

PRO Strategic Plans and Initiatives

Phil Diekemper Executive Director, PRO: An ACI Center of Excellence for Advancing Productivity



Welcome!

- Please be sure to silence all cell phones
- When asking questions, please use the microphone located in the center isle
- Photographing and video/audio recording of the speaker or slides without written consent is prohibited



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Reminders



These presentations will be available to view and save through the ACI website (concrete.org)



Session attendance tracking is below each session description in the program book



PRO Strategic Plan Initiatives

This session is sponsored by: PRO: An ACI Center of Excellence for Advancing Productivity

Moderator: Phil Diekemper, PRO Executive Director

Agenda:

- 1. Background, history, PRO's Strategic Initiatives
- 2. Six Barriers to Advancing Productivity \rightarrow Six Initiatives
- 3. PRO Initiative Task Group Chairs will provide updates



What is PRO?

PRO is a catalyst for solving constructability barriers to advance concrete construction productivity. Through a collaborative approach, PRO aims to optimize labor and time against materials by improving structural design and construction processes.





More about PRO





Today's Speakers:

- Cary Kopczynski CEO and Founding Principal of CKC, PRO Board Chair, caryk@ckcps.com
- *Phil Diekemper* PRO Executive Director, Chair Task Group #1, phil.diekemper@concreteproductivity.org
- *Rick Farr* Chief Legal & Risk Officer of Baker Construction, Chair Task Group #2, farr@BakerSharedServices.com
- Rashid Ahmed VP Walker Consultants, Chair Task Group #5, rahmed@walkerconsultants.com
- Mike Tholen Sr. Managing Director, ACI, PRO Board Member, Initiatives #3, #4, & #6, mike.tholen@concrete.org



Cary Kopczynski, PE, SE, FACI, FPTI

- CEO and Senior Principal of Cary Kopczynski & Company (CKC), with offices in Seattle and Chicago
- Past President of ACI (2021 2022), currently serving on the ACI Board of Directors, served for many years on ACI Committees 318, 352, and more
- Board Chair of PRO
- ENR magazine has twice selected Mr. Kopczynski as one of its "Top 25 Newsmakers" for CKC's pioneering work
- Honored in October with a prestigious 2024 ASCE Outstanding Projects and Leaders (OPAL) Award



Phil Diekemper

- PRO Executive Director
- Retired as Senior VP of Ceco Concrete Construction
- BS-CE, MBA
- Active in ASCC, AGC, ACI, SEA, ASA
- Author of several articles in CI and STRUCTURE
- Creator of PRO's Constructability Blueprint
- Founder of PD Advisory, LLC



Rick Farr

- Chief Legal and Risk Officer for Baker Construction
- Law Degree from Northern Kentucky University
- Supports Operations, Acquisitions, and Purchasing
- Practiced at Graydon Head and Richey
- Chair, PRO Task Group #2
- Has handled trials and dispute resolutions
- Started with Baker in 1999 as a skilled negotiator



Rashid Ahmed

- VP & Chief Engineer at Walker Consultants
- Chair- ACI 362 Parking Structures
- Voting Member- ACI 318T, ACI 423
- Chair- PRO Task Group #5: Construction Documents
- Serves on PTI & PCI Committees
- SE in IL, NV, GA, NB
- PE in WI, MI, MO, OH, FL, GA



Mike Tholen

- Senior Managing Director, Technical Operations, ACI
- BS Arch. Eng., MS CE, PhD CE from the University of Kansas
- PRO Board Member
- Awarded ACI/W.R. Grace Fellowship
- ACI Engineering Editor, *Concrete International*
- Structural Engineer for Burns & Mcdonnell Eng. Co.





Let's Get Started!



PRO: The Background, History, and Strategic Initiatives



Cary Kopczynski PE, SE, FACI, FPTI ACI Past President PRO Board Chair



Presentation Outline

- Construction Industry Productivity
- PRO Background
- PRO Vision and Mission
- PRO Overview
- PRO Strategic Initiatives





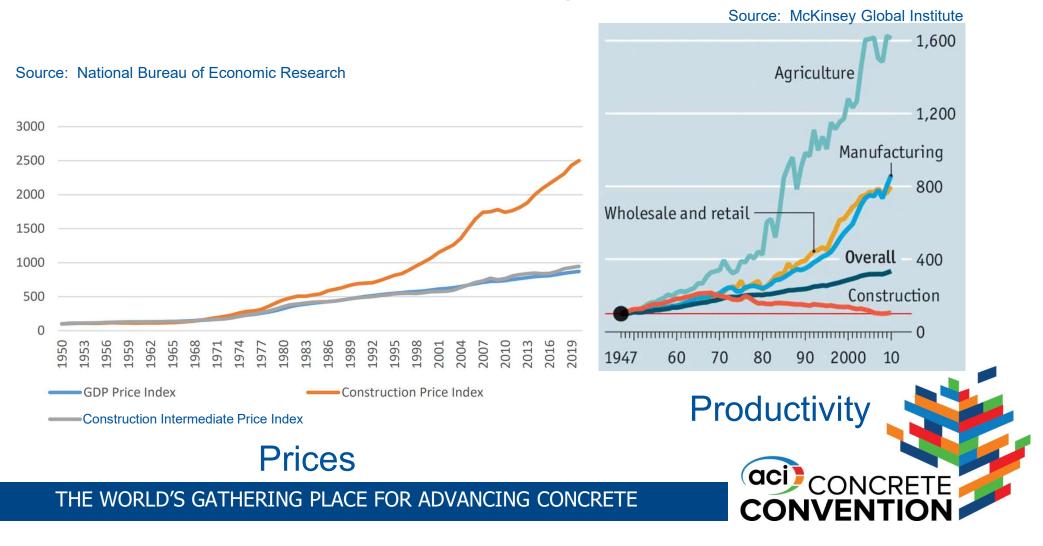


McKinsey Global Institute - Report on Construction Productivity

February 2017



U.S. Prices vs. Productivity



"Construction is a key industry in countries across the world, but one that has struggled to evolve its approaches as other industries have done, and one whose productivity has suffered as a result. **Even while other sectors from retail to manufacturing have transformed their efficiency, boosted their productivity, and embraced the digital age, construction appears to be stuck in a time warp.** In the United States since 1945, productivity in manufacturing, retail, and agriculture has grown by as much as 1,500 percent; productivity in construction has barely increased at all. This not only represents a lost opportunity for the industry but costs the world economy."

McKinsey Global Institute 2017







DIVE BRIEF

Construction lost as much as \$40B on poor productivity in 2022

About half of contractors see labor inefficiencies worsening, according to a new report, but firms see relief through lean practices.

Published Oct. 12, 2023

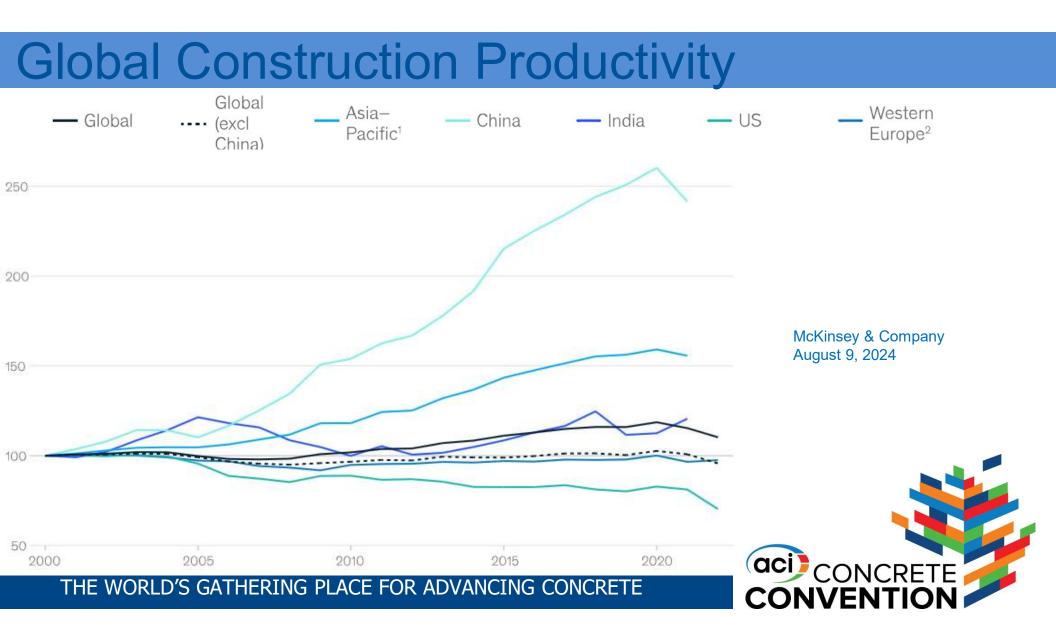


Delivering on construction productivity is no longer optional

By Jan Mischke, Kevin Stokvis, and Koen Vermeltfoort with Birgit Biemans

August 9, 2024

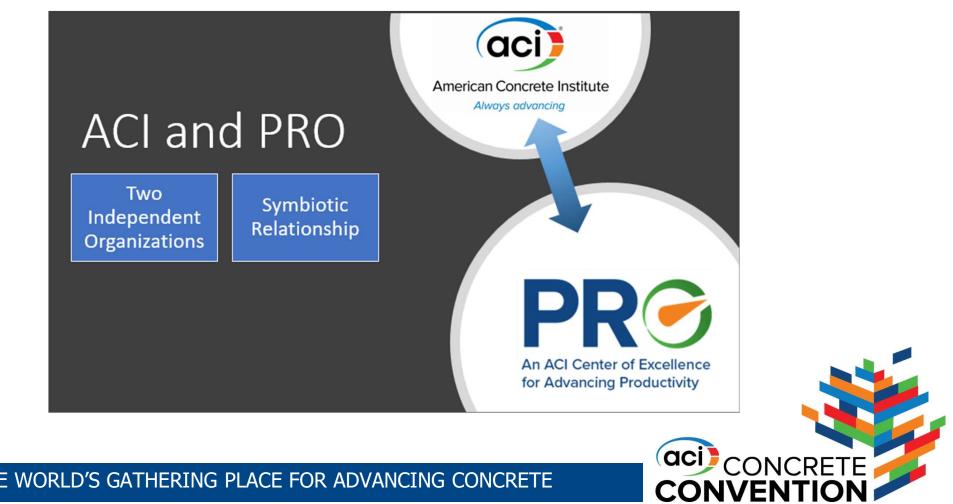
Why the construction industry must climb out of its productivity rut and why it hasn't yet.



ACI Board Task Group







PRO: An ACI Center of Excellence for Advancing Productivity

- PRO is incorporated as a non-profit 501(c)3 ACI subsidiary with its own bylaws and Board of Direction
- PRO is focused on a *specific industry target*, which will allow *faster* progress toward its objectives
- PRO members will primarily be corporations and non-profits who will provide the bulk of PRO's financial support
- **PRO** retains IT, accounting, marketing, and other services from ACI









PRO Vision:

The Center envisions a concrete industry where the productivity potential of contemporary materials and construction systems is fully realized and continually advanced.







PRO Mission:

Collaborate with designers, material suppliers, builders, and other industry stakeholders to improve design constructability and construction productivity for all concrete structures.







PRO Activities:

- Constructability resources
- Technology Advancement
- Construction best practices
- Knowledge transfer and professional development
- Association outreach
- Interaction with ACI committees







PRO Strategic Initiatives:

- Improve the constructability of concrete structures.
- Contractually align the risk and reward of concrete design, construction, and ownership.
- Incentivize innovation in concrete design and construction.
- Improve collaboration and teamwork among all project stakeholders.
- Improve construction document completeness and coordination.
- Accelerate adoption of productivity enhancing products, tools, and systems.



Thank you

For more information, please visit **PRO** at: www.concreteproductivity.org

CONCRETE CONVENTION



PRO Strategic Plans Initiative 1: Improve the Constructability of Concrete Structures

Phil Diekemper

Executive Director, PRO: An ACI Center of Excellence for Advancing Productivity



A Barrier to Productivity: Improve the Constructability of Concrete Structures

Agenda:

- 1. What is constructability?
- 2.Constructability -> Productivity Gain
- 3. Paths to improve Constructability
- 4. Constructability Blueprint: Value of Design Collaboration
- 5.Constructability Blueprint: *Constructable Design Principles* 6.PRO Resources



Constructability? Why?

- PRO defines constructability as the effective integration of construction knowledge into the planning and design of a project to optimize its construction cost and schedule and maximize its value to the owner.
- According to the Construction Industry Institute Task Force, early introduction of constructability practices can account for a <u>10:1 return on investment</u> for owners.





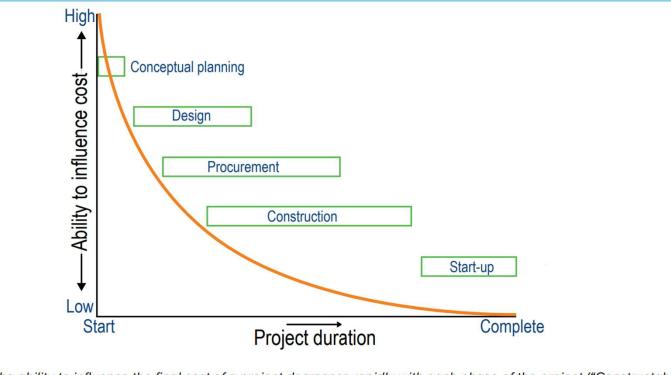
Constructability → Productivity Gain

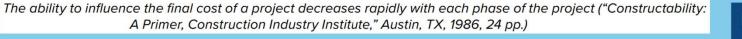
- Capitalize on construction personnel, skills, materials, and equipment
- Productivity Gain provides value to Project Owner
 - Lower Construction Cost
 - Earlier Construction Completion
 - Fewer RFI's
 - Fewer Change Orders
 - Reduced Stakeholder Conflict



Constructability → Productivity Gain

Capture Constructability Potential Early







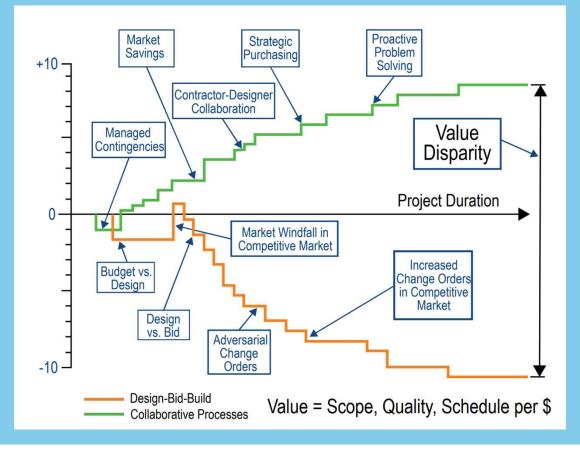
Paths to Improve Constructability

- Seek stakeholders with proven constructability skills
- Optimize construction labor & time vs material in design
- Contractor-designer collaboration
- Leverage contractor knowledge early
- Reward innovative concepts
- Maximize stakeholder communication and trust



Paths to Improve Constructability

Perceived Value of D-B-B vs. Collaborative Process



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Designer's Path to Improve Constructability

No Design Collaboration, now what?

Owner driven Design-Bid-Build, now what?

- Leverage industry relationships
- Produce complete and coordinated construction documents
- Tap industry association constructability resources



Constructability Blueprint: Value of Design Collaboration

Released Spring 2024

SECTION 1: VALUE OF DESIGN COLLABORATION

1.1 What is Constructability?

- 1.2 Improving Productivity via Constructability
- 1.3 Status of Construction Productivity
- 1.4 Constructability Economics
- 1.5 Collaborative Relationships
- 1.6 Design Collaboration is the Key
- 1.7 Timing of Collaboration to Maximize Results
- 1.8 Outcomes of Constructability Focus
- 1.9 Concrete's Design Advantages Versus Constructability
- 1.10 The Path to Concrete Productivity—A Summary
- 1.11 Additional Resources for Those Seeking to Improve Concrete Productivity

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www.concreteproductivity.org

Constructability BLUEPRINT



BLUEPRINT

Constructability Blueprint: Constructable Design Principles

Available Now!

SECTION 2: Constructable Design Principles

- 2.1 Pathways toward Constructable Design
- 2.2 Code-Compliant Design versus Code-Constructable Design
- 2.3 Permanent Material versus Construction Labor and Time
- 2.4 Where to Start as a Designer
- 2.5 Horizontal Framing
- 2.6 Formwork Logic
- 2.7 Reinforcement Logic

Dozens of Source Documents embedded,

just click!



Constructability BLUEPRINT

••••••



for Advancing Productivity

www.concreteproductivity.org

Constructability Blueprint: Constructable Design Principles





for Advancing Productivity

www.concreteproductivity.org

Available January 2025

SECTION 2: Constructable Design Principles

2.8 Mixtures, Pumping, Placing, and Finishing

- 2.9 Logistics, Hoisting, and Safety
- 2.10 Vertical Flements
- 2.11 Lateral-Force-Resisting Systems
- 2.12 Foundations
- 2.13 On-site Testing and Inspection
- 2.14 Specifications for Constructable Concrete
- 2.15 Coordination and Completion of Drawings
- 2.16 Summary of Constructable Design Principles



PRO Resources

- Website: <u>ConcreteProductivity.org</u>
- Constructability Blueprint Free Download: <u>Constructability Blueprint</u>
- Future PRO Documents: <u>Subscribe</u>

Single source of Constructability Resources



Rick Farr

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PRO TASK GROUP #2 ACI Update - November 2024

TEAM MEMBERS

Task Group Chair: Rich Farr – Baker Construction

Task Group Members:

- Jeffrey Coleman, Coleman & Erickson
- Don Kline, Kline Eng.
- Cary Kopczynski, CKC Eng.
- Chris Raftery, Raftery CRE
- Tom Wood, Ceco Concrete



TASK GROUP #2

- Purpose
- Align Contractually the Risk/Reward of Concrete Design, Construction, and Ownership
- Task Group is in its early stages.
- Initial Development Thoughts-
 - Collaborate across the industry beyond contract terms.
 - Identify areas where project end user values reduced risk.



CONTRACTS

Understand everything starts and ends with the contract.

Need to emphasize collaboration between designer, contractor and owner.

Need to review typical or industry-standard contracts to identify opportunities to improve terms

Reduce risk to all parties

Value of the risk reduction to owner or end-user



DESIGN ASSIST

Contractors are commonly asked to participate in the design assist process

Develop an industry standard process to a design assist process:

Risk/Reward for the Contractor

Fee Based Approach

Project Commitment to the Contractor for its Services

The Risk of "Free Con"



VALUE ENGINEERING

Risk/Reward for the Value Engineering Effort

- What is the incentive to the designer.
- Designer can be conservative based on the current fee structure
- Incentivize designers and contractors for value engineering efforts.
- Structure agreements to minimize risks for value engineering efforts.



White Paper Approach

What is the Group's Deliverables?

- Still in the investigative phase.
- How to we impact the industry?
- What are the benefits of reducing risks in construction.
- What are other industry done to improve this effort?
- Benchmark across other industries.
 - MEP trades
 - CURT
 - Other industry experts



White Paper Approach

Thoughts is to develop a series of white papers.

- Do we need to re-invent the "wheel"
- Or modify the wheel?
- What previous efforts have been done?
- What is the impact of the previous efforts?

WHAT CAN WE DO DIFFERENT?



White Paper #1

Identify the challenges in the industry What are the risks impacting the industry What troubles designers, contractors and owners What are the barriers and obstacles How do we reduce risk across the industry?



White Paper #2

Industry efforts to Date Benchmark other efforts. Should we steal shameless....??? Why has this effort worked? What has this effort not worked? What can be done to make a difference?



White Paper #3

WHAT DOES OUR INDUSTRY NEED?

- Risk reduction
- Collaboration
- Innovation



Early Stages

TASK GROUP STILL IN ITS EARLY STAGES

EXCELLENT COLLABORATION

GREAT OPPORTUNITY TO MAKE AN IMPACT TO THE INDUSTRY



ACI Convention, Philadelphia November 3, 2024

Rashid Ahmed, PE, SE, FACI, FPTI Walker Consultants



Task Group #5 Members:

- Rashid Ahmed, Chair, Walker Consultants
- Mike Eads, GH Phipps
- Mike Hernandez, ASCC
- Doug Karn, United Forming
- Don Kline, Kline Engineering
- Scott Meyers, Conco



Task Group #5:

- Group formed in June 2024
- The group had 2 brainstorming sessions
- Presented updates to the PRO Board of Directors in September 2024



Resources Reviewed

- McKinsey Global Institute: Reinventing Construction: A Route to Higher Productivity
- New York Times: The Story Construction Tells About America's Economy is Disturbing by Ezra Klein, February 5, 2023
- ASCC Guidelines to Design for CIP Concrete Constructability
- 2023 FMI Labor Productivity Study
- Council of American Structural Engineers (CASE)
 - CASE 962-D, "Guideline Addressing Coordination and Completeness of Structural Construction Documents"
 - CASE Tool 9-1, "Quality Assurance Plan"
 - CASE Tool 9-2, "Quality Assurance Plan"



Resources Reviewed cont.

- Construction Specification Institute (CSI), "Project Delivery Practice Guide"
- ASCE, "Quality in the Constructed Project: A Guide for Owners, Designers, and Constructors"
- American Concrete Institute
 - ACI 318-19, "Building Code Requirements for Structural Concrete and Commentary
 - ACI 301-20, "Specification for Structural Concrete"
 - ACI 117-10, "Specifications for Tolerances for Concrete Construction and Materials"
 - ACI 117.1R-14, "Guide for Tolerance Compatibility in Concrete Construction"



Resources Reviewed

 McKinsey Global Institute: Reinventing Construction: A Route to Higher Productivity

Construction is a key industry in countries across the world, but one that has struggled to evolve its approaches as other industries have done, and one whose productivity has suffered as a result. Even while other sectors from retail to manufacturing have transformed their efficiency, boosted their productivity, and embraced the digital age, construction appears to be stuck in a time warp. In the United States since 1945, productivity in manufacturing, retail, and agriculture has grown by as much as 1,500 percent; productivity in construction has barely increased at all. This not only represents a lost opportunity for the industry but costs the world economy.



Resources Reviewed

 New York Times: The Story Construction Tells About America's Economy is Disturbing by Ezra Klein, February 5, 2023

Here's something odd: We're getting worse at construction. Think of the technology we have today that we didn't in the 1970s. The new generations of power tools and computer modeling and teleconferencing and advanced machinery and prefab materials and global shipping. You'd think we could build much more, much faster, for less money, than in the past. But we can't. Or, at least, we don't.

Throughout the 1950s and 1960s, productivity in the construction sector — how much more could be done given the same number of workers and machines and land — grew faster than productivity in the rest of the economy. Then, around 1970, it began to fall, even as economywide productivity kept rising. Today, the divergence is truly wild. A construction worker in 2020 produced less than a construction worker in 1970, at least according to the official statistics. Contrast that with the economy overall, where labor productivity rose by 290 percent between 1950 and 2020, or to the manufacturing sector, which saw a stunning ninefold increase in productivity.



Resources Reviewed

ASCC Guidelines to Design for CIP Concrete Constructability

ASCC Constructability Survey Summary			
	AVG	Points	#10
Completeness of drawings	7.2	352	19
Coordination of drawings	6.7	328	7
Coordination of drawings and	6.0	295	1
specifications			
Tolerance compatibility	5.7	281	3
Dimensions	5.6	274	1
Concrete	5.5	271	5
Clash detection	5.0	247	3
Standardization	4.8	237	4
Deflection compatibility	4.7	229	1
Building information modeling	3.9	189	6

A constructability survey was sent in August 2020 to 526 ASCC contractors. They were asked to rank the ten items with the highest priority for constructability

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

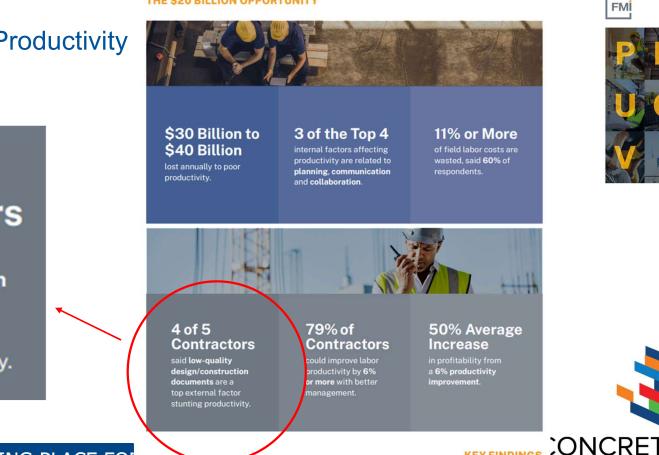


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Resources Reviewed

 2023 FMI Labor Productivity Study

CONSTRUCTION LABOR PRODUCTIVITY: THE \$20 BILLION OPPORTUNITY



4 of 5 Contractors

said low-quality design/construction documents are a top external factor stunting productivity.

THE WORLD'S GATHERING PLACE FOR



2023 FMI LABOR PRODUCTIVITY STUDY

Resources Reviewed

- Council of American Structural Engineers (CASE)
 - CASE 962-D, "Guideline Addressing Coordination and Completeness of Structural Construction Documents"
 - CASE Tool 9-1, "Quality Assurance Plan"
 - CASE Tool 9-2, "Quality Assurance Plan"

The guidelines discuss the important aspects of design relationships, communication, coordination and completeness, guidance for dimensioning of structural drawings, and the effects of various project delivery systems and document revisions. It closes with recommendations for development and application of quality management procedures, internally within the design firm and externally between disciplines. After preparation of organized and clear calculations, the drawings must be coordinated with the calculations, the specifications must be coordinated with the structural drawings and calculations, and the "general notes" must be coordinated with the specifications.



Resources Reviewed

 Construction Specification Institute (CSI), "Project Delivery Practice Guide"

The guide recommends design team coordination with sufficient time dedicated to performing coordination tasks. It states that a well-planned, well-executed, and well-enforced coordination program can result in fewer addenda items, fewer requests for interpretation, fewer change orders, fewer disputes, and reduced project costs. Ideally, the documents for construction prepared by the architect and the other design team members will be as consistent as if they were prepared and produced by one source. The guide notes that incomplete coordination results in:

- Duplications;
- Omissions;
- · Discrepancies; and
- Terminology differences.



Resources Reviewed

• ASCE, "Quality in the Constructed Project: A Guide for Owners, Designers, and Constructors"

The guide discusses the roles, responsibilities, requirements, and limits of authority of participants in the design and construction process, highlighting concepts and practices that are valuable to each in achieving project goals and objectives.



Resources Reviewed

- American Concrete Institute
 - ACI 318-19, "Building Code Requirements for Structural Concrete and Commentary
 - ACI 301-20, "Specification for Structural Concrete"
 - ACI 117-10, "Specifications for Tolerances for Concrete Construction and Materials"
 - ACI 117.1R-14, "Guide for Tolerance Compatibility in Concrete Construction"

ACI 318-19, Chapter 26, confirms the statement from IBC 1603.1 by establishing the minimum requirement for information that must be included in the construction documents. Section 26.1.1 addresses items that the design professional shall specify in the construction document, if applicable.

ACI 301-20 contains a Mandatory Requirements Checklist which lists information that must be specified in the project documents.



Brainstorming sessions outcome (work in progress):

- Develop a design checklist to serve as a resource to the industry.
 - Take it to the next level, develop training and education around that checklist.
- Define the percent of conceptual drawings. Define for each drawing percentage and what it should include for each percentage.
- Coordination among SEs/ Arch/ MEP
 - One of the key issues during construction
- Designing for constructability
 - Lack of coordination among different disciplines is one of the key issues during construction
 - Different trade tolerance
 - Labor vs technology
 - Review ACI 318, chapter 26
- Encourage adequate fees and schedules to produce final drawings.
- Evaluate the potential of AI to improve constructability.



Thank You!

Rashid Ahmed, PE, SE, FACI, FPTI

Walker Consultants 2895 Greenspoint Parkway, Ste. 600 Hoffman Estates, IL 60169 Phone: 847-710-4389 Email: <u>Rahmed@walkerconsultants.com</u>







PRO Strategic Plan & Initiatives Update: Initiatives #3, #4, and #6

An ACI Center of Excellence for Advancing Productivity

> Mike Tholen ACI Senior Managing Director, Technical Operations



Strategic Planning Initiatives

- 1. Improve the Constructability of Concrete Structures.
- 2. Contractually align the Risk & Reward of Concrete Design, Construction, and Ownership.
- 3. Incentivize Innovation in Concrete Design and Construction.
- 4. Improve Collaboration and Teamwork among All Project Stakeholders.
- 5. Improve Construction Document Completeness and Coordination.
- 6. Expand Industry Use of New Technologies.

Strategic Planning Initiative 3: Incentivize innovation in concrete design and construction.

- Outcome: Increased acceptance of innovative solutions that maximize productivity
- Task Group formed in Fall 2024
- Chair: Chris Raftery RafterySuver, LLC
- Members: T. R. Kunesh, Terry Harris, Mike Clement, Ben Birch, and Don Davies

Strategic Planning Initiative 3: Incentivize innovation in concrete design and construction.

- Value innovation in design, concrete production and in the construction process
- "There's a better way, let's find it."
- Manage liability and risk
- Fuel for productivity gains
- Team incentives

Strategic Planning Initiative 3: Incentivize innovation in concrete design and construction.

- Innovation in concrete:
 - Mixture design and proportioning
 - Production
 - Forming
 - Placing
 - Finishing

Strategic Planning Initiative 4: Improve collaboration and teamwork among all project stakeholders.

- Outcome: Project cost, schedule, and quality all benefit project stakeholders
- Task Group will be formed in 2025
- Membership open

Strategic Planning Initiative 4: Improve collaboration and teamwork among all project stakeholders.

- Owner awareness
- Greater use of Integrated Project Delivery model
- Better leadership
- Share successes

Strategic Planning Initiative 6: Accelerate adoption of productivity enhancing products, tools, and systems.

- Outcome: New technologies are identified, pursued and readily adopted.
- Task Group formed in Fall 2024
- Kickoff meeting in November
- Chair: T. R. Kunesh Somero
- Members: Jeff Shaver, Scott Berg, and David Aiken

Strategic Planning Initiative 6: Accelerate adoption of productivity enhancing products, tools, and systems.

- Review, evaluate, and publicize new technologies that improve productivity
- Incentivize the adoption of new technologies by owners, designers, and contractors.





An ACI Center of Excellence for Advancing Productivity