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COMPOUND STRIP ANALYSIS OF SLAB-GIRDER BRIDGES

COMPOUND STRIP - THE MECHANICS

The strain energy of the strip, including plate and attached beams and columns, is expressed in terms $w(x,y)$ and minimized with respect to the displacements associated with the strip, Δ . This minimization gives a strip stiffness matrix for the compound strip which includes axial and flexural stiffnesses of the columns, flexural and torsional stiffness of the beams, and the stiffness of the plate. The strip stiffness matrices are combined in the conventional manner to form the global stiffness matrix. The half bandwidth of the stiffness matrix is small, which reduces the computation effort required to determine state variables which establish displacements and actions.

STRIP DISPLACEMENT FUNCTION

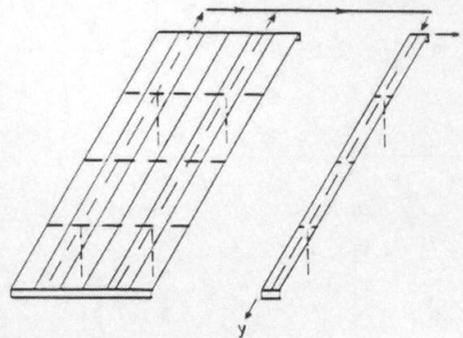
$$w(x,y) = \sum_{m=1}^{\infty} Y_m X_m = \sum_{m=1}^{\infty} Y_m [C] \{\Delta_m\}$$

$$Y_m = \sin\left(\frac{m\pi y}{l}\right)$$

C = a row vector containing third order Hermitian polynomials in x .

m = a column vector containing four displacements per mode m .

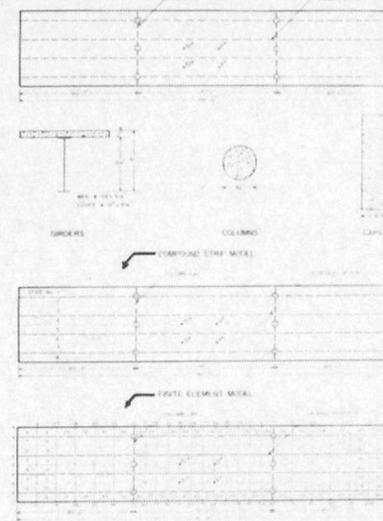
CSM IDEALIZATION



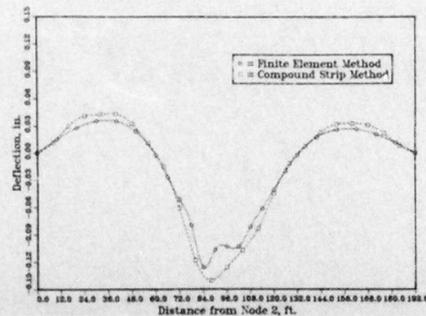
ANALYSIS SUMMARY

	FEM	CSM
Maximum Deflection, in.	0.126	0.128
Maximum Support Reaction, kip.	30.1	32.2
Maximum Girder Moment, kin.	-2430 1500	-2000 1270

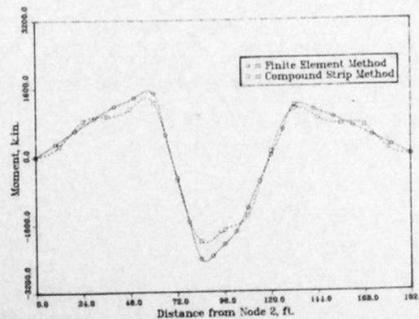
ILLUSTRATIVE EXAMPLE



Deflection Between Nodes 2 & 218



Girder Moment Between Nodes 2 & 218



Transverse Moment Between Nodes 91 & 99

