



DAVID EVANS
AND ASSOCIATES INC.

Local Agency Bridge Preservation through Posting Avoidance

Matt Harlan, PE

Project Manager

David Evans and Associates, Inc.

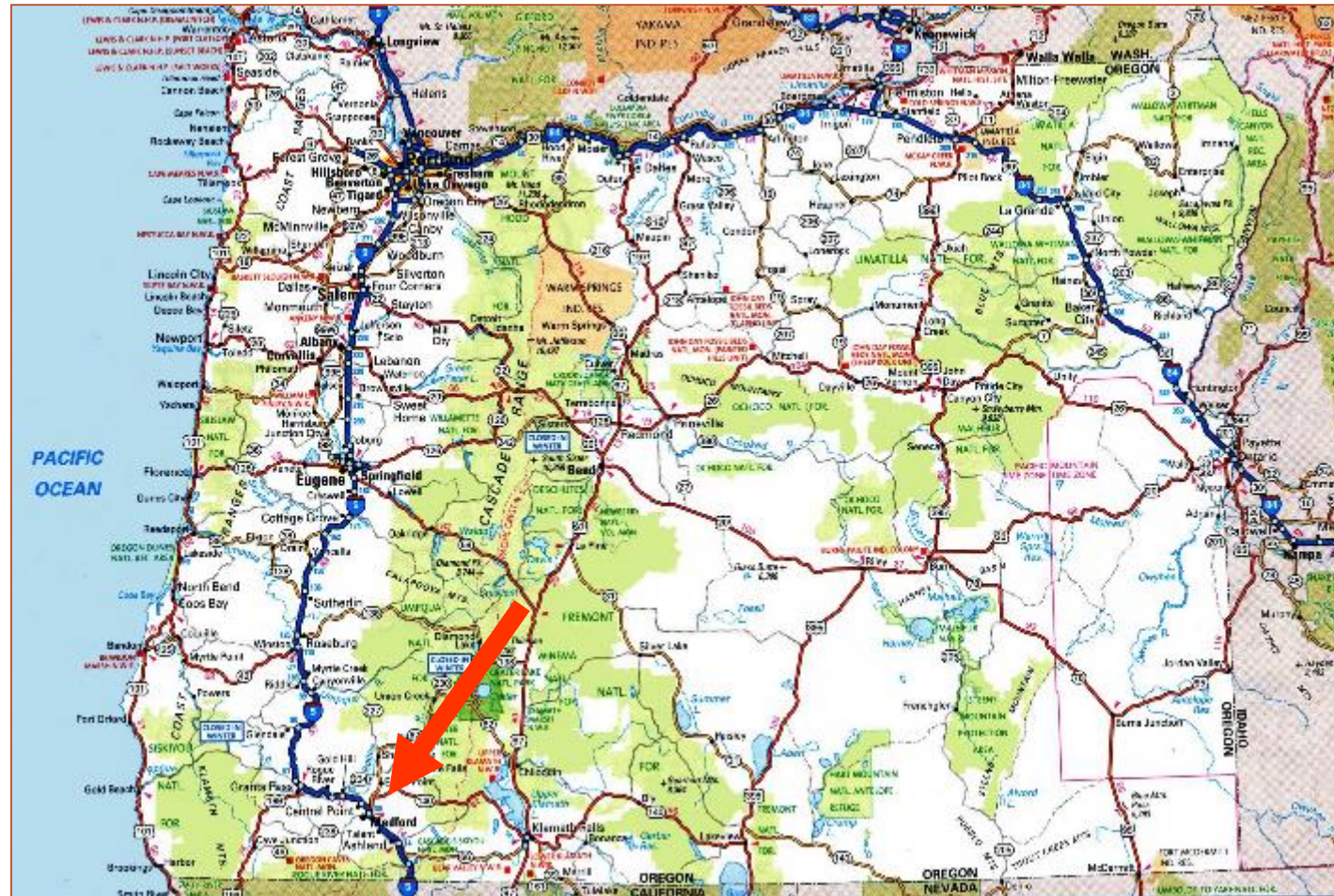
Portland, OR

Inspection, Testing, and Strengthening of an Aging Concrete Bridge in Jackson County, Oregon

- Bridge Background
- Problem Definition
- Testing and Load Rating
- FRP Strengthening
- Lessons Learned

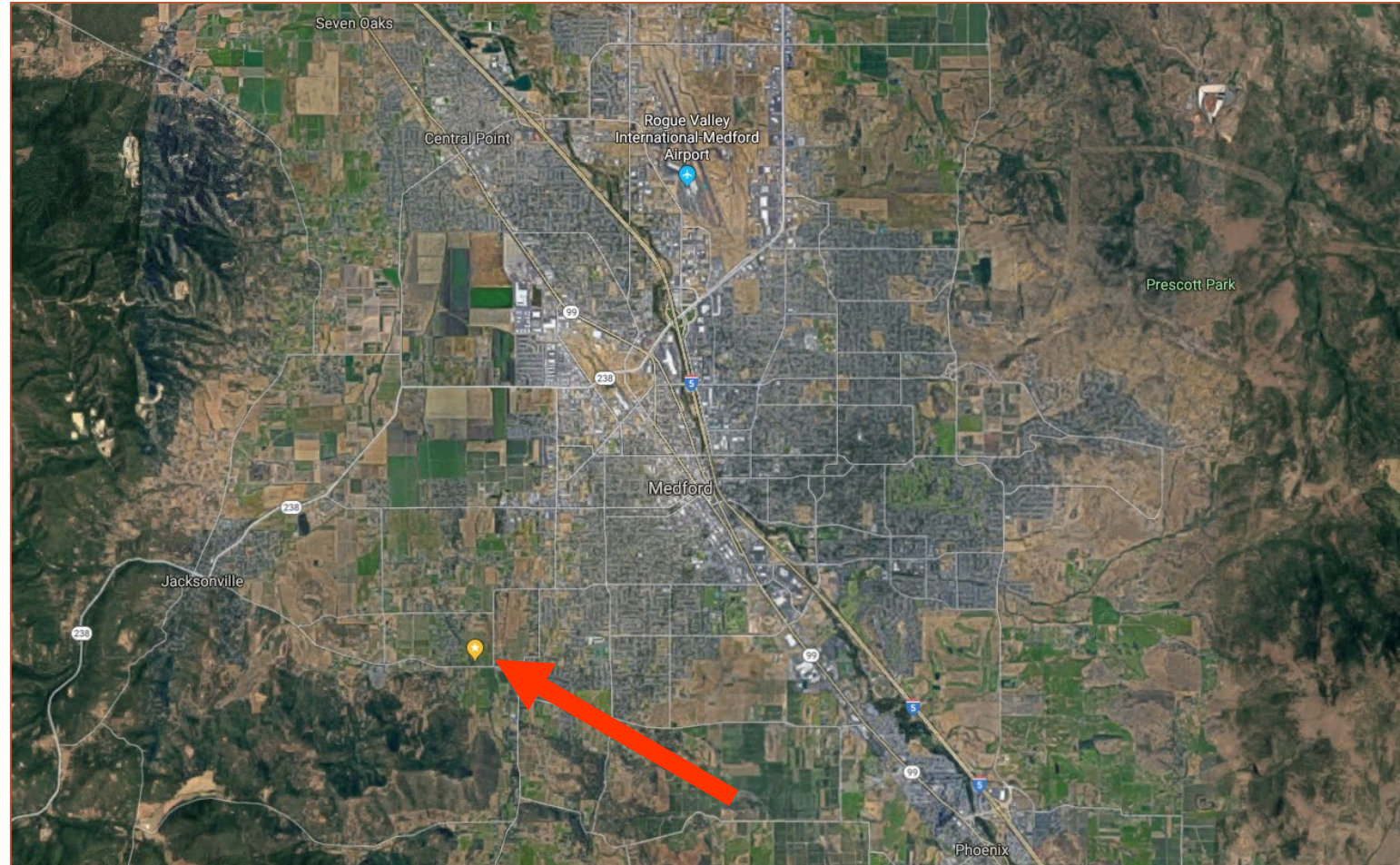
Bridge Background

- South Stage Road over Griffin Creek
- ODOT Bridge #29C133
- Jackson County
- County Bridge #612



Bridge Background

- ADT = 3770
- ADTT = 377



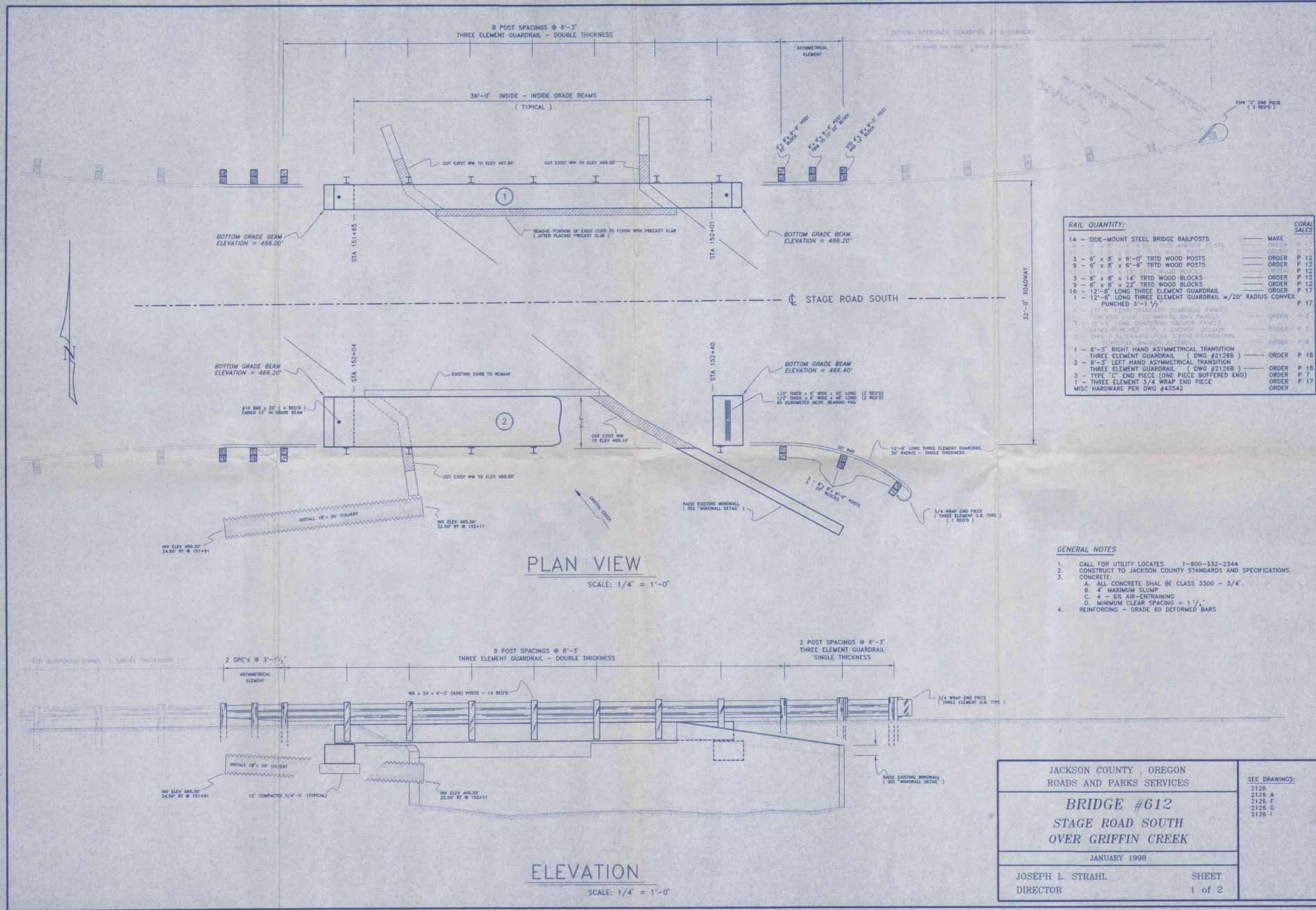
Bridge Background



Bridge Background



B



RAIL QUANTITY:

| RAIL QUANTITY: | MAKE | CORAL SALES |
|---|------------|-------------|
| 14 - SIDE-MOUNT STEEL BRIDGE RAILPOSTS | ORDER P-11 | |
| 1 - 6" x 8" x 6'-0" TRTD WOOD POSTS | ORDER P-12 | |
| 9 - 6" x 8" x 6'-6" TRTD WOOD POSTS | ORDER P-12 | |
| 3 - 6" x 8" x 14" TRTD WOOD BLOCKS | ORDER P-12 | |
| 9 - 6" x 8" x 22" TRTD WOOD BLOCKS | ORDER P-12 | |
| 16 - 12'-6" LONG THREE ELEMENT GUARDRAIL w/20" RADIUS CONVEX PUNCHED 3'-1 1/2" | ORDER P-17 | |
| 1 - 12'-6" LONG THREE ELEMENT GUARDRAIL w/20" RADIUS CONVEX PUNCHED 3'-1 1/2" | ORDER P-17 | |
| 15 - ONE STANDARD GUARDRAIL PANELS (PUNCHED END) (STANDARD END PANELS) | ORDER P-2 | |
| 1 - 12'-6" LONG GUARDRAIL ANCHOR PANELS | ORDER P-2 | |
| 3 - TYPE 1 ALTERNATE TUBE SLEEVE FOUNDATION | ORDER P-6 | |
| 1 - 6'-3" RIGHT HAND ASYMMETRICAL TRANSITION THREE ELEMENT GUARDRAIL (DWG #2126B) | ORDER P-18 | |
| 2 - 6'-5" LEFT HAND ASYMMETRICAL TRANSITION THREE ELEMENT GUARDRAIL (DWG #2126B) | ORDER P-18 | |
| 3 - TYPE 'C' END PIECE (ONE PIECE BUFFERED END) | ORDER P-7 | |
| 1 - THREE ELEMENT 3/4 WRAP END PIECE | ORDER P-17 | |
| MISC HARDWARE PER DWG #43542 | ORDER | |

- GENERAL NOTES**
- CALL FOR UTILITY LOCATES 1-800-332-2344
 - CONSTRUCT TO JACKSON COUNTY STANDARDS AND SPECIFICATIONS.
 - CONCRETE:
 - A. ALL CONCRETE SHALL BE CLASS 3300 - 3/4".
 - B. 4" MAXIMUM SLUMP.
 - C. 4 - 8% AIR-ENTRAINING
 - D. MINIMUM CLEAR SPACING = 1 1/2".
 - REINFORCING - GRADE 60 DEFORMED BARS

PLAN VIEW
SCALE: 1/4" = 1'-0"

ELEVATION
SCALE: 1/4" = 1'-0"

| | | |
|--|-----------------|---|
| JACKSON COUNTY, OREGON ROADS AND PARKS SERVICES | | SEE DRAWINGS: 2126 2126 A 2126 F 2126 G 2126 I |
| BRIDGE #612 STAGE ROAD SOUTH OVER GRIFFIN CREEK | | |
| JANUARY 1998 | | |
| JOSEPH L. STRAHL DIRECTOR | SHEET 1 of 2 | |



Bridge Background

- 2017 Routine Bridge Inspection Report
 - Deck: 7 - Good
 - Superstructure: 6 - Satisfactory
 - Isolated delamination and a spall with exposed rebar
 - Substructure: 5 - Fair
 - 1/16" wide vertical crack and moderate scour

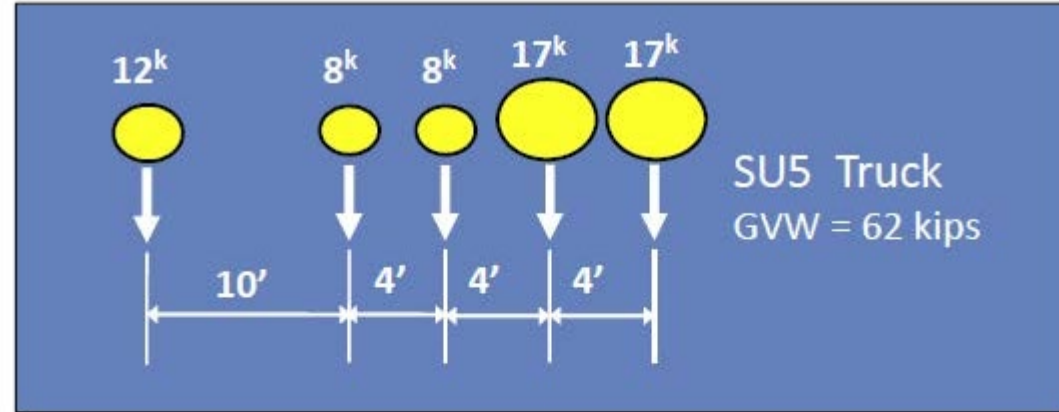


Problem Definition

- June 2017 – Posting Letter from ODOT
- “No Plans” Rating
 - ODOT LRFR Manual – Section 15
 - Rating Factors assigned...
 - Service history
 - Span configuration
 - Member condition

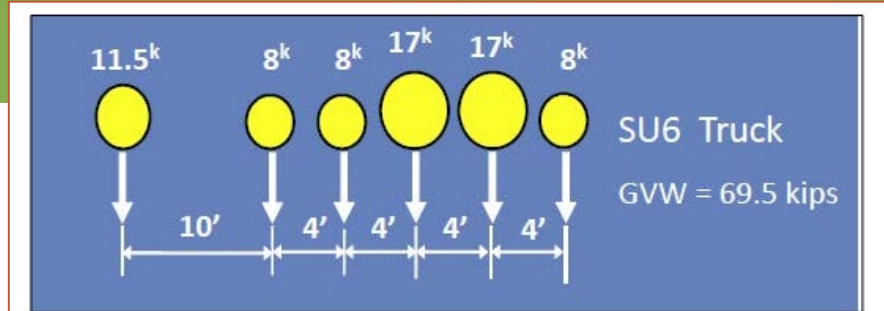
Problem Definition

- SU5 (31 ton) – 28 tons



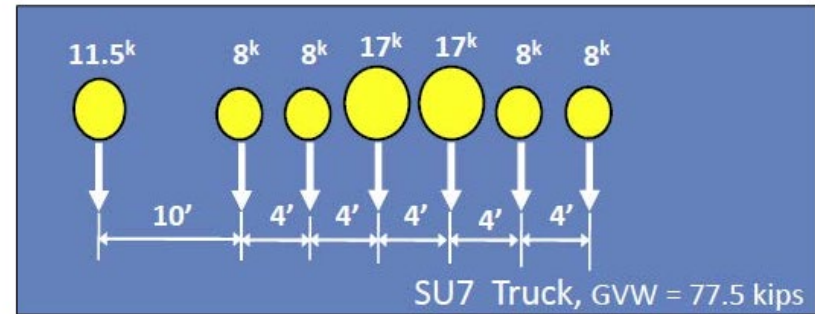
Problem Definition

- SU6 (34.75 ton) – 29 tons



Problem Definition

- SU7 (38.75 ton) – 31 tons



Testing and Load Rating



Testing and Load Rating



Testing and Load Rating



Testing and Load Rating

- Revised Load Rating = Bad News
 - Concrete Strength = very low
 - Main Longitudinal Steel = not enough
- Shear = OK
- Required Additional Posting

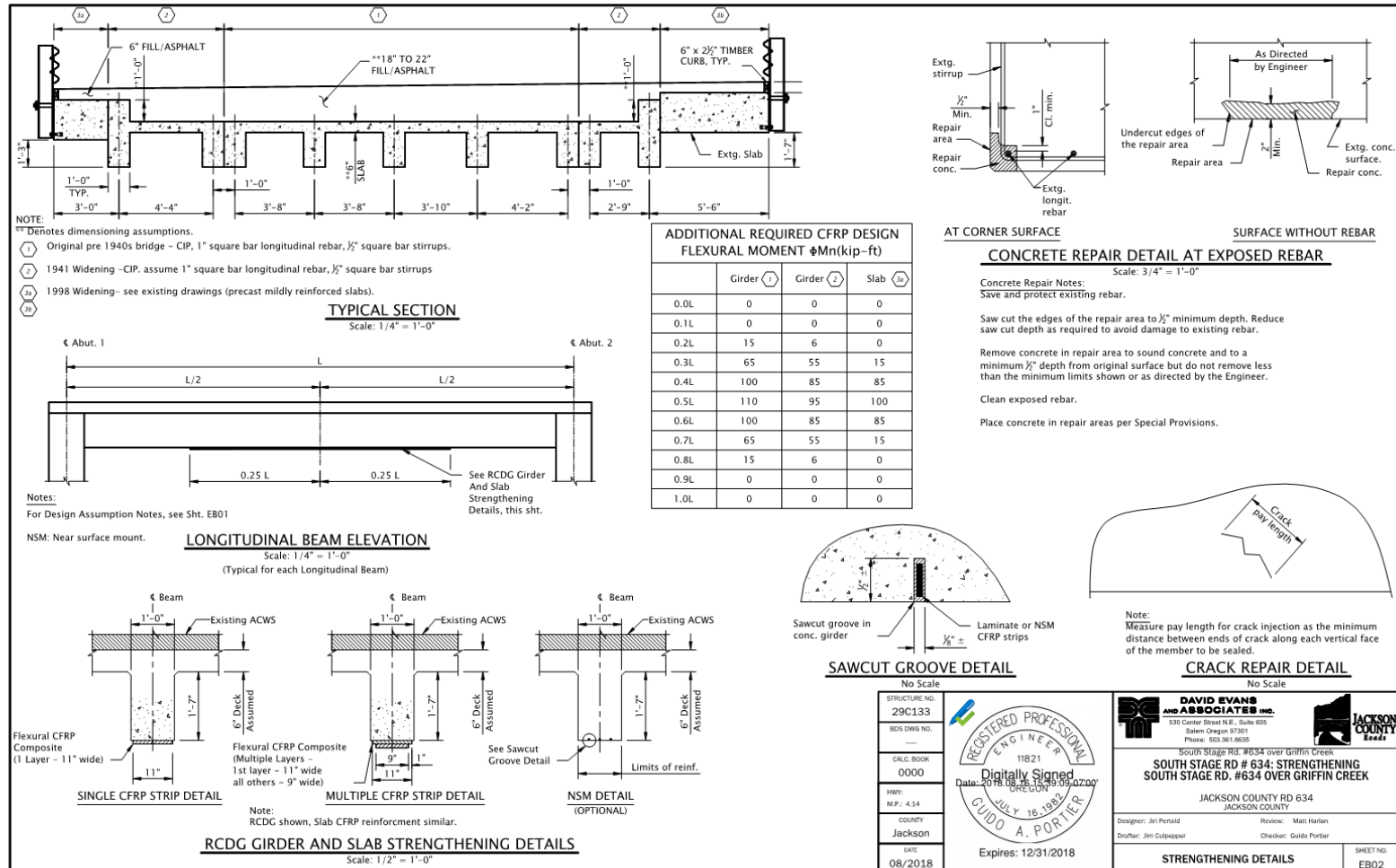
FRP Strengthening

- Next Step
 - Refined Analysis?
 - Load Testing?
 - Reduce Dead Load?
 - Strengthening



FRP Strengthening

- Engineer's Estimate
 - \$50,880
- Contractor's Bid
 - \$36,510
- Contech Services, Inc.
- Tyfo FRP system by Fyfe



| | | | |
|--|--|---|--|
| STRUCTURE NO. 29C133 BOS DWG NO. — CALC BOOK 0000 HWY. M.P.: 4.14 COUNTY Jackson DATE 08/2018 | | DAVID EVANS AND ASSOCIATES INC. 530 Center Street N.E., Suite 905 Salem, Oregon 97301 Phone: 503.361.8635 South Stage RD, #634 over Griffin Creek SOUTH STAGE RD # 634 - STRENGTHENING SOUTH STAGE RD, #634 OVER GRIFFIN CREEK JACKSON COUNTY RD 634 JACKSON COUNTY Designer: Jim Culpepper Reviewer: Matt Horton Drafter: Jim Culpepper Checker: Guido Portier DATE 08/2018 Expires: 12/31/2018 | SHEET NO. EB02 STRENGTHENING DETAILS |
|--|--|---|--|

FRP Strengthening



FRP Strengthening



FRP Strengthening



FRP Strengthening



FRP Strengthening



FRP Strengthening



FRP Strengthening



FRP Strengthening



Lessons Learned

- I received a posting letter...IT'S TIME TO FREAK OUT!!!
- Non-destructive testing can tell us a lot, but sometimes the numbers just don't work out.
- There are many options when faced with a posting decision.
- Legal truck loads continue to get heavier and heavier...older bridges are the ones suffering most!

Acknowledgements

Jackson County

- Mike Kuntz, PE County Engineer
- James Philp, PE Project Engineer
- Chuck DeJanvier, PE Project Engineer

Testing: **Intertek PSI**

Contractor: **Contech Services**

FRP Supplier: **Fyfe (Tyfo FRP)**

David Evans and Associates, Inc.

- Guido Portier, PE Engineer of Record
- Matt Harlan, PE Project Manager
- Makenzie Ellett, EI Load Rater
- Jiri Pertold, PE, SE Designer

Questions?

