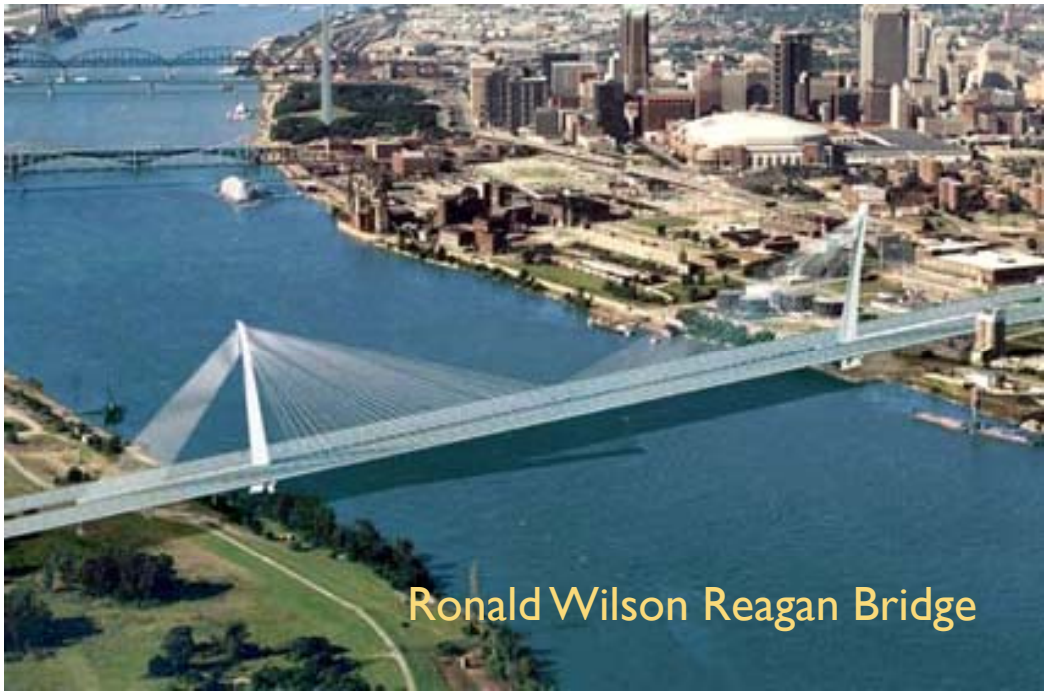


Quality Management

A new direction in Missouri

Quality Management

- The contractor provides Quality Management to ensure the project work and materials meets or exceeds all contract requirements as specified.

800 New Bridges

Quality Management

- The contractor shall provide all Quality Control (QC) of the work and material.
  - The QC inspectors may be contractor employees or the contractor may utilize a third party.

Quality Management

- The Engineer (DOT) will provide Quality Assurance (QA) inspection.
  - The role of QA is to verify the performance of the QC.

QM Philosophy

- First used on Design-build projects
  - I-64
  - Missouri River Bridge
  - Safe and Sound Bridge Replacement Program
- Pre-Cast Manufactured products
- 2012 Pilot Projects
- 2013 Goal is for all Project to include Quality Management

Quality Management

- Quality Manager

- The contractor shall designate a person to serve as the project Quality Manager (QM).

Quality Management Plan

- Quality Management Plan (QMP)

- The contractor shall develop, implement and maintain a Quality Management Plan (QMP) to ensure project quality meets or exceeds all contract requirements.

Quality Management Plan

- Document Control Procedure (DCP)
  - Included as part of the QMP, this procedure describes the project file structure for all documents required by the Specifications.
    - Including a file naming system and folder structure.
    - Electronic Format

Quality Control Inspections

- Inspection and Test Plan (ITP)
  - Included in the QMP shall identify a procedure for performing all QC inspections and testing for on site work.

Christopher S. Bond Bridge

Quality Control Inspection

- ITP includes inspection checklists and reports provided by the engineer.
- Daily reports required for all elements of work.
- Submitted electronically to the engineer no later than the morning following the work.

Material Receiving

- Material Receiving Procedures
- The QMP shall identify a procedure for material received.
  - The procedure shall address inspections for all material delivered to the site - excludes testable material such as concrete, asphalt, aggregate
  - MoDOT pre-accepted material (PAL tags, Pre-approved, certifications).

Quality Management Plan

- Hold Points - Hold Points are events that require approval prior to continuation of work.
  - QC Hold Points
    - Typically occur at more frequent stages than the QA Hold Points. At a minimum, a QC Hold Point inspection shall occur just prior to each QA Hold Point inspection.
  - QA Hold Points
    - QA will specify hold points
    - QC provides completed Daily Inspection Reports, Inspection Checklists, and Material Test Reports to QA staff prior to all QA Hold Points.

Non-Conforming and Deficient Work

- Non-Conforming Work – Work or Material that doesn't meet Specifications.
  - Identified by either QC or QA
  - Can the work be repaired or re-worked to meet specifications?
    - Yes – Requires Non-Conforming Work Report (NCR)
    - No – Work becomes Deficient
- Procedures for resolution must be identified in the QMP
- Approved by QA

Quality Control Testing

- **MoDOT Technician Certification or other approved certification is required.**
  - **Any tests performed for acceptance or payment requires certification.**

Quality Assurance

- The Engineer will perform Quality Assurance inspections (QA) for contract compliance on the contractor's performance and QC process.
  - The frequency of the QA Inspections will be as shown in the ITP, but may be more frequent at the discretion of the engineer.

The I 64 Corridor St. Louis

Quality Assurance

- The QM will be notified of any nonconforming work identified by QA.
- QA inspection and test results may not be used as a substitute for QC inspection and testing.
- QA staff will be available for QA Hold Point inspections from Monday to Friday, excluding state and federal holidays, between the hours of 8:00 A.M. and 4:00 P.M.
  - A minimum 24-hour notification from the contractor is required to schedule hold point inspections outside of these core working hours.

Work Planning and Scheduling

- The contractor shall include Quality Management in all aspects of the work planning.
  - Aspects of the Work Plan should include:
    - a safety plan
    - size of crew
    - equipment
    - material
    - work sequence

Work Planning and Scheduling

- A Weekly Schedule shall be provided to the engineer each week.
  - This schedule shall include all planned work activities and hold points for the following two-week period.
  - Other routine items that should be included in this schedule are:
    - planned quantity of materials
    - identification of new activities,
    - planned delivery dates
    - traffic control events
    - any other pertinent information.

Work Planning and Scheduling

- A Work Plan and pre-activity meeting is required prior to the start of each new activity.
  - The purpose of this meeting is to plan for all aspects of the new activity and incorporate quality control into the process.
- A Work Plan shall be submitted to the engineer for review prior to the pre-activity meeting.
  - The QM will develop a QC inspection checklist for the new activity and include it in the Work Plan.
  - QC, QA, and production staff should all be present at all pre-activity meetings.

Standard Forms, Checklist, and Reports

- Documents referenced such as:
  - The Standard Inspection and Test Plan,
  - Inspection Checklists,
  - Inspection/test reports, and
  - minimum QA Hold Points

- Are available online at the following link: http://www.modot.org/quality .

Basis of Payment

- No direct pay is made for Quality Management.

What we've learned so far

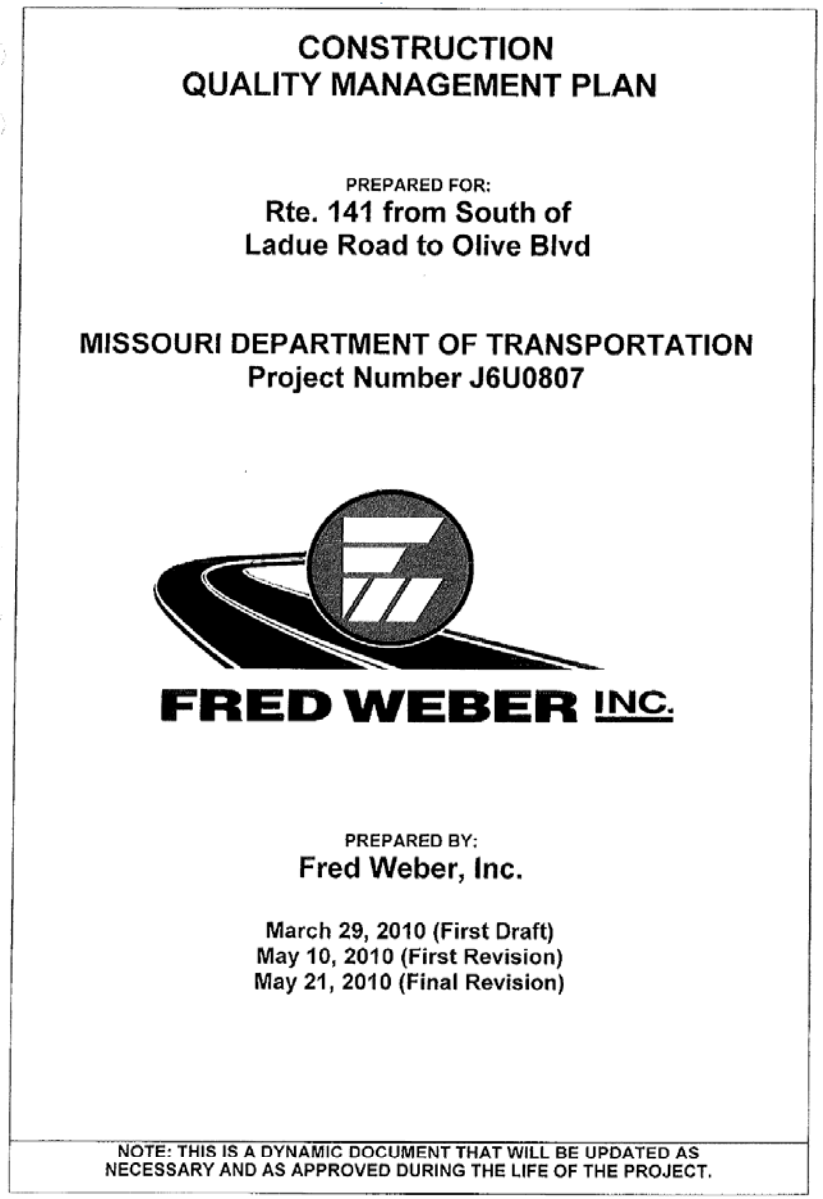
Things that work well.

Key Components for Success

- Quality Management System
  - Well Prepared Quality Manual
  - Two Week Look Ahead Schedules
  - Hold Point Notification
  - Daily Inspection Reports and Checklists
  - Testing Requirements
  - Test Tracking Sheet
  - Corrective Action
  - Document Control

A Well Built Quality Manual

- Includes all the requirements of the JSP
- DOT approved prior to starting work
- Includes all the Quality Control Procedures
- Includes all the Quality System Procedures



CONSTRUCTION
QUALITY MANAGEMENT PLAN

PREPARED FOR:
Rte. 141 from South of
Ladue Road to Olive Blvd

MISSOURI DEPARTMENT OF TRANSPORTATION
Project Number J6U0807

FRED WEBER INC.

PREPARED BY:
Fred Weber, Inc.

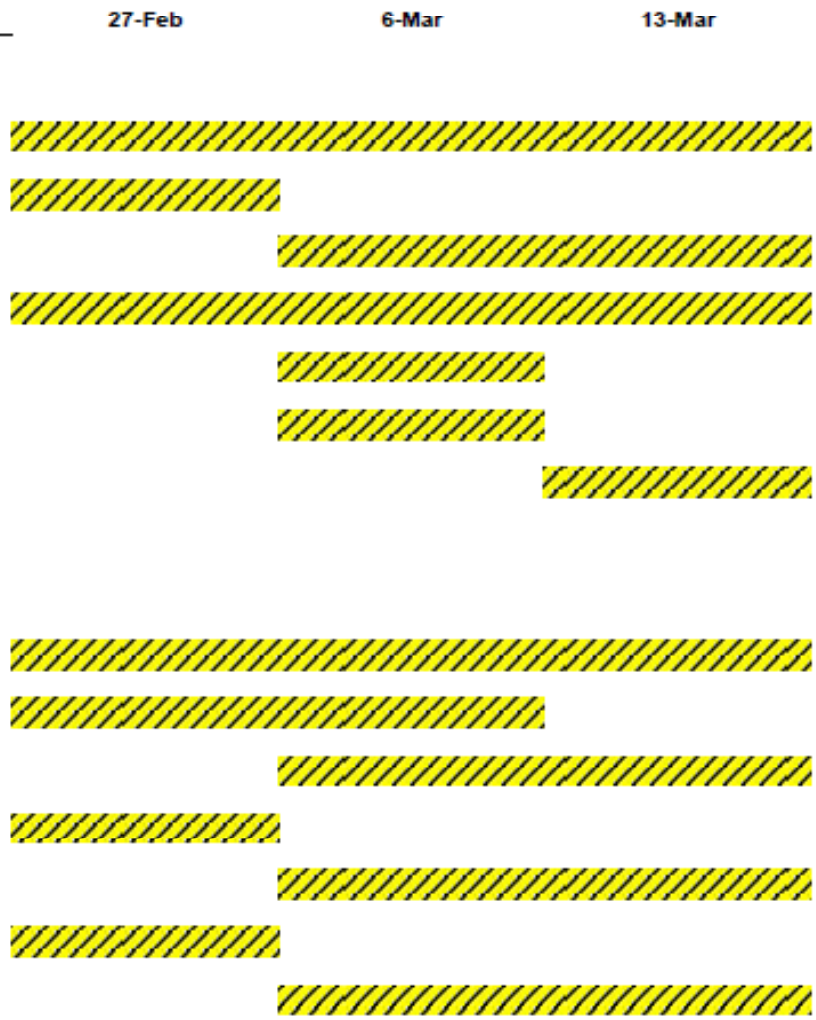
March 29, 2010 (First Draft)
May 10, 2010 (First Revision)
May 21, 2010 (Final Revision)

NOTE: THIS IS A DYNAMIC DOCUMENT THAT WILL BE UPDATED AS NECESSARY AND AS APPROVED DURING THE LIFE OF THE PROJECT.

Two Week Look Ahead Schedule

MoDOT Project #'s J6U08087/J6U0807D
FWI Project # 410504
Rte. 141

Activity	Responsibility
Roadway	
Excavation at Olive	FWI
Break Pavement @ WMR and Ladue	FWI
Maryville Creek Channel Excavation	FWI
Ladue Connector/Woods Mill Rd Fill	FWI
Drainage Various Locations	Castle
Pave Inside Shoulders STA 235 to 272	FWI
Pave Left Shoulder STA 235 to 272	FWI
Structures	
Form Diaphragms/Overhang Bridge A7810/A7814	FWI
Temp Soil Nails on A8744	Drilling Service
Set Panels Wall A7844	FWI
Drive Pile Bridge A7809	FWI
Set Panels Wall A7842	FWI
Drill Soundwall Shafts Wall 008	FWI
Drill Soundwall Shafts Wall 007	FWI



Sample ITP Page – Section 500

DIVISION 600: Rigid Pavements							Minimum Frequency For Permanent Work			QC Type Documentation: DIR, Test Record, Inspection Checklist		
Spec. ref.	.XX	Item Description	Parameter or Procedure	Requirements	Other Requirements	MoDOT Acceptance Criteria	Contractor PQ	Contractor PQ	MoDOT Acceptance	MoDOT DIR	PQ Test Record	PQ Inspection Checklist
600	All	All	Constructed according to plans, specifications, standards, JSP's, etc.				All Work Eelements	All Work Eelements		x		x
601		CONCRETE										
501	2	Concrete	Material	Per section 1000			See Frequency	See Frequency	See Frequency		x	
501	2.1	Concrete	Gradation of Coarse Aggregate	T27 and T11	1005.2	Testing	1 per 500 CY	1 per 500 CY	10% of Specified QC,		x	
501	2.1	Concrete	Gradation of Fine Aggregate	T27 and T11	1005.3	Testing	1 per 500 CY	1 per 500 CY	10% of Specified QC,		x	
501	2.1	Concrete	Deleterious Content	MoDOT TM 71		Testing	1 per 500 CY	1 per 500 CY	10% of Specified QC,		x	
501	2.1	Concrete	Absorption of Coarse Aggregate	T85		Testing	1 per 500 CY	1 per 500 CY	10% of Specified QC,		x	
501	2.1	Concrete	Thin or Elongated Pieces	ASTM D4791	ASTM D4791	Testing	1 per source/year	1 per source/year	1 per source/year		x	
501	3	Concrete	Mix Design			Visual	Approval Documentation	Approval Documentation	Per mix design			x
501	3.2	Concrete	Paving Concrete	100% each fraction pass the 2". Grade F 100% each fraction pass the 3/4"		Testing	See Gradation Frequency	See Gradation Frequency	10% of Specified QC,		x	
501	3.3	Concrete	Optimized Masonry Concrete	Coarse 100% each fraction pass one inch and no more than 2.5% shall pass the No. 200.	Fine no more than 2% pass the No. 200 for natural sand and no more than 4% pass the No. 200 for man. Sand.	Testing	See Gradation Frequency	See Gradation Frequency	10% of Specified QC,		x	
501	3.4	Concrete	Non-optimized Masonry Concrete	Sec. 1005		Testing	See Gradation Frequency	See Gradation Frequency	10% of Specified QC,		x	
501	3.5 - 3.6	Concrete	Fine Agg. Classes	Minimum cement per class.	See Chart	Testing	Documentation	Documentation				
501	3.8	Concrete	Compressive Strength Req.	Per chart for each class		Testing	Min (1) per production day	First load, restest or (1) per 100 CY/pour/day unless otherwise specified	10% of Specified QC,		x	x
501	4	Concrete	Sampling	AASHTO T 141 modified to after 1st yard	Use sample for slump, air , and cyclinders, Also for Sec 700	Plant Testing	As needed to control product. Min 1/day	1 per 100 yds unless otherwise specified	10% of Specified QC,		x	x
501	5	Concrete	Slump	AASHTO T119	Excludes minor concrete for Leveling & Work pads.	Field Testing	Min (1) per production day	First load, restest or (1) per 100 CY/pour/day unless otherwise specified	10% of Specified QC,		x	x

Test Tracking Sheet

Route 141
Fred Weber Inc.

Soil Field Compaction Tests
11/21/2011

Report	Date	Soil Test	Depth	Below Profile Gr.	Proctor	Max. Dry Density	Moisture Content	Wet Density	Dry Density	Percent Compaction	Total Yardage	Comments	Sta. Location
0009	06/08/10	1	6"		05/26/10	106.5	18.1	119.2	100.9	95	-		Sta 299 + 50 CL
0009	06/08/10	2	6"		05/26/10	106.5	14.3	122.5	107.1	100.6	1215		Sta 300 + 00 CL
0012	06/11/10	3	6"	-1.5	05/26/10	106.5	17.6	120.8	102.7	96.4	1185		Sta 297 + 00, 30' L
0018	06/21/10	4	6"	-10	04/28/10	110.0	18.7	113.6	95.8	87.1	2178		Sta 224 + 70, 15'R
0019	06/22/10	5	6"	-10	04/28/10	110.0	18.1	118.2	100.1	91		Retest	Sta 224 + 70, 15'R
0019	06/22/10	6	6"	-10	04/28/10	110.0	18.9	118.6	99.7	90.7	1410		Sta 225 + 00, 5'R
0022	06/25/10	7	6"	-8	05/26/10	106.5	17.7	124.7	105.9	99.4			Sta 301 + 25, 10'L
0023	06/28/10	8	6"	-12	06/28/10	106.5	21.3	118.2	97.4	91.5			Sta 302 + 50, 30'L
0023	06/28/10	9	6"	-12	06/28/10	106.5	20.3	118.3	98.3	92.3	1782		Sta 303 + 50, 10'R
0026	07/01/10	10	6"	-11	06/23/10	106.0	21.6	115.7	94.7	89.3			Sta 226 + 60, 16'R
0027	07/02/10	11	6"	-11	06/23/10	106.0	16.8	117.6	100.7	95		Retest	Sta 226 + 60, 16'R
0029	07/06/10	12	6"	-8.00	06/23/10	106	20.5	121.2	100.6	94.9			Sta 233 + 00, 10'L
0032	07/12/10	13	6"	-8	06/23/10	106	19.2	117.4	98.5	92.9	972		Sta 234 + 90, 40'L
0034	07/14/10	14	6"	-8	06/23/10	106	19.2	119.5	100.3	94.6	1908		Sta 237 + 90, 35'L
0036	07/16/10	15	6"	-5	06/23/10	106	16.3	114.9	98.9	93.3	1674		Sta 270 + 80, 10'L
037	07/19/10	16	6"	-8	06/23/10	106	18.9	121.3	102.0	96.2	1134		Sta 236 + 80, 15'L
041	07/23/10	17	6"	-8	06/23/10	106	22.5	118.5	96.8	91.3	1170		Sta 300 + 60, CL
045	07/30/10	18	6"	-8	06/23/10	106	14.7	117.4	102.4	96.6		Retest	Sta 300 + 60, CL
045	07/30/10	19	6"	-8	06/23/10	106	16.1	118.1	101.7	95.9			Sta 302 + 64, 10'L
053	08/11/10	20	6"	-10	06/23/10	106	22.3	117.8	96.3	90.9	2280		Sta 221 + 10, 5'R
053	08/11/10	21	6"	-5	06/23/10	106	13.9	118.3	103.9	98	2394		Sta 263 + 43, 35'L
053	08/11/10	22	6"	-4	06/23/10	106	16.2	114.0	98.1	92.6	2448		Sta 269 + 90, 20'L
057	08/17/10	23	6"	-3	06/23/10	106	20.9	115.2	95.3	89.9			Sta 277 + 25, 20'R 8/12-2754 cy, 8/16-2934 cy, 8/17-2340 cy
0059	08/19/10	24	6"	-3	06/23/10	106	11.5	107.8	96.7	91.3		Retest	Sta 277 + 25, 20'R
0060	08/20/10	25	6"	-9	06/23/10	106	16.6	125.6	107.7	101.6			Sta 278+25, CL
0060	08/20/10	26	6"	-9	06/23/10	106	17.5	125.0	107.1	101.1			Sta 278+25, CL
0064	08/26/10	27	6"	-9	06/23/10	106	23.3	116.0	97.0	88.7			Sta 278+35, 20'R
0071	09/07/10	28	6"	-9	06/23/10	106	19.1	124.3	104.4	98.5	7464	Retest	Sta 278+35, 20' R
0071	09/07/10	29	6"	-9	06/23/10	106	17.9	125.2	106.2	100.2			Sta 278+75, 35' R
0072	09/08/10	30	6"	-4	06/23/10	106	16.3	114.8	98.6	93.1	1584		Sta 269+85, 40' L
0072	09/08/10	31	6"	-10	06/23/10	106	16.6	117.4	100.7	95			Sta 264+00, 40' R
0072	09/08/10	32	6"	-10	06/23/10	106	15.3	121.2	105.1	99.2			Sta 221+10, 5' R

Non-Conformances/ Corrective Action

- Non conformances must be tracked from the date a problem was identified to the date of final closure.
- The end result of a Non-Conformance could be any of the following:
  - Use as it
  - Rework
  - Repair
  - Remove and Replace

Tracking NCR's

Route 141
NONCOMFORMANCE LOG

NCR #	Date Issued	Contractor	Location	Spec Section / Requirement	Description	Resolution	Ball In Court	Date Signed MoDOT	Open or Closed	Date Closed
1	20-Jul-10	Roy Gittemeier Contractors	Box Culvert 85-01	MoDOT Sec 703.3.1 states" Falsework for concrete masonry construction shall be adequate to support and hold the forms true to lines, camber and grades shown on the plans." MoDOT Sec 703.3.2 states "Forms for concrete shall be built true to the lines and grades specified, and shall be mortar-tight and of sound material adequate to prevent distortion during placing and curing of concrete."	*The concrete headwall has a wavy top surface that varies from 0 to 1 1/2 inches.*	Repair top surface with grout.		10-Jan-11	Closed	28-Jan-11
2	22-Jul-10	Roy Gittemeier Contractors	Box Culvert 85-01 to 85-02	MoDOT Sec 703.3.2 states"Forms for concrete shall be built true to the lines and grades specified, and shall be mortar-tight and of sound material adequate to prevent distortion during placing and curing of concrete." MoDOT Sec 703.3.2.1 states "Face lumber of forms for exposed surfaces of concrete shall have a smooth dressed surface free of knots, knotholes and other defects." MoDOT Sec 703.3.2.2 states "Forms reused shall be in good condition."	*The concrete surface of the vertical wall inside the box culvert is pitted, contains pieces of embedded wood slivers from the forms, has thin vertical voids, and slight surface bulges/distortions.*	Rub, Grind (areas with splintered wood) and grout where necessary on walls and ceiling.		1-Nov-11	Closed	2-Nov-11
3	30-Jul-10	Fred Weber Inc.	Parcel 118	MoDOT Sec 202.40.1 states"Removal of buildings shall include all attached structures, existing rubbish, trash and contents in and adjacent to the building on each parcel." MoDOT Sec 202.40.1.1 states "The contractor shall provide proper notification to all appropriate federal, state and local agencies prior to demolition." MoDOT Sec 202.40.2 states "Prior to the start of removals, the contractor shall obtain approval from the engineer for all schedules and plans."	*Carpenter requested permission to support the project's Green Goal and recycle deck timber instead of having it hauled off as waste. Carpenter was not part of the demo team, was not aware of the notification requirements, and removed the timber before notification/approval.*	A "No Trespassing" sign was posted at the front of the property and the doors were boarded shut. A QC "hold point" was issued for prior to the start of demolition.		23-Aug-10	Closed	23-Aug-10

1. (Sub)Contractor/Supplier:	2. Originator & QC Organization:	3. Segment:	4. Date Issued:	5. NCR No:
Fred Weber, Inc.	Gary Nickelson - Fred Weber, Inc.	J6U0807 100205-601	01-23-12	0024

6. Specification Section & Drawing No.:		7. Construction Element:	8. Sta./Section/Cross-street:	9. PM Respond By:
Section 702	Plan sheets 1A, 2A, & 46A	Bridge A7814	Sta. 15+38.10, Bent 2, Pile Nos. 6-11 & Sta. 6+23.10, Bent 3, Pile Nos. 12-17	01-31-12

10. Contract Requirements: Section 702.4.7 states – The tops of all piles shall be cut off at cut-off elevations.

11. Non-Conformance Description: All of the Bent #2 and Bent # 3 piles were cut-off 1 foot below plan cut-off elevation.

12. Apparent cause and action(s) to prevent recurrence: A mathematical error was made in the calculation of the height of the instrument that was used to shoot the pile cut-off elevations on Bents 2 & 3. FWI will have a second person double-check elevation calculations on all future structure work.

13. Project Manager:	14. Print Name	15. Date Accepted
Justin L. Brooks	Justin Brooks	1/23/12

16. Remedial action(s): FWI proposes to use the modified rebar configuration described in the attached response to FWI's RFI 030 from John Finke with Jacobs. After the rebar modifications are installed, FWI will pour both caps one foot deeper than plan by making the bottom of the cap one foot below plan elevation. The bearing seat elevations for both caps will be kept at plan elevations.

17. Disposition: ☐ Reject ☐ Rework ☐ Repair ☒ Use-As-Is

18. Design Change Required? ☒ Yes ☐ No

19. Response Prepared By:

Justin L. Brooks — Signature

1/23/12 — Date:

20. MoDOT has Reviewed and Approves the stated disposition and corrective action. (Required for All Dispositions)

Print Name Representative — Signature — Date

21. Remarks:

22. Total Sheets: X 3

23. NCR Resolved And Closed:

FWI Quality Manager — Date

Document Control

View All Site Content
Documents
- Project Documents

Lists
Discussions
Sites
People and Groups

Project Documents

Type	Name	Modified By
	5.00.00 Quality Control Operations	West, Timothy
	12.00.00 Quality Filing Matrix	Nickelson, Gary H.
	11.00.00 Construction Progress Photographs	Nickelson, Gary H.
	10.00.00 Route 141 Blank Report Forms	Nickelson, Gary H.
	9.00.00 Supplier - Subcontractor Material Records	Bailey, Raymond E.
	8.00.00 Consultant Reports	Bailey, Raymond E.
	7.00.00 Material Laboratory Testing	Bailey, Raymond E.
	6.00.00 Material Field Testing	Bailey, Raymond E.
	4.00.00 Quality Control Manager Records	Bailey, Raymond E.
	3.00.00 Meeting Records	Bailey, Raymond E.
	2.00.00 Quality Management Plan Records	Bailey, Raymond E.
	1.00.00 Construction QC - Admin	Bailey, Raymond E.

Key Items for Smooth Sailing

- Use the two week look ahead for planning
- Verify the QC is doing Daily Inspections and Testing per the ITP
- Audit to ensure all the DIR's, tests, material receiving reports are being entered into the Document Control System
- Promote use of NCR, to improve quality.

QM Philosophy

- Successful for these large projects.
  - I-64 Corridor in St. Louis
  - Christopher Bond Bridge in Kansas City MO
  - Safe & Sound Bridge Program
  - The New Mississippi River Bridge, St. Louis
  - Rte. 141, St. Louis Co.

Quality Management

- Advantages to Quality Management
  - Gives ownership of quality to contractor
  - Improves communication
  - Improves quality
  - Speeds construction
  - Improves personnel management

One size doesn't fit all!

- Quality Management Plans are specific.
  - Each project or product requires a plan; different elements needed depending on the scope of the project

Questions?