# INVITATION FOR BID NO. 930 CONSTRUCTION DOCUMENTS

FOR

# BUILDING NO. 6 B6 SEISMIC UPGRADE PROJECT

**PROJECT MANUAL** 

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY BERKELEY, CALIFORNIA

December 2007

#### SECTION 00005

#### CERTIFICATIONS

#### Note to Specifier: A/E's affix stamp and wet sign in the spaces provided.



# END OF SECTION

# SECTION 00007

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#### SECTION 01010

#### GENERAL REQUIREMENTS

#### PART 1: GENERAL

#### 1.01 INTENT AND ARRANGEMENT OF DOCUMENTS

- A. THESE SPECIFICATIONS AND DRAWINGS are intended to include everything necessary to perform the entire work properly. Every item necessarily required may not be specifically mentioned or shown. Unless expressly stated, all systems and equipment shall be complete and operable.
- B. TITLES AND HEADINGS to Divisions, Sections and paragraphs in these Subcontract documents are introduced for convenience and shall not be taken as a correct or complete segregation of the several units of materials and labor. No responsibility either direct or implied is assumed by the University or the Project Manager for omissions or duplications by the Subcontractor or the Subcontractor's SubSubcontractors, due to real or alleged error in arrangement of matter in the Subcontract documents.
- C. THE TERMS of the Agreement, General Provision for Fixed Price Construction and General Requirements apply to each Division of these Specifications as fully as if repeated within that Division.
- D. ITEMS LISTED under Scope of Work for each Division of the Specifications are not necessarily all inclusive. The Subcontractor shall be responsible for the complete job.
- E. PORTIONS OF THESE Specifications are of the abbreviated, simplified type and may include incomplete sentences.
  - 1. Omissions of words or phrases such as *the Subcontractor shall, in conformity with, shall be, as noted on the drawings, in accordance with details, a, the* and *all,* are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a *note* occurs on the drawings.
  - 2. Such terms as *approved*, *reviewed*, *equal*, *as directed*, *as required*, *as permitted*, *acceptable*, *satisfactory* mean by or to the Architect-Engineer or Project Manager.

- 1.02 DEFINITIONS AND STATUS OF INDIVIDUALS: The terms defined in the agreement, general conditions, and general provision for fixed price construction shall apply throughout. Certain additional terms and refinements shall apply as specified below:
  - A. Subcontractor: The term "Subcontractor" shall mean the person or firm responsible for the execution of this Subcontract, or any portion thereof. This shall include the General or Prime Subcontractor, all SubSubcontractors and any suppliers. Subcontractor usually refers to the particular contractor concerned with the Section in which the term is found, but this in no way relieves the General Subcontractor of its sole responsibility for completing the entire work of this Subcontract.

The Subcontractor shall complete the work in accordance with the Subcontract Documents, approved submittals that comply with the Subcontract Documents, and any clarifications or instructions issued by the Project Manager. The Subcontractor shall not be relieved of any responsibility to comply with such requirements by the activities of the Architect-Engineer or the Project Manager.

B. Architect-Engineer: The term "Architect-Engineer" is the person or firm designated as the responsible design professional. The Architect-Engineer shall interpret and clarify the intent of the construction Subcontract Documents, will participate with the University in determining the acceptability of workmanship, materials and the progress of the work and entitlement to payment. The Architect-Engineer will review proposed changes, substitutions, shop drawings and schedules submitted by the Subcontractor for approval as required by the Subcontract Documents. The Architect-Engineer shall have access to the work at all times and the authority to recommend that the University not accept any work or materials deemed not to conform to the requirements of the Subcontract. The Architect-Engineer for the University is:

Company:	Forell/Elsesser
Address:	San Francisco, CA

C. Project Manager: During the Construction Phase, all submittals and communications with the Architect-Engineer shall be through the University's "Project Manager". The Project Manager will administer the technical requirements of the Subcontract and will coordinate the inspection of the work. All professional design responsibility matters will be determined by the Architect-Engineer.

<u>The Project Manager for the University is:</u> Jack Heffernan, Project Manager Lawrence Berkeley National Laboratory 1 Cyclotron Road, Mailstop 90J0120 Berkeley, California 94720 (510) 486-5993 D. Subcontract Administrator: The "Subcontract Administrator" is the University's representative responsible for administering the business and contractual requirements of the Subcontract. The Subcontract Administrator participates in change order negotiations and is the University's representative authorized to effect binding formal changes to the Subcontract as required:

The Subcontract Administrator for the University is:

Rose Hoffman, Subcontract Administrator Lawrence Berkeley National Laboratory 1 Cyclotron Road, Mailstop 69R0201 Berkeley, California 94720 (510) 486-7705

#### 1.03 CODES

- A. Applicable provisions of Public Law 91-54, the Constitution and Laws of the State of California and the codes and regulations of the Department of Energy are hereby referred to and made a part of this Subcontract and all work performed shall be in accordance with such laws, regulations and the latest edition or supplement or amendment thereto in effect at the time of submittal of bid shall be considered to be the issue in effect (unless shown otherwise) of all applicable codes including, but not limited to:
  - 1. California Building Code (CBC)
  - 2. California Electrical Code, (CEC)
  - 3. California Mechanical Code (CMC)
  - 4. California Plumbing Code (CPC)
  - 5. California Energy Code (CEC)
  - 6. California Fire Code (CFC)
  - 7. NFPA 70 National Electrical Code
  - 8. General Services Administration 41 CFR Part 101-19
  - 9. Americans with Disabilities Act (ADA)
  - 10. Energy Conservation Performance Standards, 10 Code of Federal Regulations (CFR), Part 435 (Mandatory for Federal Buildings)
  - 11. Codes and Standards listed in Section 01020, Environment, Safety and Health General Requirements, Paragraph 1.02, Codes and Standards

- B. Where codes or standard specifications other than those listed in this paragraph are referred to in the different Divisions of these specifications, it is understood that they apply as fully as if cited here.
- C. Where differences exist between codes affecting this work, the code affording the greatest protection to the University shall govern.
- D. If the Subcontractor observes that these drawings and specifications are at variance with the codes, the Subcontractor shall notify the Project Manager in writing at once for resolution in writing.
- E. Pursuant to Labor Code 6707, the Subcontractor shall include in its base bid all costs incidental to the provision of adequate sheeting, shoring, bracing or equivalent method for the protection of life or limb, which shall conform to applicable Federal and State safety orders.
- F. Maintenance clearances shall be maintained around equipment as required by the Codes and Standards, and as recommended by the equipment manufacturers. The maintenance envelope and equipment access shall be kept clear of any obstruction. It is Subcontractor's responsibility to enforce these requirements with all the Subsubcontractors. The Subcontractor and Subsubcontractors shall be responsible for correcting any infringement on this requirement at no cost to the University.

## 1.04 CONSTRUCTION LIMITS

A. The area to be set aside for the work under this Subcontract is shown on the drawings, and the Subcontractor shall confine the construction to the immediate area within the construction limits.

#### 1.05 PARKING - THE USE OF ROADS - SITE ACCESS

- A. PARKING: Parking for private vehicles is limited. Parking for Subcontractors and their workers will be limited to the construction limits and as agreed with the Project Manager. During periods of under utilization, Ernest Orlando Lawrence Berkeley National Laboratory (Berkeley Lab, LBNL) personnel will be allowed to use subcontractor spaces. Parking regulations will be strictly enforced and all parking violations are subject to citation by the University Police.
- B. USE OF ROADS: The Subcontractor may use certain University roads as designated by the University for transportation of equipment, materials, workers, or other needs related to the work of this Subcontract. The Subcontractor shall be responsible for all damage to roads, curbs, gutters, fences, guard rails and other property resulting from Subcontractor use of the roads, and shall repair all damage resulting from such use.
- C. SITE ACCESS: Heavy and slow moving trucking will not be permitted to the Berkeley Lab (University) from the top of Hearst Avenue or on Centennial Drive between 7:00 a.m. and 8:30 a.m. Trucks attempting to enter the University during this period shall be denied access.

D. Permission for access to the site may be revoked for any and all persons who violate the University traffic regulations including speed limits, parking restrictions and directions of the University police. All of the Subcontractor's personnel, operating forces, and delivery personnel shall be made aware of and shall comply at all times with traffic regulations.

#### 1.06 WORKING HOURS

- A. Unless otherwise noted, construction operations can occur around-theclock, during three each four-week Building 6 shut-down periods, occurring between May and July of 2008, 2009 and 2010.
- B. Compliance is required with the City of Berkeley Noise Ordinance as follows:

<u>Days</u>	<u>Times</u>	<u>Maximum</u>
		Decibels Level
Monday - Friday	7:00 am to 7:00 pm	80
Saturday, Sunday, & Holidays	9:00 am to 8:00 pm	65

#### 1.07 COORDINATION OF WORK

- A. The Subcontractor shall coordinate and schedule the work of all its SubSubcontractors, and shall furnish all information required by them for proper scheduling and execution of the work.
- B. In the same manner, the Subcontractor shall coordinate the work with that of the University, and any other Subcontractor operating in the area, including reasonable adjustments of schedule in order to allow other Subcontractors or the University to do their work.
- C. The University shall have the right to make final and binding decisions on disputes between the Subcontractor and any other Subcontractor operating in the area regarding: (a) access to the site with work force, equipment, and/or materials to their work area or (b) their adjacent work areas.
- D. The Subcontractor shall immediately inform the Project Manager of the name of the person(s) designated as Superintendent representing the Subcontractor at the site. Once assigned, the Superintendent cannot be changed without the consent of the Project Manager.
- 1.08 INFORMATION TRANSMITTAL: THE SUBCONTRACTOR SHALL SUBMIT TO THE PROJECT MANAGER THE INFORMATION AND DOCUMENTS AS DESCRIBED IN PARAGRAPHS A THROUGH I.

- A. LIST OF SUB-SUBCONTRACTORS: Within ten (10) calendar days following the Date of Notice to Proceed, the Subcontractor shall submit a list of all SubSubcontractors shown in the submitted bid documents for approval by the Project Manager. This list shall include the telephone numbers, addresses, license number, class, and portion of work to be accomplished.
  - 1. Minority Subcontractor/SubSubcontractor Listing

Within ten (10) calendar days following the Date of Notice to Proceed the prime Subcontractor shall provide the University with the name of each minority SubSubcontractor who will perform work or labor or render services to the prime Subcontractor in or about the construction of the work, or who will specially fabricate and install a portion of the work regardless of Subcontract dollar value and Subcontract tier. See Exhibit A "Minority Subcontractor/SubSubcontractor Listing (end of Section 01010).

- a. When the prime Subcontractor is a minority the appropriate entries must be included on Exhibit A.
- b. During the course of construction should Subcontracts be entered into with minorities not listed on the original submittal of Exhibit A, an additional Exhibit A must be completed and submitted to the University.
- c. The term "minority Subcontractor or SubSubcontractor" means a firm, at least 51 percent of which is owned by minority group members, or, in case of publicly owned firms, at least 51 percent of the stock of which is owned by minority group members. For the purpose of this definition, minority group members are Black (not of Hispanic origin), Hispanic, Asian, Pacific Islander, American Indian or Alaskan Native person. Firms with the above ownership ratios of women Subcontractors/SubSubcontractor shall be defined as women's Subcontractor/SubSubcontractor firms.
- d. The prime Subcontractor shall rely upon the representation by SubSubcontractor regarding their status as minority firms in lieu of independent investigations.
- e. Before the substitution of any SubSubcontractor listed in the bid form, the Subcontractor shall obtain the consent of the Regents of the University as required by law.

# B. COST BREAKDOWN:

### 1. PROGRESS PAYMENTS

a. Within ten (10) calendar days following the Date of Notice to Proceed, the Subcontractor shall submit a segregation of the Subcontract price itemizing the estimated cost of each class of work. Each item shall include a pro rata allowance for profit and overhead expense. Insurance and bond expense shall not be prorated but should be shown as separate items. The total of the items shall equal the Subcontract price. This segregation, when accepted by the Project Manager, shall become the basis for determining progress payments.

# C. SCHEDULE OF OPERATIONS

# 1. GENERAL

- a. The Subcontractor shall, within 2 calendar days after the effective date of Notice to Proceed, provide three copies of a preliminary construction progress schedule covering Subcontractor operations for the first 15 calendar days. The preliminary progress schedule shall be a bar graph or an arrow diagram showing the times the Subcontractor intends to commence and complete the various work stages, with operations and contract items planned to start during the first 45 calendar days.
- Within 5 calendar days after the effective date of Notice to Proceed, the Subcontractor shall provide three copies of a bar chart or critical path method (CPM) network diagram as specified in Section 01210, paragraph 3.04 - CPM Network Diagram. The diagram shall show the order in which the Subcontractor proposes to accomplish the work.
- c. The CPM network diagram will show interdependence and duration, along with installation man hours by craft of each activity. Any work element longer than 3 days shall be broken down into component parts. The critical path and float for each activity shall also be shown. The diagram or bar chart shall be neatly lettered and legibly drawn to a time scale.
- d. After the initial submittal, the Subcontractor shall update the schedule monthly by entering actual progress for the period and submit five copies as part of the monthly progress payment request.
- e. Formal requests for utility shutdowns shall be in accordance with Section 01210, Paragraph 1.07 -

SHUTDOWN, and shall state the maximum duration of the shutdown.

- 2. DETERMINATION AND EXTENSION OF SUBCONTRACT TIME
  - a. The number of calendar days allowed for completion of work included in the Subcontract is stated in the proposal and Subcontract and shall be known as "Contract Time."
  - b. No changes shall be made to scheduled completion date(s) without prior approval by the Project Manager. Extensions of time to the Subcontract can only be made by formal change order/modification.
  - The Subcontractor shall submit to the Project Manager c. such justification, data, and other supporting evidence necessary for a determination as to whether or not the Subcontractor is entitled to an adjustment in completion date under the Subcontract. If the Subcontractor fails to submit sufficient evidence in support of the request, the Project Manager shall so inform the Subcontractor in writing. The Subcontractor may either submit additional evidence that, in the opinion of the Project Manager, is sufficient to determine the validity of the request, or elect to have the Project Manager base the decision on the evidence previously submitted. The Subcontractor may not request or be given an adjustment in Subcontract time or any additional compensation for any delays if the Subcontractor fails to submit sufficient evidence to the Project Manager in support of this request in a timely fashion.
  - d. The Subcontractor shall submit to the Project Manager evidence in support of its time extension request based on revised activity duration, shown on the schedule. This schedule shall include or be accompanied by a sketch showing all revisions and duration changes, for the work in question and its relationship to other activities on the approved arrow diagram. The schedule must clearly display that the Subcontractor has used, in full, all the float time available for the work involved in the request, or the Project Manager shall not grant the request. As used in this provision, the term "float time" means the amount of time that an activity can be delayed without affecting the date for completing remaining Subcontract work.

The adjustment in contract time, if any, will be made at the e. sole discretion of the Project Manager, and will be based upon an evaluation of the current calendar-dated schedule in effect at the time of the alleged delay, the supporting evidence submitted by the Subcontractor, and any other available information deemed relevant by the Project Manager. Actual delays in activities that do not affect the extended and predicted Subcontract completion (shown by the critical path in the network) will not be the basis for a change in the Subcontract completion date. If the Project Manager grants a date adjustment, the date, as adjusted, shall be in full force and effect thereafter as though it were the original Subcontract time. The adjusted date also shall be included in the data through the next monthly updating of the diagram and schedule.

# D. MATERIALS AND EQUIPMENT

- 1. The Subcontractor shall submit a complete list of all materials and equipment to be incorporated in the work. Unless a specific time limit for this submittal is established in the Special Provisions of these Specifications, this shall be done with such promptness as not to cause delay to the work.
- 2. All material and equipment shall be new and within one year of manufacture. No rebuilt, refurbished, remanufactured or used equipment and material shall be installed under this project.

#### 3. SPECIFIED ITEMS - SUBSTITUTES

- a. Wherever catalog numbers and specific or trade names followed by the designation "or equal" are used in conjunction with a designated material, product, thing, or service mentioned in these Specifications, they are used to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified will be approved, subject to the following provisions:
  - (1) All Substitutions must be accepted by the Architect-Engineer in writing. For this purpose, the Subcontractor shall submit to the Project Manager, within 3 calendar days after the date of Commencement specified in the Notice to Proceed, a typewritten list containing a description of each proposed substitute item or material. The Project Manager may increase the submittal period beyond 3 calendar days if the schedule allows. Sufficient

data, drawings, samples, literature or other detailed information as will demonstrate to the Architect-Engineer that the proposed substitute is equal in quality, utility, and appearance to the material specified shall be appended to this list. The Architect-Engineer will accept, in writing, such proposed substitutions as are in his or her opinion, equal in quality, utility, and appearance to the items or materials specified. Such acceptance shall not relieve the Subcontractor from complying with the requirements of the drawings and specifications, and the Subcontractor shall be responsible at Subcontractor's own expense for any changes resulting from Subcontractor proposed substitutions which affect the other parts of Subcontractor's own work or the work of others.

- (2) Failure of the Subcontractor to submit proposed substitutions for approval in the manner described above and within the time prescribed shall be sufficient cause for disapproval by the Architect-Engineer of any substitutions otherwise proposed.
- (3) If specified items are listed in the following format or similar format:

"First manufacturer and model number, equivalent second manufacturer or second manufacturer, or equal" the Subcontractor wishing to submit any "equivalent names manufacturer" shall do so in accordance with this SPECIFIED ITEMS-SUBSTITUTES provision.

- b. Wherever catalog numbers and specific brands or trade names are not followed by the designation "or equal" or used in conjunction with a designated material, product, thing or service mentioned in these specifications, no substitution will be approved.
- c. On Subcontracts with a short performance time, the 35 day submittal period does not excuse the Subcontractor from completing the project within the performance time stipulated in the agreement or excuse the Subcontractor from the payment of liquidated damages if completion is late.

- E. SUBMITTALS: Shop drawings and submittal data consisting of brochures, catalogs, material lists, samples, and letters requesting review of materials or substitutions by the Subcontractor shall be submitted for review as follows:
  - 1. General
    - a. When required by the technical specifications, the Subcontractor shall submit five (5) prints of all shop drawings, erection drawings, and equipment layouts, and seven (7) copies of all vendor data for review by the Architect-Engineer. Submittals shall be processed with such promptness as not to cause delay to the work or to that of any other Subcontractor.
    - b. The Subcontractor shall be responsible for and shall check the correctness of all documents including those SubSubcontractors prior to submitting them to the Project Manager for review.
    - c. The Project Manager will review, and process shop drawings and other required submittals with reasonable promptness. No delay will be allowed in the progress of the job attributable to Subcontractor's failure to make required submittals within a reasonable length of time.
    - d. The Architect-Engineer's favorable review of shop drawings and other submittals shall not relieve the Subcontractor of responsibility for deviations from drawings or specifications, unless the Subcontractor has in writing called the Architect-Engineer's attention to such deviations at the time of submission, and the Architect-Engineer has acknowledged in writing such deviations; nor shall it relieve the Subcontractor from responsibility for errors of any sort in such drawings.
    - e. If deviations, discrepancies, or conflicts between shop drawing submittals and the drawings and specifications are discovered either prior to or after the shop drawing submittals are reviewed by the Architect-Engineer, the drawings and specifications shall control and shall be followed.
    - f. The Subcontractor shall furnish prints of the favorably reviewed final shop drawings, erection drawings, equipment layouts and vendor data to Subcontractors and suppliers for the proper coordination of their work. The Subcontractor shall keep one (1) complete set of the above documents at the job site for the use of the University and the Architect-Engineer.
  - 2. Procedure

- a. Shop drawings and submittal data shall be submitted in accordance with technical specifications and as directed by the Project Manager. Each submittal shall be provided together with a transmittal letter or form. Each original transmittal shall be assigned a transmittal number. The number shall begin with the first initial of the name of the Subcontractor's firm followed by a serial number. The resubmittals shall indicate the same number with numerical suffix in sequence. Each transmittal shall itemize the enclosures and indicate the distribution of the transmittal and the enclosures.
- 3. Shop Drawings
  - a. The Project Manager will return the marked and stamped drawings together with transmittal letter or form to Subcontractor. If resubmittal is required, the Architect-Engineer will so note and Subcontractor shall make another submission for review after correction resolving the review comments on the prior submittals.
  - b. The above procedure shall be repeated until the submittal is favorably reviewed by the Architect-Engineer.
  - c. The Subcontractor, upon receipt of the favorably reviewed drawings, shall provide and transmit copies to the SubSubcontractor and/or materials supplier as required, prior to proceeding with the work on the jobsite.
  - d. Prior to completion of the entire project, Subcontractor shall submit one print of favorably reviewed shop drawings to the Project Manager for record.
- 4. Data: Product Data consisting of brochures, catalogs, material lists, letters, manufacturer's installation instructions, etc. shall be submitted as described under Paragraph 1.09.D-Materials and Equipment, specific requirements of the Sections of the technical specifications, and as directed by the Project Manager. Items for use on this project shall be clearly indicated. Information which is not pertinent shall be voided.
  - a. The Subcontractor shall transmit five (5) copies to the Project Manager.
  - b. The Project Manager will return one (1) stamped copy to the Subcontractor together with transmittal letter/form to Subcontractor. If resubmittal is required, the Architect-Engineer will so identify, and the Subcontractor shall make another submission for review.
  - c. The above procedure shall be repeated until the submittal is favorably reviewed by the Architect-Engineer.

- d. The Subcontractor, upon receipt of the favorably reviewed submittal data, shall provide and transmit the data to the SubSubcontractor and/or material supplier as required prior to proceeding with the work on the jobsite.
- e. Prior to completion of the entire project, the Subcontractor shall submit one copy of favorably reviewed product data to the Project Manager for record.

#### F. RECORD DRAWINGS

- 1. Maintain at the site a complete, precise, accurate dimensioned record of actual locations of the work, including concealed and embedded work, size and type of equipment, and every change or deviation from original Subcontract Drawings. Keep this record legible and correct weekly as the job progresses on black or blueline prints. Keep Record Drawings available for inspection at all times. Drawings will be inspected before approval of requests for payment.
- 2. It shall be the responsibility of the Subcontractor to submit to the Project Manager within ten (10) days after final inspection, one complete marked-up set of Subcontract drawings fully illustrating all revisions made by all the crafts in the course of the work. This shall include all field changes, adjustments, variances, substitutions and deletions, whether covered by Change Order or not. Underground utility installations must be located precisely as constructed on the marked-up drawings. Drawings will be furnished by the University.

#### G. OPERATION AND MAINTENANCE DATA

- 1. Submit data bound in 8-1/2 x 11 inch (A4) text pages, [three D side ring] binders with durable covers.
- 2. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- 3. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- 4. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 20 pound white paper, in three parts as follows:
  - a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

- b. Part 2: Operation and maintenance instructions will be arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
  - (1) Significant design criteria.
  - (2) List of equipment (including assigned equipment numbers).
  - (3) Parts list for each component.
  - (4) Operating instructions.
  - (5) Maintenance instructions for equipment and systems.
  - (6) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - c. Part 3: Project documents and certificates, including the following:
  - (1) Product data.
  - (2) Air and water balance reports.
  - (3) Certificates.
  - (4) Photocopies of warranties.
- 5. Submit 1 draft copy of completed volumes 15 days after approval of applicable submittal or receipt of the product. This copy will be reviewed and returned with Berkeley Lab comments. Revise content of all document sets as required prior to final submission.
- 6. Submit two sets of revised final volumes, within ten (10) days after final inspection.

#### H. GUARANTEE

- 1. All work shall be guaranteed for one (1) year from the date of acceptance against all defects in material, equipment and workmanship. When required by the specifications, guarantees for specific items shall be for periods longer than one (1) year. All guarantees shall be in the following form on the Subcontractor's own letterhead.
- 2. Guarantee form:

GUARANTEE FOR

We hereby guarantee\_

which we have constructed at the University of California Lawrence Berkeley National Laboratory, Berkeley, California. We agree to repair or replace any or all of our work together with any other adjacent work which may be replaced by so doing, that may prove to be defective in its workmanship or materials within a period of \_\_\_\_\_\_ from date of acceptance of above-named structure by the Regents of the University of California, without any expense whatsoever to said Regents of the University of California, ordinary wear and tear and unusual abuse or neglect excepted. In the event of our failure to comply with abovementioned conditions within thirty (30) days after being notified in writing by the Regents of the University of California, we, collectively or separately, do hereby authorize the Regents of the University of California to have said defects repaired and made good at our expense, and we will honor and pay the costs and charges therefore upon demand.

Signed\_

(SubSubcontractor)

Countersigned\_\_\_\_\_

(Subcontractor)

- 1.10 FINAL ACCEPTANCE
  - A. Notice that the work is ready for final inspection and acceptance shall consist of a written notice issued to the Project Manager by the Subcontractor stating that the Subcontractor has carefully inspected all portions of the work, has reviewed in detail the drawings and specifications, and that to the best of the Subcontractor's knowledge all conditions of the Subcontract documents have been fulfilled.
  - B. Upon receipt of this notice, the Project Manager and the Subcontractor shall make a joint inspection of the work. After deficiencies, if any have been corrected or accounted for, and after all work is satisfactorily complete, the University will accept the work; and Notice of Completion will be filed by the University.
  - C. Prior to final acceptance, filing of the Notice of Completion or processing of final payment, the following documents shall be submitted, reviewed and accepted by the University and the Architect-Engineer:
    - 1. Certificates of compliance and guarantees required under various Sections.
    - 2. Record Drawings: Per Paragraph 1.09 G.
    - 3. Operating and maintenance manuals.

- 4. Instruction of University personnel, as required.
- 5. All required operations tests.
- 1.11 PRIORITIES, ALLOCATIONS AND ALLOTMENTS
  - A. The Subcontractor shall follow the provisions of DMS Regulation 1 and all other applicable regulations and orders of the Domestic and International Business Administration, Department of Commerce, in obtaining controlled materials and other products and materials needed to complete this Subcontract.

#### 1.12 SUBCONTRACTOR'S LICENSE

- A. Specialty contractors bidding as prime contractors must comply with Business and Professions Code 7059. If a specialty contractor submits a prime bid covering the performance of work involving two or more specialized building trades or crafts, which "other" work is more than incidental and supplemental to the performance of construction for which the prime bidder holds a specialty license, the prime bidder must also hold either (1) specialty licenses in each craft or trade which is more than incidental to the construction to be performed, or (2) an "A" General Engineering License or (3) a "B" General Building License. The foregoing rule is applicable whether or not the prime bidder lists licensed specialty contractors for such "other" work.
- B. All work involving fire sprinkler systems shall be performed by a contractor possessing a valid State of California C-16 License.

#### 1.13 CHANGE ORDERS

- A. In connection with change orders under this Subcontract, not covered by unit price or alternate bids, the University will use the following formula for approval unless it determines that such amounts would not be acceptable. All estimates must be itemized to show the separate costs of labor and materials and other costs as described below for each item of work.
- B. For work performed by the Subcontractor, the estimated cost of the work which includes the direct cost of labor, materials, supplies and transportation plus 15% of such estimated costs for overhead and profit to which shall be added payroll taxes, sales tax, applicable insurance and bond costs.
- C. For work performed by a first tier Subcontractor of the Subcontractor, the basis shall be as established in the preceding paragraph to which the Subcontractor may add 5% to such estimated costs plus any applicable bond or applicable insurance charges.
- D. For work performed by a second tier Subcontractor of the Subcontractor, the basis for payment shall be as for a first tier Subcontractor except that the first tier Subcontractor may add 5% of the second tier Subcontractor's total estimated costs as overhead and profit and the Subcontractor may add 5% to the preceding estimated costs. No increases for overhead and profit

will be allowed above the 15% and 5% and 5% herein provided regardless of the number of tiers of Subcontractors involved.

E. For deletions not covered by unit prices or alternate bids, the Subcontractor agrees that the University shall be credited with the estimated cost of the labor, materials, supplies, transportation, payroll taxes, sales taxes, insurance, bond costs, overhead and profit that would have been incurred in connection with the work omitted had it not been omitted.

## PART 2: PRODUCTS

Not used.

PART 3: EXECUTION

Not used.

#### **END OF SECTION 01010**

## SECTION 01020

### ENVIRONMENT, SAFETY, AND HEALTH GENERAL REQUIREMENTS

#### PART 1: GENERAL

#### 1.01 WORK INCLUDED

A. Subcontractor shall provide in the performance of the work under this subcontract all labor, materials, equipment, services and supervision required to maintain work sites that meet the environment, safety and health (ES&H) requirements of all applicable federal, state, local and LBNL regulations and protect the environment and the safety and health of its employees, the employees of its lower tier subcontractors, LBNL employees and the general public.

#### 1.02 CODES AND STANDARDS

- A. Subcontractors shall comply with the requirements of the following:
  - 1. 10 CFR 851, Worker Safety and Health Program
  - 2. Occupational Safety and Health Act (OSHA)
  - 3. 29 CFR Part 1910, Occupational Safety and Health Standards, Department of Labor
  - 4. 29 CFR Part 1926, Safety and Health Regulations for Construction, Department of Labor
  - 5. California Fire Code (CFC)
  - 6. National Electrical Safety Code, ANSI C2
  - 7. National Fire Protection Association (NFPA) 70E 2004, Standards for Electrical Safety in the Workplace
  - Lawrence Berkeley National Laboratory's Health and Safety Manual, PUB 3000 (<u>http://www.lbl.gov/ehs/pub3000/pub3000c.html</u>) – in particular, Chapter 10, Construction Safety
  - 9. California Code of Regulations Title 8, Industrial Safety; Title 17, Air Resources; Title 19, Public Safety; Title 22, Hazardous Waste; Title 23, Hazardous Materials
  - 10. 40 CFR Parts 763, Environmental Protection Agency

- 11. 40CFR Parts 122 through 125, Protection of Environment
- 12. Clean Air Act
- 13. Clean Water Act
- 14. Resource Conservation and Recovery Act
- 15. Toxic substances Control Act
- 16. Bay Area Air Quality Management District (BAAQMD) Rules, Regulations, and Manual of Procedures, including CEQA Guidelines.
- 17. California Department of Health Services (DHS)
- 18. State and Regional Water Quality Control Boards
- 19. East Bay Municipal Utility District (EBMUD) Ordinances
- 20. NFPA 51B, *Fire Prevention During Welding, Cutting, and Other Hot Work* (2003 edition)
- 21. NFPA 241, Safeguarding Construction, Alteration, and Demolition Operations (2004 edition)
- B. In case of conflict or overlap of the above references, the most stringent provision shall apply.
- 1.03 SUBCONTRACTOR ONSITE HEALTH AND SAFETY PROFESSIONAL AND ALTERNATE SITE HEALTH AND SAFETY REPRESENTATIVE
  - A. The Subcontractor shall provide a qualified onsite Health and Safety Representative with the authority to enforce all the safety requirements of this subcontract and implement the Subcontractor's Injury and Illness Prevention Program.
  - B. Subcontractor shall submit the following documentation, for review and acceptance by the LBNL Project Manager, in support of the proposed safety representative.
    - Resume detailing work experience and safety responsibilities on projects similar in scope to this subcontract.
    - OSHA 30 hour training certification, current within 3 years.
    - Proof of Competent Person or Qualified Person Status attained by the proposed safety representative.
  - C. The safety representative must provide a full-time, <u>continuous</u> presence, conduct routine inspections, oversee all work activities,

including activities involving unique hazards (i.e., critical lifts, lead and asbestos abatement, excavations, etc.) If the safety representative is not qualified to conduct the inspection and monitoring requirements associated with specialized activities (such as work defined in LBNL Facilities Master Specifications, Sections 13281 and 13282), the subcontractor will engage the services of a qualified professional (i.e., a certified industrial hygienist) to perform the specialized duties.

- D. Subcontractor shall submit the following documentation, for review and acceptance by the University, in support of the proposed Certified Safety Professional.
  - a. Evidence of <u>safety professional</u> experience in the management of safety at active construction sites of similar work scope to that of this subcontract.
  - b. A resume detailing construction safety education, including: college curriculum courses, OSHA Institute Professional Development Courses and seminars, environmental protection training and other courses which have contributed to safety knowledge.
  - c. Listing of construction safety training courses conducted.
- E. The subcontractor shall provide an alternate onsite health and safety representative to assist the health and safety professional and act on their behalf when not present on site
- F. Subcontractor shall submit the following documentation, for review and acceptance by the LBNL Project Manager, in support of the proposed safety representative:
  - 1. Evidence of construction safety training with 30-hour OSHA training, or equivalent, as a minimum.
  - 2. Resume detailing work experience and safety responsibilities on projects of similar scope to this subcontract.
  - 3. Proof of Competent Person or Qualified Person status attained by the proposed safety representative.
- G. The Subcontractor shall remove and replace its Health and Safety Representative at the request of the LBNL Project Manager, if the Safety Representative is unsuccessful in enforcing the safety requirements of this subcontract and maintaining hazard free worksites
- 1.04 SUBCONTRACTOR COMPREHENSIVE INJURY AND ILLNESS PREVENTION PROGRAM

- A. The Subcontractor shall prepare a written comprehensive job specific injury and illness prevention program for its employees and all lower tier Subcontractor employees as required by this Subcontract's specified EH&S standards, and regulations and submit it to the Project Manager for review. Field activities shall not start on this project until the project manager has favorably reviewed the program. Subsequent revisions shall be submitted to the Project Manager for review prior to commencement of affected work.
- B. The required comprehensive program shall include but not be limited to:
  - 1. Confined Space Entry
  - 2. Site specific Emergency Response, First Aid, & Medical Services. Identify employees with CPR/First Aid certification available at the work site.
  - 3. Fire Protection and Prevention
  - 4. Hazard Communications
  - 5. Hazardous Waste Operations
  - 6. Hazardous Work Permits
  - 7. Toxic and Hazardous substances
  - 8. Inspection, Maintenance, and Certification of Heavy Equipment, Cranes, and Motor Vehicles
  - Lock Out/Tag Out (LOTO) Subcontractors are required to include LOTO procedures which are consistent with The Lawrence Berkeley National Laboratory LOTO Policy as stated in the LBNL Health & Safety Manual, PUB 3000.
  - 10. Medical Monitoring
  - 11. Personal Protective and Life Saving Equipment
  - 12. Radiation Protection
  - 13. Construction Safety Training
  - 14. Control of silica dust released during demolition or drilling of concrete or released from work with other materials that contain silica.
- 1.05 JOB HAZARD ANALYSIS (JHA) AND HAZARD ABATEMENT PLAN

- A. In addition to the Injury and Illness Prevention Program the Subcontractor shall prepare and submit for review by the LBNL Project Manager a written Job Hazard Analysis for each phase of construction in this subcontract. The Job Hazard Analysis shall provide the following information:
  - 1. Description of work phase or activity
  - 2. Identification of potential hazards associated with the activity
  - 3. A list of the Subcontractor's planned controls to mitigate the identified hazards
  - 4. Name of the Subcontractor's employee responsible for inspecting the activity and ensuring that all proposed safety measures are followed
- B. Construction activities for which an Job Hazard Analysis and Hazard Abatement Plan may be required include, but are not limited to:
  - 1. Roofing
  - 2. Hoisting and handling of materials
  - 3. Excavations
  - 4. Trenching and drilling
  - 5. Concrete placement and false work
  - 6. Welding
  - 7. Steel erection
  - 8. Work performed six foot or higher above ground
  - 9. Electrical work
  - 10. Demolition
  - 11. Work in confined spaces
  - 12. Work that causes the release of silica such as demolition or drilling of concrete or work with materials that contain silica.
  - 13. Work with epoxy coatings

- 14. Work with or around hazardous materials
- 15. Work on hilly terrain
- 16. Use and handling of flammable materials
- 17. Control of Crystalline Silica Dust: The subcontractor shall provide all necessary control measures at the work site to keep worker exposure to crystalline silica dust within the OSHA Established Permissible Exposure Limits (PEL's). Dust control measures may require spraying of water or engineering controls at the dust generating points. It also may include the use of respirators, industrial grade HEPA vacuums, and HEPA filtered locally exhausted tools. Construction operations known to cause the release of silica dusts include, but are not limited to:
  - a. Chipping, sawing, grinding, hammering, and drilling of concrete, rock, or brick.
  - b. Work with cementitious materials such as grout, mortar, stucco, gunnite, etc.
  - c. Dry sweeping of dust originating from concrete or rock
- C. The Job Hazard analysis and Hazard Abatement Plan must be favorably reviewed by the LBNL Project Manager before work can start on that activity.
- D. Each employee scheduled to work in the activities identified above shall receive safety training in those activities prior to working on them. The Subcontractor shall maintain proof of employee training at the work site and make it available to the LBNL Project Manager upon request.
- E. The favorably reviewed project Hazard Abatement Plan shall be maintained on the work site and shall be made available, upon request, to work site employees and the LBNL Project Manager.

#### 1.06 ENGINEERED PROTECTIVE SYSTEMS

- A. Subcontractor shall submit for review to the LBNL's Project Manager any worker, environment and property protective systems required by EH&S regulations to be designed by a registered professional engineer. LBNL's review of such system is solely to verify that the Subcontractor has had the required protective systems prepared and sealed by a registered professional engineer.
- B. LBNL's review of any documents showing the design or construction of protective systems for worker and property protection shall not relieve

the Subcontractor of its obligations to comply with applicable laws and standards for the design and construction of such protective work. Subcontractor shall indemnify and hold harmless the University and the Architect Engineer from any and all claims, liability, costs, actions and causes of action arising out of or related to the failure of such protective systems. The Subcontractor shall defend the University, its officers, employees and agents and the Architect-Engineer in any litigation or proceeding brought with respect to the failure of such protective systems.

C. The cost of required engineering services shall be solely borne by the Subcontractor and shall be deemed to have been included in the amount bid for the work as stated in the Subcontract.

#### 1.07 PROCUREMENT OF HAZARDOUS MATERIALS

- A. The Subcontractor shall submit to the LBNL's Project Manager, for review by the LBNL's EH&S Division, any proposed procurement, stocking, installing, or other use of materials containing asbestos, cadmium, chromates, or lead.
- B. All materials and applications shall comply with requirements of any and all of the Bay Area Air Quality Management Districts Regulations, including, but not limited to architectural coatings, general solvent and surface coatings, solvent cleaning operations, adhesive and sealants, visible emissions, and asbestos.
- C. Subcontractor shall keep and maintain proof of compliance with the above-referenced regulations, including any recordkeeping obligations, for a period of two years after completion of the project. Subcontractor shall make such documents or evidence available if so requested by BAAQMD or Lawrence Berkeley National Laboratory.

#### 1.08 REVIEW OF SUBCONTRACTOR'S SAFETY SUBMITTALS

- A Review by the LBNL Project Manager or his designee of Subcontractors' EH&S submittals required under this subcontract does not authorize subcontract changes nor relieve the subcontractor of any EH&S responsibilities specified in this subcontract.
- 1.09 WORK SITE SAFETY ORIENTATION
  - A. Each employee shall receive initial EH&S orientation prior to performing any work on the project. The Subcontractor shall maintain on the work site a detailed outline of the orientation and a signed and dated roster of all employees who have completed the project EHS indoctrination. Make documentation available to Project Manager on request.

- B. The orientation shall, at a minimum, cover the following points:
  - 1. Employee rights and responsibilities.
  - 2. Construction Subcontractor responsibilities.
  - 3. Alcohol and drug abuse policy
  - 4. Subcontractor's disciplinary procedures.
  - 5. First aid and medical facilities.
  - 6. Site and project specific hazards.
  - 7. Hazard recognition and procedures for reporting or correcting unsafe conditions or practices.
  - 8. Procedures for reporting accidents and incidents.
  - 9. Fire fighting and other emergency procedures to include local warning and evacuation systems.
  - 10. Hazard Communication Program.
  - 11. Access to employee exposure monitoring data and medical records.
  - 12. Protection of the environment, including air, water, and storm drains from construction pollutants.
  - 13. Location of and access to reviewed project Illness and Injury Prevention Program, Hazard Analysis and Hazard Abatement Plan
  - 14. Location and contents of required postings

#### 1.10 SAFETY INSPECTIONS BY SUBCONTRACTOR

- A. The Subcontractor's onsite health and safety representative shall conduct safety inspections of the project operations, materials, and equipment frequently throughout the day to ensure that all safety deficiencies are identified and corrected.
- B. Inspection findings and corrective actions taken shall be documented, and the record shall be kept on the construction work site and be made available to the Project Manager upon request.

C. The Subcontractor's onsite health and safety representative shall cooperate with and comply with all safety directives communicated by LBNL Project Management and EH&S support staff.

#### 1.11 TOOL BOX SAFETY TRAINING

- A. Informal "tool box" safety training shall be conducted at least weekly by the Subcontractor Safety and Health representative, superintendent, or work crew foreman for all employees on the work site.
- B. Outlines of all "tool box" training sessions shall be maintained by the Subcontractor on the work site and shall include the date, time, names of employees in attendance, and subjects discussed.
- C. The Subcontractor shall maintain on the construction work site all tool box training records required above and make them available, upon request, to the Project Manager or his designee.

#### 1.12 FIRE PROTECTION AND PREVENTION

- A. The Subcontractor shall develop and maintain an effective fire protection and prevention program at the job site through all phases of demolition, alteration, repair, and construction work. Subcontractor shall ensure the accessibility and availability of fire protection and suppression equipment.
- B. Smoking shall be prohibited at or in the vicinity of operations which constitute a fire hazard. Such areas shall be conspicuously posted with "NO SMOKING OR OPEN FLAME" signs.
- C. Smoking is not permitted in any LBNL buildings. Smoking is permitted only in designated areas outside LBNL buildings.
- D. Smoking is prohibited in buildings under construction once installation of doors or windows has begun.
- E. Burning of debris on University property is not permitted.

#### 1.13 FLAGGERS

- A. Subcontractor shall furnish an adequate number of flaggers for all work that may affect the use of roads by University.
  - 1. Flaggers shall be posted at the entrance and exit of access roads used for hauling material and at all other areas where normal traffic is subject to disruption.

2. Flaggers shall be equipped and instructed at Subcontractor's expense in accordance with current "Instructions to Flaggers" of the Department of Transportation, State of California.

#### 1.14 CONSTRUCTION CRANES:

A. Cranes used by Subcontractor shall be State of California certified. A valid copy of such certificate shall be available at each crane or derrick and indicate 1) all required tests and/or examinations have been performed, 2) any defects found by such examination and tests have been corrected and 3) that the equipment is in safe operating condition at the time of examination.

Crane operators shall be qualified in the safe operation of cranes or hoisting apparatus. Subcontractor shall submit documentation to the University verifying qualifications of the operators.

#### 1.15 STORM DRAINS

- A. The Subcontractor shall follow the recommendations of the California Storm Water Best Management Practices (BMP's) Handbooks, published by the California Storm Water Quality Association, and protect LBNL's storm drain systems. The Subcontractor's storm drain protective actions shall include but not be limited to:
  - 1. Identification of storm drain inlets that may be affected by this subcontract work and installation of needed protective filters and structures
  - 2. Regular inspection and maintenance of drain inlet protective assemblies
  - 3. Soils erosion and sediment control
  - 4. Proper storage and containment of soil and other material stockpiles to prevent them from running off into storm catch basins
  - 5. Effective management of vehicular and equipment site ingress and egress to avoid mud tracking
  - 6. Collection and proper disposal of waste material and slurry from concrete, mortar, or saw cutting work
  - 7. Collection and proper disposal of waste water resulting from washing or hydroblasting of equipment, vehicles or buildings
  - 8. Contingency plans for containing and disposing spills from sewer lines

9. Training of personnel in housekeeping practices aimed at protecting storm drains during construction.

### 1.16 ACCIDENTS

- A. The Subcontractor's representative shall immediately notify the LBNL's Project Manager of any accidents, injuries or occupational illnesses that occur on the project, regardless of the employer of the involved personnel or the owner of the involved materials or equipment. For OSHA recordable injuries, the subcontractor shall also furnish a copy of the OSHA Form 301(or equivalent) to the LBNL Project Manager within five days of the injury.
  - 1. In the event a job site accident occurs, the Subcontractor shall immediately implement controls and restrictions on the accident site to ensure the site remains undisturbed until released in writing by the University to resume work.

The Subcontractor shall provide accident investigation follow-up and shall support LBNL's accident Investigation and reporting protocol required by PUB 3000, Chapter 5, Part

#### 1.17 SPILLS

A. The Subcontractor shall promptly report to the LBNL project manager any spill, deposit, leak, drainage, debris, residue, spoil, residual, and/or by-product, whether its presence at the jobsite is occasioned by accident, inadvertence, intent, discarding, or abandonment by the Subcontractor or its lower tier subcontractors. This reporting requirement applies to petroleum products, oil, lubricants, chemical substances, waste materials, and waste substances which are in such quantities as to constitute a hazardous substance or hazardous waste under Title 22 of the California Code of Regulations. All such occurrences of any quantity involving paints, solvents, thinners, degreasers, PCBs, halogenated hydrocarbons, volatile organic compounds, and/or asbestos shall be deemed a reportable event. These identification and reporting requirements shall be the responsibility of the Subcontractor for both its own work forces as well as for any subtier Subcontractor, materialman or supplier performing work on site for the Subcontractor. Reporting shall be made to the LBNL's Project Manager and the Environment, Health and Safety Duty Officer, phone (510) 206-2305, pager (510) 425-0616

In no event shall any spill(s) identified as a hazardous substance or hazardous waste be removed from the University without prior direction by the LBNL's Project Manager, and the LBNL Environment, Health and Safety representative. All removal, cleanup, and associated costs which result from Subcontractor or lower tier subcontractor, materialman, or supplier presence at the jobsite, shall be at the Subcontractor's sole expense. Removal, cleanup and associated remedial measures shall be effected at the exclusive option of the University by either University personnel or the Subcontractor under the supervision of authorized Berkeley Lab representative.

#### 1.18 RADIATION SAFETY TRAINING AND DOSIMETRY:

A. All Subcontractor personnel, including lower tier subcontractor personnel, required to work in an area identified by LBNL as a radiation area must attend a safety training session given by LBNL Radiation Protection Group and wear personal dosimeters, if required by LBNL, before entering that area to perform work. Each dosimeter issued to the subcontractor by LBNL must be returned promptly to the LBNL Project Manager upon request, or at the conclusion of the work. The duration of the radiation safety training session is approximately one hour.

#### 1.19 SPECIAL PERMITS

- A. Permit to Penetrate Ground or Existing Surfaces of LBNL Property
  - Prior to any penetration of the ground or existing concrete surfaces (including the use of stakes or poles) in excess of 1.5", the Subcontractor shall obtain from the LBNL Project Manager a Permit to Penetrate or Excavate Existing Surface of LBNL Property and shall adhere to the conditions of the permit during such work. The Permit and all conditions in it shall be considered part of these specifications and shall be included in the Subcontractor's bid amount.
  - 2. In areas where a Permit to penetrate or excavate existing surfaces of LBNL property is not required, Subcontractors shall verify by safe means, prior to drilling, that no utilities or services are enclosed within the area to be drilled.
- B. Fire Safety Permit
  - All operations with open flames or that cause sparks or are near gas lines or near combustible storage containers require a daily Fire Safety Permit issued by the University. Subcontractor shall not commence such work until the permit is issued. Activities requiring a Permit include, but are not limited to, electric arc and gas welding and flame cutting, other open flame operations, tar kettles, powder activated tools and excavations. The daily permit may be obtained from the LBNL's Fire Department, Telephone (510) 486-6015.

- 2. Fire watch personnel shall be provided by the Subcontractor in sufficient number to continuously monitor all locations where work requiring a fire permit is being conducted. The fire watch personnel shall remain on the job at least thirty minutes after such operations are completed.
- 3. Noncombustible shields or covers shall be provided by the Subcontractor on tables, floors, walls, around the work station, and over equipment to protect building structures, equipment and personnel from sparks and fragments of hot metal. Subcontractor shall also take these precautions to protect against sparks and hot metallic oxides generated by grinding, drilling or sawing operations.
- C. Permit to Conduct Electrical Work. Energized electrical work within panels and equipment is not allowed without written authorization (permit) from the Construction Manager. This includes testing, measurement and inspection of electrical equipment that involves removing covers to expose the worker to unguarded energized electrical parts
  - 1. Electrical workers shall be qualified to perform electrical tasks in accordance with OSHA 29 CFR 1910 and 1926 requirements.
  - 2. Electrical workers shall be certified in accordance with California law, and shall carry certification cards.
  - 3. Work practices must be compliant with NFPA 70E, 2004 Standard for Electrical Safety in the Workplace.

#### 1.20 AIR EMISSIONS PERMITS AND NOTIFICATIONS

- A. For all projects that involve demolition of a structure, the Subcontractor shall complete the BAAQMD asbestos demolition forms and notify the District at least 10 working days in advance of the activity, regardless of the presence of asbestos.
- B. For all projects that involve removal of regulated asbestos containing materials, the Subcontractor shall complete the required asbestos removal forms and notify the BAAQMD at least 10 working days in advance of the activity.
- C. For any operations required to obtain an Authority to Construct or Permit to Operate from the BAAQMD, the subcontractor shall provide in advance to the LBNL Project Manager the information needed for the application. BAAQMD may take more than 40 working days to process the application and issue the Authority to Construct or Permit to Operate; the subcontractor shall include this time in his Schedule of Operations; no extra cost will be granted by LBNL under this subcontract for this wait period.

#### 1.21 AUDIT OF SUBCONTRACTOR WORK SITES

- A. The LBNL Project Manager and/or assigned delegates will periodically monitor the Subcontractor's compliance with the EH&S requirements of this subcontract. If safety deficiencies are found, the Project Manager will issue a Safety Deficiency Notice to the Subcontractor.
  - 1. Upon receipt of a written Safety Deficiency Notice from the University (Refer to Paragraph 1.22), the Subcontractor shall take appropriate action to correct the deficiency and discontinue the hazardous activity until the hazard is abated. Failure to correct or eliminate violation(s) within the period specified may result in LBNL stopping all or any part of the work– See Environment, Safety, and Health Clause in the General Provisions.
  - 2. The Subcontractor shall submit to the Project Manager a written response to the Safety Deficiency Notice describing what corrective action it has taken, the date such corrective action was completed and actions that it will take to prevent future recurrence of the same incident.
# 1.22 SAFETY DEFICIENCY NOTICE

#### SAFETY DEFICIENCY NOTICE

DATE:

UNIVERSITY OF CALIFORNIA LAWRENCE BERKELEY NATIONAL LABORATORY FACILITIES DIVISION

TO: SUBCONTRACTOR: PROJECT TITLE:

ACTIVITY LEVEL: WEATHER:

A safety audit was made of this project to verify compliance with contract documents; the deficiencies listed below were observed. Please correct deficiencies as soon as possible and return a copy of this report to the LBNL Project Manager and/or the LBNL Safety Engineer within the next 24 hours. Indicate corrective action taken now and preventive measures to be taken in the future to avoid repeat of the same incident.

Description of Safety Deficiency	Subcontractor Reply (Indicate corrective actions taken)			
SUBCONTRACTOR NOTIFIED	YES		NO 🗌	
COPY ISSUED TO SUBCONTRACTOR	YES		NO 🗌	

Construction Environment Safety & Health Surveillance Conducted by:

Distribution: Construction Safety File/ Subcontractor/ Project management/ Inspection

# **END OF SECTION**

#### SECTION 01060 APPENDIX A

#### Revocable Grant of License by Design Professional of Record to the Subcontractor for Conditional Use of Computer Aided Drafting (CAD) Electronic Files

Design Professional of Record:		Forell/ Elsesser
Subcontractor:		
Subcontract No.:		Date:
Project Name: Location:	Lawrenc Berkeley	e Berkeley National Laboratory-Building 6 Seismic Upgrade

The design professional of record hereby grants a revocable license to the Subcontractor for the use of the following CAD files, dated \_\_\_\_\_\_ for the convenience of the Subcontractor and for the limited purpose of preparing shop fabrication drawings:

[Refer to the List of Subcontract Drawings at the beginning of the Specifications]

Drawings were prepared on the following:

AutoCAD<sup>TM</sup>

Version: 2000

The license for use of CAD files shall be furnished to the Subcontractor for no additional fee.

#### **TERMS AND CONDITIONS:**

Software:

- 1. The revocable license granted under this agreement permits Subcontractor to use the aforesaid CAD files for the purpose of preparing shop fabrication drawings. Subcontractor may distribute copies in electronic or paper form to its sub-subcontractors or material suppliers having direct involvement in the Project. The University and the design professional of record make no representation as to the compatibility of the CAD files with any hardware or software.
- 2. Because the information set forth on the CAD files can be modified unintentionally or otherwise, the design professional of record reserves the right to remove all indicia of its ownership and/or involvement from each electronic file.
- 3. Subcontractor has permission under this license to make modifications to the CAD files. All information added to the drawings by the Subcontractor shall be in a distinctively heavier pen weight and different font, such that all Subcontractor information can be clearly distinguished from the original CAD files.
- 4. Any information added by the Subcontractor, that represents a proposed change to the original design, shall be clearly identified by flagging or other distinctive presentation.

5. All information on the CAD files shall remain the property of the University and shall not be used for other projects, for additions to this project, or for completion of this project by others. In no case shall the transfer of these files be considered a sale, but only a revocable license. Upon request by design professional of record or University, Subcontractor shall promptly return any and all CAD files requested, as well as any copies in electronic, print or other format. Subcontractor assumes sole responsibility to retrieve CAD files from third parties that have been provided copies of the CAD files.

- 6. The revocable license for use of CAD files provided under this agreement are for the convenience of the Subcontractor, and do not modify in any respect the Subcontractor's obligations under the Subcontract. The University and the design professional of record make no representation regarding the accuracy, completeness, or permanence of CAD files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CAD files may not have been incorporated. In the event of a conflict between the design professional of record's sealed Subcontract drawings and CAD files, the sealed Subcontract drawings shall govern. It is the Subcontractor's responsibility to determine if any conflicts exist. The CAD files shall not be considered to be Subcontract Documents as defined by the General Conditions of the Subcontract. Subcontractor acknowledges that the use of CAD files under this license is at its own risk, and that Subcontractor accepts and assumes all risks associated with the use of electronic data, including but not limited to data loss, file corruption, infection by viruses, and damage to electronic storage devices. Subcontractor affirmatively waives any and all claims arising from or related to its use of the CAD file against the University and the design professional of record.
- 7. The revocable license for use of CAD files provided under this agreement shall not in any way negate the Subcontractor's responsibility for coordination with other trades or for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection, or any other obligation under the Subcontract Documents.
- 8. The Subcontractor shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the University, the design professional of record and its subconsultants from any and all claims, damages, losses, expenses, penalties, and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the CAD files by the Subcontractor, or by third party recipients of the CAD files from the Subcontractor.
- 9. The design professional of record believes that no licensing or copyright fees are due to other's on account of the transfer of the CAD files, but to the extent any are, the Subcontractor will pay the appropriate fees, indemnify, defend and hold the University and the design professional of record harmless from such claims as may arise.
- 10. This agreement is the final, complete, sole and exclusive expression of the parties' intent. Any purchase order number provided by the Subcontractor is for Subcontractor's accounting purposes only. Subcontractor's purchase order terms and conditions are void and are not part of this agreement. This agreement may be modified only by an instrument in writing signed by the design professional of record and the Subcontractor.
- 11. Any defects discovered in the file format of the electronic CAD files by the Subcontractor or its subcontractors must be reported to the design professional of record for correction within an acceptance period of 10 working days following the receipt of these files by the Subcontractor. Required correction of defects by the design professional of record reported after the acceptance period will be at the cost of the Subcontractor.
- 12. The Subcontractor waives any right to claim additional cost or delay occasioned through the use of the electronic CAD files.
- 13. The Subcontractor acknowledges that, due to the translation process from one file type to another (e.g. CAD Native format .DWG to .DXF), the resulting electronic CAD files must be carefully

reviewed for inaccuracies or abnormalities prior to their use and that any liability that might result from any such defects (graphic and text permutations) is assumed by the Subcontractor, and not by the design professional of record.

- 14. The electronic CAD files submitted form only part of the Drawings, Specifications and other documents prepared by the design professional of record and its consultants for this project and may not indicate the complete scope of work required by the Contract.
- 15. The electronic CAD files have been drawn to the design professional of record standards and may not conform to the drafting standards of the Subcontractor or its subcontractors.
- 16. The Subcontractor is obligated to bind in writing all others to whom it distributes the electronic CAD files, or any data extracted from them, as if they were signatories to this agreement. The Subcontractor agrees to provide the Project Manager and the design professional of record with a signed copy of the written agreement between itself and a party to which it distributes the electronic CAD files within 5 days of the execution of such agreement.
- 17. The laws of the State of California shall govern this agreement.

#### AUTHORIZED ACCEPTANCE

by Design Professional of Record

by Subcontractor

Signature

Signature

Print Name and Title

Print Name and Title

Date

Date

# SPECIAL REQUIREMENTS

# PART 1: GENERAL

#### 1.01 LOCATION OF WORK

A. The work shall be performed at the Ernest Orlando Lawrence Berkeley National Laboratory, (Berkeley Laboratory, LBNL) Berkeley, California.

#### 1.02 WORK INCLUDED

- A. The work shall include furnishing of labor, materials, supplies, equipment, services, supervision, and transportation as required for construction procurement of equipment, and field testing of the facility. The complete work shall be performed as shown on the drawings and specified in the Specifications.
  - 1. Phase I Seismic rehabilitation of Building 6 dome structure (replacement of column cross-bracing), including seismic modifications to the existing polar crane (see section 3.14 below.) Plumbing and fire protection work shown on drawings is part of the contract. All electrical work shown in the documents is not in contract (NIC) and shall be performed by LBNL.

# 1.03 U.S. GOVERNMENT AND/OR UNIVERSITY PROPERTY - MATERIALS TO BE REMOVED

- A. No materials shall be removed from the site except Subcontractor's construction and demolition materials, soil spoils and other materials specifically listed herein.
- B. Unless otherwise stated herein, U.S. Government or University property to be removed from the job shall remain with University jurisdiction. Such material shall be disposed of as directed by the Project Manager.
- C. Only the following material shall be removed from the site and disposed of at the expense of the Subcontractor:
  - 1. Structural steel.

# 1.04 ALTERATIONS IN EXISTING FACILITIES:

When altering existing facilities, the Subcontractor shall take every precaution to preserve and protect existing facilities, both those to be altered and those to remain unaltered that are within the limits of the work.

A. The Subcontractor shall notify the Project Manager at once of structural members, piping, conduit, or equipment not indicated for removal that may cause interference with the work. Work shall not proceed in the affected area

until instructions have been issued. Do not drill or penetrate existing structures without prior permission.

- B. The removal of existing work shall be by methods that will not jeopardize the integrity of structures or systems that are to remain.
- 1.05 SHUTDOWN
  - A. Shutting down of active utilities, building energy distribution and delivery systems, rotating equipment, pneumatic controls, actuators and supply systems, heating ventilation and air conditioning systems and controls, lighting and power distribution systems, natural gas distribution systems and utilization equipment, fire alarm systems, communications and data distribution systems, intrusion alarm systems, Energy Monitoring and Control Systems (EMCS), elevators, roads, or portions of other services shall be performed only as scheduled in coordination with and with the expressed permission of the University. All disruptions to utilities will be scheduled during University's minimum work shift hours, i.e. 12:01 a.m. on Saturday to 6:00 a.m. on Monday, unless specifically authorized otherwise. The Subcontractor shall provide temporary utility services and bypasses for any disruptions not completed within this period.
  - B. Shutdown schedules and an activity work plan for utilities shall be submitted to the University for approval at least two weeks before the date of the desired work.
  - C. Prior to the shutdown of utilities or building energy system(s), the Subcontractor and the Project Manager or designated representative(s) shall visit the site. At that time, the Subcontractor shall present its work plan for the shutdown to the Project Manager or designated representative(s). The work plan shall include his analysis of any affect on the utility or building energy system(s) and the estimated duration of the shutdown. If the shutdown involves the interface with, or modification of, existing building energy system(s), the Subcontractor shall be required to show the reviewed submittal and shop drawings of the proposed modifications.
  - D. Shutdown schedules shall have been reviewed and approved by the University at least 72 hours prior to date of shutdown. Postponement by the University of scheduled shutdowns shall not constitute a basis for additional charges to the University.
  - E. Prior to the shutdown of any building energy system(s) the Subcontractor shall provide the following:
    - 1. Proof of receipt of all materials required for the shutdown or a written commitment from the responsible suppliers that the required materials will be available at the time of the shutdown.
    - 2. A list of the qualified Subcontractor personnel assigned to perform the work.
    - 3. A twenty-four-hour emergency call-back phone number to be used by the University in the event of any problems or concerns with the

modifications made to the building system(s) after the Subcontractor has left the site.

- F. The shutdown of existing active electrical and mechanical systems will be performed by the University in coordination with Subcontractor and restarted by the University upon completion of Subcontractor's work.
- G. The startup of electrical and mechanical utility systems constructed by Subcontractor shall be performed by Subcontractor in coordination with the University.

# 1.06 DRAWINGS AND SPECIFICATIONS

- A. Standard Specifications: Standard Specifications such as ANSI, AASHO, AWWA, AISC, Commercial Standards, Federal Specifications, NEMA, UL, and the like incorporated in the requirements by reference shall be those of the latest edition at time of receiving bids, unless otherwise specified. The manufacturers, producers and their agents of required materials shall have such specifications available for reference and are fully familiar with their requirements as pertains to their product or material.
- B. Subcontract Drawings and Specifications on the Job: Subcontract drawings shall be kept on the job by the Subcontractor shall include at least one copy of Drawings and Specifications, all approved shop and erection drawings and schedules, lists of materials and equipment, as-built drawings, addenda and bulletins, documents relevant to the work. The list of Subcontract drawings is attached to these Specifications.

# 1.07 PROJECT MEETINGS

A. During construction, weekly project meetings may be held at the discretion of the Project Manager. The minutes of these meetings will be prepared by the Project Manager and one copy issued as expeditiously as possible to the Subcontractor. The Subcontractor will submit, in writing, questions and/or answers (previously obtained verbally) to be confirmed at each meeting.

# 1.08 COORDINATION

- A. Responsibility: The Subcontractor shall coordinate the work of all crafts. Any work done without regard for other crafts and which results in an incomplete and deficient product shall be removed, replaced, or redone as required at no additional cost to the University.
- B. Field Checking: Before starting the job, the Subcontractor shall check all lines, levels, and dimensions shown on the Drawings against field conditions. If discrepancies appear, they shall be reported to the Project Manager at once. In the event of discrepancies, the work shall not proceed until instructions from the Project Manager have been received.

# 1.09 LAYING OUT AND MEASURING - ACCURACY OF DATA

A. Verification of Site Measurements: In addition to verifying at the site all measurements shown on the Drawings, Subcontractor shall consult the

Drawings and Specifications of related work or existing construction that may in any manner affect the work of this Subcontract.

- B. Reporting: Subcontractor shall promptly report to the Project Manager, in writing, any errors, omissions, violations, or inconsistencies that may be discovered as a result of such verifications; otherwise, it shall be understood that Subcontractor accepts all such related data and conditions without reservations.
- C. Interferences: Layout of existing piping, conduits, and locations of equipment are shown as exactly as could be determined during design of the facilities; but their accuracy, particularly when such layouts and drawings are schematic, cannot be guaranteed. Subcontractor shall check all Specifications including the Drawings for possible interference with electrical, mechanical, and structural details, as well as interference with existing building or equipment, and shall notify the Project Manager of the interference for resolution of the interference before commencing work. Any completed work that interferes shall be corrected by Subcontractor at Subcontractor expense so that the original design can be followed.

# 1.10 STORAGE

A. The Subcontractor may store materials only in areas as designated by the Project Manager. The Subcontractor is responsible for security of the materials. Construction materials shall be kept in an orderly manner, safely and neatly stacked or piled. Materials shall be stored in a manner so as not to endanger or overload structures.

# 1.11 DELIVERY

A. Materials and equipment shall be delivered to the site in adequate time to ensure uninterrupted progress of the work. Packaged materials and equipment shall be delivered to the site in original, undamaged containers bearing manufacturer's name, with seals unbroken. Materials or equipment that do not conform to the Specifications or are damaged shall not be incorporated in the work and shall be immediately removed from the site. All materials delivered to the site shall be considered part of the work and, except for surplus materials, shall not be removed from the site at the completion of the work.

# 1.12 QUALITY CONTROL

- A. The Subcontractor shall be fully responsible for inspecting the work of its suppliers, and Sub-subcontractors to assure that the work complies with the standards for materials and workmanship required by the Subcontract Documents. Inspections, periodic observations and testing performed by the University or the Architect-Engineer are for the University's benefit and information only and shall not be construed as partial or incremental acceptance of the work and shall not be deemed to establish any duty to the Subcontractor, its Sub-subcontractors or suppliers.
- B. The Subcontractor shall

- 1. Monitor quality control over Sub-subcontractors, suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of the quality specified in the Subcontract documents.
- 2. Comply fully with manufacturer's instructions, including each step in sequence.
- 3. Request clarification from University before proceeding with work when manufacturers' instructions or reference standards conflict with Subcontract Documents.
- 4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or manufactures instructions require more precise workmanship.
- 5. Ensure that work is performed by persons specializing in the specific trade and class of work required, and qualified to produce workmanship of specified quality.
- 6. Secure products in place with positive anchorage devices designed and sized to withstand seismic, static and dynamic loading, vibration, physical distortion or disfigurement.
- C. If reference standards or manufacturers' instructions contain provisions that would alter or are at variance with relationships between the parties to the Subcontract set forth in the Subcontract Documents, the provisions in the Subcontract Documents shall take precedence.
- D. Manufacturers' Field Inspection or Start-up

When required by individual Specification sections, Subcontractor shall provide the following services from a manufacturer's representative.

- 1. Review of Specifications and design and concurrence or suggestions for modification.
- 2. Site observation of conditions of use and substrate.
- 3. Observation of the installation work in progress and on completion.
- 4. Start up, testing, and adjustment of equipment.
- 5. Instruction of University in operation and maintenance.

Provide written signed report by manufacturer's representative documenting services provided and any comments or recommendations.

# 1.13 INSPECTIONS

- A. The work will be inspected by University inspectors and/or independent inspection service personnel under coordination of the Project Manager.
- B. All work is subject to inspection and shall remain accessible and exposed until it has been inspected by the University. Any work covered up or made

inaccessible before such inspection shall be uncovered and made accessible without additional expense to the University.

- C. Inspection or testing performed by the University or the Architect-Engineer or any of their employees or consultants shall not (1) relieve the Subcontractor from responsibility for performing his own quality control and for complying with the requirements of the Subcontract Documents and (2) shall not create a duty or responsibility of the University or Architect/ Engineer to the Subcontractor, any tier of Sub-subcontractors, material and equipment suppliers, their agents, employees or other persons performing portions of the work.
- D. The University or the Architect-Engineer will not be responsible for the Subcontractor's failure to carry out work in accordance with the Subcontract Documents.

# PART 2: PRODUCTS

# 2.01 SUSPECT/COUNTERFEIT PARTS

- A. All fasteners will be new and furnished exactly as specified and shall be manufactured in, and made of material from, the United States. No higher grade of fastener shall be substituted for a lower grade. Certification and material test reports shall be furnished for each fastener size and shall include a description, size, specification, head marking, date, manufacturer's lot number, manufacturer's name, steel origin, steel heat number, and plating specification/type. The mechanical properties shall include the wedge tensile strength, the proof stress load, the surface hardness and the core hardness along with the hardness data per the particular bolt specification. The steel chemistry shall also be included in the test report. Fasteners supplied shall not have head markings that are on the U.S. Customs Service List of suspect/counterfeit fasteners. Failure to meet a receipt verification test will be cause for rejection of a shipment and the Office of the Inspector General of the U.S. Department of Energy may be notified for possible investigation of the Seller.
- B. Seller certifies that equipment and supplies furnished under the subcontract is free from the use of suspect/counterfeit fasteners as listed on the attached U.S. Customs Service List of suspect/counterfeit fasteners. Failure to meet this criterion as disclosed by the Berkeley Lab's receipt verification process will be cause for rejection of a shipment and the Office of the Inspector General of the U.S. Department of Energy may be notified for possible investigation of the Seller.

# PART 3: EXECUTION

3.01 SAFEGUARDS - EXISTING EQUIPMENT, UNDERGROUND UTILITIES AND ARTIFACTS

A. Existing utilities, including those listed as abandoned, shall not be moved or otherwise disturbed without written verification by the Berkeley Lab Operations group that the utility is abandoned.

Damage caused by the Subcontractor to existing utilities, buildings including roof drainage systems, underground cables, ducts, roadways, manholes and equipment, fire alarm, public address or telecommunications wiring will be repaired at the Subcontractor's expense, and the University will decide whether repairs will be performed by the Subcontractor or the University. Existing utilities, including but not limited to building fire alarm, public address or telecommunications wiring shall not be moved or otherwise disturbed, nor electrical circuits or switches operated or taken in or out of service, without prior consent of the Project Manager.

Loss to the University resulting from damage to utilities shall be compensated by the Subcontractor.

- B. If bones or artifacts are encountered during digging, the Berkeley Lab requires that the Subcontractor stop work within a 50-foot radius of the find and immediately notify the Project Manger. Work may continue only with approval from the Project Manager.
- C. Buried non-metallic utilities (electrical, mechanical, and civil) shall receive a tracer wire.
  - 1. The tracer wire shall be installed on top of the buried utility crown.
  - 2. The tracer wire shall be positively attached to the non-metallic buried utilities by plastic wire ties of similar type of attachment every two 6 feet for straight run of utility and at all changes of direction. Tape shall be Polyken "930-35," Protecto-Wrap "310", or equal.
  - 3. The ends of the tracer wire shall be exposed above the finished grade.
  - 4. Install precast concrete boxes at all locations where the ends of the tracer wire are exposed above the finished grade. The precast concrete boxes shall not be more than ninety 200 feet apart and shall contain a 24" coil of wire from each end of the tracer wire.
  - 5. Tracer wire shall be continuous between boxes and shall be tested for continuity in the presence of Berkeley Lab's inspector.
  - 6. Tracer wire shall be No. 10 AWG, copper wire with TW insulation.
  - 7. Tracer wire shall be exposed above finished grade in the precast concrete boxes at the transition where the non-metallic buried utility connects to the existing metallic utility.
  - 8. Extend wire into valve boxes and terminate with a wire connector. Terminate wire from lines extending from mains to fire risers or building services 12" (300mm) above grade and cap with a wire connector.
- D. Backfilling

1. Three days before backfilling, the Project Manager shall be notified so that the University Surveyor can obtain the three-dimensional coordinates of all buried utilities. Buried utilities including the pipeline and any other utilities exposed during construction shall not be covered with backfill without the prior approval of the University Inspectors. Coordination of this survey requirement is the responsibility of the Subcontractor. Surveyors will be provided by the University when scheduled. The cost for delay or dig-up related to the Subcontractor.

Alternately, the Subcontractor shall install reference points consisting of nail and hub/flagging at all changes in grade or alignment of the new pipeline and for all other utilities exposed by the excavation. The Subcontractor shall keep a separate written record referenced to each point with the following information:

(1) Offset and depth to top and centerline of utility, accurate to 0.1 feet

- (2) Type of utility (i.e. gas, water, etc.)
- (3) Size of utility (i.e. 2", 4", 16" wide duct, etc.)
- (4) Type of material of utility (i.e. cast iron, PVC, etc.)
- 2. Identification tape shall be installed 12" above the buried utility crown. The identification tape shall be continuous for the entire length of utility. Before backfilling for buried utilities over identification tape, the University construction inspector will verify that identification tape has been installed.

# 3.02 TEMPORARY CONSTRUCTION

- A. Temporary construction shall conform to all requirements and laws of state and local authorities which pertain to operation, safety, and fire hazards: specifically to requirements noted in Section 01010, General Provisions, Paragraph 1.03 - Codes. Subcontractor shall furnish and install all items necessary for conformance with such requirements, whether called for under separate sections of these Specifications or not. Subcontractor shall provide, maintain, and remove upon completion of his work:
  - 1. Temporary crossovers and bypass to utilities, electrical connections, traffic and footbridges, and walkways used to maintain services or communications which cannot be interrupted or curtailed.
  - 2. Temporary rigging, scaffolding, shoring, hoisting equipment, and all other temporary work as required for this project.
  - 3. Temporary barricades around openings and excavations for this project.

- B. Project Sign: Subcontractor shall furnish and install signs, located as directed by the Project Manager. The signs shall be readily legible to the general public, Subcontractors, materialmen, and truck drivers approaching the site and shall include the following information:
  - 1. Project.
  - 2. Subcontract No.
  - 3. Subcontractor Name.
- C. Access to Buildings: Subcontractor shall keep access to existing buildings clear at all times.

# 3.03 TEMPORARY FACILITIES

- A. Temporary office: A field desk will be provided at the jobsite location for the contractor's use.
- B. Toilet Facilities: Subcontractor will not be required to furnish toilet facilities.
- C. Water and Power: Temporary water service and electrical power will be available at locations as close as possible to the work site. Extensions for the Subcontractor's use shall be made by the Subcontractor. No charge will be made for these services provided they are not wasted. Available power is three-phase 208V/120V (maximum of 20kVA).
  - 1. All temporary wiring and electrical installations shall be in accordance with provisions of the Electrical Safety Orders of the State of California and applicable codes.
  - 2. Any power outage occasioned by tying into the existing electrical system for temporary or permanent use shall be coordinated with the Project Manager (refer to Paragraph 1.07, SHUTDOWN).
  - 3. University does not guarantee the quantities or quality of power or water available for Subcontractor's use, nor will it be responsible in any manner for interruptions in service or for the effects of interruptions.
- D. Lighting: Temporary lighting, if necessary during the period of construction, shall be supplied and maintained by the Subcontractor at Subcontractor expense so that construction work can be safely performed.
- E. Telephone Service at Berkeley Lab: Pacific Bell does not provide telephone service within LBNL. For service to a Subcontractor trailer, the Subcontractor must do the following:
  - 1. Contact the Berkeley Lab Telephone Services Office, 486-4440. The Berkeley Lab Telephone Services Office will make arrangements within LBNL to extend service from the Pacific Bell demarcation to the Subcontractor's site.
  - 2. Contact Pacific Bell and direct them to provide the desired service to One Cyclotron Road and terminate that service on the Pacific Bell demarcation blocks at Building 50A Room 1156. They should inform

Pacific Bell that the Berkeley Lab Telephone Services Office, 486-4440, is the contact at LBNL.

- 3. Provide Berkeley Lab Telephone Services Office, 486-4440 with written requests that provide the following information:
  - a. A Sketch that shows the Subcontractor's trailer location relative to nearby Berkeley Lab buildings and the location of facilities required within the trailer.
  - b. The name and phone number of a responsible person that Berkeley Lab installers or Telephone Services may contact to resolve any installation or operational questions.
  - c. The Purchase Order Number or Subcontract Number that authorizes work at Berkeley Lab.
  - d. The estimated time that facilities will be required at this location.
  - e. The date service is required.
  - f. The Pacific Bell (1) order number, (2) due date, and (3) contact.
- 4. There will be a Berkeley Lab recharge for installation time and material.

# 3.04 CPM NETWORK DIAGRAM

A. A critical path movement (CPM) network diagram is required of the Subcontractor by the University. The CPM schedule shall conform to Section 01010, General Provisions, Paragraph 1.09 C - Schedule of Operations.

# 3.05 CLEANING

A. During construction periods:

- 1. At <u>daily</u> intervals, or as directed by Construction Manager, Subcontractor shall clean the project site of all scrap, surplus materials, rubbish, and debris, and remove same from University property.
- 2. Dust generated during the course of work must be controlled by appropriate means.
- 3. Spillage over University roads caused by hauling operations shall be removed immediately at Subcontractor's expense.
- B. Prior to Final Acceptance: Clean up the entire construction area and adjacent building(s) and site area(s) affected by the performance of work under this Subcontract. Clean-up work shall be done by personnel skilled in building cleaning and maintenance work, and shall be done according to standards considered normal for commercial janitorial work.

# 3.06 OPERATION TEST

A. Prior to acceptance, all elements of operating equipment, including those of mechanical nature and those that slide, swing, turn, or are intended to move in any way and those of an electrical nature, shall be given an operating test to assure to the satisfaction of the Project Manager that such equipment operates as required. Subcontractor shall make all adjustments, replacements, and such other modifications as needed. If it is necessary to run equipment in order to complete the work, for periods that exceed the manufacturer's recommended maintenance interval, the Subcontractor will provide such required maintenance at no additional cost to the University.

# 3.07 TRAINING

A. All contractor employees will be expected to undergo a minimum of 3 hours of training (GERT, Rad) and/or processing (badging) time. Please allow for travel to and from these training efforts. GERT Training is available online.

# 3.08 WINDOW REMOVAL TO ACCESS CONNECTIONS FOR REMOVAL

- A. In order to access the upper bracing connections, it may be necessary to remove adjacent windows. These windows are accessed via the roof of the building. The contractor should expect that the window putty removal will involve hazardous material abatement. (Refer to 08800 Glazing specifications). Replaced components to be painted to match.
- B. Removal of windows will require that the contractor utilize sound abatement to prevent the transmission of excess demolition noise. The construction of a temporary structure for the support of sound attenuation blankets, or other means will be required. See 01010 1.06 B

# 3.09 FORKLIFT CERTIFICATION

A. Forklift operators need to provide evidence of training with the equipment being utilized. Loading/unloading operations will be shut down unless the operator can provide evidence (certification) of this training.

# 3.10 PROTECTION FROM CRANE RAIL

A. If work (scaffolding installation, steel removal and installation, etc.) will occur adjacent to, or creates an exposure to the electrified bridge crane rail, the contractor will be responsible for the installation of complete temporary protective measures (plywood enclosures, etc.) to isolate the workers from these hazards. Once the exposure is concluded, the contractor will remove this temporary protection.

# 3.11 SCAFFOLDING SHOP DRAWINGS

A. Shop drawings will be submitted that delineate the layout and elevations of the required scaffolding. These drawings will identify locations of the scaffold legs, platform elevations, access, and the protection of the equipment adjacent to/ beneath it. Approval of shop drawing submittal must be obtained prior to scaffolding installation.

B. Scaffolding materials shall be clean; planks shall be free of dirt, concrete or other debris. Scaffolding that is not suitably clean will be rejected and must be removed from the project site.

# 3.12 CRANE OPERATION BY LBNL

A. LBNL will be responsible for hoisting of the material into the laydown areas within the building. Materials such as scaffolding section, structural steel and construction materials will be hoisted by LBNL forces. The contractor will need to coordinate deliveries and crane requirements one week in advance of need.

# 3.13 SCHEDULE FOR WORK

A. Working days/times for the 2008 effort are as follows:

5/5/08 - 5/6/08 are B6 shutdown days, and the scaffolding and material loadin could be performed on these days so that steel installation could begin on 5/12.

5/12/08 - 6/1/08 Area available for unrestricted work, however, the noisy (air hammer/chisel) work needs to take place from 1700 hours to 0500 hours. See 3.15 below.

6/2/08 - 6/5/08 Work can take place up to 12 hours per day. It does not matter what shift the work is done on, but again the noisy work would need to be done after 17:00.

6/6/08 - 6/8/08 Work can be done as above, but it is likely we will need unrestricted access to equipment in the construction area on day and swing shifts.

6/9/08 Only painting, clean up and quiet work can occur.

6/23/08 - 6/24/08 These days are B6 shutdown days. Break down and load out of scaffolding could take place during this period, if necessary.

Efforts for the 2009 and 2010 will follow similar schedules.

# 3.14 WORK DURING 2008, 2009, 2010

- A. Work during the 2008 period will include a total of 5 (or 6) bents: 22-23, 23-24, 24-1, 1-2, 2-3, in this counterclockwise direction, with the option of replacing bent 3 to 4 (a 6<sup>th</sup> bent) if time permits and the contractor opts to do so.
- B. Work for the 2009 and 2010 periods will likely be 7 to 8 bents in 2009 and 6 to 7 bents in 2010, depending upon what is accomplished in 2008. These bents during these years will be similarly clustered.
- 3.15 RIVET AND WELD REMOVAL

A. Rivet or weld connection demolition <u>cannot be performed by torch-cutting or</u> <u>other spark-producing cutting methods</u> due to the risk of damage to the Building 6/ ALS equipment below and adjacent to the work areas. Prior year effort involved the use of an air hammer with chisel. High noise level removal methods <u>will need to be performed during evening shifts</u>, from 1700 <u>hours until 0500 hours</u>, to minimize the disturbance to other concurrent shutdown period work efforts. See 3.08B for sound mitigating requirements.

# 3.16 POLAR CRANE REPAIRS

A. Alternate repairs to the polar crane will occur in 2010, during a pre-arranged timeframe <u>outside</u> of the shut-down period.

# 3.17 FIRE EXTINGUISHERS

A. The contractor will provide CO<sub>2</sub> or other approved fire extinguishers for primary use (first line of defense) in case of fire. This type of extinguisher will not damage the scientific equipment adjacent to the work areas. The contractor will also provide ABC type extinguishers as a second line of defense should the CO<sub>2</sub> extinguisher not be sufficient to contain the fire. Contractor will submit the proposed extinguishers for LBNL approval.

# 3.18 BUILDING 6 ACCESS RESTRICTIONS

- A. Contractor personnel access to worksite will be restricted to designated paths of travel. These paths will be designated prior to construction.
- B. Stocking and material removal will be controlled, utilizing designated paths of travel and designated times to prevent damage to scientific equipment. Paths and times will be designated prior to construction. Unplanned or ad hoc transportation of material or equipment will not be permitted due to the danger of damage to scientific equipment.

# END OF SECTION 01210

# ALTERNATES

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. This section identifies each Alternate and describes basic changes to Work only when that Alternate is made a part of the Work by specific provision in the Subcontract
- B. Base Bid and Alternates include costs of all supporting elements required, so that the combination of Base Bid and any Alternates are complete.
- C. The scope of work for Alternates shall be in accordance with applicable Drawings and Specifications.
- D. Except as otherwise indicated, complete work described in Alternates with no increase in Subcontract Time.
- E. This section includes non-technical descriptions of Alternates. Refer to specific sections of the Specifications and to Drawings for technical descriptions of Alternates.
- F. Coordinate related work and modify surrounding work as required to integrate Alternates into the Work.
- G. Base Bid includes all work indicated, except work described as Alternates.
- H. University reserves the right to award none, any one, or more in any order, or all Alternates in combination with work covered by Base Bid.
- I. Alternates will not be awarded without awarding Base Bid.
- J. University reserves the right to determine low bid as Base Bid alone or sum of Base Bid and any combination of Alternates.
- K. Each Alternate is intended to cover all work required for a complete finished job.
- L. Alternates are additive to the Base Bid. Provide costs in appropriate spaces provided on Bid Form.
- M. Submit bids for Base Bid and all Alternates listed on Bid Form. Failure to quote an amount, or insertion of the words "no bid," "none" or words of similar meaning, will be considered as not completing the proposal and may constitute disqualification of entire bid, at University's discretion. When there

is no change in base bid due to using the Alternate, use the words "No Change". The words "No Change" will be interpreted to mean that work described in the Alternate shall be completed at no adjustment or change in cost of Base Bid.

- N. Base Bid and Alternates are exclusive in their scope of work. There is no overlap between or among Base Bid and Alternates. The cost of any item of work shall be included only once, in Base Bid or in Alternates.
- 1.02 DESCRIPTION OF ADDITIVE ALTERNATES
  - A. Additive Alternate 1: Building 6 seismic upgrade project, crane repair, as described on drawing S7.2 and in the section 05100 of the specifications.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

# END OF SECTION

# CONSTRUCTION WASTE MANAGEMENT

# PART 1 - GENERAL

# 1.01 SECTION INCLUDES

- A. Landfill Diversion Goal: Divert 50% minimum of total project waste from landfill.
- B. Storage bins.

# 1.02 RELATED SECTIONS

- A. Section 01730 Cutting and Patching
- B. Section 01735 Selective Demolition.

# 1.03 SUBMITTALS

- A. Waste Management Plan (WMP): Provide the following information:
  - 1. Waste Material Estimating Sheet (Appendix A at the end of this Section):
    - a. Project title, name of company which will implement the plan, and date.
    - b. Estimated job site waste to be generated, including types and quantities.
    - c. Proposed Alternatives to Landfilling: List each material planned to be salvaged or recycled, quantities, and proposed destination.
- B. Waste Management Progress Reports: Submit the following information yearly
  - 1. Landfill Log (Appendix B at the end of this Section):
    - a. Project title, name of company completing report and dates of period covered by the report.
    - b. Date, destination, and quantity of each type of material landfilled.
  - 2. Waste Diversion Log (Appendix C at the end of this Section):
    - a. Project title, name of company completing report and dates of period covered by the report.
    - b. Date, destination, and quantity of each type of material salvaged or recycled.
    - c. Cost, including bin rental, hauling, and facility fees.

- 3. Legible copies of manifests, weight tickets, and receipts. Manifests shall be from recycling and/or disposal site operators that can legally accept the materials for the purpose of reuse, recycling or disposal.
- C. Maintain at the Project site Landfill Logs and Waste Diversion Logs for each load of materials removed from site.

# 1.03 PROJECT MEETINGS

- A. Discuss Waste management plans and implementation at the following meetings:
  - 1. Pre-bid meeting.
  - 2. Pre-construction meeting.
  - 3. Regular job-site meetings.

# 1.04 PROJECT CONDITIONS

A. Hazardous materials are excluded from the work of this Section. Immediately Inform the LBNL Project Manager if hazardous materials are encountered or suspected, and stop work in the suspect area. Do not proceed with work in the suspect area until approved by the LBNL Project Manager.

# PART 2 - PRODUCTS

# 2.01 MATERIALS

- A. The following will be removed from the site and may be suitable for diversion from landfill.
  - 1. Metals: Steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass or bronze, including banding, ductwork, framing, roofing and siding, flashing, piping and rebar.
  - 2. Wood: Clean dimensional wood, wood pallets, engineered wood products including plywood, particleboard, I joists.
  - 3. Cardboard, paper, packaging.
  - 4. Paint.

# PART 3 - EXECUTION

# 3.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Coordinate waste materials handling and separation for all trades.
- B. Document results of the Waste Management Plan.

- C. Provide separation, bins for temporary onsite storage, handling, transportation, recycling, salvage, and landfilling for all demolition and waste materials.
- D. LBNL will designate a specific area for separation of material for salvage and recycling.
- E. Keep recycling and waste bins areas neat, clean and clearly marked in order to avoid contamination or mixing materials.
- F. Maintain logs onsite for each load of materials removed from site.

# **END OF SECTION**

# **APPENDIX** A

# WASTE MATERIALS ESTIMATING SHEET

Instructions: Use as many sheets as needed.

Project Title:

npany:
--------

\_\_\_\_\_

Date:

		Total Amount Generated		Amount Recycled		Amount Salvaged		Amount Sent to Landfill	
Material	Destination	Tons	Cu Yds	Tons	Cu Yds	Tons	Cu Yds	Tons	Cu Yds
Total									

# **APPENDIX B**

# LANDFILL LOG

Instructions: Use as many sheets as needed.

Project Title:

Company:

Log Dates: \_\_\_\_\_ through \_\_\_\_\_

Date	Destination	Cubic Yards Landfilled	Tons Landfilled
Total			

# APPENDIX C

# WASTE DIVERSION LOG

Instructions: Use as many sheets as needed.

Project Title:

Company:

Log Dates: \_\_\_\_\_ through \_\_\_\_\_

Material	Date	Destination	Salvaged	Recycled	Tons	Cubic Yards	Cost
Total							

# **CUTTING AND PATCHING**

# PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Provide cutting, fitting and patching. The following are included:
  - 1. Make component parts fit together.
  - 2. Uncover work to provide for installation of out-of-sequence work.
  - 3. Remove and replace new work not conforming to Project requirements.
  - 4. Provide penetrations of nonstructural surfaces for installation of electrical conduits, plumbing, ductwork and other penetrations.
  - 5. Restore the integrity of fire rated construction at cutting and patching work.

# 1.02 RELATED SECTIONS

A. Section 01570 - Construction Waste Management.

# 1.03 SUBMITTALS

- A. Submit written request 72 hours in advance for cutting or patching work which affects:
  - 1. The work of the University, or other subcontractors performing work in the Project area.
  - 2. The structural integrity of the existing building or any of its parts.
  - 3. Items or systems which are moisture-resistant or exposed to weather.
  - 4. The efficiency, operational life, maintenance or safety of operational items.
  - 5. The appearance of items exposed to view.
- B. The request shall include:
  - 1. Project name.
  - 2. Reason for cutting or patching.
  - 3. Dates and times the work will begin and be completed.
  - 4. Description of the work, including:

- a. Scope.
- b. Trades which will execute the work.
- c. Products proposed.
- d. Extent of refinishing.
- 5 Effect of the work on the University or other subcontractor.
- 6. Effect of the work on the structural or weatherproof integrity of the existing building.
- 7. Alternatives to cutting and patching.
- 8. Written permission of other subcontractors whose work will be affected.
- 9. Request for substitution if work conditions or schedules indicate a change of products.

# PART 2 - PRODUCTS

#### 2.01 MATERIALS

Comply with requirements of Specifications and Drawings for each product.

# PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Inspect existing conditions, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect the conditions affecting the installation of products or performance of the work.
- C. Report unsatisfactory conditions to the Project Manager in writing. Do not proceed with affected work until the Project Manager has provided instructions.

# 3.02 PREPARATION

- A. Provide temporary support as necessary to ensure the structural integrity of the affected portion of the work.
- B. Protect other portions of the project from damage.
- C. Provide temporary watertight, windtight protection of Work or existing building where exposed to exterior by cutting and patching work.

#### 3.03 PERFORMANCE

- A. Prevent damage to other work.
- B. Provide proper surfaces to receive repairs.
- C. Restore work which has been cut or removed to original condition.
- D. Install new products in accordance with requirements of Subcontract Documents.
- E. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces, except as otherwise required at rated construction.
  - 1. At penetrations through rated construction, provide annular space for installation of firestopping in accordance with approved submittals.
- F. Align patched surfaces with adjacent surfaces.
- G. Refinish entire surfaces to match adjacent finishes.
  - 1. For continuous surfaces, refinish to nearest intersection.
  - 2. For assemblies, refinish entire unit.
- H. Provide firestopping at penetrations of fire rated construction in accordance with the requirements of Section 07840 Firestopping.

# 3.04 WASTE MANAGEMENT

Store and dispose of waste materials in accordance with requirements of Section 01570 - Construction Waste Management.

# **END OF SECTION**

# **SELECTIVE DEMOLITION**

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Provide selective demolition, including but not limited to the following.
  - 1. Remove structural, plumbing, fire protection, and mechanical materials and equipment as indicated or required for new construction. Electrical work shown in the documents is not in contract (NIC) and will be performed by LBNL.
    - a. Fire sprinkler, storm drainage and domestic water mains shall remain in operation.
  - 2. Remove furnishings and equipment indicated.
  - 3. Refer to Article 3.05 Schedules for special requirements for selected items.
  - 4. Remove materials from site, and dispose of legally.
  - 5. Disconnect, remove, cap and identify utilities for later reconnection.
  - 6. Protect adjacent work to remain, and items to be turned over LBNL, from damage.

# 1.02 RELATED SECTIONS

Edit or delete the following paragraph as applicable.

- A. Section 01570 Construction Waste Management.
- B. Section 13281 Hazardous Material Remediation: Lead Abatement.
- C. Section 13282 Hazardous Material Remediation: Lead Dust in Ducts.
- D. Section 13285 Hazardous Material Remediation: Asbestos.
- E. Division 15 Mechanical: Plumbing, Mechanical, and Fire Protection items to be demolished.
- 1.03 SUBMITTALS
  - A. Project Record Documents: Accurately record locations of capped utilities, subsurface obstructions and structural installation.

# 1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of applicable codes, rules and regulations referenced in Section 01010 Article 1.03 "Codes".
  - 2. Obtain required permits from University and other applicable authorities.
  - 3. Do not close or obstruct roadways or sidewalks without permits.
  - 4. Utility Shutdowns: Comply with requirements of Section 01210 Article 1.07.
  - 5. Maintain building and room egress and access at all times. Do not reduce required egress width to exits.
  - 6. Minimize interference with corridors, exits, sidewalks, roadways and public thoroughfares.
  - 7. Comply with applicable procedures if hazardous or contaminated materials are discovered or suspected.

# 1.05 PROJECT CONDITIONS

- A. Existing Conditions:
  - 1. Existing paint on structural members may contain lead. Lead dust also exists in many areas of the facility.
  - 2. Asbestos materials may exist in some locations of the work.
  - 3. If lead, asbestos or other hazardous materials are found or suspected, immediately stop work in the suspected area and advise the Project Manager. Do not recommence work in the area until advised by the Project Manager that the area has been cleared for work.
- B. LBNL will occupy adjacent areas during the course of the Work. Work under this Section shall not affect LBNL's operation of adjacent areas.
- C. Subcontractor will be sharing the space with LBNL operations and/ or other subcontractors during the work. Subcontractor will be required to coordinate use of work areas, house crane, repair of crane, etc.

# 1.06 SEQUENCING

A. Submit schedule indicating proposed sequence of operations for selective demolition work to Project Manager for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services, and details for dust and noise control.

- 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of LBNL's operations.
- 2. Coordinate the scheduling of work of Section with the work of other sections.

# PART 2 PRODUCTS

N/A

# PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Inspect and verify the existing conditions and become familiar with the extent of the Work.
- B. Examine the site to determine proper access within the limitations of the Subcontract. Conduct operations so as not to interfere with adjacent roads, driveways, walks, buildings, corridors, means of access and egress, and work areas.

# 3.02 PREPARATION

- A. Interfaces With Other Work: Coordinate extent of selective demolition work with limits of new work and existing work to remain, and with demolition and modification requirements shown on the Drawings.
- B. Protection:
  - 1. Protect existing materials, appurtenances and equipment which are not to be demolished. Existing materials, appurtenances and equipment, building exterior and interior, and landscaping altered or damaged during demolition work shall be repaired or replaced by the Subcontractor to match existing undisturbed conditions at no additional cost to LBNL.
  - 2. Prevent movement of structure; provide bracing and shoring as required.
  - 3. Provide proper and permanent support to adjacent structure for all piping, conduits and cables to remain.
  - 4. Provide and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued University occupancy.
  - 5. Maintain path of travel for debris removal dust free and clean at all times.
  - 6. Maintain ventilation system dust free at all times.

- 7. Cover and protect windows, walls and equipment that are adjacent to areas to be demolished.
- 8. Protect smoke alarms and fire sprinklers from dust intrusion.
- 9. Existing elevator may not be used for debris removal.
- 10. Maintain parking areas, driveways, exterior walkways, exit paths, and landscaping in a clean, undisturbed condition. Any debris caused by selective demolition work shall be removed each day.
- C. Field verify the exact location of existing concealed utilities. Use caution if working in or about concealed or exposed utilities.
- D. Disconnect, remove, and cap designated utility lines within demolition areas. Mark locations of disconnected utilities. Identify utilities and indicate capping locations on Project Record Documents.

#### 3.03 EXECUTION

- A. Minimize interference with adjacent building areas, materials and equipment and as required to allow LBNL's continued use of the facilities.
- B. Remove items in an orderly and careful manner.
  - 1. Remove only as much material as is required for new construction work to be conveniently performed.
  - 2. Cut surfaces so as to minimize the amount of new surfaces required to match existing. Make cuts plumb, true, level and straight, or as otherwise required to provide proper surfaces to receive new work and repairs.
  - 3. Cut asphalt and concrete by power saw in neat, sharp straight lines. Repair broken edges or as directed by Project Manager.
- C. Remove miscellaneous abandoned appurtenances that will be exposed to view, unless indicated otherwise.
- D. Investigate and measure the nature and extent of unanticipated items that conflict with intended function or design. Submit written report with accurate detailed information to Project Manager. While awaiting instructions from Project Manager, rearrange selective demolition schedule as necessary to continue overall job progress without delay.
- E. Eliminate dust from work areas:

- 1. Activities which generate silica dust, such as concrete saw cutting, jackhammering, chipping, or abrasive blasting, shall incorporate engineering controls to eliminate visible emissions.
- 2. Do not use silica sand or other substances containing more than 1 per cent crystalline silica as abrasive blasting material
- 3. Use concrete and masonry saws that provide water to the blade.
- 4. Prevent human exposure to dust using methods such as removing dust with water, high efficiency particulate air (HEPA) filters, and wet sweeping. Do not use compressed air or dry sweeping.
- F. Stop work and notify Project Manager immediately if structure or other items to remain appear to be endangered. Do not resume work until directed by Project Manager.
- G. Do not disrupt service to existing fire sprinkler lines. If disruption becomes necessary, coordinate with Project Manager in accordance with requirements of Section 1210, Article 1.07 "Shutdown".
- H. Cover roof penetrations with plywood and visqueen to provide a weathertight enclosure until roof equipment is completely installed and roofing work in the area can be completed the same day.
- I. Remove, store and protect materials to be re-installed or retained so as to prevent damage.
- J. Comply with the requirements of Section 01570 Construction Waste Management.

# 3.04 DISPOSAL AND CLEANUP

- A. Material removed under this Subcontract which is not to be salvaged or reused in the Project shall become the property of the Subcontractor and shall be promptly removed from LBNL. Do not store or permit debris to accumulate at the site.
- B. Unless indicated otherwise, immediately remove demolished material from site. Dispose of materials legally off site. Do not burn or bury materials on site.
- C. Upon completion, clean the entire area of demolition residue satisfactory for the continuation of the Work. Remove temporary work.

# **END OF SECTION**

#### ANCHORS IN RESIN

PART 1 - GENERAL

PART 2 -

2.01 SECTION INCLUDES

2.02

- A. Construction: Provide material, labor, equipment, services, tests and inspections necessary for the installation of post-installed anchors in resin.
- B.
- **RELATED INFORMATION AND REQUIREMENTS** 2.03

2.04

A. Drawings and general provisions of the Contract, including general conditions and Division 1 Specification Sections, and all other Specification Sections apply to this Section.

B.

2.05 **REFERENCE DOCUMENTS** 

2.06

A. Standards: Comply with the provisions of the documents listed below and with the requirements described in this Section. Use current editions of documents, unless otherwise indicated

B.

- 1. CBC California Building Code, 2001 Edition
- 2.
- 3. ACI 355.1, American Concrete Institute, "State-of-the-Art Report on Anchorage to Concrete".

4.

5. ASTM - American Society for Testing and Materials, designations referenced herein.

6.

7. ICC-ES, International Code Council Evaluation Services, Evaluation Service Reports referenced herein.

8.

#### 2.07 SUBMITTALS

2.08

- A. General: Submittals shall be sent to the University, or University's Testing Agency, or both, as required herein, for review prior to fabrication, delivery, and installation. Review of submittals covers the general character of the details, but not the checking of quantities or dimensions. Such review shall not relieve the Subcontractor from responsibility for executing the work in accordance with the Contract Documents.
- B.
- C. Manufacturer's Data: The Subcontractor shall submit the manufacturer's ICC-ES report for review

D.

2.09 **TESTS AND INSPECTIONS** 

2.10

A. University's Quality Assurance Tests and Inspections:

1.

- 2. General: Quality assurance tests and inspections shall be the responsibility of the University. The University shall retain a testing agency, referred to herein as the University's Testing Agency, who shall perform the required tests and inspections, prepare written summary reports of tests and inspections, and review submittals.
- 3
- 4. Notification:
- 5.
- The Subcontractor shall notify the University's Testing Agency of work to a. be tested and inspected. Notification shall be sufficiently in advance to allow scheduling of tests and inspections, but not less than 24 hours.
- b.
- The Subcontractor shall immediately notify the Engineer if the University's C. Testing Agency indicates that quality assurance tests and inspection requirements have not been met.

d.

- 6. The University's Testing Agency shall provide special inspection to verify compliance with the specifications and the product's ICC-ES report the for following items:
- 7.
  - Drill type, bit, and setting. a.
  - Hole diameter, depth, and accuracy of location. C.
  - d.

b.

- Cleanliness and surface preparation of holes. e.
- f. Anchor and dowel type, material, diameter, and length. g.
- h.
- i. Mixing and placing of resin.
- j.
- k. Placement of anchors and dowels in the resin-filled holes.
- 8. The University's Testing Agency shall conduct static tension load tests on installed anchor and dowel. Test 10% of each diameter of anchors and dowels, or test as scheduled on the Drawings. Tests shall be in accordance with ASTM E 488, "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements".
- 9.
  - a. Tension load tests shall not begin prior to manufacturer's recommended cure time after installation.
  - b.
  - Scheduled test loads shall be applied 10 minutes with no allowable slip. c.
  - d.
  - e. If an anchor or dowel fails a tension load test, additional dowels or anchors shall be tested until 20 consecutively successful tests have been performed.
  - f.
  - g.
  - h. Provide tension load tests for replacement anchors and dowels.
  - i.

The University's Testing Agency shall develop and utilize an effective j. method of field marking locations and results of tension load tests.

k.

- 1) Field marking for test locations shall not affect exposed concrete appearance.
- 2)
- 3) A detailed drawing record of test locations and results shall be acceptable.
- 4)
- B. Subcontractor's Quality Control Tests and Inspections:
  - 1)
  - 2. General: Quality control tests and inspections shall be the responsibility of the Subcontractor. Where required herein, the Subcontractor shall retain the services of an independently operating testing agency, referred to herein as the Subcontractor's Testing Agency, to verify compliance with the Contract Submittals summarizing the results of Subcontractor's quality Documents. control tests and inspections shall be prepared by the Subcontractor's Testing Agency.
  - 3.
- 2.11 ENGINEERING SERVICES
- 2.12
- A. General: Where engineering services are required, the Subcontractor shall retain a Structural Engineer registered in the State of California, referred to herein as the Subcontractor's Engineer.

B.

- 1. The Subcontractor's Engineer may be a Civil Engineer registered in the State of California only where explicitly indicated as such in the specifications.
- 2.
- C. Where required, the Subcontractor's Engineer shall provide calculations for engineering services necessary for the design and implementation of substitution requests and correction of defective work.
- D.
- E. Documents prepared by the Subcontractor's Engineer shall be stamped and signed

F.

#### 2.13 **PROJECT CONDITIONS**

- 2.14
- A. Protection: Provide protection of existing equipment in the vicinity of the work as specified in Section 01735. Obtain University approval of proposed protection methods before beginning work.

B.

C. Access Routes and Laydown Areas: Refer to the Drawings for requirements. Subcontacrtor's personnel shall be limited to the area of construction, designated routes and public areas. Personnel shall not enter experimental areas (red painted floors), except designated routes, without prior authorization.

D.

E. Crane Use: Building cranes are available for moving material. Advance notice to the University is required. Crane will be operated by University staff.

F.

G. Penetration Permit: Obtain an LBNL Plant Operations Penetration Permit prior to drilling.
- H.
- Sequence of Work: Refer to Drawings for requirements. Ι.
- J.
- K.
- L.
- M. PART 3 - PRODUCTS
- PART 4 -
- 4.01 MATERIALS
- 4.02
- A. Resin adhesives for anchors and dowels in normal weight concrete:
- Β.
  - 1. Hilti Corporation's "HVA Capsule System" (ICC-ES Report No. ER-5369).
  - 2.
- C. Threaded rod (anchors), washers, and nuts shall be as specified in Section titled "Structural Steel".
- D.
- E. Patching Mortar: Master Builders' "EMACO S66 CI", Sika Corporation's "SikaRepair 223", or equal.
- F.
- G.
- Η.
- Ι.

# PART 5 - EXECUTION

PART 6 -

- 6.01 **PROTECTION OF MATERIALS**
- 6.02
- A. Protect materials from damage, weather, and contaminants such as grease, oil, and dirt.
- Β. 6.03 LAYOUT
- 6.04
- A. Inspect areas to be drilled to verify conditions of access, interferences, and existing materials.
- B.
  - 1. Verify location of reinforcement in areas to be drilled using non-destructive methods. Subcontractor shall use care and caution to avoid cutting or damaging Maintain a minimum clearance of one inch between reinforcement. reinforcement and anchors or dowels, unless otherwise shown on the Drawings.
  - 2.
- 6.05 TOLERANCES
- 6.06
- A. Anchor hole locations shall conform to tolerances for the material being attached.
- В.

D.

C. Tolerances for holes for dowels shall be in conformance with ACI 355.1.

DRILLING AND PREPARATION OF HOLES

- 6.07
- 6.08
- A. Holes shall be drilled using the manufacturer's recommended drill type, bit, and setting, unless otherwise noted on the drawings.

B.

C. Hole diameter shall be as indicated by the manufacturer. Depth of hole shall be as indicated on the Drawings: however, in no case shall the embedment of anchors or dowels be less than that required by the manufacturer.

D.

E. Where drilling causes the concrete to spall or crack, the holes shall be considered defective work.

F.

G. Dust and other contaminants shall be completely removed from holes by blowing with compressed air or other effective means.

H.

6.09 ANCHOR AND DOWEL INSTALLATION

6.10

A. Anchor installation shall be according to the resin manufacturer's recommendations, including filling holes with resin appropriately and installing the anchor or dowel in the hole.

B.

C. Resin shall completely enshroud installed anchors without entrapping air in the hole and shall be finished flush with surface of concrete.

D.

PROTECTION DURING RESIN CURE TIME 6.11

6.12

A. Protect dowels from displacement or disturbance during resin curing period. Consider the ambient temperature in determination of minimum cure time.

REPLACEMENT ANCHORS AND DOWELS AT FAILED TEST LOCATIONS

6.13

- 6.14
- A. At failed tension load test locations:

B.

B.

- 1. Remove anchor or dowel.
- 2.
- 3. Remove resin and clean hole.
- 4.
- 5. Install replacement anchors and dowels in existing holes approved by the University's Testing Agency.
- 6.
- 7. Existing holes not approved by the University's Testing Agency shall be considered defective work.
- 8.
- DAMAGED REINFORCEMENT 6.15
- 6.16
- A. Damage to existing reinforcement shall be considered defective work.

SURFACE REPAIRS AND FILLING OF ABANDONED HOLES

- 6.17
- 6.18
- A. Clean and repair surfaces damaged by drilling or installation. Cleaning and repairing requirements shall be as directed by the University.

B.

Β.

C. Abandoned holes shall be filled with patching mortar in accordance with the manufacturer's recommendations.

D.

#### 6.19 CORRECTION OF DEFECTIVE WORK

- 6.20
- A. Correction of defective work shall be the responsibility of the Subcontractor.
- В.
- C. Work not in compliance with the requirements of the Contract Documents shall be considered defective.

D.

E. Corrected work shall conform to the requirements of the Contract Documents.

F.

G. The Subcontractor shall prepare a submittal documenting the defective work and proposed corrections to the University for review. The submittal shall include a description of the defective work, the location of defective work, and shall be accompanied by supporting sketches, photographs, or both. Additionally, the submittal shall include similar documentation of the Subcontractor's proposed corrections.

Η.

1. Where engineering services are necessary for correction of defective work, supporting calculations from the Subcontractor's Engineer shall be included as part of the Subcontractor's submittal.

2.

- I. Correction of defective work shall not commence until the University has reviewed and accepted the submittal.
- J.
- K. Correction of defective work shall be inspected by the University's Testing Agency.
- 6.21 **CLEAN-UP**

6.22

- A. Remove from the site all debris resulting from the work of this Section.
- B.
- C.
- D.
- Ε.

# END OF SECTION

# SECTION 05100

# STRUCTURAL STEEL

#### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Provide all materials, labor, equipment and services necessary for the fabrication, erection and completion of all structural steel, including all bracing and shoring required for erection and related work. The work shall include and not necessarily be limited to the following:
  - 1. Removal, replacement and strengthening of structural steel columns, beams, bracing, and connections.
  - 2. Removal of existing polar crane springs, snubbers, provision and installation of new snubber springs and associated framing and finish modifications.

#### 1.02 RELATED INFORMATION AND REQUIREMENTS

A. Drawings and general provisions of the Contract, including general conditions and Division 1 Specification Sections, and all other Specification Sections, apply to this Section.

#### 1.03 QUALITY ASSURANCE

- A. Standards: Comply with the following applicable standards unless otherwise specified herein:
  - 1. CBC "California Building Code," 2001 Edition.
  - 2. AISC American Institute of Steel Construction's "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," latest edition.
  - 3. AISC American Institute of Steel Construction's "Code of Standard Practice for Steel Buildings and Bridges," latest edition, with the exception that horizontal and vertical dimensional control may not be shown entirely on the structural drawings. The Subcontractor shall be responsible for dimensional control.
  - 4. AWS American Welding Society's "Structural Welding Code AWS D1.1, latest Edition.
  - 5. AISC American Institute of Steel Construction's "Specification for Structural Joints Using ASTM A325 or A490 Bolts," latest edition.
  - 6. ASTM American Society for Testing and Materials.
  - 7. SSPC Steel Structures Painting Council.

- 8. ICC-ES, International Code Council Evalvation Services, Evalvation Service Reports referenced herein.
- B. Tests and Inspections:
  - 1. Subcontractor shall certify, test, and inspect all materials, welding, fabrication and erection in accordance with the requirements of AISC and AWS D1.1 and as noted herein. The University will employ a University's Testing Agency to provide for additional testing and inspections as noted in the sections below.
  - 2. Mill analysis and test reports for the steel, certified and properly executed by the manufacturer will constitute sufficient evidence of conformity with the Specifications. Subcontractor shall identify steel in accordance with CBC Section 2202.2.2 as to heat number and furnish the University's Testing Agency, for their review, mill tests and manufacturer's certification for each heat of steel. If the material cannot be identified or its source is questionable, one set of tension and bend tests shall be made by the University's Testing Agency in accordance with CBC Section 2202.2.2. The cost of all tests including sampling and machining of test coupons shall be paid by the Subcontractor. The Subcontractor shall cooperate with University's Testing Agency and provide all material required to take coupons for testing, as required by the Engineer.
  - 3. Certificates of compliance for welding electrodes properly executed by the manufacturer(s) shall constitute sufficient evidence of compliance with the Specification.
  - 4. High strength bolts, nuts, washers and thread rods shall be sampled and tested in accordance with the requirements of the specification for High Strength Bolts for Structural Steel Joints, ASTM A325 or ASTM A490 Bolts.
  - 5. Additional testing required as a result of corrective measures to correct defects shall be paid for by the Subcontractor.
- C. Welding Inspection by the University's Testing Agency: All shop and field welding shall be inspected by a qualified and certified "Verification Inspector" as defined by AWS D1.1 Section 6.1, employed by the University's Testing Agency in accordance with AWS D1.1 Section 6 and in accordance with the Special Inspection Requirements of the 2001 CBC Inspection personnel shall be qualified for nondestructive testing at Level II as specified in Section 6, Paragraph 6.14 of AWS D1.1. The University's Testing Agency shall provide the following:
  - 1. Welding Procedure Specifications (WPS): Review WPS submittal and verify that welders and inspectors are performing work with the approved WPS.
  - 2. Welder Qualifications: Verify all welder qualifications. The welders' qualification shall be considered as remaining in effect indefinitely unless there is a specific reason for questioning the welders' ability, in which case welder re-certification may be required, or if in the opinion of the Engineer the welder is not suitable for the project, said welder may be disqualified from the project.

- 3. Equipment Electrical Meter Calibration Verification: Verify that electrical meters being used accurately reflect voltage and amperage at the welding site for the length of cable in use.
- 4. Visual Inspection: Visually inspect all welding in accordance with AWS D1.1 Section 6, and including verification of fit-up, preheat, calibration of equipment, equipment settings, materials, adherence to approved WPS, interpass temperatures, deposition rates, technique, proper fusion of each pass, ensure the weld is crack free at each pass, confirm porosity and undercut do not exceed AWS requirements, confirm the final weld profile, and confirm that all special requirements specified herein are adhered to.
- 5. NDT Ultrasonic Inspection: Test 100% of all complete joint penetration (CJP) groove welds and of all partial penetration groove welds using ultrasonic testing. The ultrasonic instrumentation shall be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1., Section 6.25. Technician who operates the equipment shall examine the welds and maintain a record of all welds examined, defects found and disposition of each defect. All defective welds shall be repaired by the Subcontractor and retested with ultrasonic equipment, at the expense of the Subcontractor.
- 6. NDT Magnetic Particle Inspection: Test 100% of all back-gouged weld roots and 100% of all weld tab removal sites using magnetic particle testing in accordance with ASTM E709-91. Technician who operates the equipment shall examine the welds and maintain a record of all welds so examined, defects found and disposition of each defect. All defects shall be repaired by the Subcontractor and retested at the expense of the Subcontractor.
- 7. Welded Studs: Testing and inspection of steel studs welded to structural steel shall be in accordance with Section 7, Stud Welding, AWS D1.1.
- D. Fabrication and Erection Inspection by the University's Testing Agency: All fabrication and erection of structural steel shall be inspected by the University's Testing Agency. This inspection, in addition to the welding inspection requirements specified herein, shall consist of, but shall not necessarily be limited to, the following:
  - 1. Visually inspect steel shapes and plates for existence of defects such as laminations and non-metallic inclusions. Use ultrasonic equipment and other NDT methods to determine extent of defects.
  - 2. Verify steel materials with mill certificates. Verify weld filler metal materials with certificates and manufacturers recommended limitations.
  - 3. Review rolled shapes for conformity to dimensional standards specified.
  - 4. Inspect high strength bolting in conformance with the "Specification for Structural Joints using ASTM A325 or A490 Bolts" as approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

#### 1.04 SUBMITTALS

- A. Mill Test Reports: Subcontractor shall furnish certified copies of all mill analysis and test reports covering the chemical and physical properties of the steel for review by the University's Testing Agency.
- B. Certificates of compliance: Subcontractor shall submit manufacturers data and certificates of compliance for welding filler metals, electrodes, and coatings and certificates of authenticity for high strength bolts.
- C. Shop Drawings: Subcontractor shall submit shop drawings showing anchor bolt layout, details of members and connections, and erection plans for the execution of the work showing the marking and position of each member.
  - 1. The Subcontractor shall survey and review existing conditions and confirm the asbuilt conditions prior to developing shop drawings. Shop drawings shall be based on as-built condition. Modifications of shop to suit as-built conditions shall be at the Subcontractor's expense.
- D. Spring Snubber:
  - 1. Samples: The Sub Contractor shall submit samples of specified spring snubber devices upon request of the Engineer for approval.
  - 2. Shop Drawings: Include the following:
    - a. Design Calculations: Calculation verifying compliance of the spring snubbers with specified requirements. Certification documents to be signed and sealed by a qualified Professional Engineer with at least five (5) years of experience in the design of seismic restraints.
    - b. Spring Snubber Details: Detail submittal drawings of spring snubbers. Show attachment details.
      - 1) Basis for Certification: Indicate whether the certification is based on actual test of assembled components or on calculations.
    - c. Dimensioned Drawings of Snubber Spring: Identify and describe all components of assembly.
- E. Welding Procedure Specifications: Subcontractor shall submit welding procedure specifications (WPS) and, if necessary associated procedure qualification records (PQR) for all welded joint types.
- F. Review of submittals and shop drawings will cover only the general scheme and character of the details, but not the checking of dimensions, nor will such review relieve the Subcontractor from responsibility for executing the work in accordance with the contract Drawings.

#### 1.05 PROJECT CONDITIONS

- A. Protection: Provide protection of existing equipment in the vicinity of the work as specified in Section 01735. Obtain University approval of proposed protection methods before beginning work.
- B. Access Routes and Laydown Areas: Refer to the Drawings for requirements. Subcontacrtor's personnel shall be limited to the area of construction, designated routes and public areas. Personnel shall not enter experimental areas (red painted floors), except designated routes, without prior authorization.
- C. Crane Use: Building cranes are available for moving material. Advance notice to the University is required. Crane will be operated by University staff.
- D. Fume Exhaust: Fumes from welding inside the building shall be captured by an exhaust fan equipped with a HEPA filter. All grinding and cold cutting of steel shall be performed in such a manner that all slag from welding and flame cutting, metal sparks and shavings shall be captured and removed from the building. Obtain University approval of proposed fume exhaust procedures before beginning work.
- E. Burn Permit : Obtain an LBNL Burn Permit before any flame cutting or welding.
- F. Sequence of Work. Refer to Drawings for requirements.

#### PART 2 - PRODUCTS

### 2.01 PRODUCTS AND MATERIALS

- A. Structural Steel Shapes: ASTM A992, Grade 50.
- B. Channels and Angle Shapes: ASTM A36.
- C. Plates ASTM Grade 50.
- D. Arc-Welding Electrodes: Filler metals shall conform to Table 3.1 of AWS D1.1. Electrodes and equipment settings shall be as recommended by the filler metal manufacturer for the position, thickness or other conditions of actual use. All electrodes and filler metals shall be low hydrogen types.
- E. High-Strength Bolts: ASTM A325, Connection Type SC.
- F. Structural Steel Primer Paint: Refer to Section 09900.
- G. Structural Steel Finish Paint: Refer to Section 09900.
- H. Spring Snubber: Model 632, as manufactured by California Dynamics Corporation, with the following properties, or approved equal.

- 1. Spring Material: ASTM A304, Grade 51B60H (heat treatable).
- 2. Outside Diameter of Spring: 9.25 inches.
- 3. Outer Coil Diameter: 2 inches.
- 4. Inner Coil Diameter: 1-1/4 inches
- 5. Length: ±16 inches.
- 6. Travel: 2.75 inches.
- 7. Spring Stiffness: 27,000 kips/inch.

#### PART 3 - EXECUTION

#### 3.01 GENERAL FABRICATION

- A. Workmanship and details of structural steel work, unless otherwise specified, shall conform to the 2001 California Building Code and the AISC Specification for Design, Fabrication and Erection of Structural Steel for Buildings. The quality of materials and the fabrication of all welded connections shall conform to the American Welding Society's Structural Welding Code, AWS D1.1.
- B. The Subcontractor shall secure all field measurements necessary for the completion of this work. The Subcontractor shall be responsible for all errors of detailing and fabrication and for the correct fitting of the structural members to each other and to their supports. Provide bolts and connections for attachment of the work of other sections to the structural steel.
- C. All materials both before and after fabrication shall be protected from corrosion and shall be kept free from dirt, grease and other foreign matter.
- D. Each framing member shall be free from twists and bends. Holes and all cut and sheared edges shall be neatly made without kinks, butts and warped edges. All steel left exposed shall be straight, smooth and free of nicks, scars and dents. Exposed welds shall be uniform and neat.
- E. Holes for Bolts: Holes for bolts shall be 1/16 inch larger than the nominal diameter of the bolt. If the thickness of the material is not greater than the nominal diameter of the bolt plus 1/8 inch, the holes may be punched. Holes in thicker material shall be drilled from the solid or sub-punched and reamed. Holes for high-strength bolts shall have all burrs removed by grinding.
- F. Faying Surfaces: All faying surfaces for slip critical joints shall be prepared as required for Class A or better per AISC Seismic Provisions Section 7.2.

#### 3.02 WELDING

- A. All welding shall be performed in strict adherence with an approved, written WPS.
- B. Preparation for Welding: All surfaces shall be clean, free of rust, paint and foreign matter of any kind. Scale shall be removed by wire brush, chipping or hammering as required. Thermal cut edges to be welded shall be chipped clean, and ground at least 1/32 inch to bright metal before welding. Clamp members as required, space and alternate welds, all as may be necessary to prevent warping or misalignment.
- C. Weld Quality: Welds shall present a uniform surface, free of imperfections as defined by AWS, and without undercutting or over-lapping and free of excessive oxides, gas pockets and non-metallic inclusions. Welds shall be made with the proper number of beads or passes to secure sound, thoroughly fused joints. Each deposit shall not exceed maximum layer height and bead width specified in AWS D1.1. Each pass shall be cleaned by chipping and wire brushing to remove scale and slag, before placing any additional weld metal.
- D. Preheat: No welding at the joint may proceed, including tack welds, backup bars and weld tabs, until the pre-heating has been completed. Preheat base metals in accordance with AWS D1.1 Table 3.2.

### 3.03 ERECTION

- A. Field Connections: Workmanship of field bolted and welded connections shall conform in all respects to methods and tolerances specified for fabrication.
- B. High strength bolted connections shall be made in conformance with the "Specification for Structural Joints using ASTM A325 or A490 Bolts" approved by Research Council on Riveted and Bolted Joints of the Engineering Foundation.
- C. Tighten nuts using either "Twist-off Element" method, or "Turn-of-Nut" method. Minimum bolt tension as per applicable standard AISC "Specification for Structural Joints using ASTM A325 or A490 Bolts" for each bolt type and size used. Washers may be omitted for ASTM A325 bolts when "Turn-of-Nut" method is used.
- D. Temporary shoring and bracing shall be used wherever necessary and shall be adequate for all loads to which the structure may be subjected, including wind and erection equipment and operation of same. Leave temporary bracing and shoring in place as long as may be required for safety, and until final framing construction is completed and has been accepted by the University.
- E. No final connections shall be made until the structure has been properly aligned. All temporary flooring, planking and scaffolding necessary in connection with the erection of the structural steel, or the support of erection machinery shall be provided as part of the erection work. The temporary floors and scaffolding shall conform to the requirements of all laws governing safety regulations.

- F. Drifting done during assembly shall not distort the metal or enlarge the holes. Mismatching of holes greater than 3/32 inch shall require reaming for the next larger bolt. Mismatching of holes greater than 1/8 inch shall be cause for rejection.
- G. Install drilled anchors in strict accordance with the manufacturer's written recommendations as to tools, torque and tightening procedures. Install anchors in drilled holes with the minimum size and embedment indicated in Schedules and/or Details on the Drawings. When embedment of anchors is not indicated on the Drawings, conform to minimum depths tabulated in the ICBO/UBC Evaluation Reports for the type of wedge anchor used.

# 3.04 PAINTING AND COATING

- A. General: Shop prime all structural steel work unless otherwise noted. Do not prime members or portions of members to be fireproofed or embedded in concrete or mortar. Prime embedded steel which is partially exposed on the exposed portions and the initial 2" of embedded areas only.
  - 1. Apply two coats of primer to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.
- B. Surface Preparation: After inspection, clean all steel work to be primed and prime before shipping from the shop. Remove loose rust, mill scale and spatter, slag or flux deposits. Clean all steel, including steel to be fireproofed or embedded in concrete, as follows:
  - 1. Clean steel in accordance with Steel Structures Painting Council's "Painting Manual" for Solvent Cleaning (SSPC-SP 1) and either Hand Tool Cleaning (SSPC-SP 2) or Power Tool Cleaning SSPC-SP 3).
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with the manufacturer's instructions and at a rate to provide a uniform dry film thickness of 3.0 mils. Use painting methods which will result in full coverage of joints, corners, edges and all exposed surfaces.
- D. After erection and installation, all field welds and areas in which shop painting has been disturbed shall receive surface preparation and prime painting as specified for shop painting.

# 3.05 DEFECTIVE WORK

- A. Work found to be defective, missing or damaged shall immediately be replaced with proper work. Such replaced work and the inspection for same shall be at the expense of the Subcontractor.
- B. Straightening of any material, if necessary, shall be done by a process and in a manner that will not injure the materials, and which is approved by the University. Sharp kinks or bends shall be cause for rejection. Heating will not be allowed.

- C. Delamination and other rolling defects in structural shapes and plates shall be cause for rejection when, in the judgment of the University, repairs are not feasible or acceptable.
- D. If defects or damaged work cannot be corrected in the field, the material shall be returned to the shop or new parts furnished, as the University directs; the Subcontractor shall replace all work at his own expense.

END OF SECTION

# **SECTION 08800**

# GLAZING

# PART 1. GENERAL

## 1.01 SECTION INCLUDES

Glass and glazing required throughout Project and not specified as a part of other Sections.

1.02 RELATED SECTIONS

### Select among the following as appropriate.

- A. Section 01570 Construction Waste Management.
- B. Section 01900 Lateral Force Provisions.
- C. Section 08110 Steel Doors and Frames.
- D. Section 08210 Wood Doors.
- E. Glass and glazing is specified with the following components. Unless otherwise noted, glass and glazing specified elsewhere shall conform to materials and glazing requirements and procedures specified in this Section.
  - 1. Section 06410 Custom Casework.
  - 2. Section 08410 Entrances and Storefront: Glazing gaskets and seals for aluminum entrance and storefront framing.
  - 3. Section 08450 All-Glass Entrances.
  - 4. Section 08520 Aluminum Windows.
  - 5. Section 10810 Toilet Accessories: Mirrors.

#### 1.03 REFERENCES

- A. "Glazing Manual" published by Flat Glass Marketing Assn.
- B. "Safety Standard for Architectural Glazing Materials (16 CFR 1201) CI and CII issued by the Consumer Product Safety Commission.
- C. California Building Code, Chapter 16 as modified by Section 01900 Lateral Force Provisions, and Chapter 24.

- D. ANSI Z 97.1, "Safety Glass Test Requirements".
- E. ASTM C 864, "Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers".
- E. ASTM C 1036, "Standard Specification for Flat Glass".
- F. ASTM C 1048, "Standard Specification for Heat-Treated Flat Glass Kind HS, Kind FT Coated and Uncoated Glass",.
- G. ASTM E 774, "Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units".
- I. DD-G-1403.
- J. Sealed Insulating Glass Manufacturers Association (SIGMA) Recommendations.
- K. BAAQMD Regulation 8-51 Adhesive and Sealant Products.

# 1.04 SYSTEM DESCRIPTION

- A. Install each piece of glass watertight and airtight. Each installation shall withstand local, normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind, including loss or breakage of glass, failure of sealants or gaskets to remain watertight, deterioration of glazing materials, and other defects of work.
- B. Where no thickness of glass is given in the glass schedule, it shall be determined by glass manufacturer for the wind loads specified in the California Building Code Chapter 16 as modified by Section 01900 Lateral Force Provisions.

# 1.05 SUBMITTALS

- A. Product Data: Manufacturer's product data, material safety data sheets, and specifications for installations indicated, listing specific materials proposed. Indicate completely, recommendations for use of primers, joint preparation and sealant dimensions, and shall state shelf life (from date of shipment by manufacturer to expiration date for use on a project) for the material. Provide necessary information required to translate batch number code into date of manufacture and to thereby determine the latest date of usage from manufacturer's shelf life requirements.
- B. Samples:
  - 1. Each glass type required, minimum size 12" x 12".
  - 2. Each type of glazing material and available colors, and accessories.
- C. Certifications:

- 1. Certification that all insulating units furnished comply with Class CBA of ASTM E774 and the performance specified.
- 2. Certification that all sealants are fully compatible with the surfaces and finishes with which they are in contact.
- D. Closeout Submittals: Material Safety Data: Sealant and adhesive quantity use for in accordance with requirements of BAAQMD Regulation 8-51.
- 1.06 QUALITY ASSURANCE
  - A. Regulatory Requirements: Glazing materials and installation shall comply with the requirements of Bay Area Air Quality Management District Regulation 8-51.
- 1.07 DELIVERY, STORAGE AND HANDLING
  - A. Package and deliver glass in manufacturer's sealed unopened containers, fully identified, and each pane clearly labeled with manufacturer's name and product designation.
  - B. Protect glass from damage and store in accordance with manufacturer's recommendations. Keep handling to a minimum. Protect edges of laminated and insulated glass from damage.
  - C. Glazing Sealants:
    - 1. Deliver sealants and related accessories to the job site in factory sealed, unopened containers bearing manufacturer's name, product designation and batch number.
    - 2. Store in unopened containers. Follow manufacturer's recommendations for storage temperatures and shelf life (see "Submittals" above).
    - 3. Follow manufacturer's recommendations for handling products containing toxic materials. Keep flammable material away from heat, sparks and open flame. Use recommended solvents and cleaning agents for cleaning tools, equipment and skin.

# 1.08 ENVIRONMENTAL CONDITIONS

A. Perform no glazing operations when ambient temperature is at or below 40 degrees Fahrenheit.

# 1.09 WARRANTIES

A. Insulating Glass Units: Warrant for 10 years from date of acceptance of Project to be free from delamination and failure of seals and not to develop material obstruction of vision as a result of dust, moisture or film formation on internal glass surfaces.

- B. Low-E Glass: Warrant for 10 years from date of acceptance of Project to be free of peeling or other deterioration of the Low-E coating.
- C. Laminated Glass: Warrant for 10 years from date of acceptance of Project to be free from delamination and discoloration.
- D. Glazing Sealant:s Warrant for 10 years per sealant manufacturer's standard warranty of merchantable quality. Warranty shall certify that cured sealants:
  - 1. Will perform as a watertight weatherseal.
  - 2. Will not become brittle or crack due to weathering or normal expansion and contraction of adjacent surfaces.
  - 3. Will not harden beyond a Shore A durometer of 50, nor soften below a durometer of 10.
  - 4. Will not change color when used with compatible back-up materials.
  - 5. Will not bleed.

# PART 2 PRODUCTS

# 2.01 MANUFACTURERS

A. Glass Manufacturers: PPG, LOF, Guardian Industries, Ford Glass, Hordis Brothers Inc., or equal. Provide all tinted and Low-E glass from the same manufacturer for the entire project.

# 2.02 MATERIALS

- A. Glass types, thicknesses and fabricated assemblies are scheduled in the Glass Schedule included in PART 3. EXECUTION of this Section. Where no thickness is given, it shall be determined by glass manufacturer as specified in Article 1.04 System Description of this Section. Adjacent tinted and Low-E glass shall have the same light transmittance.
  - 1. Clear Annealed Float Glass: Clear float glass conforming to ASTM C 1036, Type I, Class 1, quality q3.
  - 2. Heat Strengthened Clear Float Glass: As specified for clear annealed float glass except heat strengthened to conform to ASTM C 1048, Kind HS.
  - 3. Tempered Clear Float Glass: As specified for clear annealed float glass except fully tempered to conform to ASTM C 1048, Kind FT.
  - 4. Annealed Tinted Float Glass: Glare reducing float glass conforming to ASTM C 1036, Type I, Class 2, quality q3, 1/4" thick.

- a. PPG "Solex", green color, or equal.
- b. LOF "Blue-Green ", blue-green color, or equal.
- c. PPG "Azurelite", blue color, no substitutions.
- d. PPG "Solargray", gray color, or equal.
- e. PPG "Solarbronze", bronze color, or equal.
- 5. Heat Strengthened Tinted Float Glass: As specified for annealed tinted float glass except heat strengthened to conform to ASTM C 1048, Kind HS.
- 6. Tempered Tinted Float Glass: As specified for annealed tinted float glass except fully tempered to conform to ASTM C 1048, Kind FT.
- 7. Clear Wire Glass: 1/4" thick, clear rolled glass conforming to ASTM C-1036, Type II (flat), Class I, Form 1 (wired and polished both faces), wired with welded polished wires, 1/2" x 1/2" square pattern, smooth wires vertical, manufactured by Hordis Bros., Sierracin/Transtech, or equal.
- 8. Annealed Obscure Glass: Conforming to ASTM C 1036, Type II, Class I, Form 3, Finish 1, pattern p3 "hammered" texture glass.
- 9. Tempered Obscure Glass: As specified for annealed obscure glass except conforming to ASTM C 1048, kind FT.
- 10. Obscure Wire Glass: As specified for Clear Wire Glass, except Form 3, Finish 1, pattern p3 "hammered" texture glass.
- Clear Fire Rated Tempered Safety Glass, 20 Minute Rated: "Pyroswiss", no known equal, with UL or Warnock-Hersey label, manufactured by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products, 2425 Carillon Point, Kirkland, WA 98003, Tel. 1-800-426-0279.
- 12. Clear Fire Rated Safety Glass Ceramic, 20 90 Minute Rated: "Firelite Plus", no known equal, with UL or Warnock-Hersey label, manufactured by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products, 2425 Carillon Point, Kirkland, WA 98003, Tel. 1-800-426-0279.
- 13. Annealed Low-E Clear Float Glass: PPG "Sungate 500(2)", or equal, clear float glass with transparent reflective coating on inboard (No. 2) surface, conforming to ASTM C 1036, Type I, Class 2, quality q3.
- 14. Tempered Low-E Clear Float Glass: PPG "Sungate 500(2) ", or equal, [clear][tinted] float glass with transparent reflective coating on inboard (No. 2) surface, tempered to conform to ASTM C 1048, Kind FT.

- 15. Annealed Low-E Tinted Float Glass: PPG "Sungate 500(2)", or equal, clear float glass with transparent reflective coating on inboard (No. 2) surface, conforming to ASTM C 1036, Type I, Class 2, quality q3.
- 16. Heat Strengthened Low-E Tinted Float Glass: PPG "Sungate 500(2)", or equal, tinted float glass with transparent reflective coating on inboard (No. 2) surface, heat strengthened to conform to ASTM C 1048, Kind HS.
- 17. Tempered Low-E Tinted Float Glass: PPG "Sungate 500(2) ", or equal, [clear][tinted] float glass with transparent reflective coating on inboard (No. 2) surface, tempered to conform to ASTM C 1048, Kind FT.
- 18. Heat Strengthened Low-E Tinted Float Glass: PPG "Sungate 1000(2)", or equal, tinted float glass with transparent reflective coating on inboard (No. 2) surface, heat strengthened to conform to ASTM C 1048, Kind HS.
- 19. Tempered Low-E Tinted Float Glass: PPG "Sungate 1000(2)", or equal, tinted float glass with transparent reflective coating on inboard (No. 2) surface, tempered to conform to ASTM C 1048, Kind FT.
- 20. Spandrel Glass: Tempered spandrel glass conforming with DD-G-1403, Grade B, Style II, color as shown or selected by University.
- 21. Insulating Glass:
  - a. Manufacturer And Unit Fabrication: By a member of the Sealed Insulating Glass Manufacturers Assn. (SIGMA) and fabricated in accordance with SIGMA recommendations, except where more stringent requirements are indicated.
  - b. Class: "CBA" and certified as such by the Insulating Glass Certification Council (IGCC).
  - c. Construction: ASTM E 774 organic elastomeric sealed edge (no metal edges permitted) consisting of a polyisobutylene primary seal and a silicone secondary seal, with the interior air space hermetically sealed and provided with a concealed desiccant agent. Secondary seals other than silicone shall not be used.
  - d. Where visible through the glass, the exposed surface of the metal spacer tube shall be painted with thermosetting, siliconized acrylic paint, or equal, color to match the color of aluminum frame at the interior of the building.
  - e. Configuration: As per Glass Schedule.
- 22. Laminated Glass: Fabricated using heat and pressure with Monsanto, or approved equal, clear polyvinyl butyral sheet interlayer, configuration of

assembly as per Glass Schedule. Laminated glass shall conform to requirements of Reference Standard 1.02B.

- 23. Glazing Materials And Accessories: Glazing materials and accessories shall be fully compatible with the materials and finishes with which they are in contact. Neoprene and EPDM materials shall not come in contact with silicone sealant materials. Silicone rubber spacers, setting and edge blocks and gaskets shall be either Type I (designed to prevent adhesion) or Type II (designed for adhesion) as per glazing system manufacturer's recommendations for each condition of use.
  - a. Glazing Tapes: Preformed, preshimmed polyisobutylene-butyl tape, 1/2" wide x thickness to suit proper face clearance of glass, black color; "Pecora BB-50 Extru-Seal", PTI "606", Tremco Preshimmed #440, or "Polyshim" ("Polyshim" only where glass lites exceed 150 united inches), or equal.
  - B. Glazing Sealants: One component, silicone based sealant, black color; Dow-Corning "795" or General Electric "Silpruf 2000", or equal. Sealants shall be recommended by the manufacturer for the particular condition of use.
  - c. Glazing Sealants (Butt Glazing And Steel Windows): One component, silicone based sealant, black color except clear color at butt glazing; Dow-Corning "795" or "999-A", or General Electric "Gesil N 2600", "SCS 100" or "SCS 1200", or equal, as per manufacturer's recommendations for the particular condition of use.
  - d. Primers (If Required For Sealants): Non-staining and non-etching type as recommended by sealant manufacturer.
  - e. Setting Blocks: Neoprene, EPDM or silicone rubber conforming to ASTM C 864, 80-90 Shore A durometer hardness, and which will permit permanent mounting. Blocks shall be 0.1" long for each square foot of glass area (but no less than 4") x 1/16" less than full channel width and of thickness to provide proper bite and minimum edge clearance for glass. Where length of block may become excessive, lead blocks having a length of 0.05" for each square foot of glass (4" min.) may be used. Do not use lead blocks for insulating, laminated or wire glass.
  - f. Edge Blocks: Neoprene, EPDM or silicone rubber conforming to ASTM C 864, 60-70 Shore A durometer hardness, and which will permit permanent mounting. Blocks shall be 3" minimum length x full channel width and of thickness or configuration to provide 1/8" (nom.) clearance between block and glass edge.
  - g. Glazing Spacers: Neoprene, EPDM or silicone rubber conforming to ASTM C 864, 60-70 Shore A durometer hardness, size as required by glazing conditions, continuous (do not use intermittent spacers).

h. Insulation (Glass Spandrels): Owens-Corning Fiberglas "CW 225-FSK", or approved equal, fiberglass, semi-rigid, friction fit board with integral aluminum foil vapor barrier, "R" value as indicated on Drawings. Include galvanized steel mounting channels as required by job conditions.

# 2.03 FABRICATION

- A. Cut glass to full fit and play, consistent with glass and glazing material manufacturers' recommendations and the requirements of the Drawings and References, Codes and Standards Article.
- B. Follow code requirements and glass manufacturer's recommendations for minimum bite and edge and face clearances.
- C. Cut lights to smooth straight edges, clean, free of nicks and flares; nipping not permitted. Follow glass manufacturer's directions exactly for tinted and Low-E glass.
- D. Where glass edges (including cut openings) are required to be exposed, grind smooth and polish.
- E. Tempered and heat strengthened glass shall be horizontally treated only. Fabrication and treatment shall, where at all possible, be such that roller distortion lines (where they may occur) will run horizontally (parallel to sill and head) after installation.
- F. Glass Identification:
  - 1. Tempered and heat strengthened glass shall bear the manufacturer's identification as to type and thickness.
  - 2. Glazing in fire rated doors and fire rated windows shall bear UL classification marking in accordance with UL 9.
  - 3. Manufacturer's and UL identifications for glazing shall be permanently etched so as to be visible after glass has been set in place and glazed.
  - 4. Glass other than tempered, heat strengthened and UL-marked glass shall not have labels.

# PART 3. EXECUTION

# 3.01 EXAMINATION

- A. Inspect surfaces to receive glazing materials and report defects which might adversely affect the glazing work. Commencing work implies acceptance of surfaces as satisfactory.
- B. Weep systems shall be open.

- C. Surfaces shall be free of condensation and moisture.
- D. Steel surfaces shall be primed and dry.

# 3.02 PREPARATION

- A. Clean rebates and glazing reveals free of foreign matter, special coatings, dust, grease, projections and irregularities prior to setting glass. Solvents used for cleaning shall not etch or damage glass or metal surfaces.
- B. Wipe glass free of dust and oil.

# 3.03 INSTALLATION

- A. Conform to recommendations of glass manufacturer where such covers points not shown on Drawings or specified herein.
- B. Remove "loose" stops furnished with the units and reinstall as a part of the glazing operation.
- C. Handle lites so as to prevent nicks and flares on glass edges.
- D. Install glass exceeding 1/8" thickness on identical setting blocks permanently mounted and centered at 1/4 points. If necessary to reduce deflection of horizontal supporting member, blocks may be placed at 1/8 points or with the nearest end 6" (whichever is greater) from edge of glass unit. Ensure that blocks are equidistant from centerline of glass. Do not obstruct weep holes.
- E. Provide permanently mounted edge blocks at head and jambs of dry-glazed lights to prevent damage to glass edges during installation and lateral shifting of glass due to thermal and seismic loads and vibrations. Follow recommendations of Flat Glass Marketing Assn. Glazing Manual.
- F. Set glass to maintain bite, edge and face clearance stipulated by code and the glass manufacturer.
- G. Take special precautions to protect laminated glass edges from deterioration of vinyl interlayer by moisture.
- H. Glaze dry-glazed aluminum doors and frames as per manufacturer's directions using glazing gaskets and seals furnished with the units.
- I. Miter gaskets at corners, and install so as to prevent pulling away at corners. Gaskets with gaps or other visible irregularities on door and window units shall be corrected by manufacturer or fabricator at no additional cost to University.
- J. Set interior non-wired glass in fixed stops with glazing tape one face.

- K. Wire glass installed in metal frames and stops shall be embedded in metal sash putty, and all exposed joints between the metal and the glass struck and pointed.
- L. Close and tightly seal all partly used sealant containers, and store protected in well-ventilated area at temperature recommended by sealant manufacturer.

# 3.04 FIELD QUALITY CONTROL

- A. Conduct field check (test) of glazing in exterior for water leakage in accordance with AAMA 501.2.
- B. After substantial cure of exterior glazing sealants which are exposed to the weather, test for water leaks. Flood the joint exposure with water directed from a 3/4 inch garden hose held perpendicular to the wall face, 24 inches from the joint, connected to a water system with 43 psf minimum static water pressure. Move stream of water along joint at an approximate rate of 20 feet per minute.
- C. Test approximately 5% of total glazing system in locations which are typical of every joint condition and which can be inspected easily for leakage on opposite face. Conduct tests in presence of the Project Manager, who will determine actual percentage of joints to be tested and the actual period of exposure to water from hose, based upon extent of observed leakage or lack thereof.
- D. Repair glazing installation at leaks or, where leakage is excessive, replace glazing sealants.
- E. Where nature of observed leakage indicates possibility of inadequate glazing joint bond strength, the Project Manager may direct that additional testing be performed at a time when joints have been fully cured, followed by natural exposure through both extreme temperatures, and returned to range of temperature in which it is feasible to conduct testing. Repair or replace work as required for permanent elimination of leakage.

#### 3.05 WASTE MANAGEMENT

- A. Separate float glass and place in designated containers for recycling.
- B. Separate tempered glass and place in designated containers for recycling.
- C. Separate corrugated cardboard in accordance with the approved Waste Management Plan in Section 01570 Construction Waste Management and place in designated containers for recycling.

Place used sealant containers in designated containers for legal disposal.

# 3.06 CLEANING

A. Initial cleaning of glass surfaces is a part of this Section. Follow glass manufacturer's directions exactly for cleaning tinted and Low-E glass. Do not use abrasive cleaners or sharp instruments. Final cleaning and periodic cleaning of glass for protection from etching due to alkaline runoff from cementitious surfaces or due to construction soil is a part of the General Subcontract and is specified as a part of Division 1.

### 3.07 PROTECTION

- A. Protect installed glass from damage due to subsequent construction operations.
- B. Identification or caution markers shall not be applied to glass surfaces nor shall they be applied to metal surfaces in any way which would damage or stain the metal.
- C. Replace glass broken or damaged prior to acceptance of Project. Costs occasioned by replacement shall be borne by those causing the damage.

# 3.08 GLASS SCHEDULE

A. Glass types are indicated on Drawings.

<u>Glass Type</u>	Material or Assembly
IA	Annealed clear float glass, 1/4" thick.
2A	Heat strengthened clear float glass, 1/4" thick.
3A	Tempered clear float glass, 1/4" thick.
3B	Tempered clear float glass, 3/8" thick.
3C	Tempered clear float glass, I/2" thick.
3D	Tempered clear float glass, 3/4" thick.
4A	Annealed tinted float glass, 1/4" thick.
4B	Heat strengthened tinted float glass, 1/4" thick.
4C	Tempered tinted float glass, 1/4" thick.
5A	Annealed Low-E clear float glass, 1/4" thick.
5B	Tempered Low-E clear float glass, 1/4" thick.
6A	Heat strengthened Low-E tinted float glass, 1/4" thick.
6B	Tempered Low-E tinted float glass, 1/4" thick.
7A	Spandrel glass, 1/4" thick.
7B	Spandrel glass, 1/4" thick, with insulation.
8A	Annealed obscure glass, 1/4" thick.

- 8B Tempered obscure glass, 1/4" thick.
- 9A Clear wire glass, 1/4" thick.
- 9B Obscure wire glass, 1/4" thick.
- 10A Insulating glass fabricated with 1/4" thick clear annealed float glass outboard light, 1/2" air space and 1/4" thick clear annealed float glass inboard light.
- 10B Insulating glass fabricated with 1/4" thick tempered clear float glass outboard light, 1/2" air space and 1/4" thick clear tempered float glass inboard light.
- 11A Insulating glass fabricated with 1/4" thick tinted annealed float glass outboard light, 1/2" air space and 1/4" thick clear annealed float glass inboard light.
- 11B Insulating glass fabricated with 1/4" thick tinted heat strengthened float glass outboard light, 1/2" air space and 1/4" thick clear annealed float glass inboard light.
- 11C Insulating glass fabricated with 1/4" thick tempered tinted float glass outboard light, 1/2" air space and 1/4" thick clear tempered float glass inboard light.
- 12A Insulating glass fabricated with 1/4" thick tinted Low-E annealed float glass outboard light, 1/2" air space and 1/4" thick clear annealed float glass inboard light.
- 12B Insulating glass fabricated with 1/4" thick tinted Low-E heat strengthened float glass outboard light, 1/2" air space and 1/4" thick clear annealed float glass inboard light.
- 12C Insulating glass fabricated with 1/4" thick tempered tinted Low-E float glass outboard light, 1/2" air space and 1/4" thick clear tempered float glass inboard light.
- I3A Laminated glass fabricated with one layer [inner][outer] of 1/4" thick heat strengthened clear float glass and one layer [inner][outer] of 1/4" thick, tempered clear float glass with 0.060" interlayer.

# END OF SECTION

# **SECTION 09900**

#### PAINTS AND COATINGS

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Paint all new structural steel members and connections and touch-up adjacent existing structural steel where existing paint has been removed to make new connections. Work includes the following:
  - 1. Preparation of surfaces of new and existing structural steel.
  - 2. Application of primer, in shop for new elements and in place for existing elements.
  - 3. Application of finish coats, outside of building, for new elements and in place for existing elements.
  - 4. Touch-up of surfaces after installation.

#### 1.02 RELATED SECTIONS

- A. Section 01570 Construction Waste Management.
- B. Section 05100 Structural Steel: Shop primed items.
- C. Section 13281 Hazardous Material Remediation: Lead-Based Paint and Dust.
- D. Section 13285 Hazardous Materials Remediation: Asbestos.
- E. Division 16 Electrical: Shop primed items.

### 1.03 SURFACES NOT TO BE PAINTED

- A. Walls or ceilings of concealed or inaccessible areas.
- B. Fire or smoke rating labels on doors or frames.
- C. Equipment name plates.
- C. Fire sprinkler heads.
- E. Heat detectors.
- F. Smoke detectors.
- G. Piping identification labels.
- H. Moving parts of mechanical or electrical equipment.

- I. Galvanized chain link fences and gates.
- J. Galvanized traffic bumper rails.

#### 1.04 SUBMITTALS

- A. Product Data:
  - 1. Materials List: Complete list of proposed manufacturers and products.
  - 2. Manufacturer's Specifications: Manufacturer's technical information for each product, including paint analysis and application instructions.
  - 3. Material safety data sheets for each product.
- B. Samples:
  - 1. Samples: 8-1/2" x 11" samples of each color, texture and sheen on glossy card stock. Allow for applying field samples two additional times in order to achieve desired colors, without additional cost to LBNL or delay in schedule.
- C. Certificates: Provide certificate from each manufacturer stating material is premium quality and suitable for intended use on this Project.
- D. Closeout Submittals:
  - 1. Two copies of manufacturer's color and sheen formula, and 4" x 6" color chips, for each final color used in the Project.
  - 2. Product Usage Records: Three copies of product usage records for each paint, coating and solvent product used in the project. Include product name, amount used, description of use and use location, and period of time over which the product was used.
  - 3. Manufacturer's Warranty:
    - a. Twenty-year limited warranty for exterior 100% acrylic coatings.
    - b. Five year warranty for labor and materials for elastomeric coatings.

#### 1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years documented successful experience in work of similar scope.
- B. Regulatory Requirements:
  - 1. Bay Area Air Quality Management District (BAAQMD) Regulation 8-3 Architectural Coatings.
  - 2. East Bay Municipal Water District (EBMUD) regulations.

- 3. Products containing chromates, cadmium, lead, or mercury or are not permitted.
- C. Manufacturer's Instructions: Perform painting work in accordance with manufacturer's written instructions and recommendations.
- D. Pre-Installation Meeting: Before painting begins, meet with Project Manager, University's Inspector, EH&S Representative, Architect and Subcontractor to discuss painting work, color schedule, product compliance, and hazardous material remediation.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the Project in original, new, unbroken packages and containers bearing manufacturer's name and label, with:
  - 1. Name of material, color and sheen.
  - 2. Manufacturer's name, product number and date of manufacture.
  - 3. Contents by volume of major pigments, vehicle constituents and volatile organic compound (VOC) content.
  - 4. Thinning and application instructions.

### 1.07 PROJECT CONDITIONS

- A. Comply with paint manufacturer's instructions on temperature and humidity conditions under which materials can be applied.
- B. Environmental Requirements:
  - 1. Lead: Existing paint on structural steel framing has been tested and found to contain lead.
    - a. Lead-Related Work: Comply with requirements of Section 13281 -Hazardous Materials Remediation - Lead-Based Paint and Dust.
  - 2. Silica Dust: Incorporate controls to eliminate visible emissions from any activity, which may generate silica dust, such as abrasive blasting.
    - a. Do not use silica sand or other substances containing more than 1 per cent crystalline silica as abrasive blasting materials.
    - b. Prevent exposure of workers and others to dust using methods such as removing dust with water, high efficiency particulate air (HEPA) filters, and wet sweeping. Do not use compressed air or dry sweeping to remove dust.
  - 3. Contain and dispose of materials resulting from cleaning, including leadcontaining materials, in accordance with LBNL procedures and applicable regulations.

4. Disposal down LBNL sanitary drains or storm drains of solvents, etching materials, or water contaminated with solvents or etching materials, is not permitted. Contain and dispose of such materials at legal disposal sites approved for this purpose.

#### 1.08 MAINTENANCE STOCK

A. Provide 1 full gallon/s of each type and color of finish coats used on the Project. Label with paint manufacturer, paint type, product number, color, sheen and its representative use on the Project.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Acceptable Manufacturers: ICI Paint Stores, Benjamin Moore, Dunn-Edwards, Fuller-O'Brian, or Sherwin Williams.
  - 1. Unless otherwise indicated, ICI Paint Store products are specified in Paint Schedule Articles 3.07 to establish standards and type of materials required. Equal products of manufacturers specified above are acceptable.

### 2.02 MATERIALS

- A. Material Quality:
  - 1. Provide premium quality materials. Materials not bearing manufacturer's identification as a premium-grade product are not acceptable.
  - 2. Should manufacturer's specifications or product numbers change, provide its current equal or better product.
  - 3. Primer and undercoats are to be of same manufacturer as final coat.
  - 4. Materials left from previous jobs are not acceptable.
  - 5. Use only thinners approved by paint manufacturer, and use only within recommended limits.
  - 6. Etching Solutions: As recommended by paint manufacturer for the use intended.
  - 7. Solvents: Non-petroleum based, as recommended by paint manufacturer for the use intended.
  - 8. Crack Filler: Elastomeric, approved by paint manufacturer for the particular use intended.

- B. Finish Coat Coordination: Provide finish coats which are compatible with prime paints used.
  - 1. Review other Sections in which prime paints are provided. Ensure compatibility of total coating systems.
  - 2. Upon request from other trades, furnish information on characteristics of finish materials proposed for use.
  - 3. Provide barrier coats over incompatible primers, or remove and reprime.
  - 4. Notify LBNL in writing of any problems anticipated in use of specified coating systems with substrates primed by others.

#### 2.03 COLORS

- A. General:
  - 1. Use of proprietary names in color selections does not imply exclusion of equivalent products of other manufacturers.
  - 2. The proposal and acceptance of any paint manufacturer shall not restrict LBNL to selection of standard colors of that manufacturer.
  - 3. Color shall match color of existing structural steel.
- B. Finish coat colors shall be factory mixed.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Examine areas and conditions under which painting work is to be applied.
  - B. Do not paint over dirt, rust, scale, grease, oil, dust, moisture, scuffed or damaged surfaces, or conditions detrimental to a durable paint life.
  - C. Starting work indicates acceptance of conditions of surfaces and within any particular area.

### 3.02 PREPARATION

- A. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as specified for substrate condition.
- B. Remove hardware, accessories, and items in place and not to be painted, or provide protection prior to surface preparation and painting. Reinstall removed items after painting.

- C. Clean surfaces before applying paint. Remove oil and grease prior to mechanical cleaning. Schedule cleaning so contaminants from cleaning process do not fall onto wet, newly painted surfaces.
- D. Moisture Content: Do not paint over surfaces where moisture content exceeds manufacturer's instructions.
- E. Ferrous Metals:
  - 1. Bare Surfaces: Clean of oil, dirt, loose mill scale, and other foreign substances with solvent or by mechanical cleaning.
  - 2. Shop Applied Primer: Touch up where damaged or bare using same type of primer as adjacent surfaces.
  - 3. Galvanized Surfaces: Clean free of oil and surface contaminants using etching solution, and rinse with water to neutralize
- F. Mix painting materials in accordance with manufacturer's instructions.
- G. Store materials in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
  - 1. Cover containers of coatings or solvents when not in use.
- H. Stir materials before application to produce mixture of uniform density, and stir as required during application. Do not stir surface film into material, strain material before using if necessary.

#### 3.03 APPLICATION

- A. Apply paint in accordance with manufacturer's instructions. Use applicators and techniques best suited for substrate and type of material being applied.
  - 1. Apply additional coats when stains or blemishes show through final coat, until paint is a uniform finish, color and appearance.
  - 2. Ensure dry film thickness at corners and crevices is equivalent to that of flat surfaces.
  - 3. Sand lightly between each succeeding enamel or varnish coat.
  - 4. Existing painted surfaces which are totally intact may be finished with the 2nd and 3rd coats specified in Painting Schedule. Loose or otherwise damaged surfaces shall receive 3-coat system.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated or otherwise prepared for paint as soon as practicable after preparation.
  - 1. Do not apply materials in areas where dust is being generated, or will be generated, before coatings are thoroughly dry.

- 2. Do not commence painting work in an area or space until all firestopping work in that area or space has been completed and inspected.
- 3. Allow time between successive coats to permit proper drying.
- 4. Do not recoat until paint feels firm and does not deform or feel sticky under moderate thumb pressure.
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to achieve a total dry film thickness (DFT) as recommended by coating manufacturer.
  - 1. Dry film thicknesses specified in Article 3.07 are those recommended by ICI for their particular products. Where products of other manufacturers are approved, apply materials at the spreading rate recommended by those manufacturers to achieve their recommended DFT.
- D. Prime Coats: Apply to items not previously primed. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat.
- E. Finish Coats: Provide even texture. Leave no laps, irregularity in texture, skid marks, or other surface imperfections.
  - 1. Opaque Finishes: Provide opaque, uniform finish, color and coverage. Cloudiness, spotting, holidays, brush marks, runs, sags, ropiness or other surface imperfections are not acceptable.
    - a. Concrete Floors: Evenly apply abrasive material recommended by paint manufacturer at density in approved sample.
  - 2. Transparent Finishes: Provide glass smooth surface film of even luster. Cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections are not acceptable.
- F. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not accepted.

#### 3.04 FIELD QUALITY CONTROL

- A. LBNL may require materials testing procedures at any time during field painting.
- B. If test results show material being used does not comply with requirements, Subcontractor may be directed to remove non-complying work, pay for testing, and repaint surfaces at no additional cost to LBNL.

# 3.05 CLEANING

- A. Remove discarded paint materials, rubbish, cans and rags from site at end of each workday.
  - 1. Keep flammable materials in approved labeled containers in a well-ventilated area.

- 2. Cover containers of coatings or solvent products when not in use.
- B. Protection: Protect work of other trades, whether to be painted or not. Correct damage by cleaning, repairing, replacing, or repainting, as acceptable to Project Manager.
  - 1. Clean glass and paint-spattered surfaces immediately by proper methods of washing and scraping. Do not damage or scratch finished surfaces.
  - 2. Do not paint fire sprinkler heads, heat detectors, or smoke detectors. If painted by Subcontractor, remove and replace with new items at no additional cost LBNL.
  - 3. Provide "Wet Paint" signs to protect new painted finishes.
  - 4. Remove temporary protective wrappings, provided by others for protection of their work, after completion of painting operations.
  - 5. Do not cover operating mechanical or electrical equipment.
- C. Repair: At completion of work by other trades, touch up and restore damaged surfaces or defaced painted surfaces.

#### 3.06 WASTE MANAGEMENT

A. Deliver unused paint in original containers to recycler in accordance with requirements of Section 01570 – Construction Waste Management.

## 3.07 PAINT SCHEDULE - INTERIOR COATINGS

- A. Primers:
  - 1. Metals Unprimed Ferrous:

Preparation:	Commercial Blast (Sspc-Sp6)		
Primer:	4020 Devflex 1000 White DTM Flat Interior/Exterior Waterborne Primer & Finish	Dry Mils 2 Voc 91 0	2.7 G/L

2. Metals - Shop Primed:

Touch Up		
Touch Up Primer:	4020 Devflex 1000 White	Dry Mils 2.7
	DTM Flat Interior/Exterior	Voc 91 G/L
	Waterborne Primer & Finish	

- B. Coating Systems:
  - 1. Metals:
    - a. Flat:

	1st Coat: 2nd Coat:	Primer Lm 9100 Lifemaster Flat Vinyl Acrylic	Dry Mils Dry Mils Voc	As Noted 1.3 0 G/L
	3rd Coat:	Lm 9100 Lifemaster Flat Vinyl Acrylic	Dry Mils Voc	1.3 0 G/L
b.	Low Luster:			
	1st Coat:	Primer	Dry Mils	As Noted
	2nd Coat:	Lm 9300 Lifemaster Eggshell Vinyl Acrylic	Dry Mils Voc	1.6 0 G/L
	3rd Coat:	Lm 9300 Lifemaster Eggshell Vinyl Acrylic	Dry Mils Voc	1.6 0 G/L
с.	Semigloss:			
	1st Coat:	Primer	Dry Mils	As Noted
	2nd Coat:	Lm 9200 Lifemaster Semigloss Vinyl Acrylic	Dry Mils Voc	1.4 0 G/L
	3rd Coat:	Lm 9200 Lifemaster Semigloss Vinyl Acrylic	Dry Mils Voc	1.4 0 G/L

END OF SECTION

# **SECTION 13281**

# HAZARDOUS MATERIALS REMEDIATION:

# REMOVAL OF LEAD PAINT, LEAD WELDING / HOT CUTTING OPERATIONS, REMOVAL OF SETTLED LEADED DUST

### PART 1 - GENERAL

- 1.01 SECTION INCLUDES
  - A. Lead paint removal, Settled leaded dust removal, Welding / hot cutting operations on steel where lead paint has been abated as indicated in Drawings and Specifications.
  - B. Compliance with all applicable Federal, State, and local regulations pertaining to work practices.
  - C. Protection of workers, visitors to the site, and persons occupying areas adjacent to the site.
  - D. Provide medical examinations and maintain medical records of personnel as required by the applicable Federal, State, and local regulations.
  - E. The scope of this work does not include the manifesting, transporting, or disposal of hazardous waste. The University will manifest, transport, and dispose of hazardous waste that has been properly packaged, labeled, and stored by the subcontractor.
  - F. The University's review and approval of the lead abatement, cutting/welding subcontractor's Lead Compliance Work Plan (Attachment A) describing the means and methods of lead related work prior to work commencing.

# 1.02 RELATED SECTIONS

- A. Section 01730 Cutting and Patching.
- B. Section 01735 Selective Demolition.
- C. Section 05100 Structural Steel.
- D. Section 09900 Paints and Coatings.
- 1.03 DEFINITIONS
  - A. Lead in paint: The Consumer Product Safety Commission (CPSC) considers any paint or other surface coating as containing lead at concentrations greater than or equal to 600 parts per million (ppm), 0.06%

by weight; however, OSHA regulations apply to any detectable amount of lead in construction.

- B. Lead-In-Construction Supervisor: One who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has the authorization to take prompt corrective measures to eliminate them.
- C. Lead-in-air Action Level (AL):  $30 \mu g/m^3$ .
- D. Lead-in-air Permissible Exposure Limit (PEL):  $50 \mu g/m^3$ .
- 1.04 SUBMITTALS (For review and approval by University's Project Manager)
  - A. Product Data: Submit five (5) copies of the following:
    - 1. Material Safety Data Sheets (MSDS) sheets for each product containing hazardous materials as defined by OSHA's Hazardous Communication Standard; 29 CFR 1910.1200.
  - B. Quality Assurance/Control Submittals: Submit five (5) copies of the following:
    - 1. Lead Compliance Work Plan: Detailed, job-specific plan of the procedures proposed for use in complying with the requirements of this Specification and 29 CFR 1926.62.
      - a. As a minimum, provide the information required in Attachment A, the Lead Compliance Work Plan Outline.
      - b. The plan shall be approved by the University prior to the mobilization of equipment, supplies, or workers to the site.
    - 2. Worker Certification: Current lead worker certifications for personnel to be engaged in the work of this Section. Workers will not be permitted on the project site until the submittal is complete and has been accepted by the Project Manager. Provide legible copies of the following information for each worker:
      - a. Employee quantitative respirator fit-test records that identify the testing agency, the individual fit test exercise fit factor results, and the overall fit factor result;
      - b. Employee medical approval to wear respirator protection records;
      - c. Photo copy of current DHS-certified lead supervisor picture-identification card for the designated lead supervisor only;
      - d. Photo copy of current DHS-certified lead worker pictureidentification card for all workers;

- e. Blood lead measurements collected no more than three workdays prior to work commencing;
- f. Employee picture identification matching names on records. Picture IDs can be photo copies of taining cards; however, pictures of employee faces must be viewable vs. dark images from poor quality photo copying; and
- g. Welders hot cutting or welding on steel where lead paint has been removed shall submit items a,b, and e.
- 3. Training Program: Proof that training of all personnel engaged in work under this Section is current and in accordance with the provisions of OSHA.
- 4. Respiratory Protection Program: Submit company's Respiratory Protection Program for review and approval by the University.
- 5. All submittals will be provided to LBNL at least three (3) working days prior to mobilization and must be approved prior to work commencing.
- C. Closeout / Ongoing Project Submittals
  - 1. Personal air sampling results collected by the welding/abatement subcontractor for airborne lead within 24 hours of sample collection.
  - 2. Blood lead measurements collected within three workdays following the completion of lead related work and per 29 CFR 1926.62.
  - 3. Per 29 CFR 1926.62, the subcontractor shall notify their employees of exposure monitoring results. LBNL requires written documentation from the subcontractor that demonstrates the subcontractor's employees were notified of their results within 5 days of receiving the results including both excursion and calculated 8 hour TWA results for all results, not just those results above the PEL or excursion limit.

# 1.05 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Qualifications of Subcontractor:
    - a. Work performed under this Section shall be by a single Subcontractor.
    - b. The Subcontractor shall have a minimum of five (5) years experience as an approved lead abatement/ welding
subcontractor. If requested, the Subcontractor shall provide the names and locations of 5 projects of similar size and scope that he has completed within the previous five years.

- 2. Qualifications of Lead Abatement/ Welding Personnel:
  - a. All work shall be completed utilizing fully qualified persons who are trained, experienced, and knowledgeable in the proper techniques and procedures for lead abatement welding activities covered by this Section.
  - b. Lead Workers: All workers performing lead-based paint removal shall be currently certified as DHS Lead Workers. Welders performing welding or hot cutting on steel where lead paint was removed shall be trained by the subcontractor per 29 CFR 1926.62.
  - c. Lead-in-Construction Supervisor: Currently certified as a DHS Lead Supervisor.
- 3. Qualifications of Analytical Laboratory:
  - a. The subcontractor shall submit lead samples to an analytical laboratory that is accredited by the American Industrial Hygiene Association's (AIHA) *Industrial Hygiene Laboratory Accreditation Program* (IHLAP) and *Environmental Lead Laboratory Accreditation Program* (ELLAP) and maintains current accreditation throughout the duration of this project.
- B. Regulatory Requirements: All lead paint, settled leaded dust, welding / hot cutting removal work shall be performed in accordance with requirements of Federal, state and local, including but not limited to the following:
  - 1. Federal Regulations:
    - a. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA):
      - 1. Lead Standard: Title 29, Part 1926, Section 62
      - 2. Respiratory Protection: Title 29, Part 1910, Section 134
      - 3. Construction Industry: Title 29, Part 1910, Section 2
      - 4. Hazard Communication: Title 29, Part 1910, Section 1200
    - b. U.S. Environmental Protection Agency (EPA):

- Resource Conservation and Recovery Act (RCRA): Title 40, Part 260 to 265
- c. U.S. Department of Transportation (DOT):
  - 1. Hazardous Substances: Title 49, Part 171 and 172
- d. U.S. Department of Energy (DOE)
  - 1. Worker Protection Rule: Title 10, Part 851
- 2. State Regulations:
  - a. California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA):
    - 1. Lead Standard: Title 8, Section 1532.1, California Code of Regulations
  - b. Contractors State License Board (CSLB):
    - 1. Licensing: Section 7058.5, California Business and Professions Code
  - c. California Environmental Protection Agency (Cal/EPA).
    - 1. Disposal Requirements: Title 22 and 23, California Code of Regulations
  - d. California Department of Health Services (DHS)
    - 1. Accreditation, Certification, and Work Practices in Lead-Related Construction: Title 17, Article 16, California Administrative Code
- 3. Local Regulations:
  - a. Bay Area Air Quality Management District (BAAQMD).
    - 1. Lead: Regulation 11, Rule 1
  - b. San Francisco Bay Regional Water Quality Control Board.
    - 1. Waste Water: San Francisco Bay Basin Water Quality Control Plan.
- C. Pre-Construction Meeting: At least one week before work commences, a pre-construction meeting shall be held at a location designated by the University's Project Manager. Attendees shall include the University's Project Manager, Construction Manager, Superintendent, Safety Inspector, Building Inspector, and Industrial Hygienist; the Subcontractor's Project Superintendent and Abatement Superintendent; and others as necessary. The agenda shall include a review of project safety requirements, the Subcontractor's written lead compliance work plan, emergency contacts and notification plan, containment and work area design, facility requirements, submittals, and any other issues pertinent to the safe

execution of the lead paint removal settled leaded dust, welding / hot cutting work.

1. Work shall not commence until all required submittals and plans have been approved by the University.

## 1.06 PROJECT/SITE CONDITIONS

- A. Existing Conditions:
  - 1. Paint that contains lead and / or settled leaded dust is known to be present on surfaces at the Project site. Surfaces which have not been previously tested, that may be affected by the project scope, should be assumed to contain lead and handled according to this section. See Attachment B for lead testing results.
    - a. If any other materials are found which are suspected of containing lead or other hazardous materials, immediately stop work in the affected area and notify the University's Project Manager. Handle suspected lead containing material according to this section.
  - 2. The University will occupy adjacent areas during the course of the Work. Work under this Subcontract shall not affect the University's operation of adjacent areas.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. Plastic Sheeting: Fire retardant polyethylene sheeting conforming to NFPA 701 and ASTM S502-74T for surface flammability and smoke density. A single polyethylene film in the largest sheet size possible to minimize seams, 6 mils thick, clear, frosted or black as indicated.
- B. Duct Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to polyethylene sheeting.
- C. Spray Adhesive: Shall not contain methylene chloride, as listed on the product's label and/or Material Safety Data Sheet (MSDS). Provide spray adhesive in aerosol cans that is specifically formulated to stick aggressively to polyethylene sheeting.
- D. Disposal Bags: 6-mil polyethylene.
- E. Lead-Containing Materials Disposal Containers: Leak-tight drums.
- F. Detergent: High-phosphate wash containing at least 5% trisodium phosphate (TSP).
- 2.02 EQUIPMENT

- A. Clothing: Furnish the following for each worker and others as specified.
  - 1. Coveralls:
    - a. Disposable full-body coveralls with attached head and foot covers conforming to requirements of OSHA Standards 29 CFR 1926.62.
  - 2. Respirators:
    - a. Full facepiece negative pressure respirators with an assigned protection factor of 50X the PEL, or equivalent, for the removal of lead paint or settled leaded dust.
    - b. Full facepiece, Powered Air Purifying Respirators (PAPRs) are required for welding or torch cutting operations where lead paint has been removed.
    - d. Respirators shall be equipped with HEPA (P-100) Filters.
    - e. Powered Air Purifying Respirators (PAPRs) that have been quantitatively fit tested and equipped with HEPA (P-100) filters shall be acceptable substitutes for the respirators specified in 2.02(A)(2)(a).
  - 3. Goggles, safety glasses, face shields: Provide eye and face protection as required by OSHA.
  - 4. Gloves:
    - a. Leather work gloves for welding / hot cutting.
    - b. Compatible chemical resistant gloves for paint removal products.
  - 5. Boots: Steel toed foot protective work boots with non-skid soles and steel shanks.
  - 6. Hard Hats: Head protection (hard hats) approved by ANSI.
  - 7. Soap and Towels.
- B. Industrial Grade Vacuum and Exhaust Equipment: High Efficiency Particulate Air (HEPA) filtered vacuum and exhaust equipment with appropriate HEPA filters for lead contaminated dust / fume aerosols. Household HEPA vacuum cleaners shall not be acceptable.
- C. Temporary Shower Facility: A pre-fabricated or site-built temporary shower facility, with hot and cold water to shower head that can be controlled from inside shower, shall be installed and used by all workers when airborne lead levels exceed or are predicted to exceed the PEL without regard to respiratory protection.

- D. Temporary Washing Facilities: A sink with hot and cold water supply and soap for washing hands and face prior to breaks, lunch, and leaving the worksite at the end of the shift shall be used by all workers regardless of the airborne lead results.
- E. Pressure differential recorders shall be in working condition, calibrated and operated continuously during the operation of the negative pressure enclosure and provide a pressure reading at least every 10 minutes, or more frequent, and provide a written documentation of the pressure readings that will be submitted to LBNL at the end of the project.

## PART 3 - EXECUTION

- 3.01 PROTECTION
  - A. General:
    - 1. Take appropriate continuous measures as necessary to protect all building occupants from exposure to lead dust and fumes. Such measures shall include the procedures and methods described herein, and shall be in accordance with regulations and guidelines of applicable Federal, State, and local agencies.
    - 2. Securing the Work Area: Secure the work area from access by the public, occupants, staff, or users of the building.
      - a. Provide and maintain temporary partitions to prevent spread of dust, fumes, odors, and noise to permit continued University occupancy.
      - b. Demarcate the work by posting warning signs at each locked door and at the entrance to the change room leading to the controlled area as follows:

#### WARNING LEAD WORK AREA POISON NO SMOKING OR EATING

- 3. Protect all existing materials, appurtenances and equipment that are not to be abated. Existing materials, appurtenances and equipment, building exterior and interior, and landscaping altered or damaged during lead related work shall be repaired or replaced by the Subcontractor to match existing undisturbed conditions at no additional cost to the University.
- 4. Utility shutdowns shall be in accordance with Section 01210.

- 5. Maintain access and egress to building and all rooms at all times.
- 6. Do not block or reduce width of egress to exits.
- 7. Conduct operations with minimum interference to corridors, exits, and public thoroughfares.
- 8. Use periodic light water mist, temporary enclosures, and other suitable methods to limit the release of airborne lead dust and fumes. Comply with applicable regulations pertaining to environmental protection. Use water outside the work area only if approved by the Project Manager.
- 9. Path of travel for debris removal shall be maintained dust free and clean at all times.
- 10. Cover and protect windows, doors, and walls that are adjacent to lead work areas.
- 11. Water used during this project to remove or wet lead paint or lead dust shall be collected and prevented from entering storm water drains.
- 12. Eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics is prohibited in the work area.
- B. Personnel:
  - 1. Lead-in-Construction Supervisor:
    - a. Provide an on-site, full-time Lead-in-Construction Supervisor (or Supervisors) to ensure that the worker protection program is effective.
    - b. The Lead-in-Construction Supervisor shall have the authority to shut down the project in accordance with 29 CFR 1926.62.
  - 2. Lead Workers: The Subcontractor shall communicate information concerning lead hazards according to the requirements of the Hazard Communication Standard (29 CFR 1910.1200), including but not limited to the requirements concerning warning signs and labels, material safety data sheets (MSDS), and employee information and training.
  - 3. Training Program: The Subcontractor shall assure that each worker and supervisor holds current training records meeting OSHA requirements. The training shall include the following:
    - a. The content of the OSHA Lead in Construction Standard (29 CFR 1926.62);
    - b. The specific nature of the operations that could result in exposure to lead above the action level;

- c. The purpose, proper selection, fitting, use, and limitations or respirators;
- d. The purpose and a description of the medical surveillance program, and the medical removal protection program, including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females and hazards to the fetus and additional precautions for workers who are pregnant);
- e. The engineering controls and work practices associated with the worker's job assignment including training of workers to follow relevant good work practices described in 29 CFR 1926.62;
- f. The contents of any compliance plan and the location of regulated area in effect;
- g. Instructions to workers that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician, and;
- h. The worker's right of access to medical records.
- i. In addition to items a-h of this section, workers who perform lead removal work must also be DHS lead trained workers according to 17 CCR Division 1, Chapter 8.
- 4. Medical Surveillance:
  - a. Provide medical examinations for all workers performing the removal of lead paint, removal of settled leaded dust, or welding / hot cutting steel where lead paint was removed per 29 CFR 1926.62.
  - b. Blood testing (blood lead and zinc protoporphyrin) shall be performed for all workers performing the removal of lead paint, removal of settled leaded dust, or welding / hot cutting steel where lead paint was removed, no more than three work days prior to work commencing and within three work days following the completion of lead related work and in accordance with 29 CFR 1926.62.
- 5. Respiratory Protection Program: Comply with ANSI Z88.2 1992 "Practices for Respiratory Protection" and OSHA 29 CFR 1926.62.
  - a. Require that respiratory protection be used at all times when there is any possibility of disturbance of lead paint, settled leaded dust, or welding / hot cutting on steel where lead paint was removed.

- b. Full facepiece negative pressure respirators shall be worn by workers performing lead paint removal. Welders whom will be welding or cutting steel where lead paint was removed shall wear Powered Air Purifying Respirators (PAPRs), equipped with HEPA (P-100) filters, that are quantitatively fit tested.
- 6. Protective Clothing:
  - a. The following clothing shall be worn by all lead workers in the work area.
    - 1. Disposable Coveralls with head and shoe covers (except for welders): Provide a sufficient number for all required changes for all workers in the work area. Dispose of coveralls as clothing waste at the end of each day.
    - 2. Gloves: Chemical resistant gloves shall be used when using chemical strippers to remove lead paint. Gloves shall be secured to coveralls using duct tape to protect arms and hands. Do not remove gloves from the work area.
    - 3. Goggles, safety glasses, or face shields: Shall be worn by all workers involved in scraping, spraying, stripping, or any other activity that may potentially cause eye or face injury.
  - 7. Temporary Shower Facilities: Shall be used in accordance with subsection 2.02 (C) of this section.
  - 8. Washing Facilities: Shall be used in accordance with subsection 2.02 (D) of this section.

## 3.02 GENERAL PROCEDURES

- A. Containment Systems:
  - 1. Regardless of the lead content of paints, dust, or coatings being disturbed, Negative Pressure Enclosure (NPE) containment is not required unless operations such as sanding, abrasive blasting, or any other removal method is used that creates an uncontrolable release of airborne lead aerosols in excess of the Action Level of 30 ug/m<sup>3</sup>.
  - 2. If measured lead levels from either personal or area air samples exceed the Action Level at any time during the course of the work, or visual emissions are detected, the Subcontractor shall immediately stop work, correct the condition(s) causing the increase, and notify the University's Project Manager. If the subcontractor's existing engineering and administrative controls do

not reduce concentrations below the Action Level, the Subcontractor shall immediately stop work, notify the University's Project Manager, and implement additional controls such as the construction of a Negative Pressure Enclosure (NPE) equipped with HEPA filtered Negative Air Machines (NAMs) that have been tested as specified in subsection 3.05 (A)(2). The enclosure shall maintain a negative pressure relative to the surrounding area to adequately prevent the release of unfiltered lead aerosols. NAM exhaust ducting shall be routed to the exterior of buildings.

- 3. Demarcate the Lead Control Area by providing a roped-off and labeled perimeter area at least 20 feet wide around the work area where lead related work is to be performed. Provide signage per subsection 3.01 (A)(2)(b).
- B. In case of inclement weather, such as high winds or rain, which may cause paint chips, dust, or fumes to migrate out of the work area, immediately secure the work area and stop work until weather conditions improve.

## 3.03 WORK AREA PROCEDURES

- A. Entering the Work Area: Each time a work area is entered put on new disposable coverall or (re-use previous coverall if not overly contaminated or torn), new head cover, and a clean respirator with cartridges appropriate for the lead work to be performed. Reinforce coverall seams and secure gloves to coveralls with duct tape.
- B. Wearing disposable coveralls: Do not enter occupied building areas while wearing either new or contaminated disposable coveralls or respirators. Provide a visual barrier between lead related work and occupied areas.

#### 3.04 LEAD REMOVAL PROCEDURES

- A. Lead removal: Remove lead paint or dust as described in the contractor's lead work plan prior to disturbing the substrate or welding and hot cutting the substrate.
  - 1. Prohibited Lead Paint / Dust Removal Methods:
    - a. Open flame burning
    - b. Chemical stripping with methylene chloride based paint strippers
    - c. Uncontained abrasive blasting
    - d. Uncontained power washing
    - e. Dry sanding or scraping
    - f. Power sanding without HEPA attachment
    - g. Hot cutting or welding prior to removing lead paint

- 2. Waste Disposal: HEPA vacuum and/or wet wipe to remove all paint chips, dust, and debris generated during the work. Do not allow paint chips, dust, or debris to accumulate. Place all paint chips, dust, and debris in properly labeled plastic disposal bags at the end of each shift.
- 3. Welding, Brazing, Hot Cutting, and Heating: Where welding, hot cutting, or brazing is planned to be done under other Sections, or where building elements will be heated above 600 degrees F, remove paint to bare metal six inches to either side and behind the area that is to be welded, brazed, hot cut, or heated.
- 4. Remove welding fumes from worker breathing zones (within 12" of the weld / cut point) during welding and hot cutting operations by effectively capturing the fumes at the workers' breathing zone by using HEPA filtered negative air machines (with flex hose) that have been tested according to subsection 3.05 (Field Quality Control). Assign additional employees (e.g., fire watch) to continuously adjust the flex hose to within 12" of the weld / cut point to effectively capture the fumes in the worker's breathing zone. Exhaust from the negative air machines shall be routed outside buildings and away from building air intakes or building entrances. Flex hose shall be positioned to prevent tripping, pinching, or egress limitations from the building.

## 3.05 FIELD QUALITY CONTROL

- A. Site Tests:
  - 1. Respiratory protective equipment shall be quantitatively fit tested, including PAPR units. Qualitative fit test using irritant smoke tests or other qualitative test methods shall not be acceptable.
  - 2. All HEPA vacuums and negative air machines shall be challenge tested, by emery oil aerosol or equivalent, and certified as in "passing" condition prior to work commencing. Testing shall be completed in the presence of the University Industrial Hygienist and shall be conducted at the Berkeley Lab outside of buildings in unoccupied areas. If any units fail, no work will be allowed with those units and the units shall be removed from the Berkeley Lab. Maintenance or repair work at the Berkeley Lab shall not be allowed on vacuums or negative air machines that have failed the challenge aerosol testing. Negative air machines and HEPA vacuums shall be tested every three months, and immediately after changing HEPA filters, and remain onsite during the duration of the project. HEPA vacuums and negative air machines shall not be used after changing HEPA filters until they have been tested by a challenge aerosol.
- B. Inspection (Lead Air Monitoring):

- 1. Personal Exposure Monitoring Results: Subcontractor shall provide personal air monitoring of its employees, in accordance with requirements of 29 CFR 1926.62.
  - a. The personal air monitoring data shall include the employee's name, date of monitoring, task(s) performed, employees represented by the monitoring, analytical result, and time-weighted average exposure reported in unis of ug/m3.
  - b. The analytical lab results shall be submitted to the University's Project Manager within 24 hours of sample collection.
  - c. The subcontractor shall submit air samples to an AIHA accredited laboratory per 1.06(A)(3) of this section. The subcontractor shall request NIOSH method 7082 as the analytical method.
- 2. The University's Industrial Hygienist may conduct personal lead air monitoring on the subcontractor's employees at any time to verify Subcontractor's compliance with these Specifications, EPA and OSHA regulations, and applicable State and local government regulations.
- 3. Monitoring During Lead Decontamination: The University's Industrial Hygienist, or its representative, may conduct quality control and area monitoring at any time during potential worker exposure to airborne lead. If monitoring outside the control area shows airborne concentrations exceed the OSHA Action Level of 30 ug/m3, the Subcontractor shall immediately stop all work, correct the condition(s) causing the increase and notify the Project Manager.
- 4. If monitoring indicates that lead contamination is occurring outside of controlled areas (i.e., equal to or greater than 30 ug/m3) the Subcontractor shall immediately cease lead disturbance activities. Do not resume work until authorized by the Project Manager.

## 3.06 CLEANING

- A. Daily Cleaning: Thoroughly clean the entire area under active lead disturbance at the end of each workday.
  - 1. At end of work shift remove any paint chips, dust, and debris by using a HEPA vacuum or by spraying with wet wash solution, collect debris with wet paper towels, place in disposal bag while still wet, and clean surface of plastic sheets with wet paper towels.
  - 2. Exterior Cleanup:

- a. Undisturbed areas potentially affected by exterior lead disturbance shall be protected by using a drop poly containment system.
- b. Because weather can adversely affect the efficacy of exterior drop poly containment, remove surface plastic of the containment system at the end of each workday.
- c. Examine immediate area to ensure that no lead debris has escaped containment. Debris shall be placed in double plastic bags, sealed and stored with other contaminated debris.

## 3.07 PROJECT CLEARANCE

- A. Subcontractor Release Criteria: The lead disturbance work area is cleared when the work area is visually clean and wipe samples show lead concentrations have been reduced to the level specified below.
- B. Wipe Sampling: Wipe sampling will be used to evaluate the level of lead remaining in the work area. A commercial wipe moistened with a non-alcohol wetting agent will be used. Surface dust sampling will take place no sooner than 24 hours after completion of post-disturbance cleanup activities. This will allow any airborne dust to settle onto the surfaces to be tested.
- C. Clearance Criteria
  - 1. If any of the wipe samples exceed the clearance criteria, the work area must be cleaned again and retested until the criteria are met.

	Floors	$40 \text{ ug/ft}^2$
a.		
b.	Interior Horizontal Window Surfaces	250 ug/ft <sup>2</sup>
с.	Window Wells	400 ug/ft <sup>2</sup>
d.	Exterior Horizontal Window and Floor Surfaces	800 ug/ft <sup>2</sup>

- 2. If all wipe sample results for the work area meet the clearance criteria, the work area is cleared for re-occupancy.
- D. The University will be responsible for all costs of the initial clearance testing. The Subcontractor shall be responsible for additional testing costs if initial clearance test does not pass.
- E. After final cleanup and removal of all Subcontractor equipment, materials, and critical barriers are complete, a final post teardown inspection will be

conducted. The University or University's Industrial Hygienist will conduct the final inspection with the Subcontractor.

#### 3.08 STORAGE OF WASTE MATERIALS

- A. Waste Evaluation: The materials collected from the cleaning operations must be evaluated to determine if the materials are hazardous and require special handling. The Subcontractor is responsible for segregating waste as it is generated and labeling all waste containers appropriately. Stored waste must be labeled with the accumulation date, type of waste, and area from which it was generated. The waste will be stored in designated areas selected by the Project Manager. Load all lead-containing waste material in disposal bags or leak-tight drums. All materials are to be contained in one of the following:
  - a. Two 6-mil disposal bags.
  - b. Two 6-mil disposal bags and a drum.
  - c. Wrapped in 6-mil polyethylene sheeting and sealed with duct tape.
- B. If a dumpster is to be located on site for the duration of the project, arrange location of the dumpster with the Project Manager.
  - 1. Do not store containerized materials outside of the work area. Take containers from the work area directly to a temporary storage location arranged by the Project Manager. All open dumpsters are prohibited for any construction debris. Take special care in transporting the waste materials from the location of generation to the storage facility. Waste shall be removed from work area at times selected to minimize contacts with tenants. The path from the work area to the storage locations shall be selected to be the shortest possible distance.
- C. The waste shall be separated into a minimum of categories as follows:
  - 1. Low lead waste (e.g., filtered wash water, HEPA vacuumed disposable coveralls and plastic sheeting, etc.).
  - 2. Concentrated lead waste (e.g., sludge from paint stripping, paint chips and dust, HEPA vacuum debris and filter, mop heads, rags used for removing caustic stripper or during wet wiping, unfiltered wash water, respirator filters, etc.).
- D. Treatment and Testing of Project Waste Water: The handling and treatment of project waste water must conform with all State and local regulations.

Project waste water includes shower water and waste water from cleaning operations.

1. The Subcontractor shall not discharge waste water containing lead into a community sanitary sewer as per the requirements of the San Francisco Bay Basin Water Quality Control Plan. All waste water shall be discharged into a sanitary filter. Do not discharge any waste water on ground or soil. Filter water as necessary to meet local requirements.

## END OF SECTION 13281

## ATTACHMENT A LEAD COMPLIANCE WORK PLAN OUTLINE

In accordance with Section 13281 of the Lead Paint Removal Lead Dust Removal, Lead Welding and Hot Cutting Operations Specifications, the OSHA Lead in Construction Standard (29 CFR 1926.62), and the California Department of Health Services (DHS) Accreditation, Certification and Work Practices in Lead-Related Construction (17 CCR Division 1, Chapter 8), the Subcontractor is required to prepare a written (typed or word-processed), site-specific Lead Compliance Work Plan, and submit to the University prior to work commencing. This plan shall meet the OSHA and California DHS requirements for a written compliance plan, and shall further describe work procedures and control methods that will protect LBNL facilities and staff.

The Subcontractor shall prepare the Lead Compliance Work Plan to include, at a minimum, the following information:

I. Location of Work

The work to be completed under this Lead Compliance Work Plan will be completed at: Lawrence Berkeley National Laboratory One Cyclotron Road (Building name) (Location within building)

Previous hazardous materials inspections or surveys have found that lead-based paints or coatings, or other lead-containing materials, are present at the following locations:

(list all materials and locations, to assure the University that the Subcontractor is aware of all hazardous materials locations)

The presence of lead in these materials represents a hazard to workers who may disturb it during the course of this work.

II. Description of Work

Describe the anticipated work scope, including:

- A. Paint removal (*list paints or coatings, and locations*)
- B. Paint stabilization or encapsulation (*list paints or coatings, and locations*)
- C. Removal or replacement of lead-coated components (*list components & locations*)
- D. Dust/residue removal or decontamination (list materials and locations)
- E. Any other activities that will or may result in worker exposures to lead.

#### III. Schedule

A. General Start Date: **Completion Date:** This compliance work plan will take effect on . \_\_\_\_, will conduct worksite The competent person, visual inspections on a daily basis, or more often as necessary. B. Phase Dates Phase Date(s) Setup of work area Removal Final cleaning Final clearance (visual and wipe sampling)

#### IV. Equipment and Materials

List all equipment and materials to be used, such as the following. List trade names or types where known.

HEPA vacuums scrapers power saws hammers screwdrivers pry bars cutting shears other hand tools water compressors cleaning detergents solvents (must be approved by University) paints/sealants/encapsulants (must be approved by University) rollers/brushes

butyl rubber gloves disposable coveralls respiratory protection cotton work gloves

#### leather work gloves

#### V. Crew

List all workers and supervisors, with emergency contact names and pagers.

*Clearly identify the DHS certified lead abatement supervisor.* 

VI. Control Measures and Work Procedures

Describe, in a narrative format, specific work procedures, exposure/contamination controls, and engineering controls. Incorporate the following items in the description, including but not limited to:

Location, size, layout and details of the work Wet methods Respiratory protection Local exhaust ventilation on power and hand tools Vacuum assisted blasting General room ventilation HEPA vacuums Containment (i.e., polyethylene barriers) Interface of trades involved Methods to be used to assure safety of building occupants and visitors Pollution control (air and water) Removal method to reduce lead dust generation

VII. Technology to be used in meeting the OSHA PEL

*List all or any specialized equipment to be used to meet the PEL* 

VIII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection, including types and manufacturers, which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required.

List all personal protective equipment anticipated to be used on the project.

#### IX. Hygiene Facilities

Identify the types and locations of hygiene facilities to be used on this project. Specify clearly where handwashing facilities or showers are to be located. Specify use of disposable towels, soap, hot and cold water, and other supplies, all to be provided by the Subcontractor.

Specify the required use of the facilities, including use of the facilities prior to eating, drinking, and smoking, and before leaving the project site.

Describe handling or treatment of lead-contaminated solid waste and wastewater.

#### X. Air Monitoring Data

Identify general worker air monitoring protocol to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for sample analysis, and how pumps are calibrated and worn by employees. Identify competent person who will oversee Subcontractor's air monitoring.

#### XI. Medical Surveillance Program

Describe the Subcontractor's medical surveillance program currently in place. Identify the physician or medical provider firm currently handling the medical surveillance needs of the Subcontractor, including name and phone number.

#### XII. Worker Training

Provide the Subcontractor's DHS Lead Worker training certificates per the specifications.

#### XIII. Notification

Describe all arrangements made on multi-employer work sites to inform affected employers about the lead project. Attach copies of any notifications.

#### XIV. Waste

Describe how all waste generated on this project will be packaged and labeled. The University will manifest, haul, and dispose of lead waste.

XV. Preparation of Lead Compliance Work Plan

Date Prepared:

Prepared By (signature, name, title)

## ATTACHMENT B LEAD BULK / WIPE SAMPLING RESULTS

# MICRO ANALYTICAL LABORATORIES, INC. LEAD IN PAINT - FLAME AAS (EPA 7420)

1049

Ron Acord Lawrence Berkeley Laboratory One Cyclotron Road - MS - 48 - 102 Berkeley, CA 94720 PROJECT:

B-6 ACCT: FX-6333 Micro Log In 91622 Total Samples 2 Date Sampled 02/02/2007 Date Analyzed 02/03/2007

	Lead Conce	ntration	
Sample ID	Weight Percent	mg/kg (ppm)	Reporting Limits
Client: 6-IR-PB-BK-01 Lab: 91622-01 OFF-WHITE ON STEEL CROSS MEMBER IN CENTER RING	26.5%	265041	1.65 % 16,529 mg/kg
Client: 6-IR-PB-BK-02 Lab: 91622-02 GREEN PAINT ON POLAR CRANE BASE	0.05%	518	0.01 % 80 mg/kg

Technical Supervisor:	235	Tapple	2/3/2007	Analyst:	JC
	Tess Tagorda,	, Chemistl∳ Supervisor	Date Reported		

AIHA ELLAP Accredited Laboratory, ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (AAS). U.S. EPA SW-846 Method 7420 is used for the instrumental analysis. Nitric acid and hydrogen peroxide digestion procedures are based on ASTM E-1645. Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. This report must not be reproduced without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. N/A = Not Applicable.

5900 HOLLIS STREET, SUITE M, EMERYVILLE, CALIFORNIA 94608 - (510) 653-0824

Chain of Custody Form 1049 Name / Client / Address:	MICRO ANALYTICAL LABORA 5900 Hollis Street, Suite M, Emeryville, Ca (510) 653-0824 - (510) 653-1361	FORIES, lifornia 94 - FAX	, INC. 608 l	og in #	11622	Ŋ
Ron Acord	Project	Asb	estos			
Lawrence Berkeley Laboratory	<u> </u>	(TE — Asb	MI) AHERA	Yamate II	(Mod.) Oth (Sp	ner ecify)
<u>One Cyclotron Road - MS- 48-10</u>	02		PLM	I PC	CM	ang
Portrology CA 04720		Lead	i Only	9	701 0	
BEIREICY, CA 94720		 	i otai Lea	a silo	ICLP	
		(Spe	cify), Total Met	als STLC	TCLP	
Tel. (510) 486-4942	Jet No 6333	Othe	r			
Fax (510) 486-7014		Num	ber of Samples	2		
Matrix Type Bulk Dust Pair	int Soil Wipe Air Water Other	Turr	-Around Time_	Rus.	4	
Micro ID #		Date	Time Sampled Start / Stop /	Average	Total	Filter
(For Lab Use Only) Client Sample II	D# Description	Sampled	Total Minutes	LPM	Liters	Pore Size
6-IR-Pb- BK-01	OFF WHATE ON STEEL CROSS MEMBER IN CENTER RING	2/2/2/	: :			
6-IR-PB- 01 13K-02	CREEN PAINT ON POLAR CRANE IBASE.	3/2/2	: :	_		
đa:						
			: :			
			I			
			: :			
			: :			
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Instructions	1	Comments:
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Sample Return: YES NO If "Y	ES" is checked, sample	es will be returned to the	client or archived a	t Micro An	alytical if required.	
If "NO" is elected, solid samples may be dis	posed of within three m	onths (one week for liqu	id samples. lapsuspe	ensions, and	digestates).	
X	/ Kr	L. Acares				
Sampler's Signature / Mame		N	ote to Lab. If any sh	mpres are no	t accentable, record reasons	for rejection.
	2-2-07	Drop Box / Courier	SM.	$\langle \mathcal{Q} \rangle$	2400 162	£V
Relingutshed By	Date / Time		Received By	$\bigcirc$	Ľ	Date / Time
Je -						
Relinquished By	Date / Time		Received By		Ľ	Date / Time

#### SAMPLING BY AGENT

ASBESTOS										
Sample Date	Asmt Type	<u>}</u>	Result Type		Survey ID	Sample ID	<u>Result</u>	Max Limit	<u>Unit</u>	% of Limit
10-26-2000	BULK SAN	IPLING	BULK		SID-1345	16	N/D		PERCENT	
Sample Co	omments	Sample collected from t	the South-West ce	eiling, next to doorv	way leading to B	80. N/D=Non-Dete	ect			
Location E 10-26-2000	Description BULK SAM	B6, Room 1000 Spraye IPLING	ed on Fireproofing BULK	I.	SID-1345	17	N/D		PERCENT	
Sample Co	omments	Sample collected on W	est wall, lower righ	nt-hand side of doo	orway leading to	B80. N/D=Non-de	tect			
Location E 10-26-2000	Description BULK SAM	B6, Room 1000 Sheetr IPLING	rock, Paint Shee BULK	etrock: N/D Paint: N	N/D SID-1345	18	N/D		PERCENT	
Sample Co	omments	Sample collected at low	ver North-West wa	Il next to doorway	leading to B80.	N/D=Non-Detect				
Location E 10-26-2000	Description BULK SAM	B6 Sheetrock, Joint Co	ompound Sheetr BULK	ock: N/D Joint Co	mpound: N/D SID-1345	19	N/D		PERCENT	
Sample Co	omments	Sample collected from I	North-West ceiling	g next to doorway le	eading to B80.	N/D=Non-Detect				
Location E 11-26-2001	Description BULK SAM	B6, Room 1000 Spraye IPLING	ed on Fireproofing BULK	l.	SID-1437	9	N/D		PERCENT	
Location D	Description	Sample collected in B6, N/D N/D = Non-Detect	, Room 1000, she	etrock and joint cor	mpound with gre	een paint, lower left	corner next to the steel ro	ll-up door. St	neetrock: N/D Joint Co	mpound: N/D Paint:
09-05-2002	BULK SAM	MPLING	BULK		SID-1533	1	ND		PERCENT	
<b>Location E</b> 01-15-2004	Description BULK SAM	Beige sprayed on firepr IPLING	oofing on the first BULK	floor near beamline	e 1.4 on steel I I SID-1731	beam. 1	ND	1	PERCENT	
Location D	Description	Sample collected in B6,	, Room 1000, at b	ottom of column lin	ne 19.5 non-pair	ted sheetrock & tap	ing compound.			
		Sheetrock: ND Joint Compound: ND Brown Mastic: ND								

				REPORT FILTERS				
Site: LBNL	Company	UCAB	Assessment Type:	BULK SAMPLING	Result Type:		Badge ID:	SSN:
	Start Date	:	End Date:	Location Type:		Operational Status Code:		
Agent:						Percent of Curren	t Limit:	
Organization:					Survey ID:	Percent of Limit a	Time of Sample:	
Job:					Task Category:			
Facility:	6				Sample Equipment ID	D:		
Descriptor 1:					Descriptor 2:			
Exposure Group:					Calibration Equip ID:			
Descriptor 1:					Descriptor 2:			
Report run on:	Monday Ja	uary 14, 2008 0	2:47 PM	* *This report inc	ludes preliminary 'ur	nlocked' records * *		Page 1 of 5

# SAMPLING

#### BY AGENT

ASBESTOS Sample Date	<u>Asmt Type</u>	1	Result Type	Survey ID	Sample ID	<u>Result</u>	<u>Max Limit</u>	<u>Unit</u>	<u>% of Limit</u>
08-22-2006	BULK SAN	ND = Non-Detect IPLING	BULK	SID-2120	1	ND	1	PERCENT	
Location	Description	Steve Campos and Blair	r Mordecai (LBNL Roofers) collected	bulk roofing samples	from the roof of B6, whi	te foam insultatio	on and black rul	ober.	
		Foam (White): ND Rubber (Black): ND							
08-22-2006	BULK SAN	ND = Non-Detect IPLING	BULK	SID-2120	2	ND	1	PERCENT	
Location	Description	Steve Campos and Blair	r Mordecai (LBNL Roofers) collected	bulk roofing samples	from the roof of B6, whi	te foam insultatio	on and black rul	ober.	
		Foam (White): ND Rubber (Black): ND							
08-22-2006	BULK SAN	ND = Non-Detect IPLING	BULK	SID-2120	3	ND	1	PERCENT	
Location	Description	Steve Campos and Blair	r Mordecai (LBNL Roofers) collected	bulk roofing samples	from the roof of B6, whi	te foam insultatio	on and black rul	bber.	
		Foam (White): ND Rubber (Black): ND							
10-11-2006	BULK SAM	ND = Non-Detect IPLING	BULK	SID-2142	1	ND	1	PERCENT	
Location	Description	Bulk sample collected fr	om the red epoxy floor coating appr	oximately 12 feet from	the door near column N	lo. 1, in Room 10	000 of B6.		

			REPORT FILTERS			
Site: LBNL	Company: UCAB	Assessment Type:	BULK SAMPLING	Result Type:	Badge ID	SSN:
	Start Date:	End Date:	Location Type:		Operational Status Code:	
Agent:					Percent of Current Limit:	
Organization:				Survey ID:	Percent of Limit at Time of Sa	ample:
Job:				Task Category:		
Facility: 6				Sample Equipment ID	):	
Descriptor 1:				Descriptor 2:		
Exposure Group:				Calibration Equip ID:		
Descriptor 1:				Descriptor 2:		

# SAMPLING

#### BY AGENT

ASBESTOS Sample Date	Asmt Type		<u>Result Type</u>	Survey ID	Sample ID	<u>Result</u>	<u>Max Limit</u>	<u>Unit</u>	<u>% of Limit</u>
		Red epoxy coating: ND							
10-11-2006	BULK SAM	PLING	BULK	SID-2142	2	ND	1	PERCENT	
Location D	escription	Bulk sample collected from	om the red epoxy floor coating appr	oximately 12 feet from	the door near column N	lo. 1, in Room 10	000 of B6.		
		Red epoxy coating: ND							
05-24-2007	BULK SAM	PLING	BULK	SID-2133	12	5	1	PERCENT	500
Location D	escription	Sample collected on the	roof of B6, between column lines B	-11 & B-14, gray pain	ed window caulking.				
		Putty: 5% Chrysotile Paint: ND							
05-24-2007	BULK SAM	ND = Non-Detect PLING	BULK	SID-2133	14	5	1	PERCENT	500
Location D	escription	Sample collected on the	roof of B6, between column lines B	-11 & B-14, gray pain	ed window caulking.				
		Putty: 5% Chrysotile Paint: ND							
05-24-2007	BULK SAM	ND = Non-Detect PLING	BULK	SID-2133	13	5	1	PERCENT	500
Location D	escription	Sample collected on the	roof of B6, between column lines B	-11 & B-14, gray pain	ed window caulking.				
		Putty: 5% Chrysotile							

			REPORT FILTERS				
Site: LBNL	Company: UCAB	Assessment Type:	BULK SAMPLING	Result Type:		Badge ID:	SSN:
	Start Date:	End Date:	Location Type:		Operational Status Code:		
Agent:					Percent of Curren	nt Limit:	
Organization:				Survey ID:	Percent of Limit a	at Time of Sample:	
Job:				Task Category:			
Facility:	6			Sample Equipment	ID:		
Descriptor 1:				Descriptor 2:			
Exposure Group:				Calibration Equip II	D:		
Descriptor 1:				Descriptor 2:			

SAMPLING

BY AGENT

ASBESTOS Sample Date	Asmt Type	<u>Result Type</u>	Survey ID	Sample ID	<u>Result</u>	Max Limit	<u>Unit</u>		<u>% of Limit</u>
	Paint: ND								
	ND = Non-Detect								
LEAD, ELEM Sample Date	ENTAL AND INORGANIC	COMPOUNDS Result Type	Survey ID	Sample ID	Result	Max Limit	Unit		% of Limit
11-09-2000	BULK SAMPLING	BULK	SID-1345	22	<42		PPM		
Location [	Description B6. Room 1000.	Green Paint. Sample co	ellected on the southwest sheet	rock wall next to double d	oor.				
11-26-2001	BULK SAMPLING	BULK	SID-1437	10	59		PPM		
Location D	Description Sample collected	in B6, Room 1000, red pa	aint on recessed 3" wide steel p	late in front of metal roll-u	ıp door.				
11-26-2001	BULK SAMPLING	BULK	SID-1437	11	<73		PPM		
<b>Location E</b> 07-09-2004	Description Sample collected BULK SAMPLING	in B6, Room 1000, green BULK	paint on steel "I" beam left of n SID-1775	netal roll-up door. 1	28.39		PERCWT		
Sample Co	mments Paint chip was col	lected by Steve Wright.							
Location E 02-24-2006	Description Polar Crane BULK SAMPLING	BULK	SID-1973	1	304695	5000	PPM		6,093.9
<b>Location [</b> 10-11-2006	Description Sample collected BULK SAMPLING	from base of polar crane BULK	in B6, orange paint on steel. SID-2142	3	<80	5000	PPM		
Location I	Description Bulk sample collect	cted from the red epoxy f	oor coating approximately 12 fe	et from the door near col	umn No. 1, in Room	1000 of B6.			
		νρ. (ND)	0 11 9						
	Neu epoxy. Kou p								
0.14		A	REPORT FILTERS			De des II		001	
Site: LBNL	Company: UCAB	Assessment Type:	BULK SAMPLING	Result Type:		Badge II	):	55N:	
	Start Date:	End Date:	Location Type:	Ope	erational Status Code	e:			
Agent:					Percent of C	urrent Limit:			
Organization:				Task Category	Percent of Li	mit at time of Sa	ampie.		
Facility:	6		:	Sample Equipment ID					
Descriptor 1:	-			Descriptor 2:					

Descriptor 1: Exposure Group:

. . . . . . . . .

. Descriptor 1: Calibration Equip ID:

Descriptor 2:

#### SAMPLING BY AGENT

LEAD. ELEMENTAL AND INORGAN	NIC	COMPOU	NDS
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Sample Date	Asmt Type	2	Result Type	Survey ID	Sample ID	<u>Result</u>	Max Limit	<u>Unit</u>	% of Limit
10-11-2006	BULK SAN	MPLING	BULK	SID-2142	4	<77	5000	PPM	
Location D	escription	Bulk sample collected fr	rom the red epoxy floor coating appr	oximately 12 feet from	n the door near column N	lo. 1, in Room 10	000 of B6.		
02-02-2007	BULK SAN	Red epoxy: <77 ppm( MPLING	ND) BULK	SID-2060	1	265041	5000	PPM	5,300.8
Location D 02-02-2007	escription BULK SAM	Sample collected from t	he off-white painted steel cross mer BULK	nber in B6, Room 100 SID-2060	0, center ring. 2	518	5000	PPM	10.4
Location D 05-24-2007	escription BULK SAM	Sample collected in B6, MPLING	Room 1000 (center ring) green pair BULK	nt on polar crane base SID-2133	15	98515	5000	PPM	1,970.3
Location D	escription	Sample collected on the	e roof of B6, between column lines B	8-11 & B-14, gray pain	ted window caulking.				
05-24-2007	BULK SAM	MPLING	BULK	SID-2133	16	155229	5000	PPM	3,104.6
Location D	escription	Sample collected on the	e roof of B6, between column lines B	8-11 & B-14, gray pain	ted window caulking.				
05-24-2007	BULK SAM	MPLING	BULK	SID-2133	17	116260	5000	PPM	2,325.2
Location D	escription	Sample collected on the	e roof of B6, between column lines B	8-11 & B-14, gray pain	ted window caulking.				

Site: LBNL	Company: UCAB	Assessment Type:	REPORT FILTERS BULK SAMPLING	Result Type:	Badge ID:	SSN:
	Start Date:	End Date:	Location Type:	Ор	erational Status Code:	
Agent:					Percent of Current Limit:	
Organization:				Survey ID:	Percent of Limit at Time of Sample:	
Job:				Task Category:		
Facility:	6			Sample Equipment ID:		
Descriptor 1:				Descriptor 2:		
Exposure Group:				Calibration Equip ID:		
Descriptor 1:				Descriptor 2:		

## **SECTION 13282**

## HAZARDOUS MATERIALS REMEDIATION:

## ASBESTOS ABATEMENT SPECIFICATIONS

## PART 1 - GENERAL

- 1.01 SECTION INCLUDES
  - A. This Section includes removal, repair, encapsulation, enclosure and other abatement of asbestos-containing materials as specified herin and shown on drawings.
  - B. Compliance with all applicable Federal, State, and local regulations pertaining to work practices.
  - C. Protection of workers, visitors to the site, and persons occupying areas adjacent to the site.
  - D. Provide medical examinations and maintain medical records of personnel as required by the applicable Federal, State, and local regulations.
  - E. The scope of this work does not include the manifesting, transporting, or disposal of hazardous waste. The University will manifest, transport, and dispose of hazardous waste that has been properly packaged, labeled, and stored by the subcontractor.
  - F. The University's review and approval of the asbestos abatement subcontractor's Asbestos Compliance Work Plan (Attachment A) describing the means and methods of asbestos related work prior to work commencing.

#### [Delete the following sections as appropriate]

- 1.02 RELATED SECTIONS
  - A. Section 01730 Cutting and Patching.
  - B. Section 01735 Selective Demolition.
  - C. Section 05120 Structural Steel.
  - D. Section 09900 Paints and Coatings.
- 1.03 DEFINITIONS
  - A. Asbestos-In-Construction Supervisor (Competent Person): One who is capable of identifying existing and predicting asbestos

hazards in the surroundings or working conditions and who has the authorization to take prompt corrective measures to eliminate them.

- B. Asbestos 30 minute Excursion Limit (EL): 1.0 fiber per cubic centimeter of air (1.0 f/cc).
- C. Asbestos-in-air, 8 hour Time Weighted Average (TWA) Permissible Exposure Limit (PEL): 0.1 fiber per cubic centimeter of air (0.1 f/cc).

1.04 SUBMITTALS (For review and approval by the University's Project Manager)

- A. Product Data: Submit five (5) copies of the following:
  - 1. Material Safety Data Sheets (MSDS) sheets for each product containing hazardous materials as defined by OSHA's Hazardous Communication Standard; 29 CFR 1910.1200.
- B. Quality Assurance/Control Submittals: Submit five (5) copies of the following:
  - 1. Asbestos Compliance Work Plan: Detailed, job-specific plan of the procedures proposed for use in complying with the requirements of this Specification and 29 CFR 1926.1101.
    - a. As a minimum, provide the information required in Attachment A, the Asbestos Compliance Work Plan Outline. Make note that LBNL requires TSI glovebag work be performed inside a HEPA filtered negative pressure enclosure that must be cleared by air sampling prior to removal of the NPE.
    - b. The plan shall be approved by the University prior to the mobilization of equipment, supplies, or workers to the site.
  - 2. Worker Certification: Current asbestos worker certifications for personnel to be engaged in the work of this Section. Workers will not be permitted on the project site until the submittal is complete and has been accepted by the Project Manager. Provide the following information for each worker:
    - Employee quantitative respirator fit-test records that identify the testing agency, the individual fit test exercise fit factor results, and the overall fit factor result;
    - b. Employee medical approval to wear respirator protection records;

- Current AHERA-certified asbestos contractor supervisor certificate(s) and training for the designated contractor supervisor only;
- d. Current AHERA-certified asbestos worker certificate(s) and training; and
- e. Employee picture identification matching names on records. Picture IDs can be photo copies of training cards; however, pictures of employee faces must be viewable vs. dark images from poor quality photo copying.
- 3. Subcontractor License: Submit proof of license for asbestos-related contracting from the California Contractors State License Board (CSLB) as required by California Business and Professions Code, Section 7058.5 et.seq.
- 4. Subcontractor Registration: Submit proof of registration with the California Division of Occupational Safety and Health (DOSH) for asbestos-related work as required by Title 8 CCR, Sections 341.6 to 341.9.
- 5. Carcinogen Registration: Submit proof of carcinogen registration (report of use) with DOSH as required by California Labor Code, Section 9000 et. seq.
- 6. Bay Area Air Quality Management District (BAAQMD) Notification: Submit proof of notification made to the BAAQMD, 10 working days prior to asbestos demolition or renovation activities, as required by BAAQMD Regulation 11, Rule 2. Subcontractor shall update and resubmit notifications as needed due to changes in the project schedule or material quantities. The subcontractor shall be responsible for obtaining variances from the BAAQMD as necessary.
- 7. Respiratory Protection Program: Submit company's Respiratory Protection Program.
- 8. Written record from negative air machine and HEPA vacuum cleaner challenge aerosol testing on the day of the testing.
- 9. Per 29 CFR 1926.1101 (f)(5), the subcontractor shall notify their employees of exposure monitoring results. LBNL requires written documentation from the subcontractor that demonstrates the subcontractor's employees were notified of their results within 5 days of receiving the results including both excursion and calculated 8 hour TWA results for all results, not just those results above the PEL or excursion limit.

- C. Closeout / Ongoing Project Submittals
  - 1. Personal air sampling results collected by the asbestos abatement subcontractor for airborne asbestos within 24 hours of sample collection.
  - 2. Pressure differential recorder readings shall be submitted in written form (i.e., circular chart or other form of print out).
- D. All submittals will be provided to LBNL three (3) working days prior to mobilization for each individual site job and must be approved prior to work commencing.

## 1.05 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Qualifications of Subcontractor:
    - a. Work performed under this Section shall be by a single Subcontractor.
    - b. The Subcontractor shall have a minimum of five (5) experience approved asbestos vears as an abatement subcontractor. lf requested, the Subcontractor shall provide the names and locations of 5 projects of similar size and scope that he has completed within the previous five years.
    - c. The Subcontractor must hold a current and valid asbestos license issued by the California Contractors State Licensing Board (CSLB).
    - d. The Subcontractor must hold a current and valid Certificate of Registration for Asbestos-Related Work issued by the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA).
    - e. The Subcontractor must hold all insurance and bonds as required by other sections of this specification, and maintain as valid and current for the duration of the project.
  - 2. Qualifications of Asbestos Abatement Personnel:
    - a. All work shall be completed utilizing fully qualified persons who are trained, experienced, and

knowledgeable in the proper techniques and procedures for asbestos abatement activities covered by this Section.

- b. Asbestos Workers: All workers performing asbestos related work shall be currently certified as AHERA asbestos workers.
- c. Asbestos in Construction Contractor Supervisor: Currently certified as an AHERA Asbestos Contractor Supervisor.
- 3. Qualifications of Analytical Laboratory:
  - a. The subcontractor shall submit asbestos air samples to an analytical laboratory that is accredited by the American Industrial Hygiene Association's (AIHA) *Industrial Hygiene Laboratory Accreditation Program* (IHLAP). The subcontractor shall choose another AIHA accredited lab if their current AIHA accredited lab does not maintain accreditation throughout the duration of this project.
- B. Regulatory Requirements: All asbestos removal work shall be performed in accordance with requirements of Federal, state, and local regulations as follows:
  - 1. Federal Regulations:
    - a. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA):
      - 1. Asbestos Standard: Title 29, Part 1910, Section 1001
      - 2. Respiratory Protection: Title 29, Part 1910, Section 134
      - 3. Construction Industry: Title 29, Part 1926, Section 1101
      - 4. Hazard Communication: Title 29, Part 1910, Section 1200
    - b. U.S. Environmental Protection Agency (EPA):
      - 1. Resource Conservation and Recovery Act (RCRA):

Title 40, Part 260 to 265

- c. U.S. Department of Energy 10 CFR 851 Worker Protection Rule
- 2. U.S. Environmental Protection Agency (EPA):

- Worker Protection Rule
  40 CFR Part 763, Subpart G
  CPTS 62044, FLR 2843-9
  Federal Register, Vol. 50, No. 134, 7/12/85
  P28530-28540
- Regulation for General Industry Title 40, Part 61, Subpart A of the Code of Federal Regulations
- National Emissions Standard for Hazardous Air Pollutants (Asbestos)
   Title 40, Part 61, Subpart M of the Code of Federal Regulations including Asbestos NESHAP Revision; Final Rule, Federal Register; Tuesday, November 20, 1990.
- d. Asbestos Hazard Emergency Response Act: Final Rule Title 40, Part 763, Subpart E of the Code of Federal Regulations
- 3. State and Local Regulations: Abide by all State and local regulations which govern asbestos abatement work or storage of asbestos waste materials:
  - a. Asbestos in General Industry Title 8, Section 5208, of the California Code of Regulations
  - Asbestos In The Construction Industry Title 8, Section 1529, of the California Code of Regulations
  - c. Respiratory Protection Title 8, Section 5144, of the California Code of Regulations
  - Medical and Environmental Records
    Title 8, Section 3204, of the California Code of Regulations
  - e. Registration and Permits Title 8, Section 341, of the California Code of Regulations
- 4. Bay Area Air Quality Management District (BAAQMD)
  - a. Regulation 11 Rule 2

- C. Pre-Construction Meeting: At least one week before work commences, a pre-construction meeting shall be held at a location designated by the University's Project Manager. Attendees shall include the University's Project Manager, Construction Manager, Superintendent, Safety Inspector, Building Inspector, and Industrial Hygienist; the Subcontractor's Project Superintendent and Abatement Superintendent; and others as necessary. The agenda shall include a review of project safety requirements, the Subcontractor's written asbestos compliance work plan, emergency contacts and notification plan, containment and work area design, facility requirements, submittals, and any other issues pertinent to the safe execution of the asbestos abatement work.
  - 1. Work shall not commence until all required submittals and plans have been approved by the University.

## 1.06 PROJECT/SITE CONDITIONS

- A. Existing Conditions:
  - Building materials that contain asbestos are known to be present at the Project site. Building materials that have not been previously tested, that may be affected by the project scope, should be assumed to contain asbestos and handled according to this section. See Attachment B for asbestos testing results. Locations and quantities of asbestos containing material may be obtained by contacting the LBNL EH&S IH office (510) 486-4028.
    - a. If any other materials are found which are suspected of containing asbestos or other hazardous materials, immediately stop work in the affected area and notify the University's Project Manager. Handle suspected asbestos containing material according to this section.
  - 2. The University will occupy adjacent areas during the course of the Work. Work under this Subcontract shall not affect the University's operation of adjacent areas.
  - 3. The abatement subcontractor is responsible for notifying other subcontractors in writing regarding asbestos work per OSHA requirements (29 CFR 1926.1101).

## PART 2 - PRODUCTS

## 2.01 MATERIALS

A. Plastic Sheeting: Fire retardant polyethylene sheeting conforming to NFPA 701 and ASTM S502-74T for surface flammability and smoke density. A single polyethylene film in the largest sheet size

possible to minimize seams, 6 mils thick, clear, frosted or black as indicated.

- B. Duct Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to polyethylene sheeting.
- C. Spray Adhesive: Shall not contain methylene chloride, as listed on the product's label and/or Material Safety Data Sheet (MSDS). Provide spray adhesive in aerosol cans that is specifically formulated to stick aggressively to polyethylene sheeting.
- D. Disposal Bags: 6-mil polyethylene.
- E. Asbestos-Containing Materials Disposal Containers: Leak-tight drums.
- F. Detergent: High-phosphate wash containing at least 5% trisodium phosphate (TSP).
- 2.02 EQUIPMENT
  - A. Clothing: Furnish the following for each worker and others as specified.
    - 1. Coveralls:
      - a. Disposable full-body coveralls with attached head and foot covers conforming to requirements of OSHA Standards 29 CFR 1926.1101.
    - 2. Respirators:
      - a. Full facepiece negative pressure respirators with an assigned protection factor of 50X the PEL, or equivalent, for asbestos related work.
      - b. Respirators shall be equipped with HEPA (P-100) Filters.
      - c. Powered Air Purifying Respirators (PAPRs) with protection factors of 50X that have been quantitatively fit tested and equipped with HEPA (P-100) filters shall be acceptable substitutes for the respirator specified in 2.02(A)(2)(a) and must be worn for Class 1 work involving TSI or surfacing materials.
    - 3. Goggles, safety glasses, face shields: Provide eye and face protection as required by OSHA.
    - 4. Gloves:
      - a. Leather work gloves.
      - b. Compatible chemical resistant gloves for asbestos removal/solvent products.

- 5. Boots: Steel toed foot protective work boots with non-skid soles and steel shanks.
- 6. Hard Hats: Head protection (hard hats) approved by ANSI.
- 7. Soap and Towels.
- B. Industrial Grade Vacuum and Negative Air Machines: High Efficiency Particulate Air (HEPA) filtered vacuum and negative air machines with appropriate HEPA filters and prefilters. Household type HEPA vacuum cleaners shall not be acceptable. Provide one spare negative air machine per work area at all times. Spare negative air machines shall be of the same size and capacity as the largest operating units onsite.
- D. Pressure differential recorders shall be in working condition, calibrated and operated continuously during the operation of the negative pressure enclosure and provide a pressure reading at least every 10 minutes, or more frequent, and provide a written documentation of the pressure readings that will be submitted to LBNL at the end of the project.
- E. Temporary Shower Facility: A pre-fabricated or site-built temporary shower facility, with hot and cold water to shower head that can be controlled from inside shower, shall be installed and used by all workers.

## PART 3 - EXECUTION

- 3.01 PROTECTION
  - A. General:
    - 1. Take appropriate continuous measures as necessary to protect all building occupants from exposure to asbestos fibers. Such measures shall include the procedures and methods described herein, and shall be in accordance with regulations and guidelines of applicable Federal, State, and local agencies.
    - 2. Securing the Work Area: Secure the work area from access by the public, occupants, staff, or users of the building.
      - a. Provide and maintain temporary partitions to prevent spread of dust, fumes, odors, and noise to permit continued University occupancy.
      - b. Demarcate the regulated work area, as required by OSHA regulation 29 CFR 1926.1101, by posting warning

signs at each locked door and at the entrance to the change room leading to the regulated area as follows:

## DANGER ASBESTOS CANCER AND LUNG DISEASE HAZARD AUTHORIZED PERSONNEL ONLY RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

c. Provide labels affixed to all asbestos waste containers, as required by OSHA regulation 29 CFR 1926.1101, as follows:

## DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD

- 3. Do not block, or reduce width, of egress to exits.
- 4. Conduct operations with minimum interference to corridors, exits, and public thoroughfares.
- 5. Path of travel for debris removal shall be maintained dust free and clean at all times.
- 6. Cover and protect windows, doors, and walls that are adjacent to asbestos work areas.
- 7. Water used during this project shall be collected and prevented from entering storm water drains.
- 8. Eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics is prohibited in the work area.
- B. Personnel:
  - 1. Asbestos Contractor Supervisor (Competent Person):
    - a. Provide an on-site, full-time Asbestos in Construction Supervisor (or Supervisors) to ensure that the worker protection program and engineering controls are effective.
  - 2. Asbestos Workers: The Subcontractor shall communicate information concerning asbestos hazards according to the requirements of the Hazard Communication Standard (29 CFR 1910.1200), including but not limited to the requirements concerning warning signs and labels, material
safety data sheets (MSDS), and employee information and training.

- 3. Respiratory Protection Program: Comply with ANSI Z88.2 -1992 "Practices for Respiratory Protection" and OSHA 29 CFR 1926.62.
  - a. Require that respiratory protection be used at all times when there is any possibility of disturbance of asbestos containing material.
  - b. Down grading respiratory protection to a lower level protection factor is not allowed even with objective data to support the down grade.
- 4. Protective Clothing:
  - a. The following clothing shall be worn by all asbestos workers in the work area.
    - 1. Disposable Coveralls with head and shoe covers (except for welders): Provide a sufficient number for all required changes for all workers in the work area. Dispose of coveralls as clothing waste at the end of each day.
    - 2. Gloves: Chemical resistant gloves shall be used when using solvents to remove mastic material. Gloves shall be secured to coveralls using duct tape to protect arms and hands. Do not remove gloves from the work area.
    - 3. Goggles, safety glasses, or face shields: Shall be worn by all workers involved in scraping, spraying, stripping, or any other activity that may potentially cause eye or face injury.
  - 5. Temporary Shower Facilities: Shall be used in accordance with subsection 2.02 (C) and subsection 3.08 (C) of this section.

## 3.02 GENERAL PROCEDURES

- A. Containment Systems:
  - 1. If at any time during the course of the work visual emissions are detected, the Subcontractor shall immediately stop work, correct the condition(s) causing the emission, and notify the University's Project Manager.
  - 2. In case of inclement weather, such as high winds or rain, which may jeopardize the containment system, immediately

secure the work area and stop work until weather conditions improve.

# 3.03 WORK AREA PROCEDURES

- A. No visitors shall be allowed in work area, except as authorized by the University's Project Manager.
- B. Provide workers with sufficient sets of disposable protective full-body clothing. Such clothing shall consist of full-body coveralls, footwear, and head gear as one-piece coveralls. Provide eye protection and hard hats as required by applicable safety regulations. Reusable type protective clothing and footwear intended for reuse shall be left in the Contaminated Equipment Room until the end of the asbestos abatement work at which time such items shall be disposed of as asbestos waste. Disposable clothing shall not be allowed to accumulate and shall be disposed of as contaminated waste.
- C. Do not enter occupied building areas while wearing either new or contaminated disposable coveralls or respirators. Provide a visual barrier between the asbestos related work area and occupied areas.
- F. Provide additional make-up air openings as necessary to effectively move air through the work area and to avoid creating too high a pressure differential that would jeopardize the integrity of the enclosure system. Provide self-closing polyethylene flaps over the openings to prevent backflow of air from the contained area t the outside.
- G. Vent all exhaust units to the outside of the building. Provide flexible or rigid duct as necessary to provide exterior venting and proper location of exhaust units. Ducts shall be completely sealed, in good repair, and protected from possible damage within the work area. "Make-shift" type ducting made from poly and spray glue will not be acceptable. New ducting shall be used for each new containment system.
- H. After asbestos removal has begun, maintain operation of exhaust units continuously to maintain a constant negative pressure until final clearance results are achieved. Do not turn units off at the end of the work shift or when removal operations temporarily stop. Ensure arrangements are made with subcontractor employees to visit and make repairs to the NPE during after hours or on weekends as necessary. If LBNL night shift employees notice the NPE has fallen, torn, etc., ensure a system is in place for visiting and being able to make repairs when they are found to protect LBNL work areas from asbestos contamination.

## 3.04 ASBESTOS REMOVAL PROCEDURES

- A. Asbestos removal: Remove asbestos containing material as described in the contractor's asbestos compliance work plan prior to disturbing the substrate. Modifications to this plan shall be reviewed and approved by the University's Project Manager prior to work continuing.
  - 1. Prohibited Asbestos Removal Methods:
    - a. Removing mastic material with methylene chloride based products
    - b. Uncontained abrasive blasting
    - c. Uncontained power washing
    - d. Dry sanding or scraping
    - e. Power sanding without HEPA attachment
- B. Asbestos abatement operations shall include all tasks necessary for the proper and complete abatement of the materials in the scope of work. Tasks include, but are not limited to, the following:
  - 1. Preparation of work areas, including pre-cleaning, isolation of HVAC equipment, establishment of critical barriers and isolation barriers, establishment of negative pressure enclosures as needed, protection of building equipment, life safety systems, and electrical equipment and systems.
  - 2. Providing water and waste services to work areas, including hot and cold water supply for abatement-related work, and proper filtering of wastewater for disposal.
  - 3. Maintaining adequate negative air pressure (minimum of 0.02"w.g) and at least four air changes per hour as needed.
  - 4. Protecting and maintaining active, as applicable, all life safety systems and building equipment operation.
  - 5. Removing asbestos-containing materials and decontamination of asbestos-contaminated surfaces, equipment, and areas.
  - 6. Encapsulating asbestos-containing materials and/or surfaces possibly contaminated with asbestos fibers, using penetrating and/or bridging encapsulants.
  - 7. Proper storage of asbestos-containing waste, including packaging and labeling.

- 8. Cleaning work areas and surfaces as necessary to achieve acceptance by final visual inspection and final clearance air monitoring.
- 9. Coordinating work with other Subcontractors, University crews, staff, inspectors, and representatives.
- 10. Upon completion of all work area preparation, and not less than four hours before abatement work is to begin, notify the University's Project Manager that the work area is ready for inspection.
- 11. The Subcontractor shall not begin abatement work until the University's Industrial Hygienist has inspected the area and deficiencies have been corrected.
- C. Waste Disposal: HEPA vacuum and/or wet wipe to remove all asbestos or contaminated debris generated during the work. Do not allow asbestos material to accumulate. Place all asbestos containing material and contaminated debris in properly labeled plastic disposal bags at the end of each shift.
- 3.05 FIELD QUALITY CONTROL
  - A. Site Tests:
    - 1. Respiratory protective equipment shall be quantitatively fit tested, including PAPR units. Qualitative fit test using irritant smoke tests or other qualitative test methods shall not be acceptable.
    - 2. All HEPA vacuums and negative air machines (including spare negative air machines) shall be challenge tested, by emery oil aerosol or equivalent, and certified as in "passing" condition prior to work commencing. Testing shall be completed in the presence of the University Industrial Hygienist and shall be conducted at the Berkeley Lab outside of buildings in unoccupied areas. If any units fail, no work will be allowed with those units and the units shall be removed from the Berkeley Lab. Maintenance or repair work at the Berkeley Lab shall not be allowed on vacuums or negative air machines that have failed the challenge aerosol testing. Negative air machines and HEPA vacuums shall be tested every three months, and immediately after changing HEPA filters, and remain onsite during the duration of the project. HEPA vacuums and negative air machines shall not be used after changing HEPA filters until they have been tested by a challenge aerosol.
  - B. Inspection (Asbestos Air Monitoring):

- 1. Personal Exposure Monitoring Results: Subcontractor shall provide personal air monitoring of its employees, in accordance with requirements of 29 CFR 1926.1101. Per 1.05 (A)(3)(a) of this section, the Subcontractor shall submit air samples to an analytical laboratory accredited by the American Industrial Hygiene Association (AIHA) for analysis by Phase Contrast Microscopy (PCM) per NIOSH method 7400.
  - a. The personal air monitoring data shall include the employee's name, date of monitoring, task(s) performed, employees represented by the monitoring, analytical result, and time-weighted average exposure.
  - b. The analytical lab results shall be submitted to the University's Project Manager within 24 hours of sample collection.
- 2. The University's Industrial Hygienist may conduct personal asbestos air monitoring on the subcontractor's employees at any time to verify Subcontractor's compliance with these Specifications and OSHA regulations.
- 3. Monitoring During Asbestos Removal and Decontamination: The University's Industrial Hygienist, or its representative, may conduct quality control and area monitoring at any time during potential worker exposure to airborne asbestos. If monitoring outside the control area shows airborne concentrations exceed 0.01 fibers per cubic centimeter air (f/cc), the Subcontractor shall immediately stop all work, correct the condition(s) causing the increase and notify the Project Manager.

# 3.06 CLEANING

- A. Daily Cleaning: Thoroughly clean the entire area under active asbestos disturbance at the end of each workday.
  - 1. At end of work shift remove any asbestos containing material or debris by using a HEPA vacuum or by spraying with wet wash solution, collect debris with wet paper towels or equivalent, place in disposal bag while still wet, and clean surface of plastic sheets with wet paper towels or equivalent.
  - 2. Exterior Cleanup:
    - a. Examine immediate area to ensure that no asbestos debris has escaped containment. Debris shall be placed in double plastic bags, sealed and stored with other contaminated debris.

# 3.07 PROJECT CLEARANCE

- A. Upon completion of asbestos removal, placement of removed asbestos material and debris in waste storage containers previously approved by LBNL, and final HEPA vacuuming of surfaces, notify the University's Project Manager that the abatement area is ready for post abatement visual inspection. Provide additional removal or cleaning as directed by the University's Industrial Hygienist to provide acceptable surfaces for construction of new materials with no additional disturbance of ACM.
- B. The work area shall have passed post abatement visual inspection prior to post removal encapsulation. Negative air must continue to run and workers must remain in specified respiratory protection.
- C. An approved encapsulant shall be applied, using airless spraying equipment, to all areas of the project where asbestos-containing materials have been removed. Encapsulants shall be colored for ready visibility.
- D. Upon completion of encapsulation of surfaces from which asbestos has been removed (allowing for at least two hours for encapsulant to dry), the Subcontractor shall inform the University's Project Manager that the area is ready for clearance monitoring.
- E. The University's Industrial Hygienist will provide aggressive clearance air testing after the final cleanup and visual inspection, but before the removal of the enclosure of the asbestos control area. Samples shall be analyzed by Transmission Electron Microscopy (TEM) and submitted for a turn around time of 24 hours. All airborne TEM sample results shall be less than the AHERA clearance criteria of 70 structures per square millimeter air (70 st/mm2). Should any of the final samples indicate a higher value, the Subcontractor shall take appropriate actions to reclean the area and the monitoring shall be repeated.
- F. The University will be responsible for all costs of the initial clearance testing. The Subcontractor shall be responsible for additional testing costs if initial clearance testing does not pass.
- G. The Subcontractor shall not tear down / remove the negative pressure enclosure or negative air machines until verbal notice has been given to the Subcontractor by the University's Project Manager.

## 3.08 STORAGE OF WASTE MATERIALS

A. Waste Evaluation: The materials collected from the cleaning operations must be evaluated to determine if the materials are hazardous and require special handling. The Subcontractor is

responsible for segregating waste as it is generated and labeling all waste containers appropriately. Stored waste must be labeled with the accumulation date, type of waste, and area from which it was generated. The waste will be stored in designated areas selected by the Project Manager. Load all asbestos-containing waste material in disposal bags or leak-tight drums. All materials are to be contained in one of the following:

- a. Two 6-mil disposal bags.
- b. Two 6-mil disposal bags and a drum.
- c. Wrapped in 6-mil polyethylene sheeting and sealed with duct tape.
- B. If a dumpster is to be located on site for the duration of the project, arrange location of the dumpster with the Project Manager.
  - 1. Do not store containerized materials outside of the work area. Take containers from the work area directly to a temporary storage location arranged by the Project Manager. All open dumpsters are prohibited for any construction debris. Take special care in transporting the waste materials from the location of generation to the storage facility. Waste shall be removed from work area at times selected to minimize contacts with tenants. The path from the work area to the storage locations shall be selected to be the shortest possible distance.
- C. Treatment and Testing of Project Waste Water: The handling and treatment of project waste water must conform with all State and local regulations. Project waste water includes shower water and waste water from cleaning operations.
  - The Subcontractor shall not discharge waste water containing asbestos into a community sanitary sewer as per the requirements of the San Francisco Bay Basin Water Quality Control Plan. All waste water shall be discharged into a sanitary filter. Do not discharge any waste water on ground or soil. Filter water as necessary to meet local requirements.
  - 2. Waste water containing asbestos, including drainage from decontamination showers, shall be filtered in accordance with the following requirements prior to introduction into the sanitary sewer system.

- a. Filter water using four in-line filter cartridges with 2" inlets and outlets. The outlet of each filter cartridge shall be connected in series to the inlet of the next cartridge. The first cartridge shall contain 100  $\mu$ m prefilters and the second and third cartridge shall contain 25  $\mu$ m filters and the final cartridge shall contain 5  $\mu$ m filters.
- b. Spare filters of all three sizes shall be maintained at the site at all times to replace prefilters during cleaning.
- c. When the prefilters become clogged, replace with spares, store accumulated debris as contaminated waste for disposal by LBNL, and wash out the prefilters in the shower, allowing the drainage from the cleaning operation to go through the filtration system.
- d. Provide a holding tank for contaminated wastewater as required to prevent backup of water into shower when the amount of water generated exceeds the flow rate of the filters.

# ATTACHMENT A ASBESTOS COMPLIANCE WORK PLAN OUTLINE

In accordance LBNL's Asbestos Abatement Specifications, the Subcontractor is required to prepare a written (typed or word-processed), site-specific Asbestos Work Plan, and submit to the University prior to start of work. This plan is required for the Subcontractor to meet OSHA requirements as well as the Project Specifications, and shall describe work procedures and control methods that will protect LBNL facilities and staff.

The Subcontractor shall prepare the Asbestos Work Plan to include, at a minimum, the following information:

## I. Location of Work

The work to be completed under this Asbestos Work Plan will be completed at: Lawrence Berkeley National Laboratory One Cyclotron Road (Building name) (Location within building)

Previous hazardous materials inspections or surveys have found that asbestos-containing materials are present at the following locations:

(list all materials and locations, to assure LBNL that the Subcontractor is aware of all hazardous materials locations)

The presence of asbestos represents a hazard to workers who may disturb these materials during the course of this work.

II. Description of Work

Describe the anticipated work scope, including:

- A. Removal (list materials and locations)
- B. Encapsulation *(list materials and locations)*
- C. Repair (list materials and locations)
- D. Decontamination (list materials and locations)
- E. Any other activities that will or may result in worker exposures to asbestos.
- III. Schedule
  - A. General Start Date: Completion Date:

The competent person, \_\_\_\_\_, will conduct worksite visual inspections on a daily basis, or more often as necessary.

B. Phase Dates

Phase/Task	Anticipated Date(s)
Mobilization Setup of work area(s), containments, other Removal/repair/other abatement Final cleaning Visual Inspection Final clearance (visual and air sampling) Teardown Demobilization	

IV. Equipment and Materials

List all equipment and materials to be used, such as the following. List trade names or types where known.

HEPA vacuums scrapers power saws hammers screwdrivers pry bars cutting shears other hand tools

negative air filtration units manometers shower facilities airless sprayers/compressors cleaning detergents solvents (must be approved by University)

paints/sealants/encapsulants (must be approved by University) rollers/brushes

butyl rubber gloves disposable coveralls respiratory protection cotton work gloves leather work gloves

## V. Crew

List all workers and supervisors, with emergency contact names and pagers.

Clearly identify the supervisor and competent person who has authority for all safety and health.

VI. Control Measures and Work Procedures

Describe, in a narrative format, specific work procedures, exposure/contamination controls, and engineering controls. This description should include, but not be limited to, the following types of information:

OSHA Class I, II, III, IV Negative pressure enclosure Wet methods Glovebagging Respiratory Protection HEPA vacuums Containment (polyethylene barriers) without negative pressure Solvent removal of mastic Other procedures *(list)* 

## VII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection, including types and manufacturers, which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required.

List all personal protective equipment anticipated to be used on the project.

VIII. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies, all to be provided by the Subcontractor.

Specify the required use of the facilities, including use of the facilities prior to eating, drinking, and smoking, and before leaving the project site.

Describe handling or treatment of asbestos-contaminated solid waste and wastewater.

## IX. Air Monitoring Data

Identify general worker air monitoring protocol to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for sample analysis, and how pumps are calibrated and worn by employees. Identify competent person who will oversee Subcontractor's air monitoring.

X. Worker Training and Qualifications

Provide the Subcontractor's worker documents as an attachment to the Asbestos Work Plan. Include each worker's current AHERA training records, respiratory protection training and fit-testing certification, and asbestos and respiratory protection medical clearances.

XI. Notification

Describe all arrangements made on multi-employer work sites to inform affected employers about the asbestos project. Attach copies of any notifications.

XII. Containment Diagram

Include a diagram (either neatly and legibly hand-drawn, or generated on a wordprocessor or CAD program) of the containment showing the containment perimeter in relation to surrounding areas, locations of negative air machines, direction of air flow, decontamination chamber, bag out area, exhaust points to exterior of building, etc.

XIII. Waste

Describe how all waste generated on this project will be packaged, labeled, and stored. LBNL EH&S Waste Management will transport, manifest, and dispose of all hazardous waste.

XIV. Preparation of Asbestos Work Plan

Date Prepared:

Prepared By (signature, name, and title)

## ATTACHMENT B ASBESTOS / LEAD BULK SAMPLING RESULTS (SEE ATTACHMENT B IN SPECIFICATION SECTION 13281)

## SECTION 15410

## PLUMBING AND FIRE PROTECTION PIPING

### <u> PART 1 - GENERAL</u>

#### 1.01 WORK INCLUDED

- A. Piping for the following systems include pipe, fittings, valves:
  - 1. Storm drainage
  - 2. Fire sprinkler supply
  - 3. Fire sprinkler drainage
- B. Seismic restraints

#### 1.02 RELATED WORK

- A. Division 1 General Requirements
- B. Division 5 Metals
- 1.03 CODES AND STANDARDS

Comply with all of the following:

- A. 2001 California Plumbing Code
- B. American Society of Mechanical Engineers (ASME)
  - 1. ASME B16.3 Malleable Iron Threaded Fittings, Class 150 and 300
- C. American Society for Testing and Materials (ASTM)
  - 1. ASTM A 53 Pipe, Steel, Black and Hot Dipped Zinc-Coated, Welded and Seamless
- D. Cast Iron Soil Pipe Institute CISPI 301 Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Systems
- E. International Association of Plumbing and Mechanical Officials IAPMO UPC Uniform Plumbing Code
- F. National Fire Protection Association (NFPA)
  - 1. 1999 Edition of NFPA 13 Installation of Sprinkler Systems

## 1.04 DEFINITIONS

- NPT = National pipe thread
- OS&Y = Outside screw and yoke
- RS = Rising stem
- WOG = Water, oil, and gas (pressure)
- WWP = Working Water Pressure

### 1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product specification sheets for each system component and device to be provided that includes all data needed to prove compliance with this specification. Clearly indicate the exact model of each component to be provided.
- B. Coordination Drawings:
  - 1. Obtain drawings from the structural, electrical, sprinkler, plumbing, sheet metal, concrete, steel, and dry wall trades.
  - 2. Prepare separate composite coordination drawings to a scale of 1/4" = 1'-0" or larger, showing work of all Divisions to demonstrate coordination, clearance, access, etc. between equipment, conduits, piping, structural elements, architectural elements, etc. These drawings are to be the basis for the detailed shop drawings and need not be submitted, but are to be available for review upon request.
- C. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work.
- D. Indicate the proposed locations, of piping, and materials.

## 1.06 QUALITY ASSURANCE

- A. Contractors Qualifications: The Contractor shall be a California licensed contractor with a valid State of California license in the installation of plumbing systems, and the same company shall have been in the business of installing plumbing systems for a minimum of 5 years.
- B. Products shall from manufacturer's regularly engaged in the manufacturing of plumbing products, and product dates are in published plumbing catalogs.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and protect products.

B. Protect all piping from entrance of foreign materials with temporary caps, or covering. Complete all sections of piping, or cap at end of shift. Maintain all temporary piping end caps until next connection of piping, or completion of rough-in and connect.

#### PART 2- PRODUCTS

- 2.01 PIPE CLASS CI2: CAST-IRON SOIL PIPE, HUBLESS
  - A. Above Ground Pipe and Fittings: Hubless ASTM A74 cast-iron sanitary system; CISPI 301 and IAPMO UPC-approved. The joint system shall be Anaco, Clamp-All, or equal, heavy duty type comprised of a neoprene sleeve and a stainless-steel assembly, complying with FM1680. Install cast-iron mechanical couplings using torque wrenches set at 175 in-lbf (20 J) of torque.
- 2.02 PIPE CLASS BS2: BLACK STEEL PIPE AND FITTINGS (FIRE SPRINKLER)
  - A. Pipe: Black steel, welded or seamless wall pipe, schedule 40; ASTM A 53.
  - B. Fittings:
    - 1. Pipe Sizes 2 Inch (50 mm) or Smaller: Malleable iron threaded fittings, ASTM B16.3.
    - 2. Pipe Sizes 2-1/2 Inch (65 mm) or Larger: Flexible and rigid-type grooved couplings shall be UL listed/FM Global approved, and manufacturer approved for use in sprinkler installations. Reducing type couplings are not acceptable; use concentric reducing fitting. Flexible couplings shall be installed as required by NFPA 13.
- 2.03 PIPE CLASS GS1: GALVANIZED STEEL PIPE AND FITTING (FIRE SPRINKLER)
  - A. Pipe: Hot-dipped galvanized steel, welded or seamless wall pipe, schedule 40; ASTM A53.
  - B. Fitting: Galvanized 150-lb (1,035-kPa), threaded malleable iron, banded fitting; ASME B16.3 dimensions, ASTM A197 material, ASTM A 153 galvanizing, and ASME B1.20.1 threads.
- 2.04 GATE VALVES (FIRE SPRINKLER)
  - A. Bronze body straight pattern globe valve, bronze disc holder with EPDM seat, bronze trim, wheel handle, 175 PSI rated.
  - B. Drain and inspector Drain Valve: Existing assemblies are Victaulic "Test Master" main drain and inspector test drain assemblies.
- 2.05 PIPE JOINT CONNECTION MATERIALS
  - A. See Part 3 of this section for material call-outs for various installation situations.

#### 2.06 PIPE SUPPORT DEVICES

- A. Support from steel beam above: Anvil (Grinnell), Tolco, or equal, UL and/or FM Global approved, C type beam clamp with retaining strap for beam flange mounting.
- B. Piping supported tight to structural column: 1-5/8 inch square 12 gauge galvanized channel complete with pipe clamp, all nuts and bolts, and end caps. Bolt channel to steel column.
- C. Seismic bracing: Anvil (Grinnell), Tolco, or equal, UL and/or FM Global approved, brackets, all in accordance with NFPA #13, and California Building Code requirements. Seismic bracing members shall be mounted to building structure only.
- D. Miscellaneous steel angles, channels, brackets, rods, clamps, etc, shall be of materials conforming to ASTM A36. All steel parts shall be hot dipped galvanized after fabrication. All bolts and nuts, except as otherwise specified, shall conform to ASTM. Bolts shall have heavy hexagon heads, and nuts shall be of the hexagon heavy series. All bolts, washers, nuts, anchor bolts, screws, and other hardware, unless otherwise specified, shall be galvanized, and all galvanized nuts shall have a free running fit.

#### PART 3- EXECUTION

#### 3.01 PREPARATION

- A. Ream pipe and tube ends to full bore of piping and remove burrs. Use American Standard pipe threads for IPS threaded work. Ream out burrs formed by cutting tools and, before installing, examine each section of pipe to see that it is clean and clear. Pipes shall be free from tool marks. In making up screwed joints, apply specified thread lubricant or thread sealing tape to male threads only.
- B. Remove scale and dirt on inside and outside before assembly.

#### 3.02 PIPE INSTALLATION

- A. Route piping to maintain gradient as shown on the drawings, and in accordance with the scheduling and coordination requirements of Division 1.
- B. Install piping to clear new structural work.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide clearance for installation of insulation.
- E. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer afterwards to welded areas.
- F. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Comply with Division 9 "Painting."

G. Wherever changes in sizes of piping occur, Use reducing fittings. The use of bushings will not be permitted.

### 3.03 PIPE JOINT CONNECTIONS

- A. Threaded Pipe: Use Crane "JC-40," Rectorseal "5," or equal, for general-service applications, with temperatures from -50 F to +400 F (-46 C to +204 C), gas pressures to 2600 psi (18.0 MPa) gauge, liquid pressures to 10,000 psi (69.0 MPa) gauge; with nontoxic, nonhardening metal or plastic threads. Special situations are listed below:
  - Teflon Joint-Sealing Tape: Teflon joint-sealing tape may be used for generalservice applications, -400 F to +500 F (-240 C to +260 C) temperature limits, pipe sizes 1-1/2 inch (40 mm) or smaller. Do not apply tape to the first male thread.
- B. Steel Pipe and Roll Grooved Fittings:
  - 1. All grooved couplings, fittings, valves, and specialties shall be of one manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
- C. Storm Drain Piping and Fitting:
  - 1. Hubless: Properly align no-hub pipe ends, which shall be cut square. Slip elastomeric sealing sleeve over joint, and apply corrugated stainless steel sleeve with tightening steel bands over the sealing sleeve. Rotate bolts such that bolt heads are accessible and away from obstructions. Tighten steel bands alternately to at least 48 in-lbf (5.4 J) of torque using a torque wrench.
  - 2. Mechanical Joints: Tighten all bolts with a torque wrench and make complete installation in accordance with pipe manufacturer's recommendations. Use a teflon lubricant seal if recommended.

### 3.04 PIPING SUPPORTS

- A. Provide seismic restraints on all piping, and mechanical plumbing, with or without vibration isolation, in accordance with California Building Code.
- B. Devices for attachments to structural columns at the top portion are to be friction type with brackets and clamping devices. Attached piping to supports with pipe clamps.
- C. Piping supports at bottom of structural columns are to be welded to steel columns. Piping is to be attached to support devices with pipe clamps.

## 3.05 FIELD QUALITY CONTROL

- A. If testing results are at variance with project documents, Subcontractor shall determine and correct the installation problem at no additional cost to the University. The University will retest upon Subcontractor notification of correction.
- B. Notify the University at least 24 hours in advance of desired time for both the initial testing and any subsequent retesting.

### 3.06 PIPE SCHEDULE

PIPING SYSTEM	MATERIALS
a. Storm Drain Primary (above	e floor) Pipe Class C12, Hubless cast iron.
b. Fire Sprinkler piping	Pipe Class BS2 (black steel)
c. Fire Sprinkler drainage pipi	ng Pipe Class GS1 (galvanized steel)

### 3.07 MAINTENANCE AND TRAINING INSTRUCTIONS

A. See Division 1 – General Requirements.

# END OF SECTION

## SECTION 16010

## BASIC ELECTRICAL REQUIREMENTS

#### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Extent: The Subcontractor shall furnish all services, all skilled and common labor, and all apparatus and materials required for the complete installation as shown and within the intent of the drawings and these Specifications.
- B. Work includes, but not limited to, the following and shall be completed in accordance with the project construction drawings and all specifications:

#### 1.02 RELATED SECTIONS

- A. The following items of work are covered in other sections of these specifications:
  - 1. M01010 General Requirements
  - 2. M01210 Special Requirements

#### 1.03 EXAMINATION OF SITE

- A. The Subcontractor shall examine the site and become familiar with all conditions that may affect the work covered by this division of the Specifications in order to obtain a conclusive bid. Failure to do so shall not lessen the subcontractor's responsibility or entitle him to additional compensation for work not included in the bid.
- B. The electrical prime, sub or sub-sub contractor shall list separately in the bid quote all exceptions taken from the construction documents and specifications. If none are specified in the bid quote, it shall be understood that the prime, sub or sub-sub contractor shall comply with the requirements of the construction documents and specifications in their entirety.

#### 1.04 INSPECTIONS

- A. See Section 01210 Special Requirements, Part 1.03 Inspections.
- 1.05 RULES AND REGULATIONS
  - A. Codes: See Section 01010 General requirements, Part 1.03 Codes. In addition, all electrical construction, materials and equipment shall comply with the latest edition of the following Codes and Standards:
    - 1. National Electrical Safety Code (NESC),
    - 2. Standards for Electrical Safety in the Workplace (NFPA 70E)
    - 3. Illuminating Engineering Society of North America (IES)

- 4. American National Standards Institute (ANSI)
- 5. American Society for Testing and Materials (ASTM)
- B. Quality Control: See Section 01210 Special Requirements, Part 1.12.
- C. Coordination of Work: See Section 01010 General Requirements, Part 1.07.
- D. Submittals: See Section 01010 General Requirements, Part 1.08E (Submittals), and Section 01210 Special Requirements Part 1.06 (Drawings and Specifications). If any part of the drawings or these Specifications may not appear clear or definite, the Subcontractor shall request the Project Manager through 'Request for Information' (RFI) process for an interpretation and decision of same, and shall have all such questions decided before proceeding with the work.
- E. Materials and Equipment: See Section 01010 General Requirements, Part 1.08 D.
- F. Maintenance and Operating Instructions:
  - 1. See Section 01010 General Requirements, Part 1.08G.
  - 2. At time of occupancy, arrange for manufacturer's representatives to instruct building, operating and maintenance personnel in the use of any equipment requiring operating and maintenance. Arrange for all personnel to be instructed at one time. Pay all costs for such service.
  - 3. Maintenance and operating instructions and training for all University-furnished equipment will be provided by the equipment vendor. The Subcontractor shall be responsible for all other equipment.
- G. Manufacturer's Directions: Follow manufacturer's directions covering points not shown on the drawings or specified herein. Manufacturer's directions do not take precedence over drawings and Specifications. Where these are in conflict with the drawings and Specifications, notify the Project Manager for clarification before installing the work.
- H. Shop Drawings: The Subcontractor shall submit for approval shop drawings prepared in accordance with Section 01010 General Requirements, Part 1.08E and as required by other sections of these specifications.
- I. Guarantee: See Section 01010 General Requirements, Part 1.08H Guarantee.
- J. Protection of Equipment:
  - 1. Care shall be exercised during construction to avoid damage or disfigurement of any kind. All equipment shall be protected from dust and moisture prior to and during construction. The Subcontractor is cautioned that concrete finishing, painting, etc. in electrical rooms shall not proceed if unprotected equipment is installed.
  - 2. Where required or directed, construct temporary protection for equipment and installations so as to protect same from dust and debris caused by construction.

- 3. All protection shall be substantially constructed with the use of clean canvas, heavy plastic, Visqueen and plywood as required, and made tight and dust proof as directed.
- 4. The Subcontractor shall repair by spray or brush painting, after properly preparing the surface, all scratches or defects in the finish of the equipment. Only identical paint furnished by the equipment manufacturer shall be used for such purposes.
- 5. Failure of the Subcontractor to protect the equipment as outlined herein shall be grounds for rejection of the equipment and its installation.
- K. Removed Equipment and Material: See Section 01210 Special Requirements, Part 1.03 U.S. Government and/or University Property Materials To Be Removed.
- L. Shutdown: See Section 01210 Special Requirements, Part 1.05.
- M. Cleaning: See Section 01210 Special Requirements, Part 3.05.

#### 1.06 REVIEW OF MATERIALS

- A. Materials and Equipment: All materials and equipment shall be new. All materials and equipment for which tests have been established by Underwriter's Laboratories, Inc. shall be approved by that body and shall bear its label of approval.
  - 1. In lieu of listing by an approved testing laboratory, consideration will be given to certified test reports of an adequately equipped, recognized independent test laboratory competent to perform such testing indicating conformance to all requirements of the applicable Underwriter's Laboratories, Inc. standards.
  - 2. Unless otherwise approved by the Project Manager, the materials to be furnished under this Specification shall be the standard products of manufacturers regularly engaged in the production of such equipment equal to or superior to material specified, and shall be the manufacturer's latest standard design that complies with the Specification requirements.
- B. Approval of Materials:
  - 1. See Section 01010 General Requirements, Part 1.08E.
  - 2. A complete list of materials and equipment proposed shall be submitted to the Project Manager for approval. The list shall include for each item: the manufacturer, the manufacturer's catalog number, type or class, the rating, capacity, size, etc.
  - 3. The Subcontractor shall submit a brochure containing catalog cuts or drawings and data for, but not limited to, the following items:
  - 4. Before installation of the equipment, the Subcontractor shall submit for approval detailed construction drawings for each item of fabricated equipment required for the electrical installation. All drawings shall be to scale and fully dimensioned

and shall provide sufficient detail to clearly indicate the arrangement of equipment and its components.

5. Installation of any approved substituted equipment is the Subcontractor's responsibility, and any changes required to work included under other divisions for installations of approved substituted equipment must be made to the satisfaction of the Architect-Engineer and without change in contract price. Approval by the Architect-Engineer of substituted equipment and/or dimension drawings does not waive these requirements.

### 1.07 QUALIFICATIONS AND LICENSE REQUIREMENTS

- A. Any Prime, Sub, or Sub-Sub contractor performing any electrical construction work on the project shall have C-10 Electrical Construction License from the State of California, USA.
- B. Contractor performing electrical construction work shall provide details of the project experience addresses and references with names and phone numbers.

### PART 2 - PRODUCTS

## 2.01 GENERAL

- A. In addition to material and equipment specified, the Subcontractor shall also provide incidental materials required to effect a complete installation. Such incidental materials include solders, tapes, caulkings, mastics, gaskets and similar items.
- B. Materials and equipment shall be uniform throughout the installation. Equipment of the same type shall be of the same manufacturer. All materials and equipment shall be new. Materials and equipment for which tests have been established by the Underwriter's Laboratories, Inc. shall have been approved by that body, or an equivalent testing firm (see Part 1.06 A.1), and shall bear its label of approval.

## PART 3 - EXECUTION

#### 3.01 TESTS

- A. Upon completion of the electrical construction work, perform tests and provide test reports as specified in this and other sections.
- B. All tests shall be made in the presence of an LBNL Inspector or designated representative. The application or interruption of power shall be programmed and directed by the Project Manager.
- C. The Subcontractor shall submit to the Project Manager three (3) copies of all test results, certified in writing, witnessed, signed and dated, immediately upon completion of work. Any unsatisfactory condition revealed by these test results, or unsatisfactory methods of tests and/or testing apparatus and instruments, shall be corrected by the Subcontractor to the satisfaction of the Project Manager.

D. The Project Manager reserves the right to require that the Subcontractor perform and repeat any tests that are deemed necessary to complete or check the tests or the certified records of the Subcontractor at any time during the course of the work. The Subcontractor shall correct any unsatisfactory portion of his work that is revealed by the tests or that may be due to progressive deterioration during this period, unless the item in question was a direct specification.

### 3.02 EQUIPMENT IDENTIFICATION

- A. Transformers: All transformers shall be identified by one-inch-high white stenciledon characters giving bank number and circuit feeding the transformer in agreement with the drawings.
- B. Panelboards: All panel boards shall be identified by circuit number, voltage, phase, and wire as shown on drawings or specified elsewhere in these Specifications.
- C. Schedules: All panelboards shall be furnished with a complete 8-1/2" x 11" typewritten schedule mounted on the inside of the inner door. If field changes are necessary, new schedules shall be provided by the Subcontractor. Forms will be provided by the Project Manager.
- D. Receptacles and Light Switches: All receptacles and light switches shall be identified by a circuit number as indicated on the drawings with 1/4" high white characters on 1/2" wide dark contrasting stick-on embossing tape placed directly above the device.
- E. Equipment: Properly identify all circuit breakers and other devices on switchboards, motor disconnect switches, starters, time clocks, and other apparatus used for operation of, or control of circuits, appliances or equipment by means of 3/32 inch thick black laminated phenolic nameplate with white core. For switchboards and panelboards, fed by standby or emergency power sources, use 3/32-inch thick yellow laminated phenolic nameplate with black core. Engrave characters a minimum of 1/2 inch size for device numbers, except that transformer bank identification shall use a minimum size of 1-1/2 inch character height and 15kV switchgear shall use 1 inch character height, Helvetica style font. Attach nameplates with No. 4-36 RH nickel-plated brass machine screws.
- F. Conductors: The main incoming power will be delivered to the building site with the A phase, B phase, C phase and Neutral phase (if applicable) cables positively identified. The phase sequence rotation shall be A-B-C clockwise.
  - All conductors shall be identified using plastic or metal labels, factory colored wires or by using color bands or tape intended for the purpose and approved for wet, outdoor applications at all terminations, junctions and wherever the conductors are accessible in pull boxes. Phases of 12.47 kV conductors shall be identified with tags. Conductors are not color coded, but identified as "A Phase", "B Phase", and "C Phase". For color coding of low voltage conductors, see Section 16120, Part 2.01.
  - 2. Feeder circuit cables shall be identified with embossed metal or plastic labels with 1/2" characters permanently attached to the feeder circuit cables. Feeder circuits shall be identified with the circuit number per the drawings.

3. Branch circuit identification shall be by use of wrap-around labels such as manufactured by Brady, Thomas and Betts, or equal. Labels shall be placed on conductors at all outlets (switch, receptacle, fixture, etc.), panelboards, junction boxes, relays, disconnect switches, motor starters, and controls. Branch circuit conductors shall be identified with the circuit number.

#### 3.03 NOISE AND VIBRATION

A. The Subcontractor shall cooperate in reducing objectionable noise or vibration. If noise or vibration is a result of improper material or installation, these conditions shall be corrected at no cost to the University.

### 3.04 GENERAL INSTALLATION METHODS

- A. Carpentry, Cutting, Patching, and Core Drilling:
  - 1. Provide carpentry, cutting, patching, and core drilling required for installation of material and equipment specified in the scope of work.
  - 2. Do not cut, core, or drill structural members without consent of the Project Manager.
- B. Seismic Mounting: All electrical material and equipment, including floor mounted equipment, suspended raceways and light fixtures, shall be installed with bracing, cabling, or anchoring to comply with the latest edition of the Uniform Building Code and Standard and LBNL Lateral Forces Design Criteria RD3.22.
- C. Waterproof Construction:
  - Maintain waterproof integrity of penetrations of materials intended to be waterproof. Provide flashings at exterior roof penetrations. Caulk penetrations of foundation walls and floors watertight. Provide membrane clamps at penetrations of waterproof membranes.
  - 2. Provide waterproof NEMA 3R enclosures for all equipment or devices mounted outside or otherwise exposed to the weather.
- D. Sleeves, Conduit Stubs, and Slab Penetrations: See Section 16110.
- E. Painting of Electrical Equipment and Hardware:
  - 1. Provide moisture resistant paint for all exterior painting.
  - 2. Colors shall be as shown on the drawings unless specified.
  - 3. Refer to individual Sections and construction drawings for painting requirements of electrical equipment.
  - 4. All exposed conduits, raceways and gutters inside and outside the building shall be painted to match the wall color.
- F. Equipment Concrete Pads:

- 1. All equipment located on concrete floors inside the building or on grade outside the building, shall be mounted on a concrete base. The concrete base shall be four inches high and shall extend six inches beyond the edge of equipment base unless indicated otherwise on drawings.
- 2. Coordinate concrete bases: Concrete bases indicated on Architectural or Structural drawings are specified in other Divisions. Concrete bases not on Architectural or Structural drawings are requirements of this Division.
- G. Seismic Anchorage
  - 1. Seismic anchorage of electrical equipment shall be in accordance with Section 01900."
- H. Demolition and Removal:
  - 1. Refer to construction documents for demolition and removal details.
  - 2. LBNL EH&S approval shall be obtained prior to disposal of any electrical equipment and materials.
  - 3. All disconnected wiring shall be removed from all raceway systems, panels, enclosures pull boxes, junction boxes etc. irrespective of whether the removal is specified in the construction documents or not. The empty raceway systems shall be tagged spare on both ends of each termination.

## END OF SECTION