



Separator

164-4F(S)

SUMMARY REPORT 164-4F(S)

**AN ANALYSIS AND DESIGN PROCEDURE
FOR HIGHWAY-RAILROAD GRADE
CROSSING FOUNDATIONS**

**SUMMARY REPORT
of
Research Report Number 164-4F**

**Cooperative Research Program of the
Texas Transportation Institute
and the
State Department of Highways and Public Transportation
In Cooperation with the
U. S. Department of Transportation, Federal Highway Administration**

November, 1976

**TEXAS TRANSPORTATION INSTITUTE
Texas A&M University
College Station, Texas**

An Analysis and Design Procedure for Highway-Railroad Grade Crossing Foundations

by

Aziz Ahmad, Robert L. Lytton, and Robert M. Olson

This is the summary of the fourth and final report in a series from the study entitled "Structural and Geometric Design of Highway-Railroad Grade Crossings." The five chapters in the report describe a comprehensive design procedure for the foundation of a grade crossing employing a computerized design system.

In present day construction practice, the selection of materials and layer thicknesses for a railroad crossing structure is based on a trial and error approach. Although several improved design methods for highway pavements are available, prior to the work in this report, none of these methods had ever been applied to the design of highway-railroad grade crossings.

The design procedure developed herein is based on rideability, which mainly depends on the amount of permanent differential deformation between the railroad track and the adjacent highway pavement. Repetitions of wheel loads cause permanent differential deformation. Due to the difference in wheel loadings, material properties, and the track and pavement structures, each will deform differently after the passage of a number of repetitions of wheel loads (expected in a design period).

Layer thicknesses of the crossing structure and adjacent pavement, their wheel loadings, and the properties of all the materials involved as they are affected by the local climate determine the level of stress that acts at different points in these foundation layers. The repetition of these stresses produces the permanent differential deformation which must remain within acceptable limits if the foundation layers are properly designed. The influence of the permanent differential deformation on increasing highway dynamic load and the increase in dynamic railway wheel loads due to increasing train speed is considered while computing the stresses.

Characteristic properties of fine grained subgrade materials including the influence of environmental factors such as temperature and suction on subgrade material properties are completely described.

Several example problems are presented to illustrate the design system. These examples also illustrate how these designs must change according to the variations in expected loading, temperature, climatic zone and subgrade soil.

The published version of this report may be obtained by addressing your request as follows:

Phillip L. Wilson, State Planning Engineer, Transportation
Transportation Planning Division
State Department of Highways and
Public Transportation — File D-10R
P. O. Box 5051
Austin, Texas 78763
(Phone: (512) 475-7403 or TEX-AN 822-7403)