Major Projects discipline

Joint DOT/FHWA Major Projects Webinar

November 8, 2017

Agenda

1. **Major Project Spotlight**

   Quality Assurance on Major Projects

   - Texas DOT
   - Florida DOT
   - New York State Thruway Authority
   - Arizona DOT

2. **Major Project Information**

   - Identifying FHWA Major Projects
   - Major Projects Requirements Timeline
   - Major Projects FMIS Update

3. **Comments/Questions**

Major Project Spotlight: *Quality Assurance on Major Projects*

Peer Exchange Featuring:

Texas DOT

Florida DOT

New York State Thruway Authority

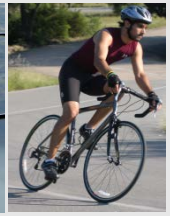
Arizona DOT

TXDOT Quality Assurance Program

Claudia Izzo
Texas DOT

TEXAS DEPARTMENT OF TRANSPORTATION



TXDOT QUALITY ASSURANCE PROGRAM

Joint DOT/FHWA Major Projects Webinar

Claudia Izzo – November 2017

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INTRODUCTION-DBB, DB, AND CONCESSION PROJECTS

History

- TXDOT first DBB QAP implemented in 2000 and last updated in 2016
- First DB project started in 2002, utilizing a project specific quality assurance approach until TxDOT's first programmatic DB QAP was implemented in 2008
- DB QAP last updated in 2017 which includes changes based on lessons learned and the findings of FHWA Program review of "Quality Assurance for TxDOT DB and Concession Projects"

DBB/DB Projects

Design Bid Build (DBB)

- Separate selection process for design and construction
- Advertise & award the construction contract
- Construct the project
- TxDOT maintains responsibility for all Quality Acceptance including inspection and testing

Design Build (DB)

- TxDOT enters into a contract with a developer to design, construct and possibly maintain the project
- Developer responsible for QC/IQF testing and inspection
- TxDOT has an oversight role on testing and inspection (OVF); as well as Independent Assurance (IA)

QAP Comparison for CDA/DB and DBB

Design-Build			
Quality Control	**IQF Testing and Inspection**	**Owner Verification**	**Independent Assurance (IA)**
DB Contractor & Subcontractors	DB Contractor's Independent Quality Firm (IQF)	TxDOT's Independent OVT Laboratory	TxDOT District Lab. or Designated IA Lab.
Design-Bid-Build			
Quality Control	**Quality Acceptance**	**Owner Verification**	**Independent Assurance (IA)**
Contractor	TxDOT District	N/A	TxDOT (CST-M&P and District Laboratory)

TxDOT CDA/DB Accomplishments

Concession:

- SH 130 Segments 5 & 6 / $1.37B (DBFOM – 50 yr.)
- North Tarrant Expressway Segments 1, 2 & 3A / $3.4B (DBFOM – 52 yr.)
- I-635 LBJ Freeway/ $3.1B (DBFOM – 52 yr.)
- SH 288/ $815M (DBFOM – 52 yr.)

Design-Build:

- SH 130 Segments 1–4 / $1.35B (DBM – 15 yr.)
- DFW Connector / $1.2B (DBM – 15 yr.)
- Dallas Horseshoe / $804M (DBM – 15 yr.)
- SH 99 (Grand Parkway) Segments F1, F2, and G / $1.45B (DBM – 15 yr.)
- Loop 1604 WE / $126M (DBW – 2 & 5 yr.)
- US 77 / $84M (DBM – 15 yr.)
- ESR2P / $189M (DBW – 1yr.)
- Harbor Bridge / $803M (DBM – 25 yr.)
- Plus Four More / $2.31B (3 DBM – 15 yr. and 1 DBW – 2 & 5 yr.)

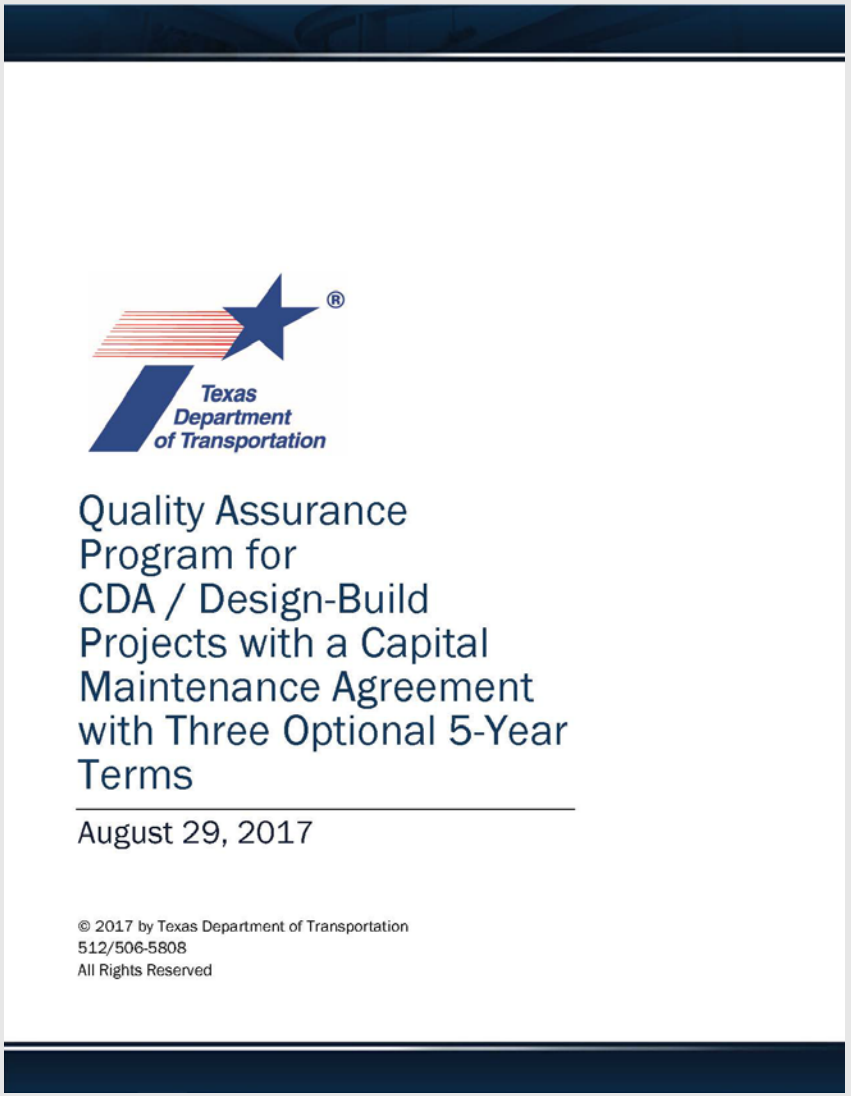
Risk Allocation Comparisons of TxDOT DBB, DB, and Concession Projects

Risk Allocations Comparisons			
Risk	**Design-Bid-Build**	**Design-Build**	**Concession**
Project Scope	Owner	Owner	Owner
Right of Way	Owner	Shared	Shared
Utilities	Owner	Shared	Shared
Design	Owner	Contractor	Contractor
Construction	Contractor	Contractor	Contractor
Site Conditions	Owner	Shared	Contractor
Quality Control (QC)	Contractor	Contractor	Contractor
Independent Quality Firm (IQF)	Owner	Shared	Shared
Hazmat	Owner	Shared	Shared
Operation & Maintenance	Owner	Shared/Owner Three optional 5-yr. term	Concessionaire 52 yr. required
Traffic (Demand/Revenue)	Owner	Owner	Concessionaire
Financial	Owner	Owner	Owner/Concessionaire
Toll Technology	Owner	Owner	Concessionaire
Force Majeure	Shared	Shared	Shared

CDA/DB QAP OVERVIEW

CDA/Design Build (DB) QAP

- Ensures that materials and workmanship incorporated into the highway construction project are in reasonable conformance
- Provides statewide consistency and a programmatic approach.
- Clarifies and Implements the Federal requirements
- Developed specifically for the risk profile associated with projects that have a CMA with three optional 5-year terms



Federal Requirements and References

23 CFR 637 Part B (1995)
Quality Assurance Procedures for Construction

FHWA Technical Advisory T 6120.3 (2004)
"Use of Contractor Test Results in the Acceptance Decision, Recommended Quality Measures, and the Identification of Contractor/Department Risks"

NS 23 CFR 637B (2006)
Quality Assurance

FHWA Publication No. FHWA-HRT-12-039
"Construction Quality Assurance for Design Build Highway Projects" (2012)

To Meet the Federal Requirements

TxDOT Quality Assurance Program

- TxDOT Quality Assurance Program for CDA/Design-Build Projects with a Capital Maintenance Agreement with three optional 5-year periods (CDA/DB QAP)
- DB Guide Schedule of Sampling & Testing by the Independent Quality Firm (IQF)
- Design-Build Contract

Reference document: TxDOT Design-Build Quality Assurance Program Implementation Guide (update pending)

Components and Relationship in the QAP

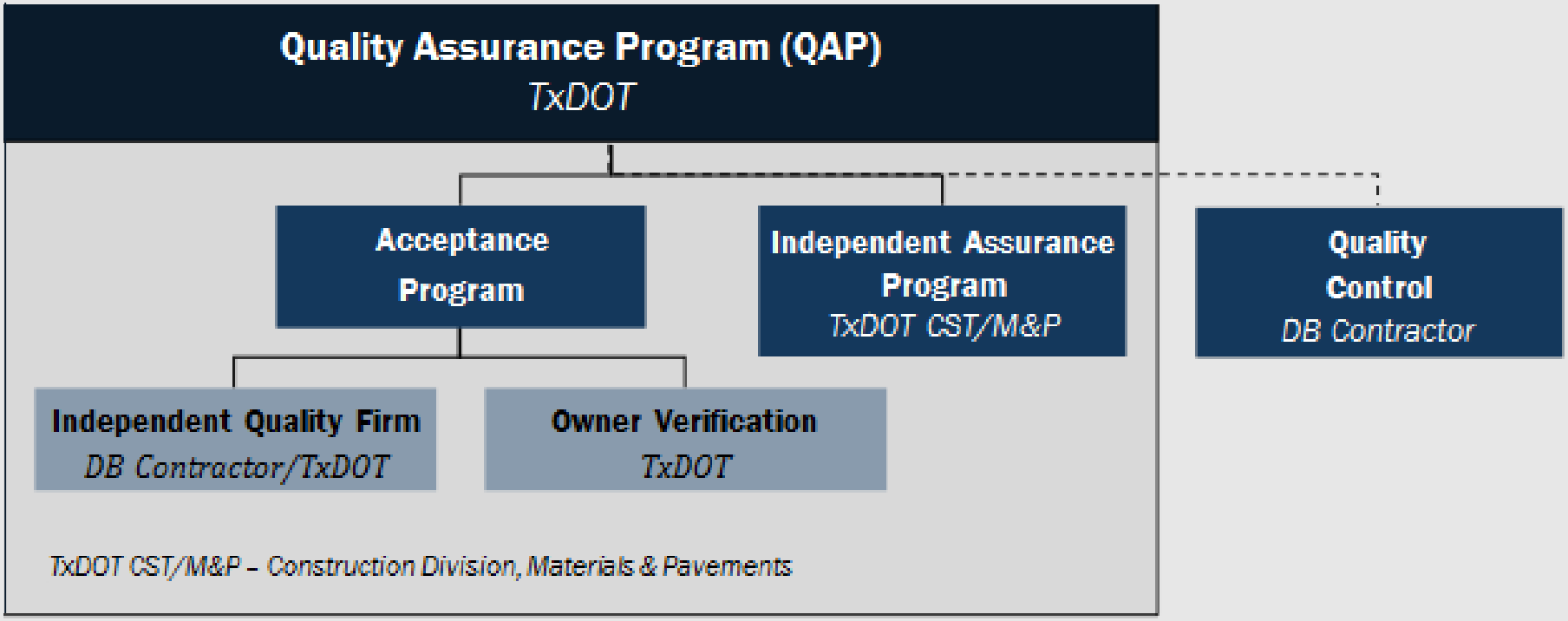
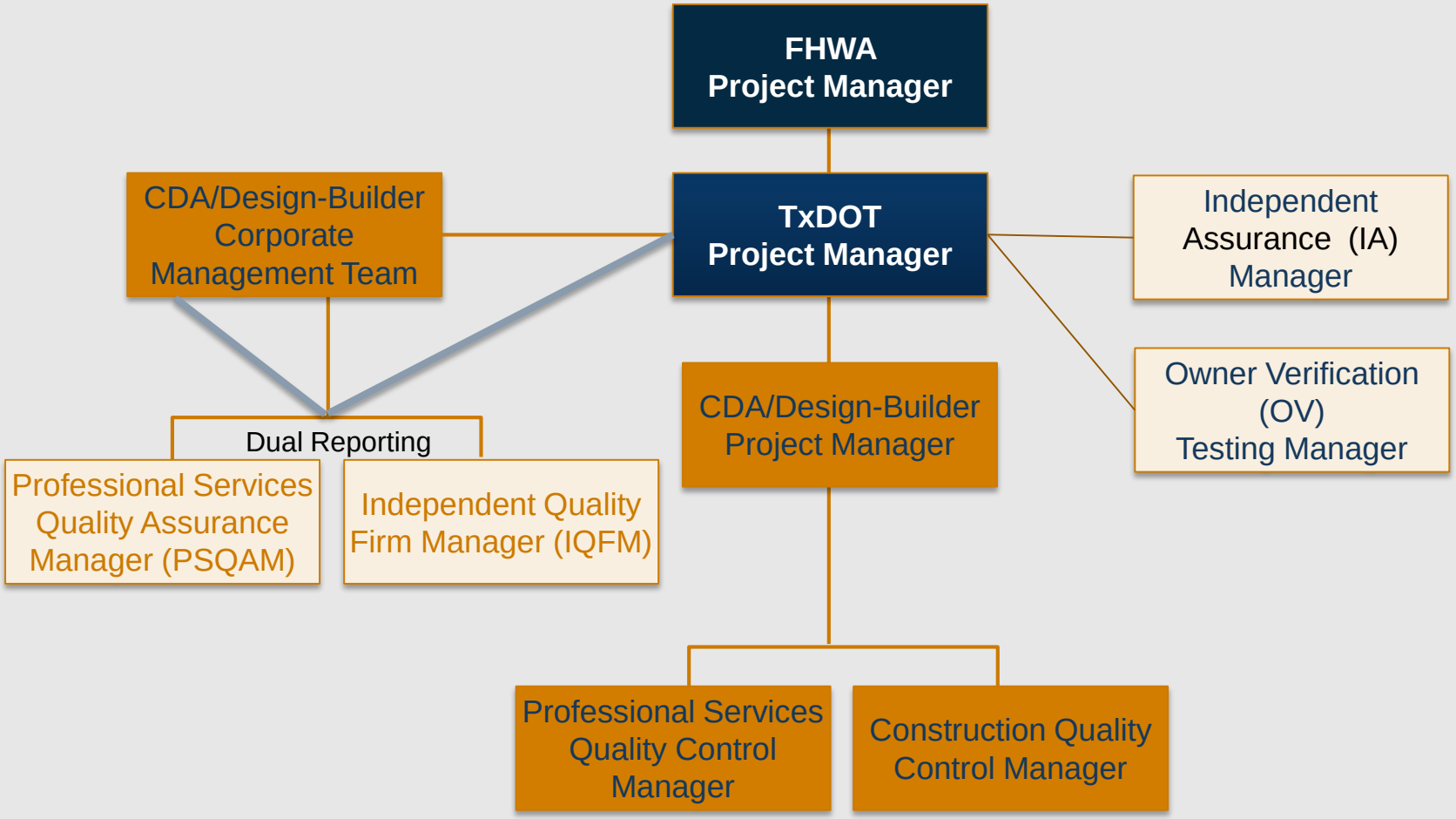


Figure 1—Components and Reporting Relationship in the QAP

TxDOT Quality Organization Framework



Design-Build - Who Performs the Activity?

Activity	TxDOT	CDA/DB Contractor	FHWA
Quality Management Plan		✓	
Construction Quality Management Plan		✓	
Design Quality Management Plan		✓	
Owner Verification Testing & Inspection Plan	✓		
Owner Verification Testing	✓		
Oversight of the QAP	✓		✓
Design Quality		✓	
Construction Quality		✓	
Independent Assurance	✓		
Acceptance Program	✓	✓	

Quality Responsibilities – DB Contractor

Quality Control (QC)

- CDA/DB Contractor's CQMP required – defines internal procedures used by contractor, suppliers, and subcontractors
- Ensure work is delivered in accordance with Contract Documents
- QC is foundation- Responsible for the quality of the work
- CQMP systematic approach. Clearly define authority and responsibility for administration of QC plan
- Results of testing and inspection not used for acceptance but used to ensure quality has been incorporated into all elements of work prior to requesting IQF testing and inspection.

Independent Quality Firm (IQF)

- CDA/DB Contractor's inspection & testing by Independent Quality Firm (IQF)
- Follows DB Contractor's CQMP requirements
- Frequency of sampling and testing per DB Guide Schedule
- Results of inspections and Testing will be used for acceptance
- Acceptance Program = IQF + OVF results
- Start-up split sample testing with OVF, for alignment
- IQFM assigned = "Engineer" in TxDOT spec book and/or contract, not considered the EOR

Quality Responsibilities – TxDOT

Owner Verification (OV)

- Required by 23 CFR 637 B & TA 6120.3
- Owner's independent firm
- Owner verification testing and Inspection
- Statistical validation and verification of IQF testing results
- Oversight of non-validation investigations
- Develop OV Testing & Inspection Plan (OVTIP)
- Audits to verify : DB Contractor's CQMP and OVTIP compliance
- OVI and OVT Risk Assessment Workshop (In conjunction with TxDOT and FHWA).

Independent Assurance (IA)

- Evaluate all sampling and testing procedures, personnel, and equipment used as part of an acceptance decision
- Verify/maintain documentation of qualifications for all individuals and laboratories performing testing for the acceptance decision
- Develop IAQP
- Oversight of misconduct accusations, investigations.
- Develop and submit a project-level IA report to CST/M&P
- TxDOT CST/M&P will develop and submit to FHWA an annual report on the IA program

Owner Verification Approach

- Three-Tiered Verification Approach - Appendix D: “OV Levels for Mtls. Testing Validation”
  - Level 1: Continuous F- & t-test analysis
    - Almost real-time verification
    - Minimum 10% of IQF testing frequency
    - Covers most critical performance properties
  - Level 2: Independent Verification (min. 3/quarter)
  - Level 3: Observation Verification (start-up & periodically as needed)
  - Analysis levels based on keys to performance
- Split-sample testing: Start-up and quarterly
- OV Validation Report: Statistical analysis results, Level 2 and 3 results, Split sample analysis results, Non-validation investigations, Non-conformance log, EJ logs, and monthly material certifications.

Resolving Material Quality Issues

- Each party (IQF and OVF) must resolve individual material quality issues that arise on the project timely with dispositions reported
- The resolution of these issues depend upon whether materials are statistically validating or non-validating
- If the material is not validating, the IQF does not have engineering authority to accept failing materials

Validating Materials	Non-Validating Materials*
Recommendation for acceptance is made by the IQF and validated by the OVF, or Referee testing	Acceptance decisions are based on TxDOT/OVF results, Percent Within Limits (PWL), or Referee Testing

* Additional IQF testing to resolve a NCR can be used only if IQF's results are validated by OVF. TxDOT's concurrence is required.

LESSONS LEARNED

Active Communication

- Communication between DB Contractor, IQF, OVF, IA, and TxDOT should begin early in the project
- DB Contractor/QC needs to notify the IQF and TxDOT (or OVF, as appropriate) in a timely manner when the Work/materials are ready for sampling and testing
- Weekly materials coordination meetings between TxDOT, the OV materials manager, the IQFM, and the CQCM is highly recommended.
  - Invitations to other members of the staff (e.g., resident engineers) as appropriate for the construction activities being discussed.
  - Meeting minutes so that future reference to discussions and decisions can be made
  - Daily communication is important for any activity schedules that vary from the submitted three week look-ahead

Lessons Learned

- IQF must have a reliable system of keeping track of quantities, and quantities must be communicated weekly with OVF.
- Communications in the field between IQF and OVF techs is a good way to make sure samples are taken when needed.
- Owner verification must take an active role in scheduling resources available to the project
- All Parties must play an active role in the project's implementation for an active materials management program
- Develop and implement opportunities for improvements based on final audit findings
- Plan, schedule and perform audits timely
- Constant communication is needed between all the laboratories so the software used to analyze the data can be used to its fullest to meet the project needs.
- IQF personnel cannot perform QC functions and vice versa.
- Acceptable method to determine if a result may be classified as an outlier is ASTM E178-16a.

Lessons Learned

- Repeated discoveries by the IQF of Nonconforming Work, Construction Deficiency Reports (CDRs)/Nonconformance Reports (NCRs) or excessive use of Engineering Judgment is considered a breakdown in QC operations and will be cause for investigation and corrective action.

- Review and posting of testing results need to be timely to allow for proper acceptance decisions.

- IA needs to be readily available for certifications.

- IA needs to inform IQF and OVF of impending certification expirations. Labs have varying levels of competency in maintaining current technician certifications and equipment calibrations

- Consistency is needed for split sampling procedures: one firm to sample with other firm observing.

Success!

- Get the IA out as soon as possible, sometimes hard to schedule
- Begin the correlation process early
- Analysis software: IQF and OV to agree early on categories and Controlled Vocabulary Language (CVL)
- Perform timely statistical analysis and OVF to review and communicate analysis results with QC and IQF on a daily basis
- Co-location of IQF and OVF labs is crucial

LESSONS LEARNED- FHWA PROGRAM OVERVIEW

Lessons Learned from FHWA Program Review

- Review conducted in June 2017 on ten DB and Concession projects.
- Nine Program Level Observations/Recommendations
- TxDOT Responded to each of the nine Observations and Recommendations to FHWA's program review; resulting in
  - changes to TxDOT's DB QAP
  - project specific quality training for all alternative delivery projects
  - TxDOT has agreed to Action Plan and identified items to address FHWA's recommendations

Observation 1 –

Improper Non-Validation Acceptance Justifications:

- Accepted based on post construction maintenance responsibilities
- Contractor accepting additional risk will not preclude meeting CFR requirements
- Additional testing by the Contractor and not the independent firm used as justification for acceptance
- OV Tests were Outliers
- Investigation Split-Samples were Good
- Validation is Expected in the Future
- OV is Only 1/10

TxDOT Response:

- Statewide QAP Revisions:
  - Accepting work based on future maintenance agreements or contractor test results is not allowed regardless of the length of any maintenance agreement.
  - Emphasis – IQF Results used Only if Verified. Use of IQF test results as part of the acceptance decision only IF the IQF's results are verified by the OV testing results.
  - Address all Failing IQF and OV Results
  - Definition of outliers and split testing defined
  - Increase OV sampling and testing frequency to provide additional OV data for potential continuing non-validation analysis.
- Mandatory Training for TxDOT Project Team
- Revisions to Contract Documents:
  - Hold Payment for Unresolved NCRs or Non-Compliance Points
  - 60 day time limit for submitting quarterly reports
  - Reporting test results within 48 hr. of test completion

Observations #2, #3, and #6:

Examples of Non-Timely Evaluation:

- Analysis evaluated at end of Quarter
- Quarterly Reports Developed Months after Work Complete
- Multiple Revisions to Acceptance Justification

TxDOT Response:

- Implemented SharePoint Workflow process for tracking Quarterly Reports
- Time Limits for submitting quarterly reports
- A quarterly report template and instructions are being developed
- Emphasis – Addressing Problems as they Occur

Observation 4 –

Improper use NCR Process:

- NCR improperly used without proper justification that conforms to 23 CFR 637

TxDOT Response:

- NCRs addressed in Statewide QAP:
  - Revisions to OVTIP requirements to include a procedure for review and approval of NCR resolutions proposed by DB Contractor.

- Emphasis – 23 CFR 637 Still Applies for NCR Resolution:
  - Revised NCR section in DB QAP to clarify that any NCR resolution involving materials should be base on:
    - Acceptance procedures in the RFC plans and specifications
    - Random testing by IQF with OV validation
    - Using test methods qualified by IA
    - Consistent with IQF's CQMP and OVTIP

Observation 5 –

Examples problems of Final Project Material Certifications:

- Projects not aware one is required
- No one wants to sign
- Projects not closed out

TxDOT Response:

- Statewide QAP Revisions: Required projects to provide a final material certification letter signed by the District Engineer (DE) or designee
- Included in Training for project team

Observation 7 –

Potential Technician Reporting Issues:

- Always assume an equipment or testing cause
- Split Samples Right on, but Independent Indicates Bias

TxDOT Response:

- Statewide QAP Revisions: If OV test results do not validate the IQF's test results, an investigation shall be conducted to determine the reason for non-validation.
- Emphasis on complete informal and formal Investigations.
- Areas for investigation:
  - data integrity and accuracy
  - Technician reporting issues
  - Testing equipment and procedures
  - Sampling variability
  - Material variability
- Training for project team

Observation 8 –

Concern with Concession Projects:

- Independent Engineer with OV Lab creates misinterpretation of QAP
- Resistance from projects that do not specifically require adhering to the QAP if not specifically referenced in contract documents

TxDOT Response:

- Contract documents modified to follow QAP

Observation 9 –

FHWA's involvement:

- FHWA is currently reviewing and approving all Quarterly Reports
- Program Continues to expand
- Becoming a Resource Issue

TxDOT Response: Action Plan

- Implementation of Quarterly Report Template for Standardization and Efficiency
- TxDOT Construction Division Review Prior to FHWA Review
- Transition to FHWA Random Review

QUESTIONS?

Contact Information

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Questions & Input

Submit a question using the chat box

Or

Dial *1 to call in your question by phone

I-4 Ultimate Project FDOT Risk Based Audit Program

Michael Gwynne, P.E.
HNTB

I-4 Ultimate Project
FDOT Risk Based Audit Program

FHWA Major Project Webinar

November 8, 2017

Project Scope by the Numbers

- Public Private Partnership (P3)
- $3.8B Concession Agreement with a term of **40 Years**
  - $2.323B for Design and Construction (Construction Period)

- Financial and Commercial Close September 4, 2014
- NTP 1 for Design October 4, 2014
- NTP 2 for Construction and O&M Work February 1, 2015
- **2,310 Days** from NTP 1 to Substantial Completion

Construction Period +/- 7 Years

- **90 Days** from Substantial Completion to Final Acceptance

Interim Period

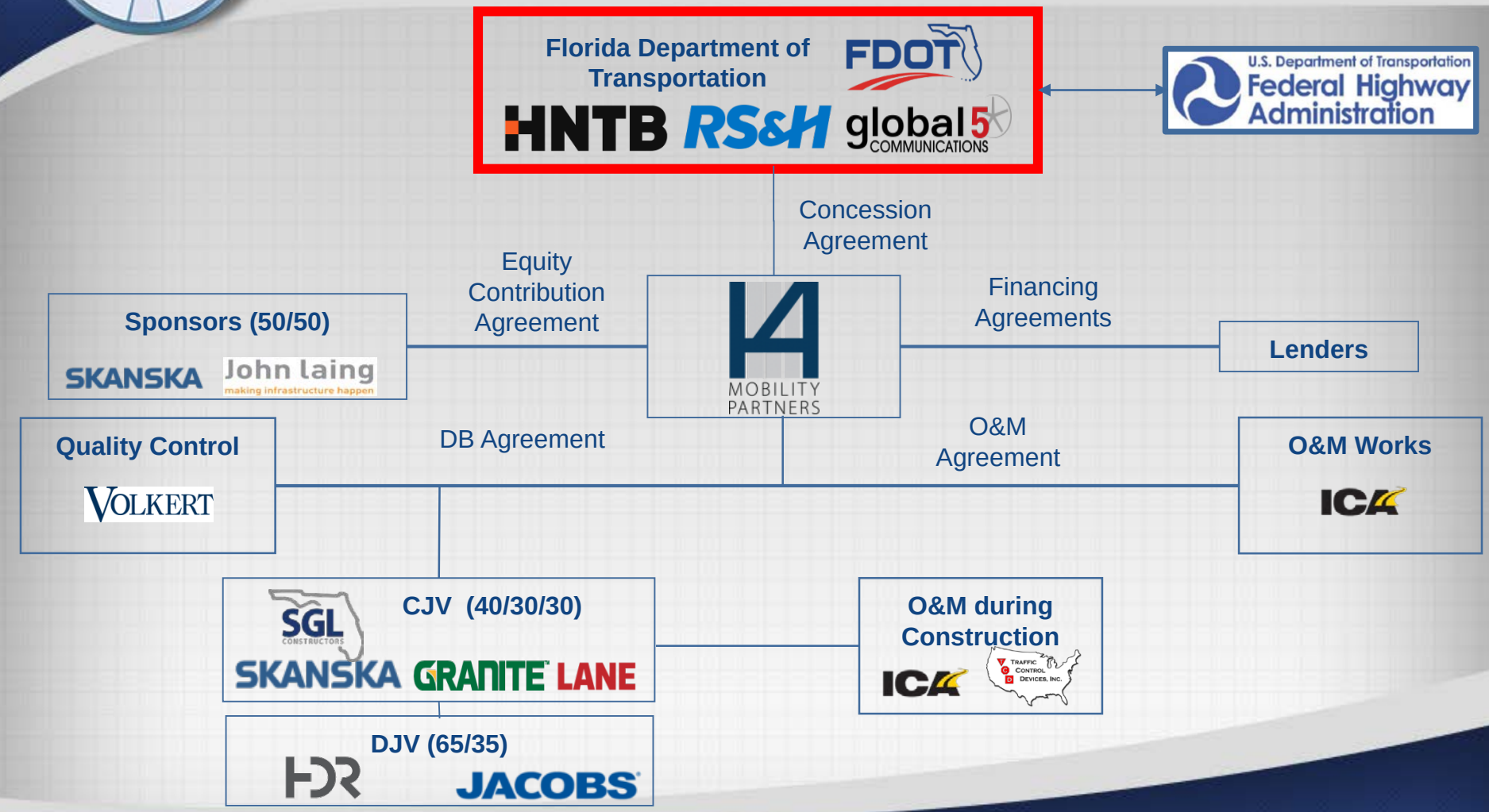
- Long-term Operations

Operating Period +/- 33 Years

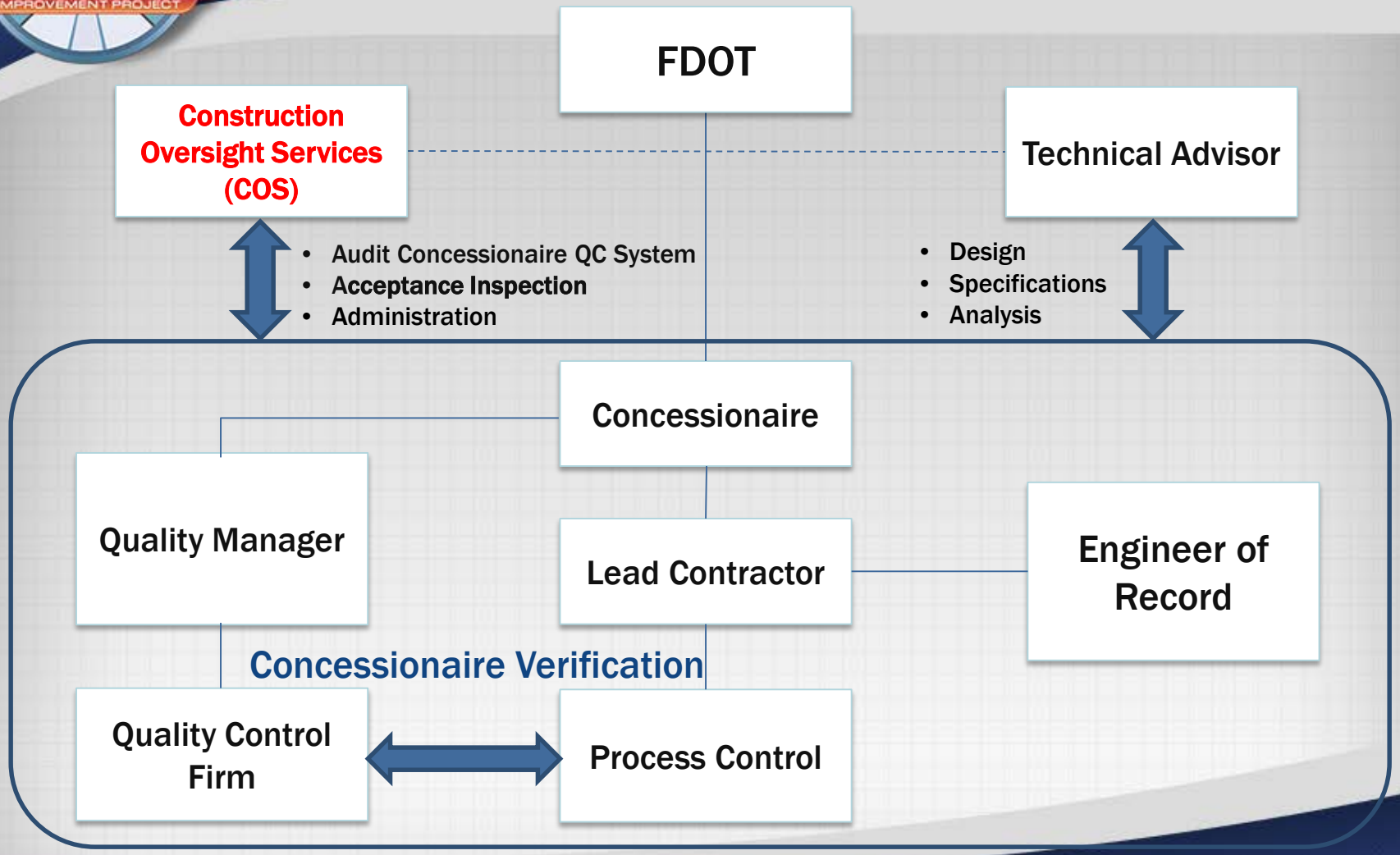
Project Scope by the Numbers

- 21 miles of Interstate reconstruction
- Increase posted speed 50mph to 60mph
- 15 Major Interchanges
- Addition of 4 Managed Lanes
- 150 Bridges
- + 13,535 EA Steel and Concrete Piles
- 86 Miles of Drainage improvements
- + 5,000,000 CY of Imported Embankment
- + 3,800,000 SF of MSE Walls
- + 577,000 SY of Concrete Pavement
- + 908,000 TN of Asphalt
- Corridor O&M during Construction Period

Project Organization



Construction Oversight Services



Construction Oversight Services

- Construction Oversight Services Consultant (COS)
  - Responsible to administer the Contract on behalf of the FDOT
    - ***Role is similar to that of an FDOT Construction Resident Engineer, Operations Engineer and Materials Engineer***
  - Review and coordination of all Construction Engineering and Administrative Functions:
  - Perform Agency Acceptance inspection
  - Managing Lane Closure requests
  - Monitoring EEO, DBE, SBE and OJT requirements
  - Monitoring the Project Schedule
  - Coordinating Submittal Review and Acceptance of RFC Plans and Shop Drawings with the FDOT Technical Advisor
  - Processing Supplemental Agreements and Payments

Acceptance Inspection - RBAP

- The Risk Based Audit Plan (RBAP) is an evolution of the I-595 model
  - Incorporating and improving on the Audit Forms used
  - Incorporating the Statistical Validation approach used
- FDOT scope for its RBAP model inspired by commercially available platforms
  - Focus is on specific **requirements** and recording audit results in a database
- Research by COS of Risk Based approaches
  - CALTRANS – Tiers of Risk from 'Catastrophic' to 'Monetary'
  - VDOT – Tiers of Risk by Category of Work
  - ODOT – Inspection Prioritization scale
  - INDOT/Purdue Study – Tiers of Risk by Category of Work
  - OIG and CIG auditing – Mathematical expression of Risk

The best aspects of all the approaches reviewed were selected to create the I-4 Ultimate Project RBAP

Acceptance Inspection - RBAP

Risk Based Audit Plan (**RBAP**) had to include:

- Identifies risks specific to the Project
- Rates those risks based on criteria specific to the Project and/or Industry Practice /Standards
- Establishes an audit program based on the risks identified, which can be adjusted based on actual performance and trends
- Audits and their results are integrated to a Concession Agreement Requirements Verification Database (**RVD**)
- All Audits are conducted using the RBAP System

Acceptance Inspection - RBAP

- The Requirements Verification Database (**RVD**) is a compendium of requirements extracted from the Contract Documents, which includes but is not limited to:
  - Volume I (Concession Agreement)
  - Volume II (Technical Requirements)
  - Volume III (Additional Mandatory Standards)
  - Specifications and Standards associated with the Final Design
  - Permits and other Project Commitments
- The requirements included within the Database form 'data points'; to date the COS Team has populated the **RVD** with over 10,000 individual requirements
- The **RVD** also houses the Project record of each audit conducted and facilitates analyzing audit results, associated trends and the possible need to re-evaluate Project risks

Acceptance Inspection - RBAP

- For the I-4 Ultimate Project the RBAP is based on Project risks that are focused on the Project elements that will be a part of the Final Design, in addition to other requirements included in the Contract Documents
- Distinct 'Work Elements' have been established to represent the different Project elements such as Deck Placement – Category II, Embankment, Erosion Control, Payrolls, etc.
- Each 'Work Element' falls into one of three audit categories:
  - Risk Rated
  - Frequency Based
  - Ad-hoc

Acceptance Inspection - RBAP

- Risk Rated ‘Work Elements’ are individually rated which sets their audit priority
- Frequency Audited ‘Work Elements’ represent persistent or repetitive risk e.g.
  - Safety and Mobility (MOT Lane Closures or MOT Reporting, etc.)
  - O&M Performance
  - EEO, DBE, Payroll and OJT compliance
- Ad-hoc Audits can be either Risk Rated or Frequency Based ‘Work Element’ and generated at any time deemed by FDOT or COS

Acceptance Inspection - RBAP

- Risk Rated 'Work Elements'
  - For large scale projects, risk is typically rated using Qualitative and Quantitative means:
    - ***Probability of Occurrence (P)***
    - ***Consequence of Occurrence (C)***
    - ***Detectability or Discovery of Occurrence (D)***
    - ***For the I-4 the COS Team added History of Performance (H)***
  - Associated with the specific requirements of the Contract Documents (e.g. Specifications) or the Project elements themselves (e.g. bridge foundation – mass concrete)
  - **Translated to a numerical value** to establish its ranking and the associated audit priority **i.e. P x C x D x H = Risk Rating/Ranking**

Acceptance Inspection - RBAP

Risk Rated Work Elements – Jointly developed between FDOT and COS during Workshops. **Concessionaire was NOT involved**

FINAL BASELINE RISK INDICES			COS TEAM				FDOT TEAM				AVERAGE TEAM				
Work Element	Sub-Category	RBAP CODE	Probability of Occurrence (P)	Consequence of Occurrence (C)	Detectability of Occurrence (D)	History of Performance (H)	Probability of Occurrence (P)	Consequence of Occurrence (C)	Detectability of Occurrence (D)	History of Performance (H)	Probability of Occurrence (P)	Consequence of Occurrence (C)	Detectability of Occurrence (D)	History of Performance (H)	Risk Index (PxCxDxH)
Architectural Pavers	Incidental Construction	APAV	2.57	4.14	2.00	5.00	2.00	2.00	2.00	5.00	2.29	3.07	2.00	5.00	70
Landscaping Materials/Placement	Landscaping	LAND	2.86	3.71	2.14	5.00	2.00	2.00	2.00	5.00	2.43	2.86	2.07	5.00	72
Patterned Pavement	Incidental Construction	PPAV	2.43	4.29	2.14	5.00	2.00	2.00	2.00	5.00	2.21	3.14	2.07	5.00	72
Fencing	Incidental Construction	FENC	2.71	4.71	2.29	5.00	2.00	2.00	2.00	5.00	2.36	3.36	2.14	5.00	85
Turf	Incidental Construction	TURF	2.71	3.00	2.14	5.00	4.00	2.00	2.00	5.00	3.36	2.50	2.07	5.00	87
Geosynthetics	Incidental Construction	GEOS	2.14	3.29	3.00	5.00	2.00	3.50	2.00	5.00	2.07	3.39	2.50	5.00	88
Power Service	Incidental Construction	PSER	2.29	5.00	2.71	5.00	2.00	2.00	2.00	5.00	2.14	3.50	2.36	5.00	88
Geotextiles	Incidental Construction	GEOT	2.29	3.29	3.43	5.00	2.00	3.50	2.00	5.00	2.14	3.39	2.71	5.00	99
Sidewalk and Curb Ramps	Incidental Construction	SWLK	3.43	4.71	2.43	5.00	2.00	2.00	2.00	5.00	2.71	3.36	2.21	5.00	101
Concrete Ditch/Slope Pavement	Drainage	DPAV	2.57	4.86	2.86	5.00	2.00	3.00	2.00	5.00	2.29	3.93	2.43	5.00	109
Pedestrian Signals	Signalization	PEDS	2.00	5.14	2.71	5.00	1.50	6.00	2.00	5.00	1.75	5.57	2.36	5.00	115
Curb and Gutter	Roadway	CUGU	2.71	5.14	2.86	5.00	2.00	3.00	2.00	5.00	2.36	4.07	2.43	5.00	117
Rip Rap	Drainage	RPRP	2.71	4.00	3.29	5.00	2.50	3.50	2.00	5.00	2.61	3.75	2.64	5.00	129
Controller Cabinets	Signalization	CABS	2.29	5.57	2.71	5.00	2.00	5.00	2.00	5.00	2.14	5.29	2.36	5.00	133
Light Poles/Luminaires	Lighting	LIGH	2.57	5.00	3.29	5.00	2.00	4.00	2.00	5.00	2.29	4.50	2.64	5.00	136
Pavement Markings	Signage and Pavement Markings	PMAR	3.00	5.71	2.00	5.00	2.50	4.50	2.00	5.00	2.75	5.11	2.00	5.00	140
Conduit, Pull Boxes and Vaults	ITS	CPBI	2.57	4.00	3.57	5.00	1.50	2.50	5.50	5.00	2.04	3.25	4.54	5.00	150
Jobsite Management - debris collection, etc.	Incidental Construction	JOBM	4.14	4.57	2.57	5.00	4.00	2.00	2.00	5.00	4.07	3.29	2.29	5.00	153
Irrigation	Landscaping	IRIG	2.29	4.00	3.71	5.00	2.00	2.00	6.00	5.00	2.14	3.00	4.86	5.00	156
CCTV	ITS	CCTV	2.86	4.29	3.57	5.00	2.50	5.00	1.50	5.00	2.68	4.64	2.54	5.00	158
Span Wire or Pole Mounted	Signalization	SPAN	2.14	5.14	3.43	5.00	2.33	4.67	2.33	5.00	2.24	4.90	2.88	5.00	158
Conduit, Pull Boxes and Conductors	Lighting	CPBL	2.43	4.14	4.14	5.00	2.00	2.00	6.00	5.00	2.21	3.07	5.07	5.00	172
Signage and Delineators	Signage and Pavement Markings	SIGN	2.86	5.29	2.43	5.00	2.67	5.33	2.33	5.00	2.76	5.31	2.38	5.00	175
CMS	ITS	CHMS	3.00	4.43	3.43	5.00	2.50	6.00	1.50	5.00	2.75	5.21	2.46	5.00	177
DMS, RWIS and HAR	ITS	DRHD	3.00	4.57	3.57	5.00	2.50	6.00	1.50	5.00	2.75	5.29	2.54	5.00	184
Embankment - Minor	Earthwork	EMB1	2.29	4.71	3.43	5.00					2.29	4.71	3.43	5.00	185
Clearing and Grubbing	Earthwork	CLGR	2.00	4.71	3.86	5.00	2.00	2.00	8.00	5.00	2.00	3.36	5.93	5.00	199

Acceptance Inspection - RBAP

Very similar to FHWA CAP Program for determining sample size

- The number of Audits to be conducted each period is based on a statistically validated **Audit Sample Population** i.e. the minimum number of 'Work Element' Audits necessary to be mathematically representative of the Concessionaire's Activities
  - Known Population (**N**) derived from the Progress Schedule
  - Assume **20% of Audits** will illicit Nonconformance findings (**p**)
  - Set **Confidence Interval (e) of 5%** for Audit Sample accuracy
    - Confidence Interval is +/- deviation from the Mean
  - The objective is to prove that the Audit Sample Size (n_0) is representative of the Known Sample Population. Assumed to be **95% Confidence Level (CL)**
  - Using **NIST Equation** to calculate Audit Sample Size (n_0)
    - $n_0 = p \times (1-p) \times z^2/e^2$
      - z factor from Normal Distribution Probability Tables with 95% CL
  - Using the finite population correction formula below for a known Population, the COS can derive the **Audit Sample Size**
    - $n = n_0 / (1+ (n_0 -1)/N)$

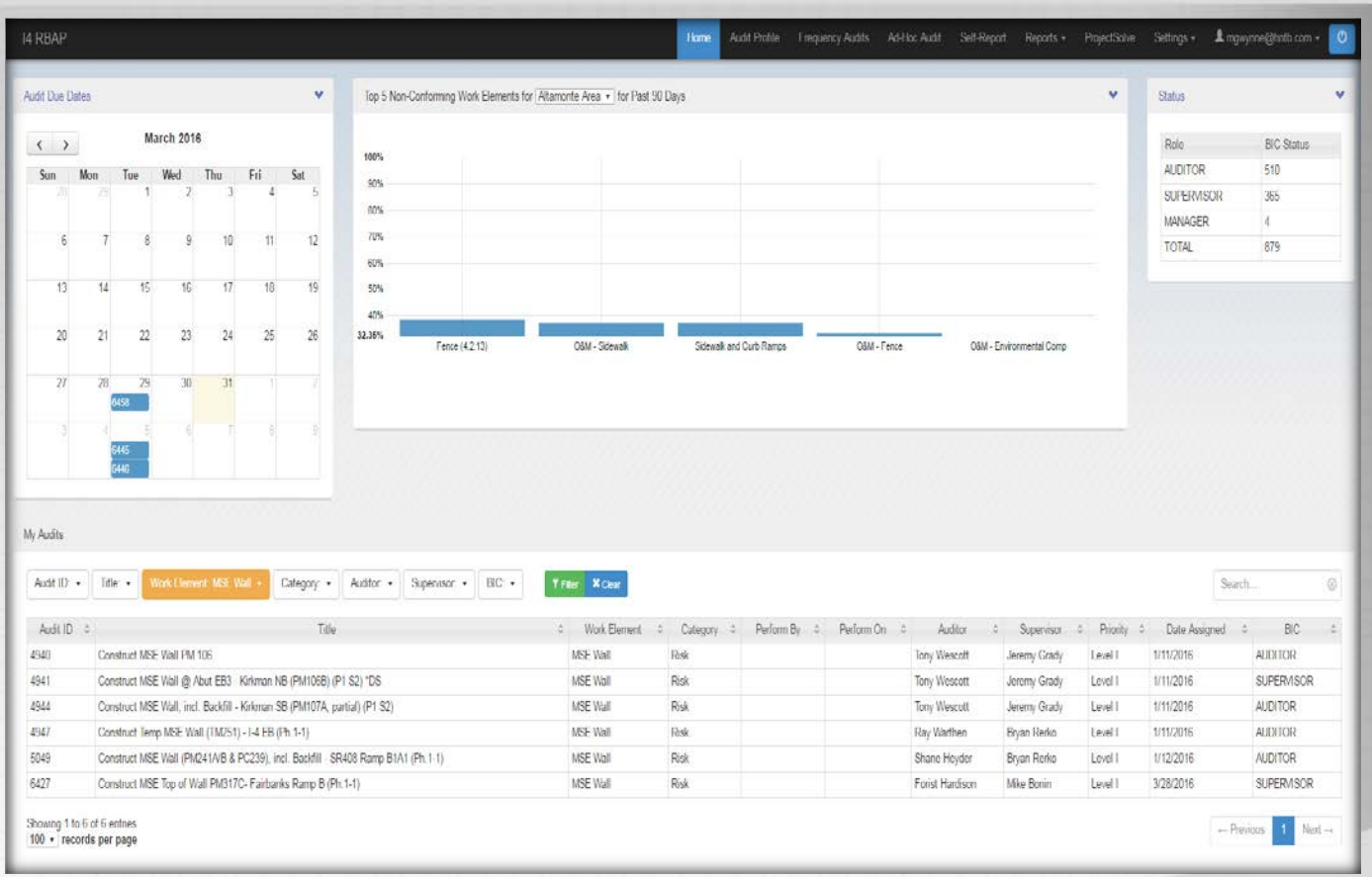
Acceptance Inspection - RBAP

- In order to maximize efficiency FDOT/COS has encapsulated the I-4 Ultimate RBAP into a web based platform or tool (**RBAP System**) that automates many of the processes involved:
  - Houses the 'Work Element' audit templates
  - Establishes the Audit Sample Population and derives the **Audit Sample Size**, or 'Work Elements' to be audited
  - Assigns the 'Work Element' to the COS Audit Specialists based on their Risk Rating and/or Frequency priority
  - Captures Audit findings, including supporting objective evidence such as photos, scanned documents, etc.
  - Facilitates trend analysis and Audit data result reporting
  - Archives Audit results within the **RVD**, integrating the associated results to each requirement reviewed

Acceptance Inspection - RBAP

- For those Risk Rated items, the COS creates an **Audit Profile** or **Audit Sample Size** within the RBAP System for a given **period**
- The Audit Profile is derived from the Concessionaire's Construction Schedule using a Risk Rating code cypher which translates Activities into 'Work Elements'
- The 'Work Elements' are separated into Risk Quartiles from 'Very High' to 'Very Low'
  - FDOT expects 50% of monthly audits in the 'Very High' Quartile
  - FDOT expects 30% of monthly audits in the 'High' Quartile
  - FDOT expects 10% of monthly audits in the 'Low' Quartile
  - FDOT expects 10% of monthly audits in the 'Very Low' Quartile
- RBAP System **randomly selects Work Elements for audit within each Risk Quartile** based on the prioritization above

Acceptance Inspection - RBAP



Acceptance Inspection - RBAP

Audit Profile – separated into Risk Quartiles

Schedule Activity

Risk Rating

Auditor Assignments

isk-Based WBS Activities

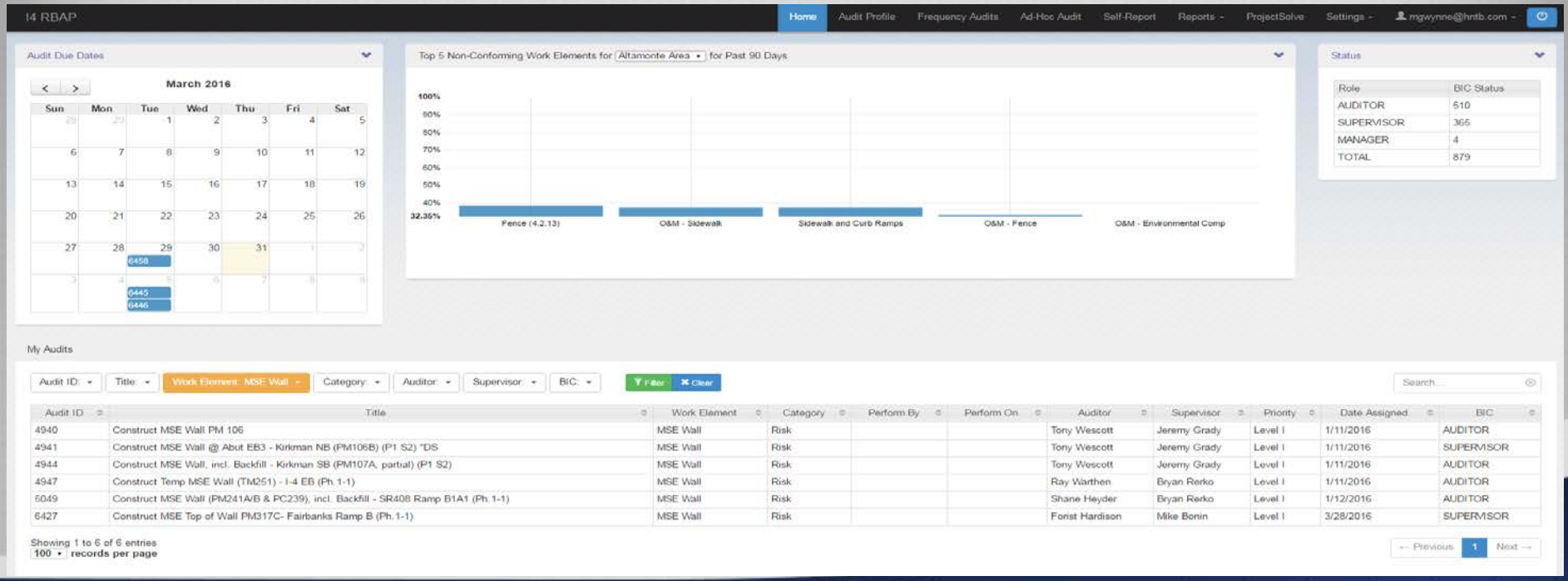
Checked	Activity ID	WBS Activity	WBS Start Date	WBS End Date	Work Element	Risk Rating	Audit Supervisor	Auditor
☐	B2301113135	Expose Ex. Drilled Shafts (4EA) - P12 - Br No. 230 (Ph.1-1)	1-11-2016	4-10-2016	Drilled Shafts	1467		
☑	B2251109130	Install 8' Drilled Shafts (1EA) - P9 - Br No. 225 (Ph.1-1)	1-11-2016	4-10-2016	Drilled Shafts	1467	Bryan Rerko	Shane Heyder
☐	P20002785	Install and Test Drilled Shaft - Area 2	1-11-2016	4-10-2016	Drilled Shafts	1467		
☑	B2T110120	Drive Test Piles (4EA) - Br No. 285 (Ph.1-0)	1-11-2016	4-10-2016	Test Pile Program	1247	Bryan Rerko	Shane Heyder
☐	B2T110130	Drive HP14x89 Piles (XXEA) - EB1 to EB5 - Br No. 285 (Ph.1-0)	1-11-2016	4-10-2016	Pile Foundation	1247		
☑	U1A1AE380	Overhead Electric Relocations - OUC-D - Kirkman Road & Grand National Drive East of I-4	1-11-2016	4-10-2016	Utility Adjustment by UAO	791	Faisal Waseem	Joel Valentin
☐	U1A1AE400	Buried Electric Relocation - OUC-D - STA 1966+50-1971+90 I-4 ML (Matrix #: 1168, 1171, 1175)	1-11-2016	4-10-2016	Utility Adjustment by UAO	791		
☐	U1A1AE450	B.T. & Fiberoptic Relocations - AT&T FL - Oak Ridge Rd (11+00,12+00,12+50,14+00) (Matrix #: 1080,84-85,87,90,93,99,1440)	1-11-2016	4-10-2016	Utility Adjustment by UAO	791		
☑	U1A1AE500	Buried Fiberoptics Relocation - Brighthouse - Oak Ridge Rd (12+50) (P1 S2) (Matrix #: 1083, 1091)	1-11-2016	4-10-2016	Utility Adjustment by UAO	791	Faisal Waseem	Joel Valentin
☐	R4B1A523	Construct 30" Jacked Cross Pipe @ 61700 - I-4 EB (Ph.1-2-2) PK2 Rev 1	1-11-2016	4-10-2016	Jack and Bore	774		
☐	R4D1A270	Construct 36" Jacked Pipe Crossing I-4 EB/WB 76400 (Ph.1-1) PK51*	1-11-2016	4-10-2016	Jack and Bore	774		
☐	B22711U3190	Erect Steel Box Girders (2 LINES) - S6 to S8 (Unit 3) - Br No. 227 (Ph.1-1)	1-11-2016	4-10-2016	Steel Girders	754		
☐	B104112070	Erect Steel Plate Girders (9EA) - Br. No. 104 (P1 S2)	1-11-2016	4-10-2016	Steel Girders	754		
☑	R4A1AB060	Construct Curb & Gutter - STA 1033-1631 - Southhall Ln (Ph.1-1)	1-11-2016	4-10-2016	Sidewalk and Curb Ramps	101	Angela Kahoe	Marc Gregory
☐	R4A1AB105	Construct Sidewalk - STA 1033-1631 - Southhall Ln (Ph.1-1)	1-11-2016	4-10-2016	Sidewalk and Curb Ramps	101		
☐	R4A1CJ124	Construct Sidewalk - STA 1100-1700 Rt - Keller Rd (Ph.1-2-2) PK3	1-11-2016	4-10-2016	Sidewalk and Curb Ramps	101		
☐	R4A1AB185	Construct Curb & Gutter - STA 2520-3030 Lt - Keller Rd (Ph.1-3)	1-11-2016	4-10-2016	Sidewalk and Curb Ramps	101		

RBAP System Selection

Work Element

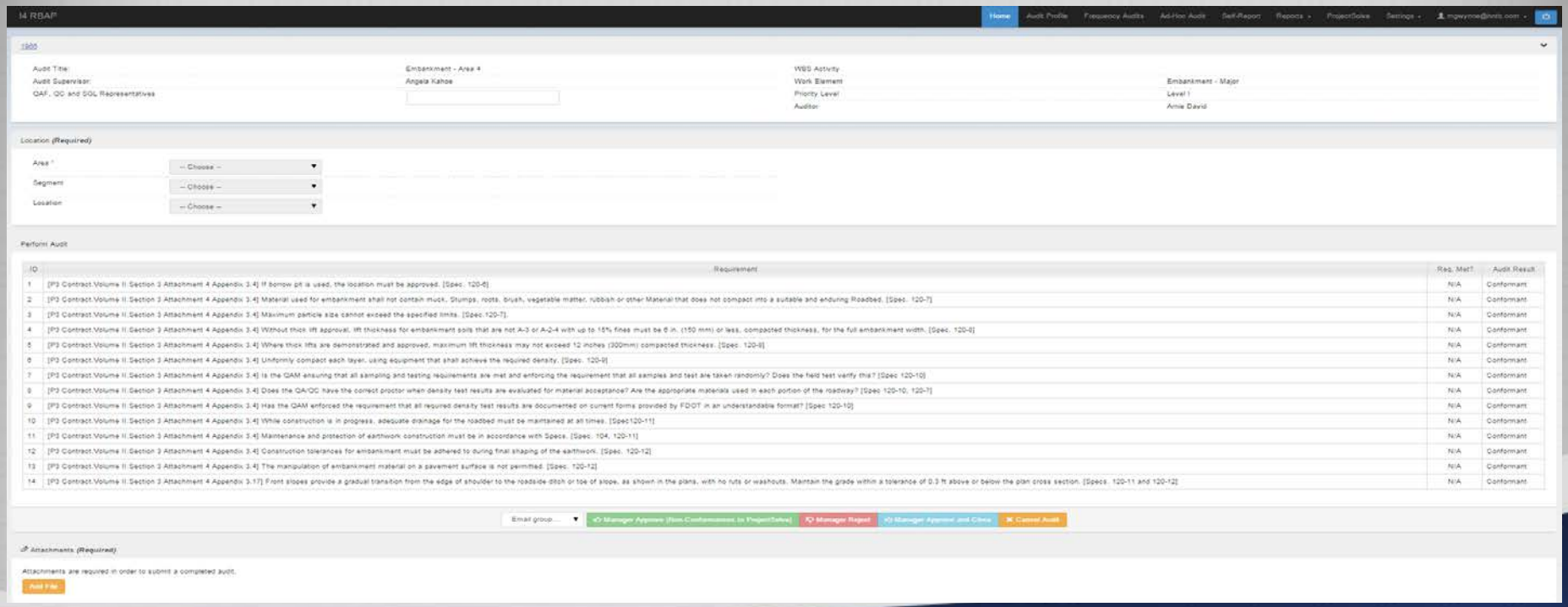
Acceptance Inspection - RBAP

- The COS Audit Specialists are assigned ‘Work Element’ Audits by the COS Risk Manager. These Audits are reflected in the COS Auditor Specialist’s Dashboard and can be launched by simply double ‘clicking’. The Risk Manager can assign target or deadline dates as well



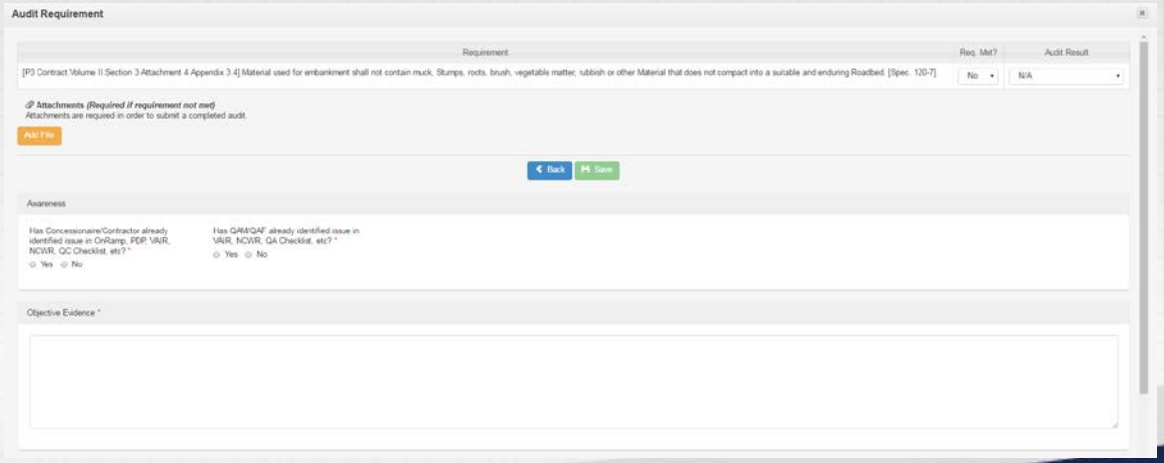
Acceptance Inspection - RBAP

- Each ‘Work Element’ Audit is a fixed template that includes Audit data points which are extracts from the Contract Documents. These templates can also be **customized by the Risk Manager** without external Site Administrator Support



Acceptance Inspection - RBAP

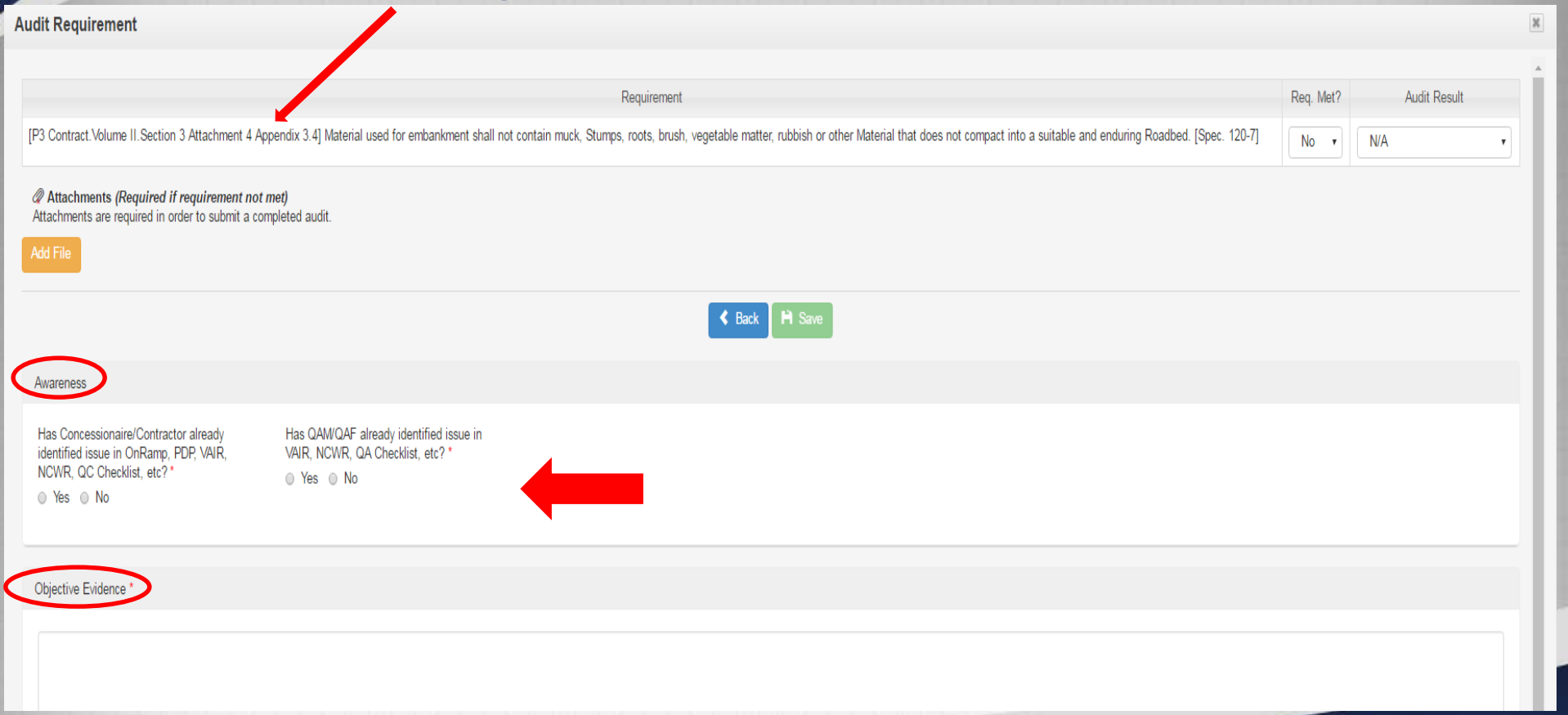
- The ‘Work Element’ Audit template guides the COS Audit Specialist through their review and ensures consistency with the Contract Documents and their quality/performance across the COS Team
- For any requirement that is not satisfied, the RBAP System automatically requires the Audit Specialist to collect and attach objective evidence (photo, measurement, scanned document, etc.) and they must explain the specific reason(s) for the nonconforming finding(s)



Acceptance Inspection - RBAP

RBAP System capture of Nonconformance

Contract Requirement



Acceptance Inspection - RBAP

- Nonconformance e-mail notice to Concessionaire issued from RBAP
- Electronic dialogue occurs in the RBAP System – COS notates location and specific Contract requirement that was found deficient

Nonconformance

Nonconformance #	2058	NCR Title	A-7485-R4299
Date NCR Created	05/09/2016 09:06:37 AM	WBS Activity	W1A1AF350
Audit Title	MSE Wall PM 105B at Bridge 104 End B	Area	Attractions Area
Work Request	56	Location	Bridge 104
Segment	1A	Auditor	Tony Wescott
Audit Supervisor	Jeremy Grady		

Requirement Description

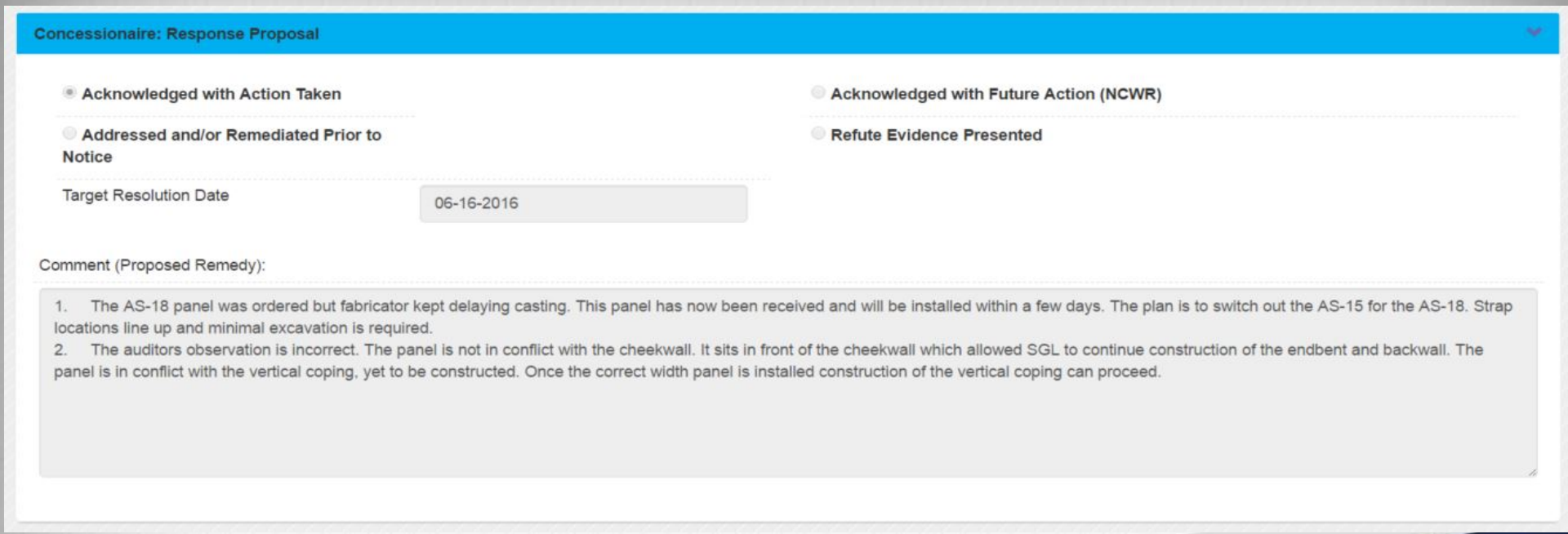
Panels - Precast panels are being inspected for rejection criteria established in Spec. 548-4. Panels that meet rejection criteria according to Spec 548-5 are being rejected. Make sure that no panels with bent connector tabs are used. [Spec. 548-6]

Comments

Observation of a panel installed on MSE Wall PM 105 B Column 326 that was in conflict with the cheek wall on Bridge 104 End Bent 1 cap.

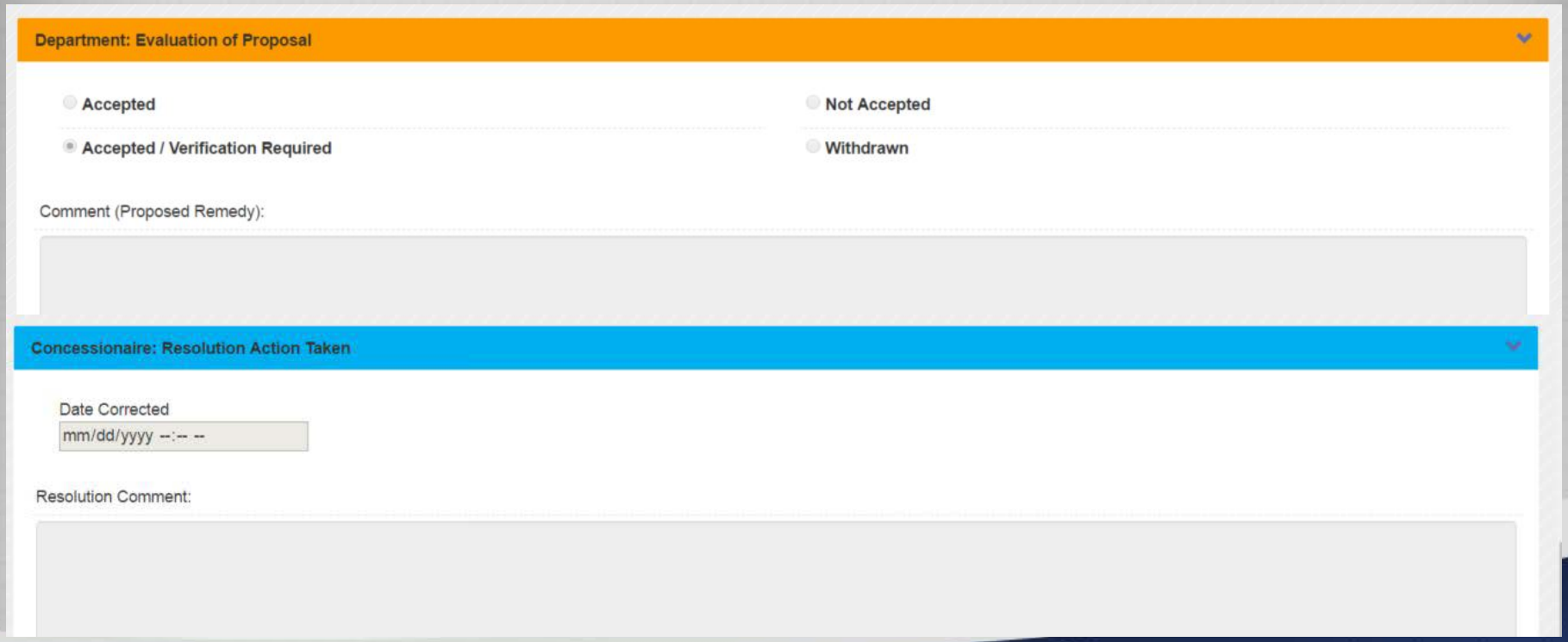
Acceptance Inspection - RBAP

- The RBAP System dialogue is designed to document, and provide an auditable/traceable process that records:
  - Concessionaire proposed corrective actions



Acceptance Inspection - RBAP

- The RBAP System dialogue is designed to document, and provide an auditable/traceable process that records:
  - FDOT/COS Acceptance of any proposed corrective action
  - Ultimate Nonconformance resolution



Acceptance Inspection - RBAP

- The RBAP System dialogue is designed to document, and provide an auditable/traceable process that records all phases of the exchange from identification of the Nonconformance to its resolution

Department: Verifification of Action taken

Accepted/Closed

Not Accepted

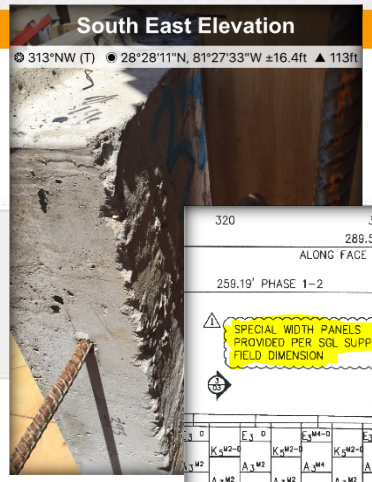
New QAM Response Required

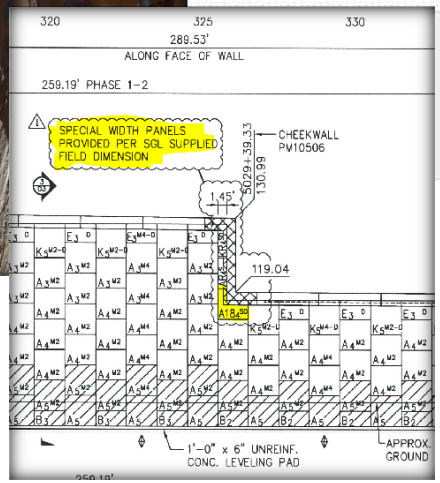
Verification Comments:

Attachments

0560_QAM_FCR-00560_-_Concurrence.pdf
2016-05-05_13.44.02.jpg
2016-05-05_13.44.16.jpg
2016-05-05_14.01.42.jpg
2016-05-06_10.30.30.jpg
2016-05-06_10.30.32.jpg
2016-05-06_10_1.30
Audit_7485_Coping_Detail.PNG
Audit_7485_Panel_Detail.PNG
Audit_7485_Plan_Detail.PNG

Add File | Save Attachments





Acceptance Inspection - RBAP

- The RBAP System dialogue is designed to document, and provide an auditable/traceable process that records all phases of the exchange from identification of the Nonconformance to its resolution

Conversation History

Department Evaluation Jeremy Grady (8/22/2016 5:03 PM):
Evaluation Disposition: Accepted / Verification Required
Comment:
Attachments: 0560_QAM_FCR-00560_-_Concurrence.pdf;2016-05-05_13.44.02.jpg;2016-05-05_13.44.16.jpg;2016-05-05_14.01.42.jpg;2016-05-06_10.30.30.jpg;2016-05-06_10.30.32.jpg;2016-05-06_10_1.30;Audit_7485_Coping_Detail.PNG;Audit_7485_Panel_Detail.PNG;Audit_7485_Plan_Detail.PNG;

QAM Response Ed DeVincenzo (6/11/2016 5:58 PM):
Response Disposition: Acknowledged with Action Taken
Target Resolution Date: 6/17/2016
Comment: 1. The AS-18 panel was ordered but fabricator kept delaying casting. This panel has now been received and will be installed within a few days. The plan is to switch out the AS-15 for the AS-18. Strap locations line up and minimal excavation is required. 2. The auditors observation is incorrect. The panel is not in conflict with the cheekwall. It sits in front of the cheekwall which allowed SGL to continue construction of the endbent and backwall. The panel is in conflict with the vertical coping, yet to be constructed. Once the correct width panel is installed construction of the vertical coping can proceed.
Attachments: 0560_QAM_FCR-00560_-_Concurrence.pdf;2016-05-05_13.44.02.jpg;2016-05-05_13.44.16.jpg;2016-05-05_14.01.42.jpg;2016-05-06_10.30.30.jpg;2016-05-06_10.30.32.jpg;2016-05-06_10_1.30;Audit_7485_Coping_Detail.PNG;Audit_7485_Panel_Detail.PNG;Audit_7485_Plan_Detail.PNG;

Acceptance Inspection - RBAP

- The RBAP System of data capture and Nonconformance reporting allows the FDOT to identify, store and correlate Concessionaire performance to each requirement included in the Contract using minimal resources, whilst also limiting interference to the Concessionaire's organization, process and procedures. This data is used to:
  - To validate the accuracy of the Concessionaire's self-monitoring and reporting
  - Gauge the effectiveness of the Concessionaire's QC System (**CQCS**)
  - Issue Nonconformances and track and document their resolution
  - Identify trends and analyze root causes such that the Concessionaire can work to improve the quality of the Work
  - Demonstrate compliance with **23 CFR 637**

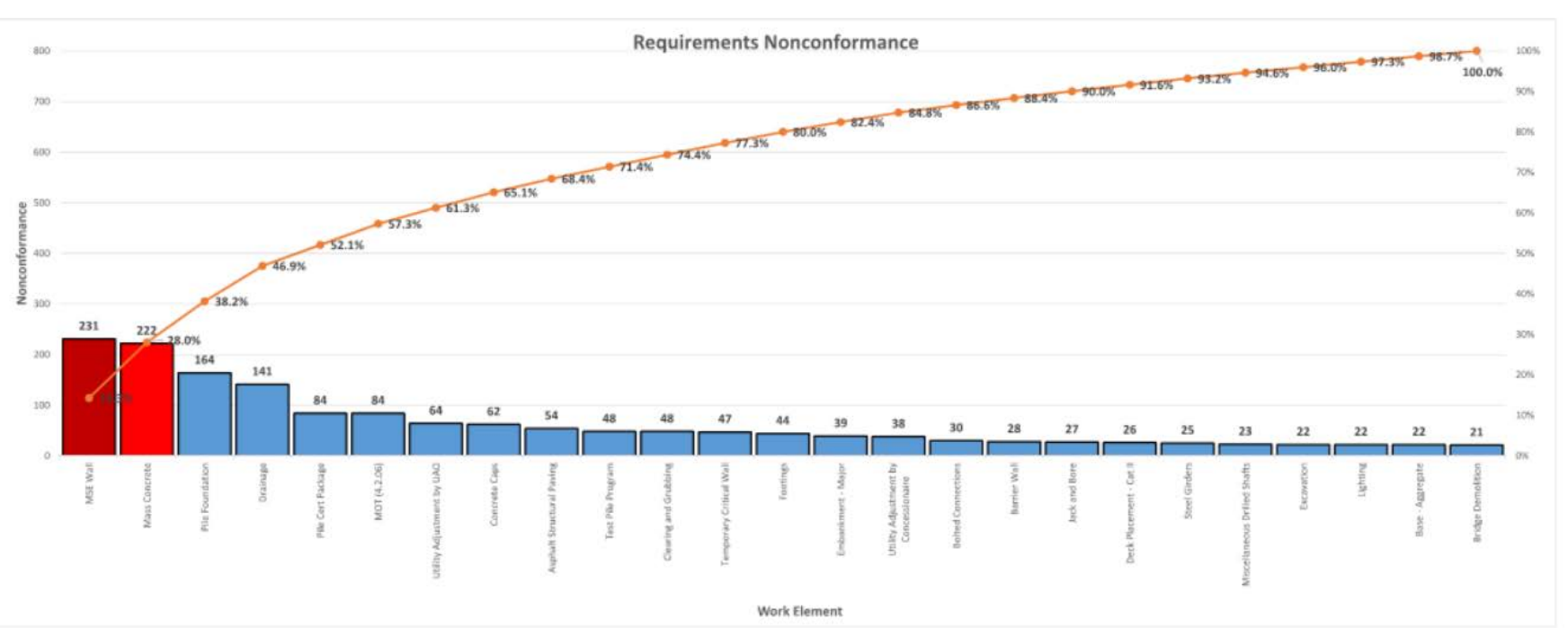
Acceptance Inspection - RBAP

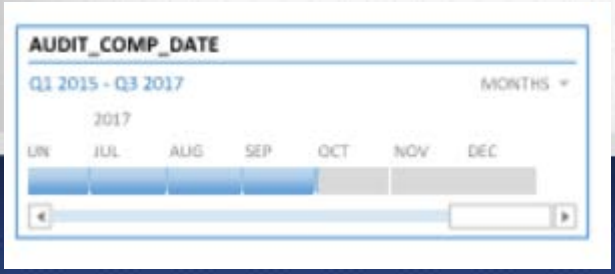
Weekly Trend Analysis

Top 5 Last 3 Month Contract NCR's	# of NCR's	% of 3 MonthTotal Contract NCR's
Table 4.2 - Element 4.2.16 - ENVIRONMENTAL COMPLIANCE - Concessionaire shall provide and maintain all erosion control features in accordance with the Contract Documents. (12hrs/24hrs/6hrs)	30	9.06%
Engineer prior to Pile Verification Testing. A separate Foundation Certification Package must be submitted for each foundation unit. A foundation unit is defined as all the piles within one bent or pier for a specific bridge for each phase of construction. Each Foundation Certification Package shall contain: a. GFDEOR letter certifying the piles have the required axial capacity including compression and uplift, lateral stability, pile integrity and settlement will not affect functionality of the structure. b. The package includes legible copies of all driving logs, EDC records, weld inspection records, all supplemental dynamic testing data and analysis for the foundation unit. All RFI's RFM's FCR's and EAR's are included in the package. c. All NCWR's and COS noncompliance issues have been resolved. d. GFDEOR Production Pile length letter has been included. e. GFDEOR Drive Criteria letter is included or a RFI has been approved to allow 100% instrumented production pile driving. f. As-built pile locations are within tolerance, the pile head at cutoff is no more than 3 inches laterally in the XY coordinate from the Plan position or approved RFM/FCR is included in package. g. Production pile tips are 20 feet above the bottom of the boring. h. Pile logs demonstrate compliance with drive criteria. i. Signed and sealed letter by the FRC stating the package has been reviewed and concurrence is given.	20	6.04%
Construction Zone floodlights shall be aimed and shielded to keep light within the confines of the immediate Construction Zone.	19	5.74%
QA Process – Verify the QA staff witnessed the installation of the monitoring devices. Verify the QA inspection was documented. (QA/QC Plan – Construction Inspection Plan)	12	3.63%
Form material must be approved and must have the proper dimensions, chamfers, positioning, bracing, friction collars, release agent, and be free of dirt or any other debris. QAM must approve forms, prior to concrete placement.	11	3.32%

Acceptance Inspection - RBAP

Direct read access to RVD Database using Power Query and Power Pivot which gives 100% customizable reporting capabilities





Acceptance Inspection - RBAP

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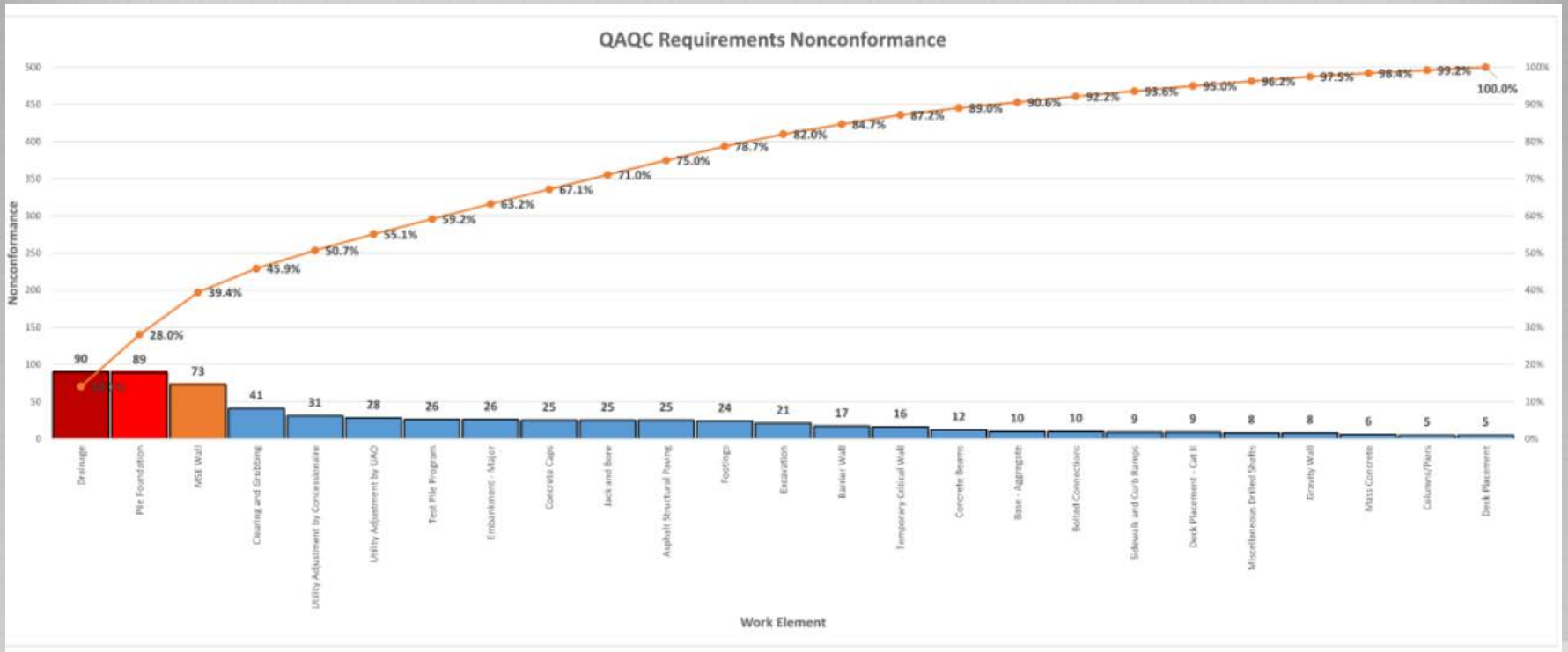
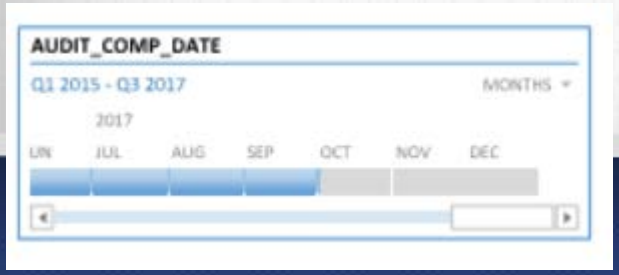
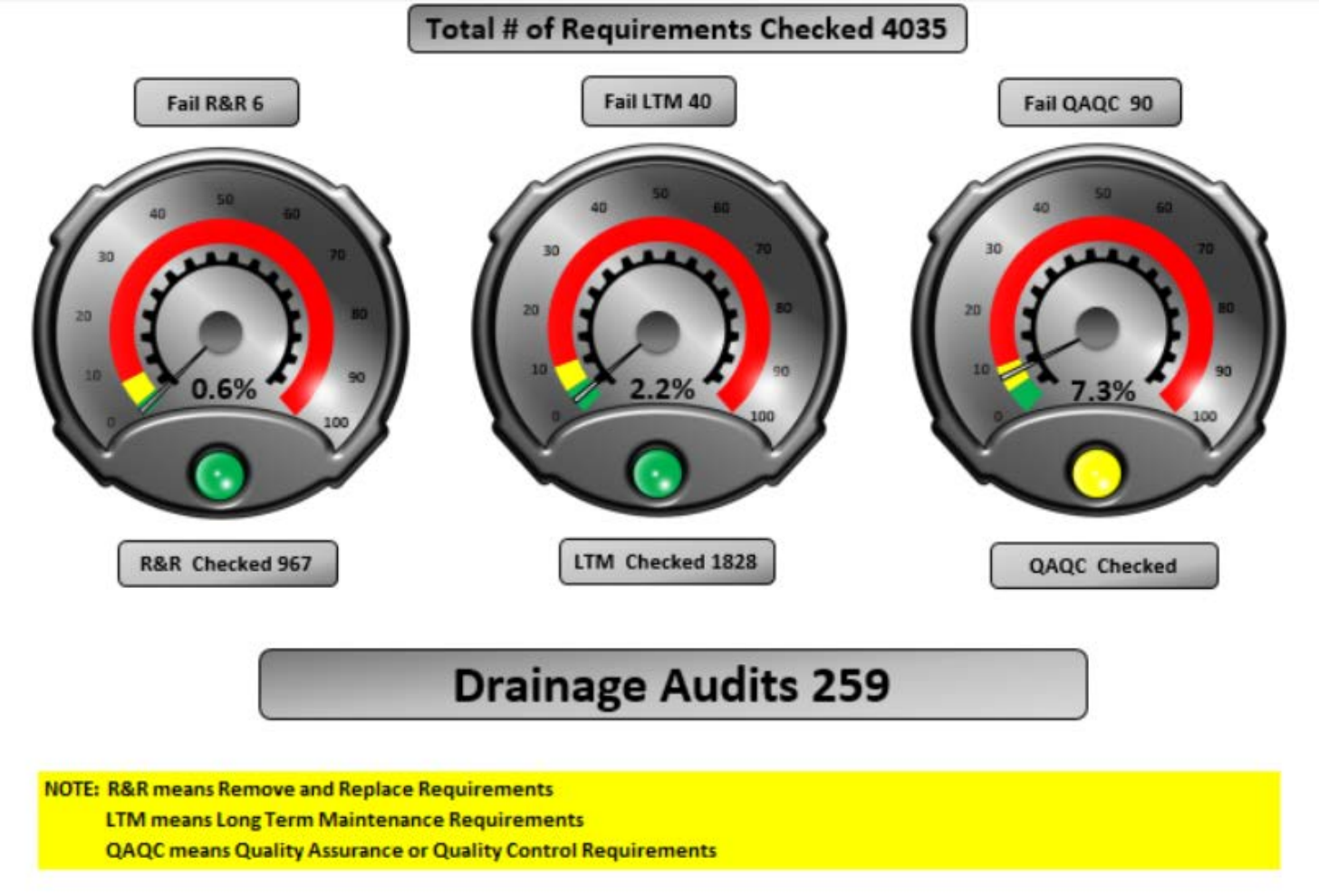




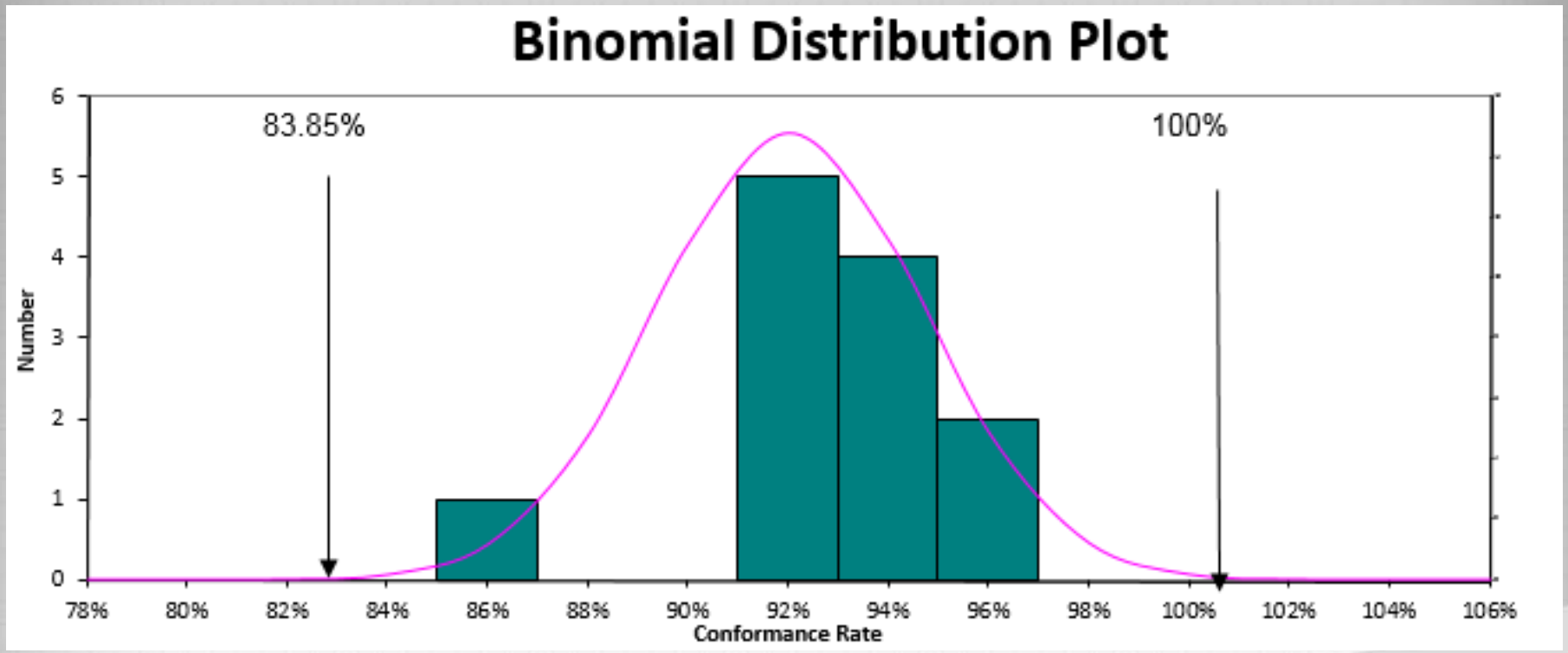
Acceptance Inspection - RBAP

Work Element Trends – Dashboards to convey performance Risk



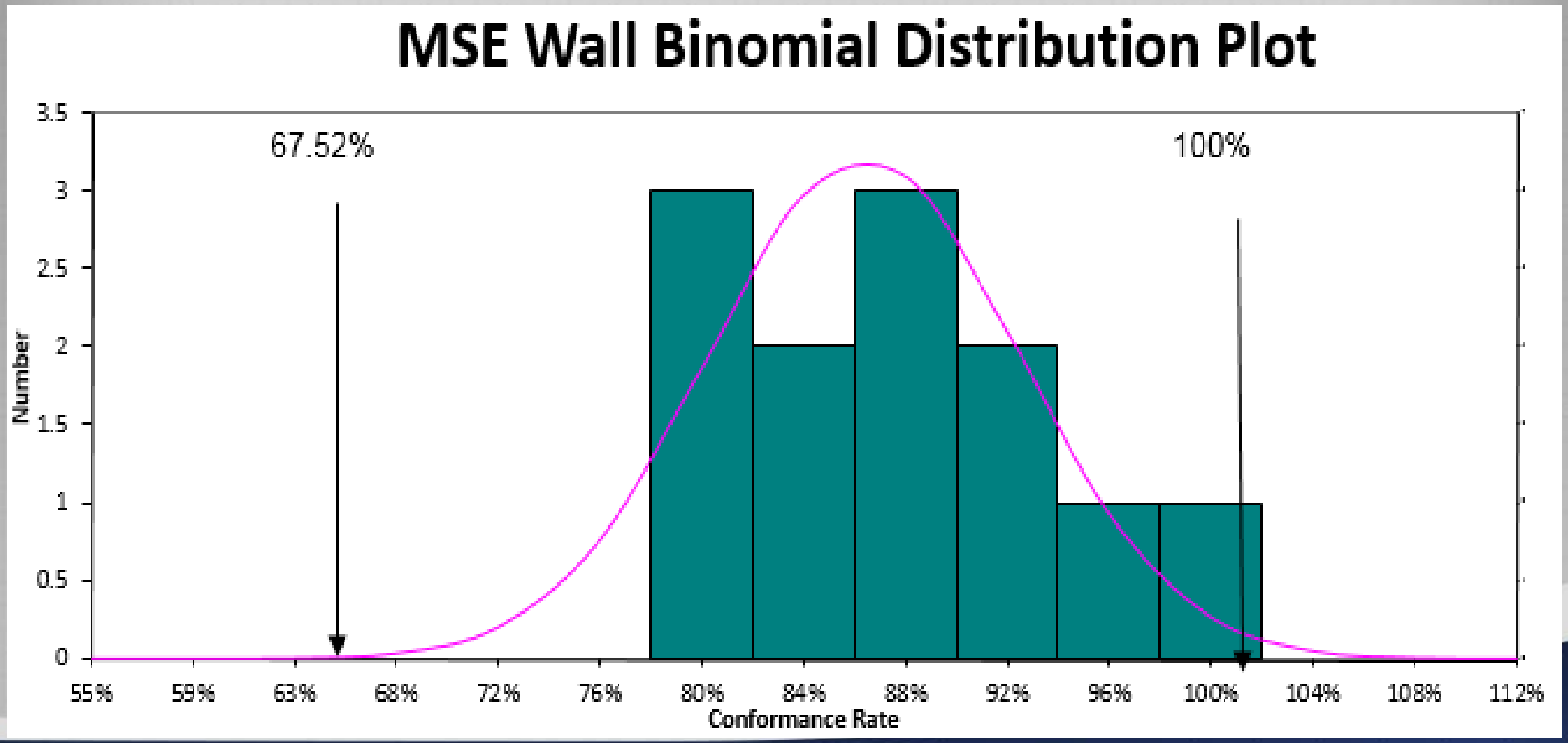
Acceptance Inspection - RBAP

COS Audits Quarterly Control Charts to confirm 'Normal Distribution' of Audit Findings – Project to Date



Acceptance Inspection - RBAP

COS Audits Quarterly Control Charts to confirm 'Normal Distribution' of Audit Findings – Work Element



Acceptance Inspection - RBAP

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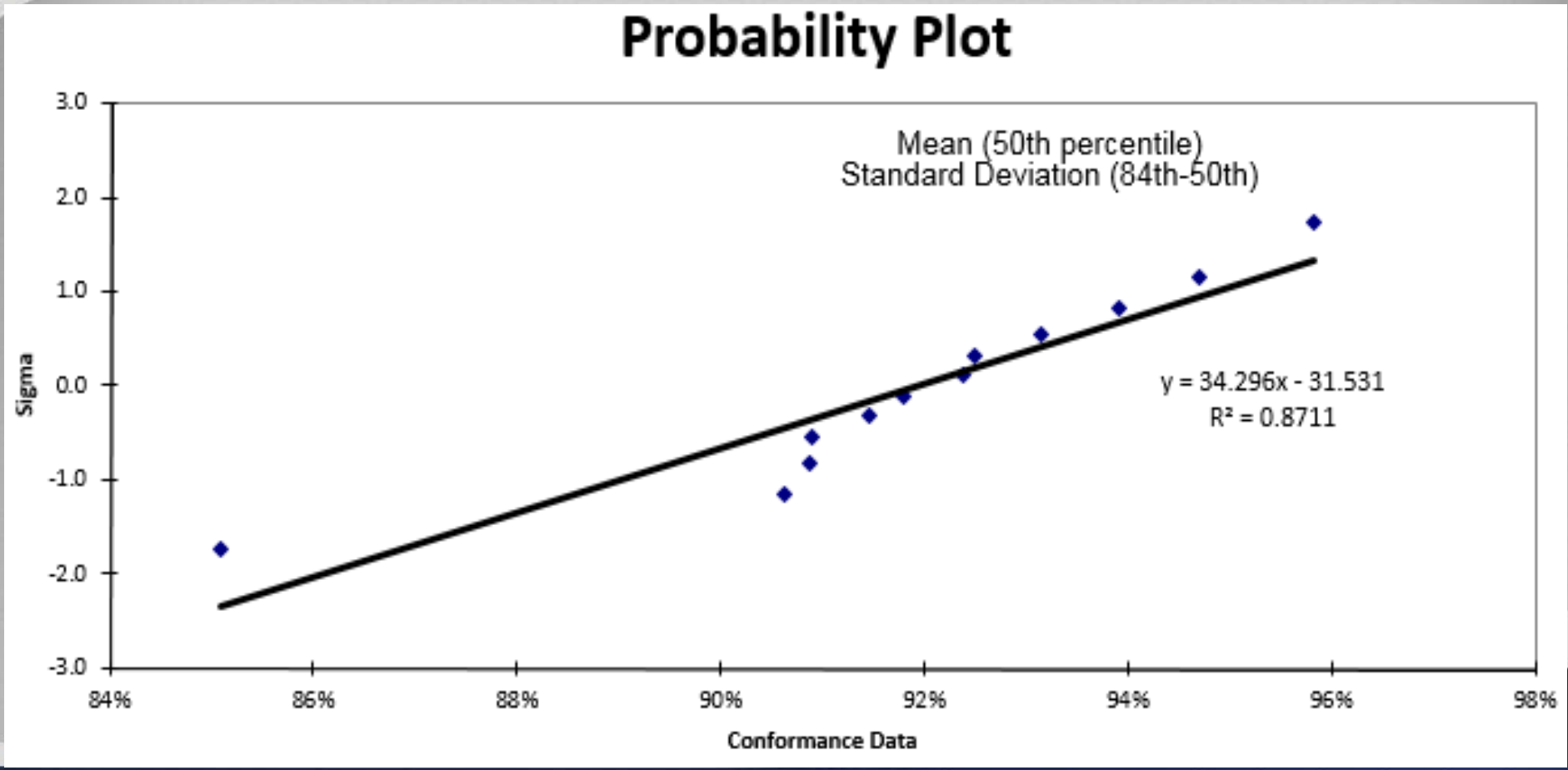
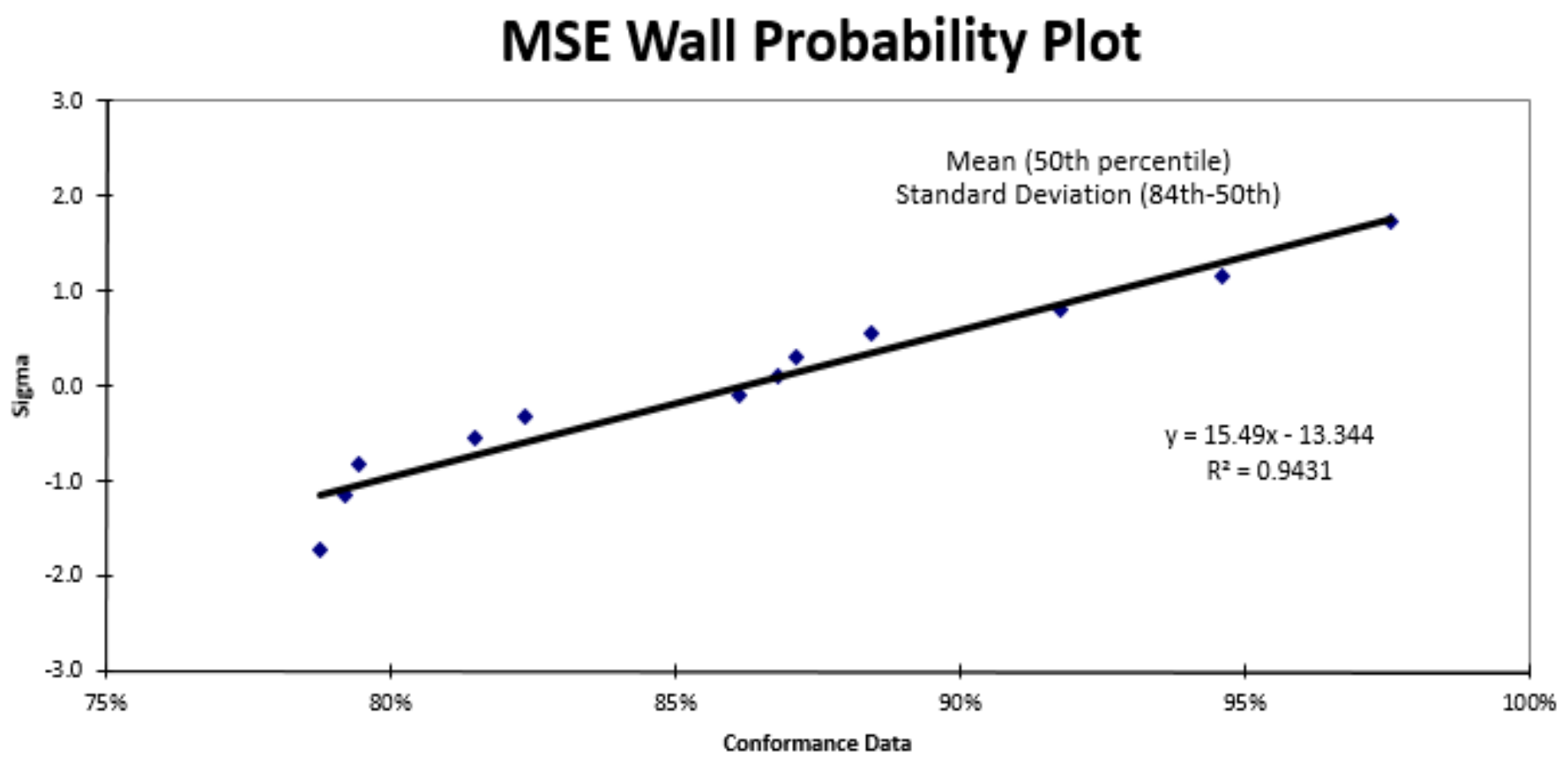


Acceptance Inspection - RBAP

COS Audits Quarterly Control Charts to confirm 'Normal Distribution' of Audit Findings – Work Element



Acceptance Inspection - RBAP

- Construction Audits Performed to Date - through **11/06/17**
  - 3,168 Audits (includes Risk Rated, Frequency and Ad-hoc Audit types)
    - 25,406 Contract Requirements reviewed
      - **92.9%** found to be in conformance to the Contract
  - Construction Risk Audits Performed to Date **1,874** out of 3,168 Audits
    - 19,457 Contract Requirements reviewed
      - **94.2%** found to be in conformance to the Contract
- Top 5 Construction Nonconformance by Work Element:
  1. Concrete Placement and Curing
  2. MSE Walls
  3. Mass Concrete Plan compliance
  4. Pile Foundation Certification Packages
  5. Density Log Book compliance

Acceptance Inspection - RBAP

Baseline Risk Rating Analysis and Re-evaluation will adjust the **Concessionaire's History of Performance (H)** variable as used to calculate the Work Element Risk Rating

Work Element	Total # of Audits Performed	Total # of Requirements in Conformance	Total # of Requirements in Non-Conformance	% of Passing Audits (QA/QC Requirements Included)	% of Passing Audits (QA/QC Requirements Excluded)	% of Passing Requirements (QA/QC Requirements included)	% of Passing Requirements (QA/QC Requirements Excluded)
Deck Profiling/Grooving	1	1	3	0.00%	0.00%	25.00%	25.00%
Deck Placement - Cat II	8	25	15	12.50%	50.00%	62.50%	80.00%
Barrier Wall	14	87	21	21.43%	57.14%	80.56%	90.74%
Steel Girders	4	17	9	25.00%	25.00%	65.38%	65.38%
Gravity Wall	7	31	9	28.57%	85.71%	77.50%	97.50%
MSE Wall	92	783	163	29.35%	38.04%	82.77%	88.05%
Asphalt Structural Paving	20	297	27	30.00%	65.00%	91.67%	97.22%
Temporary Critical Wall	16	203	26	31.25%	50.00%	88.65%	93.01%
Noise Walls	3	75	9	33.33%	66.67%	89.29%	94.05%
Utility Adjustment by UAO	49	113	64	34.69%	57.14%	63.84%	76.84%
Miscellaneous Drilled Shafts	11	118	9	36.36%	54.55%	92.91%	95.28%
Concrete Beams	5	57	8	40.00%	80.00%	87.69%	93.85%
Utility Adjustment by Concessio	33	218	33	42.42%	84.85%	86.85%	95.62%
Pile Foundation	93	936	96	46.24%	73.12%	90.70%	96.22%
ITS - Under Ground	4	13	2	50.00%	50.00%	86.67%	86.67%
Ponds	2	10	2	50.00%	50.00%	83.33%	83.33%
Jack and Bore	29	375	26	51.72%	93.10%	93.52%	97.51%
Base - Aggregate	15	189	10	53.33%	93.33%	94.97%	97.99%
Drainage	117	2017	87	54.70%	86.32%	95.87%	98.95%
Test Pile Program	43	510	32	55.81%	74.42%	94.10%	97.23%
Clearing and Grubbing	30	279	23	56.67%	90.00%	92.38%	99.34%
Concrete Caps	43	405	45	62.79%	74.42%	90.00%	93.33%
Approach Slabs	3	9	2	66.67%	66.67%	81.82%	81.82%
Deck Placement	3	25	4	66.67%	66.67%	86.21%	93.10%
Embankment - Major	57	668	28	66.67%	87.72%	95.98%	98.85%
Excavation	33	201	20	66.67%	100.00%	90.95%	99.10%
Footings	36	343	17	69.44%	94.44%	95.28%	98.61%
Bridge Demolition	20	169	12	75.00%	95.00%	93.37%	97.79%
Spread Footings	4	23	1	75.00%	100.00%	95.83%	100.00%
Stabilization	23	222	5	82.61%	100.00%	97.80%	99.56%
Directional Bore	6	33	1	83.33%	83.33%	97.06%	97.06%
Sidewalk and Curb Ramps	6	51	1	83.33%	83.33%	98.08%	98.08%
Columns/Piers	27	277	8	85.19%	88.89%	97.19%	98.25%
Asphalt Milling	1	10	0	100.00%	100.00%	100.00%	100.00%
Concrete Ditch/Slope Pavemen	1	3	0	100.00%	100.00%	100.00%	100.00%
ITS - Above Ground	1	1	0	100.00%	100.00%	100.00%	100.00%
Landscaping Materials/Placem	1	1	0	100.00%	100.00%	100.00%	100.00%
Lighting	1	3	0	100.00%	100.00%	100.00%	100.00%
Signalization - Infrastructure	1	11	0	100.00%	100.00%	100.00%	100.00%
Traffic Railing/Separator	1	3	0	100.00%	100.00%	100.00%	100.00%

RISK RATING = P x C x D x H

The baseline value for H was set to '5 out of 10'

Acceptance Inspection - RBAP

Baseline Risk Rating Analysis/Re-evaluation – example MSE Wall

Work Element	Total # of Audits Performed	Total # of Requirements in Conformance	Total # of Requirements in Non-Conformance	% of Passing Requirements (CQCS Requirements included)	% of Passing Requirements (CQCS Requirements Excluded)
MSE Wall	92	783	163	82.77%	88.05%

- MSE Wall Baseline Risk Rating is **1,078** and after 92 Audits
  - Since the Audit Profile population is driven by the assumed Audit conformance rate, the 'H' variable will be adjusted from '5' to '6'
  - Baseline Risk Rating has been adjusted to **1,294** which over the longer term will result in an increase to COS Audits for this Work Element until performance improves

Acceptance Inspection - RBAP

- The RBAP findings have been responsible for the following changes to the Concessionaire QC System (**CQCS**)
  - MSE Wall inspection process and frequency of measurements
  - Drainage inspection process and frequency of measurements
  - Issuance of Contractor Process Control (**PC**) Alerts and/or retraining sessions for MSE Walls, Drainage, Erosion Control, Curing Concrete, Drilled Shafts, Modifications to TTCP, Temporary Critical Walls and Vibration Monitoring
- Concessionaire and its **Quality Manager** have been slow to react to trends detected by the RBAP audits or Concessionaire generated Nonconforming Work Reports (**NCWRs**), but that has been changing in the last quarter. The **Quality Manager** is now proactively generating a **Monthly Quality** report that analyzes recent performance and recommends changes to the **CQCS** without intervention from the FDOT or COS

- Questions?

Contact Information

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HNTB

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Loreen Bobo

I-4 Ultimate Construction Program Manager

Florida Department of Transportation

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Questions & Input

Submit a question using the chat box

Or

Dial *1 to call in your question by phone

New NY Bridge Project Quality & Construction Oversight

Tom McGuinness
New York State Thruway Authority

Joint DOT / FHWA Major Projects Webinar
November 8, 2017

New NY Bridge Project Quality & Construction Oversight

Tom McGuinness PE - Construction Compliance Engineer

THE NEW NY BRIDGE

Project Overview

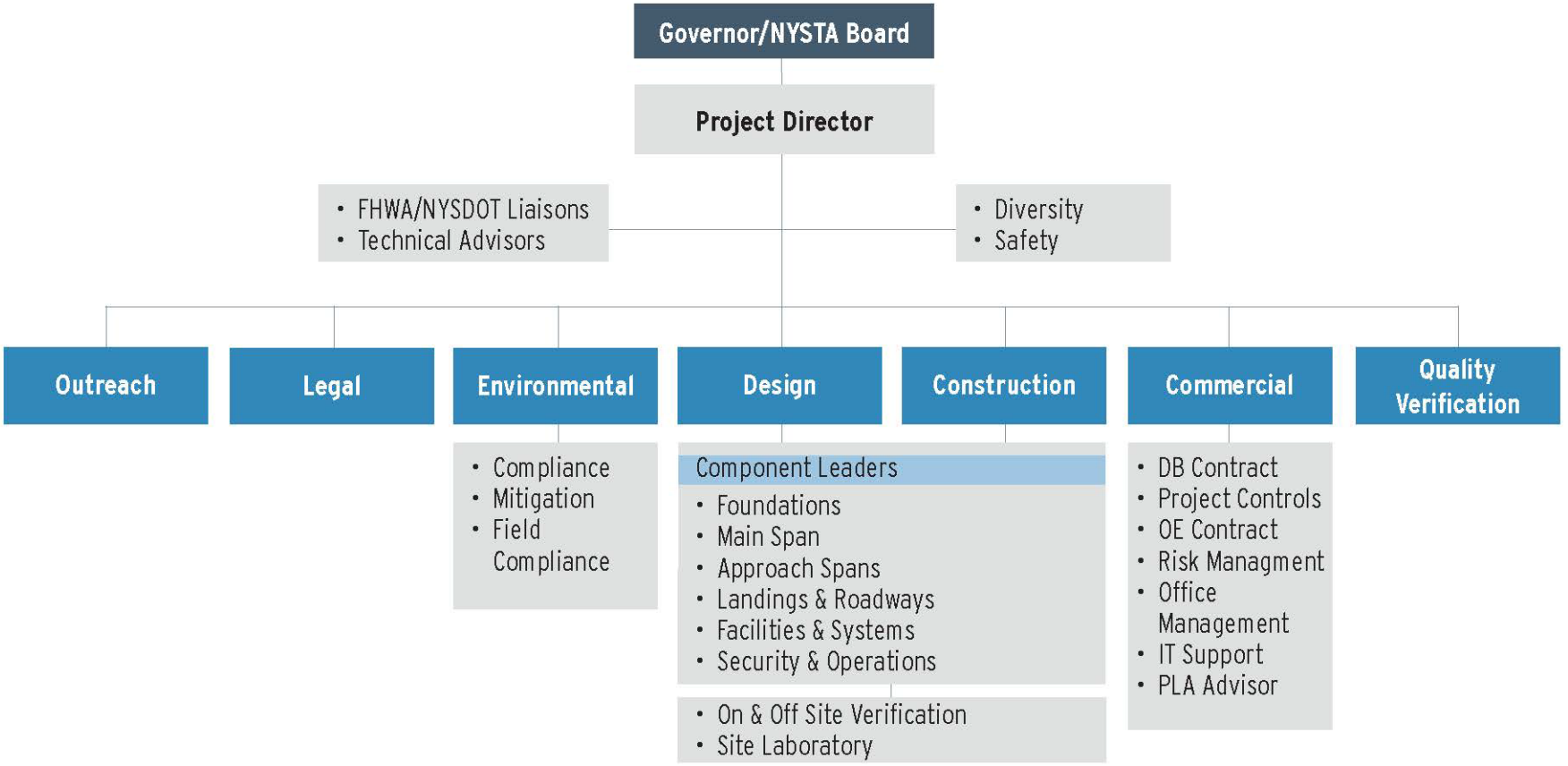
- Replacement of the Tappan Zee Bridge.
  - Bridge carries I-87 / I-287 over the Hudson River.
  - Project owner is the NYS Thruway Authority.
  - $3.1 Billion contract cost.
- N.Y. States first Design-Build contract.
- Quality Roles
  - QC performed by Design – Builder.
  - QA performed by Independent QA Firm.
  - Owner performs Verification Oversight.

Organizational Framework

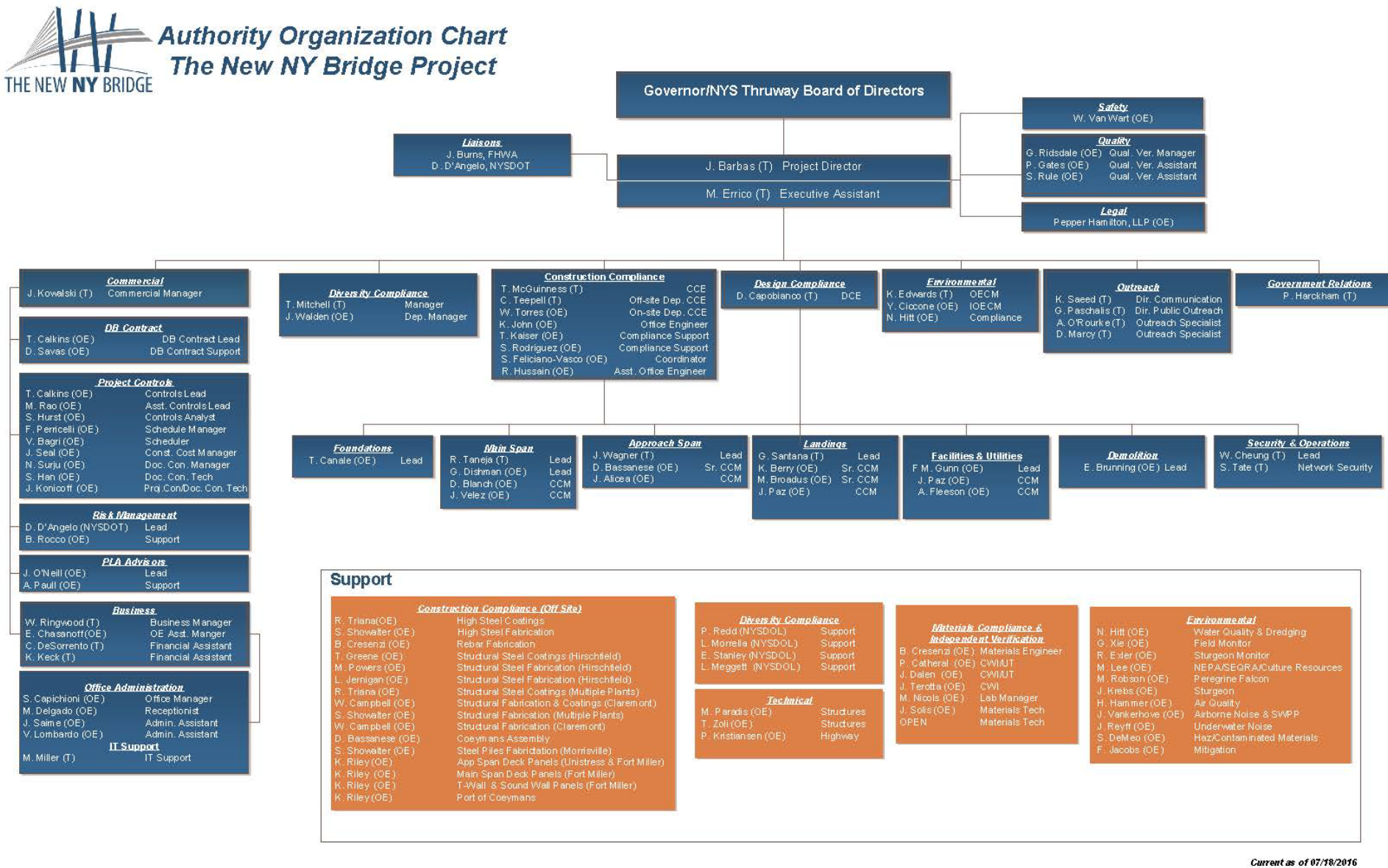
Owner Oversight – Integrated Structure

- NYSTA
  - Project Director
  - Design/Construction
  - Commercial/Environmental/Safety
- Owner's Engineer team
  - Functional support (Contract/Quality)
  - Design & Construction compliance
  - Specialized technical (Foundations/Structures/Environmental)

Owner's Project Organization



Owner's Project Organization



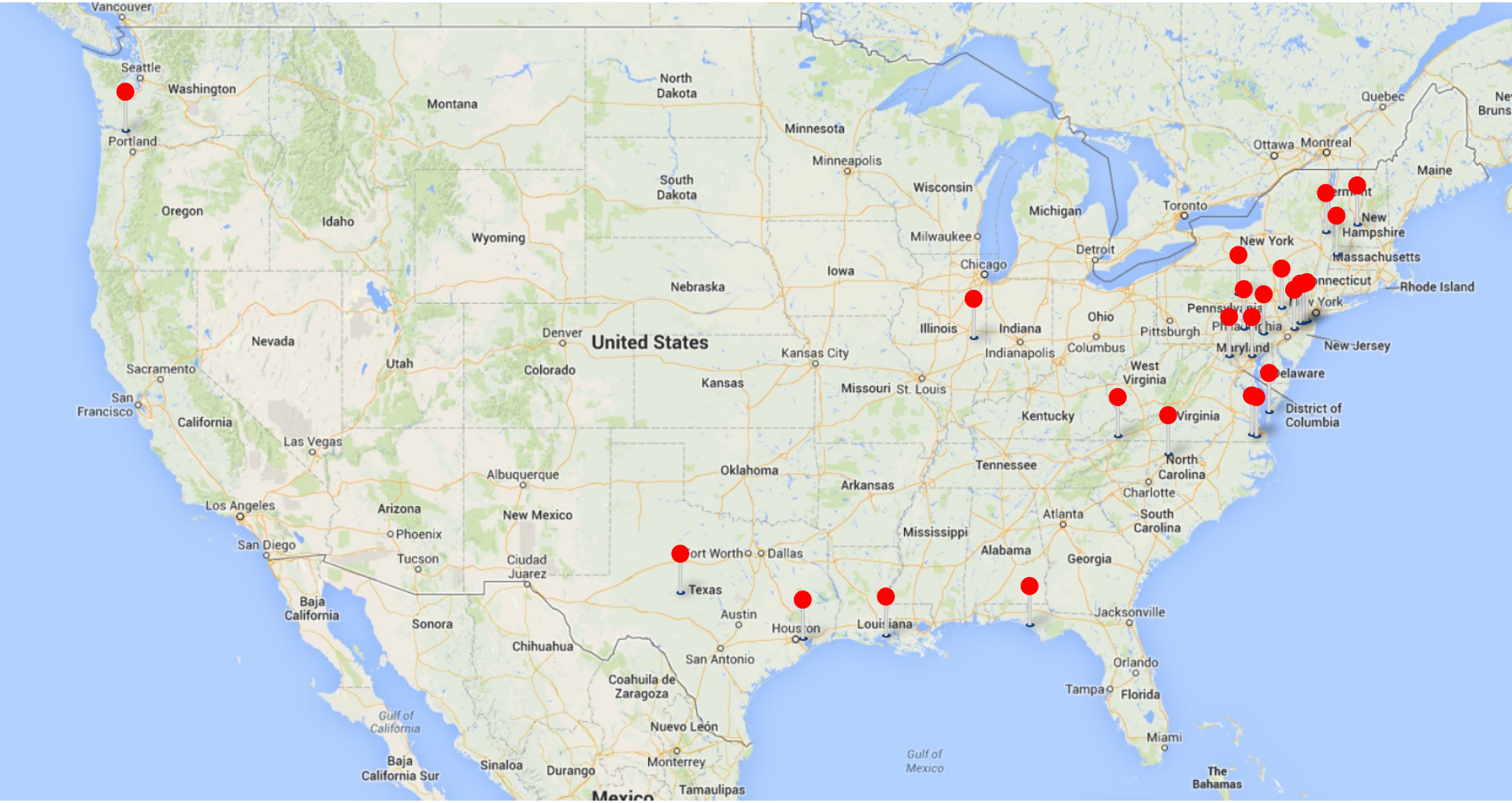
Key Owner Quality Roles

- On-site
  - Design coordination and compliance
  - Construction compliance
  - Materials validation testing
  - Environmental compliance
  - Commercial compliance support

Key Owner Quality Roles

- Off-site
  - QC and QA verification
  - Quality audits
  - 24 locations
  - 12 states

Off Site Fabrication



Systems & Practices

Key “Design-Build” Perspectives

REQUIREMENTS	not	PREFERENCES
COMPLIANCE	not	ASSURANCE
SIZE & COMPLEXITY	not	“THE STANDARD”
OWNER’S STRUCTURE	=	DB’S STRUCTURE

Clarification & Alignment

- Establishing and Verifying Requirements
- Working Plans / Quality Plans
- Inspection, Testing and Reporting
- Change Management (Construction and Design)
  - Noting Deficiencies
  - Non-Conformance Reporting
  - Requests for Information
- Close Out and Commissioning

Key Actors & Roles

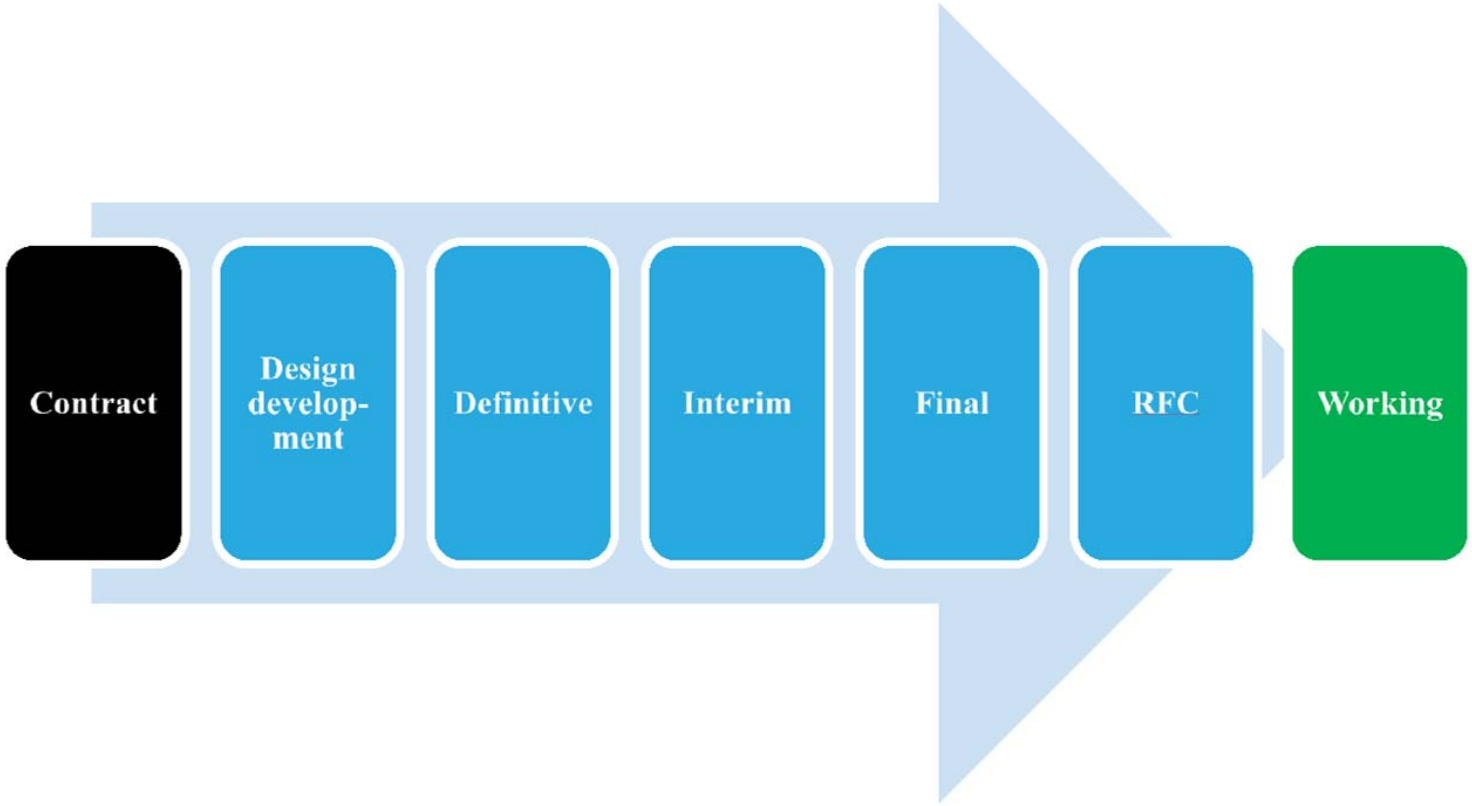
- **TZC**
  - Quality Manager and Construction QC Manager
  - Independent QA firms
- **Owner**
  - Design compliance
  - Construction compliance
  - Environmental compliance
- **NYSDOT**
  - Technical support
- **FHWA**
  - Funding and oversight

Responsibilities

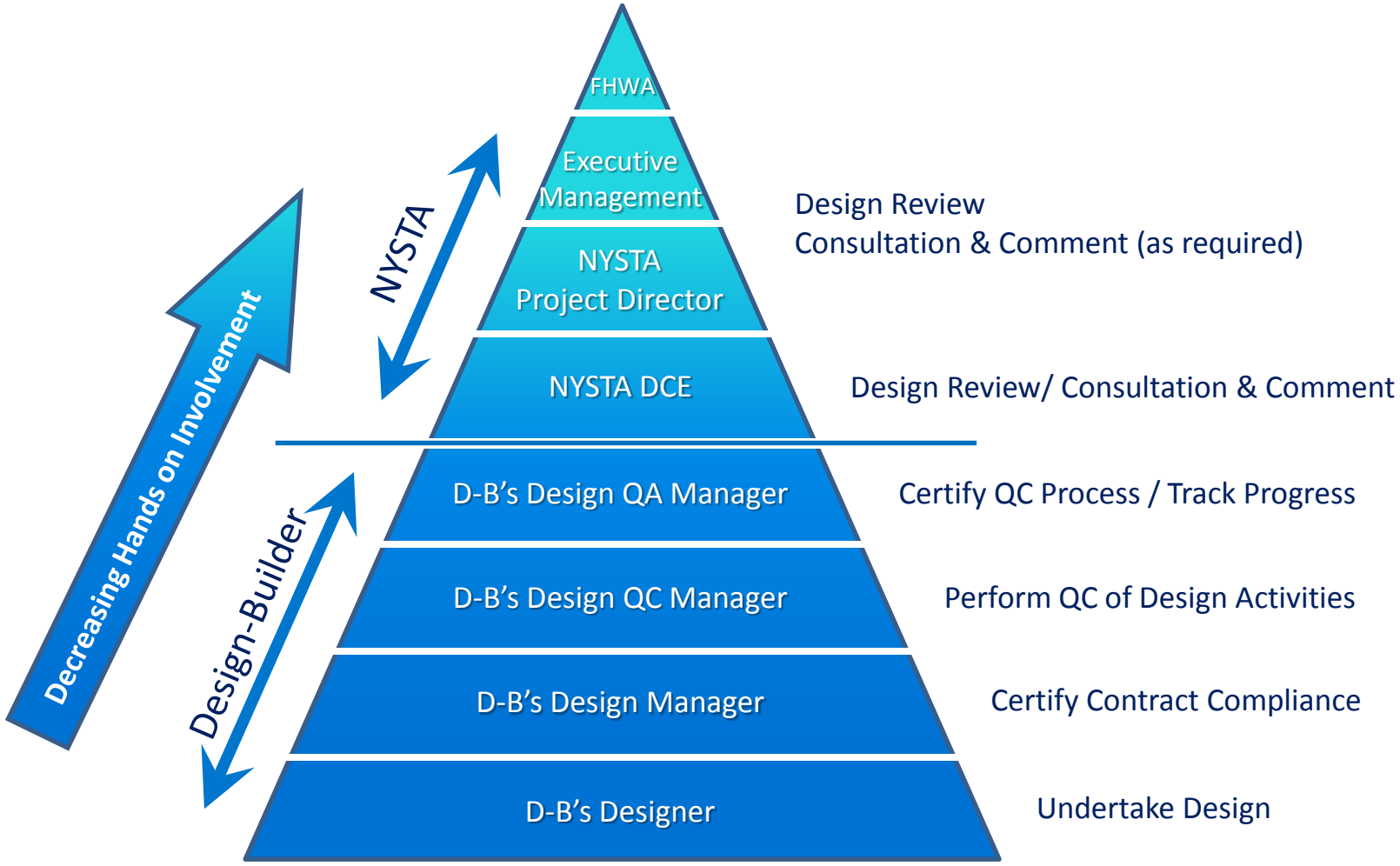
- Design – Builder (Tappan Zee Constructors)
  - Design and Construct “the Work” per Contract Requirements
  - Provide Quality Control to verify conformance
- Independent QA Engineer (IQAEF)
  - Verify QC has been properly performed (design & construction)
  - “Off Site” at fabrication and assembly locations
  - “On Site” during construction activities
- Owner (NYSTA)
  - Oversight of QA activities
    - Conformance with established Inspection & Testing frequencies
    - Statistical Validation of Materials Testing Results (f & t Testing)
- FHWA – Process Reviews & Oversight Inspections

Design Development Process

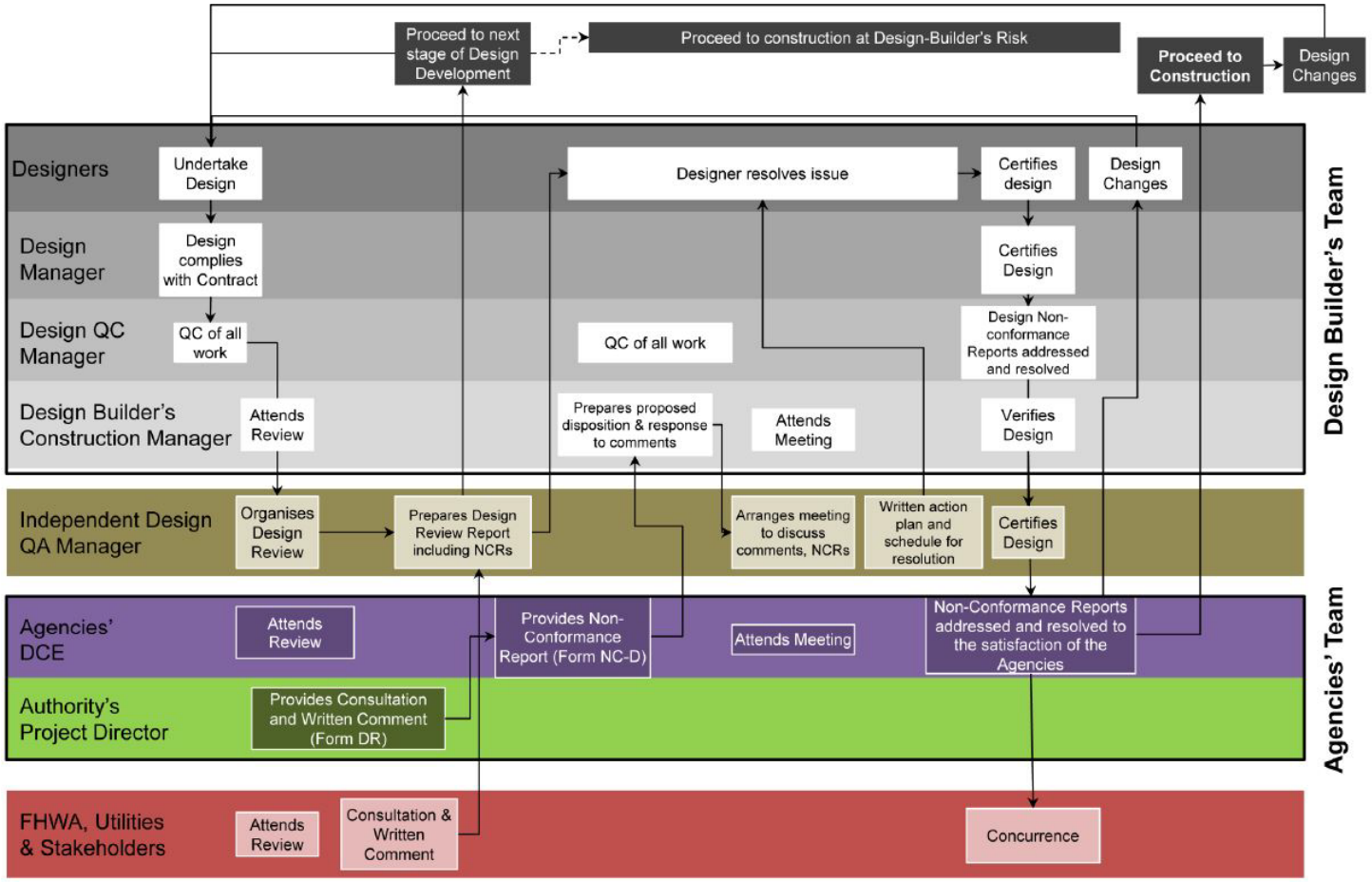
- Stages of Design prior to the start of construction



Design Quality Hierarchy



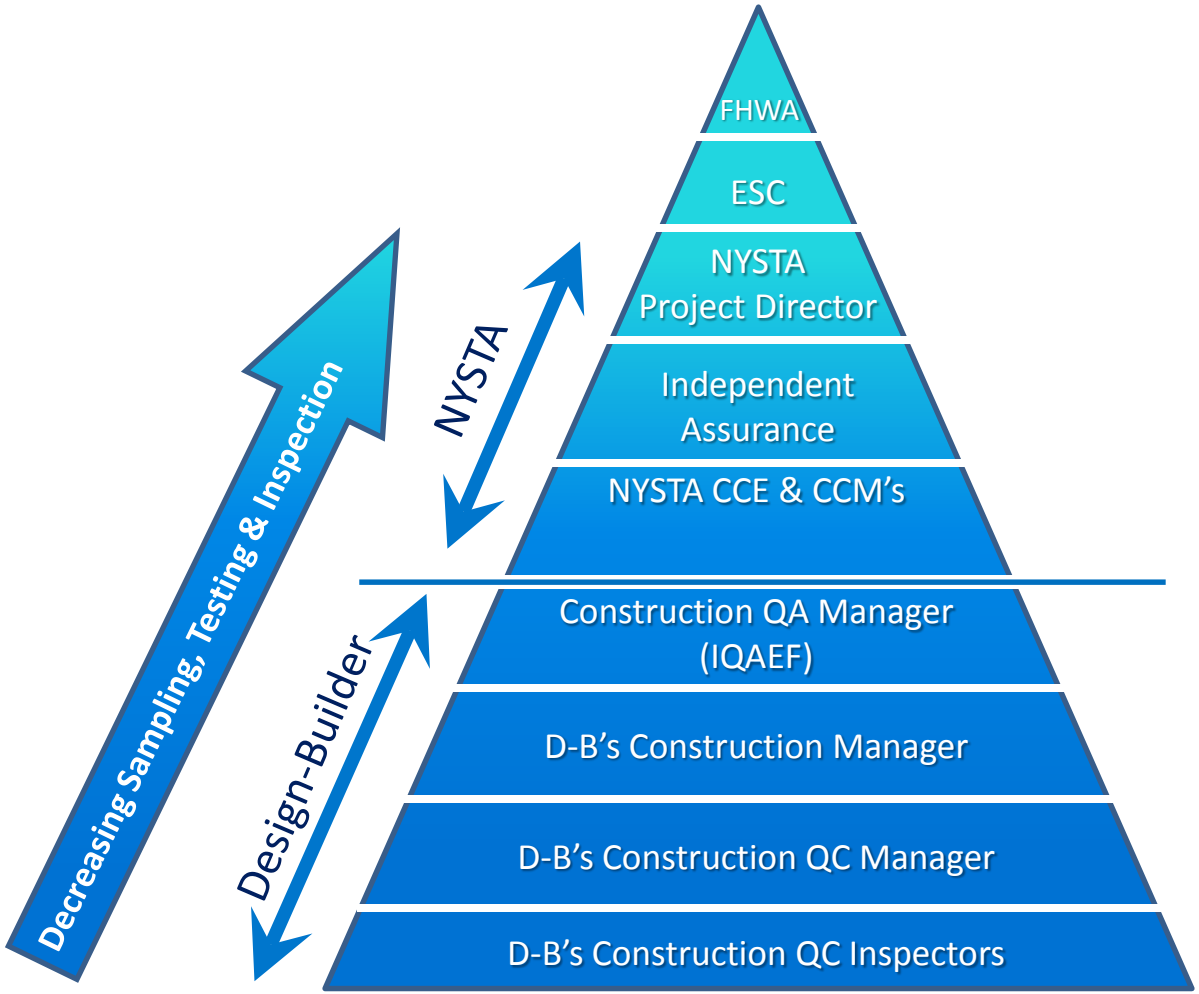
Design Quality Review Process



Responsible parties can shift responsibilities to a designee within their team

Figure 4.3 Design Review Process

Construction Quality Hierarchy



Requirements Verification

- Verification of D-B Quality Program
- Based upon Construction Oversight Guides
- Detail key requirements
  - Frequency of Audit/Monitoring
  - Requirements to be verified
  - Method of Verification
- Compiled in O-E Database System

Oversight Guides - Index

		Quality Plan	ITP
1.0 General Provisions			
2. Earthwork			
3. Base & Sub-base			
4. Hot Mix Asphalt			
5. Structures			
5.01. Structural Concrete			
W	5.01.01 On-site Concrete Testing - Rev 1		
W	5.01.04 Concrete Placement - Rev 1	Concrete & Grouting	0014 Pylon Anchor Boxes, Stay in place Forms & Anchor Pier Tie Down Assemblies
			0217 Approach Pile Cap Construction
			0239 Approach Span CIP Pier Cap Construction
5.02. Piles			
5.03. Sheeting and Retaining Wall Systems			
5.04. Post Tensioning			
5.05. VACANT			
5.06. Reinforcing Steel			
W	5.06.01 Steel Reinforcement Fabrication - Rev 0		0007 Rebar Fabrication
			0010 Rebar End Anchor Assembly Fabrication
			0134 Tompkins Cove Pre-assembly of Pile, Column & Anchor Cages
W	5.06.03 Steel Reinforcement - Rev 1		0007 Rebar Fabrication
			0008 Rebar Galvanizing
			0009 Rebar Fused Rings Fabrication
			0134-0137-0172-0177 Tompkins Cove Pre-assembly of Pile, Column & Anchor Cages
5.07. VACANT			
5.08. Masonry			
5.09. Precast Concrete			
5.10. Structural Steel			
5.11. Bridge Bearings			
5.12. Bridge Joints			
5.13. Bridge Railing Systems			
5.14. Miscellaneous Structures			
5.15. Welding			
5.16. Concrete Misc			
5.17. Vacant			
6. Incidental Construction			

Oversight Guides - Index

5. Structures			
5.01. Structural Concrete			
W	5.01.01 On-site Concrete Testing - Rev 1		
W	5.01.04 Concrete Placement - Rev 1	Concrete & Grouting	0014 Pylon Anchor Boxes, Stay in place Forms & Anchor Pier Tie Down Assemblies
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5.07. VACANT			

Construction Oversight Guides

Key Elements:

- Purpose / Scope
- Required Certifications
- Oversight / Sampling & Testing Requirements
- Verification Requirements
  - Process / Materials / Fabrication
  - Environmental Compliance
- Reference documents

Constructio s

Key Elements:

- Purpose / Scop
- Required Certifi
  - Owner CCM/ D
- Oversight / Sam
- Verification Req
  - Process / Mate
  - Environmental
- Reference docu

The New NY Bridge Project
Owners Oversight & Verification Program
Construction Oversight Guidelines

THE NEW NY BRIDGE

Subject: STEEL REINFORCEMENT FABRICATION		**Procedure No.**	5.06.01
Original Issue Date:	03/12/14	**Revision:**	2
Revision Date:	05/04/15	**Approved by:**	TJM

PURPOSE/SCOPE - This procedure describes the required Oversight Verification by the Authority related to oversight of offsite fabrication of steel reinforcement, fused rings, and headed anchors. Major elements of this work include verifying on site documents; reviewing mill certificates, tensile testing results, and hydrogen embrittlement certifications; and observing the overall production process for compliance with the DB's QC Plan. All work associated with this activity shall be accomplished in accordance with the Project Specification and reference documents listed at the end of this Construction Oversight Guideline (COG).

Oversight will be conducted as noted in the table below. There are no sampling & testing requriements for this activity.

Primary oversight of the Contractor's compliance with environmental requirement associated with performance, monitoring and permit conditions will be conducted by the Owner's Environmental Compliance Monitor (OECM). Construction Compliance Monitors (CCMs) will provide surveillance supplemental to OECM activities.

CONSTRUCTION COMPLIANCE MONITOR (CCM) CERTIFICATIONS –

The following certifications shall be required by all CCMs:

- NICET Level I – IV, or
- As approved by the Construction Compliance Engineer

QUALITY CONTROL (QC) and QUALITY ASSURANCE (QA) INSPECTOR CERTIFICATIONS –

The following certifications shall be required by all QC/QA Inspectors:

- NICET Level I – IV, or
- As approved by the DB's QC Plan

OVERSIGHT and/or SAMPLING AND TESTING REQUIREMENTS (as per DB 112, Appendix A)

	Description	Consistent with:
☐	Level I – 25% of the QA Frequency	Level 1 Verification Sampling and Testing as per DB 112 Appendix A
☐	Level II – 10% of the QA Frequency	Level 2 Verification Sampling and Testing as per DB 112 Appendix A
☒	Level III – Observation Verification	Level 3 Verification Sampling and Testing as per DB 112 Appendix A

OVERSIGHT - DB's QC and QA documentation for verification of this activity shall be completed as described in the approved DB Quality Plan, Work front specific QC and QA Plans and the reference documents listed at the end of this COG.

PROCESS VERIFICATION - Review requirements and procedures identified in the reference documents.

- Presence and methodology of DB's QC & QA Inspector;

Field Verification Checklist

Key Features / Framework:

- “Editable” pdf form
- Detail Requirements
- Allows record of “Objective Evidence”
- Records Verification Methodology & Result
  - Verification of QA Activity
  - Direct Observation
  - Joint Observation/Verification
  - Not Observed / Not Applicable

Field Verification Checklist

THE NEW NY BRIDGE

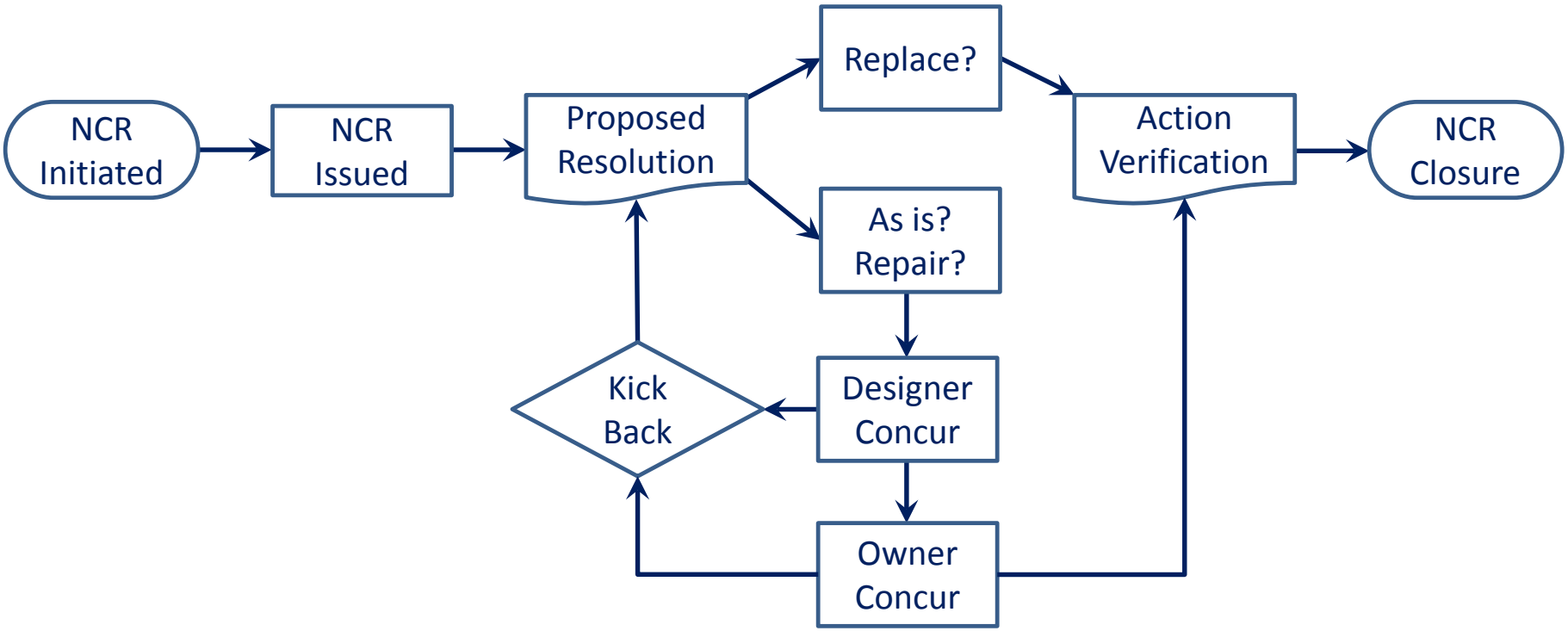
Construction Compliance Monitoring
Field Verification Checklist

COG 5.06.03 Steel Reinforcement				**Verification Result**				
Location:	**Price Center:**	**Date:**		1. Not Verified 2. Conforms: Verification of QA Activities/Records 3. Conforms: Direct Observation 4. Conforms: QA Verification & Direct Observation 5. Non-Conforming				
Activity:		**Verification by:**						
No.	**Requirement / Assessment**			**1.**	**2.**	**3.**	**4.**	**5.**
	Section 1 – Product Verification							
1.0	Certificate of compliance and material certifications for all items (galvanized steel reinforcement, fused rings, mechanical connectors, headed bar anchors) are present and available for review. (DB ITP & DB Spec 556.02030099)			☐	☐	☐	☐	☐
	Objective Evidence / Remarks:							
2.0	Reinforcing Steel Physical Markings (bar grades, tags, markings) are identifiable on bars and conform to material certificates and approved construction documents. (DB ITP & DB Spec 556.02030099)			☐	☐	☐	☐	☐
	Objective Evidence / Remarks:							
3.0	Galvanizing conforms to project specifications. (DB Spec 556.02030099)			☐	☐	☐	☐	☐
	Objective Evidence / Remarks:							
4.0	Materials are stored above ground and configured to freely drain rainwater off bars. (DB Spec 556.02030099).			☐	☐	☐	☐	☐
	Objective Evidence / Remarks:							

“Non-Conformance” Process

- “Deficiencies, non-compliance, errors and/or omissions”
- Can be issued by: D-B (QC), QA, or Owner
- Managed electronically in ELVIS
- Designer concurs in proposed resolutions
- “Repair” or “As-Is” action requires Owner “consent”
- Four (4) Categories:
  - Design
  - Construction
  - Management
  - Environmental
- All NCR’s require “Action Verification”

“Non Conformance” Process



Field Use of Technology

iPad use in Field – provides:

- ELVIS Remote Access
  - Plans / Specs / Shop Drawings / Work Plans
  - Electronic Daily Work Reports
  - Electronic Reporting of Test Data
- Real Time Conferencing (via FaceTime)
- Digital Photography

Audits

Objective: Verify conformance with requirements

- Internal Audits (Focus: NYSTA)
  - Conformance with established procedures
    - Project Management Plan
    - Project Procedures
- External Audits (Focus: TZC, Sub-contractors, QA)
  - Conformance with D-B Contract
  - Conformance with established procedures
    - NYSTA / NYSDOT Standards
    - TZC Quality Plan (including sub-contractors/suppliers)

Plan for the Finish

- It's never too early to start close out
- Orderly & timely acceptance of major construction elements.
- Full compliance of all documentation & resolution of issues.
- Commissioning and Start-up

"Begin with the end in mind." – Stephen Covey

Positioning for Success

- Start early
- Build a culture
- Systems matter
- Be prepared
- Stay in front
- Agility
- Co-location works
- Plan for the finish

Questions

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THE NEW NY BRIDGE

Contact Information

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Construction Compliance Engineer

New York State Thruway Authority

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Questions & Input

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Or

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Public-Private Partnership Quality Assurance Program

Julie Gadsby
Arizona DOT

Weng On Tam
Tam Consulting Services LLC

Public-Private Partnership Quality Assurance Program

Joint DOT/FHWA Major Projects Webinar

Julie Gadsby (ADOT) & Weng On Tam (TCS)

November 8, 2017

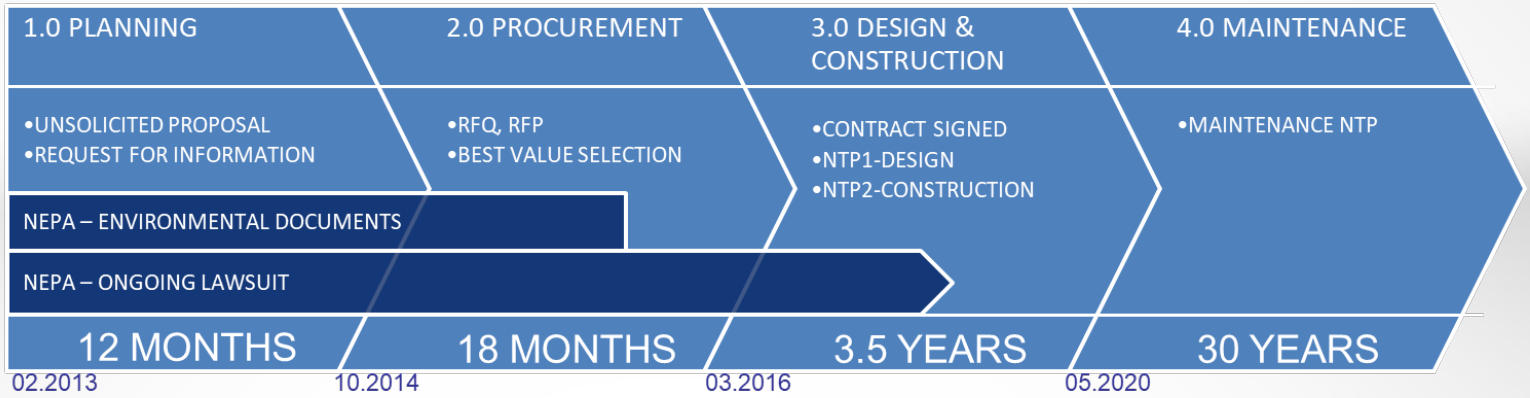
ADOT

South Mountain Freeway

ADOT's First Highway P3 Project

U.S. Department of Transportation
Federal Highway Administration

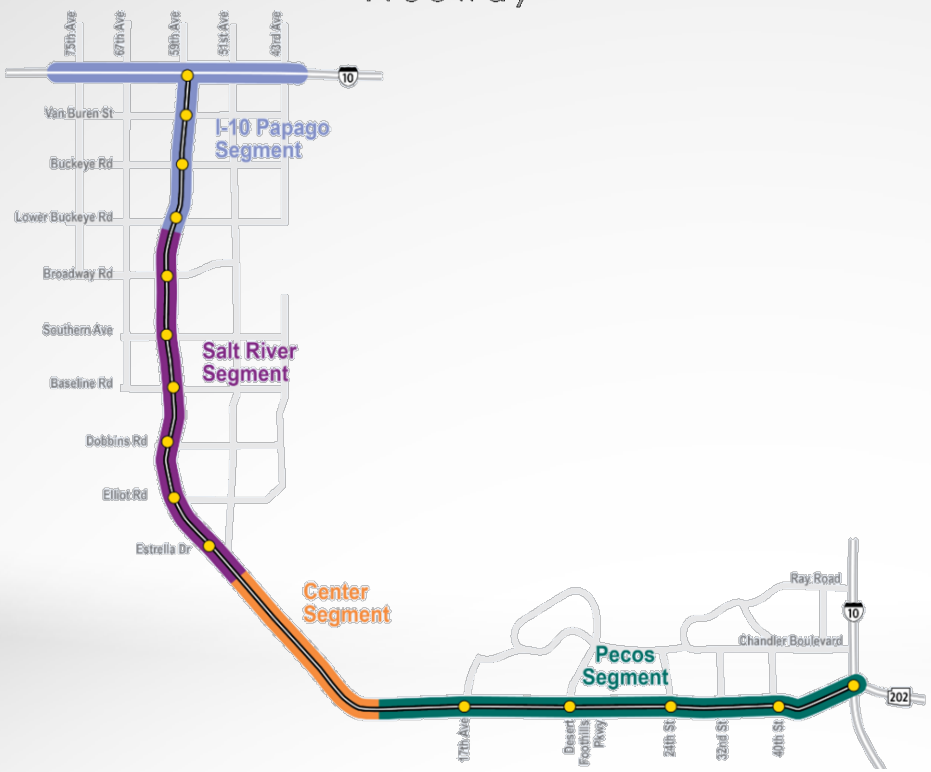
- **Design-Build-Maintain**
- **Public Funds – $1.77 Billion (40% Federal, 60% Regional)**



ADOT

LOOP 202

South Mountain Freeway



LOOP 202 **22 miles** of new freeway

Savings over $100 million

1 Double Roundabout Interchange

Open to traffic **3** years sooner

I-10 **4.5 miles** of **widening** improvements between 75th & 43rd avenues

3 general purpose lanes ↓ | ↑ **1** high occupancy vehicle lane

40 bridges & **1** pedestrian bridge

5 multi-use underpass crossings

11 **miles** of sound walls

2 half Diverging Diamond Interchanges (DDI)

13 EXIT **interchanges**

6-mile long shared use path

ADOT

Quality Assurance Program

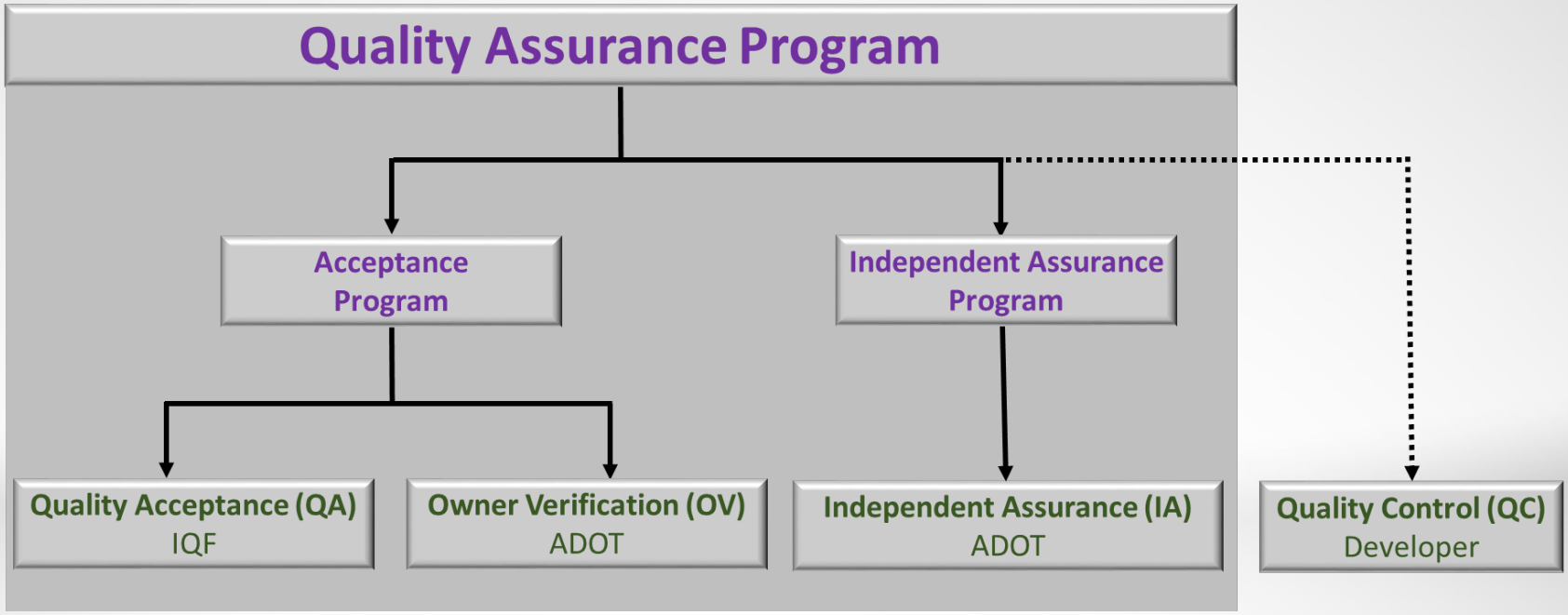
Traditional vs SMF

U.S. Department of Transportation
Federal Highway Administration

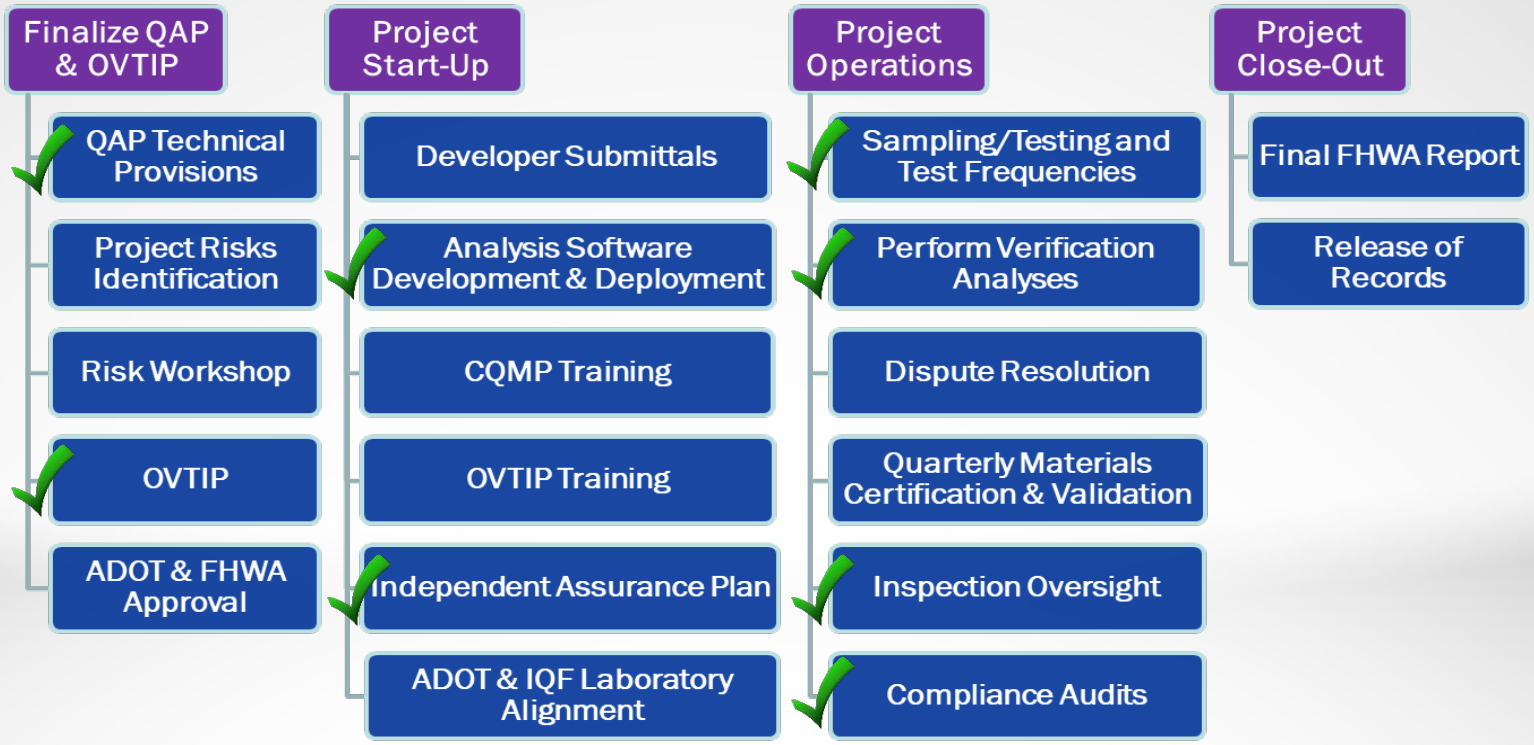
	Traditional QAP	SMF QAP
Quality Control	Contractor	Developer
Acceptance Inspection	ADOT	Developer's IQF with ADOT OV
Acceptance Testing	ADOT	Developer's IQF with ADOT OV
Independent Assurance	ADOT: *Field Tests – Systems Basis* *Lab Tests – Project Basis*	ADOT: *Field Tests – Systems Basis* *Lab Tests – System Basis*
Referee Testing	ADOT Central Lab	ADOT Central Lab
ADOT Software	ADOT PEN/FAST	ADOT PEN/FAST with Analysis Software

ADOT

SMF Construction QAP



SMF Construction QAP Process



Quality Assurance Technical Provisions

PUBLIC PRIVATE PARTNERSHIP (P3)
DESIGN-BUILD-MAINTAIN AGREEMENT

for

202 MA 054 H882701C
SR 202L (SOUTH MOUNTAIN FREEWAY)
I-10 (MARICOPA FREEWAY) – I-10 (PAPAGO FREEWAY)

Between

ARIZONA DEPARTMENT OF TRANSPORTATION

and

CONNECT 202 PARTNERS, LLC

TECHNICAL PROVISIONS

Dated as of: February 26, 2016

CONFORMED

ARIZONA DEPARTMENT OF TRANSPORTATION

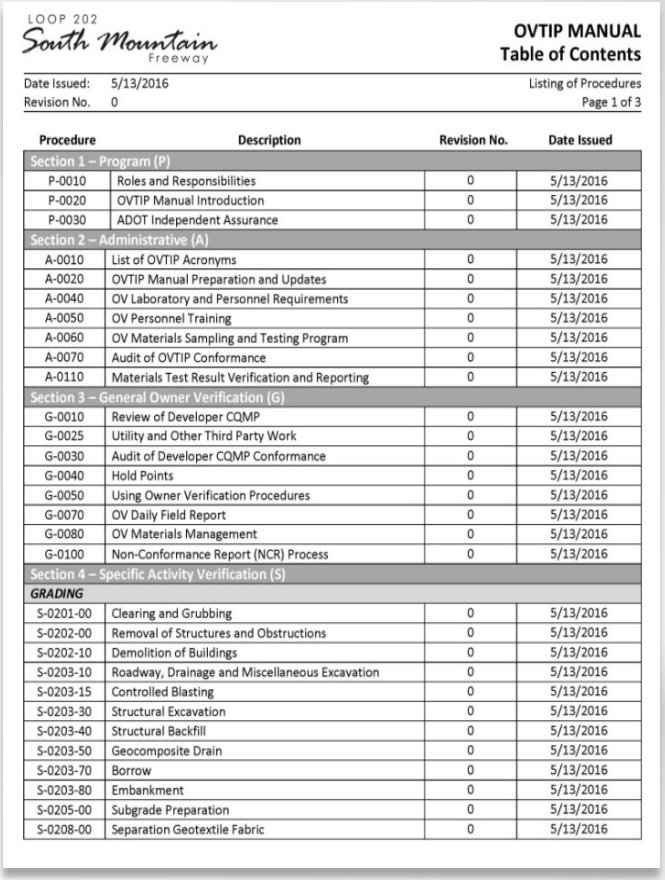
MATERIALS QUALITY ASSURANCE REQUIREMENTS
For the
LOOP 202 SOUTH MOUNTAIN FREEWAY PROJECT

TABLE OF CONTENTS

QAP Process

OVTIP Procedures

- Program (P)
- Administrative (A)
- General (G)
- Specific (S)



LOOP 202 South Mountain Freeway

OVTIP MANUAL
Table of Contents

Date Issued: 5/13/2016
Revision No. 0

Listing of Procedures
Page 1 of 3

Procedure	Description	Revision No.	Date Issued
Section 1 – Program (P)			
P-0010	Roles and Responsibilities	0	5/13/2016
P-0020	OVTIP Manual Introduction	0	5/13/2016
P-0030	ADOT Independent Assurance	0	5/13/2016
Section 2 – Administrative (A)			
A-0010	List of OVTIP Acronyms	0	5/13/2016
A-0020	OVTIP Manual Preparation and Updates	0	5/13/2016
A-0040	OV Laboratory and Personnel Requirements	0	5/13/2016
A-0050	OV Personnel Training	0	5/13/2016
A-0060	OV Materials Sampling and Testing Program	0	5/13/2016
A-0070	Audit of OVTIP Conformance	0	5/13/2016
A-0110	Materials Test Result Verification and Reporting	0	5/13/2016
Section 3 – General Owner Verification (G)			
G-0010	Review of Developer CQMP	0	5/13/2016
G-0025	Utility and Other Third Party Work	0	5/13/2016
G-0030	Audit of Developer CQMP Conformance	0	5/13/2016
G-0040	Hold Points	0	5/13/2016
G-0050	Using Owner Verification Procedures	0	5/13/2016
G-0070	OV Daily Field Report	0	5/13/2016
G-0080	OV Materials Management	0	5/13/2016
G-0100	Non-Conformance Report (NCR) Process	0	5/13/2016
Section 4 – Specific Activity Verification (S)			
GRADING			
S-0201-00	Clearing and Grubbing	0	5/13/2016
S-0202-00	Removal of Structures and Obstructions	0	5/13/2016
S-0202-10	Demolition of Buildings	0	5/13/2016
S-0203-10	Roadway, Drainage and Miscellaneous Excavation	0	5/13/2016
S-0203-15	Controlled Blasting	0	5/13/2016
S-0203-30	Structural Excavation	0	5/13/2016
S-0203-40	Structural Backfill	0	5/13/2016
S-0203-50	Geocomposite Drain	0	5/13/2016
S-0203-70	Borrow	0	5/13/2016
S-0203-80	Embankment	0	5/13/2016
S-0205-00	Subgrade Preparation	0	5/13/2016
S-0208-00	Separation Geotextile Fabric	0	5/13/2016

QAP Process

Risk / Levels of Analysis

- Risk Identification
- Risk Workshop
- Determine Level of Analysis for Each Test Method and Material Type
- Levels of Analysis Table in OVTIP

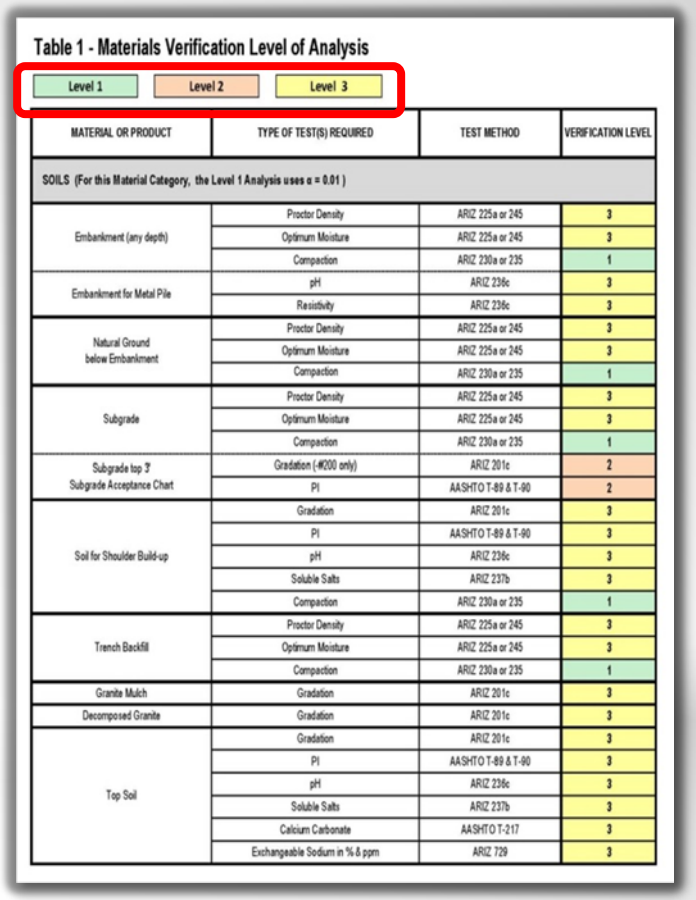


Table 1 - Materials Verification Level of Analysis

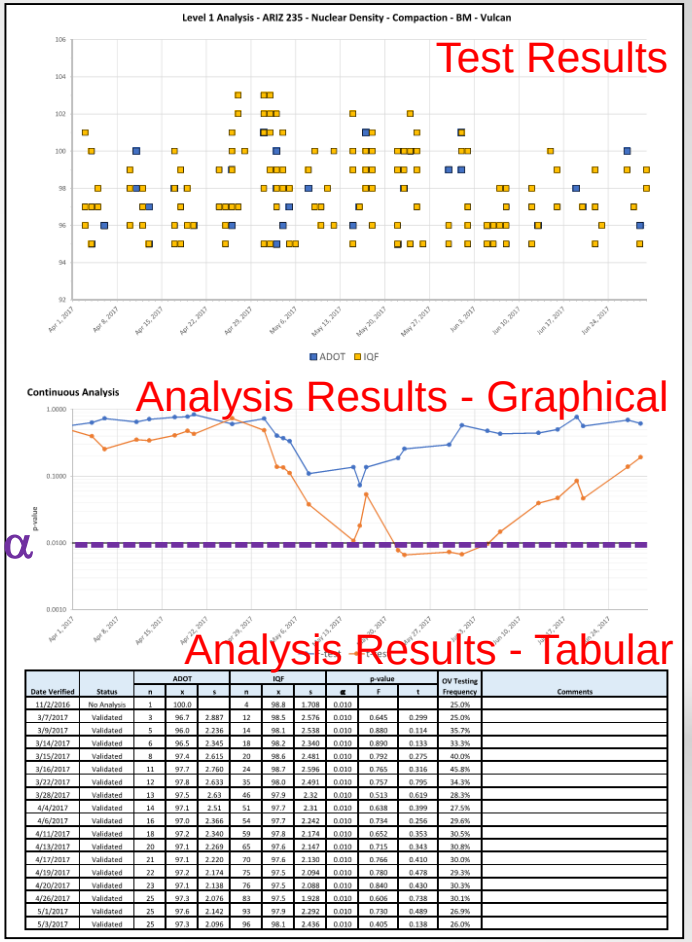
Level 1 | Level 2 | Level 3

MATERIAL OR PRODUCT	TYPE OF TEST(S) REQUIRED	TEST METHOD	VERIFICATION LEVEL
SOILS (For this Material Category, the Level 1 Analysis uses α = 0.01)			
Embankment (any depth)	Proctor Density	ARIZ 225a or 245	3
	Optimum Moisture	ARIZ 225a or 245	3
	Compaction	ARIZ 230a or 235	1
Embankment for Metal Pile	pH	ARIZ 236c	3
	Resistivity	ARIZ 236c	3
Natural Ground below Embankment	Proctor Density	ARIZ 225a or 245	3
	Optimum Moisture	ARIZ 225a or 245	3
	Compaction	ARIZ 230a or 235	1
Subgrade	Proctor Density	ARIZ 225a or 245	3
	Optimum Moisture	ARIZ 225a or 245	3
	Compaction	ARIZ 230a or 235	1
Subgrade top 3' Subgrade Acceptance Chart	Gradation (-#200 only)	ARIZ 201c	2
	PI	AASHTO T-89 & T-90	2
Soil for Shoulder Build-up	Gradation	ARIZ 201c	3
	PI	AASHTO T-89 & T-90	3
	pH	ARIZ 236c	3
	Soluble Salts	ARIZ 237b	3
	Compaction	ARIZ 230a or 235	1
Trench Backfill	Proctor Density	ARIZ 225a or 245	3
	Optimum Moisture	ARIZ 225a or 245	3
	Compaction	ARIZ 230a or 235	1
Granite Mulch	Gradation	ARIZ 201c	3
Decomposed Granite	Gradation	ARIZ 201c	3
Top Soil	Gradation	ARIZ 201c	3
	PI	AASHTO T-89 & T-90	3
	pH	ARIZ 236c	3
	Soluble Salts	ARIZ 237b	3
	Calcium Carbonate	AASHTO T-217	3
	Exchangeable Sodium in % & ppm	ARIZ 729	3

Levels of Analysis

Level 1 – Continuous Analysis

- High Residual Risk
- Strong Performance Indicator
- OV Frequency ≈ 10%
- Continuous F- and t- Tests
  - Use of p-value

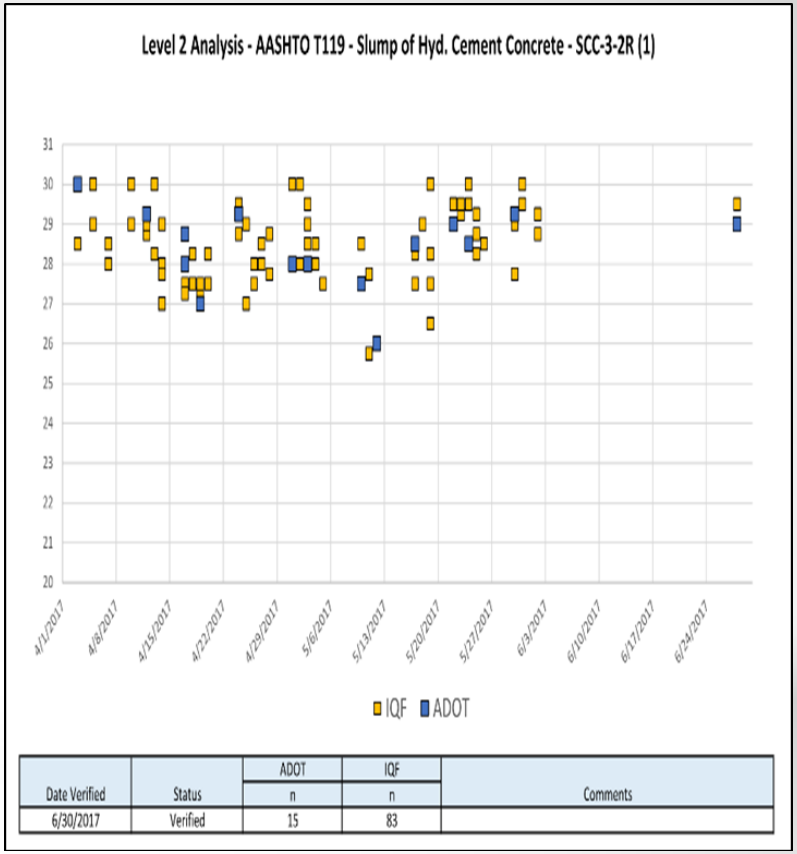


Date Verified	Status	ADOT n	ADOT x̄	ADOT s	IQF n	IQF x̄	IQF s	p-value α	p-value F	p-value t	OV Testing Frequency	Comments
11/2/2016	No Analysis	1	100.0		4	98.8	1.708	0.010			25.0%	
3/7/2017	Validated	3	96.7	2.887	12	98.5	2.576	0.010	0.645	0.299	25.0%	
3/9/2017	Validated	5	96.0	2.236	14	98.1	2.538	0.010	0.880	0.114	35.7%	
3/14/2017	Validated	6	96.5	2.345	18	98.2	2.340	0.010	0.890	0.133	33.3%	
3/15/2017	Validated	8	97.4	2.615	20	98.6	2.481	0.010	0.792	0.275	40.0%	
3/16/2017	Validated	11	97.7	2.760	24	98.7	2.596	0.010	0.765	0.316	45.8%	
3/22/2017	Validated	12	97.8	2.633	35	98.0	2.491	0.010	0.757	0.795	34.3%	
3/28/2017	Validated	13	97.5	2.63	46	97.9	2.32	0.010	0.513	0.619	28.3%	
4/4/2017	Validated	14	97.1	2.51	51	97.7	2.31	0.010	0.638	0.399	27.5%	
4/6/2017	Validated	16	97.0	2.366	54	97.7	2.242	0.010	0.734	0.256	29.6%	
4/11/2017	Validated	18	97.2	2.340	59	97.8	2.174	0.010	0.652	0.353	30.5%	
4/13/2017	Validated	20	97.1	2.269	65	97.6	2.147	0.010	0.715	0.343	30.8%	
4/17/2017	Validated	21	97.1	2.220	70	97.6	2.130	0.010	0.766	0.410	30.0%	
4/19/2017	Validated	22	97.2	2.174	75	97.5	2.094	0.010	0.780	0.478	29.3%	
4/20/2017	Validated	23	97.1	2.138	76	97.5	2.088	0.010	0.840	0.430	30.3%	
4/26/2017	Validated	25	97.3	2.076	83	97.5	1.928	0.010	0.606	0.738	30.1%	
5/1/2017	Validated	25	97.6	2.142	93	97.9	2.292	0.010	0.730	0.489	26.9%	
5/3/2017	Validated	25	97.3	2.096	96	98.1	2.436	0.010	0.405	0.138	26.0%	

Levels of Analysis

Level 2 – Independent Verification

- Medium Residual Risk
- Secondary Performance Indicator
- OV Frequency Once Per Quarter



Date Verified	Status	ADOT n	IQF n	Comments
6/30/2017	Verified	15	83	

Levels of Analysis

Level 3 – Observation Verification

U.S. Department of Transportation
Federal Highway Administration

- **Low Residual Risk**
- **No Testing. Test Observation.**

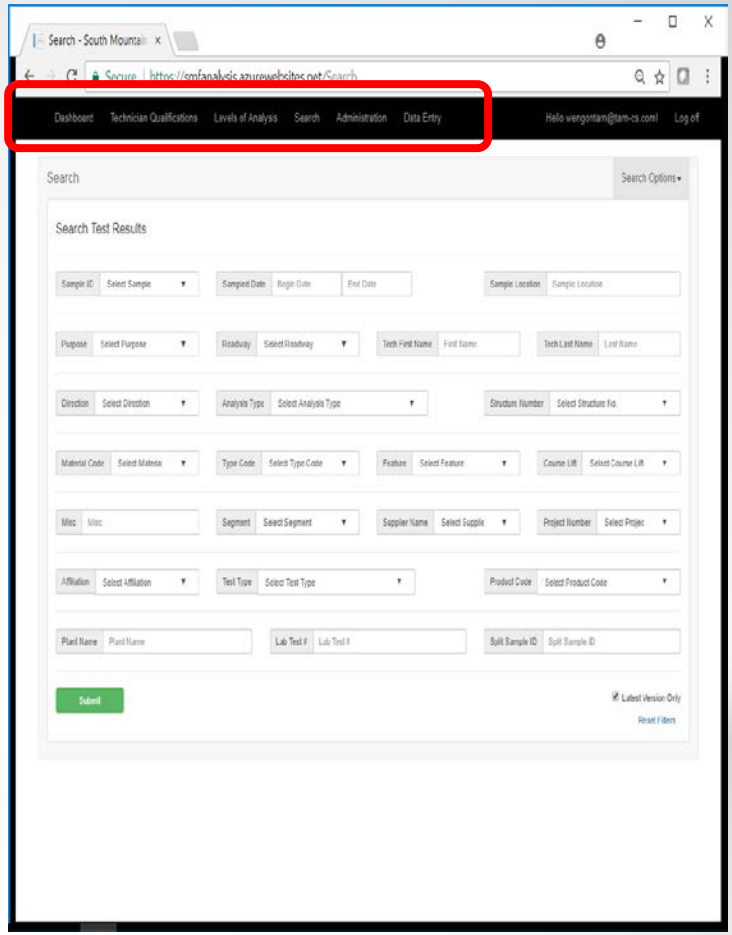
LEVEL 3 OBSERVATION LOG

Technician	Test Type	Observation Date	Evaluator	Observation	Has Attachment
Leon, Jose	Determining pH of Soil	11/9/16	Robert Clifford	No exceptions noted	No
Ekstrom, Aaron	Standard Proctor	11/9/16	Robert Clifford	No exceptions noted	No
Ekstrom, Aaron	Sand Equivalent / Soils & Fine Agg for ACFC	11/10/16	Jeremy Barnes	No exceptions noted	Yes
Fennell, Randy	Reinforcing Steel - T244/A1061	12/7/16	Hector Roman	No exceptions noted	Yes
Fennell, Randy	Bend Test - T285/E290	12/7/16	Hector Roman	No exceptions noted	Yes
Fennell, Randy	Reinforcing Steel - T244/A370	12/7/16	Hector Roman	No exceptions noted	Yes
Grindley, Jim	Temp of Fresh Mix Concrete	2/16/17	John Thompson	No exceptions noted	No
Leon, Jose	Minimum Soil Resistivity	3/24/17	Robert Clifford	No exceptions noted	No
Leon, Jose	Unit Wt & Voids in Agg	4/21/17	Robert Clifford	No exceptions noted	No

ADOT

QAP Process
Analysis Software

- Dashboard
- Technical Qualifications
- Levels of Analysis
- Search
- Data Entry
- Administration



IA Program
System Basis

U.S. Department of Transportation
Federal Highway Administration

ADOT SMF PROJECT INDEPENDENT ASSURANCE PROGRAM

ALL EVALUATION PERFORMED ON SYSTEM BASIS

ADOT ASSIGNED IA LAB EVALUATES EACH IQF & OV TECHNICIAN ANNUALLY (Evaluation Methods Defined Below)

FIELD SAMPLING & TESTING

Field Density of Soils
ARIZ 230 Field Density (Sand Cone)
ARIZ 235 Field Density (Nuclear)

Plastic Concrete
ASTM C143 - Concrete Slump
ASTM C231 - Concrete Air Content
ASTM C31 - Concrete Cylinder Fabrication

NOTE: Field Technicians will be evaluated annually on the basis of observation. IQF or OV Lab Management initiates evaluation request.

LABORATORY TESTING

Soil & Aggregate
ARIZ 201c - Sieve Analysis of Soils & Aggregates
AASHTO T176 - Sand Equivalent
AASHTO T90 - Plastic Limit & Plasticity Index

Hardened Concrete
ARIZ 314b - Compressive Strength of Concrete

Bituminous Mixture Compaction
ARIZ 410e - Compacting/Testing HMA by Marshall Method
AASHTO T312 - HMA Density by Gyratory Compactor

Bituminous Mixture Other
ARIZ 415c - Bulk SG of Compacted Bituminous Mixtures
ARIZ 417d - Max. Theoretical SG of HMA (Rice Test)
ARIZ 427 - Asphalt Binder Content (Ignition)

NOTE: Lab Technicians will be evaluated annually on the basis of either observation, an individual's IA Split test results (small groups), or an individual's Proficiency test results (large groups). Technicians will be evaluated for the test methods they will perform. IQF or OV Lab Management initiates evaluation request.

ADOT ASSIGNED IA LAB VERIFIES THAT EACH IQF & OV TECHNICIAN IS CURRENTLY CERTIFIED AS APPROPRIATE FOR TESTS PERFORMED

ALL Field Technicians MUST be ATTI Field and ACI Field Certified. In addition to field certifications, ALL Lab Technicians MUST also hold ATTI Soil & Aggregate, ATTI Asphalt, and ACI Compressive Strength Certification, as appropriate for the tests being performed.

ADOT ASSIGNED IA LAB VERIFIES THAT ALL IQF & OV TEST EQUIPMENT IS INVENTORIED AND CURRENTLY CALIBRATED

ALL test equipment (field and lab) used by any Technician must be in the active inventory of an AASHTO Accredited and ADOT Approved Laboratory. Actual calibration records for each specific inventory item must be current, and must be provided upon request.

ADOT

Inspection Oversight & Audits

U.S. Department of Transportation
Federal Highway Administration

Inspection Oversight

- Verify IQF Inspection and Reporting
- Verify QC Inspection and Reporting

Audits

- CQMP Audit
  - QC and IQF Commitments
- OVTIP Internal Audit

ADOT

South Mountain Freeway
Today and Moving Forward

U.S. Department of Transportation
Federal Highway Administration

South Mountain Freeway

- First P3 QAP (Use of QA/OV Acceptance)
- Lessons Learned

Moving Forward

- P3 is a Tool in the Toolbox
- Programmatic QAP
- Implementation Guide

ADOT

Questions?

Julie Gadsby, PE

Assistant District Engineer

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Weng On Tam, PE

Co-Owner

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Construction QA TechBrief (April 2012)

- **Quality Assurance (QA)**
  - Not specific role of one entity
- **Construction QA Program**
  - Six core elements apply to D-B
- **Responsibilities**
  - Design-Builder = QC
  - Agency = Acceptance

TECHBRIEF

Construction Quality Assurance For Design-Build Highway Projects

FHWA Publication No.: FHWA-HRT-12-039

FHWA Contact: Michael Rafalowski, HIPT-10, (202) 366-1571, michael.rafalowski@dot.gov

Introduction

A majority of State transportation agencies use the design-build (DB) contracting method to deliver some transportation projects. Documented benefits of DB include faster project delivery, improved constructability, less cost growth, early cost certainty, and fewer claims.

One area of DB contracting that requires closer examination is construction quality assurance (QA). DB is believed to provide a level of project quality equal to design-bid-build (DBB), as outlined in the Federal Highway Administration's (FHWA) *Design-Build Effectiveness Study*.(1) However, a recent examination of State agency DB procurement packages showed that roles and responsibilities for construction quality are not clearly defined in many instances. The paper "Does Design-Build Project Delivery Affect the Future of the Public Engineer?" examined 60 DB requests for proposals (RFPs) and found 23 cases in which assignment of responsibilities for verification and acceptance could not be determined.(2) National Cooperative Highway Research Program (NCHRP) Synthesis 376, *Quality Assurance in Design-Build Projects*, states "With the changing quality roles found in the DB delivery method, it is imperative that quality responsibilities and the responsible parties are clearly stated in the contract documents."(3) However, on DB projects, there is no change in the core QA functions of contractor quality control (QC) and agency acceptance. The design-builder still has a responsibility for QC, as does the contractor with DBB projects. The agency must retain its responsibility for the acceptance function, as required by Title 23, Code of Federal Regulations, Part 637 (23 CFR 637).(4)

One of the attributes of the DB delivery method is the single source of responsibility for design and construction issues.

U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296

www.tfhrc.gov/research/

FHWA Technical Assistance
QA for Design-Build Projects

- Jeff Lewis, RC Const & Project Mgmt Team
  Jeff.Lewis@dot.gov
- Greg Doyle, MA Division/RC Const & Project Mgmt Team
  Gregory.J.Doyle@dot.gov
- Dennis Dvorak, RC Pavement & Materials Team
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- Jim Travis, Texas Division
  James.Travis@dot.gov

Alternative Contracting Methods (ACMs) Library

The Federal Highway Administration supports the deployment of Alternative Contracting Methods-Design-Build (D-B), Construction Manager/General Contractor (CM/GC), Alternate Technical Concepts (ATC)-to accelerate project delivery, encourage the deployment of innovation, and minimize unforeseen delays and cost overruns.

In traditional highway construction contracting (design-bid-build), cost is generally the one criterion that determines the winning bid. As State and local agencies strive to meet customer needs, factors such as quality, delivery time, social and economic impact, safety, public perception, and life-cycle costs have gained in importance. Since the 1990s, the FHWA has been supporting the use of these innovative alternative contracting methods to help achieve these goals.

* This Library has been assembled to provide access to Samples of documents prepared by State legislatures, and transportation owner agencies in the execution of roadway construction contracting, deploying these methods. It does not constitute a standard, specification, or regulation.

- Design-Build (D-B)
- Construction Manager/General Contractor (CM/GC)
- Alternative Technical Concepts (ATC)
- Quick Reference, Background Material, and Useful Information
- FHWA Division ACM Contacts

ACM Technical Contacts

ACM Deployment	ATC	CM/GC	D-B
Team Manager Rob Elliott FHWA Resource Center (Atlanta) (404) 562-3941 rob.elliott@dot.gov	**Lead** David Unkefer FHWA Resource Center (Atlanta) (404) 562-3669 david.unkefer@dot.gov	**Lead** Ken Atkins FHWA Resource Center (Lakewood) (720) 963-3416 kenneth.e.atkins@dot.gov	**Lead** Jeff Lewis FHWA Resource Center (Sacramento) (916) 498-5035 Jeff.lewis@dot.gov
Team Lead Jeff Lewis FHWA Resource Center (Sacramento) (916) 498-5035 Jeff.lewis@dot.gov		**Co-Lead** John Haynes Utah Division Office (801) 955-3526 john.haynes@dot.gov	

More Information

- Quick Reference, Background Material, and Useful Information

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  FHWA Resource Center (Sacramento)
  916-498-5035
  E-mail Jeff

Questions & Input

Submit a question using the chat box

Or

Dial *1 to call in your question by phone

Upcoming Webinars

Joint DOT/FHWA Major Project Webinar

Wednesday, May 2, 2018

1:00 p.m. to 3:00 p.m. ET

Quarterly Major Project Webinar (FHWA)

Wednesday, February 7, 2018

1:00 p.m. to 3:00 p.m. ET

Send topic ideas for upcoming webinars to
MajorProjectsDiscipline@dot.gov

Questions & Input

Submit a question using the chat box

Or

Dial *1 to call in your question by phone

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MajorProjectsDiscipline@dot.gov

Major Projects Website

https://fhwa.dot.gov/majorprojects/

SharePoint Site (FHWA Only)

http://our.dot.gov/office/fhwa.dss/MP/default.aspx