QA/QC Program Overview

November, 2015

Transbay Transit Center

TJPA

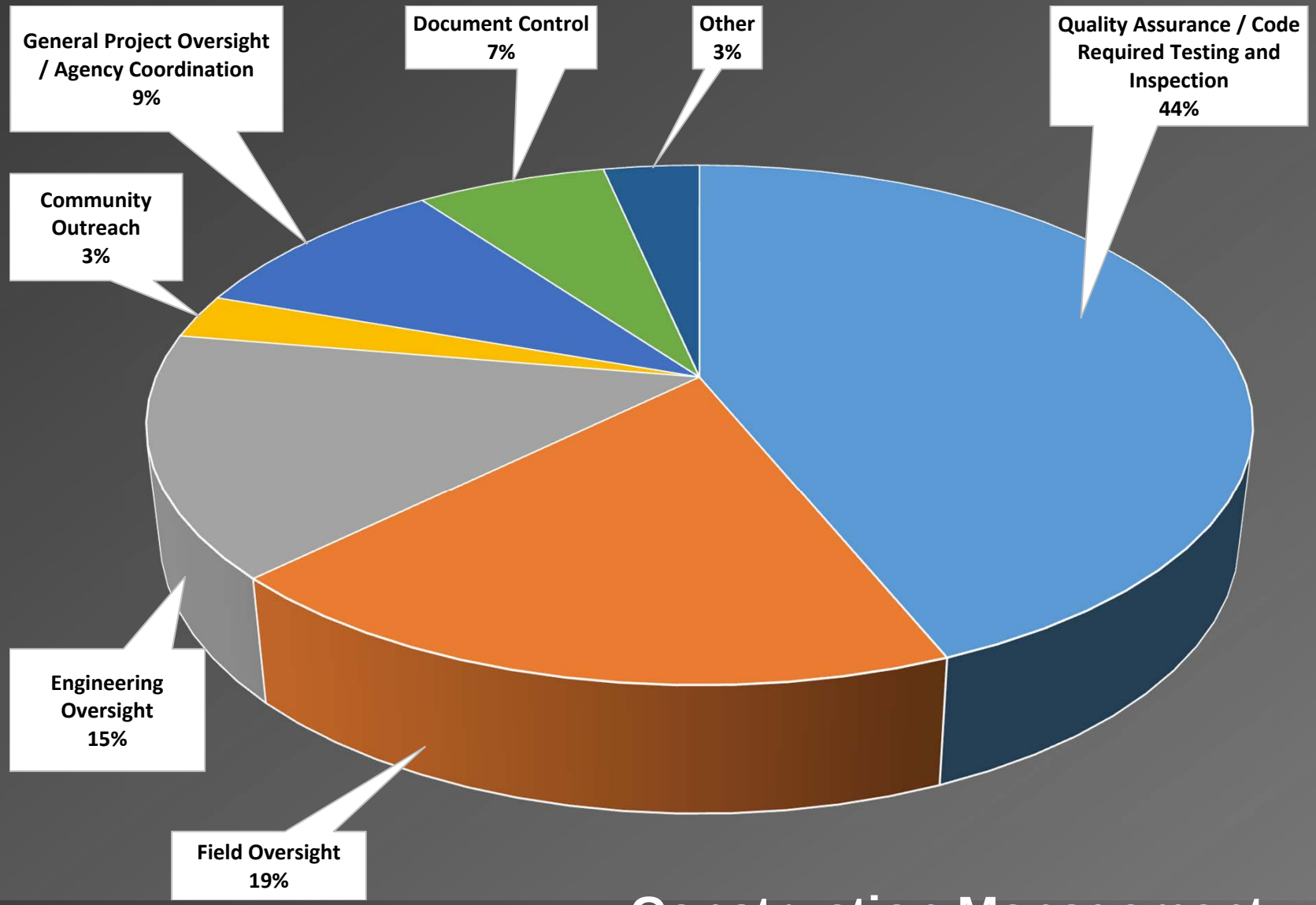
Quality Roles on the Project

- Construction Management Oversight (CMO-Turner) functions as the TJPA's eyes and ears.
- Construction Manager/General Contractor (CM/GC-WOJV) manages and directs the work.
- Design Team sets Quality Standards during the design and specifications development.
- Design team verifies standards through the submittal process and field observations.
- Quality Control is the role of the CM/GC.
- Quality Assurance is the role of the CMO including specialty inspection.

Overview of the CMO Services

- "Construction management services to coordinate, administer, monitor, inspect and interface with the Transbay Transit Center design teams, the CM/GC, the Demolition Contractor and the TJPA…"
- "Administrative tasks…which include the documentation of work progress, progress reports, correspondence, record keeping, payment verification and communications…"
- "Rapid emergency response to the TJPA...provide 24-hour on-call representation for on-site emergencies."

- **Key Activities:**
  - Quality Assurance including daily and code compliance inspections and coordination.
  - Engineering oversight of RFI and submittal process.
  - Change order and claims management.
  - Pay application review and recommendations.
  - Schedule analysis.
  - Field supervision during all work shifts.
  - Maintain a 24 hour hotline for neighbor issues.
  - Design/Assist verifications.



Transbay Transit Center

Construction Management Oversight Breakdown (dollars)

Quality Assurance – Prevent, Detect and Correct

- "Establish a quality assurance / quality control (QA/QC) plan and implementing procedures…that meets requirements of the Program Quality Management System, including compliance with the FTA's Quality Assurance and Quality Control Guidelines and the TJPA's approved Quality Management System."
- "QA/QC plan and procedures shall provide for effective oversight of the CM/GC's quality control plan…"

- **Key Activities:**
  - Turner developed the QA Plan in accordance with Project requirements, FTA requirements and Army Corp QMS best practices.
  - Turner has updated the QA Plan three times as work in the field has changed during construction.
  - QA Plan mandates observations, inspections, corrective actions, documentation and data collection.
  - As part of the QA Plan, Turner has performed quality surveillances of the CM/GC and vital offsite surveillances at manufacturing facilities around the country.

Quality Assurance – Prevent, Detect and Correct

- "Development of appropriate inspection guidelines and checklists, independent assurance and sampling test guidelines, formats for daily inspection reports and inspection and test documentation requirements. Include procedures for oversight and implementation of the non-conformance reporting and corrective action processes."
- "Support for Program QA surveillance and audits of contractor, supplier and Contractor activities and products."

- **Key Activities:**
  - Implemented Autodesk BIM360 (originally called Vela) quality tracking and inspection request system.
  - In the last year, there have been 2,737 Inspection Requests (IRs) from the Contractors (Nov. 2014 – October 2015). Average of 57 IR's per week, over 200 IR's per month. All managed by Turner.
  - To date, through daily observation, the QA/QC team has identified, tracked and assisted in resolving over 1600 Field Condition Reports ("FCRs") and over 140 Non Conformance Reports ("NCRs").
  - Currently there are over 10,000 unique Inspection and Test records in the system.

Quality Assurance – Prevent, Detect and Correct

- "Provide code and quality inspections, on a timely basis in conformance with the Construction Documents…"
- "Provide specialty inspections and independent testing including…steel, concrete, masonry, fireproofing coverage, soil compaction, water intrusion, and waterproofing…in conformance with the Construction Documents…"

- **Key Activities**:
  - Local and National Building Codes, the structural engineer and National organizations such as the American Welding Society (AWS) and American Institute of Steel Construction (AISC) mandate code inspection and test requirements for steel fabrication. The same is true for concrete, soil compaction and other work activities.
  - Turner has subcontracted with ISI to provide code compliance and special testing and inspection.
  - In the case of structural steel, ISI provides Certified Welding Inspectors (CWI) onsite for field welding and offsite at 15 locations throughout the country. ISI has performed more than 2500 tests and inspections at a total of 16 offsite facilities to date.

Quality Assurance – Special Inspections and Tests

- Structural Steel (Non-Destructive Testing)
  - Visual Inspection.
  - Ultrasonic testing.
  - Magnetic particle testing.
  - Torque testing.
  - Decking and Nelson Stud welding inspection.
  - Pull testing.
- Soil Testing
  - Nuclear gauge testing (compaction).
  - Gradation testing.
- Concrete
  - Visual Inspection for reinforcing steel placement, embedded item placement and cast-in item placement.
  - Slump testing.
  - Air testing.
  - Temperature testing.
  - Shrinkage testing.
  - Compression testing.
- Future Testing
  - Fireproofing testing.
  - Masonry / Grout testing.

Quality Assurance – A Success Story

- **Issue:**
  - During shop fabrication of the built-up park level nodes, the ISI Inspector, during Non Destructive Testing ("NDT"), noted the presence of linear indications in the welds.

- **Result:**
  - The applicable code along with the Inspector's experience mandated further investigation of the issue.
  - The Inspector's diligence caught this issue at the shop and resulted in the rejection of the built-up nodes.
  - An independent 3rd party welding consultant was brought in to determine the root cause of the issue and develop a revised procedure.
  - The built-up nodes were rebuilt using the new procedure, passing visual inspection and NDT.

Quality Assurance – A Success Story

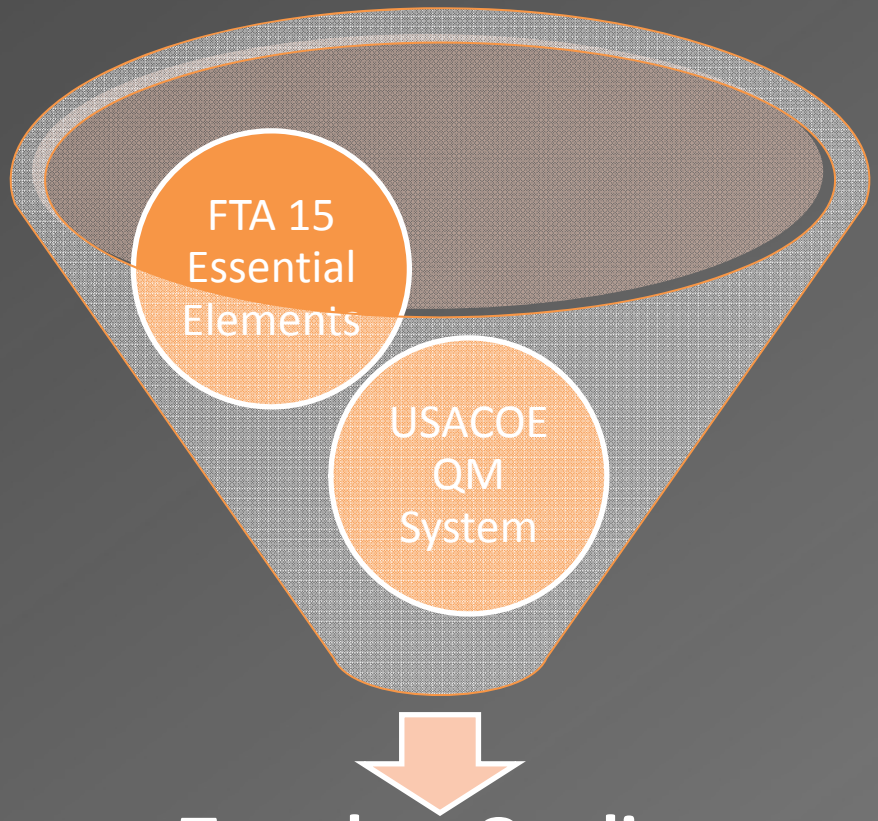
- **Issue:**
  - Accurate and auditable documentation is a cornerstone of a successful QA/QC program. Turner is charged with creating and maintaining this documentation.
- **Result:**
  - In 2011, Turner, working with the TJPA and other team members, identified the need for a modern, easy to use documentation system that would be accessible to all project participants.
  - Vela System (later purchased by Autodesk and renamed BIM 360 Field) was selected after significant research and meetings with providers of such systems.
  - Turner implemented the system Project wide and is responsible for both training and administration of the system.
  - BIM 360 Field documents / maintains all inspection requests, field conditions, non-conformance conditions, punchlists, quality checklists and, in the future, equipment and systems commissioning.

Place Holder

Steve Humphreys takes over here for CM/GC QC PRESENTATION Slides 11-25

Transbay Transit Center

- The Transbay Transit Center Construction Quality Control (CQC) Program is a blend of the requirements of the FTA QMS 2012 15 Essential Elements & the Army Corp of Engineers' Contractor Quality Management System.
- The Program has been in place during the design and construction process.
- Updated to address design assist packages.



Transbay Quality Program

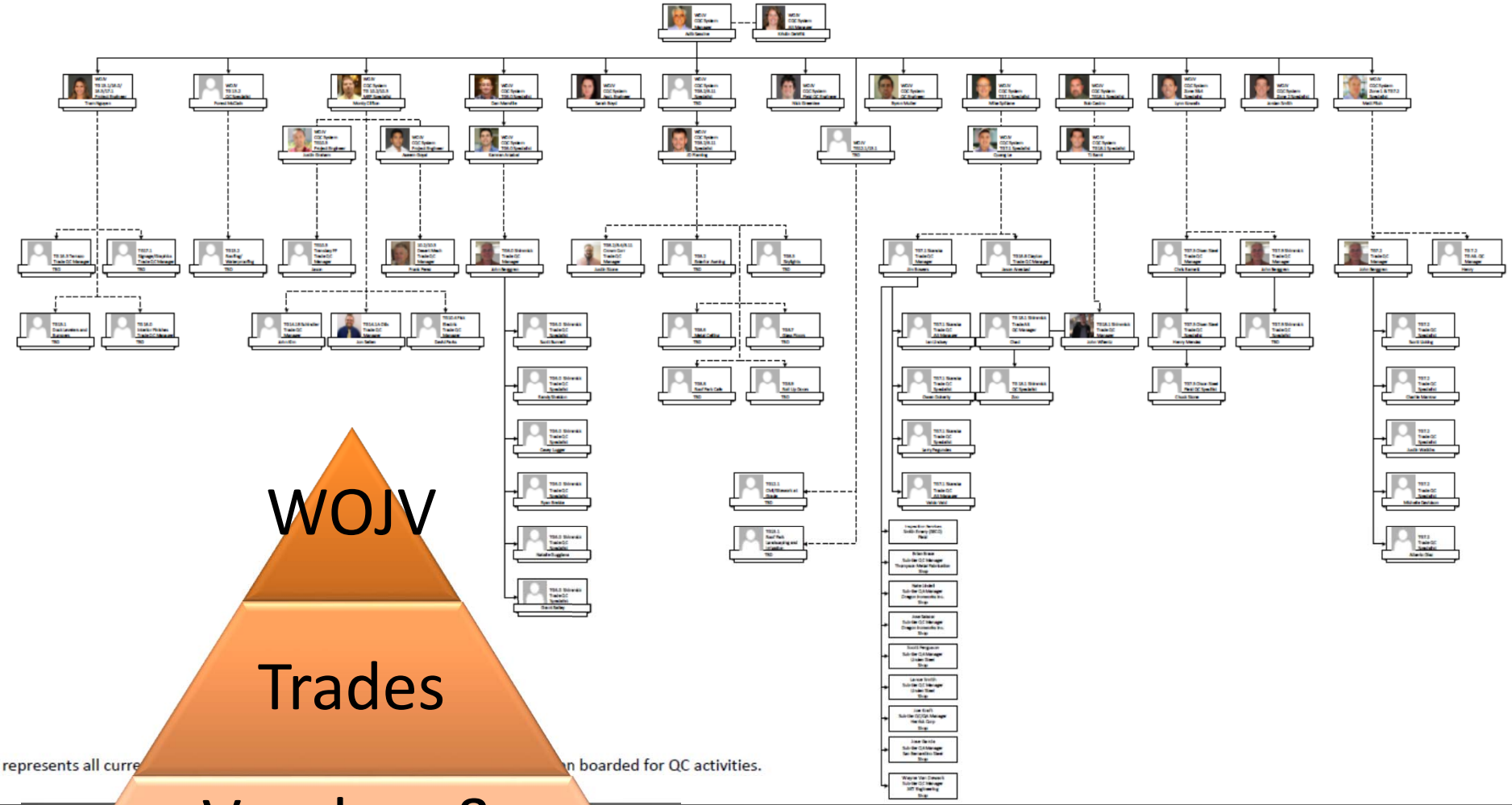
Transbay Transit Center

QA/QC Working Together

Trades WOJV Turner TJPA Design SMEs

Transbay Transit Center

CQC Organization



rt represents all curre n boarded for QC activities.

Transbay Transit Center

For each major activity in Construction, the CQC & QA teams follow a series of steps to ensure that requirements are set and met.

Design/Vision

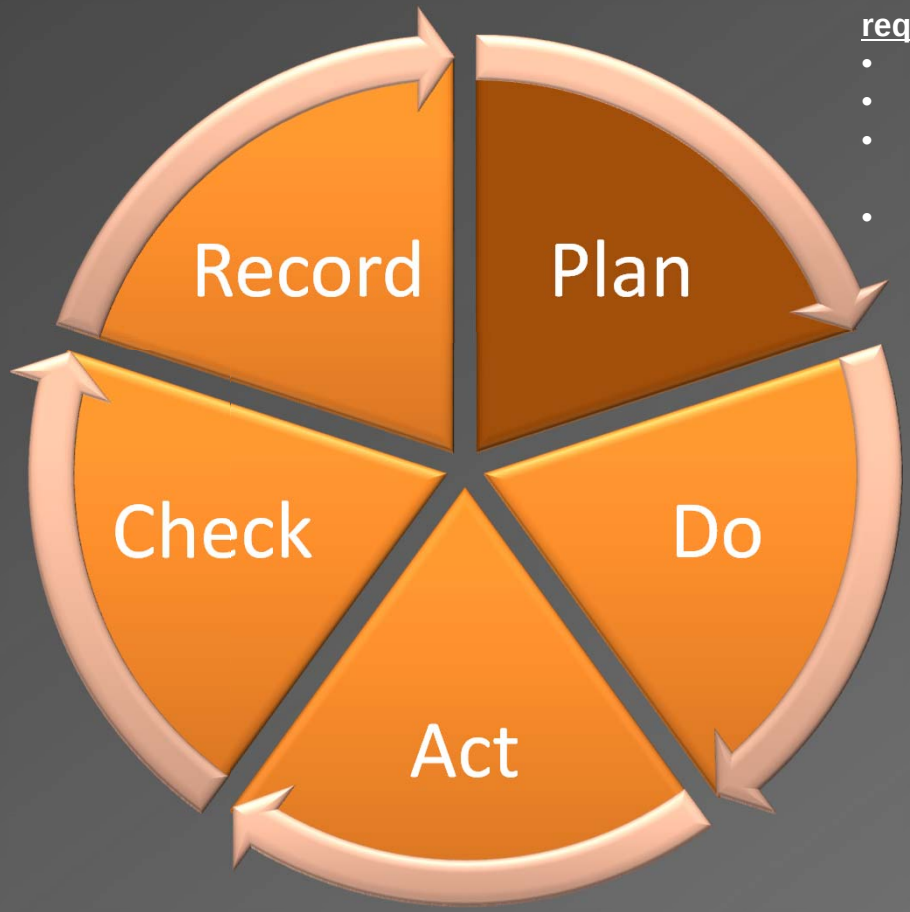
Construction

Transbay Transit Center

QA/QC Overview

Architects & Engineers provide the design of the Project thus setting the **requirements** through:

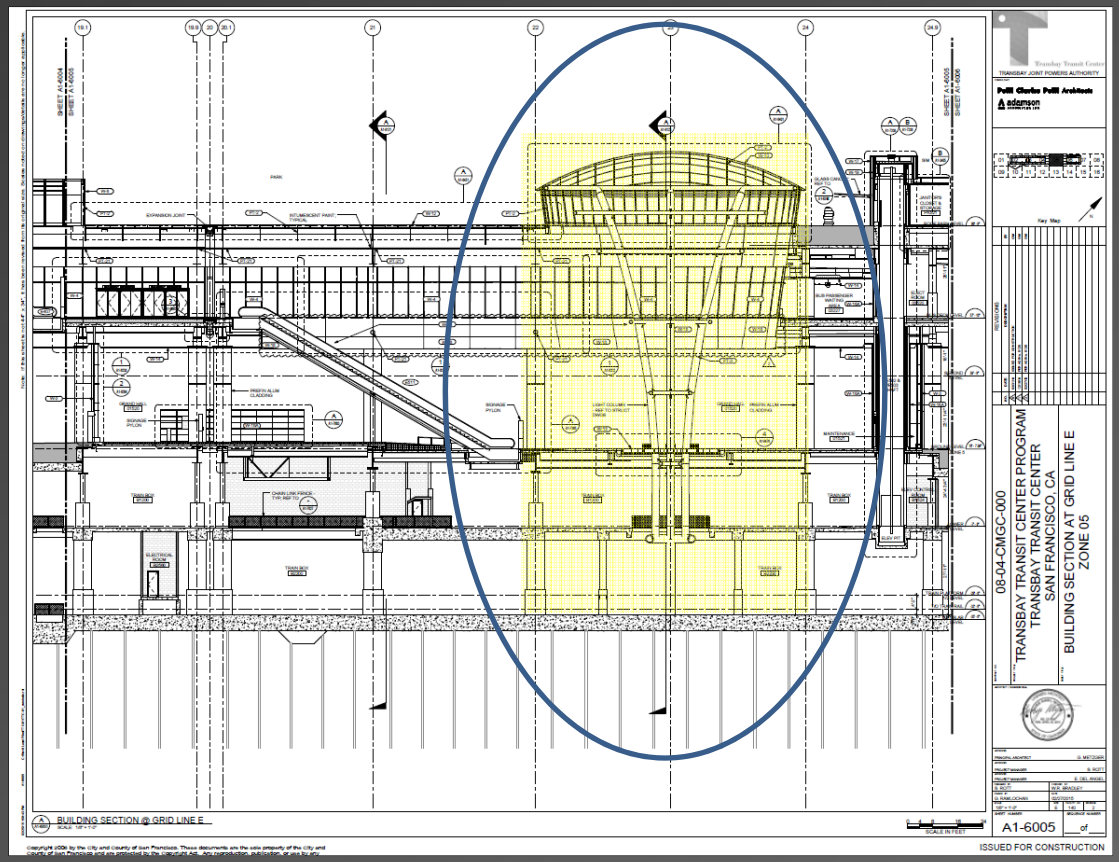
- Drawings
- Specifications
- Architectural Supplemental Instructions (ASI)
- Sketches



Quality Efforts in this ‘Plan’ phase are led by:
Design Subject Matter Experts (SMEs)

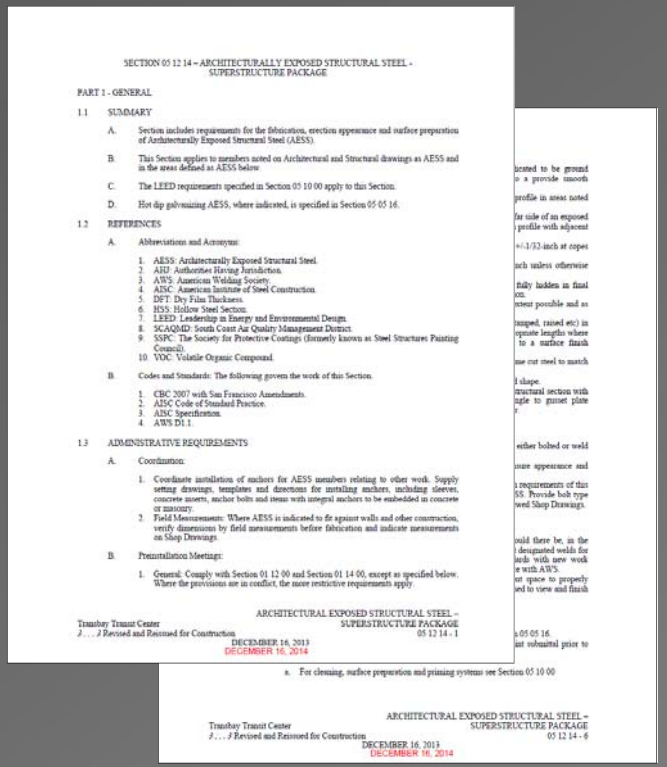
Transbay Transit Center

QA/QC Overview



Architects & Engineers provide the design of the Project thus setting the **requirements** through:

- Drawings
- Specifications
- Architectural Supplemental Instructions (ASI)
- Sketches



SECTION 05 12 14 – ARCHITECTURALLY EXPOSED STRUCTURAL STEEL – SUPERSTRUCTURE PACKAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the fabrication, erection appearance and surface preparation of Architecturally Exposed Structural Steel (AESS).

B. This Section applies to members noted on Architectural and Structural drawings as AESS and in the areas defined as AESS below.

C. The LEED requirements specified in Section 05 10 00 apply to this Section.

D. Hot dip galvanizing AESS, where indicated, is specified in Section 05 05 16.

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. AESS: Architecturally Exposed Structural Steel.
2. AHJ: Authorities Having Jurisdiction.
3. AWS: American Welding Society.
4. AISC: American Institute of Steel Construction.
5. DFT: Dry Film Thickness.
6. HSS: Hollow Steel Section.
7. LEED: Leadership in Energy and Environmental Design.
8. SCAQMD: South Coast Air Quality Management District.
9. SSPC: The Society for Protective Coatings (formerly known as Steel Structures Painting Council).
10. VOC: Volatile Organic Compound.

B. Codes and Standards: The following govern the work of this Section.

1. CBC 2007 with San Francisco Amendments.
2. AISC Code of Standard Practice.
3. AISC Specification.
4. AWS D1.1.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate installation of anchors for AESS members relating to other work. Supply setting drawings, templates and directions for installing anchors, including sleeves, concrete inserts, anchor bolts and items with integral anchors to be embedded in concrete or masonry.
2. Field Measurements: Where AESS is indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Preinstallation Meetings:

1. General: Comply with Section 01 12 00 and Section 01 14 00, except as specified below. Where the provisions are in conflict, the more restrictive requirements apply.

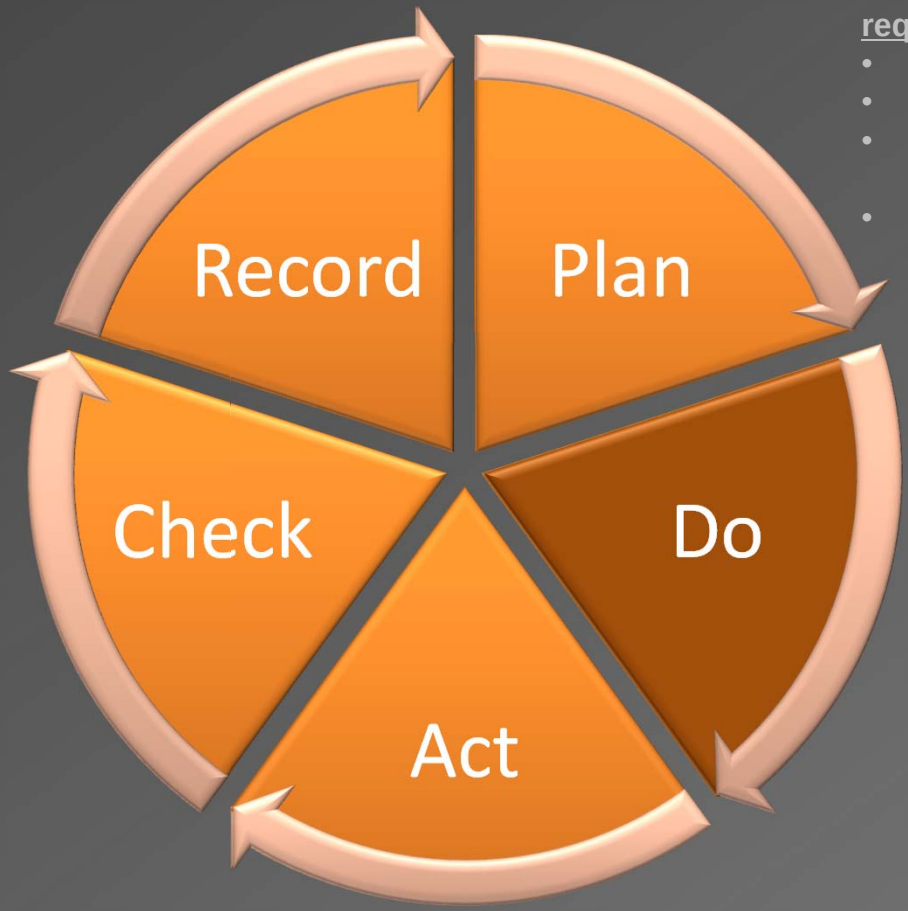
a. For cleaning, surface preparation and priming systems see Section 05 10 00

Transbay Transit Center

QA/QC Overview

Architects & Engineers provide the design of the Project thus setting the **requirements** through:

- Drawings
- Specifications
- Architectural Supplemental Instructions (ASI)
- Sketches



The CM/GC and Trades outline in more detail **how** the requirements will be met during construction through:

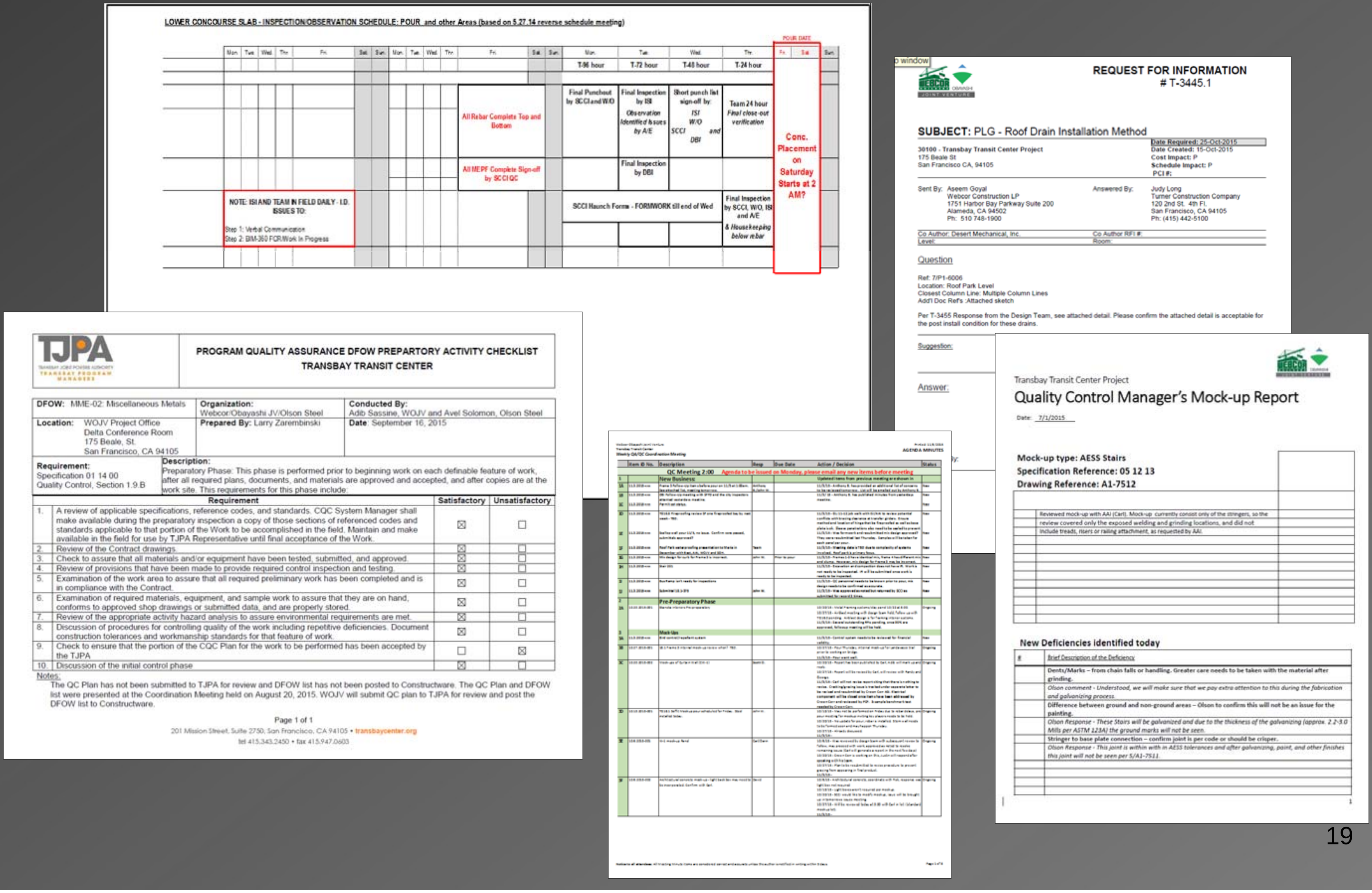
- Submittals
- RFIs
- QC Plans
- Logistic Plans
- Schedules
- Mockups
- Reverse Scheduling

Quality Efforts in this 'Do' phase are led by:
Construction Manager / General Contractor
& Trade Subcontractors

Transbay Transit Center

QA/QC Overview

Planning & Pre-Execution Activities



LOWER CONCOURSE SLAB - INSPECTION/OBSERVATION SCHEDULE: POUR and other Areas (based on 5.27.14 reverse schedule meeting)

REQUEST FOR INFORMATION
T-3445.1

SUBJECT: PLG - Roof Drain Installation Method

30100 - Transbay Transit Center Project
175 Beale St
San Francisco CA, 94105

Transbay Transit Center Project

Quality Control Manager's Mock-up Report

Mock-up type: AESS Stairs
Specification Reference: 05 12 13
Drawing Reference: A1-7512

New Deficiencies identified today

PROGRAM QUALITY ASSURANCE DFOW PREPARTORY ACTIVITY CHECKLIST
TRANSBAY TRANSIT CENTER

DFOW: MME-02: Miscellaneous Metals
Organization: Webcor/Obayashi JV/Olson Steel
Conducted By: Adib Sassine, WOJV and Avel Solomon, Olson Steel
Location: WOJV Project Office, Delta Conference Room, 175 Beale, St. San Francisco, CA 94105
Prepared By: Larry Zarembinski
Date: September 16, 2015

Requirement: Specification 01 14 00 Quality Control, Section 1.9.B

Description: Preparatory Phase: This phase is performed prior to beginning work on each definable feature of work, after all required plans, documents, and materials are approved and accepted, and after copies are at the work site. This requirements for this phase include:

	Requirement	Satisfactory	Unsatisfactory
1.	A review of applicable specifications, reference codes, and standards. CQC System Manager shall make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the Work to be accomplished in the field. Maintain and make available in the field for use by TJPA Representative until final acceptance of the Work.	☒	☐
2.	Review of the Contract drawings.	☒	☐
3.	Check to assure that all materials and/or equipment have been tested, submitted, and approved.	☒	☐
4.	Review of provisions that have been made to provide required control inspection and testing.	☒	☐
5.	Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.	☒	☐
6.	Examination of required materials, equipment, and sample work to assure that they are on hand, conforms to approved shop drawings or submitted data, and are properly stored.	☒	☐
7.	Review of the appropriate activity hazard analysis to assure environmental requirements are met.	☒	☐
8.	Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.	☒	☐
9.	Check to ensure that the portion of the CQC Plan for the work to be performed has been accepted by the TJPA	☐	☒
10.	Discussion of the initial control phase	☒	☐

Notes:
The QC Plan has not been submitted to TJPA for review and DFOW list has not been posted to Constructware. The QC Plan and DFOW list were presented at the Coordination Meeting held on August 20, 2015. WOJV will submit QC plan to TJPA for review and post the DFOW list to Constructware.

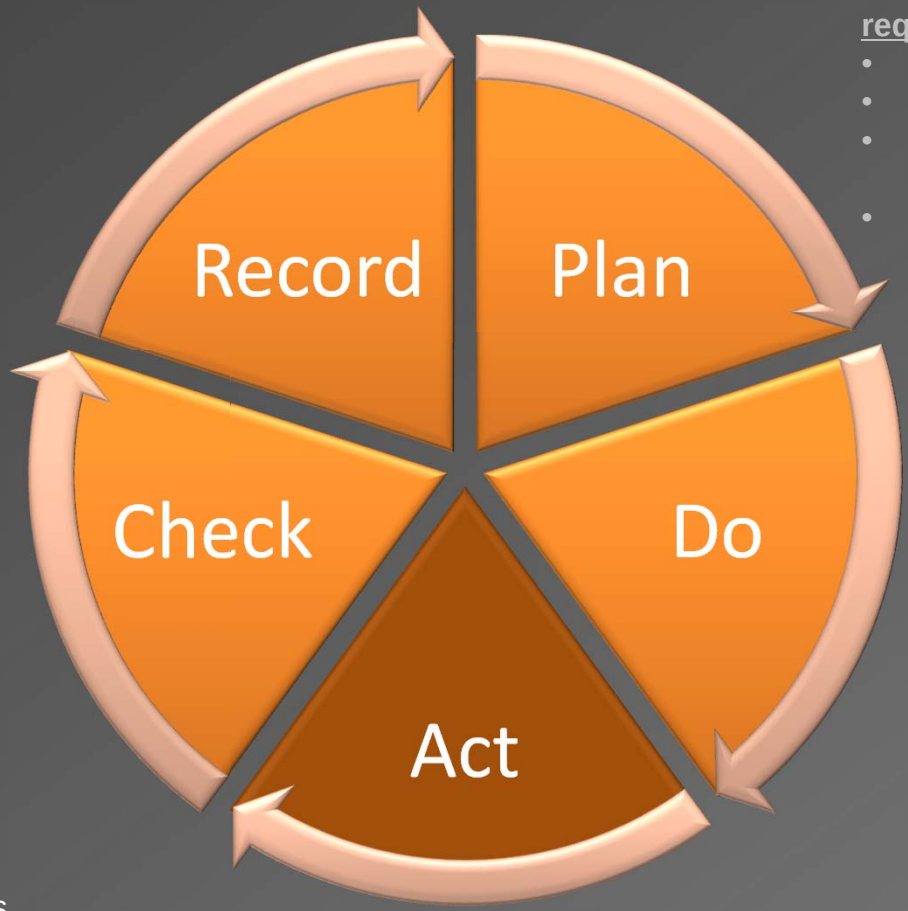
Page 1 of 1

Transbay Transit Center

QA/QC Overview

Architects & Engineers provide the design of the Project thus setting the **requirements** through:

- Drawings
- Specifications
- Architectural Supplemental Instructions (ASI)
- Sketches



The CM/GC and Trades outline in more detail **how** the requirements will be met during construction through:

- Submittals
- RFIs
- QC Plans
- Logistic Plans
- Schedules
- Mockups

The CM/GC and Trades **execute** the work using QC oversight through:

- Fabrication Surveillance
- Delivery Checklists
- Pre-Installation Meetings
- Installation Checklists
- Submittal & RFI Review

Quality Efforts in this 'Act' phase are led by:
Construction Manager / General Contractor
& Trade Subcontractors

Transbay Transit Center

QA/QC Overview

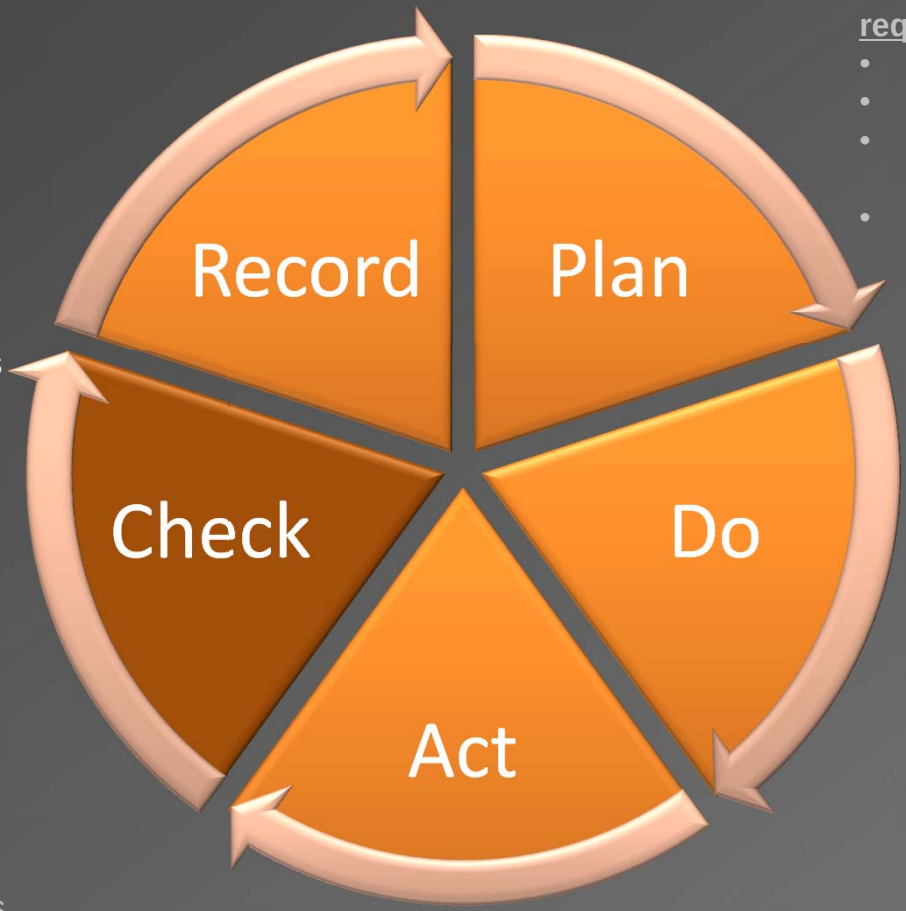
Execution of work

Transbay Transit Center

QA/QC Overview

Architects & Engineers provide the design of the Project thus setting the **requirements** through:

- Drawings
- Specifications
- Architectural Supplemental Instructions (ASI)
- Sketches



QA **verifies** that the requirements have been met through:

- Inspection
- Special Inspection
- Tests
- Observation & reporting by Design SME

The CM/GC and Trades outline in more detail **how** the requirements will be met during construction through:

- Submittals
- RFIs
- QC Plans
- Logistic Plans
- Schedules
- Mockups

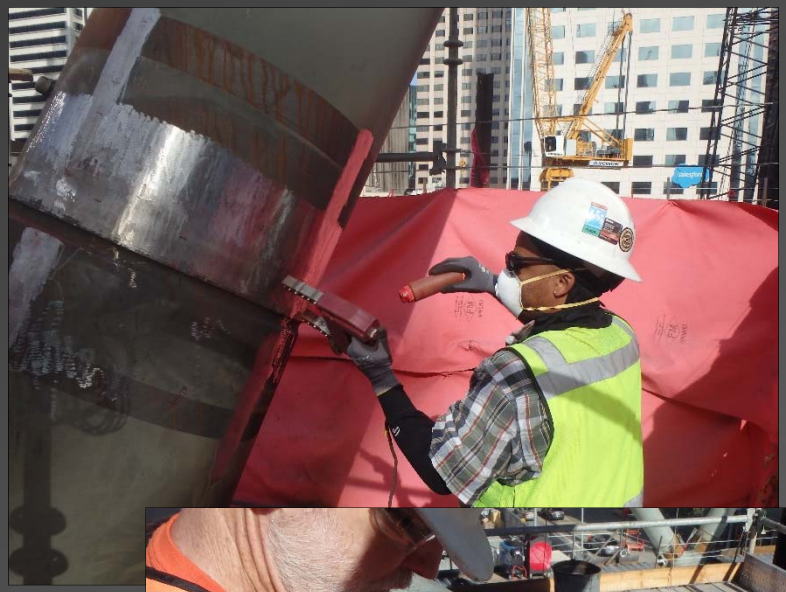
The CM/GC and Trades **execute** the work using QC oversight through:

- Fabrication Surveillance
- Delivery Checklists
- Pre-Installation Meetings
- Installation Checklists
- Submittal & RFI Review

Quality Efforts in this 'Check' phase are led by:
Program and CMO QA

Transbay Transit Center

Testing & Inspection of Work in Place



Transbay Transit Center

QA/QC Overview

All Parties **record** the compliance with the requirements:

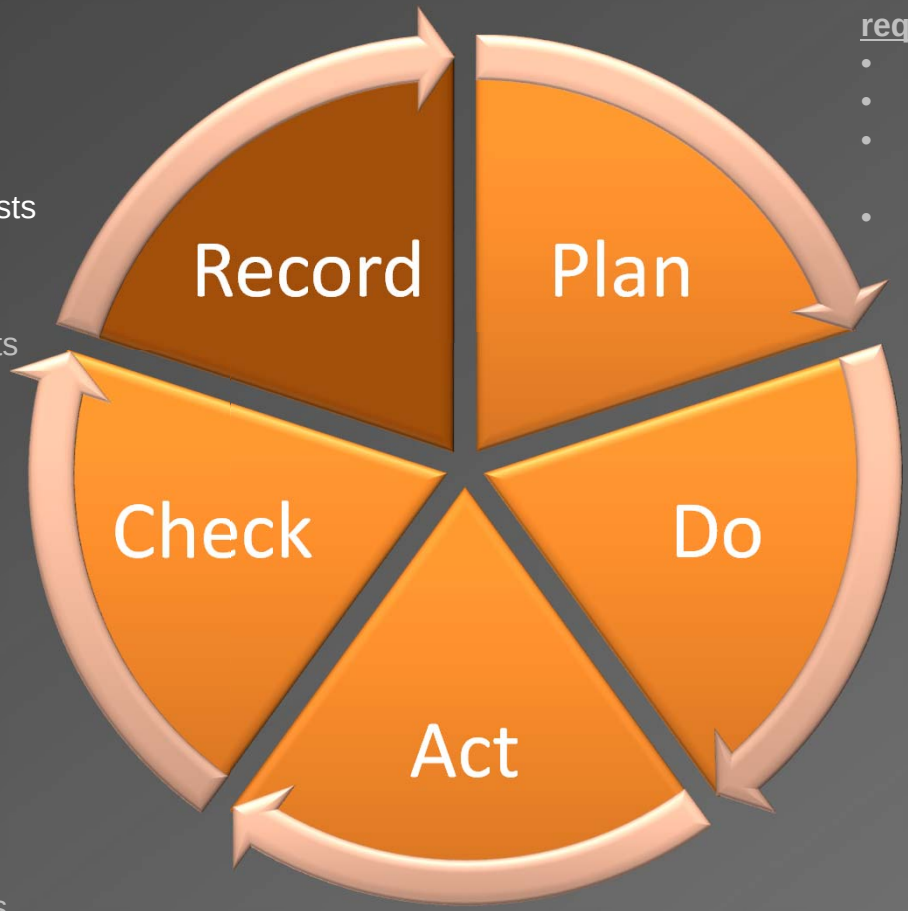
- Material Records
- Daily QC Reports
- Testing Reports
- Calibration Reports
- Completed Checklists

Architects & Engineers provide the design of the Project thus setting the **requirements** through:

- Drawings
- Specifications
- Architectural Supplemental Instructions (ASI)
- Sketches

QA **verifies** that the requirements have been met through:

- Inspection
- Special Inspection
- Tests
- Observation & reporting by Design SME



The CM/GC and Trades outline in more detail **how** the requirements will be met during construction through:

- Submittals
- RFIs
- QC Plans
- Logistic Plans
- Schedules
- Mockups

The CM/GC and Trades **execute** the work using QC oversight through:

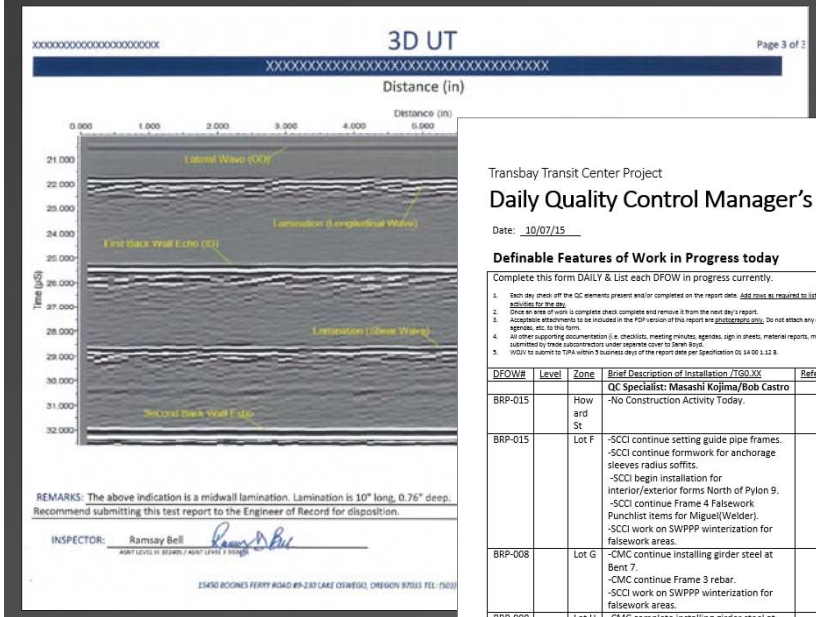
- Fabrication Surveillance
- Delivery Checklists
- Pre-Installation Meetings
- Installation Checklists
- Submittal & RFI Review

Quality Efforts in this 'Record' phase are led by:
Construction Manager / General Contractor
& Trade Subcontractors

Transbay Transit Center

QA/QC Overview

Quality Records



3D UT

Page 3 of 3

Distance (in)

Lateral Wave (OD)

Lamination (Longitudinal Wave)

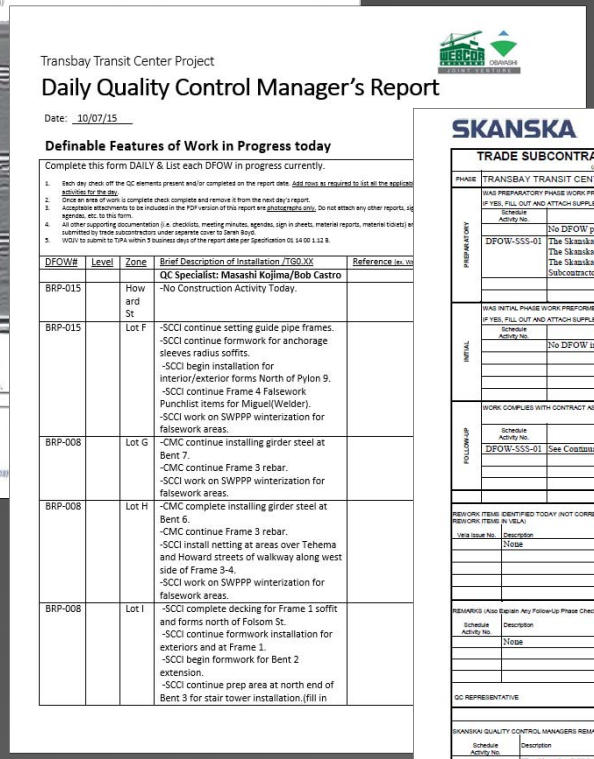
First Back Wall Echo (ID)

Lamination (Shear Wave)

Second Back Wall Echo

REMARKS: The above indication is a midwall lamination. Lamination is 10" long, 0.76" deep. Recommend submitting this test report to the Engineer of Record for disposition.

INSPECTOR: Ramsay Bell



Transbay Transit Center Project

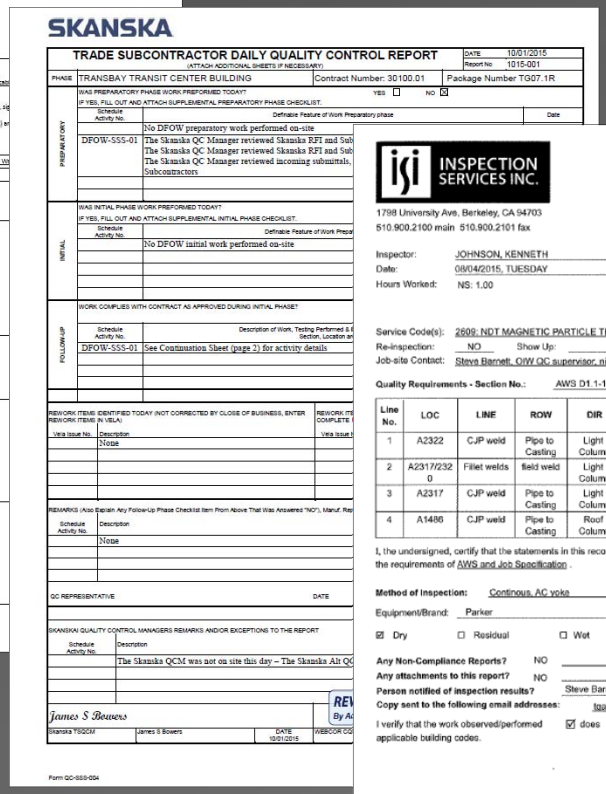
Daily Quality Control Manager's Report

Date: 10/07/15

Definable Features of Work in Progress today

Complete this form DAILY & List each DFOW in progress currently.

DFOW#	Level	Zone	Brief Description of Installation /TG0.XX	Reference (ex. w
			QC Specialist: Masashi Kojima/Bob Castro	
BRP-015		Howard St	-No Construction Activity Today.	
BRP-015		Lot F	-SCCI continue setting guide pipe frames. -SCCI continue formwork for anchorage sleeves radius soffits. -SCCI begin installation for interior/exterior forms North of Pylon 9. -SCCI continue Frame 4 Falsework Punchlist items for Miguel(Welder). -SCCI work on SWPPP winterization for falsework areas.	
BRP-008		Lot G	-CMC continue installing girder steel at Bent 7. -CMC continue Frame 3 rebar. -SCCI work on SWPPP winterization for falsework areas.	
BRP-008		Lot H	-CMC complete installing girder steel at Bent 6. -CMC continue Frame 3 rebar. -SCCI install netting at areas over Tehema and Howard streets of walkway along west side of Frame 3-4. -SCCI work on SWPPP winterization for falsework areas.	
BRP-008		Lot I	-SCCI complete decking for Frame 1 soffit and forms north of Folsom St. -SCCI continue formwork installation for exteriors and at Frame 1. -SCCI begin formwork for Bent 2 extension. -SCCI continue prep area at north end of Bent 3 for stair tower installation.(fill in	



SKANSKA

TRADE SUBCONTRACTOR DAILY QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE: 10/01/2015

Report No: 1015-001

PHASE: TRANSBAY TRANSIT CENTER BUILDING | Contract Number: 30100.01 | Package Number TG07.1R

PREPARATORY

WAS PREPARATORY PHASE WORK PREFORMED TODAY? YES ☐ NO ☒

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work Preparatory phase	Date
	No DFOW preparatory work performed on-site	
DFOW-SSS-01	The Skanska QC Manager reviewed Skanska RFI and Sub The Skanska QC Manager reviewed Skanska RFI and Sub The Skanska QC Manager reviewed incoming submittals, Subcontractors	

INITIAL

WAS INITIAL PHASE WORK PREFORMED TODAY?

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work Prepa
	No DFOW initial work performed on-site

FOLLOW UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE?

Schedule Activity No.	Description of Work, Testing Performed & I Section, Location a
DFOW-SSS-01	See Continuation Sheet (page 2) for activity details

REMARK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS, ENTER REWORK ITEMS IN VELA)

Vela Issue No.	Description
	None

REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO"), Manuf. Rep

Schedule Activity No.	Description
	None

QC REPRESENTATIVE DATE

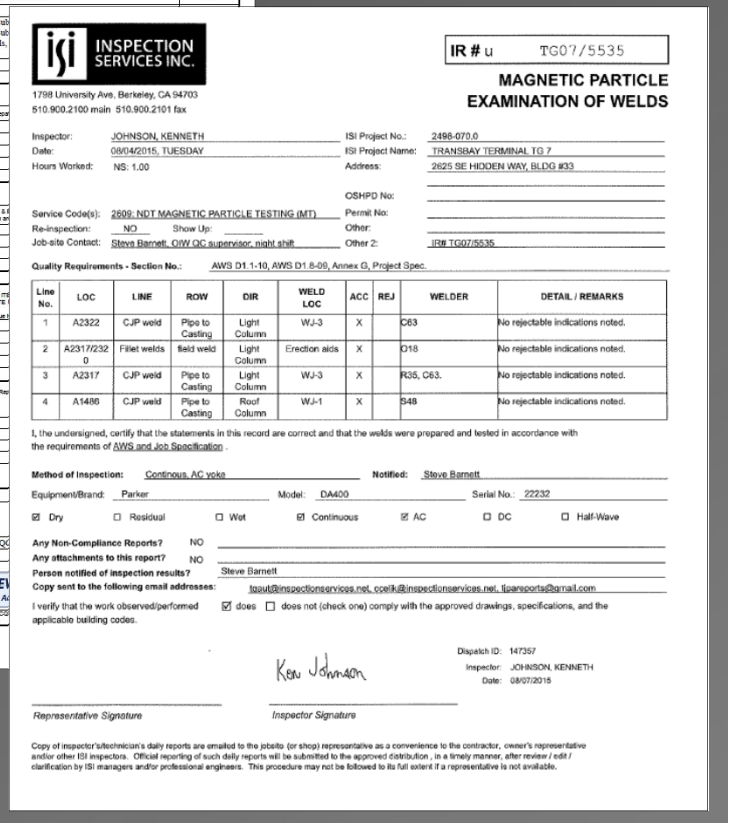
SKANSKA QUALITY CONTROL MANAGERS REMARKS AND/OR EXCEPTIONS TO THE REPORT

Schedule Activity No.	Description
	The Skanska QCM was not on site this day – The Skanska Alt QC

James S Bowers

Skanska TSQCM | James S Bowers | DATE 10/01/2015 | WEBCOR CO

Form QC-SSS-004



INSPECTION SERVICES INC.

1798 University Ave, Berkeley, CA 94703

510.900.2100 main 510.900.2101 fax

IR # u TG07/5535

MAGNETIC PARTICLE EXAMINATION OF WELDS

Inspector: JOHNSON, KENNETH

Date: 08/04/2015, TUESDAY

Hours Worked: NS: 1.00

ISI Project No.: 2498-070.0

ISI Project Name: TRANSBAY TERMINAL TG 7

Address: 2625 SE HIDDEN WAY, BLDG #33

OSHPD No:

Service Code(s): 2609: NDT MAGNETIC PARTICLE TESTING (MT)

Permit No:

Re-inspection: NO Show Up:

Other:

Job-site Contact: Steve Barnett, OIW QC supervisor, night shift

Other 2: IR# TG07/5535

Quality Requirements - Section No.: AWS D1.1-10, AWS D1.8-09, Annex G, Project Spec.

Line No.	LOC	LINE	ROW	DIR	WELD LOC	ACC	REJ	WELDER	DETAIL / REMARKS
1	A2322	CJP weld	Pipe to Casting	Light Column	WJ-3	X		C63	No rejectable indications noted.
2	A2317/2320	Fillet welds	field weld	Light Column	Erection aids	X		C18	No rejectable indications noted.
3	A2317	CJP weld	Pipe to Casting	Light Column	WJ-3	X		R35, C63.	No rejectable indications noted.
4	A1486	CJP weld	Pipe to Casting	Roof Column	WJ-1	X		S48	No rejectable indications noted.

I, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in accordance with the requirements of AWS and Job Specification .

Method of Inspection: Continous, AC yoke Notified: Steve Barnett

Equipment/Brand: Parker Model: DA400 Serial No.: 22232

☑ Dry ☐ Residual ☐ Wet ☑ Continuous ☑ AC ☐ DC ☐ Half-Wave

Any Non-Compliance Reports? NO

Any attachments to this report? NO

Person notified of inspection results? Steve Barnett

Copy sent to the following email addresses: tgaut@inspectionservices.net, ccelk@inspectionservices.net, tjpareports@gmail.com

I verify that the work observed/performed ☑ does ☐ does not (check one) comply with the approved drawings, specifications, and the applicable building codes.

Ken Johnson

Dispatch ID: 147357

Inspector: JOHNSON, KENNETH

Date: 08/07/2015

Representative Signature

Inspector Signature

Copy of inspector's/technician's daily reports are emailed to the jobsite (or shop) representative as a convenience to the contractor, owner's representative and/or other ISI inspectors. Official reporting of such daily reports will be submitted to the approved distribution , in a timely manner, after review / edit / clarification by ISI managers and/or professional engineers. This procedure may not be followed to its full extent if a representative is not available.

Transbay Transit Center

QA/QC Overview

This process has been or will be completed for each Definable Feature of Work ("DFOW") on the Project.

Total number of QA inspections completed to date:

Concrete: 3,399

Structural Steel: 798

Other: 5,399

Number of DFOW in progress currently: 7

Total number of DFOW completed to date: 115
to completion: 1000+

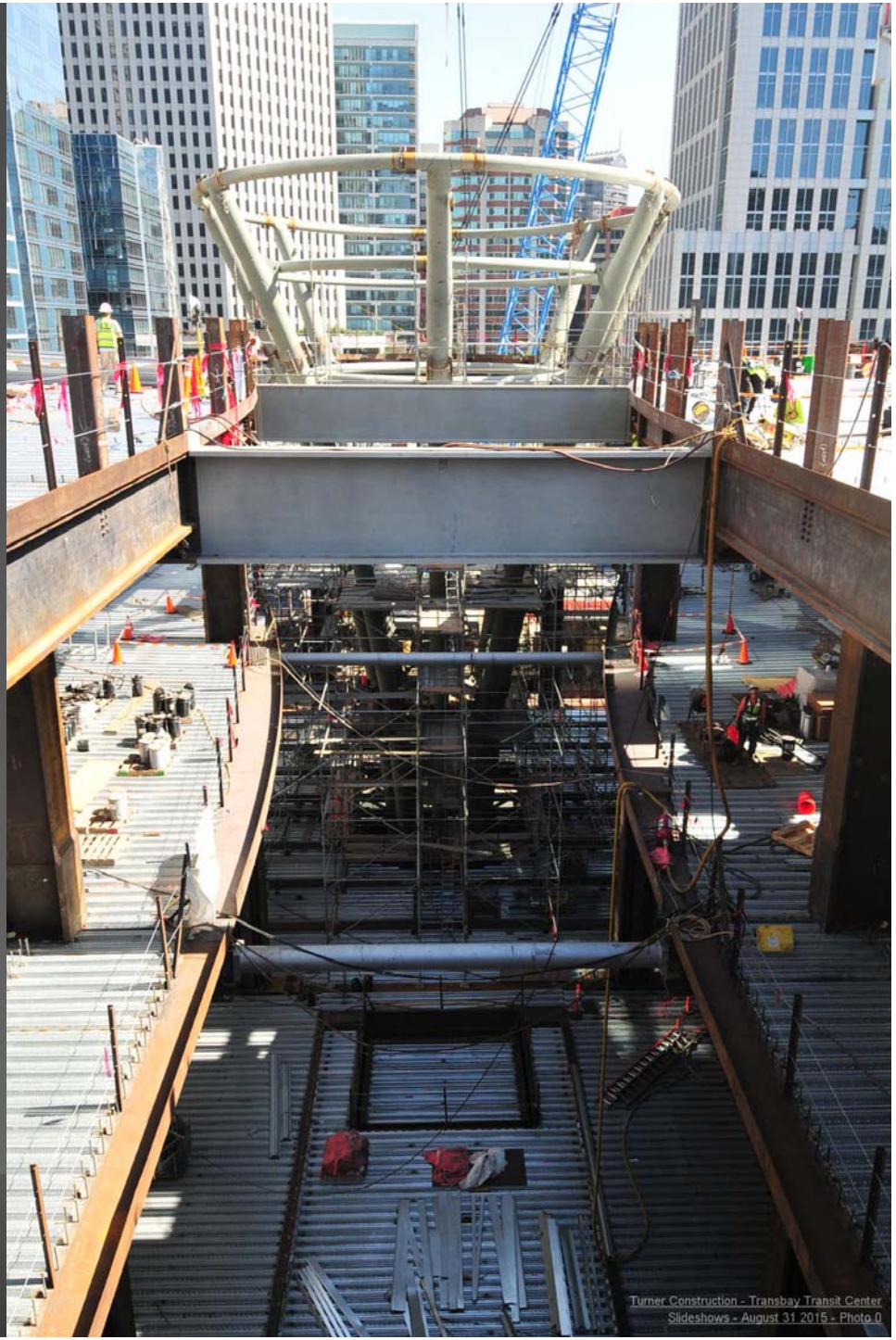
Place Holder

Steve Rule returns to do Conclusion slide

QC/QA Program Conclusion

- The process in place is a robust team approach utilizing industry best practices with checks and balances to achieve quality control and assurance.
- High confidence that the construction quality and documentation demonstrates a best construction practice.

Questions?


Turner Construction - Transbay Transit Center
Slideshows - August 31 2015 - Photo 0