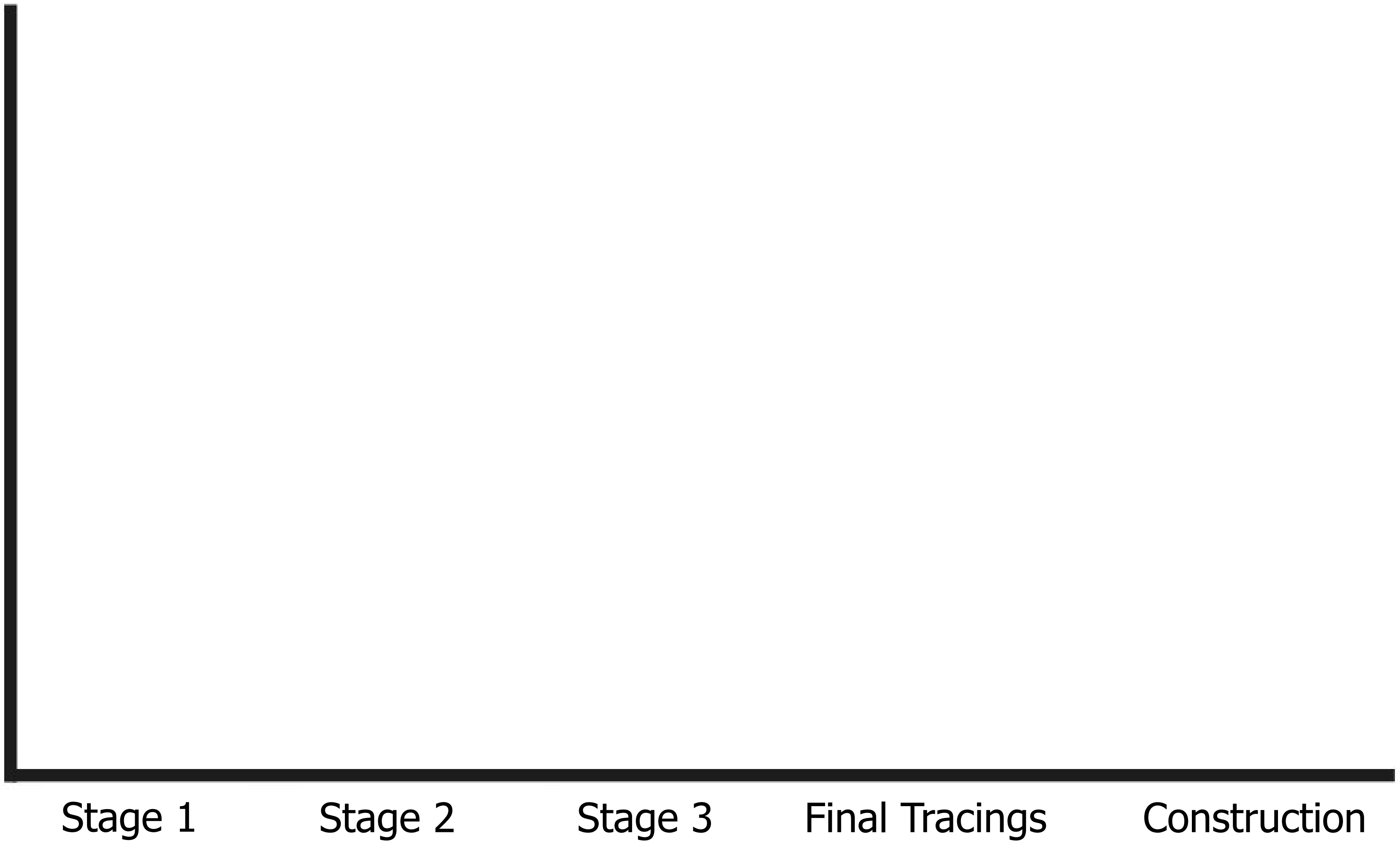
Lesson Learned

Jim Lesh, INDOT Bridge Design Team Leader

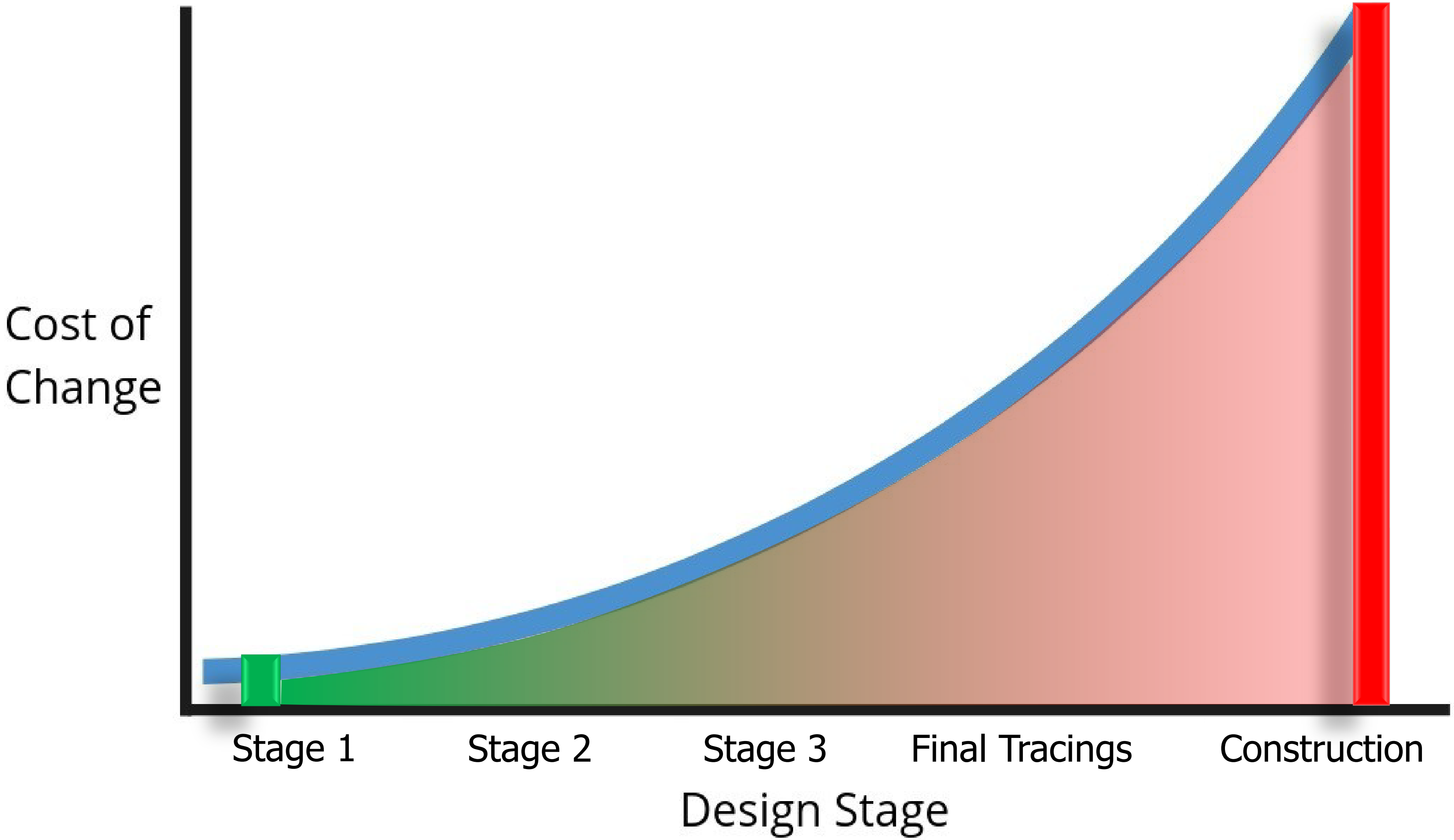
NextLevel INDIANA

Lessons Learned

Lessons Learned

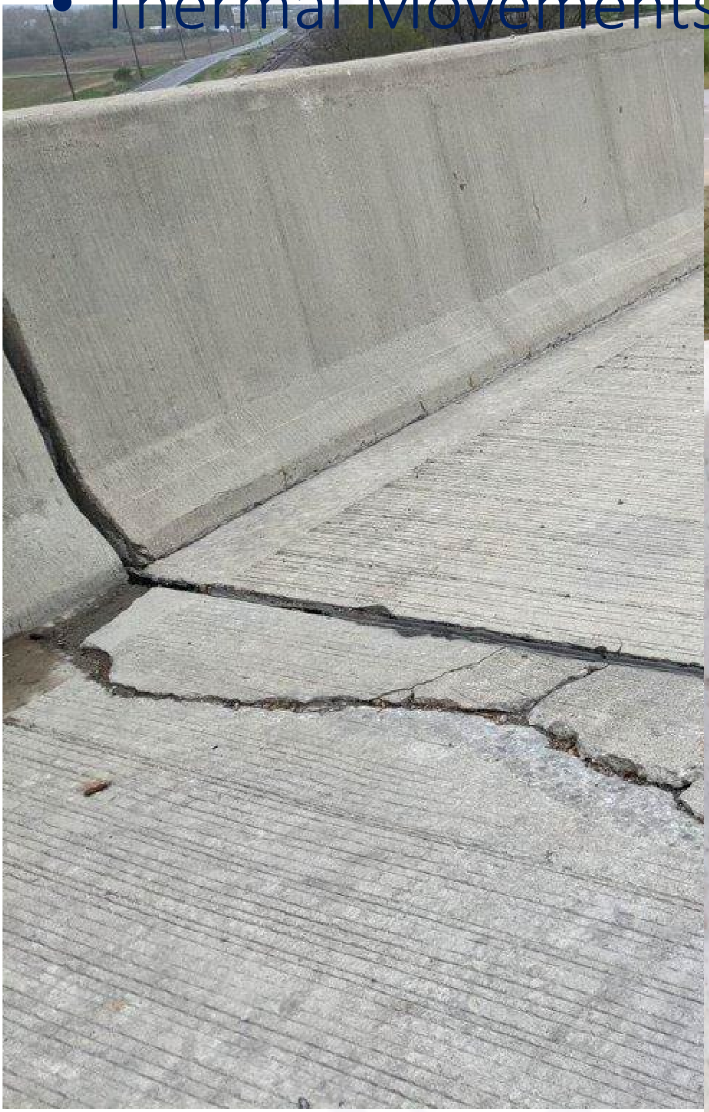


Lessons Learned



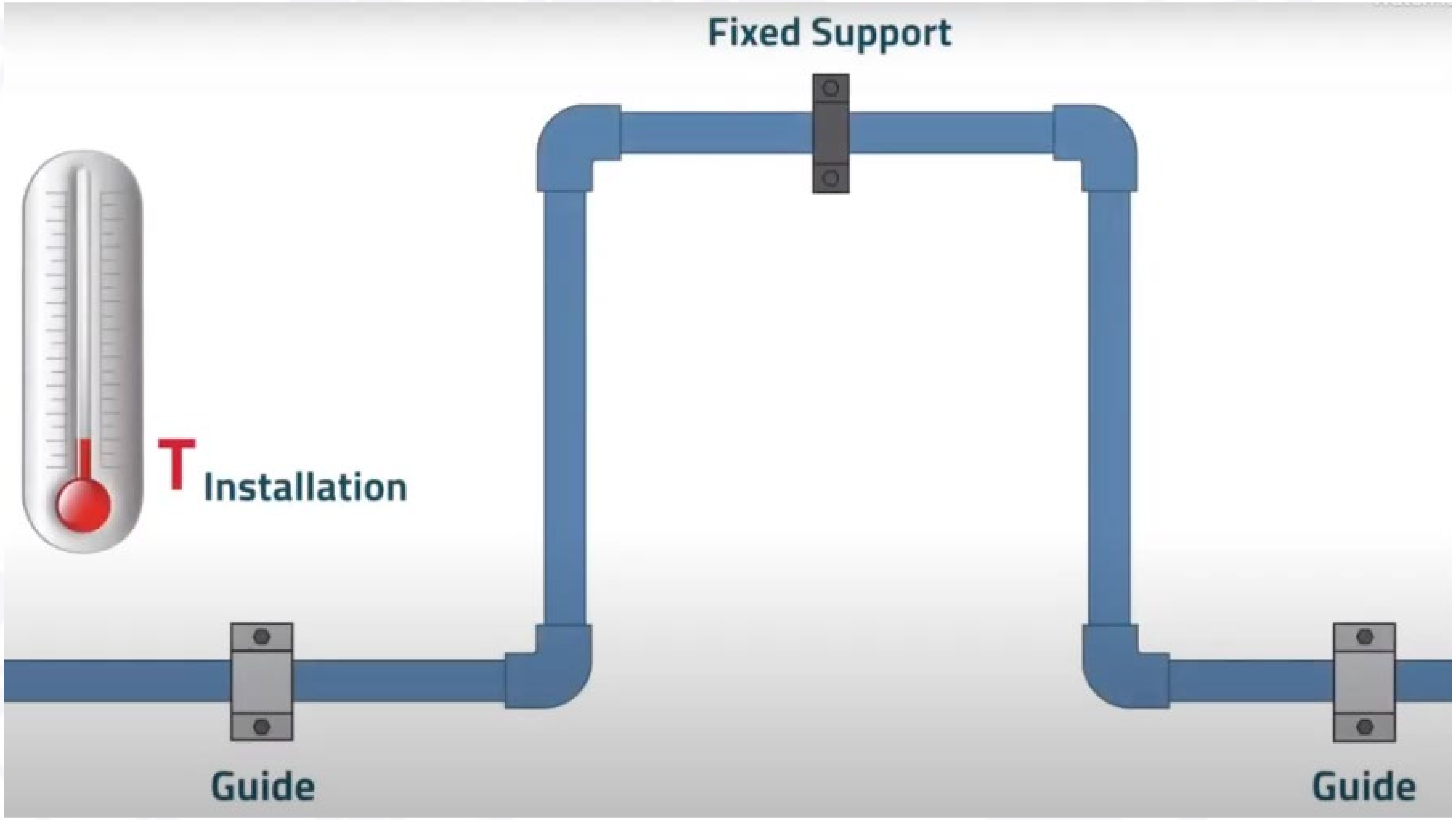
Lessons Learn

- Thermal Movements



Lessons Learned

- Thermal Movements

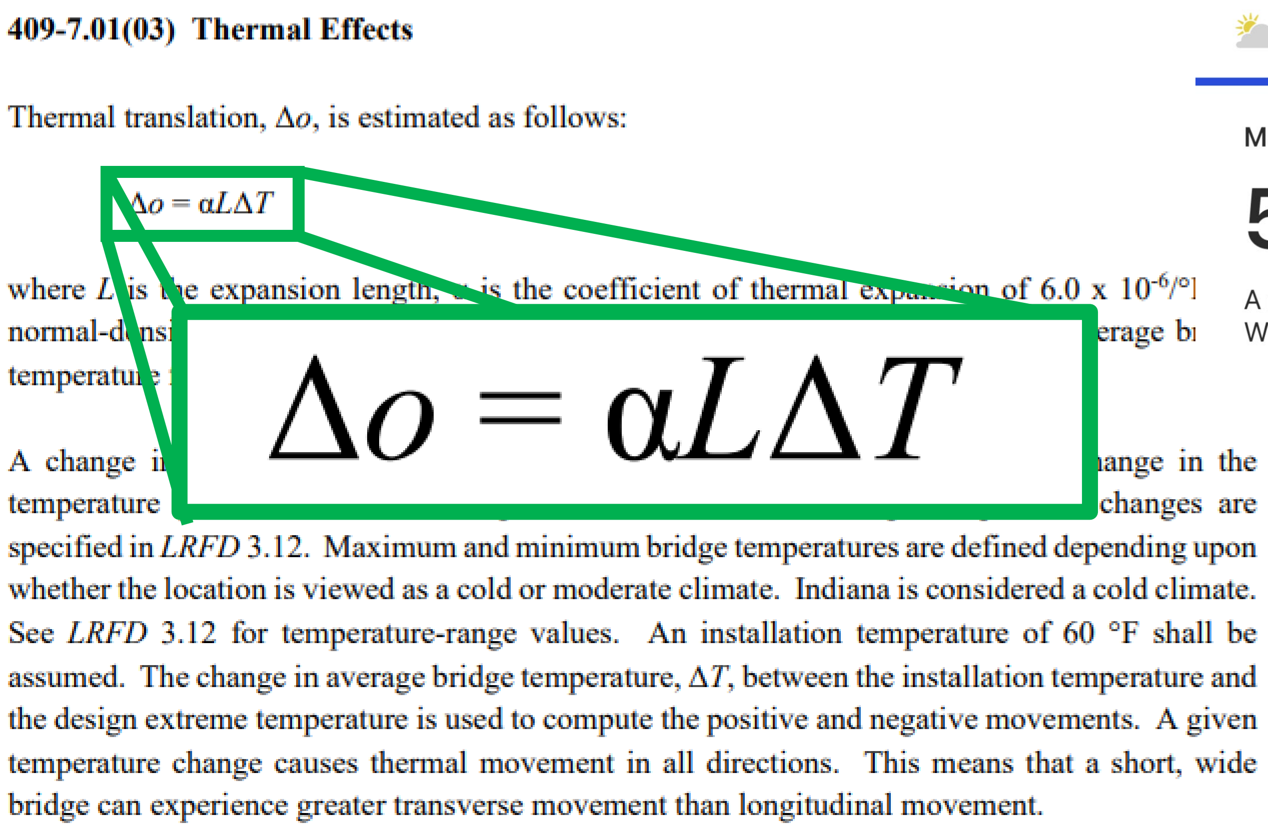


Lessons Learned

- Thermal Movements

Lessons Learned

- Thermal Movements



409-7.01(03) Thermal Effects

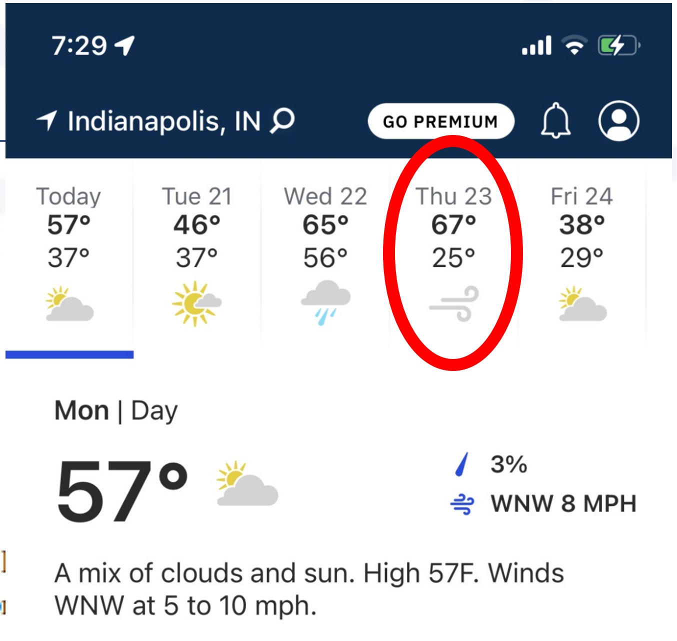
Thermal translation, Δo, is estimated as follows:

$$\Delta o = \alpha L \Delta T$$

where L is the expansion length, ... is the coefficient of thermal expansion of 6.0 x 10^{-6}/°F ... normal-densi... erage br... temperature ...

$$\Delta o = \alpha L \Delta T$$

A change i... ange in the temperature ... changes are specified in *LRFD* 3.12. Maximum and minimum bridge temperatures are defined depending upon whether the location is viewed as a cold or moderate climate. Indiana is considered a cold climate. See *LRFD* 3.12 for temperature-range values. An installation temperature of 60 °F shall be assumed. The change in average bridge temperature, ΔT, between the installation temperature and the design extreme temperature is used to compute the positive and negative movements. A given temperature change causes thermal movement in all directions. This means that a short, wide bridge can experience greater transverse movement than longitudinal movement.

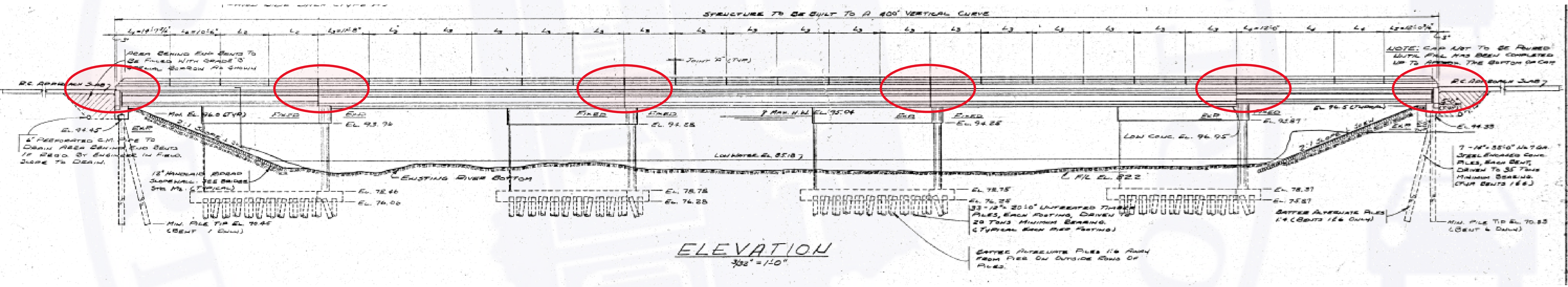


NextLevel INDIANA

Lessons Learned

- Thermal Movements

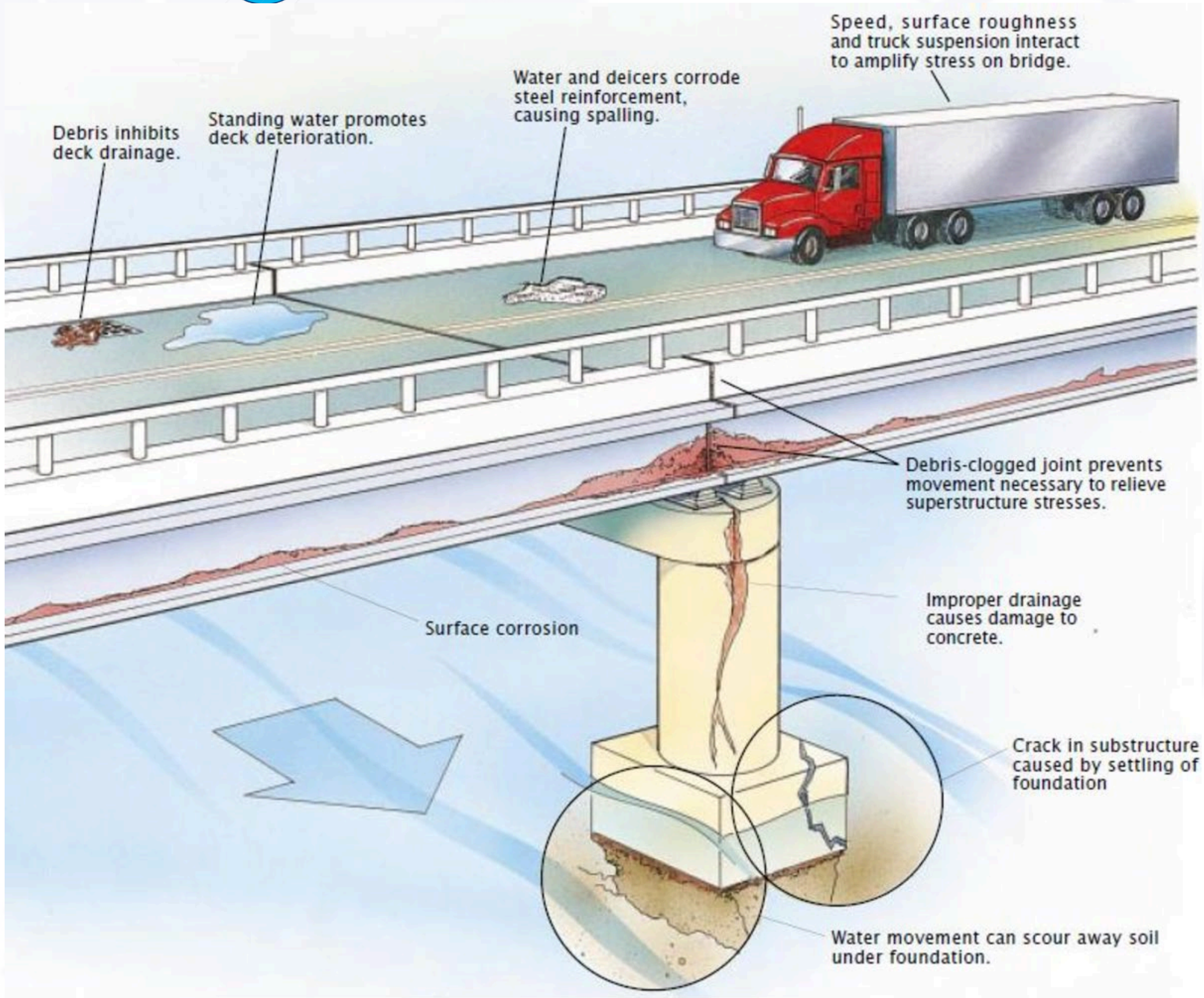
Expansion Joints



NextLevel INDIANA

Lessons Learned

- Thermal Movements



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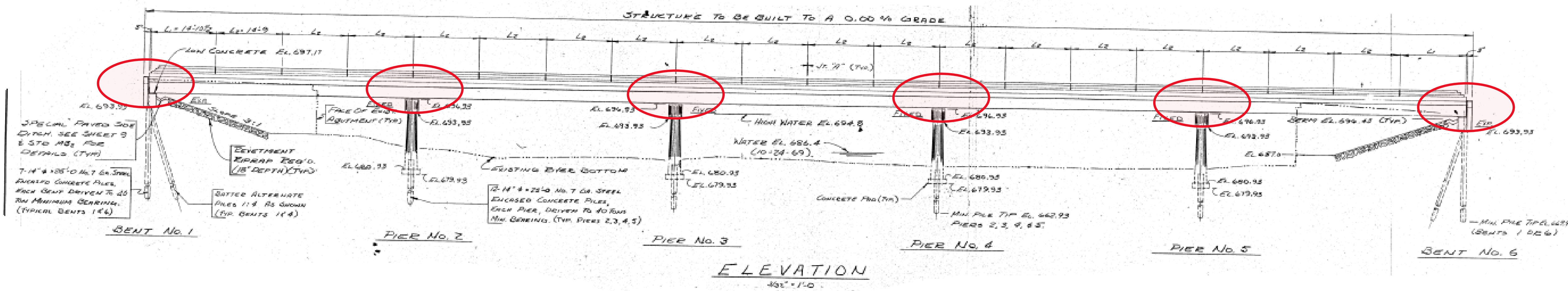
Lessons Learned

- Thermal Movements

Lessons Learned

- Thermal Movements

Expansion Joints



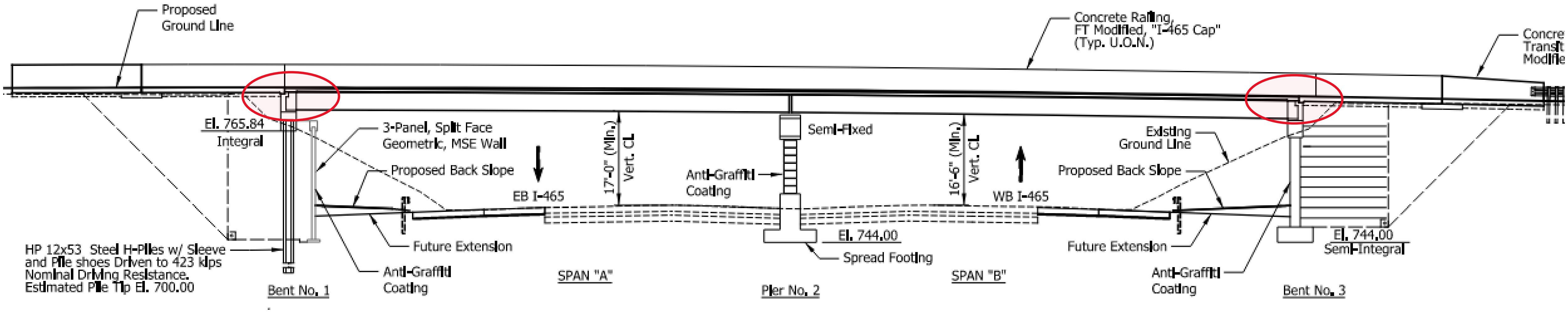
Lessons Learned

- Thermal Movements

Lessons Learned

- Thermal Movements

Expansion Joints

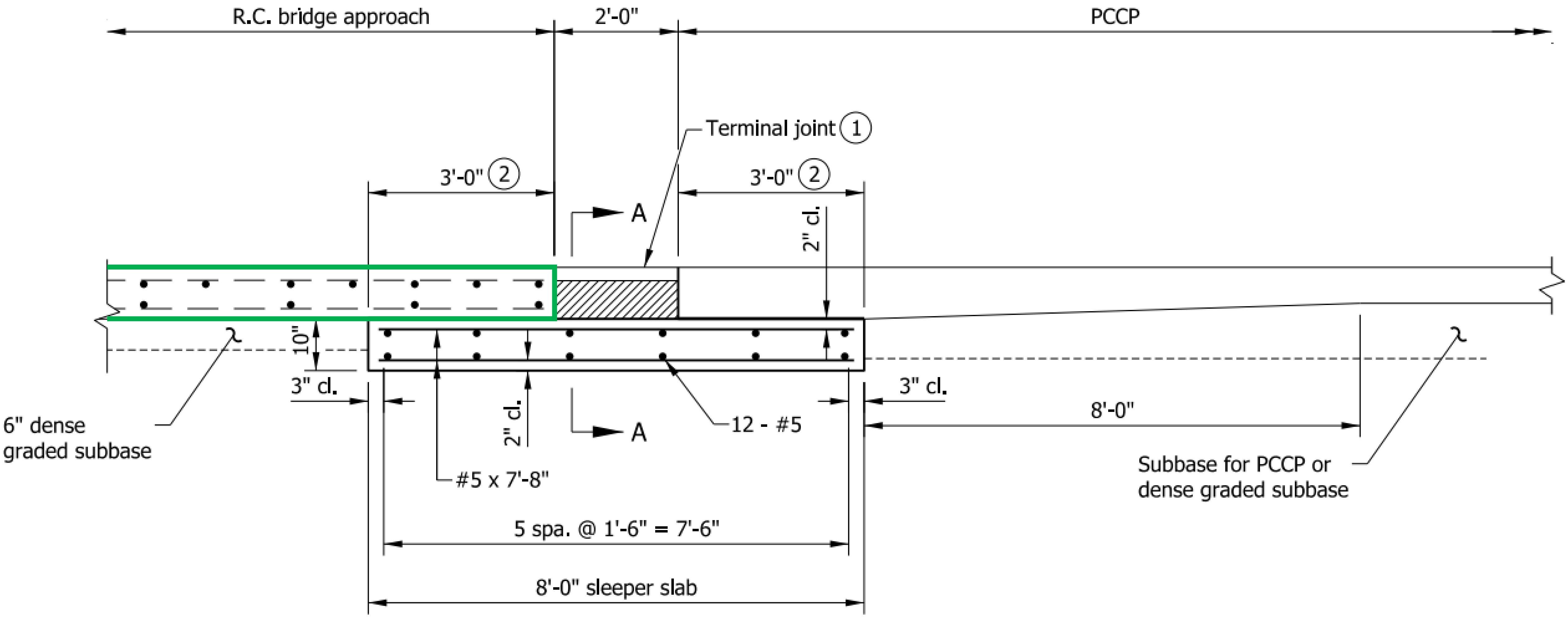


ELEVATION

Scale: 1/16"=1'-0"

Lessons Learned

- Thermal Movements



Lessons Learned

- Thermal Movements

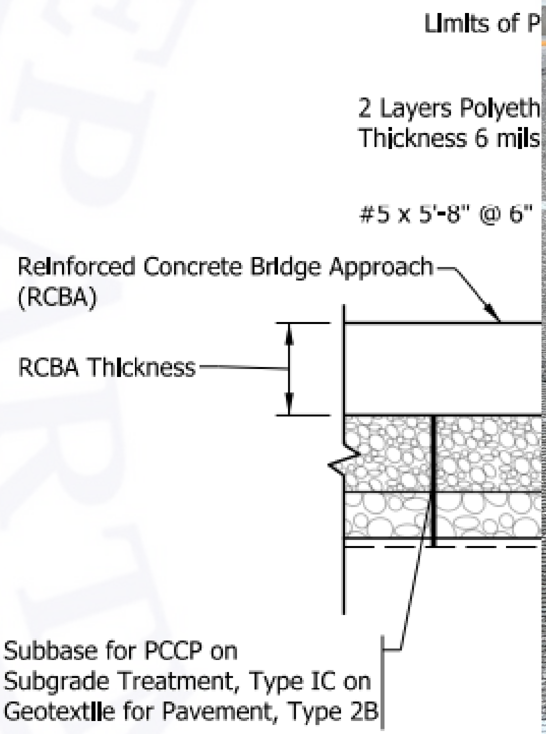
Lessons Learned

- Thermal Movements

See List of Unique Provisions (samples), No. 15, Terminal Joint Polymer Modified Asphalt
Link

Lessons Learne

- Thermal Movements



Lessons Learned

- Thermal Movements

402-7.02(03) Integral End Bent [Rev. Sep. 2019]

The integral end bent eliminates the deck joint between the superstructure and the end bent by the structural integration of the two. The vertical dimension of the cap beam can be minimized as the mudwall becomes a composite part thereof.

Components of the deep foundation shall be flexible to accommodate the longitudinal movement of the pile bent. Such flexibility can be provided with steel H-piles or steel-encased-concrete piles.

The reinforced concrete bridge approach (RCBA) should be attacl
longitudinal bridge movements should be accommodated at the outer e
terminal joint. See Section 409-2.04(01) for terminal joint criteria.

The Bridge has an...	Approach Pavement is...	Terminal Joint Requirement
integral or semi integral end bent AND *an expansion length ≤ 100 ft for concrete and ≤ 50 ft for steel.*	HMA	Not Required
	PCCP	Terminal Joint, Type PCCP
integral or semi integral end bent AND has an expansion length > 100 ft ≤ 400. (concrete) or expansion length > 50 ft ≤ 400. (steel)	HMA	Terminal Joint, Type HMA
	PCCP	Terminal Joint, Type PCCP
integral or semi integral end bent AND has an expansion length > 400 ft.	HMA or PCCP	Special Detail Required
integral or semi integral end bent AND any expansion length	CRCP or HMA over CRCP	Special Detail Required

NextLevel INDIANA

Lessons Learned

- Thermal Movements

Lessons Learned

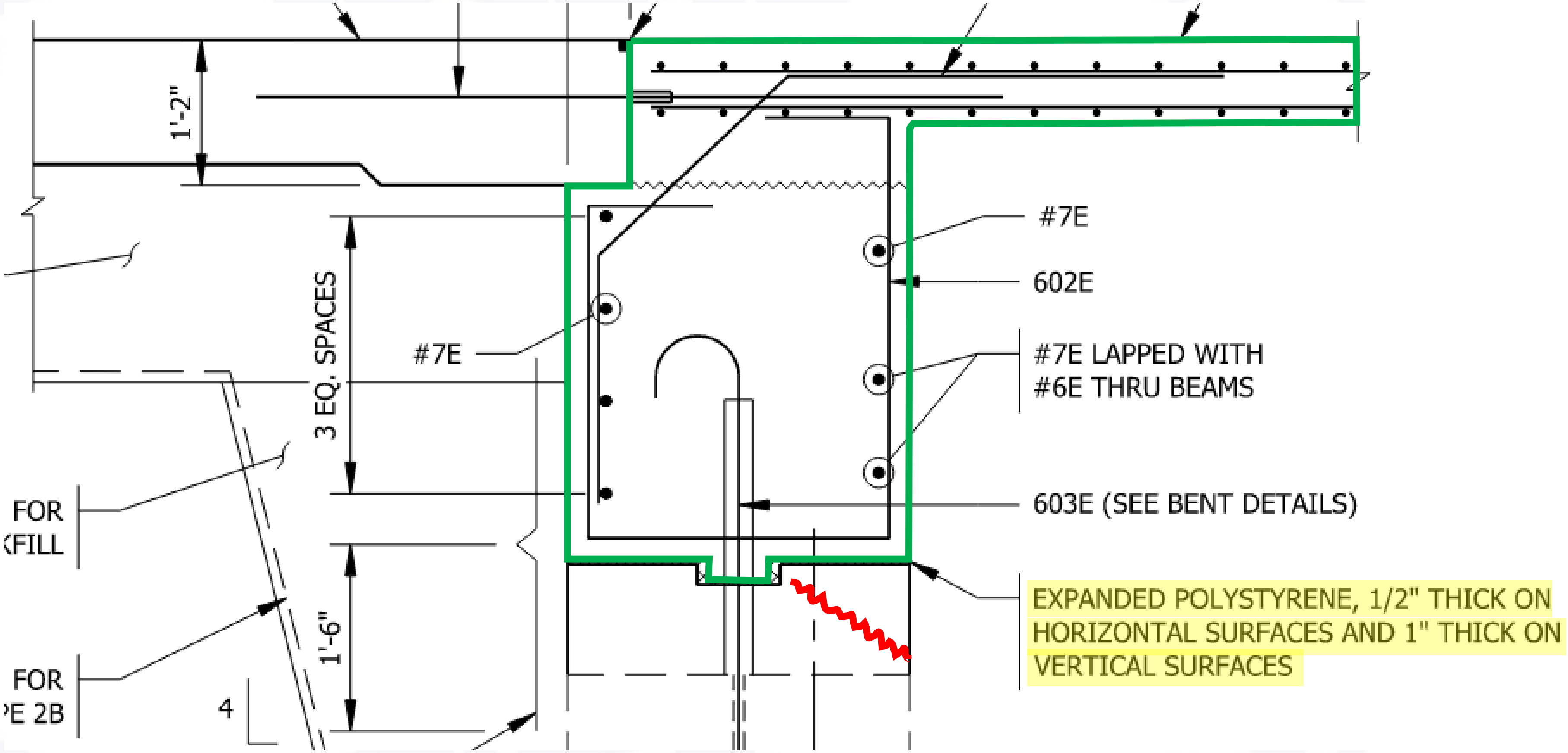
- Thermal Movements

Lessons Learned

- Thermal Movements

Lessons Learned

- Thermal Movements



Lessons Learned

- Thermal Movements

NextLevel INDIANA

Lessons Learned

- Thermal Movements
  - The Devil is in the Details
  - Show on Plans

	Joint Opening Table					
Temperature	0°	20°	40°	60°	80°	100°
Dimension "W"	10.42"	9.67"	8.92"	8.17"	7.42"	6.67"

  - Consider Terminal Joints

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Lessons Learned

- Extended-Pile Bents

Lessons Learned

- Extended-Pile Bents

C. Substructures and Foundations

1. General: The substructure is in satisfactory condition and was rated a "6" during the 2017 NBIS inspection. The substructures consist of concrete caps on exposed 14" S.E.C. piling at the piers and concrete cap on 14" S.E.C. piling at the end bents.

2. Repair/Maintenance Work: Previous minor surface patching on the center of the end bents was noted during the field inspection.

3. Specific Deficiencies: Epoxy coating is cracking and peeling on piles with only 50% of the epoxy coating remaining. The piles have minor section loss but appear to be sound.

Substructure and Foundation

1. The existing exposed 14" S.E.C. piling at the piers will be cleaned and epoxy coated to 2 feet below existing ground to further extend the service life of the piles.

Lessons Learned

- Extended Pile Bents

Lessons Learned

- Extended-Pile Bents

Lessons Learned

Lessons Learned