



**Virginia Concrete Conference
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**Innovative Bridge Research and
Deployment Program and
Progress of Self-Consolidating Concrete**

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Topics Covered

- The IBRD Program and HPC
- Introduction to SCC
- Applications in Japan and Europe
- Applications of SCC in the U.S.
- Research Effort
- Closing Remarks



Research, Technology and Education FY 2006 thru FY 2009

☞ Exploratory Advanced Research Program

– \$ 14 M/Year

☞ Seismic Research

– \$ 2.5M/Year

☞ Long-term Bridge Performance Program

– \$7.75 M/Year

☞ High Performing Steel Bridge R&T Transfer

– \$4.1 M/Year



Research, Technology and Education FY 2006 thru FY 2009

- ☞ High Performing Steel Bridge R&T Transfer
 - \$4.1 M/Year
- ☞ Ultra-High Performance Concrete
 - \$ 0.625 M/Year



IBRD Program

- ☞ Promote, Demonstrate, Evaluate and Document:
 - Innovative designs, materials, construction methods, repair, rehabilitation techniques
- ☞ IBRC = \$21 M/year
- ☞ IBRD= \$13.1M/Year
 - HPC = \$4.125M/Year



Traditional Concrete Construction

- ☞ Vibration necessary
- ☞ Labor intensive
- ☞ Skill dependent
- ☞ Quality varies



Self-Compacting/Consolidating Concrete

- No vibration needed
- **Less noise**
- Better working environment
- **Faster construction**
- Improved quality and durability

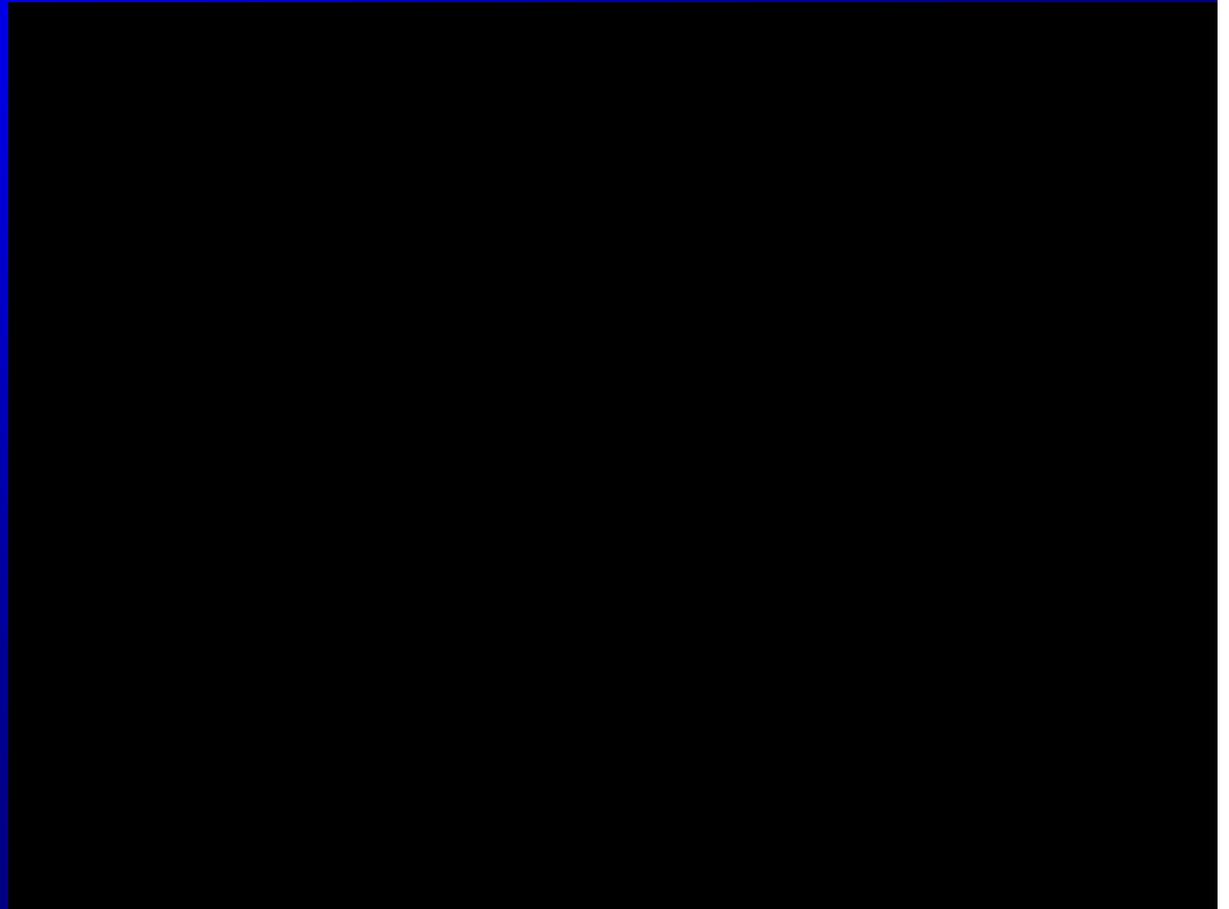


SCC Demonstration

☞ Filling ability

☞ Passing ability

☞ Resistance to segregation



Three Key Characteristics of SCC

- ☞ Ability to flow into forms
- ☞ Ability to pass through reinforcement
- ☞ Resistance to segregation



Applications of SCC in Japan



Anchorage completed in 2 years rather than 2 ½ years!





SCC Prestressed Girders
Used in Japan



Applications of SCC in Europe



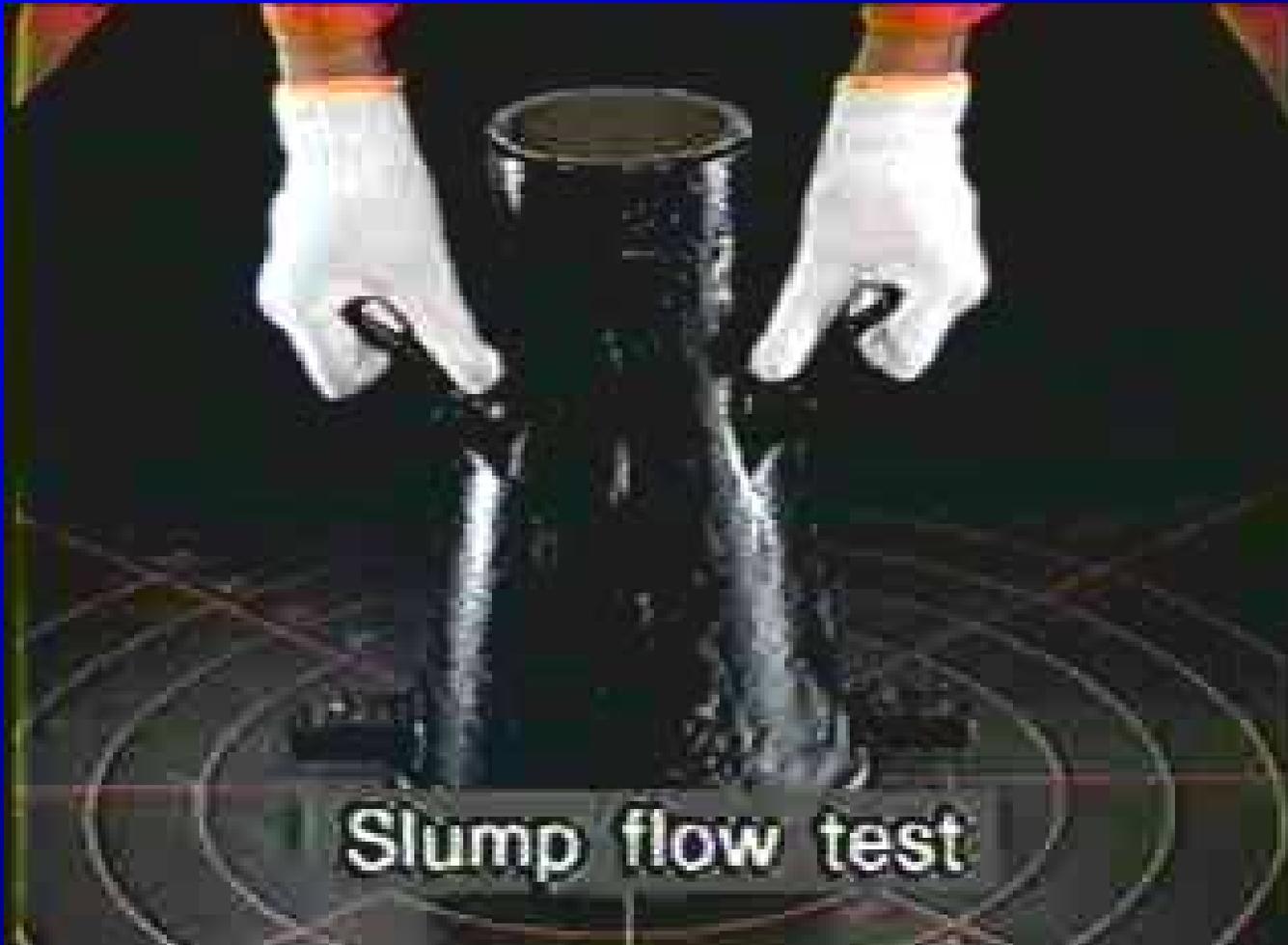
- Cast time reduced by 35–40%
- **Labor reduced by 50%**
- No repair for defects



SCC Deck Pour



Slump Flow Test



Applications of SCC in the U.S.







The Skyline Bridge in Omaha, NE





The Pamunkey River Bridge Richmond, VA







**I-4 Pedestrian Overpass
Heathrow, FL**







SCC at Auburn University



SCC in Drilled Shafts



Guidelines and Specifications

- ☞ PCI – Interim Guidelines for Self-Consolidating Concrete
- ☞ ACI Committee 237 – Self-Consolidating Concrete: Emerging Technology Series
- ☞ ACI Committee 211 – Proportioning SCC
- ☞ ASTM Test Methods – Slump Flow, J-Ring and Column Segregation





Slump Flow Test
J-Ring
Column Segregation



Innovative Bridge Research and Construction (IBRC)



Colorado

Hawaii

Kansas

Michigan

Nebraska

New Hampshire

South Carolina

Virginia



NCHRP Study

☞ NCHRP Project 18-12 SCC for PC, PS Concrete Bridge Elements:

☞ Deliverables:

- Develop properties and performance criteria
- **Provide mix design recommendations**
- Recommend Test Methods
- **Fresh and Hardened Properties**
- Durability characteristics
- **Structural Design and Construction Specifications**



Closing Remark

- ☞ Design SCC to meet project needs:
- ☞ **Work and Experiment together**
 - Designer
 - **Specification Writer**
 - Materials Engineer
 - **Contractor**
 - Subcontractor/Supplier
- ☞ **SCC has major technical and economic advantages**

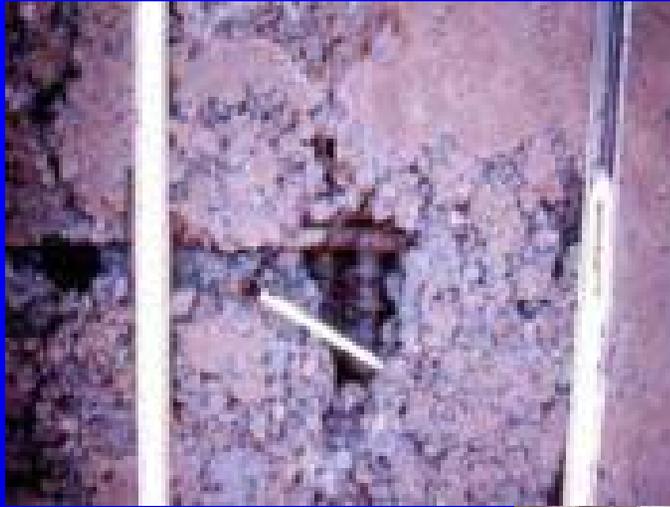




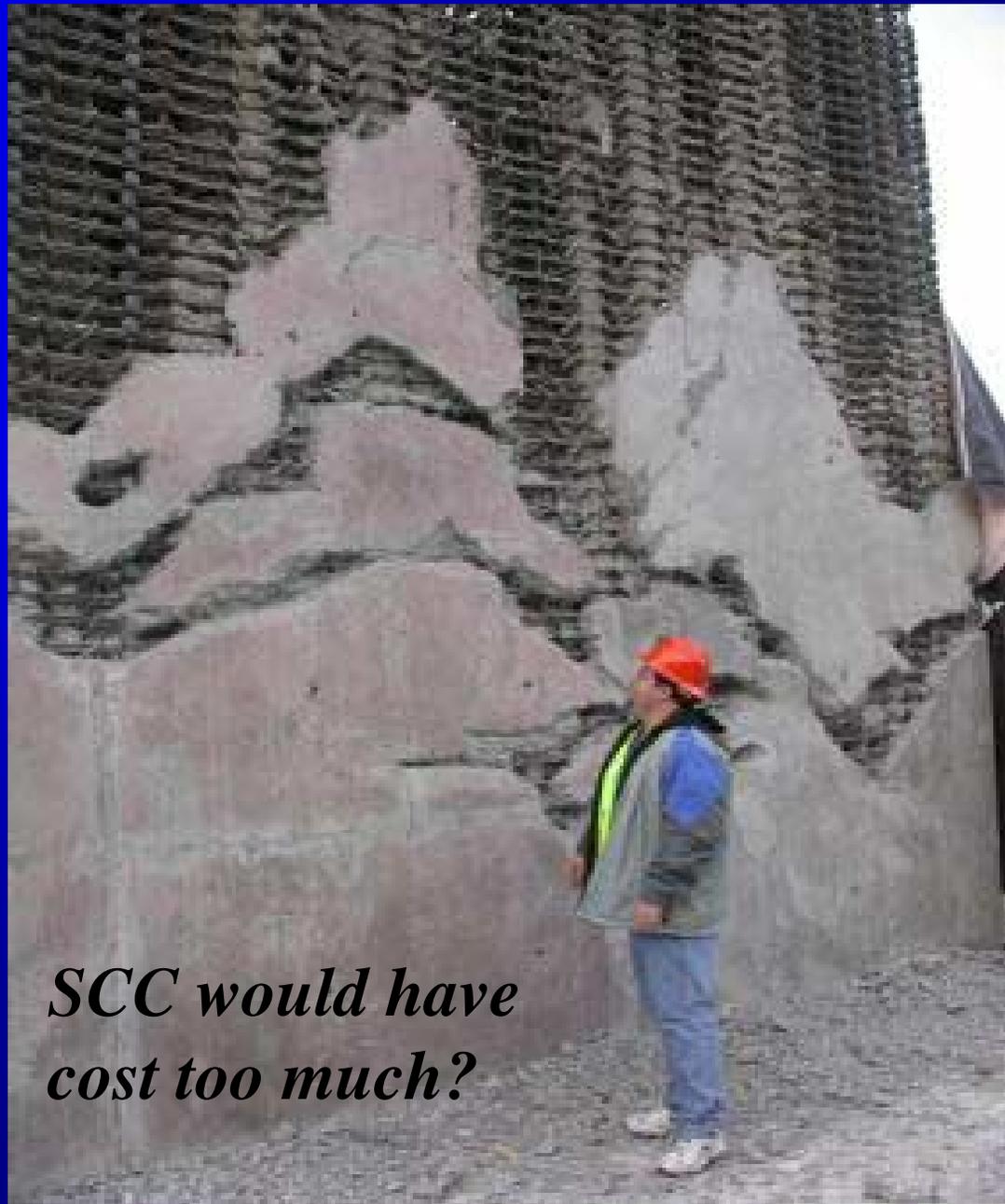
**Can we afford not to consider
SCC?**

Good HPC

But poor consolidation!



**Good HPC,
But poor
consolidation!**



*SCC would have
cost too much?*



Drilled shafts with congested reinforcement

High slump concrete would not do it.

SCC will work!



Think SCC in your next project!

- Intricate and complex forms
- Congested reinforcement
- Architectural surfaces
- Precast/Prefabricated elements
- Quality and high productivity





Thank you. Any questions?