Engineers: When to Call and How to Communicate

Travis Kinney

Overview

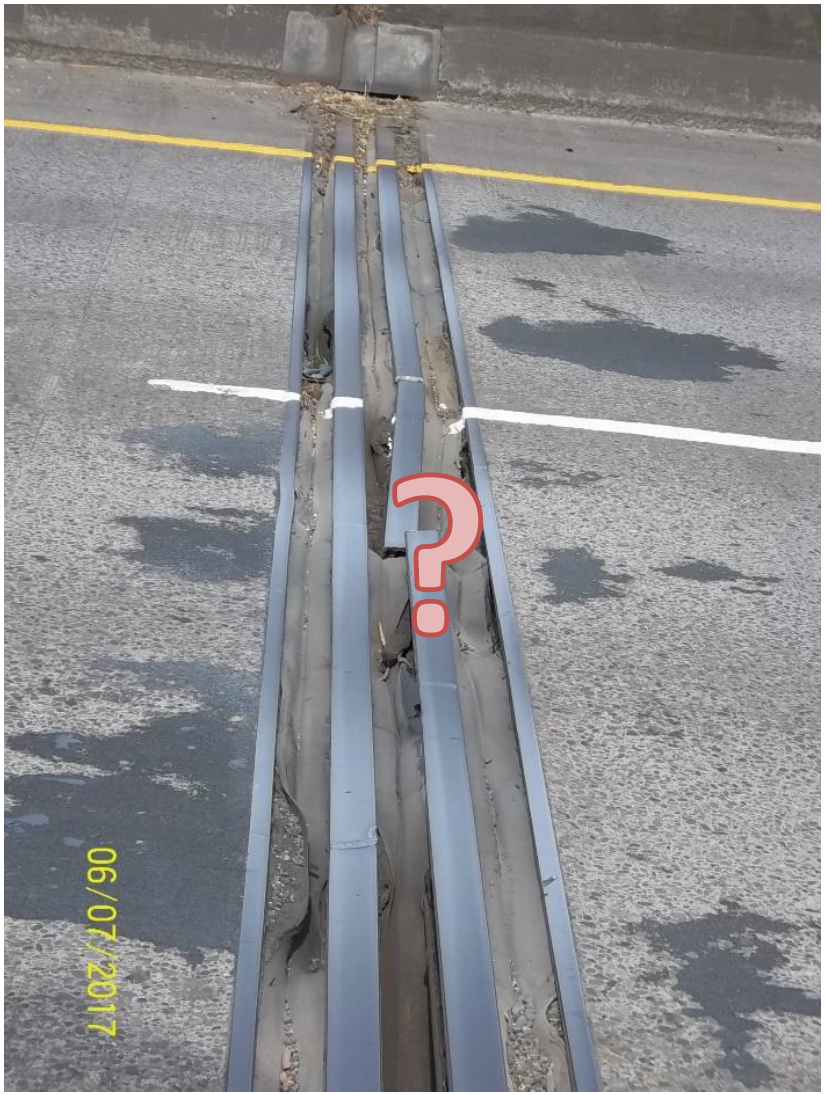
- When do you need an Engineer?
- Where do Engineers come from?
- What does running the numbers really mean?
- What's the bridge crew's role in the Engineering process?

Bridge Hit?

Large Deck Patch?

Temporary Shoring?

Joint Failure?



Pin and Hanger Damage?

Scour

Deck Replacement?

Overlay Damage?

Crushing Cap?

Hole in Deck?

Bearing Failure?

ODOT Policy

- In 2013 a ODOT issued a Statewide Operational Notice that provided guidance on when Engineered plans are required.
- Issued to comply with ORS 672
  - Temporary Shoring is Required
  - Change in load path (Jump stringers)
  - Change in material or size of member.

Where Do Engineers Come From?

- Lots and lots of school:

211	STATICS
LDT	GENERAL CRE
254	VECTOR CALC
213	*GENERAL PH CALCULUS
201	ENGINEERINC DESIGN
212	DYNAMICS
LDT	GENERAL CRE
256	APPL DIFF EQ
LDT	*MA: PROBAE

More School

311 FLUID MECHANICS I

321 CIVIL ENGINEERING MATERIALS

361 SURVEYING THEORY

381 STRUCTURAL THEORY I

313 HYDRAULIC ENGINEERING

372 GEOTECHNICAL ENGINEERING I

382 STRUCTURAL THEORY II

392 INTRO TO HIGHWAY ENGINEERING

What's Missing???

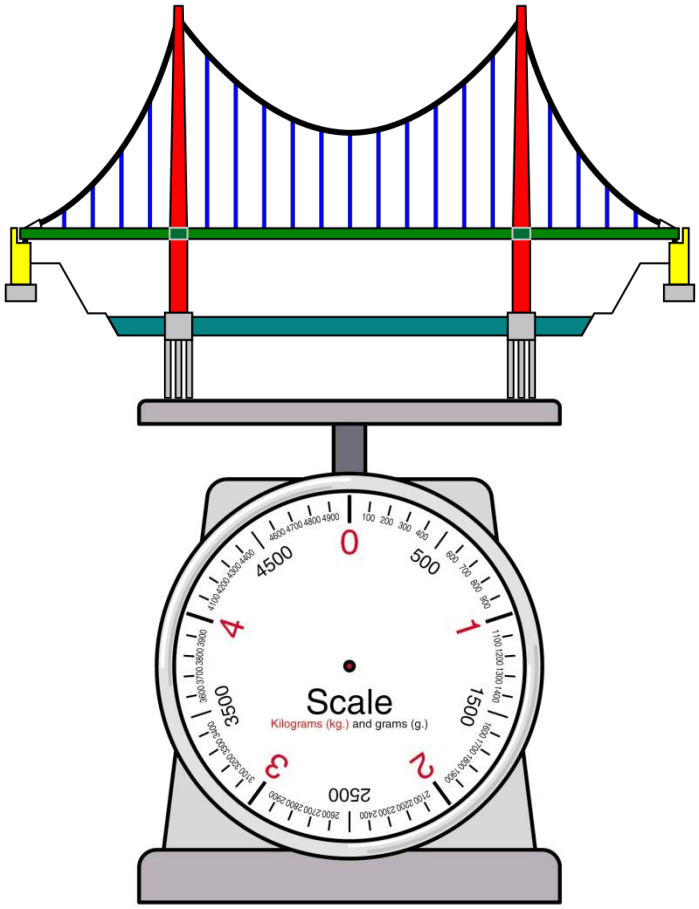
Maintenance Engineering is Unique

So what do engineers do?

- A typical shoring or maintenance structural repair consists of:
  - Estimating the weight of the bridge, including the weight of railing, and wearing surfaces. (Dead Loads)
  - Estimate the weight traffic and construction loads. (Live Loads)
  - Estimate how much weight the members can hold. (Capacity)

Dead Loads

- Can be determined pretty close.
- Estimates are used to shorten work.
- When all the weights are added up. Increase the weight by 25% to make sure the results are conservative.



Live Loads

Single Trip Permits

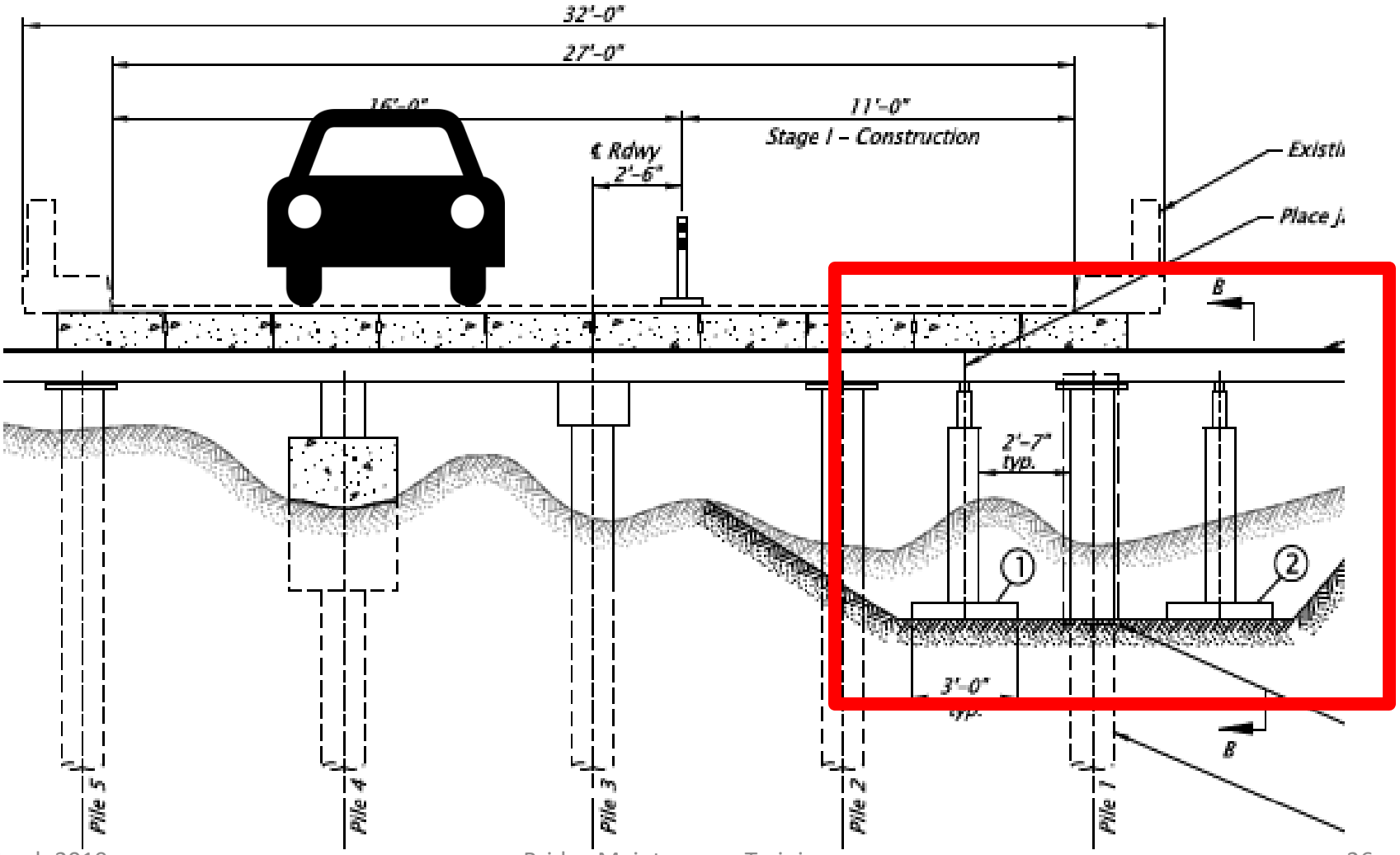
Short Haul Vehicles (SHV's)

Construction Equipment

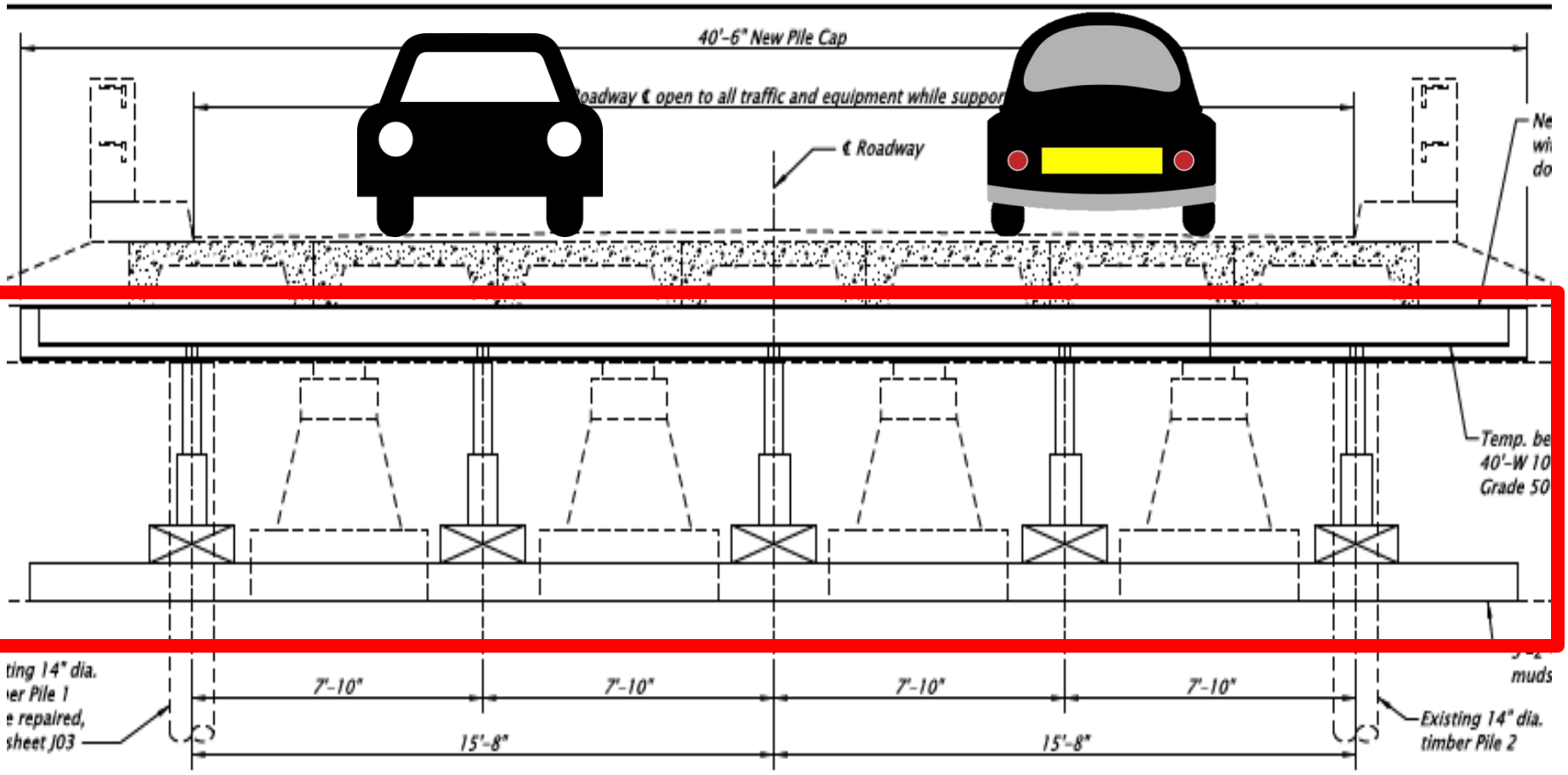
Live Loads

- A lot more variability than DLs so we use a bigger load factor (35% increase).
- Trucks are moving across the bridge causing impact loads (another 25% increase).
- LL's are the biggest impact on the shoring and repair design. (2-3 times heavier than the bridge weight)

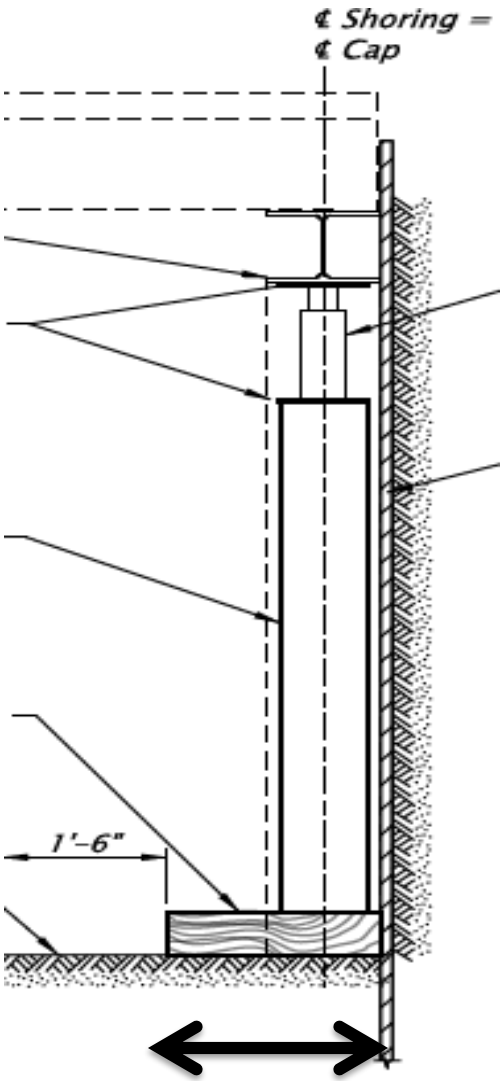
Shoring w/ Traffic Control



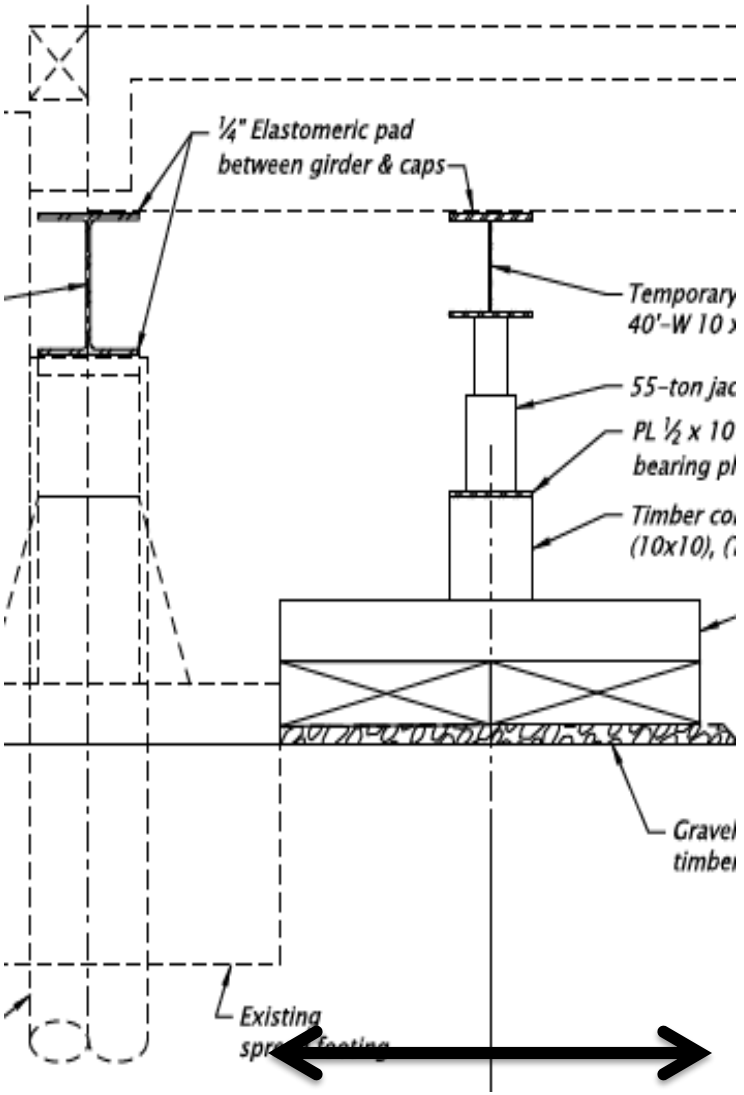
Shoring w/o Traffic Control



w/o Traffic



with Traffic



How Can the Crew Help?

- Provide LOTs of feedback and guidance to the bridge engineer.
- How would you tackle the problem?
- Can traffic be restricted?
- Review the draft plans and provide HONEST feedback.

What's ODOT doing?

- Developing Standardized Repair Details
- Documenting Engineering Calculations to Support Repair Designs
- Developing Bridge Maintenance Design Manual.

Thank You!

Contact Info

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