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 = $13.1 M/Year

HPC = $4.125 M/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

Anchorages 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
Precast SCC Railing
In Spokane, WA
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?