





American Concrete Institute®
Advancing concrete knowledge

The Art of Concrete

ACI Spring 2012 Convention
 March 18 – 21, Dallas, TX

ACI
 WEB SESSIONS

James Shilstone (Jay) is the 3rd generation of Shilstones to be involved in concrete quality control and follows after his father, Jim, in working with architectural concrete. Jay has been involved in architectural concrete projects worldwide with an accumulated value of over \$4,000,000,000. His most recent efforts involve the development of performance specifications for architectural concrete. Jay is a member of ACI 303, Architectural Concrete, as well as multiple ACI, NRMCA, ASTM and TRB committees dealing with concrete and quality control.

ACI
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Command Alkon

ACI Spring 2012 Convention "The Art of Concrete"

Making Architectural Concrete Work

- James M. Shilstone, Jr., FACI



1962 – Jim Shilstone formed Architectural Concrete Consultants

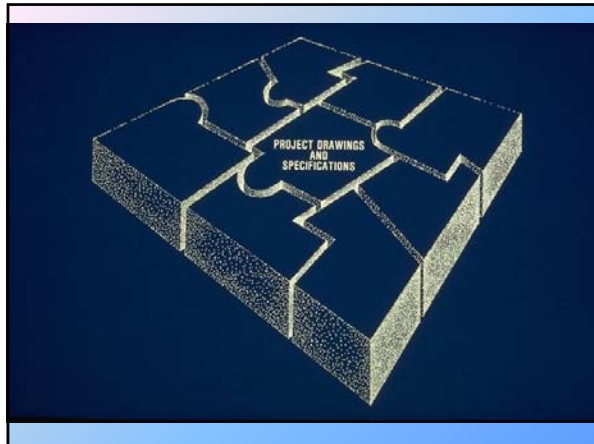


WASON MEDAL AWARD PAPER
 FOR MOST MERITORIOUS PRESENTATION TO THE INSTITUTE
 AMERICAN CONCRETE INSTITUTE – 1979

Concrete Construction — Making the Process Work

By JAMES M. SHILSTONE*

Concrete construction is the only manufacturing process that occurs on the construction site




Concrete: The Ultimate in Functional Artistry

- Understand Concrete
 - Plastic
 - Hardened
- Understand the Concrete Process
- Know the Materials available
- Recognize the limitations of the Material and the Process
- Stone vs. wood vs. concrete



Drawings & Specs

- P P P P P
 - BRE (1975) – 500 bldgs
 - 60% of problems originate from design
 - 35% from workmanship
 - 10% from materials
- Constructability
- Prebid conference
- Preconstruction conference
- Mockups



Construct-ability




ARCHITECTURAL CONCRETE QUALITY

Relative significance of construction details on the results

	AD CAST FINISH				DISTRESSED FINISH									
	Abn. ^o	Non-Abn.	Abn. Blast	Impact Hammer	Combination		Wear and Hammer		Wear and Color		Chemical Treatment			
	Factor	Impact	Texture	Light	Medium	Dark	Wet	Dry	Wet and Hammer	Very Wet and Hammer	Very Wet and Color	Very Wet and Hammer	Very Wet and Color	
CONCRETE MIX														
Cement Color	1	1	1	1	2	3	2	3	3	1	1	2	1	2
Fine Aggr. - Gradation	4	4	4	4	2	1	3	2	3	3	3	2	3	1
Color	3	3	3	2	3	3	2	2	2	2	2	2	2	3
design Technique	4	4	4	4	2	1	4	4	4	4	3	3	3	1
Appearance	2	3	3	3	3	2	1	3	2	2	2	2	2	3
Workmanship	2	1	2	2	2	2	2	2	2	2	2	2	2	2

“Exposed” concrete is the most difficult finish to achieve.



Performance Architectural Specs

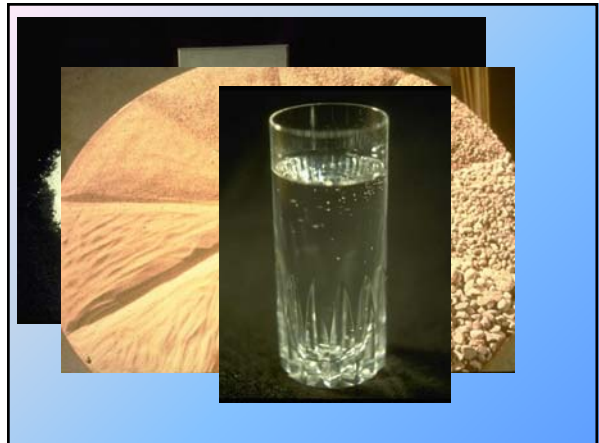
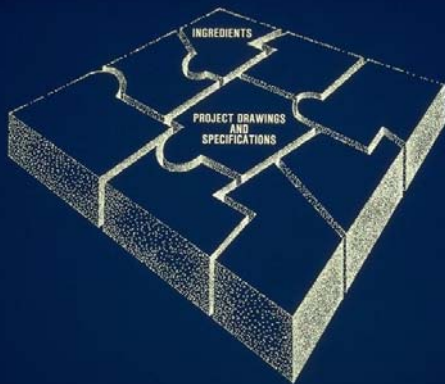
Rock pockets due to segregation



Description: If the concrete mix separates into coarse aggregate and mortar, rock pockets called “honeycomb” can occur in the concrete.

Potential Causes: Segregation of rock particles can be caused by many things. Typical causes are an unstable concrete mix, incomplete mixing or improper placement. An unstable concrete mix can occur if the concrete mix is gap graded and there is a high fluidity of the mortar or if there is too much material retained on a single sieve. Incomplete mixing can occur if there is a short haul between the batch plant and the jobsite or if the fins on the interior of the truck are worn down. Improper placement is usually the result of bouncing the concrete off either the forms or the reinforcing steel.

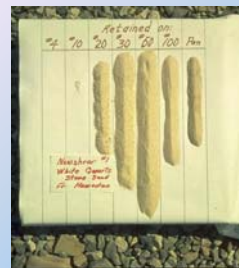
Possible Solutions: The easiest way to determine if a concrete mix is unstable is to batch the concrete at the highest allowable slump, then dump some concrete into a wheelbarrow. If the mix segregates, redesign the mix or place it at a lower slump. Well-graded aggregate mixes tend to segregate less than gap-grade mixes. Concrete mixtures can be evaluated using procedures shown in ACI 302, *Guide for Concrete Floor and Slab Construction*.



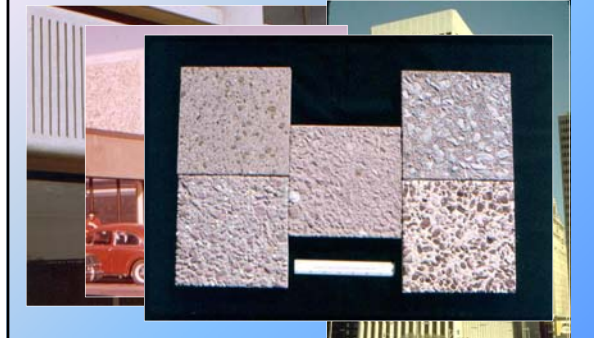
Mixture Ingredients



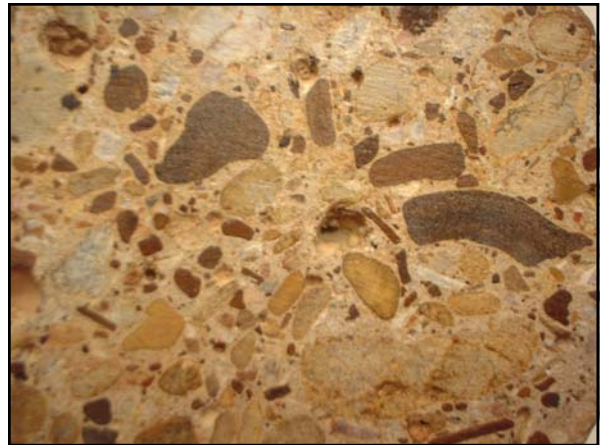
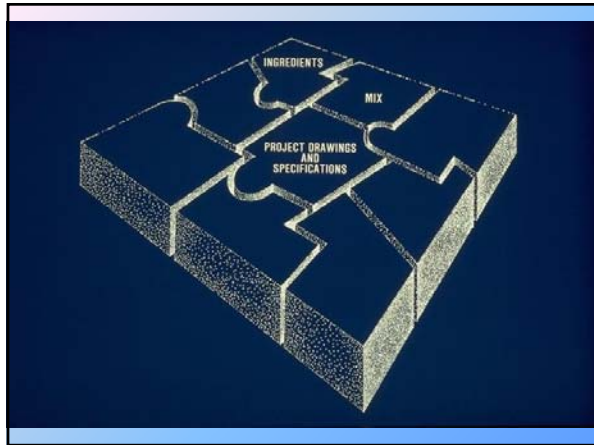
Aggregate Grading



Material Color



Beware of Contamination



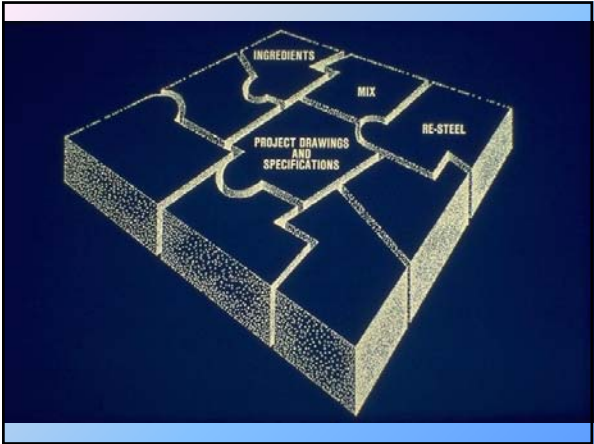
Limitless possibilities



Finish impacts appearance



Gap Graded Mixes

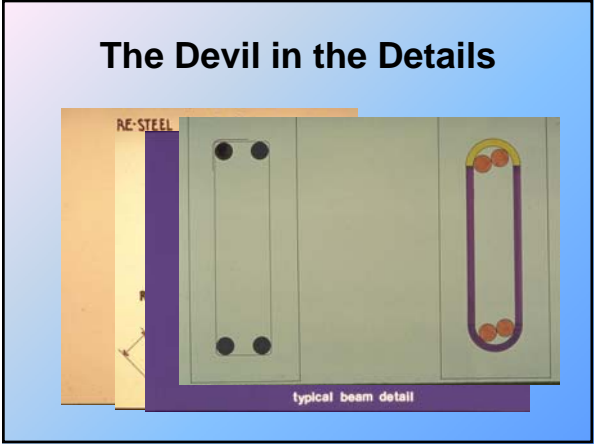


Reinforcing steel congestion

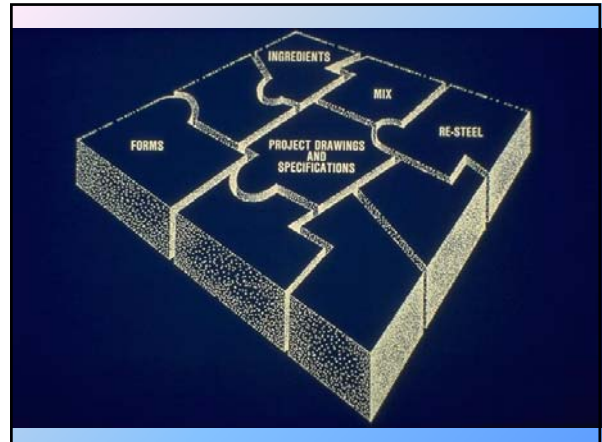
BIM can help but it isn't the entire answer



Cover on Reinforcing Steel



Steel directs the vibrator



The Mirror of the Form



Formwork



Formwork Materials



Formwork Problems



Release Agent



Formwork – Sealing Joints



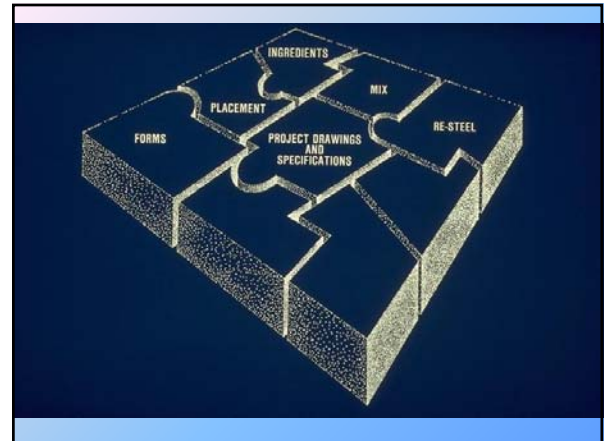
Form Butt Joint Location



Form Stripping Control



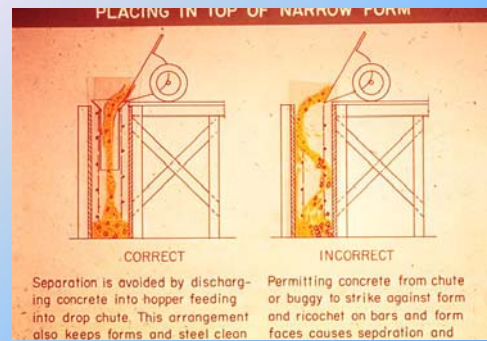
Form Ties - Installation



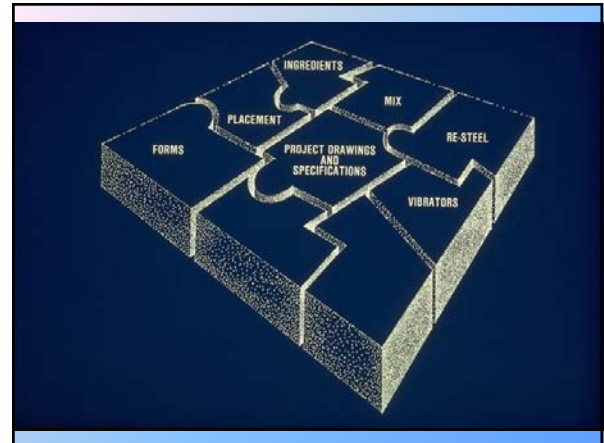
Placement Equipment



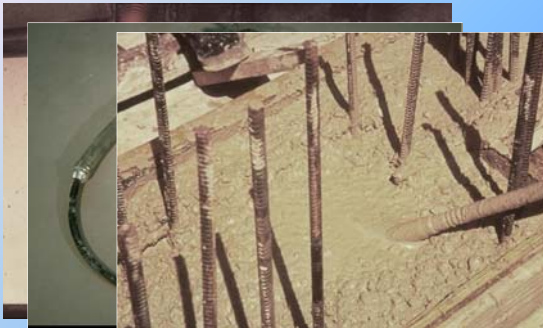
Placement



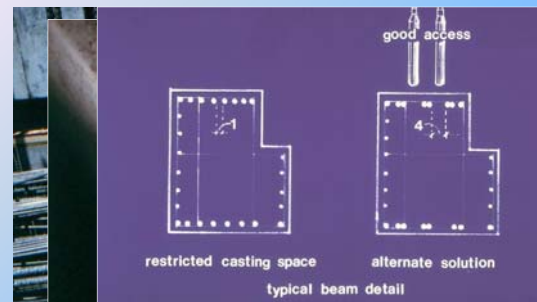
Placement Technique



Consolidation Equipment



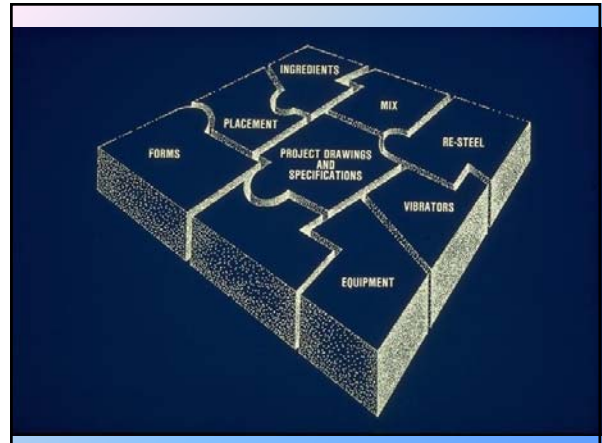
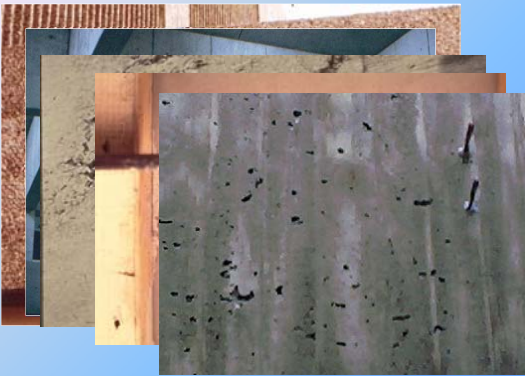
Reinforcing Steel Clear Space



Consolidation - Training



Consolidation Problems



Finishing Equipment & Technique



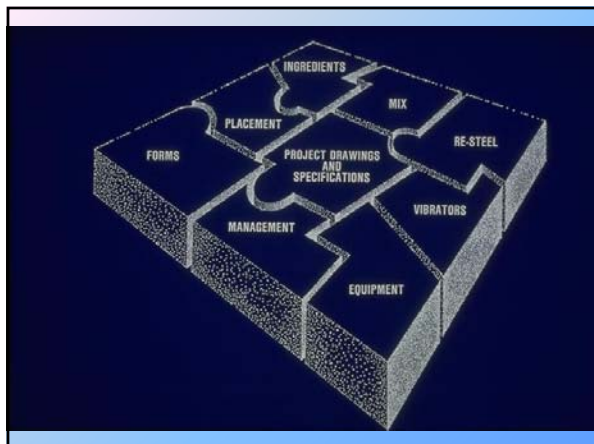
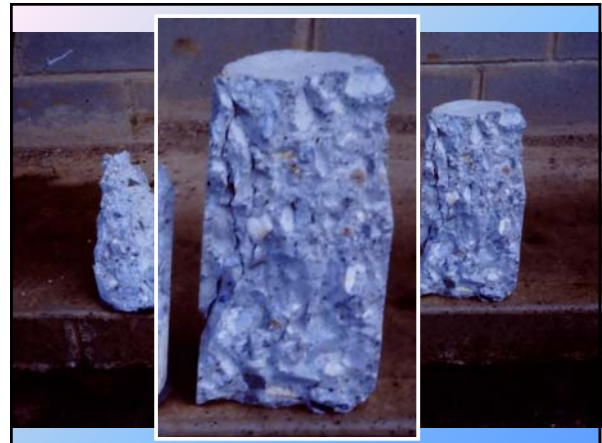
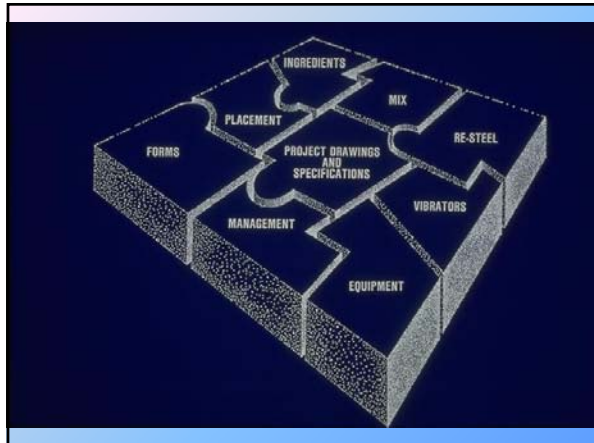
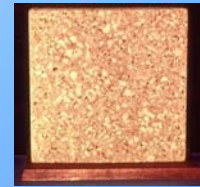
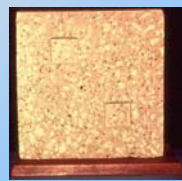
Uniform equipment & technique



Impact Hammer

- Scale (light)
- Bush (medium)
- Jack (heavy)
- Tool (heavy)

Patching



Murphy's Law

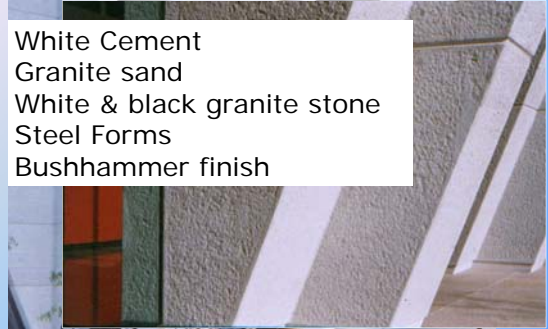
(or the optimist's creed)

*"Nothing is as easy
as it looks.
Everything takes longer
than you expect.
And if anything
can go wrong -
it will
At the worst
possible
moment."*

Case Histories

Southern Bell, Atlanta

White Cement
Granite sand
White & black granite stone
Steel Forms
Bushhammer finish



1515 Poydras, New Orleans



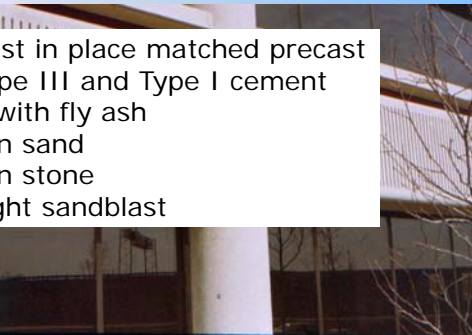
Kennedy Memorial, Dallas

Cast in place
White cement
Needle scaled finish
Post Tensioned



Park West, Dallas

Cast in place matched precast
Type III and Type I cement
with fly ash
Tan sand
Tan stone
Light sandblast



One Main Place, Dallas

White Cement
White and Black Granite
Arbeton method
Heavy Sandblast



Summer Palace, Iran

Preplaced aggregate
Injected grout



Mississippi Power & Light, Gulfport



Water Gardens, Ft. Worth, TX

Tan Cement
River Gravel
Heavy Sandblast



Park Central, Dallas

Blue-gray cement
As Cast Finish
Later painted



Thank you for your attention.

