

2010 MdQI Conference



# ICC Construction QA/QC Lessons Learned

# ICC Construction QA/QC Panel



- Mark Coblentz
- Scott Szympruch
- Robert Sebastian
- Rocky Goocharan

# Mark Coblentz

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- Construction Manager for the \$1.566B Inter County Connector
- 33 years Experience with Maryland State Highway Administration
- Assistant District Engineer for Construction in SHA District 5.

# Scott Szympruch, P.E.

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- Construction Manager, ICC Contract A
- 16 solid years expr. on heavy highway projects
- Managed numerous complex and technically-challenging projects, including the
  - Benning Rd. Bridge replacement over Anacostia R.
  - Woodrow Wilson Bridge's Virginia Approach Spans.

# Robert Sebastian, P.E.

[bob@ebaengineering.com](mailto:bob@ebaengineering.com)



- CQC Manager for ICC Contract C
- 35 years of Construction QA /QC experience
- Managed numerous projects that involved
  - roadway construction
  - bridge construction and rehabilitation
  - quality control (QC) material testing
  - environmental monitoring activities

# Rocky Goocharan

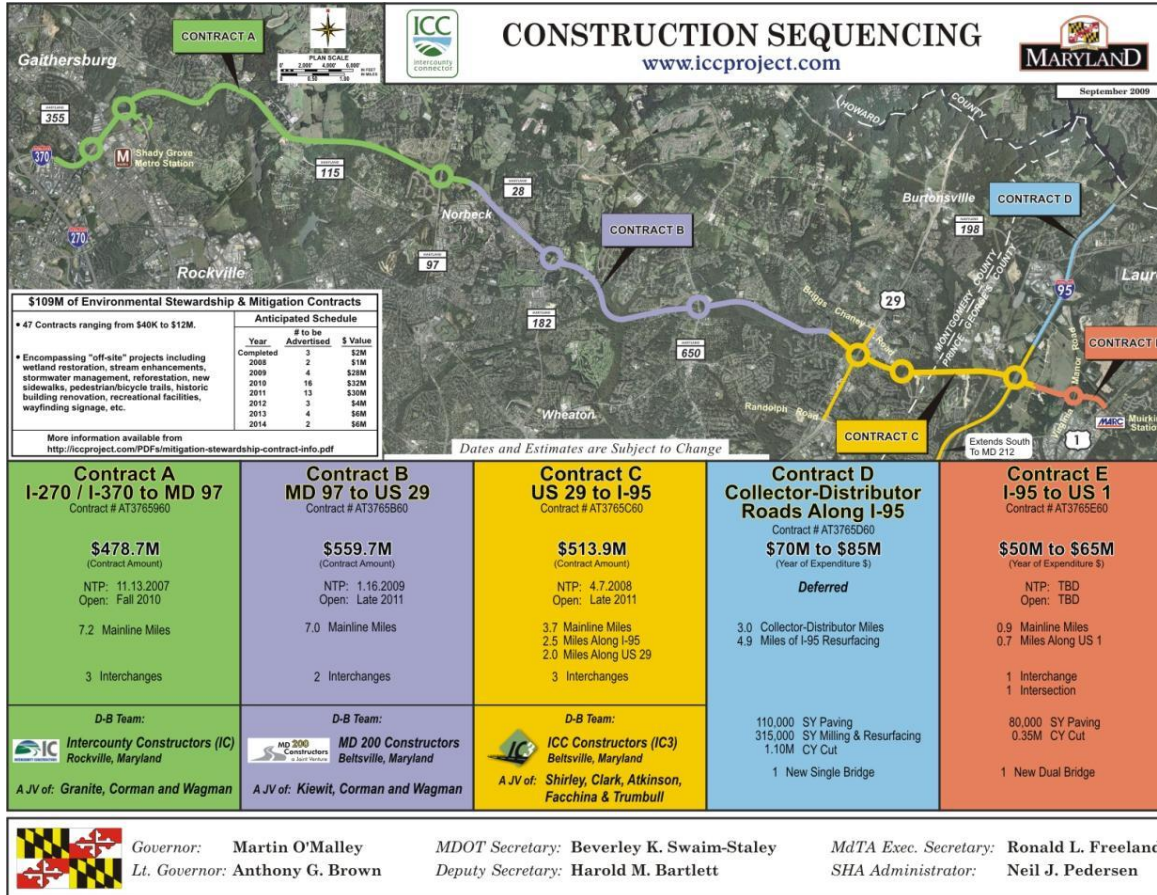
EGoocharan@iccproject.com



- Materials Engineer on the Inter County Connector Project (ICC)
- 25 years Experience in Fabrication Plant Inspection and Materials Testing
- Partner with DB CQC Firms to develop a quality management system for off-site fabrication.

# ICC Background

- Project Description



## ICC Background

- Construction Organizational Structure
  - Design-Build Teams
    - Executive
    - Construction
    - Quality Control Engineer
  - ICC Project Management Team
    - Project Wide
    - Contract Specific
      - Administration
      - Quality Assurance





## ICC Background



- Design – Builder QC
  - Builder
  - Project Quality Manager
  - QC Engineer
  - Construction QC Engineer
    - Contract General Provisions
    - Quality Control Plan
- ICC QA
  - Oversight
  - Independent Assurance – Through OMT
  - QA Oversight Database

# Communication

- Document Control
  - Contractor Software
  - Quality Assurance Oversight System
  - Quality Records Database
  - Projectwise



## Lessons

- Don't rely upon only written documentation
- Start early with checking compatibility
- Understand limitations
- Know the end game

# Communication



- Tracking Contract Compliance
  - Issue Identification
    - NC - Non Conformance (QA)
    - NCR - Non Conformance Reports (QC)
  - Issue Resolution
    - FDC - Field Design Change (DB Builder)
    - NDC - Notice of Design Change (DB Design)
    - FVR - Field Variance Request (DB Builder)



# Communication

- Tracking Contract Compliance
  - Issue Identification
    - NC - Non Conformance (QA)
      - Assessments generated from QAO Database
      - 3 Priority Levels
      - Level 1 & 2 require a response



# Communication

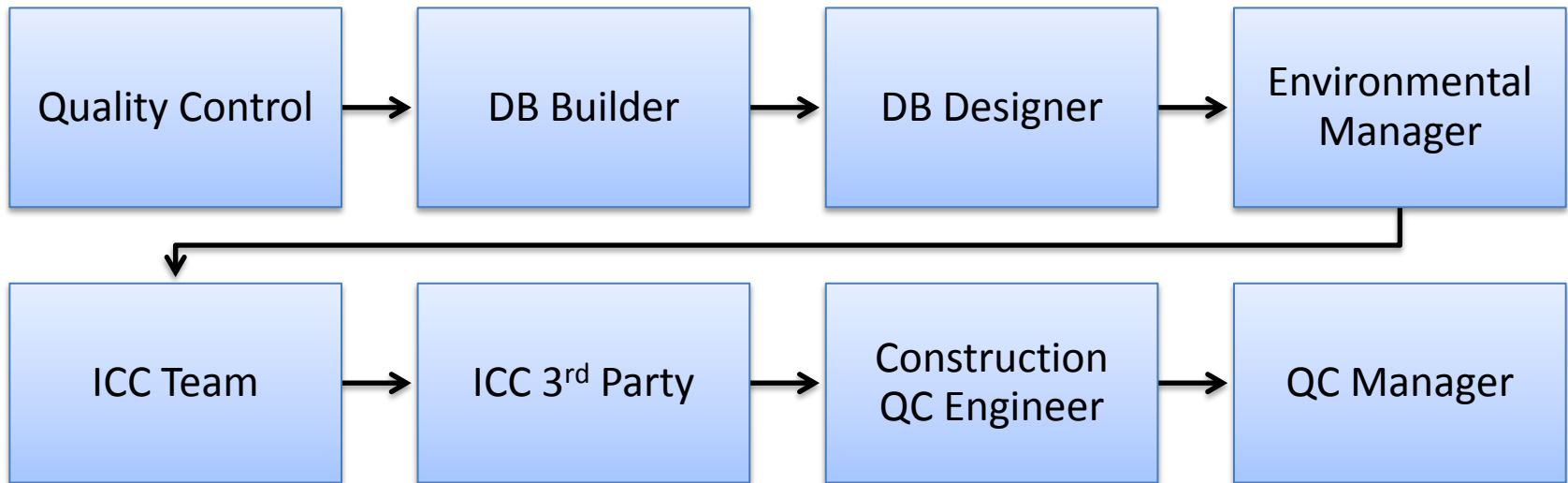


- Tracking Contract Compliance
  - Issue Identification
    - NCR - Non Conformance Report (QC)
      - Generated when Non-Compliance is identified
      - Work is stopped until the issue is resolved



# Communication

- Tracking Contract Compliance
  - Issue Identification
    - NCR - Non Conformance Report (QC)



# Communication

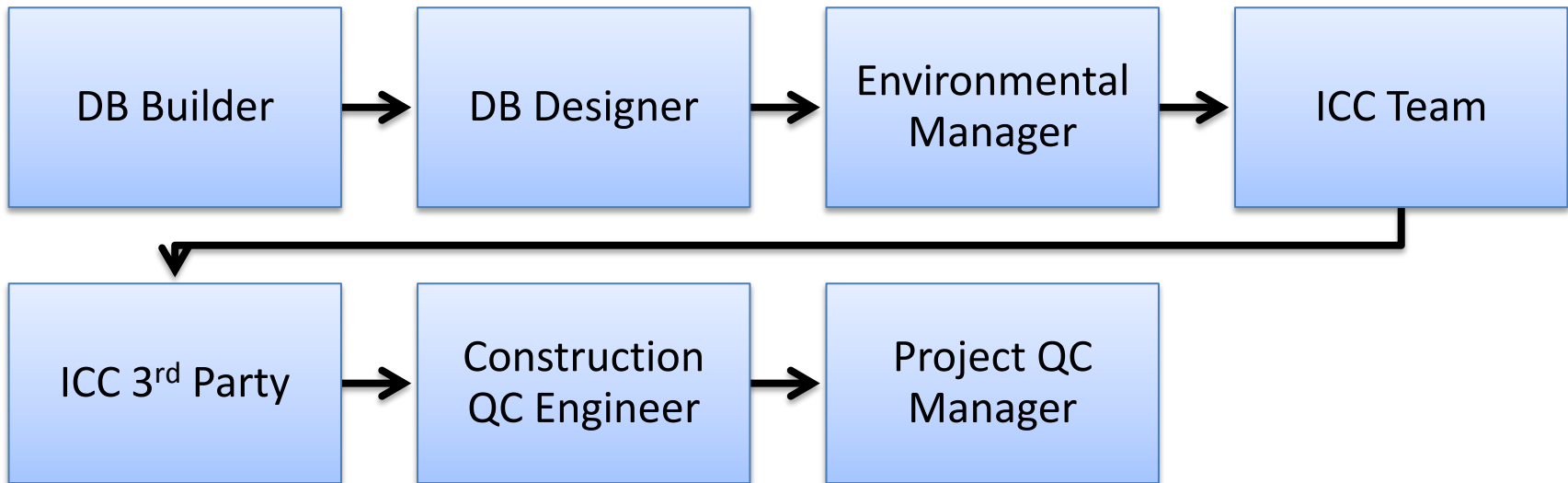


- Tracking Contract Compliance
  - Issue Resolution
    - FDC - Field Design Change (DB Builder)
      - Used to resolve an NCR
      - Modification to approved design
      - Included in As-Builts



# Communication

- Tracking Contract Compliance
  - Issue Resolution
    - FDC - Field Design Change (DB Builder)





## Communication

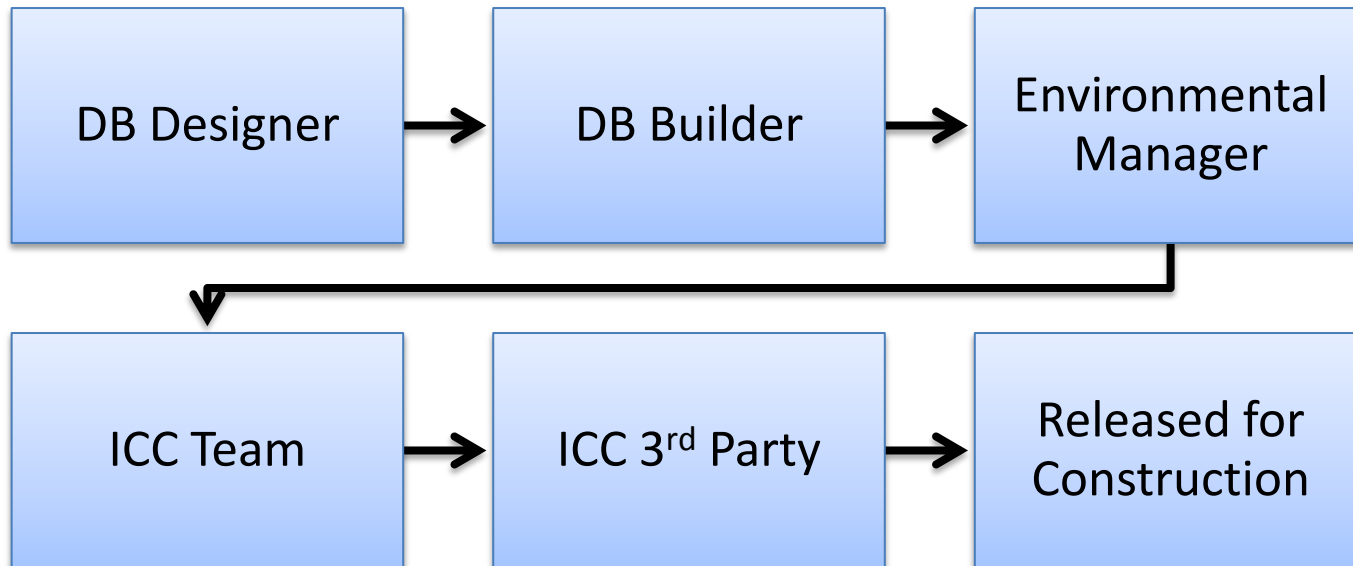


- Tracking Contract Compliance
  - Issue Resolution
    - NDC - Notice of Design Change (DB – Design)
      - Generated by the DB Designer to resolve a design error or conflict
      - Generated at the request of the DB Builder
      - Follows same review and comment cycle as initial design



# Communication

- Tracking Contract Compliance
  - Issue Resolution
    - NDC - Notice of Design Change (DB – Design)



# Communication



- Tracking Contract Compliance
  - Issue Resolution
    - FVR - Field Variance Request (DB Builder)
      - Applicable to minor issues
      - DB Requests variance
      - QC Verifies FVR accuracy
      - QC Manager, DB-Designer & QA agree
      - Paperwork follows with required signatures

# Communication



- Lessons Learned / Recommendations
  - Focus on issues that are critical to the quality of the project
    - Use Level 3 NC for Documentation / Trending minor issues
    - Don't issue NC / NCR when corrections are immediate



# Contract Compliance Resolution Process

- Parties Involved
  - Standard Bid / Build
    - Owner
      - Designer
      - 3<sup>rd</sup> Party
    - Contractor
      - Subcontractors
      - Suppliers

# Contract Compliance Resolution Process



- Parties Involved
  - Design Build (ICC Contracts)
    - Owner
    - Quality Assurance
    - Owners Designer
    - DB Contractor
    - DB Designer
    - DB Quality Control

# Contract Compliance Resolution Process



- Parties Involved
  - Design Build (ICC Contracts)
    - DB Builder responsible for Quality
    - QC role is to determine compliance with the design and project specifications
    - Owner is not responsible for project design but must approve all changes

# Contract Compliance Resolution Process



- Lessons Learned / Recommendations
  - DB Builder needs to make Quality a core value
    - Don't rely on QC or QA to identify issue
    - Become proactive not reactive
  - Simplify QC plan and processes to expedite issue resolution
    - Don't set yourself up for failure



# Contract Compliance Resolution Process



- Lessons Learned / Recommendations
  - Empower key personnel on the DB Team to make decisions on the project
    - Key personnel are submitted and approved
    - Use their expertise to benefit the project

# Non-Conformance Reporting



- QAO Database
  - Newly developed for SHA
  - Documents retained “forever”
  - Multi-use Quality Records Database (QRD)
  - Web based

# Non-Conformance Reporting Lessons Learned



- Focus on important/repetitive issues
- Use process efficiently
  - “seasoned” individual as “gate keeper”
- Speed up the transfer of info.
  - Work already corrected
  - Document “all facts” or “corrections needed”
    - Why document when work is resolved?

# Non-Conformance Reporting Lessons Learned



- How to speed up close-out
  - Use database as record search engine
- Good for QA and QC

## Internal Non-Conformance



- Contractor's reporting system (Contract C)
- QC responsibility
  - Parallel to QAO program
  - High quality standards
  - Single "gate keeper"
  - Excel log
  - Two step process (1-7 days)

## Internal Non-Conformance

- *Constructware* database
  - Available by subscription
  - Utilized by D/B team
  - LARGE amount of data
  - Multi-use
  - Web based



# Internal Non-Conformance Lessons Learned



- Write INCS to facilitate correction/closure
- Document discrepancies at end of day
- Diligently pursue corrections
  - Workmanship
  - Materials
  - Administrative – time consuming

# Internal Non-Conformance Lessons Learned



- Verbal communication is fastest
  - Gets results 90%
- Document unresolved problems
- Good written documentation necessary
  - Experienced QC inspectors
  - Sufficient number of QC staff / schedules
    - Managers & technical



# Internal Non-Conformance Lessons Learned



- Quality Check Points
  - QC notifies QA ready to check work
  - Double check
  - QCP promotes quality work

# Source of Supply Approval



- QC responsibility
  - Independent firm
  - First time for SHA
- Inertia of standard SOS process
- Pre-approved list
  - QPL
  - SHA website

## Source of Supply Approval



- “Partnering” with OMT staff
  - Specialists in several fields
    - Unique expertise
      - Coatings, chemists, cement testing, etc.
  - Knowledge of many suppliers
  - Good communication among QA/QC managers
    - Sharing of knowledge
      - Heads-up to avoid pitfalls



## Source of Supply Lessons Learned

- It takes a team!
  - Large amount of information
  - Learning curve for approval of source
    - Variety of materials
    - History of material performance
    - Updated information
    - National & MD source knowledge
    - D/B is not the same process



## Source of Supply Lessons Learned

- D/Bs don't know who supplier will be
  - Cannot set up list before construction starts
  - React quickly to new suppliers

# Off-Site Fabrication



- Inspection – Quality Control
  - Design Builder’s CQC Engineering Firm
- Verification – Quality Assurance
  - Administration (ICC Team/SHA/OMT)

# Off –Site Fabrication

## Examples of Fabricated Products



### Girders

- Structural Steel
- Pre-Stressed Concrete

# Off-Site Fabrication – Design Builder's CQC Engineering Firm



- Accepts fabricators test results as their QC results
- Reduced inspections in the plant by their authorized agent/agency
- Random Inspections of the Fabricator's processes or products for verification of conformance with Contract requirements and QC Plan



# Off-Site Fabrication Administration – ICC Team/SHA/OMT



- Performs QA verification inspection and testing
- Perform audits to verify the fabricators compliance with their approved Quality Control Plan
- Perform audits to verify the Design Builder's Quality Control processes

# Off-Site Fabrication Lessons Learned



- Fabricators were unaware of the roles and responsibilities of the Design Builder and the Administration(SHA/OMT)
- Design Builder does not have the resources to perform additional tests to confirm fabricators QC test results.

# Off-Site Fabrication Lessons Learned



- Design Builder needed additional resources to perform the inspections in the plant.
  - Hired an agency with the expertise and close proximity to the plant to perform the inspections.
- QC Engineer and SHA/OMT must cooperate and communicate so that quality issues can be quickly addressed and resolved.

# Off-Site Fabrication Lessons For The Future



- Have some patience— big changes don't happen overnight
- Expect some mistakes, be willing to work them out
- Poor quality impacts schedule and can lead to rework



## On Site Sampling & Testing

- Frequency Guide
  - QC vs. QA
  - Long list of requirements
- Testing & Acceptance
  - By QC firm
  - Extremely large amount of data to track
  - Use of QAO/QRD database and QC Plan
  - Plot compaction results on plan & profile



## On Site Sampling & Testing

- On-Site delivery
  - Various locations on large sites
- Documentation
  - Paperwork tracking
  - QC inspection stamp from plant
    - Variety
  - Filed for final audit in CW
    - Transferred to SHA *Projectwise*

## Testing Lessons Learned



- Need accurate results – credibility
- Independent QC needs highest quality staff
  - MARTCP and other certifications
  - Experienced on new construction of highway or bridge



## Testing Lessons Learned

- D/B contractor requires rapid results
  - QC must keep job moving!
  - Advance notification of close-out info.
  - QC is part of the solution
  - Contractor wants quality too!
- Need to “Partner” everyday with Team
  - contractor, QC, QA, designers, ICC staff





# Sediment & Erosion Control Lessons

- Design-Build Responsibilities
  - Multiple Roles
    - D-B Environmental Team
    - Environmental Manager
    - ESCM
    - QC Team
      - Need to have specific E&S construction experience
      - Need preemptive / planning focus
      - Could benefit from an incentive

# Sediment & Erosion Control Lessons



- ICC QA
  - Providing more of a QC function
- Roles could better be defined between parties
  - MDE, IM's, QC, QA, ESCM, EM