ALKALI-SILICA REACTION AT SEABROOK STATION

UPDATE ON TESTING PROGRAMS

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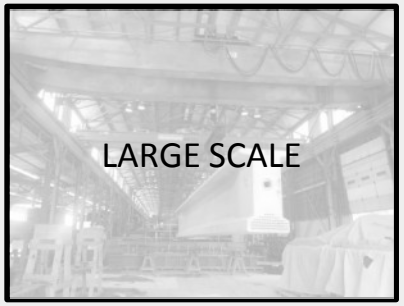
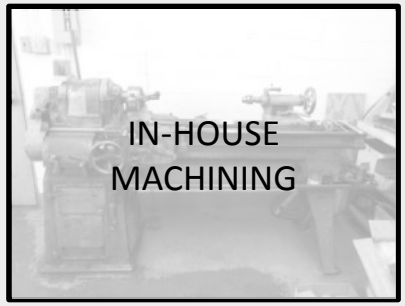
STRUCTURAL TEST FACILITY

CAPABILITIES

FABRICATION





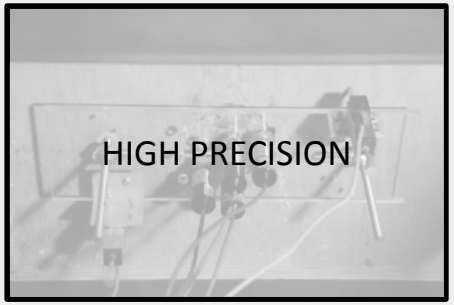
IN-HOUSE
WELDING

TESTING

HIGH
TEMPERATURE

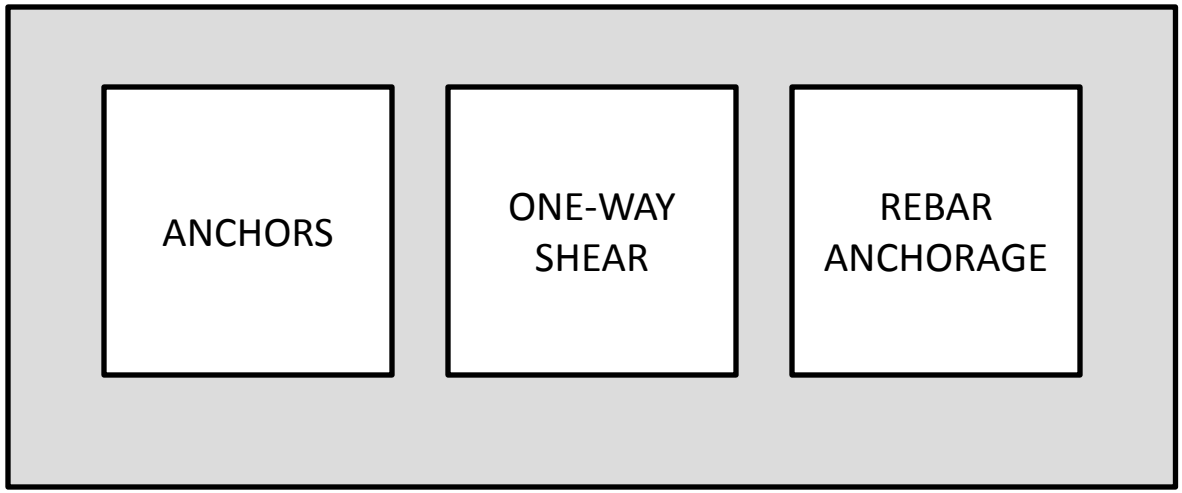
INSTRUMENTATION

HIGH SPEED



AGENDA

SEABROOK TESTING PROGRAMS



ANCHOR PROGRAM

ANCHOR PROGRAM

Wedge Anchors

Large size anchors, deep embedment

Medium size anchors , medium embedment

Small size anchors , shallow embedment

Undercut Anchors

Medium size anchors, deep embedment

Medium size anchors, medium embedment

Half of all ASR-affected anchors installed before development of ASR.

ANCHOR PROGRAM

Deep Anchor Test Setup

Shallow Anchor Test Setup

PROGRESS TO DATE

Specimen fabrication completed October 2012.

Control tests completed in November 2012.

Post-installed anchors tested at low level of ASR in November 2013.

Deep Anchor Test Setup

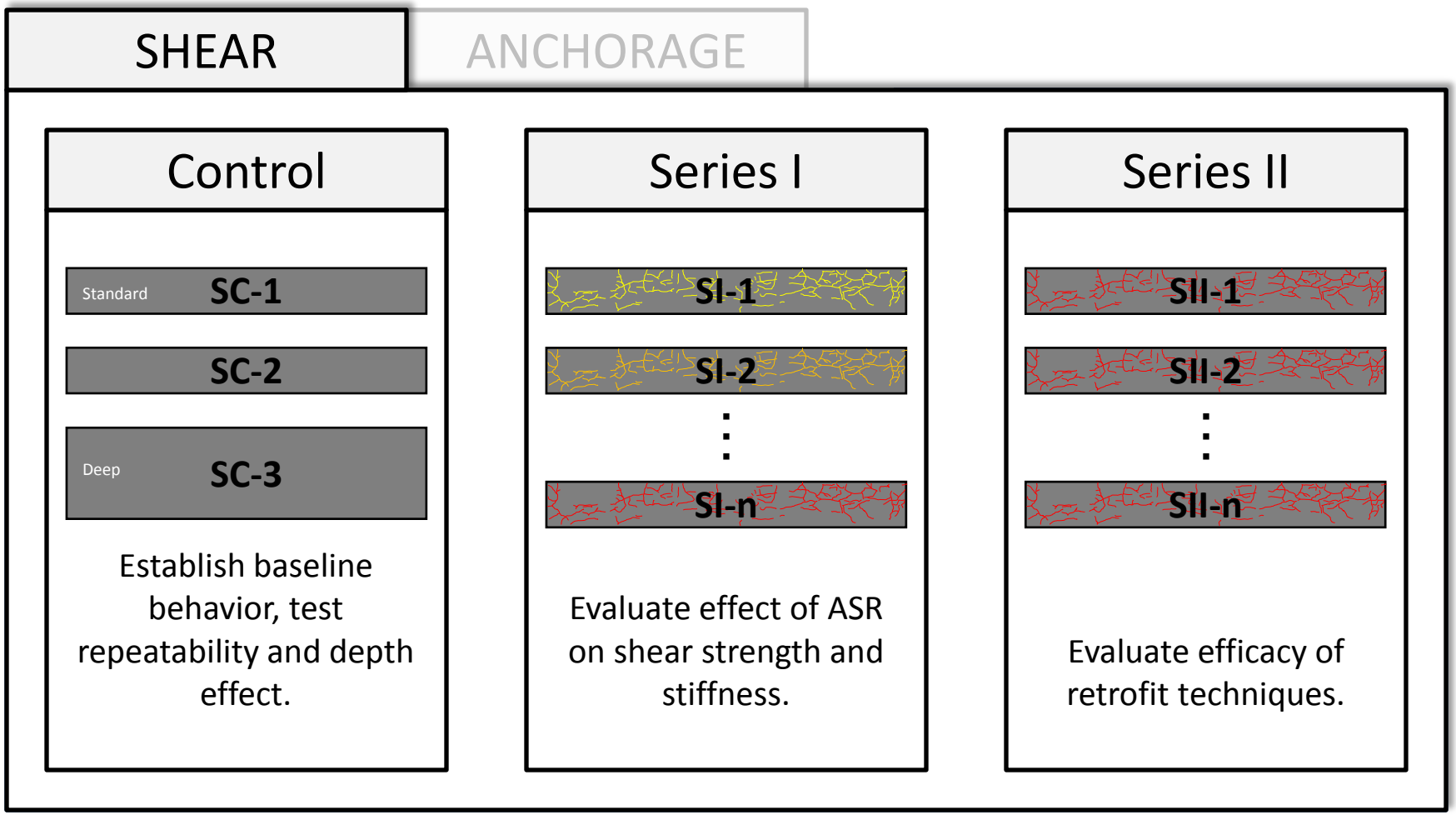
Shallow Anchor Test Setup

OUTLOOK

- Environmental conditioning of blocks and beams is ongoing at FSEL
- Testing of pre-installed anchors at a low level of ASR is to be completed in December 2013.

BEAM PROGRAM

BEAM PROGRAM



BEAM PROGRAM

SHEAR | ANCHORAGE

Control

AC-1

Establish baseline anchorage performance.

Series I

AI-1

AI-2

⋮

AI-n

Evaluate effect of ASR on anchorage capacity and wall stiffness.

Series II

AII-1

AII-2

⋮

AII-n

Evaluate efficacy of retrofit techniques.

REPLICATION OF SEABROOK DETAILS

The reinforcement detailing…

… represents the lack of through-thickness reinforcement within structural walls

… will enable focused study of shear and anchorage behavior at current and future levels of ASR

REPLICATION OF SEABROOK DETAILS

The concrete mixture…

… was developed through trial batching with representative coarse and fine aggregates

… is sufficiently reactive to obtain the necessary data in a timely manner

… yields mechanical properties that are representative of Seabrook structures

CONCRETE MATERIALS

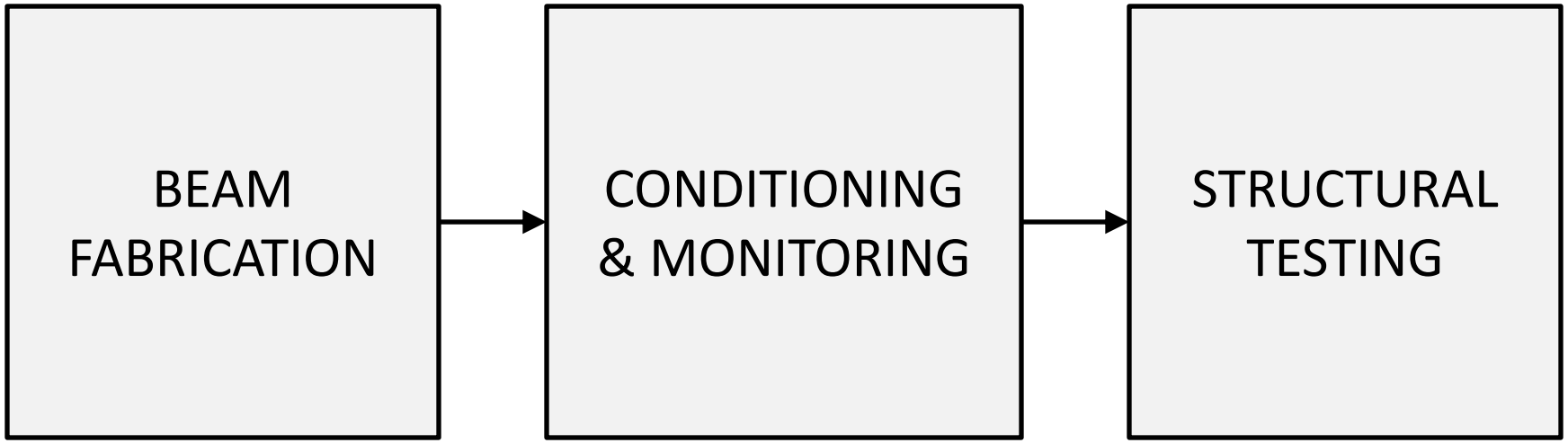
Santa Ana CA
Lafarge Aggregates
Bernalillo, NM

Jobe
Cemex
El Paso, TX

Type I/II
Dragon Cement
Thomaston, ME

Maine
Pike Industries
Westbrook, ME

BEAM PROGRAM WORKFLOW



AGGREGATE DELIVERY

AGGREGATE STORAGE

SIEVE ANALYSIS

FABRICATION AREA

CAGE FABRICATION

FORMWORK

READY MIX TRUCK

AGGREGATE BATCHING EQUIPMENT

AGGREGATE BATCHING

AGGREGATE MOISTURE CORRECTION

SODIUM HYDROXIDE ADDITION

WATER ADDITION

CEMENT BATCHING

CONCRETE SAMPLING EQUIPMENT

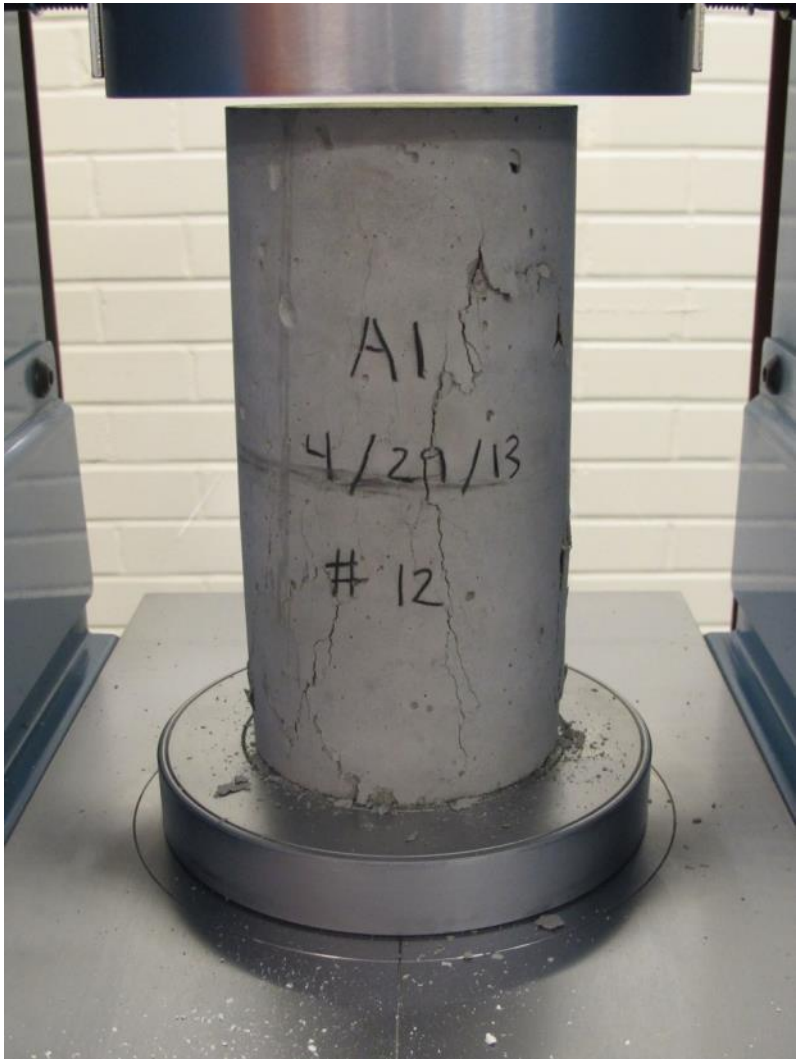
SLUMP TESTING

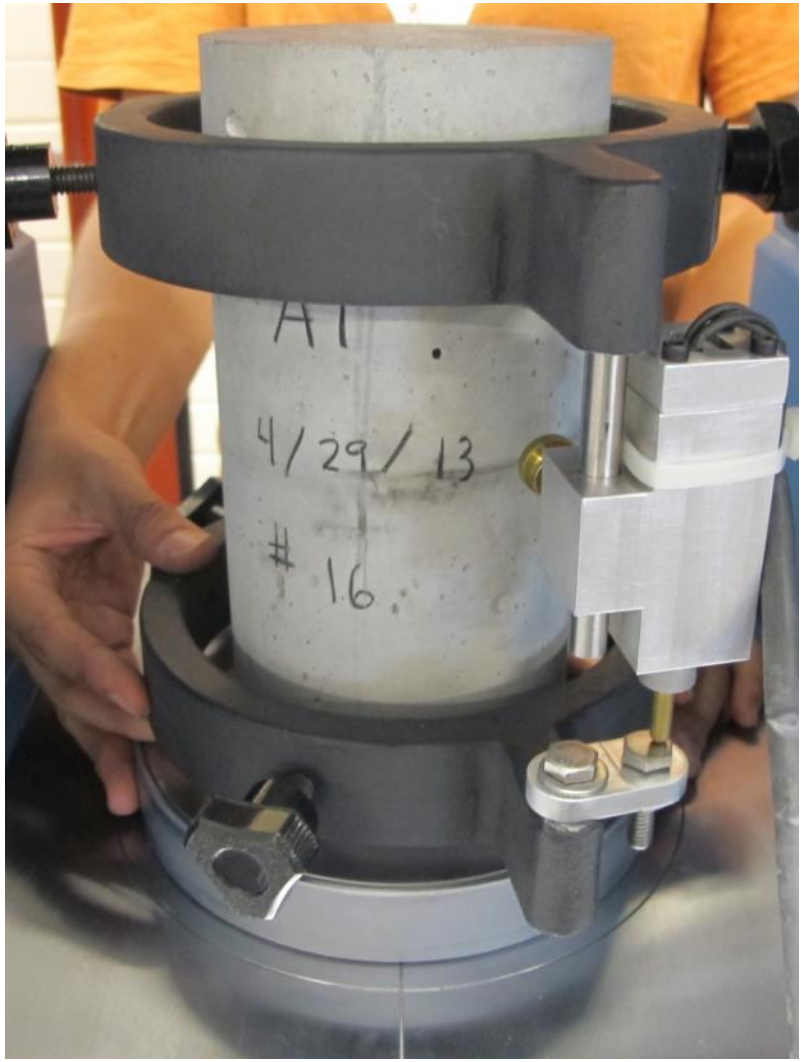
CONCRETE PLACEMENT

BEAM IDENTIFICATION

CURING

COMPRESSION TESTING





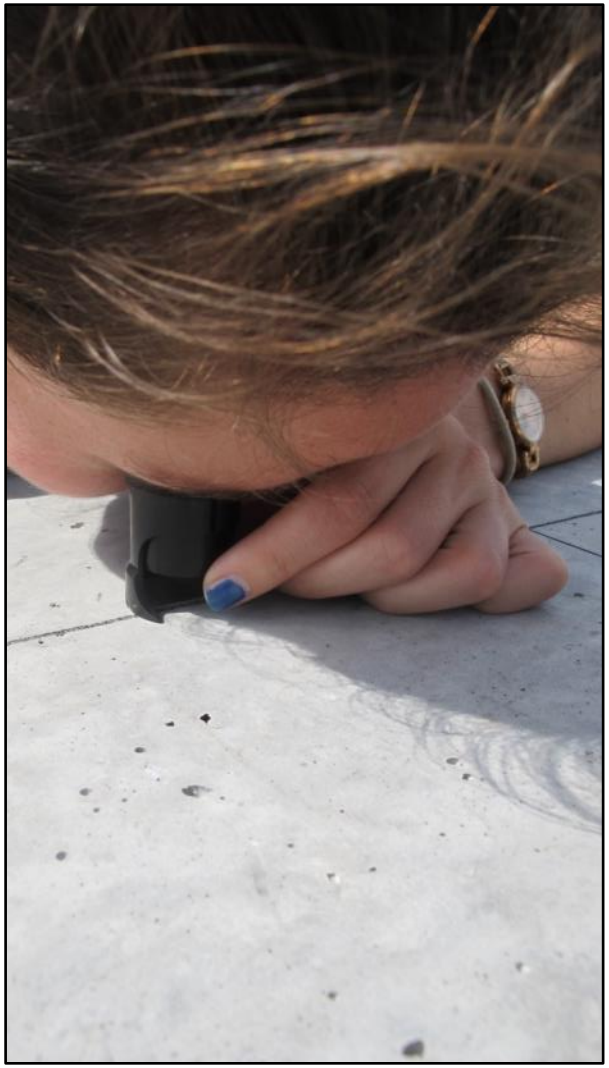
HANDLING

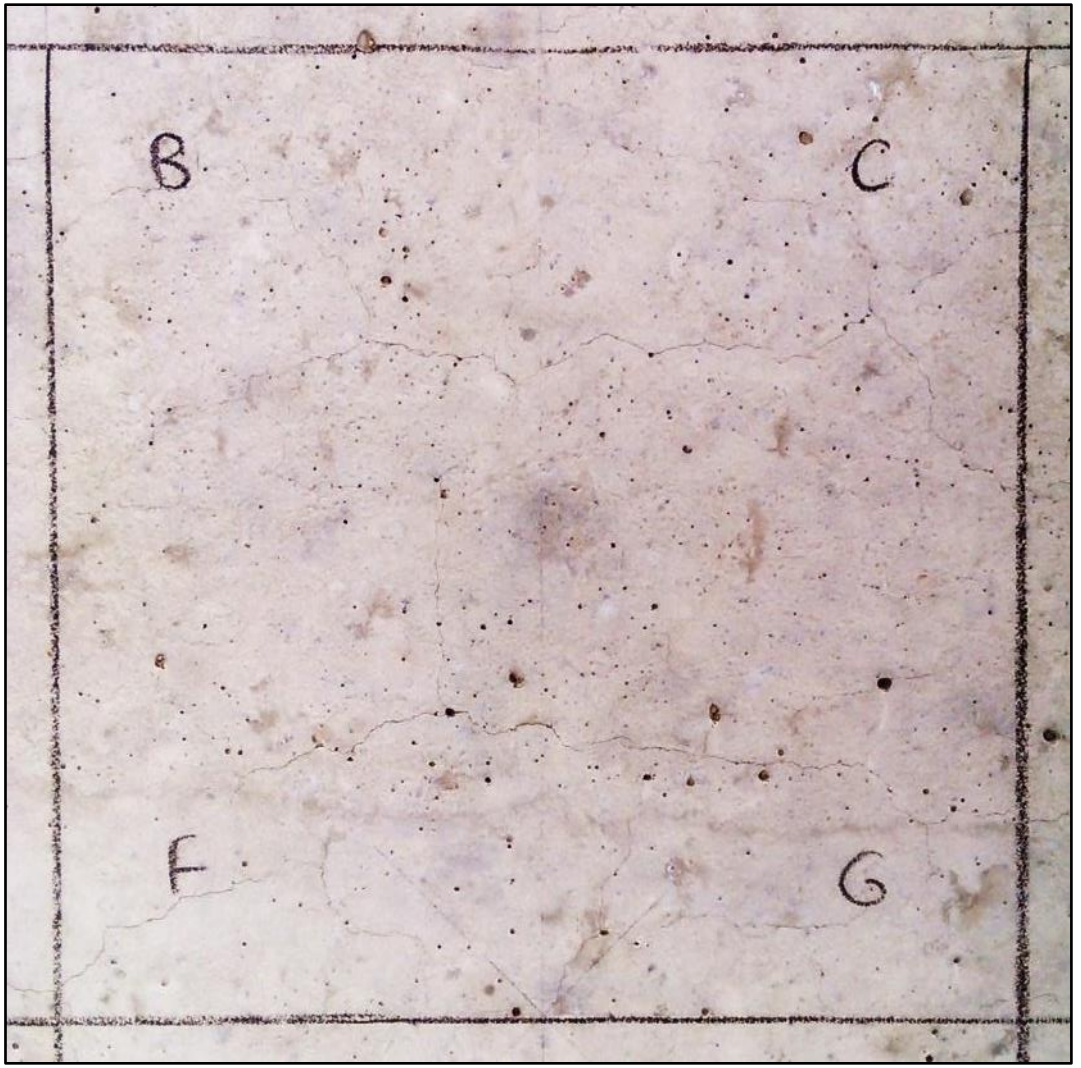
CONDITIONING

EXPANSION MONITORING GRID

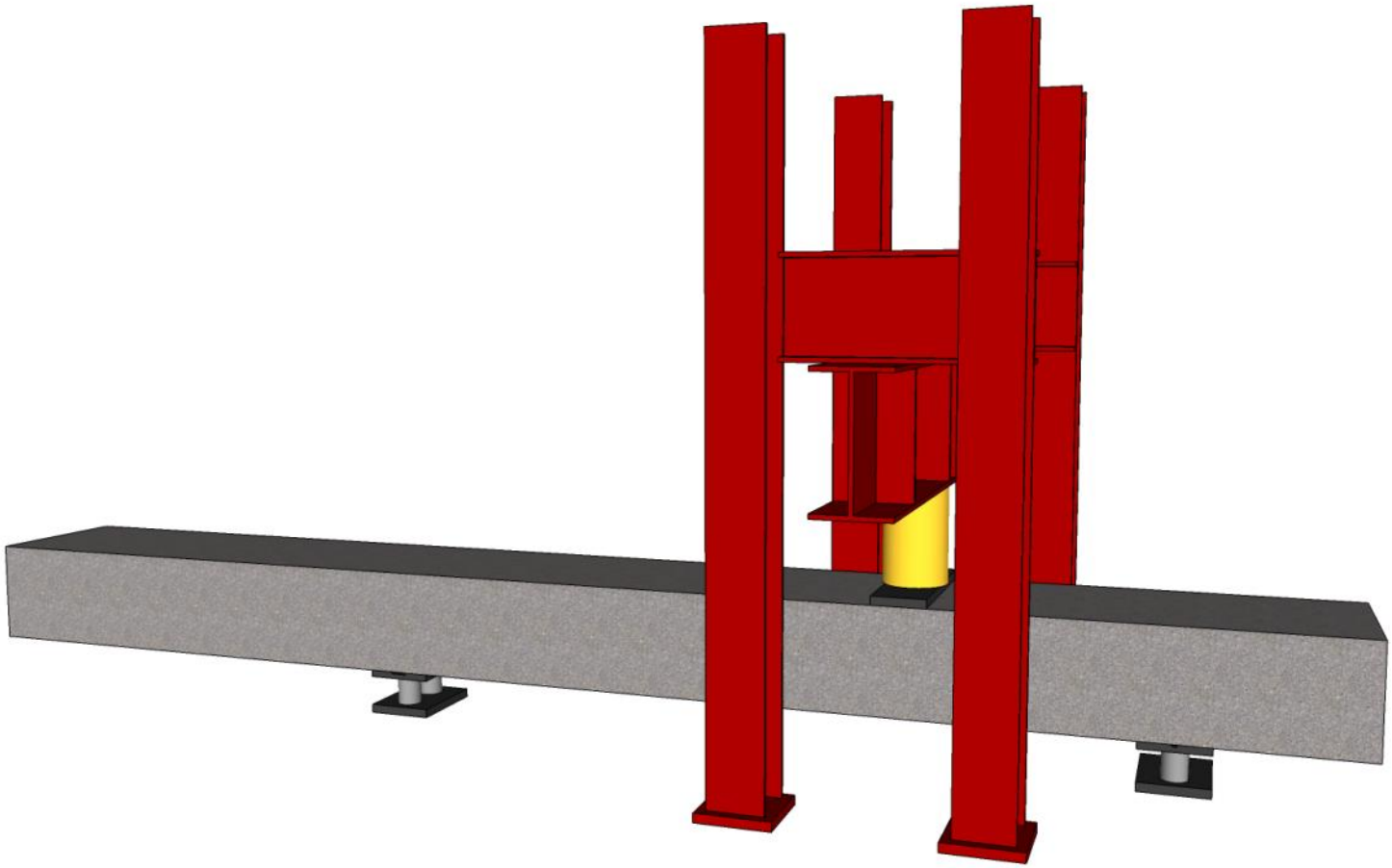
EXPANSION MEASUREMENT

CRACK MEASUREMENT

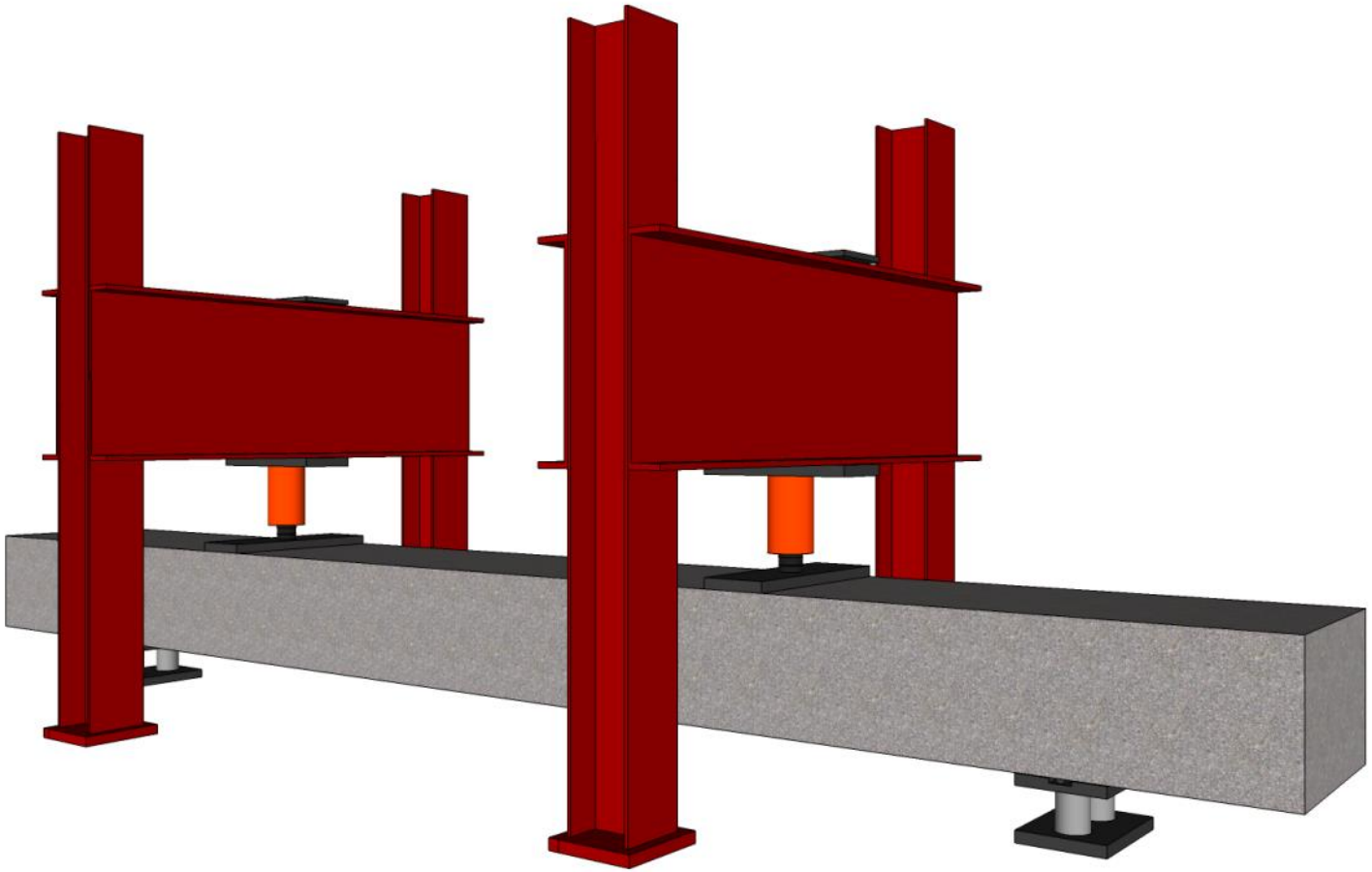




SHEAR TESTING



ANCHORAGE TESTING



PROGRESS / OUTLOOK

SHEAR | ANCHORAGE

1st control test currently scheduled for Q1 of 2014.

2/3 of the shear beams fabricated.

Fabrication, conditioning and monitoring efforts to continue until desired levels of ASR are achieved.

PROGRESS / OUTLOOK

SHEAR | ANCHORAGE

1st control test currently scheduled for Q1 of 2014.

2/3 of the anchorage beams fabricated.

Fabrication, conditioning and monitoring efforts to continue until desired levels of ASR are achieved.

Thank you!