

I-GRAM

Army Dams & Transportation Infrastructure Program

The Army Dams & Transportation Infrastructure Program (ADTIP) guards against the potential for loss of life and damage to property, strives to adhere to Federal and States statutory and regulatory requirements, ensures mission execution accomplishment through the safe use and operation of the infrastructure systems as required and protects the environment. The Installation Management Command (IMCOM) is responsible for preparing the Army Dams and Transportation Infrastructure Program (ADTIP) execution strategy each year and for managing program execution.

Contact Us:

IMCOM ADTIP PM
 COMM:210-466-0543
 DSN:312-450-0535
 michael.r.andres.civ@army.mil

ERDC POC
 COMM: 601-634-2920
 DSN: 312-446-2920
 henry.diaz-alvarez@usace.army.mil

Bridge Load Testing to measure the elastic deformation of the structural members of the bridge under heavy loads.

Load test to determine the safe structural capacity of the bridge

Objective:

- Verification of design assumptions
- Identify Live Load effect (LL)
- Measurement of stress response in certain members
- Determining actual performance of bridge appurtenances that affect structural boundary conditions (i.e., expansion joints or pinned connections)
- Identify vehicle distribution factors (DF)
- Obtain accurate bridge Rating Factor (RF) with respect to civilian and military load configurations

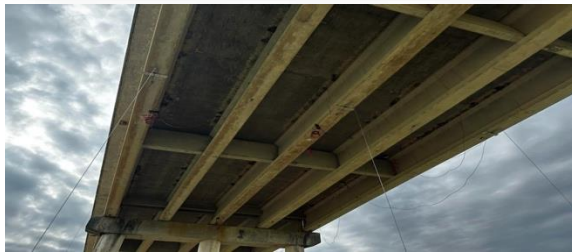


Live Load Testing of Bridges

Bridge Load Testing

Load Test Procedure

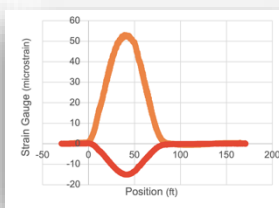
- Measuring strains and displacement on the bridge superstructure while it is subjected to a moving load.



Underside view of bridge



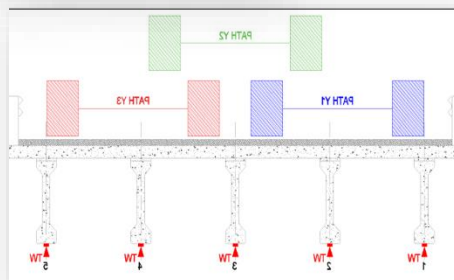
Strain gages (BDI) sensor



Response History

Load Distribution Factor (DF)

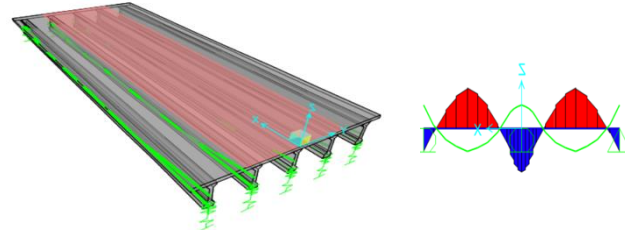
- Measure of lateral distribution



Different Load path configuration

Finite Element Model (FEM)

- Response data is used to "calibrate" a FEM of the structure, to which is used to develop load ratings

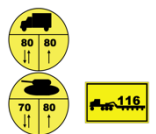


Development of a calibrated FEM

Load Rating

- Model adjustments
- Remove/reduce parameters that may not be counted on reliably.
- Calculate member capacities
- Member capacities are calculated using the applicable code
- Apply dead and live load
- Apply design live loads according to applicable code.
- Extracting results
- Rating factors (RF) should be produced for all elements

$$RF = \frac{C - (\gamma_{DC})(DC) - (\gamma_{DW})(DW) \pm (\gamma_P)(P)}{(\gamma_{LL})(LL + IM)}$$



Results - Bridge posting

- Recommendation of live load restriction

Cost Benefit Analysis

- Load Rating: ~\$1.5K - \$5.5K
- Load Test and Load Rating: ~\$25K - \$35K
- A physically proven load carrying capacity (full DL + magnified LL)
 - Eliminating unnecessary bridge replacement/rehabilitation/repairs
 - Reducing economic impacts due to unnecessary weight restrictions