NMSU Bridge Inspection and Evaluation Program

David V. Jauregui
Foreman Professor and Head
Department of Civil Engineering

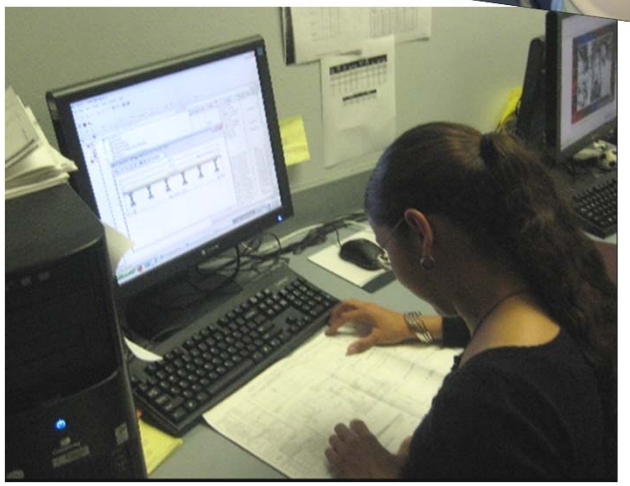
Brad D. Weldon
Associate Professor
Harold Foreman Professor for Excellence in Civil Engineering

Bridge Inspection Program at NMSU

- Only one if its kind in the US
- Two teams
  - One professional engineer
  - Two co-op students (6 months)
- Inspection and documentation of ~400 bridges per year
  - Fracture-critical steel bridges
  - On or over the Interstate
- Bridge Inspection Schools (twice a year)
  - Comprehensive bridge inspection school
  - Training of NMSU and NMDOT personnel

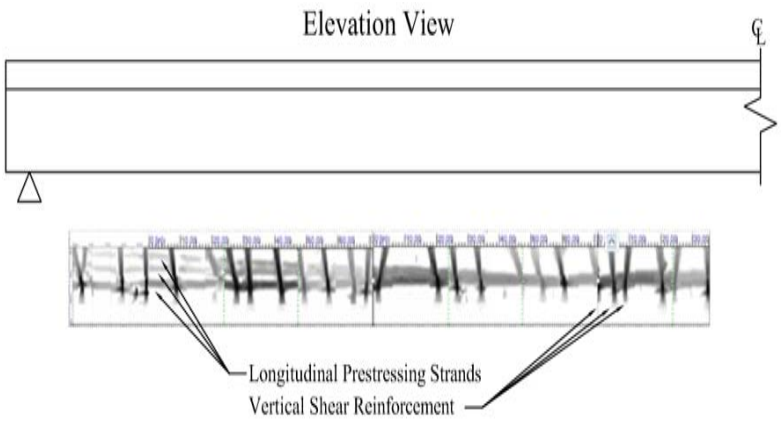
Bridge Load Rating

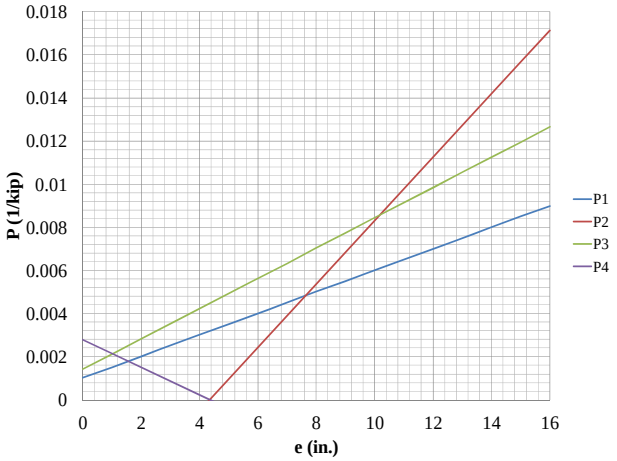
- undergraduate seniors and MS students
- two-member teams under PE supervision
- load rating of approximately 50 bridges per year
- evaluation of bridges without plans using advanced techniques developed through research supported by NMDOT



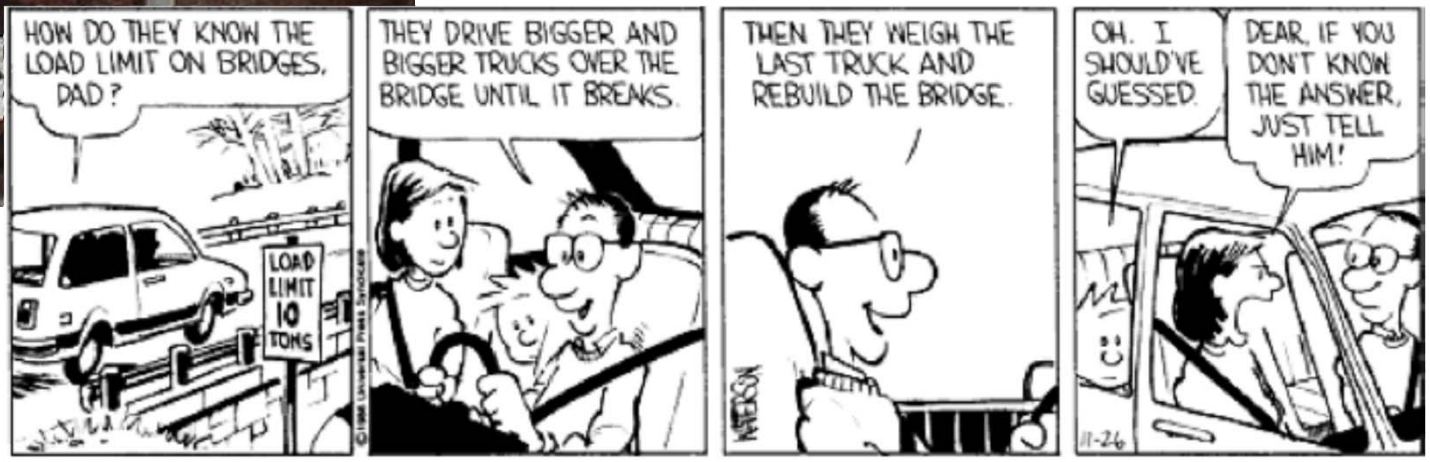
Load Rating of Prestressed Concrete Bridges without Plans

- Bridges without design plans
  - Most are older, off-system (city or county owned) bridges
  - This presents a challenge for load rating concrete bridges
- Developed procedure to load rate the bridge
  - Non-destructive evaluations
  - Load testing



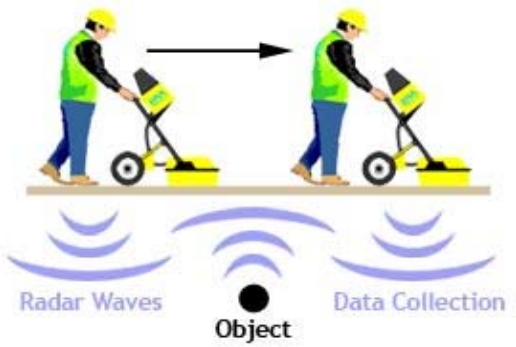


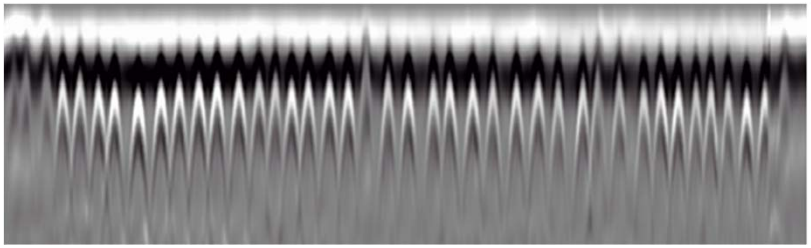

WEIGHT
LIMIT
22T
27T
31T

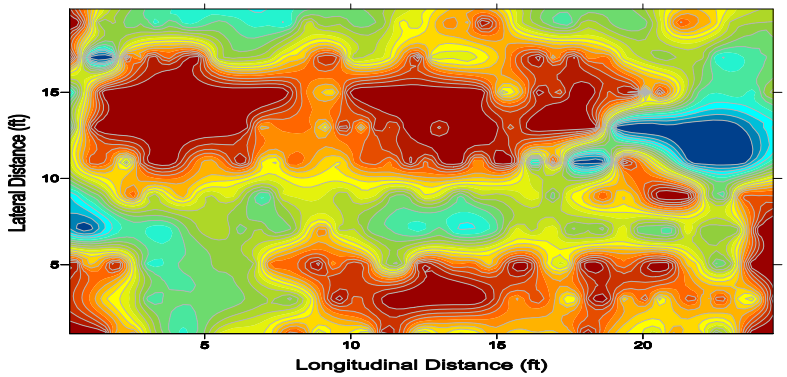

HOW DO THEY KNOW THE LOAD LIMIT ON BRIDGES, DAD?
LOAD LIMIT 10 TONS
THEY DRIVE BIGGER AND BIGGER TRUCKS OVER THE BRIDGE UNTIL IT BREAKS.
THEN THEY WEIGH THE LAST TRUCK AND REBUILD THE BRIDGE.
OH. I SHOULD'VE GUESSED.
DEAR, IF YOU DON'T KNOW THE ANSWER, JUST TELL HIM!
11-26

Ground Penetrating Radar for Concrete Bridge Deck Evaluation

this research seeks to provide *improved* understanding of GPR technology, data acquisition, and training needs for adoption of GPR in bridge deck inspections in New Mexico



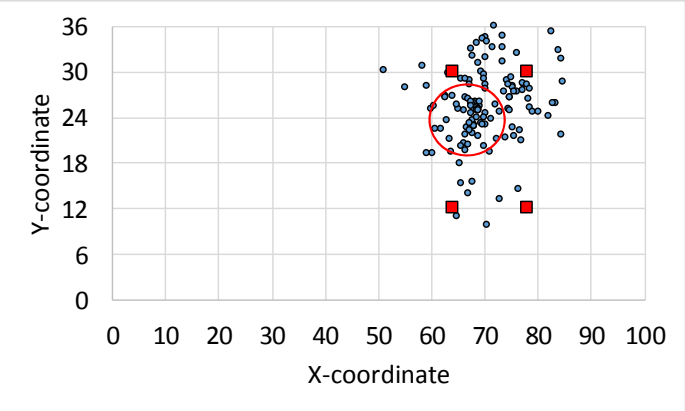


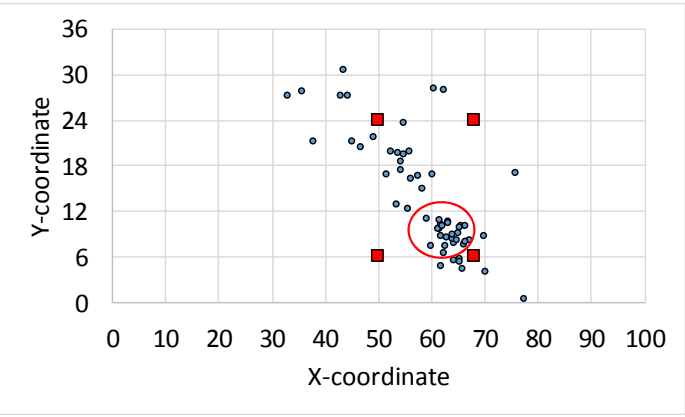


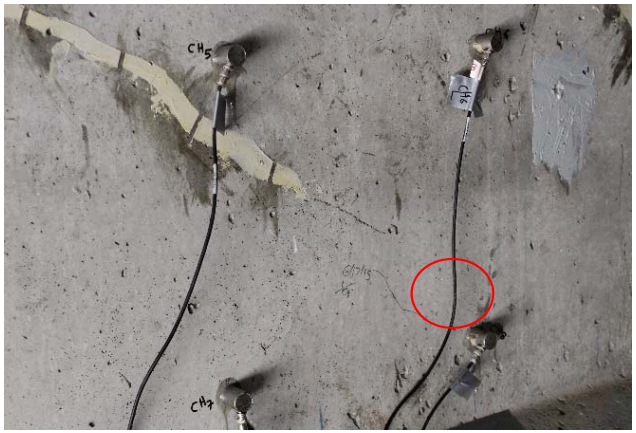
Prestressed Concrete Bridges with Shear Cracks

Acoustic Emissions

Load Testing Results







Structural Health Monitoring

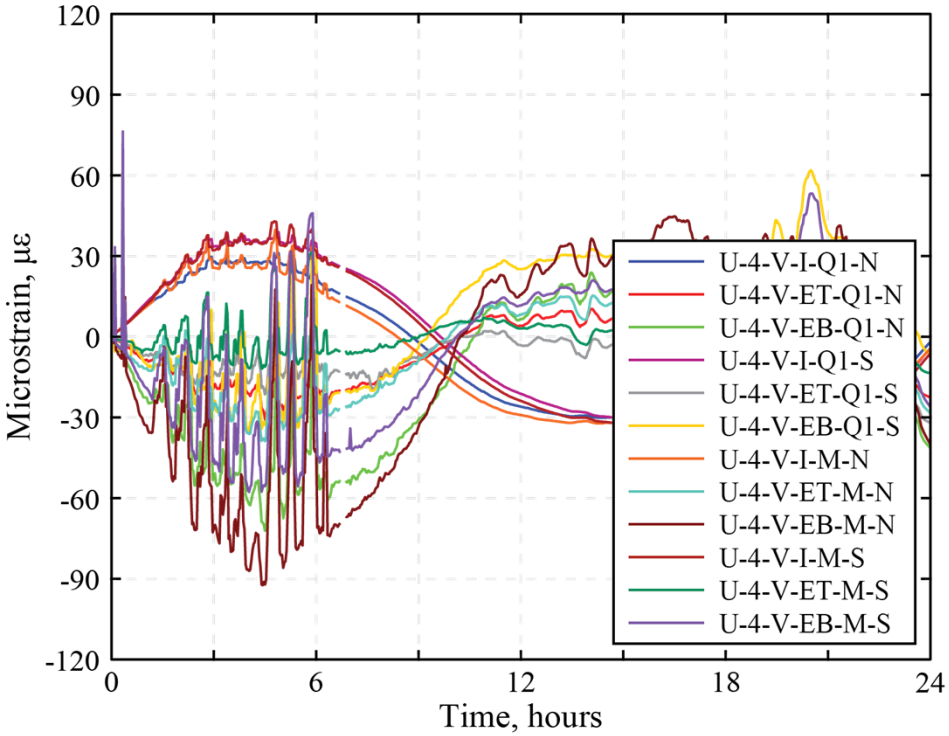

ROCTEST


ROCTEST

Load Testing

Strain – During Load Testing & Initial 24 Hours

U-4



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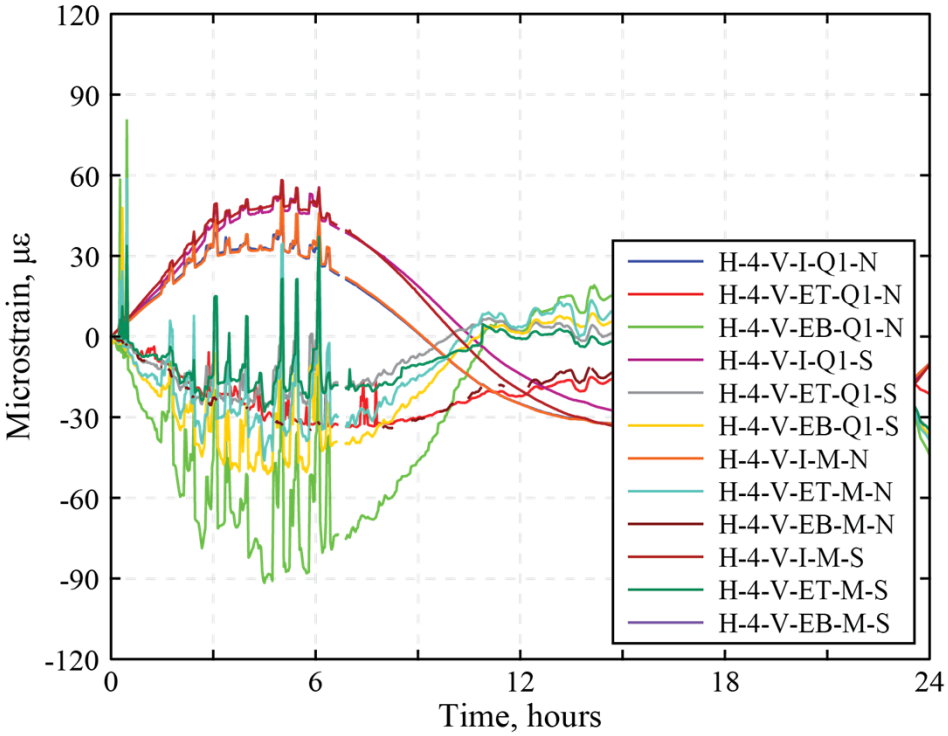


Structural Health Monitoring

- 3- Additional Bridges
  - Sensors installed up to 20 years ago
- Durability of Sensor Systems
- Long Term Monitoring
- Future of Bridge Inspection
- Interpretation of data
- Data plan

Bridge No. 9234

Bridge No. 9266

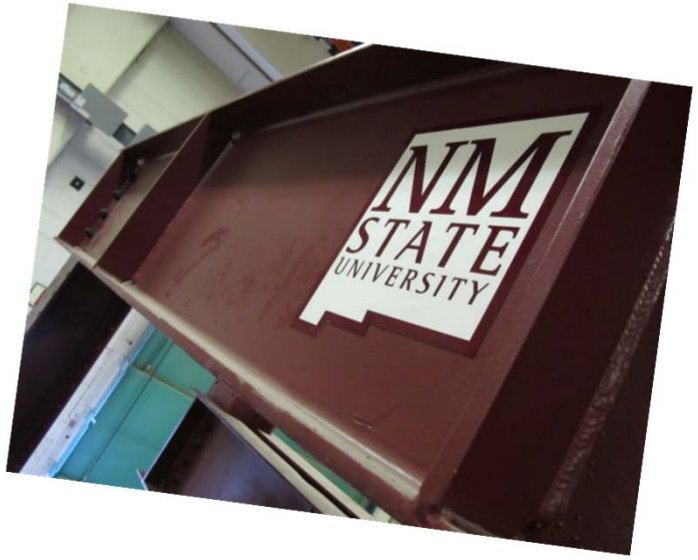
Bridge No. 9336

Outcomes

Outcomes

- conduct inspections and provide bridge reports for the State
- conduct higher level inspections (NDT)
- load rating of bridges
- conduct load testing on bridges without plans
- provide training
- identify key needs for the State’s infrastructure
- implement new technologies
- structural health monitoring

Educational Outcomes



- Interpretation of design plans
- Understanding of inspection and rating procedures
- Appreciation for the importance of quality control
- Preparation of structural calculations
- Collaborating and building a partnership
- Creation of opportunities for decision making
- Has benefited NMSU by providing practical tools and opportunities to the Civil Engineering students
- NMDOT and private consultants have benefited by hiring engineering interns ready to produce

Impact on Students

- Over 100 students have participated in the co-op
- Numerous MS and PhD students
  - Funded by research
- FHWA Eisenhower Fellowships
  - Transportation related research
  - Over $60,000 in fellowships awarded
- Publications and Conference Presentations
  - Best Paper Award – TRB 2016 UHPC
  - Invited to write a book chapter on Load Rating Bridges without Plans
  - Invited for ACI Special Publication
  - TRB Minority Fellowships (write a paper and present at TRB Annual Meeting in Washington, DC)


NEW MEXICO STATE
CIVIL ENGINEERING