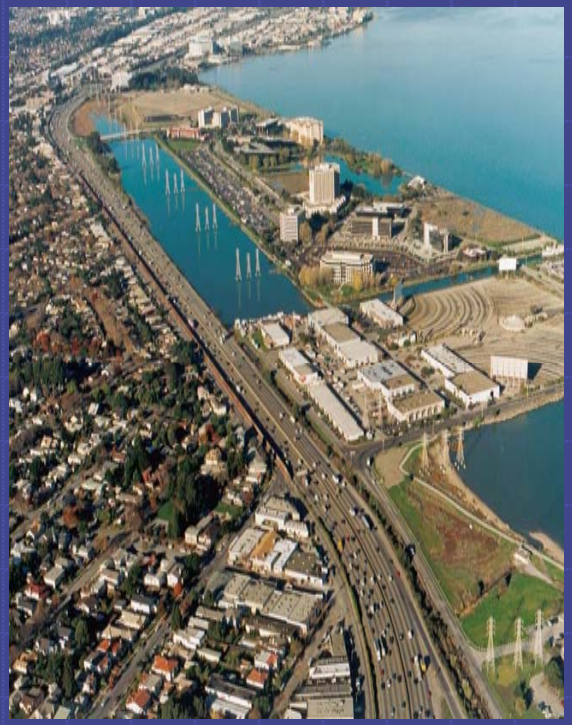
04-235624 – Prebid Outreach Meeting: San Francisquito Bridge Replacement CIP Structural Concrete Materials Specification Overview



Bartlomiej Krol, P.E.
Office of Structural Materials
Materials Engineering Testing Services
Division of Engineering Services

February 24th, 2015

Prebid Outreach Meeting *(2-1.04)*

- **Section 11-4 CIP Structural Concrete Materials Changes**
- **Define QC and QA responsibilities**

Working with Industry to Implement Executive Decision on QC

- Notable involvement from Industry Organizations since 2008 decision document
  - Caltrans Rock Products Committee
- Many Caltrans units
  - Construction, Materials, Specs, Design…
- Continuous Outreach
- Coordination of Joint Efforts

Pilot Program – Structural Concrete QCQA

	Project EA	Project Common Name
1	03-0F2204	ED-50 Sly Park Rd Undercross Rehab
2	04-235624	San Francisquito Bridge
3	06-342524	FRE-180 King's Canyon Expressway - Seg 2
4	07-215954	LA-5 Widening Florence Ave Project
5	07-278304	LA-405 Structures PS&E - Bridge Rehab
6	08-0N5904	SBD-40 Replace Van Winkle Wash
7	11-2T1824	SD-805 Palomar DAR
8	07-119344	I-10 HOV (Seg 3)
9	07-215924	LA-5 Widening Valley View Ave
10	04-4A0904	Troutdale Creek Bridge Replacement

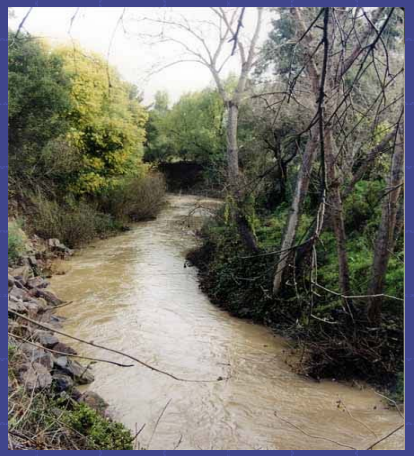
Completed	Ongoing	Pending

Agenda

- **Project Overview**
- **New Requirements for CIP Structural Concrete Materials**
- **QC Plan Requirements**
  - QC Responsibilities
  - Testing
  - Inspection
- **Verification Testing**
- **DIME Data Input**
- **Dispute Resolution**

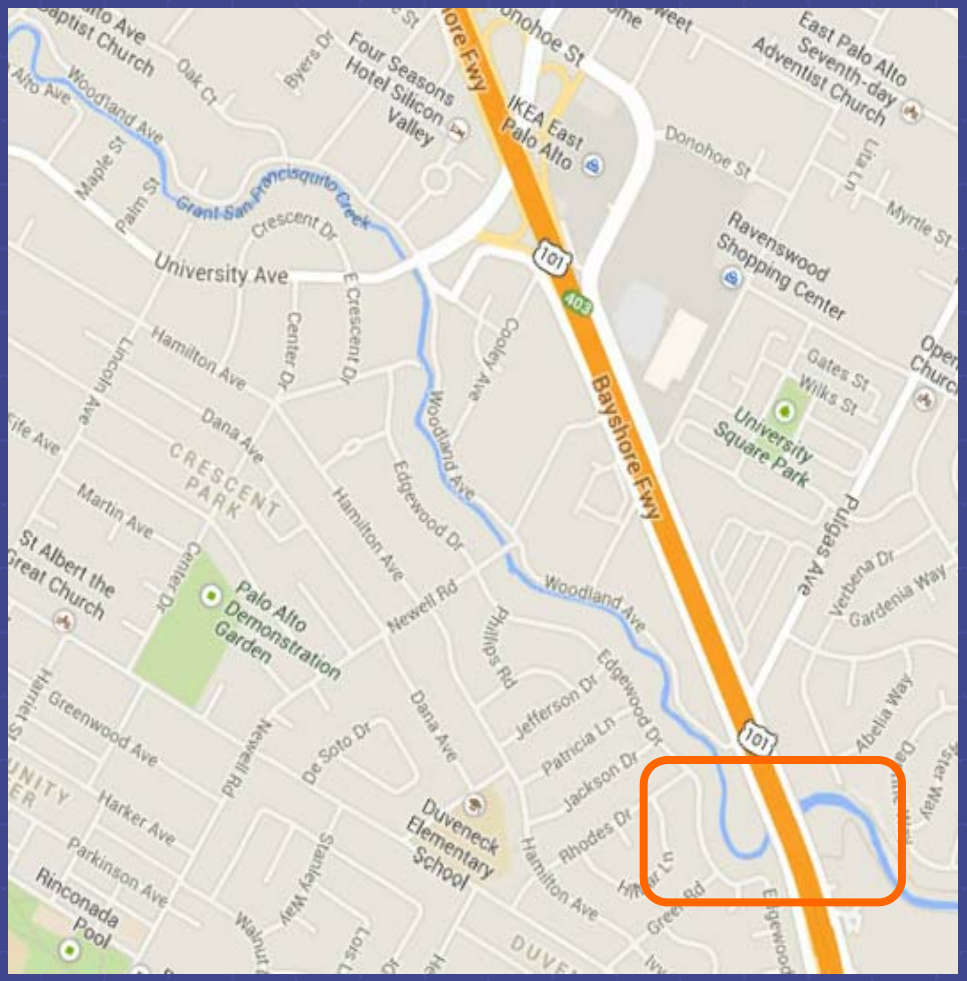
Project Overview

- **Contract No.:** 04-235624
- **Description:** Replace Bridge Structure at San Francisquito Creek
- **Project Estimate:** $14,000,000
- **Location:** US Route 101 at San Mateo/Santa Clara County Line in San Mateo County



Jobsite Location

- Palo Alto in San Mateo County on Hwy 101
- 1/4 Mile South of University Avenue Overcrossing



Major Items with Structural Concrete

Bid Item	Item Description	Unit of Measure	Estimated Quantity
86	Structural Concrete, Bridge Footing	CY	549
87	Structural Concrete, Bridge	CY	3,054
88	Structural Concrete, Cap	CY	16
89	Structural Concrete, Approach Slab	CY	174

- http://www.dot.ca.gov/hq/esc/oe/weekly_ads/oe_biditems.php?q=04-235624

Overview of “11-4 Cast-in-Place Structural Concrete Materials” Specification

Replace section 11-4 with:

11-4 CAST-IN-PLACE STRUCTURAL CONCRETE MATERIALS

11-4.01 GENERAL

11-4.01A General

Section 11-4 applies to CIP structural concrete members constructed under sections 49 or 51 except for those members constructed of minor concrete.

Quality control and assurance for CIP structural concrete materials includes:

1. Your QC program
2. Acceptance of the concrete by the Engineer using the Department's test results and verified QC test results

11-4.01B Definitions

lot: quantity represented by the specified minimum QC testing frequency.

11-4.02 QUALITY CONTROL

11-4.02A General

Develop, implement, and maintain a QC program that includes inspection, sampling, and testing of

Requirements for Structural Concrete Quality Control

- Section 11-4 “Cast-in-Place Structural Concrete Materials”
  - *“Quality control and assurance for CIP structural concrete materials includes:*
    1. *Your QC program*
    2. *Acceptance of the concrete by the Engineer using the Department's test results and verified QC test.”*
- *Applies to Sections 49 and 51.*
- *Does not apply to Minor Concrete, Paving Concrete, Precast Concrete*

Quality Control Meeting *(11-4.02F)*

- A meeting to discuss the QC requirements for structural concrete
- Meeting attendees Include:
  - The Engineer
  - The QC Manager
  - At least one representative from each concrete plant

Quality Control - Contractor Program
(11-4.02A)

- Develop a QC Plan
  - QCM
  - Inspection, Sampling, and Testing by Contractor
    - Certified personnel
    - Accredited labs
    - ASTM test methods
  - Methods and frequencies of QC procedures

Quality Control - Role of Quality Control Manager *(11-4.02B)*

- Designated by the Contractor
- Ensure all materials meet Contract requirements
- Ensure QC personnel adhere to QC plan
- Review all correspondence, submittals and reports
- Maintain QC Records

Quality Control - Quality Control Manager Qualifications *(11-4.02B)*

- QCM must have one of the following:
  - Civil Engineer in State of California
  - ACI Lab Testing Tech Level 1
  - NICET Level II Concrete Cert
  - ICC Reinforced Concrete Special Inspector Cert
  - ASQ Certified Quality Manager
- Section 11-1 of Std Spec:
  - Must be an employee of the contractor or a subcontractor whose only responsible for QC.

Testing and Inspection Personnel
(11-4.02C)

- **QC laboratory testing personnel must have:**
  - ACI Laboratory Testing Technician, Level 1
  - ACI Aggregate Testing Technician, Level 2
- **QC field testing personnel and field and plant inspection personnel must have:**
  - ACI Concrete Field Testing Technician, Grade I
- **Caltrans IA Certifications not required for these Concrete tests**

Testing Laboratories *(11-4.02D)*

- Must be an authorized laboratory
- Have a current accreditation from the AASHTO Accreditation Program

Concrete Plant Requirements *(11-4.02E)*

- Each plant must have:
  - Current National Ready Mixed Concrete Association (NRMCA) certification http://www.nrmca.org/
  - Authorized under California Test 109

Quality Control Procedures – QC Tests and Frequencies *(11-4.02H)*

- Frequencies determined by ACI and Standard Industry practices
- Lab test results approved and stamped by a PE
- Results will be in the form of daily field logs, data submittals, and monthly reports

QC Tests and Frequencies

Test	Test Method	Minimum Frequency
Aggregate Gradation	ASTM C136	Once a Day
Sand Equivalent	ASTM D2419	Once a Day
% Fines under 75 Microns (CA Only)	ASTM C117	Once a Day
Moisture Content (within half a percent)	ASTM C566	1-2 times daily depending on conditions (at batch plant)
Slump	ASTM C143	Once per 100 CY or when consistency is in question
Unit Weight	ASTM C138	Once per 100 CY or each day of pour, whichever is more frequent
Air Content	ASTM C173 / ASTM C231	If concrete is air entrained, once per 30 CY in freeze-thaw areas, every 100 CY in other areas
Temperature	ASTM C1064	Once per 100 CY or each day of pour, whichever is more frequent
Compressive Strength	ASTM C31/C39	Once per 100 CY or each day of pour, whichever is more frequent

Verification Sampling and Testing
(11-4.03B)

- The Department performs verification testing of the QC tests for the following quality characteristics:
  1. Slump
  2. Air Content
  3. Compressive Strength

Verification Sampling and Testing
(11-4.03B)

Allowable difference between results:

Quality Characteristic	ASTM Test Method	Difference
Slump	C 143/C 143M	1 inch
Air content	C 231/C 231M or C 173/C 173M	32 percent of the average of the 2 test results
Compressive strength[a]	C 172/C 172M, C 31/C 31M, and C 39/C 39M	14 percent of the average of the 2 test results

[a]The Department performs verification tests at the maximum age allowed in the specifications.

Test Results *(11-4.02G(3))*

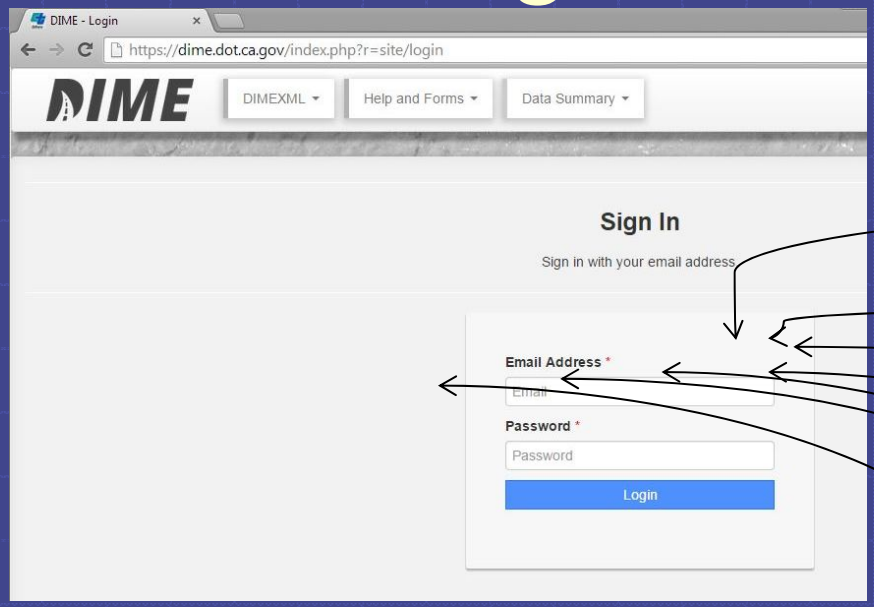
- Test sample identification number – very specific requirements given in specifications.

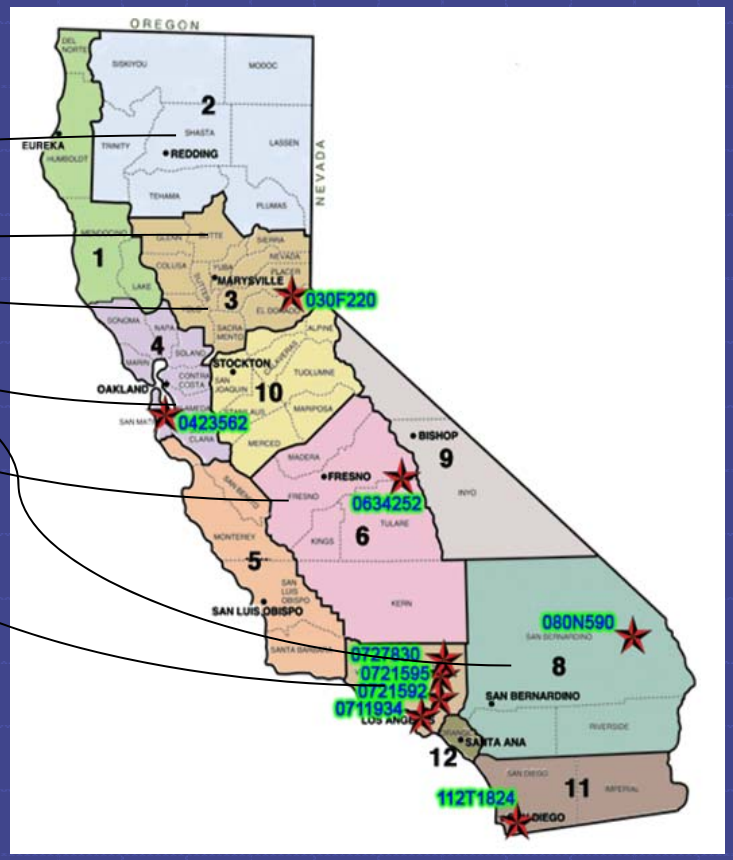
- Allows QC/QA test results to be compared

Submission of QC Results

- Electronic submission of test data through Data Interchange for Materials Engineering (DIME)
- Communicating results in a timely manner
- Onsite submission of results
- Monthly summary report

Online Submission: DIME- Data Interchange for Materials Engineering

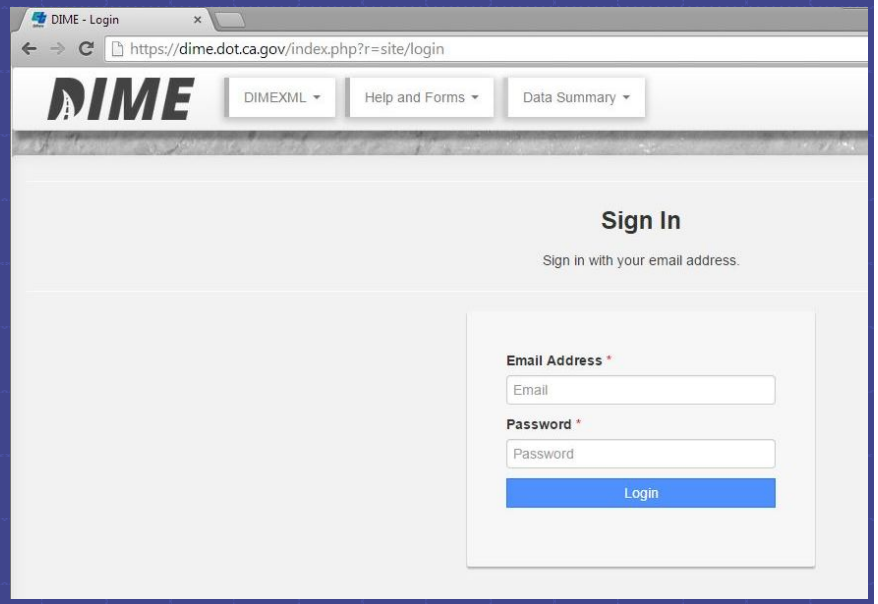




- Electronic data collection from all QC and QA testing labs
- Worked with industry for over a year for Beta testing and awareness

DIME Overview

- Submit data within 3 days.
- Methods to input data:
  - Batch Upload
  - Manual Entry
- Browser based web application
- Works on multiple operating systems
- Training will be provided



How to Set Up Account

- Submit following data to Quality Assessment and Management Branch of METS Caltrans
  - Company name and street address
  - Full name and email of laboratory account manager
- User Account Types
  - Lab Account Manager
  - Data Verifier (i.e. Engineer)
  - Data Provider (may add and view test data)
  - Subscriber (may only view test data)

http://www.dot.ca.gov/hq/esc/Translab/DIME/

Dispute Resolution *(11-4.03B(3))*

- You and the Engineer must investigate the:
  - Sampling method
  - Test procedure
  - Equipment condition
  - Equipment calibration
  - Other factors to determine the cause of the difference

Until the cause of the difference has been resolved, the Department's test results are used for acceptance of the concrete.

Acceptance *(11-4.03C)*

- If any QC plastic concrete test results fail:
  - QC rejects the load
  - Notifies the Engineer.
- Repeat the QC tests on subsequent loads until test results comply with requirements.
- Hardened concrete will be accepted or rejected under Section 90.
- Deductions are determined under Section 90

Example 1 – Compressive Strength

Scenario: Designated 28-day compressive strength = 4000psi

- QC Test @ 42 days = 4100psi
- Verification Test @ 42 days = 3900psi
- What to do?
  - QC – Verification = 200psi
  - QC result verified (14% of avg.= 574 psi)
  - Not a deduction because the QC test is used for acceptance.

Example 2 – Compressive Strength

Scenario: Designated 28-day compressive strength = 4000psi

- QC Test @ 42 days = 3800psi
- Verification Test @ 42 days = 4400psi
- What to do?
  - QC – Verification = 600psi
  - QC result not verified (14% of avg.= 532psi)
  - Launch an investigation to determine dispute resolution.

Summary

- QC Responsibilities, Testing, and Inspection
- Verification Testing
- DIME Data Input
- Dispute Resolution

Questions and Feedback

Submit contract questions formally through bidder inquiry