

I-580 Freeway Extension Project: Post-Tensioning and Grouting Challenges

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2011 Western Bridge Engineers Seminar
Phoenix, Arizona



Special Thanks

For your work and assistance

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AMEC

Outline

- Introduction
- Construction Specifications
- Construction Challenges
- Design Changes
- Closing



Project Description

Location Map



Project Update



Project Update



Contract Specifications

New Grout Materials



Contract Specifications

Additional Vents



Contract Specifications

Grout Caps



Contract Specifications

Air Pressure Test



Contract Specifications

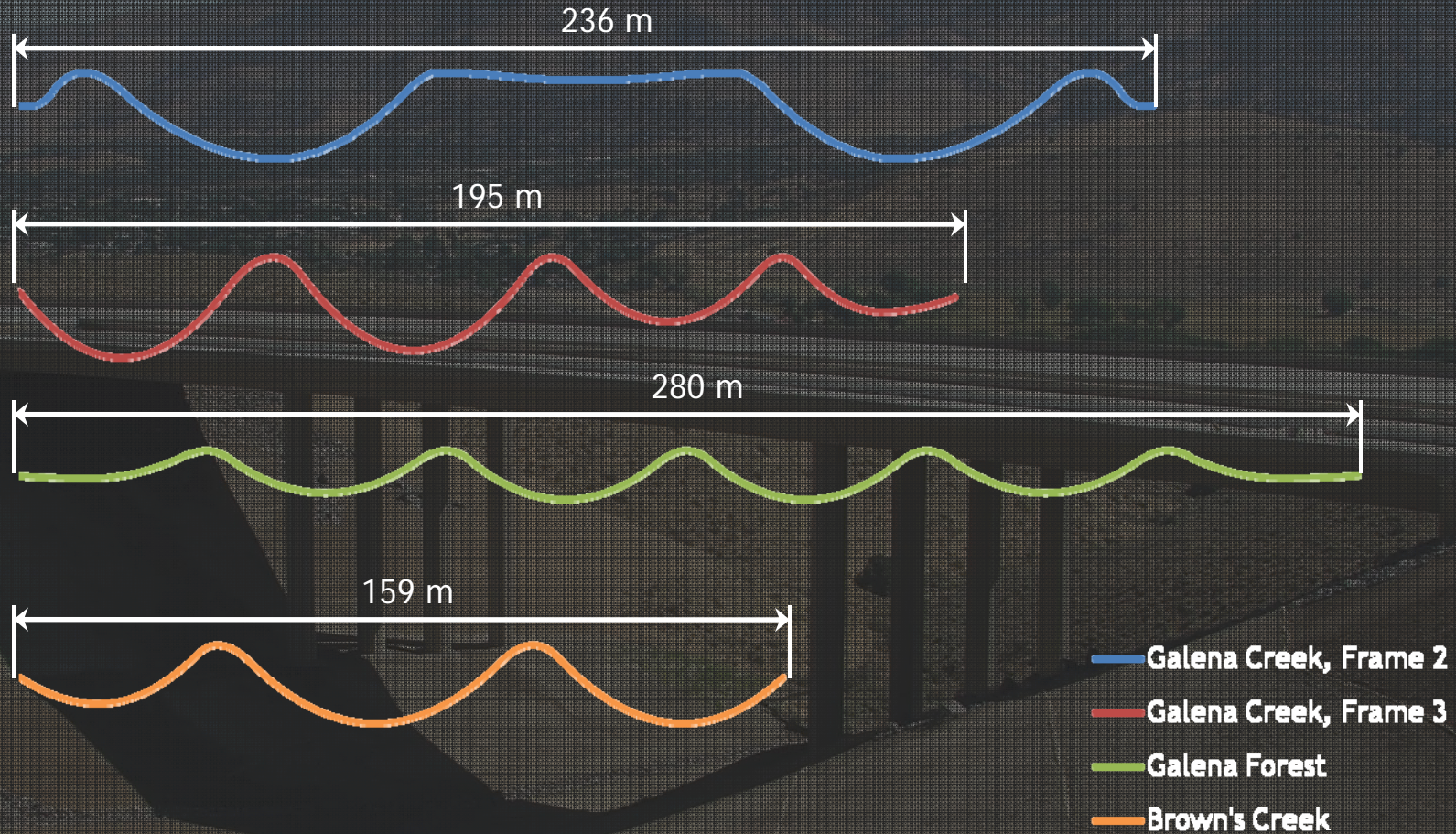
Grouting Mockup



Long Tendon Paths



Long Tendon Paths



Grouting Temperatures



Grout Bleeding



Grout Bleed Material



Air Pressure Test Issues

Duct Materials



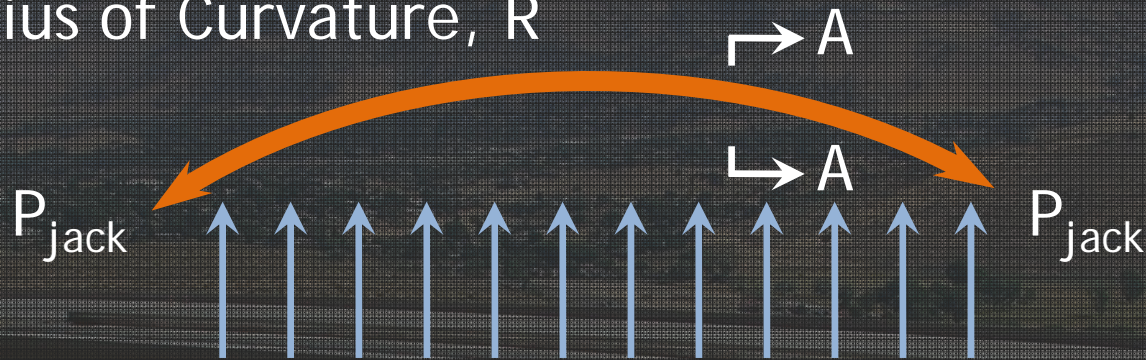
Air Pressure Test Issues



Post-Tensioning Forces

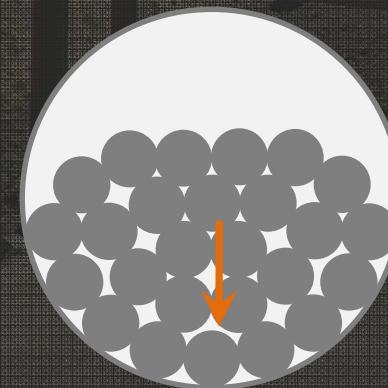
In-Plane Force

Radius of Curvature, R



Equivalent Distributed Load, $F_{u in}$

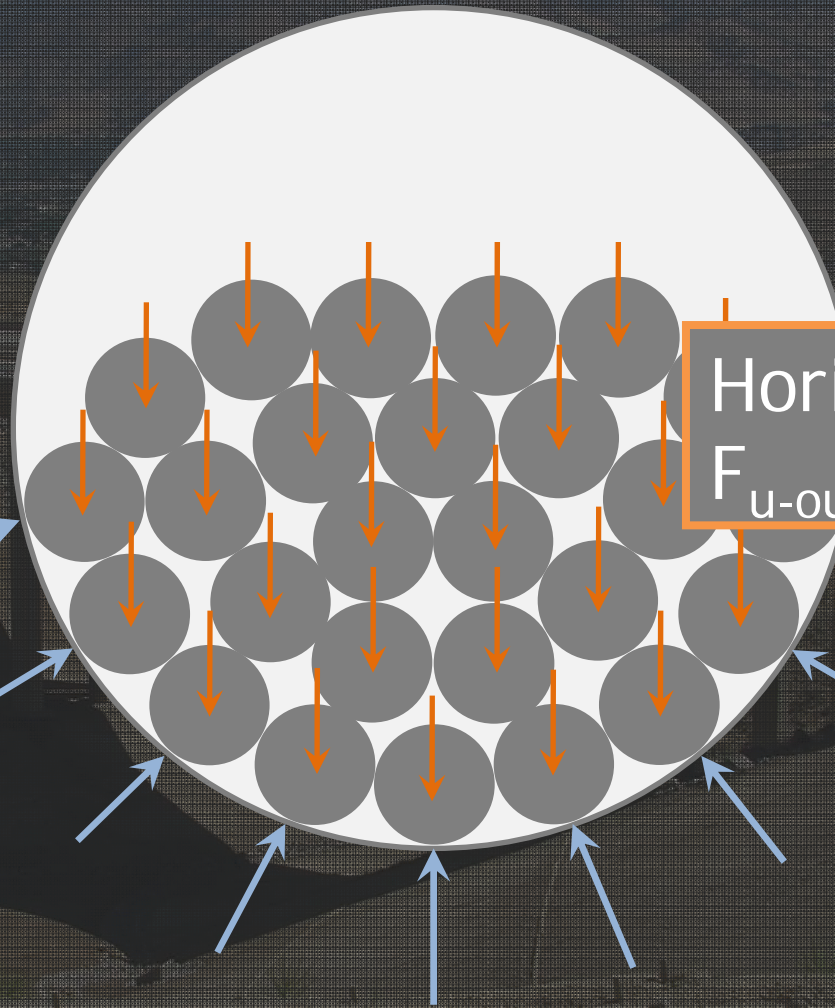
$$F_{u in} = P_{jack} / R$$



Section-A-A

Post-Tensioning Forces

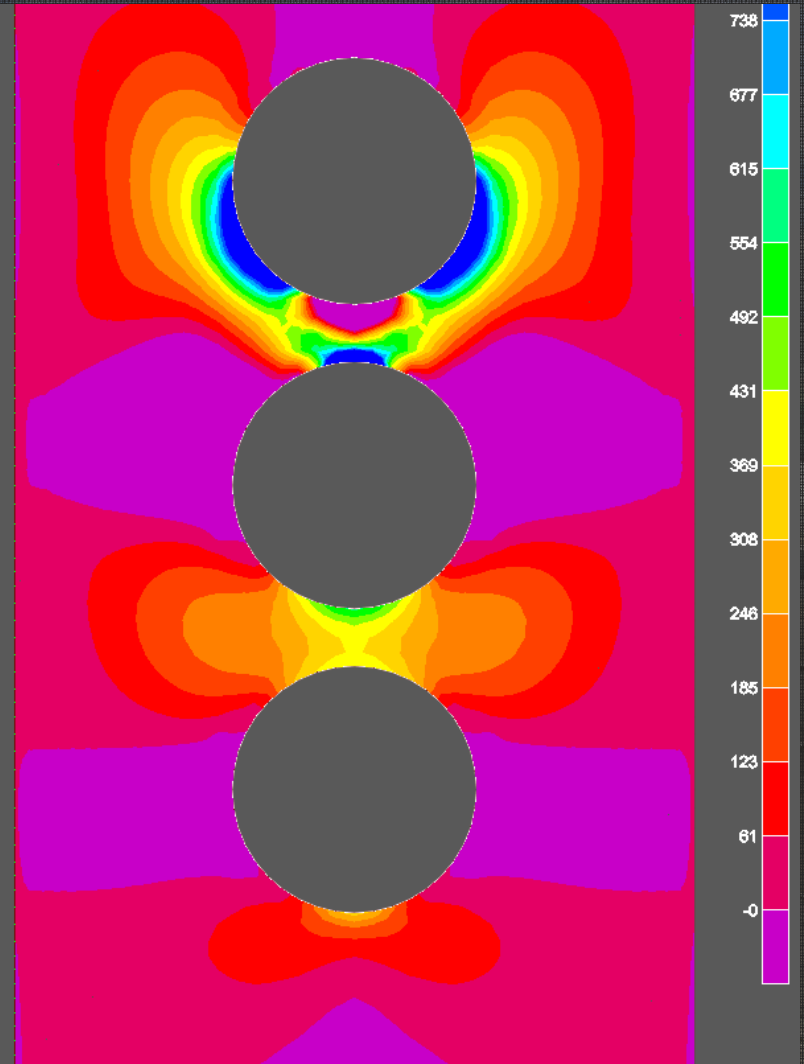
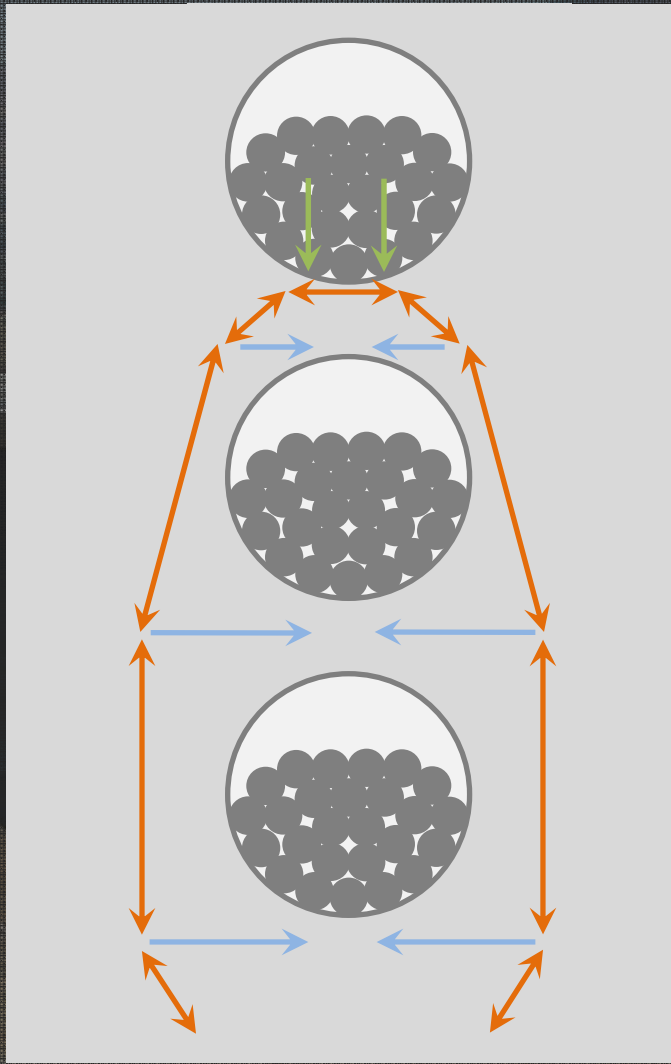
Tendon Equilibrium



Horizontal Force:
 $F_{u-out} = P_{jack} / (\pi \cdot R)$

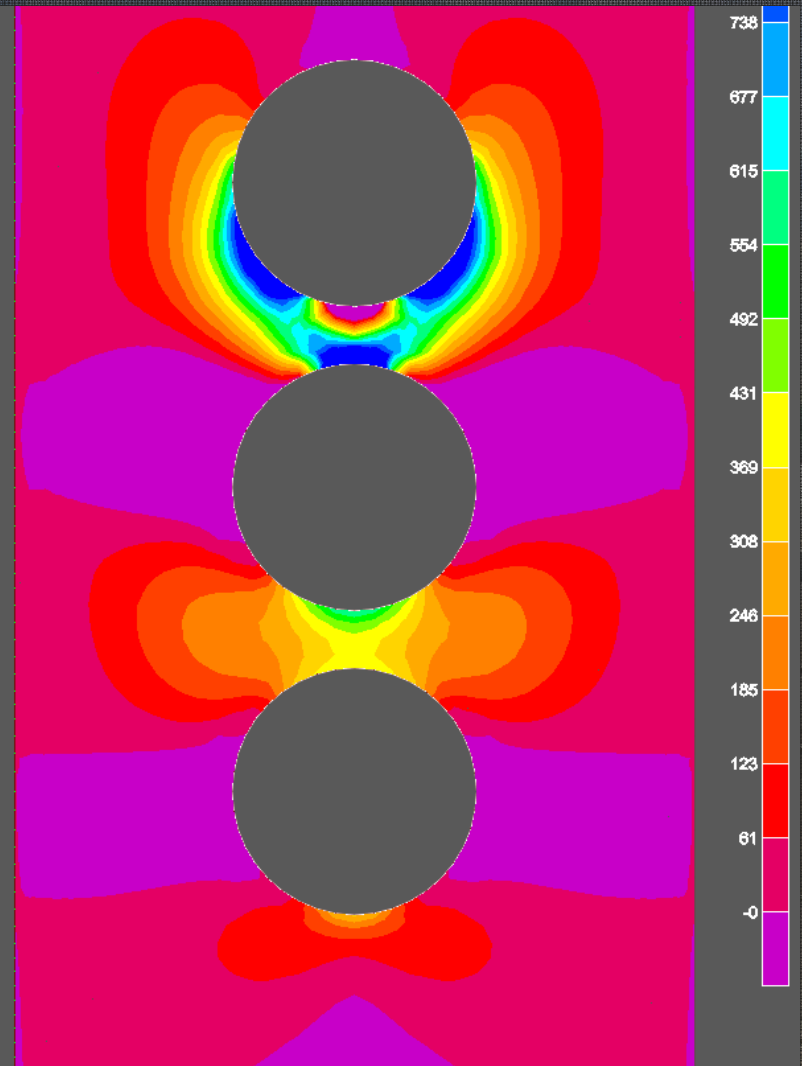
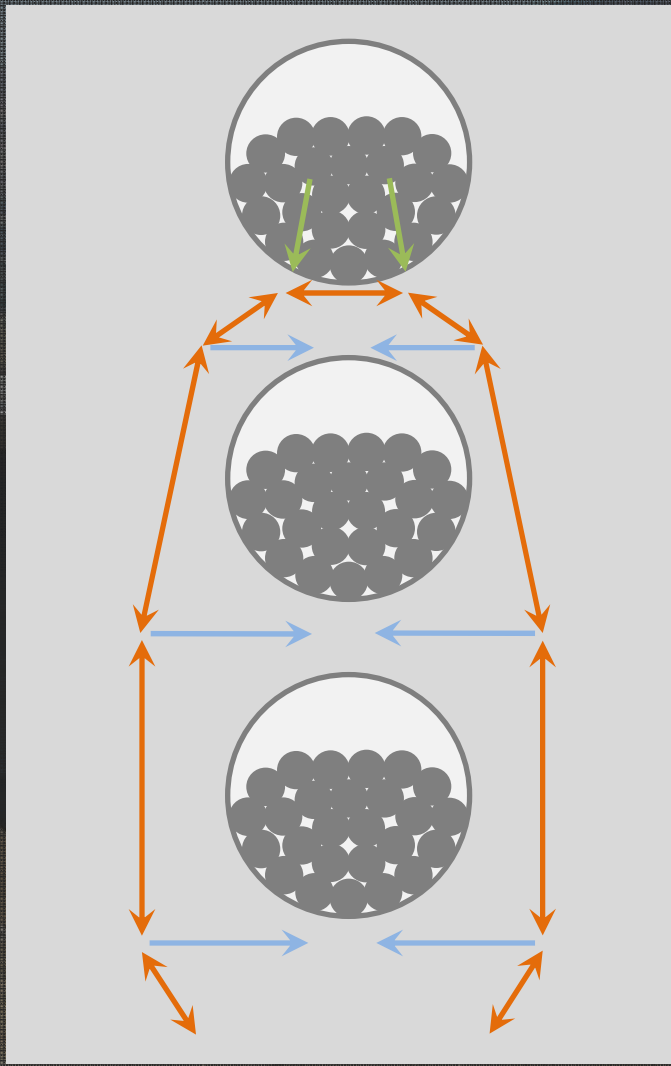
Post-Tensioning Forces

Vertical Load



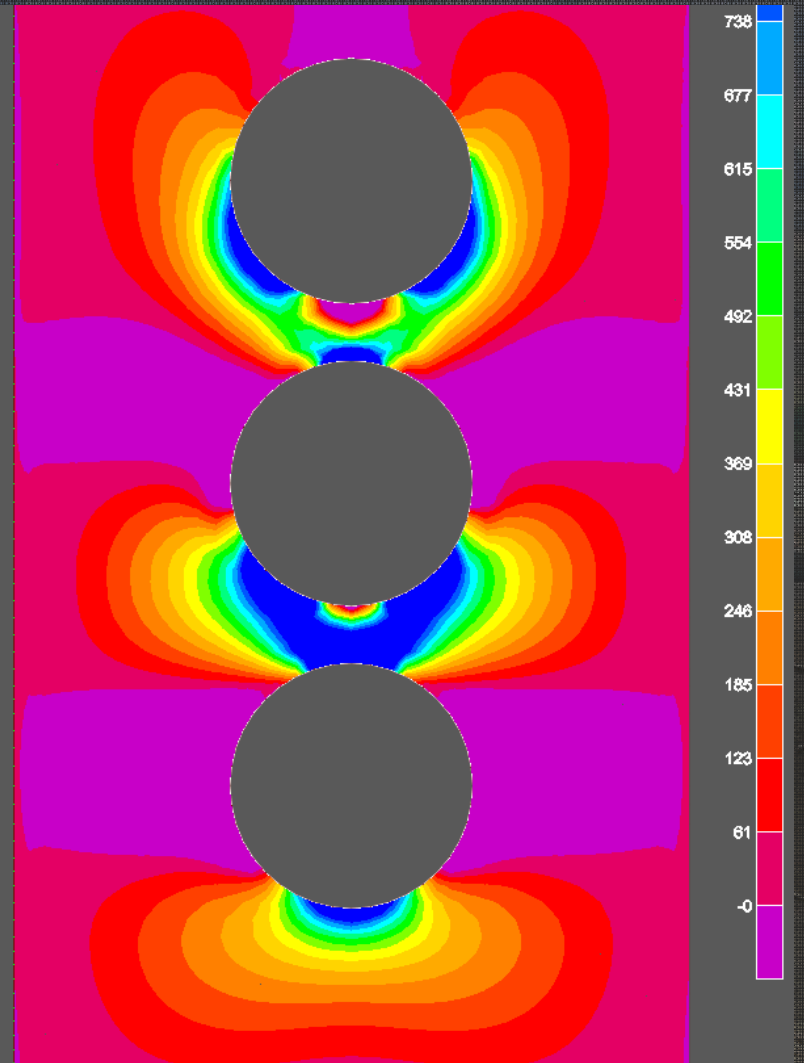
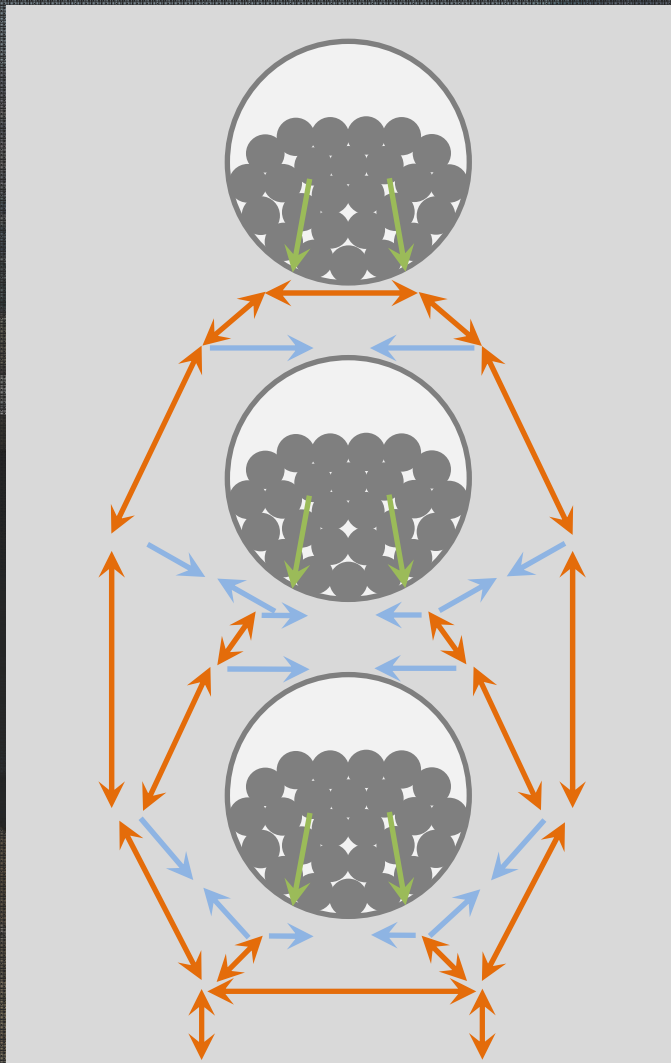
Post-Tensioning Forces

Vertical & Dilation



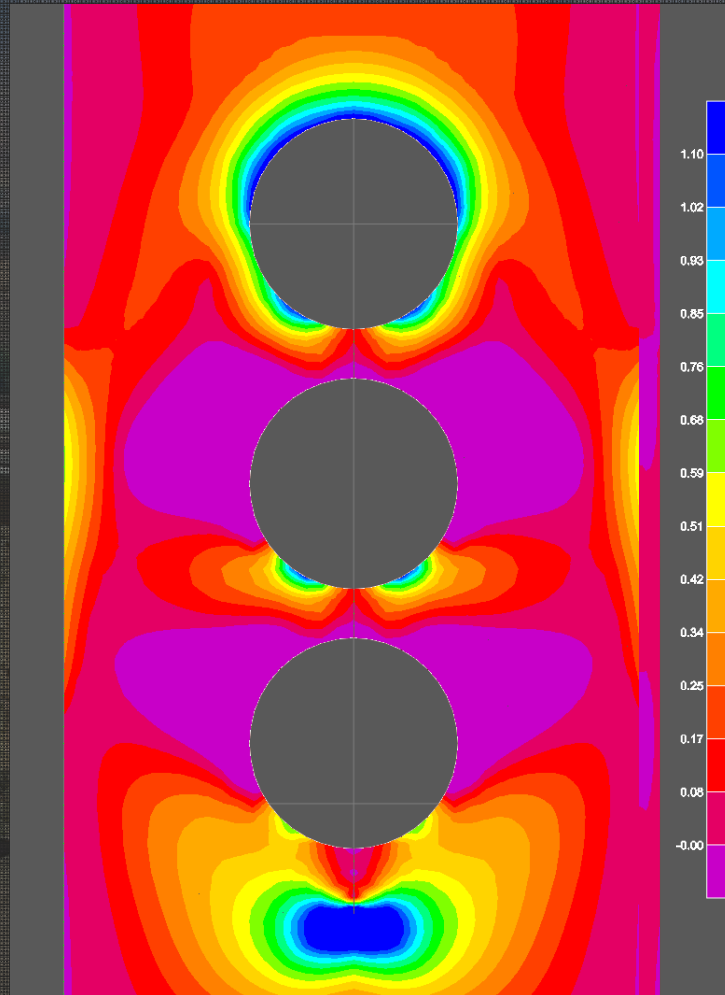
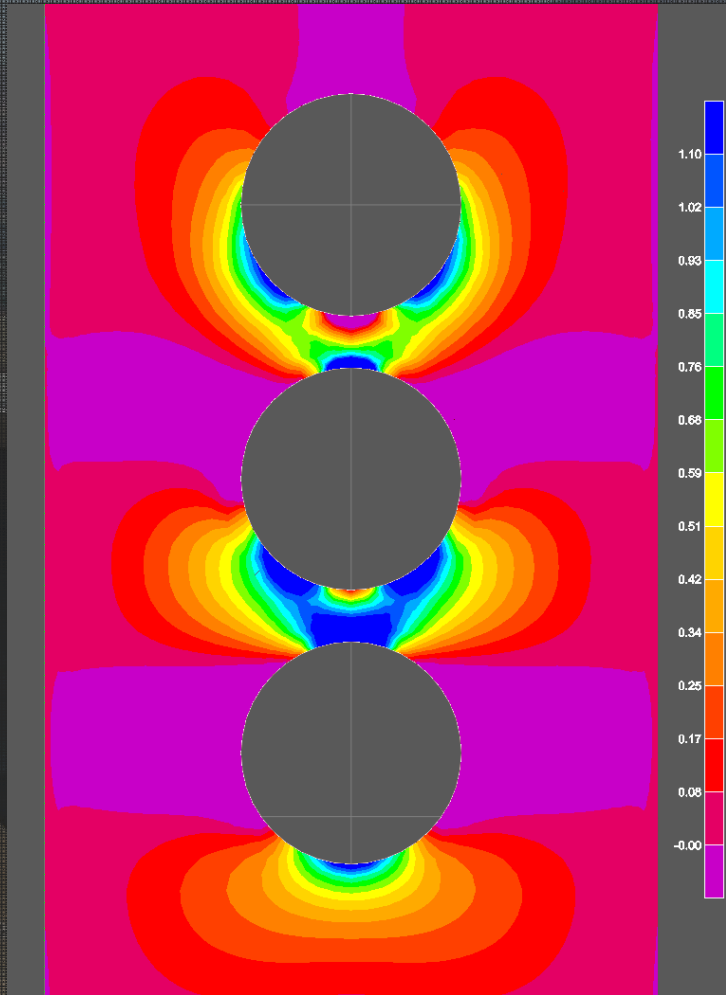
Post-Tensioning Forces

Multiple Tendons Loaded



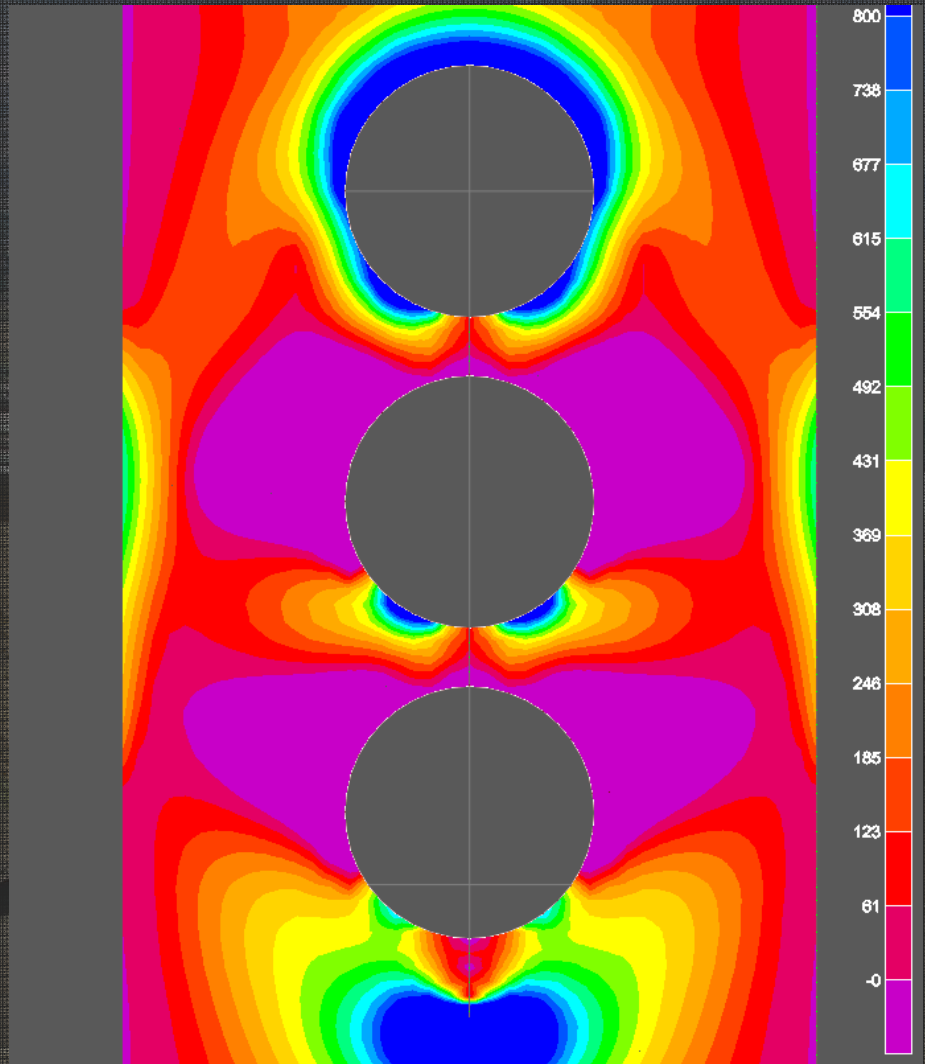
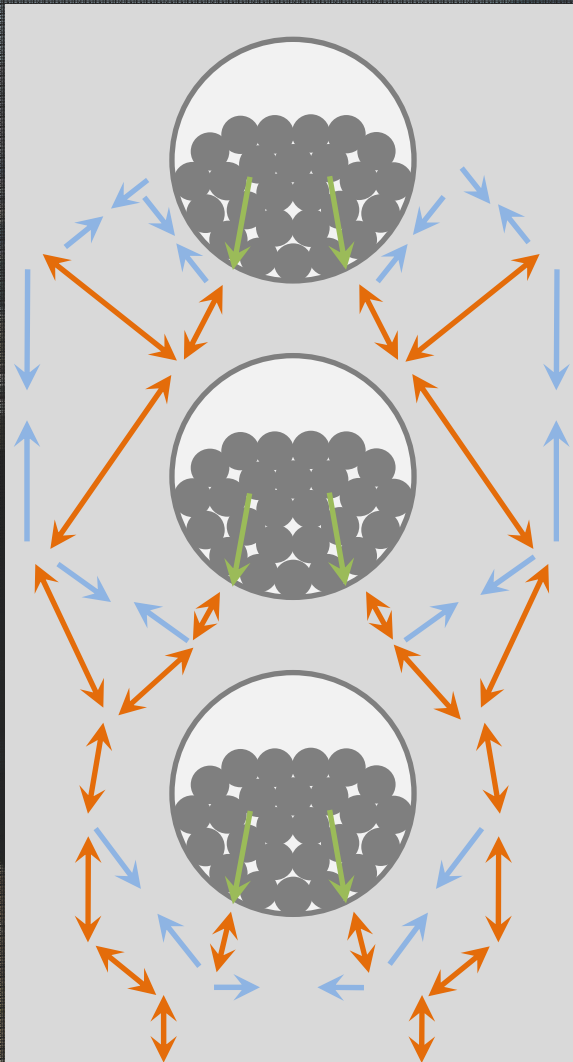
Post-Tensioning Forces

Tendon Loads + Air Pressure



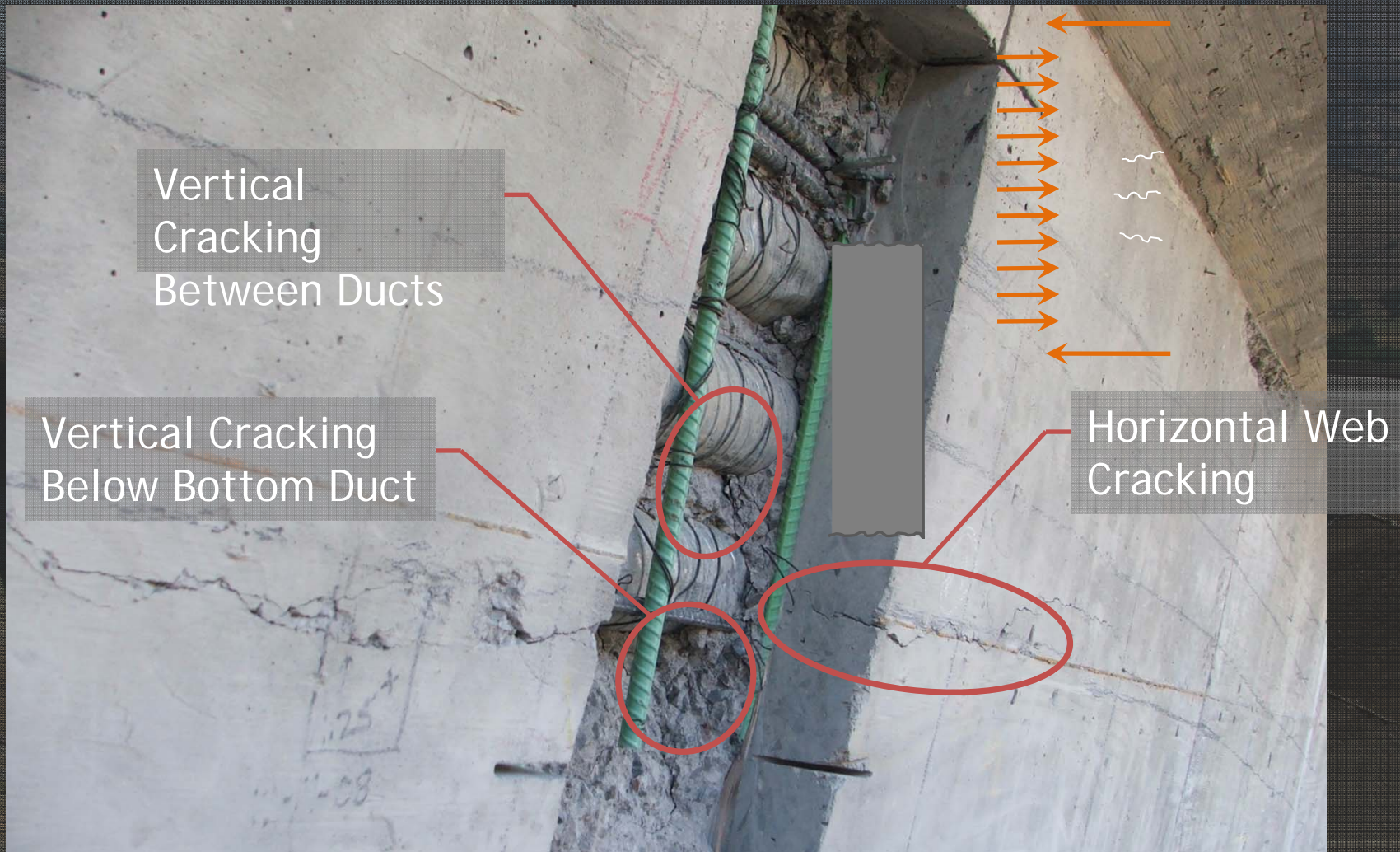
Post-Tensioning Forces

Web Cracking



Air Pressure Test Issues

Web Cracking



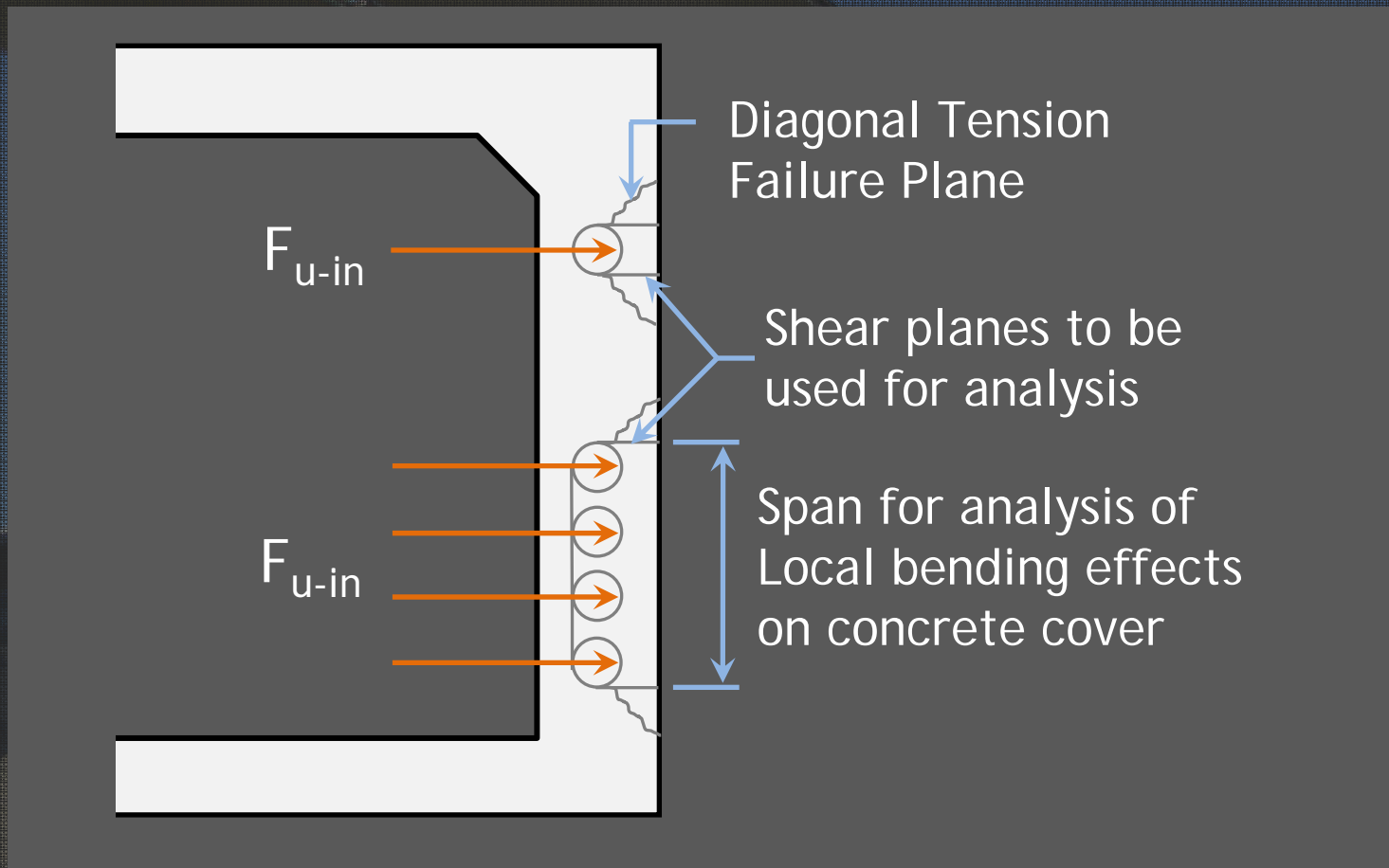
Air Pressure Test Issues

Web Cracking



Design Changes

AASHTO LRFD Provisions



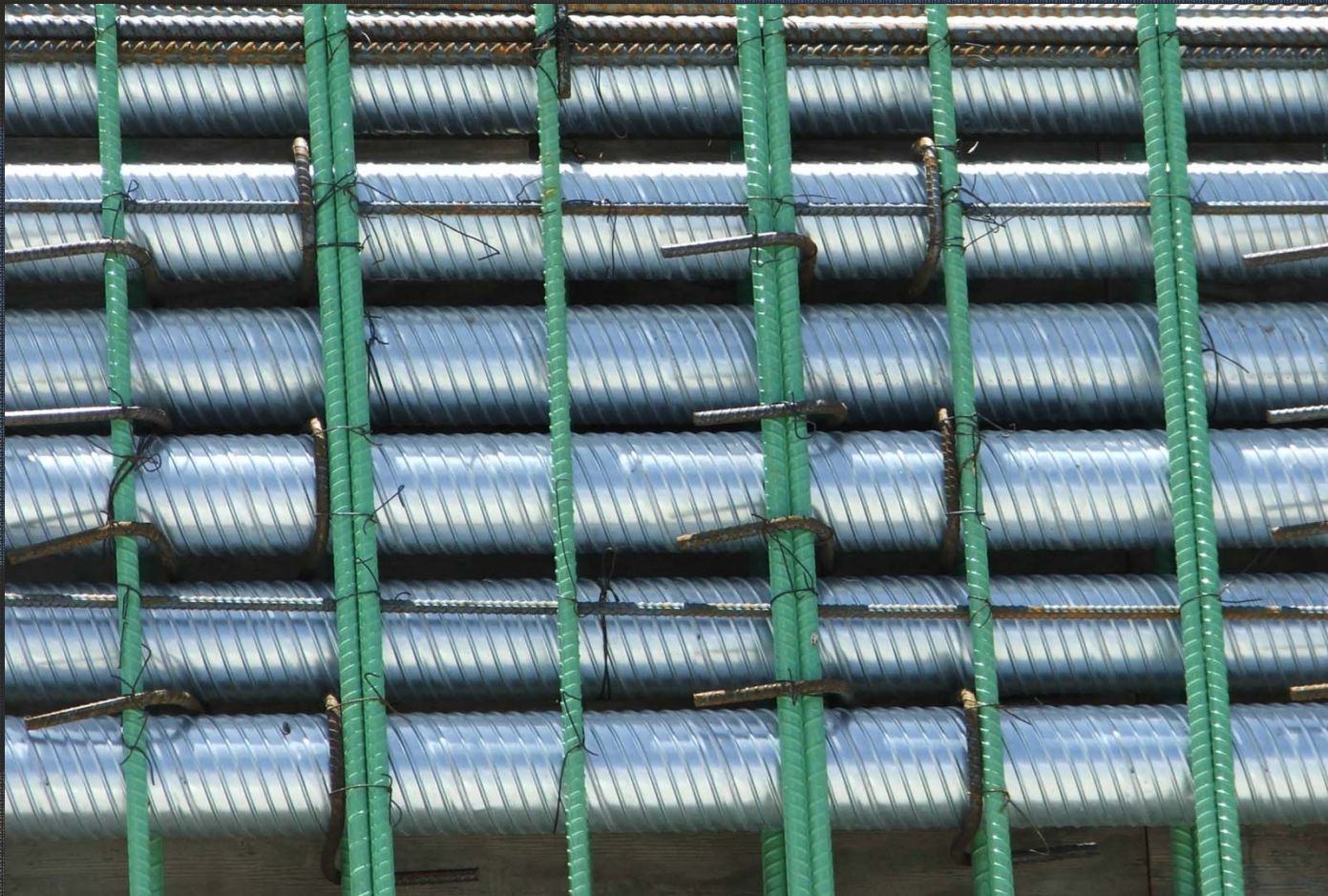
Design Changes

Tension Splitting



Design Changes

Duct Ties



Additional Recommendations

1. Mix Grout 3 Minutes
2. Use Long Vent Tubes
3. Perform Air Pressure Mockup
4. Add Duct Ties
5. Avoid Multiple Duct Pressurization

Project Website

www.freewayextension.com

Galena Creek Bridge Webcams ARCH CAM NORTH CAM SOUTH CAM EAST CAM MAIN

FREEWAY EXTENSION PROJECT

NORTH CAM

SOUTH CAM

EAST CAM

The Galena Creek Bridge is a significant element of the I-580 Freeway Extension Project. When complete, the span of the Bridge's concrete arch will be the longest in the US. To record the construction of this engineering marvel, three cameras are continuously taking photographs. An additional camera has been temporarily added for a one year period. The camera records construction only of the concrete arch span.

NORTH CAM - Located north of the bridge, this camera is aimed at the Bridge's south footing.
SOUTH CAM - The south camera is located south of Galena Creek and aimed at the Bridge's north footing.
EAST CAM - This camera is positioned one-half mile east of the Bridge site.
ARCH CAM - Co-located with the East Cam.

These cameras are timed to take photo images on a regular basis. The frequency of these images varies typically between 15 and 30 minutes.

NEVADA DOT I-580 Galena Creek Bridge Webcams ARCH CAM NORTH CAM SOUTH CAM EAST CAM MAIN

I-580 Bridge over Galena Creek Arch Cam

CONTROLLER Fullscreen

Current Time: 10/17/2005 10:57am
 Time Zone:
 Status:

CAMERA ONE

OCTOBER 2005

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

VIEW MOST RECENT IMAGE

TIME SELECT 10:52 am

100 %

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