Miscellaneous Topics

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Design Manager

Outline

- Pedestrian Truss Bridges
- Pay Items / New Spec Book
- Design Build
- Memos to Designers
  - Plain Elastomeric Pads
  - Barrier Slope
  - Stainless Steel
  - Temporary Barriers

Outline

- Zone of Intrusion
- Adhesive Anchors
- Maintenance Issues
- Fixity / Bearings
- Future AASHTO Items

Pedestrian Truss Bridges

- "LRFD Guide Specifications for the Design of Pedestrian Bridges"
  - New in 2010
  - New special provision (Brian Homan contact)
  - Checking procedures for prefab truss

- What changed?
  - Loads (not really)
  - FC fabrication

Pay Items / New Spec Book

- New specification will be out later this year
  - HOPEFULLY!
  - Look for a transition plan with release
  - Change to active voice

- Pay Items
  - Please include draft list with 60% plans
  - Check of quantities is important and required

Design Build

- Quality process is important
  - We should see consistent approach from designers
- Changes from standards
  - Additional checking and review may be needed
  - Special provisions important
- Encourage ATC innovation
  - After selection change is Value Engineering item
    - We must see cost savings
    - ‘Stretching’ standard is not equal value

Memos to Designers - PEP

- Plain Elastomeric Pads
  - 'Bulging' of pads
  - Problems on several projects around the state
    - Mainly recent projects
  - AASHTO study is underway

- Possible Causes
  - Fab process
  - Materials
  - Stay tuned!

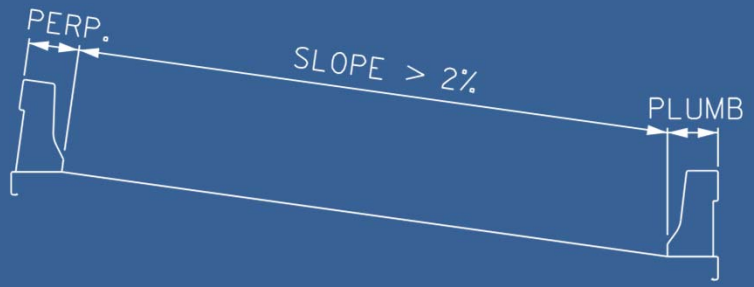
Memos to Designers - PEP

- Short term solution
  - Cotton Duck Pad
  - Has been used on RR structures
  - Great compressive capacity
  - Limited lateral movement

- Other option
  - Reinforced elastomeric pad
    - One ½ inch thick internal pad
  - Can still use PEP at integral abutments

Memos to Designers – Barrier Slope

- Sloped barrier requirement
  - Required on high side of superelevated bridge
  - 2% or greater slope



- Why needed?
  - Crash test concern
  - Recent experience with vehicle

Memos to Designers – Stainless Steel

- Stainless steel reinforcement
- Tech Memo on use
  - Complex Bridges
  - Large cost structures / major projects
  - Superstructure including barrier
  - Tied with HPC

- Potential design manual additions
  - Deck design example
  - Standard selection table
  - Consider non elastic-plastic yield strength

Memos to Designers – Temp Barriers

- Discontinuance of B920
  - Lack of testing, validation

- Interim policy based on:
  - Past practice
  - Draft research findings
  - Other state policies

Memos to Designers – Temp Barriers

Minimum Distance from Edge of Deck to Back (Non-Traffic) Side of Barrier on Bridges and Approach Panels			
Construction Posted Speed Limit	50 mph or greater or with significant geometric elements*	40-45 mph	35 mph or less
Anchored	4'-0"	2'-0"	6"
Unanchored	N/A	6'-0"	3'-0"

- Use more restrictive setback distance where:
  - Travel speeds significantly exceed the posted speed limit
  - Heavy truck traffic
  - Situations warrant increasing the dimensions in the chart

Memos to Designers – Temp Barriers

- Anchor requirements:
  - Three, 1⅛” diameter anchor rods on traffic side only for each barrier segment
  - Bridge deck
    - 5½” minimum embedment and 6” maximum embedment
    - Maximum hole depth: 1½ inches less than the slab depth
  - Approach panels with top and bottom reinforcement
    - 5½” minimum embedment
    - Approach panels with no reinforcement or only a bottom mat of reinforcement 9” minimum embedment

Memos to Designers – Temp Barriers

- Anchors (cont):
  - Use only where concrete is in good condition
  - Through-deck anchoring may be utilized on existing bridge decks in poor condition.
  - Ultimate (nominal) strength of 14 kips
  - Proof tested to 7 kips
  - Include special provision for additional testing requirements
  - Minimum deployment length and anchorage requirements past the end of the bridge determined by the roadway designer and shown in the traffic control plans

Zone of Intrusion

- Why important?

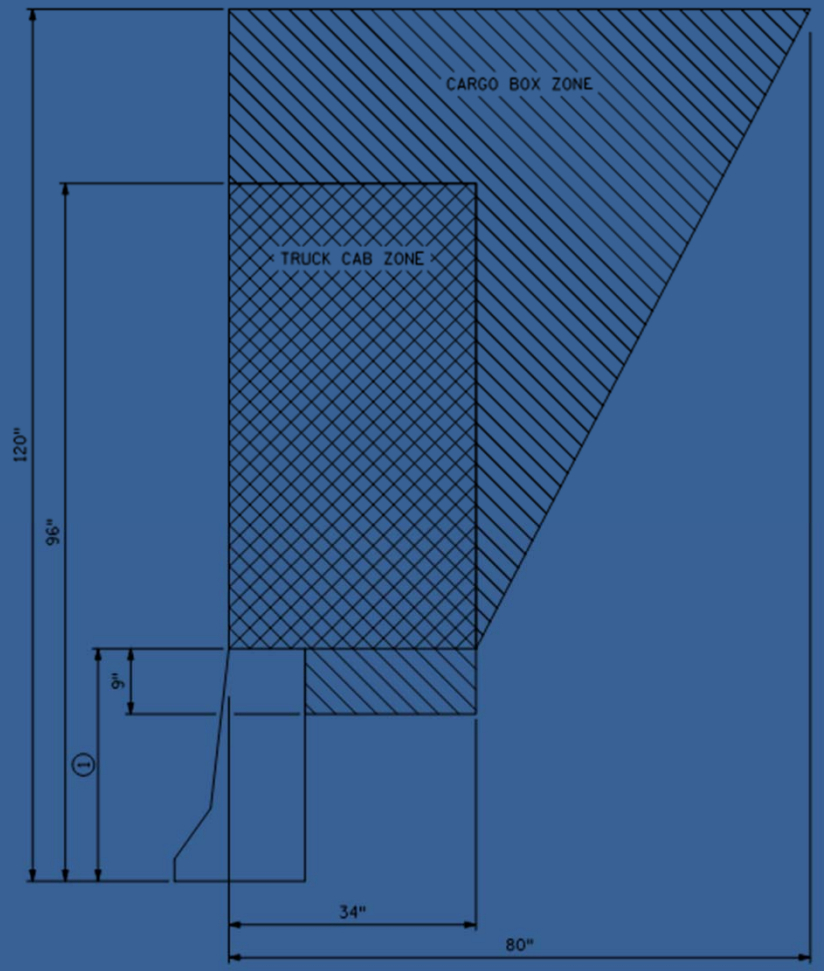
- Allow safety items only (i.e. lights, signs)
- Limit other items (i.e. pilasters)
- Protect by removing
  - Cables
  - Other critical structural elements

Zone of Intrusion

Reproduced from:

"Guidelines for Attachments to Bridge Rails and Median Barriers"

Midwest Roadside Safety Facility
February 26, 2003



① REVIEWED TL-4 BARRIER HEIGHTS FELL IN A RANGE OF 29" TO 42"

Adhesive Anchors

- T-1 Rail Issue
  - Short anchors (hitting rebar)
  - Inadequate bond
  - Not enough capacity
- Retrofitted several T-1 rails
- Process change
  - Installer training and certification
  - Increased in-field testing
  - Key issues noted at inspector training
  - In future use only CIP anchorage with T1 rails
  - Still utilized on non-traffic rails

Maintenance Issues- Deck Cracking

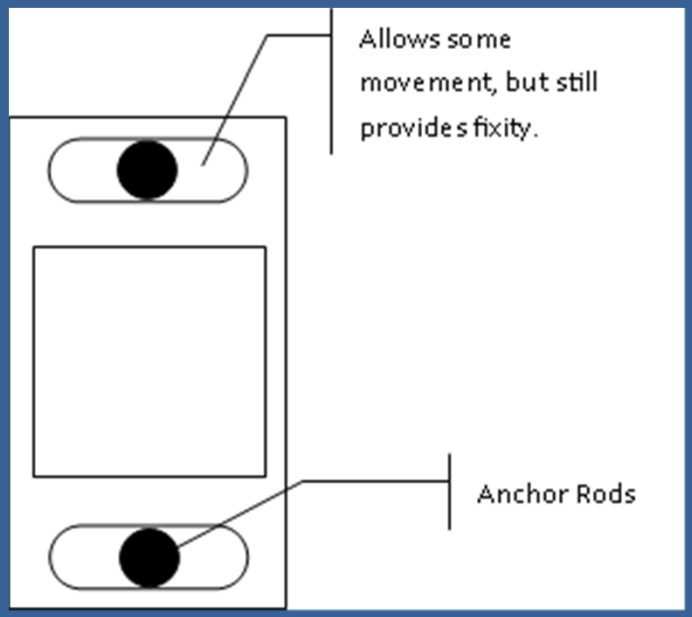
Fixity and Bearings

- Increased use of pot and disc bearings
  - Utilize AASHTO movement load factor
  - Vertical and lateral loads
  - List service and strength loads
- Modular joints
  - Historically only 20 year service life; want 100 years
  - New design and fabrication criteria – early 2000's
  - Fatigue is critical (14.5.6.9.7b)
    - Use infinite life for fatigue range
    - Average opening: consider creep, potential movements, 50 years as mid-life

Fixity and Bearings

- Requirement for two fixed piers
  - Stop end of bridge joints from closing/ripping
  - Better control of bridge movement
  - Increased thermal forces in piers
    - Utilize slotted anchor rod holes w/ exp. bearings
- Shear lugs to restrain lateral movement
  - Curved and skewed bridges
  - Concrete lug (preferred)
  - Steel lug allowed

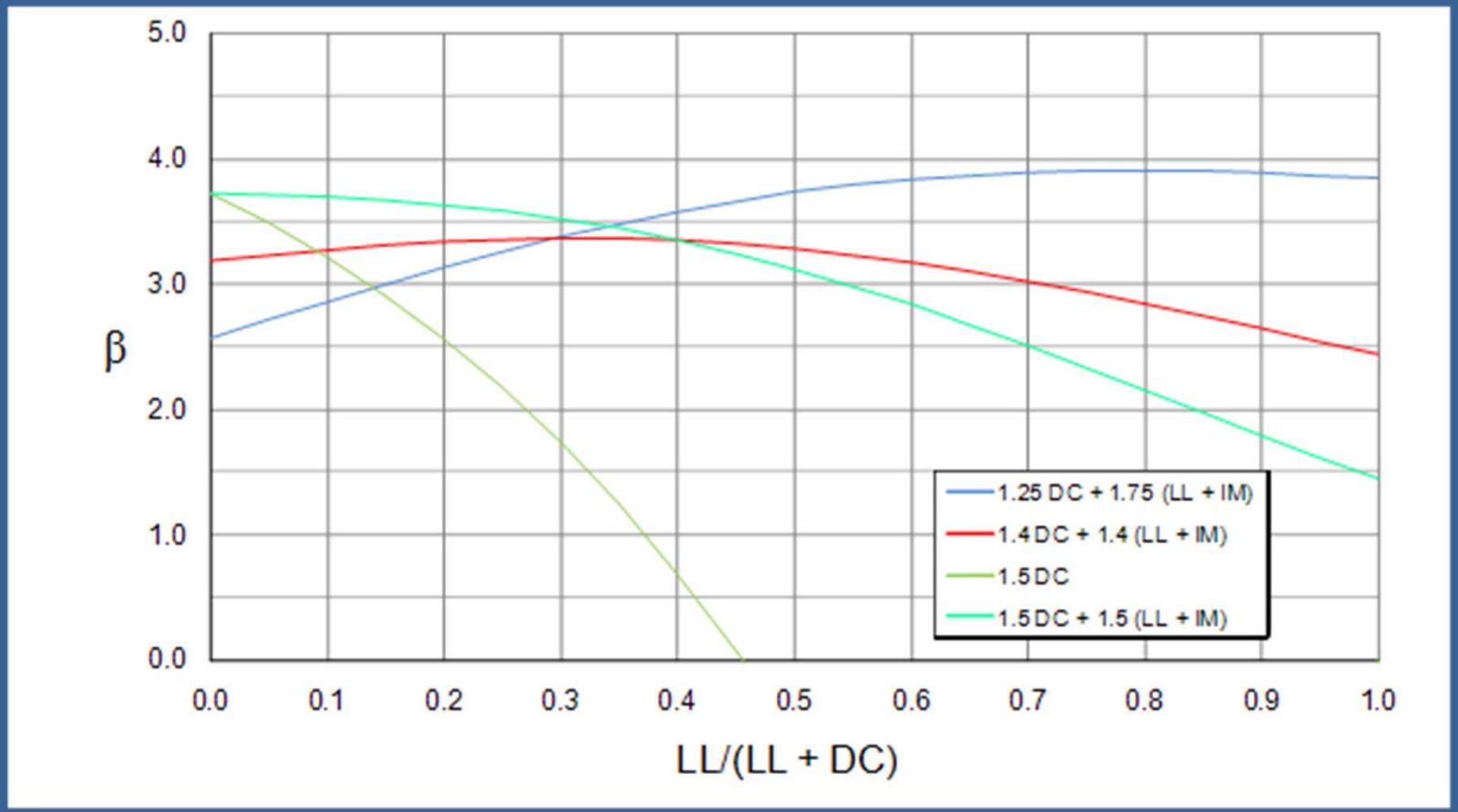
Fixity and Bearings



Shear lug

Future AASHTO Items

- Strength IV Load Combination
  - Possible change to 1.4 (DL+LL)



Future AASHTO Items

- Refined Analysis Section and Training
  - Explain 2D vs. 3D modeling
  - Analysis / resistance factor
  - NHI training being discussed

- Rewrite of Concrete Section
  - Clarify and REDUCE!

Questions