June 1988 MEMO TO DESIGNERS 15-20

LIVE LOAD DISTRIBUTION BY THREE DIMENSIONAL ANALYSIS

Three dimensional analysis of a bridge superstructure explicitly considers the lateral stiffness and load transfer characteristics of the superstructure elements. The technique produces more exact girder live loading distribution and is therefore less conservative than the empirical AASHTO method. The use of this refined analysis for production work is limited. It shall not be used for the design of structures for normal HS and P live load.

LANELL and CURVBRG are two operational programs that utilize three dimensional analysis. LANELL is applicable to concrete box girder bridges; CURVBRG to steel girder bridges. For three dimensional analysis of other types of superstructures consult the Special Analysis Section.

In three dimensional analysis the concept of widely or closely spaced girders as defined in Bridge Design Specifications (BDS) does not exist.

Three dimensional analysis may be used to advantage for the following conditions:

- The live loading and its lateral location is relatively fixed such as for transit or construction loads.
- The live load capacity of an existing structure is to be determined.

Once the live load wheel lines per girder or bridge are determined by three dimensional analysis, design proceeds by conventional Load Factor methods. Loads are applied in accordance with Table 3.22.1A of (BDS) using Groups I_B and I_{P3D}. Load intensity is reduced in accordance with Article 3.12 of BDS.

The LANELL program is available through our Bridge Menu. Instructions for the use of LANELL is included with this Memo to Designers as Attachment A.

Direct questions related to the use of CURVBRG to Special Analysis Section.

Philip C Warriner

Guy D. Mancarti

FLM/tew
Attachment(s)