STATE OF CALIFORNIA
Arnold Schwarzenegger, *GOVERNOR*

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF LABOR STATISTICS & RESEARCH
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

ADDRESS REPLY TO:
P.O. Box 420603
San Francisco CA 94142-0603

SCOPE OF WORK PROVISIONS

FOR

BUILDING/CONSTRUCTION INSPECTOR AND FIELD SOILS AND MATERIAL TESTER

IN

ALAMEDA, ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, CONTRA CONSTA, DEL NORTE, EL DORADO, FRESNO, GLENN, HUMBOLDT, KINGS, LAKE, LASSEN, MADERA, MARIN, MARIPOSA, MENDOCINO, MERCED, MODOC, MONTEREY, NAPA, NEVADA, PLACER, PLUMAS, SACRAMENTO, SAN BENITO, SAN FRANCISCO, SAN JOAQUIN, SAN MATEO, SANTA CLARA, SANTA CRUZ, SHASTA, SIERRA, SISKIYOU, SOLANO, SONOMA, STANISLAUS, SUTTER, TEHAMA, TRINITY, TULARE, TUOLUMNE, YOLO AND YUBA COUNTIES

AGREEMENT

THIS AGREEMENT, made and entered into this 25 day of May, 2005, by and between OPERATING ENGINEERS LOCAL UNION NO. 3 of the International Union of Operating Engineers, AFL-CIO ("Union") and COUNCIL OF ENGINEER AND LABORATORY EMPLOYERS, INC. ("Employer") for and on behalf of its members hereinafter identified,

WITNESSETH

01.00.00 GENERAL PROVISIONS DEFINITIONS

01.01.00 *Employer.* The term "Employer" as used herein shall refer to the Council of Engineer and Laboratory Employers, Inc.

01.02.00 *Individual Employer.* The term "Individual Employer" as used herein shall refer to any person or entity who is now, or during the term of this Agreement may become, a member of the Employer. The present Individual Employers are set forth in Appendix "A" attached hereto.

01.03.00 *Notice of Members.* The Employer shall notify the Union once every three (3) months following the effective date of this Agreement of any changes in membership in Employer since the last such notification.

01.04.00 *Union.* The term "Union" as used herein shall refer to the Operating Engineers Local Union No. 3 of the International Union of Operating Engineers, AFL-CIO.

01.05.00 *Employee.* The term "Employee" as used herein shall mean all technical Employees employed by the Individual Employer, including Drill Rig Operators and Tracers who are classified as Trainee, Technician, Engineering Technician and Senior Engineering Technician, excluding all other employees, draftsmen, office clerical employees, professional employees, guards and supervisors as defined by the Labor Management Relations Act of 1947, as amended. The intent of this paragraph is to include in the coverage of this Agreement Employees as certified in NLRB Case No. 20-RC-9077. Nothing in this Agreement shall apply to individuals performing work such as washing vehicles, cleaning laboratories, picking up cylinders and/or equipment at jobsites, or functioning as flagmen.

01.06.00 *Coverage.* This Agreement shall apply to all work performed in Northern California and Northern Nevada, which shall include the forty-six (46) California counties north of the northerly boundaries of Kern and San Luis Obispo Counties and the westerly boundaries of Inyo and Mono Counties to the southerly boundary of the State of Oregon, and which shall also include that portion of Nevada above the northerly boundaries of Esmeralda, Nye and Lincoln Counties, and the States of Utah and Hawaii, and Mid-Pacific Islands; provided, however, that the Employer reserves the right to negotiate wages and fringe benefits which vary from those set forth herein with regard to any Individual Employer in a geographical area where local conditions warrant such negotiations. This proviso shall not apply to the California Counties of San Francisco, Marin, Napa, Solano, Contra Costa, Alameda, Santa Clara, Sonoma, and San Mateo.

01.07.00 *Performance of Work.* Registered Engineers, Registered Geologists, Certified Engineers in Training, and Supervisors of Employees of firms party to this Agreement may perform, only occasionally, any work covered by this Agreement so long as the performance of such work does not cause the layoff or prevent the recall of an Employee covered by this Agreement.

02.00.00 RECOGNITION UNION SHOP HIRING PROVISIONS

02.01.00 *Union Recognition.* The Employer and the Individual Employers covered hereby recognize the Union as the sole collective bargaining agent of all covered Employees.

02.02.00 *Employer Recognition.* The Union hereby recognizes and acknowledges that the Employer includes in its membership a majority of the Individual Employers in the area in which they generally operate. By reason of such fact, the Union hereby recognizes the Employer as the collective bargaining representative in the territory subject to this Agreement for all persons, firms or corporations who are now or hereafter may become members of any employer organization that is now or hereafter may be listed in Appendix "A" appended hereto, and of any

STATE OF CALIFORNIA

GRAY DAVIS, *GOVERNOR*

DEPARTMENT OF INDUSTRIAL RELATIONS
OFFICE OF THE DIRECTOR
455 Golden Gate Avenue, 10th Floor
San Francisco, CA 94102

ADDRESS REPLY TO:
P.O. Box 420603
San Francisco CA 94142-0603

February 8, 2002

IMPORTANT NOTICE TO AWARDING BODIES AND OTHER INTERESTED PARTIES CONCERNING INSPECTION AND SOILS AND MATERIALS TESTING

Dear Public Official/Other Interested Party:

This notice provides clarification to many questions from the public regarding the scope of work of the testing and inspection determinations. In addition, it answers many questions from the public regarding work performed by architects and engineers.

Attached please find letters from Operating Engineers Local Union No. 3 dated February 4, 2002, and Operating Engineers Local Union No. 12 dated December 6, 2001, clarifying the scope of work for the following determinations:

SOUTHERN CALIFORNIA
BUILDING/CONSTRUCTION INSPECTOR AND FIELD SOILS AND MATERIAL TESTER, page 10E

SAN DIEGO COUNTY
BUILDING CONSTRUCTION INSPECTOR AND FIELD SOILS AND MATERIAL TESTER, page 27C

NORTHERN CALIFORNIA
OPERATING ENGINEER (Heavy and Highway Work): Group 6 (Soils and Materials Tester), page 39
OPERATING ENGINEER (Building Construction): Group 6 (Soils and Materials Tester), page 40A

Scope of work for each of these classifications has been posted on the Internet at http://www.dir.ca.gov/DLSR/PWD. This information may also be requested from the Division of Labor Statistics and Research, Prevailing Wage Unit by calling (415) 703-4774, by faxing a request to (415) 703-4771 or by writing to:

California Department of Industrial Relations
Division of Labor Statistics and Research
Prevailing Wage Unit
P.O. Box 420603
San Francisco, CA 94142

When referring to questions 7 and 8 in the letters from Operating Engineers Local No. 3 and Local No. 12 respectively, please note that testing and inspection is covered at off-site manufacturing and/or fabrication facilities only if the off-site facility is determined covered under prevailing wage laws. If there are any questions pertaining to this area please contact the Division of Labor Statistics and Research at the above address. Please include all relevant documents including but not limited to the contract, financial documents, plans, specifications, as well as contact information for the Awarding Body.

Please refer to an Important Notice dated December 29, 2000 for additional information pertaining to testing, inspection, and field surveying.

Sincerely,

Chuck Cake

Chuck Cake
Chief Deputy Director

OPERATING ENGINEERS LOCAL UNION NO. 3

1620 SOUTH LOOP ROAD, ALAMEDA, CA 94502-7090 • (510) 748-7400 • FAX (510) 748-7401

Jurisdiction: Northern California, Northern Nevada, Utah, Wyoming, South Dakota, Hawaii and Mid-Pacific Islands

February 4, 2002

Ms. Maria Y. Robbins, Deputy Chief
California State Department of Industrial Relations
Division of Labor Statistics and Research
455 Golden Gate Avenue, 8th Floor
San Francisco, CA 94102

RE: Prevailing Wage Determination - Soils and Materials Tester (SMT) On Site

Dear Ms. Robbins:

Please find enclosed the response of Operating Engineers Local Union No. 3 in support of a Prevailing Wage Determination for a Soils and Materials Tester as set forth in the Master Construction Agreement for Northern California.

The data enclosed, we believe, justifies and establishes the Scope of Work Conforming to SB1999 for a Soils and Materials Tester performing on-site work in Northern California.

We respectfully request that a conclusive determination be made that the wage rates and fringe benefit rates applicable to this classification are the prevailing wage for this type of work within the geographical jurisdiction established in the Master Agreement and are consistent with the requirements of SB1999.

Your continuing assistance is appreciated. If there are any further questions, do not hesitate to contact myself or Dean Dye at 510/748-7400.

Sincerely,

Robert E. Clark,
Director/Contracts Department

RECEIVED
Department of Industrial Relations
FEB 06 2002
Div. of Labor Statistics & Research
Chief's Office

cc: Don Doser, Local 3 Business Manager
Dean Dye, Director - Testing & Inspection Division
and Technical Engineers Division

REC:mer
opeiu-3-afl-cio(3)

DEPARTMENT OF INDUSTRIAL RELATIONS
STATE OF CALIFORNIA
CLARIFICATION REQUEST - SOILS & MATERIALS TESTER (SMT)
WITH
OPERATING ENGINEERS LOCAL 3'S RESPONSES

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1. **Summarize the intent of the coverage of the SMT classification in your No. CA Master Agreement, which serves as the basis for the prevailing wage determination.**

   All visual, physical and non-destructive testing that is done at a jobsite, on-site lab, fabrication site (yard), or off-site lab used exclusively for covered work.

2. **Define the following and indicate if done by the SMT classification:**

   a) Magnetic particle testing -- used for welding, laminations and other steel inspections; done by SMT
   b) Non-destructive inspection -- used for welding, laminations and other steel inspections; done by SMT
   c) Ultrasonic testing -- used for welding, laminations and other steel inspections; done by SMT
   d) Keying -- excavation at the toe of a slope; done by equipment operator
   e) Benching -- process of removing noncompacted or "soft" soil in order to properly place the compacted soil on unyielding materials; done by equipment operator
   f) Scarifying -- process of ripping or otherwise preparing the existing surface; done by equipment operator
   g) "Rolling of slopes" -- process of compacting the slope to the required density (also called "back rolling"); done by equipment operator
   h) One-pointer -- test made to roughly determine the weight and maximum density of the soil being used as fill material; done by SMT
   i) "Correction for rock" -- used during a compaction test to mathematically remove all oversize rock from the equation; done by SMT

3. **Does lab work fall within the jurisdiction of the SMT? Does the on/off site location of the lab make a difference?**

   Lab work done offsite normally does not fall under the Construction Inspectors jurisdiction. If a field lab is set up at the project site in the field, it then falls under the Construction Inspectors jurisdiction.

4. **What is the civil engineer's job when working with the SMT? Is the civil engineer covered under the scope of the SMT sections of the collective bargaining agreement (CBA)?**

   A Civil Engineer generally provides direction, plan interpretation and engineering type decisions. They may be either on- or off-site (depends on the nature of the project). They generally do not do the Construction Inspector type work; but if they do, then it is covered work.

5. **The MLA (p.5) lists employees excluded from coverage. Does this imply that engineers and architects, project managers, off-site laboratory workers are excluded?**

   Engineers, Architects, Project Managers, off-site Lab Workers, as long as they do not perform the Construction Inspector work, would not be covered.

6. **Some signatories perform mechanical & electrical inspections. Are these jobs covered under the Operating Engineers Agreement? If so, how is work performed?**

   We (OE3) consider Mechanical Inspectors to be covered by our CBA, therefore the prevailing wage (at the SMT rate) would be paid. Electrical should be covered work by the electrical craft.

7. **Regarding manufacturing sites, if inspectors visit plants, is that inspection of the plant and its processes covered under the Agreement, is that the intent of SB1999?**

   Steel fab shops, concrete and asphalt batch plants, prestressed yard and fabrication shop, etc. (such as those for piles & girders, gul lam beams) is covered work under the intent of SB1999, including mechanical and electric.

8. **Are the following inspectors included in the scope of the agreement: Geotechnical, Concrete, Painting, Steel and Electrical?**

   Concrete, Steel, Painting and Electrical Inspectors are covered work. Also Inspectors such as Roofing, Mechanical (HVAC), Suspended Ceiling, Plumbing, Geotechnical (unless registered Geologists/Engineer is specifically required by the plans & specs) Masonry, Fireproofing, Gul lam beams, Shotcrete, etc. In essence all inspection as required by the Uniform Building Code (UBC) is considered covered work.

9. **Is visual observation inspection covered? For example: Using tape measures...**

   The Construction/Special Inspector shall observe the work for conformance....." is part of the UBC requirements. The majority of inspection work is visually by nature. Slump of concrete, length of weld, depth of footings, pile caps, width of footings, pile caps etc. are but a short list of work that a Construction Inspector would use a tape measure for.

10. **What is the difference between a Geotechnical Inspector and a Geotechnical Engineer? Are they covered under the Operating Engineer Agreement?**

    A Geotechnical Engineer normally would be a registered person with a college degree. They may be a Geologist/Engineer in training also. Geotechnical Engineer performs/supervises the analyses, design and documents preparation associated with the geotechnical aspects of the project. They would not normally be covered, unless doing Construction Inspector work.

    A Geotechnical Inspector ascertains through inspection and/or testing that the Geotechnical Engineer's requirements/recommendations are complied with. A Geotechnical Inspector would normally be covered.

11. **Is a Project Manager whose duties include weekly meetings, approving, contracts, managing engineers, managing subcontracts and preparing monthly reports be covered under the CBA?**

    A Project Manager, (who would normally not be doing construction inspection work) would not be covered.

12. **Is a Resident Engineer whose duties include logging correspondence amongst contractors and subcontractors, performing soil, concrete, masonry, and HVAC tests, and acting as a liaison between contractors and engineers be covered?**

    Resident Engineers, normally a professional registered person is not covered unless doing Construction Inspector work (such as performing soils, concrete, masonry & HVAC tests).

13. **Is the SMT an apprenticeable classification?**

    Yes.

14. **Is inspection of bridges and piers covered under the SMT classification under Operating Engineers Local #3's agreement?**

    Yes.

The following, in addition to the above, are also considered covered inspection work: high strength bolting; shearwall & diaphragms; metal connectors, anchors or fasteners for wood construction; piling; drilled piers; caissons; bolts installed in concrete; post tensioning steel; pre-stressed steel. Also includes, but not limited to, underground construction (sewers, gas lines, drainage devices, water lines, backfilling, welding, bedding). SMT rates apply.

STATE OF CALIFORNIA

GRAY DAVIS, *GOVERNOR*

DEPARTMENT OF INDUSTRIAL RELATIONS
OFFICE OF THE DIRECTOR
455 Golden Gate Avenue, 10th Floor
San Francisco, CA 94102

ADDRESS REPLY TO:
P.O. Box 420603
San Francisco CA 94142-0603

December 29, 2000

IMPORTANT NOTICE TO AWARDING BODIES AND OTHER INTERESTED PARTIES CONCERNING INSPECTION, FIELD SURVEYING AND SOILS TESTING

The passage of Senate Bill 1999 (Chapter 881), effective January 1, 2001, codifies existing Department of Industrial Relations administrative decisions, determinations and regulations concerning the above referenced work. This work when done on or in the execution of a "Public Works" project requires the payment of prevailing wages. In accordance with SB 1999, Inspection and Testing determinations will be strictly enforced for all public works projects advertised for bids on or after January 1, 2001. Field surveying determinations have been and will continue to be enforced for all public works projects.

The classifications that perform this work have been published in the Director's General Prevailing Wage Determinations for over 20 years and can be found on the Basic Trades pages (Building Inspection, Soils Testing) and on the individual county sheets (Field Surveying). For the basic trades, please use the following determinations:

SOUTHERN CALIFORNIA
OPERATING ENGINEER, Group 2 (Soils Field Technician), page 7
BUILDING CONSTRUCTION INSPECTOR (OPERATING ENGINEER), page 10E

SAN DIEGO COUNTY
OPERATING ENGINEER, Group 2 (Soils Field Technician), page 25
BUILDING CONSTRUCTION INSPECTOR (OPERATING ENGINEER), page 10E

NORTHERN CALIFORNIA
OPERATING ENGINEER (Heavy and Highway Work): Group 6 (Soils and Materials Tester), page 39
OPERATING ENGINEER (Building Construction): Group 6 (Soils and Materials Tester), page 40A

Advisory scope of work covered by each of these classifications has been posted on the Internet at http://www.dir.ca.gov/DLSR/PWD. This information may also be requested from the Division of Labor Statistics and Research, Prevailing Wage Unit by calling (415) 703-4774, by faxing a request to (415) 703-4771 or by writing to:

California Department of Industrial Relations
Division of Labor Statistics and Research
Prevailing Wage Unit
P.O. Box 420603
San Francisco, CA 94142

In addition, Director's precedential Public Works coverage determinations concerning inspection and testing work will be enforced for all public works projects advertised for bids on or after the dates the precedential decisions were designated as such. For determinations of the applicability of prevailing wage requirements to other work covered by SB 1999, please contact the Division either via fax number or by mailing your request to the address indicated above. Requests of this nature should include all of the relevant documents including, but not limited to, the contract for the work and a detailed description of the work to be performed. Future clarifications regarding the scope and application of Senate Bill 1999, if needed, will be posted on the DLSR website and mailed to those on the Prevailing Wage mailing list.

OPERATING ENGINEERS LOCAL UNION NO. 3

SOILS AND MATERIALS TESTER

UNION EMPLOYERS

CONSOLIDATED ENGINEERING LABORATORIES, INC.
CONSTRUCTION MATERIALS TESTING
CTS CONSTRUCTION TESTING SERVICES
DYNAMIC CONSULTANTS, INC.
ISI INSPECTION SERVICES, INC.
ENGEO, INC.
HALLENBECK & ASSOCIATES
HARZA
NORTHERN CALIFORNIA SOIL TEST, INC.
ROCKRIDGE TECHNOLOGIES, INC.
SIGNET TESTING LABORATORIES
SMITH-EMERY COMPANY
SOILS LABORATORY & FIELD, INC.
SUNOL RADIO GRAPHIC INSPECTION, INC.
TERRA SEARCH, INC.
TESTING & CONTROLS, INC.
TESTING ENGINEERS, INC.
WATT HIBLER BUILDING & CONSTRUCTION INSPECTIONS
WOODWARD-CLYDE CONSULTANTS, INC.
WRIGHT TESTING, INC.

REVISED MAY 1, 1999

OPERATING ENGINEERS LOCAL UNION NO. 3

HISTORY

In 1964, The American Federation of Technical Engineers transferred jurisdiction of "soils and materials testers" to the International Union of Operating Engineers. (See letter from AFTE dated January 25, 1965 and letter dated October 19, 1993 from Frank Hanley, I.U.O.E. General President).

Since 1973, Operating Engineers Local Union No. 3, through an affiliation with "MEBA", (Marine Engineers Beneficial Association), and a series of successful NLRB elections, became the sole collective bargaining representative for a large number of employees classified as "technicians", (an employee assigned to perform the actual operations of inspection and testing). The Union immediately began collective bargaining with the employers, quickly establishing classifications that continue to be recognized today by employers in the field of "TESTING and INSPECTION", which helped define the scope of "SOILS and MATERIALS TESTER".

SOILS AND MATERIALS TESTER OVERVIEW

The Uniform Building Code (U.B.C.) provides guidelines for testing and inspection and sets forth a number of situations in which the employment of the inspector technician is mandatory. The owner and/or prime contractor is required to provide specially qualified inspectors for inspection during construction in addition to called inspections provided by the municipality, and in addition to periodic site visits by the architect or engineer of record.

Testing and Inspection is best defined as the monitoring of the materials and workmanship which are critical to the engineer or architect of record and/or the building official. This requires inspection by persons with highly developed inspection skills to verify that the material and workmanship comply with the approved plan specifications and contract documents. The special inspector/technician is used for complex on site installations requiring certain inspection skills in one or more construction crafts. These generally include:

Continued from page 1

1. Concrete – during the taking of test specimens and placing of reinforced concrete and pneumatically placed concrete;

2. Bolts installed in concrete – during installation of bolts and placing of concrete of such bolts;

3. Reinforcing Steel and Prestressing Steel – during stressing and grouting of prestressed concrete and placing of reinforced steel, placing of tendons, and prestressing steel;

4. Of ductile monent-resisting steel frames, and for all structural welding;

5. High-strength Bolting – during all bolt installations and tightening operations;

6. Structural Masonry – during preparation of masonry wall prisms, sampling of all masonry units, placement of reinforcement, inspection of grout spaces, and during all grouting operations;

7. Insulating Concrete Fill – during the application of insulating concrete fill when used as part of a structural system;

8. Spray-applied Fireproofing;

9. Piling, Drilled Piers and Caissons – during driving and testing of piles and construction of cast in-place drilled piles or caissons;

10. Shotcrete – during the taking of test specimens and placing of shotcrete; and

11. Special Grading, Excavation and Filling (soils) – soils as used in construction, includes subgrade, base select fill and other similar types of granular and non-granular soils used in construction. The soil may be considered as a structural element in the project or general fill not supporting structural elements.

N ORGANIZATION
FOR ENGINEERS
ARCHITECTS AND
DRAFTSMEN

FILIATED WITH THE AFL-CIO

American Federation of Technical Engineers

900 F STREET, N.W. • WASHINGTON 4, D. C. • REPUBLIC 7-7364

January 25, 1965

Mr. George Meany, President
American Federation of Labor and
Congress of Industrial Organizations
815 16th Street, N.W.
Washington, D.C. 20005

Dear President Meany:

This is to advise you that the American Federation of Technical Engineers, acting underd the authority of the Thirty-sixth Convention held in Seattle, Washington, July 27 to July 30, 1964, and the International Union of Operating Engineers, acting under the authority of the General Executive Board Meeting, held September 14-18, 1964, in Washington, D.C., have agreed to the following transfer of jurisdiction:

"The American Federation of Technical Engineers, hereby transfer to the International Union of Operating Engineers, all rights and claims presently enjoyed by the American Federation of Technical Engineers by virtue of and arising out of its Charter as an affiliate of the AFL-CIO to jurisdiction over all individuals employed or to be employed on field survey parties and directly engaged or to be engaged in outside field work on the site of the project, as rodmen, chainman, instrumentmen, chief of party, chief of parties, construction inspector, and soil testers, in both private and public employment, including all such employees of federal, state, county and municipal government."

In keeping with this action, former members of the American Federation of Technical Engineers, working in the above jurisdiction, have been transferred to local unions of the International Union of Operating Engineers in several areas.

With best wishes and personal regards, we remain

Fraternally yours,

Russell M. Stephens
President, AFTE

Hunter P. Wharton
General President, IUOE

International Union of Operating Engineers
1125 SEVENTEENTH STREET NORTHWEST ★ WASHINGTON, D. C. 20036
AFFILIATED WITH THE AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS

OFFICE OF GENERAL PRESIDENT ● (202) 429-9100

October 19, 1993

Mr. Thomas J. Stapleton
Business Manager
I.U.O.E. Local Union 3
1620 South Loop Road
Alameda, CA 94501

Dear Sir and Brother:

There is enclosed for your information and attention, a copy of the transfer of jurisdiction rights involving field survey and outside field work on all construction projects, granted at the Thirty-sixth Convention of the American Federation of Technical Engineers many years ago and subsequently agreed to by the IUOE General Executive Board.

The essence of this jurisdictional agreement was as follows: "The American Federation of Technical Engineers, hereby transfers to the International Union of Operating Engineers, all rights and claims presently enjoyed by the American Federation of Technical Engineers by virtue of and arising out of its charter as an affiliate of the AFL-CIO to jurisdiction over all individuals employed or to be employed on field survey parties and directly engaged or to be engaged in outside field work on the site of the project, as rodmen, chainmen, instrumentmen, chief of party, chief of parties, construction inspector, and soil testers, in both private and public employment, including all such employees of federal, state, county and municipal government."

Given the tremendous upsurge in environmental reclamation work throughout the U. S. and Canada and the resulting need to test for contaminated soil, I remind you of that transfer, and the need to protect our jurisdiction, particularly in the area of soil testing. To serve our members' best interests, I strongly recommend that you advise contractors in your area of this agreement. By doing this you can ensure that work assignments of this nature are given to Operating Engineers.

With best wishes and kind personal regards, I remain

Fraternally yours,

Frank Hanley
General President

RECEIVED
OCT 22 1993
BUSINESS MANAGER'S OFFICE

FH/bu
Encl.

SECTION 1

EARTHWORK
(Special Grading, Excavation and Filling)

OBJECTIVE

Earthwork as presented in this section includes, in general, those soils construction activities normally associated with special grading, excavation and filling. The purpose of earthwork observation and testing is to verify that the work is done in compliance with the approved plans and specifications, and, in particular, the recommendations of the project geotechnical report.

Soils is a highly variable material, very sensitive to moisture fluctuations, and requires close attention to construction quality control in order to achieve the desired result. Many factors contribute to its suitability and effective performance. Identifying and properly controlling these factors can be divided into two general areas of activity. The first involves the observation or monitoring during construction with particular attention that placement and compaction operations are followed as specified in the contract documents and geotechnical report. The second involves tests to document the soils properties and verify compliance to the quality specified.

Materials engineering laboratories that offer services in this field provide special expertise and equipment to verify the objectives of the design and project specifications. However, this is best accomplished when the Design Geotechnical Consultant provides these construction related services and can in turn achieve continuity and integration of the design-construct process. Without involvement of this Geotechnical Engineer, the constructed earthwork may not meet the performance requirements intended.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and the Geotechnical Engineer's report.
2. Note and record the equipment being used on site.

B. Sampling of Materials

1. Sample and verify that the following materials are delivered to the Materials Engineering Laboratory for any required testing:
   a) Subgrade materials
   b) Native-fill materials
   c) Imported materials
   d) Additive materials (lime, cement, sand, pozzolan, etc.)

C. Testing

1. Perform soils classification and properties tests as required on native and/or imported soils.
2. Perform laboratory moisture-density relationship tests or other structural property tests as required.
3. Where applicable, conduct laboratory testing program to determine soils' properties resulting from admixtures such as cement or lime.
4. In the field, conduct in-place field density and moisture tests using procedures specified in the contract documents. Frequency of testing should be predetermined to allow for representative coverage of each lift.
5. Testing must be timely to avoid having to retest previously covered work. Similarly, test methods should be predetermined so as to take into account the Contractor's procedures and soil types.
6. Periodic sampling of materials in the field to verify continued compliance with specification requirements is recommended.

D. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work.

SECTION 2

ASPHALTIC CONCRETE

OBJECTIVE

The performance of asphaltic concrete pavement is as much affected by the careful construction of the subgrade and base as it is by the control of the asphaltic concrete itself. Therefore, the paving inspector must be knowledgeable in soils as well. The purpose of observation and testing of asphaltic concrete paving is to verify that the paving contractor and his supplier are exercising adequate quality control in their operations and are providing a finished product that complies with the project plans and specification requirements.

This objective can best be achieved by qualified special inspectors performing the following duties under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans and specifications, and meet with contractor and suppliers before construction to discuss project and to verify that requirements for testing and observation are well understood.
2. Review material certificates and test reports for compliance with job specifications.
3. Prepare or review mix designs for compliance to project requirements.

B. Sampling of Materials

1. Sample and perform preliminary tests on proposed aggregates and asphalt cement (gradation, soundness, abrasion, stripping, etc.).

C. Subgrade and Base

1. Confirm that sources of materials have been sampled and approved.
2. Verify that materials delivered are of uniform quality.
3. Verify that control testing of subgrade materials is being performed and recorded as required.
4. Verify that subbase and base courses are of the source, type, thickness and density specified.
5. Verify that soil sterilization is provided, if required.
6. Refer to Section 1, *Earthwork* for additional details.

D. Batch Plant

1. The special inspector should become familiar with the appearance and physical characteristics of the mix to be used by observing visually the finished mixture so that unsatisfactory conditions may be readily recognized.
2. Check the batch plant facilities prior to production of asphaltic concrete mixture.
3. Check aggregates in stockpile to verify conformance to materials utilized in the design.
4. Check the bin weights of the aggregate fractions and asphaltic cement (batch plant only).
5. Check the temperature of the mixed batches on the truck.
6. Perform hot-bin gradations of the blended aggregates (where applicable).
7. Verify cold-bin feeds and hot-bin batch weights are adjusted as necessary to produce the job-mix formula within tolerance.
8. Before loading, truck beds should be checked for cleanliness and absence of materials that might be detrimental to the mix.
9. Coordinate with the job site inspector to obtain a uniform and consistent asphaltic concrete mixture.

E. Spreading and Paving

1. The field inspector should contact the batch plant inspector promptly should conditions be observed during placement and spreading operations that suggest a need for change at the plant. The following items should be addressed prior to and during placement operations:
   a) Area to be paved, cleaned and properly primed, or tack coated.
   b) Leveling course installed where required.
   c) Suitability of spreading and paving equipment.
   d) Asphalt mix temperature when delivered, and after final rolling, is within limits required.
   e) Density tests by nuclear gauge during rolling.
   f) Thickness control by adequate placement and compaction.
   g) Sampling of asphaltic concrete at job site during placement for laboratory testing (extraction, gradation, stability, etc.).
   h) Core samples taken for verification of thickness and density of in-place asphaltic concrete.
   i) Application of seal coat and curing in accordance with specification requirements, if required.

F. Verification Tests

1. Stability and density, bulk specific gravity and maximum specific gravity.
2. Asphalt content by extraction.
3. Aggregate gradation of the mixture from extracted sample.
4. Physical properties of the asphalt cement: penetration, viscosity, ductility, and specific gravity.
5. Aggregate quality: Los Angeles abrasion, plasticity index, and sieve analysis.
6. Field density.
7. Thickness determination.
8. Smoothness tolerance.

G. Reports

1. Submit written progress reports describing the tests made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 3

REINFORCING STEEL

OBJECTIVE

The purpose of reinforcing steel observation is to give assurance that the supplier is exercising satisfactory control over production, fabrication and placing of reinforcing steel so that it meets the project specifications, applicable oodes and industry standards.

This objective can best be achieved by qualified special inspectors who diligently perform the duties listed below while under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and approved shop drawings.
2. Review applicable sections of referenced codes, such as: the Uniform Building Code (ICBO); the Building Code Requirements for Reinforced Concrete (ACI-318) by the American Concrete Institute (ACI); the Manual of Standard Practice of the Concrete Reinforcing Steel Institute (CRSI); the Reinforcing Steel Welding Code (AWS D1.4) by the American Welding Society (AWS).

B. Mill Test Reports

1. Verify reinforcing steel mill test reports (when available) for mill markings and test data, checking against project requirements.
2. Sample material for tests directly from unopened bundles when required by specifications.

C. Fabrication

1. Check each shipment of reinforcing steel for the following:
   a) Bar sizes and grades are as specified.
   b) Mill marking is in conformance with mill test reports.
   c) Check for corrosion, contaminants, surface cracks and bars damaged in shipment.
   d) Check shop bends for specified radius and cracks.

D. Placement

1. During placement of reinforcing, check for proper bar locations, alignment, laps, ties, form and ground clearance, supports, field bend radii and cracks, gouges or tack welds causing stress concentrations, removal of contaminants, and hardened concrete.
2. If welding of reinforcing is required, it should be observed as defined in UBC Section 1701.5(5.3), with particular emphasis on joint configuration, suitability of low hydrogen electrodes, preheat and interpass temperatures, and interpass slag removal. Check welding procedures for conformance to AWS D1.4.
3. Prior to concrete placement, check for complete installation and notify contractor of any variations from plans and specifications. If variations are not corrected prior to start of c-oncrete placement, promptly notify the appropriate authority.
4. During concrete placement, check for displacement of reinforcing steel. Check for removal of dirt, concrete spatter and grease.
5. Check embedded items, including anchorages, inserts, and bolts installed in concrete for compliance to project documents. Verify they are solidly cast in place during placement of concrete.

E. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 4

CONCRETE BATCH PLANT

OBJECTIVE

The purpose of batch plant observation is to verify that the concrete supplier is exercising adequate quality control to produce concrete that will meet the project requirements for materials, their batch proportions, mixing, and water content.

This objective can best be achieved by qualified special inspectors who diligently perform the duties listed below while under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Verify that the class of concrete ordered is being delivered and conforms with approved mix designs.

B. Equipment

1. Check the trucks for worn out or damaged fins, excessive buildup of hardened concrete, and for the presence of wash water from the previous delivery.
2. Check the National Readymix Concrete Manufacturers Association truck rating plate and verify that load capacities are not exceeded.
3. Check the current "weights and measures" seal on scales.
4. Verify that the moisture metering device is operable.
5. Verify that the scales start at and return to zero after each weighing operation.
6. Verify that the metering devices for admixtures have been recently calibrated and are operating.

C. Materials, Storage and Handling

1. Visually check the fine and coarse aggregate for storage conditions, handling, cleanliness, and moisture conditions. Verify grading and source are as specified on approved mix design.
2. Obtain samples of aggregates when specified or when it appears that they may not conform to the required gradation or cleanliness.
3. Obtain grab samples of cement and pozzolanic materials when required by project specifications.
4. Check cement temperature.
5. For lightweight aggregates, check loose moist unit weight regularly and verify whether the plant is making proper adjustments to batch weights to compensate for variations in weight as well as moisture.

D. Batching of Materials

1. Record the volume in cubic yards for each class of concrete delivered. Verify that each mix proposed for delivery is of the proper designation and proportions approved for the project. Where discrepancies occur, request that the dispatcher clarify with the general contractor.
2. Verify that the specified materials are dispensed to the weigh hopper and record the adjusted batch weights for all ingredients in the desired proportions of the concrete mix.
3. Verify that the proper adjustments have been made for variations in moisture of aggregates.
4. Record the mixing time and check whether it is sufficient.
5. Visually estimate the slump of the concrete and report immediately to the operator any outside that specified.
6. Coordinate with the job site and verify the "as delivered" slump, air content, unit weight, mix temperature, general workability, and preparation of test samples.

E. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 5

CONCRETE

OBJECTIVE

Because so many factors interact to affect the ultimate quality of concrete, it has earned a reputation as one of the most variable of construction materials. Quality assurance during production and placement of concrete should be employed. to reduce the number of variables so that the desired concrete quality and performance can be achieved. Quality assurance services can be divided into two easily recognized categories or activities.

The first involves the performance of standard tests to obtain data demonstrating that the delivered concrete was produced to the quality specified. These tests may include measurements of the mix temperature, slump, air content, and unit weight.

The second involves observation of the construction practices during placement. Additional quality assurance services during job site construction may include observation of construction practices during finishing and curing. On essential services projects and other more complex projects, quality assurance services may also include observation of the concrete batching at a central plant.

These objectives of quality assurance can best be achieved by qualified special inspectors who diligently exercise judgment in following the duties listed below while under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans and specifications.
2. Verify that the class of concrete ordered is being delivered and conforms with specifications, drawings and/or code requirements.

B. Observation Procedures

1. Check forms for cleanliness and proper treatment prior to placement.
2. Visually estimate the slump of each batch delivered and perform slump tests regularly.
3. Determine concrete temperature, number of mixing revolutions, and/or length of time since batching.
4. Observe placement procedures for evidence of segregation, possible cold joints, displacement of reinforcing or forms, and proper support of embedded items, anchor bolts, etc.
5. Inspect for proper compaction/consolidation.

C. Sampling and Testing Duties

1. Sample and test fresh concrete for the following (or as stipulated by plans and specifications):
   a) Slump
   b) Entrained air
   c) Temperature
   d) Wet unit weight, when required
2. Sample concrete and prepare test cylinders in accordance with ASTM C31.
3. Field sampling and testing of concrete should be performed by a qualified technician, certified as an ACI - Grade I Concrete Field Testing Technician.

D. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

NOTE: Unless otherwise contracted for, concrete observation may not include verification of reinforcing, embedded items, form dimensions/alignment, finishing, or curing procedures.

SECTION 6

SHOTCRETE

OBJECTIVE

The purpose of special observation for shotcrete is to verify that the materials, processes and the particularly unique application techniques conform to the project documents. The process moves rapidly in often noisy and congested environments; it relies heavily on experienced working crews.

The quality control objectives can best be achieved by a thoroughly experienced special inspector who understands shotcrete as an extension of his or her concrete inspection knowledge and is under the direct supervision of a qualified materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and contractor submittals for applications process used.
2. Verify crew qualifications.
3. Verify material sources and approved mix design.
4. Verify test methods and sample procedure.

B. Observation Procedures

1. Verify main and auxiliary equipment for compliance, capacity, pressures, and proper functioning.
2. Check for hot or cold weather limitations and precautions.
3. Verify reinforcing has been previously inspected and placed for minimal congestion.
4. Verify joints, penetrations, embeds, and formwork are correct and adequately supported.
5. Verify the nozzleman has suitable shooting positions and access to achieve placement with minimal rebound.
6. Check for ground wires or other thickness gauging control method.
7. Review mixing and placing procedures with crew before commencement of application.
8. Observe placement for:
   a) Consistency
   b) Consolidation
   c) Coverage
   d) Rebound
   e) Finish
   f) Cure
9. Check completed job for defects and corrective action.

C. Sampling and Testing

1. Prepare a test panel 18" x 18" x 3", or as otherwise specified to obtain suitable cores for testing. Arrange correct positioning of sample panel to represent job shotcrete. Prearrange with nozzleman the correct timing of the test sample preparation and verify that it is representative of job placement, finish, and cure. Refer to ACI 506 for further guidance.
2. Mark panel with specimen identification and protect for curing period

D. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 7

PRE-TENSIONED CONCRETE

OBJECTIVE

Because the strength of materials used in prestressed construction is significantly higher than normal concrete construction, there has developed a strong quality control program by plant manufacturers. As a result, the purpose of pre-tensioned concrete plant observation is to verify the actual control program and check its effectiveness.

This objective can best be achieved by qualified special concrete inspectors performing the following duties under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and approved shop detail drawings.
2. Verify that concrete mix designs, tensioning data, and calculations for stressing have been approved by the reviewing authority.
3. Verify that jacking equipment has been calibrated.

B. Mill and Plant Test Reports

1. Check conformance of all materials to project specifications. Verify steel mill test reports for prestressing steel and deformed bar steel. Verify mill markings and tags. Verify cement mill test reports and certification.
2. Check fabricator's testing facility and reporting of tests performed under fabricator's quality control program.

C. Sampling

1. Sample and deliver to the laboratory for testing:
   a) Concrete aggregates
   b) Prestressing strand or wire
   c) Reinforcing steel
   d) Steel used for structural steel embedded items

D. Steel Fabrication of Embedded Items

1. Verify that qualified welders are employed to perform welding of structural steel using welding procedures qualified in accordance with AWS Structural Welding Code.

E. Pre-Placement Observations

1. Bed layout and form cleanliness.
2. Quantity and spacing of reinforcing and stressing steel.
3. Location of inserts and embedded items.
4. Profile of stressing steel.
5. Witness tensioning of prestressing elements, measure elongation of strand, and record gauge pressure.

F. Tests and Observation During Casting

1. Perform batch plant observations.
2. Conduct slump, air, and unit weight tests. Request adjustments as necessary.
3. Cast compression test specimens.
4. Observe placement and vibration of concrete in forms.
5. Observe finishing treatment.

G. Post-Placement Tests and Observations

1. Observe curing procedures, temperatures, and curing cycles.
2. Monitor compressive strength results for specified release strength.
3. Witness stress transfer.
4. Identify member by component and date cast.

H. Field Erection

1. Check members for damage during storage or shipment.
2. Check field installation and structural connections.

I. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 8

POST-TENSIONED CONCRETE

OBJECTIVE

Post-tensioned concrete is normally constructed on site rather than fabricated in plants. As a result, more responsibility is placed on the independent inspection agency to verify that quality control meets acceptable standards.

This objective can best be achieved by qualified special inspectors performing the following duties under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and approved placing and stressing drawings furnished by the post-tensioning contractor.
2. Review the reinforcing steel placing drawings to check whether they have been coordinated with the stressing drawings.

B. Mill Test Reports

1. Check that reinforcing steel and post-tensioning steel supplied to job is properly identified and mill test reports show conformance to project specifications.

C. Sampling of Materials

1. Sample and deliver to the laboratory for testing the following materials when required by project specifications:
   a) Concrete aggregates and cement
   b) Prestressing strand, rods or wire
   c) Reinforcing steel
   d) Steel used for structural inserts

D. Steel Fabrication of Embedded Items

1. Visit fabrication plant.
2. Verify that qualified welders only are welding in accordance with AWS Structural Welding Code.
3. Verify that only qualified welding procedures are being used.
4. Observe the welding operations and the finished product for defects and verify that corrections are made, if necessary.

E. Pre-Placement Observations

1. Check the general layout, size, spacing, and profile of reinforcing steel and post-tensioning steel.
2. Observe anchorages, inserts, embedded items. blockouts, conduits, etc.
3. Calibrate or review current calibration data on the proposed stressing equipment.

F. Observation During Placement of Concrete

1. Observe batch plant operations when required.
2. Observe concrete placement and report any damage or misalignment of embedded components (with particular emphasis on end anchorages).
3. Cast compression test specimens.
4. Test slump, air content, and unit weight. Request adjustment as necessary.

G. Stressing

1. Verify that the concrete compressive strength meets the minimum required strength prior to post-tensioning.
2. Check the stressing sequence and verify the required post-tensioning forces.
3. Call to the attention of the structural engineer any out of tolerance discrepancy in force-elongation relationship, spalled concrete, broken tendons, or anchorage slippage.
4. Verify friction losses where applicable.
5. When using bonded tendons, observe grouting procedure.

H. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 9

MASONRY

OBJECTIVE

The purpose of special observation for masonry is to verify that the workmanship and materials meet the minimum standards required by code, as well as the project specifications. This is particularly difficult in masonry work where so much is dependent upon the capabilities of the individual mason, as well as practices which have developed over the years and have become the custom of the trade for the particular locality. This requires experience and judgment by the inspector as well.

This objective can best be achieved by qualified special inspectors performing the following duties under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans and specifications with the masonry contractor and architect's representative in a preconstruction meeting to verify level of inspection required for the particular job. This is the time to resolve any differences in local custom or practice of the mason with requirements of the code and project specifications.

B. Mill Test Reports

1. Verify that mill test certifications for unit masonry, cement and reinforcing steel have been furnished by supplier and are acceptable to the architect/engineer.

C. Sampling of Materials

1. Sample and verify that the following materials are delivered to laboratory for testing when required by project specifications:
   a) Concrete block or brick
   b) Aggregates and cement for mortar and grout
   c) Reinforcing steel as delivered

D. Storage of Materials

1. Check that cement, lime, block and brick are supported on pallets and covered to protect from exposure to excessive moisture or drying.
2. Check that aggregates for mortar and grout are stored free from contamination and in such a manner as to minimize segregation.

E. Preparation for Lay-Up

1. Verify size and spacing of reinforcing dowels.
2. Verify that foundation concrete is clean and prepared as required by specifications.

F. Lay-Up or Placing of Masonry Units

1. Verify whether high lift procedures have been approved for use.
2. Verify that cleanouts are provided for first course of each pour, if high lift method is used.
3. Check plumb and lay-up configuration.
4. Check moisture condition of masonry units.
5. Verify that proper mortar ingredients and batching techniques are being used and prepare mortar compression test specimens.
6. Check mortar time on board.
7. Verify that head joints are the same thickness as face shells or that full head joints are used when specified.
8. Check that mortar extrusions (fins) are cleaned off inside.
9. Check whether joints are tooled as specified.
10. Check required frequency of masonry wall prisms and observe construction of same.
11. Check for ties when specified.
12. Check horizontal reinforcing steel placing:
    a) Placed at correct course, laps as specified
    b) Check whether laps are staggered in bond beams and corners as required
    c) Check lintel bars over openings
    d) Check hooks, if called for in jambs
    e) Check ties in piers, diameter, spacing, and properly fastened
13. Check vertical reinforcing steel:
    a) Check bars at jambs, corners and piers, and typical wall steel
    b) Check whether tied at top and bottom, and as required by project specifications

G. Grouting Observations

1. Verify that cells and starting beds are clean. Check condition with light or mirror.
2. Check whether dowels, anchor bolts and inserts are all in place, particularly at roof lines, floor lines and intersecting wall lines.
3. Check installation of cleanout closures.
4. Check grout mix and admixture requirements.
5. Check slump in accordance with the specifications.
6. If low lift grouting, verify that maximum masonry height is in accordance with the code before grouting.
7. Check that grout is stopped below top for keying where required.
8. Verify mechanical vibrating during placement, and later during reconsolidation.
9. Continuous observation is required during grouting operations.
10. Prepare grout specimens in absorbent form, or as specified, for laboratory testing.
11. Check that curing requirements are being followed.

H. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 10

STRUCTURAL STEEL AND HIGH STRENGTH BOLTING

OBJECTIVE

The customary practice of fabrication of steel in the shop prior to erection conveniently allows division of observation of structural steel into two basic categories, shop and field. While the purpose is to assure that proper quality control is exercised at each location, the environment differs. Often the shop is fabricating other projects concurrently and may operate two or three shifts per day. The shop work is closely related to mass production, while the field work relates closer to handcrafting.

These duties should be performed by qualified special inspectors under the direct supervision of the materials engineering laboratory. To better achieve the objective of quality assurance, it is wise to use only one agency to fulfill the duties of both shop and field observation.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and approved shop drawings.
2. Review applicable sections of referenced codes, particularly the American Welding Society Structural Welding Code (AWS D1.1) and the Manual and Specifications of the American Institute of Steel Construction (AISC).
3. Review welding procedure qualifications when other than standard AWS prequalified joints and procedures are involved.

B. Mill Test Reports

1. Review mill test reports and check heat numbers with material as received. Verify that proper identification of steel is maintained during fabrication.

C. Sampling and Testing

1. When required by project specifications (particularly schools and hospitals), mark sample location with steel stamp on each piece tested.
2. Record sample number and location, and maintain sample identification as they are delivered to laboratory.
3. When steel members are delivered to finish length and no "crop ends" are available for sample cutting, coordinate cutting and patching requirements with architect/engineer and fabricator.

D. Welding Observation (Applicable to Shop and Field)

1. Check each welder's certification and verify that the welder does work only as covered by his certification.
2. Keep a written record of each welder by name, his identifying steel mark, and the percentage of rejectable welds.
3. Upon detection of a rejectable weld (either visually or by nondestructive test), the inspector-in-charge will notify the welder and/or his foreman for verification of defect. The inspector-in-charge will observe removal of defects and repairs to check whether acceptable procedures were used.
4. Check structural members for thickness adjacent to welds.
5. Inspect joints for proper preparation, including bevel, root faces, root opening, etc.
6. Check the type and size of electrodes to be used for the various joints and positions. Check the storage facilities to see if they are adequate to keep the electrodes dry.
7. Observe the technique of each welder periodically with the use of a welding inspection shield.
8. Verify the use of proper preheat and interpass temperatures.
9. Observe multi-pass welds continuously. Continuous observation is defined as follows: *The inspector is present in the welding area at all times.* The extent of inspection of individual welds will depend on the number of operators welding.
10. Observe single pass fillet welds periodically (in accordance with code requirements), after determining that the operator is capable of producing the welds required.
11. If straightening or restraining of weldments is necessary, verify that approved methods will be used.
12. Tag or stamp accepted weldments with the inspector's identification stamp.

E. Workmanship

1. Check straightening and bending procedures.
2. Check cut edges, including those flame cut, sheared, or milled.
3. Check bolt holes in major connections for size.

F Additional Field Duties

1. Discuss welding sequence, general construction plans, and specific joint sequence with steel contractor and engineer to verify proper sequence to minimize restraint.
2. During adverse weather conditions, check that adequate steps are taken to prevent moisture penetration at welding location.

G. High Strength Bolting

1. Sample high strength bolts, washers, and nuts for testing from the lots in the shop or on the job site, if required.
2. Review type of joint specified (i.e. slip critical, non-slip critical).
3. Check bolts, nuts, and washers for compliance to project specifications.
4. Review the procedure for installation of bolts. The amount and type of inspection during installation will depend on the method used.
5. Check joint surfaces to verify that they are free of burrs, dirt, etc.
6. Verify installation procedures meet minimum bolt tensions required by code.
7. Check calibration of wrenches for tightening capacity in a wrench calibrator.

H. Painting

1. Verify cleaning operations are to condition specified.
2. Verify conformance of paint to specification.
3. Verify application method, brush, roller, or spray.
4. Check for thickness of each coating, final thickness, and holidays.
5. Check touch-up for final finish

I. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 11

NONDESTRUCTIVE TESTING (NDT)

OBJECTIVE

The purpose of nondestructive testing is to verify that structural steel and/or completed welds are sound with respect to the given project criteria. Visual observation may not detect hidden fusion defects, cracking, and lamellar tearing. Therefore, it is important that all means necessary be available to the special inspector for reasonable verification of sound welds.

This objective can best be achieved by qualified NDT special inspectors performing standard test methods under the direction of the materials engineer laboratory. Since NDT tests are indirect (relying on a probing medium to disclose defects), accurate evaluation depends upon experienced, qualified personnel who are thoroughly trained in theory and applications.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and approved shop drawings.
2. Review applicable sections of referenced codes, particularly UBC Section 1703 and Section 6 of the AWS Structural Welding Code D1.1.
3. Where applicable, review welding procedures and sequences.

B. Personnel

1. All NDT personnel shall be qualified in accordance with the American Society for Nondestructive Testing, *Recommended Practice SNT-TC-1A*, and the supplement applicable to the method to be used. Only Level II and III inspectors, or Level I inspectors working under the direct supervision of a Level II or III inspector, are permitted to conduct the tests.

C. Method Selection

1. Method to be used shall be as prescribed by project specifications, building codes, or as recommended by the materials engineering laboratory under the direction of the design professional.
2. Effective use of NDT depends on utilizing the proper test method and techniques. Where field conditions or sequences affect the specified methods, the NDT technician will make recommendations for suitable approved methods or techniques.

D. Tests

1. Perform tests as prescribed by contract documents, for welds, laminations, or lamellar tearing.
2. Upon detection of a defect, mark the defect, and notify the foreman and/or the lead visual inspector.
3. Keep written records of pieces, welds, welder identification marks, length and location of defects, method and date of repair, number of retests, records of performance of each welder (percent of rejected welds), sampling rate, etc.

E. Reports

1. Submit written progress reports describing the tests and observations made, their location, and any corrective actions taken.
2. Report the current percent of rejectable welds.

F. Standards

1. Many nondestructive testing standards and codes are presently available for information and reference. Most standards and codes specify equipment and personnel requirements, operational steps, and acceptance standards tied to the end-use function. Following is a partial list of the more common standard test methods.
   a) Radiography - AWS D1.1, ASTM E94 and E99, ASME Section V
   b) Ultrasonic Testing - AWS D1.1, ASTM E164, ASME Section V
   c) Magnetic Particle Testing ASTM E109, ASME Section V
   d) Penetrant Testing - ASTM E165, ASME Section V

SECTION 12

SPRAY-APPLIED FIREPROOFING

OBJECTIVE

The purpose of spray-applied fireproofing observation is to verify that the application of material is in accordance with the project specifications, applicable codes, and manufacturer's recommendations.

This objective can best be achieved by experienced special inspectors who diligently perform the duties listed below while under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and manufacturer's recommendations.
2. Review applicable sections of referenced codes and standards.

B. Observation Procedures

1. Verify substrate condition for cleanliness prior to application.
2. Verify application in accordance with code and specifications.

C. Testing and Sampling Duties

1. Measure thickness of spray-applied fireproofing in accordance with specifications and Uniform Building Code Standard 7-6.
2. Remove and deliver samples to materials engineering laboratory for unit weight tests.
3. Reinspect areas repaired due to insufficient thickness or damage by sampling, tenant improvements, panel placement, rain, etc.

D. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 13

GLU LAM AND TRUSS JOISTS

OBJECTIVE

The fabrication of most glu lam and truss joist products is conducted in controlled plant conditions which are designed for a mass-produced product. The primary purpose of observing the product at the plant is to check the critical operations, such as gluing, and to provide verification that the quality control exercised by the fabricator is adequate.

To best achieve this objective, an experienced timber technician should be employed performing the following duties under the direct control of the materials engineering laboratory.

GLU LAM TIMBER OBSERVATION DUTIES

A. **Documents**
   1. Review the approved plans, specifications, and approved shop drawings.
   2. Review applicable sections of referenced codes, particularly the Timber Construction Manual by the American Institute of Timber Construction (AITC) and reference standards of the Uniform Building Code by ICBO.
   3. Verify that the proposed lumber grades, combinations, adhesive, and end joint details meet with code requirements.

B. **Materials**
   1. Verify certifications on lumber grading, adhesives, and preservatives.
   2. Verify lumber grade marks on the pieces being used.

C. **Observation Requirements - Preliminary**
   1. Verify that shop drawings have been reviewed and stamped by architect/engineer and general contractor.
   2. Verify that spacing of joints meets job and code requirements.
   3. Measure moisture content of lumber and verify with acceptance range specified.
   4. Check appearance grade requirements.
   5. Verify preservative treatment requirements.

D. **Observation of Sub-Assemblies** (End Joints)
   1. Verify lumber grade at end joints.
   2. Gluing and curing procedure, verification of following:
      a) Lumber moisture, temperature, and cross-section
      b) Workroom humidity and temperature
      c) Adhesive certification, lot, and temperature
      d) Joint match and separation
      e) Assembly temperature, pressure, and time
      f) Sample and test representative joints

E. **Laminating** (Gluing)
   1. Recheck lumber grades, combinations and faces, moisture, and temperature.
   2. Record workroom temperature and humidity.
   3. Check adhesive certification, lot verification, and temperature.
   4. Verify camber assembly.
   5. Gluing and curing:
      a) Observe glue spread and check for skips
      b) Record open time prior to clamping
      c) Record clamping pressure
      d) Record curing temperature and time
      e) Sample and test (block shear, core shear, cyclic delamination)

F. **Finishing**
   1. Recheck joint spacing and cross-sectional dimensions.
   2. Observe repairs for appearance.
   3. Record and inspect surface treatment.
      a) Preservative
      b) Sealer
      c) Primer or paint
   4. Hammer-brand each member, prepare shipping certificate.
   5. Observe and record wrapping.

G. **Reports**
   1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

TRUSS-TYPE JOIST CONSTRUCTION

A. **Chord Fabrication**
   1. Perform all requirements of "Glu Lam Timber Observation Duties".
   2. Check end joint spacing at panel points.
   3. Check drilling and routing for webs.

B. **Web Fabrication**
   1. Structural Steel:
      a) Review specification requirements
      b) Review mill certification, steel, and coating
      c) Sample and test, when specified
   2. Fabrication:
      a) Verify web wall thicknesses and diameters at specified locations
      b) Check for splitting at flattened ends
      c) Check alignment edge distance and pin placement
      d) Check bridging clips, bearing clips, and ridge connector
      e) Check truss dimensions
      f) Check connector welding, if performed.

C. **Reports**
   1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.

SECTION 14

SHEAR WALLS AND FLOOR SYSTEMS USED AS SHEAR DIAPHRAGMS

OBJECTIVE

Many public agencies are now requiring special inspection during the construction of plywood shear walls and floor systems used as shear diaphragms. These are critically important elements to the structural integrity of the building, and are therefore considered appropriate for special inspection.

This objective can best be achieved by qualified special inspectors performing the following duties under the direct supervision of the materials engineering laboratory.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and other appropriate project documents.
2. Review applicable sections of referenced codes and standards, particularly the Timber Construction Manual by the American Institute of Timber Construction (AITC) and the Uniform Building Code by ICBO.

B. Materials

1. Verify material grades.
2. Verify nail type and size.
3. Verify connector, including tiedowns, framing clips, bolts, and straps.

C. Sampling of Materials

1. Sample and deliver to the laboratory for testing the following materials when required by project specifications:
   a) Structural panel sheathing (i.e. plywood, gypsum, fiberboard or particle board)
   b) Framing lumber
   c) Fasteners including nails, screws, bolts, etc

D. Observations Procedures

1. Check nail spacing, penetration, edge distance, and verify nail size.
2. Check for proper plywood thickness and grade.
3. Check for installation of blocking, when blocked edges are required.
4. Check the receiving members for spacing, size, and resistance to splitting.
5. Check for proper plywood layout per project requirements.
6. Check for "shiners" (nails penetrating structural panel sheathing only).
7. Verify that critical members have received the nail specified.

E. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.