 4, and the "As Built Plans" file may be used as a reference for similar structures.

5. Superstructure
   a) Prestressed - check the prestressing path low and high points and check for possible conflicts with column bars and/or cap steel, P_j, f'_c, tension in concrete, total amount of ultimate moment reinforcement required, stirrups near the supports, and camber diagram.
   b) Reinforced Concrete - check the total amount of moment reinforcement at bents and near midspan. Review bar cut-offs to the extent that they look reasonable by comparison with the spans, but do not check individual bar cut-offs. Check stirrups near supports and "spot-check" the remainder. Check "fitup" for all hinge details (i.e.: pads, keys, restrainers, reinforcement, joint seal assemblies, and skew details). For bent caps, check main reinforcement and stirrups similar to superstructure girders.

6. Substructure
   a) Bent and Abutment Footings - check size of footing for bearing pressure or number of piles, and footing reinforcement.
   b) Pile Shafts - check depth, main reinforcement, and spirals.
   c) Columns - check main reinforcement and spirals.
   d) Abutments - review longitudinal and transverse keys for reasonableness, and check bearing pad size.

7. Review all plan details with an "overview perspective" to insure that the details are complete, reasonable, structurally sound, and constructible. Make in-depth review of appropriate details.

Check moment connection to make sure details are adequate to resist moments resulting from various loading conditions. Confirm that there are sufficient details shown for modifying existing structures and joining new structure to existing structures for widenings.

8. Check for construction sequence.

9. Check all notes and corner details.