


Appendix C.1 - Purdue University Quality Surveillance Report

	QUALITY SERVICES DEPARTMENT QUALITY SURVEILLANCE REPORT (QSR)		QSR NO.: 25539-000-QSVS-12-001-000 REV. 000 PAGE: 1 of 2 Date: 04/28/12
	Project Name/Function: Davis Besse SGR Project		Safety Related: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Project No.: 25539		Quality Related: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Surveillance Subjects: Surveillance of Purdue University – Observation of Concrete/Rebar Research and Testing Activities Associated with the Davis Besse Project		ASME Section III Related: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Responsible Manager/Title: Javeed Munshi, Principal Engineer Civil/Structural		Department/Function: Civil / Structural / Architectural	
PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS: Bowen Laboratory, Purdue University "Tests to Determine The Behavior of #11 Bars With Lap Splices, dated 03/14/12 (2 nd Draft) Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0 (Draft)			
CHARACTERISTICS / DETAILS OF THE SURVEILLANCE SCOPE: A surveillance was performed 03/20/12 thru 03/21/12 at the Purdue University, Bowen Laboratory to assess the university's readiness to conduct testing activities as a part of an assessment of the Davis Besse shield building crack investigation being conducted by FirstEnergy, at the Davis Besse Site. This work is being performed by Purdue University in cooperation with Bechtel engineering personnel assigned to this task.			
METHODS USED DURING THE SURVEILLANCE: <input checked="" type="checkbox"/> Interview(s) <input checked="" type="checkbox"/> Document Review <input checked="" type="checkbox"/> Observation			
RESULTS: <div style="float: right;"> Unsatisfactory <input type="checkbox"/> Satisfactory <input checked="" type="checkbox"/> </div> <p>A review of the Bowen Laboratory at Purdue University was conducted to evaluate their readiness to perform testing activities based on Bechtel Specification 25539-000-3PS-SY01-00001 "Specification for Concrete Specimen Testing Services" and Purdue University, Bowen Laboratory test procedure – "Tests to Determine The Behavior of #11 Bars With Lap Splices". Currently both procedures are in draft form.</p> <p>The review and evaluation was conducted while visiting Purdue University, Bowen Laboratory in West Lafayette, IN to ensure the University has implemented the elements of a Quality Assurance Program applicable to the work they are performing for FirstEnergy and to ensure that these elements are reflected in the Bowen Laboratory Test Procedure. The evaluation concluded that some work was needed to properly detail and document the following activities:</p> <ul style="list-style-type: none"> • Prescribing the recipe of the Concrete Batch (finalized) • Determining the critical characteristics, including dimensions of the cast forms and rebar prior to placement of concrete • Concrete Batching Operation (Plant is due for recertification by NRMCA) • Placing Concrete into Forms • Curing and Compressive Testing of Concrete Samples • Test Setup and Verification Prior to performing the testing activities • Data sampling and recording of critical characteristics during the actual test performance • Testing of the Test Specimen <p>Irving Materials, Inc. (IMI) the concrete batch plant used by Bowen Laboratory to batch concrete for their experiments and research projects was also assessed during the visit. A tour of the batch plant was conducted in conjunction with an interview with the plant supervisor during the evaluation. Currently, the batch plant has been certified by NRMCA (National Ready Mixed Concrete Association). The certificate indicates that Plant ID # 816465 IMI is certified thru February 20, 2011. Also examined were the scale calibration certification performed by Farwick Scale Corporation on November 26, 2011. A re-certification by NRMCA will be completed prior to batching concrete for this project.</p>			
CAR(s) or CR(s) No.: N/A			
Surveillance By: L. Kummer		DATE: 04/28/12	
Approved By: L. Kummer		DATE: 04/28/12	



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PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):

Results continued:

Purdue University had previously provided the following information, which was reviewed and factored into the evaluation performed during this surveillance:

- Calibration records for instrumentation used for performing tests at the facility
- Batch Plant weight scale calibration records
- Batching equipment operational procedures
- Batch plant mix records
- Test fixture form drawings
- Technical specifications of the batching equipment
- State and Local licenses associated with the batch plant and university laboratory
- Schedules for all work evolutions
- Certificates of Calibration
- Report data sheets that contain the critical characteristics for each activity associated with the testing.

A tour of the Bowen Laboratory facility with the Purdue University Project Manager assigned to conduct the concrete testing activities for FirstEnergy/Davis Besse was performed during the surveillance. The test area, curing room, building sub-structure, hydraulic pump rooms, calibration area, concrete compressive testing area, equipment storage area and office area were visited during the tour. These areas were evaluated based on the work scope associated with the FirstEnergy contract, and Bechtel specification 25539-000-3PS-SY01-00001, Rev. 0 (Draft). The resulting items listed on page one is a result of the evaluation.

Test Procedure

The review of the test procedure indicated that it was not finalized and needed some additional detail as it did not provide a clear picture of critical characteristics, associated procedures, integration of the different evolutions required to fully document the testing from start to finish. Specific areas needing additional attention included:

- Clear independent verification of work activities
- Calibration equipment identification and association with different evolutions
- Drawing details on the placement (measurements) of rebar in the forms prior to placing concrete
- Documenting of the Test Setup prior to performing each test
- Qualification of Personnel performing the testing activities
- Calibration and Certification of the Batch Plant
- Work product deliverable details were missing from the test procedure

These details were discussed with the Purdue University Bowen Lab project manager for the project. Since the procedures have not been approved and the current version is the 1st version, rev. 0 it was determined that the lab had some work to complete prior to performing the testing activities. Discussions with the project manager also indicated that the project will see to it that pre-job briefings are performed each test day and that these briefings need to be documented prior to performing testing activities.

Recommendation

Purdue University, Bowen Lab should consider documenting lessons learned as part of the de-briefing process after completion of each test. These lessons learned could then be used as a basis for making improvements to further enhance the test procedure.

A follow-up surveillance will be performed to document the improvements detailed on page1, and to reexamine the re-certification of the concrete batch plant.

Satisfactory

DISTRIBUTION

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QUALITY SERVICES DEPARTMENT **QUALITY SURVEILLANCE REPORT (QSR)**

QSR NO.: 25593-000-QSVS-12-003-000

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PAGE: 1 of 2

Date: 04/28/12

Project Name/Function: Davis Besse SGR Project

Project No.: 25593

Surveillance Subjects: Surveillance of Purdue University – Observation of Concrete Batching and Placement Activities Associated for the Davis Besse Project

Safety Related: Yes ☐ No ☒Quality Related: Yes ☒ No ☐ASME Section III Related: Yes ☐ No ☒

Responsible Manager/Title: Javeed Munshi, Principal Engineer Civil/Structural

Department/Function: Civil/Structural/Archetectural

PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS:

Bowen Laboratory, Purdue University "Tests to Determine The Behavior of #11 Bars With Lap Splices, dated 04/09/12

Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0, dated 04/03/12

CHARATERISTICS / DETAILS OF THE SURVEILLANCE SCOPE:

A surveillance was performed 04/10/12 at the Purdue University, Bowen Laboratory to observe the batching and placement of concrete during the formation of test blocks as a part of an investigation of a Davis Besse containment shield building concrete cracking problems being conducted by FirstEnergy. These test blocks will be used by Purdue to conduct tests designed to show that the cracks in the shield building either have an effect on, or do not have an effect on the building's ability to meet the original design specifications. This work is being performed by Purdue University at the Bowen Laboratory with oversight being performed by Bechtel QA/QC/Engineering personnel. Some of the specific activities observed during this surveillance included Bechtel QC performing and documenting the following inspections: concrete batch temperature testing, slump testing, placement and vibration of concrete, placement and finishing of test sample cylinders, and final finishing of concrete forms. Follow-up of the recertification of IMI, the batch plant used to mix and deliver the concrete was also conducted during this surveillance based on issues identified during surveillance 25539-000-QSVS-12-001.

METHODS USED DURING THE SURVEILLANCE:
☒ Interview(s)

 ☒ Document Review

 ☒ Observation
RESULTS:Unsatisfactory ☐ Satisfactory ☒

Follow-up reviews conducted during this surveillance included verification that Purdue University had addressed issues that had been identified during surveillance 25539-000-QSVS-12-001. in the following areas:

Test Procedure

- Clear independent verification of work activities
- Calibration equipment identification and association with different evolutions
- Drawing details on the placement (measurements) of rebar in the forms prior to placing concrete
- Documenting of the Test Setup prior to performing each test
- Qualification of Personnel performing the testing activities
- Calibration and Certification of the Batch Plant
- Work product deliverable details were missing from the test procedure

A review of the newly approved test procedure "Bowen Laboratory, Purdue University - Tests to Determine The Behavior of #11 Bars With Lap Splices", dated 04/09/12 based on issues listed above indicated that the newly approved procedure had adequately addressed each issue related to the test procedure. The other issues that had been identified during surveillance 25539-000-QSVS-12-001 were also reviewed and verified to have been addressed by the University of Purdue. These issues included: calibration of equipment needed for each evolution of the test; and calibration and certification of the concrete batch plant.

Satisfactory

CAR(s) or CR(s) No.: N/A

Surveillance By: L. Kummer

DATE: 05/09/12

Approved By: L. Kummer

DATE: 05/09/12



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PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):

RESULTS cont.

Batch Plant Certification

Surveillance 25539-000-QSVS-12-001 indicated that the last certification performed by NRMCA expired on February 20, 2011. The follow-up on this issue indicated that the batch plant had been recertified on January 05, 2011 with the certification good till February 20, 2013.

Satisfactory

Placement of Concrete into Pre-built forms

Purdue University staff and graduate students had pre-staged the formwork in anticipation of the placement of concrete. The formwork was pre-inspected by Bechtel QC the day before the placement of concrete. The formwork was assembled per the requirements contained in the "Tests to Determine the Behavior of #11 Bars with Lap Splices – Test Procedure, section 1 "Fabrication". Prior to placement of the concrete, inspections were performed by Bechtel QC of the formwork for each placement beam, and included: installation of the rebar; installation of the reinforcement cages. Along with material verification, additional measurements were taken of forms and rebar to ensure they met the design dimensions specified in the test procedure.

Observed three (3) separate concrete trucks delivering concrete to the lab for placement of beams B1, B2 and B3. These beams are associated with and configured to have 79" rebar overlap. As the placement of concrete took place, I also observed Bechtel QC verifying and recording concrete temperature, slump testing, verification of batch tickets for each truck delivered, and placement of the concrete into the forms in conjunction with vibration of the concrete to eliminate air pockets.

Interviews with the Purdue Project Manager conducted during this evolution identified that an additional set of test beams will be developed to address the 120" rebar overlap at a later date. These beams will be identified as A1, A2, and A3.

Satisfactory

Concrete Test Cylinders

Observed and verified the Purdue University staff in conjunction with the Bechtel QC inspector taking 35 concrete cylinder samples to be used to periodically test the compressive strength of the concrete during the required 28 day cure for the test beams. Verifications will be performed by Bechtel QC to ensure that the testing of cylinders is performed in accordance with the test procedure requirements. This information will be used to qualify the concrete beams prior to performing testing.

Satisfactory

Date: 05/07/12

ASME Section III Related: Yes ☐ No ☒

Department/Function: Civil/Structural/Archetectural

Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0, dated 04/03/12

A surveillance was performed 05/07/12 at the Purdue University, Bowen Laboratory to observe a trial dry run of the test procedure using a "trial test beam" for a practice. This dry run was conducted by Purdue University with oversight being performed by Bechtel QA/QC\Engineering personnel. Some of the specific activities observed during this surveillance included Bechtel QC performing and documenting the following inspections: placement of sensors and monitoring equipment on the test beam; system calibration; safety training: video set-up and conduction of the beam test per the test procedure.

☒ Interview(s) ☒ Document Review ☒ Observation

Unsatisfactory ☐ **Satisfactory** ☒

Follow-up reviews were conducted during this surveillance to verify that Purdue University had addressed issues that had been identified during surveillance 25539-000-QSVS-12-001. These concerns included verification that Purdue had added additional details and document requirements in the following areas:


- Prescribing the recipe of the Concrete Batch (finalized)
- Determining the critical characteristics, including dimensions of the cast forms and rebar prior to placement of concrete
- Concrete Batching Operation (Plant is due for recertification by NRMCA)
- Placing Concrete into Forms
- Curing and Compressive Testing of Concrete Samples
- Test Setup and Verification Prior to performing the testing activities
- Data sampling and recording of critical characteristics during the actual test performance
- Testing of the Test Specimen

Additional follow-up was conducted to ensure that the batch plant certification had been updated. Records reviewed indicated that the certification was updated to include an expiration date of 02/20/13. The previous batch plant scale calibrations conducted by Farwick Scale Corporation on November 26, 2011 were determined to be up to date and not an issue based on a conversation with the batch plant operations supervisor.

Satisfactory

DATE: 05/09/12

DATE: 05/09/12

	QUALITY SERVICES DEPARTMENT QUALITY SURVEILLANCE REPORT (QSR) (Continuation Sheet)	QSR NO.: 25593-000-QSVS-12-004-000 REV. 000 PAGE 2 of 2 Date: 05/07/12
PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):		
<p>RESULTS cont.</p> <p><u>Test Procedure</u></p> <p>A review conducted of the test procedure indicated that it had be revised and approved from the original version reviewed during surveillance 25539-000-QSVS-12-001. The following areas were addressed by Purdue University, Bechtel and FENOC Engineering, and Bechtel QC:</p> <ul style="list-style-type: none"> • Clear independent verification of work activities • Calibration equipment identification and association with different evolutions • Drawing details on the placement (measurements) of rebar in the forms prior to placing concrete • Documenting of the Test Setup prior to performing each test • Qualification of Personnel performing the testing activities • Calibration and Certification of the Batch Plant • Work product deliverable details were missing from the test procedure <p>Satisfactory</p> <p><u>Dry Run Test Set-up Activities</u></p> <p>Verified that a pre-job brief was conducted and that safety was included. This included the University staff's use of all safety equipment. The brief included a review of the test procedure, expectations, establishing who was in charge of the test; methods to be used to measure crack indications during the test; operation of the video equipment . Interviews conducted during the surveillance included data collection, test results format, storage of test results after the test was completed.</p> <p>Bechtel QC had verified the test strength of the sample dry run concrete beam and verified that the test prerequisites were met prior to Purdue conducting the tests. This included the placement of the sensors, calibration of the strain gages, placement of dial indicators at each end of the test specimen and at the center to measure deflection. QC also verified that the system check on the instruments was satisfactory prior to the start of the testing.</p> <p>Satisfactory</p> <p><u>Testing of Sample Test Beam</u></p> <p>Observed testing being conducted on trial test beam B-0 per the requirements of Tests to Determine The Behavior of #11 Bars With Lap Splices, dated 04/09/12. The tests include the pressurization of hydraulic pumps to provide the pressure needed to compress the ends of the concrete beam. This pressure was applied in 4K steps. Once each step was reached, the beam would be mapped for deflection, and cracking. Observed that test pressures were being recorded by a test computer. Each of the cracks being mapped were traced by marker on the test beam, measured and recorded on a beam map. Prior to pressurizing to the next level, photographs were taken of the cracks for the record. An inferred laser was also employed to capture reflector movements. Data was recorded by a separate computer onto a spread sheet to capture each reflector's measurements.</p> <p>The test continued at this stage upwards in 4K steps utilizing the same methods to capture the same critical attributes as previously described.</p> <p>Observed testing up to 20K, using the same methods. The final portion of the test, taking the beam to failure, was not observed as part of this surveillance. The remainder of the testing was verified to have been completed to failure. Interviews conducted after the test was completed provided positive feedback from the Purdue Project Manager. No corrective actions were required during the pre testing, testing and post testing portions of the testing activities. Testing pressures reported by the project manager were: 4, 8, 12, 16, 18, 20, 24, 26, 28, 32, 35, 37 and 38K.</p> <p>Satisfactory</p> <p><u>NEES Database</u></p> <p>Purdue University maintains a database on the internet called NEES.org (Network for Earthquake Engineering Simulation). This secure web site contains the project: data files; reports; correspondence; procedures, including all revisions of procedures; and data sheets used to record the data. The project is identified as: "Experimental Investigation of the Capacity of Lap Splices of No. 11 Reinforcing Bars" and internet location is: nees.org/warehouse/project/1128. This database was reviewed during this surveillance to ensure that Purdue is capturing the testing data in a secure way. This data location is being shared with Purdue University project personnel; Bechtel Engineering, QA and QC personnel; and FENOC Engineering personnel.</p> <p>Satisfactory</p>		

Date: 05/20/12

ASME Section III Related: Yes ☐ No ☒

Department/Function: Civil/Structural/Archetectural

Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0, dated 04/03/12

A surveillance was performed 05/10/12 at the Purdue University, Bowen Laboratory to observe the testing of concrete test beams as a part of an investigation of a Davis Besse containment shield building concrete cracking problems being conducted by FirstEnergy. This work is being performed by Purdue University at the Bowen Laboratory with oversight being performed by Bechtel QA/QC/Engineering personnel. Some of the specific activities observed during this surveillance included Bechtel QC performing and documenting the following inspections: verification of the test beam identification; placement of sensors; verification of the mechanical setup of the beam; equipment calibration verification; setup of test monitoring equipment; operability of the testing equipment; observation of the tests themselves; recording of related data as specified by the test procedure.

☒ Interview(s) ☒ Document Review ☒ Observation

Unsatisfactory ☒ **Satisfactory** ☐

The following test setup prerequisites and activities that were observed were verified to be acceptable based on test procedure "Tests to Determine The Behavior of #11 Bars With Lap Splices, dated 04/09/12":

- **Batch Plant Information**
- **Calibration of Equipment**
- **Placement of Sensors**
- **Monitoring Equipment**
- **Equipment Operability Tests**
- **Compressive Strength Test Results**
- **Qualification of Individuals Conducting the Test**

Testing of Concrete Beam B-1

Observed Purdue University performing the testing of concrete beam B-1. This beam has 79" of rebar overlap, and is made up of #11 rebar. Compressive strength test results of sample cylinders taken during the concrete placement process indicated that the compressive strength prior to testing the beam is 4400 psi. Testing was performed in 4K increments. Pressurization of the hydraulic pump used to conduct the testing on beam B-1 was systematically stopped every 4K to perform optic mapping, and physical mapping of cracks. Verified that the Purdue Project Manager/Test Supervisor actively monitored the data collection from the test sensors throughout the test.

DATE: 05/30/12



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Date: 05/20/12

PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):**RESULTS cont.**

Surveillance activities included monitoring that pump pressure and beam displacement was registering and recording properly throughout the test. The cracks were mapped at 4K tension increments. Mapping included physical measurements being taken of each crack as it developed and recording these measurements on a beam drawing. What is captured during this mapping is the location of each crack, its width and length and the direction each crack is taking as it propagates. This is backed by pictures at each pressure milestone and inferred measurements of sensors that detect movement of the beam during testing. Lastly, dial indicators were located at each end and the middle of the beam to read the amount of deflection. These readings are compared to the sensors monitoring beam displacement to ensure each measurement follows the other (a backup of the mechanical measurement performed by the electrical measurement). Observed these measurements being taken throughout the test right up to failure.

SatisfactoryReview of Test Procedure

Interviews conducted post-testing with the Bechtel QC Inspector, and the Purdue University Project Manager (Principal Investigator) indicated that a tolerance was missing in the test procedure for measuring the distance between the roller stands. The test procedure indicates the measurements, but does not give a tolerance. This was noted during the surveillance and was identified as CR 23568-000-GCA-GAMG-00009.

CR 23568-000-GCA-GAMG-00009

25593 - Purdue University - Test Procedure - Tests to Determine the Behavior of #11 Bars with Lap Splices, Section 3.0 - Does not address the tolerance required to determine if the roller supports are correctly installed.

Description of Condition

"Tests to Determine the Behavior of #11 Bars with Lap Splices", Section 3.0 - "Setup" states that each test beam shall be placed on two roller supports at the specified distance described in the proposal. The distance specified in the "Proposal to FENCE Experimental Investigation of Capacity of Lap Splices of No. 11 Bar", page 4, Figure 1, Proposed Specimens - Test Series B is 9'8.5" from each end of the test beam with a span of 12'7" between the roller supports, and was to be measured to the nearest 1/16 in per the test procedure. However, neither the test procedure nor the proposal specify an acceptable deviation tolerance for this measurement."

Follow-up is required

Unsatisfactory

Date: 05/30/12

ASME Section III Related: Yes ☐ No ☒

Department/Function: Civil/Structural/Archetectural

Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0, dated 04/03/12

A surveillance was performed 05/30/12 at the Purdue University, Bowen Laboratory to observe the testing of concrete test beams as a part of an investigation of a Davis Besse containment shield building concrete cracking problems being conducted by FirstEnergy. These test beams will be used by Purdue to conduct tests designed to show that the cracks in the shield building either have an effect on, or do not have an effect on the building's ability to meet the original design specifications. This work is being performed by Purdue University at the Bowen Laboratory with oversight being performed by Bechtel QA/QC/Engineering personnel. Activities observed included the pre-staging, testing and post-testing of concrete beam A-3. These activities were also verified and documented by Bechtel QC. Follow-up of an issue identified during surveillance 25593-000-QSVS-12-006-000 was also performed during this surveillance.

☒ Interview(s) ☒ Document Review ☒ Observation

Unsatisfactory ☐ **Satisfactory** ☒

The following test setup prerequisites and activities that were observed were verified to be acceptable based on test procedure "Tests to Determine The Behavior of #11 Bars With Lap Splices, dated 04/09/12":

- Batch Plant Information
- Calibration of Equipment
- Placement of Sensors
- Monitoring Equipment
- Equipment Operability Tests
- Compressive Strength Test Results
- Qualification of Individuals Conducting the Test

Testing of Concrete Beam A-3

Observed Purdue University performing the testing of concrete beam A-3. This beam has 120" of rebar overlap, and is made up of #11 rebar. Compressive strength requirements were recorded and verified by Bechtel QC prior to testing. Testing was performed in 6K increments. Pressurization of the hydraulic pump was systematically stopped every 6K to perform optic mapping, and physical mapping of cracks. Additionally, observed the Purdue Project Manager/Test Supervisor monitoring the collection of sensor data throughout the test.

CAR(s) or CR(s) No.: N/A

DATE: 05/30/12

DATE: 05/30/12



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PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):**RESULTS cont.**

Surveillance activities included monitoring that pump pressure and beam displacement was registering and recording properly throughout the test. Cracks were mapped at 6K tension increments. Mapping included physical measurements being taken of each crack as it developed and recording these measurements on a beam drawing. What is captured during this mapping is the location of each crack, its width and length and the direction each crack is taking as it propagates. This is backed by pictures at each pressure milestone and inferred measurements of sensors that detect movement of the beam during testing. Lastly, dial indicators were located at each end and the middle of the beam to read the amount of deflection. These readings are compared to the sensors monitoring beam displacement to ensure each measurement follows the other (a backup of the mechanical measurement performed by the electrical measurement). Observed these measurements being taken throughout the test right up to failure at 43K.

An interview with the Purdue project manager conducted after the test was completed indicated that the data produced by the testing would be put into the NEES database once it's been analyzed by Purdue. A final report will be generated once all testing has been completed.

SatisfactoryFollow-up of issue identified during Surveillance 25593-000-QSVS-12-006-000

Follow-up of an issue identified during surveillance 25593-000-QSVS-12-006-000 was performed during the surveillance. A newly revised version of the test procedure was initialed to correct the lack of a tolerance in regards to measuring the placement of the rollers. Follow-up with Bechtel QC confirmed that the A-3 was measured using this tolerance, and was acceptable.

Update: CR 23568-000-GCA-GAMG-00009 was reviewed on 06/15/12. Verification of the corrective action was also reviewed and found to be acceptable. This issue is closed, no further actions are required.

Satisfactory

Appendix C.2 - Purdue University Condition Report

06/24/2012 10:54 EDT

Condition Reports			
Identifier	Project	Current State	Current Assignee
23568-000-GCA-GAMG-00009	23568 - NES CORE SUPPORT	[Responsible Manager Approval]	Munshi, Javeed A
Current Task Due	Date Created	Initiator	Initiator's Organization
06/21/2012	06/03/2012	Kummer, Louis Philip	QS Project; Q-13
Date of Event	Time of Event	Identified By	
05/30/2012	15:30	Quality Audit / Surveillance	
CR Originator Identifying Information			
L Summer			
Title			
25593 - Purdue University - Test Procedure - Tests to Determine the Behavior of #11 Bars with Lap Splices, Section 3.0 - Does not address the tolerance required to determine if the roller supports are correctly installed			
Description of Condition			
"Tests to Determine the Behavior of #11 Bars with Lap Splices", Section 3.0 - "Setup" states that each test beam shall be placed on two roller supports at the specified distance described in the proposal. The distance specified in the "Proposal to FENCE Experimental Investigation of Capacity of Lap Splices of No. 11 Bar", page 4, Figure 1, Proposed Specimens - Test Series B is 9'8.5" from each end of the test beam with a span of 12'7" between the roller supports, and was to be measured to the nearest 1/16 in per the test procedure. However, neither the test procedure nor the proposal specify an acceptable deviation tolerance for this measurement.			
Immediate Actions Taken			
The Purdue University project manager in charge of conducting the tests was apprised of this condition.			
Significance Level	Plant Operability Related (if yes, contact plant operations)	Potentially Reportable (10CFR21) (if yes, route to Engineering to perform evaluation)	ASME III Related
C	No	No	No
Safety Classification	Reason for Closure	Stop Work Number (if applicable)	
Augmented Quality			
Extent/Investigation			
see attached email communication with Purdue			
Responsible Organization	Responsible Manager	Responsible Person	Quality POC
Civil/Struct/Arch St; E-20	Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)	Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)	Kummer, Louis Philip; User: LPKUMMER; Dept: QS Project (Q-13)
Summarized Comments			
<p>[Quality Concurrence] Comments:</p> <p>Entered NEES.org to check on the revision to the test procedure. Reviewed the newly uploaded "Approved Test Procedure Rev. #2 25539-000-VIS-SY01-00001.pdf and found that the procedure now reflects the tolerance necessary to perform measurements of the roller locations. Actions are acceptable and complete.</p> <p>Added By Kummer, Louis on 2012-06-18</p> <p>-----</p> <p>[CRRC Screening] Comments:</p> <p>Committee feels that this should be a D as written and will discuss with the Lead Auditor. After discussion with the lead auditor, and a review of the supporting attached documentation the significance level will remain as is.</p> <p>Added By Bartgis, Deborah on 2012-06-14</p> <p>-----</p> <p>[CRRC Pre-Screen] Comments:</p> <p>D, ES Javeed</p> <p>Added By Bartgis, Deborah on 2012-06-08</p> <p>-----</p> <p>[CAP Admin Screening] Comments:</p> <p>Please complete the check list for this CR</p> <p>Added By Bartgis, Deborah on 2012-06-05</p> <p>-----</p>			
Long Term			
N			
Date Closed			

Cause Code						
A5B2; Written Communication Content LTA						
Event Code				Nature of Issue		
ES; Specification				04; Product Quality Issue		
Action Identifier	Type	Title	Current State	Current Task Due	Action Due Date	
ACT-01-23568-000-GCA-GAMG-00009	Action	Communicate with Purdue University	[Closed]		06/15/2012	
Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[Initiate]	Completed	Kummer, Louis	Kummer, Louis	06/03/2012 15:10 EDT	Kummer, Louis	06/05/2012 09:44 EDT
[CAP Admin Screening]	Completed	Functional CAP Admin Team	Kummer, Louis	06/05/2012 09:44 EDT	Bartgis, Deborah	06/05/2012 21:45 EDT
[CRRC Pre-Screen]	Completed	Kobyra, James	Bartgis, Deborah	06/05/2012 21:45 EDT	Bartgis, Deborah	06/08/2012 10:00 EDT
[CRRC Screening]	Completed	Functional CAP Admin Team	Bartgis, Deborah	06/08/2012 10:00 EDT	Bartgis, Deborah	06/14/2012 10:31 EDT
[Responsible Manager Screening]	Completed	Munshi, Javeed	Bartgis, Deborah	06/14/2012 10:31 EDT	Munshi, Javeed	06/15/2012 13:02 EDT
[Action Plan]	Completed	Munshi, Javeed	Munshi, Javeed	06/15/2012 13:02 EDT	Munshi, Javeed	06/15/2012 13:31 EDT
[Quality Concurrence]	Completed	Kummer, Louis	Munshi, Javeed	06/15/2012 13:31 EDT	Kummer, Louis	06/18/2012 16:53 EDT
[Responsible Manager Approval]	Working	Munshi, Javeed	Kummer, Louis	06/18/2012 16:53 EDT		
Attachment						
FENOC_II_Feb2012[2].docx						
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Purdue_corresp-CR.pdf						

A Proposal to
FENOC
Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars

by
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February 21, 2012

SUMMARY

The goal of this experimental study is to investigate the strength of Grade-60 No.-11 reinforcing-bar splices after development of laminar cracks in the plane of the bars. Two splice lengths will be investigated in two series, A and B, each comprising six beam specimens with laps of 120 in. and 79 in. corresponding to L/d_b (length/bar diameter) ratios of 85 and 56. The nominal design concrete strength is 4000 psi at 28 days. The proposed test setup and cross-sectional properties are shown in Figures 1 to 3. The rate of short-time loading will be monotonic. Measurements will include load, deflections, and strain-distribution history along the splice. The project is planned to be completed within four months after initiation. The final report will document the properties of the specimens, the test setup, and observations made during the tests to failure. It will include a digital database containing all quantitative information obtained. Quality Assurance during the conduct of the work will be carried out in accordance with client specifications and will conform to the applicable sections of 10 CFR, Appendix B. Weekly reports will be posted on a secure internet site describing the progress of the work.

PROJECT DESCRIPTION

We plan to build, instrument, and test twelve reinforced concrete beams organized in two series of six (A and B). Each beam will have a region of nearly constant bending moment where flexural reinforcement will be lap spliced. In series A, the length of the lap splices will be 10ft (85 bar diameters). In series B the length of the lap splices will be 6 ft 7 in. (56 bar diameters). The main goal of the

investigation is to establish the capacity of splices of #11 reinforcing bars with high L/d_b (splice length to bar diameter) ratios and project the information obtained to determine the influence of laminar cracking on the capacity of spliced circumferential reinforcement in the David-Besse Shell structure.

It has been observed by many investigators¹ that the dominant mode of failure of lap splices is that initiated by the formation of a laminar crack in the plane of the spliced bars. A critical parameter in determining the bond strength of reinforcing bars is the L/d_b ratio (ratio of splice length to bar diameter). This ratio is as high as 85 in the circumferential splices of the D-B Shell Structure. The extensive database compiled ACI committee 408 and published by NeesHub¹ contains results of a total of 632 tests. Of these, only 7 had L/d ratios of more than 50 and the maximum ratio, in only one test, was 80. That is the first reason for the necessity of splice tests with long L/d ratios.

The second and more important reason for the proposed experiments is based on the observed behavior of tests carried out, but not yet reported, by C. Sim in Bowen Laboratory of Purdue University. These tests showed that, whereas in lap splices with L/d_b ratios below 24 the initiation of the laminar crack paralleling the plane of the reinforcing bars led to almost immediate failure, in bars with longer lap splices there was an increase of approximately 50 % (minimum 50% and maximum 63 %) after the formation of the laminar crack, as summarized in Table 1. These test results promise that for long lap splices, a laminar crack in the plane of the bar is not likely to lead to a mean bond strength below that required for the yielding of the spliced bars. This promise needs to be investigated experimentally. That is the second reason for testing bar splices with L/d_b ratios of 85 and 55 covering the range of splice length in the D-B Shell.

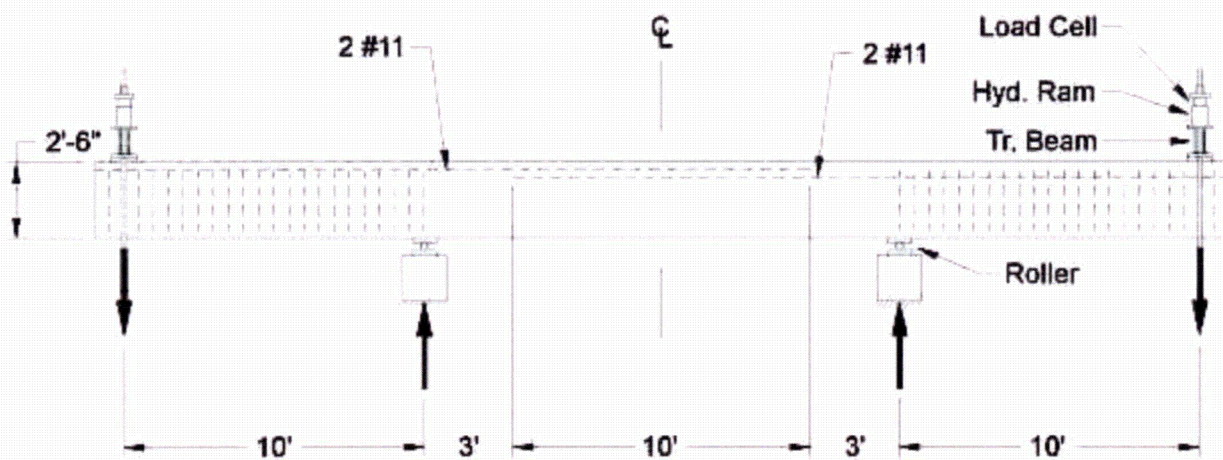
Results of bond tests are subject to scatter as illustrated by the results in Table 1. On the basis of those results and other experience in Bowen laboratory it is expected that the range of scatter will not exceed 30% of the mean. Six tests with concrete from the same mix should suffice to provide convincing information on splice strength for a given splice length. Should FENOC require it, additional tests can be carried out.

We plan to test the proposed specimens as indicated in Figure 1. The testing setup and procedure have been used repeatedly in the past to study the bond between steel reinforcing bars and concrete.¹ In the proposed configuration the reinforcement lap splices will be located in a region of essentially constant bending moment. The distance from loading point to end of splice will be 3 ft.

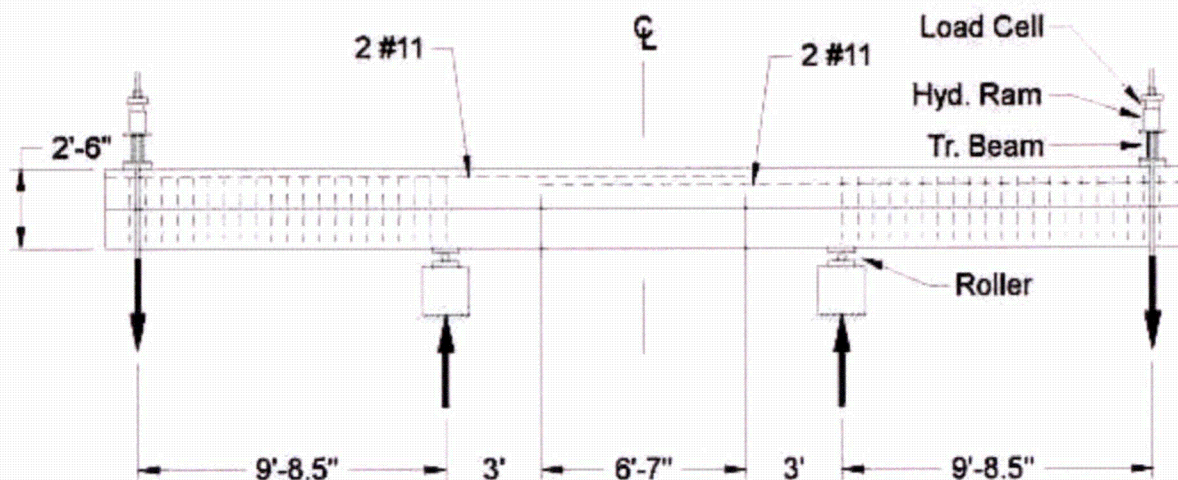
¹ https://nees.org/groups/bond_rc/wiki

Table 1. Results of Lap-Splice Tests by C. Sim, November 2011, Bar Size = #8, Lap Length = 24 in., Concrete Compressive Strength = 3850 psi.

Specimen	Load at which Laminar Crack was Observed kip	Unit Stress at which Laminar Crack was Observed ksi	Unit Bond Stress at which Laminar Crack was Observed psi	Max. Load kip	Unit Stress at Max. Load ksi	Unit Bond Strength psi	Max. Load/ Load at Crack kip
XM28	22	27.6	290	34	42.7	440	1.56
316LN	24	30.1	310	37	46.0	480	1.54
Duplex2205	22	27.6	290	36	44.5	460	1.63
Duplex2304	24	30.1	310	36	44.8	470	1.50
Galvanized	22	27.6	290	34	42.5	440	1.56
Black	22	27.6	290	34	42.7	440	1.56
Mean (psi)			297			455	1.56
Mean bond stress coeff. $\sqrt{f'_c}$			4.8			7.3	



Test Series A



Test Series B

Figure 1. Proposed Specimens

The cross section of the proposed specimens is shown in Figure 2. The side cover (distance from center of outermost bar to closest vertical concrete surface) will be kept constant (at 3 in.). The spacing (half distance between inner bars –measured from center to center–) will be the same (3 in.), but the bottom cover (distance from center of bar to closest horizontal concrete surface) will be larger (5 in.) to increase the probability of formation of laminar cracks at the level of the reinforcement.

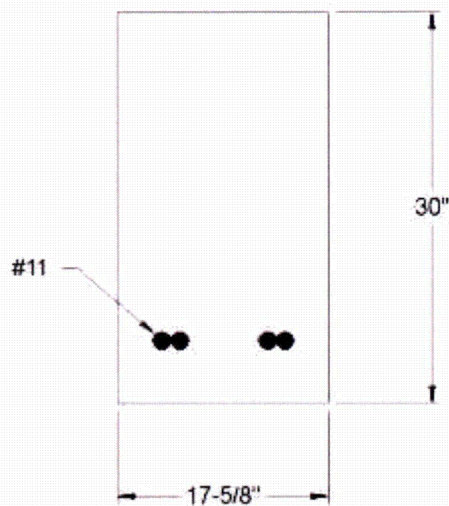


Figure 2. Cross Section of Proposed Specimens (in casting position – specimen shall be rotated 180 deg. for testing)

Vertical downward displacement at loading points will be applied in increments to allow for inspection of the specimens, mapping of cracks, crack width measurement, and measurement of deformations using infrared coordinate-tracking targets.

Load Application

We plan to use four center-hole hydraulic rams with a capacity of 40 kip each. The rams will be connected to a single hydraulic pump to ensure that the pressure in all rams is the same. The rams will react against transfer beams (Figure 1). There will be two rams per beam (one on each side of the specimen), and two beams per specimen (Figure 1). The transfer beams will rest on steel bearing plates with 2"x8" cross sections. These plates will be attached to the specimens using a uniform layer of 10-ksi minimum-shrinkage plaster to ensure levelness and to avoid stress concentrations. Post-tensioning high-strength steel threaded rods will pass through each ram, the transfer beams, and the strong floor of Bowen Lab. These rods will be connected to both strong floor and rams using nuts with spherical heads and plates with concave bearing surfaces designed to minimize bending.

Reactions will be provided by (2) steel rollers with a diameter of 3 in. These rollers will react against bearing plates with 2"x8" cross sections attached to the specimens using 10-ksi minimum-shrinkage plaster. The rollers will rest on similar plates supported by concrete pedestals to be built to allow the beams to deflect and to facilitate specimen inspection and detection of cracks.

Two rollers will be used (instead of a roller and a pin) to minimize axial restraints and to ensure symmetry on the loading.

Instrumentation

Vertical displacements: will be measured using optical encoders and DCDTs (for redundancy) with accuracies of approximately 0.004 in. Displacement transducers will be calibrated using a TRIMOS V600+ Height gage with a precision of 0.00005 in.

Crack widths: will be monitored using a Pro-Series Optotrack Coordinate-Measurement System with an accuracy of approximately 0.002 in. Targets for this system will be fastened at a spacing of 12 in. in the region of nearly constant moment at the level of the reinforcement, 4 in. below that level, and 4 in. above that level, on one vertical face of each specimen (Figure 3). In addition, Vishay crack-detection sensors will be adhered to the face of the specimen not instrumented with Optotrack targets at the level of the reinforcement. Cracks will also be monitored visually spraying the concrete surface with a thin layer of water which penetrates into the cracks increasing their contrast with the concrete and making them visible at widths smaller than 0.003 in. Observed cracks will be marked with black lines drawn approximately ¼-in away from the crack to make them visible in photographs and to allow measurement of crack widths using crack comparators. The Optotrack system has calibration

certificates traceable to ISO, ANSI and ASME standards. The system has a reference bar to perform on-site calibration checks that can be also corroborated using our TRIMOS V600+ height gage.

Applied Loads: The applied loads will be measured using two center-hole strain-gage based load cells (one per transfer beam). These load cells will be placed on opposite sides of the specimen (to corroborate the symmetry of the loading) and will be inserted between the loading rams and the transfer beams. They will be calibrated using a 120-kip Instron Universal-Testing machine available at Bowen Lab and calibrated by Instron Inc. annually. Instron coordinates its calibrations with NIST.

Strain Gages: installing strain gages on reinforcing bars requires removal of a layer of the bar to provide a smooth and clean surface to adhere the strain gage. This process inevitably reduces the cross-sectional area of the bar and leads to concentration of strains. Strain gages disturb the bond between the reinforcing bars and the concrete. And their readings are sensitive to location of the gage relative to cracks. To avoid these problems, we propose to use instead the measurements made with the Optotrack system to compute mean unit strains in the nearly constant moment region from which we can estimate unit stresses in the reinforcement.

The output of all sensors and transducers will be recorded continuously using a National Instruments 16-bit data acquisition card.

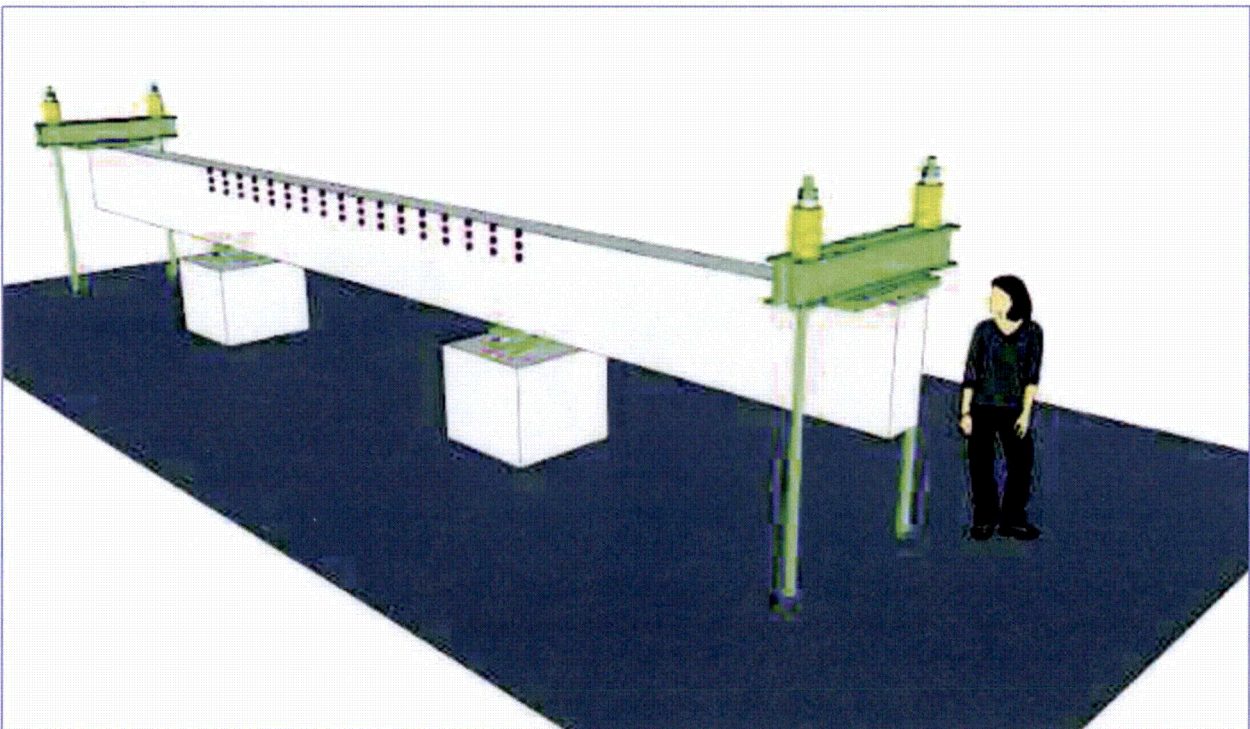


Figure 3. Approximate 3D Rendering of Test Specimen with Infrared Targets

We plan to record the tests and the construction of the specimens as follows:

Using lapse-time video (to avoid generation of unnecessarily large video files during construction and instrumentation).

Using a high-speed high-resolution camera that can capture up to 250,000 frames per second. This camera has a large RAM which is overwritten until a trigger is activated. We can use this trigger to capture failure should it occur abruptly.

Materials

The materials to be used to fabricate the test specimens shall meet the standards listed in Table 2.

Table 2. Materials

Material	Standard
Type I Portland Cement	ASTM C150
Water	ASTM C1602
Deformed Reinforcing Bar	ASTM A615
Admixtures	ASTM C494, C1017, C260
Aggregates	To be provided or specified by client

Concrete

The concrete mix to be used will have these properties:

Nominal Design Compressive Strength: 4000 psi

Maximum Size of Coarse Aggregate: 1-1/2 in.

Target Slump: 6 in.

Target Air Content from 3% to 6%

Proportions:

Cement 588 lb

Type 200-N Pozzolite or Similar 17.6 oz. or equivalent

MBVR Air Entraining Admixture or Sim. 3.8 oz. or equivalent

Coarse Aggregate*	1560 lb
Fine Aggregate*	1435 lb
Net Water	36.5 gal.

*Aggregates to be provided or specified by client.

Steel

#11 Grade 60 ASTM 615 Deformed Reinforcing Bars from a single heat will be used as longitudinal reinforcement.

Material testing

Table 3 shows the testing schedule proposed to control the quality of the materials.

Table 3. Tests of Materials.

Material Property	Age [days]	Number of Tests
Concrete Compressive Strength (6x12" cylinders)	3	9
	7	9
	14	9
	28	9
	Test	36
Air Content of Freshly Mixed Concrete	0	6
Concrete Splitting Strength	Test	36
Steel Reinforcing Bars Yield Stress and Tensile Strength	N/A	3

The proposed tests of concrete and steel coupons will be conducted following the standards listed in Table 4.

Table 4. Testing Standards.

Material Property	Applicable Standard
Concrete Compressive Strength	ASTM C39
Air Content of Freshly Mixed Concrete	ASTM C231 and/or C173
Concrete Splitting Strength	ASTM C496
Steel Reinforcing Bar Mechanical Properties (for tensile stress)	ASTM A370

Quality Assurance

Quality assurance processes per client specifications and conforming to relevant 10CFR Appendix B requirements will be followed.

SCHEDULE

The total duration of the project after initiation is planned not to exceed four months. We have identified the task groups listed below. The duration of each of these task groups and details are shown in Figure 4. This schedule does not include hold points. We plan to revise the schedule to allow for “hold points” to be specified by the client.

- Formwork
- Assemblage of reinforcement cages (Series A)
- Casting of first six specimens (Series A)
- Curing
- Preparation of setup, instrumentation, and data-acquisition system for the first series of tests
- Series-A tests
- Removal of Series-A specimens
- Assemblage of reinforcement cages (Series B)
- Casting of first six specimens (Series B)
- Curing
- Preparation of setup, instrumentation, and data-acquisition system for the second series of test
- Series-B tests
- Removal of Series-B specimens
- Data reduction and preparation of report

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Tests to Determine the Behavior of #11 Bars with Lap Splices

Bowen Laboratory
Purdue University
Spring 2012

Test Procedure

1. Fabrication

1.1 Formwork

The formwork shall be made using non-absorbent plywood. Its interior shall be caulked to prevent water leakage and it shall be covered with a thin layer of oil before casting. The dimensions of the formwork shall be checked and recorded using Form 1.

1.2 Reinforcement Cages

The steel reinforcement cages shall be built following the drawings attached. Reinforcing bars shall be supported by steel chairs placed away from lap splices. To ensure alignment, the bars shall be tied to chairs and to one another using gage-16 steel wire. The location of the reinforcement shall be recorded using Form 1. The locations of wire ties and rebar markings shall be recorded using Form 2.

Tolerances (within the test region) are:

3/16" for horizontal cover and horizontal spacing measured to the surface of the bar (excluding ribs)

1/4" for vertical distances shown in Form 1

1.3 Casting

Fresh concrete properties to be measured include:

Unit Weight
Slump
Air Content

These measurements shall be made following the Specifications and recorded using Form 3.

BECHTEL POWER CORPORATION										
SUPPLIER DOCUMENT REVIEW										
CLASSIFICATION & STATUS										
<input type="checkbox"/> Nuclear Safety-Related			<input type="checkbox"/> Augmented Quality			<input checked="" type="checkbox"/> Non-Safety-Related				
STATUS CODE:										
1 <input checked="" type="checkbox"/> Work may proceed			3 <input type="checkbox"/> Rejected. Revise and Resubmit.							
1C <input type="checkbox"/> Work may proceed. Editorial comments need only be incorporated if revised for other purposes.			4 <input type="checkbox"/> Review not required. Work may proceed.							
2 <input type="checkbox"/> Revise and resubmit. Work may proceed subject to incorporation of changes indicated										
Permission to proceed does not constitute acceptance or approval of design details, calculations, analysis, test methods, or materials developed or selected by the Supplier and does not relieve the Supplier from full compliance with contractual obligations.										
Reviewed by	Arch	Civil	CS	Elect	Mech	MET	PD	Const	Startup	STE
	N/A	RL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Status By:	Ridgely						Date: 5/18/12			

Revision 1

1

Slump shall be measured before any other activity related to casting takes place to make sure that the delivered mix has satisfactory workability. The mixing truck shall deliver a ticket with the batched mix weights. These weights shall be examined to corroborate that the delivered mix has the specified proportions. Concrete shall not be accepted if it arrives more than 45 min. after leaving the batching plant. No water shall be added to the mix after the truck leaves the plant.

Specimens and cylinders shall be cast and vibrated in two lifts following the Specifications. The vibrators to be used shall have the following cross-sectional dimensions:

For cylinders: $3/4'' - 7/8''$
For Larger Specimens: $1-3/4''$

Their frequencies shall be between 50 and 200 Hz.

Excess concrete shall be removed off the formwork. The exposed surfaces of the specimens shall be finished using cast magnesium floats. Lifting inserts shall be inserted in the fresh concrete as soon as the finishing is completed.

Each test beam shall be cast using concrete from a single mixing truck. A complete set of concrete samples (cylinders) shall be obtained from each truck. Test beams and samples shall be marked with a number referring to the truck from which they were cast and the date of casting. In each casting day, trucks shall be numbered sequentially starting at 1. The number assigned to a truck shall be written clearly on the mix ticket describing the mix proportions for the batch. Test beams shall be cast and tested oriented in the North-South axis of the laboratory. During finishing, the north end of each beam shall be marked with the letter N.

These activities shall be documented using Form 3

1.4 Curing

As soon as casting is completed all specimens shall be covered with impermeable sheets. When the concrete surface sets, wet burlap shall be inserted between these sheets and the exposed concrete. All formwork and molds shall be struck no later than three days after the cast.

All exposed concrete surfaces shall be covered by wet burlap and impermeable sheets for a total of at least seven days after casting.

Burlap shall be doused with water at least every other day during the curing period.

Curing activities shall be logged using Form 4.

Test cylinders shall be stored and cured next to the test specimens and under similar conditions of temperature and humidity.

The variation of concrete strength with time shall be monitored as specified in the Specifications. The results of cylinder tests shall be recorded using Form 5.

2. Calibration

Three types of measurements will be made: displacement, force, air content.

The apparatuses to be used to calibrate sensors to measure these quantities are:

Displacement Sensors: INSTRON Universal Testing Machine (S.N.:)

Load Sensors: INSTRON Universal Testing Machine (S.N.:)

Air Content: Calibrated Cylinder (S.N.)

Load and displacement sensors will be calibrated following steps listed below:

- 1) Connect the sensor to the data-acquisition system that is going to be used in the test
- 2) Set and record the excitation voltage to the maximum possible value (not exceeding the maxima specified for the data-acquisition system and the sensor)
- 3) Set the data-acquisition equipment to record voltage
- 4) Set the gain of the data-acquisition system to the first available level lower than the ratio of the maximum range of the system to the maximum expected output from the sensor.
- 5) Mount the sensor on the universal testing machine
- 6) Apply a series of known displacement or force increments to the sensor ranging between 10% and 90% of the rated capacity of the sensor
- 7) Record the voltage read on the data-acquisition system at each known displacement or force increment
- 8) Create a plot of change in output voltage vs. change in force or displacement
- 9) Fit a line to the plot from 7) using "least squares"
- 10) Record the slope of the line from 8) (sensor sensitivity)
- 11) Label the cable used in the calibration with the serial number of the sensor

Sensors shall be calibrated before ~~and after each test~~ the first test and after the final test.

The apparatus used to measure air content of the fresh concrete shall be calibrated following the procedure described in ASTM standard 231. Form 6B shall be used to document the calibration.

All calibrations shall be performed by at least two persons: one leading each step and the other checking the work of the first independently. A log of each calibration shall be made using Form 6 and it shall include an estimate of the accuracy of the sensor.

Sensors for which the sensitivity obtained in 9) above deviates by more than 105% from the nominal sensitivity (as reported by the manufacturer) shall not be used in any of the tests.

3. Setup

Each test beam shall be placed on two roller supports as described in the attached proposal. The final location of the supports shall be measured (to the nearest 1/16 in.) and reported using Form 7. As-built external dimensions of each test beam shall be recorded using the same form. The maximum deviation from nominal dimensions in the test region shall be ¼ in.

The test beam shall be placed with the reinforcement facing up as shown in the attached proposal.

The shear spans shall be reinforced with external stirrups (pairs of 5/8-in threaded rods) installed at a spacing not exceeding 12 in. The locations of the stirrups shall be measured. The measurements shall be recorded using Form 7.

The loading rigs (consisting of a loading tube, two hydraulic rams, two threaded rods, plates and nuts, and one load cell per rig) shall be placed on the test specimen and connected to "the strong floor" of the laboratory (without applying load to the specimen other than the weight of the rigs) as described in the attached proposal. The rams in each rig shall be connected to a single manifold and pump using 10,000-psi hydraulic hoses. All hoses and other hydraulic hardware shall be inspected visually and replaced –if defective- before testing.

4. Instrumentation

Displacement sensors shall be installed at midspan, at each support, and at each load point. They shall be secured to the strong floor of the laboratory directly below the point where displacement is to be measured.

All sensors (displacement and force) shall be connected to the data acquisition system using the same cables used during calibration. The excitation voltage and gain shall also be set to the value used in calibration. The data acquisition system shall be set to record voltage changes caused by loading. Before applying load with the hydraulic rams, all sensors shall be set to read a voltage value between 10% and 90% of the voltage output of the sensor at its rated capacity. These voltages shall be referred to as the "zero offsets" of the sensors. If a sensor is set to have an initial

voltage exceeding 20% of its output at rated capacity, the sign of the initial "zero offset" shall be opposite to the sign of the expected change in its signal.

Set the data acquisition system to scan all sensors and save at least one record per sensor every 1 sec.

Record a file of "zero offsets" capturing at least 10 min. of data before any load is applied with the hydraulic system.

Means of initial voltages for all sensors (mean "zero offsets"), sensor serial numbers, the most recent sensitivity constants, excitation voltages, and the channels of the data-acquisition system used for each sensor shall be recorded using Form 8. The pairing of channels and sensors shall be checked by a second person working independently from the person making the initial connections.

Infrared targets to be used to measure displacements as described in the attached proposal shall be glued to one face of the test beam using epoxy adhesive. The numbering sequence of these targets shall be recorded using Form 9.

Video cameras (one for long-time lapse video and one for high-speed video) will be positioned to capture the response of the mid third of each specimen. To the extent possible, the location of the cameras shall be the same in all tests.

5. Testing

The following actions shall take place during each test:

At the end of each loading increment:

Mark Cracks: all visible cracks shall be marked using black permanent markers. Cracks shall be marked by drawing lines parallel to them and with an offset of approximately 0.25 in.

Measure Crack Widths: Crack widths shall be measured using crack comparators or graduated handheld microscopes.

Measure coordinates of infrared coordinates: A set of coordinates shall be obtained using an OptoTrack System 600 Pro. A set of ~~five~~ four targets shall be attached to the strong floor, ~~or to a thick steel element at the same spacing as the targets attached to the test beam.~~ They shall be located at approximately the same distance to the OptoTrack cameras as targets attached to the test beam. Coordinates for these reference targets shall be obtained at each loading increment. They are to be used to

monitor the stability of the Optotrack system by computing the variation in the distances between reference targets.

In-Test Data Backup: At every loading increment the data being produced by the data-acquisition system shall be copied to an external hard drive.

Photographs: a set of high-resolution photographs shall be obtained after cracks are marked at each loading increment. The photographs shall include views of both elevations of the test beam and the top concrete surface above lap splices.

The following data shall be recorded throughout each test:

Sensor readings: to be recorded on a hard drive in volts. Conversion to engineering units shall be done after the test as follows:

- Subtract zero offsets
- Divide the result by the sensitivity obtained in the most recent calibration

Lapse video photographs: to be obtained every 5 min.~~30 sec.~~

Actions to be taken at failure

Trigger high-speed camera to record breaking away of the concrete cover and relative movement of the bars.

Actions to be taken after test

Generate a record of sensors that may have malfunctioned or been accidentally moved during the test

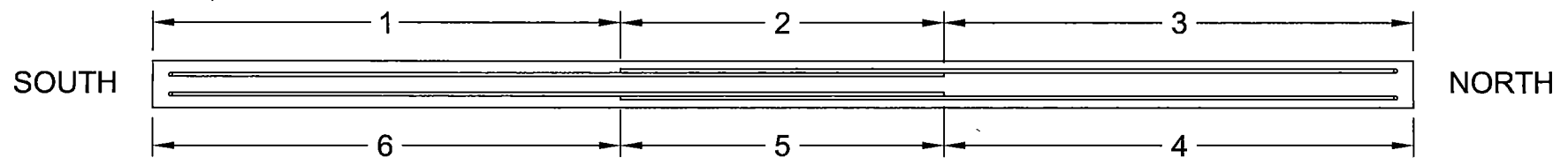
Remove from all files recordings from sensors for which the results of the after-test calibration differ by more than 5% from the before-test calibration.

6. Reporting and Backup

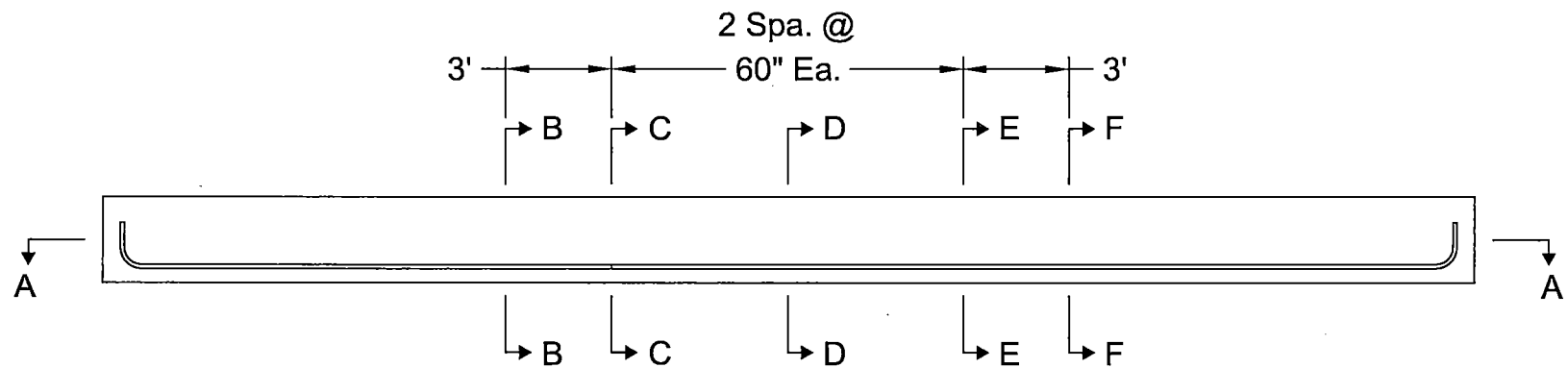
Produce all the captured data in two ways:

- By uploading data, photos, and video to a private project at nees.org.
- By recording all data, photos, and video on a magnetic hard drive

Reports shall be produced as described in the Specifications.



Section A-A



*For section B-B through F-F see Sheet 3 of 3

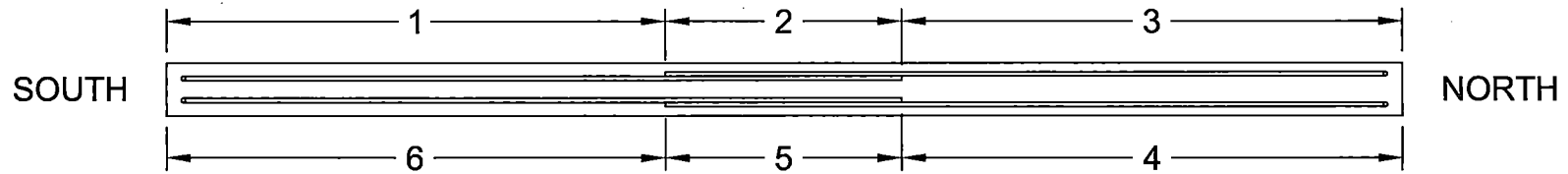
Series A



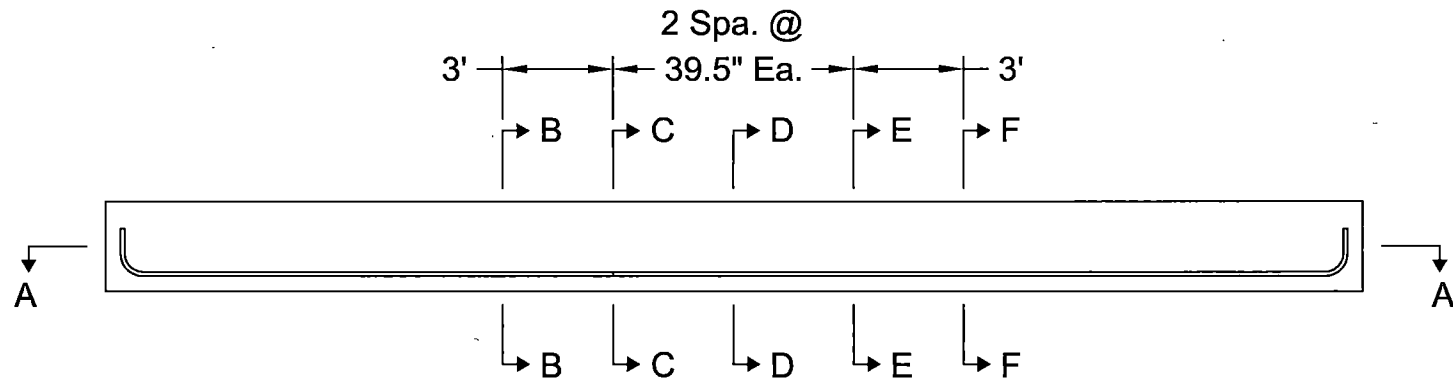
Drawing: Series A Formwork As-builts

Project: Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars

Sheet:	1	of	3
Drawn by:	BPR	Checked by:	SP
Date:	04/04/2012		



Section A-A



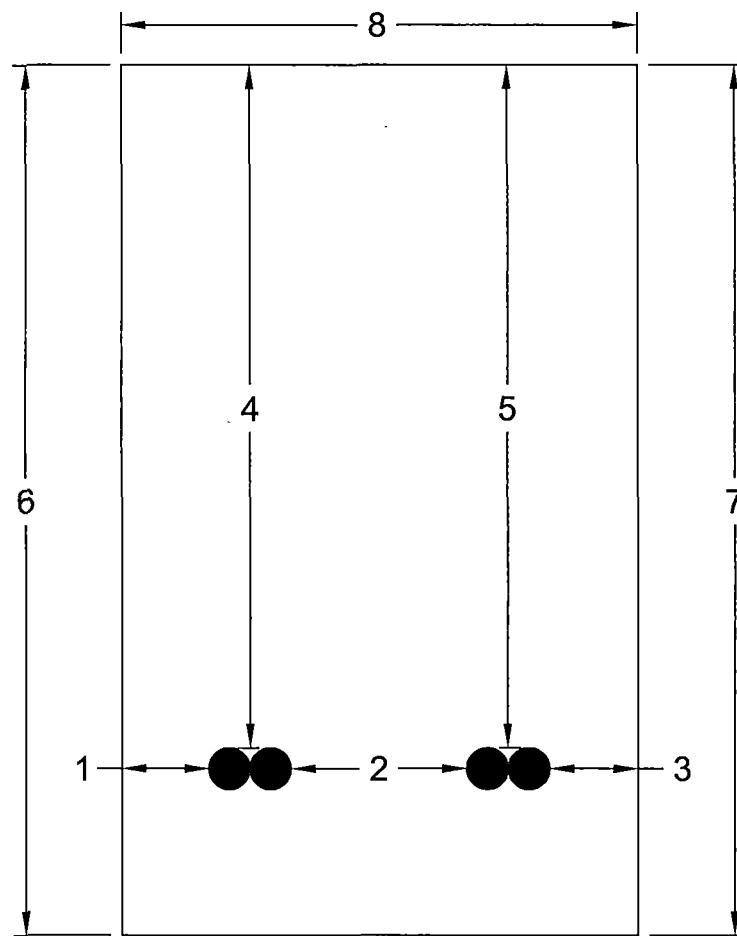
*For section B-B through F-F see Sheet 3 of 3

Series B

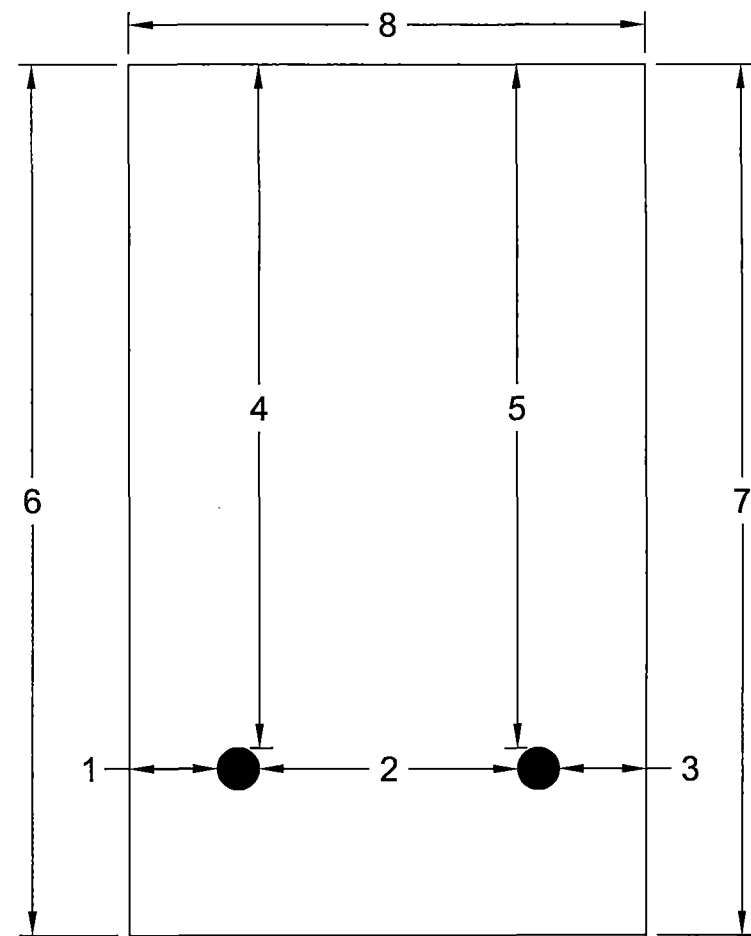


Drawing: Series B Formwork As-builts
Project: Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars

Sheet:	2	of	3
Drawn by:	BPR	Checked by:	SP
Date:	04/04/2012		



Section C-C, D-D, & E-E
*Facing North



Section B-B & F-F
*Facing North



Drawing:	Formwork As-built Sections	Sheet:	3	of	3
Project:	Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars	Drawn by:	BPR	Checked by:	SP
		Date:	04/04/2012		

Form 1

Project: Tests to Determine the
Behavior of Spliced #11 Bars

As-built Dimensions v.1
(Rev. 04/04/2012)

Specimen: _____

Sheet 1 of 2

Section	Formwork As-built Dimensions							
	1	2	3	4	5	6	7	8
A-A								
B-B								
C-C								
D-D								
E-E								
F-F								
Recorded by:			Signature				Date	Time
Checked by:			Signature				Date	Time
Checked by:			Signature				Date	Time
Comments:								
*See formwork as-built drawings for dimension locations								

Project: Tests to Determine the
Behavior of Spliced #11 Bars

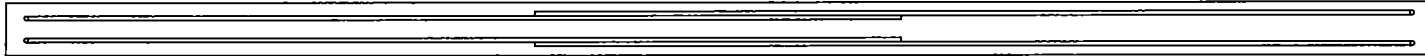
As-built Dimensions v.1
(Rev. 04/04/2012)

Specimen: _____

Sheet 2 of 2

Section	Formwork As-built Dimensions Key - Series A							
	1	2	3	4	5	6	7	8
A-A	14'-6"	10'-0"	14'-6"	14'-6"	10'-0"	14'-6"	N/A	N/A
B-B	4-3/8"	6"	4-3/8"	23-5/8"	23-5/8"	30"	30"	17-5/8"
C-C	3"	6"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
D-D	3"	6"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
E-E	3"	6"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
F-F	3"	8-3/4"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
Section	Formwork As-built Dimensions Key - Series B							
	1	2	3	4	5	6	7	8
A-A	13'-10.5"	6'-7"	13'-10.5"	13'-10.5"	6'-7"	13'-10.5"	N/A	N/A
B-B	4-3/8"	6"	4-3/8"	23-5/8"	23-5/8"	30"	30"	17-5/8"
C-C	3"	6"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
D-D	3"	6"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
E-E	3"	6"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"
F-F	3"	8-3/4"	3"	23-5/8"	23-5/8"	30"	30"	17-5/8"

Wire Ties



NORTH

Bar Marks



NORTH



Specimen:

Project:

Behavior of Lap Splices of No.
11 Reinforcing Bars

Drawn by:

Date:

Checked by:

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Casting Documentation v.1
(Rev. 03/30/2012)

Specimen: _____

Sheet 1 of 1

General Information					
Date	Disp Ticket Num	Truck No.	Time on Ticket	Time of Arrival	Temp. in Lab
Measurements made upon arrival of concrete					
Slump (ASTM C143 - 10a)		Air Content (ASTM C231 - 10)			
Time ₁	Result ₁	Time ₁	Result ₁	S/N of Air Meter	
Time ₂	Result ₂	Time ₂	Result ₂	S/N of Scale	
Unit Weight (ASTM C138 - 10b)					
Time ₁	Wt. of Cont. ₁	Total Wt. ₁	Wt. of Conc. ₁	Result ₁ = Wt. of Conc./Vol. of Cont.	
Time ₂	Wt. of Cont. ₂	Total Wt. ₂	Wt. of Conc. ₂	Result ₂ = Wt. of Conc./Vol. of Cont.	
Times of actions during and after casting					
Layer 1 placed	Layer 1 vibration complete	Layer 2 placed	Layer 2 vibration complete	Top surface struck off	Truck Departing Lab
Lifting Inserts Placed	Covered with plastic	Plastic removed	Covered with burlap	Burlap doused with water	Covered with plastic
Recorded by		Signature		Date	Time
Checked by		Signature		Date	Time
Checked by		Signature		Date	Time
Comments:					
*The following ASTM standards and specifications will be followed during casting: C172-10, C192-07, C470-09					

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Curing Documentation v.1
(Rev. 03/30/2012)

Purdue University - Bowen Laboratory
Sheet 1 of 1

General Information			
Specimen(s)	Date	Specimen Age	
	Time Beginning	Time Ending	
	Temperature inside Lab (deg. F)		
Description of Work Performed			
Recorded by	Signature	Date	Time
Checked by	Signature	Date	Time
Checked by	Signature	Date	Time
Comments:			
*Test specimens and associated cylinders are to be cured under wet burlap for seven days			

Form 5

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Cylinder Compression Tests Documentation v.2
(Rev. 04/01/2012)

Specimen: _____

Sheet 1 of 2

Specimen	Date	Time of Test	Wet/Dry	Diameter [nearest 0.01 in.]		Length [nearest 0.05 in.]			P _{max} [lb _f]	Fracture Type (1-6)
				1	2	1	2	3		
1										
2										
3										
4										
5										
6										
S/N of Testing Machine:										
Recorded by:			Signature				Date		Time	
Checked by:			Signature				Date		Time	
Checked by:			Signature				Date		Time	
Comments:										
<p>*Cylinders to be test per ASTM C-39-12 and C-1231-10a with a loading rate of 60,000lb_f/min at concrete ages of 3, 7, 14, 28 days, and on same day that test of corresponding specimen is conducted. Specimens and caps free of defects unless otherwise noted in comments. Average cylinder diameter and area and unit compressive stress (f'_c) calculated on sheet 2 of 2.</p>										

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Cylinder Compression Tests Documentation v.2
(Rev. 04/01/2012)

Specimen: _____

Sheet 2 of 2

Specimen	Date	Age	Time of Test	Wet/Dry	Average Measured Dia. [in.]	Cross-sectional Area [in ²]	P _{max} [lb _f]	f' _c [psi]	Fracture Type (1-6)
1	0-Jan		12:00 AM	0	#DIV/0!	#DIV/0!	0	#DIV/0!	0
2	0-Jan		12:00 AM	0	#DIV/0!	#DIV/0!	0	#DIV/0!	0
3	0-Jan		12:00 AM	0	#DIV/0!	#DIV/0!	0	#DIV/0!	0
4									
5									
6									
S/N of Testing Machine:									
Recorded by:			Signature				Date	Time	
0							0	0	
Checked by:			Signature				Date	Time	
0							0	0	
Checked by:			Signature				Date	Time	
Comments:									
<p>*Cylinders to be test per ASTM C-39-12 and C-1231-10a with a loading rate of 60,000lb_f/min at concrete ages of 3, 7, 14, 28 days, and on same day that test of corresponding specimen is conducted. Specimens and caps free of defects unless otherwise noted in comments. Recorded data is shown on sheet 1 of 2.</p>									

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Calibration Documentation v.1
(Rev. 04/02/2012)

Bowen Lab - Purdue University
Sheet 1 of 1

Calibration Instrument Name and S.N.:					
Data Acquisition System:					
Gain:					
Excitation Voltage:					
Channel:					
Sensor:					
Sensor S.N.:					
Measurand	Voltage	Measurand	Voltage	Measurand	Voltage
Operator		Signature		Date	Time
Checked by		Signature		Date	Time
Checked by		Signature		Date	Time
Results		Sensitivity		Accuracy	
Notes:					

Revision 1

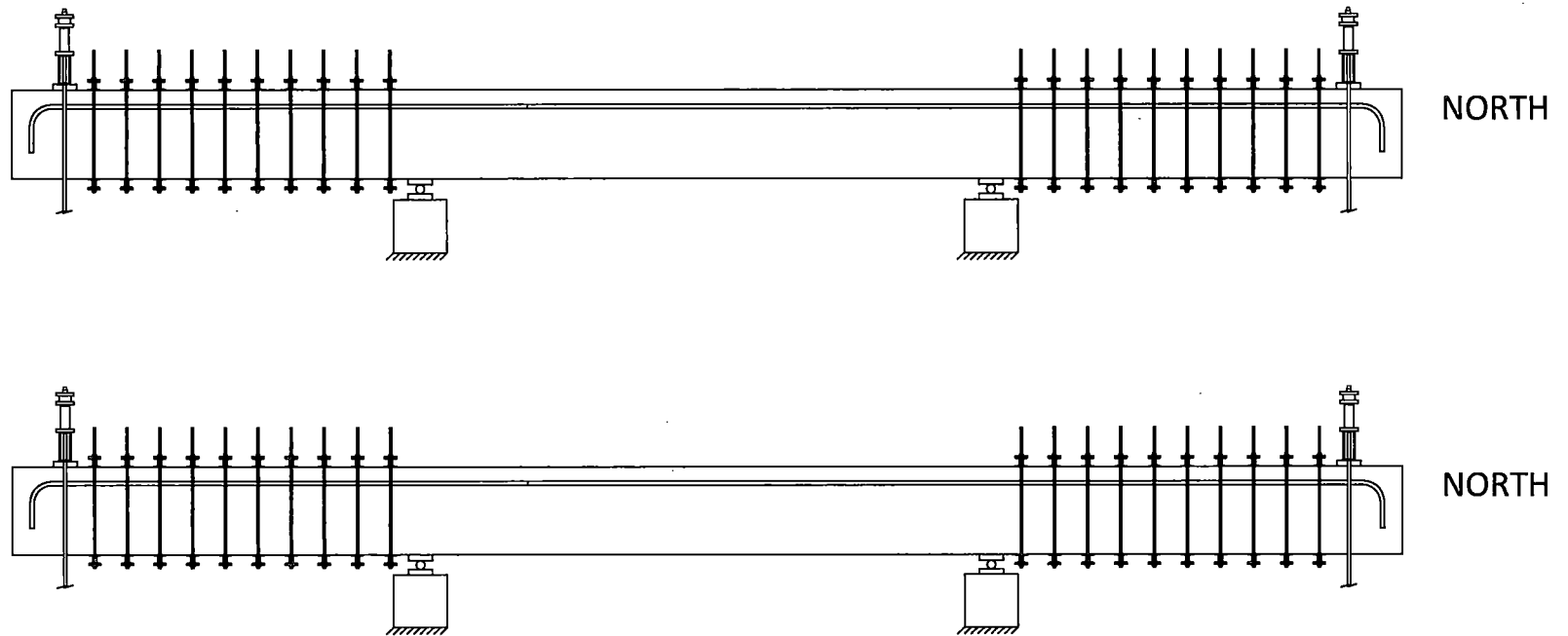
REDACTED VERSION

Project: Tests to Determine the Behavior of Spliced #11 Bars

Calibration Documentation v.1
(Rev. 04/06/2012)

Bowen Lab - Purdue University
Sheet 1 of 1

Meter S.N.			
Type of Meter			
Meter Brand Name			
Ambient Temperature			
		Target Air Content	Measured Air Content
Operator	Signature	Date	Time
Checked by	Signature	Date	Time
Checked by	Signature	Date	Time
Notes:			



Specimen

Behavior of Lap Splices of No. 11
Reinforcing Bars

Sheet:

1

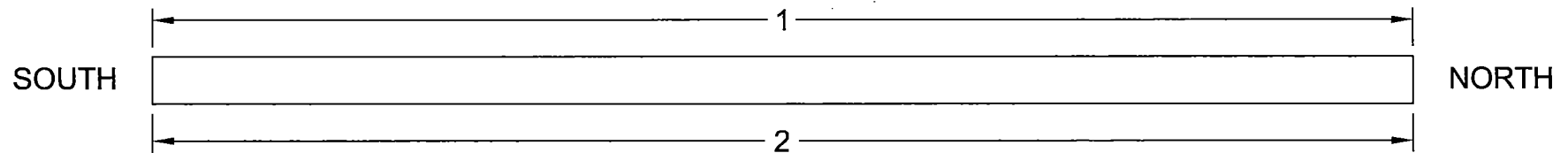
of

4

Drawn by:

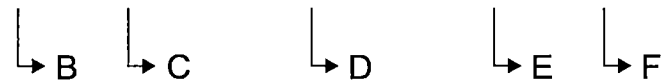
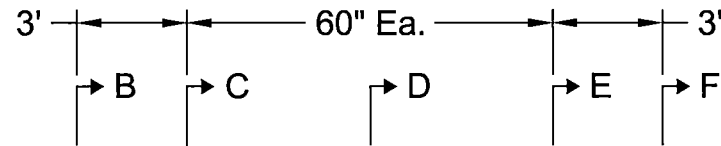
Checked by:

Date:



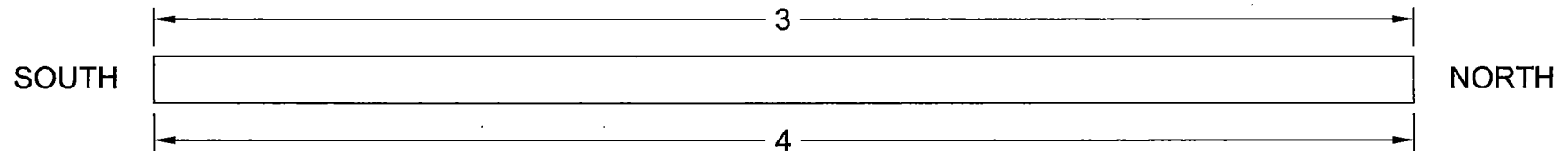
Top Plan

2 Spa. @



Profile

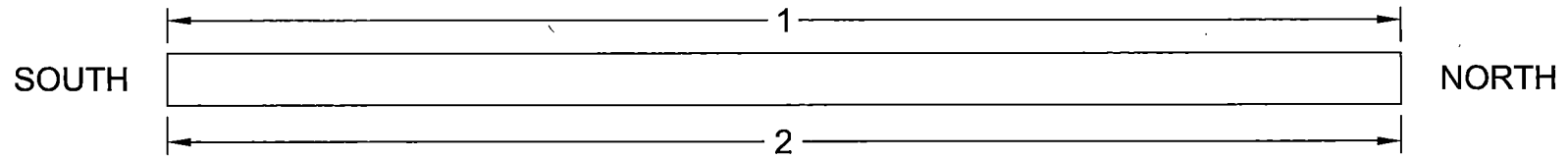
*For section B-B through F-F see Sheet 3 of 3



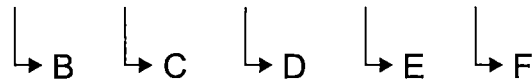
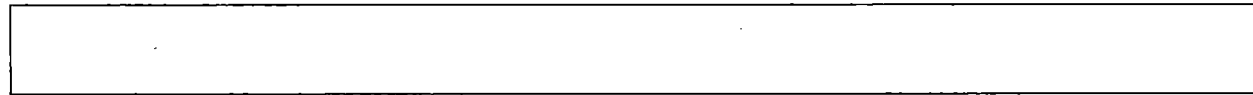
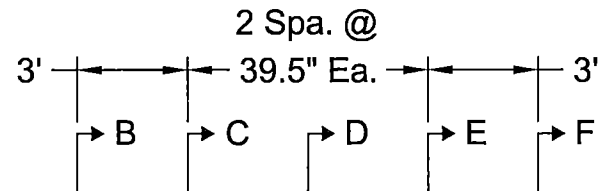
Bottom Plan



Drawing:	Series A Concrete As-builts	Sheet:	2	of	4
Project:	Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars	Drawn by:	BPR	Checked by:	SP
		Date:	04/04/2012		

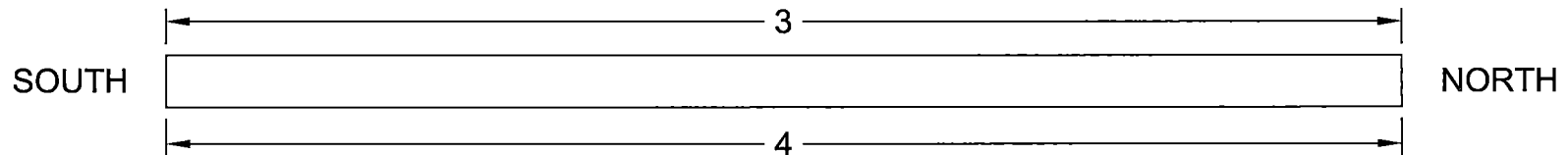


Top Plan



Profile

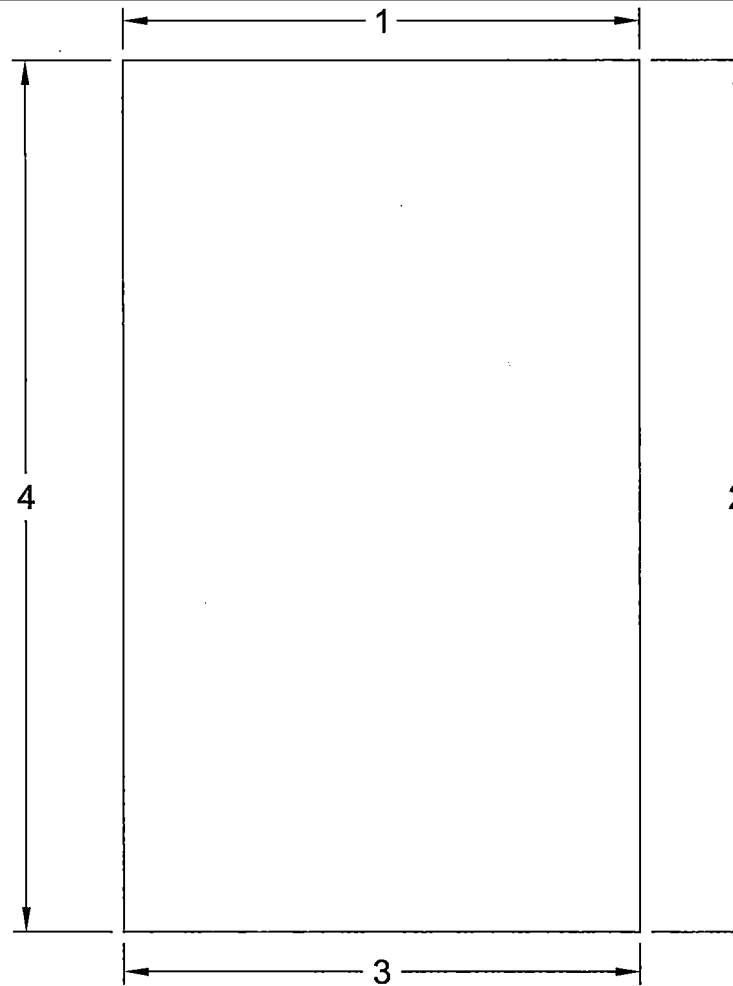
*For section B-B through F-F see Sheet 3 of 3



Bottom Plan



Drawing:	Series B Concrete As-builts	Sheet:	3	of	4
Project:	Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars	Drawn by:	BPR	Checked by:	SP
		Date:	04/04/2012		



Section B-B, C-C, D-D, E-E & F-F
*Facing North



Drawing:	Concrete As-built Sections	Sheet:	4	of	4
Project:	Experimental Investigation of Capacity of Lap Splices of No. 11 Reinforcing Bars	Drawn by:	BPR	Checked by:	SP
		Date:	04/04/2012		

Form 7

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Setup and As-built Dimensions v.1
(Rev. 04/04/2012)

Specimen: _____

Sheet 1 of 2

Section	Concrete As-built Dimensions							
	1	2	3	4	5	6	7	8
Plan								
B-B								
C-C								
D-D								
E-E								
F-F								
Recorded by:			Signature				Date	Time
Checked by:			Signature				Date	Time
Checked by:			Signature				Date	Time
Comments:								
*See concrete as-built drawings for dimension locations								

Form 7

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Setup and As-built Dimensions v.1
(Rev. 04/04/2012)

Specimen: _____

Sheet 2 of 2

Section	Concrete As-built Dimensions Key - Series A							
	1	2	3	4	5	6	7	8
Plan	39'-0"	39'-0"	39'-0"	39'-0"	N/A	N/A	N/A	N/A
B-B	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
C-C	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
D-D	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
E-E	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
F-F	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
Section	Concrete As-built Dimensions Key - Series B							
	1	2	3	4	5	6	7	8
Plan	34'-4"	34'-4"	34'-4"	34'-4"	N/A	N/A	N/A	N/A
B-B	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
C-C	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
D-D	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
E-E	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A
F-F	17-5/8"	30"	17-5/8"	30"	N/A	N/A	N/A	N/A

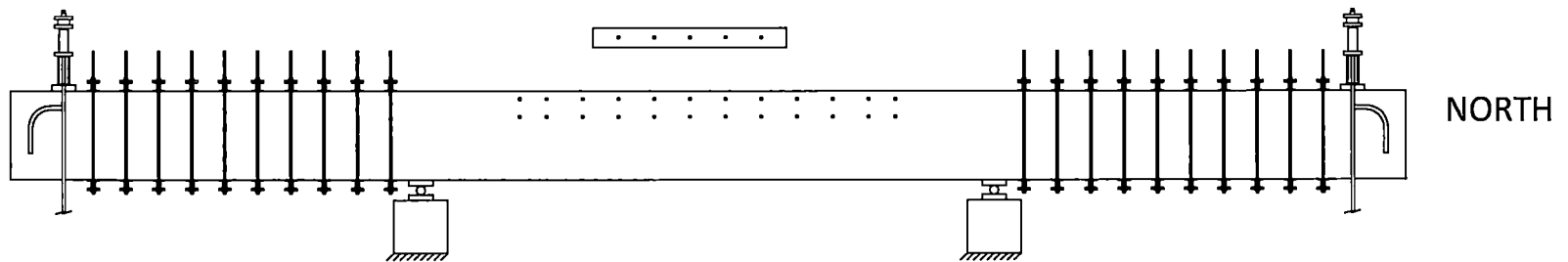
Form 8

Project: Tests to Determine the
Behavior of Spliced #11 Bars

Instrumentation Documentation v.1
(Rev. 04/01/2012)

Specimen: _____
Sheet _____ of _____

Data Acquisition System:								
Channel #	Gain	Excitation V.	Sensor	S.N.	Sensitivity	Zero Offset	Location	Comments
Operator		Signature			Date		Time	
Checked by		Signature			Date		Time	
Checked by		Signature			Date		Time	
Notes:								



Specimen

Behavior of Lap Splices of No. 11
Reinforcing Bars

Drawn by:

Checked by:

Date:

Munshi, Javeed

From: Santiago Pujol [spujol@ecn.purdue.edu]
Sent: Monday, June 11, 2012 11:08 AM
To: Munshi, Javeed
Cc: Kummer, Louis; Brian P Richter; Mete A Sozen
Subject: Re: FW: crs

Javeed,

We added the following sentence to the procedure:

"The maximum deviation from nominal setup dimensions shall be 1/4 in."

We are uploading the updated procedure to the NEEShub now.

We set everything up within this tolerance. The results were not affected by the omission in the text.

-Santiago Pujol

On Mon, 11 Jun 2012, Munshi, Javeed wrote:


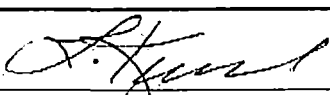

> Santiago: our QA has issue the following CR that needs your correction and response:
 >
 > "Tests to Determine the Behavior of #11 Bars with Lap Splices",
 > Section 3.0 -"Setup" states that each test beam shall be placed on two
 > roller supports at the specified distance described in the proposal.
 > The distance specified in the "Proposal to FENCE Experimental
 > Investigation of Capacity of Lap Splices of No. 11 Bar", page 4, Figure 1, Proposed
 Specimens - Test Series B is 9'8.5" from each end of the test beam with a span of 12'7"
 between the roller supports, and was to be measured to the nearest 1/16 in per the test
 procedure. However, neither the test procedure nor the proposal specify an acceptable
 deviation tolerance for this measurement.
 >
 > Please revise your test procedure or attach addendum to address the above CR and send a
 copy for approval. Also, please verify that the above did not have any impact on the results
 of the tests.
 >
 > This action needs to be taken ASAP, please.
 >
 > Regards,
 > Javeed
 >
 > From: Kummer, Louis
 > Sent: Monday, June 11, 2012 9:43 AM
 > To: Munshi, Javeed
 > Cc: Vessels, Benjamin; Steele, Jim B
 > Subject: RE: crs
 >
 > Drag and drop the attached "ActionWay.url" file to your desktop, then click on it. It will
 bring you to the ActionWay site. You should be able to get to the CRs that way. I've also
 attached .pdf versions.

>
> Lou Kummer
> PQAM
> Davis Besse SGR
> BP2-3D4
> Office: 419-321-7758
> Cell: 301-514-9433
>
> From: Munshi, Javeed
> Sent: Monday, June 11, 2012 8:53 AM
> To: Kummer, Louis
> Subject: crs
>
> Can you send me pdf or word files of your crs?
>
> Best Regards,
>
> Javeed Munshi
> Principal Engineer
> Bechtel Power Corporation
> 5275 Westview Drive
> Frederick, MD 21703 - 8306
> Ph: (301) 228 8281
> Fax: (301) 682 6785
>
>

Actions						
Action Identifier	Condition Report	Current State	Action Due Date			
ACT-01-23568-000-GCA-GAMG-00009	23568-000-GCA-GAMG-00009	[Closed]	06/15/2012			
Actionee						
Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)						
Title						
Communicate with Purdue University						
Action Description						
Send an email to Prof. Sozeen and Sabtiago to update the test procedure to reflect the required tolerances.						
Response						
action completed						
Summarized Comments						
[Responsible Person Approval] Comments:						
approved						
Added By Munshi, Javeed on 2012-06-18						

Initiator	Date Created	CR Significance Level	Response Completed On			
Munshi, Javeed A	06/15/2012	C	06/18/2012			
Days Open	Date Closed					
	06/18/2012					
Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[Initiate]	Completed	Munshi, Javeed	Munshi, Javeed	06/15/2012 13:14 EDT	Munshi, Javeed	06/15/2012 13:14 EDT
[Hold for Release]	Completed	Munshi, Javeed	Munshi, Javeed	06/15/2012 13:14 EDT	Munshi, Javeed	06/18/2012 06:55 EDT
[Respond]	Completed	Munshi, Javeed	Munshi, Javeed	06/18/2012 06:55 EDT	Munshi, Javeed	06/18/2012 06:57 EDT
[Responsible Person Approval]	Completed	Munshi, Javeed	Munshi, Javeed	06/18/2012 06:57 EDT	Munshi, Javeed	06/18/2012 06:57 EDT
[Close]	Completed		Munshi, Javeed	06/18/2012 06:57 EDT	Munshi, Javeed	06/18/2012 06:57 EDT

Appendix C.3 - University of Kansas Quality Surveillance Report

		QUALITY SERVICES DEPARTMENT QUALITY SURVEILLANCE REPORT (QSR)		QSR NO.: 25539-000-QSVS-12-002-000 REV. 000 PAGE: 1 of 2 Date: 04/28/12	
Project Name/Function: Davis Besse SGR Project				Safety Related: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Project No.: 25539				Quality Related: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Surveillance Subjects: Surveillance of the University of Kansas – Observation of Concrete/Rebar Research and Testing Activities Associated with the Davis Besse Project				ASME Section III Related: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Responsible Manager/Title: Javeed Munshi, Principal Engineer Civil / Structural			Department/Function: Civil / Structural / Architectural		
PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS: Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, (1 st draft) University of Kansas, "Effect of Simulated Cracks on Lap Splice Strength of Reinforcing Bars, dated 03/22/12					
CHARACTERISTICS / DETAILS OF THE SURVEILLANCE SCOPE: A surveillance was performed on 03/29/12 at the University of Kansas, Learned Hall Lab facility to assess the university's readiness to conduct testing activities as a part of an assessment of the Davis Besse shield building crack investigation being conducted by FirstEnergy, at the Davis Besse Site. This work is being performed by the University of Kansas in cooperation with Bechtel engineering personnel assigned to this task.					
METHODS USED DURING THE SURVEILLANCE: <input checked="" type="checkbox"/> Interview(s) <input checked="" type="checkbox"/> Document Review <input checked="" type="checkbox"/> Observation					
RESULTS: <div style="float: right;"> Unsatisfactory <input type="checkbox"/> Satisfactory <input checked="" type="checkbox"/> </div> <p>An interview with the University of Kansas, Learned Hall staff personnel assigned to perform testing and research activities for FirstEnergy, Davis Besse Site was conducted to evaluate the university's ability to perform these activities in accordance with Bechtel Specification 25539-000-3PS-SY01-00001 (draft), and the University of Kansas test procedure detailed in a proposal titled "Effect of Simulated Cracks on Lap Splice Strength of Reinforcing Bars" provided by the University on 03/22/12. The University of Kansas staff members associated with the testing activities mentioned that the University has not completed an agreement with FirstEnergy to perform the work based in the scope outlined in the original proposal. The test procedure itself is still in development.</p> <p>The review of the proposed test procedure performed during the surveillance in conjunction with interviews and a physical tour of the Learned Hall facility indicated that the following areas need to be enhanced to properly detail and document the testing activities: (as currently defined)</p> <ul style="list-style-type: none"> Prescribing the recipe of the Concrete Batch (finalized) Determining the critical characteristics, including dimensions of the cast forms and rebar prior to placement of concrete Concrete Batching Operation Placing Concrete into Forms Curing and Compressive Testing of Concrete Samples Test Setup and Verification Prior to performing the testing activities Data sampling and recording of critical characteristics during the actual test performance Testing of the Test Specimen Additional data sheets designed to capture critical activities not previously submitted 					
CAR(s) or CR(s) No.: N/A					
Surveillance By: L. Kummer 				DATE: 04/28/12	
Approved By: L. Kummer 				DATE: 04/28/12	



QUALITY SERVICES DEPARTMENT
QUALITY SURVEILLANCE REPORT (QSR)
 (Continuation Sheet)

QSR NO.: 25539-000-QSVS-12-002-000
 REV. 000
 PAGE 2 of 2
 Date: 04/28/12

PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):

Results continued:

Midwest Concrete Materials (MCM), the concrete batch plant used by the University of Kansas to batch concrete for their experiments and research projects was also assessed during the visit. A tour of the batch plant was conducted in conjunction with an interview with the plant supervisor during the evaluation. The following batch plant calibration certificates were also examined to ensure plant equipment had current calibrations of its batch processing equipment:

1. WH Scale Co. Inc. – Batch Plant Test/Calibration Report Sheet, dated 03/23/11, Plant/Scale Make: Alkon Sperturn Easy Cal Series – This calibration included the cement scale and 3 aggregate scales
2. WH Scale Co. Inc. – Batch Plant Test/Calibration Report Sheet, dated 03/16/12, Plant/Scale Make: Alkon Sperturn Easy Cal Series - This calibration included the cement scale and 3 aggregate scales
 *The aggregate #1 scale initially did not calibrate. Issues with this scale were resolved and the re-calibration was acceptable
3. WH Scale Co. Inc. – Batch Plant Test/Calibration Report Sheet, dated 11/02/11, Plant/Scale Make: Alkon Sperturn Easy Cal Series - This calibration included the cement scale and 3 aggregate scales
4. W.R. Grace Dispenser Calibration Report, Admixture dispenser, State DOT type calibration, dated 08/31/11

The University of Kansas had previously provided the following information, which was reviewed and factored into the evaluation performed during this surveillance:

- Calibration records for instrumentation used for performing tests at the Learned Hall Lab
- Batch Plant weight scale calibration records (reviewed above)
- Batching equipment operational procedures
- Batch plant mix records
- Test fixture form drawings
- Technical specifications of the batching equipment
- State and Local licenses associated with the batch plant and university laboratory
- Schedules for all work evolutions
- Certificates of Calibration
- Report data sheets that contain the critical characteristics for each activity associated with the testing.

Satisfactory

Test Procedure

The University of Kansas test procedure is included as part of the original proposal, and titled "Effect of Simulated Cracks on Lap Splice Strength of Reinforcing Bars", dated 03/22/12. The test procedure section contains the testing requirements that will be used by the University of Kansas for the phase 1 portion of the work. The proposal contains a proposed study (phase 1) which will provide information needed to conduct the production study (phase 2). Page 1 of this surveillance contains a consolidated list of areas that were discussed with the University needing attention prior to conducting the work activities.

Satisfactory

DISTRIBUTION

T. M. Nixon
 R. D. Kies
 J. A. Munshi
 R. Liano
 J. B. Steele
 R. J. Reilly
 A. M. Caprarola

InfoWorks Project File

QSR NO.: 25593-000-QSVS-12-007-000
REV. 000
PAGE: 1 of 2
Date: 05/24/12

Safety Related: Yes ☐ No ☒

Quality Related: Yes ☒ No ☐

ASME Section III Related: Yes ☐ No ☒

Department/Function: Civil/Structural/Archetectural

University of Kansas, "Lap-Splice Beam Tests Structural Testing Laboratory University of Kansas, Spring 2012", dated 05/18/12
Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0, dated 04/03/12

A surveillance was performed 05/24/12 at the University of Kansas, Learned Hall Laboratory facility to observe the batching and placement of concrete during the formation of test blocks as a part of an investigation of a Davis Besse containment shield building concrete cracking problems being conducted by FirstEnergy. These test blocks will be used by the University of Kansas to conduct tests designed to show that the cracks in the shield building either have an effect on, or do not have an effect on the building's ability to meet the original design specifications. This work is being performed by the University of Kansas at the Learned Hall Facility with oversight being performed by Bechtel QA/QC/Engineering personnel. Some of the specific activities observed during this surveillance included Bechtel QC performing and documenting the following inspections: concrete batch temperature testing, slump testing, placement and vibration of concrete, placement and finishing of test sample cylinders, and final finishing of concrete forms. Previously submitted concrete batch plant certifications along with batch plant calibration certificates in conjunction with certifications of calibration provided by the University of Kansas for instruments to be used during testing were also reviewed and accepted.

☒ Interview(s) ☒ Document Review ☒ Observation

Unsatisfactory ☐ **Satisfactory** ☒

Test Procedure

- Prescribing the recipe of the Concrete Batch (finalized)
- Determining the critical characteristics, including dimensions of the cast forms and rebar prior to placement of concrete
- Concrete Batching Operation
- Placing Concrete into Forms
- Curing and Compressive Testing of Concrete Samples
- Test Setup and Verification Prior to performing the testing activities
- Data sampling and recording of critical characteristics during the actual test performance
- Testing of the Test Specimen
- Additional data sheets designed to capture critical activities not previously submitted

Satisfactory

Surveillance By: L. Kummer

DATE: 05/30/12

Approved By: L. Kummer

DATE: 05/30/12



QUALITY SERVICES DEPARTMENT
QUALITY SURVEILLANCE REPORT (QSR)
(Continuation Sheet)

QSR NO.: 25593-000-QSVS-12-007-000

REV. 000

PAGE 2 of 2

Date: 05/24/12

PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):

RESULTS cont.

Batch Plant Weight Scale Calibrations

Reviews conducted of the batch plant certification for Midwest Concrete Materials (MCM) indicated that the plant scales had last been calibrated in 03/16/12. WH Scale Co., Inc. of Topeka, KA had performed the calibrations. These certifications were provided by the University of Kansas on 03/24/12 by an email from Dr. David Darwin. Included with the WH Scale Co. calibrations were calibrations performed by WR Grace on 08/31/11. These were calibrations associated with the admixture dispenser used by MCM.

Satisfactory

Placement of Concrete into Pre-built forms

The University of Kansas staff and graduate students had pre-staged the formwork in anticipation of the placement of concrete. The formwork was pre-inspected by Bechtel QC the day before the placement of concrete. The formwork was assembled per the requirements contained in the "Lap-Splice Beam Tests Structural Testing Laboratory University of Kansas, Spring 2012", dated 05/18/12, section 1 "Fabrication". Prior to placement of the concrete, inspections were performed by Bechtel QC of the formwork for each placement beam, and included: installation of the rebar; installation of the reinforcement cages. Along with material verification, additional measurements were taken of forms and rebar to ensure they met the design dimensions specified in the test procedure.

One concrete truck delivered the concrete to the lab for placement of beams 1, 2 and 3. These beams are associated with and configured to have 79" rebar overlap. As the placement of concrete took place, I also observed Bechtel QC verifying and recording concrete temperature, slump testing, verification of batch tickets for each truck delivered, and placement of the concrete into the forms in conjunction with vibration of the concrete to eliminate air pockets.

Interviews with the University of Kansas Project Manager conducted during this evolution identified that an additional set of test beams will be developed to address the 120" rebar overlap at a later date. These beams will be identified as Beam 1, 2, and 3.

Satisfactory

Concrete Test Cylinders

Observed and verified the University of Kansas staff in conjunction with the Bechtel QC inspector taking concrete fifteen (15) cylinder samples to be used periodically to test the compressive strength of the concrete during the required cure period. Verifications will be performed by Bechtel QC to ensure that the testing of cylinders is performed in accordance with the test procedure requirements. This information will be used to qualify the concrete beams prior to performing testing. It is the intention of the University of Kansas to conduct testing after a 7 day cure.

Satisfactory

QSR NO.: 25593-000-QSVS-12-008-000
REV. 000
PAGE: 1 of 2
Date: 05/31/12

Safety Related: Yes ☐ No ☒

Quality Related: Yes ☒ No ☐

ASME Section III Related: Yes ☐ No ☒

Department/Function: Civil/Structural/Archetectural

University of Kansas, "Lap-Splice Beam Tests Structural Testing Laboratory University of Kansas, Spring 2012", dated 05/18/12
Bechtel Engineering Specification for Concrete Specimen Testing Services, 25539-000-3PS-SY01-00001, Rev. 0, dated 04/03/12

A surveillance was performed 05/31/12 at the University of Kansas, Learned Hall Laboratory to observe the testing of concrete test beams as a part of an investigation of a Davis Besse containment shield building concrete cracking problems being conducted by FirstEnergy. These test beams will be used by the University of Kansas to conduct tests designed to show that the cracks in the shield building either have an effect on, or do not have an effect on the building's ability to meet the original design specifications. This work is being performed by The University of Kansas at the Learned Hall Laboratory with oversight being performed by Bechtel QA/QC Engineering personnel. Some of the specific activities observed during this surveillance included Bechtel QC performing and documenting the following inspections: placement of sensors and monitoring equipment on the test beam that will be used in conjunction with performing the test.

☒ Interview(s) ☒ Document Review ☒ Observation

Unsatisfactory ☐ **Satisfactory** ☒

The following test setup prerequisites were verified to be acceptable based on test procedure "Lap-Splice Beam Tests Structural Testing Laboratory University of Kansas, Spring 2012", dated 05/18/12 prior to performing testing of beams B-1, 2 and 3:

- Batch Plant Information
- Calibration of Equipment
- Placement of Sensors
- Monitoring Equipment
- Equipment Operability Tests
- Compressive Strength Test Results
- Qualification of Individuals Conducting the Test

Testing of Concrete Beams 1, 2, 3

Observed the University of Kansas performing the testing of concrete beams 1, 2, and 3. These beams have 79" of rebar overlap, and are made up of #11 rebar. Compressive strength test results for beams 1, 2, and 3 sample cylinders taken during the concrete placement process indicated that the compressive strength prior to testing beams 1, 2 and 3 was 4670 psi, which was acceptable.

Surveillance By: L. Kummer

DATE: 06/13/12

Approved By: L. Kummer

DATE: 06/13/12



QUALITY SERVICES DEPARTMENT
QUALITY SURVEILLANCE REPORT (QSR)
(Continuation Sheet)

QSR NO.: 25593-000-QSVS-12-008-000

REV. 000

PAGE 2 of 2

Date: 05/31/12

PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):**RESULTS cont.**

Testing was performed in 5 K increments for each beam. Pressurization of the hydraulic pump was systematically stopped every 5K to perform deflection measurements, recording (taking pictures) and measurement of physical cracks as they developed. Additionally, observed the University of Kansas Test Supervisor monitoring the data collection from the installed test sensors. Verified that test equipment constantly monitored and recorded pump pressure, and beam displacement throughout the test of each beam. Verified thru an interview with the test supervisor that the electronic sensors indicating deflection were reacting and measuring the deflection with the same accuracy as the dial indicators located at each end and the middle of each test beam. Tests concluded when the test pressures caused concrete failure as follows:

Beam 1 - 43.5K

Beam 2 - 51K

Beam 3 - 51K

Testing activities were conducted in accordance with "Lap-Splice Beam Tests Structural Testing Laboratory University of Kansas, Spring 2012", dated 05/18/12 and were determined to be acceptable.

Interviews with the University of Kansas project manager after the testing activities were completed indicated that further evaluation of the data provided by the tests will be performed by the university staff assigned to the project and will be submitted as a package to FENOC and Bechtel at a later date.

SatisfactoryMapping and Dial Indicator Identification

During the testing it was noticed that the project was monitoring the development of cracks and documenting them (measuring them) based on taking notes and pictures to document each phase of the tests. A physical drawing indicating the approximate location of the cracks was not being employed during the tests. Interviews with the University of Kansas project manager indicated that his notes and the pictures generated for each test beam would be married later in the test report.

Separately, dial indicators being used during the tests did not contain a serial number or identification number to associate them with their calibration records. This included both the end indicators as well as the center indicator.

CR 23568-000-GCA-GAMG-00011

The dial indicators being utilized to measure the deflection of the test specimens did not contain markings or labeling that indicated their association with certificates of calibration. The 3 gages located at each end and the middle of the test beam were identified as not having a serial number or label indicating it's calibration. Level C

Follow-up is required

CR 23568-000-GCA-GAMG-00010

The project test procedure does not detail how cracks forming during testing are to be documented as they occur. Currently, the process being utilized by the University of Kansas is by photographing the cracks, and documenting a general location and size using a log. The log will be reassessed to provide more detail by comparing the general locations with the locations as documented in the photographs. This method could introduce error into the final product. Level D

Unsatisfactory

Date: 06/30/12

ASME Section III Related: Yes ☐ No ☒

Department/Function: Civil/Structural/Archetectural

DATE: 06/30/12



QUALITY SERVICES DEPARTMENT
QUALITY SURVEILLANCE REPORT (QSR)
(Continuation Sheet)

QSR NO.: 25593-000-QSVS-12-009-000

REV. 000

PAGE 2 of 2

Date: 06/30/12

PROCEDURE / SPECIFICATION / APPLICABLE DOCUMENTS (continued):**RESULTS cont.**

Testing was performed in 5 K increments for each beam. Pressurization of the hydraulic pump was systematically stopped every 5K to perform deflection measurements, recording (taking pictures) and measurement of physical cracks as they developed. Additionally, observed the University of Kansas Test Supervisor monitoring the data collection from the installed test sensors. Verified that test equipment constantly monitored and recorded pump pressure, and beam displacement throughout the test of each beam. Verified thru an interview with the test supervisor that the electronic sensors indicating deflection were reacting and measuring the deflection with the same accuracy as the dial indicators located at each end and the middle of each test beam. Tests concluded when the test pressures caused concrete failure as follows:

Beam 4 - 51K

Beam 5 - 51K

Beam 6 - 50K

Testing activities were conducted in accordance with "Lap-Splice Beam Tests Structural Testing Laboratory University of Kansas, Spring 2012", dated 05/18/12 and were determined to be acceptable.

Interviews with the University of Kansas project manager after the testing activities were completed indicated that further evaluation of the data provided by the tests will be performed by the university staff assigned to the project and will be submitted as a package to FENOC and Bechtel at a later date.

SatisfactoryFollow-up of CRs generated during Surveillance 25593-000-QSVS-12-008CR 23568-000-GCA-GAMG-00011

- The dial indicators being utilized to measure the deflection of the test specimens did not contain markings or labeling that indicated their association with certificates of calibration. The 3 gages located at each end and the middle of the test beam were identified as not having a serial number or label indicating it's calibration. Level C*

A follow-up of this CR conducted prior to testing beams 3, 4 and 5 was conducted during this surveillance. This CR was closed on 06/20/12. A verification of actions taken was performed to ensure the gages had been properly identified by serial or ID number prior to testing activities. Bechtel QC verified that the gages and that the associated calibration certificates for each gage contained the correct information to close out the CR. A review indicated that these verification activities had taken place and were documented on the CR. No further actions are required. This CR is closed.

CR 23568-000-GCA-GAMG-00010

- The project test procedure does not detail how cracks forming during testing are to be documented as they occur. Currently, the process being utilized by the University of Kansas is by photographing the cracks, and documenting a general location and size using a log. The log will be reassessed to provide more detail by comparing the general locations with the locations as documented in the photographs. This method could introduce error into the final product. Level D*

This CR was closed based on actions taken by the University of Kansas in regards to the mapping of cracks. A new beam drawing was generated by the University of Kansas to document the propagation of cracks that occur during the testing in real time. The University of Kansas was observed using this new drawing to document the cracks in real time during the testing activities for beams 4, 5 and 6. The CR was closed on 06/20/12. No further actions are required. This CR is closed.

Satisfactory

Appendix C.4 - University of Kansas Condition Report

06/24/2012 11:19 EDT

Condition Reports						
Identifier		Project		Current State		Date Created
23568-000-GCA-GAMG-00010		23568 - NES CORE SUPPORT		[Closed]		06/03/2012
Initiator		Initiator's Organization				
Kummer, Louis Philip		QS Project; Q-13				
Date of Event		Time of Event		Identified By		
05/31/2012		02:00		Quality Audit / Surveillance		
CR Originator Identifying Information						
L. Kummer						
Title						
25593 - University of Kansas Concrete Testing for Davis Besse – The current process for mapping cracks during the testing of concrete samples does not adequately document the location of cracks as they occur						
Description of Condition						
The project test procedure does not detail how cracks forming during testing are to be documented as they occur. Currently, the process being utilized by the University of Kansas is by photographing the cracks, and documenting a general location and size using a log. The log will be reassessed to provide more detail by comparing the general locations with the locations as documented in the photographs. This method could introduce error into the final product.						
Immediate Actions Taken						
This issue was discussed with the University of Kansas during a post test review meeting on 05/31/12.						
Significance Level		Plant Operability Related (if yes, contact plant operations)		Potentially Reportable (10CFR21) (if yes, route to Engineering to perform evaluation)		ASME III Related
D		No		No		No
Safety Classification		Reason for Closure		Stop Work Number (if applicable)		Responsible Organization
Augmented Quality						Civil/Struct/Arch St; E-20
Responsible Manager		Responsible Person		Quality POC		
Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)		Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)		Kummer, Louis Philip; User: LPKUMMER; Dept: QS Project (Q-13)		
Summarized Comments						
[CAP Manager Closure Approval] Comments:						
Actions have been taken to address the condition documented on this CR. Therefore, this CR can be closed.						
Added By Loofbourrow, Steven on 2012-06-19						
[Resp Person/Manager Closure Approval] Comments:						
The CR can be closed to actions taken.						
Added By Munshi, Javeed on 2012-06-12						
[CRRC Pre-Screen] Comments:						
D CT24 munshi						
Added By Bartgis, Deborah on 2012-06-08						
Long Term						
N						
Date Closed						
06/19/2012						
Event Code				Nature of Issue		
CT; Test Control				24; External Issue		
Action Identifier	Type	Title	Current State	Current Task Due	Action Due Date	
ACT-01-23568-000-GCA-GAMG-00010	Action	communication with kansas lab	[Closed]		06/13/2012	
Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[Initiate]	Completed	Kummer, Louis	Kummer, Louis	06/03/2012 15:28 EDT	Kummer, Louis	06/05/2012 09:48 EDT
[CAP Admin Screening]	Completed	Functional CAP Admin Team	Kummer, Louis	06/05/2012 09:48 EDT	Bartgis, Deborah	06/05/2012 21:45 EDT
[CRRC Pre-Screen]	Completed	Kobyra, James	Bartgis, Deborah	06/05/2012 21:45 EDT	Bartgis, Deborah	06/08/2012 10:11 EDT

Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[CRRC Screening]	Completed	Functional CAP Admin Team	Bartgis, Deborah	06/08/2012 10:11 EDT	Bartgis, Deborah	06/08/2012 10:12 EDT
[Responsible Manager Screening]	Completed	Munshi, Javeed	Bartgis, Deborah	06/08/2012 10:12 EDT	Munshi, Javeed	06/12/2012 15:38 EDT
[Action Plan]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:38 EDT	Munshi, Javeed	06/12/2012 15:43 EDT
[Complete Actions]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:43 EDT	Munshi, Javeed	06/12/2012 15:48 EDT
[Resp Person/Manager Closure Approval]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:48 EDT	Munshi, Javeed	06/12/2012 15:50 EDT
[CAP Manager Closure Approval]	Completed	Functional CAP Admin Team	Munshi, Javeed	06/12/2012 15:50 EDT	Loofbourrow, Steven	06/19/2012 12:32 EDT
[Waiting to Archive]	Completed	Holding Tank	Loofbourrow, Steven	06/19/2012 12:32 EDT	AUTO-GENERATED	06/19/2012 15:01 EDT
[Close]	Completed		AUTO-GENERATED	06/19/2012 15:01 EDT	AUTO-GENERATED	06/19/2012 15:01 EDT

Attachment

correspondence from Kansas CR-10.pdf

Munshi, Javeed

From: O'Reilly, Matt [oreilly3@ku.edu]
Sent: Tuesday, June 12, 2012 9:32 AM
To: Munshi, Javeed; jiquiyuan@gmail.com
Cc: Darwin, David
Subject: RE: need response ASAP, please

Javeed,

- 1) We provide the mix design, including w/c ratio, to the mix design plant. We also get a batch ticket and can verify the exact quantities mixed.
- 2) The dial indicators have been labeled and their accuracy verified in our calibrated testing frame. I can provide the results of these verifications if you would like.
- 3) We are currently assembling a template for mapping cracks and will have dedicated people preparing the crack map as the test progresses.

Let me know if I provide any more information.

-Matt

From: Munshi, Javeed [jamunshi@bechtel.com]
Sent: Tuesday, June 12, 2012 7:05 AM
To: O'Reilly, Matt; jiquiyuan@gmail.com
Cc: Darwin, David
Subject: need response ASAP, please

Matt and Jiqui:

Couple of things:

1. What is the issue with batch plant? It seems we will not know the w/c ratio – please provide a justification for how the w/c will be determined
2. The dial indicators being utilized to measure the deflection of the test specimens did not contain markings or labeling that indicated their association with certificates of calibration. The 3 gages located at each end and the middle of the test beam were identified as not having a serial number or label indicating it's calibration.

Action – please provide proper identification for each dial gage and the corresponding calibration certificate

3. The project test procedure does not detail how cracks forming during testing are to be documented as they occur. Currently, the process being utilized by the University of Kansas is by photographing the cracks, and documenting a general location and size using a log. The log will be reassessed to provide more detail by comparing the general locations with the locations as documented in the photographs. This method could introduce error into the final product.

Action – please prepare sketches of the test specimen and map cracks on them as the test progresses. This together with photos should provide a good traceable record for future reference.

Best Regards,

Javeed Munshi
Principal Engineer
Bechtel Power Corporation
5275 Westview Drive
Frederick, MD 21703 - 8306
Ph: (301) 228 8281
Fax: (301) 682 6785

06/24/2012 11:19 EDT

Actions						
Action Identifier	Condition Report	Current State	Action Due Date			
ACT-01-23568-000-GCA-GAMG-00010	23568-000-GCA-GAMG-00010	[Closed]	06/13/2012			
Actionee						
Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)						
Title						
communication with kansas lab						
Action Description						
Send a note to Kansas to develop sketches to track cracking as the test proceeds						
Response						
Sent an email to Prof. Darwin at Kansas and got his confirmation that detailed sketches will be developed to cover the future tests. No impact on previous results.						
Summarized Comments						
[Responsible Person Approval] Comments:						
Actions complete and verified.						
Added By Munshi, Javeed on 2012-06-12						

Initiator	Date Created	CR Significance Level	Response Completed On			
Munshi, Javeed A	06/12/2012	D	06/12/2012			
Days Open	Date Closed					
	06/12/2012					
Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[Initiate]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:42 EDT	Munshi, Javeed	06/12/2012 15:42 EDT
[Hold for Release]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:42 EDT	Munshi, Javeed	06/12/2012 15:44 EDT
[Respond]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:44 EDT	Munshi, Javeed	06/12/2012 15:45 EDT
[Responsible Person Approval]	Completed	Munshi, Javeed	Munshi, Javeed	06/12/2012 15:45 EDT	Munshi, Javeed	06/12/2012 15:49 EDT
[Close]	Completed		Munshi, Javeed	06/12/2012 15:49 EDT	Munshi, Javeed	06/12/2012 15:49 EDT

Condition Reports					
Identifier		Project		Current State	
23568-000-GCA-GAMG-00011		23568 - NES CORE SUPPORT		[Responsible Manager Approval]	
Current Task Due		Date Created		Initiator	
06/22/2012		06/03/2012		Kummer, Louis Philip	
Date of Event		Time of Event		Identified By	
05/31/2012		02:00		Quality Audit / Surveillance	
CR Originator Identifying Information					
L. Kummer					
Title					
25593 - University of Kansas Concrete Testing for Davis Besse - Dial Indicators being used to measure deflection during testing did not contain identification numbers or serial numbers that correspond to calibration certifications					
Description of Condition					
The dial indicators being utilized to measure the deflection of the test specimens did not contain markings or labeling that indicated their association with certificates of calibration. The 3 gages located at each end and the middle of the test beam were identified as not having a serial number or label indicating it's calibration.					
Immediate Actions Taken					
The University of Kansas project manager was notified of this condition.					
Significance Level		Plant Operability Related (if yes, contact plant operations)		Potentially Reportable (10CFR21) (if yes, route to Engineering to perform evaluation)	
C		No		No	
Safety Classification		Reason for Closure		ASME III Related	
Augmented Quality				No	
Extent/Investigation		Stop Work Number (if applicable)			
see email communication with Kansas					
Responsible Organization		Responsible Manager		Responsible Person	
Civil/Struct/Arch St; E-20		Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)		Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)	
				Quality POC	
				Kummer, Louis Philip; User: LPKUMMER; Dept: QS Project (Q-13)	
Summarized Comments					
[Quality Concurrence] Comments:					
Reviewed the response from the U of Kansas on 06/12/12 in conjunction with another email and calibration spreadsheet file "Dial_Gauge_Verification_to_FENOC.xlsx" forwarded on 06/19/2012. Verified that these documents provide objective evidence that the gauges were serialized and calibrated by U of Kansas as a result of this CR. All actions have been completed.					
Added By Kummer, Louis on 2012-06-19					
[CRRC Screening] Comments:					
After discussion with the lead auditor, the significance level will remain as is.					
Added By Bartgis, Deborah on 2012-06-14					
[CRRC Pre-Screen] Comments:					
C					
Added By Bartgis, Deborah on 2012-06-08					
Long Term					
N					
Date Closed					
Cause Code					
A3B2; Rule Based Error (Rules are applied incorrectly)					
Event Code			Nature of Issue		
CM; Control M&TE			24; External Issue		
Action Identifier	Type	Title	Current State	Current Task Due	Action Due Date
ACT-01-23568-000-GCA-GAMG-00011	Action	communicate with Kansas Univ	[Closed]		06/15/2012

Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[CAP Admin Screening]	Completed	Functional CAP Admin Team	Kummer, Louis	06/05/2012 09:50 EDT	Bartgis, Deborah	06/05/2012 21:46 EDT
[CRRC Pre-Screen]	Completed	Kobyra, James	Bartgis, Deborah	06/05/2012 21:46 EDT	Bartgis, Deborah	06/08/2012 10:31 EDT
[CRRC Screening]	Completed	Functional CAP Admin Team	Bartgis, Deborah	06/08/2012 10:31 EDT	Bartgis, Deborah	06/14/2012 10:33 EDT
[Responsible Manager Screening]	Completed	Munshi, Javeed	Bartgis, Deborah	06/14/2012 10:33 EDT	Munshi, Javeed	06/15/2012 13:32 EDT
[Initiate]	Completed	Kummer, Louis	Kummer, Louis	06/03/2012 15:41 EDT	Kummer, Louis	06/05/2012 09:50 EDT
[Action Plan]	Completed	Munshi, Javeed	Munshi, Javeed	06/15/2012 13:32 EDT	Munshi, Javeed	06/15/2012 13:37 EDT
[Quality Concurrence]	Completed	Kummer, Louis	Munshi, Javeed	06/15/2012 13:37 EDT	Kummer, Louis	06/19/2012 07:21 EDT
[Responsible Manager Approval]	Working	Munshi, Javeed	Kummer, Louis	06/19/2012 07:21 EDT		

Attachment

correspondence from Kansas CR-10.pdf

Dial Gauge Verification to FENOC.xlsx

correspondence from Kansas CR-10[2].pdf

Munshi, Javeed

From: O'Reilly, Matt [oreilly3@ku.edu]
Sent: Tuesday, June 12, 2012 9:32 AM
To: Munshi, Javeed; jiquiyuan@gmail.com
Cc: Darwin, David
Subject: RE: need response ASAP, please

Javeed,

1) We provide the mix design, including w/c ratio, to the mix design plant. We also get a batch ticket and can verify the exact quantities mixed.

2) The dial indicators have been labeled and their accuracy verified in our calibrated testing frame. I can provide the results of these verifications if you would like.

3) We are currently assembling a template for mapping cracks and will have dedicated people preparing the crack map as the test progresses.

Let me know if I provide any more information.

-Matt

From: Munshi, Javeed [jamunshi@bechtel.com]
Sent: Tuesday, June 12, 2012 7:05 AM
To: O'Reilly, Matt; jiquiyuan@gmail.com
Cc: Darwin, David
Subject: need response ASAP, please

Matt and Jiqui:

Couple of things:

1. What is the issue with batch plant? It seems we will not know the w/c ratio – please provide a justification for how the w/c will be determined
2. The dial indicators being utilized to measure the deflection of the test specimens did not contain markings or labeling that indicated their association with certificates of calibration. The 3 gages located at each end and the middle of the test beam were identified as not having a serial number or label indicating it's calibration.

Action – please provide proper identification for each dial gage and the corresponding calibration certificate

3. The project test procedure does not detail how cracks forming during testing are to be documented as they occur. Currently, the process being utilized by the University of Kansas is by photographing the cracks, and documenting a general location and size using a log. The log will be reassessed to provide more detail by comparing the general locations with the locations as documented in the photographs. This method could introduce error into the final product.

Action – please prepare sketches of the test specimen and map cracks on them as the test progresses. This together with photos should provide a good traceable record for future reference.

Best Regards,

Javeed Munshi
Principal Engineer
Bechtel Power Corporation
5275 Westview Drive
Frederick, MD 21703 - 8306
Ph: (301) 228 8281
Fax: (301) 682 6785

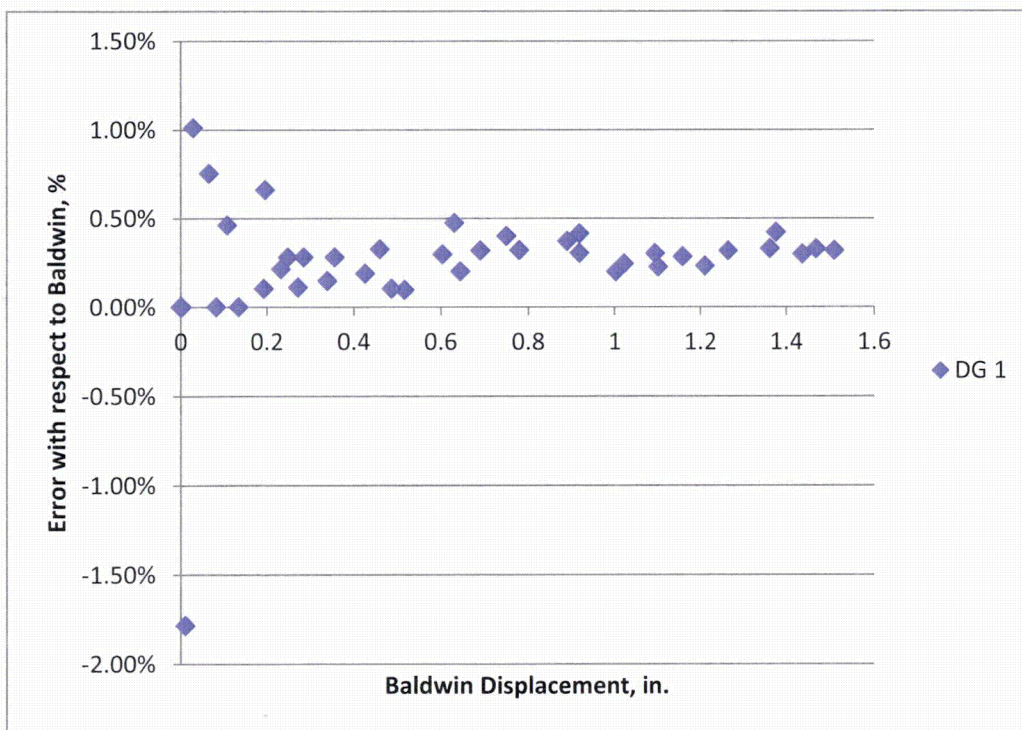
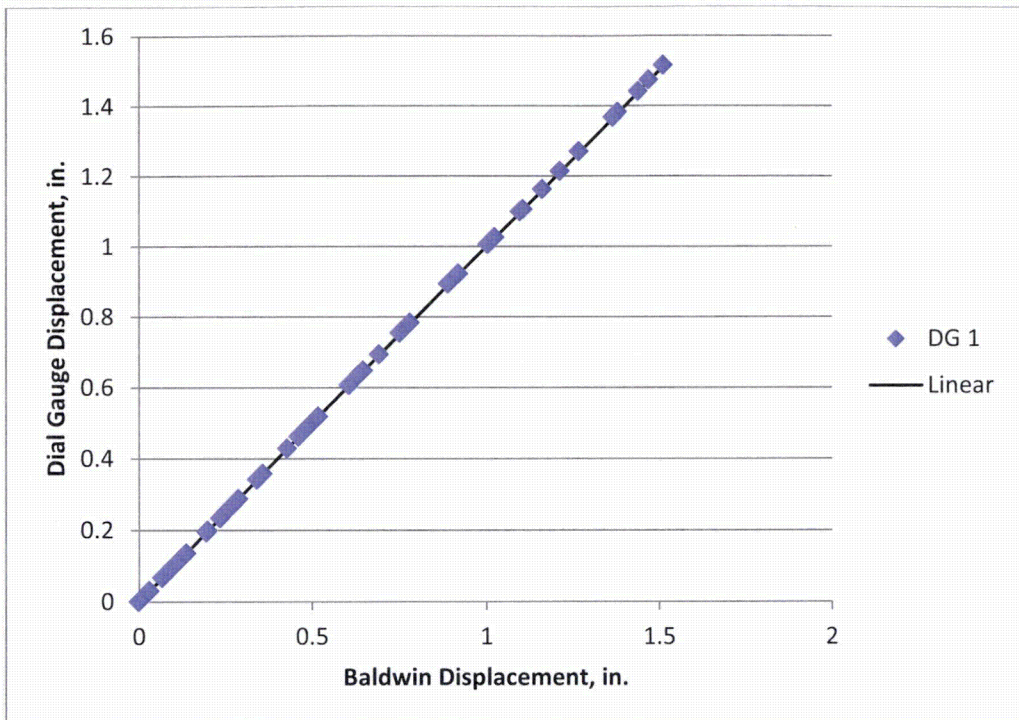
Machine Serial #: 472961

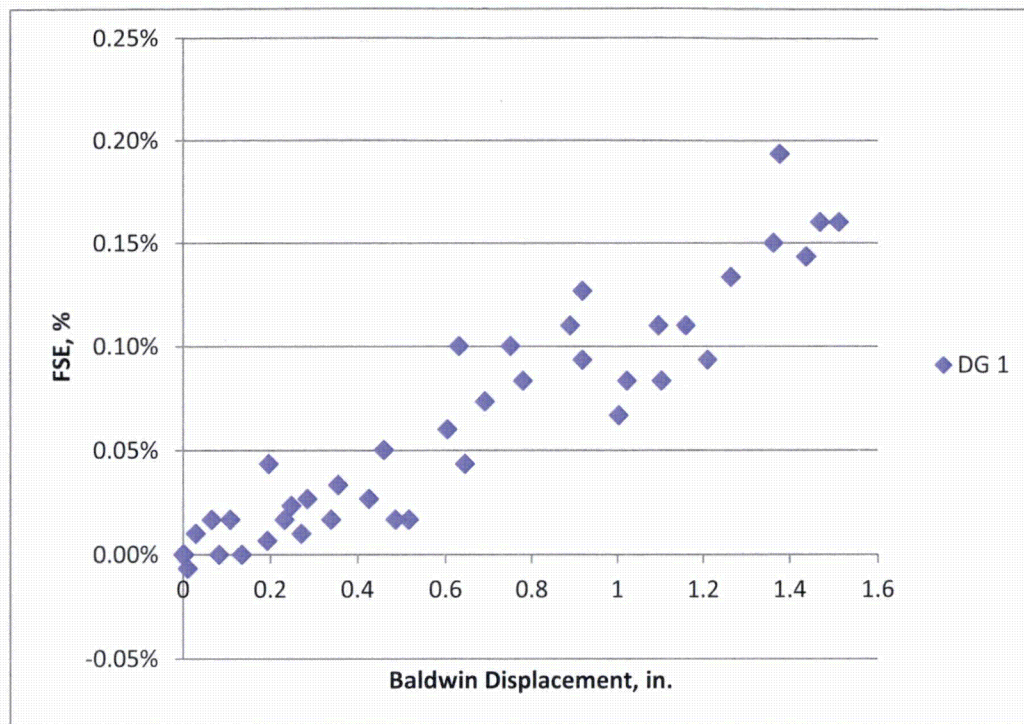
Displacement Calibration Certificate: 106072611122608

ID:	DG1
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Baldwin	Gauge	% variation FSE, %	
0	0	0.00%	0.00%
0.0112	0.011	-1.79%	-0.01%
0.0297	0.03	1.01%	0.01%
0.083	0.083	0.00%	0.00%
0.135	0.135	0.00%	0.00%
0.1967	0.198	0.66%	0.04%
0.2493	0.25	0.28%	0.02%
0.2862	0.287	0.28%	0.03%
0.357	0.358	0.28%	0.03%
0.4605	0.462	0.33%	0.05%
0.5175	0.518	0.10%	0.02%
0.6457	0.647	0.20%	0.04%
0.6918	0.694	0.32%	0.07%
0.7805	0.783	0.32%	0.08%
0.9192	0.923	0.41%	0.13%
1.004	1.006	0.20%	0.07%
1.0957	1.099	0.30%	0.11%
1.1597	1.163	0.28%	0.11%
1.266	1.27	0.32%	0.13%
1.3772	1.383	0.42%	0.19%
1.4377	1.442	0.30%	0.14%
1.5112	1.516	0.32%	0.16%
1.4692	1.474	0.33%	0.16%
1.3635	1.368	0.33%	0.15%
1.2112	1.214	0.23%	0.09%
1.1035	1.106	0.23%	0.08%
1.0235	1.026	0.24%	0.08%
0.9192	0.922	0.30%	0.09%
0.8907	0.894	0.37%	0.11%
0.751	0.754	0.40%	0.10%
0.632	0.635	0.47%	0.10%
0.6052	0.607	0.30%	0.06%
0.4875	0.488	0.10%	0.02%
0.4272	0.428	0.19%	0.03%
0.3405	0.341	0.15%	0.02%
0.2727	0.273	0.11%	0.01%
0.2335	0.234	0.21%	0.02%
0.1938	0.194	0.10%	0.01%
0.1085	0.109	0.46%	0.02%
0.0665	0.067	0.75%	0.02%
0.003	0.003	0.00%	0.00%
0	0		0.00%

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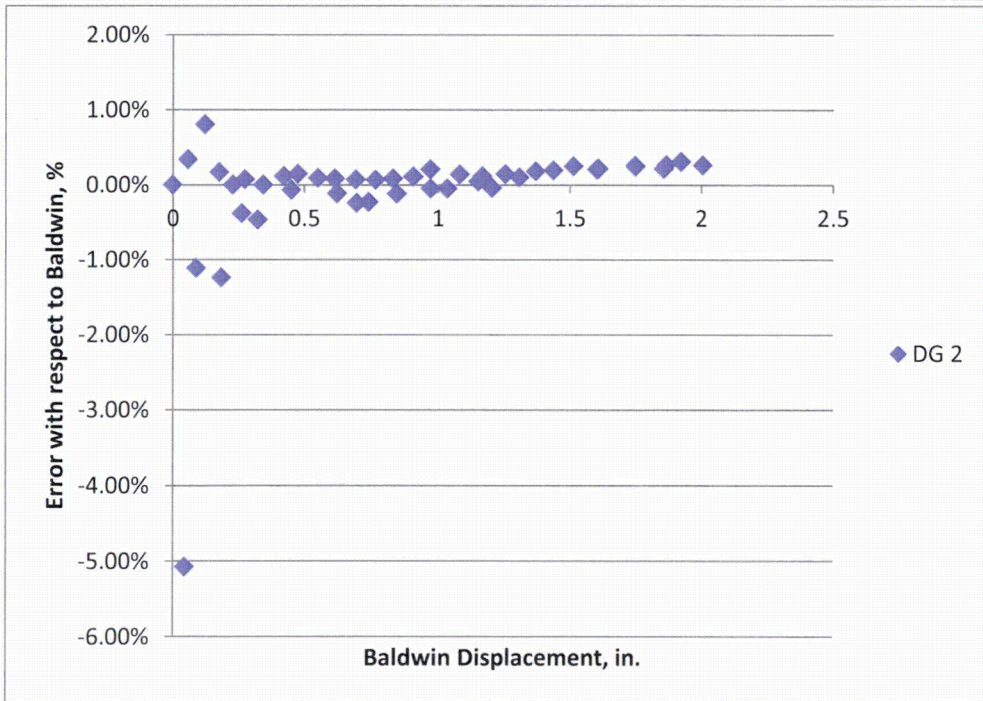
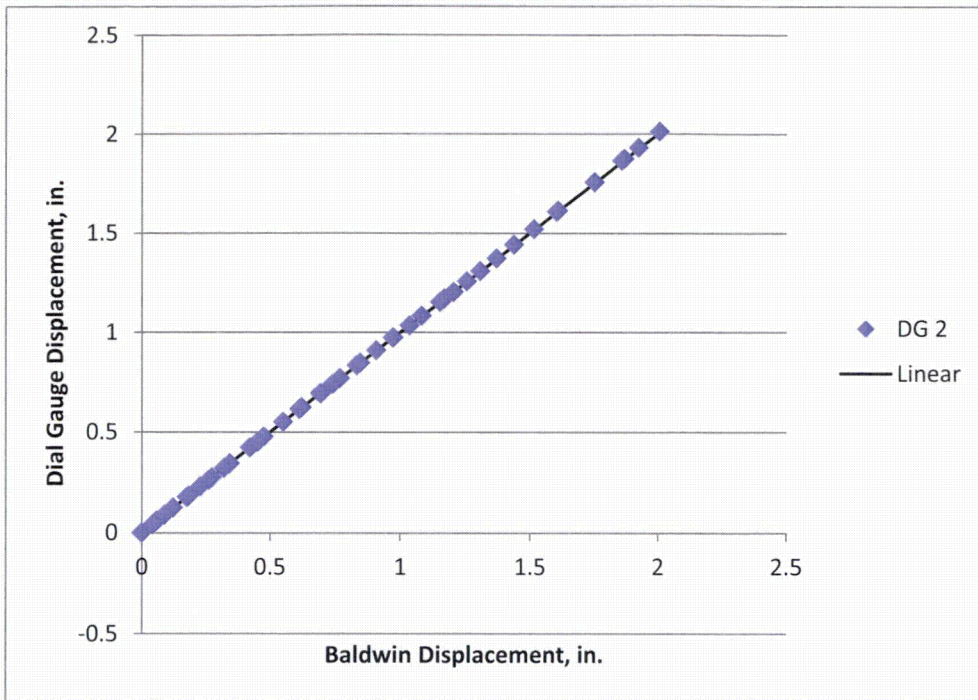


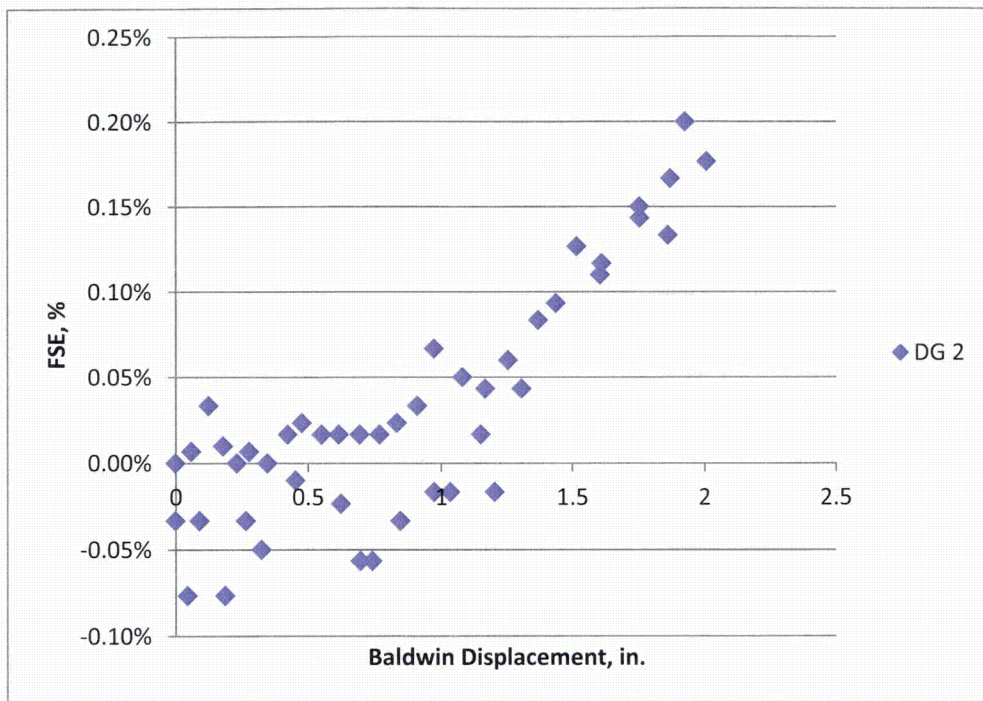


ID: DG2

Baldwin	Gauge	% variation FSE, %	
0	0	0.00%	0.00%
0.0588	0.059	0.34%	0.01%
0.124	0.125	0.81%	0.03%
0.1777	0.178	0.17%	0.01%
0.23	0.23	0.00%	0.00%
0.2758	0.276	0.07%	0.01%
0.345	0.345	0.00%	0.00%
0.4225	0.423	0.12%	0.02%
0.4763	0.477	0.15%	0.02%
0.5515	0.552	0.09%	0.02%
0.6145	0.615	0.08%	0.02%
0.6935	0.694	0.07%	0.02%
0.7685	0.769	0.07%	0.02%
0.8333	0.834	0.08%	0.02%
0.909	0.91	0.11%	0.03%
0.972	0.974	0.21%	0.07%
1.0815	1.083	0.14%	0.05%
1.1677	1.169	0.11%	0.04%
1.2542	1.256	0.14%	0.06%
1.3695	1.372	0.18%	0.08%
1.5152	1.519	0.25%	0.13%
1.6037	1.607	0.21%	0.11%
1.7527	1.757	0.25%	0.14%
1.869	1.874	0.27%	0.17%
2.0067	2.012	0.26%	0.18%
1.925	1.931	0.31%	0.20%
1.86	1.864	0.22%	0.13%
1.7515	1.756	0.26%	0.15%
1.6095	1.613	0.22%	0.12%
1.4372	1.44	0.19%	0.09%
1.3067	1.308	0.10%	0.04%
1.2035	1.203	-0.04%	-0.02%
1.1515	1.152	0.04%	0.02%
1.0355	1.035	-0.05%	-0.02%
0.9735	0.973	-0.05%	-0.02%
0.847	0.846	-0.12%	-0.03%
0.7417	0.74	-0.23%	-0.06%
0.6967	0.695	-0.24%	-0.06%
0.6237	0.623	-0.11%	-0.02%
0.4523	0.452	-0.07%	-0.01%
0.3235	0.322	-0.46%	-0.05%
0.264	0.263	-0.38%	-0.03%
0.1863	0.184	-1.23%	-0.08%
0.09	0.089	-1.11%	-0.03%
0.0453	0.043	-5.08%	-0.08%
0	-0.001		-0.03%

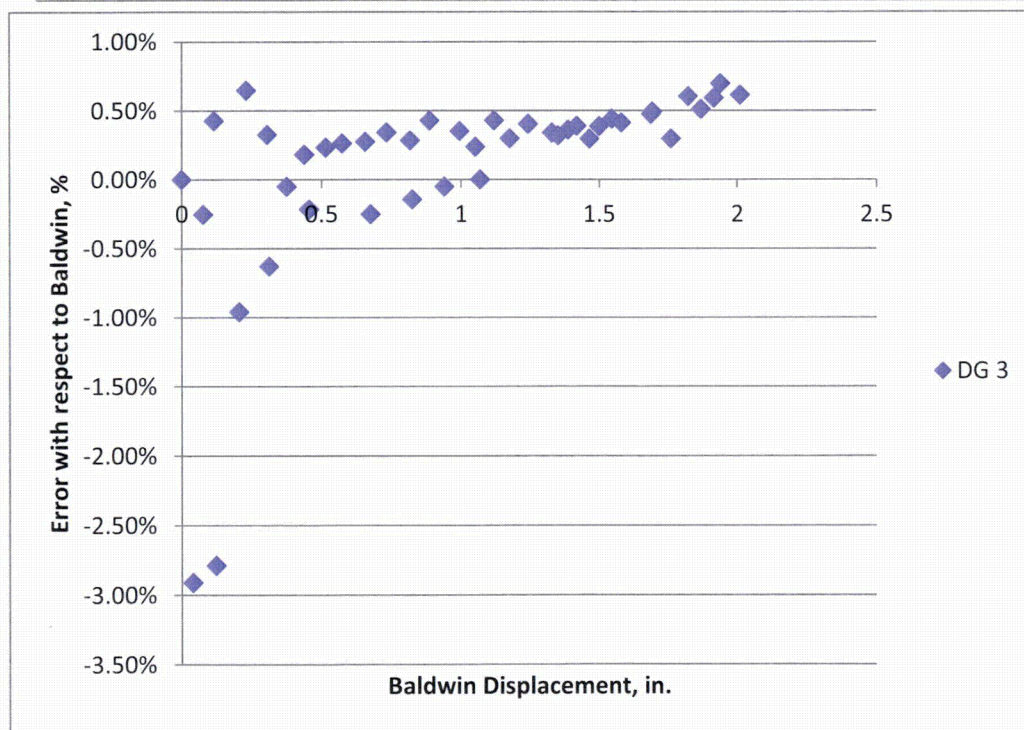
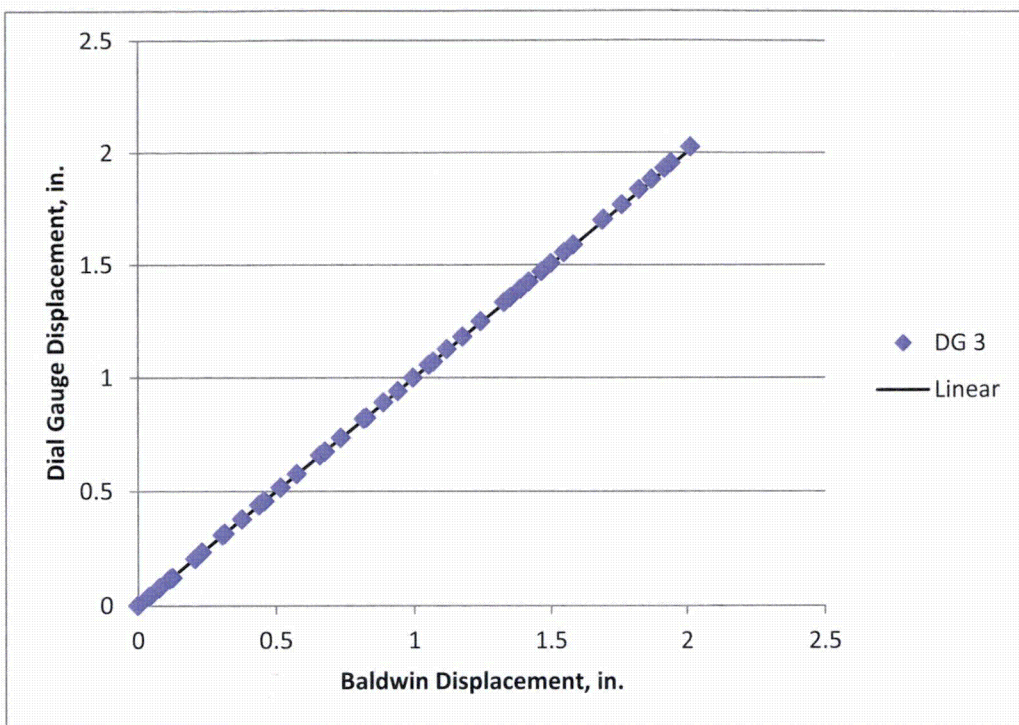
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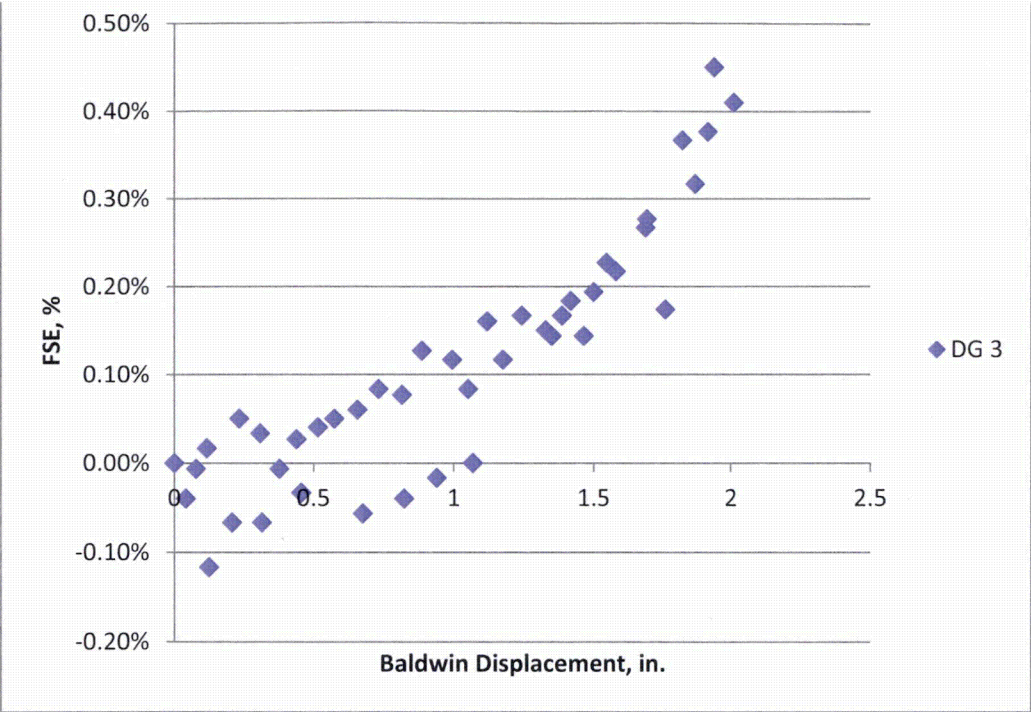




Baldwin	Gauge	% variation	FSE, %
ID:	DG3		
0	0	0.00%	0.00%
0.0782	0.078	-0.26%	-0.01%
0.1175	0.118	0.43%	0.02%
0.2325	0.234	0.65%	0.05%
0.308	0.309	0.32%	0.03%
0.3782	0.378	-0.05%	-0.01%
0.4402	0.441	0.18%	0.03%
0.5158	0.517	0.23%	0.04%
0.5745	0.576	0.26%	0.05%
0.6572	0.659	0.27%	0.06%
0.7325	0.735	0.34%	0.08%
0.8157	0.818	0.28%	0.08%
0.8872	0.891	0.43%	0.13%
0.9955	0.999	0.35%	0.12%
1.0535	1.056	0.24%	0.08%
1.1202	1.125	0.43%	0.16%
1.243	1.248	0.40%	0.17%
1.3285	1.333	0.34%	0.15%
1.387	1.392	0.36%	0.17%
1.4647	1.469	0.29%	0.14%
1.5482	1.555	0.44%	0.23%
1.69	1.698	0.47%	0.27%
1.7618	1.767	0.30%	0.17%
1.8705	1.88	0.51%	0.32%
1.9405	1.954	0.70%	0.45%
2.0117	2.024	0.61%	0.41%
1.9177	1.929	0.59%	0.38%
1.824	1.835	0.60%	0.37%
1.6947	1.703	0.49%	0.28%
1.5825	1.589	0.41%	0.22%
1.5002	1.506	0.39%	0.19%
1.4185	1.424	0.39%	0.18%
1.3507	1.355	0.32%	0.14%
1.1765	1.18	0.30%	0.12%
1.07	1.07	0.00%	0.00%
0.9405	0.94	-0.05%	-0.02%
0.8242	0.823	-0.15%	-0.04%
0.6757	0.674	-0.25%	-0.06%
0.458	0.457	-0.22%	-0.03%
0.316	0.314	-0.63%	-0.07%
0.208	0.206	-0.96%	-0.07%
0.1255	0.122	-2.79%	-0.12%
0.0412	0.04	-2.91%	-0.04%
0	0		

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Munshi, Javeed

From: O'Reilly, Matt [oreilly3@ku.edu]
Sent: Tuesday, June 12, 2012 9:32 AM
To: Munshi, Javeed; jiquiyuan@gmail.com
Cc: Darwin, David
Subject: RE: need response ASAP, please

Javeed,

- 1) We provide the mix design, including w/c ratio, to the mix design plant. We also get a batch ticket and can verify the exact quantities mixed.
- 2) The dial indicators have been labeled and their accuracy verified in our calibrated testing frame. I can provide the results of these verifications if you would like.
- 3) We are currently assembling a template for mapping cracks and will have dedicated people preparing the crack map as the test progresses.

Let me know if I provide any more information.

-Matt

From: Munshi, Javeed [jamunshi@bechtel.com]
Sent: Tuesday, June 12, 2012 7:05 AM
To: O'Reilly, Matt; jiquiyuan@gmail.com
Cc: Darwin, David
Subject: need response ASAP, please

Matt and Jiqui:

Couple of things:

1. What is the issue with batch plant? It seems we will not know the w/c ratio – please provide a justification for how the w/c will be determined
2. The dial indicators being utilized to measure the deflection of the test specimens did not contain markings or labeling that indicated their association with certificates of calibration. The 3 gages located at each end and the middle of the test beam were identified as not having a serial number or label indicating it's calibration.

Action – please provide proper identification for each dial gage and the corresponding calibration certificate

3. The project test procedure does not detail how cracks forming during testing are to be documented as they occur. Currently, the process being utilized by the University of Kansas is by photographing the cracks, and documenting a general location and size using a log. The log will be reassessed to provide more detail by comparing the general locations with the locations as documented in the photographs. This method could introduce error into the final product.

Action – please prepare sketches of the test specimen and map cracks on them as the test progresses. This together with photos should provide a good traceable record for future reference.

Best Regards,

Javeed Munshi
Principal Engineer
Bechtel Power Corporation
5275 Westview Drive
Frederick, MD 21703 - 8306
Ph: (301) 228 8281
Fax: (301) 682 6785

Actions						
Action Identifier	Condition Report	Current State	Action Due Date			
ACT-01-23568-000-GCA-GAMG-00011	23568-000-GCA-GAMG-00011	[Closed]	06/15/2012			
Actionee						
Munshi, Javeed A; User: JAMUNSHI; Dept: Civil/Struct/Arch St (E-20)						
Title						
communicate with Kansas Univ						
Action Description						
Send an email to Kansas Univ to correct the problem						
Response						
action completed						
Summarized Comments						
[Responsible Person Approval] Comments:						
approved						
Added By Munshi, Javeed on 2012-06-18						

Initiator	Date Created	CR Significance Level	Response Completed On			
Munshi, Javeed A	06/15/2012	C	06/18/2012			
Days Open	Date Closed					
	06/18/2012					
Event	Status	Assigned to	Created by	Created on	Finished by	Finished on
[Initiate]	Completed	Munshi, Javeed	Munshi, Javeed	06/15/2012 13:36 EDT	Munshi, Javeed	06/15/2012 13:36 EDT
[Hold for Release]	Completed	Munshi, Javeed	Munshi, Javeed	06/15/2012 13:36 EDT	Munshi, Javeed	06/18/2012 06:55 EDT
[Respond]	Completed	Munshi, Javeed	Munshi, Javeed	06/18/2012 06:55 EDT	Munshi, Javeed	06/18/2012 06:56 EDT
[Responsible Person Approval]	Completed	Munshi, Javeed	Munshi, Javeed	06/18/2012 06:56 EDT	Munshi, Javeed	06/18/2012 06:57 EDT
[Close]	Completed		Munshi, Javeed	06/18/2012 06:57 EDT	Munshi, Javeed	06/18/2012 06:57 EDT

Appendix D - Quality Control Documentation

Appendix D.1 - Purdue University Inspection Record

PURDUE DAVIS BESSE CONCRETE PRE-PLACEMENT INSPECTION RECORD				
WORK PROCESS: Concrete beams		IR number <u>25539-115 PP-1-0001</u>		Page <u>1</u> of <u>3</u>
PROJECT NUMBER: 25539-115		PROJECT NAME: Davis-Bessie - concrete tests		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: 3 concrete beams with rebar c splice of 79" B1,2, & 3				
Reference Criteria: 25593-000-TCO-GEO-00001				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>	R	N/A	 SAW4-10-12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.		See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.		See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PRE-PLACEMENT INSPECTION</u>			
	a) Verify concrete pour boundaries, size and location are as required.	I	N/A	 SAW4-10-12
	b) Rebar/Wire Mesh overlap splices, size, type, grade, spacing, tying, support, configuration, anchoring and details meet the requirements	I	N/A	 SAW 4-10-12
	c) Dowels are installed with the correct size, type, grade, spacing, support, tying, anchoring, location and configuration	I	N/A	N/A
	d) Sub-grades prepared properly, to proper elevation and to proper top finish	I	N/A	N/A
	e) Verify the construction joints, control joints, expansion joints and water stops are installed	I	N/A	N/A

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	f) Verify the formwork: is the correct size and type, has the correct form release agent applied, is installed in a workmanship manner, and without interference with embedded items, maintains proper clearance with embedded items, does not have excessive gaps, vertical and horizontal deviations are within required limits and anchored and supported properly	I	N/A	<i>SAW</i> SAW 4-10-12
	g) Verify the concrete placement area is clean, free of debris and foreign material	I	N/A	<i>SAW</i> SAW 4-10-12
	h) Verify all areas required to bond to the placed concrete are free of oil, grease or any other item or agent which will prevent bonding	I	N/A	<i>SAW</i> SAW 4-10-12
	i) Verify adjoining concrete surfaces required to be bonded with the placed concrete are clean, free of laitance, surface roughened and otherwise prepared properly	I	N/A	N/A
	j) Verify weather protection and temperature controls are provided as required and the concrete area is within the temperature requirements Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	k) Verify waterproofing membrane is installed as required	I	N/A	N/A
	l) Verify any bonding agents required are installed as and where required	I	N/A	N/A
	m) Verify pre-soak if required, is completed per project documents Pre-soak start: Time _____ Date _____	S	N/A	N/A
	n) Verify required embedded items, penetrations or any other items, inspections or tests per discipline are complete and acceptable to embed in concrete and signified here by signature and date by an authorized representative of the discipline Civil _____ I&C _____ Mechanical _____ Electrical _____ Welding _____ HVAC _____ Start-up _____ Subcontractor _____ Other _____	R	N/A	N/A
	o) The concrete placement is released and ready to accept concrete provided the placement occurs within the allowed time after the release	R	N/A	<i>SAW</i> SAW 4-10-12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
4.1	PRE-PLACEMENT INSPECTION			
	a) Review the Reinforcing Bar Mechanical Splicing Record	R	N/A	N/A
	b) Review the Site Excavation and Backfill inspection record	R	N/A	N/A
	c) Perdue Test Procedure	R	N/A	SAW 4-10-12
5.0	Exceptions			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	SAW 4-10-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	SAW 4-10-12

REMARKS:

FE Inspection Performed by: N/A	DATE:
QCE Final Review Performed by: Sam Worthy	DATE: 4-10-12

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(2)



PURDUE DAVIS BESSE CONCRETE PRE-PLACEMENT INSPECTION RECORD

WORK PROCESS: Concrete beam (3)		IR number <u>25539-115-PP1-0002</u>		Page <u>1</u> of <u>3</u>
PROJECT NUMBER: 25539-115		PROJECT NAME: Davis Bessie beam test		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: 3 concrete beams with rebar lapsplce of 120" A1, 2, & 3				
Reference Criteria: 25539-000-TCO-GEO-00001				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>	R	N/A	 SAW 4-17-12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.		See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.		See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PRE-PLACEMENT INSPECTION</u>			
	a) Verify concrete pour boundaries, size and location are as required.	I	N/A	 SAW 4-17-12
	b) Rebar/Wire Mesh overlap splices, size, type, grade, spacing, tying, support, configuration, anchoring and details meet the requirements	I	N/A	 SAW 4-17-12
	c) Dowels are installed with the correct size, type, grade, spacing, support, tying, anchoring, location and configuration	I	N/A	N/A
	d) Sub-grades prepared properly, to proper elevation and to proper top finish	I	N/A	N/A
	e) Verify the construction joints, control joints, expansion joints and water stops are installed	I	N/A	N/A

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25539-115-PP-1-0002

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	f) Verify the formwork: is the correct size and type, has the correct form release agent applied, is installed in a workmanship manner, and without interference with embedded items, maintains proper clearance with embedded items, does not have excessive gaps, vertical and horizontal deviations are within required limits and anchored and supported properly	I	N/A	<i>SAW</i> SAW 4-17-12
	g) Verify the concrete placement area is clean, free of debris and foreign material	I	N/A	<i>SAW</i> SAW 4-17-12
	h) Verify all areas required to bond to the placed concrete are free of oil, grease or any other item or agent which will prevent bonding	I	N/A	<i>SAW</i> SAW 4-17-12
	i) Verify adjoining concrete surfaces required to be bonded with the placed concrete are clean, free of laitance, surface roughened and otherwise prepared properly	I	N/A	N/A
	j) Verify weather protection and temperature controls are provided as required and the concrete area is within the temperature requirements Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	k) Verify waterproofing membrane is installed as required	I	N/A	N/A
	l) Verify any bonding agents required are installed as and where required	I	N/A	N/A
	m) Verify pre-soak if required, is completed per project documents Pre-soak start: Time _____ Date _____	S	N/A	N/A
	n) Verify required embedded items, penetrations or any other items, inspections or tests per discipline are complete and acceptable to embed in concrete and signified here by signature and date by an authorized representative of the discipline Civil _____ I&C _____ Mechanical _____ Electrical _____ Welding _____ HVAC _____ Start-up _____ Subcontractor _____ Other _____	R	N/A	N/A
	o) The concrete placement is released and ready to accept concrete provided the placement occurs within the allowed time after the release	R	N/A	<i>SAW</i> SAW 4-17-12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			

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25539-115-PP-1-6002

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
4.1	<u>PRE-PLACEMENT INSPECTION</u>			
	a) Review the Reinforcing Bar Mechanical Splicing Record	R	N/A	N/A
	b) Review the Site Excavation and Backfill inspection record	R	N/A	N/A
	c) Perdue Test Procedure	R	N/A	SAW 4-12-17
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	SAW 4-17-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	SAW 4-17-12

REMARKS:

FE Inspection Performed by: N/A	DATE:
QCE Final Review Performed by: Sam Worthy <i>Sam Worthy</i>	DATE: 4-17-12 <i>4/17/12</i>

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SAW 4/24/12
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PURDUE DAVIS BESSE CONCRETE PRE-PLACEMENT INSPECTION RECORD

WORK PROCESS: Concrete beams (3)		IR number <u>25539-115-PP1-0003</u>		Page <u>1</u> of <u>3</u>
PROJECT NUMBER: 25539-115		PROJECT NAME: Davis Bessie/Purdue concrete		
Safety Class <input type="checkbox"/> Safety Related <input type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: 3 concrete beams with lapsplice of 120" A4,5 & 6				
Reference Criteria: 25593-000-TCO-GEO-00001				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.	R	N/A	<i>[Signature]</i> SAW 4-24-12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.		See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.		See note 1.0	See note 1.0
2.0	In-Process Inspections The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	PRE-PLACEMENT INSPECTION			
	a) Verify concrete pour boundaries, size and location are as required.	I	N/A	<i>[Signature]</i> SAW 4-24-12
	b) Rebar/Wire Mesh overlap splices, size, type, grade, spacing, tying, support, configuration, anchoring and details meet the requirements	I	N/A	<i>[Signature]</i> SAW 4-24-12
	c) Dowels are installed with the correct size, type, grade, spacing, support, tying, anchoring, location and configuration	I	N/A	N/A
	d) Sub-grades prepared properly, to proper elevation and to proper top finish	I	N/A	N/A
	e) Verify the construction joints, control joints, expansion joints and water stops are installed	I	N/A	N/A

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Inspection Description	RESPONSIBILITY		
	Insp. Type	FE/Date	QCE/Date
f) Verify the formwork: is the correct size and type, has the correct form release agent applied, is installed in a workmanship manner, and without interference with embedded items, maintains proper clearance with embedded items, does not have excessive gaps, vertical and horizontal deviations are within required limits and anchored and supported properly	I	N/A	SAW 4-24-12
g) Verify the concrete placement area is clean, free of debris and foreign material	I	N/A	SAW 4-24-12
h) Verify all areas required to bond to the placed concrete are free of oil, grease or any other item or agent which will prevent bonding	I	N/A	SAW 4-24-12
i) Verify adjoining concrete surfaces required to be bonded with the placed concrete are clean, free of laitance, surface roughened and otherwise prepared properly	I	N/A	N/A
j) Verify weather protection and temperature controls are provided as required and the concrete area is within the temperature requirements Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
k) Verify waterproofing membrane is installed as required	I	N/A	N/A
l) Verify any bonding agents required are installed as and where required	I	N/A	N/A
m) Verify pre-soak if required, is completed per project documents Pre-soak start: Time _____ Date _____	S	N/A	N/A
n) Verify required embedded items, penetrations or any other items, inspections or tests per discipline are complete and acceptable to embed in concrete and signified here by signature and date by an authorized representative of the discipline Civil _____ I&C _____ Mechanical _____ Electrical _____ Welding _____ HVAC _____ Start-up _____ Subcontractor _____ Other _____	R	N/A	N/A
o) The concrete placement is released and ready to accept concrete provided the placement occurs within the allowed time after the release	R	N/A	SAW 4-24-12
4.0			
<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			

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REMARKS:

DATE:

DATE: 4-24-12

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PURDUE DAVIS BESSE CONCRETE PRE-PLACEMENT INSPECTION RECORD

WORK PROCESS: Concrete beams (3)		IR number <u>25539-115 PPI-0004</u>		Page <u>1</u> of <u>3</u>	
PROJECT NUMBER:		PROJECT NAME: Davis-Bessie/Purdue			
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related					
Scope of Record: Three concrete beams with lapsplice of 79" B4, 5 & 6					
Reference Criteria: 25539-000-TCO-GEO-00001					
	Inspection Description	RESPONSIBILITY			
		Insp. Type	FE/Date	QCE/Date	
1.0	<u>Prerequisites</u>				
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>	R	N/A	Saw 4-30-12	
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.		See note 1.0	See note 1.0	
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.		See note 1.0	See note 1.0	
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.				
2.1	<u>PRE-PLACEMENT INSPECTION</u>				
	a) Verify concrete pour boundaries, size and location are as required.	I	N/A	SAW 4-30-12	
	b) Rebar/Wire Mesh overlap splices, size, type, grade, spacing, tying, support, configuration, anchoring and details meet the requirements	I	N/A	SAW 4-30-12	
	c) Dowels are installed with the correct size, type, grade, spacing, support, tying, anchoring, location and configuration	I	N/A	N/A	
	d) Sub-grades prepared properly, to proper elevation and to proper top finish	I	N/A	N/A	
	e) Verify the construction joints, control joints, expansion joints and water stops are installed	I	N/A	N/A	

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	f) Verify the formwork: is the correct size and type, has the correct form release agent applied, is installed in a workmanship manner, and without interference with embedded items, maintains proper clearance with embedded items, does not have excessive gaps, vertical and horizontal deviations are within required limits and anchored and supported properly	I	N/A	SAW 4-30-12
	g) Verify the concrete placement area is clean, free of debris and foreign material	I	N/A	SAW 4-30-12
	h) Verify all areas required to bond to the placed concrete are free of oil, grease or any other item or agent which will prevent bonding	I	N/A	SAW 4-30-12
	i) Verify adjoining concrete surfaces required to be bonded with the placed concrete are clean, free of laitance, surface roughened and otherwise prepared properly	I	N/A	N/A
	j) Verify weather protection and temperature controls are provided as required and the concrete area is within the temperature requirements Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	k) Verify waterproofing membrane is installed as required	I	N/A	N/A
	l) Verify any bonding agents required are installed as and where required	I	N/A	N/A
	m) Verify pre-soak if required, is completed per project documents Pre-soak start: Time _____ Date _____	S	N/A	N/A
	n) Verify required embedded items, penetrations or any other items, inspections or tests per discipline are complete and acceptable to embed in concrete and signified here by signature and date by an authorized representative of the discipline Civil _____ I&C _____ Mechanical _____ Electrical _____ Welding _____ HVAC _____ Start-up _____ Subcontractor _____ Other _____	R	N/A	N/A
	o) The concrete placement is released and ready to accept concrete provided the placement occurs within the allowed time after the release	R	N/A	SAW 4-30-12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
4.1	PRE-PLACEMENT INSPECTION			
	a) Review the Reinforcing Bar Mechanical Splicing Record	R	N/A	N/A
	b) Review the Site Excavation and Backfill inspection record	R	N/A	N/A
	c) Perdue Test Procedure	R	N/A	SAW 4-30-12
5.0	Exceptions			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	SAW 4-30-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	SAW 4-30-12

REMARKS:

FE Inspection Performed by: N/A

DATE:

QCE Final Review Performed by: Sam Worthy

DATE: 4-30-12

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①



PURDUE DAVIS BESSE CONCRETE PLACEMENT INSPECTION RECORD

WORK PROCESS: 3 concrete beams

IR number 25539-115-P-1-0001

Page 1 of 3

PROJECT NUMBER: 25539-115

PROJECT NAME: Davis Bessie/Purdue

Safety Class ☐ Safety Related ☒ Augmented Quality ☐ Non Safety Related

Scope of Record: 3 concrete beams with lapslice of 79" B1, 2, & 3

Reference Criteria: 25593-000-TCO-GEO-00001

	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>		N/A	 SAW 4-10-12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PLACEMENT INSPECTION</u>			
	a) Prior to concrete placement, verify batch plant tickets to assure:			
	1. The proper concrete mix was received	R	N/A	 SAW 4-10-12
	2. The load time is not exceeded prior to discharge from the truck	R	N/A	 SAW 4-10-12
	3. The truck drum revolutions per minute have not exceeded the limits of the project requirements	I	N/A	N/A
	4. The signature of the batch plant inspector exists if required	R	N/A	N/A

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	5. The quantity of water allowed to be added to the mix	R	N/A	SAW 4-10-12
	6. If water is allowed to be added to the mix, the maximum is not exceeded	I	N/A	N/A
	b) Check the free drop of concrete and the flow of concrete from the deposition point is not exceeded.	S	N/A	N/A
	c) Check that the concrete is deposited in layers not to exceed the project requirements.	S	N/A	N/A
	d) Check that the proper type of vibration equipment is used.	S	N/A	SAW 4-10-12
	e) Check that vibration equipment is used properly to eliminate voids and enhance bonding of subsequent layers of concrete.	S	N/A	SAW 4-10-12
	f) Check that vibration equipment is used with the proper insertion overlap radii of action and duration to consolidate the concrete but not used to spread or move concrete from one deposit point to another.	S	N/A	SAW 4-10-12
	g) Check that the temperature is maintained at the placement area throughout the entire placement of concrete Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	h) Verify any testing required during the concrete placement and record the results on the concrete placement card	W	N/A	SAW 4-10-12
	i) Check that the proper concrete finishing methods are used and applied to the concrete throughout the finishing process	S	N/A	SAW 4-10-12
	j) Verify the concrete placement has been completed to the proper boundaries and elevation per project documents	I	N/A	SAW 4-10-12
	k) Verify critical embeds, ie: anchor bolts etc. are still in their required location, configuration and tolerance after the concrete placement is complete	I	N/A	N/A
	l) Verify the proper finish has been applied to the concrete surface and no debris, foreign material or excess water was left in the concrete	I	N/A	N/A
3.0	Final Inspection Activities The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.	None	None	None
4.0	Review Of Supplementary Records The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	PLACEMENT INSPECTION a) Review batch plant tickets to assure all tickets are accounted for and recorded	R	N/A	SAW 4-10-12
	b) Review the concrete placement card for completeness and acceptance of test results.	R		

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
5.0	Exceptions			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	<i>SAW</i> SAW 4-10-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	<i>SAW</i> SAW 4-10-12

REMARKS:

FE Inspection Performed by: N/A

DATE:

QCE Final Review Performed by: Sam Worthy

DATE: 4-10-12

4/10/12

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PURDUE DAVIS BESSE CONCRETE PLACEMENT INSPECTION RECORD

WORK PROCESS: Concrete beams		IR number <u>25539-115 P-1 - 0000</u>		Page <u>1</u> of <u>3</u>
PROJECT NUMBER: 25539-115		PROJECT NAME: Davis-Besse/Purdue		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Concrete beams (3) with rebar lapslice of 120" A 1, 2 & 3				
Reference Criteria: 25593-000-TC0-GEO-00001				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	Fn/AE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>	R	N/A	 SAW 4-17-12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PLACEMENT INSPECTION</u>			
	a) Prior to concrete placement, verify batch plant tickets to assure:			
	1. The proper concrete mix was received	R	N/A	 SAW 4-17-12
	2. The load time is not exceeded prior to discharge from the truck	R	N/A	 SAW 4-17-12
	3. The truckdrum revolutions per minute have not exceeded the limits of the project requirements	I	N/A	N/A
	4. The signature of the batch plant inspector exists if required	R	N/A	N/A

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	5. The quantity of water allowed to be added to the mix	R	N/A	SAW 4-17-12
	6. If water is allowed to be added to the mix, the maximum is not exceeded	I	N/A	N/A
	b) Check the free drop of concrete and the flow of concrete from the deposition point is not exceeded.	S	N/A	N/A
	c) Check that the concrete is deposited in layers not to exceed the project requirements.	S	N/A	N/A
	d) Check that the proper type of vibration equipment is used.	S	N/A	SAW 4-17-12
	e) Check that vibration equipment is used properly to eliminate voids and enhance bonding of subsequent layers of concrete.	S	N/A	SAW 4-17-12
	f) Check that vibration equipment is used with the proper insertion overlap radii of action and duration to consolidate the concrete but not used to spread or move concrete from one deposit point to another.	S	N/A	SAW 4-17-12
	g) Check that the temperature is maintained at the placement area throughout the entire placement of concrete Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	h) Verify any testing required during the concrete placement and record the results on the concrete placement card	W	N/A	SAW 4-17-12
	i) Check that the proper concrete finishing methods are used and applied to the concrete throughout the finishing process	S	N/A	SAW 4-17-12
	j) Verify the concrete placement has been completed to the proper boundaries and elevation per project documents	I	N/A	SAW 4-17-12
	k) Verify critical embeds, ie: anchor bolts etc. are still in their required location, configuration and tolerance after the concrete placement is complete	I	N/A	N/A
	l) Verify the proper finish has been applied to the concrete surface and no debris, foreign material or excess water was left in the concrete	I	N/A	N/A
3.0	Final Inspection Activities The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.	None	None	None
4.0	Review Of Supplementary Records The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	PLACEMENT INSPECTION a) Review batch plant tickets to assure all tickets are accounted for and recorded	R	N/A	SAW 4-17-12
	b) Review the concrete placement card for completeness and acceptance of test results.	R	N/A	SAW 4-17-12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	<i>SAW</i> SAW 4-17-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	<i>SAW</i> SAW 4-17-12
REMARKS:				
FE Inspection Performed by: N/A			DATE:	
QCE Final Review Performed by: Sam Worthy <i>Sam Worthy</i>			DATE: 4-17-12 <i>4/17/12</i>	

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PURDUE DAVIS BESSE CONCRETE PLACEMENT INSPECTION RECORD

WORK PROCESS: Concrete Beams (30)		IR number <u>25539-115-P-1-0003</u>		Page <u>1</u> of <u>3</u>	
PROJECT NUMBER: 25539-115			PROJECT NAME:		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related					
Scope of Record: Concrete beams (3) with lap splice of 120" A 4,5 & 6					
Reference Criteria: 25593-000-TCO-GEO-00001					
	Inspection Description	RESPONSIBILITY			
		Insp. Type	FE/Date	QCE/Date	
1.0	<u>Prerequisites</u>				
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>	R	N/A	 SAW 4-24-12	
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0	
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0	
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.				
2.1	<u>PLACEMENT INSPECTION</u>				
	a) Prior to concrete placement, verify batch plant tickets to assure:				
	1. The proper concrete mix was received	R	N/A	 SAW 4-24-12	
	2. The load time is not exceeded prior to discharge from the truck	R	N/A	 SAW 4-24-12	
	3. The truck drum revolutions per minute have not exceeded the limits of the project requirements	I	N/A	N/A	
	4. The signature of the batch plant inspector exists if required	R	N/A	N/A	

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	5. The quantity of water allowed to be added to the mix	R	N/A	SAW 4-24-12
	6. If water is allowed to be added to the mix, the maximum is not exceeded	I	N/A	N/A
	b) Check the free drop of concrete and the flow of concrete from the deposition point is not exceeded.	S	N/A	N/A
	c) Check that the concrete is deposited in layers not to exceed the project requirements.	S	N/A	N/A
	d) Check that the proper type of vibration equipment is used.	S	N/A	SAW 4-24-12
	e) Check that vibration equipment is used properly to eliminate voids and enhance bonding of subsequent layers of concrete.	S	N/A	SAW 4-24-12
	f) Check that vibration equipment is used with the proper insertion overlap radii of action and duration to consolidate the concrete but not used to spread or move concrete from one deposit point to another.	S	N/A	SAW 4-24-12
	g) Check that the temperature is maintained at the placement area throughout the entire placement of concrete Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	h) Verify any testing required during the concrete placement and record the results on the concrete placement card	W	N/A	SAW 4-24-12
	i) Check that the proper concrete finishing methods are used and applied to the concrete throughout the finishing process	S	N/A	SAW 4-24-12
	j) Verify the concrete placement has been completed to the proper boundaries and elevation per project documents	I	N/A	SAW 4-24-12
	k) Verify critical embeds, ie: anchor bolts etc. are still in their required location, configuration and tolerance after the concrete placement is complete	I	N/A	N/A
	l) Verify the proper finish has been applied to the concrete surface and no debris, foreign material or excess water was left in the concrete	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.	None	None	None
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>PLACEMENT INSPECTION</u> a) Review batch plant tickets to assure all tickets are accounted for and recorded	R	N/A	SAW 4-24-12
	b) Review the concrete placement card for completeness and acceptance of test results.	R	N/A	SAW 4-24-12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	<i>SAW</i> SAW 4-24-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	<i>SAW</i> SAW 4-24-12

REMARKS: No water added on-site

FE Inspection Performed by: N/A

DATE:

QCE Final Review Performed by Sam Worthy

DATE: 4-24-12

4/24/12


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REDACTED VERSION

(K)

 PURDUE DAVIS BESSE CONCRETE PLACEMENT INSPECTION RECORD				
WORK PROCESS:		IR number <u>25539-115-P1-0004</u>		Page <u>1</u> of <u>3</u>
PROJECT NUMBER:		PROJECT NAME:		
Safety Class <input type="checkbox"/> Safety Related <input type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: concrete beam with lap splice of 79" B4, 5, & 6				
Reference Criteria: 25593-TCO-GEO-00001				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>	R	N/A	SAW SAW 4-30-12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PLACEMENT INSPECTION</u>			
	a) Prior to concrete placement, verify batch plant tickets to assure:			
	1. The proper concrete mix was received	R	N/A	SAW SAW 4-30-12
	2. The load time is not exceeded prior to discharge from the truck	R	N/A	SAW SAW 4-30-12
	3. The truck drum revolutions per minute have not exceeded the limits of the project requirements	I	N/A	N/A
	4. The signature of the batch plant inspector exists if required	R	N/A	N/A

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	5. The quantity of water allowed to be added to the mix	R	N/A	SAW 4-30-12
	6. If water is allowed to be added to the mix, the maximum is not exceeded	I	N/A	N/A
	b) Check the free drop of concrete and the flow of concrete from the deposition point is not exceeded.	S	N/A	N/A
	c) Check that the concrete is deposited in layers not to exceed the project requirements.	S	N/A	N/A
	d) Check that the proper type of vibration equipment is used.	S	N/A	SAW 4-30-12
	e) Check that vibration equipment is used properly to eliminate voids and enhance bonding of subsequent layers of concrete.	S	N/A	SAW 4-30-12
	f) Check that vibration equipment is used with the proper insertion overlap radii of action and duration to consolidate the concrete but not used to spread or move concrete from one deposit point to another.	S	N/A	SAW 4-30-12
	g) Check that the temperature is maintained at the placement area throughout the entire placement of concrete Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	h) Verify any testing required during the concrete placement and record the results on the concrete placement card	W	N/A	SAW 4-30-12
	i) Check that the proper concrete finishing methods are used and applied to the concrete throughout the finishing process	S	N/A	SAW 4-30-12
	j) Verify the concrete placement has been completed to the proper boundaries and elevation per project documents	I	N/A	SAW 4-30-12
	k) Verify critical embeds, ie: anchor bolts etc. are still in their required location, configuration and tolerance after the concrete placement is complete	I	N/A	N/A
	l) Verify the proper finish has been applied to the concrete surface and no debris, foreign material or excess water was left in the concrete	I	N/A	N/A
3.0	Final Inspection Activities The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.	None	None	None
4.0	Review Of Supplementary Records The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	PLACEMENT INSPECTION a) Review batch plant tickets to assure all tickets are accounted for and recorded	R	N/A	SAW 4-30-12
	b) Review the concrete placement card for completeness and acceptance of test results.	R	N/A	SAW 4-30-12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R	N/A	<i>SAW</i> SAW 4-30-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	<i>SAW</i> SAW 4-30-12

REMARKS: No water added on-site

FE Inspection Performed by N/A

DATE:

QCE Final Review Performed by: Sam Worthy

DATE: 4-30-12


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Attachment E

 PURDUE DAVIS BESSE CONCRETE POST PLACEMENT/CURING INSPECTION RECORD				
WORK PROCESS: <i>Concrete Curing</i>		IR number <i>25593-115-CP20-1-0001</i>		Page _____ of _____
PROJECT NUMBER: <i>25593-115</i>		PROJECT NAME: <i>DAVIS BESSE/BOWEN LAB</i>		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: <i>Documentation submitted by Bowen LAB</i>				
<i>Beams BL 2 & 3</i>				
Reference Criteria: <i>25593-000-V15-SY01-00001-001</i>				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Check that the proper curing method is applied and started within the time period required and the proper curing method is used as designated in the project documents and as indicated by acceptance below:			
	1. Curing compound is the approved type and applied per project requirements. Manufacturer and expiration date if required _____	S	N/A	N/A
	b) Check that the water cure has been maintained throughout the specified time period as recorded on the inspection record. Record in the remarks section of this record.	S		<i>SAW 4/17/12</i>

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	c) Verify curing has been completed and documented.	R		SAW 4/17/12
	d) Check that the formwork is not removed prior to the time period stated in the project requirements.	S		SAW 4/17/12
	e) Inspect concrete surfaces for defects and damage after the forms are removed.	I		SAW 4/17/12
	f) Verify any repairs allowed and performed to the concrete meet the project requirements.	I		SAW 4/17/12
	g) Verify saw cuts or any other type post placement control joints specified are completed as required and meet project documents.	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.			
3.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Verify concrete meets project requirements ie: surfaces, dimensions, tolerances and all other visual aspects after all post placement activities and requirements are completed.	I		SAW 4/17/12
	b) Verify all testing that was required has been completed.	R		SAW 4/17/12
	c) Verify the concrete has achieved the minimum required strength within the specified time period as recorded on the concrete test record.	R		SAW 4/17/12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Review the concrete curing record.	R		SAW 4/17/12
	b) Review the concrete test record.	R		SAW 4/17/12
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		SAW 4/17/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		SAW 4/17/12

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REMARKS:

2.3 b Cure Record							
Day	1	2	3	4	5	6	7
Time	1:45pm	11: AM	2:30p	3:30p	1:30p.	3p	2:30p
Temp.	65°	60°F	65°F	65°F	65°F	67°F	62°F
M&TE	BL001	BL001	BL001	BL001	BL001	BL001	BL001
Initial/date	SAW 4/11/12	SAW 4/12/12				SAW 4/16/12	SAW 5/17/12

Water cured by wet burlap for 14 days

FE Inspection Performed by:

N/A

DATE:

QCE Final Review Performed by:

Stworthy

DATE:

4/17/12


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Attachment E

 PURDUE DAVIS BESSE CONCRETE POST PLACEMENT/CURING INSPECTION RECORD				
WORK PROCESS: <u>Concrete Curing</u>		IR number <u>25593-115-Cure-1-0002</u>		Page _____ of _____
PROJECT NUMBER: <u>25593-115</u>		PROJECT NAME: <u>Davis Besse / Bowen LAB</u>		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: <u>Curing records submitted by Bowen LABs</u>				
Reference Criteria: <u>25593-000-VIS-SYD-0000-601</u>				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Check that the proper curing method is applied and started within the time period required and the proper curing method is used as designated in the project documents and as indicated by acceptance below:			
	1. Curing compound is the approved type and applied per project requirements. Manufacturer and expiration date if required _____	S	N/A	N/A
	b) Check that the water cure has been maintained throughout the specified time period as recorded on the inspection record. Record in the remarks section of this record.	S		SAW 4/23/12 4/23/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	c) Verify curing has been completed and documented.	R		SAW 4/23/12
	d) Check that the formwork is not removed prior to the time period stated in the project requirements.	S		SAW 4/23/12
	e) Inspect concrete surfaces for defects and damage after the forms are removed.	I		SAW 4/23/12
	f) Verify any repairs allowed and performed to the concrete meet the project requirements.	I		SAW 4/23/12
	g) Verify saw cuts or any other type post placement control joints specified are completed as required and meet project documents.	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.			
3.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Verify concrete meets project requirements ie: surfaces, dimensions, tolerances and all other visual aspects after all post placement activities and requirements are completed.	I		SAW 4/23/12
	b) Verify all testing that was required has been completed.	R		SAW 4/23/12
	c) Verify the concrete has achieved the minimum required strength within the specified time period as recorded on the concrete test record.	R		SAW 4/23/12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Review the concrete curing record.	R		SAW 4/23/12
	b) Review the concrete test record.	R		SAW 4/23/12
5.0	<u>Exceptions</u>			SAW 4/23/12
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		SAW 4/23/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		SAW 4/23/12

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REMARKS:

2.3 b Cure Record							
Day	1	2	3	4	5	6	7
Time	3 P	10 A	5:30 P				
Temp.	65°	72°	62°				
M&TE	BL001	BL001	BL001				
Initial/date	SAC 4/19/12	SAC 4/19/12					

Water cured by wet burlap for 3 days

FE Inspection Performed by:

DATE:

QCE Final Review Performed by:

DATE:

4/23/12


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Attachment E

 PURDUE DAVIS BESSE CONCRETE POST PLACEMENT/CURING INSPECTION RECORD				
WORK PROCESS: <u>Concrete Curing</u>		IR number <u>25593-115-Cure-1-0003</u>		Page _____ of _____
PROJECT NUMBER: <u>25593-115</u>		PROJECT NAME: <u>Davis Besse / Bowen Lab</u>		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: <u>Curing Records submitted by Bowen Lab</u>				
<u>Benchs A 45 & 6</u>				
Reference Criteria: <u>25593-000-V15-SY01-00001-001</u>				
Inspection Description		RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Check that the proper curing method is applied and started within the time period required and the proper curing method is used as designated in the project documents and as indicated by acceptance below:			
	1. Curing compound is the approved type and applied per project requirements. Manufacturer and expiration date if required	S	N/A	N/A
	b) Check that the water cure has been maintained throughout the specified time period as recorded on the inspection record. Record in the remarks section of this record.	S		SAW 5/7/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	c) Verify curing has been completed and documented.	R		SAW 5-7-12
	d) Check that the formwork is not removed prior to the time period stated in the project requirements.	S		SAW 5-17-12
	e) Inspect concrete surfaces for defects and damage after the forms are removed.	I		SAW 5-7-12
	f) Verify any repairs allowed and performed to the concrete meet the project requirements.	I		SAW 5-7-12
	g) Verify saw cuts or any other type post placement control joints specified are completed as required and meet project documents.	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.			
3.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Verify concrete meets project requirements ie: surfaces, dimensions, tolerances and all other visual aspects after all post placement activities and requirements are completed.	I		SAW 5-7-12
	b) Verify all testing that was required has been completed.	R		SAW 5-7-12
	c) Verify the concrete has achieved the minimum required strength within the specified time period as recorded on the concrete test record.	R		SAW 5-7-12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Review the concrete curing record.	R		SAW 5-7-12
	b) Review the concrete test record.	R		SAW 5-7-12
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		SAW 5-7-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		SAW 5-7-12

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REMARKS:

2.3 b Cure Record							
Day	1	2	3	4	5	6	7
Time	1:15p	N/A	9:30A				
Temp.	65°		70°				
M&TE	BLOOI		BLOOI				
Initial/date	SAW 5/1/12						

3 day cure

FE Inspection Performed by:

DATE:

QCE Final Review Performed by:

DATE:

5/7/12


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Attachment E

 PURDUE DAVIS BESSE CONCRETE POST PLACEMENT/CURING INSPECTION RECORD				
WORK PROCESS: <u>Concrete Curing</u>		IR number <u>25593-115-CURE-1-0004</u>		Page _____ of _____
PROJECT NUMBER: <u>25593-115</u>		PROJECT NAME: <u>DAVIS Besse / Bowen LAB</u>		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: <u>Curing Records submitted by Bowen LABS</u>				
Reference Criteria: <u>25593-000-115-SY01-00001-001</u>				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	In-Process Inspections The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	POST PLACEMENT INSPECTION			
	a) Check that the proper curing method is applied and started within the time period required and the proper curing method is used as designated in the project documents and as indicated by acceptance below:			
	1. Curing compound is the approved type and applied per project requirements. Manufacturer and expiration date if required	S	N/A	N/A
	b) Check that the water cure has been maintained throughout the specified time period as recorded on the inspection record. Record in the remarks section of this record.	S		SAW 3-1-12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	c) Verify curing has been completed and documented.	R		SAW 5-1-12
	d) Check that the formwork is not removed prior to the time period stated in the project requirements.	S		SAW 5-1-12
	e) Inspect concrete surfaces for defects and damage after the forms are removed.	I		SAW 5-1-12
	f) Verify any repairs allowed and performed to the concrete meet the project requirements.	I		SAW 5-1-12
	g) Verify saw cuts or any other type post placement control joints specified are completed as required and meet project documents.	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.			
3.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Verify concrete meets project requirements ie: surfaces, dimensions, tolerances and all other visual aspects after all post placement activities and requirements are completed.	I		SAW 5-1-12
	b) Verify all testing that was required has been completed.	R		SAW 5-1-12
	c) Verify the concrete has achieved the minimum required strength within the specified time period as recorded on the concrete test record.	R		SAW 5-1-12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Review the concrete curing record.	R		SAW 5-1-12
	b) Review the concrete test record.	R		SAW 5-1-12
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		SAW 5-1-12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		SAW 5-1-12

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REMARKS:

2.3 b Cure Record							
Day	1	2	3	4	5	6	7
Time	4 P	10:30 A	2:30 P	1 AM		8:15 A	1 PM
Temp.	65°	65°	65°	65°		65°	65°
M&TE	BL001	BL001	BL001	BL001		BL001	BL001
Initial/date	SW 4/25/12					SW 4/30/12	SW 5/1/12

Water cured by wet burlap for 7 days

FE Inspection Performed by:

DATE:

QCE Final Review Performed by:

DATE:

PWPP 3210, Concrete Operations – Rev. 1

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Davis Bessie/Bowen Laboratory



SUBCONTRACTOR SURVEILLANCE REPORT

JOB No. 25593-007	REPORT No. 25486-007-BT-1-0001
SUBCONTRACTOR: Bowen Laboratory	DATE: 5/10/12
REF. SPEC. / PROC. en/ DWGS: 25593-000-V15-SY01-00001-001	SHEET: 1 OF 1
DESCRIPTION OF ACTIVITY BEING MONITORED: Calibration of M & TE used during Test. Pressure was applied in 3 Kip increments until failure at 39.5 Kip. No problems noted.	
LOCATION: Bowen Laboratory/Purdue University	
OBSERVATIONS / COMMENTS: Review of Bowen Laboratory Procedure 25595-000-V15-SY01-00001 M & TE used was calibrated prior to test per procedure. Beam was set in-place and all equipment for test was applied to beam. Test was performed as specified and documented accordingly.	
NCR GENERATED: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	NCR No.
REPORT BY: Sam Worthy PFQCE <i>[Signature]</i>	DATE: 5/10/2012 <i>5/10/12</i>
REVIEWED BY:	DATE:
QCE: Sam Worthy <i>[Signature]</i>	DATE: 5/22/12 <i>5/22/12</i>

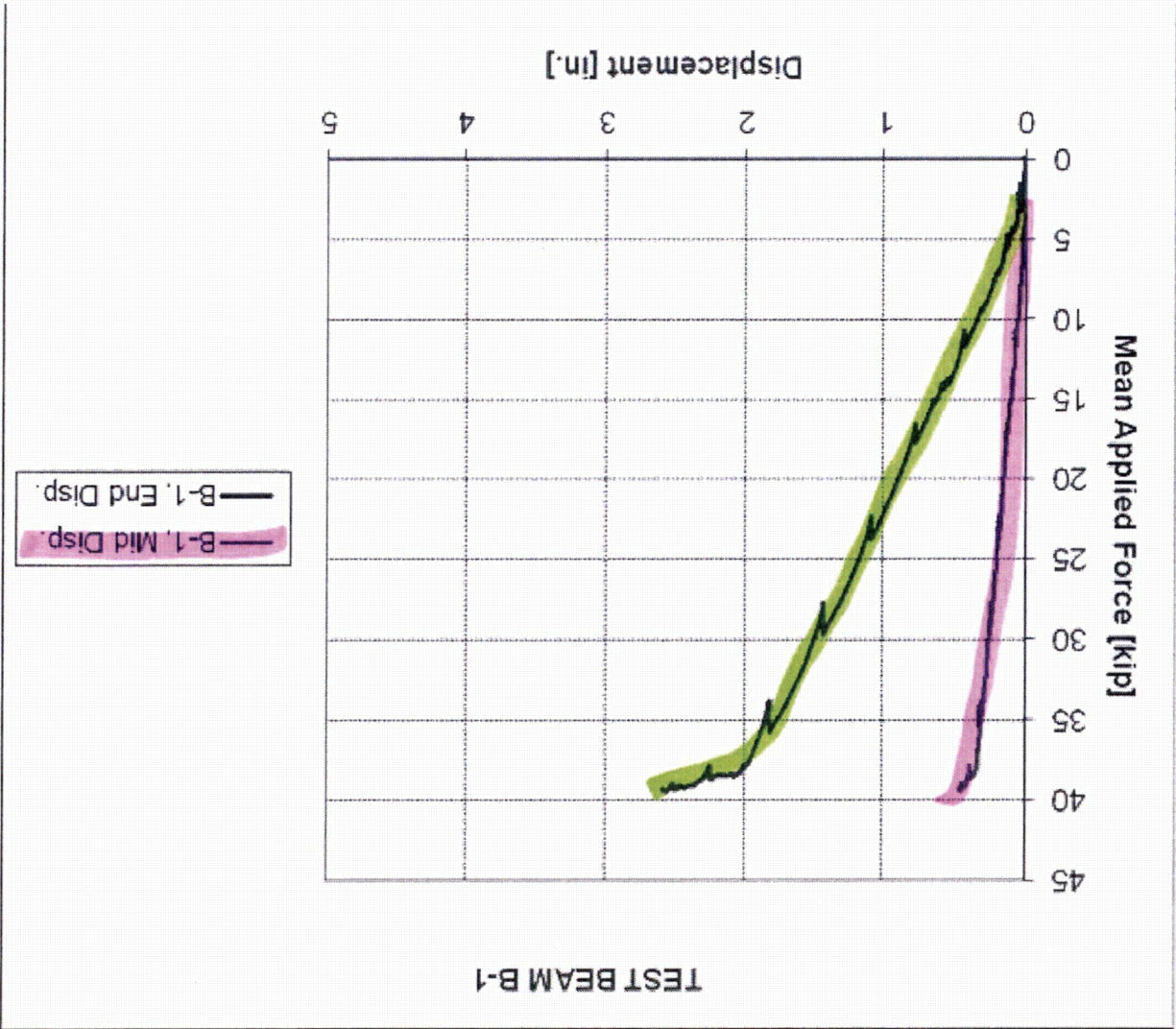
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Subject: RE: test results

May 10



39.5 kips

Davis Bessie/Bowen Laboratory



SUBCONTRACTOR SURVEILLANCE REPORT

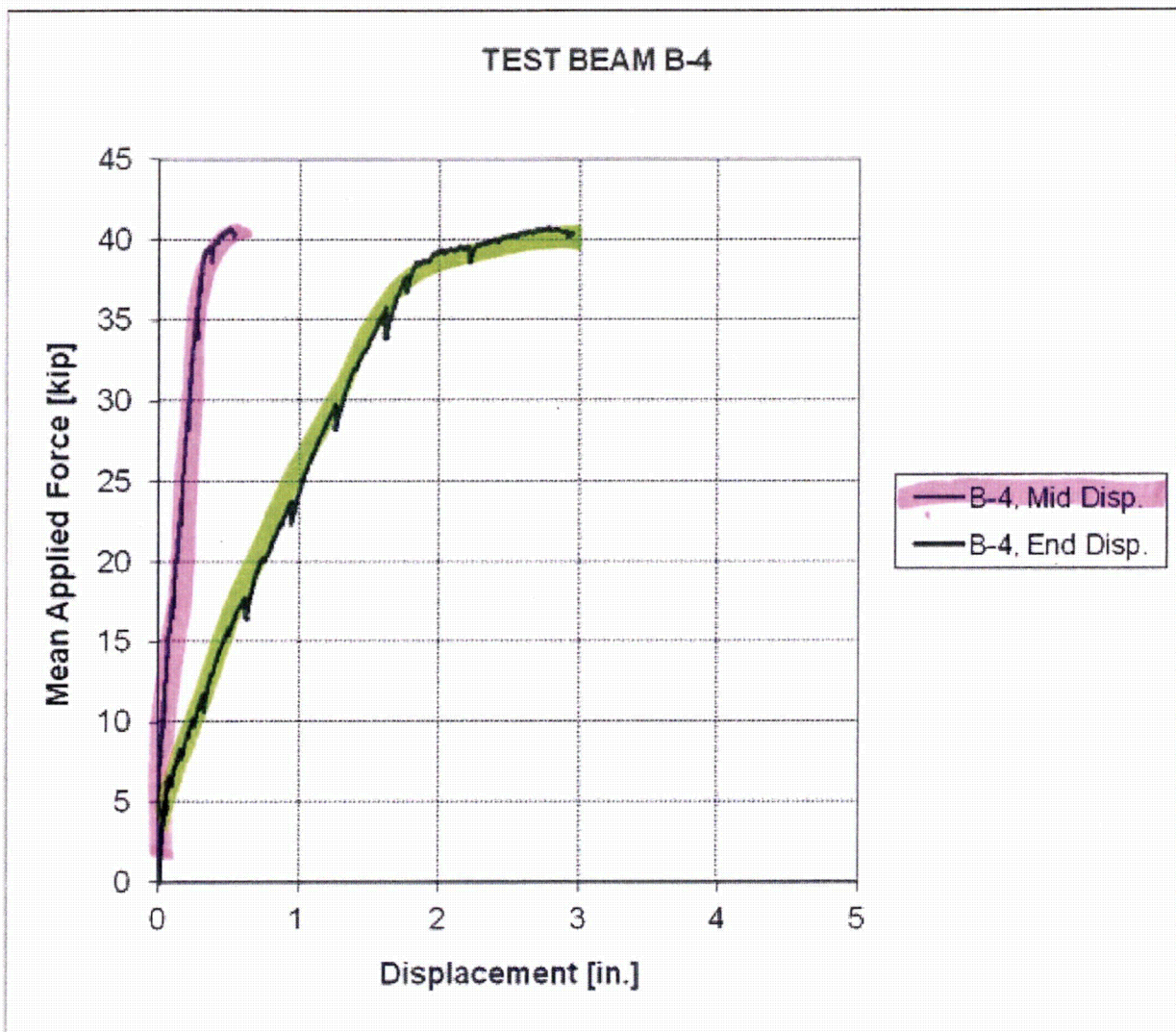
JOB No. 25593-007	REPORT No. 25486-007-BT-1-0002
SUBCONTRACTOR: Bowen Laboratory	DATE: 5/14/12
REF. SPEC. / PROC. en/ DWGS: 25593-000-V15-SY01-00001-001	SHEET: 1 OF 1
<p>DESCRIPTION OF ACTIVITY BEING MONITORED:</p> <p>Calibration of M & TE used during Test.</p> <p>Pressure was applied in 6 Kip increments until failure at 40 Kip. No problems noted.</p>	
<p>LOCATION: Bowen Laboratory/Purdue University</p>	
<p>OBSERVATIONS / COMMENTS: Review of Bowen Laboratory Procedure 25595-000-V15-SY01-00001</p> <p>M & TE used was calibrated prior to test per procedure.</p> <p>Beam was set in-place and all equipment for test was applied to beam. Test was performed as specified and documented accordingly.</p>	
<p>NCR GENERATED: <input type="checkbox"/> YES</p> <p><input checked="" type="checkbox"/> NO</p>	NCR No.
REPORT BY: Sam Worthy PFQCE <i>SWorthy</i>	DATE: 5/14/2012
REVIEWED BY:	DATE:
QCE: Sam Worthy <i>SWorthy</i>	DATE: 5/22/12 <i>5/22/12</i>

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May 14



41 KIPS

Davis Bessie/Bowen Laboratory



SUBCONTRACTOR SURVEILLANCE REPORT

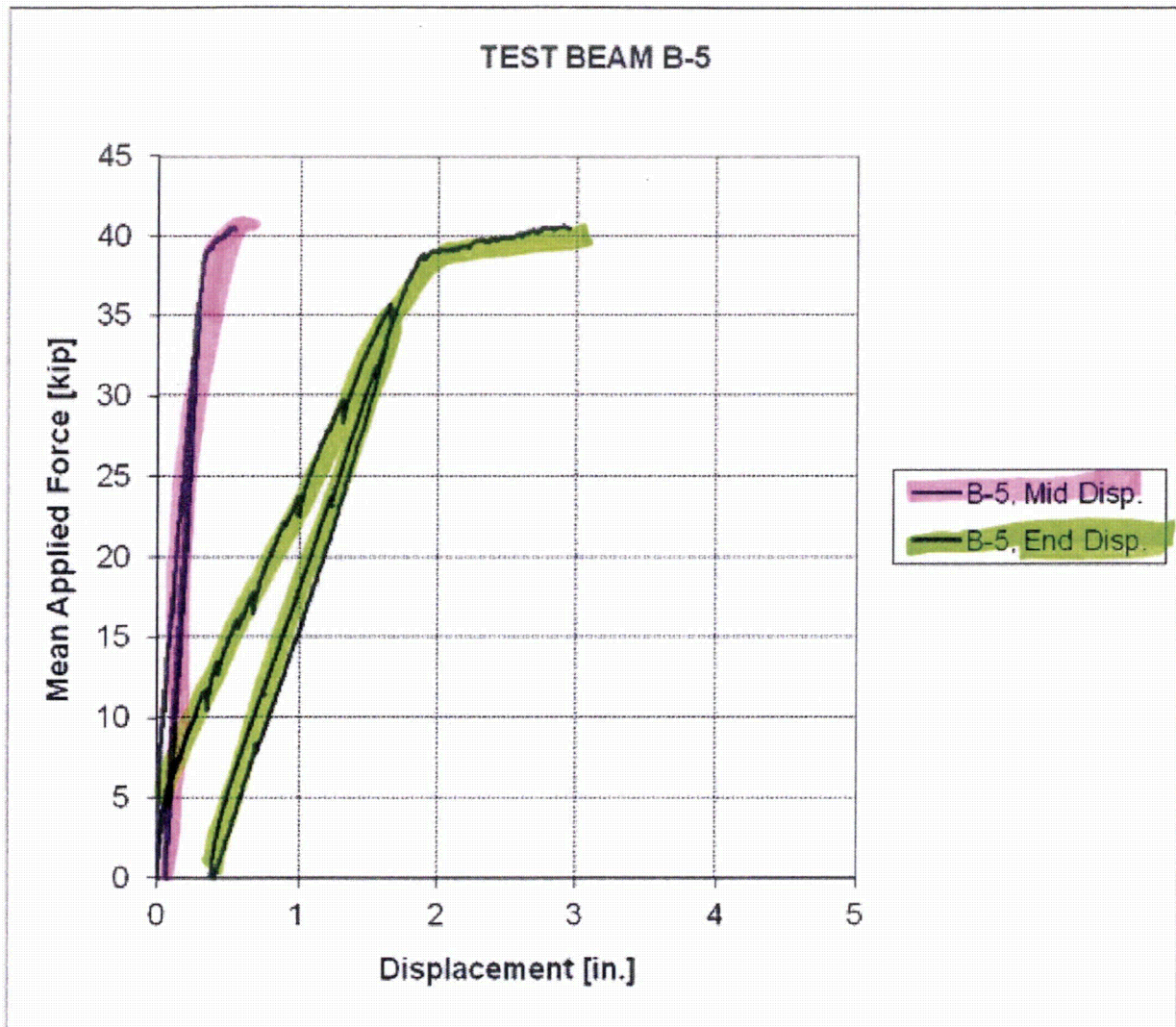
JOB No. 25593-007	REPORT No. 25486-007-BT-1-0003
SUBCONTRACTOR: Bowen Laboratory	DATE: 5/17/12
REF. SPEC. / PROC. en/ DWGS: 25593-000-V15-SY01-00001 <i>0001</i>	SHEET: 1 OF 1
<p>DESCRIPTION OF ACTIVITY BEING MONITORED:</p> <p>Calibration of M & TE used during Test.</p> <p>Pressure was applied in 6 Kip increments to 36 Kip, then taken to zero and re-started until failure 40 Kip. No problems noted.</p>	
<p>LOCATION: Bowen Laboratory/Purdue University</p>	
<p>OBSERVATIONS / COMMENTS: Review of Bowen Laboratory Procedure 25595-000-V15-SY01-00001</p> <p>M & TE used was calibrated prior to test per procedure.</p> <p>Beam was set in-place and all equipment for test was applied to beam. Test was performed as specified and documented accordingly.</p> <p>Beam was taken to 36 Kip and brought back to zero. Recording of cracks was accomplished throughout the test.</p>	
<p>NCR GENERATED: <input type="checkbox"/> YES</p> <p><input checked="" type="checkbox"/> NO</p>	NCR No.
<p>REPORT BY: Sam Worthy PFQCE <i>Sam Worthy</i></p>	DATE: 5/17/2012
<p>REVIEWED BY:</p>	DATE:
<p>QCE: Sam Worthy <i>SWorthy</i></p>	DATE: 5/22/12 <i>5/22/12</i>

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MAY 17



40 KIP

Attachment E



PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete Testing		IR number: BT-1-0001-4		Page 1 of 2	
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse			
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related					
Scope of Record: Observe Testing of specimen is performed according to specification					
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure					
	Inspection Description	RESPONSIBILITY			
		Insp. Type	FE/Date	QCE/Date	
1.0	<u>Prerequisites</u>				
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>				
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0	
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0	
2.0	<u>Test</u>				
2.1	Verify the test beam is placed on two roller supports to the specified distance.				
	a) Test series A – 16'	I		N/A	
	b) Test series B – 12' 7"	I		RTV 5/21/12	
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTV 5/21/12	
2.3	Verify the following steps are completed during each loading increment.				
	a) All visual cracks shall be marked using black permanent markers.	W		RTV 5/21/12	
	b) Crack widths shall be measured.	W		RTV 5/21/12	

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	Supplemental Records			
3.1	Test procedure	R		RTV 5/21/12
3.2	Previous Inspection records – IR# 22593-115-cure-1-0001	R		RTV 5/21/12
4.0	Exceptions			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		RTV 5/21/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On May 21, 2012, I witnessed test beam B-3 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the loading totaled 36 kips the test beam was then unloaded to zero. The specimen was then reloaded to 12 and 24 kips with measurements recorded at both intervals, loading then continued until fracture at 39.7 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <i>Ben T. U...</i>			DATE: 6/11/12	

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PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-5		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	Test			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A – 16'	I		N/A
	b) Test series B – 12' 7"	I		RTV 5/23/12
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTV 5/23/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTV 5/23/12
	b) Crack widths shall be measured.	W		RTV 5/23/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	<u>Supplemental Records</u>			
3.1	Test procedure	R		RTU 5/23/12
3.2	Previous Inspection records – IR# 22593-115-cure-1-0001	R		RTU 5/23/12
4.0	<u>Exceptions</u>			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		RTU 5/23/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On May 23, 2012, I witnessed test beam B-2 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the loading totaled 36 kips the test beam was then unloaded to zero. The specimen was then reloaded to 12 and 24 kips with measurements recorded at both intervals, loading then continued until fracture at 38.9 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <i>B. T. V.</i>			DATE: 6/11/12	

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Attachment E



PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-6		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>Test</u>			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A - 16'	I		N/A
	b) Test series B - 12' 7"	I		RTU 5/25/12
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTU 5/25/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTU 5/25/12
	b) Crack widths shall be measured.	W		RTU 5/25/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	Supplemental Records			
3.1	Test procedure	R		PTV 5/25/12
3.2	Previous Inspection records – IR# 22593-115-cure-1-0004	R		PTV 5/25/12
4.0	Exceptions			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		PTV 5/25/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On May 25, 2012, I witnessed test beam B-6 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the loading totaled 36 kips the test beam was then unloaded to zero. The specimen was then reloaded to 12 and 24 kips with measurements recorded at both intervals, loading then continued until fracture at 41.6 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <i>B. J. T. U.</i>			DATE: 6/11/12	

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PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-7		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	Test			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A – 16'	I		RTV 5/30/12
	b) Test series B – 12' 7"	I		N/A
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTV 5/30/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTV 5/30/12
	b) Crack widths shall be measured.	W		RTV 5/30/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	<u>Supplemental Records</u>			
3.1	Test procedure	R		PTU 5/30/12
3.2	Previous Inspection records – IR# 22593-115-cure-1-0002	R		PTU 5/30/12
4.0	<u>Exceptions</u>			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		PTU 5/30/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		
REMARKS: <p>On May 30, 2012, I witnessed test beam A-3 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. The test beam was then loaded until fracture at 44.1 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <u>R. J. T. U</u>			DATE: <u>6/11/12</u>	

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PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-8		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	Test			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A – 16'	I		6/1/12 PTU
	b) Test series B – 12' 7"	I		N/A
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		PTU 6/1/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		PTU 6/1/12
	b) Crack widths shall be measured.	W		PTU 6/1/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	Supplemental Records			
3.1	Test procedure	R		PTU 6/1/12
3.2	Previous Inspection records – IR# 22593-115-cure-1-0002	R		PTU 6/1/12
4.0	Exceptions			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		PTU 6/1/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On June 1, 2012, I witnessed test beam A-2 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. The test beam was then loaded until fracture at 44.1 kips. The fracture was not recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <u>B. J. T. U</u>			DATE: 6/11/12	

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Attachment E



PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-9		Page 1 of 2	
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse			
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related					
Scope of Record: Observe Testing of specimen is performed according to specification					
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure					
	Inspection Description	RESPONSIBILITY			
		Insp. Type	FE/Date	QCE/Date	
1.0	Prerequisites				
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.				
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0	
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0	
2.0	Test				
2.1	Verify the test beam is placed on two roller supports to the specified distance.				
	a) Test series A – 16'	I		PTV 6/4/12	
	b) Test series B – 12' 7"	I		N/A	
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		PTV 6/4/12	
2.3	Verify the following steps are completed during each loading increment.				
	a) All visual cracks shall be marked using black permanent markers.	W		PTV 6/4/12	
	b) Crack widths shall be measured.	W		PTV 6/4/12	

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	<u>Supplemental Records</u>			
3.1	Test procedure	R		PTU 6/4/12
3.2	Previous Inspection records – IR# 22593-115-cure-1-0002	R		PTU 6/4/12
4.0	<u>Exceptions</u>			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		PTU 6/4/12
'OR'				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On June 4, 2012, I witnessed test beam A-1 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the test beam was loaded to the point where the average displacement on the beam was 4 inches the beam was then unloaded to zero. The specimen was then reloaded using 12 kips increments with measurements recorded at each interval, loading then continued until fracture at 43.5 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <i>R. T. U.</i>			DATE: 6/11/12	

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Attachment E



PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-10		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>Test</u>			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A – 16'	I		RTU 6/5/12
	b) Test series B – 12' 7"	I		N/A
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTU 6/5/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTU 6/5/12
	b) Crack widths shall be measured.	W		RTU 6/5/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	Supplemental Records			
3.1	Test procedure	R		NTU 6/5/12
3.2	Previous Inspection records - IR# 22593-115-cure-1-0003	R		RTU 6/5/12
4.0	Exceptions			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		RTU 6/5/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On June 5, 2012, I witnessed test beam A-6 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the test beam was loaded to the point where the average displacement on the beam was 4 inches the beam was then unloaded to zero. The specimen was then reloaded using 12 kips increments with measurements recorded at each interval, loading then continued until fracture at 43.5 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <u>RTU</u>			DATE: 6/11/12	

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Attachment E



PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-11		Page <u>1</u> of <u>2</u>
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	Test			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A – 16'	I		RTU 6/7/12
	b) Test series B – 12' 7"	I		N/A
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTU 6/7/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTU 6/7/12
	b) Crack widths shall be measured.	W		RTU 6/7/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	<u>Supplemental Records</u>			
3.1	Test procedure	R		MTU 6/7/12
3.2	Previous inspection records - IR# 22593-115-cure-1-0003	R		MTU 6/7/12
4.0	<u>Exceptions</u>			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		MTU 6/7/12
'OR'				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On June 7, 2012, I witnessed test beam A-5 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the test beam was loaded to the point where the average displacement on the beam was 4 inches the beam was then unloaded to zero. The specimen was then reloaded using 12 kips increments with measurements recorded at each interval, loading then continued until fracture at 43.4 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <u>R. T. U.</u>			DATE: 6/11/12	

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PURDUE DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: BT-1-0001-12		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Purdue Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Observe Testing of specimen is performed according to specification				
Reference Criteria: Proposal to FENOC, Test specifications, Test procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	Test			
2.1	Verify the test beam is placed on two roller supports to the specified distance.			
	a) Test series A – 16'	I		RTU 6/8/12
	b) Test series B – 12' 7"	I		N/A
2.2	Verify the reinforced shear spans are installed at the specified limits.	I		RTU 6/8/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTU 6/8/12
	b) Crack widths shall be measured.	W		RTU 6/8/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	<u>Supplemental Records</u>			
3.1	Test procedure	R		PTU 6/8/12
3.2	Previous inspection records – IR# 22593-115-cure-1-0003	R		PTU 6/8/12
4.0	<u>Exceptions</u>			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		PTU 6/8/12
"OR"				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A
REMARKS: <p>On June 8, 2012, I witnessed test beam A-4 undergo loading until fracture. The test beam was setup according to procedure, loading was applied in 6 kip increments. At every interval the test beam was examined and all visible cracks were identified and mapped. The crack widths were then measured at the top of the beam and at the approximate location of the rebar, all measurements were recorded. The coordinates of the Infrared coordinates were obtained using the Opto Track system 600 pro at each interval as well as periodically. When the test beam was loaded to the point where the average displacement on the beam was 4 inches the beam was then unloaded to zero. The specimen was then reloaded using 12 kips increments with measurements recorded at each interval, loading then continued until fracture at 43.3 kips. The fracture was recorded successfully by the high speed camera.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <i>R. J. T. U.</i>			DATE: 6/11/12	

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Appendix D.2 - University of Kansas Inspection Record

Hon 5/24/12 Attachment C

 U. of KANSAS PERDUE DAVIS BESSE CONCRETE PRE-PLACEMENT INSPECTION RECORD				
WORK PROCESS:		IR number UK-1		Page 1 of 10
PROJECT NUMBER: 25593		PROJECT NAME: DAVIS BESSIE		
Safety Class <input checked="" type="checkbox"/> Safety Related <input type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: BEAMS 1, 2, 3				
Reference Criteria: U.K. Inspection PLAN				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	Prerequisites			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			Hon 5/23/12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.		See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.		See note 1.0	See note 1.0
2.0	In-Process Inspections The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	PRE-PLACEMENT INSPECTION			
	a) Verify concrete pour boundaries, size and location are as required.	I		Hon 5/23/12
	b) Rebar/Wire Mesh overlap splices, size, type, grade, spacing, tying, support, configuration, anchoring and details meet the requirements	I		Hon 5/23/12
	c) Dowels are installed with the correct size, type, grade, spacing, support, tying, anchoring, location and configuration	I	N/A	N/A
	d) Sub-grades prepared properly, to proper elevation and to proper top finish	I	N/A	N/A
	e) Verify the construction joints, control joints, expansion joints and water stops are installed	I	N/A	N/A

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REDACTED VERSION

UK *How* 5/24/12
IR# KU-1

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	f) Verify the formwork: is the correct size and type, has the correct form release agent applied, is installed in a workmanship manner, and without interference with embedded items, maintains proper clearance with embedded items, does not have excessive gaps, vertical and horizontal deviations are within required limits and anchored and supported properly	I		<i>How</i> 5/23/12
	g) Verify the concrete placement area is clean, free of debris and foreign material	I		<i>How</i> 5/23/12
	h) Verify all areas required to bond to the placed concrete are free of oil, grease or any other item or agent which will prevent bonding	I		<i>How</i> 5/23/12
	i) Verify adjoining concrete surfaces required to be bonded with the placed concrete are clean, free of laitance, surface roughened and otherwise prepared properly	I	N/A	N/A
	j) Verify weather protection and temperature controls are provided as required and the concrete area is within the temperature requirements Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	k) Verify waterproofing membrane is installed as required	I	N/A	N/A
	l) Verify any bonding agents required are installed as and where required	I	N/A	N/A
	m) Verify pre-soak if required, is completed per project documents Pre-soak start: Time _____ Date _____	S	N/A	N/A
	n) Verify required embedded items, penetrations or any other items, inspections or tests per discipline are complete and acceptable to embed in concrete and signified here by signature and date by an authorized representative of the discipline Civil _____ I&C _____ Mechanical _____ Electrical _____ Welding _____ HVAC _____ Start-up _____ Subcontractor _____ Other _____	R	N/A	N/A
	o) The concrete placement is released and ready to accept concrete provided the placement occurs within the allowed time after the release	R		<i>How</i> 5/24/12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			

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PWPP 3210, Concrete Operations – Rev. 1

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REDACTED^{D-63} VERSION

UK Min
I.R. Rtt-1 5/31/12

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Form 1: Dimensions of formwork

Beam #1

Specimen ID:	Mono - 79-1	Date:	05/24/12
Measured by:	Matt O'Reilly	Checked by:	Jeff Peckover

	Width	Height	Length
Design	18 in.	24 in.	25ft (300 in)
Tolerance	$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.	± 1 in.
Measurement 1	$17\frac{3}{8}$ "	24	$300\frac{3}{8}$ "
Measurement 2	$17\frac{3}{8}$ "	24	$300\frac{3}{8}$ "
Measurement 3	18"	24	$300\frac{3}{8}$ "
Measurement 4	$17\frac{15}{16}$ "	24	
Measurement 5	$17\frac{3}{8}$ "	24	
Measurement 6	$17\frac{3}{4}$ "	$24\frac{1}{16}$	
Measurement 7	$17\frac{3}{8}$ "	24	
Measurement 8	18"	24	
Measurement 9	$17\frac{3}{8}$ "	24	

Verified all measurements
Mon 5/24/12

WK Mon 5/31/12 Pg. 5 of 10
I.R. ~~KA~~-1

Form 2: Dimensions of reinforcing steel within in the test region

Specimen ID:	Mon- 79-1	Date:	05/24/12
Measured by:	Matt Opeika	Checked by:	Jeff Pectover

		Side cover	Bottom to top of all-thread rod	Splice length
Design		3 in.		79
Tolerance		$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.
Splice 1	Measurement 1	3 $\frac{1}{4}$	19 $\frac{3}{8}$	12 $\frac{3}{8}$ 79
	Measurement 2	2 $\frac{2}{8}$	19 $\frac{1}{4}$	19 $\frac{1}{4}$
	Measurement 3	2 $\frac{3}{4}$	19 $\frac{3}{8}$	19 $\frac{3}{8}$
Splice 2	Measurement 1	2 $\frac{3}{4}$	19 $\frac{3}{8}$	79 $\frac{1}{4}$
	Measurement 2	2 $\frac{15}{16}$	19 $\frac{5}{16}$	79 $\frac{1}{4}$
	Measurement 3	3 $\frac{3}{8}$	19 $\frac{3}{8}$	79 $\frac{1}{4}$

Measured bar diameter:

Splice 1: $\frac{11}{8}$ " - $1 \frac{3}{8}$ "

Splice 2: $\frac{11}{8}$ " - $1 \frac{3}{8}$ "

Verified measurements 5/24/12

UK ^{Mon} 5/31/12
IR KU-1

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Form 1: Dimensions of formwork

Beam #2

Specimen ID:	SF-721 SF-721	Date:	05/24/12
Measured by:	Matt O'Reilly	Checked by:	J. Perez

	Width	Height	Length
Design	18 in.	24 in.	25 A (300 in.)
Tolerance	$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.	± 1 in.
Measurement 1	17 ¹⁵ / ₁₆	24	25 ¹ / ₄ ~
Measurement 2	18	20 ¹ / ₈	25 ¹ / ₄
Measurement 3	18	20 ³ / ₁₆	25 ³ / ₁₆
Measurement 4	17 ¹⁵ / ₁₆	20 ³ / ₁₆	
Measurement 5	18	20 ¹ / ₈	
Measurement 6	18	20 ³ / ₁₆	
Measurement 7	17 ¹⁵ / ₁₆	20 ¹ / ₄	
Measurement 8	18	20 ¹ / ₈	
Measurement 9	18	24	

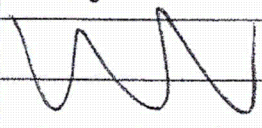
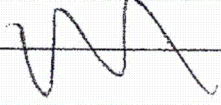
Verified dimensions
Mon 5/24/12

UK Mon 5/31/12
LR AU-1

Pg 2 of 10

Form 2: Dimensions of reinforcing steel within in the test region

Specimen ID:	CJ-79-2	Date:	05/24/12
Measured by:	Math O'Reilly	Checked by:	Jeff Peckover

		Side cover	Bottom to top of all-thread rod	Splice length
Design		3 in.		79"
Tolerance		$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.
Splice 1	Measurement 1	3 $\frac{7}{16}$ "	19 $\frac{1}{2}$ "	79"
	Measurement 2	3 $\frac{3}{8}$ "	19 $\frac{3}{8}$ "	
	Measurement 3	3 $\frac{1}{4}$ "	19 $\frac{3}{8}$ "	
Splice 2	Measurement 1	2 $\frac{5}{8}$ "	19 $\frac{3}{8}$ "	78 $\frac{15}{16}$ "
	Measurement 2	2 $\frac{3}{8}$ "	19 $\frac{3}{8}$ "	
	Measurement 3	3 $\frac{1}{4}$ "	19 $\frac{3}{8}$ "	

Measured bar diameter:

Splice 1: $1 \frac{3}{8}$ " } Mon 5/24/12
Splice 2: $1 \frac{3}{8}$ "

Verified dimensions
Mon 5/24/12

WK Mon 5/21/12
LR. RW-1

Pg. 8 of 10

Form 1: Dimensions of formwork

Beam #3

Specimen ID:	61 CF79-2	Date:	05/24/12
Measured by:	Max O'Reilly	Checked by:	Jeff Peckover

	Width	Height	Length
Design	18 in.	24 in.	25 ft (300 in.)
Tolerance	$\pm \frac{1}{2}$ in.	$\pm \frac{1}{2}$ in.	± 1 in.
Measurement 1	18	24	300 $\frac{1}{4}$
Measurement 2	18	20 $\frac{1}{8}$	300 $\frac{1}{4}$
Measurement 3	18 $\frac{1}{8}$	20 $\frac{1}{8}$	300 $\frac{1}{4}$
Measurement 4	17 $\frac{3}{4}$	20	
Measurement 5	17 $\frac{3}{4}$	20 $\frac{1}{8}$	
Measurement 6	17 $\frac{11}{16}$	20 $\frac{3}{16}$	
Measurement 7	17 $\frac{13}{16}$	20 $\frac{1}{8}$	
Measurement 8	18	20 $\frac{1}{8}$	
Measurement 9	18	24	

Verified dimensions
Jaw 5/24/12

UK Mon 5/31/12
 TR. KU-1

Pg. 9 of 10

Form 2: Dimensions of reinforcing steel within in the test region

Specimen ID:	SCJ-79-1	Date:	05/24/12
Measured by:	Math O'Rielly	Checked by:	

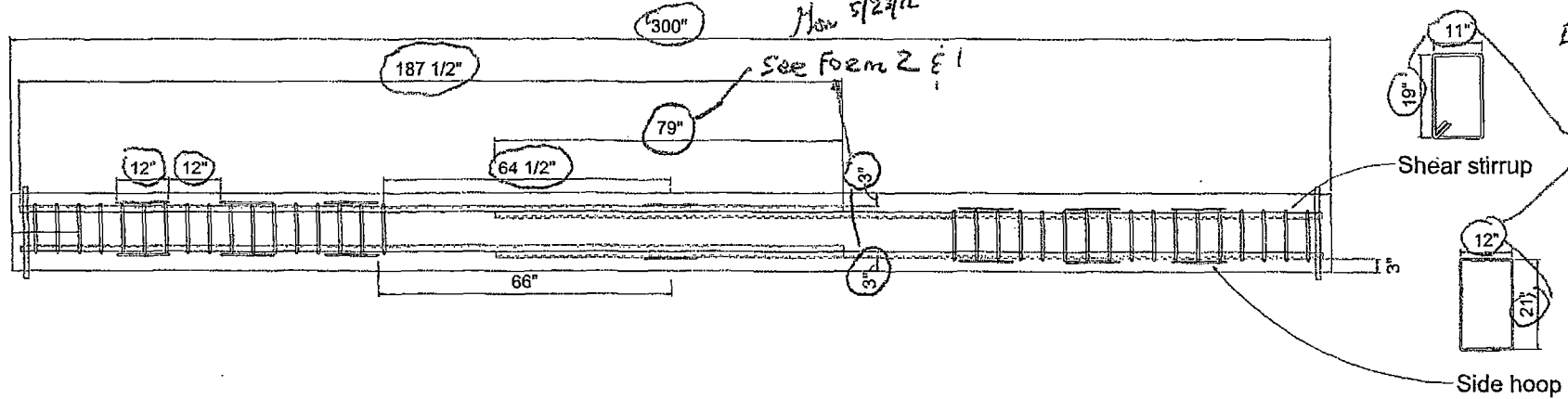
		Side cover	Bottom to top of all-thread rod	Splice length
Design		3 in.		
Tolerance		± ½ in.	± ½ in.	± ½ in.
Splice 1	Measurement 1	2 5/8	19 3/8	79
	Measurement 2	3	19 3/8	
	Measurement 3	3 3/8	19 1/4	
Splice 2	Measurement 1	2 13/16	19 3/8	79 1/16
	Measurement 2	3 1/16	19 1/16	
	Measurement 3	3 3/16	19 3/8	

Measured bar diameter:

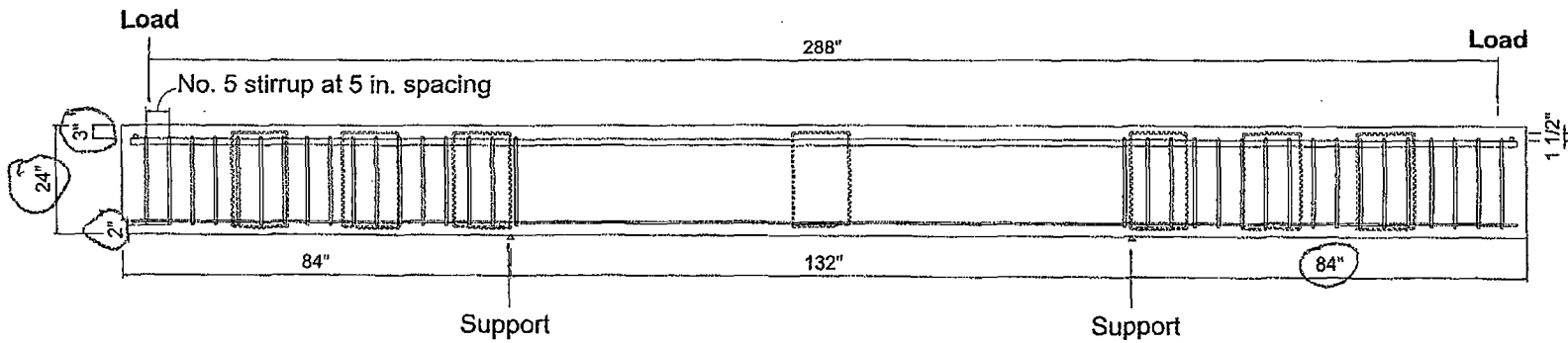
Splice 1: $1 \frac{3}{8}$ Mon 5/23/12
 Splice 2: $1 \frac{3}{8}$

Verified dimensions
 Mon 5/24/12

Verified measurements all beams
Mon 5/23/12



Entolerance
all 3
beams
Mon
5/23/12



18"

3"

24"

2"

1K, KA-1
WK
Mon 5/24/12
Pg. 10 of 10

Fig.1 Reinforcing steel drawing for beams with 79 in. splice length - monolithic

Verified all Rebar dimensions
Mon 5/24/12

KANSAS *Mon 5/24/12*

Attachment D



PERDUE DAVIS BESSE CONCRETE PLACEMENT INSPECTION

RECORD
Mon 5/31/12
Mon 5/31/12

 WORK PROCESS: IR number *R.U. - 2* Page *1* of *245*

 PROJECT NUMBER: *25593* PROJECT NAME: *Davis Bessie*

 Safety Class ☐ Safety Related ☐ Augmented Quality ☐ Non Safety Related

 Scope of Record: *TEST BEAMS 1,2,3*

 Reference Criteria: *ASTM'S C-172-10, C-192-07, C-470-09, U of Kansas Inspection Plan*

	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			<i>Mon 5/24/12</i>
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PLACEMENT INSPECTION</u>			
	a) Prior to concrete placement, verify batch plant tickets to assure:			
	1. The proper concrete mix was received	R		<i>Mon 5/24/12</i>
	2. The load time is not exceeded prior to discharge from the truck	R		<i>Mon 5/24/12</i>
	3. The truck drum revolutions per minute have not exceeded the limits of the project requirements	I	N/A	N/A
	4. The signature of the batch plant inspector exists if required	R	N/A	N/A

Mon 5/25/12
Mon 5/25/12
Mon 5/25/12
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REDACTED VERSION

IR. WK. - 2
 WK. Mon 5/31/12

Mon 5/31/12
 Pg. 2 of 5

	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	5. The quantity of water allowed to be added to the mix	R		Mon 5/24/12
	6. If water is allowed to be added to the mix, the maximum is not exceeded	I	N/A	N/A
	b) Check the free drop of concrete and the flow of concrete from the deposition point is not exceeded.	S	N/A	N/A
	c) Check that the concrete is deposited in layers not to exceed the project requirements.	S	N/A	N/A
	d) Check that the proper type of vibration equipment is used.	S		Mon 5/24/12 Mon 5/25/12
	e) Check that vibration equipment is used properly to eliminate voids and enhance bonding of subsequent layers of concrete.	S		Mon 5/24/12 Mon 5/25/12
	f) Check that vibration equipment is used with the proper insertion overlap radii of action and duration to consolidate the concrete but not used to spread or move concrete from one deposit point to another.	S		Mon 5/24/12
	g) Check that the temperature is maintained at the placement area throughout the entire placement of concrete Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	h) Verify any testing required during the concrete placement and record the results on the concrete placement card	W		Mon 5/24/12, Mon 5/25/12
	i) Check that the proper concrete finishing methods are used and applied to the concrete throughout the finishing process	S		Mon 5/24/12 Mon 5/25/12
	j) Verify the concrete placement has been completed to the proper boundaries and elevation per project documents	I		Mon 5/24/12 Mon 5/25/12
	k) Verify critical embeds, ie: anchor bolts etc. are still in their required location, configuration and tolerance after the concrete placement is complete	I	N/A	N/A
	l) Verify the proper finish has been applied to the concrete surface and no debris, foreign material or excess water was left in the concrete	I	N/A	N/A
3.0	Final Inspection Activities The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.	None	None	None
4.0	Review Of Supplementary Records The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	PLACEMENT INSPECTION a) Review batch plant tickets to assure all tickets are accounted for and recorded	R		Mon 5/31/12
	b) Review the concrete placement card for completeness and acceptance of test results.	R		Mon 5/31/12

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REDACTED VERSION

UK Mon 5/31/12
I.R. KLA-2

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		Mon 5/31/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		Mon 5/31/12
<p>REMARKS:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>① For Colo Joint Pour Back Beams 2 & 3 Mon 5/25/12</p> <p>Test Results 5/24/12</p> <p>Slump 2 1/4"</p> <p>Temp 82°F</p> <p>Weight Tare 7.84 lbs.</p> <p>Total 46.04 lbs.</p> <p>Vol 0.2497 ft³</p> <p>152.08 LBS.</p> </div> <div style="width: 45%;"> <p>Test Results 5/25/12</p> <p>Slump - 2 1/4"</p> <p>Temp. 76.4 deg. F</p> <p>Tare 7.88 lbs</p> <p>gross 45.72 lbs.</p> <p>net. 37.84</p> <p>Vol. 0.2497 ft³</p> <p>152 ft³.</p> </div> </div>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: Gary Nickolans / Gary Nickolans			DATE: 6/13/12	

PWPP 3210, Concrete Operations - Rev. 1

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MCM Midwest Concrete Materials

3645 E. 23rd Street • Lawrence, KS 66046
(785) 843-1688 • FAX (785) 843-1783

LAWRENCE (785) 843-1688 • TOLL FREE (888) 244-2082

"QUALITY AND SERVICE SINCE 1927"

PLANT	TIME	DATE	ACCOUNT	TRUCK	DRIVER	TICKET
		05/25/12	UK2450	0124	ROMA WISDOM	2021578
C R NAME UNIV OF KANSAS - CIVIL ENG.				DELIVERY ADDRESS LEARNED HALL 15TH & IOWA & E. TO LEARNED HALL DR. - PARKING LOT ON WEST SIDE		

PURCHASE ORDER KAM006373	SALES ORDER	TAX CA	CREDIT	SLUMP 5.00 in
-----------------------------	-------------	-----------	--------	------------------

LOAD QTY.	PRODUCT	DESCRIPTION	ORDERED	DELIVERED	UNIT PRICE	AMOUNT
1.00	156220	(HE) OPTIMIZED TEP	1.00	1.00		

SHORT LOAD CHARGE

LOADED 9:55	ARRIVE JOB SITE :	START DISCHARGE :	FINISH DISCHARGE :	ARRIVE PLANT :
----------------	----------------------	----------------------	-----------------------	-------------------

SUB TOTAL
DISCOUNT
TAX
TOTAL
PREVIOUS TOTAL
GRAND TOTAL

This batch of concrete is mixed with the proper amount of water. If additional water is desired, please instruct the driver.

ADDITIONAL WATER
ADDED ON JOB →

Gallons

By

CAUTION: Freshly mixed cement, mortar, grout or concrete may cause skin irritation. Avoid direct contact where possible and wash exposed skin areas promptly with water.
If any cementitious material gets into the eye, rinse immediately and repeatedly with water and get prompt medical attention.

KEEP OUT OF REACH OF CHILDREN

UNLOADING TIME ALLOWED 30 MINUTES PER TRIP
EXTRA CHARGE FOR OVER 30 MINUTES →

RECEIVED IN GOOD CONDITION

BY X

Purchaser waives all claims for personal or property damage caused by seller's truck when delivery is made beyond street curb line.

If not paid as agreed, this credit agreement provides for your payment of reasonable costs of collection, including, but not limited to, court costs, attorney fees and/or collection agency fees.

Truck	Driver	User	Disp	Ticket Num	Ticket ID	Time	Date
0124	905	user		2021578	77120	9:55	5/25/12
Load Size	Bin Code	Returned	Qty	Bin Age	Seq	Load ID	
1.00	CYDS 156220				W	78967	
Material	Design Qty	Required	Batched	% Var	% Moisture	Actual Wat	
WATER	26.50 GL	# 26.16 GL	26.00 GL	-0.59%		26.00 gl	
ADMI48	50.00 OZ	# 50.00 OZ	50.00 OZ	0.00%			
LAFARGE	588.0 LB	# 588.0 LB	588.0 LB	-1.36%			
LAFARGE	.0	# .0 LB	.0 LB				
FLYASH	.0	# .0 LB	.0 LB				
USAND	720 LB	# 735 LB	740 LB	0.63%	2.14% N	2 gl	
MCCA-5	1050 LB	# 1050 LB	1070 LB	1.90%	0.95% N		
WATER	.00	# .00 OZ	.00 OZ				
KPSA-1	836 LB	# 849 LB	850 LB	0.17%	1.50% N	2 gl	
Actual	New Batches: 1				Manual 9:55:59		
Load Total:	3460 lb	Design 0.381	Water/Cement 0.492	T	Design 34.2 gl	Actual 23.4 gl	To Add: 4.8 gl
Slump:	5.00 in	# Water in Truck: 0.0 GL	Adjust Water: 0.0 GL	/ Load	Trim Water: 0.0 GL / CYD		

1.5' CA

687 (died)

0.75%

w/c = .425

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(785) 843-1688 • FAX (785) 843-1783

LAWRENCE (785) 843-1688 • TOLL FREE (888) 244-2082

"QUALITY AND SERVICE SINCE 1927"

PLANT	TIME	DATE	ACCOUNT	TRUCK	DRIVER	TICKET
		5/24/12	UK2450	0135	DIRK VON MORRIS	2021516
C. ORDER NAME				DELIVERY ADDRESS		
UNIV OF KANSAS - CIVIL ENG.				15TH & IOWA & E. TO LEARNED HALL DR. - PARKING LOT ON WEST SIDE		
PURCHASE ORDER		SALES ORDER		TAX	CREDIT	SLUMP
KAND06373				CA		5.00 in

Pg. 6 of 5

LOAD QTY.	PRODUCT	DESCRIPTION	ORDERED	DELIVERED	UNIT PRICE	AMOUNT
9.00	156220	(HE) OPTIMZD TER	9.00	9.00		

IR UK-2

LOADED	ARRIVE JOB SITE	START DISCHARGE	FINISH DISCHARGE	ARRIVE PLANT
8:50	:	:	:	:

SUB TOTAL
DISCOUNT
TAX
TOTAL
PREVIOUS TOTAL
GRAND TOTAL

This batch of concrete is mixed with the proper amount of water. If additional water is desired, please call the driver.		ADDITIONAL WATER ADDED ON JOB →	Gallons	By
CAUTION: Freshly mixed cement, mortar, grout or concrete may cause skin irritation. Avoid direct contact where possible and wash exposed skin areas promptly with water. If any cementitious material gets into the eye, rinse immediately and repeatedly with water and get prompt medical attention. KEEP OUT OF REACH OF CHILDREN		UNLOADING TIME ALLOWED 30 MINUTES PER TRIP EXTRA CHARGE FOR OVER 30 MINUTES →		
RECEIVED IN GOOD CONDITION		BY X		

Purchaser waives all claims for personal or property damage caused by seller's truck when delivery is made beyond street curb line.
If not paid as agreed, this credit agreement provides for your payment of reasonable costs of collection, including, but not limited to, court costs, attorney fees and/or collection agency fees.

Truck	Driver	User	Disp	Ticket Num	Ticket ID	Time	Date
0135	773	user		2021516	77050	8:50	5/24/12
Load Size	Mix Code	Returned	Qty	Mix Age	Seq	Load ID	
9.00	CYDS 156220				W	78965	
Material	Design Qty	Required	Batched	% Var	% Moisture	Actual Wat	
WATER	29.50 GL	# 248.07 GL	248.00 GL	-0.03%		248.00 gl	
ADVA140	40.00 OZ	# 360.00 OZ	362.00 OZ	0.56%			
UNIFUG	508.0 LB	# 5242.0 LB	5335.0 LB	0.81%			
LAFCOBS	.0	# .0 LB	.0 LB				
FLASH	.0	# .0 LB	.0 LB				
VP5000	720 LB	# 6624 LB	6610 LB	-0.29%	2.30% A	18 gl	
MCCA-5	1850 LB	# 9450 LB	9450 LB	0.00%	0.20% M		
WAK1400	.00	# .00 OZ	.00 OZ				
KPSA-1	836 LB	# 7595 LB	7610 LB	0.19%	0.95% M	9 gl	
Actual	Hum Batches: 1				Manual 8:50/12		
Load Total:	31097 lb	Design 8.301	Water/Cement 0.482 1	Design 387.8 gl	Actual 274.4 gl	To add: 33.4 gl	
Slump:	5.00 in	# Water in truck: 0.0 GL	Adjust Water: 0.0 GL	/ Load Trim Water: 0.0 GL/ CYD			

1/2 G. water added

W83 1b5.

w/c .43.2

Now 5/24/12

How 5/24/12

U. of Kansas

Attachment E



PERDUE DAVIS BESSE CONCRETE POST PLACEMENT/CURING INSPECTION RECORD

WORK PROCESS:		IR number	U.K. - 3	Page	1	of	14
PROJECT NUMBER:		25593					
PROJECT NAME:		DAVIS BESSE					
Safety Class <input type="checkbox"/> Safety Related <input type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related							
Scope of Record:							
Reference Criteria: U. of Kansas Inspection Plan							
	Inspection Description	RESPONSIBILITY					
		Insp. Type	FE/Date	QCE/Date			
1.0	<u>Prerequisites</u>						
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			How 5/24/12			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0			
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0			
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.						
2.1	<u>POST PLACEMENT INSPECTION</u>						
	a) Check that the proper curing method is applied and started within the time period required and the proper curing method is used as designated in the project documents and as indicated by acceptance below:			How 5/24/12			
	1. Curing compound is the approved type and applied per project requirements. Manufacturer and expiration date if required.	S	N/A	N/A			
	b) Check that the water cure has been maintained throughout the specified time period as recorded on the inspection record. Record in the remarks section of this record.	S		How 5/28/12			

How 5/25/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	c) Verify curing has been completed and documented.	R		Mon 5/28/12
	d) Check that the formwork is not removed prior to the time period stated in the project requirements.	S		Mon 5/28/12
	e) Inspect concrete surfaces for defects and damage after the forms are removed.	I		Mon 5/28/12
	f) Verify any repairs allowed and performed to the concrete meet the project requirements.	I	①	Mon 5/28/12
	g) Verify saw cuts or any other type post placement control joints specified are completed as required and meet project documents.	I	N/A	N/A
3.0	Final Inspection Activities The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.			
3.1	POST PLACEMENT INSPECTION			
	a) Verify concrete meets project requirements ie: surfaces, dimensions, tolerances and all other visual aspects after all post placement activities and requirements are completed.	I		Mon 5/28/12
	b) Verify all testing that was required has been completed.	R		Mon 5/31/12
	c) Verify the concrete has achieved the minimum required strength within the specified time period as recorded on the concrete test record.	R		Mon 5/31/12
4.0	Review Of Supplementary Records The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	POST PLACEMENT INSPECTION			
	a) Review the concrete curing record.	R		Mon 5/31/12
	b) Review the concrete test record.	R		Mon 5/31/12
5.0	Exceptions			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		Mon 6/13/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R	N/A	N/A Mon 6/13/12

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REMARKS:

2.3 b Cure Record							
Day	1	2	3	4	5	6	7
Time	9:00 AM	9:30 AM	9:00 AM	9:30 AM	9:30	①	
Temp.	How	How	How	How	How 5/29/12	How	How 5/28/12
M&TE	5/29/12	5/29/12	5/29/12	5/29/12	5/29/12	5/29/12	5/28/12
Initial/date	How 5/25/12	How 5/26/12	How 5/27/12	How 5/28/12	How	How	How

How 5/24/12 - wet cure placed after finish burp covered with plastic

How 5/25/12 checked wet cure at 9:00 AM.

How 5/26/12 checked wet cure @ 9:30 AM

How 5/27/12 checked wet cure @ 9:00 AM

How 5/28/12 checked wet cure @ 9:30 AM

① How 5/28/12 breaker exceeded 3500 Lbs. wet cure and forms

removed. cylinders striped to match condition of beams for field cures. How 5/28/12

① No Repairs made only surface minor surface cosmetic indications How 5/28/12

FE Inspection Performed by:

DATE:

QCE Final Review Performed by:

Gary Nickolans / Gary Nickolans

DATE:

5/13/12

PWPP 3210, Concrete Operations - Rev. 1

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IR UK-3

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University of Kansas Flexure Beam Tests

DATE: 5/31/2012

BEAM TESTS: Beams 1, 2, 3

Flexure Beam ID*	Date Made	Height** in.	Width** in.	Date Tested	Load lb.	Age*** Days	Modulus of Rupture psi.
Mono-1	5/24/2012	6.04	6.27	5/31/2012	7750	7	610
Mono-2	5/24/2012	6.06	6.16	5/31/2012	6600	7	525
Avg. Monolithic							570
CJ-1	5/24/2012	6.08	6.12	5/31/2012	1200	7	95
CJ-2	5/24/2012	6.06	6.08	5/31/2012	2250	7	180
Avg. Cold Joint							140

*Mono = monolithic concrete; CJ = cold joint at midspan

**Measured at fracture plane

***The cold joint specimens contain concrete that is 7 and 6 days of age

Matt O'Reilly
Matt O'Reilly

Observed testing Mon 5/31/12

IR. UK-3

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University of Kansas Split Cylinder Tests

DATE: 5/31/2012

BEAM TESTS: Beams 1, 2, 3

Cylinder	Date Made	Length in.	Diameter in.	Date Tested	Load kips	Age Days	Modulus of Rupture psi.
1	5/24/2012	12.19	6.04	5/31/2012	50.5	7	435
2	5/24/2012	12.15	5.97	5/31/2012	49.0	7	430
Avg.							435

Notes: Concrete from 5/24 cast

Matt O'Reilly
Matt O'Reilly

I.R. UK-3

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Form 3: Plastic concrete testing and concrete compressive strength

Specimen ID:	Beam #1, 2, 3	Date:	5/24/2012
Measured by:	Nate Searle	Checked by:	Jayne

Plastic concrete testing

Slump, in.	Unit weight, lb/ft ³	Concrete temperature, °F
2 1/4"	153 lb/ft ³	82 °F

Tare weight: 7.84 lb
 Total weight: 46.04 lb
 Volume: 0.2447 ft³

38.02

152.08

~~37.16~~~~156~~

Concrete compressive strength

Cylinder ID	Cast date	Test date	Age, days	Dia., in.	Area, in. ²	Load, kips	Strength, psi	Notes
5/24 #1	5/24	5/28	4	6.015	28.416	113,000	3980	> 4010 : plastic
5/24 #2	5/24	5/28	4	6.025	28.51	115,000	4030	> 4010 : plastic
5/25 #1	5/25	5/28	3	6.022	28.48	105,000	3690	> 3640 : plastic
5/25 #2	5/25	5/28	3	6.015	28.42	102,000	3590	> 3640 : plastic
5/24 #3	5/24	5/30	6	6.025	28.51	131,000	4600	> 4610 : plastic
5/24 #4	5/24	5/30	6	6.02	28.46	134,500	4730	> 4610 : plastic
5/24 #1	5/24	5/31	7	6.015	28.42	146,500	5150	> 5330 : steel
5/24 #2	5/24	5/31	7	6.009	28.36	159,500	5620	> 5330 : steel
5/24 #3	5/24	5/31	7	5.995	28.23	147,000	5210	> 5330 : steel
5/25 #1	5/25	5/31	6	5.995	28.23	133,000	4710	> 4330 : steel
5/25 #2	5/25	5/31	6	5.997	28.25	126,000	4460	> 4330 : steel
5/25 #3	5/25	5/31	6	5.994	28.22	108,000	3830	> 4330 : steel

Observed all breaks. Mon 5/31/12

IR UK-3

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University of Kansas Flexure Beam Tests

DATE: 5/31/2012

BEAM TESTS: Beams 1, 2, 3

Flexure Beam ID*	Date Made	Height** in.	Width** in.	Date Tested	Load lb.	Age*** Days	Modulus of Rupture psi.
Mono-1	5/24/2012	6.04	6.27	5/31/2012	7750	7	610
Mono-2	5/24/2012	6.06	6.16	5/31/2012	6600	7	525
Avg. Monolithic							570
CJ-1	5/24/2012	6.08	6.12	5/31/2012	1200	7	95
CJ-2	5/24/2012	6.06	6.08	5/31/2012	2250	7	180
Avg. Cold Joint							140

*Mono = monolithic concrete; CJ = cold joint at midspan

**Measured at fracture plane

***The cold joint specimens contain concrete that is 7 and 6 days of age

Observed Testing
5/31/12
How

Matt O'Reilly
Matt O'Reilly

IR UK-3

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University of Kansas Split Cylinder Tests

DATE: 5/31/2012

BEAM TESTS: Beams 1, 2, 3

Cylinder	Date Made	Length in.	Diameter in.	Date Tested	Load kips	Age Days	Modulus of Rupture psi.
1	5/24/2012	12.19	6.04	5/31/2012	50.5	7	435
2	5/24/2012	12.15	5.97	5/31/2012	49.0	7	430
Avg.							435

Notes: Concrete from 5/24 cast

Matt O'Reilly
Matt O'Reilly

TR UK-3

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Form 4: Test setup – span spacing

Specimen ID:	Beam 1	Date:	5/31/12
Measured by:	Matt O'Reilly	Checked by:	BA

	Measurement 1, in.	Measurement 2, in.	Measurement 3, in.	Average, in.
Pin centerline to roller centerline				
① West end to West support	84 $\frac{3}{16}$	84 $\frac{1}{4}$	84 $\frac{1}{8}$	
② West end to West splice end	110 $\frac{5}{8}$	110 $\frac{3}{4}$	110 $\frac{5}{8}$	
③ West end to beam centerline	150 $\frac{1}{4}$	150 $\frac{3}{8}$	150 $\frac{3}{16}$	
④ West end to East splice end	189 $\frac{5}{8}$	189 $\frac{5}{8}$	189 $\frac{5}{8}$	
⑤ West end to East support	216 $\frac{1}{4}$	216 $\frac{1}{4}$	216 $\frac{5}{16}$	
⑥ West end to East end	300 $\frac{3}{8}$	300 $\frac{1}{16}$	300 $\frac{3}{8}$	

1 - 84 $\frac{1}{16}$ "
 2 - 110 $\frac{9}{16}$ "
 3 - 150 $\frac{3}{16}$ "
 4 - 189 $\frac{9}{16}$ "
 5 - 216 $\frac{3}{16}$ "
 6 - 300 $\frac{3}{8}$ "

measurements made
 Nov 5/31/12

LR UK-3

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Form 4: Test setup – span spacing

Beam 2

Specimen ID:	5/11/12	Date:	5/31
Measured by:	Matt O'Reilly	Checked by:	<i>RA</i>

	Measurement 1, in.	Measurement 2, in.	Measurement 3, in.	Average, in.
Pin centerline to roller centerline				
① West end to West support	84 $\frac{3}{16}$ "	84 $\frac{3}{8}$ "	84 $\frac{1}{8}$ "	
② West end to West splice end	110 $\frac{1}{2}$ "	110 $\frac{3}{4}$ "	110 $\frac{5}{8}$ "	
③ West end to beam centerline	150 $\frac{3}{16}$ "	150 $\frac{3}{8}$ "	150 $\frac{1}{4}$ "	
④ West end to East splice end	189 $\frac{3}{16}$ "	189 $\frac{3}{4}$ "	189 $\frac{5}{8}$ "	
⑤ West end to East support	216 $\frac{1}{8}$ "	216 $\frac{1}{4}$ "	216"	
⑥ West end to East end	300 $\frac{1}{4}$ "	300 $\frac{3}{8}$ "	300 $\frac{1}{4}$ "	

1 - 84 $\frac{3}{16}$ "
 2 - 110 $\frac{5}{8}$ "
 3 - 150 $\frac{1}{8}$ "
 4 - 189 $\frac{1}{2}$ "
 5 - 216"
 6 - 300 $\frac{1}{4}$ "

measurements
made.

How 5/31/12

TR UK-3

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Form 4: Test setup – span spacing

Specimen ID:	Beam 3	Date:	5/31/12
Measured by:	Matt O'Reilly	Checked by:	<i>[Signature]</i>

	Measurement 1, in.	Measurement 2, in.	Measurement 3, in.	Average, in.
Pin centerline to roller centerline				
① West end to West support	84 $\frac{1}{16}$	84 $\frac{3}{16}$	84 $\frac{3}{16}$	
② West end to West splice end	111 $\frac{1}{16}$	111 $\frac{1}{16}$	110 $\frac{13}{16}$	
③ West end to beam centerline	150 $\frac{3}{16}$	150 $\frac{3}{16}$	150 $\frac{5}{16}$	
④ West end to East splice end	189 $\frac{5}{16}$	189 $\frac{13}{16}$	189 $\frac{3}{4}$	
⑤ West end to East support	216 $\frac{1}{8}$	216 $\frac{3}{16}$	216 $\frac{5}{16}$	
⑥ West end to East end	300 $\frac{1}{4}$	300 $\frac{3}{8}$	300 $\frac{1}{4}$	

1 - 84 $\frac{3}{16}$ "
 2 - 110 $\frac{11}{16}$ "
 3 - 150 $\frac{5}{16}$ "
 4 - 189 $\frac{13}{16}$ "
 5 - 216 $\frac{1}{4}$ "
 6 - 300 $\frac{1}{4}$ "

measurements made
 Low 5/31/12

ER UK-3

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Form 5: Dial gage readings

Specimen ID:	Beam 1	Date:	05/31/12
Measured by:	Matt O'Reilly		

	Load, kips	Dial gage 1, in.	Dial gage 2, in.	Dial gage 3, in.
Reading 1	0	0.817	2.695	1.427
Reading 2	5	0.846	2.688	1.459
Reading 3	10	0.879	2.679	1.503
Reading 4	15	0.991	2.652	1.628
Reading 5	20	1.131	2.623	1.860
Reading 6	25	1.253	2.597	1.992
Reading 7	30	1.374	2.570	2.115
Reading 8	35	1.501	2.541	2.239
Reading 9	40	1.651	2.514	2.357
Reading 10				
Reading 11				
Reading 12				
Reading 13				
Reading 14				
Reading 15				
Reading 16				
Reading 17				
Reading 18				
Reading 19				
Reading 20				

IR UK-3

Form 5: Dial gage readings

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Specimen ID:	Beam 2	Date:	05/31/12
Measured by:	Matt O'Reilly		

	Load, kips	Dial gage 1, in.	Dial gage 2, in.	Dial gage 3, in.
Reading 1	5	0.845"	0.602"	
Reading 2	0	0.819"	2.609"	0.952"
Reading 3	5	0.843"	2.602"	0.976"
Reading 4	10	0.882	2.592	1.013
Reading 5	15	0.897 0.997	2.566	1.026
Reading 6	20	1.129	2.534	1.254
Reading 7	25	1.252	2.504	1.396
Reading 8	30	1.398	2.471	1.552
Reading 9				
Reading 10				
Reading 11				
Reading 12				
Reading 13				
Reading 14				
Reading 15				
Reading 16				
Reading 17				
Reading 18				
Reading 19				
Reading 20				

IR WK-3

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Form 5: Dial gage readings

Specimen ID:	Beam 3	Date:	05/31/12
Measured by:	Matt O'Reilly		

	Load, kips	Dial gage 1, in.	Dial gage 2, in.	Dial gage 3, in.
Reading 1	0	0.916	2.681	0.813
Reading 2	5	0.943	2.674	0.839
Reading 3	10	0.977	2.665	0.876
Reading 4	15	1.090	2.639	0.996
Reading 5	20	1.236	2.605	1.124
Reading 6	25	1.390	2.573	1.260
Reading 7	30	1.534	2.543	1.402
Reading 8	Unload			
Reading 9	0	1.045	2.655	0.935
Reading 10	5	1.089	2.644	0.980
Reading 11	10	1.180	2.623	1.068
Reading 12	15	1.268	2.603	1.151
Reading 13	20	1.360	2.581	1.238
Reading 14	25	1.451	2.561	1.324
Reading 15	30	1.554	2.538	1.421
Reading 16	35	1.674	2.509	1.549
Reading 17				
Reading 18				
Reading 19				
Reading 20				

Attachment C



KANSAS DAVIS BESSE CONCRETE PRE-PLACEMENT INSPECTION RECORD

WORK PROCESS: Concrete placement		IR number UK - 4		Page _____ of _____
PROJECT NUMBER: 25593		PROJECT NAME: Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Beams 4, 5, & 6				
Reference Criteria: UK's Lap Splice Beam Test Procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>			RTU 6/13/12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.		See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.		See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PRE-PLACEMENT INSPECTION</u>			
	a) Verify concrete pour boundaries, size and location are as required.	I		RTU 6/13/12
	b) Rebar/Wire Mesh overlap splices, size, type, grade, spacing, tying, support, configuration, anchoring and details meet the requirements	I		RTU 6/13/12
	c) Dowels are installed with the correct size, type, grade, spacing, support, tying, anchoring, location and configuration	I	N/A	N/A
	d) Sub-grades prepared properly, to proper elevation and to proper top finish	I	N/A	N/A
	e) Verify the construction joints, control joints, expansion joints and water stops are installed	I	N/A	N/A

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	f) Verify the formwork: Is the correct size and type, has the correct form release agent applied, is installed in a workmanship manner, and without interference with embedded items, maintains proper clearance with embedded items, does not have excessive gaps, vertical and horizontal deviations are within required limits and anchored and supported properly	I		RTU 6/13/12
	g) Verify the concrete placement area is clean, free of debris and foreign material	I		RTU 6/13/12
	h) Verify all areas required to bond to the placed concrete are free of oil, grease or any other item or agent which will prevent bonding	I		RTU 6/13/12
	i) Verify adjoining concrete surfaces required to be bonded with the placed concrete are clean, free of laitance, surface roughened and otherwise prepared properly	I	N/A	N/A
	j) Verify weather protection and temperature controls are provided as required and the concrete area is within the temperature requirements Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	k) Verify waterproofing membrane is installed as required	I	N/A	N/A
	l) Verify any bonding agents required are installed as and where required	I	N/A	N/A
	m) Verify pre-soak if required, is completed per project documents Pre-soak start: Time _____ Date _____	S	N/A	N/A
	n) Verify required embedded items, penetrations or any other items, inspections or tests per discipline are complete and acceptable to embed in concrete and signified here by signature and date by an authorized representative of the discipline Civil _____ I&C _____ Mechanical _____ Electrical _____ Welding _____ HVAC _____ Start-up _____ Subcontractor _____ Other _____	R	N/A	N/A
	o) The concrete placement is released and ready to accept concrete provided the placement occurs within the allowed time after the release	R		RTU 6/13/12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
4.1	PRE-PLACEMENT INSPECTION			
	a) Review the Reinforcing Bar Mechanical Splicing Record	R	N/A	N/A
	b) Review the Site Excavation and Backfill inspection record	R	N/A	N/A
	c) Border Test Procedure (KAUSAS)	R		BTU 6/13/12
5.0	Exceptions			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		BTU 6/13/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		WA
REMARKS: All measurements recorded on Forms 1 and 2 were verified for beams 4, 5 , and 6 prior to placement of concrete.				
FE Inspection Performed by:		DATE:		
QCE Final Review Performed by: <i>BTU</i>		DATE: 6/25/12		


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Attachment D

 KANSAS DAVIS BESSE CONCRETE PLACEMENT INSPECTION RECORD				
WORK PROCESS: Concrete placement		IR number UK - 5		Page _____ of _____
PROJECT NUMBER: 25593		PROJECT NAME: Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Beams 4, 5, and 6				
Reference Criteria: UK's Lap Splice Beam Test Procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			BTU 6/13/12
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>			
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>PLACEMENT INSPECTION</u>			
	a) Prior to concrete placement, verify batch plant tickets to assure:			
	1. The proper concrete mix was received	R		BTU 6/13/12
	2. The load time is not exceeded prior to discharge from the truck	R		BTU 6/13/12
	3. The truck drum revolutions per minute have not exceeded the limits of the project requirements	I	N/A	N/A
	4. The signature of the batch plant inspector exists if required	R	N/A	N/A

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	5. The quantity of water allowed to be added to the mix	R		RTU 6/13/12
	6. If water is allowed to be added to the mix, the maximum is not exceeded	I	N/A	N/A
	b) Check the free drop of concrete and the flow of concrete from the deposition point is not exceeded.	S	N/A	N/A
	c) Check that the concrete is deposited in layers not to exceed the project requirements.	S	N/A	N/A
	d) Check that the proper type of vibration equipment is used.	S		RTU 6/13/12
	e) Check that vibration equipment is used properly to eliminate voids and enhance bonding of subsequent layers of concrete.	S		RTU 6/13/12
	f) Check that vibration equipment is used with the proper insertion overlap radii of action and duration to consolidate the concrete but not used to spread or move concrete from one deposit point to another.	S		RTU 6/13/12
	g) Check that the temperature is maintained at the placement area throughout the entire placement of concrete Temperature _____ Temperature M&TE _____ Calibration due date _____	I	N/A	N/A
	h) Verify any testing required during the concrete placement and record the results on the concrete placement card	W		RTU 6/13/12
	i) Check that the proper concrete finishing methods are used and applied to the concrete throughout the finishing process	S		RTU 6/13/12
	j) Verify the concrete placement has been completed to the proper boundaries and elevation per project documents	I		RTU 6/13/12
	k) Verify critical embeds, ie: anchor bolts etc. are still in their required location, configuration and tolerance after the concrete placement is complete	I	N/A	N/A
	l) Verify the proper finish has been applied to the concrete surface and no debris, foreign material or excess water was left in the concrete	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.	None	None	None
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>PLACEMENT INSPECTION</u> a) Review batch plant tickets to assure all tickets are accounted for and recorded	R		RTU 6/13/12
	b) Review the concrete placement card for completeness and acceptance of test results.	R		RTU 6/13/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		PTU 6/13/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		NA
REMARKS:				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <u>B. T. U.</u>			DATE: 6/25/12	


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Attachment E

 KANSAS BESSE CONCRETE POST PLACEMENT/CURING INSPECTION RECORD				
WORK PROCESS: Concrete placement		IR number UK - 6		Page _____ of _____
PROJECT NUMBER: 25593		PROJECT NAME: Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Beams 4, 5, and 6				
Reference Criteria: UK's Lap Splice Beam Test Procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			RTU
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: <u>NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.</u>			6/20/12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>In-Process Inspections</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the QCI and IR.			
2.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Check that the proper curing method is applied and started within the time period required and the proper curing method is used as designated in the project documents and as indicated by acceptance below:			RTU 6/20/12
	1. Curing compound is the approved type and applied per project requirements. Manufacturer and expiration date if required	S	N/A	N/A
	b) Check that the water cure has been maintained throughout the specified time period as recorded on the inspection record. Record in the remarks section of this record.	S		RTU 6/20/12

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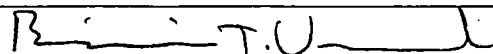
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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
	c) Verify curing has been completed and documented.	R		RTU 6/20/12
	d) Check that the formwork is not removed prior to the time period stated in the project requirements.	S		RTU 6/20/12
	e) Inspect concrete surfaces for defects and damage after the forms are removed.	I		RTU 6/20/12
	f) Verify any repairs allowed and performed to the concrete meet the project requirements.	I		RTU 6/20/12
	g) Verify saw cuts or any other type post placement control joints specified are completed as required and meet project documents.	I	N/A	N/A
3.0	<u>Final Inspection Activities</u> The following inspection activities shall be performed by the inspection method shown in Column 6 of the QCI and identified on the IR to verify that the completed work meets the quality requirements contained in the inspection and reference criteria shown on the QCI and IR.			
3.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Verify concrete meets project requirements ie: surfaces, dimensions, tolerances and all other visual aspects after all post placement activities and requirements are completed.	I		RTU 6/20/12
	b) Verify all testing that was required has been completed.	R		RTU 6/20/12
	c) Verify the concrete has achieved the minimum required strength within the specified time period as recorded on the concrete test record.	R		RTU 6/20/12
4.0	<u>Review Of Supplementary Records</u> The following Supplementary Records identified in Column 7 of the QCI shall be reviewed to verify that the required quality documentation has been satisfactorily completed and is attached or available for filing.			
4.1	<u>POST PLACEMENT INSPECTION</u>			
	a) Review the concrete curing record.	R		RTU 6/20/12
	b) Review the concrete test record.	R		RTU 6/20/12
5.0	<u>Exceptions</u>			
5.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		RTU 6/20/12
"OR"				
5.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		N/A

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REMARKS:**FE Inspection Performed by:****DATE:****QCE Final Review Performed by:****DATE:** 6/25/12

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Attachment E



KANSAS DAVIS BESSE CONCRETE TESTING INSPECTION RECORD

WORK PROCESS: Concrete testing		IR number: UK - 7		Page 1 of 2
PROJECT NUMBER: 25593-007		PROJECT NAME: Davis Besse		
Safety Class <input type="checkbox"/> Safety Related <input checked="" type="checkbox"/> Augmented Quality <input type="checkbox"/> Non Safety Related				
Scope of Record: Beams 4, 5, and 6				
Reference Criteria: UK's Lap Splice Beam Test Procedure				
	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
1.0	<u>Prerequisites</u>			
1.1	Review the applicable Engineering Documents listed under Column 5 "Inspection Criteria" on the QCI and "Reference Criteria" on the IR to ensure: NOTE 1.0: Signature(s) on the IR for any inspection activity provides conformation that activities 1.1a) and 1.1b) have been completed as applicable prior to sign off of the inspection activity.			RTU 6/20/12
	a) The inspection and reference criteria documents, including the applicable codes and standards, are available for reference and are the applicable revision when performing the inspection activities.	R	See note 1.0	See note 1.0
	b) Review open nonconformance reports (NCRs) and Field Change Documents (FCDs) which may affect the work operations for the scope shown on the IR.	R	See note 1.0	See note 1.0
2.0	<u>Test</u>			
2.1	Verify the test beam is placed on two roller supports to the specified distance.	I		RTU 6/20/12
2.3	Verify the following steps are completed during each loading increment.			
	a) All visual cracks shall be marked using black permanent markers.	W		RTU 6/20/12
	b) Crack widths shall be measured.	W		RTU 6/20/12

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	Inspection Description	RESPONSIBILITY		
		Insp. Type	FE/Date	QCE/Date
3.0	Supplemental Records			
3.1	Test procedure	R		RTU 6/20/12
4.0	Exceptions			
4.1	Review the completed IR to verify that the applicable inspection activities have been performed without any exceptions. If any exceptions exist, complete Activity 5.2.	R		RTU 6/20/12
'OR'				
4.2	Any inspection activity exceptions noted on the IR are to be identified and described in the IR under "REMARKS". The document opened to track the exception to completion shall be entered in "REMARKS".	R		RTU 6/20/12
REMARKS: <p>On June 20, 2012, I witnessed test beams 4, 5, and 6 undergo loading until fracture. The test beams were setup according to procedure, loading was applied in 5 kip increments. At every interval the test beam was examined and all visible cracks were identified, mapped, and measured. Test beam 4 was loaded until fracture, tests beams 5 and 6 were unloaded after 40 kips was applied and then reloaded until failure.</p>				
FE Inspection Performed by:			DATE:	
QCE Final Review Performed by: <i>B. T. U.</i>			DATE: 6/25/12	

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