



Improving Productivity with Planning, Technology, & Sweat Equity



Dedicated to Customers, Co-workers & Suppliers of Wood, Iron, and Mud

The Concrete Convention and Exposition



What We Already Know from CII

Construction Industry Institute (CII) formed in 1983 to
Construction Owner value driven research

Owners, Design and Construction Contractors, Academia

Research teams:

- Strategically formed

- Member company participation on all teams

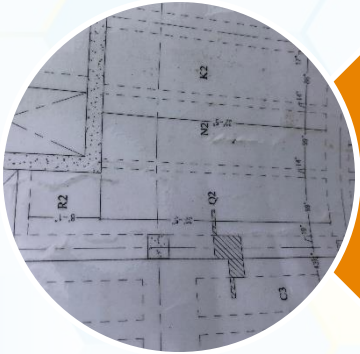
- Supported by a primary investigator from academia

- Publish research and implementation tools

Based on statistically significant research findings, 17 Best Practice
Areas have been established –

Constructability is one of them

Constructability



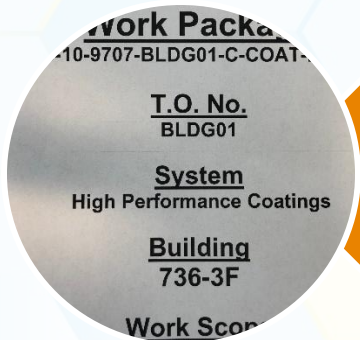
Formal constructability programs have resulted in 6.1% cost reduction and 7.5% schedule gain

Front End Planning



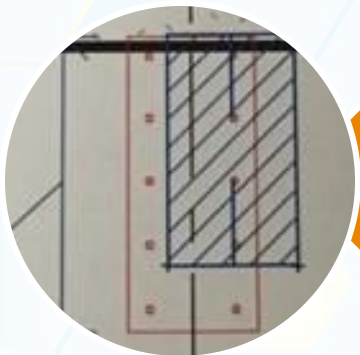
Every \$3 spent on Front End Planning has resulted in a \$10 payback. Early supplier involvement has translated to cost saving of 4% - 8%.

Work Planning



By combining Front End Planning with Advanced Work Packaging an average of \$8M will be saved on a \$100M project.

Rework Reduction



An average of 3-5% of completed construction requires rework. Worse, inefficiencies and impacts during work execution are estimated at 40% - 50% waste.

Technology



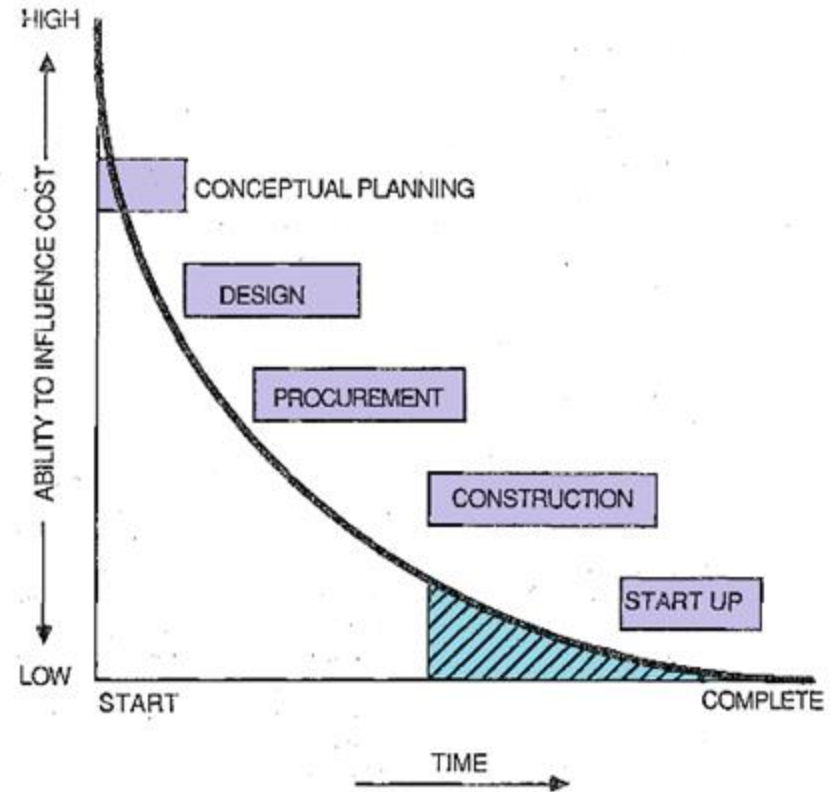
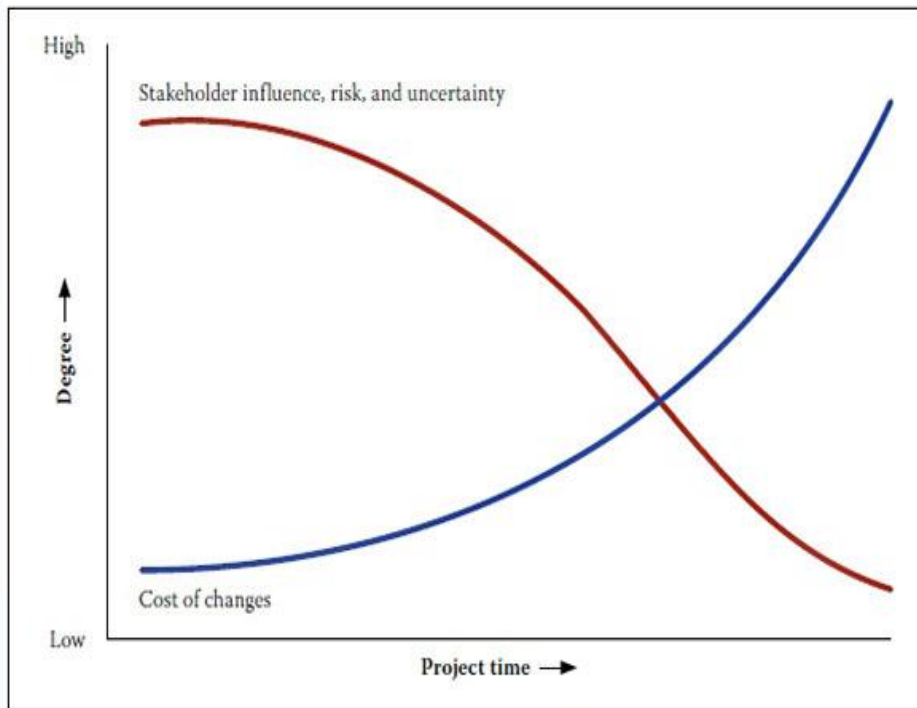
Adoption of proven technology can improve productivity by 30-45%.

Zero Incidents



Use of Zero Incidents Techniques reduces Total Recordable Incident Rate 54-64%.

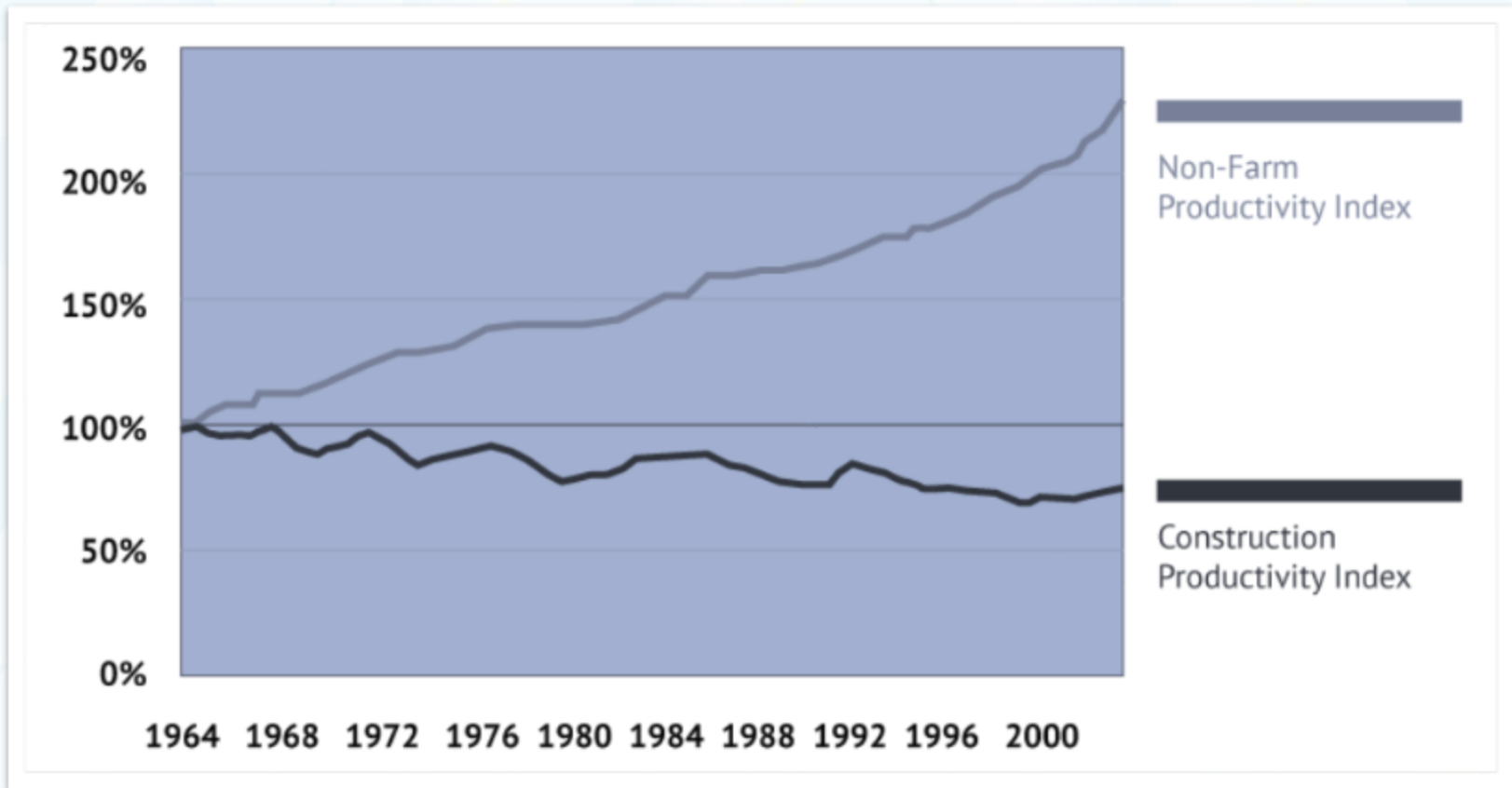
Timing is Important!





Mega Trend 2 – Construction Lags in Productivity

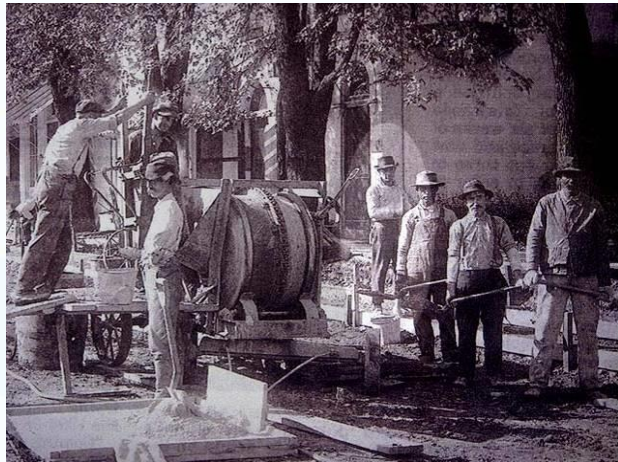
Constant \$ of Contracts / Workhours of Hourly Workers





How Is This Possible With All These Advancements And Resources?

- Much Better Equipment
- Mechanical drafting / CAD / BIM
- Robotic Total Station Surveyors
- GPS Logistics, Laser Scanning
- Computer Software for Structural Designs
- Performance Based Designs & Specifications
- Collaborative Project Management Software
- ASCE, AGC, ABC, AIA, CII, FMI, ACI, ASCC



1930s - Grandfather Elmer Baker



2 CY Concrete Truck -1951 Ford



1970s – Early Baker years



Statistics

- Started March 17, 1930
Complete April 11, 1931
- Tallest in the World at that Time
- On Schedule & under budget
(12 days early - \$40 M)
- Today - Still 30th tallest in the world -
1250 feet
- Built primarily by European immigrants
and Mohawk Indian ironworkers
- 13 Months



Statistics

- Started August, 2004
- Complete May, 2010
- \$2 Billion - \$700M in incentives
- Six years

Defining Our Challenges

- A Comparison



Construction

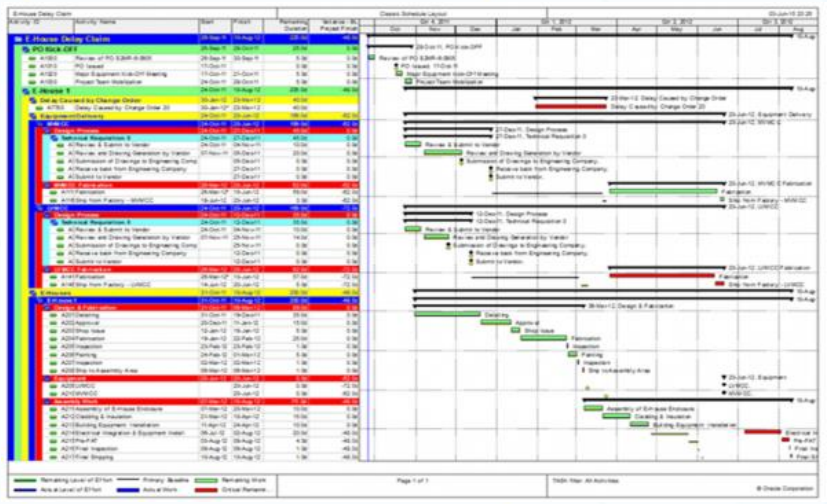
- Fragmented industry
- Every building is unique
- Aging workforce
- Competition restricts means to invest in improvement



Manufacturing

- Mature industry
- Refined processes
- Many multigenerational firms
- Intensive investment into capital to reduce labor

aci Significant Barriers - Fragmentation



Fragmentation – Project Level:
 Imagine organizing 50 different companies to work on a manufacturing floor.



**Concrete
 And
 Masonry
 Related
 Associations**

Fragmentation – Industry Level
 The concrete industry alone has over 50 industry associations that represent various stakeholders

Significant Barriers - Risk Transference vs. Risk Mitigation

Design Bid Build (DBB)

- Competition: All stakeholders squeezed for fees
- Fewer resources to put into design detail and front end planning prior to the start of construction
- Often focus is on “contract coverage” instead of conversations that optimize overall project results
- Leads to each stakeholders managing their own spend and risk; rather than common project goals.

Risk Mitigation Is Better Than Risk Transference – No Losers and lower total cost



Significant Barriers - Information Flow

A photograph showing a person's hands holding a white sign with the word 'HELP' written in black capital letters. The person is submerged up to their chest in a large, chaotic pile of crumpled white paper, symbolizing information overload.

HELP

Design Document Quality is Deteriorating

Too much information that is often not relevant to the recipients.

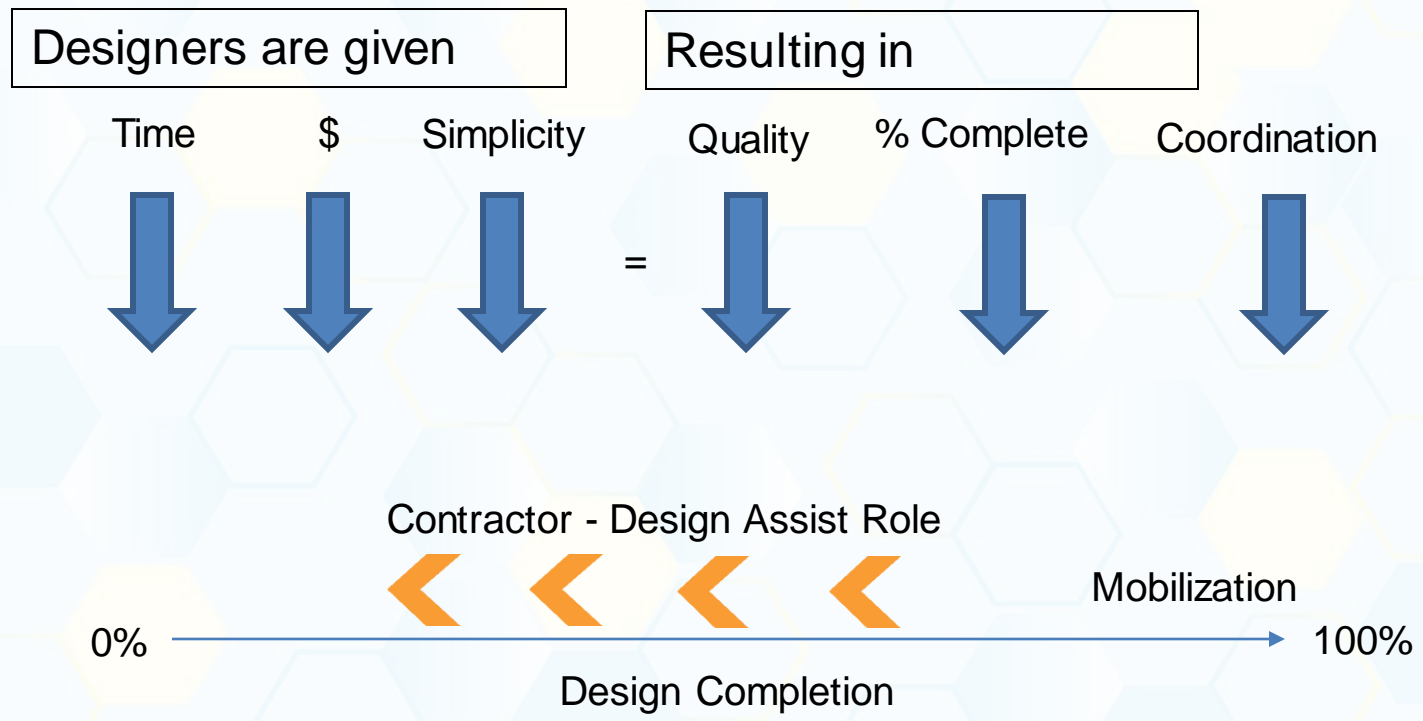
Additive design responsibilities – design information developed too late in the construction process

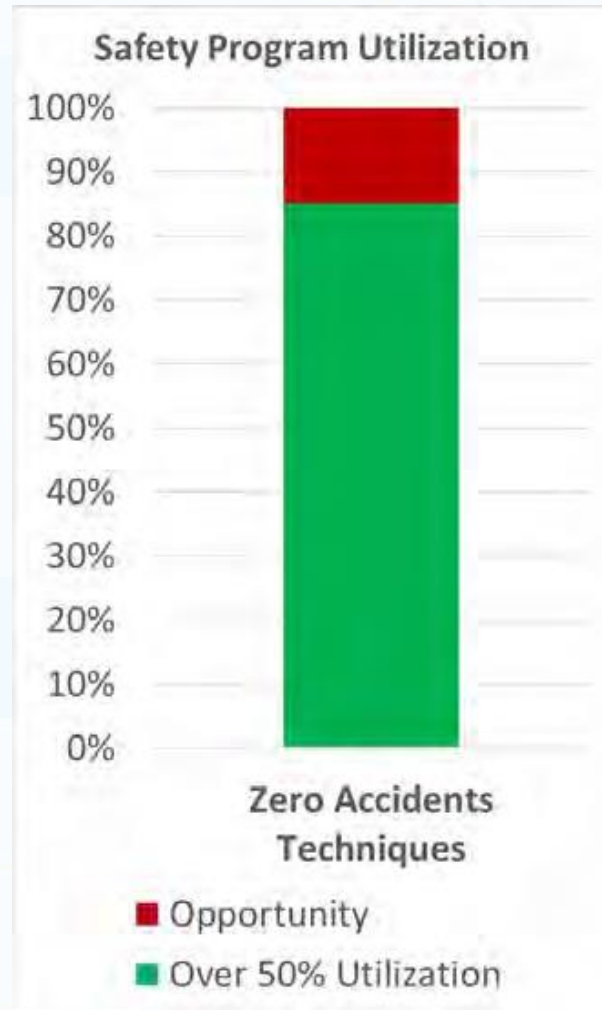
Endless permutations of design during construction execution – Short circuiting planning processes



Why is Early Contractor Involvement in Design Necessary?

The Evolution of Design Documents



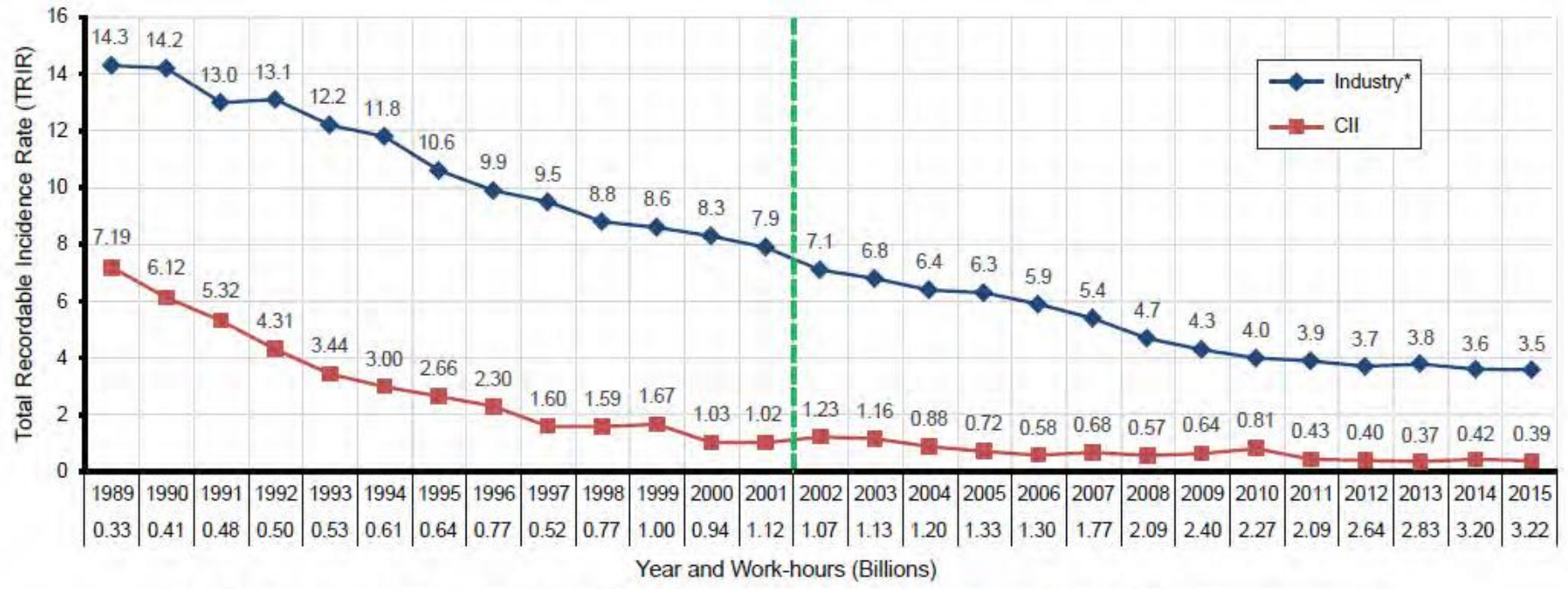


Safety Program Implementation

In a recent survey of CII member companies high levels of safety program utilization was measured.



Safety Program Implementation Results



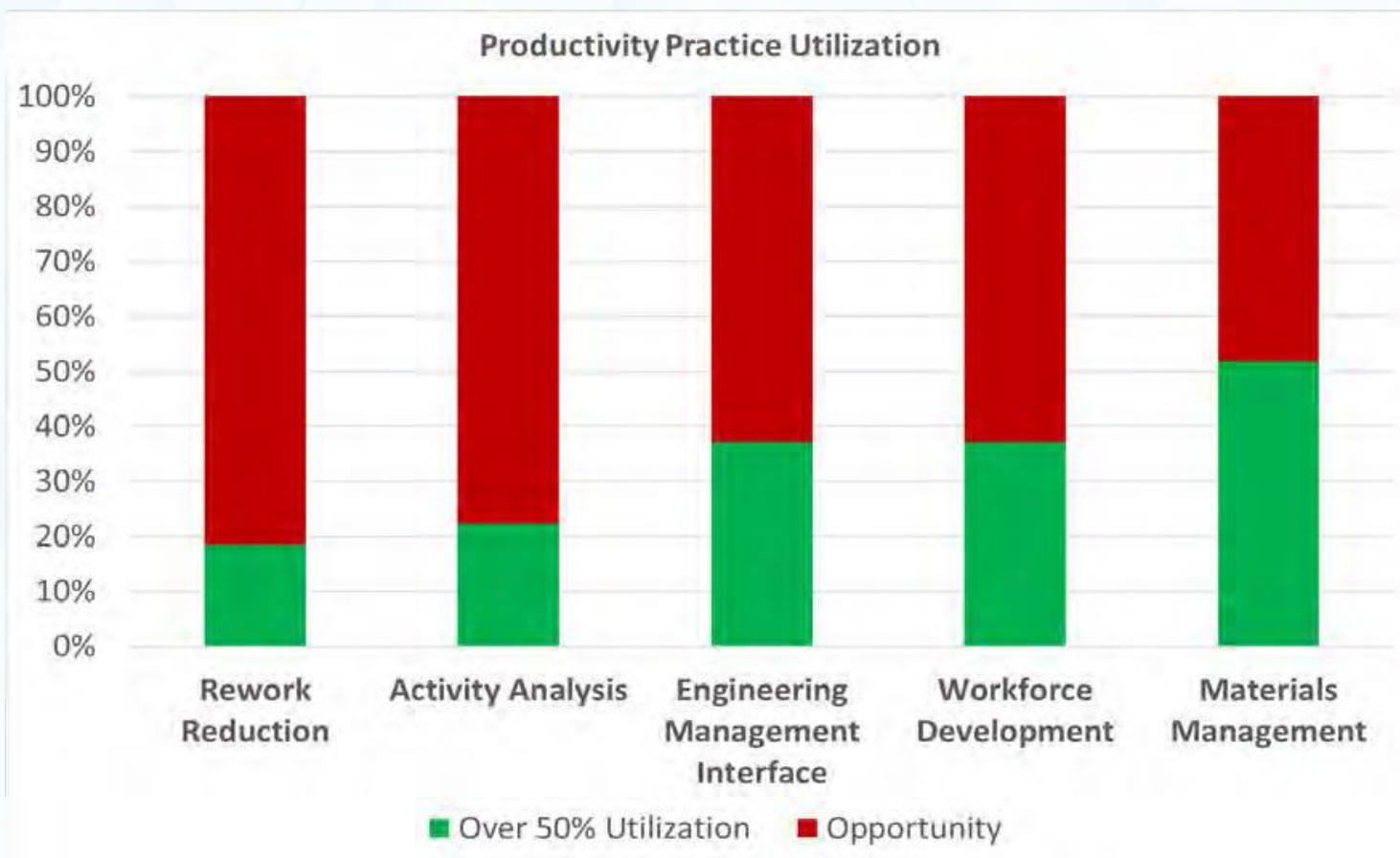
*OSHA Construction Division, NAICS 236-238 (SIC 15-17)

--- Reflects OSHA reporting change



Five Typical Productivity Improvement Implementations

CII RT-340 Study Also Measured Member Company Implementation of 5 Key Productivity Focus Areas





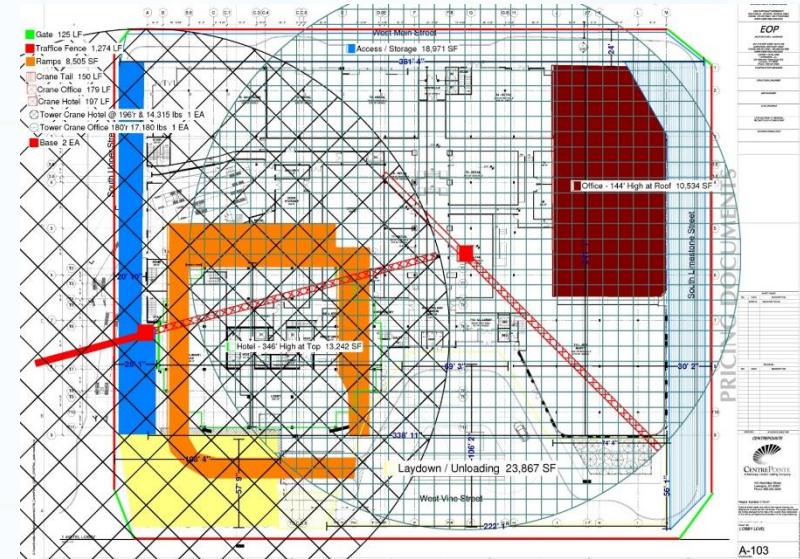
Road Mapping Baker Approach

Recognizing the five focus areas defined by CII RT 340, we further identified three primary threads related to improving productivity. These threads are interrelated and interdependent.

| | Planning | Technology | Sweat Equity |
|-----------------------------|---------------|------------|--------------|
| ▪ Leadership | | | |
| ▪ Resources | Relationships | Tools | Co-workers |
| ▪ Structure & Communication | | | |
| ▪ Planning | Communication | Knowledge | Leadership |
| ▪ Monitoring & Control | | | |
| ▪ Continuous Improvement | Processes | Metrics | Values |
| | | | Culture |

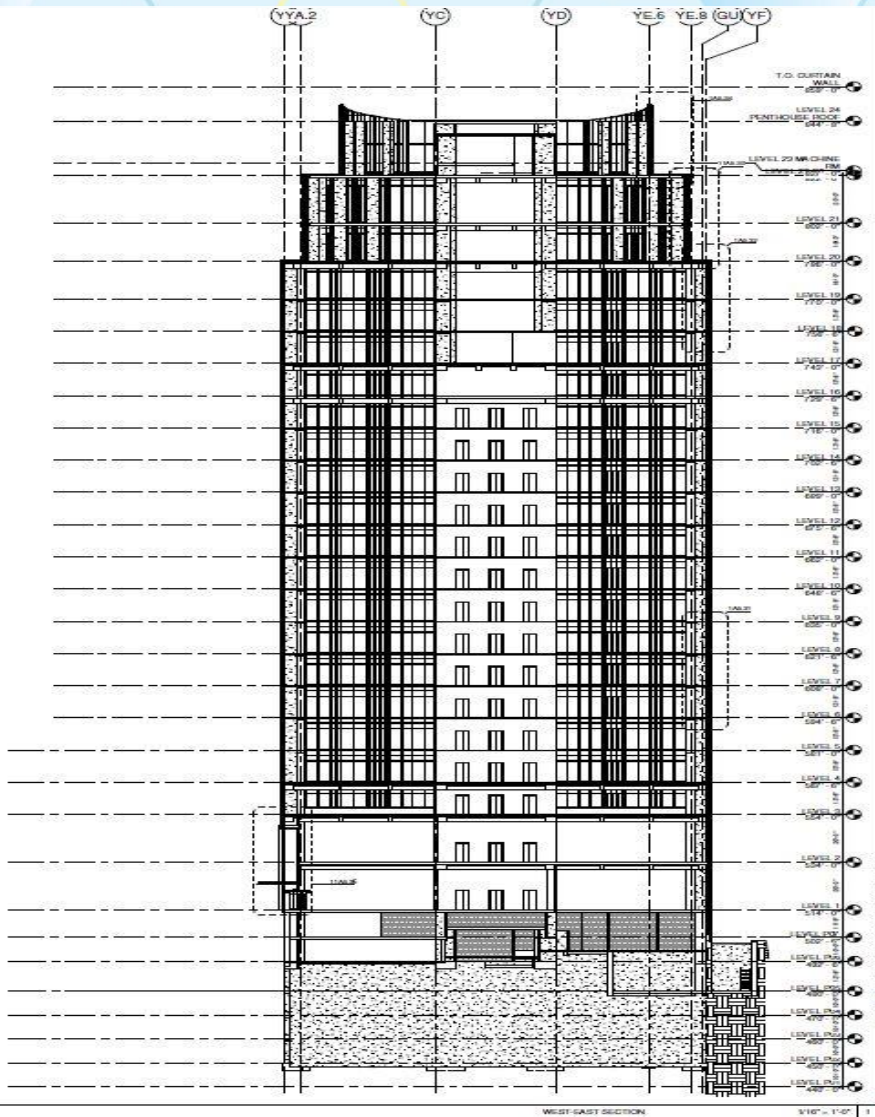
4 Key Phases

1. Early BIM – Defining Project Conceptual Design and Path of Construction During Early Pre-Construction
2. Detailed Design Assist / Constructability Assessments, Site Logistics, Value Engineering, and Resource Management Plans Prior to Contracts
3. Detailed Project Execution Plans Prior to Construction
4. LEAN – SSQP Meetings, Pull Planning, First Run Studies, and Thoughtful RFIs During Construction



- On-Screen - Take-Off & Site Logistics
- Timberline
- HCSS Civil
- P6 Scheduling
- Models – Synchro, Navis Works, Revit / Tekla

Types of Estimates



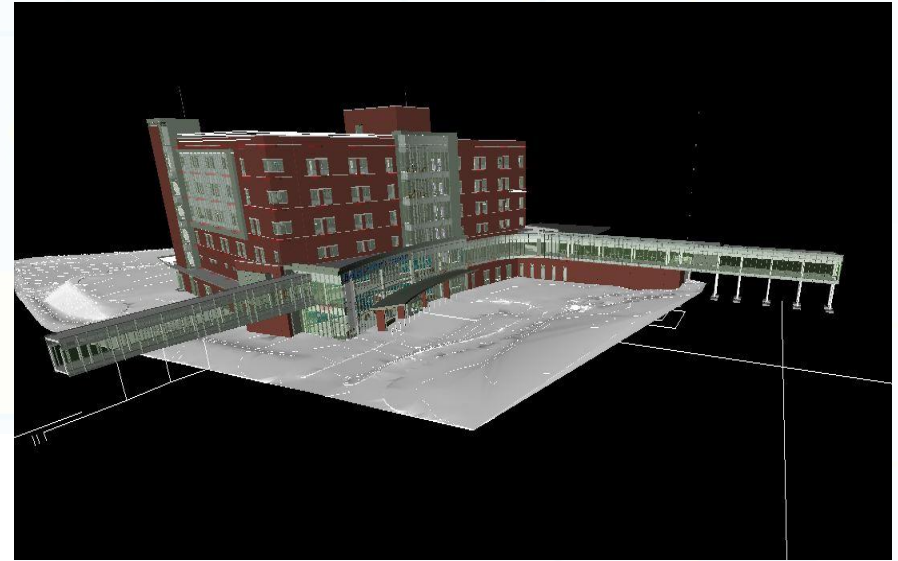
Conceptual Estimate

Preliminary Budget Estimate

Lump Sum Estimate

Unit Price Estimate

Change Order Estimate



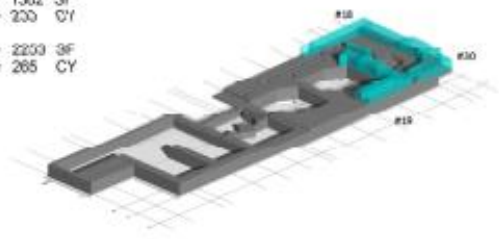
FOUNDATION LOOKING NORTH WEST

Models for Planning

Pour # 18 Formwork = 1071 SF
 18 Concrete = 243 CY

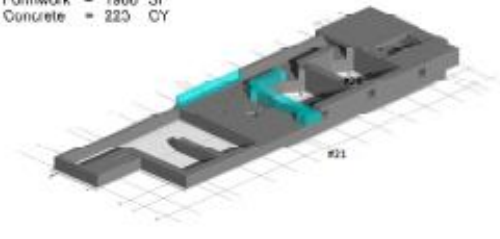
Pour # 30 Formwork = 1382 SF
 30 Concrete = 300 CY

Pour # 19 Formwork = 2203 SF
 19 Concrete = 265 CY



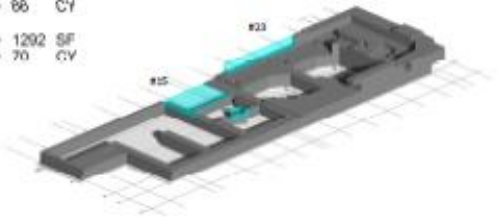
Pour # 24 Formwork = 1101 SF
 24 Concrete = 63 CY

Pour # 21 Formwork = 1986 SF
 21 Concrete = 220 CY

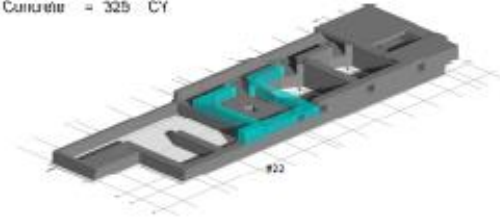


Pour # 15 Formwork = 297 SF
 15 Concrete = 66 CY

Pour # 23 Formwork = 1202 SF
 23 Concrete = 70 CY



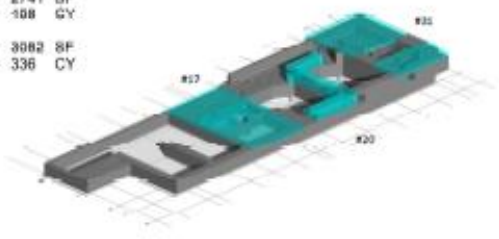
Pour # 22 Formwork = 2612 SF
 22 Concrete = 325 CY



Pour # 17 Formwork = 1630 SF
 17 Concrete = 295 CY

Pour # 31 Formwork = 2741 SF
 31 Concrete = 308 CY

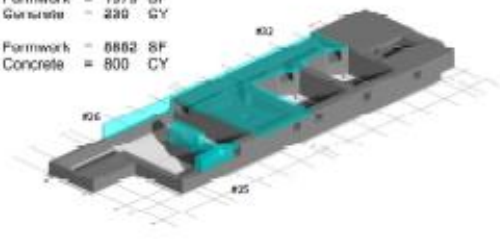
Pour # 20 Formwork = 3882 SF
 20 Concrete = 336 CY



Pour # 26 Formwork = 2846 SF
 26 Concrete = 96 CY

Pour # 25 Formwork = 1979 SF
 25 Concrete = 220 CY

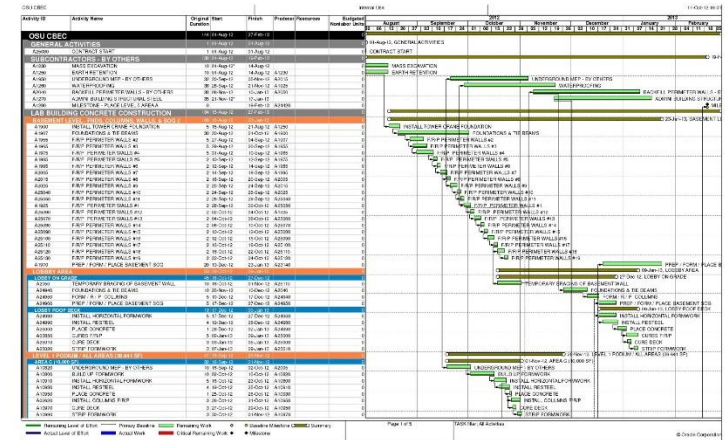
Pour # 32 Formwork = 8862 SF
 32 Concrete = 800 CY



4 Key Engineering Interface Steps

1. Defining and Collaborating Work Breakdown Structure (WBS) With Project Stakeholders
2. Detailed 4D BIM – Clash Detection & Detailed Sequencing of Work Errors, Clashes and RFI Generation BIM Visualizations– Model Shots, Planning & Communication Support

| Description | Amount | Totals | Hours | Rate | Cost per Unit | Percent of Total |
|--------------------------------|-----------|------------------|----------------|----------|--------------------|------------------|
| Labor | 655,018 | | 14,828,951 hrs | | 173,841 /CY | 29.39% |
| Material | 396,743 | | | | 99,235 /CY | 16.84% |
| Subcontract | 714,575 | | | | 178,733 /CY | 30.32% |
| Equipment | 267,450 | | 8,645,651 hrs | | 66,896 /CY | 11.35% |
| Other | | | | | /CY | |
| | 2,073,786 | 2,073,786 | | | 518,796 /CY | 88.00% |
| Consumable Material Sales Tax | 6,331 | | | 7.000 % | 1,584 /CY | 0.27% |
| Permanent+Consumable Mat'l Tax | 6,331 | 2,080,117 | | | 520,289 /CY | 0.27% |
| | 6,331 | | | | /CY | 88.27% |
| Training - Base Rate Labor | 8,460 | | | 2.000 % | 2,116 /CY | 0.39% |
| Safety Training - Base Rate | 3,976 | | | 0.940 % | 0,995 /CY | 0.17% |
| Cost of Loan Interest | 12,555 | | | 0.600 % | 3,140 /CY | 0.53% |
| G.I. Insurance-1 Million | 16,651 | | | 3.700 % | 3,915 /CY | 0.69% |
| Risk Contingency Y 2% to 3% | | | | | /CY | |
| | 40,642 | 2,120,759 | | | 530,455 /CY | 1.72% |
| | | | | | /CY | 90.00% |
| Profit on Labor | 165,804 | | | 24.000 % | 41,722 /CY | 7.09% |
| Profit on Material | 19,837 | | | 5.000 % | 4,962 /CY | 0.84% |
| Profit on Equipment | 13,372 | | | 5.000 % | 3,345 /CY | 0.57% |
| Profit on Subcontract | 35,729 | | | 5.000 % | 8,937 /CY | 1.52% |
| | 235,742 | 2,356,501 | | | 589,420 /CY | 10.00% |
| | | | | | /CY | 100.00% |
| | | 2,356,501 | | | 589,420 /CY | |
| Total | | 2,356,501 | | | 589,420 /CY | |



4 Key Engineering Interface Steps

3. Constructability Assessment

Mix Designs

Detailing of Concrete Elements - Size

Reinforcing & Congestion

Simplification of Formwork

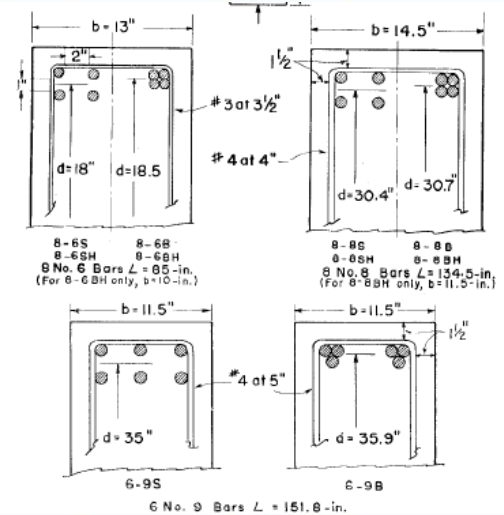
Other Value Engineering Submittals

4. Bringing BIM to the Field

Layout (Passing points, 2D CAD, 3D data imported to Collectors)

Robotic Total Stations

As-Built Conditions and Communication





Technology Tools for Rework Reduction

Mobility App – Connecting with the Workforce, Reporting Events, Trending Events , Practice Improvement



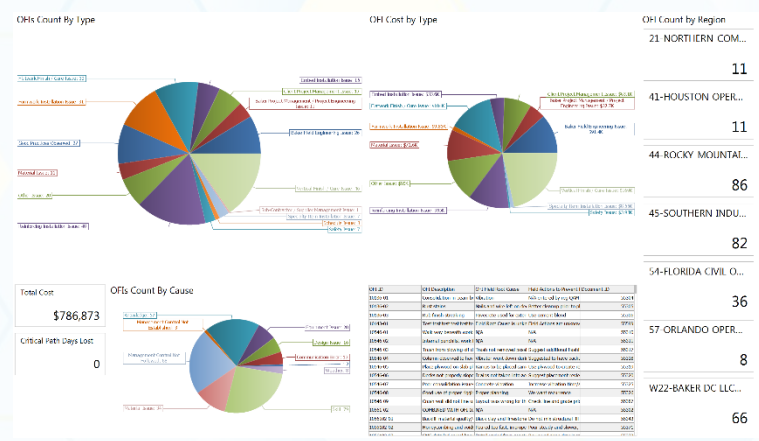
BAKER CONCRETE CONSTRUCTION
 900 North Garver Road
 Monroe, OH 45050
 expect more

Opportunity For Improvement (OFI) Form
 Form No. 0
 Revision 07/02/2018
 Page 1 of 2

OFI Form 5.2.3-1' Submission

Submitter: Baker DC
 Submit: Baker DC
 Job Number: W1143
 Region: Baker DC
 Work Perform: Baker DC
 OFI Description: PT notes
 Field Root Cause: Floor dra
 Field Action: Ensure it otherwise as it
 Cause Code: FORMW etc.)
 Site Project: 00-320

Attachment



| | | | | |
|--|--|---|--------------|------------|
| | 900 North Garver Rd. Monroe, OH 45050 | Pre-fabrication - Formwork, Reinforcing, Embeds & Tools | BP 03300-003 | 0 |
| | | | Page 1 of 1 | 07/02/2018 |



Technology Tools for Real Time Productivity Reporting

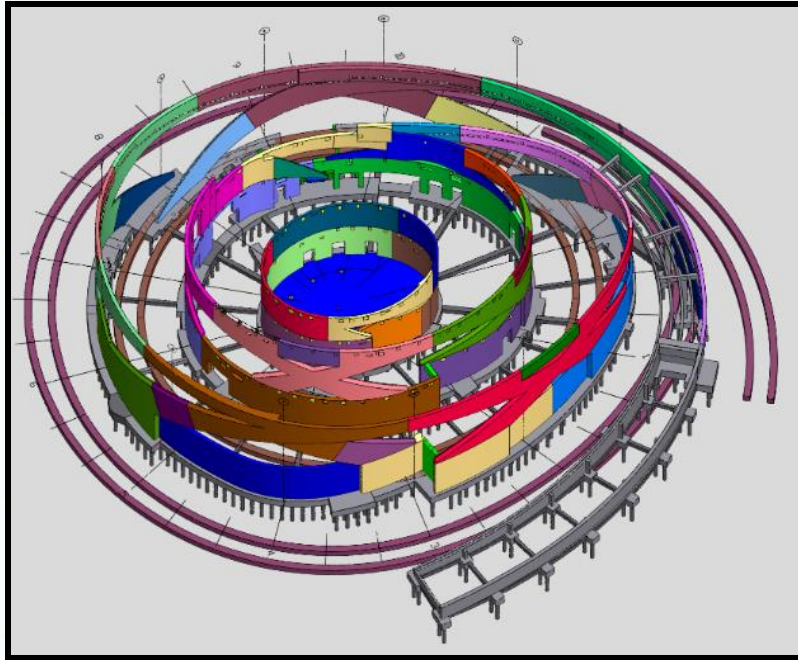
11021 CAMP FRIEDLANDER SHELTR FNDN JTD
Feedback on items with weekly activity for payroll
week ending 09/30/18

Overall JTD Labor Efficiency: 0%
JTD Cost/Hr: \$.00 vs. \$.00 target

Work Item: 985 T & M

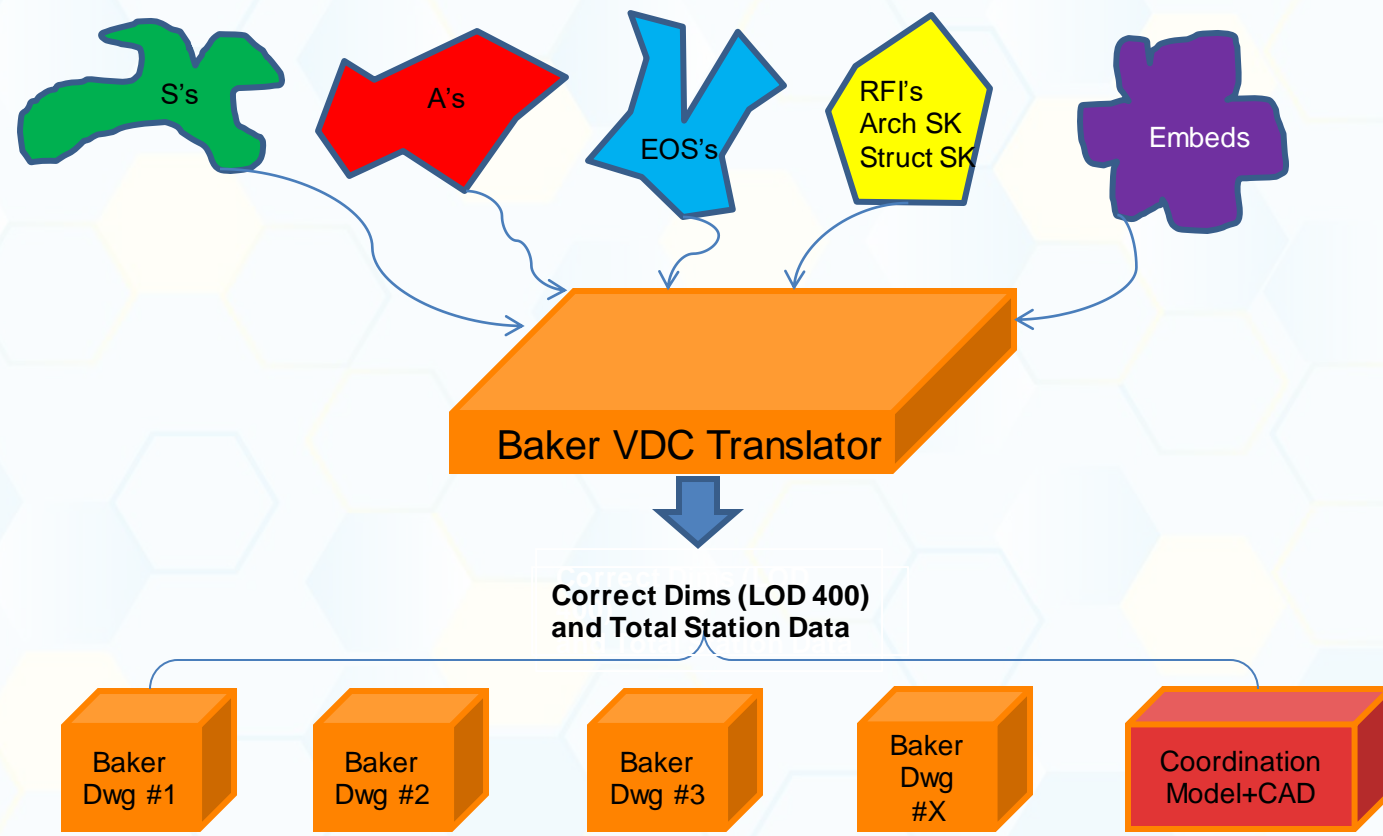
985-001-00 2018 SHELTER FOUNDATIONS () JTD Efficiency: 0%. NO BUDGET Budget: \$ 0 JTD: \$ 5,549 EAC: \$ 5,549







Baker's VDC Content Generation Process



So What is Sweat Equity?

50 Years Above and Beyond the Call - Remarkable projects are made up of co-workers that have a sense that they are part of something much greater than themselves.



Saturn



Thyssen Krupp

Glory belongs to the act of being constant to something greater than yourself, to a cause, to your principles, to the people on whom you rely and who rely on you in return.



Frost Miami Science Center

John McCain



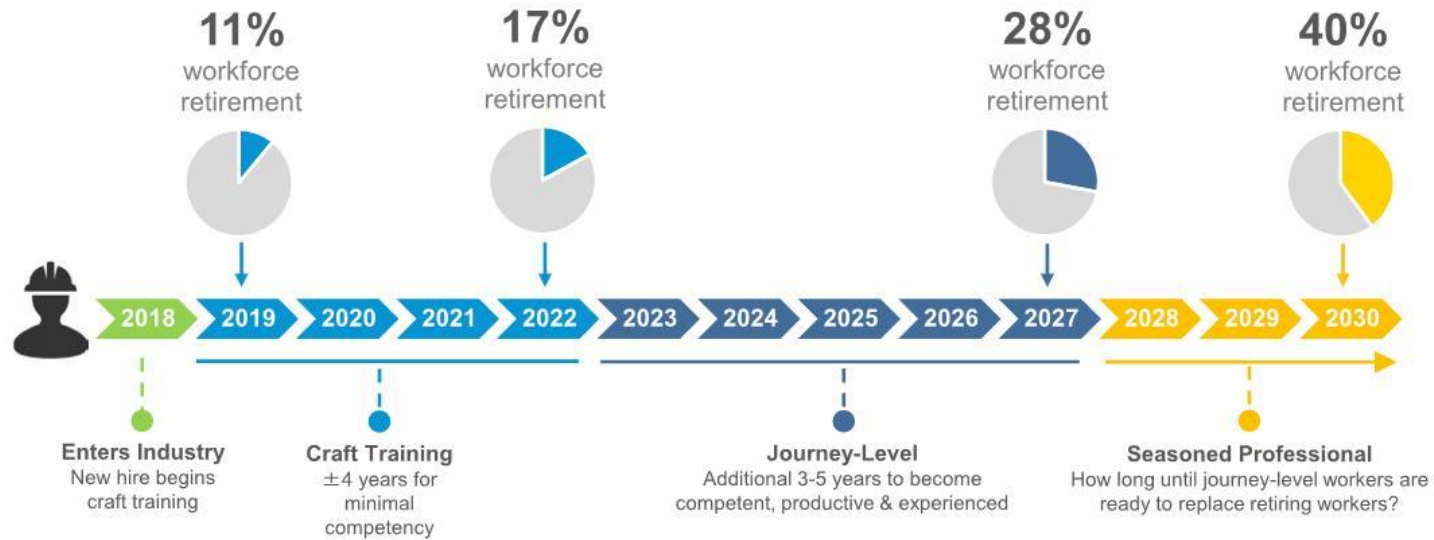
ExxonMobil Houston Campus

The Concrete Convention and Exposition



Sweat Equity Starts with Workforce – Current Condition

What will happen going forward?



Source: Construction Industry Resources, LLC, 2018.



ANNUAL CONFERENCE 2018

RT335 | 4

Re-establish the
Nation's Commitment to the
Equal Dignity of All Workers

**“I believe in the
dignity of labor...”**

- John D. Rockefeller, 1941



ANNUAL CONFERENCE 2018

RT335 | 6

Key Workforce Development Steps

1. Better Define Competencies by Co-worker Role
2. Leverage Existing and Continually Improve Knowledge Assets
3. Convert Knowledge Assets to Co-worker Role Specific Training Materials
4. Implement Training
5. Continually Assess, Update, and Improve



Always Remember

Concrete is hard work. We get paid to safely and productively form, place, and finish high quality concrete.

Key Leadership Values

1. Incident and Injury Free (IIF) Co-worker focus
2. Quality & Customer focus – “Expect More” mantra
3. SSQP- Safety, Schedule Quality & Productivity Mentality
– Nothing less than 4 for 4



Respect and embrace technology, always strive for better planning, and remember that email has never pounded a single nail.