

MONTEREY BAY CHAPTER ICBO/ ICC

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CAMA Special Inspection Guidelines for Expansion and Adhesive Anchors. (Part 2)

(Reprinted from December 4, 2000 article)

3.0 Special inspection requirements for post-installed anchors

Special inspection of expansion and adhesive anchors has been specified by ICBO Evaluation Service, Inc. (ICBO ES) in evaluation reports for proprietary anchors. The basis for this is the UBC requirement for special inspection of “Bolts installed in concrete” which permits higher design loads for cast-in-place anchor bolts when special inspection prior to and during the placement of concrete around the bolts is provided.

4.0 Recognized special inspection procedures

4.1 General

The Structural Engineers Association of Northern California has recently developed a document titled “Guidelines for UBC Special Inspection” which provides UBC provisions for special inspection with commentary to assist engineers and other to understand the provisions and how they are used in practice. This document has a section on anchorage to concrete which elaborates on the special inspection of expansion and adhesive anchors. Information from this document is incorporated below.

4.2 Expansion anchors

When special inspection is specified by the design engineer, ICBO ES evaluation reports permit use of twice the allowable tension loads for anchors installed without special inspection. To meet the requirements of continuous inspection when special inspection is specified, the special inspector must verify that the installation is in accordance with the requirements of the approved plans, evaluation report and manufacturer’s instructions. This generally means verifying the location of the anchor including any edge distance and spacing requirements, drill bit type and size, hole depth, hole cleaning technique (if applicable), anchor type, size embedment and installation procedure.

Proof loading of anchors is frequently specified, however this alone is not recognized as meeting special inspection requirements. Periodic special inspection may meet the requirements of continuous inspection if specified on the project plans and approved by the building official as provided in the 1997 UBC, Section 1701.6.2.

A program of post-installation visual inspection for location, size and embedment combined with torque or tension testing is used in California hospital construction and could be considered as periodic inspection in other construction. A detailed written procedure was developed by State of California Office of State-wide Health Planning (cont. next page)



and Development (OSHPD), the state agency responsible for approving plans and observing construction, and has been in use for approximately ten years. The document is named Interpretation of Regulations IR 26-6. The procedure includes visual observation and proof loading or torque testing of the installed anchors. Torque testing is applicable for wedge and sleeve type anchors only. The ICBO ES requirement for a length identification symbol on the ends of anchors recognized for multiple embedments makes it possible for the special inspector to determine the embedment of these anchors after installation.

Approval of the building official for periodic special inspection may be obtained by specifying the procedure (such as the OSHPD) on the project plans which are then plan checked and approved.

4.3 Adhesive anchors

ICBO ES evaluation reports require special inspection for all installations. The special inspector must verify that the installation is in accordance with the requirements of the approved plans, evaluation report and manufacturer's instructions. This generally means verifying the location of the anchor, any edge distance and spacing requirements, drill bit type and size, hole depth, hole cleaning technique (very important), anchor type, size, embedment and installation procedure including adhesive expiration date and proper dispensing.

Proof loading alone is not recognized as meeting special inspection requirements. While proof loading may be specified as a supplement, visual inspection of the anchor installation must still be provided since it is not possible to verify embedment and important installation procedures such as hole cleaning, mixing and adhesive dispensing after the anchors have been installed.

Periodic special inspection is possible, however there is no established procedures like the OSHPD procedures for expansion anchors. A reasonable approach to periodic inspection for adhesive anchors is:

- 1 Initial inspection of installation of the first anchors.
- 2 Proof loading to the lesser of 50% of expected adhesive ultimate bond strength or 80% of steel yield strength. Proof loading should be done after a minimum curing period specified by the manufacturer. Anchors should have no visible indications of movement during or after the application of the proof load.
- 3 For highly redundant applications such as rebar doweling for shotcrete or slab doweling, proof load a minimum random sampling of 5% of the anchors. The engineer or architect should consider higher sampling rates for installations with less redundancy or that are considered more critical.
- 4 Subsequent inspection of installation when there is a change of personnel performing the installation or use of a different product.

The following is an example of a periodic inspection used on an actual project:

Initial inspection is required for each different subcontractor. The inspector will verify location and configuration of the anchors based on the project plans including any edge distance and spacing requirements, drill bit type and size used, hole depth, hole cleaning technique, anchor type size, embedment and installation procedure including adhesive expiration date and proper dispensing.

Subsequent inspection of installation will be required only when there is a change of personnel doing the installation. The general contractor shall call for such inspection in the event of a change, defined as any one or more persons drilling, preparing holes or installing anchors.

Initial inspection and proof load testing are required for the following. Anchor type drawing detail reference, test frequency and tension loads are:

#4 Rebar Dowels as shotcrete walls (7/S1.2) – 5%/9000 lbs

#4 Rebar Dowels at lower level ramps (5/S1.1) – No testing

#5 Rebar Dowels at roof infill (2/S1.3) – 10%/14,000 lbs.

¾" Epoxy Rods at steel moment frames (1-7/S5.1) – 5%/20,000 lbs

1" Epoxy Rods at steel moment frames (9/S5.1) – 5%/28,000 lbs

1-1/4" Epoxy Rods at steel moment frames (8/S5.1) – 1 at each frame / 50,000 lbs

Test loads are based on either 80% of steel yield or 50% of expected ultimate adhesive bond tension capacity, whichever is less, to avoid permanent distress. Anchors shall have no visible indications of movement during or after the application of the proof load.

As noted in Section 4.2, a periodic inspection procedure may be included on the project plans and approved by the building official via the plan check process.

5.0 Equipment and calibration

5.1 Hydraulic systems

Hollow core rams with pressure gages are used when proof loading is part of the special inspection procedures. Each combination of ram and gage must be calibrated together as a system in a testing machine or other device that is traceable to the Nation Institute of Standards and Technology (NIST). It is not acceptable to calibrate the gage alone and calculate the load by multiplying gage pressure times the ram area.

When testing anchor to ultimate failure, the load reaction from the bridging system should be at least two times the anchor embedment away from the anchor when testing anchors to ultimate failure. However when using the OSHPD procedure, it is permissible to have the reactions close to the anchor as long as the fixtures do not restrict the anchor from pulling out. The reason for this is that only the anchor installation is being verified using a relatively low proof load.

5.2 Torque wrenches

Torque wrenches are used when torque testing is part of the special inspection procedures. They must be calibrated by a standard traceable to NIST.

5.3 Other

Torque bridges, lever and other custom devices must be carefully conceived and calibrated to insure that the required proof load is applied to the anchors. Torque bridges are particularly tricky since the calibration procedures in testing machines using rigid connections may not be valid for anchors that move when loaded (are less rigid than the calibration set up).

MONTEREY BAY CHAPTER – ICBO
Meeting Minutes of March 21, 2002

CALL TO ORDER**1.01 Pledge of Allegiance****1.02 Self-Introductions**

- 1 The meeting was opened by President Ray Proffitt (City of Hollister) at 11:00 am.

CHAPTER BUSINESS**2.01 Approval of Minutes**

- 2 The minutes of the February 2002 meeting were approved as written. (M/Pasquinelli. 2/Kostelec)

2.02 Unfinished Business

- 3 There was a brief discussion on the location for the June Tri-Chapter meeting in Santa Cruz. West Coast Santa Cruz Hotel seems to be the location of choice. The tentative dates for the meeting are June 5 and 6 for the educational portion and the 7th for the business meeting.
- 4 Mike Stone (City of Salinas) opened a discussion on the scholarship that we maintain at Cabrillo College. Part of the problem is that the scholarship is limited to full time students (12 units or more). The Chapter decided to ease the requirement and allow part time students to obtain a proportionate amount with preference being given to full time students. (M/Kostelec, 2/deCourcy) It also seems that Hartnell College has reinstated their Construction Technology program. The Chapter was not prepared to start a second scholarship at this time, but did not discount one in the future.
- 5 There was a motion to reimburse Daniel Kostelec for the cost of the door prizes used at the Calbo ABM to get people into the short breakout we had on the proposed code amendments we put on for the amount \$228.51. (As a result we had very good attendance at the meeting.) M/Wyatt, 2/Pasquinelli

2.03 New Business

- 1 None

2.04 Treasurer's Report

- 6 Janet Praria (Cypress Business Services) presented the Treasurer's report to the members.

COMMITTEE REPORTS**3.01 Code Change**

- 7 Daniel Kostelec (City of Capitola) attended the CA Building Standards Commission meeting of March 20th in Sacramento. On the agenda was supposed to be the closure on the adoption of California codes for the Triennial cycle. At the last minute, the commission pulled the adoption of the Uniform Plumbing Code until the May meeting. The issue of concern is corrugated stainless steel tubing (CSST) for gas installations. This material has been removed from the UPC after years of effective approval in the state of California. The reason for the removal has been targeted to industry political pressure. This does not mean that existing installations will become illegal. There were around forty building officials at the meeting who generally spoke to the effective date of the codes, however, that particular item was already on the agenda. Daniel spoke for the Chapter and told the commission that even though they had set an effective date, we would still be adopting a set of uncoordinated codes that are not up to date. He further noticed the commission that the Chapter would be moving forward with strategies for mitigating the commission's lack of responsibility. The commission further stated that the May meeting would also set forth a discussion on how they would start working toward the next cycle of code adoption. There is a good possibility the commission will try to adopt the NFPA 5000 codes. (This was a major failing of the ICC presentations to the state in that the codes were not well formatted and polished.)
- 8 There was not a discussion of the ramifications against the ISO ratings and the impending decline in local ratings however, the ISO representatives are slated to address the commission in May. Jim Hodges (Berryman & Henigar) said that FEMA had addressed the problem and stated that since California had their own set of amendments, then they probably would not penalize state and local agencies over this code adoption.

3.02 Legislation

- 1 Daniel Kostelec reported that AB 2411 (Corbett) has been introduced in the legislature. The bill would authorize local building departments to make amendment recommendations to the CA Building Standards Commission the same as a state agency does. The bill does not authorize the local agency to adopt an alternate code or lesser standard amendments. The same rules would apply in regard to cycling, analysis, reference to current model codes and the payment of appropriate direct costs to the commission as they would for any state agency. (Note: This bill is already receiving strong opposition from the pipe trades council and other plumbing unions. Apparently our amendment package also came under fire by these individuals, which is not unexpected. An appropriate response from local building officials is a letter of support to both Assemblyman Corbett and to your local representative requesting support for this bill.) www.assembly.ca.gov/defaulttex.asp (Go to Legislation, then look up the bill by number or by Corbett's name or E-mail William Schock at San Leandro Building Dept.)

3.03 Special Inspection

- 2 Dick Stubendorff (City of Santa Cruz) reported that the committee is not reviewing agencies for renewal over a three-year period. This helps to spread out the load of this arduous task.

3.04 Membership and Honors

- 3 Dave Van Etten (City of King City) has his body in the repair shop. We all hope you feel better soon, Dave.
- 4 Joe Mitchell (City of Seaside, ret.) is feeling better and hope to make a meeting soon.
- 5 Steve Borossay (Monterey County, ret.) is alive and well and living in Oceanside and consulting part time for San Diego County. It was great to see him at the ABM. He said to say hello to everyone.

3.05 IAEI

- 1 Rex Wyatt (City of Gilroy) reported on the passing of Paul Stevens after a battle with cancer. Paul worked with a number of local jurisdictions and provided knowledge and support. A moment of silence was observed for him.

3.06 2003 CALBO ABM

- 2 Craig Oliver (City of Marina) reported that the funds are beginning to come in for the ABM. A number of members from both Peninsula and East Bay Chapters are ready to volunteer to help out. This is really appreciated. There will need to be at least three more meetings before the end of the year. Craig also said that the tentative locations for future ABMs would be Long Beach (2004) and Yosemite (2005).

3.07 Education

- 3 The Chapter has scheduled a seminar, "On The Front Counter" for July 12 at the Monterey Training Institute by the airport. There will be flyers out shortly on this seminar. (Note: There is a possibility that this seminar could be offered during the Tri-Chapter meeting in June.)
- 4 Rex Wyatt (City of Gilroy) said that Bill Brookes of Endecon Engineering would be willing to teach a seminar on Photovoltaic systems. The only thing we need to provide is a location. There is a tentative date of May 16th for this seminar.

4.0 OTHER REPORTS

4.01 CALBO

- 1 No report

4.02 ICBO / ICC

- 2 Jon Traw is no longer the President of ICBO and has been released without cause by the Board of Directors. He has been replaced by Bob Heinrich who has been the Executive Vice-President for a number of years and has generally been in charge of the in-house operations. This was somewhat of an expected change in that as ICBO becomes part of the ICC, there can only be one president who has already been named.

March Attendance

John Kuehl.....City of Monterey
Mike StoneCity of Salinas
Rex Wyatt.....City of Gilroy
J.D. Jones.....Development Consultants
Salvatore DiSalvo.....City of Seaside
Dave PasquinelliCity of Salinas
Gwen Miller.....SVBX
Carl Henn.....Santa Cruz Seaside Company
Jeff Gower.....City of Scotts Valley
John DeCourcy.....County of Santa Cruz
Daniel KostelecCity of Capitola
Jim Hodges.....Berryman & Heinger
Dick Stubendorff.....City of Santa Cruz
Craig Oliver.....City of Marina
Ray Proffitt.....City of Hollister
Janet Praria.....CBS
Gwen Wells.....MBX
Doug Riparetti.....Louis & Riparetti

Agenda

April 18, 2002 @11:a.m.
Bay Park Hotel, Monterey

1.0 Call to Order

- 1.01 Pledge of Allegiance
- 1.02 Self- Introductions

2.0 Chapter Business

- 2.01 Approval of Minutes
- 2.03 Unfinished Business
- 2.03 New Business
- 2.04 Treasurers Report

3.0 Committee Reports

- 3.01 Code Change
- 3.02 Legislation
- 3.03 Special Inspection
- 3.04 Membership & Honors
- 3.05 IAEI
- 3.06 2003 CALBO ABM
- 2.07 Education

4.0 Other Reports

- 4.01 CALBO
- 4.02 ICBO / ICC
- 4.03 Code Discussion

Lunch \$15.00

5.0 Program—Code Amendments

**MONTEREY BAY CHAPTER ICBO / ICC
ANNOUNCEMENTS**

Meetings

May 16, 2002Chapter Meeting
June 5, 6, & 7.....Tri Chapter Meetings
June 20, 2002.....Chapter Meeting
July 18, 2002Chapter Meeting
August 22, 2002.....Chapter Meeting
September 19, 2002 ... Chapter Meeting

Coming Soon

“At the Front Counter”

Seminar



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SPECIAL INSPECTION COMMITTEE

International Conference of Building Officials
Peninsula Monterey Bay East Bay

RECOGNIZED SPECIAL INSPECTION & TESTING AGENCIES

Effective 4/1/2002 – 9/30/2002

Key: RC=Reinforced Concrete PC=Prestressed/Post-tensioned Concrete SM=Structural masonry
SS=Structural Steel Welding/Bolting FP=Spray-Applied Fireproofing URM=Unreinforced Masonry Push/Torque Tests Only

Agencies have not been evaluated for geotechnical special inspection or for nondestructive testing. Agencies may not be qualified to perform all aspects of special inspection. Agencies may have offices in more than one location

Agency Name	HQ Address	Phone/Fax	RC	PC	SM	SS	FP	URM	EXPIRATION DATE
Applied Materials Engineering	980 - 41 st Street Oakland, CA 94608	(510) 420-8190 (510) 420-8186	X	X	X	X	X	X	3/31/2003
Berlogar Geotechnical Consultants	5587 Sunol Blvd. Pleasanton, CA 94566	(925) 484-0220 (925) 846-9645	X	X					3/31/2003
Biggs Cardosa Associates, Inc.	1871 The Alameda, Suite 200 San Jose, CA 95126	(408) 296-5515 (408) 296-8114	X	X	X	X	X	X	3/31/2003
B.S.K. Associates	1181 Quarry Lane #300 Pleasanton, CA 94566	(925) 462-4000 (925) 462-6283	X	X	X	X	X	X	9/30/2002
Capex Engineering Inc.	P.O. Box 14198 Fremont, CA 94539	(510) 668-1815 (510) 490-8690	X	X	X	X	X	X	9/30/2002
Consolidated Engineering Labs	7060 Koll Center Parkway #300 Pleasanton, CA 94566-3108	(925) 485-5000 (925) 485-5018	X	X	X	X	X	X	9/30/2002
Construction Materials Testing, Inc.	2278-F Pike Court Concord, CA 94520-1252	(925) 825-2840 (925) 682-7953	X	X	X	X	X	X	3/31/2003
Construction Testing Services	39 California Ave. Ste. 402 Pleasanton, CA 94566	(925) 462-5151 (925) 462-5183	X	X	X	X	X	X	3/31/2003
Construction Testing & Engineering, Inc.	242 W. Larch Rd., Ste F Tracy, CA 95304	(800) 576-2271 (209) 839-2895	X	X	X	X	X	X	3/31/2003
D&M Consulting Eng. Inc (Terratech)	3194 De La Cruz Blvd, Ste 19 Santa Clara, CA 95054	(408) 297-6969 (408) 297-7716	X	X	X	X	X	X	9/30/2002
Dynamic Consultants Inc.	415 Fairchild Drive Mountain View, CA 94043	(650) 967-6982 (650) 967-6955	X	X	X	X	X	X	3/31/2003
Earth Systems Consultants	47853 Warm Springs Blvd. Fremont, CA 94539-7400	(510) 353-0320 (510) 353-0344	X	X	X	X	X	X	3/31/2003
ENGEO Incorporated	2401 Crow Canyon Road, Ste 200 San Ramon, CA 94583-1545	(925)838-1600 (925)838-7425	X	X	X	X	X	X	3/31/2003
Forsythe Engineering Consultants	1760 Industrial Way, Su. 1 Napa, CA 94558	(707) 259-1292 (707) 259-1393				X	X	X	3/31/2003
HP Inspections	550 Sunol St. San Jose, CA 95126	(408) 287-7722 (408) 271-0902	X	X	X	X	X	X	9/30/2002
Inspection Consultants Inc.	870 Market St., Suite 1117 San Francisco, CA 94102	(415) 834-1960 (415) 834-1018	X	X	X	X	X	X	3/31/2003
Inspection Services Inc.	Pier 26 The Embarcadero San Francisco, CA 94105	(415) 243-3265 (415) 243-3266	X	X	X	X	X	X	3/31/2003
Inspection & Testing Consultants	2107 Van Ness Ave., # 216 San Francisco, CA 94107	(415) 440-1544 (415) 440-1543	X		X	X	X	X	3/31/2003
KC Engineering Co.	865 Cotting Lane, Suite A Vacaville, CA 95688	(707) 447-4025 (707)447-4143	X	X	X	X		X	3/31/2005
Kleinfelder Inc.	7133 Koll Ctr. Pkwy. # 100 Pleasanton, CA 94566	(925) 484-1700 (925) 484-2977	X	X	X	X	X	X	9/30/2002
Korbmacher Engineering, Inc.	480 Preston Ct, Suite B Livermore, CA 94550	(925) 454-9033 (925) 454-9564	X						3/31/2003
Krazand Associates Inc.	550 Parrott Street Suite 1 San Jose, CA 95112	(408) 271-2200 (408) 271-2201	X	X	X	X	X	X	9/30/2002
Montgomery Watson Harza	425 Roland Way Oakland, CA 94621	(510) 568-4001 (510) 568-2205	X	X	X	X	X	X	9/30/2002
Nicholas Engineering Consultants	6743 Dublin Blvd. # 15 Dublin, CA 94568	(925) 829-8090 (925) 829-0235	X	X	X	X	X	X	3/31/2003
PSC Associates Inc.	1185 Terra Bella Mountain View, CA 94043	(650) 969-1144 (650) 969-5523	X	X	X	X	X	X	3/31/2003
PSI	365 Victor Street, Ste. C Salinas, CA 93907	(831) 757-3536 (831) 757-6265	X	X	X	X	X	X	3/31/2003
RES Engineers, Inc.	150 North Wiget Lane, Suite 204 Walnut Creek, CA 94598-2434	(925) 932-4600 (925) 932-4625	X	X	X	X	X	X	3/31/2003
Signet Testing Laboratories	3121 Diablo Ave. Hayward, CA 94545	(510) 887-8484 (510) 783-4295	X	X	X	X	X	X	9/30/2002
Smith-Emery Company	P.O. Box 880550, Hunters Point Shipyard San Francisco, CA 94188	(415) 330-3000 (415) 330-3030	X	X	X	X	X	X	9/30/2002
Terraresearch Inc.	6840 Via Del Oro, # 110 San Jose, CA 95119	(408) 362-4920 (408) 362-4926	X	X	X	X	X	X	9/30/2002
Testing Engineers Inc.	2811 Adeline Street Oakland, CA 94608	(510) 835-3142 (510) 834-3777	X	X	X	X	X	X	9/30/2002
Triangle Engineering	1388 Haight Street, Ste 172 San Francisco, CA 94117	(415) 626-6972 (415) 626-6972						X	3/31/2003
Twining Laboratories, Inc.	2527 Fresno St. Fresno, CA 93721	(559) 268-7021 (559) 268-0740	X	X	X	X	X	X	3/31/2003
Valley Inspection Services	326 Woodrow Avenue Vallejo, CA 94571	(707) 552-7037 (707) 552-7022				X	X	X	3/31/2003