

SUMMARY REPORT 294-1(S)

**BEHAVIOR OF ASTM C 850 CONCRETE
BOX CULVERTS WITHOUT
SHEAR CONNECTORS**

**SUMMARY REPORT
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Behavior of ASTM C 850 Concrete Box Culverts Without Shear Connectors

by

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Precast box culverts have been extensively used to economically span smaller drainage channels. Presently, design standards exist for two categories of box culverts: ASTM C 850 establishes designs for boxes with less than 2 ft of cover subject to highway loadings, while ASTM C 789 establishes standard designs for other precast box sections. The C 850 standard requires shear connectors between top slabs of adjacent box sections, a requirement that is also adopted by AASHTO.

A series of static loads simulating factored HS20-44 wheel loads was applied to the 7 ft and 5 ft spans of two experimental box culvert sections. The culverts were designed in accordance with ASTM C 850 requirements for 5 x 5 boxes, and the steel areas in the 7 ft slabs were sized according to the C 850 requirements for 7 x 5 boxes, so that testing of 5 ft as well as 7 ft spans could be conducted.

The major objective of the study was to determine whether shear connectors required by ASTM C 850 and AASHTO might be safely omitted. To accomplish this objective, stresses in reinforcing steel were measured while simulated critical wheel loads were applied.

The following conclusions are apparent:

(1) Maximum measured steel stresses are well below design steel stresses for design service wheel loads and for factored ultimate design wheel loads.

(2) Cracking caused by the design ultimate wheel load is relatively insignificant with respect to cracking assumed in a "cracked section" design philosophy.

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