# Engineers: When to Call and How to Communicate

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# Typical Communication Between Engineer and Road/Bridge Crew

- Those #$%@#$ Engineers

- Those #$%@$ Road/Bridge Crew

# 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?

# Pile Failure?

# Deck Failure?

Yes & No!

# Where Do Engineers Come From?

- Lots and lots of school:

| | |
|---|---|
| 211 | STATICS |
| LDT | GENERAL CRE |
| 254 | VECTOR CALC |
| 213 | *GENERAL PH CALCULUS |
| 201 | ENGINEERIN( 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???

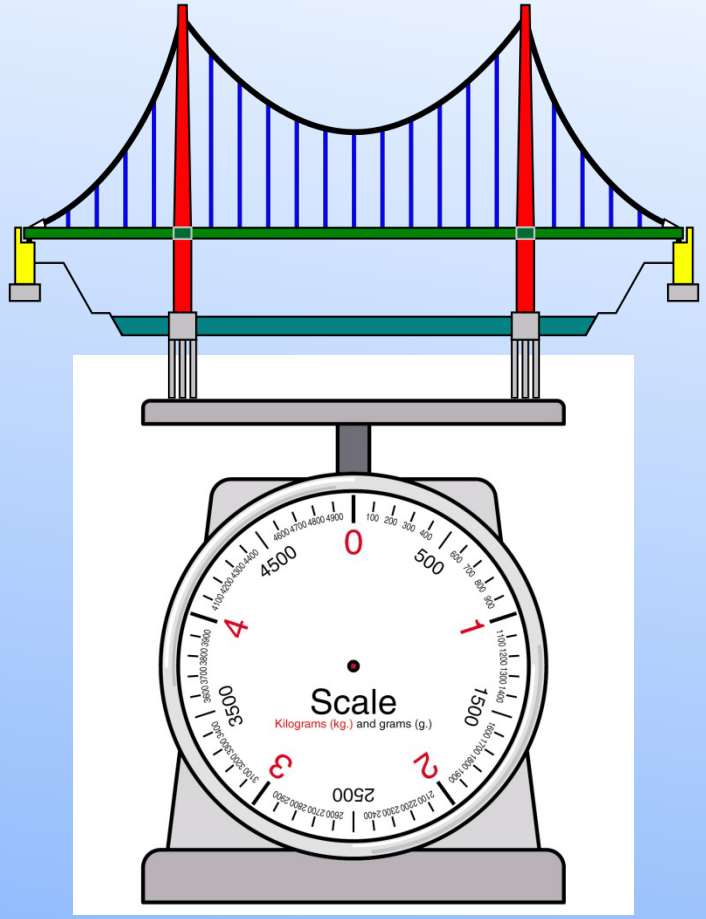
# Maintenance Engineering is Unique

# 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

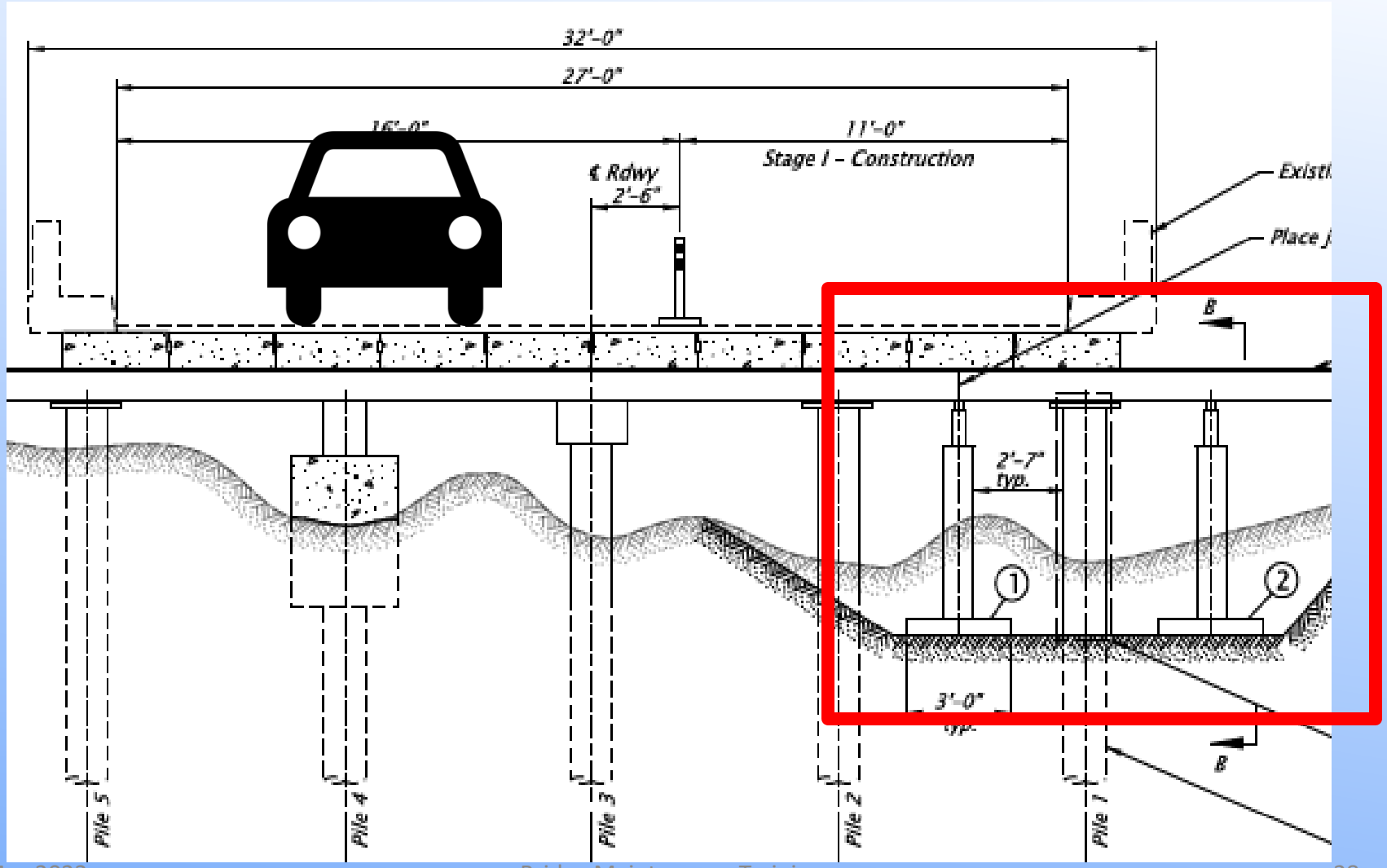
# Short Haul Vehicles (SHV's)

# Construction Equipment

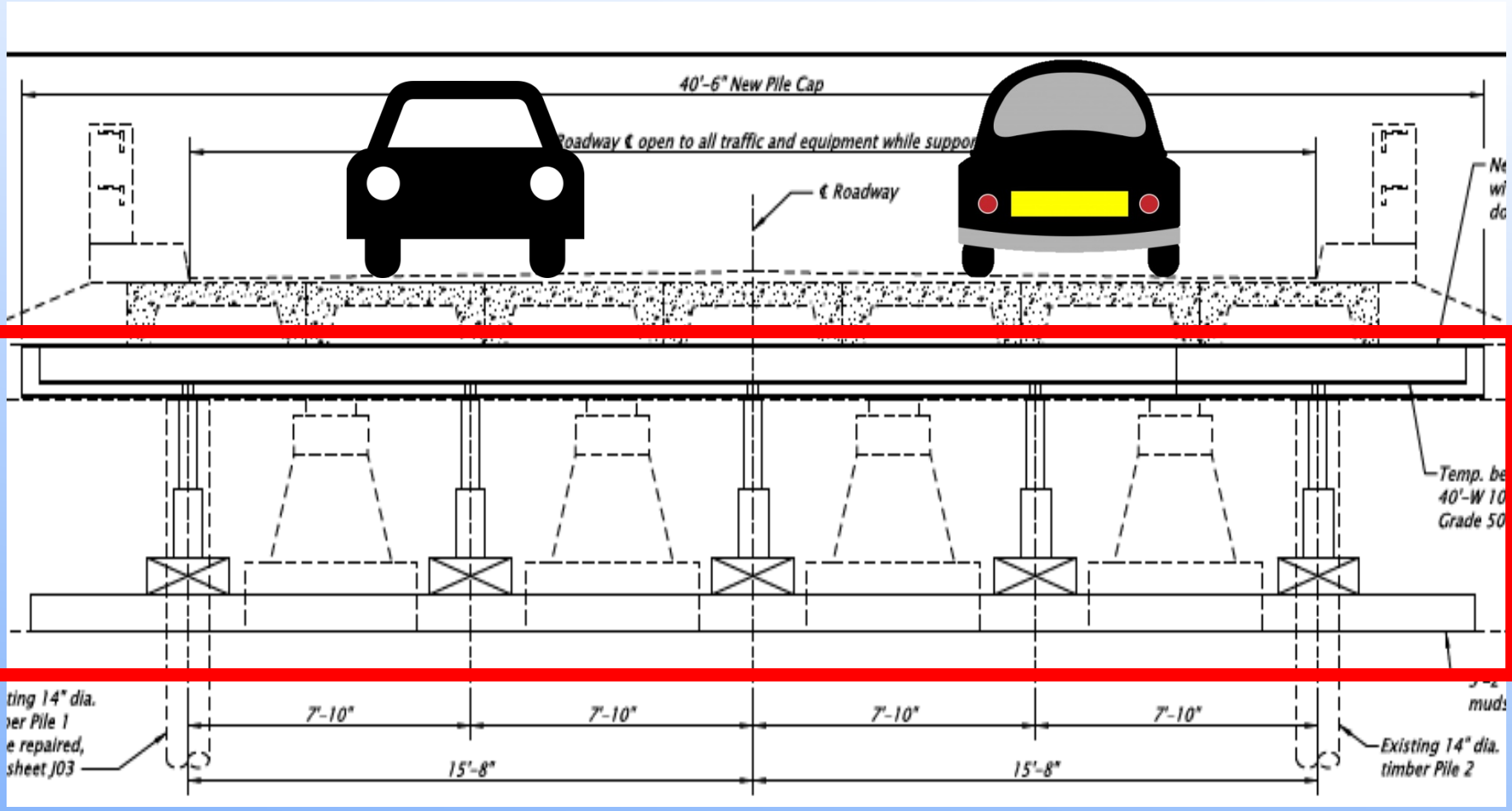
# Live Loads

- 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)

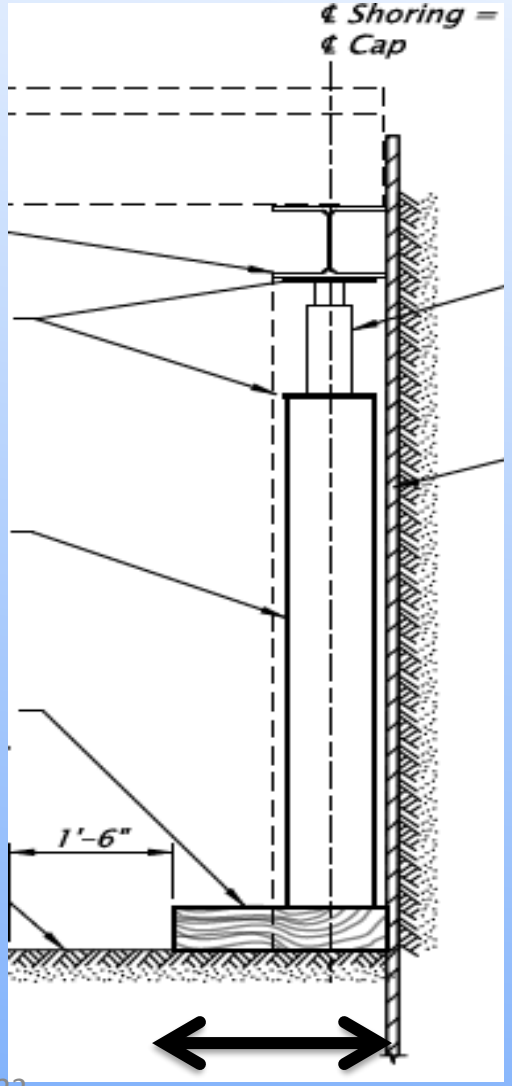
# Shoring w/ Traffic Control



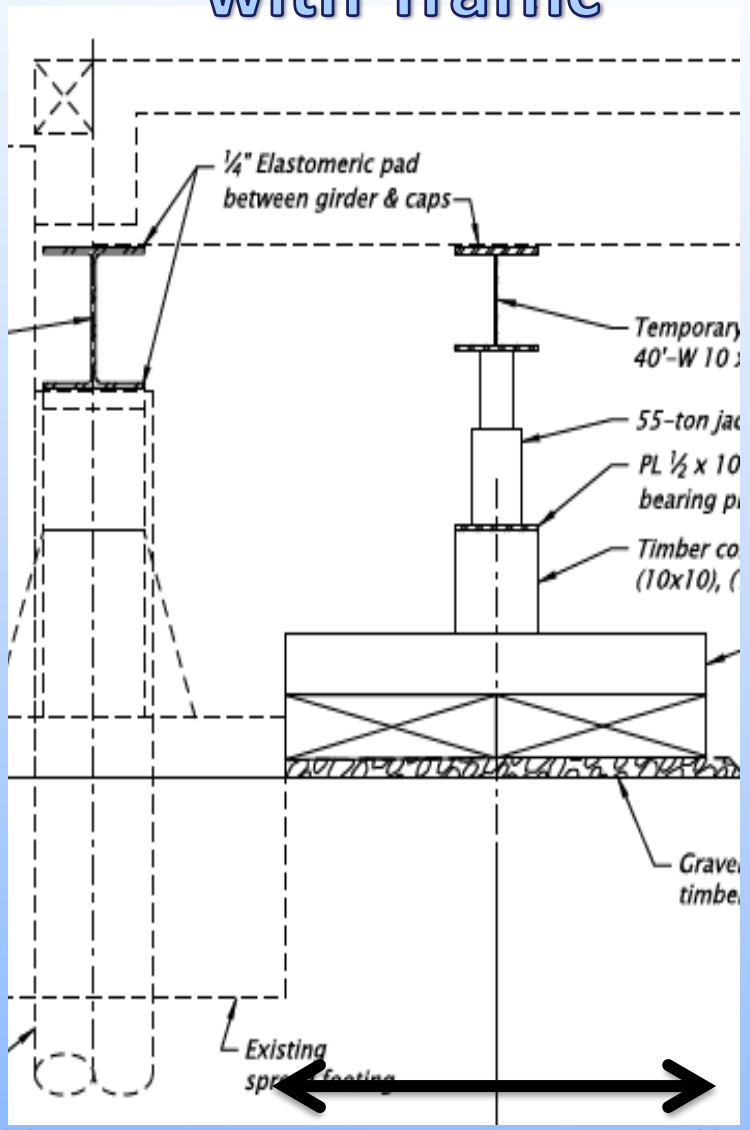
# Shoring w/o Traffic Control



# 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.
- Don’t Call Us Names Behind Our Back

# Thank You!

## Contact Info

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