

North Twin Bridge Emergency and Permanent Footing Repairs



City of Des Moines



Consulting Engineers



September 22, 2009

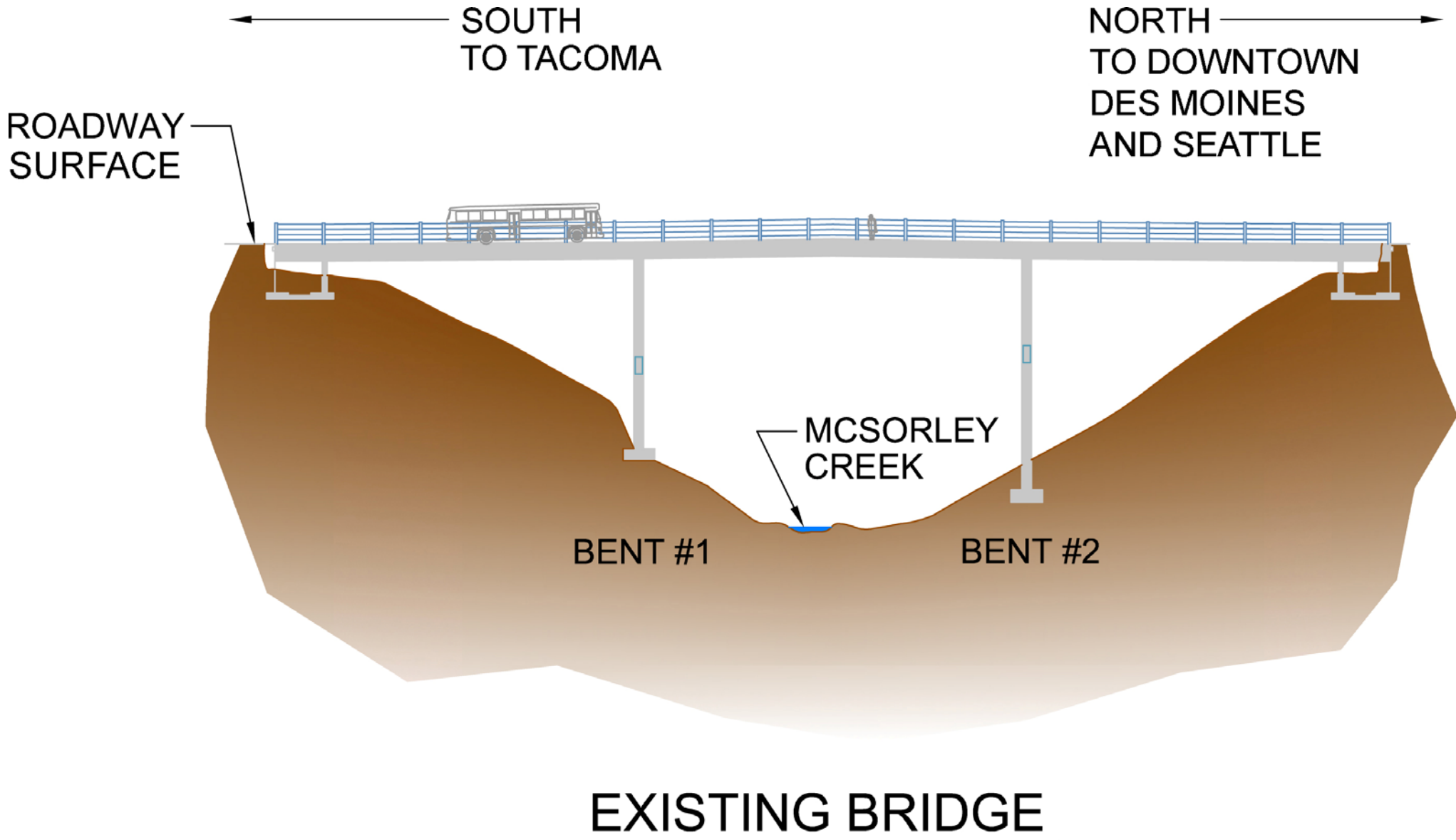
2009 Western Bridge Engineers' Seminar

North Twin Bridge

- Seismic Retrofit – Preliminary Analysis
- Emergency Footing Repair
- Permanent Footing Repair
- Seismic Retrofit and Safety Upgrades - Final Design

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MCSORLEY CREEK

WITHIN THE
GREATER
PUGET SOUND
WATERSHED

The Project Team

- Owner: City of Des Moines
- City's Bridge Inspector: King County DOT
- Structural Engineer and Consultant Lead: KPFF, Seattle
- Geotechnical Engineer: Terracon, Mountlake Terrace
- Contractor: Gary Merlino, Seattle









Consulting Engineers

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project

location

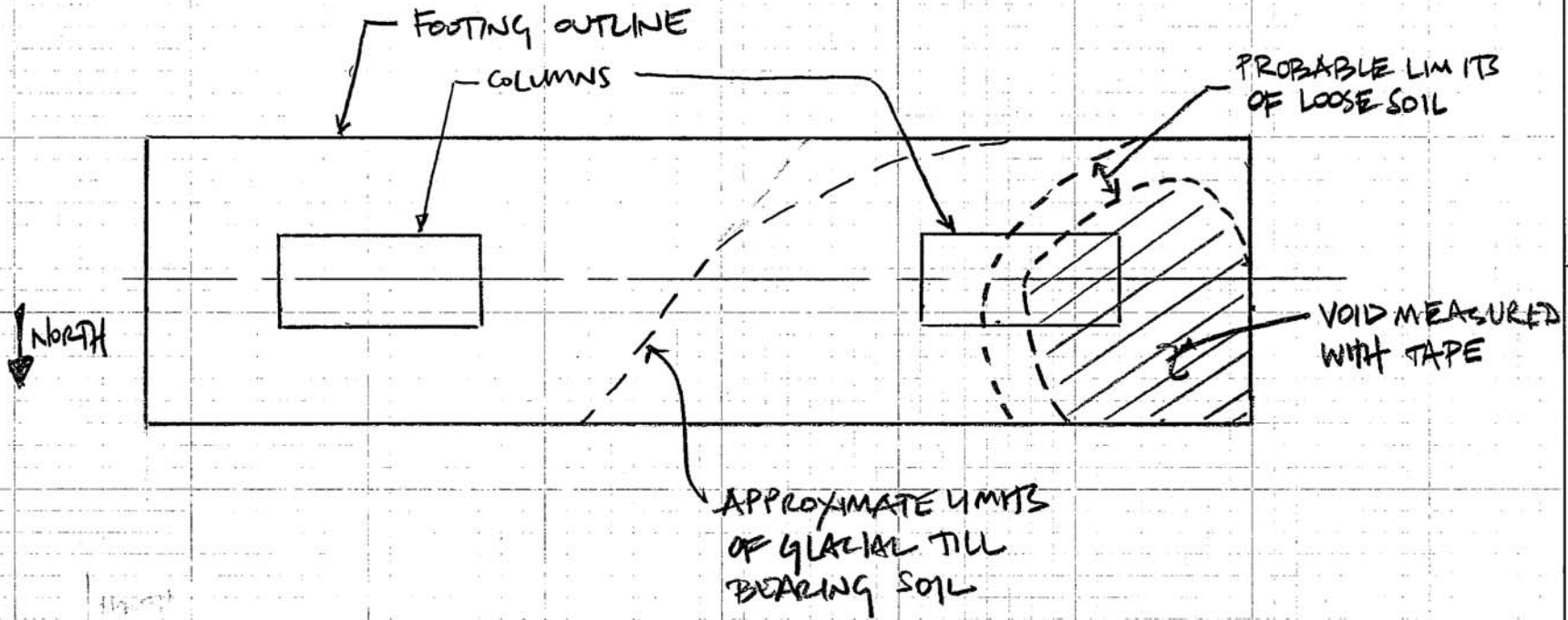
client

by

date

job no.

sheet no.





ROAD
CLOSED

DETOUR

S 250th

STOP

NO TRUCKS
WEIGHT
LIMIT
20
TONS

WATCH
FOR

Emergency Footing Repair



1) Inspection

- 2) Hand borings completed near footing
- 3) Analyzed the structure as-is (no support under approx. 1/3 of footing)

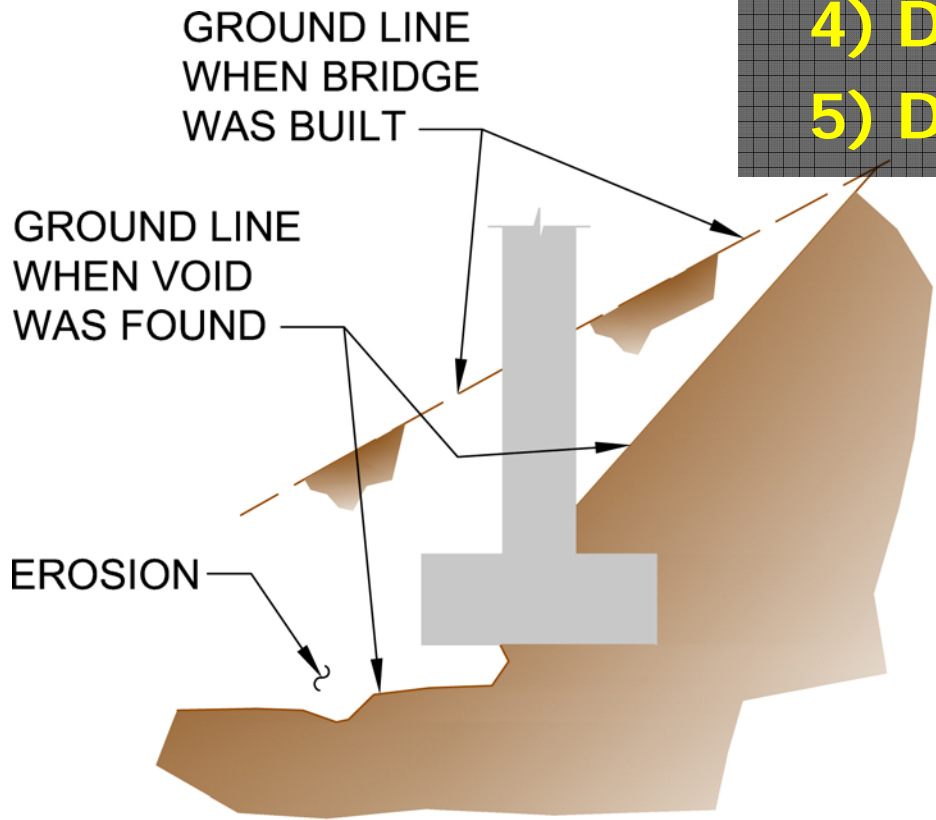


What caused the void?

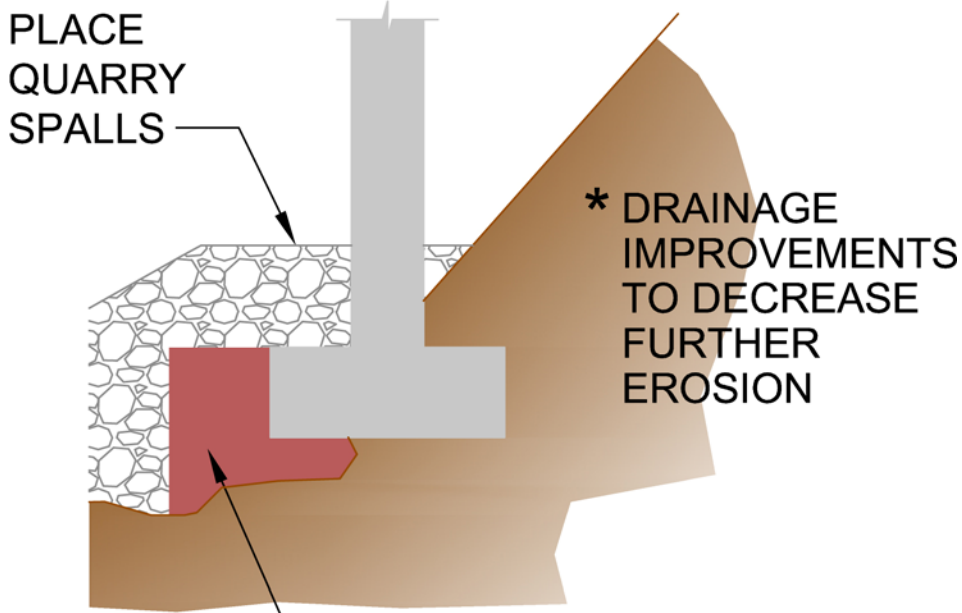
Design/Construction Issues

- Protect the bridge from structural damage
- Access, access, access...
- Time (or lack thereof)

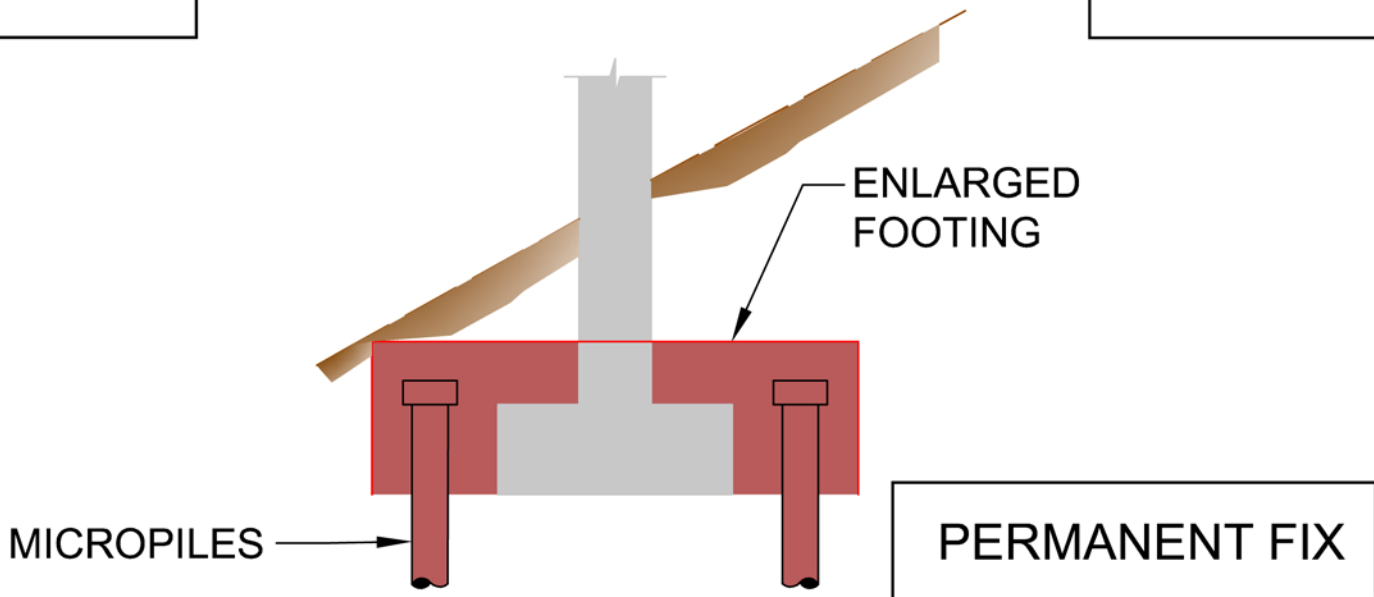
4) Design temporary fix
5) Develop permanent fix concept



BEFORE



TEMPORARY FIX



PERMANENT FIX



6) Construction

















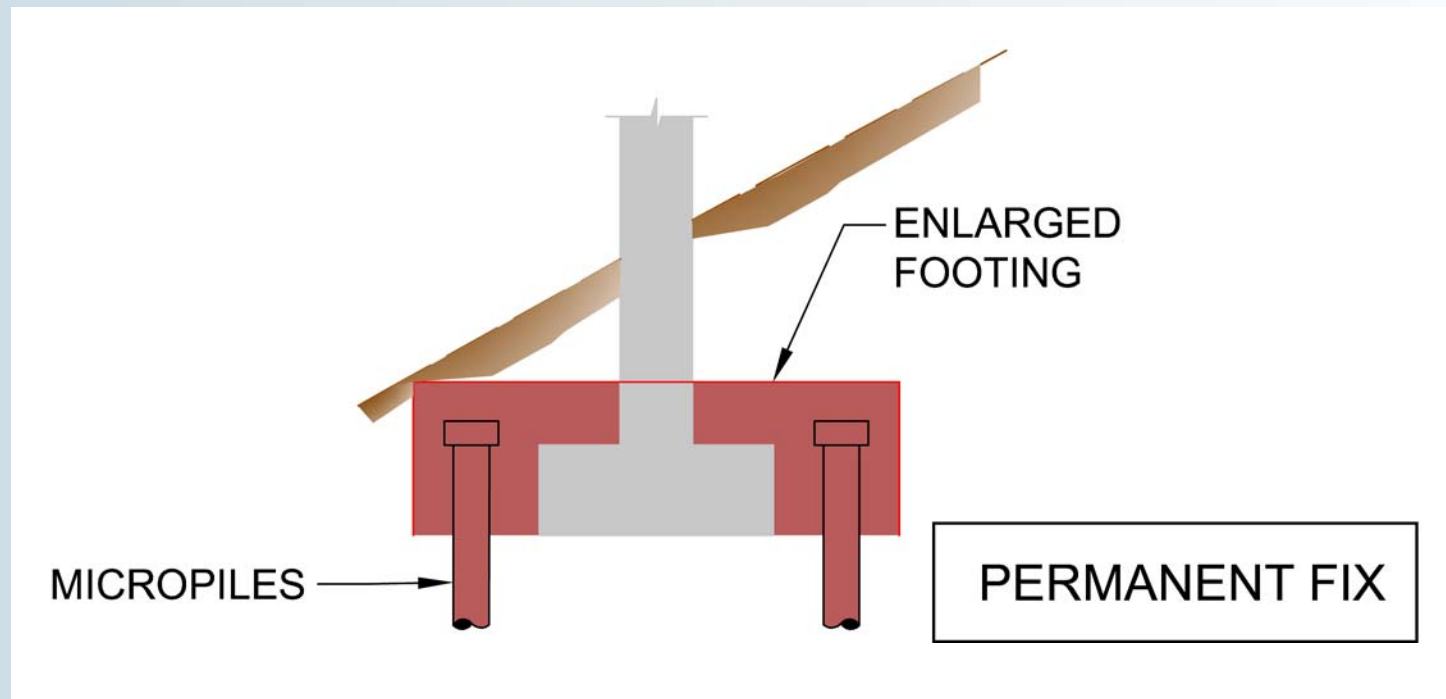
Divert Bridge Drains

- 7) Provided an interim “load rating” for the footing until a permanent repair can be completed
- 8) Assisted the City in obtaining funding to cover permanent repairs

Conclusions – Temporary Fix

- Void caused by erosion
- Soil support is not what was assumed for design – need a permanent repair
- Temporary support provided to reduce chance of structural damage
- Reduced vehicle loads (Posting = 20 tons to 10 tons)

Permanent Repair of Footing



Permanent Repair of Footing

- Structural engineering
- Geotechnical engineering
- Drainage repairs for bridge runoff
- Construction access to footing
- Environmental permitting

Objectives of Permanent Repairs:

- Restore footing capacity to carry HS-20 traffic
- Restore Emergency and Metro bus access

Design Obstacles

- Access, access, access
 - No way to get conventional drilling equipment to footing
 - Micropiles
- Footing repairs done concurrently with seismic retrofit
 - Micropiles have low lateral capacity

Schedule

- Funding Available - Spring 2009
- Design and Permitting Preparation
- Spring/Summer 2009
- Construction - Winter 2009 to Spring 2010

QUESTIONS?

