ADDENDUM No. 1

TO ALL CONTRACTORS AND BIDDERS

SUBJECT: ADDENDUM NO. 1 TO CONTRACT DOCUMENTS FOR LOS GATOS CREEK BRIDGE ON ALDERCROFT HEIGHTS ROAD SEISMIC RETROFIT AND RAILING REPLACEMENT

This addendum is part of the Contract Documents for the subject Project. Your attention is directed to the "Special Provisions" for this Project and the following revisions thereunto. Acknowledgment of Addendum No. 1 is required on Bid Form 1, Section 112, page 1.

Special Provisions:

1. Replace Section 105, Pages 1 and 2 with the attached Section 105, Pages 1 and 2.

2. Add the attached DEPARTMENT OF THE ARMY PERMIT and the attached sheets; total of six sheets to Section 105-05 PERMITS.

3. Replace TEMPORARY CONSTRUCTION AND ACCESS PERMIT from San Jose Water Company, Pages 1 through 5, with the attached Pages 1 through 5 to Section 105-05 PERMITS.

4. Add Section 107 – AMENDMENTS TO COUNTY STANDARD SPECIFICATIONS, Pages 7 through 39, after Section 107, Page 6.

5. Replace Section 112 BID SCHEDULE, Pages 2a, 2b, and 2c, with attached Section 112, Pages 2a, 2b, 2c, 2d, and 2e.

6. Replace Section 112, Pages 9 and 10 with attached Section 112, Pages 9 and 10.
7. Replace Section 112, Page 19 with attached Section 112, Page 19.

8. Replace Section 113, Page 12a with attached Section 113, Page 12a.

End of Addendum No. 1

Date: March 1, 2007

Michael J. Murditz, Director
County of Santa Clara Roads and Airports Department

Ratified
SECTION 105 - GENERAL CONDITIONS

105-01 FINAL PAY QUANTITY ITEMS

Attention is directed to the provisions in Section 9.01 "Measurement and Final Pay Quantities" of the County Santa Clara Standard Specifications. The following items of work are hereby designated as "Final Pay Quantity Items."

<table>
<thead>
<tr>
<th>BID ITEM NO.</th>
<th>BID ITEM DESCRIPTION</th>
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<tr>
<td>Seismic</td>
<td>Railing</td>
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<tr>
<td>9A</td>
<td>STRUCTURE EXCAVATION (BRIDGE)</td>
</tr>
<tr>
<td>10A</td>
<td>STRUCTURE BACKFILL (BRIDGE)</td>
</tr>
<tr>
<td>11A</td>
<td>REPLACE BASE AND ASPHALT CONCRETE SURFACING</td>
</tr>
<tr>
<td>13A</td>
<td>18B</td>
</tr>
<tr>
<td>20A</td>
<td>22B</td>
</tr>
<tr>
<td>21A</td>
<td>COMPOSITE COLUMN CASING</td>
</tr>
<tr>
<td>22A</td>
<td>MISCELLANEOUS METAL (RESTRAINER - PIPE TYPE)</td>
</tr>
<tr>
<td>23B</td>
<td>MISCELLANEOUS METAL (BRIDGE)</td>
</tr>
<tr>
<td>24B</td>
<td>TUBULAR HAND RAILING (TYPE 25)</td>
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<tr>
<td>25B</td>
<td>CONCRETE BARRIER (TYPE 25)</td>
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105-02  SPECIALTY ITEMS OF WORK

Attention is directed to the provisions in Section 8.01 "Subcontracting" of the County Standard Specifications. The following items of work are hereby designated as "Specialty Items."

<table>
<thead>
<tr>
<th>BID ITEM NO.</th>
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<td>3A</td>
<td>CONSTRUCTION AREA SIGNS</td>
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<td>TRAFFIC CONTROL SYSTEM</td>
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<td>5A</td>
<td>TEMPORARY PAVEMENT MARKER</td>
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<td>7B</td>
<td>PORTABLE TRAFFIC SIGNAL SYSTEM</td>
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<tr>
<td>8B</td>
<td>PORTABLE CHANGEABLE MESSAGE SIGN</td>
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<td>12B</td>
<td>RECONSTRUCT METAL BEAM GUARD RAILING</td>
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<tr>
<td>12A</td>
<td>48&quot; CAST-IN-DRILLED-HOLE CONCRETE PILLING</td>
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<tr>
<td>16A</td>
<td>DRILL &amp; BOND DOWEL</td>
</tr>
<tr>
<td>17A</td>
<td>DRILL &amp; PRESSURE GROUT BAR REINFORCEMENT</td>
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<tr>
<td>18A</td>
<td>CORE CONCRETE (9&quot;)</td>
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<tr>
<td>19A</td>
<td>JOINT SEAL (TYPE A)</td>
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<td>20A</td>
<td>BAR REINFORCING STEEL (BRIDGE)</td>
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<td>COMPOSITE COLUMN CASING</td>
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<td>TERMINAL SYSTEM (TYPE SRT)</td>
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<td>PAINT YELLOW TRAFFIC STRIPE</td>
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<td>29B</td>
<td>PAINT WHITE TRAFFIC STRIPE</td>
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</table>

5/22/2000  105-2
Formal/Fed
DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
333 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94105-2157

REPLY TO
Regulatory Branch

FEB 13 2007

SUBJECT: File Number 28007S

Mr. Amir Douraghy,
County of Santa Clara
Roads and Airports Department
1505 Schallenberger Road
San Jose, California 95131-2434

Dear Mr. Douraghy:

This letter is written in response to your request dated November 17, 2006, for a time extension of Permit Number 28007S, issued by this office on June 23, 2004, authorizing you to temporarily place fill in 0.01 acre of jurisdictional waters of the U.S. in order to seismically retrofit the Aldcroft Heights Road bridge spanning Los Gatos Creek, south of the Town of Los Gatos, in an unincorporated part of Santa Clara County, California.

You are hereby granted Department of the Army authorization to extend to March 18, 2007. If you have commenced work or are under contract to commence work prior to the suspension, or revocation of the Nationwide Permit and the project would not comply with the resulting Nationwide Permit authorization, you have twelve (12) months from that date to complete the project under the present terms and conditions of the Nationwide Permit.

All conditions of the original permit remain in full force and effect.

Should you have any questions regarding this matter, please contact Holly Costa of our Regulatory Branch at 415-977-8438 or by email: holly.u.costa@usace.army.mil. Please address all correspondence to the Regulatory Branch and refer to the File Number at the head of this letter.

Sincerely,

Jane M. Hicks
Chief, Regulatory Branch
Regulatory Branch

SUBJECT: File Number 280078

Mr. Peter Hu
County of Santa Clara
Roads and Airports Department
1505 Schallenberger Road
San Jose, California 95131

Dear Mr. Hu:

This letter is in reference to your submittal of December 3, 2003, concerning Department of the Army authorization to temporarily place fill in 0.01 acre of jurisdictional waters of the U.S. in order to seismically retrofit the Aldercrest Heights Road bridge spanning Los Gatos Creek, south of the Town of Los Gatos, in an unincorporated part of Santa Clara County, California.

The retrofit work at each pier in the channel includes the addition of a new concrete cap beam, installed at the top of the existing piers. Steel casings will be placed on the existing columns extending down from this cap to the top of the infill wall. The top of the infill wall is several feet above ground; therefore no work will be required in the water. At the abutments, large diameter concrete pilings will be drilled and placed behind each abutment, with a concrete beam connection to the existing abutments. These beams will be anchored to the existing abutments by drilling and bonding dowels into the concrete. Construction equipment storage and staging areas will occur at the site.

The seismic retrofit work will be performed both from above and below the structure; therefore, access to the creek bed will be required. This access will occur on the upstream sides of both abutments. Equipment will be moved down the bank to access each pier. It will be necessary to erect scaffolding at each pier, so some water diversion system may be required. The water diversion will likely involve either the temporary placement of x-rails in the creek bed, or the temporary placement of clean fill into the bed of the creek to create a surface to place the scaffolding on. When construction is finished, the diversion structure will be removed and the creek restored to original conditions.

Based on a review of the information you submitted, your project qualifies for authorization under Department of the Army Nationwide Permit 33 – Temporary Construction, Access and Dewatering (67 Fed.Reg. 2020, January 13, 2002), pursuant to Section 404 of the Clean Water Act (33 U.S.C. Section 1344). See Enclosure 1. All work shall be completed in accordance with
the attached plans and drawings titled Lost Gatos Creek Bridge at Aldercoft Heights Road and dated 09-03-03 (2 pages).

The project must be in compliance with the General Conditions cited in Enclosure 2 for this Nationwide Permit authorization to remain valid. Upon completion of the project and all associated mitigation requirements, you shall sign and return the Certification of Compliance, Enclosure 3, verifying that you have complied with the terms and conditions of the permit. Non-compliance with any condition could result in the revocation, suspension or modification of the authorization for your project, thereby requiring you to obtain an individual permit from the Corps. This Nationwide Permit authorization does not obviate the need to obtain other State or local approvals required by law.

This authorization will remain valid for two years from the date of this letter unless the Nationwide Permit is modified, suspended or revoked. If you have commenced work or are under contract to commence work prior to the suspension, or revocation of the Nationwide Permit and the project would not comply with the resulting Nationwide Permit authorization, you have twelve (12) months from that date to complete the project under the present terms and conditions of the Nationwide Permit.

This authorization will not be effective until you have obtained a Section 401 water quality certification from the San Francisco Bay Regional Water Quality Control Board (RWQCB). If the RWQCB fails to act on a valid request for certification within two (2) months after receipt of a complete application, the Corps will presume a waiver of water quality certification has been obtained. You shall submit a copy of the certification to the Corps prior to the commencement of work.

To ensure compliance with the Nationwide Permit, the following special conditions shall be implemented:

1. This Corps permit does not authorize you to take an endangered species. In order to legally take a listed species, you must have a separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit or a Biological Opinion (BO) under ESA Section 7 with "incidental take" provisions with which you must comply). The enclosed U.S. Fish and Wildlife Service (USFWS) letter, dated May 19, 2004, appending this project to the California Red-legged Frog Programmatic Consultation on Nationwide Section 404 Permits in California (Programmatic Consultation) dated January 26, 1999, contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the Programmatic Consultation. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take authorized by the attached Programmatic Consultation, whose terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the Programmatic Consultation, where a take of the listed species occurs, would constitute an unauthorized take and it would also constitute non-compliance with this Corps permit. The USFWS is the appropriate
authority to determine compliance with the terms and conditions of its Programmatic Consultation and with the ESA.

2. The project, restoration, and monitoring plan shall be implemented as proposed in the "Aldercroft Heights Road Bridge Over Los Gatos Creek Natural Environment Study", dated August 4, 2003.

3. The Sacramento Fish and Wildlife Office is to be notified within three working days of the finding of any dead listed species or any unanticipated harm to the species addressed in this biological opinion. The USFWS contact is Mike Nepstad, Endangered Species Division at (916) 414-6625.

Should you have any questions regarding this matter, please call Holly Costa of our Regulatory Branch at 415-977-8438. Please address all correspondence to the Regulatory Branch and refer to the File Number at the head of this letter. If you would like to provide comments on our permit review process, please complete the Customer Survey Form available through the Forms and Contacts Block on our website: www.spn.usace.army.mil/regulatory.

Sincerely,

Edward A. Wylie
Chief, South Section

Enclosures

Copy furnished (w/ enclosures):

Copy furnished (w/o enclosures):
US FWS, Sacramento, CA
CA DFG, Yountville, CA
CA RWQCB, Oakland, CA
33. Temporary Construction, Access and Dewatering. Temporary structures, work and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites; provided that the associated primary activity is authorized by the Corps of Engineers or the USCG, or for other construction activities not subject to the Corps or USCG regulations. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must be of materials, and placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if it is determined by the District Engineer that it will not cause more than minimal adverse effects on aquatic resources. Temporary fill must be entirely removed to upland areas, or dredged material returned to its original location, following completion of the construction activity, and the affected areas must be restored to the pre-project conditions. Cofferdams cannot be used to dewater wetlands or other aquatic areas to change their use. Structures left in place after cofferdams are removed require a Section 10 permit if located in navigable waters of the U.S. (See 33 CFR Part 322.) The permittee must notify the District Engineer in accordance with the “Notification” General Condition. The notification must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic resources. The District Engineer will add Special Conditions, where necessary, to ensure environmental adverse effects is minimal. Such conditions may include: limiting the temporary work to the minimum necessary; requiring seasonal restrictions; modifying the restoration plan; and requiring alternative construction methods (e.g., construction mats in wetlands where practicable). (Sections 10 and 404)
Permittee: Santa Clara County
File Number: 280078

Certification of Compliance for Nationwide Permit

"I hereby certify that the work authorized by the above referenced File Number and all required mitigation have been completed in accordance with the terms and conditions of the Nationwide Permit."

(Permittee) (Date)

Return to:
Holly Costa
U.S. Army, Corps of Engineers
San Francisco District
Regulatory Branch, CESPN-OR-R
333 Market Street
San Francisco, CA 94105-2197
TEMPORARY CONSTRUCTION
AND ACCESS PERMIT

This Temporary Construction and Access Permit ("Permit") is made this \underline{February} 1, 2007, by and between San Jose Water Company, ("Company") whose address is 374 W. Santa Clara St, San Jose, CA 95196, ("Grantor") and County of Santa Clara, Roads and Airports Department ("Grantee"), (together the "Parties").

Recitals

A. Grantor owns that certain parcel or parcels of real property located in Santa Clara County, California (the "Property") described as: area near Los Gatos Creek adjacent to Aldercroft Heights Road, and as more particularly described in Exhibit "A" & "A'", attached hereto.

B. Grantee is an agent of a public entity of the State of California that desires to use a portion of the Property on a limited and temporary basis in connection with seismic retrofit of bridge #37C-173 located on Aldercroft Heights Road over Los Gatos Creek in the County of Santa Clara, California and described more fully in Exhibit "B" attached hereto.

C. The parties acknowledge that this Permit is made pursuant to the authority of and upon, and is subject to the conditions prescribed by General Order No. 69-C of the Public Utilities Commission of the State of California (the Commission) dated and effective July 10, 1985, which General Order No. 69-C, by this reference, is hereby incorporated herein and made a part hereof. Without limiting the generality of the foregoing, General Order 69-C provides in part that all public utilities covered by the provisions of PUC \$851...are authorized to grant easements, licenses or permits for use or occupancy, on, over or under any portion of the operating property of said utilities for rights of way, private roads, agricultural purposes, or other limited uses of their several properties without further special authorization by this Commission whenever it shall appear that the exercise of such easement, license or permit will not interfere with the operations, practices and services of such public utilities to and for their...consumers.... Provided, however, that each such grant...shall be made conditional upon the right of the grantor, either upon order of this Commission or upon its own motion to commence or resume the use of the property in question whenever, in the interests of its service to its patrons or consumers, it shall appear necessary or desirable so to do.

D. Grantor grants to Grantee a license of temporary use subject to and in accordance with the terms and conditions set forth in this Permit.
TEMPORARY CONSTRUCTION
AND ACCESS PERMIT

NOW, THEREFORE, in consideration of the foregoing recitals, the Parties agree as
follows:

1. **Temporary and Limited Right of Use.** Grantor hereby grants to Grantee, its
affiliates, subsidiaries, authorized licensees, agents, employees, subcontractors,
successors and assignees the right to use and occupy the Property on a temporary
basis for the purpose of: to retrofit two bridge columns with fiber wrapping,
installing concrete pilings behind two bridge abutments and replacing existing
bridge railing. Grantee's right of use shall be subject to the terms and conditions set
forth herein.

2. **Term.** The rights and obligations granted under this Permit shall be effective upon
execution and shall expire at the end of project completion, but in no case shall
exceed 1.5 years (548 days) from date of execution.

3. **Prohibited Activities.** This Permit neither allows Grantee to perform any ultra-
hazardous activities, including blasting, nor allows Grantee to transport, store, or
dispose of hazardous materials on the Property.

4. **Maintenance of Property.** Grantor makes no warranty regarding the present
condition of the Property. Grantee hereby agrees that Grantor shall not be liable to
it for dangerous conditions, known or unknown, at the Property, except that Grantor
shall disclose any known, hidden hazards to Grantee on a separate attachment to this
Permit at the time of execution of this agreement. (Exhibit C, if applicable.)
Grantee shall maintain the Property and Grantee’s equipment located on Grantor’s
Property in safe condition during the term of this agreement and shall return the
property in safe condition at the end of the term of this agreement. Grantor
reserves the right, upon such prior written notice to Grantee as is reasonable under
the circumstances, to remediate unsafe conditions caused by Grantee on the
Property, and Grantee agrees to reimburse Grantor its costs for doing so.

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~2101508.doc 1-2007 Page 2 of 5
TEMPORARY CONSTRUCTION
AND ACCESS PERMIT

5. **Notice.** Grantor will not control, direct, or approve Grantee's work on the Property, except that Grantee shall provide 48 hours notice prior to entering Property for the first time and shall provide 48 hours notice prior to vacating Property for the last time. Grantor reserves the right to inspect the condition of its Property at any time without notice to Grantee, but shall not interfere with the retrofit work in progress. All notices required to be given hereunder, or which either party may wish to give, shall be in writing and shall be served either by personal delivery or by certified or registered mail, postage prepaid, addressed as follows:

**TO GRANTOR:**
San Jose Water Company
Attention Maps and Records
1265 South Bascom Avenue
San Jose, CA 95128
Phone: 408-279-7821

**TO GRANTEE:**
County of Santa Clara
Roads and Airports Department
Attention – Amir Douraghy
101 Skyport Drive
San Jose, CA 95110
Phone: 408-573-2496

6. **Restoration.** Grantee shall restore the Property to Grantor's reasonable satisfaction within 30 days after completion of the approved use of the Property. The Property shall be restored to the condition that existed immediately prior to such disturbance or as otherwise reasonably required by Grantor, except for the property completed retrofit work to the County bridge.

7. **Indemnification.** Grantee agrees to indemnify and hold the Grantor, its affiliates, successors, subsidiaries, officers, directors, agents, and employees harmless from and against any and all claims, actions, costs, losses and damages, based upon or arising out of damages or injuries to persons or property, including environmental liability, or any financial loss, to the extent solely caused by Grantee's use or occupation of the Property, as determined by a court of competent jurisdiction excepting any claims resulting from Grantor's or its affiliates', successors', subsidiaries', officers', directors', agents', or employees' negligence, gross negligence or willful misconduct.

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TEMPORARY CONSTRUCTION
AND ACCESS PERMIT

8. **Attorneys' Fees.** If any suit or action is instituted in connection with any controversy arising hereunder, the prevailing party shall be entitled to recover in addition to costs such sum as the court or courts may adjudge reasonable as attorney fees, at or in preparation for trial, appeal and on review or other proceeding, including without limitation, any arbitration or other proceeding.

9. **Governing Law.** This Permit shall be governed and construed under the laws of the State of California without regard to conflicts of law provisions.

10. **Severability.** Whenever possible, each provision of this Permit will be interpreted in such a manner as to be effective and valid under applicable law, but if any provision of this Permit is held to be prohibited by or invalid under applicable law, such provision will be ineffective only to the extent of such prohibition or invalidity, without invalidating the remainder of this Permit.

11. **Waiver.** Waiver by Grantee of any one default will not be deemed to be a waiver of any other default under this agreement. Any remedy or election under this agreement will not be deemed exclusive, but, instead, whenever legally permissible, will be cumulative with all other remedies at law or in equity.

12. **Construction.** The rule of strict construction does not apply to this Permit. This permit shall be given a reasonable construction so that the intention of the parties can be carried out.

13. **Exhibits.** The parties acknowledge and agree that each of the Exhibits attached to this Permit form an integral part of this Permit and by this reference are incorporated herein.

14. **No Recording.** Grantee hereby acknowledges that this Permit shall not constitute an interest in real property and shall not be recorded with the County or any other entity responsible for keeping public records of ownership of the Property.

15. **Authorization.** Each individual executing this Permit represents and warrants that he or she has been duly authorized by appropriate action of the governing body of the party for which he signs to execute and deliver this Permit in the capacity and for the entity set forth where he signs and that as a result of his signature, this Permit shall be binding upon the party for which he signs.
TEMPORARY CONSTRUCTION
AND ACCESS PERMIT

IN WITNESS WHEREOF, this Permit shall be dated and effective on date and year first above written.

County of Santa Clara, Roads and Airports Department

By: Michael J. Murdter, P.E.,
    Director, Roads and Airports Dept.
    Santa Clara County

San Jose Water Company

By: Richard J. Pardini
    V.P., Chief Engineer
    San Jose, Water Company

San Jose Water Company

By: [Signature]
    Senior V.P. of Operations

Theresa Plantes
Deputy County Counsel

Recommended for Approval:

By: [Signature]
    William Sprouse
    Senior Real Estate Agent

Office of the County Executive

[Signature]

ATTACHMENTS

Exhibit A & A' — Location Map & Site Map
Exhibit B — Project Design Plans for Seismic Retrofit of Bridge #37C-173, Aldercroft Heights Road
Exhibit C — Grantor's Disclosure of Known, Hidden Hazards (if any)
SECTION 107 - AMENDMENTS TO COUNTY STANDARD SPECIFICATIONS

107-03 PORTLAND CEMENT CONCRETE

Section 90 "Portland Cement Concrete" shall be amended as follows:

90-1 GENERAL

90-1.01 DESCRIPTION

- Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.
- The Contractor shall determine the mix proportions for concrete in conformance with these specifications. Unless otherwise specified, cementitious material shall be a combination of cement and mineral admixture. Cementitious material shall be either:
  1. "Type II (MS) Modified" cement; or
  2. A combination of "Type II Modified" portland cement and mineral admixture; or
  3. A combination of Type V portland cement and mineral admixture.

- Type III portland cement shall be used only as allowed in the special provisions or with the approval of the Engineer.
- Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter (674 pounds of cementitious material per cubic yard).
- Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter (590 pounds of cementitious material per cubic yard).
- Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter (506 pounds of cementitious material per cubic yard).
- Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter (421 pounds of cementitious material per cubic yard).
- Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter (548 pounds of cementitious material per cubic yard) unless otherwise specified in these specifications or the special provisions.
- Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic meter (cubic yard) of concrete in structures or portions of structures shall conform to the following:
Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa (3,600 pounds per square inch), the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 28 MPa (4,000 pounds per square inch) or greater, an additional 14 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans that are 25 MPa (3,600 pounds per square inch) or less are shown for design information only and are not a requirement for acceptance of the concrete.

- Concrete designated by compressive strength shall be proportioned such that the concrete will attain the strength shown on the plans or specified in the special provisions.
- Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.
- Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.
- If any concrete has a cementitious material, portland cement, or mineral admixture content that is less than the minimum required, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $0.55 for each kilogram ($0.25 for each pound) of cementitious material, portland cement, or mineral admixture that is less than the minimum required. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-3, "Proportioning." No deductions will be made based on the results of California Test 518.
- The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

90-2 MATERIALS

90-2.01 CEMENT
- Unless otherwise specified, cement shall be either "Type IP (MS) Modified" cement, "Type II Modified" portland cement or Type V portland cement.
- "Type IP (MS) Modified" cement shall conform to the requirements for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate and uniform blend of Type II cement and not more than 35 percent by mass of mineral
admixtures. The type and minimum amount of mineral admixtures used in the manufacture of "Type II (MS) Modified" cement shall be in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

- "Type II Modified" portland cement shall conform to the requirements for Type II portland cement in ASTM Designation: C 150.
- In addition, "Type II (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:

A. The cement shall not contain more than 0.60 percent by mass of alkalies, calculated as the percentage of Na₂O plus 0.658 times the percentage of K₂O, when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in conformance with the requirements in ASTM Designation: C 114;
B. The autolysis expansion shall not exceed 0.50 percent; and
C. Mortar, containing the cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not expand in water more than 0.010 percent and shall not contract in air more than 0.048 percent, except that when cement is to be used for precast prestressed concrete pilings, precast prestressed concrete members, or steam cured concrete products, the mortar shall not contract in air more than 0.053 percent.

- Type III and Type V portland cements shall conform to the requirements in ASTM Designation: C 150 and the additional requirements listed above for "Type II Modified" portland cement, except that when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.
  - Cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.
  - Cement shall be protected from exposure to moisture until used. Bagged cement shall be piled to permit access for tally, inspection, and identification of each shipment.
  - Adequate facilities shall be provided to assure that cement meeting the provisions specified in this Section 90-2.01 shall be kept separate from other cement in order to prevent any but the specified cement from entering the work. Safe and suitable facilities for sampling cement shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper, in conformance with California Test 125.
  - If cement is used prior to sampling and testing as provided in Section 6-1.07, "Certificates of Compliance," and the cement is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the cement manufacturer or supplier of the cement. If the cement is used in ready-mixed concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.
  - Cement furnished without a Certificate of Compliance shall not be used in the work until the Engineer has had sufficient time to make appropriate tests and has approved the cement for use.

90-2.02 AGGREGATES
- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.
- Natural aggregates shall be thoroughly and uniformly washed before use.
- The Contractor, at the Contractor's expense, shall provide safe and suitable facilities, including necessary splitting devices for obtaining samples of aggregates, in conformance with California Test 125.
- Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of water content provided in Section 90-6.06, "Amount of Water and Penetration."
- For fine aggregate, the Aggregate shall have not more than 10 percent loss when tested for soundness in conformance with the requirements in California Test 214. The soundness requirement for fine aggregate will be waived, provided that the durability index, D₂₀ of the fine aggregate is 60 or greater, when tested for durability in conformance with California Test 229.

If the results of any one or more of the Cleanliness Value, Sand Equivalent, or aggregate grading tests do not meet the requirements specified for "Operating Range" but all meet the "Contract Compliance" requirements, the placement of concrete shall be suspended at the completion of the current pour until tests or other information indicate that the next material to be used in the work will comply with the requirements specified for "Operating Range."

- If the results of either or both the Cleanliness Value and coarse aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter ($3.50 per cubic yard) for paving concrete and $7.20 per cubic meter ($5.50 per cubic yard) for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.
- If the results of either or both the Sand Equivalent and fine aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete which is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter ($3.50 per cubic yard) for paving concrete and $7.20 per cubic meter ($5.50 per cubic yard) for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.
- The 2 preceding paragraphs apply individually to the "Contract Compliance" requirements for coarse aggregate and fine aggregate. When both coarse aggregate and fine aggregate do not conform to the "Contract Compliance" requirements, both paragraphs shall apply. The payments specified in those paragraphs shall be in addition to any payments made in conformance with the provisions in Section 90-1.01, "Description."

- No single Cleanliness Value, Sand Equivalent or aggregate grading test shall represent more than 250 m³ [325 cubic yards] of concrete or one day's pour, whichever is smaller.

When the source of an aggregate is changed, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregate.

90-2.02A Coarse Aggregate

- Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, crushed air-cooled iron blast furnace slag or combinations thereof. Crushed air-cooled blast furnace slag shall not be used in reinforced or prestressed concrete.
- Coarse aggregate shall conform to the following quality requirements:
**Tests** | California Test | Requirements
---|---|---
Loss in Los Angeles Rattler (after 500 revolutions) | 211 | 45% max.

### Cleanness Value
- Operating Range: 227
- Contract Compliance: 227

- ** Requirements: 75 min.**
- ** Requirements: 71 min.

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- In lieu of the above Cleanness Value requirements, a Cleanness Value "Operating Range" limit of 71, minimum, and a Cleanness Value "Contract Compliance" limit of 68, minimum, will be used to determine the acceptability of the coarse aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:
  1. Coarse aggregate sampled at the completion of processing at the aggregate production plant had a Cleanness Value of not less than 82 when tested by California Test 227; and
  2. Prequalification tests performed in conformance with the requirements in California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

### 90-2.02 Fine Aggregate
- Fine aggregate shall consist of natural sand, manufactured sand produced from larger aggregate or a combination thereof. Manufactured sand shall be well graded.
- Fine aggregate shall conform to the following quality requirements:

<table>
<thead>
<tr>
<th>Test</th>
<th>California Test</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| Organic Impurities | 213 | Satisfactory
| Mortar Strengths Relative to Ottawa Sand | 215 | 95%, min. |
| Sand Equivalent: | | |
| Operating Range | 217 | 75%, min. |
| Contract Compliance | 217 | 71%, min. |

- Fine aggregate developing a color darker than the reference standard color solution may be accepted if it is determined by the Engineer, from mortar strength tests, that a darker color is acceptable.

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- In lieu of the above Sand Equivalent requirements, a Sand Equivalent "Operating Range" limit of 71, minimum and a Sand Equivalent "Contract Compliance" limit of 68, minimum will be used to determine the acceptability of the fine aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:
  1. Fine aggregate sampled at the completion of processing at the aggregate production plant had a Sand Equivalent value of not less than 82 when tested by California Test 217; and
  2. Prequalification tests performed in conformance with California Test 549 indicated that the aggregate would develop a relative strength of not less than 75% min.
95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

90-2.03 WATER

- In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO₄, when tested in conformance with California Test 417. In prestressed concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 650 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO₄, when tested in conformance with California Test 417. In no case shall the water contain an amount of impurities that will cause either: 1) a change in the setting time of cement of more than 25 percent when tested in conformance with the requirements in ASTM Designation: C 191 or ASTM Designation: C 266 or 2) a reduction in the compressive strength of mortar at 14 days of more than 15 percent, when tested in conformance with the requirements in ASTM Designation: C 109, when compared to the results obtained with distilled water or deionized water, tested in conformance with the requirements in ASTM Designation: C 109.

- In non-reinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1500 parts per million of sulfates as SO₄, when tested in conformance with California Test 417.

- In addition to the above provisions, water for curing concrete shall not contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

- Water reclaimed from mixer wash-out operations may be used in mixing concrete. The water shall not contain coloring agents or more than 300 parts per million of alkalis (Na₂O + 0.658 K₂O) as determined on the filtrate. The specific gravity of the water shall not exceed 1.03 and shall not vary more than ±0.010 during a day’s operations.

90-2.04 ADMIXTURE MATERIALS

- Admixture materials shall conform to the requirements in the following ASTM Designations:
  
  A. Chemical Admixtures—ASTM Designation: C 494.
  C. Calcium Chloride—ASTM Designation: D 98.
  D. Mineral Admixtures—Coal fly ash; raw or calcined natural pozzolan as specified in ASTM Designation: C 618; silica fume conforming to the requirements in ASTM Designation: C 1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

- Unless otherwise specified in the special provisions, mineral admixtures shall be used in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

5/22/2000; Rev. 12/28/2004
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90-3 AGGREGATE GRADINGS

90-3.01 GENERAL

• Before beginning concrete work, the Contractor shall submit in writing to the Engineer the gradation of the primary aggregate nominal sizes that the Contractor proposes to furnish. If a primary coarse aggregate or the fine aggregate is separated into 2 or more sizes, the proposed gradation shall consist of the gradation for each individual size, and the proposed proportions of each individual size, combined mathematically to indicate one shown in the table in this section, and shall show the percentage passing each of the sieve sizes used in determining the end result.

• The Engineer may waive, in writing, the gradation requirements in this Section 90-3.01 and in Sections 90-3.02, "Coarse Aggregate Grading," 90-3.03, "Fine Aggregate Grading," and 90-3.04, "Combined Aggregate Gradings." If, in the Engineer's opinion, furnishing the gradation is not necessary for the type or amount of concrete work to be constructed.

• Gradations proposed by the Contractor shall be within the following percentage passing limits:

<table>
<thead>
<tr>
<th>Primary Aggregate Nominal Size</th>
<th>Sieve Size</th>
<th>Limits of Proposed Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.5-mm x 19-mm {1 1/2&quot; x 3/4&quot;}</td>
<td>25-mm {1&quot;}</td>
<td>19 - 41</td>
</tr>
<tr>
<td>25-mm x 4.75-mm {1&quot; x No. 4}</td>
<td>19-mm {3/4&quot;}</td>
<td>52 - 85</td>
</tr>
<tr>
<td>25-mm x 4.75-mm {1&quot; x No. 4}</td>
<td>9.5-mm {3/8&quot;}</td>
<td>15 - 38</td>
</tr>
<tr>
<td>12.5-mm x 4.75-mm {1/2&quot; x No. 4}</td>
<td>9.5-mm {3/8&quot;}</td>
<td>40 - 78</td>
</tr>
<tr>
<td>9.5-mm x 2.36-mm {3/8&quot; x No. 8}</td>
<td>9.5-mm {3/8&quot;}</td>
<td>50 - 85</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>1.18-mm (No. 16)</td>
<td>55 - 75</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>600-μm (No. 30)</td>
<td>34 - 46</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>300-μm (No. 50)</td>
<td>16 - 29</td>
</tr>
</tbody>
</table>

• Should the Contractor change the source of supply, the Contractor shall submit in writing to the Engineer the new gradations before their intended use.

90-3.02 COARSE AGGREGATE GRADING

• The grading requirements for coarse aggregates are shown in the following table for each size of coarse aggregate:
## Percentage Passing Primary Aggregate Nominal Sizes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50-mm (2&quot;)</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.5-mm (1 1/2&quot;)</td>
<td>0-17</td>
<td>0-20</td>
<td>82-100</td>
<td>80-100</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-mm (1&quot;)</td>
<td>88-100</td>
<td>86-100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-mm (3/4&quot;)</td>
<td>x ±18</td>
<td>X ± 25</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.5-mm (1/2&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.5-mm (3/8&quot;)</td>
<td>0-7</td>
<td>0-9</td>
<td>X ±15</td>
<td>X ± 22</td>
<td>X ±15</td>
<td>X ± 22</td>
<td>X ±15</td>
<td>X ± 20</td>
</tr>
<tr>
<td>4.75-mm (No. 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.36-mm (No. 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."
- Coarse aggregate for the 37.5-mm {1 1/2 inch}, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," shall be furnished in 2 or more primary aggregate nominal sizes. Each primary aggregate nominal size may be separated into 2 sizes and stored separately, provided that the combined material conforms to the grading requirements for that particular primary aggregate nominal size.
- When the 25-mm (one inch), maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," is to be used, the coarse aggregate may be separated into 2 sizes and stored separately, provided that the combined material shall conform to the grading requirements for the 25-mm x 4.75-mm {1 inch x No. 4} primary aggregate nominal size.

### 90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>Operating Range</th>
<th>Contract Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5-mm (3/8&quot;)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4.75-mm (No. 4)</td>
<td>95-100</td>
<td>93-100</td>
</tr>
<tr>
<td>2.36-mm (No. 8)</td>
<td>65-95</td>
<td>61-99</td>
</tr>
<tr>
<td>1.18-mm (No. 16)</td>
<td>X ±10</td>
<td>X ±13</td>
</tr>
<tr>
<td>600-μm (No. 30)</td>
<td>X ±9</td>
<td>X ±12</td>
</tr>
<tr>
<td>300-μm (No. 50)</td>
<td>X ±6</td>
<td>X ±9</td>
</tr>
<tr>
<td>150-μm (No. 100)</td>
<td>2-12</td>
<td>1-15</td>
</tr>
<tr>
<td>75-μm (No. 200)</td>
<td>0-8</td>
<td>0-10</td>
</tr>
</tbody>
</table>

- In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."

5/22/2000; Rev. 12/28/2004

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• In addition to the above required grading analysis, the distribution of the fine aggregate sizes shall be such that the difference between the total percentage passing the 1.18-mm (No. 16) sieve and the total percentage passing the 600-μm (No. 30) sieve shall be between 10 and 40, and the difference between the percentage passing the 600-μm (No. 30) and 300-μm (No. 50) sieves shall be between 10 and 40.
• Fine aggregate may be separated into 2 or more sizes and stored separately, provided that the combined material conforms to the grading requirements specified in this Section 90-3.03.

90-3.04 COMBINED AGGREGATE GRADINGS

• Combined aggregate grading limits shall be used only for the design of concrete mixes. Concrete mixes shall be designed so that aggregates are combined in proportions that shall produce a mixture within the grading limits for combined aggregates as specified herein. Within these limitations, the relative proportions shall be as ordered by the Engineer, except as otherwise provided in Section 90-1.01, "Description."

The combined aggregate grading, except when specified otherwise in these specifications or the special provisions, shall be either the 37.5-mm (1 1/2 inch), maximum grading, or the 25-mm (one inch), maximum grading, at the option of the Contractor.

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>37.5-mm (1 1/2 inch) Max.</th>
<th>25-mm (one inch) Max.</th>
<th>12.5-mm (1/2 inch) Max.</th>
<th>9.5-mm (3/8 inch) Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0-mm (2&quot;)</td>
<td>100</td>
<td>90-100</td>
<td>50-86</td>
<td>45-75</td>
</tr>
<tr>
<td>3.75-mm (1 1/2&quot;)</td>
<td>90-100</td>
<td>100</td>
<td>90-100</td>
<td>100</td>
</tr>
<tr>
<td>2.5-mm (1&quot;)</td>
<td>50-86</td>
<td>90-100</td>
<td>100</td>
<td>90-100</td>
</tr>
<tr>
<td>1.9-mm (3/4&quot;)</td>
<td>45-75</td>
<td>55-100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1.25-mm (1/2&quot;)</td>
<td></td>
<td>90-100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>0.9-mm (3/8&quot;)</td>
<td>35-55</td>
<td>45-75</td>
<td>55-86</td>
<td>50-100</td>
</tr>
<tr>
<td>0.44-mm (No. 4)</td>
<td>30-45</td>
<td>35-60</td>
<td>45-63</td>
<td>45-63</td>
</tr>
<tr>
<td>0.27-mm (No. 8)</td>
<td>23-38</td>
<td>27-45</td>
<td>35-49</td>
<td>35-49</td>
</tr>
<tr>
<td>0.18-mm (No. 16)</td>
<td>17-33</td>
<td>20-35</td>
<td>25-37</td>
<td>25-37</td>
</tr>
<tr>
<td>0.09-mm (No. 30)</td>
<td>10-22</td>
<td>12-25</td>
<td>15-25</td>
<td>15-25</td>
</tr>
<tr>
<td>0.06-mm (No. 50)</td>
<td>4-10</td>
<td>5-15</td>
<td>5-15</td>
<td>5-15</td>
</tr>
<tr>
<td>0.04-mm (No. 100)</td>
<td>1-6</td>
<td>1-8</td>
<td>1-8</td>
<td>1-8</td>
</tr>
<tr>
<td>0.02-mm (No. 200)</td>
<td>0-3</td>
<td>0-4</td>
<td>0-4</td>
<td>0-4</td>
</tr>
</tbody>
</table>

• Changes from one grading to another shall not be made during the progress of the work unless permitted by the Engineer.

90-4 ADMIXTURES

90-4.01 GENERAL

• Admixtures used in portland cement concrete shall conform to and be used in conformance with the provisions in this Section 90-4 and the special provisions. Admixtures shall be used when specified or ordered by the Engineer and may be used at the Contractor’s option as provided herein.
• Chemical admixtures and air-entraining admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used in prestressed or reinforced concrete.
• Calcium chloride shall not be used in concrete except when otherwise specified.
Ratified

SECTION 107

- Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.
- Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.
- If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.

90-4.02 MATERIALS
- Admixture materials shall conform to the provisions in Section 90-2.04, "Admixture Materials."

90-4.03 ADMIXTURE APPROVAL
- No admixture brand shall be used in the work unless it is on the Department's current list of approved brands for the type of admixture involved.
- Admixture brands will be considered for addition to the approved list if the manufacturer of the admixture submits to the Transportation Laboratory a sample of the admixture accompanied by certified test results demonstrating that the admixture complies with the requirements in the appropriate ASTM Designation and these specifications. The sample shall be sufficient to permit performance of all required tests. Approval of admixture brands will be dependent upon a determination as to compliance with the requirements, based on the certified test results submitted, together with tests the Department may elect to perform.
- When the Contractor proposes to use an admixture of a brand and type on the current list of approved admixture brands, the Contractor shall furnish a Certificate of Compliance from the manufacturer, as provided in Section 6-1.07, "Certificates of Compliance," certifying that the admixture furnished is the same as that previously approved. If a previously approved admixture is not accompanied by a Certificate of Compliance, the admixture shall not be used in the work until the Engineer has had sufficient time to make the appropriate tests and has approved the admixture for use. The Engineer may take samples for testing at any time, whether or not the admixture has been accompanied by a Certificate of Compliance.
- If a mineral admixture is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the manufacturer or supplier of the mineral admixture. If the mineral admixture is used in ready-mix concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE
- When the use of a chemical admixture or calcium chloride is specified, the admixture shall be used at the dosage specified, except that if no dosage is specified, the admixture shall be used at the dosage normally recommended by the manufacturer of the admixture.
- Calcium chloride shall be dispensed in liquid, flake, or pellet form. Calcium chloride dispensed in liquid form shall conform to the provisions for dispensing liquid admixtures in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures."

90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES
- The Contractor will be permitted to use Type A or P, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM 107-16

5/22/2000; Rev. 12/28/2004
Formal/Prel
Designation: C 494 to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:

A. When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent by mass, except that the resultant cementitious material content shall be not less than 300 kilograms per cubic meter (506 pounds per cubic yard), and

B. When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.

* Unless otherwise specified, a Type C accelerating chemical admixture conforming to the requirements in ASTM Designation: C 494, may be used in Portland cement concrete. Inclusion in the mix design submitted for approval will not be required provided that the admixture is added to counteract changing conditions that contribute to delayed setting of the Portland cement concrete, and the use or change in dosage of the admixture is approved in writing by the Engineer.

90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES

* When air-entrainment is specified or ordered by the Engineer, the air-entraining admixture shall be used in amounts to produce a concrete having the specified air content as determined by California Test 504.

90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES

* When air-entrainment has not been specified or ordered by the Engineer, the Contractor will be permitted to use an air-entraining admixture to facilitate the use of any construction procedure or equipment provided that the average air content, as determined by California Test 504, of 3 successive tests does not exceed 4 percent, and no single test value exceeds 5.5 percent. If the Contractor elects to use an air-entraining admixture in concrete for pavement, the Contractor shall so indicate at the time the Contractor designates the source of aggregate as provided in Section 40-1.015, "Cement Content."

90-4.08 REQUIRED USE OF MINERAL ADMIXTURES

* Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material.

* The calcium oxide content of mineral admixtures shall not exceed 10 percent and the available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 618.

* The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:

A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content;

B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:

1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than
15 percent by mass of the total amount of cementitious material to be used in
the mix;
2. When the calcium oxide content of a mineral admixture is greater than
   2 percent, the amount of mineral admixture shall not be less than 25 percent by
   mass of the total amount of cementitious material to be used in the mix;
3. When a mineral admixture that conforms to the provisions for silica fume in
   Section 90-2.04, "Admixture Materials," is used, the amount of mineral
   admixture shall not be less than 10 percent by mass of the total amount of
   cementitious material to be used in the mix.

C. The total amount of mineral admixture shall not exceed 35 percent by mass of the
   total amount of cementitious material to be used in the mix. Where Section 90-1.01,
   "Description," specifies a maximum cementitious content in kilograms per cubic
   meter (pounds per cubic yard), the total mass of cement and mineral admixture per
   cubic meter (cubic yard) shall not exceed the specified maximum cementitious
   material content.

90-4.09 BLANK

90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES
- Chemical admixtures and air-entraining admixtures shall be dispensed in liquid form.
  Dispensers for liquid admixtures shall have sufficient capacity to measure at one time the
  prescribed quantity required for each batch of concrete. Each dispenser shall include a
  graduated measuring unit into which liquid admixtures are measured to within
  ±5 percent of the prescribed quantity for each batch. Dispensers shall be located and
  maintained so that the graduations can be accurately read from the point at which
  proportioning operations are controlled to permit a visual check of batching accuracy
  prior to discharge. Each measuring unit shall be clearly marked for the type and quantity
  of admixture.
- Each liquid admixture dispensing system shall be equipped with a sampling device
  consisting of a valve located in a safe and readily accessible position such that a sample
  of the admixture may be withdrawn slowly by the Engineer.
- If more than one liquid admixture is used in the concrete mix, each liquid admixture shall
  have a separate measuring unit and shall be dispensed by injecting equipment located in
  such a manner that the admixtures are not mixed at high concentrations and do not
  interfere with the effectiveness of each other. When air-entraining admixtures are used
  in conjunction with other liquid admixtures, the air-entraining admixture shall be the first
  to be incorporated into the mix.
- When automatic proportioning devices are required for concrete pavement, dispensers for
  liquid admixtures shall operate automatically with the batching control equipment. The
  dispensers shall be equipped with an automatic warning system in good operating
  condition that will provide a visible or audible signal at the point at which proportioning
  operations are controlled when the quantity of admixture measured for each batch of
  concrete varies from the prespecified dosage by more than 5 percent, or when the entire
  contents of the measuring unit are not emptied from the dispenser into each batch of
  concrete.
- Unless liquid admixtures are added to premixed water for the batch, their discharge
  into the batch shall be arranged to flow into the stream of water so that the admixtures
  are well dispersed throughout the batch, except that air-entraining admixtures may be
dispensed directly into moist sand in the batching bins provided that adequate control of
the air content of the concrete can be maintained.

- Liquid admixtures requiring dosages greater than 2.5 L/m³ (one-half gallon per cubic
yard) shall be considered to be water when determining the total amount of free water as
specified in Section 90-6.06, "Amount of Water and Penetration."

- Special admixtures, such as "high range" water reducers that may contribute to a high
rate of slump loss, shall be measured and dispensed as recommended by the admixture
manufacturer and as approved by the Engineer.

90-4.11 STORAGE, PROPORISIONING, AND DISPENSING OF MINERAL
ADMIIXTURES

- Mineral admixtures shall be protected from exposure to moisture until used. Sacked
material shall be piled to permit access for tally, inspection and identification for each
shipment.

- Adequate facilities shall be provided to assure that mineral admixtures meeting the
specified requirements are kept separate from other mineral admixtures in order to
prevent any but the specified mineral admixtures from entering the work. Safe and
suitable facilities for handling mineral admixtures shall be provided at the weigh hopper
or in the feed line immediately in advance of the hopper.

- Mineral admixtures shall be incorporated into concrete using equipment conforming to
the requirements for cement weigh hoppers, and charging and discharging mechanisms in
ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section
90-4.11.

- When concrete is completely mixed in stationary paving mixers, the mineral admixture
shall be weighed in a separate weigh hopper conforming to the provisions for cement
weigh hoppers and charging and discharging mechanisms in Section 90-5.03A,
"Proportioning for Pavement," and the mineral admixture and cement shall be introduced
simultaneously into the mixer proportionately with the aggregate. If the mineral
admixture is not weighed in a separate weigh hopper, the Contractor shall provide
certification that the stationary mixer is capable of mixing the cement, admixture,
aggregates and water uniformly prior to discharge. Certification shall contain the
following:

A. Test results for 2 compressive strength test cylinders of concrete taken within the
first one-third and 2 compressive strength test cylinders of concrete taken within the
last one-third of the concrete discharged from a single batch from the stationary
paving mixer. Strength tests and cylinder preparation will be in conformance with
the provisions of Section 90-9, "Compressive Strength;"

B. Calculations demonstrating that the difference in the averages of 2 compressive
strengths taken in the first one-third is no greater than 7.5 percent different than the
averages of 2 compressive strengths taken in the last one-third of the concrete,
discharged from a single batch from the stationary paving mixer. Strength tests and
cylinder preparation will be in conformance with the provisions of Section 90-9,
"Compressive Strength;" and

C. The mixer rotation speed and time of mixing prior to discharge that are required to
produce a mix that meets the requirements above.
90-5 PROPORTIONING

90-5.01 STORAGE OF AGGREGATES

- Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size shall be avoided and also that the various sizes shall not become intermixed before proportioning.
- Aggregates shall be stored or stockpiled and handled in a manner that shall prevent contamination by foreign materials. In addition, storage of aggregates at batching or mixing facilities that are erected subsequent to the award of the contract and that furnish concrete to the project shall conform to the following:
  A. Intermingling of the different sizes of aggregates shall be positively prevented. The Contractor shall take the necessary measures to prevent intermingling. The preventive measures may include, but are not necessarily limited to, physical separation of stockpiles or construction of bulkheads of adequate length and height; and
  B. Contamination of aggregates by contact with the ground shall be positively prevented. The Contractor shall take the necessary measures to prevent contamination. The preventive measures shall include, but are not necessarily limited to, placing aggregates on wooden platforms or on hardened surfaces consisting of portland cement concrete, asphalt concrete, or cement treated material.
- In placing aggregates in storage or in moving the aggregates from storage to the weigh hopper of the batching plant, any method that may cause segregation, degradation, or the combining of materials of different gradings that will result in any size of aggregate at the weigh hopper failing to meet the grading requirements, shall be discontinued. Any method of handling aggregates that results in excessive breakage of particles shall be discontinued. The use of suitable devices to reduce impact of falling aggregates may be required by the Engineer.

90-5.02 PROPORTIONING DEVICES

- Weighing, measuring, or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, automatic weighing systems shall comply with the requirements for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." Automatic devices shall be automatic to the extent that the only manual operation required for proportioning the aggregates, cement, and mineral admixture for one batch of concrete is a single operation of a switch or starter.
  - Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to ensure their accuracy.
  - Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the mass of each batch of material shall not vary from the mass designated by the Engineer by more than the tolerances specified herein.
  - Equipment for cumulative weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be ±0.5 percent of the individual batch mass designated for each size of aggregate.
  - Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately shall have a
zero tolerance of ±0.5 percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated mass or volume.

- The mass indicated for any batch of material shall not vary from the preselected scale setting by more than the following:
  
  A. Aggregate weighed cumulatively shall be within 1.0 percent of the designated total batch mass of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch masses; and
  
  B. Cement shall be within 1.0 percent of its designated batch mass. When weighed individually, mineral admixture shall be within 1.0 percent of its designated batch mass. When mineral admixture and cement are permitted to be weighed cumulatively, cement shall be weighed first to within 1.0 percent of its designated batch mass, and the total for cement and mineral admixture shall be within 1.0 percent of the sum of their designated batch masses; and
  
  C. Water shall be within 1.5 percent of its designated mass or volume.

- Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a mass not exceeding the maximum permissible mass variation above, except that no scale shall be required having a capacity of less than 500 kg (1,000 pounds), with 0.5-kg (one pound) graduations.

90.5.03 PROPORTIONING

- Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture, and water as provided in these specifications. Aggregates shall be proportioned by mass.
  
- At the time of batching, aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 3 percent of its saturated, surface-dry mass.
  
- Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.
  
- Bulk Type IP (MS) Modified cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.
  
- Bulk cement and mineral admixture may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and mineral admixture are weighed cumulatively, the cement shall be weighed first.
  
- When cement and mineral admixtures are weighed in separate weigh hoppers, the weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.
• The scales and weigh hoppers for bulk weighing cement, mineral admixture, or cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.

• For batches with a volume of one cubic meter (one cubic yard) or more, the batching equipment shall conform to one of the following combinations:

  A. Separate boxes and separate scale and indicator for weighing each size of aggregate.
  B. Single box and scale indicator for all aggregates.
  C. Single box or separate boxes and automatic weighing mechanism for all aggregates.

• In order to check the accuracy of batch masses, the gross mass and tare mass of batch trucks, truck mixers, truck agitators, and non-agitating hauling equipment shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

90-5.03A Proportioning for Pavement

• Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to these specifications.

• The Contractor shall install and maintain in operating condition an electronically actuated moisture meter that will indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched within a sensitivity of 0.5 percent by mass of the fine aggregate.

• The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

• When interlocks are required for cement and mineral admixture charging mechanisms and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

• The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.

• When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.

• Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.

• When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.
• The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

90-6 MIXING AND TRANSPORTING

90-6.01 GENERAL

• Concrete shall be mixed in mechanically operated mixers, except that when permitted by the Engineer, batches not exceeding 0.25 m³ (1/3 cubic yard) may be mixed by hand methods in conformance with the provisions in Section 90-6.05, "Hand-Mixing."

• Equipment having components made of aluminum or magnesium alloys that would have contact with plastic concrete during mixing, transporting, or pumping of portland cement concrete shall not be used.

• Concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.

• Uniformity of concrete mixtures will be determined by differences in penetration as determined by California Test 533, or slump as determined by ASTM Designation: C 143, and by variations in the proportion of coarse aggregate as determined by California Test 529.

• When the mix design specifies a penetration value, the difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 10 mm (1/2 inch). When the mix design specifies a slump value, the difference in slump, determined by comparing slump tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed the values given in the table below. Variation in the proportion of coarse aggregate will be determined by comparing the results of tests of 2 samples of mixed concrete from the same batch or truck mixer load and the difference between the 2 results shall not exceed 100 kg per cubic meter (169 pounds per cubic yard) of concrete.

<table>
<thead>
<tr>
<th>Slump Class</th>
<th>Maximum Permissible Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100-mm (4&quot;)</td>
<td>25-mm (1&quot;)</td>
</tr>
<tr>
<td>100-mm to 150-mm (4&quot; to 6&quot;)</td>
<td>38-mm (1 1/2&quot;)</td>
</tr>
<tr>
<td>Greater than 150-mm to 225-mm (Greater than 6&quot; to 9&quot;)</td>
<td>50-mm (2&quot;)</td>
</tr>
</tbody>
</table>

• The Contractor, at the Contractor's expense, shall furnish samples of the freshly mixed concrete and provide satisfactory facilities for obtaining the samples.

90-6.02 MACHINE MIXING

• Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.

• The temperature of mixed concrete, immediately before placing, shall be not less than 10°C (50°F) or more than 32°C (90°F). Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither aggregates nor mixing water shall be heated to exceed 65°C (150°F). If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.

• The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one-fourth of the specified mixing time.
Cementitious materials shall be batched and charged into the mixer by means that will not result in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.

- Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
- The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.
- The size of batch shall not exceed the manufacturer's guaranteed capacity.
- When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at jobsite batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.
- Concrete shall be mixed and delivered to the jobsite by means of one of the following combinations of operations:
  A. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in non-agitating hauling equipment (central-mixed concrete).
  B. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer (shrink-mixed concrete).
  C. Mixed completely in a truck mixer (transit-mixed concrete).
  D. Mixed completely in a paving mixer.

- Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.
- Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.
- When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

90-6.03 TRANSPORTING MIXED CONCRETE

- Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."
- Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.
Bodies of non-agitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.

Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 24°C (75° F).

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.

When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates.

Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C (85° F) or above, the time allowed may be less than 1.5 hours.

When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C (85° F) or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

Each load of concrete delivered at the jobsite shall be accompanied by a weighmaster certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water added to the load, and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weighmaster certificate shall also show the actual scale masses (kilograms (pounds)) for the ingredients batched. Theoretical or target batch masses shall not be used as a substitute for actual scale masses.

Weighmaster certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on a 90 mm (3 1/2-inch) diskette with a capacity of at least 1.4 megabytes. Captured data for the ingredients represented by each batch shall be "line feed, carriage return" (LF/CR) and "one line, separate record" with allowances for sufficient fields to satisfy the amount of data required by these specifications.

The Contractor may furnish a weighmaster certificate accompanied by a separate certificate that lists the actual batch masses or measurements for a load of concrete provided that both certificates are imprinted with the same non-repeating load number that is unique to the contract and delivered to the jobsite with the load.

Weighmaster certificates furnished by the Contractor shall conform to the provisions in Section 9-1.01, "Measurement of Quantities."

90-6.04 TIME OR AMOUNT OF MIXING

Mixing of concrete in paving or stationary mixers shall continue for the required mixing time after all ingredients, except water and admixture, if added with the water, are in the mixing compartment of the mixer before any part of the batch is released. Transfer time in multiple drum mixers shall not be counted as part of the required mixing time.
The required mixing time, in paving or stationary mixers, of concrete used for concrete structures, except minor structures, shall be not less than 90 seconds or more than 5 minutes, except that when directed by the Engineer in writing, the requirements of the following paragraph shall apply.

- The required mixing time, in paving or stationary mixers, except as provided in the preceding paragraph, shall be not less than 59 seconds or more than 5 minutes.
- The minimum required revolutions at the mixing speed for transit-mixed concrete shall not be less than that recommended by the mixer manufacturer, but in no case shall the number of revolutions be less than that required to consistently produce concrete conforming to the provisions for uniformity in Section 90-6.01, "General."

**90-6.05 HAND-MIXING**

- Hand-mixed concrete shall be made in batches of not more than 0.25 m³ (1/3 cubic yard) and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than 0.3 meters (one foot) in total depth. On this mixture shall be spread the dry cement and mineral admixture and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

**90-6.06 AMOUNT OF WATER AND PENETRATION**

- The amount of water used in concrete mixes shall be regulated so that the penetration of the concrete as determined by California Test 533 or the slump of the concrete as determined by ASTM Designation C 143 is within the "Nominal" values shown in the following table. When the penetration or slump of the concrete is found to exceed the nominal values listed, the mixture of subsequent batches shall be adjusted to reduce the penetration or slump to a value within the nominal range shown. Batches of concrete with a penetration or slump exceeding the maximum values listed shall not be used in the work. When Type F or Type G chemical admixtures are added to the mix, the penetration requirements shall not apply and the slump shall not exceed 225 mm (9 inches) after the chemical admixtures are added.

<table>
<thead>
<tr>
<th>Type of Work</th>
<th>Nominal</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Penetration (mm, inches)</td>
<td>Slump (mm, inches)</td>
</tr>
<tr>
<td>Concrete Pavement</td>
<td>0-25 (0-1)</td>
<td>—</td>
</tr>
<tr>
<td>Non-reinforced concrete facilities</td>
<td>0-35 (0-1 1/2)</td>
<td>—</td>
</tr>
<tr>
<td>Reinforced concrete structures</td>
<td>—</td>
<td>150-200 (6-8)</td>
</tr>
<tr>
<td>Concrete placed under water</td>
<td>63-90 (2 1/2-3 1/2)</td>
<td>130-180 (5-7)</td>
</tr>
</tbody>
</table>

- The amount of free water used in concrete shall not exceed 183 kg/m³ (308 pounds per cubic yard), plus 20 kg (20 pounds) for each required 100 kg (100 pounds) of cementitious material in excess of 325 kg/m³ (548 pounds per cubic yard). The amount of free water used in concrete for roadway deck slabs of highway bridges shall not exceed 195 kg/m³ (325 lbs/cubic yard), plus 20 kg (20 pounds) for each required 100 kg (100 pounds) of cement in excess of 400 kg/m³ (658 lbs/cubic yard).
- The term free water is defined as the total water in the mixture minus the water absorbed by the aggregates in reaching a saturated surface-dry condition.

5/22/2000; Rev. 12/28/2004
Formal/Fed
Where there are adverse or difficult conditions that affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter (cubic yard) of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg (30 pounds) of water per added 100 kg (100 pounds) of cementitious material per cubic meter (cubic yard). The cost of additional cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.

- The equipment for supplying water to the mixer shall be constructed and arranged so that the amount of water added can be measured accurately. Any method of discharging water into the mixer for a batch shall be accurate within 1.5 percent of the quantity of water required to be added to the mix for any position of the mixer. Tanks used to measure water shall be designed so that water cannot enter while water is being discharged into the mixer and discharge into the mixer shall be made rapidly in one operation without dripping. All equipment shall be arranged so as to permit checking the amount of water delivered by discharging into measured containers.

90-7 CURING CONCRETE

90-7.01 METHODS OF CURING

- Newly placed concrete shall be cured by the methods specified in this Section 90-7.01 and the special provisions.

90-7.01A Water Method

- The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.
- When a curing medium consisting of cotton mats, rugs, carpets, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.
- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified in the preceding paragraph, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

90-7.01B Curing Compound Method

- Surfaces of the concrete that are exposed to the air shall be sprayed uniformly with a curing compound.
- Curing compounds to be used shall be as follows:

1. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B, except the resin type shall be poly-alpha-methylstyrene.
2. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B.
3. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A.
4. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
5. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.
6. Non-pigmented curing compound with fugitive dye conforming to the requirements in ASTM Designation: C 309, Type 1-D, Class A.

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.
- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.15-kg/m² in 24 hours.
- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.
- When the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.
- Curing compound shall be applied at a nominal rate of 3.7 m²/L (one gallon per 150 square feet), unless otherwise specified.
- At any point, the application rate shall be within ±1.2 m²/L of the nominal rate specified, and the average application rate shall be within ±0.5 m²/L of the nominal rate specified when tested in conformance with the requirements in California Test 535. Runs, sags, thin areas, skips, or holidays in the applied curing compound shall be evidence that the application is not satisfactory.
- Curing compounds shall be applied using power operated spray equipment. The power operated spraying equipment shall be equipped with an operational pressure gage and a means of controlling the pressure. Hand spraying of small and irregular areas that are not reasonably accessible to mechanical spraying equipment, in the opinion of the Engineer, may be permitted.
- The curing compound shall be applied to the concrete following the surface finishing operation, immediately before the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear. In the event of any drying or cracking of the surface, application of water with an atomizing nozzle as specified in Section 90-7.01A, "Water Method," shall be started immediately and shall be continued until application of the compound is resumed or started; however, the compound shall not be applied over any resulting freestanding water. Should the film of compound be damaged from any cause before the expiration of 7 days after the concrete is placed in the case of structures and 72 hours in the case of pavement, the damaged portion shall be repainted immediately with additional compound.
- At the time of use, compounds containing pigments shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. A paddle shall be used to loosen all settled pigment from the bottom of the container, and a power driven agitator shall be used to disperse the pigment uniformly throughout the vehicle.
- Agitation shall not introduce air or other foreign substance into the curing compound.
- The manufacturer shall include in the curing compound the necessary additives for control of sagging, pigment settling, leveling, de-emulsification, or other requisite qualities of a satisfactory working material. Pigmented curing compounds shall be
manufactured so that the pigment does not settle badly, does not cake or thicken in
the container, and does not become granular or crumbled. Settlement of pigment shall
be a thoroughly wetted, soft, mushy mass permitting the complete and easy vertical
penetration of a paddle. Settled pigment shall be easily redispersed, with minimum
resistance to the sideways manual motion of the paddle across the bottom of the
container, to form a smooth uniform product of the proper consistency.

- Curing compounds shall remain sprayable at temperatures above 4°C (40°F) and
shall not be diluted or altered after manufacture.
- The curing compound shall be packaged in clean 1040-L totes (274-gallon), 210-L
(55-gallon) barrels or 19-L (5-gallon) pails or shall be supplied from a suitable
storage tank located at the jobsite. The containers shall comply with "Title 49,
(274-gallon) totes and the 210-L (55-gallon) barrels shall have removable lids and
airtight fasteners. The 19-L (5-gallon) pails shall be round and have standard full
open head and bail. Lids with bungholes shall not be permitted. Settling or
separation of solids in containers, except tanks, must be completely redispersed with
low speed mixing prior to use, in conformance with these specifications and the
manufacturer's recommendations. Mixing shall be accomplished either manually by
use of a paddle or by use of a mixing blade driven by a drill motor, at low speed.
Mixing blades shall be the type used for mixing paint. On site storage tanks shall be
kept clean and free of contaminants. Each tank shall have a permanent system
designed to completely re-disperse settled material without introducing air or other
foreign substances.

- Steel containers and lids shall be lined with a coating that will prevent destructive
action by the compound or chemical agents in the air space above the compound.
The coating shall not come off the container or lid as skins. Containers shall be
filled in a manner that will prevent skinning. Plastic containers shall not react with
the compound.

- Each container shall be labeled with the manufacturer's name, kind of curing
compound, batch number, volume, date of manufacture, and volatile organic
compound (VOC) content. The label shall also warn that the curing compound
containing pigment shall be well stirred before use. Precautions concerning the
handling and the application of curing compound shall be shown on the label of the
curing compound containers in conformance with the Construction Safety Orders
and General Industry Safety Orders of the State of California.

- Containers of curing compound shall be labeled to indicate that the contents fully
comply with the rules and regulations concerning air pollution control in the State of
California.
- When the curing compound is shipped in tanks or tank trucks, a shipping invoice
shall accompany each load. The invoice shall contain the same information as that
required herein for container labels.
- Curing compound will be sampled by the Engineer at the source of supply or at the
jobsite or at both locations.
- Curing compound shall be formulated so as to maintain the specified properties for a
minimum of one year. The Engineer may require additional testing before use to
determine compliance with these specifications if the compound has not been used
within one year or whenever the Engineer has reason to believe the compound is no
longer satisfactory.

- Tests will be conducted in conformance with the latest ASTM test methods and
methods in use by the Transportation Laboratory.

107-29

5/22/2000; Rev. 12/28/2004
Formal/Fed
90-7.01C Waterproof Membrane Method

- The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.
- Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.
- The sheeting material shall be fabricated into sheets of such width as to provide a complete cover for the entire concrete surface. Joints in the sheets shall be securely cemented together in such a manner as to provide a waterproof joint. The joint seams shall have a minimum lap of 100 mm (0.33-foot).
- The sheets shall be securely weighted down by placing a bank of earth on the edges of the sheets or by other means satisfactory to the Engineer.
- Should any portion of the sheets be broken or damaged before the expiration of 72 hours after being placed, the broken or damaged portions shall be immediately repaired with new sheets properly cemented into place.
- Sections of membrane that have lost their waterproof qualities or have been damaged to such an extent as to render them unfit for curing the concrete shall not be used.

90-7.01D Forms-In-Place Method

- Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for a minimum period of 7 days after the concrete has been placed, except that for members over 0.5-m (20 inches) in least dimension the forms shall remain in place for a minimum period of 5 days.
- Joints in the forms and the joints between the end of forms and concrete shall be kept moisture tight during the curing period. Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods subject to the approval of the Engineer.

90-7.02 CURING PAVEMENT

- The entire exposed area of the pavement, including edges, shall be cured by the waterproof membrane method, or curing compound method using curing compound (1) or (2) as the Contractor may elect. Should the side forms be removed before the expiration of 72 hours following the start of curing, the exposed pavement edges shall also be cured. If the pavement is cured by means of the curing compound method, the sawcut and all portions of the curing compound that have been disturbed by sawing operations shall be restored by spraying with additional curing compound.
- Curing shall commence as soon as the finishing process provided in Section 40-1.10, "Final Finishing," has been completed. The method selected shall conform to the provisions in Section 90-7.01, "Methods of Curing."
- When the curing compound method is used, the compound shall be applied to the entire pavement surface by mechanical sprayers. Spraying equipment shall be of the fully atomizing type equipped with a tank agitator that provides for continual agitation of the curing compound during the time of application. The spray shall be adequately protected against wind, and the nozzles shall be so oriented or moved mechanically transversely as to result in the minimum specified rate of coverage being applied uniformly on exposed faces. Hand spraying of small and irregular areas, and areas inaccessible to mechanical spraying equipment, in the opinion of the Engineer, will be permitted. When the ambient air temperature is above 15°C (60 F), the Contractor shall fog the surface of the
concrete with a fine spray of water as specified in Section 90-7.01A, "Water Method." The surface of the pavement shall be kept moist between the hours of 10:00 a.m. and 4:30 p.m. on the day the concrete is placed. However, the fogging done after the curing compound has been applied shall not begin until the compound has set sufficiently to prevent displacement. Fogging shall be discontinued if ordered in writing by the Engineer.

90-7.03 CURING STRUCTURES
- Newly placed concrete for cast-in-place structures, other than highway bridge decks, shall be cured by the water method, the forms-in-place method, or, as permitted herein, by the curing compound method, in conformance with the provisions in Section 90-7.01, "Methods of Curing."
- The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only Ordinary Surface Finish is to be applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).
  - The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1).
  - Concrete surfaces of minor structures, as defined in Section 51-1.02, "Minor Structures," shall be cured by the water method, the forms-in-place method or the curing compound method.
  - When deemed necessary by the Engineer during periods of hot weather, water shall be applied to concrete surfaces being cured by the curing compound method or by the forms-in-place method, until the Engineer determines that a cooling effect is no longer required. Application of water for this purpose will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

90-7.04 CURING PRECAST CONCRETE MEMBERS
- Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:
  A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C (50°F), steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C (50°F and 90°F).
  B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
  C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
  D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During
application of the steam, the temperature rise within the enclosure shall not exceed 22°C {40°F} per hour. The curing temperature throughout the enclosure shall not exceed 65°C {150°F} and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.

B. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m (200 feet) of continuous bed length will be required for checking temperature.

F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C {60°F} until the stress is transferred to the concrete.

G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

- Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles with a class designation ending in C (corrosion resistant) shall be cured as follows:

  A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."

  B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

90-7.06 CURING SLOPE PROTECTION

- Concrete slope protection shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."

- Concreted-rock slope protection shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing," or with a blanket of earth kept wet for 72 hours, or by sprinkling with a fine spray of water every 2 hours during the daytime for a period of 3 days.

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

- Exposed surfaces of curbs shall be cured by pigmented curing compounds as specified in Section 90-7.01B, "Curing Compound Method."

- Concrete sidewalks, gutter depressions, island paving, curb ramps, driveways, and other miscellaneous concrete areas shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."

- Shotcrete shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

- Mortar and grout shall be cured by keeping the surface damp for 3 days.

- After placing, the exposed surfaces of sign structure foundations, including pedestal portions, if constructed, shall be cured for at least 72 hours by spraying with water, or
by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

90-8 PROTECTING CONCRETE

90-8.01 GENERAL
- In addition to the provisions in Section 7-1.16, "Contractor's Responsibility for the Work and Materials," the Contractor shall protect concrete as provided in this Section 90-8.
- Concrete shall not be placed on frozen or ice-coated ground or subgrade nor on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.
- Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage.
- Concrete that has been frozen or damaged by other causes, as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

90-8.02 PROTECTING CONCRETE STRUCTURES
- Structure concrete and shotcrete used as structure concrete shall be maintained at a temperature of not less than 7°C (45°F) for 72 hours after placing and at not less than 4°C (40°F) for an additional 4 days. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.

90-8.03 PROTECTING CONCRETE PAVEMENT
- Pavement concrete shall be maintained at a temperature of not less than 4°C (40°F) for 72 hours. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.
- Except as provided in Section 7.1.08, "Public Convenience," the Contractor shall protect concrete pavement against construction and other activities that abrade, scar, discolor, reduce texture depth, lower coefficient of friction, or otherwise damage the surface. Strockpiling, drilling, or excessive spillage of soil, gravel, petroleum products, and concrete or asphalt mixes on the surface of concrete pavement is prohibited unless otherwise specified in these specifications, the special provisions or permitted by the Engineer.
- When ordered by the Engineer or shown on the plans or specified in the special provisions, pavement crossings shall be constructed for the convenience of public traffic. The material and work necessary for the construction of the crossings, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved and if there are no contract items for the work involved, payment for pavement crossings will be made by extra work as provided in Section 4-1.03D, "Extra Work." Where public traffic will be required to cross over the new pavement, Type III portland cement may be used in concrete, if permitted in writing by the Engineer. The pavement may be opened to traffic as soon as the concrete has developed a modulus of rupture of 3.8 MPa. The modulus of rupture will be determined by California Test 523.
- No traffic or Contractor's equipment, except as hereinafter provided, will be permitted on the pavement before a period of 10 days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa. Concrete that fails to attain a modulus of rupture of 3.8 MPa within 10 days shall not be opened to traffic until directed by the Engineer.
- Equipment for sawing weakened plane joints will be permitted on the pavement as specified in Section 40-1.08B, "Weakened Plane Joints."

5/22/2000; Rev. 12/28/2004
Final/Fed
• When requested in writing by the Contractor, the tracks on one side of paving equipment will be permitted on the pavement after a modulus of rupture of 2.4 MPa has been attained, provided that:

A. Unit pressure exerted on the pavement by the paver shall not exceed 135 kPa (20 pounds per square inch);
B. Tracks with cleats, grousers, or similar protuberances shall be modified or shall travel on planks or equivalent protective material, so that the pavement is not damaged; and
C. No part of the track shall be closer than 0.3-m (one foot) from the edge of pavement.

• In case of visible cracking of, or other damage to the pavement, operation of the paving equipment on the pavement shall be immediately discontinued.
• Damage to the pavement resulting from early use of pavement by the Contractor’s equipment as provided above shall be repaired by the Contractor at the Contractor’s expense.
• The State will furnish the molds and machines for testing the concrete for modulus of rupture, and the Contractor, at the Contractor’s expense, shall furnish the material and whatever labor the Engineer may require.

90-9 COMpressive strength
90-9.01 General
• Concrete compressive strength requirements consist of a minimum strength that shall be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified in these specifications or the special provisions or are shown on the plans.
• The compressive strength of concrete will be determined from test cylinders that have been fabricated from concrete sampled in conformance with the requirements of California Test 539. Test cylinders will be molded and initially field cured in conformance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in conformance with the requirements of California Test 521. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding, or testing, that cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.
• When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in conformance with Method 1 of California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.
• When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor’s expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the
State $14 for each in-place cubic meter ($10 for each in-place cubic yard) of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State $20 for each in-place cubic meter ($15 for each in-place cubic yard) of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. Concrete represented by a single test that indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials."

- If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but is 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the requirements in ASTM Designation: C 42.

- No single compressive strength test shall represent more than 250 m³ (325 cubic yards).
- When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.
- When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.
- Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.
- Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa (600 pounds per square inch) greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength.
at the maximum age specified or allowed. Data contained in the report shall be from trial batches that were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances:
  - Tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. Equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures:
  - The certified test data and trial batch test reports shall include the following information:

A. Date of mixing.
B. Mixing equipment and procedures used.
C. The size of batch in cubic meters (cubic yards) and the mass, type, and source of all ingredients used.
D. Penetration of the concrete.
E. The air content of the concrete if an air-entraining admixture is used.
F. The age at time of testing and strength of all concrete cylinders tested.

- Certified test data and trial batch test reports shall be signed by an official of the firm that performed the tests.
- When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.
- After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional prequalification by testing of trial batches will be required prior to making changes that, in the judgment of the Engineer, could result in a strength of concrete below that specified.
- The Contractor's attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.
- When precast concrete members are manufactured at the plant of an established manufacturer of precast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures will not be required.

90-10 MINOR CONCRETE

90-10.01 GENERAL

- Concrete for minor structures, slope paving, curbs, sidewalks and other concrete work, when designated as minor concrete on the plans, in the specifications, or in the contract item, shall conform to the provisions specified herein.
- The Engineer, at the Engineer's discretion, will inspect and test the facilities, materials and methods for producing the concrete to ensure that minor concrete of the quality suitable for use in the work is obtained.

90-10.02 MATERIALS

- Minor concrete shall conform to the following requirements:
90-10.02A Cementitious Material

- Cementitious material shall conform to the provisions in Section 90-1.01, "Description."

90-10.02B Aggregate

- Aggregate shall be clean and free from deleterious coatings, clay balls, roots, and other extraneous materials.
- The Contractor shall submit to the Engineer for approval, a grading of the combined aggregate proposed for use in the minor concrete. After acceptance of the grading, aggregate furnished for minor concrete shall conform to that grading, unless a change is authorized in writing by the Engineer.
- The Engineer may require the Contractor to furnish periodic test reports of the aggregate grading furnished. The maximum size of aggregate used shall be at the option of the Contractor, but in no case shall the maximum size be larger than 37.5 mm (1 1/2-inch) or smaller than 19 mm (3/4-inch).
- The Engineer may waive, in writing, the gradation requirements in this Section 90-10.02B, if, in the Engineer's opinion, the furnishing of the gradation is not necessary for the type or amount of concrete work to be constructed.

90-10.02C Water

- Water used for washing, mixing, and curing shall be free from oil, salts, and other impurities that would discolor or etch the surface or have an adverse affect on the quality of the concrete.

90-10.02D Admixtures

- The use of admixtures shall conform to the provisions in Section 90-4, "Admixtures."

90-10.03 PRODUCTION

- Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as those issued by American Concrete Institute, AASHTO, or the Department.
- The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."
- The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.
- Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32°C (90°F) will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.
• The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.
• The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.
• Each load of ready-mixed concrete shall be accompanied by a weightmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weightmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.
• A Certificate of Compliance conforming to the provisions in Section 6–1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

90-10.04 CURING MINOR CONCRETE
• Curing minor concrete shall conform to the provisions in Section 90-7, "Curing Concrete."

90-10.05 PROTECTING MINOR CONCRETE
• Protecting minor concrete shall conform to the provisions in Section 90-8, "Protecting Concrete," except the concrete shall be maintained at a temperature of not less than 4°C (40°F) for 72 hours after placing.

90-10.06 MEASUREMENT AND PAYMENT
• Minor concrete will be measured and paid for in conformance with the provisions specified in the various sections of these specifications covering concrete construction when minor concrete is specified in the specifications, shown on the plans, or indicated by contract item in the Engineer's Estimate.

90-11 MEASUREMENT AND PAYMENT
90-11.01 MEASUREMENT
• Portland cement concrete will be measured in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.
• When it is provided that concrete will be measured at the mixer, the volume in cubic meters (cubic feet) shall be computed as the total mass of the batch in kilograms (pounds) divided by the density of the concrete in kilograms per cubic meter (pounds per cubic foot). The total mass of the batch shall be calculated as the sum of all materials, including water, entering the batch. The density of the concrete will be determined in conformance with the requirements in California Test 518.

90-11.02 PAYMENT
• Portland cement concrete will be paid for in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.
• Full compensation for furnishing and incorporating admixtures required by these specifications or the special provisions will be considered as included in the contract prices paid for the concrete involved and no additional compensation will be allowed thereafter.
• Should the Engineer order the Contractor to incorporate any admixtures in the concrete when their use is not required by these specifications or the special provisions, furnishing the admixtures and adding them to the concrete will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."
• Should the Contractor use admixtures in conformance with the provisions in Section 90-4.05, "Optional Use of Chemical Admixtures," or Section 90-4.07, "Optional Use of Air-entraining Admixtures," or should the Contractor request and obtain permission to use other admixtures for the Contractor's benefit, the Contractor shall furnish those admixtures and incorporate them into the concrete at the Contractor's expense and no additional compensation will be allowed therefor.
### Los Gatos Creek Bridge on Aldecroft Heights Road

#### Bid Schedule A - Seismic Retrofit

**Name of Bidder:**

**Federal Project Number:** STPLX-5937(033)

**Bid Opening Date:** Thursday, March 8, 2007

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<td>Prepare Water Pollution Control Program</td>
<td>1</td>
<td>LS</td>
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<tr>
<td>3A</td>
<td>Construction Area Signs</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
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<tr>
<td>4A</td>
<td>Traffic Control System</td>
<td>1</td>
<td>LS</td>
<td></td>
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<tr>
<td>5A</td>
<td>Temporary Pavement Marker</td>
<td>40</td>
<td>LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6A</td>
<td>Reconstruct Fence</td>
<td>70</td>
<td>LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7A</td>
<td>Bridge Removal (Portion)</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8A</td>
<td>Clearing and Grubbing</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9A</td>
<td>Structure Excavation (Bridge)</td>
<td>131</td>
<td>CY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10A</td>
<td>Structure Backfill (Bridge)</td>
<td>23</td>
<td>CY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11A</td>
<td>Replace Base and Asphalt Concrete Surfacing</td>
<td>1,085</td>
<td>SQFT</td>
<td></td>
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<tr>
<td>12A</td>
<td>48&quot; Cast-in-Drilled-Hole Concrete Piling</td>
<td>155</td>
<td>LF</td>
<td></td>
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<tr>
<td>13A</td>
<td>Structural Concrete (Bridge)</td>
<td>117</td>
<td>CY</td>
<td></td>
<td></td>
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<tr>
<td>14A</td>
<td>Diaphragm Bolster</td>
<td>8</td>
<td>EA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15A</td>
<td>Abutment Bolster</td>
<td>8</td>
<td>EA</td>
<td></td>
<td></td>
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<tr>
<td>16A</td>
<td>Drill &amp; Bond Dowel</td>
<td>144</td>
<td>LF</td>
<td></td>
<td></td>
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<tr>
<td>17A</td>
<td>Drill &amp; Pressure Grout Bar Reinforcement</td>
<td>54</td>
<td>LF</td>
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<tr>
<td>18A</td>
<td>Core Concrete (9&quot;)</td>
<td>46</td>
<td>LF</td>
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<td>19A</td>
<td>Joint Seal (Type A)</td>
<td>44</td>
<td>LF</td>
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<tr>
<td>20A</td>
<td>Bar Reinforcing Steel (Bridge)</td>
<td>60,308</td>
<td>LB</td>
<td></td>
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</tr>
</tbody>
</table>

**Ratified**
# LOS GATOS CREEK BRIDGE ON ALDERCROFT HEIGHTS ROAD
## BID SCHEDULE A - SEISMIC RETROFIT

**NAME OF BIDDER:**

**FEDERAL PROJECT NUMBRER:** STPLX-5937(033)

**BID OPENING DATE:** THURSDAY, MARCH 8, 2007

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Price ($)</th>
<th>Total ($)</th>
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</thead>
<tbody>
<tr>
<td>21A</td>
<td>F-S COMPOSITE COLUMN CASING</td>
<td>807</td>
<td>SQFT</td>
<td></td>
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<tr>
<td>22A</td>
<td>F-S MISCELLANEOUS METAL (RESTRAINER-PIPE TYPE)</td>
<td>9,967</td>
<td>LBS</td>
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<td></td>
</tr>
<tr>
<td>23A</td>
<td>MOBILIZATION</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
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<tr>
<td>24A</td>
<td>PERMIT REQUIREMENTS</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25A</td>
<td>SUPPLEMENTAL WORK</td>
<td>64,000</td>
<td>EA</td>
<td>1</td>
<td>64,000</td>
</tr>
</tbody>
</table>

Contractor (bidder) shall complete and submit Bid Schedule A and B for its bid to be considered a Responsive Bid. The owner will select for award the lowest BASE BID which is the Combined Lowest Total Bid of Schedule A and Bid Schedule B and otherwise in accordance with the provisions of the Contract Documents.

**SCHEDULE A TOTAL BASE BID PRICE (SUM OF BID ITEMS 1A THROUGH 25A INCLUSIVE):**

**WRITE AMOUNT IN FIGURES AND WORDS**

$ ___________________

DOLLARS

The (F) on the Bid Schedule denotes a “Final Pay Quantity.”

The (S) on the Bid Schedule denotes a “Specialty Item.”
4. LOS GATOS CREEK BRIDGE ON ALDERCROFT HEIGHTS ROAD  
BID SCHEDULE B - RAILING REPLACEMENT

NAME OF BIDDER:

FEDERAL PROJECT NUMBER: STPLX-5937(033)  
BID OPENING DATE: THURSDAY, MARCH 8, 2007

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Price ($)</th>
<th>Total ($)</th>
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<tbody>
<tr>
<td>1B</td>
<td>S CONSTRUCTION AREA SIGNS</td>
<td>1</td>
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<tr>
<td>2B</td>
<td>S TRAFFIC CONTROL SYSTEM</td>
<td>4</td>
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<tr>
<td>3B</td>
<td>TEMPORARY PAVEMENT MARKING (PAINT)</td>
<td>800</td>
<td>SQFT</td>
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<tr>
<td>4B</td>
<td>TEMPORARY YELLOW TRAFFIC STRIPE (PAINT)</td>
<td>852</td>
<td>LF</td>
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<tr>
<td>5B</td>
<td>TEMPORARY WHITE TRAFFIC STRIPE (PAINT)</td>
<td>2015</td>
<td>LF</td>
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<tr>
<td>6B</td>
<td>S TEMPORARY PAVEMENT MARKER</td>
<td>40</td>
<td>LF</td>
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<tr>
<td>7B</td>
<td>S PORTABLE TRAFFIC SIGNAL SYSTEM</td>
<td>1</td>
<td>LS</td>
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<tr>
<td>8B</td>
<td>S PORTABLE CHANGEABLE MESSAGE SIGN</td>
<td>2</td>
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<tr>
<td>9B</td>
<td>TEMPORARY RAILING (TYPE K)</td>
<td>560</td>
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<tr>
<td>10B</td>
<td>REMOVE YELLOW PAINTED TRAFFIC STRIPE</td>
<td>1,140</td>
<td>LF</td>
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<tr>
<td>11B</td>
<td>REMOVE WHITE PAINTED TRAFFIC STRIPE</td>
<td>1,350</td>
<td>LF</td>
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<tr>
<td>12B</td>
<td>S RECONSTRUCT METAL BEAM GUARD RAILING</td>
<td>245</td>
<td>LF</td>
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<tr>
<td>13B</td>
<td>BRIDGE REMOVAL (PORTION)</td>
<td>1</td>
<td>LS</td>
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<tr>
<td>14B</td>
<td>RELOCATE ROADSIDE SIGN</td>
<td>1</td>
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<td></td>
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<tr>
<td>15B</td>
<td>REPLACE OBJECT MARKER</td>
<td>4</td>
<td>EA</td>
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<td></td>
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<tr>
<td>16B</td>
<td>CLEARING AND GRUBBING</td>
<td>1</td>
<td>LS</td>
<td></td>
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<tr>
<td>17B</td>
<td>SLURRY SEAL</td>
<td>16,000</td>
<td>SQFT</td>
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<tr>
<td>18B</td>
<td>F STRUCTURAL CONCRETE (BRIDGE)</td>
<td>31</td>
<td>CY</td>
<td></td>
<td></td>
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<tr>
<td>19B</td>
<td>S DRILL &amp; BOND DOWEL</td>
<td>440</td>
<td>LF</td>
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<tr>
<td>20B</td>
<td>REFINISH BRIDGE DECK</td>
<td>422</td>
<td>SQFT</td>
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</tbody>
</table>
### LOS GATOS CREEK BRIDGE ON ALDERCROFT HEIGHTS ROAD
### BID SCHEDULE B – RAILING REPLACEMENT

#### NAME OF BIDDER:

#### FEDERAL PROJECT NUMBER: STPLX-6937(033)
#### BID OPENING DATE: THURSDAY, MARCH 8, 2007

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Price ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21B</td>
<td>JOINT SEAL (TYPE A)</td>
<td>15</td>
<td>LF</td>
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<td></td>
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<tr>
<td>22B</td>
<td>BAR REINFORCING STEEL (BRIDGE)</td>
<td>14,550</td>
<td>LB</td>
<td></td>
<td></td>
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<tr>
<td>23B</td>
<td>MISCELLANEOUS METAL (BRIDGE)</td>
<td>66</td>
<td>LB</td>
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<td>24B</td>
<td>TUBULAR HAND RAILING (TYPE 25)</td>
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<tr>
<td>25B</td>
<td>CONCRETE BARRIER (TYPE 25)</td>
<td>330</td>
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<td>26B</td>
<td>END SECTION</td>
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<td>EA</td>
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<tr>
<td>27B</td>
<td>TERMINAL SYSTEM (TYPE SRT)</td>
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<td>28B</td>
<td>PAINT YELLOW TRAFFIC STRIPE</td>
<td>570</td>
<td>LF</td>
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<tr>
<td>29B</td>
<td>PAINT WHITE TRAFFIC STRIPE</td>
<td>1,350</td>
<td>LF</td>
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</tr>
<tr>
<td>30B</td>
<td>MOBILIZATION</td>
<td>1</td>
<td>LS</td>
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<tr>
<td>31B</td>
<td>PERMIT REQUIREMENTS</td>
<td>1</td>
<td>LS</td>
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<tr>
<td>32B</td>
<td>SUPPLEMENTAL WORK</td>
<td>36,000</td>
<td>EA</td>
<td>1</td>
<td>36,000</td>
</tr>
</tbody>
</table>

Contractor (bidder) shall complete and submit Bid Schedule A and B for its bid to be considered a Responsive Bid. The owner will select for award the lowest BASE BID which is the Combined Lowest Total Bid of Schedule A and Bid Schedule B and otherwise in accordance with the provisions of the Contract Documents.

**SCHEDULE B TOTAL BASE BID PRICE (SUM OF BID ITEMS 1B THROUGH 32B INCLUSIVE):**

WRITE AMOUNT IN FIGURES AND WORDS

$_____________ DOLLARS

The (F) on the Bid Schedule denotes a “Final Pay Quantity.”
The (S) on the Bid Schedule denotes a “Specialty Item.”

112- 2 d
4. **BID SCHEDULE**
LOS GATOS CREEK BRIDGE ON ALDERCROFT HEIGHTS ROAD

**NAME OF BIDDER:**

**BID SUMMARY**

TOTAL BID SCHEDULE A: $______________________

TOTAL BID SCHEDULE B: $______________________

**WRITE AMOUNT IN FIGURES AND WORDS**

TOTAL BASE BID SCHEDULES A + B: $______________________

(TOTAL BASE BID SCHEDULES A + B)

DOLLARS

Contractor (bidder) shall complete and submit Bid Schedule A and B for its bid to be considered a Responsive Bid. The owner will select for award the lowest BASE BID which is the Combined Lowest Total Bid of Schedule A and Bid Schedule B and otherwise in accordance with the provisions of the Contract Documents.
BID FORM 5 - EQUAL OPPORTUNITY REQUIREMENTS

In connection with the performance of Work under this Contract, the Contractor agrees as follows:

1. The County of Santa Clara is an equal opportunity employer. Contractor shall comply with all applicable federal, state, and local laws and regulations including Santa Clara County's equal opportunity requirements. Such laws include but are not limited to the following:

   - Title VII of the Civil Rights Act of 1964 as amended;
   - Americans with Disabilities Act of 1990;
   - The Rehabilitation Act of 1973 (sections 503 and 504);
   - California Fair Employment and Housing Act (Government Code sections 12900 et seq.);
   - California Labor Code sections 1101 and 1102.

Contractor shall not discriminate against any Subcontractor, employee, or applicant for employment because of age, race, color, national origin, ancestry, religion, sex/gender, sexual orientation, mental disability, physical disability, medical condition, political beliefs, organizational affiliations, or marital status in the recruitment, selection for training including apprenticeship, hiring, employment, utilization, promotion, layoff, rates of pay or other forms of compensation. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the awarding authority setting forth these requirements.

2. The Contractor herein certifies that:

   Paragraph 1 set forth above shall be included in all subcontracts.

   The Contractor shall notify all employees and all sources of employee referrals (including unions, employment agencies, advertisements, department of employment) of the required compliance with Paragraph 1 above.

The undersigned, in submitting Bid for performing the following Work by Contract, hereby certifies that it will comply with the Equal Opportunity Requirements.

<table>
<thead>
<tr>
<th>BIDDER'S SIGNATURE:</th>
<th>DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>BIDDER'S NAME (PRINT):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TITLE (PRINT):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

5/22/2000
Formal/Fed

112-9
BID FORM 6 - NONCOLLUSION AFFIDAVIT

In accordance with Title 23 United States Code, Section 112, and Public Contract Code §7106, ________, being first duly sworn, deposes and says that he

(Bidder's full name)  of  (Company's name)

or she is ________, ________, the party making the foregoing Bid that the Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham Bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham Bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the Bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the Bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the Bid are true; and, further, that the Bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham Bid.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

BIDDER'S SIGNATURE: ______________________________ DATE: ________________

BIDDER'S NAME (PRINT): ______________________________

TITLE (PRINT): ______________________________

NOTE:  
• If this Affidavit is signed outside of the State of California, a notarized acknowledgement is required.

5/22/2000
Formal/Fed
BID FORM 14 - CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

I, ____________________________________________, hereby certify on behalf of ____________________________________________ that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL "Disclosure Form to Report Lobbying" (See Contract Form 7) in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance is placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by the provisions of Title 31 U.S. Code Section 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

<table>
<thead>
<tr>
<th>BIDDER'S SIGNATURE:</th>
<th>DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIDDER'S NAME (PRINT):</td>
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<tr>
<td>TITLE (PRINT):</td>
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5/22/2000; Rev 04/14/2006
Formal/Fed 112-19