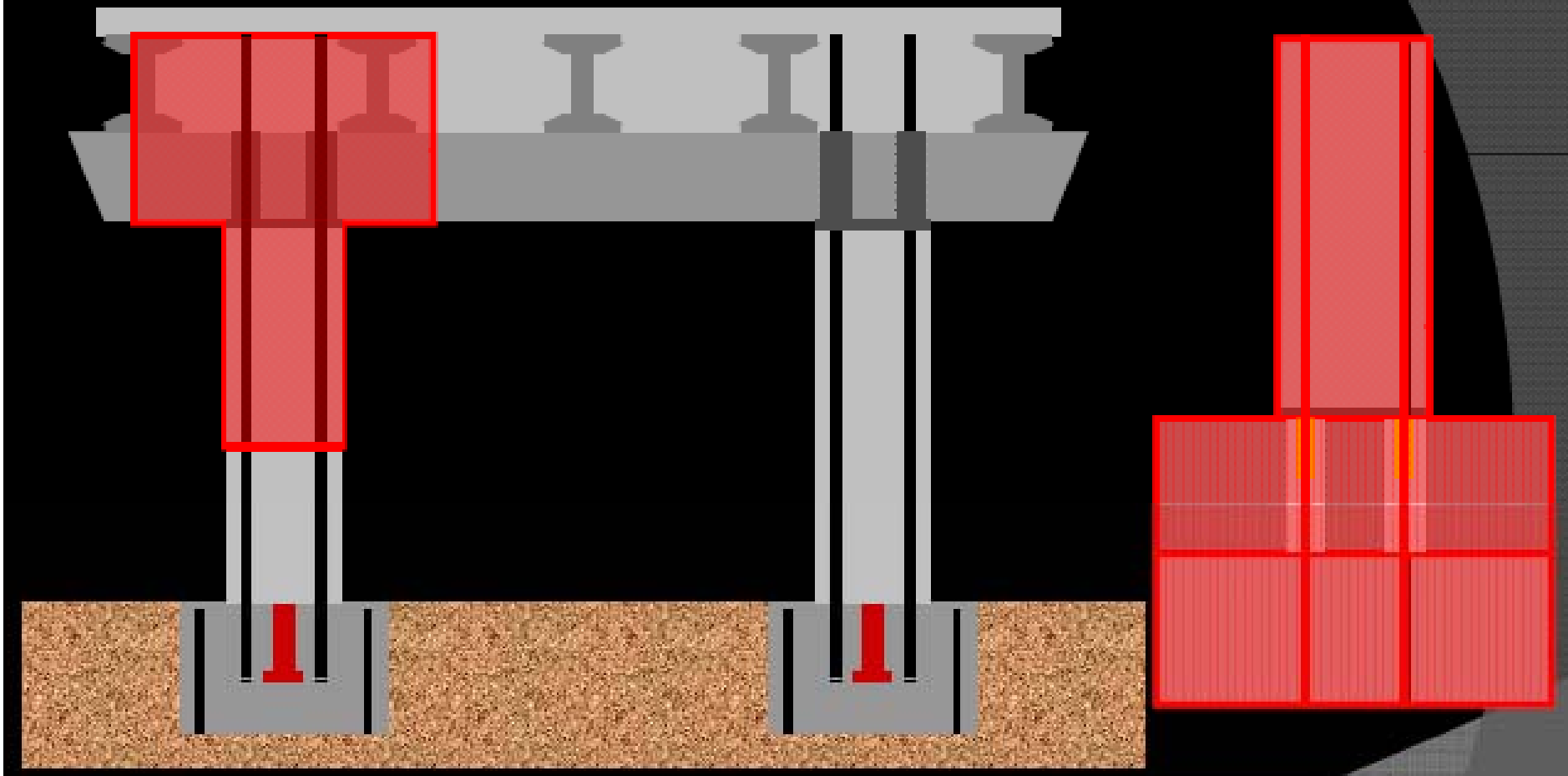
Washington State DOT Precast Points of Interest

(taken from presentation to PCI Bridge Committee, 9/24/10, by Dr. Bijan Khaleghi of WSDOT and AASHTO T10)

- Research--Precast Bent System
- Research--“Highways for Life”
- Precast columns—upcoming project

Precast Bent System (Emulative)– UW Test



WARD 648.2 Rapidly Constructible Large-Bar Precast Bridge-Bent Seismic Connection

PI: Professors John Stanton and Marc Eberhard

Seismic Performance

Pull out Test
Large Bar – Grouted Duct

PRECAST SUBSTRUCTURE
Test Specimen

FHWA - Highways for LIFE (HFL)
Fully Precast Bridge in Seismic Regions

PI: Dr. Lee Marsh, Professors John Stanton and Marc Eberhard

TOP Connection

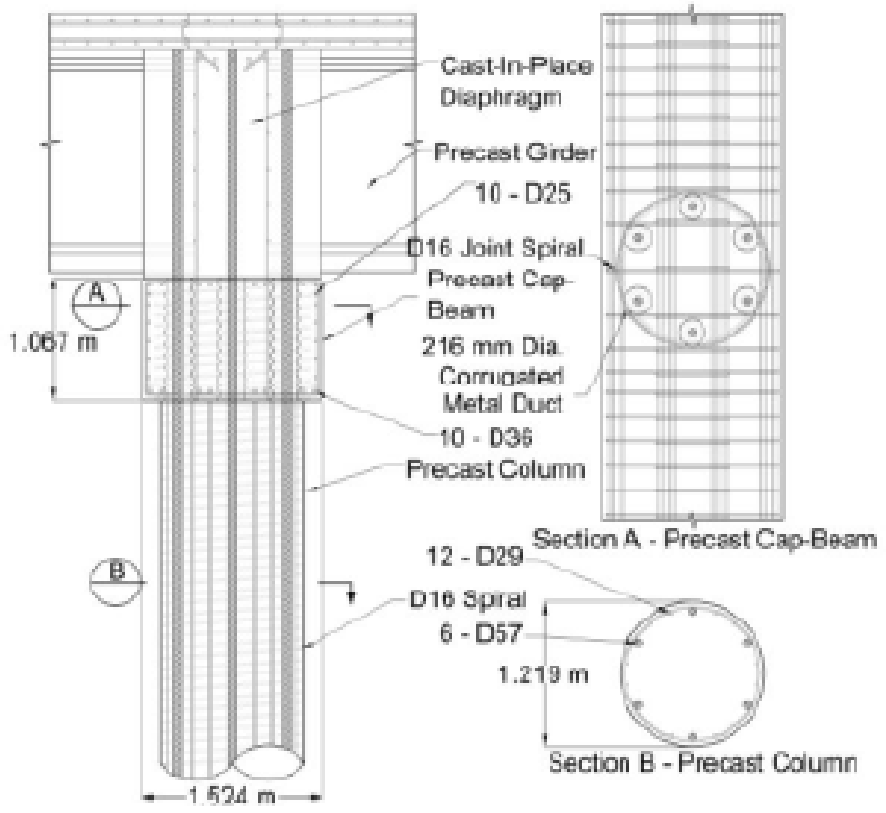


Figure 1. Typical Implementation of Product Concept

Bottom Connection

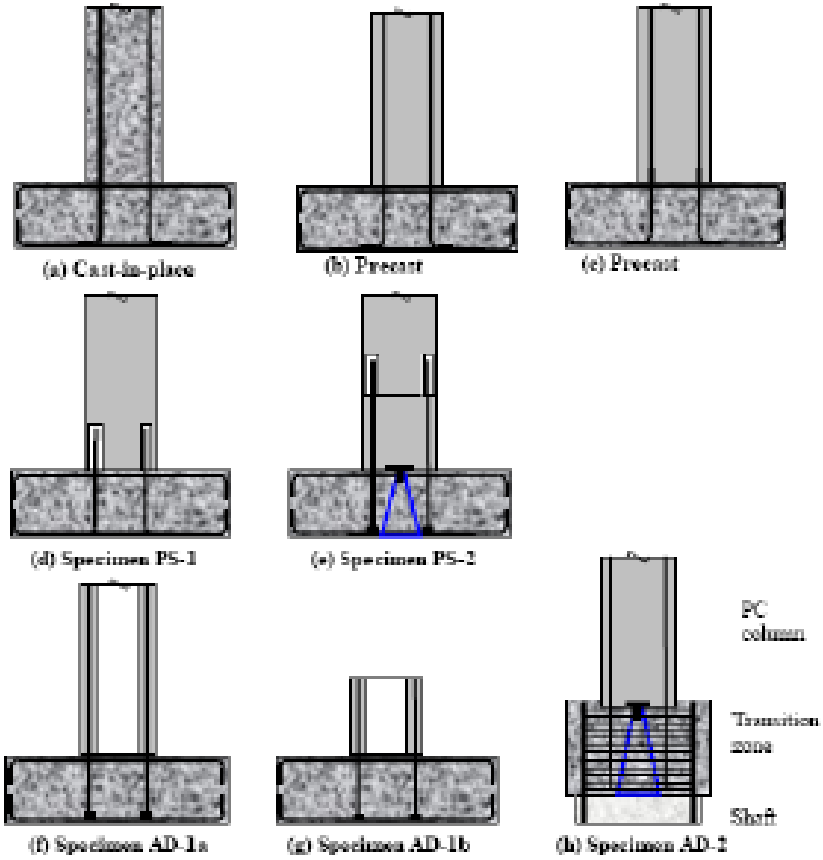
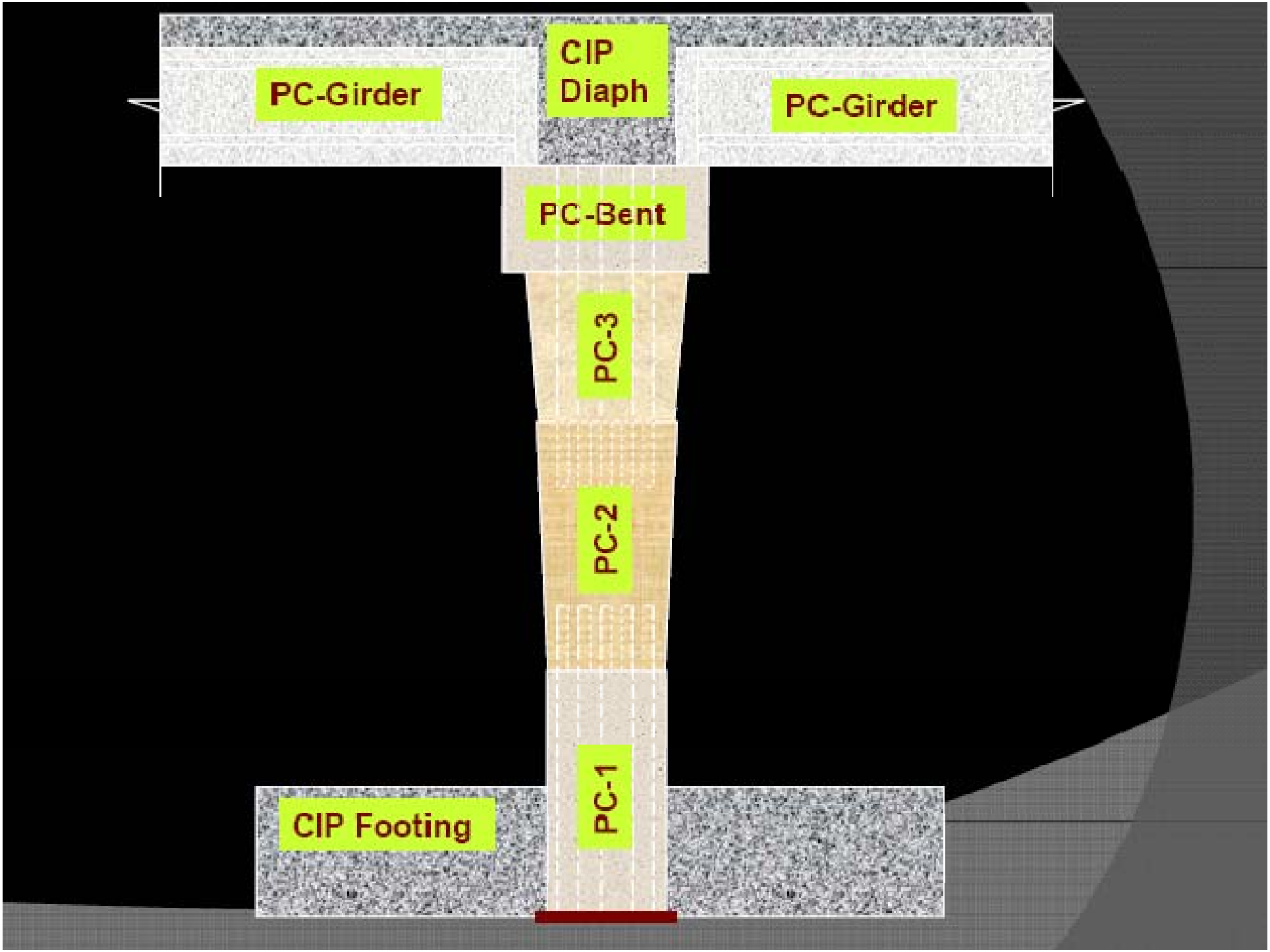
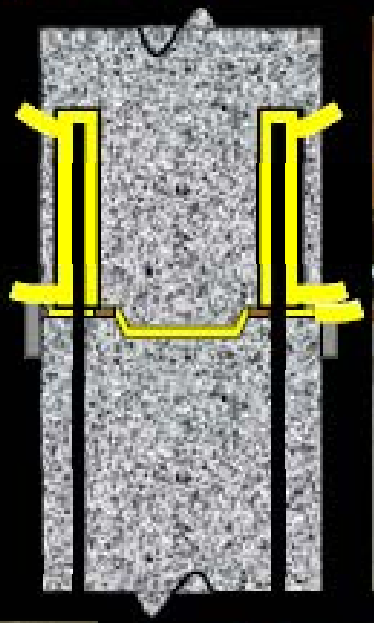


Figure 3. Test Specimens


PC-Girder
CIP
Diaph
PC-Girder
PC-Bent
PC-3
PC-2
PC-1
CIP Footing

Column Splice - Grouting

Grouting Ducts and the interface.



HFL Test Results

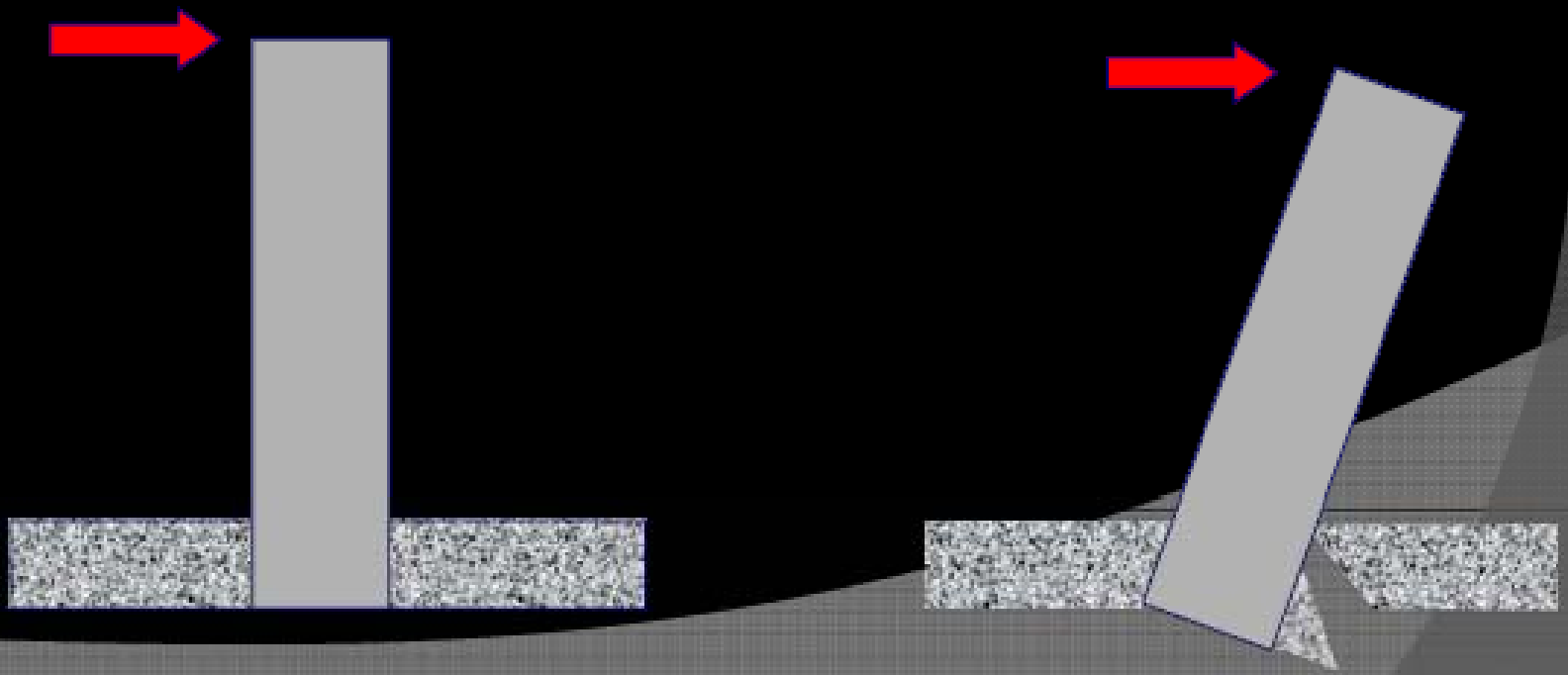
Specimen A

Specimen B

No cracks in footings.

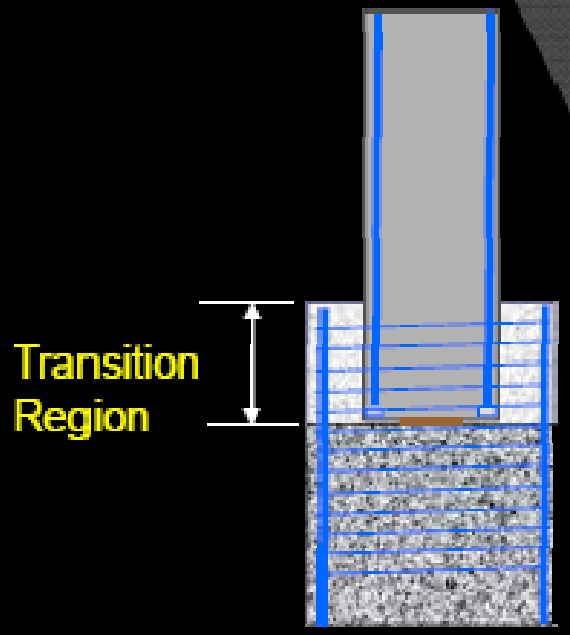
Planned Tests 1: Thinner Footing

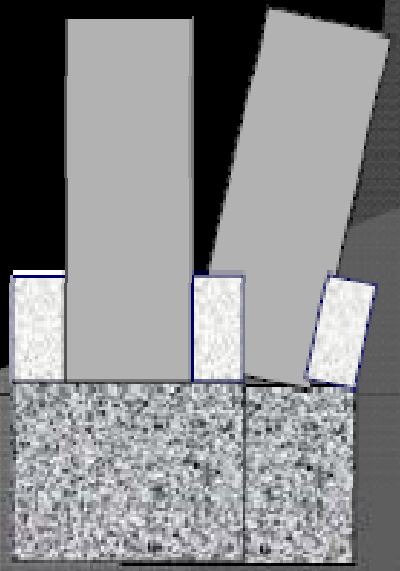
- Footing thickness < column diameter.
- Investigate strength and failure mode if footing fails.
- Expected failure mode:
  - Punching shear + moment transfer



Planned Tests 2: Drilled Shaft.

- P.C column embedded in drilled shaft.
- Investigate potential for failure in transition region
- Specimen A: per WSDOT BDM and AASHTO Seismic Guide Spec.
- Specimen B: Less conservative design of transition region.





WSDOT – UNR: Proposed Highway for Life Demonstration Project

Professor Saiidi, director of Center for Advanced Technology for Bridges and other Infrastructure, University of Nevada, Reno

1. (a) Columns with shape memory alloy (SMA) reinforcement and engineered cementitious composite (ECC), and

2. (b) Columns with embedded elastomeric pads.

Columns with SMA-reinforced ECC: Two innovative materials are combined in these columns each with a distinct purpose. The role of SMA bars is to dissipate energy but essentially eliminate permanent drift and the role of ECC is to eliminate or, at least, minimize concrete damage.

Fig. 4- Damage in RC (left) and ECC columns (right) under 7% lateral drift (Earthquake defense Test, Japan)

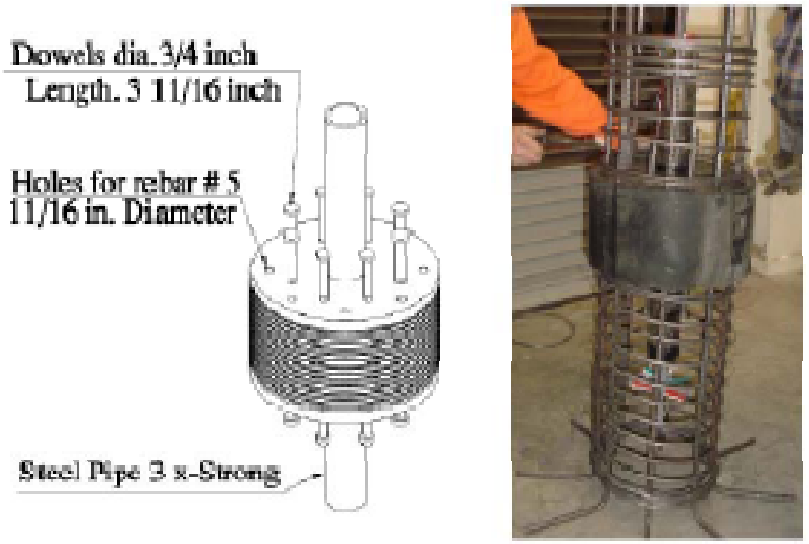
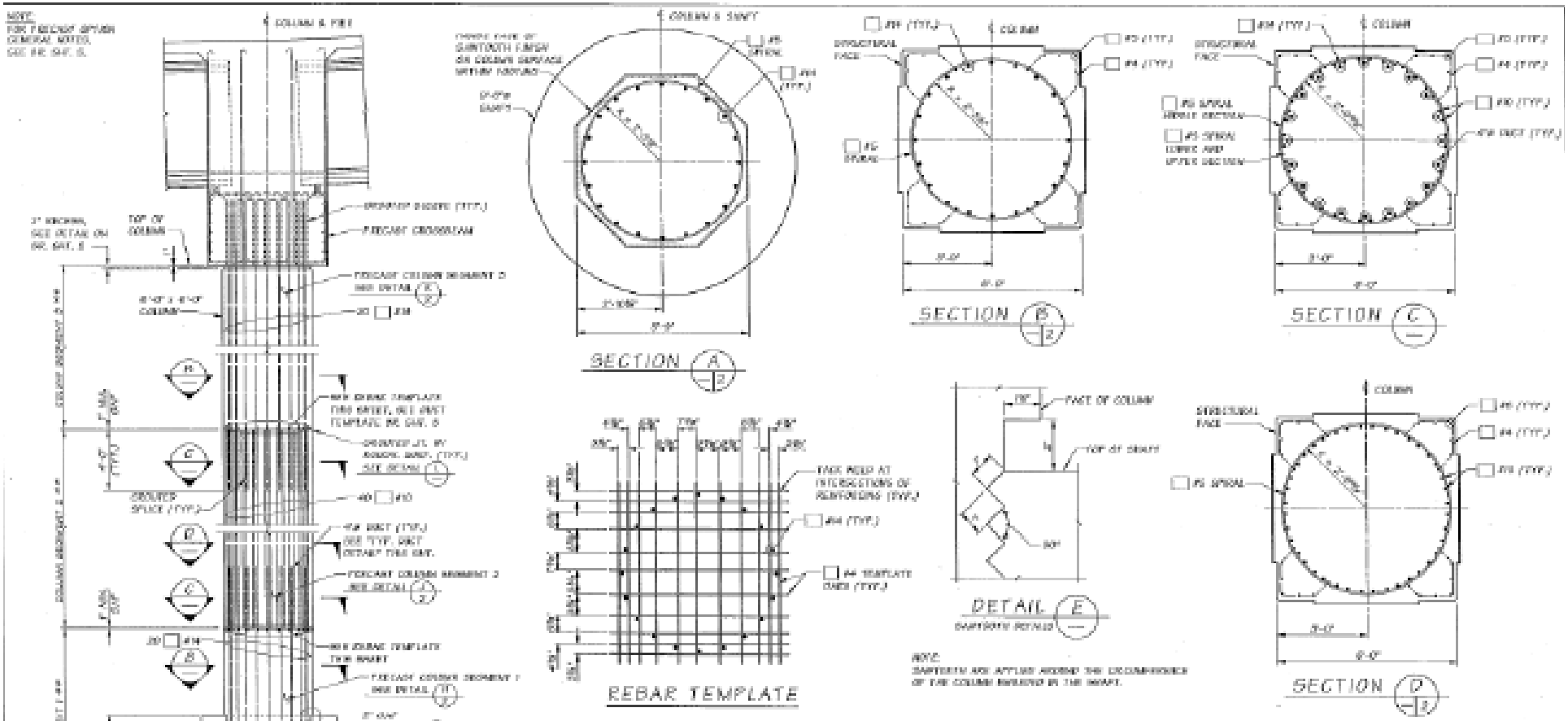


Fig. 5- Details of next generation pad (left) and the actual pad (right)

I5 / SR 16 EB Nalley Valley - HOV



Structure	Bridge Type	Potential Precast Elements	*** Number of Piers	Number of Columns	*Column Height Range	Crossbeam Dimensions
New Line	Steel Plate Girder	Columns & Crossbeams	2	2	25' - 35'	7' x 34' x 6'
SPN Line	Precast, Prestressed Girde	Columns & Crossbeams	6	6	25' - 75'	8' x 27' x 4.5'
SPS Line	Precast, Prestressed Girde	Columns & Crossbeams	6	6	55' - 80'	8' x 27' x 4.5'
HOV16 Line	Precast, Prestressed Girde	Columns	7	15	25' - 35'	N/A
EB16 Line	Precast, Prestressed Girde	Columns	7	20	35' - 60'	N/A