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SECTION 01090

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

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## SECTION 01090

## SOURCES FOR REFERENCE PUBLICATIONS

## PART 1 GENERAL

## 1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the sponsoring organization, e.g.

ASTM B 564 Nickel Alloy Forgings. However, when the sponsoring organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

## 1.2 ORDERING INFORMATION

The addresses of the organizations whose publications are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the sponsoring organization should be ordered from the source by title rather than by number.

## AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

1330 Kemper Meadow Dr.  
Suite 600  
Cincinnati, OH 45240  
Ph: 513-742-2020  
Fax: 513-742-3355  
Internet: [www.acgih.org](http://www.acgih.org)  
E-mail: [pubs@acgih.org](mailto:pubs@acgih.org)  
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## AMERICAN FOREST &amp; PAPER ASSOCIATION (AF&amp;PA)

American Wood Council  
ATTN: Publications Dept.  
1111 Nineteenth St. NW, Suite 800  
Washington, DC 20036  
Ph: 800-294-2372  
Fax: 202-463-2785  
Internet: <http://www.afandpa.org>  
Order From: American Wood Council  
P.O. Box 5364  
Madison, WI 53705-5364  
Ph: 800-890-7732  
Fax: 608-231-2152  
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## AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

7012 So. Revere Parkway, Suite 140

Englewood, CO 80112  
Ph: 303-792-9559  
Fax: 303-792-0669  
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AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

11 West 42nd St  
New York, NY 10036  
Ph: 212-642-4900  
Fax: 212-398-0023  
Internet: [www.ansi.org/](http://www.ansi.org/)  
Note: Documents beginning with the letter "S" can be ordered from:  
Acoustical Society of America  
P. O. Box 1020  
Sweickley, PA 15143-9998  
Ph: 412-741-1979  
Fax: 412-741-0609  
Internet:  
AOK6/99

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

100 Barr Harbor Drive  
West Conshohocken, PA 19428-2959  
Ph: 610-832-9585  
Fax: 610-832-9555  
Internet: [www.astm.org](http://www.astm.org)  
NOTE: The annual ASTM Book of Standards (66 Vol) is  
available for \$3500.00. Prices of individual standards vary.  
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AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

3246 Fall Creek Highway, Suite 1900  
Grandbury, TX 76049-7979  
Ph: 817-326-6300  
Fax: 817-326-6306  
NOTE: AWPA Book of Standards is published yearly @\$75.00;  
individual standards may be ordered separately for \$12.00 to  
\$28.00 each.  
AOK6/99

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

2130 Barrett Park Dr., Suite 102  
Kennesaw, GA 30144-3681  
Ph: 770-427-9371  
Fax: 770-423-1703  
Internet: [www.apawood.org](http://www.apawood.org)  
Note: Prices are available only by calling APA  
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CODE OF FEDERAL REGULATIONS (CFR)

Order from:  
Government Printing Office  
Washington, DC 20402  
Ph: 202-512-1800

Fax: 202-275-7703  
Internet: <http://www.pls.com:8001/his/cfr.html>  
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COMPRESSED GAS ASSOCIATION (CGA)

1725 Jefferson Davis Highway, Suite 1004  
Arlington, VA 22202-4102  
Ph: 703-412-0900  
Fax: 703-412-0128  
Internet: [www.cganet.com](http://www.cganet.com)  
e-mail: [Customer\\_Service@cganet.com](mailto:Customer_Service@cganet.com)  
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DEPARTMENT OF COMMERCE (DOC)

Order From:  
National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22161  
Ph: 703-605-6000  
Fax: 703-605-6900  
Internet: <http://www.ntis.gov>  
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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

Order from:  
HUD User  
P.O. Box 6091  
Rockville, MD 20850  
Ph: 800-245-2691  
e-mail: [Huduser@aspensys.com](mailto:Huduser@aspensys.com)  
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ENGINEERING MANUALS (EM)

USACE Publications Depot  
Attn: CEIM-SP-D  
2803 52nd Avenue  
Hyattsville, MD 20781-1102  
Ph: 301-394-0081  
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ENVIRONMENTAL PROTECTION AGENCY (EPA)

Public Information Center  
401 M St., SW  
Washington, DC 20460  
Ph: 800-490-9198  
FAX: 202-260-6257  
Internet: <http://www.epa.gov>  
NOTE: Some documents are available only from: National Technical  
Information Services (NTIS)  
5285 Port Royal Rd.  
Springfield, VA 22161  
Ph: 800-553-6847  
Fax: 703-321-8547  
Internet: <http://www.fedworld.gov/ntis/ntishome.html>

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FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

1151 Boston-Providence Turnpike  
P.O. Box 9102  
Norwood, MA 02062-9102  
Ph: 617-255-4681  
Fax: 617-255-4359  
Internet: <http://www.factorymutual.com>  
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FEDERAL SPECIFICATIONS (FS)

Order from:  
General Services Administration  
Federal Supply Service Bureau  
470 L'Enfant Plaza, S.W.  
Washington, DC 20407  
Ph: 202-619-8925  
Fax: 202-619-8978  
Internet: <http://pub.fss.gsa.gov/>  
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HAWAII ADMINISTRATIVE RULES (HAR)

Noise and Radiation Branch  
P.O. Box 3378  
Honolulu, HI 96801  
Ph: 808-586-5800

STATE OF HAWAII DEPARTMENT OF HEALTH (HIDOH)

P.O. Box 3378  
Honolulu, Hawaii 96801  
Fax: 808-586-5800

HAWAII REVISED STATUTES (HRS)

Legislative Research Library  
State Capitol, Room 005  
Honolulu, Hawaii 96813  
Phone: (808) 587-0690 or State Library Phone: (808) 586-3500

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

One Batterymarch Park P.O. Box 9101  
Quincy, MA 02269-9101  
Ph: 800-344-3555  
Fax: 800-593-6372  
Internet: <http://www.nfpa.org>  
NOTE: The complete set of 1997 NFPA National Fire Codes (13 Vol.)  
is available for \$835.00.  
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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

Mail Stop C-13  
4676 Columbia Parkway

Cincinnati, OH 45226-1998  
Ph: 800-356-4676  
Internet: <http://www.cdc.gov/niosh/homepage.html>  
To order pubs for which a fee is charged, order from:  
Superintendent of Documents  
Government Printing Office  
Washington, DC 20402-9325  
Ph: 202-512-1800  
Fax: 202-512-2250  
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## NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

P.O. Box 809261  
Chicago, IL 60680-9261  
Ph: 800-323-9545  
Fax: 708-299-1183

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION  
(SMACNA)

4201 Lafayette Center Dr.,  
Chantilly, VA 20151-1209  
Ph: 703-803-2980  
Fax: 703-803-3732  
Internet: <http://www.smacna.org>  
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## THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

40 24th Street, 6th Floor  
Pittsburgh, PA 15222-4656  
Ph: 412-281-2331  
Fax: 412-281-9992  
Internet: [www.sspc.org](http://www.sspc.org)  
NOTE: SSPC documents, except as noted otherwise, are available  
only as a part of the 1995 Steel Structures Painting Manual, 7th  
Edition @ \$115.00.  
AOK6/99

## UNDERWRITERS LABORATORIES (UL)

333 Pfingsten Rd.  
Northbrook, IL 60062-2096  
Ph: 847-272-8800  
Fax: 847-272-8129  
Internet: <http://www.ul.com/>  
AOK6/99

Note: First price is for the standard only. Second price is for  
the standard including the Revision Subscription Service.

## WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

P.O. Box 23145  
Portland, OR 97281  
Ph: 503-639-0651  
Fax: 503-684-8928  
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WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

Yeon Bldg.  
522 SW 5th Ave.  
Suite 500  
Portland, OR 97204-2122  
Ph: 503-224-3930  
Fax: 503-224-3934  
AOK6/99

WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION (WMMPA)

507 First Street  
Woodland, CA 95695  
Ph: 916-661-9591  
Fax: 916-661-9586  
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## SECTION 01320

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## SECTION 01320

## PROJECT SCHEDULE

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-07 Schedules

Preliminary Project Schedule; GA.  
Initial Project Schedule; GA.  
Periodic Schedule Updates; GA.

Two copies of the schedules showing codes, values, categories, numbers, items, etc., as required.

## SD-08 Statements

Qualifications; GA.

Documentation showing qualifications of personnel preparing schedule reports.

## SD-09 Reports

Narrative Report; FIO.  
Schedule Reports; FIO.

Two copies of the reports showing numbers, descriptions, dates, float, starts, finishes, durations, sequences, etc., as required.

## 1.2 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports. This person shall have previously created and reviewed computerized schedules. Qualifications of this individual shall be submitted to the Contracting Officer for review with the Preliminary Project Schedule submission

## PART 2 PRODUCTS (Not Applicable)

## PART 3 EXECUTION

## 3.1 GENERAL

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS, a

Project Schedule as described below shall be prepared. The scheduling of construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

### 3.2 BASIS FOR PAYMENT

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule or scheduling personnel shall result in an inability of the Contracting Officer to evaluate Contractor progress for the purposes of payment. Failure of the Contractor to provide all information, as specified below, shall result in the disapproval of the entire Project Schedule submission and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. In the case where Project Schedule revisions have been directed by the Contracting Officer and those revisions have not been included in the Project Schedule, then the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until revisions to the Project Schedule have been made.

### 3.3 PROJECT SCHEDULE

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the Contracting Officer.

#### 3.3.1 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in either the Precedence Diagram Method (PDM) or the Arrow Diagram Method (ADM).

#### 3.3.2 Level of Detail Required

With the exception of the preliminary schedule submission, the Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the Contracting Officer at the appropriate level of detail, as specified by the Contracting Officer, shall result in the disapproval of the schedule. The Contracting Officer will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule.

##### 3.3.2.1 Activity Durations

Contractor submissions shall follow the direction of the Contracting Officer regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods (usually less than 2 percent of all non-procurement activities' Original Durations shall be greater than 20 days).

### 3.3.2.2 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, delivery, installation, and testing.

### 3.3.2.3 Government Activities

Government and other agency activities that could impact progress shall be shown. These activities include, but are not limited to: approvals, inspections, and notice to proceed for phasing requirements.

### 3.3.2.4 Bid Item

All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

### 3.3.2.5 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

## 3.3.3 Scheduled Project Completion

The schedule interval shall extend from notice-to-proceed to the contract completion date.

### 3.3.3.1 Project Start Date

The schedule shall start no earlier than the date that the Notice to Proceed (NTP) was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have: a "ES" constraint, a constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

### 3.3.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have: a "LF" constraint, a constraint date equal to the completion date for the project, and a zero day duration.

### 3.3.3.3 Early Project Completion

In the event the project schedule shows completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion.

Contractor shall specifically address each of the activities noted at every project schedule update period to assist the Contracting Officer in evaluating the Contractor's ability to actually complete prior to the contract period.

#### 3.3.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

#### 3.3.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in-progress or completed activity and ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes.

#### 3.3.6 Out-of-Sequence Progress

Activities that have posted progress without predecessors being completed (Out-of-Sequence Progress) will be allowed only on a case-by-case approval of the Contracting Officer. The Contracting Officer may direct that changes in schedule logic be made to correct any or all out-of-sequence work.

#### 3.3.7 Extended Non-Work Periods

Designation of Holidays to account for non-work periods of over 5 days will not be allowed. Non-work periods of over 5 days shall be identified by addition of activities that represent the delays. Modifications to the logic of the project schedule shall be made to link those activities that may have been impacted by the delays to the newly added delay activities.

#### 3.3.8 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

### 3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

#### 3.4.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days shall be submitted for approval within 20 calendar days after Notice to Proceed is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 90 calendar days after Notice to Proceed.

### 3.4.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 60 calendar days after Notice to Proceed. The schedule shall provide a reasonable sequence of activities which represent work through the entire project and shall be at a reasonable level of detail.

### 3.4.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the Contracting Officer or to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgement of the Contracting Officer or authorized representative, is necessary for verifying the contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

## 3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the initial submission, and every periodic project schedule update throughout the life of the project:

### 3.5.1 Data Disks

One data disk or one set of data disks containing the project schedule shall be provided. Data on the disks shall be in the P3 format or other format which conforms to the format specified in the attached Standard Data Exchange Format specification (attached at the end of this Project Schedule specification).

#### 3.5.1.1 File Medium

Required data shall be submitted on 3.5-inch disks, formatted to hold 1.44 MB of data, under the MS-Windows operating system.

#### 3.5.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the operating system and version used to format the disk.

#### 3.5.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the Contracting Officer for approval.

### 3.5.2 Narrative Report

A Narrative Report shall be provided with each update of the project schedule. This report shall be provided as the basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the critical path(s), a description of

current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken.

### 3.5.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the Contracting Officer shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

### 3.5.4 Schedule Reports

The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.

#### 3.5.4.1 Activity Report

A list of all activities sorted according to activity number or "I-NODE" AND "J-NODE" and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

#### 3.5.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

#### 3.5.4.3 Total Float Report

A list of all activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates.

#### 3.5.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the Notice to Proceed until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and Contracting Officer at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; and complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: Activity Number or "i-node" and "j-node", Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), Earnings to Date.

### 3.5.5 Network Diagram

The network diagram shall be required on the initial schedule submission and on monthly schedule update submissions. The network diagram shall

depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The activity or event number, description, duration, and estimated earned value shall be shown on the diagram. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

#### 3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left.

#### 3.5.5.2 Project Milestone Dates

Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

#### 3.5.5.3 Critical Path

The critical path shall be clearly shown.

#### 3.5.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

#### 3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

### 3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly onsite meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The Contracting Officer will approve activity progress, proposed revisions, and adjustments as appropriate.

#### 3.6.1 Meeting Attendance

The Contractor's Project Manager and Scheduler shall attend the regular progress meeting.

#### 3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

#### 3.6.3 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost-to-Date shall be subject to the approval of the Contracting Officer. The following is a minimum set of items which the Contractor shall address, on an activity by activity basis, during each progress meeting.

### 3.6.3.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed activities.

### 3.6.3.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations must be based on Remaining Duration for each activity.

### 3.6.3.3 Cost Completion

The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

### 3.6.3.4 Logic Changes

All logic changes pertaining to Notice to Proceed on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

### 3.6.3.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary, and 3) a schedule which does not represent the actual prosecution and progress of the work.

## 3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, he shall furnish such justification, project schedule data and supporting evidence as the Contracting Officer may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

### 3.7.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request.

The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, will not be a cause for a time extension to the contract completion date.

### 3.7.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the Notice to Proceed or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

- a. A list of affected activities, with their associated project schedule activity number.
- b. A brief explanation of the causes of the change.
- c. An analysis of the overall impact of the changes proposed.
- d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

### 3.7.3 Additional Submission Requirements

For any requested time extension of over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the Contracting Officer's request.

### 3.8 DIRECTED CHANGES

If Notice to Proceed (NTP) is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, the Contractor shall advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

### 3.9 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

-- End of Section --

## STANDARD DATA EXCHANGE FORMAT SPECIFICATION

## PART 1- GENERAL

1. **Application of This Provision:** The Standard Data Exchange Format (SDEF) provides a non-proprietary protocol to exchange project planning and progress data between scheduling systems.
2. **File Type and Format:** The data file shall consist of a 132 character, freed format, "ASCII" file. Text shall be left-justified and numbers shall be right-justified in each field. Data records must conform, exactly, to the sequence, column position, maximum length, mandatory values, and field definitions described below to comply with the SDEF. Unless specifically stated, all numbers shall be whole numbers. Fields containing numbers shall not be zero filled. All data columns shall be separated by a single blank column. The file shall not contain blank lines.
3. **Usage Notes:** Where appropriate, notes regarding proper usage of systems to support the SDEF have been included in brackets ( [ ] ). These notes are included to assist users in creating SDEF-compatible files, given the variety of software systems that support the SDEF.
4. **Recommended Systems:** Several systems have been tested to determine the accuracy of importing and exporting SDEF files. For information on the current list of recommended systems, please contact Mr. Stan Green at HQUSACE, (202) 761-0206. Although the currently listed system have been tested other systems may also be acceptable provided those systems correctly import and export SDEF files.
5. **SDEF Checker Program:** A program that checks whether a file meets the SDEF is available free of charge. A copy of this program may be obtained by written request to: U.S. Army Corps of Engineers, ATTN: Mr. Bill East (CECER-FFA), P.O. Box 9005, Champaign, IL 61826-90005. A description of the SDEF Checker is also available on the Internet and CivilNet.

## PART 2- SDEF SPECIFICATION

6. **SDEF Organization:** The SDEF shall consist of the following records provided in the exact sequence shown below:

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Paragraph Record

<u>Reference</u>	<u>Description</u>	<u>Remarks</u>
6.a	Volume Record	Mandatory First Line of File
6.b	Project Record	Mandatory Second Line of File
6.c	Calendar Record(s)	Mandatory One Record Minimum
6.d	Holiday Record(s)	Mandatory if Holidays Used
6.e	Activity Record(s)	Mandatory Records
6.f	Precedence Record(s)	Mandatory for Precedence
6.g	Unit Cost Record(s)	Mandatory for Unit Costs
6.h	Progress Record(s)	Mandatory Records
6.i	File End Record	Mandatory Last Line of Disk/File

**6.a. Volume Record:** The Volume Record shall be used to control the transfer of data that may not fit on a single disk. The first line in every file used to store SDEF data shall be the Volume Record. The Volume Record shall sequentially identify the number of the data transfer disk(s). The Volume Record shall have the following format:

<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1 - 4	4	VOLM	Fixed	Filled
DISK NUMBER	6 - 7	2	√	Number	Right Justified

6.a.(1) The RECORD IDENTIFIER is the first four characters of this record. The required value for this field shall be "VOLM". The VOLM record must appear on the first line of the SDEF data file.

6.a.(2) The DISK NUMBER field shall identify the number of the data disk used to store the data exchange information. If all data may be contained on a single disk, this field shall contain the value of "1". If more disks are required, then the second disk shall contain the value "2", the third disk shall be designated with a "3", and so on. Identification of the last data disk is accomplished in the Reject End Record.

**6.b. Project Record:** The Project Identifier Record shall contain general project information. Because more than one SDEF file may be required for data transfer between large projects, the PROJ record shall be the second line of the first SDEF file transferred. The PROJ record shall contain information in the following format:

<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1- 4	4	PROJ	Fixed	Filled
DATA DATE	6- 12	7	√	ddmmyy	Filled
PROJECT IDENTIFIER	14- 17	4	√	Alpha.	Left Justified
PROJECT NAME	19-66	48	√	Alpha.	Left Justified
CONTRACTOR NAME	68-103	36	√	Alpha.	Left Justified
ARROW OR PRECEDENCE	105-105	1	A,P	Fixed	Filled
CONTRACT NUMBER	107-112	6	√	Alpha.	Left Justified
PROJECT START	114-120	7	√	ddmmyy	Filled
PROJECT END	122-128	7	√	ddmmyy	Filled

6.b.(1) The RECORD IDENTIFIER is the first four characters of this record. The required value for this field shall be "PROJ". This record shall contain the general project information and indicates which scheduling method shall be used.

6.b.(2) The DATA DATE is the date of the schedule calculation. The abbreviation "ddmmyy" refers to a date format that shall translate a date into two numbers for the day, three letters for the month, and two numbers for the year. For example, March 1, 1999 shall be translated into 01Mar99. This same convention for date formats shall be used throughout the entire data format. To ensure that dates are translated consistently, the following abbreviations shall be used for the three character month code:

Abbreviation Month

JAN	January
FEB	February
MAR	March
APR	April
MAY	May
JUN	June
JUL	July
AUG	August
SEP	September
OCT	October
NOV	November
DEC	December

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6.b.(3) The PROJECT IDENTIFIER is a maximum four character abbreviation for the schedule. These four characters shall be used to uniquely identify the project and specific update as agreed upon by Contractor and Contracting Officer. When utilizing scheduling software these four characters shall be used to select the project. Software manufacturers shall provide information to users to ensure that data importing programs do not automatically overwrite other schedules with the same PROJECT IDENTIFIER.

6.b.(4) The PROJECT NAME field shall contain the name and location of the project edited to fit the space provided. The data appearing here shall appear on scheduling software reports. The abbreviation "Alpha." refers to an "Alphanumeric" field value and shall be used throughout the remainder of this specification.

6.b.(5) The CONTRACTOR NAME field shall contain the Construction Contractor's name, edited to fit the space provided.

6.b.(6) The ARROW OR PRECEDENCE field shall indicate which method shall be used for calculation of the schedule. The value "A" shall signify the Arrow Diagramming Method. The value "P" shall signify the Precedence Diagramming Method. The ACTIVITY ID field of the Activity Record shall be interpreted differently depending on the value of this field. The Precedence Record shall be required if the value of this field is "P". [Usage note: software systems may not support both arrow and precedence diagramming. It is recommended that the selection of the type of network be based on the capabilities of the software used by project partners.]

6.b.(7) The CONTRACT NUMBER field shall contain the contract number for the project. For example, the construction contract number DACA85-89-C-0001 shall be entered into this field as "890001".

6.b.(8) The PROJECT START field shall contain the date that the Contractor acknowledges the Notice to Proceed (NTP). [Usage note: Software systems may use a project start date to constrain the first activity of a network. To ensure consistent scheduling calculations across products, it is recommended that the first activity in the schedule contain an EARLY START constraint and a software system's PROJECT START date only be used to report on the project's start date.]

6.b.(9) The PROJECT END field shall contain the date that the Contractor plans to complete the work as approved by the Contracting Officer. [Usage note: software systems may use a project end date to constrain the last activity of a network. To ensure consistent scheduling calculations across products, it is recommended that the last activity in the schedule contain an EARLY START constraint and a software system's PROJECT END date only be used to report on the project's end date.]

**6.c. Calendar Record:** The Calendar Record(s) shall follow the Project Identifier Record in the first disk of data transferred. A minimum of one Calendar Record shall be required for all data exchange activity files. The format for the Calendar Record shall be as follows:

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<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1 - 4	4	CLDR	Fixed	Filled
CALENDAR CODE	6 - 6	1	√	Alpha.	Filled
WORKDAYS	8 - 14	7	SMTWTFS	Fixed	Filled
CALENDAR DESCRIPTION	16-45	30	√	Alpha.	Left Justified

6.c.(1) The RECORD IDENTIFIER shall always begin with "CLDR" to identify it as a Calendar Record. Each Calendar Record used shall have this identification in the first four columns. [Usage note: Systems contain a variety of calendar options. It is recommended that the least common denominator of calendar features between the systems be used as the basis for creating the SDEF file for a given project.]

6.c.(2) The CALENDAR CODE shall be used in the activity records to signify that this calendar is associated with the activity. [Usage note: Some systems do not allow for alphanumeric CALENDAR CODES, but only allow positive integers from 1 to 9. It is recommended that only positive integers be used for the CALENDAR CODE field to support the widest variety of scheduling systems.]

6.c.(3) The WORKDAYS field shall contain the work-week pattern selected with "Y", for Yes, and "N", for No. The first character shall be Sunday and the last character Saturday. An example of a typical five (5) day work-week would be NYYYYYN. A seven (7) day work-week would be YYYYYYY.

6.c.(4) The CALENDAR DESCRIPTION shall be used to briefly describe the calendar used.

**6.d. Holiday Record:** The Holiday Record(s) shall follow the Calendar Record(s) in the first disk of data transferred. There may be calendars without any holidays designated or several Holiday Records for each Calendar Record(s). The format for the Holiday Record shall be as follows:

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<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1-4	4	HOLI	Fixed	Filled
CALENDAR CODE	6-6	1	√	Alpha.	Filled
HOLIDAY DATE	8-14	7	√	ddmmyy	Filled
HOLIDAY DATE	16-22	7	-	ddmmyy	May be Filled
HOLIDAY DATE	24-30	7	-	ddmmyy	May be Filled
HOLIDAY DATE	32-38	7	-	ddmmyy	May be Filled
HOLIDAY DATE	40-46	7	-	ddmmyy	May be Filled
HOLIDAY DATE	48-54	7	-	ddmmyy	May be Filled
HOLIDAY DATE	56-62	7	-	ddmmyy	May be Filled
HOLIDAY DATE	64-70	7	-	ddmmyy	May be Filled
HOLIDAY DATE	72-78	7	-	ddmmyy	May be Filled
HOLIDAY DATE	80-86	7	-	ddmmyy	May be Filled
HOLIDAY DATE	88-94	7	-	ddmmyy	May be Filled
HOLIDAY DATE	96-102	7	-	ddmmyy	May be Filled
HOLIDAY DATE	104-110	7	-	ddmmyy	May be Filled
HOLIDAY DATE	112-118	7	-	ddmmyy	May be Filled
HOLIDAY DATE	120-126	7	-	ddmmyy	May be Filled

6.d.(1) The RECORD IDENTIFIER shall always begin with "HOLI". Each Holiday Record used shall have this identification in the first four columns.

6.d.(2) The CALENDAR CODE indicates which work-week calendar the holidays shall be applied to. More than one HOLI record may be used for a given CALENDAR CODE.

6.d.(3) The HOLIDAY DATE shall contain the date of each individual non-work day.

**6.e. Activity Records:** Activity Records shall follow any Holiday Record(s). If there are no Holiday Record(s), then the Activity Records shall follow the Calendar Record(s). There shall be one Activity Record for every activity in the network. Each activity shall have one record in the following format:

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<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1-4	4	ACTV	Fixed	Filled
ACTIVITY ID	6-15	10	√	Integer	See Comment Below
ACTIVITY DESCR.	17-46	30	√	Alpha.	Left Justified
ACTIVITY DURATION	48-50	3	√	Integer	Right Justified
CONSTRAINT DATE	52-58	7		ddmmmyy	May be Filled
CONSTRAINT TYPE	60-61	2		ES or LF	May be Filled
CALENDAR CODE	63-63	1	√	Alpha.	Filled
HAMMOCK CODE	65-65	1	Y, blank	Fixed	May be Filled
WORKERS PER DAY	67-69	3		Integer	Right Justified
RESPONSIBILITY CODE	71-74	4		Alpha.	Left Justified
WORK AREA CODE	76-79	4		Alpha.	Left Justified
MOD OR CLAIM NO.	81-86	6		Alpha.	Left Justified
BID ITEM	88-93	6		Alpha.	Left Justified
PHASE OF WORK	95-96	2		Alpha.	Left Justified
CATEGORY OF WORK	98-98	1		Alpha.	May be Filled
FEATURE OF WORK	100-128	30		Alpha.	Left Justified

6.e.(1) The RECORD IDENTIFIER for each activity description record must begin with the four character "ACTV" code. This field shall be used for both the Arrow Diagram Method (ADM) and Precedence Diagram Method (PDM).

6.e.(2) The ACTIVITY ID consists of coding that shall differ, depending on whether the ADM or PDM method was selected in the Project Record. If the ADM method was selected then the field shall be interpreted as two right-justified fields of five (5) integers each. If the PDM method was selected the field shall be interpreted as one (1) right-justified field of ten (10) integers each. The maximum activity number allowed under this arrangement is 99999 for ADM and 999999999 for the PDM method. [Usage note: Many systems allow alphanumeric ACTIVITY IDs. While the SDEF does not strictly, allow the use of alphanumeric values, users may agree to use the ACTIVITY ID field to exchange alphanumeric data. It is recommended that the ACTIVITY ID be restricted to integers when one or more of the systems being used for scheduling allows only integer ACTIVITY ID values.]

6.e.(3) The ACTIVITY DESCRIPTION shall be a maximum of 30 characters. Descriptions must be limited to the space provided.

6.e.(4) The ACTIVITY DURATION contains the estimated original duration for the activity on the schedule. The duration shall be based upon the work-week designated by the activity's related calendar.

6.e.(5) The CONSTRAINT DATE field shall be used to identify a date that the scheduling system may use to modify float calculations. If there is a date in this field, then there must be a valid entry in the CONSTRAINT TYPE field.

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6.e.(6) The CONSTRAINT TYPE field shall be used to identify the way that the scheduling system shall use the CONSTRAINT DATE to modify schedule float calculations. If there is a value in this field, then there must be a valid entry in the CONSTRAINT DATE field. The valid values for the CONSTRAINT TYPE are as follows:

<u>Code</u>	<u>Definition</u>
ES	The CONSTRAINT DATE shall replace an activity's early start date, if the early start date is prior to the CONSTRAINT DATE.
LF	The CONSTRAINT DATE shall replace an activity's late finish date, if the late finish date is after the CONSTRAINT DATE.

[Usage note: Systems provide a wide variety of constraint types that may not be supported by other systems. It is recommended that constraint types be restricted to the values above regardless of the capabilities of the various systems being used for scheduling.]

6.e.(7) The CALENDAR CODE relates this activity to an appropriate work-week calendar. The ACTIVITY DURATION must be based on the valid work-week referenced by this CALENDAR CODE field.

6.e.(8) The HAMMOCK CODE indicates that a particular activity does not have its own independent duration, but takes its start dates from the start date of the preceding activity (or node) and takes its finish dates from the finish dates of its succeeding activity (or node). If the value of the HAMMOCK CODE field is "Y", then the activity is a hammock activity.

6.e.(9) The WORKERS PER DAY shall contain the average number of workers expected to work on the activity each day the activity is in progress. If this code is required by project scheduling specifications, values for this data will be right justified. Activities without workers per day shall have a value of "0".

6.e.(10) The RESPONSIBILITY CODE shall identify the subcontractors or major trade involved with completing the work for the activity. If this code is required by project scheduling specifications, value for this data will be left justified.

6.e.(11) The WORK AREA CODE shall identify the location of the activity within the project. If this code is required by project scheduling specifications, value for this data will be left justified.

6.e.(12) The MOD OR CLAIM NUMBER shall uniquely identify activities that are added or changed on a construction contract modification, or activities that justify any claimed time extensions. If this code is required by project scheduling specifications, value for this data will be left justified.

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6.e.(13) The BID ITEM shall identify the bid item number associated with each activity. If this code is required by project scheduling specifications, value for this data will be left justified.

6.e.(14) The PHASE OF WORK shall identify the timing of a specific activity within the entire project. If this code is required by project scheduling specifications, value for this data will be left justified.

6.e.(15) The CATEGORY OF WORK shall identify the general type of work performed by every activity. If this code is required by project scheduling specifications, value for this data will be placed in the field.

6.e.(16) The FEATURE OF WORK shall identify a very broad designation of the general type of work that is being accomplished by the activity. If this code is required by project scheduling specifications, value for this data will be left justified. [Usage note: Many systems require that FEATURE OF WORK values be placed in several activity code fields. It is recommended that users review SDEF documentation to determine the correct way to use a given software system to produce the FEATURE OF WORK code.]

**6.f. Precedence Record:** The Precedence Record(s) shall follow the Activity Records if a Precedence Diagram Method schedule (PDM) is identified in the ARROW OR PRECEDENCE field of the Project Record. The Precedence Record has the following format:

<u>Description</u>	<u>Column</u>	<u>Max.</u>	<u>Req.</u>	<u>Type</u>	<u>Notes</u>
	<u>Position</u>	<u>Len.</u>	<u>Value</u>		
RECORD IDENTIFIER	1 - 4	4	PRED	Fixed	Filled
ACTIVITY ID	6-15	10	√	Integer	See Comment Below
PRECEDING ACTIVITY	17 - 26	10	√	Integer	See Comment Below
PREDECESSOR TYPE	28-28	1	√	S, F, C	Filled
LAG DURATION	30-33	4	√	Integer	Right Justified

6.f.(1) The RECORD IDENTIFIER shall begin with the four characters "PRED" in the first four columns of the record.

6.f.(2) The ACTIVITY ID identifies the activity whose predecessor shall be specified in this record.

6.f.(3) The PRECEDING ACTIVITY number is the number of an activity that precedes the activity noted in the ACTIVITY ID field.

6.f.(4) The PREDECESSOR TYPE field indicates the type of relation that exists between the chosen pair of activities. Valid PREDECESSOR TYPE fields areas follows:

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<u>Code</u>	<u>Definition</u>
S	Start-to-Start relation
F	Finish-to-Finish relation
C	Finish-to-Start relation

[Usage note: Some systems provide additional predecessor types that may not be supported by all other systems. It is recommended that predecessor types be restricted to the values above regardless of the capabilities of the various systems being used for scheduling.]

6.f.(5) The LAG DURATION field contains the number of days delay between the preceding and current activity. [Usage note: Some systems allow negative values for the LAG DURATION. Because these values are not supported by all other systems, it is recommended that values be restricted to zero and positive integers.]

**6.g. Unit Cost Record:** The Unit Cost Record shall follow all Precedence Records. If the schedule utilizes the Arrow Diagram Method, then the Unit Cost Record shall follow any Activity records. There shall be one Unit Cost Record for every activity that is not a lump sum activity. [Usage note: (1) It is recommended that users who wish to exchange unit cost data contact SDEF vendor representatives to determine the ability of the software system to import/export unit cost information. (2) If the software being used by each member of the project team supports unit cost data then users may wish to conduct a trial run of the SDEF data exchange with a two or three-activity network to ensure that unit cost data transfers as expected. If problems are found please consult vendor representatives for resolution prior to exchange of full project schedules. (3) Unit cost record data does not, in most systems, result in the correct values being placed in the ACTIVITY COST and COST TO DATE fields of the Progress (PROG) Record. Users must, at this time, manually transfer the data from the Unit Cost Record to the Progress Record.]

The fields for this record shall take the following format:

<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1-4	4	UNIT	Fixed	Filled
ACTIVITY ID	6-15	10	√	Integer	See Comment Below
TOTAL QTY	17-29	13	√	Format 8.4	Right Justified
COST PER UNIT	31-43	13	√	Format 8.4	Right Justified
QTY TO DATE	45-57	13	√	Format 8.4	Right Justified
UNIT OF MEASURE	59-61	3	√	Alpha.	Left Justified

6.g.(1) The RECORD IDENTIFIER shall be identified with the four characters 'UNIT' placed in the first four columns of the record.

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6.g.(2) The ACTIVITY ID for each activity shall match the format described in the activity record. Each activity may have only one Unit Cost Record.

6.g.(3) The TOTAL QTY is the total amount of material to be used in this activity. This number consists of eight digits, one decimal point and four more digits. An example of a number in this format is "11111111.1111". If decimal places are not needed this field shall still contain a ".0000" in columns 25-29. [Usage note: Many systems support a different format for this value that does not include as many decimal places. It is recommended that users determine their requirements for significant digits based on the lowest common denominator of the software systems being used for a given project.]

6.g.(4) The COST PER UNIT is the cost, in dollars and cents, for each unit to be used in this activity. This number consists of eight digits, one decimal point, and four more digits. An example of a number in this format is "11111111.1111". If decimal places are not needed this field shall still contain a ".0000" in columns 39-43. [Usage note: Many systems support a different format for this value that does not include as many decimal places. It is recommended that users determine their requirements for significant digits based on the lowest common denominator of the software systems being used for a given project.]

6.g.(5) The QTY TO DATE is the quantity of material installed in this activity up to the data date. This number consists of eight digits, one decimal point, and four more digits. An example of a number in this format is "11111111.1111". If decimal places are not needed this field shall still contain a ".0000" in columns 53-57. [Usage note: Many systems support a different format for this value that does not include as many decimal places. It is recommended that users determine their requirements for significant digits based on the lowest common denominator of the software systems being used for a given project.]

6.g.(6) The UNIT OF MEASURE is an abbreviation that may be used to describe the units being measured for this activity. Valid values for this field are any meaningful English or metric unit, except "LS" for Lump Sum. Lump Sum activities are not to have Unit Cost Records.

**6.h. Progress Record:** Progress Record(s) shall follow all Unit Cost Record(s). If there are no Unit Cost Record(s), then the Progress Record(s) shall follow all Precedence Records. If the schedule utilizes the Arrow Diagram Method, then the Progress Record shall follow any Activity Records. One Progress Record is required for every activity in the Activity Record. The fields for this Record shall be provided in the following format:

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<u>Description</u>	<u>Column Position</u>	<u>Max. Len.</u>	<u>Req. Value</u>	<u>Type</u>	<u>Notes</u>
RECORD IDENTIFIER	1-4	4	PROG	Fixed	Filled
ACTIVITY ID	6-5	10	√	Integer	See Comment Below
ACTUAL START DATE	17-23	7	√	ddmmyy	Filled if Started
ACTUAL FINISH DATE	25-31	7	√	ddmmyy	Filled if Finished
REMAINING DURATION	33-35	3	√	Integer	Right Justified
ACTIVITY COST	37-48	12	√	Format 9.2	Right Justified
COST TO DATE	50-61	12	√	Format 9.2	Right Justified
STORED MATERIAL	63-74	12	√	Format 9.2	Right Justified
EARLY START DATE	76-82	7	√	ddmmyy	Filled if Not Started
EARLY FINISH DATE	84-90	7	√	ddmmyy	Filled if Not Finished
LATE START DATE	92-98	7	√	ddmmyy	Filled if Not Started
LATE FINISH DATE	100-1067		√	ddmmyy	Filled if Not Finished
FLOAT SIGN	108-1081		+,-	Fixed	Filled if Not Finished
TOTAL FLOAT	110-1123		√	Integer	R. Just. if Not Finished

6.h.(1) The RECORD IDENTIFIER shall begin with the four characters "PROG" in the first four columns of the record.

6.h.(2) The ACTIVITY ID for each activity for which progress has been posted shall match the format described in the Activity Record.

6.h.(3) An ACTUAL START DATE is required for all in-progress activities. The ACTUAL START DATE shall be the same as, or later than, the PROJECT START date contained in the Project Record. The ACTUAL START DATE shall also be the same as, or prior to, the DATA DATE contained in the Project Record. If there is an ACTUAL START DATE for an activity that there must also be a REMAINING DURATION, and the values for the EARLY START DATE and LATE START DATE are blank. [Usage note: Some systems allow default values for ACTUAL START DATE if the date is not entered by the user. Because the failure to include a start date for activities may result in different schedule calculations, it is recommended that the ACTUAL START DATE be required for all activities in progress.]

6.h.(4) An ACTUAL FINISH DATE is required for all completed activities. If the REMAINING DURATION of an activity is zero, then there must be an ACTUAL FINISH DATE. If there is an ACTUAL FINISH DATE, then values for the EARLY START DATE, LATE START DATE, EARLY FINISH DATE, LATE FINISH DATE, FLOAT SIGN, and TOTAL FLOAT shall be blank. [Usage note: Some systems allow default values for ACTUAL FINISH DATE if the date is not entered by the user. Because the failure to include a finish date for activities may result in different schedule calculations, it is recommended that the ACTUAL FINISH DATE be required for all activities in progress.]

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6.h.(5) AREMAINING DURATION is required for all activities. Activities that have not started shall have a remaining duration equal to their original duration. Activities completed based on time, shall have a zero (0) REMAINING DURATION. [Usage note: Systems have a variety of "short-cut" methods to determine the REMAINING DURATION value. It is recommended that users actually consider the time required to complete the remaining work on a given task, rather than allow a system to calculate the remaining duration based on the amount of work that has already been accomplished.]

6.h.(6) The ACTIVITY COST contains the estimated earned value of the work to be accomplished in the activity. An example of a number in this format is "1111111 11.11". If decimal places are not needed this field shall still contain a ".00" in the last three columns of this field. [Usage note: Users should inquire of software vendors if the user needs to add a zero in the data field to produce the default value "0.00".]

6.h.(7) The COST TO DATE contains the earned value for the activity. If there is an ACTUAL START DATE, then there must also be some value for COST TO DATE. An example of a number in this format is "11111111.11". If decimal places are not needed, this field shall still contain a ".00" in the last three columns of this field. The COST TO DATE is not tied to REMAINING DURATION. For example, if the REMAINING DURATION is "0", the COST TO DATE may only be 95% of the ACTIVITY COST. This difference may be used to reflect 5% retainage for punch list items. [Usage note: Systems implement cost information in different ways. It is recommended that users carefully review SDEF documentation and test results to determine how to ensure that SDEF data is exported correctly.]

6.h.(8) The STORED MATERIAL field contains the value of the material that the Contractor has paid for and is on site or in secure storage areas that is a portion of the COST TO DATE. An example of a number in this format is "11111111.11". If decimal places are not needed, this field shall still contain a ".00" in the last three columns of this field. [Usage note: Systems implement the stored materials field in a variety of ways. Many systems do not enforce STORED MATERIAL + COST TO DATE < ACTIVITY COST. To avoid potential confusion between systems, it is recommended that new activities be added to a schedule to reflect the cost of large equipment procurement rather than use the STORED MATERIALS field.]

6.h.(9) The EARLY START DATE indicates the earliest date possible that an activity can start as calculated by a CPM scheduling system or other Contracting Officer approved planning method. If the progress record for an activity contains an ACTUAL START DATE, then this field shall be blank.

6.h.(10) The EARLY FINISH DATE indicates the earliest date possible that an activity can finish as calculated by a CPM scheduling system or other Contracting Officer approved planning method. If the progress record for an activity contains an ACTUAL FINISH DATE, then this field shall be blank.

6.h.(11) The LATE START DATE indicates the latest date that an activity can begin as calculated by a CPM scheduling system or other Contracting Officer approved planning method. If the progress record for an activity contains an ACTUAL START DATE, then this field shall be blank.

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6.h.(12) The LATE FINISH DATE indicates the latest date that an activity can finish as calculated by a CPM scheduling system or other Contracting Officer approved planning method. If the progress record for an activity contains an ACTUAL FINISH DATE, then this field shall be blank.

6.h.(13) The FLOAT SIGN indicates whether the float time calculated using a CPM scheduling system or other Contracting Officer approved planning method, is positive or negative in nature. If the progress record for an activity contains an ACTUAL FINISH DATE, then this field shall be blank. In the case of zero float this field shall be blank.

6.h.(14) The TOTAL FLOAT indicates the total float time. In the Precedence Diagram Method (PDM), the total float is the difference between the early and late start or finish dates. In the Arrow Diagram Method (ADM), the total float is equal to the late event time at the end of the activity, minus the sum of the early event time at the start of the activity plus the duration of the activity.

**6.i. Project End Record:** The Project End Record shall be used to identify that the data file is completed. If the ASCII End of File character is encountered, then data import programs shall use that character to infer that the data continues on the next disk. The user shall then be prompted for the next disk number, based on the VOLM record data. The Project End Record shall be the last record of the entire data file, and shall have the following format:

<u>Description</u>	<u>Column</u>	<u>Max.</u>	<u>Req.</u>	<u>Type</u>	<u>Notes</u>
	<u>Position</u>	<u>Len.</u>	<u>Value</u>		
RECORD IDENTIFIER	1-3	3	END	Fixed	Filled

6.i.(1) The RECORD IDENTIFIER for the Project End Record shall be "END". Data contained in the data exchange file that occurs after this record shall not be used.

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## SECTION 01330

## SUBMITTAL PROCEDURES

## PART 1 GENERAL

## 1.1 SUBMITTAL DESCRIPTIONS

The submittals described below are those required and further described in other sections of the specifications. Other requirements pertaining to submittals are included in the SPECIAL CLAUSES. Submittals required by the CONTRACT CLAUSES and other nontechnical parts of the contract are not included in this section.

## SD-01 Data

Submittals which provide calculations, descriptions, or documentation regarding the work.

## SD-04 Drawings

Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, details of fabrication, layouts of particular elements, connections, and other relational aspects of the work.

## SD-06 Instructions

Preprinted material describing installation of a product, system or material, including special notices and material safety data sheets, if any, concerning impedances, hazards, and safety precautions.

## SD-07 Schedules

Tabular lists showing location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

## SD-08 Statements

A document, required of the Contractor, or through the Contractor, from a supplier, installer, manufacturer, or other lower tier Contractor, the purpose of which is to confirm the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verifications of quality.

## SD-09 Reports

Reports of inspections or tests, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used shall be identified and test results shall be recorded.

## SD-13 Certificates

Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system or material, attesting that the product, system or material meets specified requirements. The statement must be

dated after the award of the contract, must state the Contractor's name and address, must name the project and location, and must list the specific requirements which are being certified.

#### SD-14 Samples

Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

#### SD-18 Records

Documentation to record compliance with technical or administrative requirements.

### 1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

#### 1.2.1 Government Approved

Governmental approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

#### 1.2.2 Information Only

All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

### 1.3 APPROVED SUBMITTALS

The Contractor shall coordinate Governmental approval submittals with all other aspects of the project so that proper interfaces are maintained. The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the CQC requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

### 1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

### 1.5 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) representative and each item shall be stamped, signed, and dated by the CQC representative indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288)

At the end of this section is one set of a Submittal Register listing each item of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. The Contractor will also be given the Submittal Register as a diskette containing the computerized ENG Form 4288 and instructions on the use of the diskette. Columns "d" through "q" have been completed by the Government; the Contractor shall complete columns "a" through "c" and "r" through "t" and submit the forms to the Contracting Officer for approval within 30 calendar days after Notice to Proceed. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 30 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 15 calendar days shall be allowed and shown on the register for review and approval of submittals for food service equipment and refrigeration and HVAC control systems.

3.4 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

### 3.5 SUBMITTAL PROCEDURE

Submittals shall be made as follows:

#### 3.5.1 Procedures

The Contractor shall establish procedures for purchasing materials and equipment, subcontracting, and processing of shop drawings, outlining the responsibilities at each level to insure that adequate review and approval, timely delivery, verification of procedures and proper storage are provided. Delays in the review and approval process shall not be given consideration for a time extension or additional cost, when such delays are the result of the Contractor's late submittal or failure to provide proper submittals; or make corrections in compliance with the contract documents or the Contracting Officer's comments; or provide a resubmittal because of an unacceptable original submittal.

#### 3.5.2 Deviations

- a. For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. Approval action by the Contracting Officer will not relieve the Contractor of his quality control responsibility and compliance with the contract, except for those specific portions of a submittal which clearly highlight the departures from the contract, and which are brought to the attention of the Government. The Contractor shall be responsible for all corrective actions, when submittals containing provisions of non-compliance with the contract are not specifically brought to the Government's attention. Any associated cost or time loss resulting from such corrective actions shall not be made subject to a claim against the Government. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.
- b. In cases where "trade names or equal" specifications are used in the Technical Specifications, any "equal" substitution by the Contractor is considered a variance and will require the Government's approval. The submittal shall specifically indicate if the "equal" does not conform to features of the "trade name" along with justification for the difference.
- c. Variations from the contract requirements may require an appropriate contract modification prior to acceptance by the Government; however, such pending action shall not be a basis of claim for time or additional cost against the Government, since the Contractor still has the option to comply with the original

contract requirements. If the variation is of a minor nature and does not affect a change in cost or time of performance, a modification may not be issued. All variations shall meet the standards set by the contract documents.

### 3.6 COORDINATION OF LAYOUTS

The Contractor Quality Control (CQC) organization is responsible for ensuring that the shop drawings and submittals of the different trades are coordinated in order that space conflicts during installation/construction of mechanical, electrical, architectural, civil, structural and other items of work are avoided. The Contractor shall prepare/develop coordinated working layout drawings prior to commencement of any feature of work, at any contractor tier, unless otherwise directed by the Contracting Officer. These layout drawings shall be reviewed and certified by the CQC organization prior to the start of work in any area. The CQC shall ensure that layout drawings indicate all necessary features of work, providing for a coordinated arrangement of the various installations, giving full consideration for access to installed equipment/systems and the future maintenance of these items. Interference between equipment and systems or construction materials which cannot be resolved between Contractor and subcontracting tiers shall be resolved by the Contracting Officer at no additional cost to the Government, if it is determined that adequate space was available and installations could have been accommodated within the designated construction area through properly coordinated layout drawings. One (1) CQC certified copy of all layout drawings shall be available for the Government's review five (5) working days prior to scheduled commencement of the work. Submission shall be made upon Government's request.

### 3.7 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

#### 3.7.1 Monthly Updates of Submittal Register

Monthly updates of the initially accepted Submittal Register, ENG Form 4288, shall be provided in duplicate at the time the monthly progress payment is requested and be current to within one (1) week of the date of submission. Where a monthly progress payment is not being requested, update shall be submitted on the 15th of each month or a work day closest to the 15th. If the Contractor fails to provide the Government an acceptable initial submittal register or monthly updates within the specified time frames, the Government may issue a stop work order and withhold a portion of pending progress payments due to non-performance. Any resulting cost or time loss to the Contractor due to such Government action shall not be subject to a claim for the time extensions or for additional cost or damages by the Contractor. Furnishing of the submittal register by the Contractor and the subsequent review by the Government do not relieve the Contractor of the obligation to comply with all of the contract submittal requirements; for example, even if a required submittal was not originally listed on the initial register accepted by the Government, the Contractor will still be responsible for providing such submittal in accordance with the contract. The following shall be provided on the monthly updates to the initially approved schedule:

- a. Activity number (column a), Transmittal number (column b), Item Number (column c), and entries under columns u through aa, as appropriate.
- b. Distinguish those submittals which are VARIANCES, as appropriate.
- c. Furnish a separate LISTING of required RESUBMITTALS, together with the Government's review comments, and appropriate Contractor's status report on pending resubmittal actions.
- d. Furnish a separate LISTING of submittals provided by the Contractor to the Government; and another separate LISTING of submittals returned by the Government to the Contractor, for the particular month the update is furnished.

### 3.8 GOVERNMENT APPROVED SUBMITTALS

Shop drawings furnished for Government approval, including "variations", shall be submitted in six (6) copies, to include resubmittals. Upon completion of review by the Government, five (5) copies will be retained by the Contracting Officer and one (1) copy will be returned to the Contractor.

### 3.9 INFORMATION ONLY SUBMITTALS

Shop drawings provided for Government information only shall be submitted in five (5) copies, to include resubmittals; none will be returned to the Contractor. Since approval by the Contracting Officer is not required on information only submittals, these may or may not be reviewed by the Government; non-review by the Government does not constitute a waiver of any requirement of the contract drawings or specifications. Certification and approval by the Contractor Quality Control that a submittal meets the requirements of the contract shall signify completion of the review process. However, the Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. The Contractor is responsible for furnishing material conforming to the plans and specifications, and the Contracting Officer may require the removal and replacement of nonconforming material incorporated in the work. This does

not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or check testing by the Government in those instances where the technical specifications so prescribed.

3.10 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

<p>CONTRACTOR</p> <p>(Firm Name)</p> <p>_____ Approved</p> <p>_____ Approved with corrections as noted on submittal data and/or attached sheets(s).</p> <p>SIGNATURE: _____</p> <p>TITLE: _____</p> <p>DATE: _____</p>
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3.11 SUBMITTAL CONTROL DOCUMENTS

Submittal control documents and all submittal to the Contracting Officer shall be addressed to:

U.S. Army Honolulu Engineering District  
Fort Shafter  
Resident Office, Bldg 230  
Fort Shafter, Hawaii 96858-5440

-- End of Section --



**SUBMITTAL REGISTER**  
(ER 415 1-10)

CONTRACT NO.

TITLE AND LOCATION

CONTRACTOR

SPECIFICATION SECTION

**REPAIR AND RE-ROOFING VARIOUS HOUSING AREAS, OAHU, HAWAII**

**01430**

ACTIVITY NO.	TRANS-MITTAL NO.	ITEM NO.	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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## INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.
2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No." This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.
3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288-R for each entry on this form.
4. Submittals requiring expeditious handling will be submitted on a separate form.
5. Separate transmittal form will be used for submittals under separate sections of the specifications.
6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications -- also, a written statement to that effect shall be included in the space provided for "Remarks."
7. Form is self-transmittal, letter of transmittal is not required.
8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.
9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i, to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

### THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

- |      |  |       |   |
|------|--|-------|---|
| A -- | Approved as submitted.   | E --  | Disapproved (See attached).   |
| B -- | Approved, except as noted on drawings.   | F --  | Receipt acknowledged.   |
| C -- | Approved, except as noted on drawings.<br>Refer to attached sheet resubmission required. | FX -- | Receipt acknowledged, does not comply as<br>noted with contract requirements. |
| D -- | Will be returned by separate correspondence.   | G --  | Other (Specify)   |
10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

(Reverse of ENG Form 4025-R)

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## SECTION 01430

## ENVIRONMENTAL PROTECTION

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## STATE OF HAWAII DEPARTMENT OF HEALTH (HIDOH)

HIDOH, Chapter 46	Administrative Rules, Title 11, Community Noise Control
HIDOH, Chapter 59	Administrative Rules, Ambient Air Quality Standards
HIDOH, Chapter 60	Administrative Rules, Air Pollution Control

## 1.2 GENERAL REQUIREMENTS

This section covers prevention of environmental pollution and damage as the result of construction operations under this contract and for those measures set forth in the TECHNICAL REQUIREMENTS. For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

## 1.2.1 Subcontractors

Assurance of compliance with this section by subcontractors will be the responsibility of the Contractor.

## 1.2.2 Notification

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with the aforementioned Federal, State or local laws or regulations, permits, and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or costs or damages allowed to the Contractor for any such suspension.

## 1.3 SUBMITTALS

Government approval is required for submittals with "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-18 Records

Environmental Protection Plan; GA.

Within 30 calendar days of receipt of Notice to Proceed, the Contractor shall submit in writing an environmental protection plan. Approval of the Contractor's plan will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and other environmental protection measures. The environmental protection plan shall include but not be limited to the following:

- a. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
- b. Methods for protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection; i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, wildlife, soil, historical, archeological, and cultural resources.
- c. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall set out the procedures to be followed to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures set out in accordance with the environmental protection plan.
- d. Location of the solid waste disposal area.
- e. Drawings showing locations of any proposed temporary material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.
- f. Environmental monitoring plans for the job site, including land, water, air, and noise monitoring.
- g. Traffic control plan.
- h. Methods of protecting surface and ground water during construction activities.
- i. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas.
- j. Training for his personnel during the construction period.

PART 2 PRODUCTS (NOT APPLICABLE)

### PART 3 EXECUTION

#### 3.1 PROTECTION OF ENVIRONMENTAL RESOURCES

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications.

##### 3.1.1 Land Resources

Prior to the beginning of any construction, the Contractor shall identify all land resources to be preserved within the Contractor's work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from the Contracting Officer. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

##### 3.1.1.1 Work Area Limits

Prior to any construction, the Contractor shall mark the areas that are not required to accomplish all work to be performed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

##### 3.1.1.2 Protection of Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

##### 3.1.1.3 Contractor Facilities and Work Areas

Location of Field Offices, Storage, and Other Contractor Facilities: The Contractors' field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only on approval by the Contracting Officer.

##### 3.1.2 Disposal of Wastes

Disposal of wastes shall be as specified in Section 02220 DEMOLITION and as specified hereinafter.

##### 3.1.2.1 Solid Wastes

Solid wastes shall be placed in containers which are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination. Segregation measures shall be employed such that no hazardous or toxic waste will become commingled with solid waste. The Contractor shall transport all solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal.

#### 3.1.2.2 Chemical Wastes:

Chemical wastes shall be stored in corrosion resistant containers, removed from the work area and disposed of in accordance with Federal, State, and local laws and regulations.

#### 3.1.2.3 Hazardous Wastes:

The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing and shall collect waste in suitable containers observing compatibility. The Contractor shall transport all hazardous waste off Government property and dispose of it in compliance with Federal and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer. Cleanup and cleanup costs due to spills shall be the responsibility of the Contractor.

#### 3.1.3 Water Resources

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Special management techniques as set out below shall be implemented to control water pollution by the listed construction activities which are included in this contract. In particular, toxic or hazardous chemicals shall not be applied to soil or vegetation in a manner that may cause contamination of the fresh water reserve.

##### 3.1.3.1 Monitoring of Water Areas:

Monitoring of water areas affected by construction activities shall be the responsibility of the Contractor. All water areas affected by construction activities shall be monitored by the Contractor.

#### 3.1.4 Wildlife Resources

The Contractor shall keep construction activities under surveillance, management and control to minimize interference with, disturbance to and damage of wildlife. Species that require specific attention along with measures for their protection will be listed by the Contractor prior to beginning of construction operations.

#### 3.1.5 Air Resources

The Contractor shall keep construction activities under surveillance, management and control to minimize pollution of air resources. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with HDOH, Chapter 59, HDOH, Chapter 60, and all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for those construction operations and activities specified in this section. Special

management techniques as set out below shall be implemented to control air pollution by the construction activities which are included in the contract.

#### 3.1.5.1 Particulates

- a. Dust particles, aerosols, and gaseous by-products from all construction activities, processing and preparation of materials, such as from asphaltic batch plants, shall be controlled at all times, including weekends, holidays and hours when work is not in progress.
- b. The Contractor shall maintain all stockpiles, haul roads, permanent and temporary access roads, and all other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards mentioned in paragraph Air Resources, herein before, to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated at such intervals as to keep the disturbed area damp at all times. The Contractor must have sufficient competent equipment available to accomplish this task. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

#### 3.1.5.2 Hydrocarbons and Carbon Monoxide

Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

#### 3.1.5.3 Odors

Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

#### 3.1.5.4 Monitoring of Air Quality

Monitoring of air quality shall be the responsibility of the Contractor. All air areas affected by the construction activities shall be monitored by the Contractor.

#### 3.1.6 Sound Intrusions

The Contractor shall keep construction activities under surveillance, and control to minimize damage to the environment by noise. The Contractor shall comply with the provisions of HDOH, Chapter 46.

### 3.2 POST CONSTRUCTION CLEANUP

The Contractor shall clean up area(s) used for construction.

### 3.3 RESTORATION OF LANDSCAPE DAMAGE

The Contractor shall restore all landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be in accordance with the plan submitted for approval by the Contracting Officer. This work will be accomplished at the

Contractor's expense.

3.4 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.5 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL

The Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities (vegetative covers, and instruments required for monitoring purposes) to ensure adequate and continuous environmental pollution control.

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## SECTION 01451

## CONTRACTOR QUALITY CONTROL

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1996) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1995b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

## 1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

## PART 2 PRODUCTS (Not Applicable)

## PART 3 EXECUTION

## 3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

## 3.2 QUALITY CONTROL PLAN

## 3.2.1 General

The Contractor shall furnish for review by the Government, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will consider an interim plan for the first 90 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

### 3.2.2 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Technicians responsible for sampling and testing of concrete shall be certified by the American Concrete Institute (ACI) or the Concrete Technicians Association of Hawaii (CTAH). Proof of certification shall be included in the CQC Plan. Personnel qualifications may be furnished incrementally as the work progresses, but in no case, less than fourteen (14) calendar days before personnel are required on the job.
- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test.
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

- g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.
- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

### 3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

### 3.2.4 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

## 3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

## 3.4 QUALITY CONTROL ORGANIZATION

### 3.4.1 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be

at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

#### 3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a construction person with a minimum of 5 years in related work. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall be assigned as System Manager, but may have duties as project superintendent in addition to quality control. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirement for the alternate shall be the same as for the designated CQC Systems Manager.

#### 3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager. If it is subsequently determined by the Contracting Officer that the minimum contract CQC requirements are not being met, the Contractor may be required to provide additional staff personnel to the CQC organization at no cost to the Government.

#### 3.4.4 Additional Requirement

The CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors". This course is periodically offered at the General Contractors Association of Hawaii.

#### 3.4.5 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

#### 3.5 SUBMITTALS

Submittals shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

#### 3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

##### 3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

- a. A review of each paragraph of applicable specifications.
- b. A review of the contract drawings.
- c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- j. Discussion of the initial control phase.
- k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

### 3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

- a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample

panels as appropriate.

- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government shall be notified at least 24 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

### 3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

### 3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, onsite production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

## 3.7 TESTS

### 3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall obtain the services of an industry recognized testing laboratory, or may establish a testing laboratory at the project site acceptable to the Contracting Officer. However, tests contractually required to be performed by an industry recognized testing laboratory shall not be accomplished by the Contractor established on-site laboratory. The Contractor shall perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.

- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

### 3.7.2 Testing Laboratories

#### 3.7.2.1 Laboratory Accreditation

The testing laboratory performing the actual testing on the project shall be in the process of being accredited by one of the following laboratory accreditation authorities by December 1999:

American Association of State Highway and Transportation Officials  
National Voluntary Laboratory Accreditation Program  
American Association for Laboratory Accreditation  
Washington Association of Building Officials

The testing laboratory shall submit an acknowledgement letter from one of the listed laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process started.

#### 3.7.2.2 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

#### 3.7.2.3 Capability Recheck

If the selected laboratory fails the capability check, the Contractor shall reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

### 3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

### 3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to a testing laboratory on the Island of Oahu, State of Hawaii, designated by the Contracting Officer. Coordination for each specific test, exact delivery location, and dates will be made through the Government field office.

## 3.8 COMPLETION INSPECTION

### 3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a punch list of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

### 3.8.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. The QC Manager shall develop a punch list of items which do not conform to the contract documents. The Government will review the punch list and add to or correct the items listed. The QC Manager shall incorporate Government comments and provide a Pre-Final Punch List. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

### 3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional

inspection cost in accordance with the contract clause titled "Inspection of Construction".

### 3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals reviewed, with contract reference, by whom, and action taken.
- g. Off-site surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

## 3.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

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## SECTION 01780

## CLOSEOUT SUBMITTALS

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-04 Drawings

As-Built Drawings; FIO.

Drawings showing final as-built conditions of the project. The final CADD as-built drawings shall consist of one set of electronic CADD drawing files in the specified format, one set of original drawings, 2 sets of prints of the originals, and one set of the Government accepted working as-built drawings.

## SD-01 Data

As-Built Record of Equipment and Materials; FIO.

Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.

Warranty Management Plan; FIO.

One set of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. The Contractor shall furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

Warranty Tags; FIO.

Two record copies of the warranty tags showing the layout and design.

Final Clean-Up; FIO.

Two copies of the listing of completed final clean-up items.

## 1.2 PROJECT RECORD DOCUMENTS

## 1.2.1 As-Built Drawings

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract

drawings which are revised to be used for final as-built drawings.

#### 1.2.1.1 Government Furnished Materials

One set of electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file as-built drawings.

#### 1.2.1.2 Working As-Built and Final As-Built Drawings

The Contractor shall maintain 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a daily basis and at least one set shall be available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. At the final inspection or upon beneficial occupancy of the facility by the user, whichever comes first. The Contractor shall provide one of the two sets of working as-built drawings to the COR for turnover with the facility. This set will serve as an advance/interim working set for the occupant of the completed facility; until such time that the final as-built drawings are furnished to them. Final as-built drawings shall be prepared after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked drawings and final as-built drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final as-built drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement is reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. The working and final as-built drawings shall show, but shall not be limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

b. The location and dimensions of any changes within the building structure.

c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or modifications which result from the final inspection.

g. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built drawings.

h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

j. Modifications (change order price shall include the Contractor's cost to change working and final as-built drawings to reflect modifications) and compliance with the following procedures.

- (1) Directions in the modification for posting descriptive changes shall be followed.
- (2) A Modification Circle shall be placed at the location of each deletion.
- (3) For new details or sections which are added to a drawing, a Modification Circle shall be placed by the detail or section title.
- (4) For minor changes, a Modification Circle shall be placed by the area changed on the drawing (each location).
- (5) For major changes to a drawing, a Modification Circle shall be placed by the title of the affected plan, section, or detail at each location.
- (6) For changes to schedules or drawings, a Modification Circle shall be placed either by the schedule heading or by the change in the schedule.
- (7) The Modification Circle size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

#### 1.2.1.3 Drawing Preparation

The as-built drawings shall be modified as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with Government accepted working as-built drawings, and adding such additional drawings as may be necessary. These working as-built marked drawings shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned by the Contractor to the Contracting Officer after final acceptance by the Government. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the Government.

#### 1.2.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only personnel proficient in the preparation of microstation CADD drawings shall be employed to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings shall be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols shall be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, they shall be prepared using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final as-built drawings shall be identical to that used on the contract drawings. Additions and corrections to the contract drawings shall be accomplished using CADD files. The Contractor will be furnished Microstation CADD files and pentable. The electronic files will be supplied on compact disc, read-only memory (CD-ROM). The Contractor shall be responsible for providing all program files and hardware necessary to prepare final as-built drawings. The Contracting Officer will review final as-built drawings for accuracy and the Contractor shall make required corrections, changes, additions, and deletions.

a. CADD colors shall be the "base" colors of red, green, and blue. Color code for changes shall be as follows:

(1) Deletions (red) - Deleted graphic items (lines) shall be colored red with red lettering in notes and leaders.

(2) Additions (Green) - Added items shall be drawn in green with green lettering in notes and leaders.

(3) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes shall be in blue.

b. All changes to the contract drawing files shall be made on the level as the original item. There shall be no deletions of existing lines; existing lines shall be over struck in red. Additions shall be in green with line weights the same as the drawing.

c. When final revisions have been completed, the cover sheet drawing shall show the wording "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high. All other contract drawings shall be marked either "as-built" drawing denoting no revisions on the sheet or "Revised As-Built" denoting one or more revisions. Original contract drawings shall be dated in the revision block.

d. Within 10 days after Government acceptance of all of the working as-built drawings for a phase of work, the Contractor shall prepare the final CADD as-built drawings for that phase of work and submit two sets of blue/black-line prints of these drawings for Government review. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days the Contractor shall revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 10 days of substantial completion of all phases of work, the Contractor shall submit the final as-built drawing package for the entire project. The submittal shall consist of one set of electronic files on compact disc, read-only memory (CD-ROM), one set of originals, two sets of prints and one set of the Government annotated and accepted working as-built drawings. They shall be complete in all details and identical in form and function to the

contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final acceptance. Failure to submit final as-built drawing files or working as-built marked drawings as specified shall be cause for withholding any payment due the Contractor under this contract. Acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

#### 1.2.1.5 Payment

No separate payment will be made for as-built drawings required under this contract, and all costs accrued in connection with such drawings shall be considered a subsidiary obligation of the Contractor.

#### 1.2.2 As-Built Record of Equipment and Materials

The Contractor shall furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with Government comments. Two sets of final record of equipment and materials shall be submitted 10 days after final inspection. The designations shall be keyed to the related area depicted on the contract drawings. The record shall list the following data:

##### RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA

Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used
-------------	--------------------------	---	-------------------------	---------------

Insulation				
Shingle Roofing				
Metal Roofing				
Built-up Roofing				

#### 1.2.3 Final Approved Shop Drawings

The Contractor shall furnish final approved project shop drawings 30 days after transfer of the completed facility.

#### 1.2.4 Real Property Equipment

The Contractor shall furnish a list of installed equipment furnished under this contract. The list shall include all information usually listed on manufacturer's name plate. The "EQUIPMENT-IN-PLACE LIST" shall include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. A draft list shall be furnished at time of transfer. The final list shall be furnished 30 days after transfer of the completed facility.

#### 1.3 WARRANTY MANAGEMENT

### 1.3.1 Warranty Management Plan

The Contractor shall develop a warranty management plan. At least 30 days before the planned pre-warranty conference, the Contractor shall submit the warranty management plan for Government approval. The warranty management plan shall include all required actions and documents to assure that the Government receives all warranties to which it is entitled, in accordance with the Contract Clause, WARRANTY OF CONSTRUCTION. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase shall be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Approved information shall be assembled in a binder and shall be turned over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. A joint 4 month and 9 month warranty inspection shall be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Information contained in the warranty management plan shall include, but shall not be limited to, the following:

- a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.
- b. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- c. A list for each warranted equipment, item, feature of construction or system indicating:
  1. Name of item.
  2. Model and serial numbers.
  3. Location where installed.
  4. Name and phone numbers of manufacturers or suppliers.
  5. Names, addresses and telephone numbers of sources of spare parts.
  6. Warranties and terms of warranty. This shall include one-year overall warranty of construction. Items which have extended warranties shall be indicated with separate warranty expiration dates.
  7. Cross-reference to warranty certificates as applicable.
  8. Starting point and duration of warranty period.
  9. Summary of maintenance procedures required to continue the warranty in force.
  10. Cross-reference to specific pertinent Operation and Maintenance manuals.
  11. Organization, names and phone numbers of persons to call for warranty service.
  12. Typical response time and repair time expected for various warranted equipment.
- d. The Contractor's plans for attendance at the 4 and 9 month

post-construction warranty inspections conducted by the Government.

e. Procedure and status of tagging of all equipment covered by extended warranties.

f. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

#### 1.3.2 Performance Bond

The Contractor's Performance Bond shall remain in effect throughout the construction period, and during the life of any guaranty required under the Contract Performance Bond, Standard Form 25.

a. In the event sufficient funds are not available to cover the construction warranty work performed by the Government, at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

b. Following oral or written notification of required construction warranty repair work, the Contractor shall respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

#### 1.3.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, the Contractor shall meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor shall furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, shall be continuously available, and shall be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

#### 1.3.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, the Contractor shall respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. The Contractor shall submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframes specified, the Government will perform the work and backcharge the construction warranty payment item established.

a. First Priority Code 1. Perform onsite inspection to evaluate

situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Air Conditioning Systems

- (1) Recreational support.
- (2) Air conditioning leak in part of building, if causing damage.
- (3) Air conditioning system not cooling properly.

Code 1-Doors

- (1) Overhead doors not operational, causing a security, fire, or safety problem.
- (2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors

- (1) Overhead doors not operational.
- (2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical

- (1) Power failure (entire area or any building operational after 1600 hours).
- (2) Security lights
- (3) Smoke detectors

Code 2-Electrical

- (1) Power failure (no power to a room or part of building).
- (2) Receptacle and lights (in a room or part of building).

Code 3-Electrical

Street lights.

Code 1-Gas

- (1) Leaks and breaks.
- (2) No gas to family housing unit or cantonment area.

Code 1-Heat

- (1) Area power failure affecting heat.
- (2) Heater in unit not working.

Code 2-Kitchen Equipment

- (1) Dishwasher not operating properly.
- (2) All other equipment hampering preparation of a meal.

Code 1-Plumbing

- (1) Hot water heater failure.
- (2) Leaking water supply pipes.

Code 2-Plumbing

- (1) Flush valves not operating properly.

- (2) Fixture drain, supply line to commode, or any water pipe leaking.
- (3) Commode leaking at base.

Code 3 -Plumbing  
Leaky faucets.

Code 3-Interior  
(1) Floors damaged.  
(2) Paint chipping or peeling.  
(3) Casework.

Code 1-Roof Leaks  
Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks  
Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 2-Water (Exterior)  
No water to facility.

Code 2-Water (Hot)  
No hot water in portion of building listed.

Code 3-All other work not listed above.

1.3.5 Warranty Tags

At the time of installation, each warranted item shall be tagged with a durable, oil and water resistant tag approved by the Contracting Officer. Each tag shall be attached with a copper wire and shall be sprayed with a silicone waterproof coating. The date of acceptance and the QC signature shall remain blank until project is accepted for beneficial occupancy. The tag shall show the following information.

- a. Type of product/material\_\_\_\_\_.
- b. Model number\_\_\_\_\_.
- c. Serial number\_\_\_\_\_.
- d. Contract number\_\_\_\_\_.
- e. Warranty period\_\_\_\_\_ from\_\_\_\_\_ to\_\_\_\_\_.
- f. Inspector's signature\_\_\_\_\_.
- g. Construction Contractor\_\_\_\_\_.
- Address\_\_\_\_\_.
- Telephone number\_\_\_\_\_.
- h. Warranty contact\_\_\_\_\_.
- Address\_\_\_\_\_.

Telephone number\_\_\_\_\_.

i. Warranty response time priority code\_\_\_\_\_.

j. WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.

1.4 OPERATION AND MAINTENANCE MANUALS

Operation manuals and maintenance manuals shall be submitted as specified. Operation manuals and maintenance manuals provided in a common volume shall be clearly differentiated and shall be separately indexed.

1.5 FINAL CLEANING

The premises shall be left broom clean. Stains, foreign substances, and temporary labels shall be removed from surfaces. Carpet and soft surfaces shall be vacuumed. Equipment and fixtures shall be cleaned to a sanitary condition. Debris shall be removed from roofs, drainage systems, gutters, and downspouts. Paved areas shall be swept and landscaped areas shall be raked clean. The site shall have waste, surplus materials, and rubbish removed. The project area shall have temporary structures, barricades, project signs, and construction facilities removed. A list of completed clean-up items shall be submitted on the day of final inspection.

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PART 3 EXECUTION (NOT USED)

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## SECTION 01900

## MISCELLANEOUS PROVISIONS

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having a "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

As-Built Drawings; FIO.

SD-09 Reports

Inspection of Existing Conditions; FIO.

A written report with color photographs noting the condition of the existing facilities at the time of the inspection. One copy of the report including photographs shall be submitted to the Schofield Area Family Housing Office prior to construction.

Recovered Material Report.

The Contractor shall provide a report listing all products meeting EPA guidelines for products containing recovered materials and quantity used for this project.

SD-18 Records

Dust Control; GA.

Method(s) of dust control.

Condition of Contractor's Operation or Storage Area; FIO.

The Contractor shall submit to the Contracting Officer photographs and/or videos depicting the condition of the Contractor's Operation or Storage Area.

## 1.2 CONTRACTOR QUALITY CONTROL

To assure compliance with contract requirements, the Contractor shall establish and maintain quality control for materials and work covered by all sections of the TECHNICAL REQUIREMENTS in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Records shall be maintained for all operations including sampling and testing.

## 1.3 AS-BUILT DRAWINGS

As-built drawings shall be in accordance with SPECIAL CONTRACT REQUIREMENT entitled "Section 01780 CLOSEOUT SUBMITTALS".

#### 1.4 DUST CONTROL

Dust control shall be in accordance with Section 02220 DEMOLITION.

#### 1.5 PROTECTION

The Contractor shall take all necessary precautions to insure that no damages to private or public property will result from his operations. Any such damages shall be repaired or property replaced by the Contractor in accordance with the CONTRACT CLAUSES entitled "PERMITS AND RESPONSIBILITIES" and "PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS", without delay, and at no cost to the Government.

##### 1.5.1 Warning Signs and Barricades

The Contractor shall be responsible for posting warning signs or erecting temporary barricades to provide for safe conduct of work and protection of property.

##### 1.5.2 Protection of Grassed and Landscaped Areas

The Contractor's vehicles shall be restricted to paved roadways and driveways. Vehicles shall not be driven or parked on grassed and/or landscaped areas except when absolutely necessary for the performance of the work and approved in advance by the Contracting Officer. Grassed or landscaped areas damaged by the Contractor shall be restored to their original condition without delay and at no cost to the Government.

##### 1.5.3 Protection of Trees and Plants

Where necessary, tree branches and plants interfering with the work may be temporarily tied back by the Contractor to permit accomplishment of the work in a convenient manner, so long as they will not be permanently damaged thereby. If this is not feasible, they may be pruned, subject to written approval by the Contracting Officer.

##### 1.5.4 Protection of Building From the Weather

The interior of the building and all materials and equipment shall be protected from the weather at all times.

#### 1.6 RESTORATION WORK

Existing conditions or areas damaged or disturbed by the Contractor's operations shall be restored to their original condition, or near original condition as possible, to the satisfaction of the Contracting Officer.

#### 1.7 REMOVAL AND DISPOSAL

Removal and disposal shall be in accordance with Section 02220 DEMOLITION. The Contractor shall salvage or recycle waste to the maximum extent practical as it relates to the capabilities of local industries. A record of the quality of salvaged or recycled materials shall be maintained by the Contractor during the length of the project and submitted to the Contracting Office at acceptance of the project. Quantities shall be recorded in the unit of measure of the industry. Reuse of materials on the site shall be considered a form of recycling. An example of such reuse

would be the use of acceptable excavated materials as fill.

#### 1.8 INTERFERENCE WITH GOVERNMENT OPERATIONS

The Contractor shall establish work procedures and methods to prevent interference with existing operations within or adjacent to the construction area. Free passage into adjoining or adjacent buildings not in the contract will not be permitted except as approved by the Contracting Officer. Procedures and methods shall also provide for safe conduct of work and protection of property which is to remain undisturbed.

##### 1.8.1 Coordination

The Contractor shall coordinate all work with the Contracting Officer to minimize interruption and inconvenience to the occupants or to the Government. Scheduling and programming of work will be established during the pre-construction conference.

##### 1.8.2 Materials and Equipment

All materials and equipment required to complete the project shall be on hand before work is started.

##### 1.8.3 Utilities and Facilities

All utilities and facilities within the dwelling units shall remain operable and shall not be affected by the Contractor's work, unless otherwise approved in writing in advance by the Contracting Officer.

#### 1.9 CONTRACTOR'S OPERATIONS OR STORAGE AREA

At the request of the Contractor, an open operations or storage area will be made available within the installation, the exact location of which will be determined by the Government. The Contractor shall be responsible for the security necessary for protection of his equipment and materials, and shall maintain the area free of debris. No rusty or unsightly materials shall be used for providing the secure measure and such measure shall be erected in a workmanlike manner. Before any construction commences on establishing the operation/storage area, Contractor shall take photographs and/or videos of the site in order to establish the original conditions of the site. A duplicate set shall be made and submitted to the Government for its files. Upon completion and prior to the final acceptance of the contract work, the Contractor shall restore the area to its original condition.

#### 1.10 INSPECTION

##### 1.10.1 Final Inspection and Acceptance

The Contractor shall give the Fort Shafter, Schofield Area Family Housing Office, through the Contracting Officer, a minimum of fourteen (14) calendar days advance notice prior to final inspection of each building for acceptance by the Contracting Officer. All deficiencies found on final inspection of each building shall be promptly and satisfactorily corrected by the Contractor upon notification by the Contracting Officer.

#### 1.11 WORKING DIRECTIVES

##### 1.11.1 Working Hours

All work shall be performed between the hours of 0730 to 1600 HST, Monday through Friday. No work shall be accomplished on Saturdays, Sundays, and all federal holidays without written permission from the Contracting Officer. Such written permission shall be available at the job site at all times during construction.

#### 1.11.2 Occupancy

Buildings to be reroofed under this contract will be occupied during the time of construction. Buildings identified with existing asbestos containing materials will be unoccupied during the removal of the asbestos-containing materials. The removal work shall be so expedited that the occupants will be able to reoccupy the unit as quickly as possible. At times, and as directed by the Contracting Officer, the Contractor will be required to deviate from the approved schedule to accomplish work at the buildings that have been recently vacated, and to work out of sequence for the occupants' convenience. If a building becomes unavailable on the scheduled availability date due to exigency, the Government reserves the right to cancel the item of work, to substitute another building or to reschedule the particular building at a later date.

#### 1.11.3 Availability of Work Areas

- a. The Contractor shall limit his work to not less than 2 and not more than 3 buildings at any given time. After approval of the Contractor's schedule and within ninety (90) calendar days after receipt of notice to proceed, the buildings will be made available to the Contractor in the following order:

- (1) Initially one building will be made available to the Contractor to be completed as the "model building" to ensure that the Contracting Officer and the Contractor are in agreement over the standards of workmanship, applicable under the contract, which will be consistently applied by the Contractor, throughout the remainder of the work. The Contractor may take 14 calendar days to complete the model building. Additional buildings will not be made available to the Contractor for work until satisfactory completion of the model building.

- (2) Upon satisfactory completion of the model building, the Contracting Office will make available to the Contractor an increment of not less than 2 and not more than 3 buildings for the Contractor's work.

- (3) Thereafter, upon satisfactory completion of the first increment of buildings, the Contractor will turn back the completed increment to the Contracting Office and, at any time within 2 working days after turning back the increment, will receive in exchange a new increment of buildings upon which to begin work. The Contracting Officer may, without any liability to the Government, accept turnover of individual buildings within an increment, but will in case make available another increment, or part of another increment of buildings, until the Contractor has turned over all buildings in a particular increment.

- (4) The Contracting Officer, at his or her sole discretion, may withhold making a new increment of buildings available for more than 2 working days (up to an indefinite period), where the

Contracting Officer determines that the Contractor, for any reason solely within the Contractor's responsibility, is not likely to complete the buildings within the new increment in a timely manner, or has failed or is failing to perform any material requirement under the contract. Upon assuring himself or herself that the cause(s) for withholding a new increment of buildings no longer exist, the Contracting Officer shall promptly make a new increment of buildings available to the Contractor.

(5) The Contracting Officer, at his or her sole discretion, and at no liability to the Government, may vary the number of buildings made available within increments within the minimum and maximum number of buildings per increment set forth herein, depending upon factors such as, but not limited to, the Contractor's perceived rate of production, problems in timely completion of the work in individual buildings or availability of buildings.

(6) The Contracting Office will make reasonable efforts to make contiguous or proximate buildings available to the Contractor. However, the Government makes no representation that contiguous or proximate buildings will always be made available to the Contractor, and the Government will not be liable for "Inefficiencies", "delays", or other "Impacts" allegedly due to the Contracting Officer's failure to make contiguous or proximate buildings available to the Contractor.

- b. Except for the model building described herein, and regardless of the number of buildings made available under any particular increment of buildings, all required construction (including clean up and punch list work) at a particular building shall be completed within 10 consecutive work days after the building is made available to the Contractor for work. Once the work has started, the Contractor shall continue performance through each workday until completion, except for lunch periods and other normal breaks. The Contractor shall ensure that all required materials and equipment are on hand, including adequate work force before starting work. Work stoppage will not be permitted without the approval of the Contracting Officer.

#### 1.11.4 Notification of Occupants

- a. The initial notification of the occupants, including their responsibilities, will be accomplished by the Schofield Area Family Housing Office.
- b. After the Schedule has been approved, the affected occupants shall be notified by the Contractor of the date and time work will begin at that building and to remove or safeguard their valuables and personal effects.
- c. The Contractor shall by letter notify each dwelling unit a minimum of seven (7) calendar days prior to commencement of work on that building. This notification shall include the time, the date, and any pertinent changes to the progress chart or any special requirements approved by the Contracting Officer. If the scheduled work is delayed for any cause, the affected occupants shall be notified immediately in writing by the Contractor, and they shall be notified again in writing by the Contractor prior to

the commencement of rescheduled work. The Contractor shall include the following information in all delay and rescheduling notices:

- (1) Title of Contract
- (2) Originally Scheduled Date of Work
- (3) Cause of Delay
- (4) Rescheduled Date of Work
- (5) Family Housing Office Point of Contact
- (6) Family Housing Office Telephone
- (7) Contractor's Point of Contact
- (8) Contractor's Name and Telephone

#### 1.12 USE OF PRODUCTS CONTAINING RECOVERED MATERIALS

Recovered materials are materials manufactured from waste material and byproducts that have been recycled or diverted from solid waste. The Contractor shall give preference to products containing recovered material when price, performance, and availability meet project requirements. A listing of products, including the recommended recovered material content, is provided by the Environmental Protection Agency at <http://www.epa.gov/cpg/products.htm>. Only those products having recovered material content equal to or greater than EPA guidelines shall be used to meet this requirement.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

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## SECTION 02090

## LEAD-BASED PAINT (LBP) ABATEMENT AND DISPOSAL

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 148	Hazardous Waste Injection Restrictions
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

## DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD-01	(1996) Lead-Based Paint: Guidelines for the Availability and Control of Lead-Based Paint Hazards in Housing
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## ENGINEERING MANUALS (EM)

EM 385-1-1 (1992) U.S. Army Corps of Engineers Safety and Health Requirements Manual

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (1996) Methods of Fire Test for Flame-Resistant Textiles and Films

## NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH OSHA Booklet 3142 Lead in Construction

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

Equipment List; GA.

A list of equipment items to be used in the work, including brand names, model, capacity, performance characteristics, quantities and other pertinent information.

## SD-08 Statements

Lead-Based Paint (LBP) Inventory; GA.

All painted louvers, gutters, flashings, downspouts or fascias and trim, are assumed to be coated with lead-based paint. Contractor shall supply an inventory of these materials for handling and disposal.

Lead-Based Paint (LBP) Management Plan; GA.

The Contractor shall review the specified abatement work tasks and abatement methods and shall prepare a detailed LBP Management Plan that identifies the work procedures, health, and safety measures to be used in LBP abatement. The plan shall address the various sources of lead and the methods to be undertaken to abate the lead hazards to include the following key elements:

- a. Location of LBP containing components keyed to project drawings.
- b. Abatement methods for each LBP containing component.
- c. Means for notifying occupants of proposed work schedules.
- d. Training requirements as required by Federal, state, and local regulations.
- e. Unique problems associated with the LBP abatement project.
- f. Sketch of LBP control areas and decontamination areas.

- g. Eating, drinking, smoking, and rest room procedures.
- h. Sequencing of LBP related work.
- i. Personnel protective equipment; respiratory protection program and controls.
- j. Engineering controls, containment structures and safety measures.
- k. Worker exposure assessment procedures.
- l. Work Practice controls.
- m. Housekeeping.
- n. Hygiene facilities and practice.
- o. Medical surveillance, including medical removal protection.
- p. Sampling, testing and analytical methods to include personal air sampling requirements of 29 CFR 1926 Section .62 and when specified or where required, environmental air sampling, dust wipe sampling (preabatement, during abatement, post abatement), soil sampling (preabatement, post abatement, final clearance), toxicity characteristic leaching procedure (TCLP) of the waste material in accordance with 40 CFR 261. Procedures must include frequency, locations, and sampling and analytical methods to be used.

Hazardous Waste Management Plan; GA.

A Hazardous Waste Management Plan shall be prepared that complies with applicable requirements of Federal, state, and local hazardous waste regulations and addresses:

- a. Identification or documentation of potential hazardous wastes associated with the work.
- b. Estimated quantities of wastes to be generated and disposed of.
- c. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes; the facility location, phone number, and name of a 24-hour point of contact shall be included. Two copies of EPA, state, and local hazardous waste permit applications, permits, and EPA identification numbers.
- d. Names and qualifications (experience and training) of personnel who will be working onsite with hazardous waste.
- e. List of waste handling equipment to be used in performing the work to include cleaning, volume reduction, and transport equipment.
- f. Spill prevention, containment, and clean-up contingency measures to be implemented.
- g. Work plan and schedule for waste containment, removal, and disposal. Waste shall be cleaned up and containerized daily.
- h. Cost for hazardous waste disposal according to this plan.

Waste Handling and Site Storage Plan; GA.

A Handling and Site Storage Plan shall be prepared that addresses the handling and storage of LBP debris in accordance with the requirement of 40 CFR 262 and 40 CFR 265. The Contractor shall confirm that an EPA identification number has been obtained so that proper manifesting of the waste will be addressed, and that site storage limitations, including the time of storage, container requirements, contingency plan, and personnel training have been complied with.

Waste Disposal Plan; GA.

A Waste Disposal Plan shall be prepared that will include but not be limited to the following:

- a. A written confirmation that the debris will be treated and disposed of in accordance with the requirements of 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 264 and 40 CFR 268.
- b. A written confirmation that transportation of the debris will be in accordance with 40 CFR 263.
- c. Waste subcontractor's name, address, telephone number, and landfill location, including copies of licenses and signed agreements.
- d. Landfill name, address, and telephone number. A copy of the landfill's state and locally issued license, and a signed agreement that the landfill will accept the LBP wastes.
- e. Detailed delivery tickets prepared, signed, and dated by an agent of the landfill, certifying the amount of LBP containing materials delivered to the landfill, within 3 days after delivery.

SD-09 Reports

Sampling Result; GA.

A daily log of the personal and environmental air sampling test results shall be reviewed by the Competent Person and submitted, in written form, no more than 48 hours after completion of the sampling cycle. The log shall list each sample result, sampling time and date, sample type, identification of personnel monitored, flow rate and duration, air volume sampled, yield of lead, cassette size, analytical method used, analyst's name and company, and interpretation of results. Results shall be reported in micrograms of lead per cubic meter of air. In addition, the daily log shall include the results of dust wipe samples, soil samples and TCLP sampling including each phase of preabatement, during abatement and final clearance. Documentation of results that exceed specified limits (personal air samples that exceed 30 micrograms per cubic meter) or as required by Federal, state or local requirements shall be highlighted in the log in such a manner to make them easily distinguishable from monitoring results that do not exceed specified or regulatory limits.

SD-13 Certificates

Quality Assurance; GA.

Certificates shall meet the requirements of paragraph QUALITY ASSURANCE. The statements shall be signed and dated by a certifying officer after the award of this contract and contain the following:

- a. Contractor's name and address.
- b. Project name and location.
- c. The specified requirements that are being certified.

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Qualifications

- a. Contractor: Certification that the Contractor has prior experience on LBP abatement projects similar in nature and extent to ensure the capability to perform the abatement in a satisfactory manner.
- b. Competent Person: Certification that the Contractor's full-time onsite Competent Person meets the competent person requirements of 29 CFR 1926 Section .62 and is experienced in administration and supervision of LBP abatement projects, including work practices, protective measures for building and personnel, disposal procedures, etc. This person shall have completed a Contractor Supervisor LBP abatement course by an EPA Training Center or an equivalent certification course, and have had a minimum of 2 years on-the-job experience.
- c. Certified Industrial Hygienist (CIH): Certification that the CIH has 2 years prior experience on similar LBP abatement projects and is certified by the American Board of Industrial Hygiene (ABIH). The certification shall include a copy of the ABIH certificate showing certification number, and date of certification or recertification.
- d. Industrial Hygienist: Certification that the Industrial Hygienist meets the Office of Personnel Management Standard for the Industrial Hygiene Series GS-690, and has a minimum of two years experience in LBP abatement.
- e. Testing Laboratory: The name, address, and telephone number of the independent testing laboratory selected to perform sampling and analysis for personal and environmental air samples and TCLP analysis. Documentation that the laboratory performing the analysis is an EPA National Lead Laboratory Accreditation Program (NLLAP) accredited laboratory and that it is rated proficient in the NIOSH/EPA Environmental Lead Proficiency Analytical Testing Program (ELPAT). Certification shall include accreditation for heavy metal analysis, list of experience relevant to analysis of lead in air, and a Quality Assurance and Quality Control Program. Currently, the American Association for Laboratory Accreditation (ASLA) and the American Industrial Hygiene Association (AIHA) are the EPA recognized laboratory accreditors. Documentation shall include the date of accreditation or reaccreditation.
- f. Blood Lead Testing Laboratory. The name, address and telephone number of the blood lead testing laboratory; the laboratory's listing by OSHA and the U.S. Public Health Service Center for

Disease Control (CDC); and documentation that the laboratory certified in the state where the work site is located.

#### 1.3.2 Respiratory Protection Devices

Manufacturer's certification of NIOSH or the Mine Safety and Health Administration (MSHA) approval for respiratory protection devices utilized on the site.

#### 1.3.3 Cartridges, Filters, and Vacuum Systems

Manufacturer's certification of NIOSH approval of respirator cartridges (organic vapor, acid gas, mist, dust, high efficiency particulate); High Efficiency Particulate Air (HEPA) filtration capabilities for all cartridges, filters, and HEPA vacuum systems.

#### 1.3.4 Medical Records

Certification that employees who are involved in LBP abatement work have received medical examinations and will receive continued medical surveillance, including biological monitoring, as required by 29 CFR 1926 Section .62 and by the state and local regulations pertaining to such work. Records shall be retained, at Contractor expense, in accordance with 29 CFR 1910 Section .20.

#### 1.3.5 Training

Training certification shall be provided prior to the start of work involving LBP abatement, for all of the Contractors' workers, supervisors and Competent Person. Training shall meet the requirements of 29 CFR 1926 Section .62, 29 CFR 1926 Section .59 and 49 CFR 172, and that required by EPA or the state LBP course for the work to be performed. Training shall be provided prior to the time of job assignment and, at least, annually. Training may cover all abatement methods or focus only on those methods specified in the LBP Management Plan. The project specific training shall, as a minimum, include the following:

- a. Specific nature of the operation which could result in exposure to lead.
- b. Purpose, proper selection, fitting, use, and limitations of respirators.
- c. Purpose and 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 employees who are pregnant).
- d. Relevant engineering controls and good work practices.
- e. The contents of any compliance plan in effect.
- f. Instructions to employees 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.
- g. The employee's right of access to records under 29 CFR 1910Section

.20.

#### 1.3.6 Licenses and Permits

Copies of licenses and permits as required by applicable Federal, state, and local regulations shall be obtained at least 20 days before the start of the LBP abatement project.

#### 1.4 DESCRIPTION OF WORK

LBP is to be removed. All painted louvers, gutters, flashings, downspouts, fascias, and trim are to be handled as lead-based painted waste. These materials must be recycled or disposed of in accordance with local, state and federal regulations.

#### 1.5 SITE VISIT

Contractor shall visit and investigate the site, review the drawings and specifications, assess the amount of LBP, and become familiar with conditions which will affect the work.

#### 1.6 LIABILITY INSURANCE FOR LBP

LBP abatement liability insurance shall be obtained without additional expense to the Government. The Contractor shall assume full responsibility and liability for the compliance with Federal, state, and local regulations pertaining to training, work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site.

#### 1.7 PROTECTION OF EXISTING WORK TO REMAIN

Abatement, storage, transportation, and disposal work shall be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, the Contractor shall restore work and areas to the original condition.

#### 1.8 COORDINATION WITH OTHER WORK

Abatement and disposal work shall be coordinated with existing work and/or concurrent work being performed in adjacent areas.

#### 1.9 SAFETY AND HEALTH REGULATORY REQUIREMENTS

Work shall be performed in accordance with requirements of EM 385-1-land applicable regulations including, but not limited to 29 CFR 1910, 29 CFR 1926, especially Section .62. Matters of interpretation of the standards shall be submitted to the appropriate agency for resolution before starting work. Where these requirements vary, the most stringent shall apply.

#### 1.10 PRECONSTRUCTION SAFETY MEETING

The Contractor and competent person shall attend a preconstruction safety meeting prior to starting any work involving LBP abatement. Items required to be submitted will be reviewed for completeness, and where specified, for acceptance.

#### 1.11 ACCIDENT PREVENTION PLAN

### 1.11.1 Preparation and Implementation

The Accident Preparation Plan (APP) shall be prepared in accordance with EM 385-1-1, Table 1-1. Where topic in table 1-1 is not applicable, the APP shall justify its omission or reduced level of detail, and establish that adequate consideration was given to the topic. The APP shall cover onsite work by the Contractor or subcontractors. The Competent Person shall be responsible for development, implementation, and quality control of the content and actions required in the APP. For each anticipated work task, the APP shall establish hazards and control measures. The APP shall be easily readable and understandable by the Contractor's work force.

### 1.11.2 Acceptance and Modifications

The APP shall be prepared, signed and dated by the Contractors Competent Person and submitted 20 days prior to the preconstruction safety conference. Deficiencies in the APP shall be discussed at the Preconstruction Safety Conference and the APP shall be revised to correct the deficiencies, and resubmitted for acceptance. Onsite work shall not begin until the APP has been accepted unless otherwise authorized by the Contracting Officer. One copy of the APP shall be maintained in the Contractor's jobsite file, and a second copy shall be posted where it will be accessible to personnel on the site. As work proceeds, the APP shall be adapted to new situations and conditions. Changes to the APP shall be made with concurrence of the Competent Person and Site Superintendent, and acceptance of the Contracting Officer. Should an unforeseen hazard become evident during performance of the work, the Competent Person shall bring such hazard to the attention of the Superintendent and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, the Contractor shall take necessary action to re-establish and maintain safe working conditions; and to safeguard onsite personnel, visitors, the public, and the environment. Disregard for provisions of this specification, or the accepted APP shall be cause for stopping of work until the matter is rectified.

### 1.11.3 Activity Hazard Analyses

An Activity Hazard Analysis (AHA) shall be prepared prior to beginning each major phase of the work and submitted for review and acceptance. Format shall be in accordance with EM 385-1-1, figure 1-1. A major phase of work is defined as an operation involving hazards not experienced in previous operations, or where a new work crew is to perform. The analysis shall define the activities and the sequence in which they are to be performed, specific hazards anticipated, and control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity Hazard Analysis has been accepted and a preparatory meeting has been conducted by the Contractor to discuss content of the AHA with everyone engaged in the activity, including the Government's onsite representative. The AHA shall be continuously reviewed and modified when appropriate to address changing conditions or operations. The accepted AHA shall be appended to and become part of the APP.

## 1.12 RESPIRATORY PROTECTION PROGRAM

A respiratory protection program shall be established as required by 29 CFR 1926 Section .103 and .62 and in accordance with 29 CFR 1910Section .134. An approved respirator shall be furnished to each employee and visitor required to enter a LBP work control area. A fit test shall be conducted in accordance with 29 CFR 1926 Section .62, Appendix D.

### 1.13 HAZARD COMMUNICATION PROGRAM

A Hazard Communication Program shall be implemented in accordance with 29 CFR 1926 Section .59.

### 1.14 SAFETY AND HEALTH OVERSIGHT

The Competent Person shall be the onsite person responsible for coordination, safety, security and execution of the work. The Competent Person shall be able to identify existing and predictable lead hazards and shall have the authority to take corrective measures to eliminate them. The Competent Person shall be responsible for personal and environmental sampling.

### 1.15 PREPARATORY INSPECTION MEETING

The Contractor and competent person shall arrange and hold a preparatory inspection meeting immediately prior to beginning any LBP abatement. The APP, Activity Hazard Analyses, and the Contractor's LBP Management Plan, including containment, engineering controls, worker protection, training, and monitoring, will be reviewed for completeness.

### 1.16 TRAINED AND COMPETENT PERSONNEL

Work shall be performed by Competent Persons, qualified and trained in the abatement, enclosure, encapsulation, monitoring, testing, storage, treatment, hauling, and disposal of contaminated LBP debris material, and in subsequent cleanup of the affected environment. Workers shall comply with the appropriate Federal, state, and local regulations which mandate training requirements and work practices and shall be capable of performing the work under this contract.

### 1.17 POSTED WARNINGS AND NOTICES

The following regulations, warnings, and notices shall be posted at the work site in accordance with 29 CFR 1926 Section .62.

#### 1.17.1 Regulations

Two copies of applicable Federal, state, and local regulations and NIOSH OSHA Booklet 3142 shall be maintained. One copy shall be posted at the work site and one copy shall be on file in the project office.

#### 1.17.2 Warning Signs and Labels

Warning signs shall be provided at building entrances and approaches to LBP control areas containing airborne LBP debris. Signs shall be located at a distance from the LBP control areas that will allow personnel to read the sign and take the necessary protective actions required before entering the LBP control area.

##### 1.17.2.1 Warning Signs

Warning signs shall be in English and be of sufficient size to be clearly legible and display the following:

WARNING  
LEAD WORK AREA

POISON  
NO SMOKING OR EATING  
AUTHORIZED PERSONNEL ONLY  
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

1.17.2.2 Warning Labels

Warning labels shall be in English and be of sufficient size to be clearly legible and display the following:

CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE OR LOCAL REGULATIONS.

1.17.3 Worker Information

Right-to-know notices shall be placed in clearly visible areas of the work site in compliance with Federal, state, and local regulations.

1.17.4 Air Monitoring Results

Daily air monitoring results shall be prepared so as to be easily understood by the workers, and shall be placed in a clearly visible area of the work site.

1.17.5 Emergency Telephone Numbers

A list of telephone numbers shall be posted at the site. The list shall include numbers of the local hospital, emergency squad, police and fire departments, Government and Contractor representatives who can be reached 24 hours per day, and professional consultants directly involved in the project.

1.18 EQUIPMENT AND MATERIALS

Sufficient quantities of health and safety materials required by 29 CFR 1926 Section .62, and other materials and equipment needed to complete the project, shall be available and kept on the site.

1.18.1 Respirators

Air-purifying respirators shall be approved by NIOSH for use with dust, fumes, and mists having permissible exposure limits less than 0.05 milligrams per cubic meter (i.e., have high-efficiency particulate air (HEPA) filters) and for other hazardous airborne contaminants that may be encountered, as determined by the Competent Person. Respirators shall comply with the requirements of 29 CFR 1926 Section .62 and shall be used in accordance with 29 CFR 1926 Section .103 and 29 CFR 1910 Section .134.

1.18.2 Respirator Cartridges

A sufficient supply of respirator cartridges shall be maintained at the work site to provide new cartridges to employees, authorized visitors, and Government personnel throughout the duration of the project. Cartridges shall be replaced according to the manufacturer's recommendations, when breathing becomes difficult, or if the cartridge becomes wet.

1.18.3 Protective Clothing

The Contractor shall furnish, at no cost to personnel, equipment/clothing for protection from airborne and waterborne LBP debris. An adequate supply of these items shall be available for worker, authorized visitor, and Government personnel use. Workers and visitors shall not take protective clothing and equipment off the work site at any time. Protective clothing includes:

- a. Coveralls (Whole Body Protective Coverings): Full-body coveralls and head covers shall be worn by workers in the work area. Sleeves shall be secured at the wrist and pants legs at the ankle with tape. Permeable clothing shall be provided in heat-stress conditions. Where non-disposable coveralls are provided, these coveralls shall be cleaned after each wearing. Cleaning of coveralls and other non-disposable clothing shall be in accordance with the provisions for cleaning in 29 CFR 1926 Section .62.
- b. Boots: Work boots with nonskid soles or impermeable work boot covers shall be worn by workers. Where required by OSHA, safety boots (steel toe or steel toe and shank) shall be worn. Paint the uppers of boots red with waterproof enamel. Do not allow boots to be removed from the work area for any reason after being contaminated with LBP debris. Dispose of boots as LBP contaminated waste at the end of the work.
- c. Gloves: Inner gloves, appropriate for items and hazards encountered, and disposable outer work gloves shall be provided to each worker and shall be worn while the worker is in the work area. Glove material shall be appropriate for the specific chemical exposure. Gloves shall not be removed from the work area, and shall be disposed of as LBP contaminated waste at the end of the work.
- d. Hard Hats: Head protection (hard hats) shall be provided as required by OSHA and EM 385-1-1 for workers and authorized visitors. Protective plastic strap suspension hats shall be used. Hard hats shall be worn at all times that work is in progress. Hats shall remain in the work area until the project is completed. Hats shall be thoroughly cleaned, decontaminated, and bagged before being removed from the work area at the end of the project.
- e. Eye Protection: Fog-proof goggles for personnel engaged in LBP abatement operations shall be worn when the use of a full face piece respirator is not required.
- f. Work Clothing: Cloth work clothes shall be provided for wearing under the disposable protective coveralls and foot coverings.

#### 1.18.4 Expendable Supplies

##### 1.18.4.1 Polyethylene Sheet and Bags - General

Polyethylene sheet and bags shall be minimum 6 mils thick. Bags shall have pre-printed labels, and 5 inch (minimum) long plastic ties, pointed and looped to secure the filled bags. Polyethylene sheets shall be in roll sizes to minimize seams.

##### 1.18.4.2 Polyethylene Sheet - Flame Resistant

Where a potential for fire exists, flame-resistant polyethylene sheets

shall be provided. Polyethylene film shall be frosted or black and shall conform to the requirements of NFPA 701.

#### 1.18.4.3 Polyethylene Sheet - Reinforced

Reinforced polyethylene sheet shall be provided where high skin strength is required such as where it constitutes the only barrier between the LBP control area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between two layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

#### 1.18.4.4 Tape and Adhesive Spray

Tape and adhesive shall be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive shall retain adhesion when exposed to wet conditions, including amended water. Tape shall be minimum 2 inches wide, industrial strength.

#### 1.18.4.5 Containers

Impermeable containers shall be used to receive and retain lead contaminated material until disposal. Containers shall be labeled in accordance with EPA, DOT and OSHA standards.

#### 1.18.4.6 Chemicals

Chemicals, including caustics and paint strippers, shall be properly labeled and stored in leak-tight containers.

#### 1.18.5 Vacuum Systems

HEPA filtered vacuum systems shall be used during abatement operations which generate dust. The systems shall be suitably sized for the project, and filters shall be capable of removing particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.

### 1.19 STORAGE OF MATERIALS

Materials shall be stored in a place and manner which protects them from damage and contamination. During periods of cold weather, plastic materials shall be protected from the cold. No flammable or hazardous materials shall be stored inside any building. Regularly inspect materials to identify damaged or deteriorating items. Damaged or deteriorated items shall not be used and shall be removed from the site as soon as they are discovered. Any materials which become contaminated with LBP waste shall be disposed of consistent with the requirements of 40 CFR 148 and these specifications. Stored materials shall not present a hazard or an inconvenience to workers, visitors, and/or other occupants and employees of the building.

## PART 2 PRODUCTS (NOT APPLICABLE)

## PART 3 EXECUTION

### 3.1 PILOT ABATEMENT PROJECT

Prior to beginning full-scale abatement, a pilot abatement project shall

demonstrate the specified abatement procedure on a representative facility. Preabatement lead dust samples shall be collected from each type of surface in the pilot facility as specified in paragraphs Wipe Sampling, and Preabatement Lead-Dust Wipe Samples. The Contracting Officer shall evaluate the following during the pilot abatement project:

- a. Lead dust wipe samples shall be collected and analyzed during abatement and for final clearance as specified in paragraph Wipe Sampling. If results of analysis indicate that lead levels are above clearance levels, the Contractor shall evaluate his/her abatement cleanup procedures. If clearance levels are low and continue to be low, less restrictive engineering controls may be proposed by the Contractor.
- b. If personal air sample analyses indicate that action levels or permissible exposure limits specified in 29 CFR 1926 Section .62 have not been exceeded, then respirator protection may become less restrictive. Half-face respirators shall be the minimum respiratory protection employed.
- c. During cleanup a final dust wipe clearance shall be performed after a single cleanup iteration. If the samples are below acceptable levels the Contractor may request approval for one cleanup pass instead of two cleanup passes.
- d. Adequate samples of waste generated (water, solid components, caustic paste, filters, paint chips, etc.) shall be collected for Toxicity Characteristic Leaching Procedure (TCLP) testing. The TCLP test shall be performed by an accredited laboratory.
- e. Waste generated throughout the abatement project shall be properly containerized, according to applicable regulations, and disposed of as per the results of the TCLP analysis.

### 3.2 WORK PROCEDURES

LBP abatement and related work shall be performed in accordance with the accepted Contractor's LBP Management Plan as modified and approved, following the pilot abatement project. Procedures and equipment required to limit occupational and environmental exposures to lead during LBP removal shall be in accordance with 29 CFR 1926 Section .62, and as specified herein. Paint chips and associated waste shall be disposed of in compliance with Federal, state, and local regulations.

#### 3.2.1 Personnel Protection Procedures

Personnel shall wear and use protective clothing and equipment as specified. Eating, smoking, drinking, chewing tobacco and chewing gum, and applying makeup shall not be permitted in the LBP control area. Personnel of trades not engaged in the abatement and disposal of LBP shall not be exposed at any time to airborne concentrations of lead equal to or in excess of 30 micrograms per cubic meter of air. Electrical service shall be disconnected when wet removal is performed, and temporary electrical service protected by a ground fault circuit interrupter shall be provided.

#### 3.2.2 Safety and Health Procedures

The Competent Person shall be present on the work site throughout the abatement project to supervise, monitor, and document the project's health

and safety provisions. A daily log shall be maintained showing the results of sampling tests throughout the project area. LBP abatement work being conducted within a LBP Control area where an airtight barrier is required shall be stopped if dust wipe concentration levels collected outside the containment area during abatement, equal or exceed the preabatement level or 200 micrograms per square foot, whichever is greater.

### 3.2.3 Safety and Health Responsibilities

The Competent Person shall:

- a. Verify that training meets applicable requirements.
- b. Review and approve LBP Management Plan for conformance to the applicable referenced standards.
- c. Inspect LBP removal work for conformance with the accepted LBP Management Plan.
- d. Ensure that worker exposure air monitoring activities are in accordance with 29 CFR 1926 Section .62.
- e. Ensure work is performed in strict accordance with specifications.
- f. Ensure hazardous exposure to personnel and to the environment are adequately controlled.

The Competent Person CIH, IH shall be responsible for directing personal and environmental air monitoring and lead dust wipe sampling.

### 3.2.4 Medical Surveillance Procedures

Medical surveillance shall be implemented in accordance with the approved Contractor's LBP Management Plan, and shall comply with the requirements of 29 CFR 1926 Section .62, including the provisions for biological monitoring, medical removal protection and a physician's written opinion, signed by the physician performing the employee examination. The Contractor shall provide a copy of the written opinion for Contractor's employees 2 days prior to each employee's commencement of work.

### 3.2.5 Engineering Controls and Containment Structures

#### 3.2.5.1 LBP Control Area

The LBP control area is where LBP abatement work occurs and as such shall be considered contaminated, and shall be isolated to prevent LBP containing dust or debris from passing into adjacent building or open areas. The control area shall be decontaminated at the completion of the LBP abatement and disposal work.

#### 3.2.5.2 Masking and Sealing

- a. Interior LBP control area requirements: Openings shall be sealed where the release of airborne LBP dust is expected. A control area shall be established with the use of curtains, portable partitions, or other systems in order to prevent the escape of dust from the contaminated control area. The control area shall be provided with protective covering of two layers of polyethylene sheeting over floors. Penetrations of the floor, walls, and

ceiling shall be sealed with polyethylene sheeting and duct tape. Polyethylene sheeting shall be firmly attached to the structure. Joints shall be sealed with spray adhesive and duct tape. Openings shall be provided for the supply and exhaust of air for the negative air pressure system. Personal monitoring during the work shift shall be in accordance with 29 CFR 1926 Section .62.

- b. Exterior LBP control area requirements: Where the construction of a contained LBP control area is impractical, a roped-off perimeter shall be installed 20 feet from, and around, the area where the LBP handling procedures are performed and other requirements for LBP control areas shall be maintained. Personal monitoring of airborne concentrations shall be conducted in adjacent areas, during the work shift, in accordance with 29 CFR 1926 Section .62. Where wipe sampling is not practical, air monitoring outside of the roped-off perimeter shall be conducted as specified. Airborne concentrations shall not exceed specified levels.

#### 3.2.5.3 Personnel Decontamination Unit Procedures

Decontamination units shall be constructed when required for the abatement procedures. Materials fabricated or delivered to the site before the shop drawings have been returned to the Contractor will be subject to rejection by the Contracting Officer. Specifications and drawings of portable prefab units, such as a trailer unit, if utilized, must be submitted for review and approval before start of construction. Submittal shall include, but not be limited to, a floor plan layout showing dimensions, materials, sizes, thicknesses, plumbing, and electrical outlets. Access between contaminated and uncontaminated rooms or areas shall be through an airlock.

Access between any two rooms or room and trailer within the decontamination unit shall be through a plastic sheeting curtained doorway.

A separate equipment decontamination unit shall be provided. Each work area shall have an emergency exit. The personnel decontamination unit's clean room shall be the only means of entrance and exit, except for emergencies, from the LBP control area. Materials shall exit the LBP control area through the equipment decontamination area.

#### 3.2.5.4 Hand Wash Station/Shower Room Procedures

An operational shower and hand washing station shall be provided between the work area and the clean changing room. Workers shall wash and/or shower before entering the clean changing room. Shower room shall be separated from other rooms by air tight walls fabricated from polyethylene sheeting. Water shall be hot and cold or warm. Shower heads and controls, soap dish, continuing supply of soap, and clean towels shall be provided. The shower shall be maintained in a sanitary condition. Waste water shall be pumped to drain and through waste water filters that meet state and/or local requirements. These filters shall be located inside the shower unit and filters shall be changed regularly. Spent filters shall be discarded as LBP contaminated waste.

#### 3.2.5.5 Equipment Decontamination Unit Procedures

The Equipment Decontamination Unit shall be used for removal of equipment and materials from the LBP control area, and shall include a wash room, holding room, and an enclosed walkway. The unit shall be constructed from wood framing material and polyethylene sheeting. Workers shall not enter or exit the LBP control area through the Equipment Decontamination Unit. A washdown station, consisting of an enclosed shower unit, shall be located

in the work area outside the Wash Room. The washdown station shall be used to clean equipment, bags and containers. Bagged or containerized LBP wastes shall be passed from the work area and cleaned in the Wash Room. The Wash Room shall be separated from the work area by a polyethylene sheeting flap. Wastewater shall be filtered and filters shall be changed as required for the shower unit and the Wash Room. Filters shall be disposed of as LBP contaminated wastes. The Holding Room shall be used as a drop location for bagged LBP passed from the Wash Room. This room shall be constructed so that bagged materials cannot be passed from the Wash Room through the Holding Room to the enclosed walkway. The walkway shall be separated from adjacent rooms by double flaps of 1/16 inch thick single ply rubber roofing materials of EPDM or Neoprene. The enclosed walkway shall isolate the Holding Room from the building exterior and shall be constructed of wood framing and polyethylene sheeting. The walkway shall provide access to the Holding Room from the building exterior. The enclosed walkway shall be separated from the exterior by a single flap of polyethylene sheeting.

#### 3.2.5.6 Maintenance of Decontamination Units

Barriers and polyethylene sheeting shall be effectively sealed and taped. Containment barriers shall be visually inspected at the beginning of each work period. Damaged barriers and defects shall be immediately repaired upon discovery. Smoke methods shall be used to test effectiveness of barriers when directed by the Contracting Officer.

#### 3.2.5.7 LBP Control Area Exiting Procedures

Personnel exiting a LBP control area shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

- a. Vacuum all protective clothing before removing.
- b. Remove protective clothing in the decontamination room, and place this clothing in an approved impermeable disposal bag.
- c. Wash or shower.
- d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated work site.

#### 3.2.6 Building Ventilating Systems

Any building ventilating system or any other system bringing air into or out of the LBP control work area shall be shut down and isolated by lockable switch; disconnecting wires; removing circuit breakers; isolated by airtight seals, or other positive means that will prevent spread of contamination through the system. Airtight seals shall consist of 2 layers of polyethylene. Individual seals shall be applied to ventilation openings (supply and exhaust), lighting fixtures, clocks, windows, doorways, elevator doors, stairs, ramps, speakers, and other openings into the work area. Seals shall be maintained until project decontamination is completed. After decontamination work has been completed and final air sample testing proves that the area is decontaminated, seals shall be removed and the ventilating systems may be operated again.

#### 3.2.7 Temporary Utilities

Temporary equipment to provide adequate power, light, heat, and water shall be installed to accomplish the abatement operations properly and safely. The Contractor shall maintain the security and maintenance of the utility system in the LBP control areas. In the event of a failure of any utility system, the Government will not be responsible for any loss of time or other expense incurred by the Contractor. In addition, the Contractor shall provide:

- a. Backflow protection on all water connections. Fittings installed by the Contractor shall be removed after completion of work with no damage or alteration to existing water piping and equipment.
- b. Heavy-duty abrasion-resistant hoses to provide water to each work area and decontamination area.
- c. A hot water heater, if hot water is not supplied through the building's existing water supply to the decontamination showers.
- d. Electrical service to work areas. Electrical service shall comply with NEMA, NECA, and UL standards. Warning signs shall be posted at power outlets which are other than 110-120 volt power. Only grounded extension cords shall be used. Incandescent lamps and light fixtures shall be of adequate wattage to provide good illumination in LBP control areas.
- e. Temporary heating units, when needed, that have been tested and labeled by UL, FM, or another recognized trade association related to the fuel being consumed. Forced air or fan type units shall not be utilized inside a work area. Units shall have tip-over protection.
- f. Sufficient quantity of single-occupant, self-contained chemical toilets, properly vented and fully enclosed, if permanent toilets are not available.

### 3.3 LBP ABATEMENT METHODS

#### 3.3.1 Exterior Work

Peeling and deteriorating surfaces shall be wet scraped prior to removal. All debris shall be handled in accordance with the Hazardous Waste Management Plan. Siding and moisture barriers shall be installed according to manufacturer's specifications and local building codes.

- a. Doors and windows on the side of the building upon which a dust-generating method is being used, and on the same floor and all floors below, must be closed and covered with polyethylene sheeting.
- b. The ground and any plants or shrubs in the area in which exterior abatement is occurring shall be covered with a waterproof canvas tarp and weighted at all edges to prevent blowing. Such covering shall cover from the side of the structure to a point eight feet away from the structure. The covering shall be taped or otherwise attached to the structure. The tarp shall be placed in a manner that traps all debris and water. This is best accomplished by elevating the edges. The tarp shall be properly disposed of and not re-used.

### 3.3.2 Component Replacement

All louvers, gutters, flashing, fascias, siding and downspouts shall be removed from the applicable buildings. All debris shall be handled in accordance with the Hazardous Waste Management Plan. Replacement components shall be installed according to local building codes.

### 3.4 MONITORING

During the entire LBP removal and disposal operations, a Competent Person shall be onsite directing the monitoring/sampling and inspecting the work to ensure that the health and safety requirements of this contract are satisfied.

#### 3.4.1 Personal Air Monitoring

Airborne concentrations of lead shall be collected and analyzed in accordance with 29 CFR 1926 Section .62. Results shall be reported in micrograms per cubic meter of air. The Competent Person shall use personal air monitoring results to determine the effectiveness of engineering controls, the adequacy of PPE and to determine if proper work practices are being employed. The Contracting Officer shall be notified if any personal air monitoring result equals or exceeds 30 micrograms per cubic meter of air. The Contractor shall take steps to reduce the concentration of lead in the air.

#### 3.4.2 Wipe Sampling

Wipe sampling for lead dust concentrations shall be conducted:

- a. Preabatement to establish a baseline.
- b. During abatement to monitor activities and ensure containment integrity.
- c. Post abatement to determine if specified clearance criteria has been met.

##### 3.4.2.1 Removal

Preabatement wipe samples shall be collected outside the LBP control area in accordance with paragraph Preabatement Lead-Dust Wipe Samples. Samples outside the LBP control work area shall be collected at critical barriers, in the clean room of the decontamination unit and in traffic control areas such as personal and equipment entrances.

##### 3.4.2.2 Removal

The Competent Person shall collect wipe samples during all LBP abatement activities on a daily basis. The samples shall be collected outside the LBP control area in accordance with paragraph Preabatement Lead-Dust Wipe Samples. Samples shall be collected outside the LBP control work area at critical barriers, in the clean room of the decontamination unit and in traffic control areas such as personal and equipment entrances.

##### 3.4.2.3 Results

The Contractor shall have the results of the wipe sampling within 48 hours after the completion of the sampling. Results shall be reported in

micrograms per square foot.

#### 3.4.2.4 Excessive Levels

LBP abatement work being conducted within a LBP control area shall be stopped if measured dust wipe concentration levels collected outside the containment area, during abatement, equal or exceed the preabatement levels or 200 micrograms per square foot, whichever is greater. The Contractor shall immediately notify the Contracting Officer. At the direction of the Contracting Officer, the Contractor shall clean outside areas which equal or exceed the levels stated above, at no additional cost to the Government.

The cleaning shall be in accordance with paragraph CLEANUP AND DISPOSAL, prior to clearance. The Contractor shall collect and have analyzed additional wipe samples at no charge to the Government to ensure the areas are clean. Cleaning and resampling shall continue until levels as stated above are achieved. The Contractor shall correct containment and/or work practices to mitigate the problem. Removal work shall resume when approval is given by the Contracting Officer.

#### 3.4.3 Area Air Monitoring

Airborne concentrations of lead shall be collected and analyzed in accordance with 29 CFR 1926 Section .62. Results shall be reported in micrograms per cubic meter of air.

##### 3.4.3.1 Removal

The Competent Person shall collect area air samples on a daily basis. The samples shall be collected in the same location as the preabatement samples.

##### 3.4.3.2 Results

The Contractor shall have the results of the area air monitoring within 48 hours after completion of the sampling. Results shall be reported in micrograms per cubic meter of air.

##### 3.4.3.3 Excessive Levels

Outdoor LBP abatement shall cease and the Contracting Officer notified if measured airborne lead concentrations, collected during abatement, exceed the preabatement airborne concentration levels. The Contractor may be required to clean and resample the effected area, at no additional cost to the Government, if directed by the Contracting Officer. The Contractor shall correct the work practices and/or engineering controls and shall resume abatement at the direction of the Contracting Officer.

#### 3.4.4 Waste Sampling and Testing

Sampling and testing of all waste shall be in accordance with 40 CFR 261.

#### 3.4.5 Negative Exposure

If a negative exposure can be demonstrated in accordance with applicable OSHA and EPA Guidelines, continuous monitoring and testing may be discontinued. This must be approved by the Contracting Officer.

### 3.5 ADJACENT AREAS

Damage to adjacent areas shall be repaired to the approval of the

Contracting Officer.

### 3.6 CLEANUP AND DISPOSAL

#### 3.6.1 Cleanup

##### 3.6.1.1 Daily

Surfaces in the LBP control area shall be maintained free of accumulations of paint chips and dust. Spread of dust and debris shall be restricted; waste shall not be distributed over the work area. Dry sweep or compressed air shall not be used for cleanup. At the end of each shift, the area shall be cleaned of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area. LBP abatement work shall cease during the cleanup.

##### 3.6.1.2 Prior to Clearance

Upon completion of the lead paint abatement and a satisfactory visual inspection by the Contracting Officer in a given work area, a preliminary clean-up shall be performed by the Contractor. This clean-up includes removal of any contaminated material, equipment or debris including polyethylene sheeting from the work area, except for critical barriers. The polyethylene sheeting shall be sprayed or misted with water for dust control, abatement debris removed and then the sheeting removed by folding it in upon itself. Polyethylene sheeting used for critical barriers shall remain in place until final clearance criteria. The following methodology shall be utilized during the cleanup prior to clearance.

- a. Lead-contaminated debris shall be containerized in accordance with paragraph Contaminated Waste. Waste bags shall not be overloaded, shall be securely sealed and stored in the designated area until disposal.
- b. Non-contaminated debris shall be containerized; removed from the work area and stored in the designated area until disposal in accordance with paragraph Non-Contaminated Waste.
- c. Removal of surface polyethylene sheeting shall begin from upper levels such as cabinets and shelves. Removal of floor polyethylene sheeting shall begin at the corners and folded in the middle to contain the dust. Polyethylene shall be disposed of as specified for debris.
- d. Cleaning. Once the polyethylene sheeting, except critical barriers is removed from the work area, cleaning shall begin. It shall be done in the following sequence: HEPA Vacuum; Tri-Sodium Phosphate (TSP) wash (or equivalent cleaner); and HEPA Vacuum.
- e. HEPA Vacuum. Vacuum all surfaces. Begin with ceilings and proceed down the walls, including window, doors, door trim and ending with floors. Begin vacuuming at the furthest corner from the entrance to the work area.
- f. Wet Wash. Wash or mop the surfaces vacuumed in the same sequence. Contractor shall utilize a tri-sodium phosphate (TSP) detergent solution or other equally effective cleaning agent and allow surface to dry.

- g. Cleaning Equipment. The Contractor shall prepare and use detergents containing five to ten percent TSP or other equally effective cleaning agent which shall be used in accordance with the manufacturers instructions. The waste water from cleaning shall be contained and disposed of according to applicable Federal, state, county and local regulations and guidelines. The waste water shall not be disposed of in storm sewers or sanitary sewers without specific and written Government approval.

### 3.6.2 Visual Inspection

Upon completion of the final cleaning, the Contractor shall notify the Contracting Officer and request a final visual inspection with the Contracting Officer's representative with the criteria in the final cleaning/visual inspection example format sheet located at the end of this section. If the area does not pass the visual inspection, the Contractor shall reclean the area as required by paragraph CLEANUP AND DISPOSAL, at no additional expense to the Government. Final clearance testing shall not proceed until the Contracting Officer has accepted the final cleaning by the Contractor.

### 3.6.3 Final Clearance Testing

Final clearance surface dust sampling in accordance with HUD-01 shall be conducted after a thorough cleanup has been completed in accordance with the following guideline for:

- a. Exterior abatement. At least one wipe sample shall be taken on a horizontal surface in part of the living area such as a front porch or stairway.
- b. Retests. Should laboratory results indicate that the wipe test clearance level is exceeded, the Contractor shall reclean the affected area, at no additional cost to the Government. The Contractor shall utilize specified cleaning methods. Retesting will then be performed to determine if specified clearance criteria was met. The Contractor shall pay for additional testing and shall provide, at no additional cost, a recleaning of an affected area until the clearance level is achieved.

### 3.6.4 Certification

The Competent Person shall certify in writing that inside the LBP control area and the area external to the LBP control area met final clearance requirements.

### 3.6.5 Removal of Control Area

After approval of the final clearance certification, and when authorized by the Contracting Officer, the LBP control area, containment barriers, and control structures roped-off boundary and warning signs shall be removed.

### 3.6.6 Disposal

#### 3.6.6.1 Toxicity Characteristic Leaching Procedure (TCLP) Results

The results of the Pilot Abatement Project TCLP analysis performed during abatement shall be used to determine disposal procedures.

### 3.6.6.2 Contaminated Waste

Lead-contaminated waste, scrap, and debris shall be disposed of as follows:

- a. Lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles shall be stored in U.S. Department of Transportation 49 CFR 178 approved 55 gallon drums. Each drum shall be labeled to identify the type of waste as defined in 49 CFR 172 and the date lead-contaminated wastes were first put into the drum. The Uniform Hazardous Waste Manifest forms from Federal and state agencies shall be obtained and completed. Land disposal restriction notifications shall be as required by 40 CFR 268. The Contracting Officer shall be notified at least 14 days prior to delivery to arrange for job site inspection of the drums and manifests. Lot deliveries of hazardous wastes shall be made as needed to ensure that drums do not remain on the work site longer than 90 calendar days from the date affixed to each drum. The Contracting Officer will assign an area for interim storage of waste-containing drums.
- b. Lead-contaminated waste shall be handled, stored, transported, and disposed of in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Land disposal restriction notification shall be as required by 40 CFR 268.

### 3.6.6.3 Non-Contaminated Waste

Non-contaminated waste, scrap, and debris shall be disposed of as general construction debris.

### 3.6.7 Disposal Documentation

Written evidence shall be provided that the hazardous waste treatment, storage, or disposal facility is approved for lead disposal by the EPA and state or local regulatory agencies. One copy shall be submitted of the completed manifest; signed, and dated by the initial transporter in accordance with 40 CFR 262.

### 3.6.8 Title to Materials

Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor, and shall be disposed of in accordance with Section 02220 DEMOLITION, except as specified herein.

### 3.6.9 Payment for Hazardous Waste

Payment for disposal of hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials delivered is returned and a copy is furnished to the Government.

CERTIFICATION OF FINAL CLEANING AND VISUAL INSPECTION

Individual abatement task as identified in paragraph,  
Description of Work\_\_\_\_\_

In accordance with the clearing and decontamination procedures specified in the Contractor's lead hazard abatement plan and this contract, the Contractor hereby certifies that he/she has thoroughly visually inspected the decontaminated regulated work area (all surfaces, including pipes, beams, ledges, walls, ceiling, floor, decontamination unit, etc.) and has found no dust, debris, or lead containing material residue.

BY: (Contractor's signature)\_\_\_\_\_  
Date\_\_\_\_\_  
Print name and  
title\_\_\_\_\_

(Contractor's Onsite Supervisor signature)\_\_\_\_\_  
Date\_\_\_\_\_  
Print name and  
title\_\_\_\_\_

(Contractor's Competent Person CIH / IH signature)\_\_\_\_\_ Date\_\_\_\_\_  
Print name and  
title\_\_\_\_\_

CONTRACTING OFFICER ACCEPTANCE OR REJECTION

The Contracting Officer hereby determines that the Contractor has performed final cleaning and visual inspection of the decontaminated regulated work area (all surfaces including pipes, beams, ledges, walls, ceiling, floor, decontamination unit, etc.) and by quality assurance inspection, finds the Contractor's final cleaning to be:

\_\_\_\_\_ Acceptable

\_\_\_\_\_ Unacceptable, Contractor instructed to reclean the LBP control work area

BY: Contracting Officer's Representative

Signature\_\_\_\_\_  
Date\_\_\_\_\_  
Print name and  
title\_\_\_\_\_

-- End of Section --

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SECTION 02220

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## SECTION 02220

## DEMOLITION

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## ENGINEERING MANUALS (EM)

EM 385-1-1 (1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

## 1.2 GENERAL REQUIREMENTS

The work includes selective demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible; salvaged items and materials shall be disposed of as specified.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Work Plan; GA.

The procedures proposed for the accomplishment of the work. The procedures shall provide for safe conduct of the work, including procedures and methods to provide necessary temporary weatherproof protective coverings, supports, lateral bracing and shoring when required, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1.

## 1.4 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent

the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

## 1.5 PROTECTION

### 1.5.1 Protection of Personnel

During the selective demolition work the Contractor shall continuously evaluate the condition of the surfaces being removed and take immediate action to protect all personnel working in and around the site.

### 1.5.2 Protection of Existing Property

Before beginning any selective work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

### 1.5.3 Protection From the Weather

The interior of buildings shall be protected from the weather at all times.

### 1.5.4 Environmental Protection

The work shall comply with the requirements of Section 01430 ENVIRONMENT PROTECTION.

## 1.6 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

## 1.7 USE OF EXPLOSIVES

Use of explosives will not be permitted.

## 1.8 ASBESTOS CONTAINING MATERIALS

Asbestos containing materials are removed under Section 13280 ASBESTOS ABATEMENT.

## PART 2 PRODUCTS (Not Applicable)

## PART 3 EXECUTION

### 3.1 UTILITIES

When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

### 3.2 TREE PRUNING

For branches on trees that overhang roofs, the Contractor shall prune and remove those branches that are up to 2-inch diameter in order to perform roofing work. For branches that are greater than 2-inch diameter, DPW will prune. Contractor shall coordinate the requirement with DPW Service Contract Management Branch (Tammy Phillips at 656-1410) for the work. Contractor shall notify DPW at least 2 weeks in advance of requirement.

### 3.3 DISPOSITION OF MATERIAL

Title to material and equipment to be demolished, is vested in the Contractor upon receipt of notice to proceed. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed.

#### 3.3.1 Salvageable Items and Material

Contractor shall salvage items and material to the maximum extent possible.

##### 3.3.1.1 Material Salvaged for the Contractor

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

#### 3.3.2 Unsalvageable Material

Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed of off Government Property. Combustible material shall be disposed of off the the Government property.

### 3.4 CLEAN UP

Debris and rubbish shall be removed from roofs and site. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

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## SECTION 06100

## ROUGH CARPENTRY

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN FOREST &amp; PAPER ASSOCIATION (AF&amp;PA)

- AF&PA T01 (1991; Supple 1993; Addenda Apr 1997; Supple T02) National Design Specification for Wood Construction
- AF&PA T11 (1988) Manual for Wood Frame Construction

## AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

- AITC 111 (1979) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM A 153 (1982; R 1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- ASTM F 547 (1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

## AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

- AWPA C2 (1995) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
- AWPA C9 (1997) Plywood - Preservative Treatment by Pressure Processes
- AWPA M4 (1996) Standard for the Care of Preservative-Treated Wood Products
- AWPA P5 (1997) Standards for Waterborne Preservatives

## APA - THE ENGINEERED WOOD ASSOCIATION (APA)

- APA EWS R540C (1996) Builder Tips Proper Storage and Handling of Glulam Beams

APA PRP-108 (1994; Rev 1997) Performance Standards and Policies for Structural-Use Panels

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1996) Voluntary Product Standard - Construction and Industrial Plywood

DOC PS 2 (1992) Performance Standards for Wood-Based Structural-Use Panels

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM LPD 1-49 (1995) Loss Prevention Data Sheet - Perimeter Flashing

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17 (1996; Supples VII(A-E), VIII(A-C)) Grading Rules for West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules (1995; Supple Nos. 1 thru 5) Western Lumber Grading Rules 95

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

### SD-04 Drawings

Nailers and Nailing Strips; FIO.

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

### SD-13 Certificates

Grading and Marking; FIO.

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

## 1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540C.

## PART 2 PRODUCTS

### 2.1 LUMBER AND SHEATHING

#### 2.1.1 Grading and Marking

##### 2.1.1.1 Lumber Products

Solid sawn and finger-jointed lumber shall bear an authorized gradestamp or grademark recognized by ALSC, or an ALSC recognized certification stamp, mark, or hammerbrand. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

##### 2.1.1.2 Plywood Sheathing Products

Materials shall bear the grademark or other identifying marks indicating grades of material and rules or standards under which produced, including requirements for qualifications and authority of the inspection organization. Except for plywood and wood structural panels, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

#### 2.1.2 Sizes

Lumber and material sizes shall conform to requirements of the rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Unless otherwise specified, sizes indicated are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

#### 2.1.3 Treatment

Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4.

##### 2.1.3.1 Lumber

Lumber and timbers shall be treated in accordance with AWPA C2 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

- a. 0.25 pcf intended for above ground use.
- b. 0.40 pcf intended for ground contact and fresh water use.

##### 2.1.3.2 Plywood

Plywood shall be treated in accordance with AWPA C9 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

- a. 0.25 pcf intended for above ground use.
- b. 0.40 pcf intended for ground contact and fresh water use.

#### 2.1.4 Moisture Content

At the time lumber and other materials are delivered and when installed in

the work their moisture content shall be as follows:

a. Treated Lumber Except: 4 inches or less, nominal thickness, 19 percent maximum. 5 inches or more, nominal thickness, 23 percent maximum in a 3 inch perimeter of the timber cross-section.

b. Materials Other Than Lumber: In accordance with standard under which product is produced.

#### 2.1.5 Sheathing

##### 2.1.5.1 Plywood

Plywood shall conform to DOC PS 1, APA PRP-108 or DOC PS 2, Grade C-D or sheathing grade with exterior glue. Sheathing for roof and walls without corner bracing of framing shall have a span rating of 16/0 or greater for supports 16 inches on center and a span rating of 24/0 or greater for supports 24 inches on center.

#### 2.1.6 Miscellaneous Wood Members

##### 2.1.6.1 Nonstress Graded Members

Members shall include nailing strips. Members shall be in accordance with TABLE I for the species used.

#### 2.2 ACCESSORIES AND NAILS

Markings shall identify both the strength grade and the manufacturer. Accessories and nails shall conform to the following:

##### 2.2.1 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use. Finish options include zinc compounds, cadmium, and aluminum paint impregnated finishes. All materials shall be hot-dip galvanized in accordance with ASTM A 153, Class D.

##### 2.2.2 Expansion Shields

Type and size best suited for intended use.

##### 2.2.3 Nails and Staples

ASTM F 547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T11. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T01. Reasonable judgement backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used. All materials

shall be hot dip galvanized in accordance with ASTM A 153, Class D.

### PART 3 EXECUTION

#### 3.1 INSTALLATION OF FRAMING

##### 3.1.1 General

General framing shall be in accordance with AF&PA T11. Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place.

#### 3.2 INSTALLATION OF SHEATHING

##### 3.2.1 Plywood and Wood Structural Panels

Sheathing shall be applied with edges 1/8 inch apart at side and end joints, and nailed at supported edges at 6 inches on center and at intermediate supports 12 inches on center unless otherwise shown. Nailing of edges shall be 3/8 inch from the edges. Roof sheathing shall be applied with long dimension at right angles to supports, end joints made over supports, and end joints staggered.

#### 3.3 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS

##### 3.3.1 Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials. Stacked nailers shall be assembled with spikes or nails spaced not more than 18 inches on center and staggered. Beginning and ending nails shall not be more than 6 inches for nailer end.

Ends of stacked nailers shall be offset approximately 12 inches in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place. Nailers and nailer installation for Factory Mutual wind uplift rated roof systems specified in other Sections of these specifications shall conform to the recommendations contained in FM LPD 1-49.

#### 3.4 TABLE I - SPECIES AND GRADE

TABLE I. SPECIES AND GRADE

Subflooring, Roof Sheathing, Wall Sheathing, Furring

Grading Rules	Species	Construction Standard
WCLIB Std 17	Douglas Fir-Larch	X
	Hem-Fir	X
WWPA Grading Rules	Douglas Fir-Larch	X
	Hem-Fir	X

-- End of Section --

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## SECTION 06200

## FINISH CARPENTRY

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 547 (1977; R 1990) Definitions of Terms  
Relating to Nails for Use with Wood and  
Wood-Base Materials

## AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA M4 (1996) Standard for the Care of  
Preservative-Treated Wood Products

## WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17 (1996; Supples VII(A-E), VIII(A-C))  
Grading Rules For West Coast Lumber

## WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules (1995; Supple Nos. 1 thru 5) Western Lumber  
Grading Rules 95

## WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION (WMMPA)

WMMPA WM 6 (1987) Industry Standard for Non-Pressure  
Treating of Wood Millwork

## 1.2 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well-ventilated areas, and protected from extreme changes in temperature and humidity.

## PART 2 PRODUCTS

## 2.1 WOOD ITEMS AND TRIM

The Contractor shall furnish products which optimize design by reducing the amount of wood used (engineered wood), or recycled wood products, and preservatives without arsenic or chromium when the products and methods are competitive in price or directed by the Contracting Officer.

### 2.1.1 Grading and Marking

Materials shall bear the grademark, stamp or other identifying marks indicating grades of material and rules or standards under which produced. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Except lumber, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be architecturally exposed to view shall not bear grademarks, stamps, or other types of identifying marks.

### 2.1.2 Sizes and Patterns

Lumber sizes and patterns shall conform to rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Sizes and patterns for materials other than lumber shall conform to requirements of the rules or standards under which produced. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

### 2.1.3 Moisture Content

The maximum moisture content of trim shall be 15 percent at the time of delivery to the jobsite and when installed.

### 2.1.4 Preservative Treatment

#### 2.1.4.2 Exterior Wood

Exterior wood shall be preservative-treated in accordance with WMPA WM 6. Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWP M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment.

### 2.1.5 Fascias and Trim

#### 2.1.5.1 Wood

Fascias and trim, shall be species and grade listed in TABLE I at the end of this section. Sizes shall be as indicated.

## 2.2 NAILS

Nails shall be the size and type best suited for the purpose and shall conform to ASTM F 547. Nails shall be hot-dip galvanized. Screws for use where nailing is impractical shall be size best suited for purpose.

## PART 3 EXECUTION

### 3.1 GENERAL

### 3.2 FASCIAS AND EXTERIOR TRIM

Exposed surfaces and square edges shall be machine sanded, caulked, and constructed to exclude water. Joints of built-up items, in addition to nailing, shall be glued as necessary for weather-resistant construction. End joints in built-up members shall be well distributed. Joints in flat work shall be shouldered. Backs of wide-faced miters shall be held together with metal rings and glue. Fascias and other flat members shall be in maximum practicable lengths.

TABLE I. SPECIES AND GRADE TABLES

Grading Rules	Species	Clear	C & Better
WCLIB Std 17			
	Douglas Fir		X
	Larch		X
	Hemlock Fir	X	
WWPA Grading Rules			
	Douglas Fir		X
	Larch		X
	Hemlock Fir	X	

-- End of Section --

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-- End of Section Table of Contents --

## SECTION 07220

## ROOF INSULATION

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 153	(1982; R 1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 41	(1994) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 312	(1995a) Asphalt Used in Roofing
ASTM D 2178	(1997) Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free
ASTM F 547	(1977; R 1990) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

## FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825c	(1998) Approval Guide Building Materials
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## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Instructions

Application of Insulation; FIO.

Insulation manufacturer's recommendations for the application and installation of insulation.

SD-08 Statements

Inspection; FIO.

The inspection procedure for insulation installation, prior to start of roof insulation work.

#### SD-13 Certificates

Insulation; FIO. Glass Roofing Felt; FIO.

Certificate attesting that polyisocyanurate insulation contains recovered material and showing estimated percent of recovered material. Certificates of compliance for felt materials.

### 1.3 STORAGE OF MATERIALS

Insulation, base sheet, and felt shall be kept dry at all times, before, during, and after delivery to the site and shall be stored in an enclosed building or in a closed trailer. Wet insulation, wet base sheet or wet felt shall be permanently removed from the site. Felts shall be stacked on end one level high.

## PART 2 PRODUCTS

### 2.1 BITUMINOUS MATERIALS

Bituminous materials shall conform to the following requirements:

#### 2.1.1 Asphalt Bitumen

ASTM D 312, Type III or IV. Asphalt flash point, finished blowing temperature, and equiviscous temperature (EVT) shall be indicated on bills of lading or on individual containers.

#### 2.1.2 Asphalt Cement

ASTM D 4586, Type I for horizontal surfaces; Type II for vertical surfaces.

#### 2.1.3 Asphalt Primer

ASTM D 41.

### 2.2 INSULATION

Insulation shall be a standard product of the manufacturer and shall be factory marked with the manufacturer's name or trade mark, the material specification number, the R-value at 75 degrees F, and the thickness. Minimum thickness shall be as recommended by the manufacturer. Boards shall be marked individually. The thermal resistance of insulation shall be not less than the R-value shown on the drawings. The insulation manufacturing process shall not include chlorofluoro carbons (CFC) or formaldehydes. Insulation shall contain the highest practicable percentage of material which has been recovered or diverted from solid waste (e.g., postconsumer waste), but not including material reused in a manufacturing process. Where two materials have comparable price and performance, the one having the higher recovered material content shall be selected. Insulation shall be as followings:

#### 2.2.1 Tapered Insulation

Composition board conforming to ASTM C 1289, Type III.

### 2.3 NAILS AND FASTENERS

All nails and fasteners shall be hot dip galvanized in accordance with ASTM A 153, Class D. Nails and fasteners shall conform to the following requirements:

- a. ASTM F 547 of sufficient length to hold insulation securely in place.

#### 2.3.1 Fasteners

Fasteners for concrete decks shall conform to FM P7825c for Class I roof deck construction, and shall be spaced to withstand an uplift pressure of 60 pounds per square foot.

### 2.4 GLASS ROOFING FELT

ASTM D 2178, Type IV.

### 2.5 WOOD NAILERS

Wood nailers shall conform to Section 06100 ROUGH CARPENTRY, including preservative treatment. Edge nailers shall be not less than nominal 6 inches wide and of thickness to finish flush with the top surface of the insulation.

## PART 3 EXECUTION

### 3.1 COORDINATION REQUIREMENTS

Insulation and roofing membrane shall be finished in one operation up to the line of termination at the end of each day's work. Completed sections shall be waterproofed when more than one day is required to finish the roofing. Phased construction will not be permitted.

### 3.2 ENVIRONMENTAL CONDITIONS

There shall be no visible moisture on the roof deck when the insulation and roofing are installed.

### 3.3 SUBSTRATE PREPARATION

Insulation applied directly on concrete shall not be scheduled until frothing or bubbling does not occur when hot bitumen is applied to the concrete and until the hot bitumen sticks tightly to the concrete. Vents and other items penetrating the roof shall be secured in position and properly prepared for flashing. Prior to application of insulation, substrate joints shall be covered with a 4 inch strip of roofing felt, embedded in and coated with asphalt cement. Substrate surface shall be smooth, clean, and dry at time of application.

### 3.4 HEATING OF ASPHALT

Asphalt shall not be heated higher than 75 degrees F above the EVT or 50 degrees F below the flash point, or 525 degrees F, whichever is lower.

EVT and flash point temperatures of asphalt in the kettle shall be conspicuously posted on the kettle. Kettle shall be provided with automatic thermostatic controls and an accurate thermometer. Kettle operators shall be in attendance at all times during heating to ensure that the maximum temperature is not exceeded. Asphalt shall be applied within a range of 25 degrees F below or above the EVT, or as specified by the manufacturer. Application temperature shall be measured at the mop bucket or mechanical applicator. Asphalt at a temperature below this range shall be returned to the kettle. Flame-heated equipment shall not be placed on the roof.

### 3.5 INSTALLATION OF WOOD NAILERS

Bolt anchors shall have nuts and washers countersunk, and bolts shall be cut flush with top of nailer. Powder-actuated fasteners, sized and spaced for nailer anchorage equivalent to that specified and indicated, may be used when approved.

### 3.6 APPLICATION OF INSULATION

Insulation shall be laid in two or more layers. Units of insulation shall be laid in courses parallel with the roof slope. End joints shall be staggered. Insulation shall be cut to fit neatly against adjoining surfaces. Joints between insulation boards shall not exceed 1/4 inch. Joints in successive layers shall be staggered with respect to joints of preceding layer. Insulation which can be readily lifted after installation is not considered to be adequately secured. Insulation shall be applied so that all roof insulation applied each day is waterproofed the same day. Phased construction will not be permitted. Application of impermeable faced insulation shall be performed without damage to the facing.

#### 3.6.1 Foam Insulation

Polyisocyanurate, insulations shall be isolated from built-up roof and modified bitumen membrane by a separate or composite layer perlite board.

#### 3.6.2 Installation

Insulation layers shall be laid in solid moppings of hot asphalt applied at a rate of at least 20 pounds per square. Asphalt shall not be applied further than one panel length ahead of roof insulation being installed. Asphalt primer shall be applied at the rate of 1 gallon per square over the entire surface to be mopped when the insulation is applied over concrete deck. The edges of insulation boards adjoining vented nailers shall be kept free of asphalt.

#### 3.6.3 Protection Requirements

The insulation shall be kept dry at all times. Insulation boards shall not be kicked into position. Exposed edges of the insulation shall be protected by cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs shall be 2 layers of bituminous-saturated felt set in plastic bituminous cement. Cutoffs shall be removed when work is resumed. Edges of insulation at open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, shall be protected until permanent roofing and flashing is applied. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces will not be permitted. Smooth, clean board or plank walkways, runways, and platforms shall be used, as necessary to distribute weight to conform to

live load limits of roof construction.

-- End of Section --

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SECTION 07311

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## SECTION 07311

## ROOFING, STRIP SHINGLES

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 226	(1997) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 3018	(1990; R 1994) Class A Asphalt Shingles Surfaced With Mineral Granules
ASTM D 3161	(1995a) Wind-Resistance of Asphalt Shingles (Fan-Induced Method)
ASTM D 3462	(1997) Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules
ASTM D 4869	(1988; R 1993) Asphalt-Saturated Organic Felt Shingle Underlayment Used in Roofing
ASTM E 108	(1996) Fire Tests of Roof Coverings

## NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA Asph Shing Roof Mnl	(1996) Asphalt Shingle Roofing Manual
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## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Roofing System; FIO.

Manufacturer's catalog data, description of underlayment, shingles, fasteners and flashing. Manufacturer's instructions, annotated or supplemented by the Contractor to indicate configuration and method for installing the materials, and for waterproofing of joints where flashings change direction. The number, spacing and orientation of fasteners shall be specified.

SD-14 Samples

Finishes; GA.

Full shingle sample and manufacturer's standard size samples of materials and products requiring color or finish selection.

### 1.3 DELIVERY AND STORAGE OF MATERIALS

Materials shall be delivered in manufacturer's unopened bundles and containers with the manufacturer's brand and name marked clearly thereon. Shingles shall be stored in accordance with manufacturer's printed instructions. Roll goods shall be stored on end in an upright position or in accordance with manufacturer's recommendations.

### 1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

## PART 2 PRODUCTS

### 2.1 MATERIALS

Materials shall conform to the following requirements:

#### 2.1.1 Metal Drip Edges

Metal drip edges shall be as specified in Section 07600, SHEET METALWORK GENERAL.

#### 2.1.2 Underlayment

Organic felt; ASTM D 4869 or ASTM D 226, non perforated Type II, heavy-duty number 30.

#### 2.1.3 Nails

Nails shall be round head 11 or 12 gauge galvanized steel or equivalent corrosion resistant roofing nails. Nail heads shall be 3/8 inch minimum diameter, with flat and smooth low profile. Shanks shall be barbed or otherwise deformed for added pull-out resistance. Nails shall be long enough to penetrate all layers of roofing materials and achieve secure anchorage into the roof deck. Nails shall extend through the underside of plywood or wood panel roof decks, and shall penetrate at least 3/4 inch into wood plank decks except at exposed eaves.

#### 2.1.4 Shingles

Shingles shall be approximately 12 by 36 inches in dimension and architectural design. Shingles shall have self-sealing adhesive strips and shall meet a wind velocity rating of 60 mph plus or minus 5 percent in accordance with ASTM D 3161. Shingles shall be algae resistant. Glass felt shingles shall comply with ASTM D 3018 and ASTM D 3462 Type I (self-sealing), ASTM E 108 Class A (a light degree of fire protection), and shall weigh not less than 290 lbs..

### 2.2 COLOR

Shingle color shall be in accordance with Section 09915 COLOR SCHEDULE.

### PART 3 EXECUTION

#### 3.1 PREPARATION OF SURFACES

Roof surfaces shall be smooth, firm, dry, and free from loose boards, large cracks, and projecting ends that might damage the roofing. Vents and other projections through roofs shall be properly flashed and secured in position, and projecting nails shall be driven flush with the deck.

#### 3.2 APPLICATION OF ROOFING MATERIALS

##### 3.2.1 Flashings

Metal flashings shall conform to Section 07600 SHEET METALWORK, GENERAL. Metal flashings shall be provided at the intersections of roofs and adjoining walls and at projections through the deck such as chimneys and vent stacks. Valley flashing shall be of the woven type, in accordance with NRCA Asph Shing Roof Mnl.

##### 3.2.2 Metal Drip Edges

Metal drip edges shall be provided along the eaves and rakes. The metal drip edge shall be applied directly over the underlayment along the rakes and directly on the wood deck at the eaves. Metal drip edges shall extend back from the edge of the deck not less than 3 inches and shall be secured with compatible nails spaced not more than 10 inches on center along the inner edge.

##### 3.2.3 Underlayment

Before any shingles are applied, a single layer of asphalt-saturated-felt underlayment shall be applied to the roof deck sheathing.

##### 3.2.4 Shingles

Shingles with the correct recommended exposure shall be applied in accordance with the manufacturer's printed instructions as they appear on the bundle wrapping.

-- End of Section --

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## SECTION 07510

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## SECTION 07510

## BUILT-UP ROOFING

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 153	(1982; R 1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM D 41	(1994) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 226	(1997a) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 312	(1995a) Asphalt Used in Roofing
ASTM D 1668	(1997a) Glass Fabrics (Woven and Treated) for Roofing and Waterproofing
ASTM D 2178	(1997) Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D 3617	(1983; R 1994) Sampling and Analysis of New Built-Up Roof Membranes
ASTM D 3909	(1997) Asphalt Roll Roofing (Glass Felt) Surfaced With Mineral Granules
ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free
ASTM D 4601	(1998) Asphalt-Coated Glass Fiber Base Sheet Used in Roofing

## FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825c	(1998) Approval Guide Building Materials
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## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Inspection; FIO.

The inspection procedure for roofing installation, prior to the start of roofing work.

#### SD-13 Certificates

Bitumen; FIO. Felt; FIO.

Certificates of Compliance for felts and bitumens.

Cants; FIO.

### 1.3 STORAGE OF MATERIALS

Felts, fabrics, and roll roofing shall be kept dry before, during, and after delivery to the site and shall be stored in an enclosed building or in a closed trailer, and stored on end 1 level high. Rolled felts shall not be covered with non breathable plastic when in exposed conditions.

## PART 2 PRODUCTS

### 2.1 PRIMER

ASTM D 41 for asphalt roofing systems.

### 2.2 BITUMEN

#### 2.2.1 Asphalt

ASTM D 312. Bills of lading shall indicate the flash point and equiviscous temperature (EVT) or this information shall be shown on labels for each container of asphalt.

### 2.3 BITUMINOUS CEMENT

ASTM D 4586 for use with asphalt roofing systems..

### 2.4 CANTS

Cants shall be made from treated wood not less than 3-1/2 inches high cut to reduce change in direction of the membrane to 45 degrees or less.

### 2.5 FELT

#### 2.5.1 Base Sheet

Base sheet shall conform to ASTM D 4601, Type II, with no perforations.

#### 2.5.2 Glass Roofing Felt

ASTM D 2178, Type IV or VI.

#### 2.5.3 Organic Felt

ASTM D 226 for use with asphalt roofing system. Organic felts may be used for bitumen stops, and edge envelopes.

## 2.6 MINERAL-SURFACED ROLL ROOFING

ASTM D 3909 with 2-inch selvage edge.

## 2.7 NAILS AND FASTENERS

Nails and fasteners shall be an approved type recommended by the roofing felt manufacturer. Fasteners for concrete deck shall conform to FM P7825c for Class I roof deck construction, to withstand an uplift pressure of 60 pounds per square foot. Materials shall be hot dipped galvanized in accordance with ASTM A 153, Class D.

## 2.8 WOVEN GLASS FABRIC

ASTM D 1668, Type I for asphalt roofing systems.

## 2.9 FLASHINGS

Bituminous flashings in accordance with these specifications shall be used throughout unless otherwise specified or indicated.

# PART 3 EXECUTION

## 3.1 COORDINATION

The entire roofing system, shall be finished in 1 operation up to the line of termination at end of day's work. Phased construction will not be permitted.

### 3.1.1 Insulation

Application of roofing shall immediately follow application of insulation as a continuous operation. Roofing operations shall be coordinated with insulation work so that all roof insulation applied each day is waterproofed the same day. Insulation is specified in Section 07220ROOF INSULATION.

### 3.1.2 Sheet Metalwork

Roofing operations shall be coordinated with sheet metalwork so that sheet metal items are installed to permit continuous roof surfacing operations the same day felts are installed. Sheet metalwork is specified in Section 07600 SHEET METALWORK, GENERAL.

## 3.2 ENVIRONMENTAL CONDITIONS

There shall be no visible moisture on the roof deck at the time roofing is installed.

## 3.3 PREPARATION REQUIREMENTS

Roofing applied directly on concrete shall not be scheduled until frothing or bubbling does not occur when hot bitumen is applied to the concrete and until the hot bitumen sticks tightly to the concrete. Vents and other items penetrating the roof shall be secured in position and properly prepared for flashing. Nailers, curbs and other items attached to roof surface shall be in place before roofing is begun.

### 3.4 INSTALLATION OF CANTS

Cants shall be installed in the angles formed between the roof and walls or other vertical surfaces. Cants shall be laid in a solid coat of bituminous cement just prior to laying the roofing plies. Cants shall be continuous, and shall be installed in lengths as long as practicable. Additional cants are not required at locations where cast-in-place cants are integrally formed with the structural deck or roof fill.

### 3.5 CONDITION OF SURFACES

Surfaces shall be inspected and approved immediately before application of roofing and flashings. The roofing and flashings shall be applied to a smooth and firm surface free from visible moisture, dirt, projections, and foreign materials. Prior to application of primer on precast concrete decks, joints shall be covered with a 4 inch strip of roofing felt, embedded in and coated with bituminous cement.

### 3.6 MECHANICAL APPLICATION DEVICES

Mechanical application devices shall be mounted on pneumatic-tired wheels, and shall be designed and maintained to operate without damaging the insulation, roofing membrane, or structural components.

### 3.7 PRIMING

Concrete surfaces to receive bitumen shall be uniformly coated with primer at a rate of not less than 1 gallon per square and allowed to dry. Primer shall be compatible with the bitumen to be used.

### 3.8 HEATING OF BITUMEN

Asphalt shall not be heated higher than 75 degrees F above the EVT or 50 degrees below the flash point or 525 degrees F (maximum) whichever is lower. EVT and flash point temperatures of asphalt in the kettle shall be conspicuously posted on the kettle. Heating kettles shall be provided with automatic thermostatic controls and an accurate thermometer. Kettle operators shall be in attendance at all times during the heating to ensure that the maximum temperature specified is not exceeded. Equipment utilizing flame-heat shall not be placed on the roof.

### 3.9 BITUMEN STOPS

Bitumen stops shall be installed at roof edges, openings and vertical projections before application of roofing plies unless otherwise recommended by the manufacturer's printed instructions. Bitumen stops shall be formed of two 18 inch wide strips of organic felt. Nine inches of the width shall be attached to the roof surface with 9 inches extending beyond the edge. The first strip shall be applied in a 9 inch wide layer of bituminous roofing cement and nailed 1/2 inch from the roof edge at 6 inch spacing. The second strip shall be applied to the first in a 9 inch wide mopping of bitumen. The free portion of each strip shall be protected from damage throughout the roofing period. After the roofing plies are in place, the free portion of each strip shall be folded back over the roofing membrane and embedded in a continuous coating of bituminous cement and secured with roofing nails spaced 3 inches on centers.

### 3.10 BITUMEN APPLICATION

Asphalt shall be applied within a range of 25 degrees F below to 25 degrees F above the EVT. Application temperatures shall be measured at the mop bucket or mechanical applicator. Bitumen at a temperature below the recommended temperature shall be returned to the kettle. Each layer of felt shall be laid in not less than 20 pounds nor more than 35 pounds of asphalt per square. Where solid moppings are required, the following requirements as evidenced in any one roof cut-out sample shall apply:

- a. Overlapping voids between two or more plies are not acceptable.
- b. The maximum length of any individual void that is encapsulated in bitumen shall be 2 inches.
- c. The total length of all voids encapsulated in bitumen shall not exceed 4 inches between any two plies.
- d. Dry voids (the absence of bitumen between plies) are not acceptable.
- e. Voids continuous through the specimen are not acceptable.
- f. Visual interply moisture in voids is not acceptable.

### 3.11 APPLICATION OF FELTS

Felt plies shall be laid at right angles to the slope of the deck with minimum 6 inch end-laps staggered at least 12 inches. Felts shall be applied in 36 inch widths with 24 2/3 inch side laps and starter sheets 12, 24 and 36 inches wide along eaves to maintain 4 full plies including the base sheet when used. The full 36 inch width of each ply shall be placed in hot bitumen immediately behind the applicator. A squeegee shall be used to eliminate air pockets and obtain complete adhesion between plies. Bitumen shall be visible beyond all edges of each ply as it is being installed. Plies shall be laid free of wrinkles, creases or fishmouths. Each layer of roofing felt shall be carried up to the top of the cant. Workers shall not walk on mopped surfaces when the bitumen is fluid.

#### 3.11.1 On Insulation Surfaces

Four plies of 36 inch wide glass roofing felts shall be placed shingle-fashion in solid mopped bitumen.

### 3.12 MECHANICAL FASTENING

Nails and fasteners for securing roofing shall be flush driven through flat metal disks of not less than 1 inch diameter. Metal disks may be omitted where heads of fasteners are equivalent in size to the 1 inch diameter disks. Fasteners, when required, shall be spaced within 20 percent of the indicated spacing dimensions. There shall be no less than the total number of indicated fasteners in any 100 square feet area. Fastener pull-out resistance shall be not less than 40 pounds each.

### 3.13 PROTECTION OF APPLIED ROOFING

At end of day's work or whenever precipitation is imminent, the terminated edge of built-up roofing shall be sealed with 2 full width strips of roofing felt set in and coated with bituminous cement. One half-width of the strips shall be extended up and over the finished roofing and the other

half-width extended out and onto the bare roof deck. Sealing strips shall be removed before continuing installation of roofing. To facilitate sealing, termination edges may be straightened with pieces of insulation board which shall be removed when work is resumed.

### 3.14 FLASHINGS

Flashings shall be provided over cants in the angles formed at walls and other vertical surfaces and where required to make the work watertight. Bituminous flashings described below shall be used, except where metal flashings are specified in other sections of the specifications. Flashings shall be provided and installed immediately after the top ply of felt is placed adjacent to the flashing. Modified bituminous flashing may be used when it is specified in the roofing manufacturer's instructions.

#### 3.14.1 Base Flashings

Base Flashings shall be a 3-ply system using woven glass fabric, laid in roofing cement, with mineral surfaced roll roofing as the outer ply. The top of the base flashing shall be at least 8 inches above the roof membrane surface. Mineral surfaced roofing strips shall be cut from the width of the rolls, and shall extend from the reglet or top of curb onto the roof at least 2 inches beyond the widest flashing ply. Laps shall be well cemented, and where possible, shall be shingled in a direction down slope or away from the prevailing wind. The top edge of base flashing systems shall be nailed a maximum of 8 inches on center.

#### 3.14.2 Strip Flashings

Sheet metal flashings, bitumen stops and gravel stops installed over the roofing top ply shall be strip flashed with 2 layers of roofing felt, 9 inches and 12 inches wide and 1 layer of mineral surfaced roofing 15-inches wide. The felt shall be cemented in place, and the mineral surfaced strip shall be applied in 2 layer of hot asphalt directly onto the felts.

#### 3.14.3 Valleys and Ridges

Felt plies shall continue across valleys and ridges and terminate approximately 12 inches from the valley or ridge. Exposed lap shall terminate on a line approximately 12 inches from, and parallel to the valley or ridge. Two plies of roofing felt 9 inch wide bottom ply, and 12 inch wide top ply, shall be successively mopped-in over each felt line of termination.

### 3.15 MINERAL-SURFACED CAP SHEET

Prior to laying mineral surfaced cap sheets, cut rolls into sheets approximately 12 to 18 feet long, and stack in flat protected piles not less than 24 hours. Felts shall not be buckled or wrinkled. Apply the sheet shingle fashioned and in the same direction as the plying felts. The plies shall be side-lapped 6-inches. Stagger end laps not less than 12-inches. Apply sheets firmly in hot-mopping of asphalt the full width under the sheets. The sheets shall be applied so that in no place felt will touch felt. Care should be exercised to avoid mopping asphalt onto the exposed mineral surface portion of the cap sheet. Edges of sheets shall be completely sealed. The asphalt shall be heated in accordance with EVT standard and applied within a range of 25 degrees F below to a 25 degrees above the EVT. Asphalt application shall be 25 pounds per roof square

between the plies. End laps shall be set in bituminous cement.

### 3.16 GLAZE COAT

Glaze coating shall be used to waterproof completed sections when more than one day is required to finish the roofing. If there is a probability of rain falling on the felts before the mineral surfaced cap sheet can be applied, a light glaze coat of bitumen 10 to 15 pounds per square, shall be applied over the exposed felts. The surfacing operation shall be completed within 48 hours after application of the glaze coat. Where glaze coat is used, surface treatment shall be completed as soon as weather conditions permit.

### 3.17 ROOF CUT-OUT TESTS

Roof cut-out samples shall be taken and analyzed in accordance with ASTM D 3617 as directed by the Contracting Officer when there is reason to believe that deficiencies exist in the roofing membrane. When samples indicate deficiencies in the built-up roofing, corrective action shall be taken as directed.

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## SECTION 07600

## SHEET METALWORK, GENERAL

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 32	(1996) Solder Metal
ASTM B 370	(1992) Copper Sheet and Strip for Building Construction
ASTM B 749	(1997) Lead and Lead Alloy Strip, Sheet, and Plate Products
ASTM D 226	(1997) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 2822	(1991; R 1997) Asphalt Roof Cement
ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free

## SHEET METAL &amp; AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA-02	(1993; Errata) Architectural Sheet Metal Manual
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## 1.2 GENERAL REQUIREMENTS

Sheet metalwork shall be accomplished to form weathertight construction without waves, warps, buckles, fastening stresses or distortion, and shall allow for expansion and contraction.

## 1.2.1 Coordination

Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades shall be performed by sheet metal mechanics. Application of bituminous strip flashing over various sheet metal items is covered in Section 07510 BUILT-UP ROOFING. Installation of sheet metal items used in conjunction with roofing shall be coordinated with roofing work to permit continuous roofing operations.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTALS

## PROCEDURES:

## SD-04 Drawings

Materials; FIO.

Drawings of sheet metal items showing weights, gauges or thicknesses; types of materials; expansion-joint spacing; fabrication details; and installation procedures.

## 1.4 DELIVERY, STORAGE, AND HANDLING

Materials shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness, and wet-storage stains upon delivery to the jobsite. Materials shall be clearly labeled as to type and manufacturer. Sheet metal items shall be carefully handled to avoid damage. Materials shall be stored in dry, ventilated areas until immediately before installation.

## PART 2 PRODUCTS

## 2.1 MATERIALS

Materials shall conform to the requirements specified below and to the thicknesses and configurations established in SMACNA-02.

## 2.1.1 Accessories

Accessories and other items essential to complete the sheet metal installation, though not specifically indicated or specified, shall be provided.

## 2.1.2 Bituminous Cement

Type I asphalt cement conforming to ASTM D 2822 or ASTM D 4586.

## 2.1.3 Sealant

Unless otherwise specified, sealant shall be an elastomeric weather resistant sealant as specified in Section 07900 JOINT SEALING.

## 2.1.4 Fasteners

Fasteners shall be compatible with the fastened material and shall be the type best suited for the application.

## 2.1.5 Felt

ASTM D 226, Type I.

## 2.1.6 Copper

ASTM B 370, Temper H 00.

## 2.1.7 Lead Sheet for Vent Pipe Flashing

ASTM B 749, Grade B, copper-bearing sheet lead weight as indicated.

### 2.1.8 Vent Cap

Standard prefabricated aluminum as indicated.

### 2.1.9 Solder

ASTM B 32, 95-5 tin-antimony.

### 2.1.10 Splash Block

Precast concrete as indicated.

## PART 3 EXECUTION

### 3.1 GENERAL

Items such as gutters, downspouts and louvers shall be fabricated in conformance with SMACNA-02 and as indicated. Unless otherwise specified or indicated, exposed edges shall be folded back to form a 1/2 inch hem on the concealed side, and bottom edges of exposed vertical surfaces shall be angled to form drips. Bituminous cement shall not be placed in contact with roofing membranes other than built-up roofing.

### 3.2 EXPANSION JOINTS

Expansion joints shall be provided as indicated. Expansion joints in continuous sheet metal shall be provided at 40 foot intervals for copper. Joints shall be evenly spaced. An additional joint shall be provided where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing.

### 3.3 CONNECTIONS AND JOINTING

#### 3.3.1 Soldering

Soldering shall apply to copper items. Edges of sheet metal shall be pretinned before soldering is begun. Soldering shall be done slowly with well heated soldering irons so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Soldering shall follow immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a water solution of washing soda and rinsed with clean water.

#### 3.3.2 Seaming

Flat-lock and soldered-lap seams shall finish not less than 1 inch wide. Unsoldered plain-lap seams shall lap not less than 3 inches unless otherwise specified. Flat seams shall be made in the direction of the flow.

### 3.4 CLEATS

A continuous cleat shall be provided where indicated or specified to secure loose edges of the sheet metalwork. Butt joints of cleats shall be spaced approximately 1/8 inch apart. The cleat shall be fastened to supporting wood construction with nails evenly spaced not over 12 inches on centers. Where the fastening is to be made to concrete or masonry, screws shall be used and shall be driven in expansion shields set in concrete or masonry.

### 3.5 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be installed as indicated. Gutters shall be supported as indicated or by cleats spaced not less than 36 inches apart. Downspouts shall be rigidly attached to the building. Supports for downspouts shall be spaced according to manufacturer's recommendations. Provide new concrete splash blocks in quantity indicated on drawings.

### 3.6 FLASHINGS

Flashings shall be installed at locations indicated and as specified below. Sealing shall be according to the flashing manufacturer's recommendations. Flashings shall be installed at intersections of roof with vertical surfaces and at projections through roof. Except as otherwise indicated, counter flashings shall be provided over base flashings. Perforations in flashings made by masonry anchors shall be covered up by an application of bituminous plastic cement at the perforation. Flashing shall be installed on top of joint reinforcement. Flashing shall be formed to direct water to the outside of the system.

#### 3.6.1 Base Flashing

Metal base flashing shall be coordinated with roofing work.

#### 3.6.2 Counter Flashings

Except as otherwise indicated, counter flashings shall be provided over base flashings. Counter flashing shall be installed as shown on the drawings. Where bituminous base flashings are provided, the counter flashing shall extend down as close as practicable to the top of the cant strip. Counter flashing shall be factory formed to provide spring action against the base flashing.

#### 3.6.3 Stepped Flashing

Stepped flashing shall be installed where sloping roofs surfaced with shingles abut vertical surfaces. Separate pieces of base flashing shall be placed in alternate shingle courses.

### 3.7 GRAVEL STOPS AND FASCIA

Gravel stops and fascia shall be fabricated and installed as indicated and in accordance with SMACNA-02.

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## SECTION 07900

## JOINT SEALING

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 920	(1995) Elastomeric Joint Sealants
ASTM D 1056	(1991) Flexible Cellular Materials - Sponge or Expanded Rubber

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

Backing; FIO. Bond-Breaker; FIO.

Sealant; FIO.

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

## SD-13 Certificates

Sealant; FIO.

Certificates of compliance stating that the materials conform to the specified requirements.

## 1.3 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be

stored at temperatures not exceeding 90 degrees F unless otherwise specified by the manufacturer.

## PART 2 PRODUCTS

### 2.1 BACKING

Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated.

#### 2.1.1 Rubber

Cellular rubber sponge backing shall be ASTM D 1056, Type 2, closed cell, Class A, Grade 2A3, round cross section.

#### 2.1.2 Synthetic Rubber

Synthetic rubber backing shall be ASTM C 509, Option I, Type I, preformed rods.

#### 2.1.3 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

### 2.2 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

### 2.3 PRIMER

Primer shall be non-staining type as recommended by sealant manufacturer for the application.

### 2.4 SEALANT

#### 2.4.1 Elastomeric

Elastomeric sealants shall conform to ASTM C 920 and the following:

- a. Polyurethane Sealant for Sheet Metal Flashings: Type S or M Grade NS, Class 25, Use NT, M, A, O.

### 2.5 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

## PART 3 EXECUTION

### 3.1 GENERAL

#### 3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all condensation and moisture. Oil, grease, dirt, chalk, particles of mortar,

dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

### 3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

### 3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

### 3.1.4 Aluminum Surfaces

Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be non-staining.

### 3.1.5 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

## 3.2 APPLICATION

### 3.2.1 Masking Tape

Masking tape shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

### 3.2.2 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

### 3.2.3 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

### 3.2.4 Primer

Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces

adjacent to joints shall not be primed.

### 3.2.5 Sealant

Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Joints shall be sealed as detailed in the drawings. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

### 3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

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## SECTION 09900

## PAINTING, GENERAL

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values (1996) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3273 (1994) Resistance to Growth of Mold on the Surface of Interior Coating in an Environmental Chamber

ASTM D 3274 (1995) Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation

ASTM D 4214 (1998) Evaluating Degree of Chalking of Exterior Paint Films

ASTM D 4258 (1999) Surface Cleaning Concrete for Coating

## FEDERAL SPECIFICATIONS (FS)

FS TT-C-555 (Rev B; Am 1) Coating, Textured (for Interior and Exterior Masonry Surfaces)

FS TT-E-2784 (Rev A) Enamel (Acrylic-Emulsion, Exterior Gloss and Semigloss) (Metric)

## THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 1 (1982) Solvent Cleaning

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

Paint; FIO.

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials when the required quantity of a particular batch is 50 gallons or less.

## SD-06 Instructions

Mixing and Thinning; FIO. Application; FIO.

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system.

## SD-09 Reports

Paint; FIO.

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 50 gallons:

- a. A test report showing that the proposed batch to be used meets specified requirements:
- b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements, plus, on the proposed batch to be used, a report of test results for properties of weight per gallon, viscosity, fineness of grind, drying time, color, and gloss.

## SD-13 Certificates

Lead; FIO. Mildewcide and Insecticide; FIO.

Certificate stating that paints for interior use contain no mercurial mildewcide or insecticide. Certificate stating that paints proposed for use contain not more than 0.06 percent lead by weight of the total nonvolatile.

## SD-14 Samples

Paint; FIO.

While the material is at the site or source of supply, and at a time agreeable to the Contractor and the Contracting Officer, a 1 quart sample of each color and batch, except for quantities of 50 gallons or less, shall be taken by random selection from the sealed containers by the Contractor in the presence of a representative of the Contracting Officer. The contents of the containers to be sampled shall be thoroughly mixed to ensure that the sample is representative. Samples shall be identified by designated name, specification number, manufacturer name and address, batch number, project contract number, intended use, and quantity involved.

## 1.3 PACKAGING, LABELING, AND STORING

Paints shall be in sealed containers that legibly show the designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions

including any warnings and special precautions, and name of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons.

Paints and thinner shall be stored in accordance with the manufacturer's written directions and as a minimum stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures below 95 degrees F. Paints shall be stored on the project site or segregated at the source of supply sufficiently in advance of need to allow 30 days for testing.

#### 1.4 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense.

#### 1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be below 95 degrees F when applying coatings other than water-thinned coatings. Water-thinned coatings shall be applied only when ambient temperature is below 90 degrees F.

#### 1.6 SAFETY AND HEALTH

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

##### 1.6.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH Limit Values, or as required by a more stringent applicable regulation.

##### 1.6.2 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

##### 1.6.3 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

#### 1.6.4 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

### PART 2 PRODUCTS

#### 2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall conform to the requirements listed in the painting schedules at the end of this section, except when the required amount of a material of a particular batch is 50 gallons or less, an approved first-line proprietary paint material with similar intended formulation, usage and color to that specified may be used. Additional requirements are as follows:

##### 2.1.1 Colors and Tints

Colors shall be as selected from manufacturer's standard colors, as indicated. Manufacturer's standard color is for identification of color only. Stains shall conform in shade to manufacturer's standard color. The color of the undercoats shall vary slightly from the color of the next coat.

##### 2.1.2 Mildewcide and Insecticide

Paint specified for all coats shall contain a mildewcide that will not adversely affect the color, texture, or durability of the coating. The mildewcide shall be incorporated into the paint by the manufacturer and shall attain a surface disfigurement rating of 8 or greater when tested in accordance with ASTM D 3273 and evaluated in accordance with ASTM D 3274. Mercurial mildewcide shall not be used in interior paint. Insecticides shall not be used in paint.

##### 2.1.3 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content (calculated as lead metal) shall not be used.

##### 2.1.4 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

### PART 3 EXECUTION

#### 3.1 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Surfaces contaminated by coating materials shall be restored to original condition.

### 3.2 SURFACE PREPARATION

Surfaces to be painted shall be clean and free of foreign matter before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

#### 3.2.1 Masonry Surfaces

Surfaces shall be cleaned in accordance with ASTM D 4258. Glaze, efflorescence, laitance, dirt, grease, oil, asphalt, surface deposits of free iron and other foreign matter shall be removed prior to painting.

#### 3.2.2 Nonferrous Metallic Surfaces

Galvanized, metal surfaces shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1.

#### 3.2.3 Wood Surfaces

Wood surfaces shall be cleaned of foreign matter. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter, unless otherwise authorized. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints. Small, dry seasoned knots shall be scraped, cleaned, and given a thin coat of commercial knot sealer, before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or, if it is still soft, removed with mineral spirits or turpentine, and the resinous area shall be thinly coated with knot sealer. Finishing nails shall be set, and all holes and surface imperfections shall be primed. After priming, holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, colored to match the finish coat if natural finish is required, allowed to dry, and sanded smooth. Putty or wood filler shall be compatible with subsequent coatings.

#### 3.2.4 Previously Painted Surfaces

Previously painted surfaces shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas. Edges of chipped paint shall be feather edged and sanded smooth. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8. New, proposed coatings shall be compatible with existing coatings. If existing surfaces are glossy, the gloss shall be reduced.

### 3.3 MIXING AND THINNING

When thinning is approved as necessary to suit surface, temperature,

weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Paints of different manufacturers shall not be mixed.

### 3.4 APPLICATION

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush or roller. No spray paint shall be allowed. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

#### 3.4.1 Respirators

Operators and personnel in the vicinity of operating paint sprayers shall wear respirators.

#### 3.4.2 First Coat

The first coat on surfaces shall include repeated touching up of suction spots or overall application of primer or sealer to produce uniform color and gloss. Excess sealer shall be wiped off after each application.

#### 3.4.3 Timing

Surfaces that have been cleaned, pretreated, and otherwise prepared for painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Sufficient time shall elapse between successive coats to permit proper drying. This period shall be modified as necessary to suit weather conditions.

#### 3.4.4 Fillers

Concrete and masonry surface voids shall be filled; however, surface irregularities need not be completely filled. The dried filler shall be uniform and free of pinholes. Filler shall not be applied over caulking compound.

#### 3.4.5 Ferrous-Metal Primer

Primer for ferrous-metal shall be applied to ferrous surfaces to receive paint other than asphalt varnish prior to deterioration of the prepared surface.

### 3.4.6 Elastomeric Waterproof Coating

High build, smooth finish flexible acrylic latex coating conforming to FS TT-C-555 for exterior use on previously painted surfaces.

### 3.5 SURFACES TO BE PAINTED

Surfaces listed in the painting schedules at the end of this section, other than those listed in paragraph SURFACES NOT TO BE PAINTED, shall be painted as scheduled.

### 3.6 SURFACES NOT TO BE PAINTED

Surfaces in the following areas shall not to be painted: Roof shingles, prefinished metal roofing, built-up roofing, lead flashing, copper shall not be painted except where existing is painted or as required to separate dissimilar metals. In addition, surfaces of hardware, fittings, and other factory finished items shall not be painted.

### 3.7 CLEANING

Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. Upon completion of the work, staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint and other deposits on adjacent surfaces shall be removed and the entire job left clean and acceptable.

### 3.8 PAINTING SCHEDULES

The following painting schedules identify the surfaces to be painted and prescribe the paint to be used and the number of coats of paint to be applied. Contractor options are indicated by -----or----- between optional systems or coats.

#### 3.8.1 Existing Surfaces

Existing surfaces to be repainted where paint is in sound condition, and if the color of the new paint is the same as the existing, shall be given one finish coat as specified in the PAINTING SCHEDULE for the respective type of surface. If the color of the new paint is different from the existing, two coats shall be applied to obtain complete hiding. Surfaces that are completely exposed shall be painted as specified for new surfaces.

## EXTERIOR PAINTING SCHEDULE

<u>Surface</u>	<u>First Coat</u>	<u>Second Coat</u>	<u>Third Coat</u>
Concrete masonry units at chimney.	Primer as recommended by FS TT-C-555 manufacturer	FS TT-C-555 Type II Elastomeric Waterproof Coating (10 mils DFT minimum)	None
Concrete, unless otherwise specified at patching	FS TT-E-2784 Type III	FS TT-E-2784 Type III	None
Wood, unless otherwise specified. NOTE: Paint wall louver where not factory finished or color not in conformance with requirements.	FS TT-E-2784 Type III	FS TT-E-2784 Type II	FS TT-E-2784 Type II
Galvanized metal.	FS TT-E-2784 Type III	FS TT-E-2784 Type II	FS TT-E-2784 Type II

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SECTION 09915

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## SECTION 09915

## COLOR SCHEDULE

## PART 1 GENERAL

## 1.1 GENERAL

This section covers only the color of the exterior and interior materials and products that are exposed to view in the finished construction. The word "color" as used herein includes surface color and pattern. Requirements for quality and method of installation are covered in other appropriate sections of the specifications. Specific locations where the various materials are required are shown on the drawings. Items not designated for color in this section may be specified in other sections. When color is not designated for items, the Contractor shall propose a color for approval.

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-14 Samples

Color board; GA.

Two sets of color boards, 120 days after the Contractor is given Notice to proceed, complying with the following requirements:

- a. Color boards shall reflect all actual finish textures, patterns, and colors required for this contract.
- b. Materials shall be labeled with the finish type, manufacturer's name, pattern, and color reference.
- c. Samples shall be on size A4 or 8-1/2 by 11 inch boards with a maximum spread of size A1 or 25-1/2 by 33 inches for foldouts.
- d. Samples for this color board are required in addition to samples requested in other specification sections.
- e. Color boards shall be submitted to the Contracting Officer.

## PART 2 PRODUCTS

## 2.1 REFERENCE TO MANUFACTURER'S COLOR

Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equal colors from other manufacturers.

## 2.2 COLOR SCHEDULE

The color schedule lists the colors, patterns and textures required for exterior and interior finishes, including both factory applied and field applied colors.

### 2.2.1 Exterior Trim

Exterior trim shall be provided to match the colors listed below.

- a. Fascia: Match existing.
- b. Louvers : White.
- c. Caulking and Sealants: White.

### 2.2.2 Exterior Roof

Roof color shall apply to exterior roof surfaces including sheet metal flashings and copings, mechanical units, roof trim, pipes, conduits, electrical appurtenances, and similar items. Roof color shall be provided to match the colors listed below.

- a. Metal: Match existing white color
- b. Shingles: Indicated on drawings
- c. Cap Sheet: White

## PART 3 EXECUTION (Not Applicable)

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## SECTION 10201

## WALL LOUVERS

## PART 1 GENERAL

## 1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

Wall louvers; GA.

Colors of finish shall match existing.

## SD-04 Drawings

Wall louvers; FIO

Show all information necessary for fabrication and installation of louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

## 1.2 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

## PART 2 PRODUCTS

## 2.1 MATERIALS

## 2.1.1 Molded Frame and Louvers

High density polymer fabrication.

## 2.2 WALL LOUVERS

Weather resistant type, triangular shape with bird screens and made to withstand a wind load of not less than 30 pounds per square foot.

## 2.2.1 Screens and Frames

Provide 1/2 inch square mesh, 14 or 16 gage aluminum, 1/4 inch square mesh, 16 gage aluminum bird screening OR 3/4 inch by 0.051 inch flattened expanded aluminum as standard with the louver manufacturer. Mount screens in removable, rewirable frames of same material and finish as the louvers.

## 2.3 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for wall louvers. Provide other accessories as required for complete and proper installation.

## 2.4 FINISHES

### 2.4.1 Molded Frame and Louver

Manufacturer's ultra violet exterior grade acrylic emulsion paint, color in accordance with Section 09915 COLOR SCHEDULE.

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

#### 3.1.2 Screens and Frames

Attach frames to louvers with screws or bolts.

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## SECTION 13280

## ASBESTOS ABATEMENT

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
- ANSI Z87.1 (1989; Errata; Z87.1a) Occupational and Educational Eye and Face Protection
- ANSI Z88.2 (1992) Respiratory Protection

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM C 732 (1995) Aging Effects of Artificial Weathering on Latex Sealants
- ASTM D 1331 (1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents
- ASTM D 4397 (1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
- ASTM E 84 (1998e1) Surface Burning Characteristics of Building Materials
- ASTM E 96 (1995) Water Vapor Transmission of Materials
- ASTM E 119 (1998) Fire Tests of Building Construction and Materials
- ASTM E 736 (1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- ASTM E 1368 (1997) Visual Inspection of Asbestos Abatement Projects

## CODE OF FEDERAL REGULATIONS (CFR)

- 29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 61	National Emissions Standards for Hazardous Air Pollutants
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
COMPRESSED GAS ASSOCIATION (CGA)	
CGA G-7	(1990) Compressed Air for Human Respiration
CGA G-7.1	(1997) Commodity Specification for Air
ENGINEERING MANUALS (EM)	
EM 385-1-1	(1996) Safety and Health Requirements Manual
ENVIRONMENTAL PROTECTION AGENCY (EPA)	
EPA 340/1-90-018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance
EPA 340/1-90-019	(1990) Asbestos/NESHAP Adequately Wet Guidance
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 701	(1996; TIA 96-1, 96-2) Methods of Fire Tests for Flame-Resistant Textiles and Films
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)	
NIOSH Pub No. 84-100	(1984; Supple 1985, 1987, 1988 & 1990) NIOSH Manual of Analytical Methods
HAWAII REVISED STATUTES (HRS)	
HRS 16-77-19	Contractors

## HAWAII ADMINISTRATIVE RULES (HAR)

HAR 11-501	Title, 11, Chapter 501, Asbestos Requirements
HAR 11-503	Title, 11, Chapter 503, Asbestos Removal Certifications
HAR 11-504	Title, 11, Chapter 504, Asbestos Abatement Certification Program

## UNDERWRITERS LABORATORIES (UL)

UL 586	(1996) High-Efficiency, Particulate, Air Filter Units
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## 1.2 DEFINITIONS

- a. Adequately Wet: A term defined in 40 CFR 61, Subpart M, and EPA 340/1-90-019 meaning to sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.
- b. Aggressive Method: Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact asbestos-containing material (ACM).
- c. Amended Water: Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter when tested in accordance with ASTM D 1331.
- d. Asbestos: Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.
- e. Asbestos-Containing Material (ACM): Any materials containing more than one percent asbestos.
- f. Asbestos Fiber: A particulate form of asbestos, 5 micrometers or longer, with a length-to-width ratio of at least 3 to 1.
- g. Authorized Person: Any person authorized by the Contractor and required by work duties to be present in the regulated areas.
- h. Building Inspector: Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) "Building Inspector" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.
- i. Certified Industrial Hygienist (CIH): An Industrial Hygienist certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.
- j. Class I Asbestos Work: Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

- k. Class II Asbestos Work: Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos - containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glovebag may be classified as a Class III job.
- l. Class III Asbestos Work: Activities defined by OSHA that involve repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.
- m. Class IV Asbestos Work: Maintenance and custodial construction activities during which employees contact but do not disturb ACM and activities to clean-up dust, waste and debris resulting from Class I, II, and III activities. This may include dusting surfaces where ACM waste and debris and accompanying dust exists and cleaning up loose ACM debris from TSI or surfacing ACM following construction.
- n. Clean room: An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.
- o. Competent Person: In addition to the definition in 29 CFR 1926, Section .32(f), a person who is capable of identifying existing asbestos hazards as defined in 29 CFR 1926, Section .1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.
- p. Contractor/Supervisor: Individual who supervises asbestos abatement work and has EPA Model Accreditation Plan "Contractor/Supervisor" training; accreditation required by 40 CFR 763, Subpart E, Appendix C.
- q. Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.
- r. Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.
- s. Demolition: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

- t. Disposal Bag: A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926, Section .1101, used for transporting asbestos waste from containment to disposal site.
- u. Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in 1 standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.
- v. Equipment Room or Area: An area adjacent to the regulated area used for the decontamination of employees and their equipment.
- w. Employee Exposure: That exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.
- x. Fiber: A fibrous particulate, 5 micrometers or longer, with a length to width ratio of at least 3 to 1.
- y. Friable ACM: A term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent, as determined by a method other than point counting by PLM, the asbestos content is verified by point counting using PLM.
- z. Glovebag: Not more than a 60 by 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.
- aa. High-Efficiency Particulate Air (HEPA) Filter: A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.
- bb. Homogeneous Area: An area of surfacing material or thermal system insulation that is uniform in color and texture.
- cc. Industrial Hygienist: A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards.
- dd. Intact: ACM which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.
- ee. Model Accreditation Plan (MAP): USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763, Subpart E, Appendix C.
- ff. Modification: A changed or altered procedure, material or component of a control system, which replaces a procedure,

material or component of a required system.

- gg. Negative Exposure Assessment: A demonstration by the Contractor to show that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).
- hh. NESHAP: National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61, Subpart M.
- ii. Nonfriable ACM: A NESHAP term defined in 40 CFR 61, Subpart M and EPA 340/1-90-018 meaning any material containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix A, Section 1, Polarized Light Microscopy, that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.
- jj. Nonfriable ACM (Category I): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.
- kk. Nonfriable ACM (Category II): A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90-018 meaning any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.
- ll. Permissible Exposure Limits (PELs):
  - (1) PEL-Time weighted average(TWA): Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8 hour time weighted average (TWA), as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.
  - (2) PEL-Excursion Limit: An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes as determined by the method prescribed in 29 CFR 1926, Section .1101, Appendix A, or the current version of NIOSH Pub No. 84-100 analytical method 7400.
- mm. Regulated Area: An OSHA term defined in 29 CFR 1926, Section .1101 meaning an area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted; also any adjoining area where debris and waste from such asbestos work accumulate; and an area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limit.
- nn. Removal: All operations where ACM is taken out or stripped from structures or substrates, and includes demolition operations.
- oo. Repair: Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including

encapsulation or other repair of ACM attached to structures or substrates. If the amount of asbestos so "disturbed" cannot be contained in 1 standard glovebag or waste bag, Class I precautions are required.

- pp. Spills/Emergency Cleanups: Cleanup of sizable amounts of asbestos waste and debris which has occurred, for example, when water damage occurs in a building, and sizable amounts of ACM are dislodged. A Competent Person evaluates the site and ACM to be handled, and based on the type, condition and extent of the dislodged material, classifies the cleanup as Class I, II, or III. Only if the material was intact and the cleanup involves mere contact of ACM, rather than disturbance, could there be a Class IV classification.
- qq. Surfacing ACM: Asbestos-containing material which contains more than 1% asbestos and is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.
- rr. Thermal system insulation (TSI) ACM: ACM which contains more than 1% asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain or water condensation.
- ss. Transite: A generic name for asbestos cement wallboard and pipe.
- tt. Worker: Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926, Section .1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation required by 40 CFR 763, Subpart E, Appendix C, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

### 1.3 DESCRIPTION OF WORK

The work covered by this section includes the removal of asbestos-containing materials (ACM) roofing materials which are encountered during renovation activities associated with this project and describes procedures and equipment required to protect workers and occupants of the regulated area from contact with airborne asbestos fibers and ACM dust and debris. Activities include OSHA Class II work operations involving ACM. The work also includes containment, storage, transportation and disposal of the generated ACM wastes. More specific operational procedures shall be detailed in the required Accident Prevention Plan and its subcomponents, the Asbestos Hazard Abatement Plan and Activity Hazard Analyses required in paragraph SAFETY AND HEALTH PROGRAM AND PLANS attached at the end of this section.

## 1.3.1 Schofield Barracks: (Appendix A)

Porter Neighborhood (HA-K-1):

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
AR	3410, 3522	Black Sealant
AS	3403	Black Sealant
AT	3430	Black Sealant
AV	3908	Black Sealant
AT/AU-1	3434	Black Sealant
AT/AU-2	3440	Black Sealant
AT/AU-2R	3432	Black Sealant

Santa Fe Neighborhood (HA-S-1):

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
AM-1	1882	Black and Gray Sealant
AM-3	1856	Roofing Paper/Black Tar
AM-4	1853	Black Sealant
AK/AL	1860	Roofing Paper/Mastic
AL/AM-3	1848	Black Sealant

Moyer Neighborhood (HA-T):

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
AV	4232	Black Sealant
AV/AW	4117	Black Sealant
AV/AW-R	4218	Black Sealant

Aloala Neighborhood (HA-T-1)

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
AY-1	4446, 4420	Black Tar Sealant
AY-2	4428, 4539	Gray and Black Sealant
AZ-BA	4468, 4529	Black Tar Sealant

Santa Fe Neighborhood (HA-T-2):

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
AN-1	1811	Black Sealant
AN-2	1800	Black Sealant
AN-3	1808, 1814	Black Sealant
A0	1812	Black Sealant

## 1.3.2 Wheeler Army Air Field: (Appendix B)

Wilikina Neighborhood (W14B):

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
700A	722, 729, 732	Roofing Paper and Black Tar
700B	709, 725	Black Tar Sealant

## 1.3.3 Fort Shafter:(Appendix C)

Radar Hill Neighborhood (100):

BUILDING TYPE	BUILDING NO.	BUILDING MATERIAL
BB	1155	Black Tar Sealant

## 1.3.4 Abatement Work Tasks

The specific ACM to be abated is identified on the detailed plans and project drawings. A summary of work task data elements for each individual ACM abatement work task to include the appropriate RESPONSE ACTION DETAIL SHEET (item to be abated and methods to be used) and SET-UP DETAIL SHEETS (containment techniques to include safety precautions and methods) is included in Table 1, "Individual Work Task Data Elements" at the end of this section.

## 1.3.5 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, the Contractor shall notify the Contracting Officer (CO) who will have the option of ordering up to 7 bulk samples to be obtained at the Contractor's expense and delivered to a laboratory accredited under the National Institute of Standards and Technology (NIST) "National Voluntary Laboratory Accreditation Program (NVLAP)" and analyzed by PLM at no additional cost to the Government. Any additional components identified as ACM that have been approved by the Contracting Officer for removal shall be removed by the Contractor and will be paid for by an equitable adjustment to the contract price under the CONTRACT CLAUSE titled "changes". Sampling activities undertaken to determine the presence of additional ACM shall be conducted by personnel who have successfully completed the EPA Model Accreditation Plan (MAP) "Building Inspector" training course required by 40 CFR 763, Subpart E, Appendix C.

## 1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials and Equipment; FIO.

Manufacturer's catalog data for all materials and equipment to be used in the work, including brand name, model, capacity, performance characteristics and any other pertinent information. Test results and certificates from the manufacturer of encapsulants substantiating compliance with performance requirements of this specification. Material Safety Data Sheets for all chemicals to be used onsite in the same format as implemented in the Contractor's HAZARD COMMUNICATION PROGRAM. Data shall include, but shall not be limited to, the following items:

- a. High Efficiency Filtered Air (HEPA) local exhaust equipment
- b. Vacuum cleaning equipment
- c. Pressure differential monitor for HEPA local exhaust equipment
- d. Air monitoring equipment
- e. Respirators
- f. Personal protective clothing and equipment
  - (1) Coveralls
  - (2) Underclothing
  - (3) Other work clothing
  - (4) Foot coverings
  - (5) Hard hats
  - (6) Eye protection
  - (7) Other items required and approved by Contractors Designated IH and Competent Person
- g. Duct Tape
- h. Disposal Containers
  - (1) Disposal bags
  - (2) Fiberboard drums
  - (3) Paperboard boxes
- i. Sheet Plastic
  - (1) Polyethylene Sheet - General
  - (2) Polyethylene Sheet - Reinforced
- j. Wetting Agent
  - (1) Amended Water
  - (2) Removal encapsulant
- k. Other items
- l. Chemical encapsulant
- m. Material Safety Data Sheets (for all chemicals proposed)

SD-04 Drawings

Site Layout; GA.

Descriptions, detail project drawings, and site layout to include worksite containment area techniques as prescribed on applicable SET-UP DETAIL SHEETS, local exhaust ventilation system locations, decontamination units and load-out units, other temporary waste storage facility, access tunnels, location of temporary utilities (electrical, water, sewer) and boundaries of each regulated area.

#### SD-08 Statements

Qualifications; GA.

A written report providing evidence of qualifications for personnel, facilities and equipment assigned to the work.

Training Program; FIO.

A copy of the written project site-specific training material as indicated in 29 CFR 1926, Section .1101 that will be used to train onsite employees. The training document shall be signed by the Contractor's Designated IH and Competent Person.

Medical Requirements; FIO.

Physician's written opinion.

Encapsulants; GA.

Certificates stating that encapsulants meet the applicable specified performance requirements.

#### SD-09 Reports

Exposure Assessment and Air Monitoring; GA.

Initial exposure assessments, negative exposure assessments, air-monitoring results and documentation.

Local Exhaust Ventilation; FIO.

Pressure differential recordings.

Licenses, Permits and Notifications; GA.

Licenses, permits, and notifications.

#### SD-13 Certificates

Vacuum, Filtration and Ventilation Equipment; FIO.

Manufacturer's certifications showing compliance with ANSI Z9.2 for:

- a. Vacuums.
- b. Water filtration equipment.
- c. Ventilation equipment.
- d. Other equipment required to contain airborne asbestos fibers.

## SD-18 Records

Respiratory Protection Program; GA.

Records of the respirator program.

Cleanup and Disposal; GA.

Waste shipment records. Weigh bills and delivery tickets shall be furnished for information only.

## 1.5 QUALIFICATIONS

## 1.5.1 Written Qualifications and Organization Report

The Contractor shall furnish a written qualifications and organization report providing evidence of qualifications of the Contractor, Contractor's Project Supervisor, Designated Competent Person, supervisors and workers; Designated IH (person assigned to project and firm name); independent testing laboratory (including name of firm, principal, and analysts who will perform analyses); all subcontractors to be used including disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. The report shall include an organization chart showing the Contractor's staff organization for this project by name and title, chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor's onsite project manager, Designated Competent Person, Designated IH, designated testing laboratory and the principals of all subcontractors to be used. The Contractor shall include the following statement in the report: "By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and the federal, state and local requirements specified in paragraph SAFETY AND HEALTH PROGRAM AND PLANS for those asbestos abatement activities that they will be involved in."

## 1.5.2 Specific Requirements

The Contractor shall designate in writing, personnel meeting the following qualifications:

- a. Designated Competent Person: The name, address, telephone number, and resume of the Contractor's Designated Competent Person shall be provided. Evidence that the full-time Designated Competent Person is qualified in accordance with 29 CFR 1926, Sections .32 and .1101, has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and is experienced in the administration and supervision of asbestos abatement projects, including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite, etc. The duties of the Competent Person shall include the following: controlling entry

to and exit from the regulated area; supervising any employee exposure monitoring required by 29 CFR 1926, Section .1101; ensuring that all employees working within a regulated area wear the appropriate personal protective equipment (PPE), are trained in the use of appropriate methods of exposure control, and use the hygiene facilities and decontamination procedures specified; and ensuring that engineering controls in use are in proper operating conditions and are functioning properly. The Designated Competent Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan and Asbestos Hazard Abatement Plan. The Designated Competent Person shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that this person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

- b. Project and Other Supervisors: The Contractor shall provide the name, address, telephone number, and resume of the Project Supervisor and other supervisors who have responsibility to implement the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses, the authority to direct work performed under this contract and verify compliance, and have EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C. The Project Supervisor and other supervisors shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Contractor shall submit evidence that the Project Supervisor has a minimum of 2 years of on-the-job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a minimum of 1 year on-the-job asbestos abatement experience commensurate with the responsibilities they will have on this project.
- c. Designated Industrial Hygienist: The Contractor shall provide the name, address, telephone number, resume and other information specified below for the Industrial Hygienist (IH) selected to prepare the Contractor's Asbestos Hazard Abatement Plan, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who is board certified in the practice of industrial hygiene or board eligible (meets all education and experience requirements) as determined and documented by the American Board of Industrial Hygiene (ABIH), has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training accreditation required by 40 CFR 763, Subpart E, Appendix C, and has a minimum of 2 years of comprehensive experience in planning and overseeing asbestos abatement activities. The Designated IH shall provide, and the Contractor shall submit, the "Contractor/Supervisor" course completion certificate and the most recent certificate for

required refresher training with the employee "Certificate of Worker Acknowledgment" required by this paragraph. The Designated IH shall be completely independent from the Contractor according to federal, state, or local regulations; that is, shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. A copy of the Designated IH's current valid ABIH certification shall be included. The Designated IH shall visit the site at least one time for the duration of asbestos activities and shall be available for emergencies. In addition, the Designated IH shall prepare, and the Contractor shall submit, the name, address, telephone numbers and resumes of additional IH's and industrial hygiene technicians (IHT) who will be assisting the Designated IH in performing onsite tasks. IHs and IHTs supporting the Designated IH shall have a minimum of 2 years of practical onsite asbestos abatement experience. The formal reporting relationship between the Designated IH and the support IHs and IHTs, the Designated Competent Person, and the Contractor shall be indicated.

- d. Asbestos Abatement Workers: Asbestos abatement workers shall meet the requirements contained in 29 CFR 1926, Section .1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment" in this paragraph.
- e. Worker Training and Certification of Worker Acknowledgment: Training documentation will be required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.
- f. Physician: The Contractor shall provide the name, medical qualifications, address, telephone number and resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician shall be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconiosis and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926, Section .1101 and paragraph MEDICAL REQUIREMENTS. The physician shall be familiar with the site's hazards and the scope of this project.
- g. First Aid and CPR Trained Persons: The names of at least 2 persons who are currently trained in first aid and CPR by the American Red Cross or other approved agency shall be designated and shall be onsite at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030 and shall be included in the Contractor's Bloodborne Pathogen Program. These persons may perform other duties but

shall be immediately available to render first aid when needed. A copy of each designated person's current valid First Aid and CPR certificate shall be provided.

- h. Independent Testing Laboratory: The Contractor shall provide the name, address and telephone number of the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor, shall be submitted:
- (1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926, Section .1101, OSHA method ID-160, the most current version of NIOSH Pub No. 84-100 Method 7400, the laboratory is currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program; the names of the selected microscopists who will analyze airborne samples by PCM with verified documentation of their proficiency to conduct PCM analyses by being judged proficient in counting samples as current participating analysts in the AIHA PAT Program, and having successfully completed the Asbestos Sampling and Analysis course (NIOSH 582 or equivalent) with a copy of course completion certificate provided; when the PCM analysis is to be conducted onsite, documentation shall be provided certifying that the onsite analyst meets the same requirements.
  - (2) Polarized light microscopy (PLM): The laboratory is fully equipped and proficient in conducting PLM analyses of suspect ACM bulk samples in accordance with 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for bulk asbestos analysis and will use analysts (names shall be provided) with demonstrated proficiency to conduct PLM to include its application to the identification and quantification of asbestos content.
  - (3) PCM/TEM: The laboratory is fully equipped and each analyst (name shall be provided) possesses demonstrated proficiency in conducting PCM analysis of airborne samples using NIOSH Pub No. 84-100 Method 7400 PCM.
- i. Disposal Facility, Transporter: The Contractor shall provide written evidence that the landfill to be used is approved for asbestos disposal by the USEPA state and local regulatory agencies. Copies of signed agreements between the Contractor (including subcontractors and transporters) and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste generated during the performance of this contract shall be provided. Qualifications shall be provided for each subcontractor or transporter to be used, indicating previous experience in transport and disposal of asbestos waste to include all required state and local waste hauler requirements for asbestos. The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration

requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61, Section .150(b), and other applicable state or local requirements.

### 1.5.3 Federal, State or Local Citations on Previous Projects

The Contractor and all subcontractors shall submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company shall be provided.

## 1.6 REGULATORY REQUIREMENTS

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. This includes, but is not limited to, OSHA standards, 29 CFR 1926, especially Section .1101, 40 CFR 61, Subpart M and 40 CFR 763. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply. The following state and local laws, rules and regulations regarding demolition, removal, encapsulation, construction alteration, repair, maintenance, renovation, spill/emergency cleanup, housekeeping, handling, storing, transporting and disposing of asbestos material apply: HRS 16-77-19 and HAR 11-501, HAR 11-503, HAR 11-504

## 1.7 SAFETY AND HEALTH PROGRAM AND PLANS

The Contractor shall develop and submit a written comprehensive site-specific Accident Prevention Plan at least 30 days prior to the preconstruction conference. The Accident Prevention Plan shall address requirements of EM 385-1-1, Appendix A, covering onsite work to be performed by the Contractor and subcontractors. The Accident Prevention Plan shall incorporate an Asbestos Hazard Abatement Plan, and Activity Hazard Analyses as separate appendices into 1 site specific Accident Prevention Plan document. Any portions of the Contractor's overall Safety and Health Program that are referenced in the Accident Prevention Plan, e.g., respirator program, hazard communication program, confined space entry program, etc., shall be included as appendices to the Accident Prevention Plan. The plan shall take into consideration all the individual asbestos abatement work tasks identified in Table 1. The plan shall be prepared, signed (and sealed, including certification number if required), and dated by the Contractor's Designated IH, Competent Person, and Project Supervisor.

### 1.7.1 Asbestos Hazard Abatement Plan Appendix

The Asbestos Hazard Abatement Plan appendix to the Accident Prevention Plan shall include, but not be limited to, the following:

- a. The personal protective equipment to be used;
- b. The location and description of regulated areas including clean and dirty areas, access tunnels, and decontamination unit (clean room, shower room, equipment room, storage areas such as load-out unit);
- c. Initial exposure assessment in accordance with 29 CFR 1926, Section .1101;
- d. Level of supervision;
- e. Method of notification of other employers at the worksite;
- f. Abatement method to include containment and control procedures;
- g. Interface of trades involved in the construction;
- h. Sequencing of asbestos related work;
- i. Storage and disposal procedures and plan;
- j. Type of wetting agent and asbestos encapsulant to be used;
- k. Location of local exhaust equipment;
- l. Air monitoring methods (personal, environmental and clearance);
- m. Bulk sampling and analytical methods (if required);
- n. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber concentrations;
- o. Fire and medical emergency response procedures;
- p. The security procedures to be used for all regulated areas.

#### 1.7.2 Activity Hazard Analyses Appendix

Activity Hazard Analyses, for each major phase of work, shall be submitted and updated during the project. The Activity Hazard Analyses format shall be in accordance with EM 385-1-1 (Figure 1-1). The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the Activity Hazard Analyses has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the onsite Government representatives. The Activity Hazard Analyses shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

#### 1.8 PRECONSTRUCTION CONFERENCE AND ONSITE SAFETY

The Contractor and the Contractor's Designated Competent Person, Project Supervisor, and Designated IH shall meet with the Contracting Officer prior to beginning work at a safety preconstruction conference to discuss the details of the Contractor's submitted Accident Prevention Plan to include

the Asbestos Hazard Abatement Plan and Activity Hazard Analyses appendices. Deficiencies in the Accident Prevention Plan will be discussed and the Accident Prevention Plan shall be revised to correct the deficiencies and resubmitted for acceptance. Any changes required in the specification as a result of the Accident Prevention Plan shall be identified specifically in the plan to allow for free discussion and acceptance by the Contracting Officer, prior to the start of work. Onsite work shall not begin until the Accident Prevention Plan has been accepted. A copy of the written Accident Prevention Plan shall be maintained onsite. Changes and modifications to the accepted Accident Prevention Plan shall be made with the knowledge and concurrence of the Designated IH, the Project Supervisor, Designated Competent Person, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Designated IH shall bring such hazard to the attention of the Project Supervisor, Designated Competent Person, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Once accepted by the Contracting Officer, the Accident Prevention Plan, including the Asbestos Hazard Abatement Plan and Activity Hazard Analyses will be enforced as if an addition to the contract. Disregarding the provisions of this contract or the accepted Accident Prevention Plan will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

#### 1.9 SECURITY

Construction exclusion zone shall be provided for each regulated area. A log book shall be kept documenting entry into and out of the regulated area.

Entry into regulated areas shall only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas shall be trained, be medically evaluated, and wear the required personal protective equipment for the specific regulated area to be entered.

#### 1.10 MEDICAL REQUIREMENTS

Medical requirements shall conform to 29 CFR 1926, Section .1101.

##### 1.10.1 Medical Examinations

Before being exposed to airborne asbestos fibers, workers shall be provided with a medical examination as required by 29 CFR 1926, Section .1101 and other pertinent state or local requirements. This requirement shall have been satisfied within the last 12 months. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. X-ray films of asbestos workers shall be identified to the consulting radiologist and medical record jackets shall be marked with the word "asbestos."

##### 1.10.1.1 Information Provided to the Physician

The Contractor shall provide the following information in writing to the examining physician:

- a. A copy of 29 CFR 1926, Section .1101 and Appendices D, E, G, and I;
- b. A description of the affected employee's duties as they relate to

the employee's exposure;

- c. The employee's representative exposure level or anticipated exposure level;
- d. A description of any personal protective and respiratory equipment used or to be used;
- e. Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

#### 1.10.1.2 Written Medical Opinion

For each worker, a written medical opinion prepared and signed by a licensed physician indicating the following:

- a. Summary of the results of the examination.
- b. The potential for an existing physiological condition that would place the employee at an increased risk of health impairment from exposure to asbestos.
- c. The ability of the individual to wear personal protective equipment, including respirators, while performing strenuous work tasks under cold and/or heat stress conditions.
- d. A statement that the employee has been informed of the results of the examination, provided with a copy of the results, informed of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure, and informed of any medical condition that may result from asbestos exposure.

#### 1.10.2 Medical and Exposure Records

Complete and accurate records shall be maintained of each employee's medical examinations, medical records, and exposure data, as required by 29 CFR 1910, Section .1910.20 and 29 CFR 1926, Section .1101 for a period of 30 years after termination of employment. Records of the required medical examinations and exposure data shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health (OSHA) or authorized representatives of the employee and an employee's physician upon request of the employee or former employee. A copy of the required medical certification for each employee shall be maintained on file at the worksite for review, as requested by the Contracting Officer or the representatives.

#### 1.11 TRAINING PROGRAM

##### 1.11.1 General Training Requirements

The Contractor shall establish a training program as specified by EPA Model Accreditation Plan (MAP), training requirements at 40 CFR 763, Subpart E, Appendix C, Hawaii HAR 11-501, HAR 11-503, HAR 11-504 and OSHA requirements at 29 CFR 1926, Section .1101(k)(9), and this specification. Contractor employees shall complete the required training for the type of work they are to perform and such training shall be documented and provided to the Contracting Officer as specified in paragraph QUALIFICATIONS.

### 1.11.2 Project Specific Training

Prior to commencement of work, each worker shall be instructed by the Contractor's Designated IH and Competent Person in the following project specific training:

- a. The hazards and health effects of the specific types of ACM to be abated;
- b. The content and requirements of the Contractor's Accident Prevention Plan to include the Asbestos Hazard Abatement Plan and Activity Hazard Analyses and site-specific safety and health precautions;
- c. Hazard Communication Program;
- d. Hands-on training for each asbestos abatement technique to be employed;
- e. Heat and/or cold stress monitoring specific to this project;
- f. Air monitoring program and procedures;
- g. Medical surveillance to include medical and exposure record-keeping procedures;
- h. The association of cigarette smoke and asbestos-related disease;
- i. Security procedures;
- j. Specific work practice controls and engineering controls required for each Class of work in accordance with 29 CFR 1926, Section .1101.

### 1.12 RESPIRATORY PROTECTION PROGRAM

The Contractor's Designated IH shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926, Section .1101, 29 CFR 1910, Section .134, ANSI Z88.2, CGA G-7, CGA G-7.1 and DETAIL SHEET 12. The Contractor's Designated IH shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations encountered during the performance of the asbestos abatement work. The Contractor's respiratory protection program shall include, but not be limited to, the following elements:

- a. The company policy, used for the assignment of individual responsibility, accountability, and implementation of the respiratory protection program.
- b. The standard operating procedures covering the selection and use of respirators. Respiratory selection shall be determined by the hazard to which the worker is exposed.
- c. Medical evaluation of each user to verify that the worker may be assigned to an activity where respiratory protection is required.
- d. Training in the proper use and limitations of respirators.

- e. Respirator fit-testing, i.e., quantitative, qualitative and individual functional fit checks.
- f. Regular cleaning and disinfection of respirators.
- g. Routine inspection of respirators during cleaning and after each use when designated for emergency use.
- h. Storage of respirators in convenient, clean, and sanitary locations.
- i. Surveillance of regulated area conditions and degree of employee exposure (e.g., through air monitoring).
- j. Regular evaluation of the continued effectiveness of the respiratory protection program.
- k. Recognition and procedures for the resolution of special problems as they affect respirator use (e.g., no facial hair that comes between the respirator face piece and face or interferes with valve function; prescription eye wear usage; contact lenses usage; etc.).
- l. Proper training in putting on and removing respirators.

#### 1.12.1 Respiratory Fit Testing

A qualitative or quantitative fit test conforming to 29 CFR 1926, Section 1101, Appendix C shall be conducted by the Contractor's Designated IH for each Contractor worker required to wear a respirator, and for the Contracting Officer and authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test shall be performed for each worker wearing a negative-pressure respirator prior to initially wearing a respirator on this project and every 6 months thereafter. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, or of full-facepiece air purifying respirators where they are worn at levels at which half-facepiece air purifying respirators are permitted. If physical changes develop that will affect the fit, a new fit test for the worker shall be performed. Functional fit checks shall be performed by employees each time a respirator is put on and in accordance with the manufacturer's recommendation.

#### 1.12.2 Respirator Selection and Use Requirements

The Contractor shall provide respirators, and ensure that they are used as required by 29 CFR 1926, Section .1101 and in accordance with the manufacturer's recommendations. Respirators shall be jointly approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (MSHA/NIOSH), or by NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. Personnel who handle ACM, enter regulated areas that require the wearing of a respirator, or who are otherwise carrying out abatement activities that require the wearing of a respirator, shall be provided with approved respirators that are fully protective of the worker at the measured or anticipated airborne asbestos concentration level to be encountered. For air-purifying respirators, the particulate filter portion of the cartridges or canister approved for use in airborne asbestos environments shall be high-efficiency particulate air (HEPA). The initial

respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered. Recommendations made by the Contractor's Designated IH to downgrade respirator type shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person in consultation with the Designated IH, shall have the authority to take immediate action to upgrade or downgrade respirator type when there is an immediate danger to the health and safety of the wearer. Respirators shall be used in the following circumstances:

- a. During all Class I asbestos jobs.
- b. During all Class II work where the ACM is not removed in a substantially intact state.
- c. During all Class II and III work which is not performed using wet methods. Respirators need not be worn during removal of ACM from sloped roofs when a negative exposure assessment has been made and ACM is removed in an intact state.
- d. During all Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment.
- e. During all Class III jobs where TSI or surfacing ACM is being disturbed.
- f. During all Class IV work performed within regulated areas where employees performing other work are required to wear respirators.
- g. During all work where employees are exposed above the PEL-TWA or PEL-Excursion Limit.
- h. In emergencies

#### 1.12.3 Class I Work

The Contractor shall provide: (1) a tight-fitting, powered air purifying respirator equipped with high efficiency filters, or (2) a full-facepiece supplied air respirator operated in the pressure demand mode, equipped with HEPA egress cartridges, or (3) an auxiliary positive pressure self-contained breathing apparatus, for all employees within the regulated area where Class I work is being performed; provided that a negative exposure assessment has not been produced, and that the exposure level will not exceed 1 f/cc as an 8-hour time weighted average. A full-facepiece supplied air respirator, operated in the pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided under such conditions, if the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.

#### 1.12.4 Class II and III Work

The Contractor shall provide an air purifying respirator, other than a disposable respirator, equipped with high-efficiency filters whenever the employee performs Class II and III asbestos jobs where the Contractor does not produce a negative exposure assessment ; and Class III jobs where TSI or surfacing ACM is being disturbed.

#### 1.12.5 Sanitation

Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

#### 1.13 HAZARD COMMUNICATION PROGRAM

A hazard communication program shall be established and implemented in accordance with 29 CFR 1926, Section .59. Material safety data sheets (MSDSs) shall be provided for all hazardous materials brought onto the worksite. One copy shall be provided to the Contracting Officer and 1 copy shall be included in the Contractor's Hazard Communication Program.

#### 1.14 LICENSES, PERMITS AND NOTIFICATIONS

##### 1.14.1 General Legal Requirements

Necessary licenses, permits and notifications shall be obtained in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. The Contractor shall notify the Regional Office of the USEPA state's environmental protection agency responsible for asbestos air emissions and the Contracting Officer in writing, at least 10 days prior to the commencement of work, in accordance with 40 CFR 61, Subpart M, and state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notification shall be by Certified Mail, Return Receipt Requested. The Contractor shall furnish copies of the receipts to the Contracting Officer, in writing, prior to the commencement of work. Local fire department shall be notified 3 days before fire-proofing material is removed from a building and the notice shall specify whether or not the material contains asbestos. A copy of the rental company's written acknowledgment and agreement shall be provided as required by paragraph RENTAL EQUIPMENT. For licenses, permits, and notifications that the Contractor is responsible for obtaining, the Contractor shall pay any associated fees or other costs incurred.

##### 1.14.2 Litigation and Notification

The Contractor shall notify the Contracting Officer if any of the following occur:

- a. The Contractor or any of the subcontractors are served with notice of violation of any law, regulation, permit or license which relates to this contract;
- b. Proceedings are commenced which could lead to revocation of related permits or licenses; permits, licenses or other Government authorizations relating to this contract are revoked;
- c. Litigation is commenced which would affect this contract;
- d. The Contractor or any of the subcontractors become aware that their equipment or facilities are not in compliance or may fail to comply in the future with applicable laws or regulations.

#### 1.15 PERSONAL PROTECTIVE EQUIPMENT

One complete set of personal protective equipment shall be made available to the Contracting Officer and authorized visitors for entry to the regulated area. Contracting Officer and authorized visitors shall be provided with training equivalent to that provided to Contractor employees in the selection, fitting, and use of the required personal protective equipment and the site safety and health requirements. Contractor workers shall be provided with personal protective clothing and equipment and the Contractor shall ensure that it is worn properly. The Contractor's Designated IH and Designated Competent Person shall select and approve all the required personal protective clothing and equipment to be used.

#### 1.15.1 Respirators

Respirators shall be in accordance with paragraph RESPIRATORY PROTECTION PROGRAM.

#### 1.15.2 Whole Body Protection

Personnel exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn properly. The Contractor's Designated IH and Competent Person shall select and approve the whole body protection to be used. The Competent Person shall examine work suits worn by employees at least once per work shift for rips or tears that may occur during performance of work. When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the work suit shall be immediately replaced. Disposable whole body protection shall be disposed of as asbestos contaminated waste upon exiting from the regulated area. Reusable whole body protection worn shall be either disposed of as asbestos contaminated waste upon exiting from the regulated area or be properly laundered in accordance with 29 CFR 1926, Section .1101. Whole body protection used for asbestos abatement shall not be removed from the worksite by a worker to be cleaned. Recommendations made by the Contractor's Designated IH to downgrade whole body protection shall be submitted in writing to the Contracting Officer. The Contractor's Designated Competent Person, in consultation with the Designated IH, has the authority to take immediate action to upgrade or downgrade whole body protection when there is an immediate danger to the health and safety of the wearer.

##### 1.15.2.1 Coveralls

Disposable-breathable coveralls with a zipper front shall be provided. Sleeves shall be secured at the wrists, and foot coverings secured at the ankles. See DETAIL SHEET 13.

##### 1.15.2.2 Underwear

Disposable underwear shall be provided. If reusable underwear are used, they shall be disposed of as asbestos contaminated waste or laundered in accordance with 29 CFR 1926, Section .1101. Asbestos abatement workers shall not remove contaminated reusable underwear worn during abatement of ACM from the site to be laundered.

##### 1.15.2.3 Work Clothing

An additional coverall shall be provided when the abatement and control method employed does not provide for the exit from the regulated area

directly into an attached decontamination unit. Cloth work clothes for wear under the protective coverall, and foot coverings, shall be provided when work is being conducted in low temperature conditions. Cloth work clothes shall be either disposed of as asbestos contaminated waste or properly laundered in accordance with 29 CFR 1926, Section .1101.

#### 1.15.2.4 Gloves

Gloves shall be provided to protect the hands. Where there is the potential for hand injuries (i.e., scrapes, punctures, cuts, etc.) a suitable glove shall be provided and used.

#### 1.15.2.5 Foot Coverings

Cloth socks shall be provided and worn next to the skin. Footwear, as required by OSHA and EM 385-1-1, that is appropriate for safety and health hazards in the area shall be worn. Rubber boots shall be used in moist or wet areas. Reusable footwear removed from the regulated area shall be thoroughly decontaminated or disposed of as ACM waste. Disposable protective foot covering shall be disposed of as ACM waste. If rubber boots are not used, disposable foot covering shall be provided.

#### 1.15.2.6 Head Covering

Hood type disposable head covering shall be provided. In addition, protective head gear (hard hats) shall be provided as required. Hard hats shall only be removed from the regulated area after being thoroughly decontaminated.

#### 1.15.2.7 Protective Eye Wear

Eye protection provided shall be in accordance with ANSI Z87.1.

### 1.16 HYGIENE FACILITIES AND PRACTICES

The Contractor shall establish a decontamination area for the decontamination of employees, material and equipment. The Contractor shall ensure that employees enter and exit the regulated area through the decontamination area.

#### 1.16.1 Shower Facilities

Shower facilities, when provided, shall comply with 29 CFR 1910, Section .141(d)(3).

#### 1.16.2 Single Stage Decontamination Area

A decontamination area (equipment room/area) shall be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment produced before the operation. The equipment room or area shall be adjacent to the regulated area for the decontamination of employees, material, and their equipment which is contaminated with asbestos. The equipment room or area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area. Surfaces of the equipment room shall be wet wiped 2 times after each shift.

Materials used for wet wiping shall be disposed of as asbestos contaminated waste.

#### 1.16.3 Decontamination Area Exit Procedures

The Contractor shall ensure that the following procedures are followed:

- a. Before leaving the regulated area, respirators shall be worn while employees remove all gross contamination and debris from their work clothing using a HEPA vacuum.
- b. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal and/or laundering.
- c. Employees shall not remove their respirators in the equipment room.
- d. Employees shall shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, the Contractor shall ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.
- e. After showering, employees shall enter the clean room before changing into street clothes.

#### 1.16.4 Lunch Areas

The Contractor shall provide lunch areas in which the airborne concentrations of asbestos are below 0.01 f/cc.

#### 1.16.5 Smoking

Smoking, if allowed by the Contractor, shall only be permitted in designated areas approved by the Contracting Officer.

#### 1.17 REGULATED AREAS

All Class I, II, and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they shall demarcate the regulated area. Access to regulated areas shall be limited to authorized persons. The Contractor shall control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

#### 1.18 WARNING SIGNS AND TAPE

Warning signs and tape printed in English shall be provided at the regulated boundaries and entrances to regulated areas. The Contractor shall ensure that all personnel working in areas contiguous to regulated

areas comprehend the warning signs. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs, as shown and described in DETAIL SHEET 11, shall be in vertical format conforming to 29 CFR 1910 and 29 CFR 1926, Section .1101, a minimum of 20 by 14 inches, and displaying the following legend in the lower panel:

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

Spacing between lines shall be at least equal to the height of the upper of any two lines. Warning tape shall be provided as shown and described on DETAIL SHEET 11. Decontamination unit signage shall be as shown and described on DETAIL SHEET 15.

#### 1.19 WARNING LABELS

Warning labels shall be affixed to all asbestos disposal containers used to contain asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable. Warning labels shall be as described in DETAIL SHEET 14, shall conform to 29 CFR 1926, Section .1101 and shall be of sufficient size to be clearly legible displaying the following legend:

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

#### 1.20 LOCAL EXHAUST VENTILATION

Local exhaust ventilation units shall conform to ANSI Z9.2 and 29 CFR 1926, Section .1101. Filters on local exhaust system equipment shall conform to ANSI Z9.2 and UL 586. Filter shall be UL labeled.

#### 1.21 TOOLS

Vacuums shall be leak proof to the filter, equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system, or has otherwise been approved for use by the Contracting Officer. Residual asbestos shall be removed from reusable tools prior to storage and reuse. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

#### 1.22 RENTAL EQUIPMENT

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment. A written acceptance of the terms of the Contractor's notification shall be obtained from the rental agency.

### 1.23 AIR MONITORING EQUIPMENT

The Contractor's Designated IH shall approve air monitoring equipment to be used to collect samples. The equipment shall include, but shall not be limited to:

- a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute when equipped with a sampling train of tubing and filter cassette.
- b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute when equipped with a sampling train of tubing and filter cassette, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.
- c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands, to be used with low flow pumps in accordance with 29 CFR 1926, Section .1101 for personal air sampling.
- d. Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands, to be used with high flow pumps when conducting environmental area sampling using NIOSH Pub No. 84-100 Methods 7400 and 7402, (and the transmission electric microscopy method specified at 40 CFR 763 if required).
- e. Appropriate plastic tubing to connect the air sampling pump to the selected filter cassette.
- f. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

### 1.24 EXPENDABLE SUPPLIES

#### 1.24.1 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container shall be provided.

#### 1.24.2 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926 Section .1101 and DETAIL SHEETS 9A, 9B, 9C and 14.

#### 1.24.3 Disposal Bags

Leak-tight bags, 6 mil thick, shall be provided for placement of asbestos generated waste as described in DETAIL SHEET 9A.

#### 1.24.4 Cardboard Boxes

Heavy-duty corrugated cardboard boxes, coated with plastic or wax to retard deterioration from moisture, shall be provided as described in DETAIL SHEET 9C, if required by state and local requirements. Boxes shall fit into selected ACM disposal bags. Filled boxes shall be sealed leak-tight with duct tape.

#### 1.24.5 Sheet Plastic

Sheet plastic shall be polyethylene of 6 mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams, as indicated on the project drawings. Film shall be clear frosted or black and conform to ASTM D 4397, except as specified below:

##### 1.24.5.1 Reinforced

Reinforced sheets shall be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

#### 1.24.6 Amended Water

Amended water shall meet the requirements of ASTM D 1331.

#### 1.24.7 Mastic Removing Solvent

Mastic removing solvent shall be nonflammable and shall not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite shall have a flash point greater than 140 degrees F.

#### 1.24.8 Leak-tight Wrapping

Two layers of 6 mil minimum thick polyethylene sheet stock shall be used for the containment of removed asbestos-containing components or materials such as reactor vessels, large tanks, boilers, insulated pipe segments and other materials too large to be placed in disposal bags as described in DETAIL SHEET 9B. Upon placement of the ACM component or material, each layer shall be individually leak-tight sealed with duct tape.

#### 1.24.9 Wetting Agents

Removal encapsulant (a penetrating encapsulant) shall be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant shall be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS.

#### 1.25 MISCELLANEOUS ITEMS

A sufficient quantity of other items, such as, but not limited to: scrapers, brushes, brooms, staple guns, tarpaulins, shovels, rubber squeegees, dust pans, other tools, scaffolding, staging, enclosed chutes, wooden ladders, lumber necessary for the construction of containments, UL

approved temporary electrical equipment, material and cords, ground fault circuit interrupters, water hoses of sufficient length, fire extinguishers, first aid kits, portable toilets, logbooks, log forms, markers with indelible ink, spray paint in bright color to mark areas, project boundary fencing, etc., shall be provided.

## PART 2 PRODUCTS

### 2.1 ENCAPSULANTS

Encapsulants shall conform to USEPA requirements, shall contain no toxic or hazardous substances and no solvent and shall meet the following requirements:

#### ALL ENCAPSULANTS

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Combustion Toxicity Zero Mortality	Univ. of Pittsburgh Protocol
Life Expectancy, 20 yrs Accelerated Aging Test	ASTM C 732
Permeability, Minimum 0.4 perms	ASTM E 96

#### Additional Requirements for Lockdown Encapsulant

Requirement	Test Standard
Fire Resistance, Negligible affect on fire resistance rating over 3 hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E 119
Bond Strength, 100 pounds of force/foot (Tests compatibility with cementitious and fibrous fireproofing)	ASTM E 736

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

Asbestos abatement work tasks shall be performed as shown on the detailed plans and drawings, as summarized in paragraph DESCRIPTION OF WORK and including Table 1 and the Contractor's Accident Prevention Plan, Asbestos Hazard Abatement Plan, and the Activity Hazard Analyses. The Contractor shall use the engineering controls and work practices required in 29 CFR 1926, Section .1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize protective clothing and equipment as specified. The Contractor shall not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. All hot work (burning, cutting, welding, etc.) shall be conducted under controlled conditions in conformance with 29 CFR 1926, Section .352, Fire Prevention. Personnel of other trades, not engaged in asbestos abatement activities, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the

Contractor's Accident Prevention Plan are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal. The Contractor shall stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. The Contractor shall correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work shall resume only upon notification by the Contracting Officer. Corrective actions shall be documented.

### 3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Asbestos abatement shall be performed without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government, as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the Contracting Officer, work shall proceed.

### 3.3 OBJECTS

### 3.4 BUILDING VENTILATION SYSTEM AND CRITICAL BARRIERS

Building ventilating systems supplying air into or returning air out of a regulated area shall be shut down and isolated by lockable switch or other positive means in accordance with 29 CFR 1910, Section .147. isolated by airtight seals to prevent the spread of contamination throughout the system. Air-tight critical barriers shall be installed on building ventilating openings located inside the regulated area that supply or return air from the building ventilation system or serve to exhaust air from the building. The critical barriers shall consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces shall be sealed with industrial grade duct tape.

### 3.5 METHODS OF COMPLIANCE

#### 3.5.1 Mandated Practices

The Contractor shall employ proper handling procedures in accordance with 29 CFR 1926 and 40 CFR 61, Subpart M, and the specified requirements. The specific abatement techniques and items identified shall be detailed in the Contractor's Asbestos Hazard Abatement Plan including, but not limited to, details of construction materials, equipment, and handling procedures. The Contractor shall use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

- a. Vacuum cleaners equipped with HEPA filters to collect debris and dust containing ACM.
- b. Wet methods or wetting agents to control employee exposures during

asbestos handling, mixing, removal, cutting, application, and cleanup; except where it can be demonstrated that the use of wet methods is unfeasible due to, for example, the creation of electrical hazards, equipment malfunction, and in roofing.

- c. Prompt clean-up and disposal in leak-tight containers of wastes and debris contaminated with asbestos.
- d. Inspection and repair of polyethylene in work and high traffic areas.
- e. Cleaning of equipment and surfaces of containers filled with ACM prior to removing them from the equipment room or area.

### 3.5.2 Control Methods

The Contractor shall use the following control methods to comply with the PELs:

- a. Local exhaust ventilation equipped with HEPA filter dust collection systems;
- b. Enclosure or isolation of processes producing asbestos dust;
- c. Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;
- d. Use of other work practices and engineering controls;
- e. Where the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the PELs, the Contractor shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with paragraph, RESPIRATORY PROTECTION PROGRAM.

### 3.5.3 Unacceptable Practices

The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

- a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
- b. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- c. Dry sweeping, shoveling, or other dry clean-up of dust and debris containing ACM.
- d. Employee rotation as a means of reducing employee exposure to asbestos.

### 3.5.4 Specific Control Methods for Class I Work

In addition to requirements of paragraph Class I Work Procedures, Class I asbestos work shall be performed using the control methods identified in the subparagraphs below.

### 3.5.5 Class II Work

In addition to the requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

- a. A Competent Person shall supervise the work.
- b. For indoor work, critical barriers shall be placed over all openings to the regulated area.
- c. Impermeable dropcloths shall be placed on surfaces beneath all removal activity.

### 3.5.6 Specific Control Methods for Class II Work

#### 3.5.6.1 Roofing Material

Roofing material shall be removed in an intact state. Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards. When removing built-up roofs, with asbestos-containing roofing felts and an aggregate surface, using a power roof cutter, all dust resulting from the cutting operations shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. Asbestos-containing roofing material shall not be dropped or thrown to the ground, but shall be lowered to the ground via covered, dust-tight chute, crane, hoist or other method approved by the Contracting Officer. Any ACM that is not intact shall be lowered to the ground as soon as practicable, but not later than the end of the work shift. While the material remains on the roof it shall be kept wet or placed in an impermeable waste bag or wrapped in plastic sheeting. Intact ACM shall be lowered to the ground as soon as practicable, but not later than the end of the work shift. Unwrapped material shall be transferred to a closed receptacle precluding the dispersion of dust. Critical barriers shall be placed over roof level heating and ventilation air intakes.

#### 3.5.6.2 Cementitious Siding and Shingles or Transite Panels

When removing cementitious asbestos-containing siding, shingles or transite panels the Contractor shall use the following practices shown in RESPONSE ACTION DETAIL SHEET 81 82 83. Intentionally cutting, abrading or breaking siding, shingles, or transite panels is prohibited. Each panel or shingle shall be sprayed with amended water prior to removal. Nails shall be cut with flat, sharp instruments. Unwrapped or unbagged panels or shingles shall be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.

#### 3.6.7.4 Gaskets

Gaskets shall be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly

deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag. Any scraping to remove residue shall be performed wet.

### 3.5.7 Alternative Methods for Roofing Materials and Asphaltic Wrap

The Contractor shall use the following engineering controls and work practices when removing, repairing, or maintaining intact pipeline asphaltic wrap, or roof cements, mastics, coatings, or flashings which contain asbestos fibers encapsulated or coated by bituminous or resinous compounds. If during the course of the job the material does not remain intact, the Contractor shall use the procedures described in paragraph Roofing Material. Before work begins, and as needed during the job, the Designated Competent Person shall conduct an inspection and determine that the roofing material is intact and will likely remain intact. The material shall not be sanded, abraded, or ground. Manual methods which would render the material non-intact shall not be used. Roofing material shall not be dropped or thrown to the ground but shall be lowered via covered, dust-tight chute, crane, hoist or other method approved by the Contracting Officer. All such material shall be removed from the roof as soon as practicable, but not later than the end of the work shift. Removal or disturbance of pipeline asphaltic wrap shall be performed using wet methods.

### 3.5.8 Cleaning After Asbestos Removal

After completion of all asbestos removal work, surfaces from which ACM has been removed shall be wet wiped or sponged clean, or cleaned by some equivalent method to remove all visible residue. Run-off water shall be collected and filtered through a dual filtration system. A first filter shall be provided to remove fibers 20 micrometers and larger, and a final filter provided that removes fibers 5 micrometers and larger. After the gross amounts of asbestos have been removed from every surface, remaining visible accumulations of asbestos on floors shall be collected using plastic shovels, rubber squeegees, rubber dustpans, and HEPA vacuum cleaners as appropriate to maintain the integrity of the regulated area.

### 3.5.9 Class II Asbestos Work Response Action Detail Sheets

The following Class II Asbestos Work Response Action Detail Sheet is specified on Table 1 for each individual work task to be performed:

- a. Built-Up Roofing and Flashing: 74
- b. Roof, Shingles and Underlayment: 75
- c. Asbestos Cement Siding: 8
- d. Asbestos Cement Roofing: 82
- e. Asbestos-Containing Walkway Cover: 82

### 3.5.10 Sealing Contaminated Items Designated for Disposal

Contaminated architectural, mechanical, and electrical appurtenances such as Venetian blinds, full height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit panels, and other contaminated items designated for removal shall be coated with an asbestos lockdown encapsulant at the demolition site before being removed from the asbestos control area. These items shall be vacuumed prior to application of the lockdown encapsulant. The asbestos lockdown encapsulant shall be tinted a

contrasting color and shall be spray applied by airless method. Thoroughness of sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces.

### 3.6 FINAL CLEANING AND VISUAL INSPECTION

Upon completion of abatement, the regulated area shall be cleaned by collecting, packing, and storing all gross contamination; see SET-UP DETAIL SHEETS 9, 14 and 20. A final cleaning shall be performed using HEPA vacuum and wet cleaning of all exposed surfaces and objects in the regulated area. Upon completion of the cleaning, the Contractor shall conduct a visual pre-inspection of the cleaned area in preparation for a final inspection before final air clearance monitoring and recleaning, as necessary. Upon completion of the final cleaning, the Contractor and the Contracting Officer shall conduct a final visual inspection of the cleaned regulated area in accordance with ASTM E 1368 and document the results on the Final Cleaning and Visual Inspection as specified on the SET-UP DETAIL SHEET 19. If the Contracting Officer rejects the clean regulated area as not meeting final cleaning requirements, the Contractor shall reclean as necessary and have a follow-on inspection conducted with the Contracting Officer. Recleaning and follow-up reinspection shall be at the Contractor's expense.

### 3.7 LOCKDOWN

Prior to removal of plastic barriers and after clean-up of gross contamination and final visual inspection, a post removal (lockdown) encapsulant shall be spray applied to ceiling, walls, floors, and other surfaces in the regulated area.

### 3.8 EXPOSURE ASSESSMENT AND AIR MONITORING

#### 3.8.1 General Requirements For Exposure

Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926, Section .1101, the Contractor's air monitoring plan, and as specified. Personal exposure air monitoring (collected at the breathing zone) that is representative of the exposure of each employee who is assigned to work within a regulated area shall be performed by the Contractor's Designated IH.

Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section. The Contractor shall The Contracting Officer will provide an onsite independent testing laboratory with qualified analysts and appropriate equipment to conduct sample analyses of air samples using the methods prescribed in 29 CFR 1926, Section .1101, to include NIOSH Pub No. 84-100 Method 7400. Preabatement and abatement environmental air monitoring shall be performed by the Contractor's Designated IH and Contracting Officer's IH. Final clearance environmental air monitoring, shall be performed by the Contractor's Designated IH Contracting Officer's IH. Environmental and final clearance air monitoring shall be performed using NIOSH Pub No. 84-100 Method 7400 (PCM) with optional confirmation of results by NIOSH Pub No. 84-100 Method 7402 (TEM) the EPA TEM Method specified in 40 CFR 763. For environmental and final clearance, air monitoring shall be conducted at a sufficient velocity and duration to establish the limit of detection of the method used at 0.005 f/cc. Confirmation of asbestos fiber concentrations (asbestos f/cc) from environmental and final clearance samples collected and analyzed by NIOSH Pub No. 84-100 Method 7400 (total f/cc) may be

conducted using TEM in accordance with NIOSH Pub No. 84-100 Method 7402. When such confirmation is conducted, it shall be from the same sample filter used for the NIOSH Pub No. 84-100 Method 7400 PCM analysis. For all Contractor required environmental or final clearance air monitoring, confirmation of asbestos fiber concentrations, using NIOSH Pub No. 84-100 Method 7402, shall be at the Contractor's expense. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. Results of breathing zone samples shall be posted at the job site and made available to the Contracting Officer. The Contractor shall maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement. If fiber concentration rises above 0.1 f/cc, work procedures shall be investigated with the Contracting Officer to determine the cause. At the discretion of the Contracting Officer, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. The Contractor's workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should either an environmental excursion concentration of 1.0 f/cc expressed as an 8-hour TWA or a personal concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, the Contractor shall stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by the Contracting Officer.

### 3.8.2 Initial Exposure Assessment

The Contractor's Designated IH shall conduct an exposure assessment immediately before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation. The assessment shall be completed in time to comply with the requirements which are triggered by exposure data or the lack of a negative exposure assessment, and to provide information necessary to assure that all control systems planned are appropriate for that operation. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the Contractor which indicate the levels of airborne asbestos likely to be encountered on the job.

### 3.8.3 Negative Exposure Assessment

The Contractor shall provide a negative exposure assessment for the specific asbestos job which will be performed. The negative exposure assessment shall be provided within 5 days of the initiation of the project and conform to the following criteria:

- a. Objective Data: Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the PEL-TWA and PEL-Excursion Limit under those work conditions having the greatest potential for releasing asbestos.
- b. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-Excursion Limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; the data

were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations; the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job; and these data show that under the conditions prevailing and which will prevail in the current workplace, there is a high degree of certainty that the monitoring covered exposure from employee exposures will not exceed the PEL-TWA and PEL-Excursion Limit.

- c. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job, made from breathing zone air samples that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee. The monitoring covered exposure from operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

#### 3.8.4 Environmental Air Monitoring During Abatement

Until an exposure assessment is provided to the Contracting Officer, environmental air monitoring shall be conducted at locations and frequencies that will accurately characterize any evolving airborne asbestos fiber concentrations. The assessment shall demonstrate that the product or material containing asbestos minerals, or the abatement involving such product or material, cannot release airborne asbestos fibers in concentrations exceeding 0.01 f/cc as a TWA under those work conditions having the greatest potential for releasing asbestos. The monitoring shall be at least once per shift at locations including, but not limited to, close to the work inside a regulated area; preabatement sampling locations; outside entrances to a regulated area; close to glovebag operations; representative locations outside of the perimeter of a regulated area; inside clean room; and at the exhaust discharge point of local exhaust system ducted to the outside of a containment (if used). If the sampling outside regulated area shows airborne fiber levels have exceeded background or 0.01 f/cc, whichever is greater, work shall be stopped immediately, and the Contracting Officer notified. The condition causing the increase shall be corrected. Work shall not restart until authorized by the Contracting Officer.

#### 3.8.5 Air-Monitoring Results and Documentation

Air sample fiber counting shall be completed and results provided within 24 hours (breathing zone samples), and 24 hours (environmental monitoring) after completion of a sampling period. The Contracting Officer shall be notified immediately of any airborne levels of asbestos fibers in excess of established requirements. Written sampling results shall be provided within 5 working days of the date of collection. The written results shall be signed by testing laboratory analyst, testing laboratory principal and the Contractor's Designated IH. The air sampling results shall be documented on a Contractor's daily air monitoring log. The daily air monitoring log shall contain the following information for each sample:

- a. Sampling and analytical method used;
- b. Date sample collected;

- c. Sample number;
- d. Sample type: BZ = Breathing Zone (Personal), P = Preabatement, E = Environmental, C = Abatement Clearance;
- e. Location/activity/name where sample collected;
- f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (L/min);
- g. Calibration date, time, method, location, name of calibrator, signature;
- h. Sample period (start time, stop time, elapsed time (minutes));
- i. Total air volume sampled (liters);
- j. Sample results (f/cc and S/mm square) if EPA methods are required for final clearance;
- k. Laboratory name, location, analytical method, analyst, confidence level. In addition, the printed name and a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log verifying the accuracy of the information.

### 3.9 CLEARANCE CERTIFICATION

When asbestos abatement is complete, ACM waste is removed from the regulated areas, and final clean-up is completed, the Contracting Officer will certify the areas as safe before allowing the warning signs and boundary warning tape to be removed. HVAC, mechanical, and electrical systems shall be re-established in proper working order. The Contractor and the Contracting Officer shall visually inspect all surfaces within the regulated area for residual material or accumulated debris. The Contractor shall reclean all areas showing dust or residual materials. The Contracting Officer will certify in writing that the area is safe before unrestricted entry is permitted. The Government will have the option to perform monitoring to certify the areas are safe before entry is permitted.

### 3.10 CLEANUP AND DISPOSAL

#### 3.10.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

#### 3.10.2 Collection and Disposal of Asbestos

All ACM waste shall be collected and including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing, shall be collected and placed in leak-tight containers such as double plastic bags sealed double wrapped polyethylene sheet; sealed fiberboard boxes; or other approved containers. Waste within the containers shall be wetted in case the container is breached. Asbestos-containing waste shall be disposed of at an EPA, state and local approved asbestos landfill. For temporary storage, sealed impermeable

containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e., dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by the Contracting Officer. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards.

### 3.10.3 Scale Weight Measurement

Scales used for measurement shall be public scales. Weighing shall be at a point nearest the work at which a public scale is available. Scales shall be standard truck scales of the beam type; scales shall be equipped with the type registering beam and an "over and under" indicator; and shall be capable of accommodating the entire vehicle. Scales shall be tested, approved and sealed by an inspector of the State of Hawaii. Scales shall be calibrated and resealed as often as necessary and at least once every three months to ensure continuous accuracy. Vehicles used for hauling ACM shall be weighed empty daily at such time as directed and each vehicle shall bear a plainly legible identification mark.

### 3.10.4 Weigh Bill and Delivery Tickets

Copies of weigh bills and delivery tickets shall be submitted to the Contracting Officer during the progress of the work. The Contractor shall furnish the Contracting Officer scale tickets for each load of ACM weighed and certified. These tickets shall include tare weight; identification mark for each vehicle weighed; and date, time and location of loading and unloading. Tickets shall be furnished at the point and time individual trucks arrive at the worksite. A master log of all vehicle loading shall be furnished for each day of loading operations. Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified weigh bills and/or certified tickets and manifests of all ACM actually disposed by the Contractor for this contract.

### 3.10.5 Asbestos Waste Shipment Record

The Contractor shall complete and provide the Contracting Officer final completed copies of the Waste Shipment Record for all shipments of waste material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill.

Each Waste Shipment Record shall be signed and dated by the Contractor Contracting Officer, the waste transporter and disposal facility operator.

## 3.11 TABLES I, II, III

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 1 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Porter Neighborhood (HA-K-1): BLDG. 3410, 3522, 3403, 3430, 3908, 3440, 3432
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Black Sealant
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content 2-10 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM Ea. and CONDITION OF ACM: GOOD x FAIR \_\_\_\_\_ POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 124, SQUARE FT. \_\_\_\_\_,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 2 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Santa Fe Neighborhood (HA-S-1): BLDG. 1882, 1856, 1853, 1860, 1848 .
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Black/Spray Sealant
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content 2-4 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM Ea. and CONDITION OF ACM: GOOD \_\_\_\_\_ FAIR X POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 98, SQUARE FT. 87,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 3 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Moyer Neighborhood (HA-T): BLDG. 4232, 4117, 4218.
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Black Sealant
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content <1-2 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM Ea. and CONDITION OF ACM: GOOD \_\_\_\_\_ FAIR X POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 62, SQUARE FT. 16,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 4 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Aloala Neighborhood (HA-T-1): BLDG. 4446, 4420, 4539, 4428, 4468, 4529
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Black Tar, Sealant, Gray/Black Sealant.
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content 2-5 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM Ea. and CONDITION OF ACM: GOOD \_\_\_\_\_ FAIR X POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 52, SQUARE FT. --,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 5 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Santa Fe Neighborhood (HA-T-2): BLDG. 1800, 1800, 1811, 1812, 1808.
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Black Sealant.
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content 2 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM Ea. and CONDITION OF ACM: GOOD \_\_\_\_\_ FAIR X POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 325, SQUARE FT. --,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 6 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Wilikina Neighborhood (W14B): BLDG. 722, 729, 732, 709, 725.
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Roofing Paper and Black Tar, Black Tar Sealant.
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content 2-15 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM EA. and CONDITION OF ACM: GOOD \_\_\_\_\_ FAIR X POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 325, SQUARE FT. --,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 1

## INDIVIDUAL WORK TASK DATA ELEMENTS

Sheet 7 of 7

There is a separate data sheet for each individual work task.

1. WORK TASK DESIGNATION NUMBER \_\_\_\_\_
2. LOCATION OF WORK TASK Radar Hill Neighborhood (100): BLDG. 1155.
3. BRIEF DESCRIPTION OF MATERIAL TO BE ABATED: Black Tar Sealant.
  - a. Type of Asbestos Chrysotile
  - b. Percent asbestos content 3 percent
4. ABATEMENT TECHNIQUE TO BE USED Manual Using Wet Method
5. OSHA ASBESTOS CLASS DESIGNATION FOR WORK TASK Class II
6. EPA NESHAP FRIABILITY DESIGNATION FOR WORK TASK  
Friable \_\_\_\_\_, Non-friable Category I \_\_\_\_\_  
Non-friable Category II x
7. FORM EA. and CONDITION OF ACM: GOOD \_\_\_\_\_ FAIR X POOR \_\_\_\_\_
8. QUANTITY: METERS \_\_\_\_\_, SQUARE METERS \_\_\_\_\_
- 8a. QUANTITY: LINEAR FT. 8, SQUARE FT. --,
9. RESPONSE ACTION DETAIL SHEET NUMBER FOR WORK TASK 74, 75
10. SET-UP DETAIL SHEET NUMBERS  
FOR WORK TASK 9A, 11, 12, 13,  
14, 15, 19.

## NOTES:

- (1) Numeric sequence of individual work tasks (1,2,3,4, etc.) for each regulated area. Each category of EPA friability/OSHA class has a separate task.
- (2) Specific location of work (building, floor, area, e.g., Building 1421, 2nd Floor, Rm 201)
- (3) A description of material to be abated (example: horizontal pipe, cement wall panels, tile, stucco, etc.) type of asbestos (chrysotile,amosite, crocidolite, etc.); and % asbestos content.
- (4) Technique to be used: Removal = REM; Encapsulation = ENCAP; Encasement = ENCAS; Enclosure = ENCL; Repair = REP.
- (5) Class designation: Class I, II, III, or IV (OSHA designation).
- (6) Friability of materials: Check the applicable EPA NESHAP friability designation.
- (7) Form: Interior or Exterior Architectural = IA or EA; Mechanical/Electrical = ME.  
Condition: Good = G; Fair = F; Poor = P.
- (8) Quantity of ACM for each work task in meters or square meters.
- (8a) Quantity of ACM for each work task in linear feet or square feet.
- (9) Response Action Detail Sheet specifies the material to be abated and the methods to be used. There is only one Response Action Detail Sheet for each abatement task.
- (10) Set-up Detail Sheets indicate containment and control methods used in support of the response action (referenced in the selected Response Action Detail Sheet).

TABLE 2

FORMULA FOR CALCULATION OF THE 95 PERCENT CONFIDENCE LEVEL  
(Reference: NIOSH 7400)

---

$$\text{Fibers/cc(01.95 percent CL)} = X + [(X) * (1.645) * (CV)]$$

Where:  $X = ((E)(AC))/((V)(1000))$

$$E = ((F/Nf) - (B/Nb))/Af$$

CV = The precision value; 0.45 shall be used unless the analytical laboratory provides the Contracting Officer with documentation (Round Robin Program participation and results) that the laboratory's precision is better.

AC = Effective collection area of the filter in square millimeters

V = Air volume sampled in liters

E = Fiber density on the filter in fibers per square millimeter

F/Nf = Total fiber count per graticule field

B/Nb = Mean field blank count per graticule field

Af = Graticule field area in square millimeters

$$\text{TWA} = C1/T1 + C2/T2 = Cn/Tn$$

Where: C = Concentration of contaminant

T = Time sampled.

TABLE 3  
 NIOSH METHOD 7400  
 PCM ENVIRONMENTAL AIR SAMPLING PROTOCOL (NON-PERSONAL)

Sample Location	Minimum No. of Samples	Filter Pore Size (Note 1)	Min. Vol. (Note 2) (Liters)	Sampling Rate (liters/min.)
Inside Abatement Area	0.5/140 Square Meters (Notes 3 & 4)	0.45 microns	3850	2-16
Each Room in 1 Abatement Area Less than 140 Square meters		0.45 microns	3850	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

## Notes:

1. Type of filter is Mixed Cellulose Ester.
2. Ensure detection limit for PCM analysis is established at 0.005 fibers/cc.
3. One sample shall be added for each additional 140 square meters. (The corresponding I-P units are 5/1500 square feet).
4. A minimum of 5 samples are to be taken per abatement area, plus 2 field blanks.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME \_\_\_\_\_ CONTRACT NO. \_\_\_\_\_
PROJECT ADDRESS \_\_\_\_\_
CONTRACTOR FIRM NAME \_\_\_\_\_
EMPLOYEE'S NAME \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,
(Print) (Last) (First) (MI)

Social Security Number: \_\_\_\_\_-\_\_\_\_\_-\_\_\_\_\_

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:

\_\_\_\_\_ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

b. For Workers:

\_\_\_\_\_ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

\_\_\_\_\_ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

\_\_\_\_\_ (3) For OSHA Class II work (there will only be abatement of one type of Class II material):

\_\_\_\_\_ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926, Section .1101(g) and hands-on training.

\_\_\_\_\_ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.

\_\_\_\_\_ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101, and hands-on training.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

\_\_\_\_\_ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926, Section .1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926, Section .1101(g) and hands-on training.

\_\_\_\_\_ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:

\_\_\_\_\_ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:

\_\_\_\_\_ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:

\_\_\_\_\_ I have been trained in the proper selection, fit, use, care, cleaning, maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

MEDICAL EXAMINATION:

\_\_\_\_\_ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

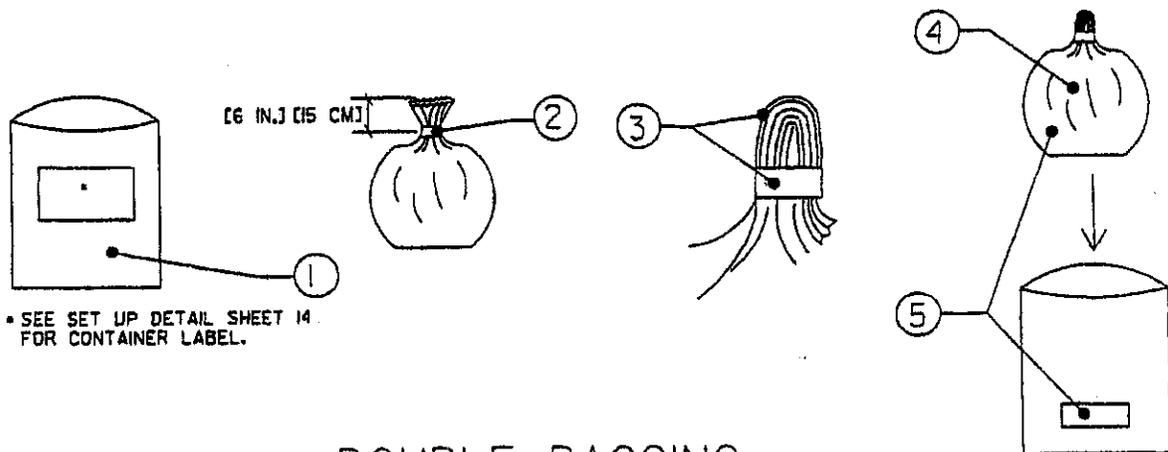
\_\_\_\_\_ were no limitations to performing the required work tasks.  
\_\_\_\_\_ were identified physical limitations to performing the required work tasks.

Date of the medical examination \_\_\_\_\_

Employee Signature \_\_\_\_\_ date \_\_\_\_\_  
Contractor's Industrial Hygienist Signature \_\_\_\_\_ date \_\_\_\_\_

-- End of Section --

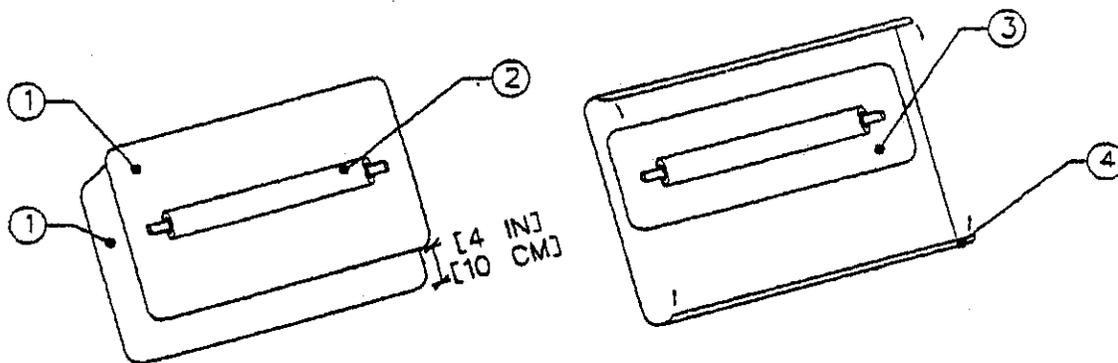




## DOUBLE BAGGING

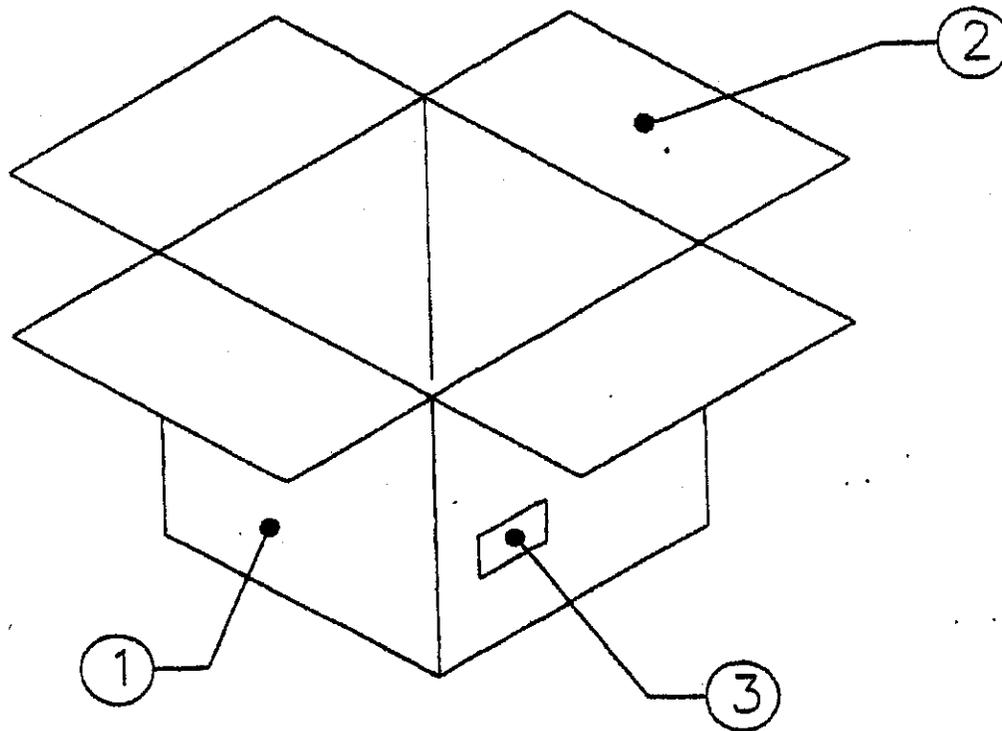
### Containers—double bagging

1. Place the still-wet asbestos-containing and asbestos-contaminated material into a prelabelled 6-mil polyethylene bag. Do not overfill. Do not use bag for asbestos-containing or asbestos-contaminated material that could puncture the bag. (See sheet 9C for packaging items that could puncture bags.)
2. Evacuate with HEPA vacuum, and seal collapsed bag by twisting top [6 in] [15 cm] closed and wrapping with a minimum of two layers of duct tape.
3. Twist top and fold over. Apply second wrap of duct tape.
4. Adequately wet clean outside of disposal bag by wet wiping, and take bag to the equipment and staging area.
5. Place bag inside a second prelabelled 6-mil polyethylene bag.
6. Seal outer bag by repeating steps 2 and 3 above. Take bag to load-out unit; see sheet 20.



### Containers—leak-tight wrapping

1. Place two layers of 6-mil polyethylene sheet on surface so that the bottom layer is offset [4 in] [10 cm] from the top layer.
2. Place the still-wet asbestos-containing or asbestos-contaminated material that is too large (boiler, vessel, pipe segment, etc.) to be placed in disposal bags on the top layer of polyethylene.
3. Wrap the top layer tightly around the contaminated material. Seal all edges of the top layer of sheeting with duct tape. Apply labels; see sheet 14.
4. Repeat procedure with bottom layer, including labeling. Take to load-out unit; see sheet 20.

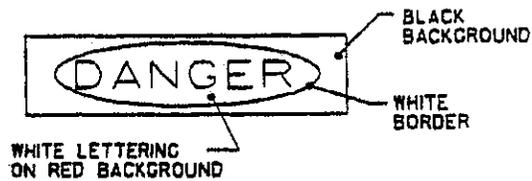
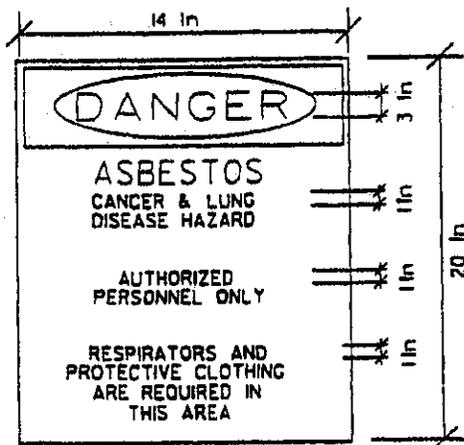


**Containers-corrugated cardboard boxes**

1. Place still-wet asbestos-containing or asbestos-contaminated material that could puncture disposal bags into heavy-duty corrugated cardboard boxes coated with plastic or wax that will retard deterioration from moisture.

2. Close flaps, and seal with duct tape.

3. Apply labels; see sheet 14. Place box into disposal bags; see sheet 9A. Take to load-out unit; see sheet 20.



AREA WARNING SIGNS AND WARNING TAPE

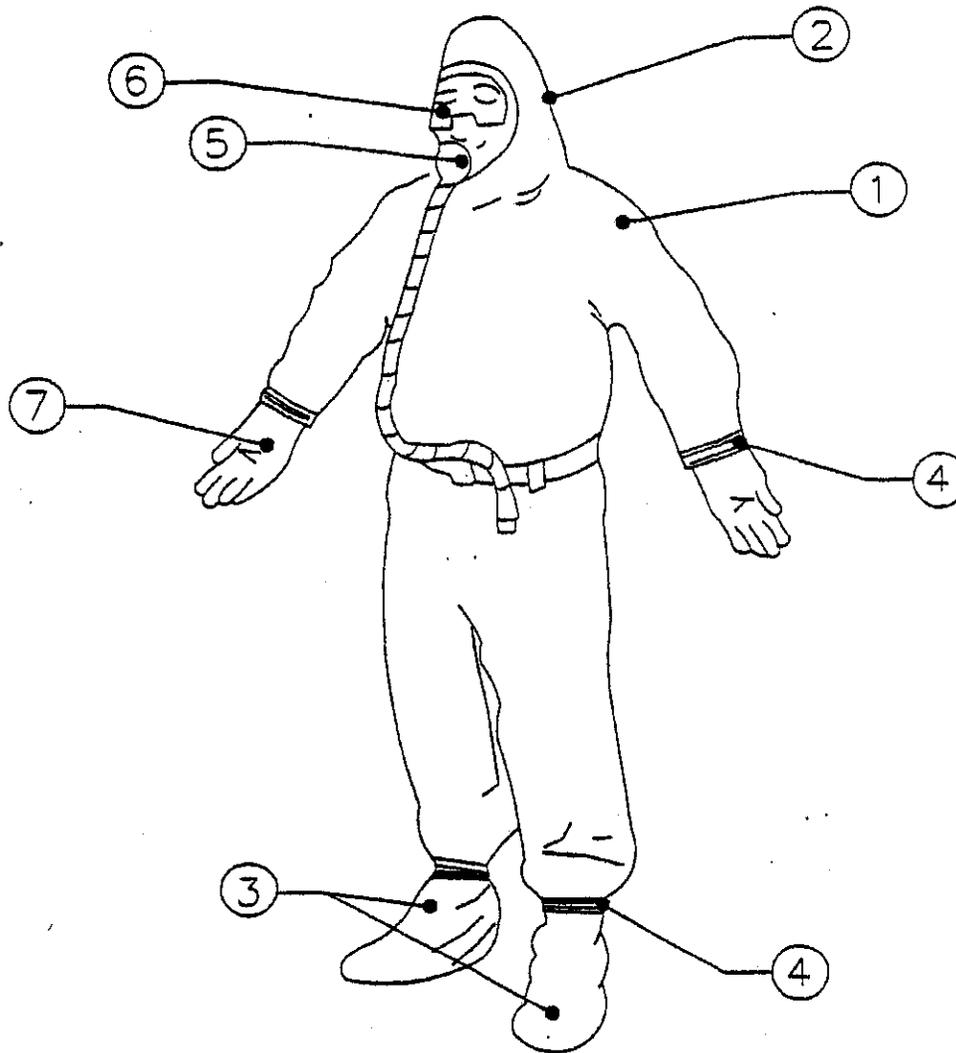
DETAIL 

**Area warning signs and warning tape**

1. Provide and install [4 mil] [0.10 mm] polyethylene warning tape at locations shown on the abatement area plan.
2. Warning tape is to be attached to wood or metal posts at [10 ft] [300 cm] on center. Tape must be [3 ft] [100 cm] from ground.
3. Attach both warning signs at each entrance of the work area and at [33 yd] [30 m] on center where security fencing is installed.
4. Warning signs must be in English and other languages required by the contract.
5. Install at eye level.

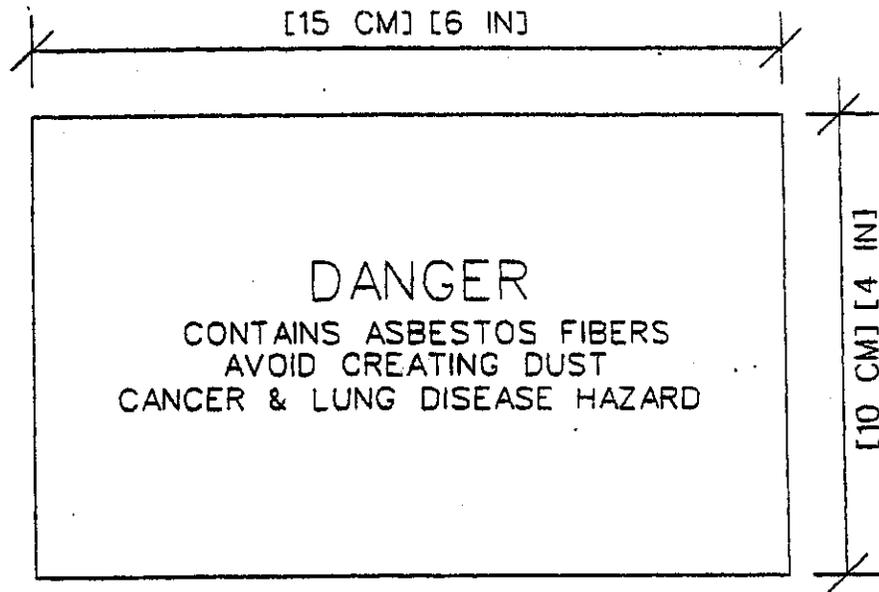
FIBER CONCENTRATION	MINIMUM REQUIRED RESPIRATOR	
NOT IN EXCESS OF 1 FIBER/CC	HALF-MASK AIR PURIFYING RESPIRATOR WITH HEPA FILTERS	
NOT IN EXCESS OF 5 FIBERS/CC	FULL FACEPIECE AIR-PURIFYING RESPIRATOR WITH HEPA FILTERS	HEPA FILTER 
NOT IN EXCESS OF 10 FIBERS/CC	LOOSE FITTING HELMET OR HOOD, POWERED AIR-PURIFYING RESPIRATOR WITH HEPA FILTERS	BATTERY-POWERED BLOWER WITH HEPA FILTER 
NOT IN EXCESS OF 10 FIBERS/CC	POWERED AIR-PURIFYING RESPIRATOR WITH FULL FACEPIECE AND HEPA FILTER	
NOT IN EXCESS OF 10 FIBERS/CC	LOOSE FITTING HELMET OR HOOD, SUPPLIED AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE WITH BACK-UP HEPA FILTER	
NOT IN EXCESS OF 10 FIBERS/CC	SUPPLIED AIR RESPIRATOR WITH FULL FACEPIECE OPERATED IN CONTINUOUS FLOW MODE WITH BACK-UP HEPA FILTER	AIR SUPPLY 
NOT IN EXCESS OF 100 FIBERS/CC	FULL FACEPIECE SUPPLIED AIR RESPIRATOR OPERATED IN PRESSURE-DEMAND MODE WITH BACK-UP HEPA FILTER	AIR SUPPLY 
GREATER THAN 100 FIBERS/CC OR UNKNOWN CONCENTRATION	FULL FACEPIECE SUPPLIED-AIR RESPIRATOR OPERATED IN PRESSURE-DEMAND MODE WITH AUXILIARY POSITIVE-PRESSURE SELF-CONTAINED BREATHING APPARATUS	AUXILIARY POSITIVE-PRESSURE SELF-CONTAINED BREATHING APPARATUS 
		AIR SUPPLY 

Respiratory protection table



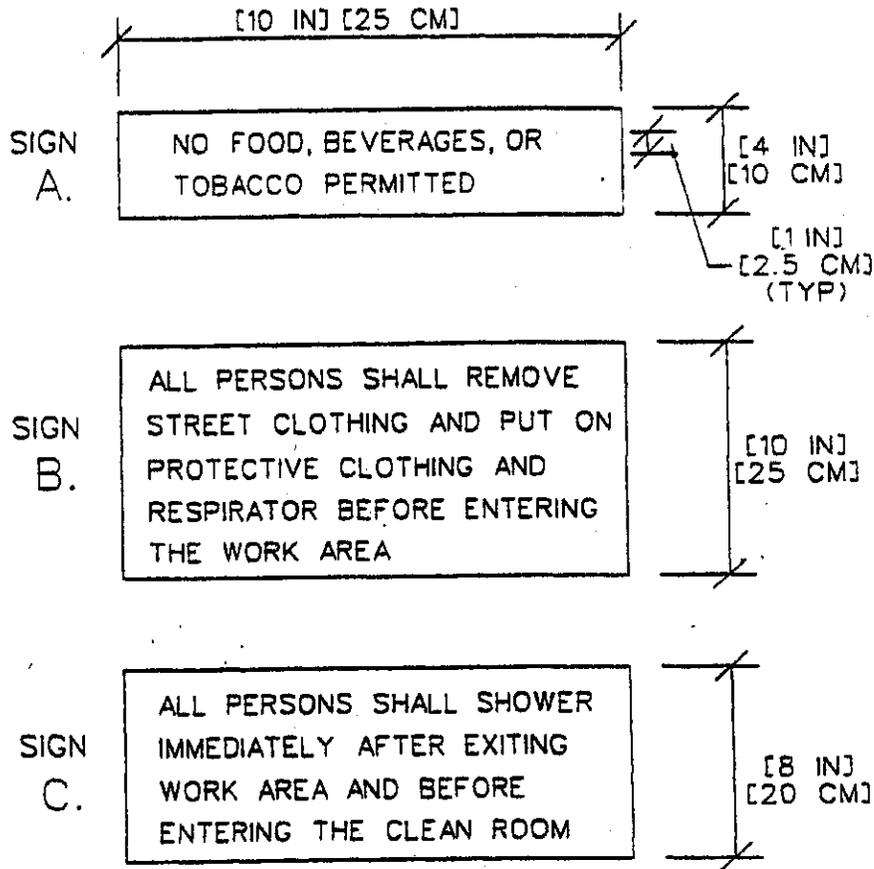
### Protective clothing

1. Disposable or reusable full body suit with elastic around hood and shoe cover openings is required or as otherwise specified in the contract.
2. Hood shall be worn over respirator's head and neck straps.
3. Shoe covers shall be worn over work shoes.
4. Cuffs shall be taped with duct tape at wrists and ankles in order to prevent infiltration.
5. Cartridge-type air-purifying HEPA filter respirator is minimal requirement. Type shall be selected in accordance with sheet 12.
6. If eye protection is not integral with respirator, protection goggles are required.
7. Rubber work gloves are recommended to be worn alone or under outer work gloves provided for hand and operation safety.



**Disposal container label**

Attach warning labels to each disposal container removed from abatement area.



**Decontamination unit signage**

1. Provide signs in English and other languages required by the contract.
2. Install at eye level.

---

**Certification of Final Cleaning And Visual Inspection**

Individual abatement task as identified in paragraph, Description of Work \_\_\_\_\_

In accordance with the cleaning and decontamination procedures specified in the Contractor's asbestos hazard abatement plan and this contract, the Contractor hereby certifies that he/she has thoroughly visually inspected the decontaminated regulated work area (all surfaces, including pipes, beams, ledges, walls, ceiling, floor, decontamination unit, etc.) in accordance with ASTM E1368, *Standard Practice for Visual Inspection of Asbestos Abatement Projects*, and has found no dust, debris, or asbestos-containing material residue.

BY: (Contractor's signature) \_\_\_\_\_ Date \_\_\_\_\_

Print name and title \_\_\_\_\_

(Contractor's Onsite Supervisor signature) \_\_\_\_\_ Date \_\_\_\_\_

Print name and title \_\_\_\_\_

(Contractor's Industrial Hygienist signature) \_\_\_\_\_ Date \_\_\_\_\_

Print name and title \_\_\_\_\_

**Contracting Officer Acceptance or Rejection**

The Contracting Officer hereby determines that the Contractor has performed final cleaning and visual inspection of the decontaminated regulated work area (all surfaces including pipes, beams, ledges, walls, ceiling, floor, decontamination unit, etc.) and by quality assurance inspection, finds the Contractor's final cleaning to be:

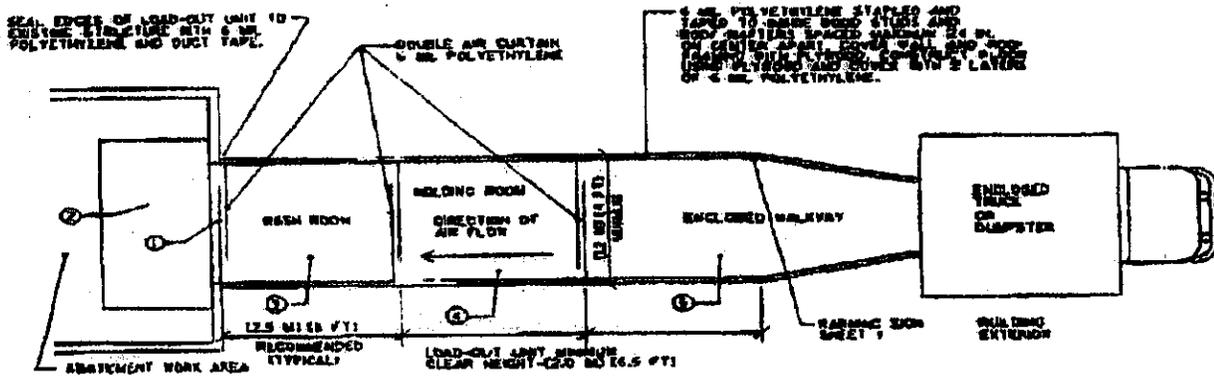
Acceptable

Unacceptable, Contractor instructed to reclean the regulated work area.

BY: Contracting Officer's Representative

Signature \_\_\_\_\_ Date \_\_\_\_\_

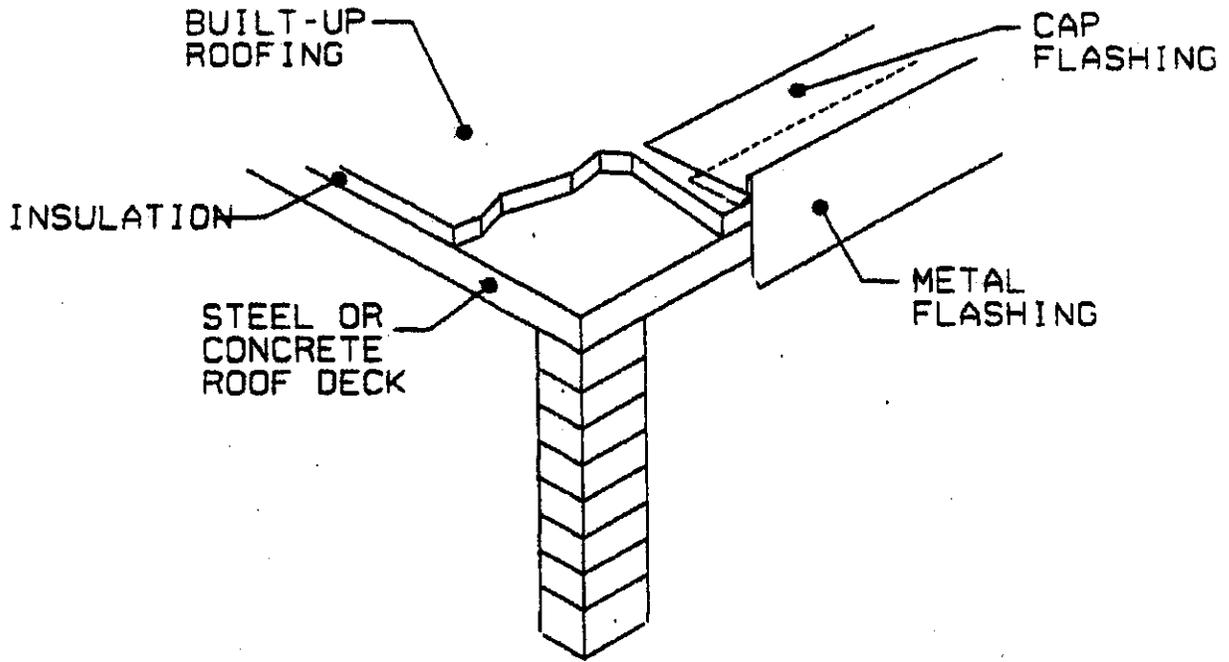
Print name and title \_\_\_\_\_



Load-out unit floor plan

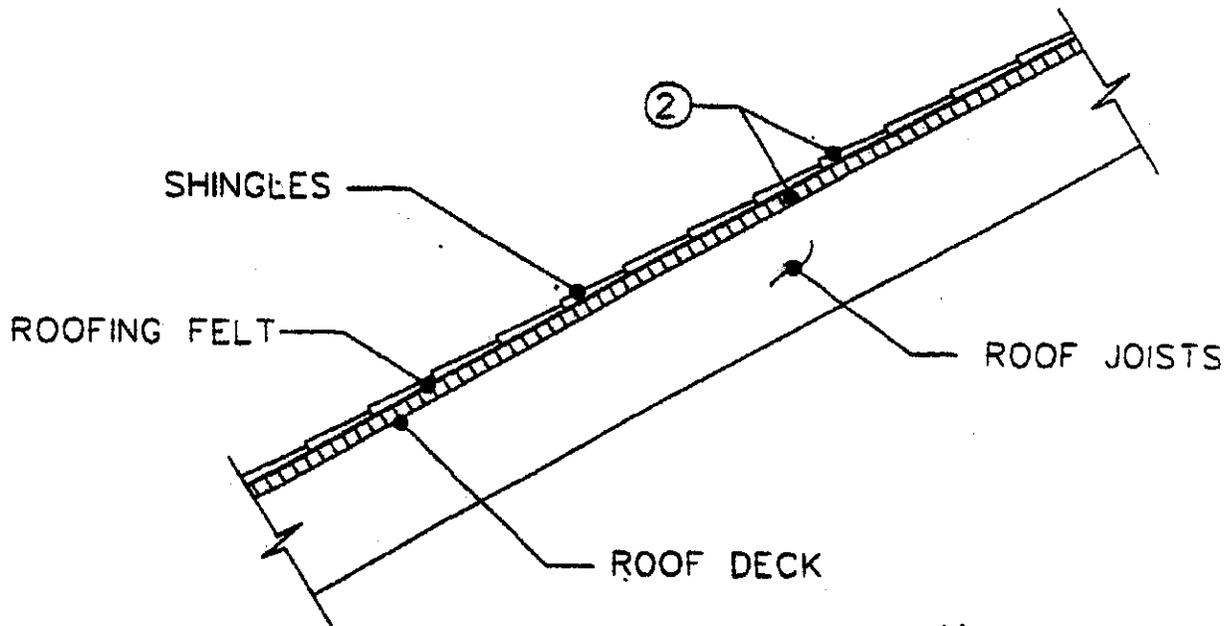
1. Abatement worker is to enter and exit abatement work area only through decontamination unit.
2. Place additional 6-mil polyethylene sheeting on top of abatement area floor. Double bag asbestos-contaminated material in this area before removing.
3. Wet wipe bags, equipment, and containers, and take to holding room.
4. Stage clean bags, equipment, and containers in holding room until disposal worker removes them.
5. Disposal workers, wearing full protective clothing and appropriate respirator protection, carry decontaminated bags and containers through enclosed walkway and into enclosed truck or Dumpster.

Final clearance requirements. Before breaking down load-out unit, adequately wet clean and HEPA vacuum all surfaces and prepare area for final clearance. Contractor and Contracting Officer will certify visual inspection of work area on sheet 19, Certification of Final Cleaning and Visual Inspection. Contractor will apply lockdown encapsulant. Contract designee(s) will conduct final air-clearance monitoring as required by the contract. Breakdown load-out area upon instructions from Contracting Officer. Treat as asbestos-contaminated material. Place in approved container; see sheet 9. Apply labels; see sheet 14. Dispose of as required by the contract.



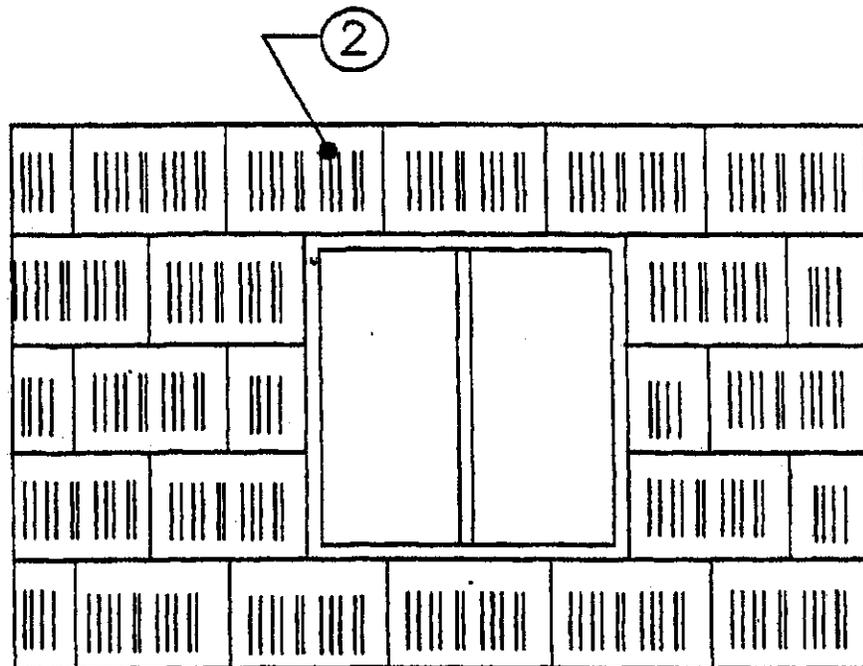
### Removal of built-up roofing and flashing

1. No containment area is required. Establish boundaries of asbestos-regulated work area so that unauthorized entry is prevented; see sheet 11. Provide personal protection and decontamination facilities as specified in contractor's asbestos hazard abatement plan.
2. Remove accumulated debris.
3. Adequately wet mist flashing and built-up roofing, initially and during removal procedures. Remove flashing and built-up roofing.
4. Dispose of all materials by carefully sliding them down an enclosed chute into an enclosed Dumpster or truck that is lined with two layers of 6-mil polyethylene. When the Dumpster or truck is filled, fold the polyethylene edges over each other and seal with duct tape; see sheet 9 for leak-tight wrapping. Apply labels; see sheet 14.
5. Clean and HEPA vacuum roof.
6. Inspect and reclean area as necessary.
7. Apply tinted penetrating encapsulant to exposed roof deck, using an airless sprayer. Inspect and reapply encapsulant as necessary.
8. Prepare area for final clearance.
9. Contractor and contracting officer will certify visual inspection of work area on sheet 19, *Certification of Final Cleaning and Visual Inspection*.



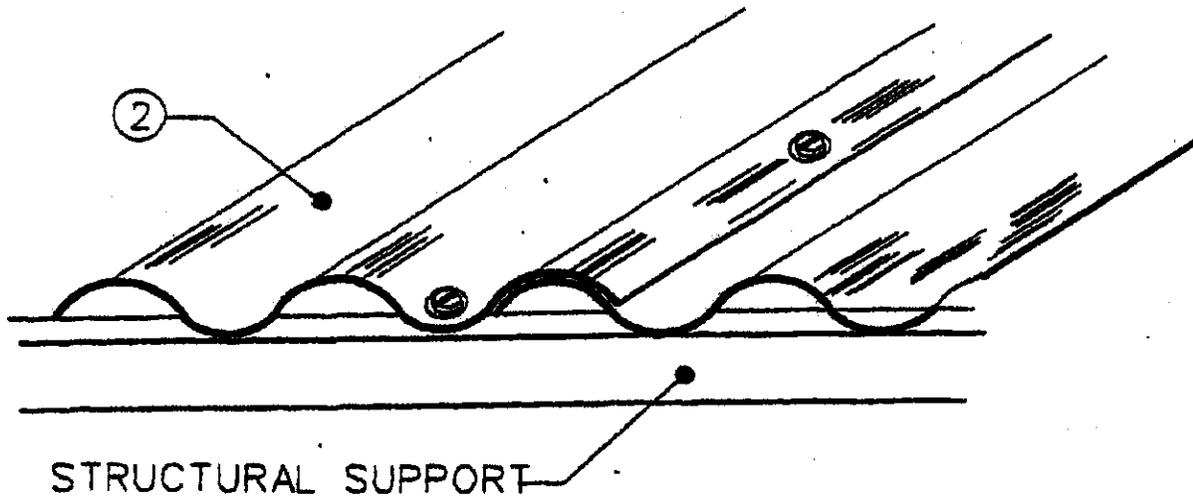
### Removal of roof, shingles, and underlay

1. No containment area is required. Establish boundaries of asbestos-regulated work area so that unauthorized entry is prevented, and install warning signs; see sheet 11. Provide personal protection and decontamination facilities as specified in contractor's asbestos hazard abatement plan.
2. Remove shingles, roofing felt, nails, and debris, using wet removal technique.
3. Dispose of all materials by carefully sliding them down an enclosed chute into an enclosed Dumpster or truck that is lined with two layers of 6-mil polyethylene. When Dumpster or truck is filled, fold the polyethylene edges over each other and seal with duct tape; see sheet 9. Apply labels; see sheet 14.
4. Clean and HEPA vacuum roof.
5. Inspect and reclean area as necessary.
6. Apply tinted penetrating encapsulant to exposed roof deck, using an airless sprayer.
7. Prepare area for final clearance.
8. Contractor and contracting officer will certify visual inspection of work area on sheet 19, *Certification of Final Cleaning and Visual Inspection*.



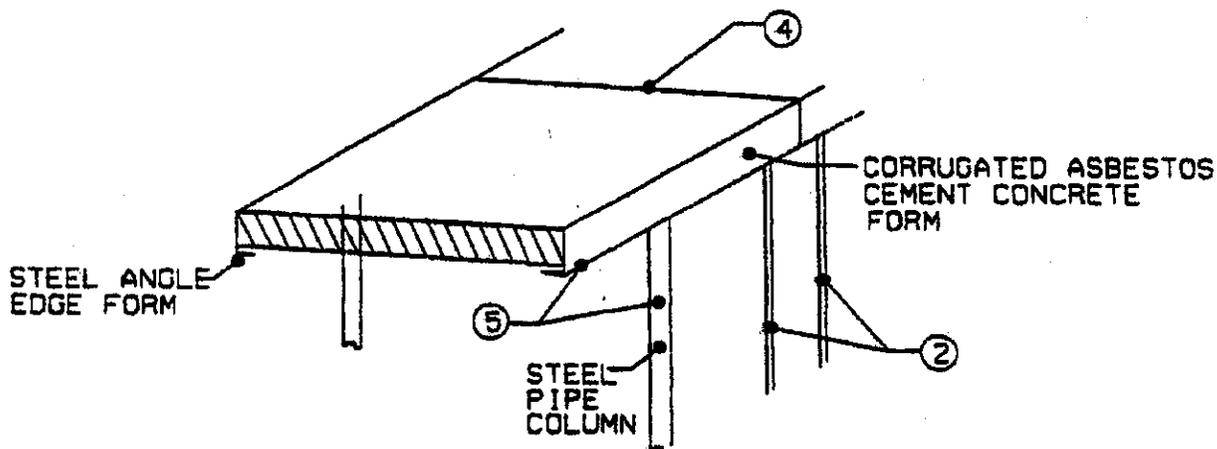
### Removal of asbestos cement siding

1. No containment area is required. Establish boundaries of asbestos-regulated work area so that unauthorized entry is prevented; see sheet 11. Provide personal protection and decontamination facilities as specified in contractor's asbestos hazard abatement plan.
2. Wet mist siding with amended water, initially and during removal procedures.
3. Anchor 10-mil polyethylene sheeting below work area. Remove siding in a manner that will prevent crumbling, pulverizing, or reducing to powder during the removal procedure. NOTE: Normal breakage does not constitute crumbling, pulverizing, or reducing to powder.
4. Clean and HEPA vacuum all surfaces.
5. Inspect and reclean area as necessary.
6. Place all materials in Dumpster or other transport container lined with two layers of 6-mil polyethylene. Seal the joints and ends of each layer with duct tape; see sheet 9. Apply labels; see sheet 14. Other containers may be used; see sheet 9. Apply labels; see sheet 14.
7. Prepare area for final clearance.
8. Contractor and contracting officer will certify visual inspection of work area on sheet 19, *Certification of Final Cleaning and Visual Inspection*.



### Removal of asbestos cement roofing

1. No containment area is required. Establish boundaries of asbestos-regulated work area so that unauthorized entry is prevented; see sheet 11. Provide personal protection and decontamination facilities as specified in contractor's asbestos hazard abatement plan.
2. Wet mist the top surface of the roofing with amended water, initially and during removal procedures. Carefully remove roofing in a manner that will prevent crumbling, pulverizing, or reducing to powder during the removal procedure. NOTE: Normal breakage does not constitute crumbling, pulverizing, or reducing to powder.
3. Place all materials in Dumpster or other transport container lined with two layers of 6-mil polyethylene. Seal the joints and ends of each layer with duct tape; see sheet 9. Apply labels; see sheet 14. Other containers may be used; see sheet 9. Apply labels; see sheet 14.
4. Prepare area for final clearance.
5. Contractor and contracting officer will certify visual inspection of work area on sheet 19, *Certification of Final Cleaning and Visual Inspection*.



### Removal of asbestos-containing walkway cover

1. No containment area is required. Establish boundaries of asbestos-regulated work area so that unauthorized entry is prevented; see sheet 11. Provide personal protective equipment and decontamination facilities as specified in the contractor's asbestos hazard abatement plan.
2. Install temporary supports at midpoint between existing columns.
3. Support walkway-cover slab with forklift, crane, or other approved lifting device.
4. Saw cut through concrete no deeper than the concrete cover over the corrugated asbestos cement form.
5. Burn through steel side angles and pipe columns.
6. Lift slab and place on truck bed lined with two layers of 6-mil polyethylene sheeting. Seal the joints and ends of each layer with duct tape; see sheet 9. Apply labels; see sheet 14. Treat as asbestos-contaminated construction waste, keeping walkway-cover slab intact. Secure slab to truck bed and cover with tarp. Gather any loose debris lying on ground and place in approved container; see sheet 9. Apply labels; see sheet 14. Prepare area for final clearance.
7. Contractor and contracting officer will certify visual inspection of work area on sheet 19, *Certification of Final Cleaning and Visual Inspection*.

**APPENDIX A**

**ASBESTOS SURVEY  
RE-ROOFING PROJECT  
FAMILY HOUSING AREAS HA-K-1, S-1, T, T-1, AND T-2  
SCHOFIELD BARRACKS, OAHU, HAWAII**

Prepared for

Family Housing Division  
Directorate of Public Works  
U.S. Army Garrison Hawaii  
Schofield Barracks, Hawaii 96857-5013

January 2001

Prepared by

Environmental Division  
Directorate of Public Works  
U.S. Army Garrison Hawaii  
Schofield Barracks, Hawaii 96857-5013

APVG-GWV (200-1a)

MEMORANDUM FOR RECORD

Subject: Asbestos Survey, Schofield Barracks Housing Area K-1, S-1, T, T-1, and T-2 Re-Roofing Project

1. Enclosed is a preliminary asbestos survey for subject above.
2. Questions pertaining to the survey can be directed to Dale Kanehisa at 656-2878 ext. 1036.

Encl.

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APPENDIX E: CHAIN OF CUSTODY FORMS	

## 1.0 INTRODUCTION

The Directorate of Public Works (DPW), Environmental Division, performed a preliminary survey for asbestos-containing material (ACM) in Schofield Barracks (SB) Housing Areas (HA) K-1, S-1, T, T-1, and T-2 from May 23, 2000 through December 12, 2000. The surveys were conducted by Dale Kanehisa (AHERA Inspector Certificate #IAVII-MEC-AIMP-062498-01), Mitch Uehara (AHERA Certificate #IAVII-MEC-AI-072998-05), Donna Mason (AHERA Inspector Certificate #IAVII-MEC-AIMP-03172000-11), Dean Shiota (AHERA Inspector Certificate #7ME07197203I004) and Hector Laus (AHERA Inspector Certificate #7ME07197203I005). 113 buildings in housing areas K-1, S-1, T, T-1, and T-2 are scheduled for re-roofing. The purpose of the survey was to identify the presence of ACM in the buildings to be re-roofed.

### 1.1 Site Description

SB HA-K-1, known as the Porter Neighborhood in the Comprehensive Neighborhood Plan (CNP) for Schofield Barracks, is a multi-family housing area located in the central portion of the installation. Twenty-five buildings in this housing area are scheduled for re-roofing. Included in the project are buildings 3401, 3403-3406, 3410, 3413, 3415, 3416, 3421, 3424, 3426, 3430, 3432, 3434, 3440, 3501, 3503-3506, 3509, 3512, 3520-3523, and 3908. There are seven building types classified as AR, AS, AT, AV, AT/AU-1, AT/AU-2, and AT/AU-2R. The buildings, constructed in 1958, have flat roofs with pitch and gravel roofing material.

SB HA-S-1 is part of the Santa Fe Neighborhood. This neighborhood is a multi-family housing area located in the western portion of the installation. Twenty buildings included in the re-roofing project are 1840-1876, 1882-1888, 1896, 1900, 1908, 1911, and 1914. All buildings in HA-S-1 were constructed in 1972. There are seven different building types, all with sloped roofs and asphalt shingles. The building types are AK, AM-1, AM-3, AM-4, AN-1, AK/AL, and AL/AM-3.

SB HA-T makes up part of the Moyer Neighborhood located in the western portion of the installation. There are five multi-family buildings included in the re-roofing project and include buildings 4117, 4121, 4215, 4218, and 4232, all constructed in 1961. The three building types present are classified as AV, AV/AW, and AV/AW-R. The buildings have flat roofs with pitch and gravel roofing material.

SB HA-T-1 is part of the Aloala Neighborhood located in the western portion of the installation. There are a total of 51 multi-family buildings scheduled for re-roofing. Thirty-one buildings were constructed in 1961 and include buildings 4417-4452, 4457, 4462, and 4466-4491. The buildings fall into one of five different building types, AY-1, AY-2, AZ, AZ/BA, and B2. All have sloped roofs with asphalt shingle roofing material. The remaining 20 buildings were constructed in 1971 and include buildings 4517-4550, and 4555-4559. There are four building types classified as B2, AY-1, AY-2, AZ/BA, and. Roofs are sloped with asphalt shingles.

SB HA-T-2 is part of the Santa Fe Neighborhood. This neighborhood is a multi-family housing area located in the western portion of the installation. Twenty-eight buildings in this housing area are scheduled for re-roofing. Included in the project are buildings 1800-1815 and 1817-1832. There are four building types classified as AN-1, AN-2, AN-3, and AO. The buildings constructed in 1966 have flat roofs with pitch and gravel roofing material.

## 2.0 ASBESTOS INSPECTION

### 2.1 Methodology

The ACM survey included a visual inspection of all roofs in order to determine the location of suspect material. Since construction dates and building types varied between the different housing areas, buildings were first grouped by housing area, then construction date, and finally by building type. The roofs of approximately 10% of each building type were inspected for ACM. The buildings inspected, by housing area and building type are as follows:

#### HA-K-1, Porter Neighborhood

Type AR: 3410, 3522  
Type AS: 3403  
Type AT: 3430  
Type AV: 3908  
Type AT/AU-1: 3434  
Type AT/AU-2: 3440  
Type AT/AU-2R: 3432

#### HA-T, Moyer Neighborhood

Type AV: 4232  
Type AV/AW: 4117  
Type AV/AW-R: 4218

#### HA-S-1, Santa Fe Neighborhood

Type AK: 1911  
Type AM-1: 1882  
Type AM-3: 1856  
Type AM-4: 1853  
Type AN-1: 1851  
Type AK/AL: 1860  
Type AL/AM-3: 1848

#### HA-T-1, Aloala Neighborhood, (1961)

Type B-2: 4472  
Type AY-1: 4420, 4446  
Type AY-2: 4428  
Type AZ: 4475  
Type AZ/BA: 4468

HA-T-1, Aloala Neighborhood, (1971)

Type B-2: 4548  
Type AY-1: 4525  
Type AY-2: 4539  
Type AZ/BA: 4529

HA-T-2, Santa Fe Neighborhood

Type AN-1: 1811  
Type AN-2: 1800, 1814  
Type AN-3: 1808  
Type AO: 1812

## 2.2 Sample Collection

The asbestos sampling methods followed the Asbestos Hazard Emergency Response Act (AHERA) protocol. Sampling was conducted on all suspect material. At the inspector's discretion, varying numbers of bulk samples from each homogeneous area of miscellaneous material, including asphalt shingles, tar paper, tar, and pipe sealant were collected.

The suspect ACM was first moistened. The samples were collected by dislodging a piece of the suspect ACM with a decontaminated collection tool, such as an utility knife, paint scraper, or tile-cutter, and placed in a plastic sample bag labeled with the sample number. The collection tool was decontaminated between sampling to prevent cross-contamination. The homogeneous area, sample description, location, friability, substrate, estimated amount, and sample identification were recorded in a sampling table. The sample identification number included the installation, facility ID, homogeneous area, and sample number.

## 2.3 Sample Analysis

The samples were packaged and shipped with a chain of custody to AMA Analytical Services, Inc., which is an accredited NVLAP laboratory. A total of 100 samples were sent for Polarized Light Microscopy (PLM) asbestos analysis. In addition, the laboratory was instructed to stop analysis of a homogeneous material when a positive result was detected.

## 2.4 Results

Results were interpreted as ACM if at least one sample of a homogeneous material was determined to contain 1% or greater, asbestos. Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos. The following tables present a summary of positive results based on the collection of bulk samples analyzed for asbestos for each housing area.

**HA-K-1, Porter Neighborhood**

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
AR	M2	Black sealant	3410, 3522: around pipes & vents on roof	No	9 LF per building	2%C
AS	M2	Black sealant	3403: around pipes & vents on roof	No	19 LF per building	2%C
AT	M2	Black sealant	3430: around pipes & vents on roof	No	19 LF per building	2%C
AV	M2	Black sealant	3908: around pipes & vents on roof	No	20 LF per building	2%C
AT/AU-1	M2	Black sealant	3434: around pipes & vents on roof	No	14 LF per building	2%C
AT/AU-2	M2	Black sealant	3440: around pipes & vents on roof	No	21 LF per building	2%C
AT/AU-2R	M2	Black sealant	3432: around pipes & vents on roof	No	22 LF per building	10%C

**HA-S-1, Santa Fe Neighborhood**

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
AM-1	M5	Black sealant	1882: around pipes and vents on roof	No	20 LF per building	3%C
	M7	Black sealant	1882: along unit wall & lanai roof connection	No	1 LF	2%C
	M8	Gray/black sealant	1882: patch on lanai roof	No	4 SF	4%C
AM-3	M3	1) Black asphalt sheet w/green stones 2) Black tar	1856: patch on roof	Yes	49 SF	1) ND 2) 3%C
	M5	Black sealant	1856: around pipes and vents on roof	No	39 LF per building	3%C
AM-4	M5	Black sealant	1853: around pipes & vents on roof	No	30 LF per building	3%C
AK/AL	M3	1) Black asphalt sheet w/green stones 2) Black tar	1860: patch on roof	Yes	36 SF	1) ND 2) 3%C
AL/AM-3	M5	Black sealant	1848: around vents on roof	No	8 LF per building	2%C

**HA-T, Moyer Neighborhood**

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
AV	M2	Black sealant	4232: around pipes & vents on roof	No	20 LF per building	2%C
	M3	Black sealant	4232: patch on roof	No	16 SF	<1%C
AV/AW	M2	Black sealant	4117: around pipes & vents on roof	No	21 LF per building	2%C
AV/AW-R	M2	Black sealant	4218: around pipes & vents on roof	No	21 LF per building	2%C

**HA-T-1, Aloala Neighborhood, Constructed in 1961**

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
B-2	No ACM Identified					
AY-1	M3	Black tar sealant	4446: around 4" diameter pipes on roof	No	2 LF per building	2%C
	M4	Black tar sealant	4420: patch at corner of roof and lanai connection	No	1 LF	3%C
AY-2	M5	1) Gray sealant 2) Black sealant	4428: around 4" diameter pipes on roof	No	4 LF per building	1) ND 2) 5%C
AZ	No ACM Identified					
AZ/BA	M3	Black tar sealant	4468: around pipes & vents on roof	No	39 LF per building	2%C

**HA-T-1, Aloala Neighborhood, Constructed in 1971**

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
B-2	No ACM Identified					
AY-1	No ACM Identified					
AY-2	M3	Black tar sealant	4539: around 4" diameter pipes on roof	No	4 LF per building	2%C
AZ/BA	M3	Black tar sealant	4529: around pipes & vents on roof	No	39 LF per building	2%C

**HA-T-2, Santa Fe Neighborhood**

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
AN-1	M2	Black sealant	1811: around pipes & vents on roof	No	11 LF per building	2%C
	M4	Black sealant	1811: around lanai skylights	No	36 LF per building	2%C
AN-2	M2	Black sealant	1800, 1814: around pipes & vents on roof	No	22 LF per building	2%C
	M4	Black sealant	1800, 1814: around lanai skylights	No	72 LF per building	2%C
AN-3	M2	Black sealant	1808: around pipes & vents on roof	No	33 LF per building	2%C
	M4	Black sealant	1808: around lanai skylights	No	108 LF per building	2%C
AO	M2	Black sealant	1812: around lanai skylights, and pipes & vents on roof	No	43 LF per building	2%C

Note: C = Chrysotile  
 ND = none detected  
 SF = square feet LF = linear feet  
 For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

The results of the sample analysis are located in Appendix A. The sample locations are shown in Appendix B. The analytical laboratory reports are found in Appendix C. Laboratory and inspector certificates are located in Appendix D. Chain of custody forms are found in Appendix E.

## 2.5 Disclaimer

Although the building was thoroughly inspected, the inspection does not implicitly guarantee that all ACM were identified because certain suspected materials may be. If suspected materials are uncovered during demolition, the suspected materials shall not be disturbed until additional sampling is done.

## 3.0 ADDENDUM

This research was supported in part by an appointment to the Postgraduate Environmental Management Participation Program at the U.S. Army Environmental Center administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and USAEC.

# Appendix A

## Asbestos Sample Area Identification Table

Appendix A-1

Housing Area K-1, Porter Neighborhood

## ASBESTOS SAMPLE AREA IDENTIFICATION TABLE

HA-K-1

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black tar paper 2) Black tar	Type AR Building (3410, 3522): roof Type AS Building (3403): roof Type AT Building (3430): roof Type AV Building (3908): roof Type AT/AU-1 Building (3434): roof of units B, C, D Type AT/AU-2 Buildings (3440): roof Type AT/AU-2R Buildings (3432): roof	No	SB-3403-1-1	1) ND 2) ND
				SB-3434-1-1	1) ND 2) ND
				SB-3440-1-1	1) ND 2) ND
				SB-3432-1-1	1) ND 2) ND
				SB-3908-1-1	1) ND 2) ND
				SB-3410-1-1	1) ND 2) ND
				SB-3430-1-1	1) ND 2) ND
				SB-3522-1-1	1) ND 2) ND
M2	Black sealant	Type AR Building (3410, 3522): around pipes & vents on roof Type AS Building (3403): around pipes & vents on roof Type AT Building (3430): around pipes & vents on roof Type AV Building (3908): around pipes & vents on roof Type AT/AU-1 Building (3434): around pipes & vents on roof Type AT/AU-2 Building (3440): around pipes & vents on roof Type AT/AU-2R Building (3432): around pipes & vents on roof	No	SB-3403-2-1	2%C
				SB-3434-2-1	NA
				SB-3440-2-1	NA
				SB-3432-2-1	10%C
				SB-3908-2-1	2%C
				SB-3410-2-1	ND
				SB-3430-2-1	2%C
M3	1) Black asphalt shingles w/white stones 2) Black tar	Type AT/AU-1 Building (3434): roof of unit A; flashing between units D & C Type AT/AU-2 Building (3440): flashing between units A & B Type AT/AU-2R Building (3432): flashing between units D & E	Yes	SB-3434-3-1	1) ND 2) ND
				SB-3440-3-1	1) ND 2) ND
				SB-3432-3-1	1) ND 2) ND

Note: C = Chrysotile  
NA = not analyzed, previous sample of same homogeneous material tested positive  
ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

Appendix A-2

Housing Area S-1, Santa Fe Neighborhood

**ASBESTOS SAMPLE AREA IDENTIFICATION TABLE**

**HA-S-1**

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black asphalt shingles w/black stones 2) Black tar paper 3) Black tar	Type AM-1 Building (1882): roof Type AM-3 Building (1856): roof Type AM-4 Building (1853): roof Type AN-1 Building (1851): roof Type AK/AL Building (1860): roof Type AL/AM-3 Building (1848): roof	Yes	SB-1860-1-1	1) ND 2) ND 3) ND
				SB-1848-1-1	1) ND 2) ND 3) ND
				SB-1851-1-1	1) ND 2) ND 3) ND
				SB-1853-1-1	1) ND 2) ND 3) ND
				SB-1856-1-1	1) ND 2) ND 3) ND
				SB-1882-1-1	1) ND 2) ND 3) ND
M2	1) Black asphalt sheet w/black stones 2a) Black tar 2b) Black tar paper 3) Black tar	Type AK Building (1911): lanai roof Type AM-1 Building (1882): lanai & carport roofs Type AM-3 Building (1856): lanai & carport roof Type AM-4 Building (1853): lanai & carport roof Type AN-1 Building (1851): lanai & carport roof Type AK/AL Building (1860): lanai & carport roof Type AL/AM-3 Building (1848): lanai & carport roof	Yes	SB-1860-2-1	1) ND 2a) ND
				SB-1848-2-1	1) ND 2a) ND
				SB-1851-2-1	1) ND 2b) ND 3) ND
				SB-1853-2-1	1) ND 2b) ND 3) ND
				SB-1856-2-1	1) ND 2b) ND 3) ND
M3	1) Black asphalt sheet w/green stones 2) Black tar	Type AM-3 Building (1856): patch on roof Type AK/AL Building (1860): patch on roof	Yes	SB-1860-3-1	1) ND
				SB-1856-3-1	1) ND 2) 3%C
M4	Gray sealant	Type AK/AL Building (1860): patch on roof	No	SB-1860-4-1	ND
M5	Black sealant	Type AM-1 Building (1882): around pipes and vents on roof Type AM-3 Building (1856): around pipes and vents on roof Type AM-4 Building (1853): around pipes & vents on roof Type AL/AM-3 Building (1848): around vents on roof	No	SB-1848-5-1	2%C
				SB-1848-5-2	NA
				SB-1853-5-1	3%C
				SB-1856-5-1	NA
				SB-1882-5-1	NA
				SB-1882-5-2	NA
M6	Gray sealant	Type AM-1 Building (1882): along unit wall & lanai roof connection Type AM-3 Building (1856): along unit wall & lanai roof connection Type AM-4 Building (1853): along unit wall & lanai roof connection	No	SB-1853-6-1	ND
				SB-1856-6-1	ND
				SB-1882-6-1	ND
M7	Black sealant	Type AM-1 Building (1882): along unit wall & lanai roof connection	No	SB-1882-7-1	2%C
				SB-1882-7-2	NA
M8	Gray/black sealant	Type AM-1 Building (1882): patch on lanai roof	No	SB-1882-8-1	4%C
				SB-1882-8-2	NA

HA-S-1 (continued)

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M9	1) Black asphalt shingles w/brown & white stones 2) Black tar paper 3) Black tar	Type AK Building (1911): roof	Yes	SB-1911-9-1	1) ND 2) ND 3) ND
				SB-1911-9-2	1) ND 2) ND 3) ND

Note: C = Chrysotile  
 NA = not analyzed, previous sample of same homogeneous material tested positive  
 ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

Appendix A-3

Moyer Neighborhood, Housing Area T

## ASBESTOS SAMPLE AREA IDENTIFICATION TABLE

HA-T

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black tar paper 2) Black tar	Type AV Building (4232): roof Type AV/AW Building (4117): roof Type AV/AW-R Building (4218): roof	Yes	SB-4117-1-1	1) ND 2) ND
				SB-4218-1-1	1) ND 2) ND
				SB-4232-1-1	1) ND 2) ND
M2	1) Black sealant 2) White fibers	Type AV Building (4232): around pipes & vents on roof Type AV/AW Building (4117): around pipes & vents on roof Type AV/AW-R Building (4218): around pipes & vents on roof	Yes	SB-4117-2-1	1) ND
				SB-4218-2-1	1) 2%C
				SB-4232-2-1	1) ND 2) ND
M3	Black sealant	Type AV Building (4232): patch on roof	No	SB-4232-3-1	<1%C
				SB-4232-3-2	ND

Note: C = Chrysotile  
 NA = not analyzed, previous sample of same homogeneous material tested positive  
 ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

Appendix A-4

Housing Area T-1, Aloala Neighborhood

**ASBESTOS SAMPLE AREA IDENTIFICATION TABLE**

HA-T-1

Constructed in 1961

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black asphalt shingles w/brown & white stones 2) Black tar paper 3) Black tar	Type B-2 Building (4472): roof Type AY-1 Building (4420, 4446): roof Type AY-2 Building (4428): roof Type AZ Building (4475): roof Type AZ/BA Building (4468): roof	Yes	SB-4468-1-1	1) ND 2) ND 3) ND
				SB-4472-1-1	1) ND 2) ND 3) ND
				SB-4475-1-1	1) ND 2) ND 3) ND
				SB-4420-1-1	1) ND 2) ND 3) ND
				SB-4428-1-1	1) ND 2) ND 3) ND
				SB-4446-1-1	1) ND 2) ND 3) ND
M2	1) Black asphalt sheet w/brown & white stones 2) Black tar	Type B-2 Building (4472): lanai roof Type AY-1 Building (4420, 4446): lanai roof Type AY-2 Building (4428): lanai roof Type AZ Building (4475): lanai roof Type AZ/BA Building (4468): lanai roof	Yes	SB-4468-2-1	1) ND 2) ND
				SB-4472-2-1	1) ND 2) ND
				SB-4475-2-1	1) ND 2) ND
				SB-4420-2-1	1) ND 2) ND
				SB-4428-2-1	1) ND 2) ND
				SB-4446-2-1	1) ND 2) ND
M3	Black tar sealant	Type AY-1 Building (4446): around 4" diameter pipes on roof Type AZ/BA Building (4468): around pipes & vents on roof	No	SB-4468-3-1	2% C
				SB-4446-3-1	2% C
M4	Black tar sealant	Type AY-1 Building (4420): patch at corner of roof and lanai connection	No	SB-4420-4-1	3% C
M5	1) Gray sealant 2) Black sealant	Type AY-2 Building (4428): around 4" diameter pipes on roof	No	SB-4428-5-1	1) ND 2) 5% C

HA-T-1 (continued)

Constructed in 1971

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black asphalt shingles w/brown & white stones 2) Black tar paper 3) Black tar	Type B-2 Building (4548): roof Type AY-1 Building (4525): roof Type AY-2 Building (4539): roof Type AZ/BA Building (4529): roof	Yes	SB-4548-1-1	1) ND 2) ND 3) ND
				SB-4529-1-1	1) ND 2) ND 3) ND
				SB-4525-1-1	1) ND 2) ND 3) ND
				SB-4539-1-1	1) ND 2) ND 3) ND
M2	1) Black asphalt sheet w/brown & white stones 2) Black tar	Type B-2 Building (4548): lanai & carport roofs Type AY-2 Building (4539): lanai roof Type AZ/BA Building (4529): lanai & carport roofs	Yes	SB-4548-2-1	1) ND 2) ND
				SB-4529-2-1	1) ND 2) ND
				SB-4539-2-1	1) ND 2) ND
M3	Black tar sealant	Type AY-2 Building (4539): around 4" diameter pipes on roof Type AZ/BA Building (4529): around pipes & vents on roof	No	SB-4529-3-1	NA
				SB-4529-3-2	NA
				SB-4539-3-1	2%C
M4	Gray sealant	Type B-2 Building (4548): around one vent on roof Type AY-2 Building (4539): around 2½" diameter pipes on roof	No	SB-4548-4-1	ND
				SB-4539-4-1	ND

Note: C = Chrysotile  
 NA = not analyzed, previous sample of same homogeneous material tested positive  
 ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

Appendix A-5

Housing Area T-2, Santa Fe Neighborhood

**ASBESTOS SAMPLE AREA IDENTIFICATION TABLE**

**HA-T-2**

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black tar paper 2) Black tar	Type AN-1 Building (1811): roof Type AN-2 Building (1800, 1814): roof Type AN-3 Building (1808): roof Type AO Building (1812): roof & lanai roof	No	SB-1800-1-1	1) ND 2) ND
				SB-1808-1-1	1) ND 2) ND
				SB-1811-1-1	1) ND 2) ND
				SB-1812-1-1	1) ND 2) ND
M2	Black sealant	Type AN-1 Building (1811): around pipes & vents on roof Type AN-2 Building (1800, 1814): around pipes & vents on roof Type AN-3 Building (1808): around pipes & vents on roof Type AO Building (1812): around lanai skylights, and pipes & vents on roof	No	SB-1800-2-1	2%C
				SB-1808-2-1	NA
				SB-1811-2-1	NA
				SB-1812-2-1	ND
M3	1) Black tar paper 2) Black tar	Type AN-1 Building (1811): lanai roof Type AN-2 Building (1800, 1814): lanai roof Type AN-3 Building (1808): lanai roof	No	SB-1800-3-1	1) ND 2) ND
				SB-1808-3-1	1) ND 2) ND
				SB-1811-3-1	1) ND 2) ND
				SB-1814-3-1	1) ND 2) ND
M4	Black sealant	Type AN-1 Building (1811): around lanai skylights Type AN-2 Building (1800, 1814): around lanai skylights Type AN-3 Building (1808): around lanai skylights	No	SB-1800-4-1	ND
				SB-1808-4-1	ND
				SB-1811-4-1	2%C
				SB-1814-4-1	NA

Note: C = Chrysotile  
 NA = not analyzed, previous sample of same homogeneous material tested positive  
 ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

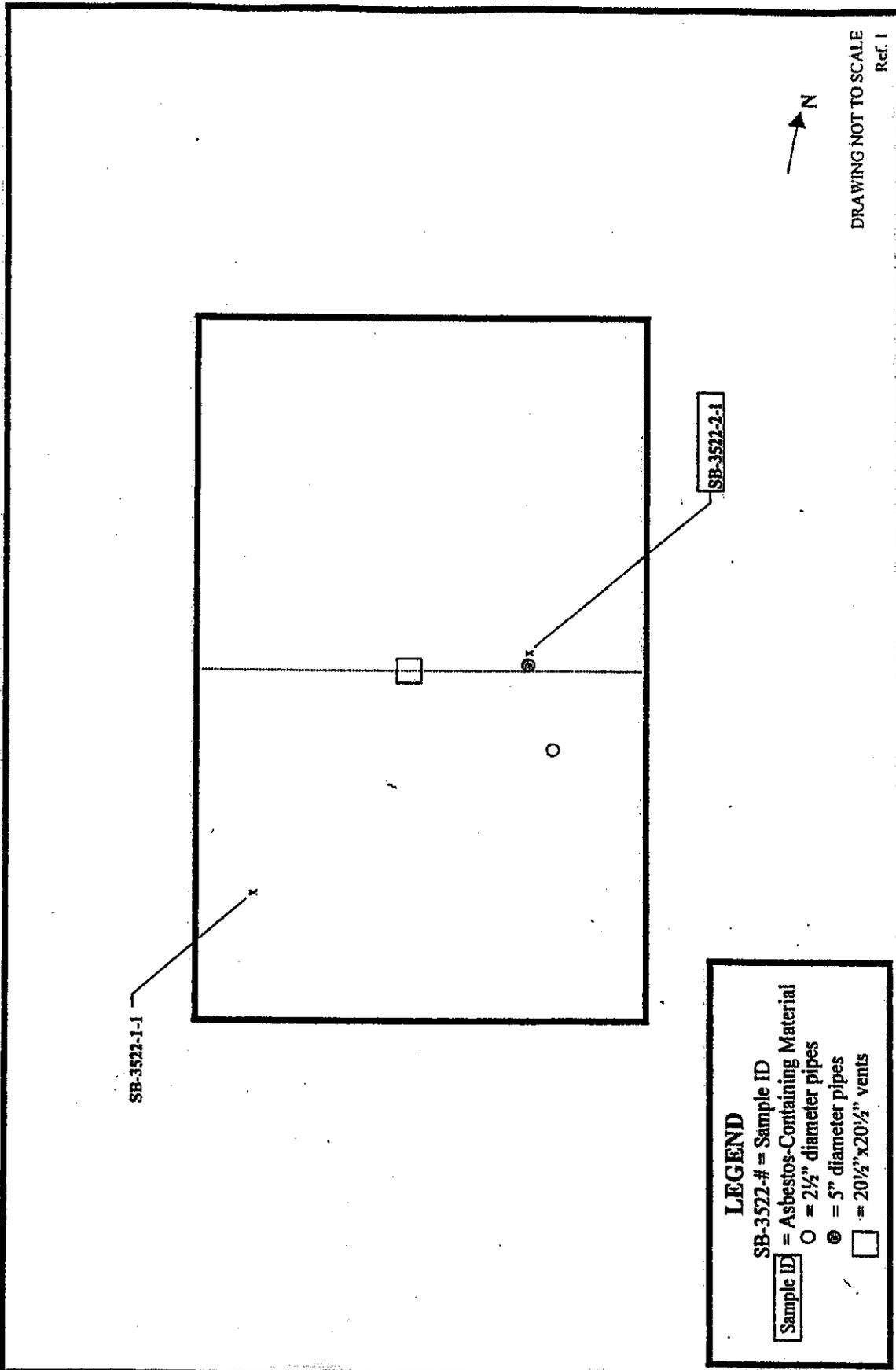
Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

## Appendix B

### Asbestos Sample Locations

Appendix B-1

Housing Area K-1, Porter Neighborhood



**LEGEND**  
 SB-3522-# = Sample ID  
 [Sample ID] = Asbestos-Containing Material  
 ○ = 2 1/2" diameter pipes  
 ⊙ = 5" diameter pipes  
 □ = 20 1/2"x20 1/2" vents

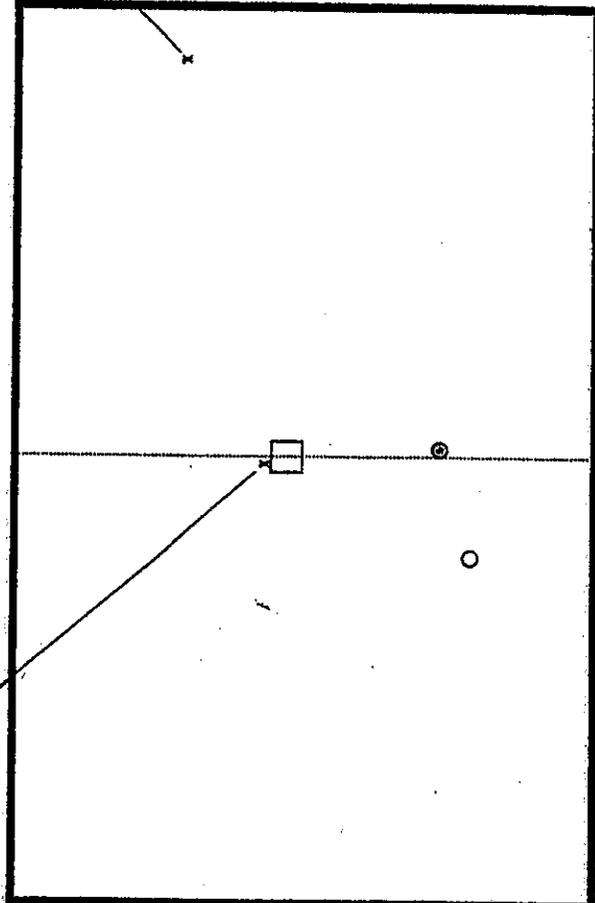
DRAWING NOT TO SCALE  
 Ref. 1

Re-Roofing Project  
 Asbestos Sampling Location Plan, Building Type AR  
 Building 3522, HA-K-1C, Schofield Barracks, Hawaii

DPW, Environmental Division

\*Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
 Schofield Barracks, Military Housing Master Plan for Oahu

SB-3410-2-1



SB-3410-1-1

**LEGEND**

SB-3410-# = Sample ID

Sample ID = Asbestos-Containing Material

○ = 2½" diameter pipes

● = 5" diameter pipes

□ = 20½"x20½" vents



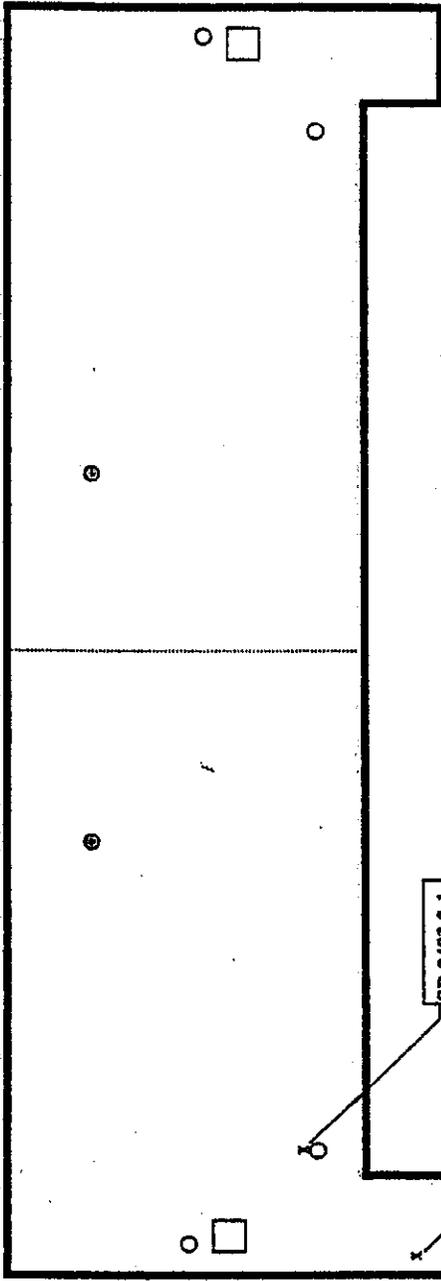
DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AR  
Building 3410, HA-K-1C, Schofield Barracks, Hawaii

Mitsunaga & Associates, Inc. Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing Master Plan for Oahu



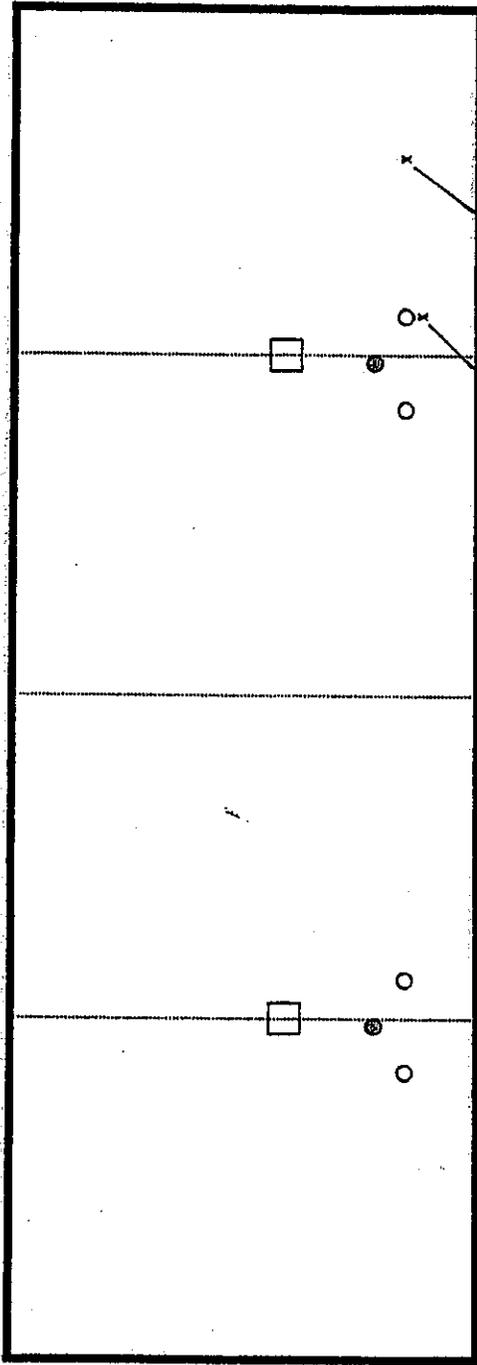
**LEGEND**  
 SB-3403-# = Sample ID  
 Sample ID = Asbestos-Containing Material  
 ○ = 2 1/2" diameter pipes  
 ● = 5" diameter pipes  
 □ = 20 1/2" x 20 1/2" vents



DRAWING NOT TO SCALE  
 Ref. 1

<p>Re-Roofing Project</p>	<p>Asbestos Sampling Location Plan, Building Type AS</p>
<p>DPW, Environmental Division</p>	<p>Building 3403, HA-K-1C, Schofield Barracks, Hawaii</p>

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**LEGEND**

- SB-3430-# = Sample ID
- Sample ID = Asbestos-Containing Material
- = 2½" diameter pipes
- = 5" diameter pipes
- = 20½"x20½" vents



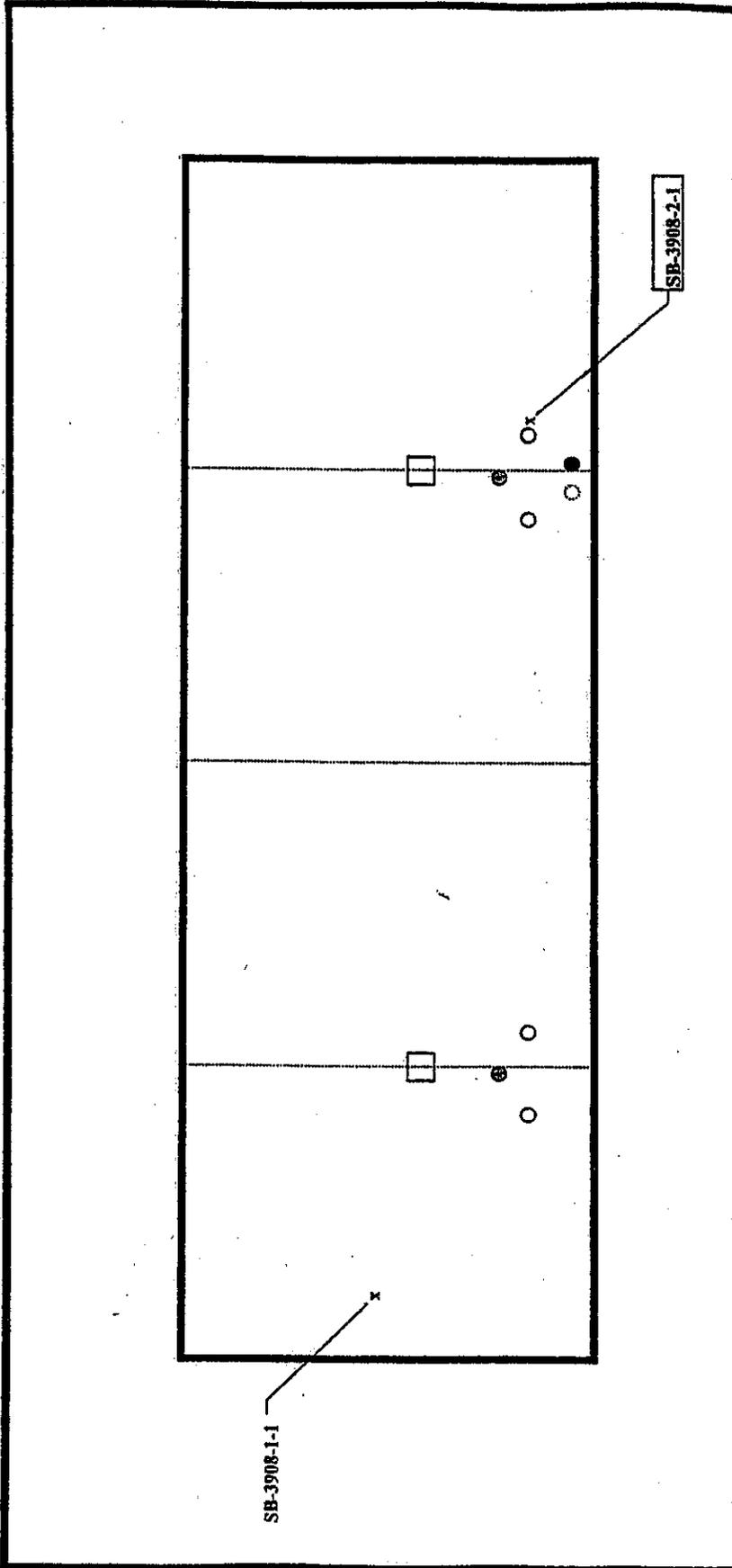
DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AT  
Building 3430, HA-K-1C, Schofield Barracks, Hawaii

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Schofield Barracks, Military Housing Master Plan for Oahu



**LEGEND**

SB-3908-# = Sample ID

Sample ID = Asbestos-Containing Material

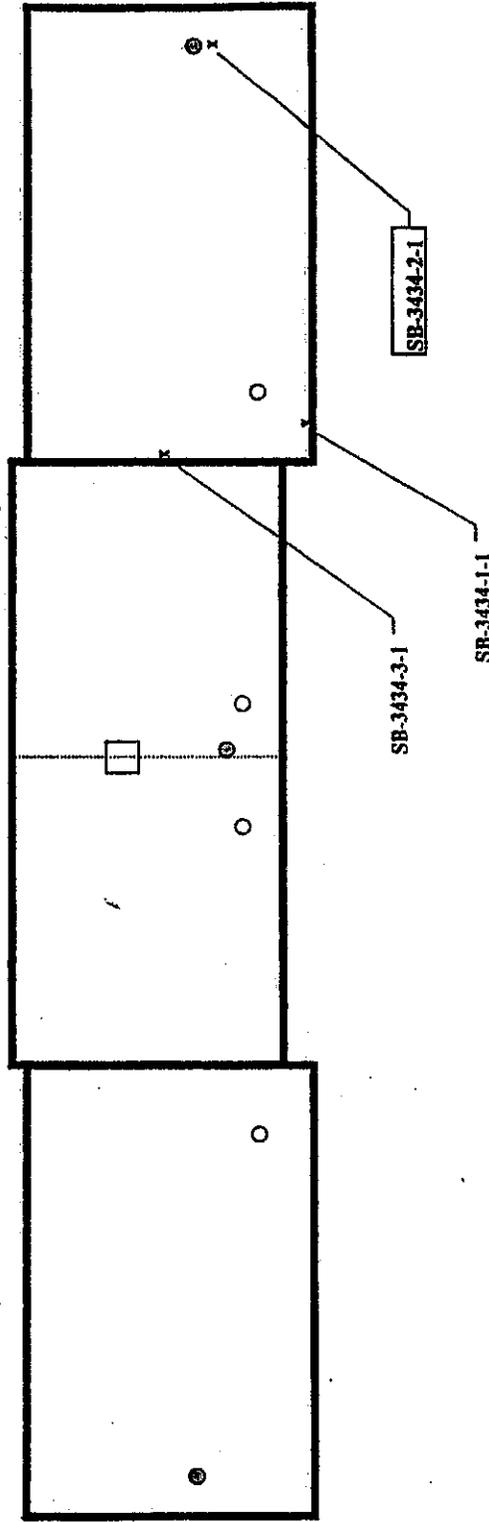
- = 2½" diameter pipes
- = 5" diameter pipes
- = 20½" x 20½" vents
- = 1" cable pipe
- = 3" light pipe



DRAWING NOT TO SCALE  
Ref. 1

<p>Re-Roofing Project</p>	<p>Asbestos Sampling Location Plan, Building Type AV Building 3908, HA-K-1A, Schofield Barracks, Hawaii</p>
<p>DPW, Environmental Division</p>	

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing Master Plan for Oahu

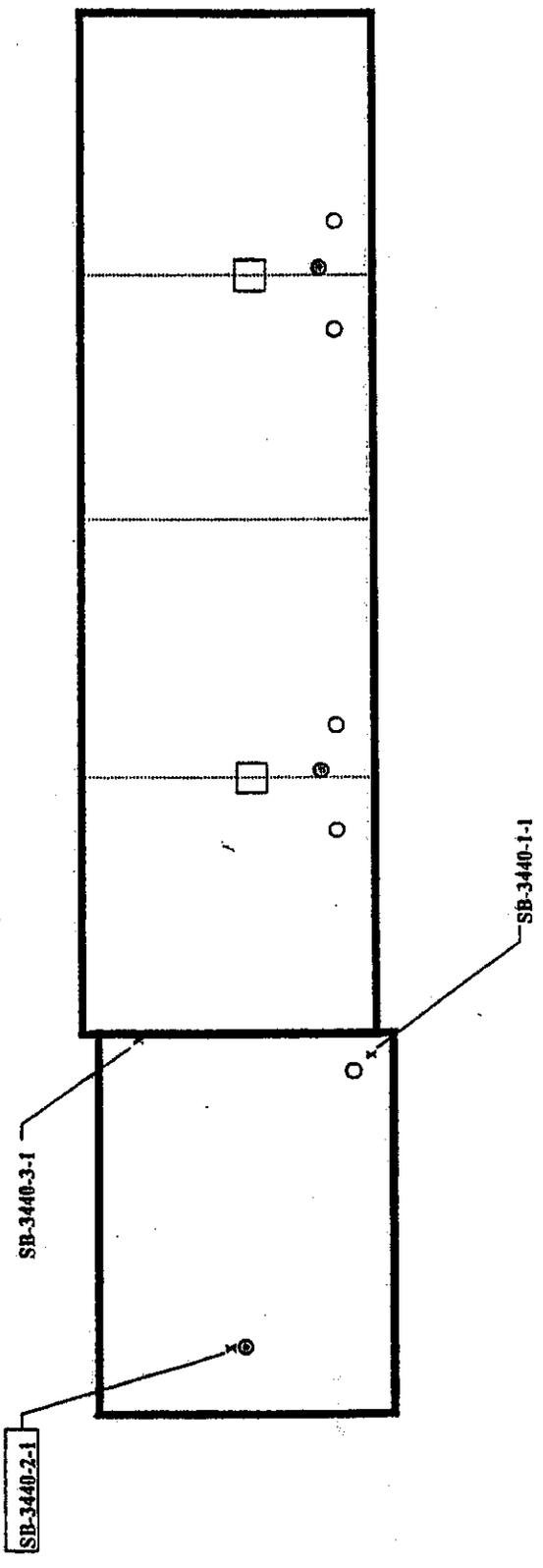


**LEGEND**

- SB-3434-# = Sample ID
- Sample ID = Asbestos-Containing Material
- = 2 1/2" diameter pipes
- ⊗ = 5" diameter pipes
- = 20 1/2"x20 1/2" vents

DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project  
 DPW, Environmental Division  
 Asbestos Sampling Location Plan, Building Type AT/AU-1  
 Building 3434, HA-K-1C, Schofield Barracks, Hawaii



DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**

SB-3440-# = Sample ID

Sample ID = Asbestos-Containing Material

- = 2½" diameter pipes
- ⊙ = 5" diameter pipes
- = 20½"x20½" vents

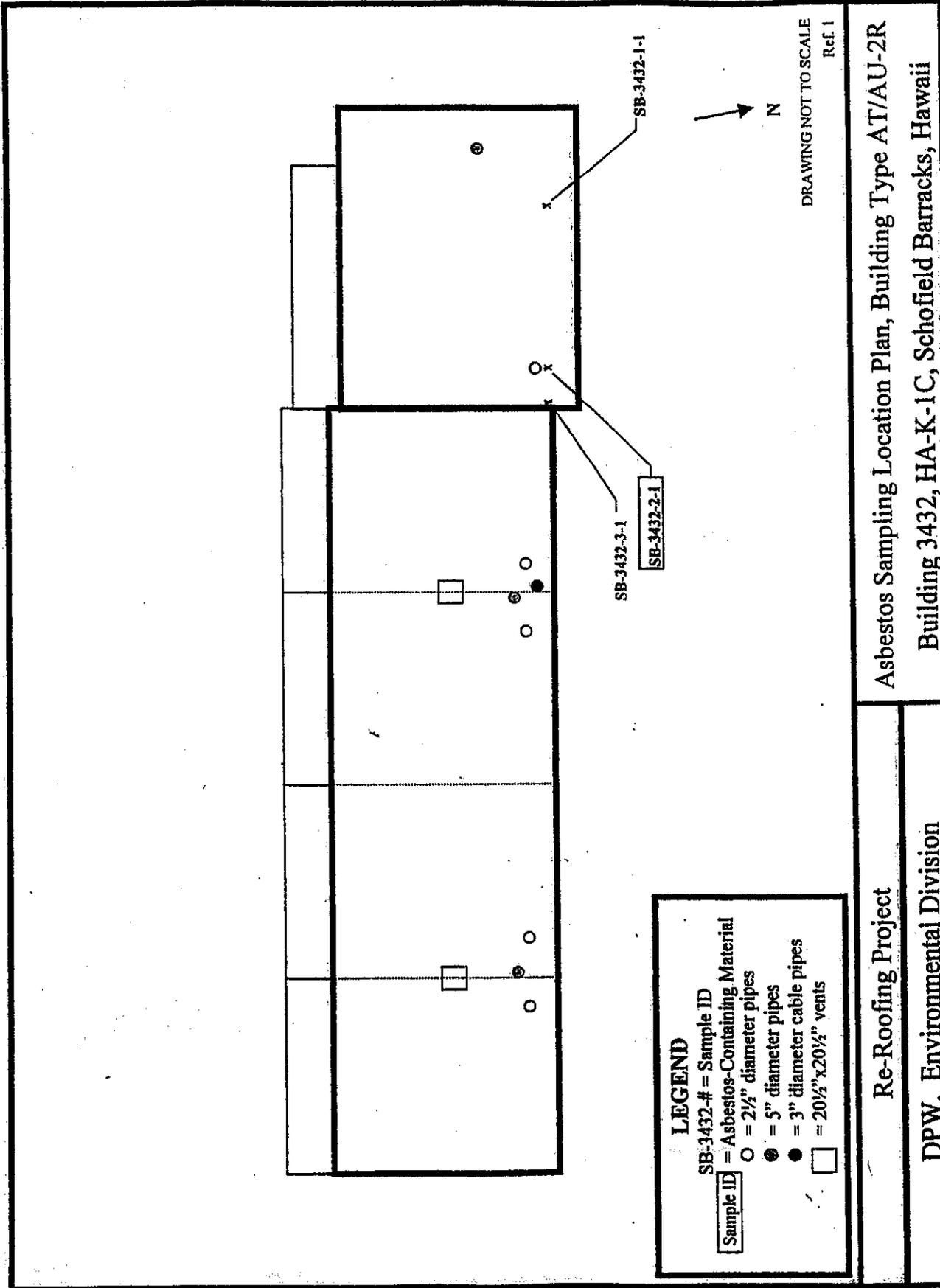
Re-Roofing Project

Asbestos Sampling Location Plan, Building Type AT/AU-2

DPW, Environmental Division

Building 3440, HA-K-1C, Schofield Barracks, Hawaii

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**LEGEND**

SB-3432-# = Sample ID

Sample ID    = Asbestos-Containing Material

○ = 2½" diameter pipes

● = 5" diameter pipes

● = 3" diameter cable pipes

□ = 20½"x20½" vents

DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project

Asbestos Sampling Location Plan, Building Type AT/AU-2R

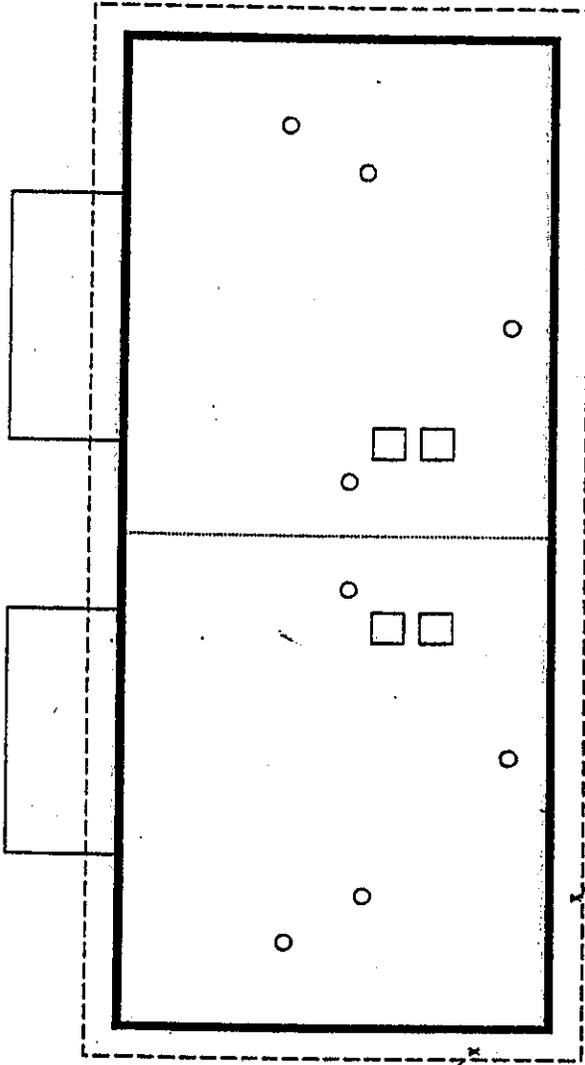
Building 3432, HA-K-1C, Schofield Barracks, Hawaii

DPW, Environmental Division

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Schofield Barracks, Military Housing Master Plan for Oahu

Appendix B-2

Housing Area S-1, Santa Fe Neighborhood



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Ref. 1

**LEGEND**

SB-1911-# = Sample ID

Sample ID = Asbestos-Containing Material

○ = 2" diameter pipes

□ = 10"x10" vents

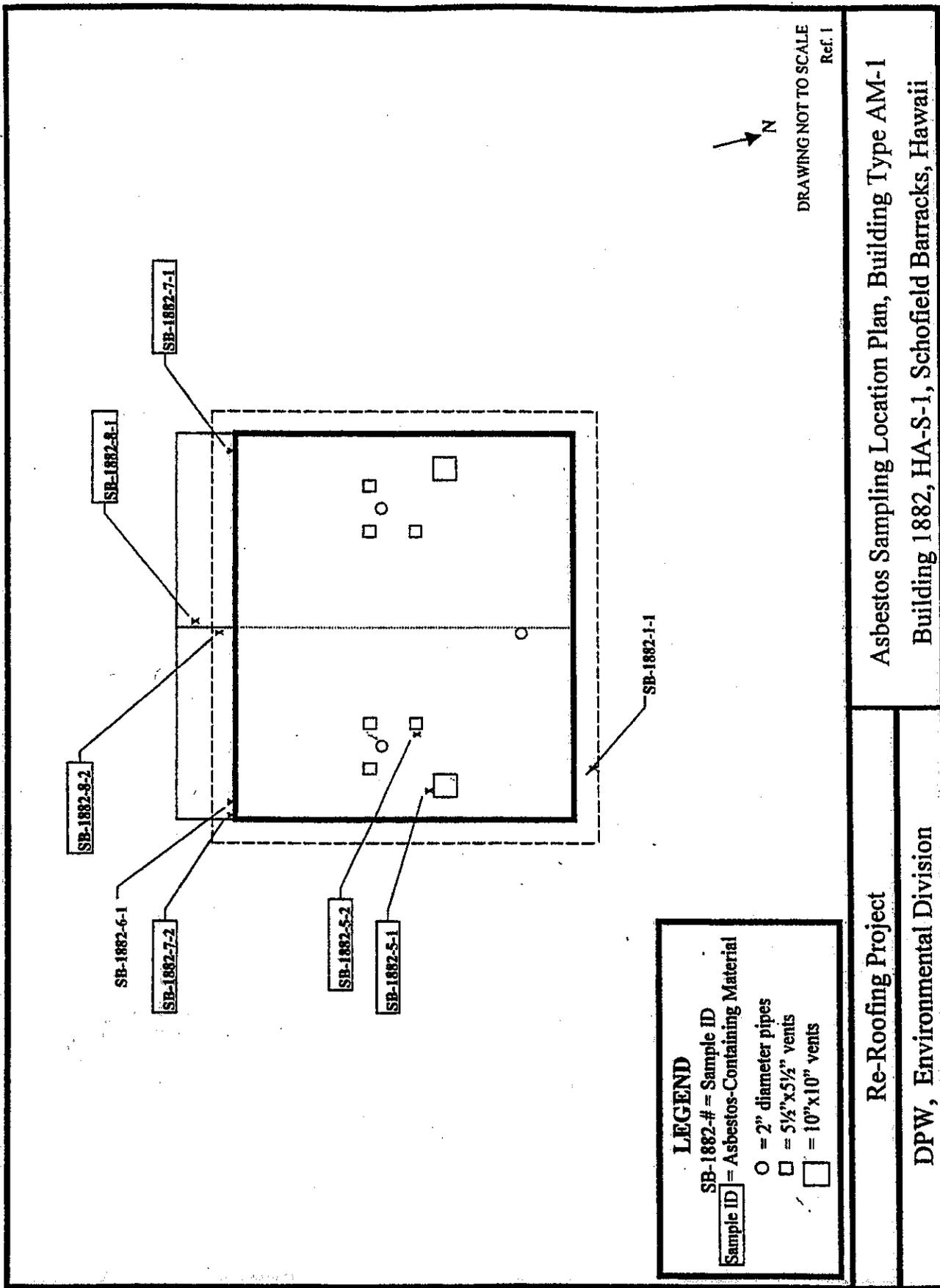
Re-Roofing Project

Asbestos Sampling Location Plan, Building Type AK

Building 1911, HA-S-1, Schofield Barracks, Hawaii

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Ref. 1

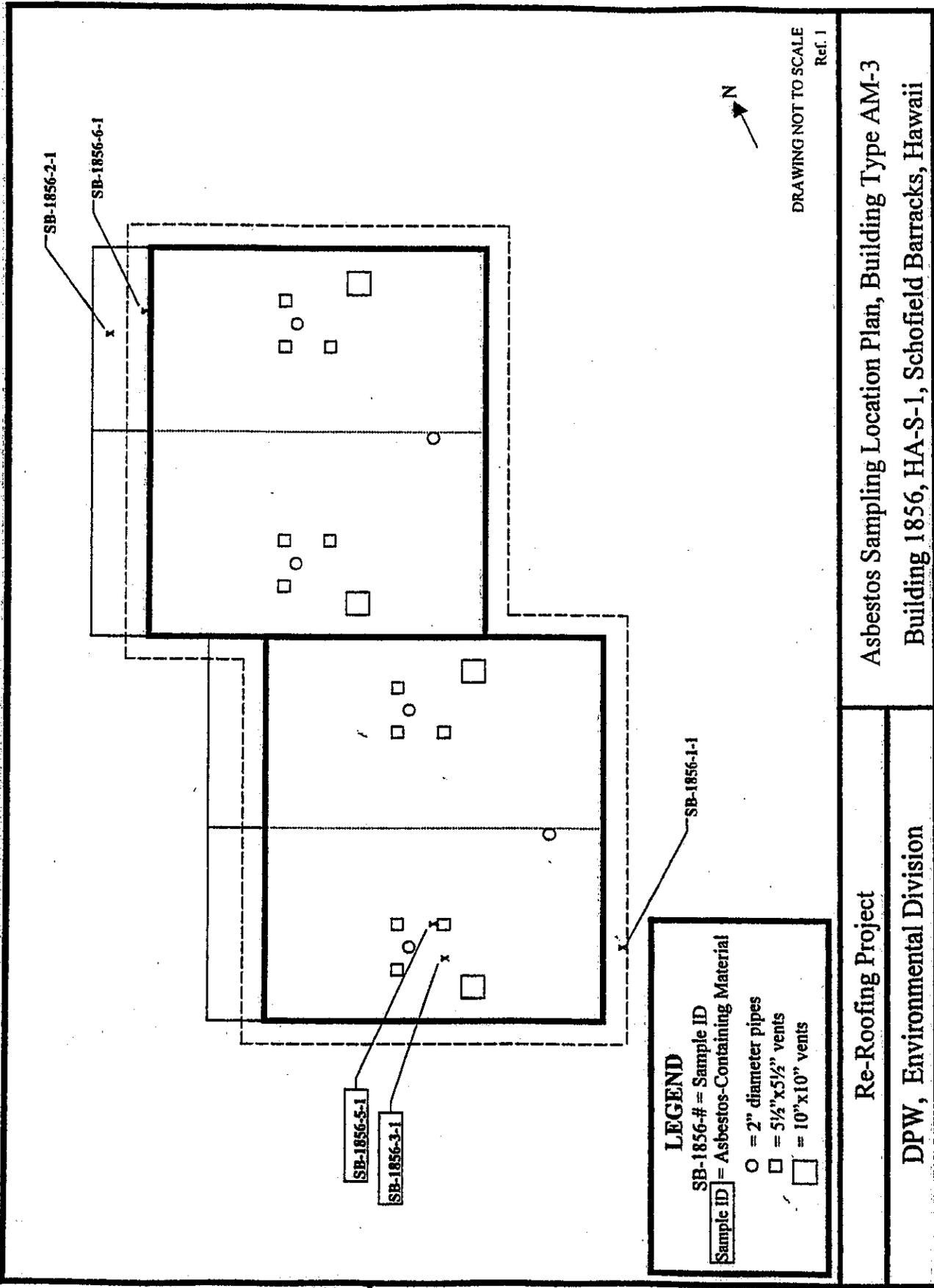
**LEGEND**  
 SB-1882-# = Sample ID  
 Sample ID = Asbestos-Containing Material  
 ○ = 2" diameter pipes  
 □ = 5 1/2" x 5 1/2" vents  
 □ = 10" x 10" vents

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AM-1  
 Building 1882, HA-S-1, Schofield Barracks, Hawaii

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DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**

SB-1856-# = Sample ID

Sample ID = Asbestos-Containing Material

- = 2" diameter pipes
- = 5½"x5½" vents
- = 10"x10" vents

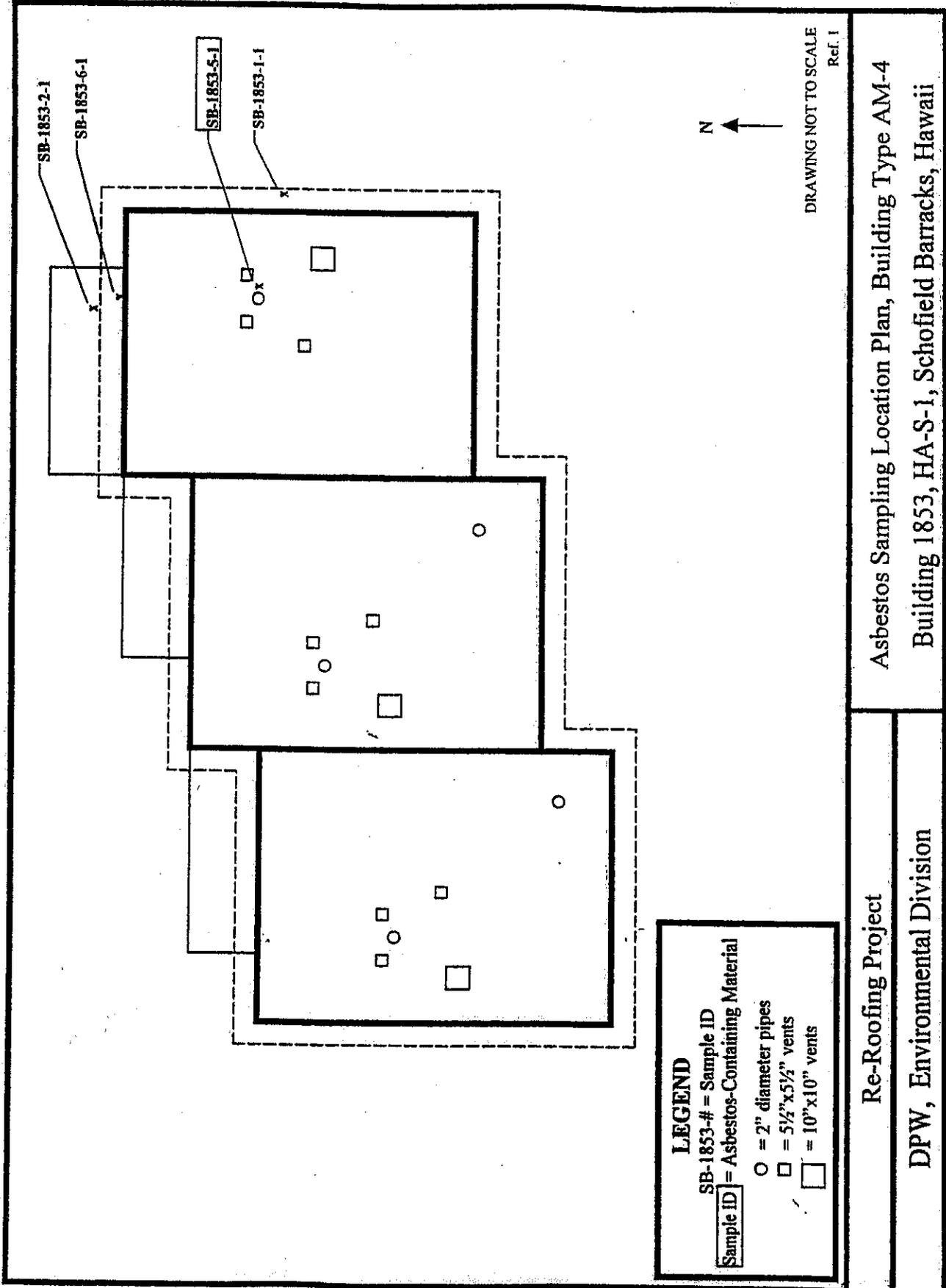
Re-Roofing Project

DPW, Environmental Division

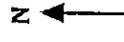
Asbestos Sampling Location Plan, Building Type AM-3

Building 1856, HA-S-1, Schofield Barracks, Hawaii

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Schofield Barracks, Military Housing Master Plan for Oahu



**LEGEND**  
 SB-1853-# = Sample ID  
 Sample ID | = Asbestos-Containing Material  
 ○ = 2" diameter pipes  
 □ = 5 1/2"x5 1/2" vents  
 ▭ = 10"x10" vents



DRAWING NOT TO SCALE  
 Ref. 1

Re-Roofing Project

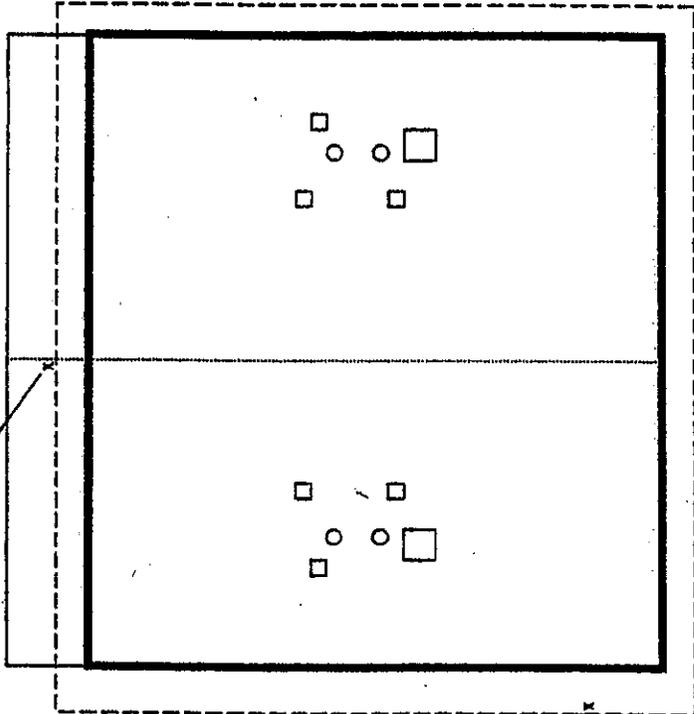
Asbestos Sampling Location Plan, Building Type AM-4

DPW, Environmental Division

Building 1853, HA-S-1, Schofield Barracks, Hawaii

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
 Schofield Barracks, Military Housing Master Plan for Oahu

SB-1851-2-1



SB-1851-1-1

**LEGEND**

SB-1851-# = Sample ID  
Sample ID = Asbestos-Containing Material

- = 2" diameter pipes
- = 5½"x5½" vents
- = 10"x10" vents



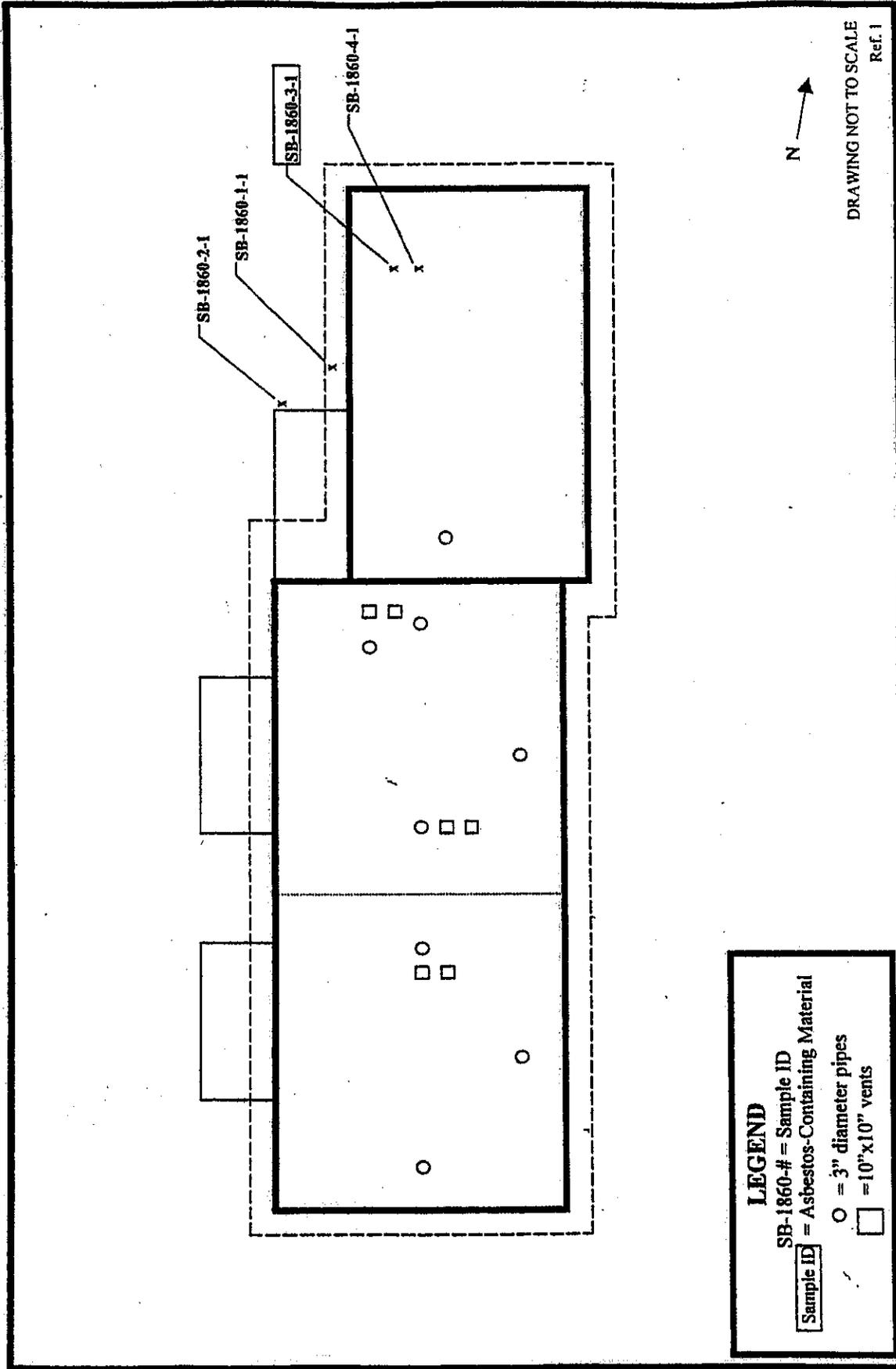
DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AN-1  
Building 1851, HA-S-1, Schofield Barracks, Hawaii

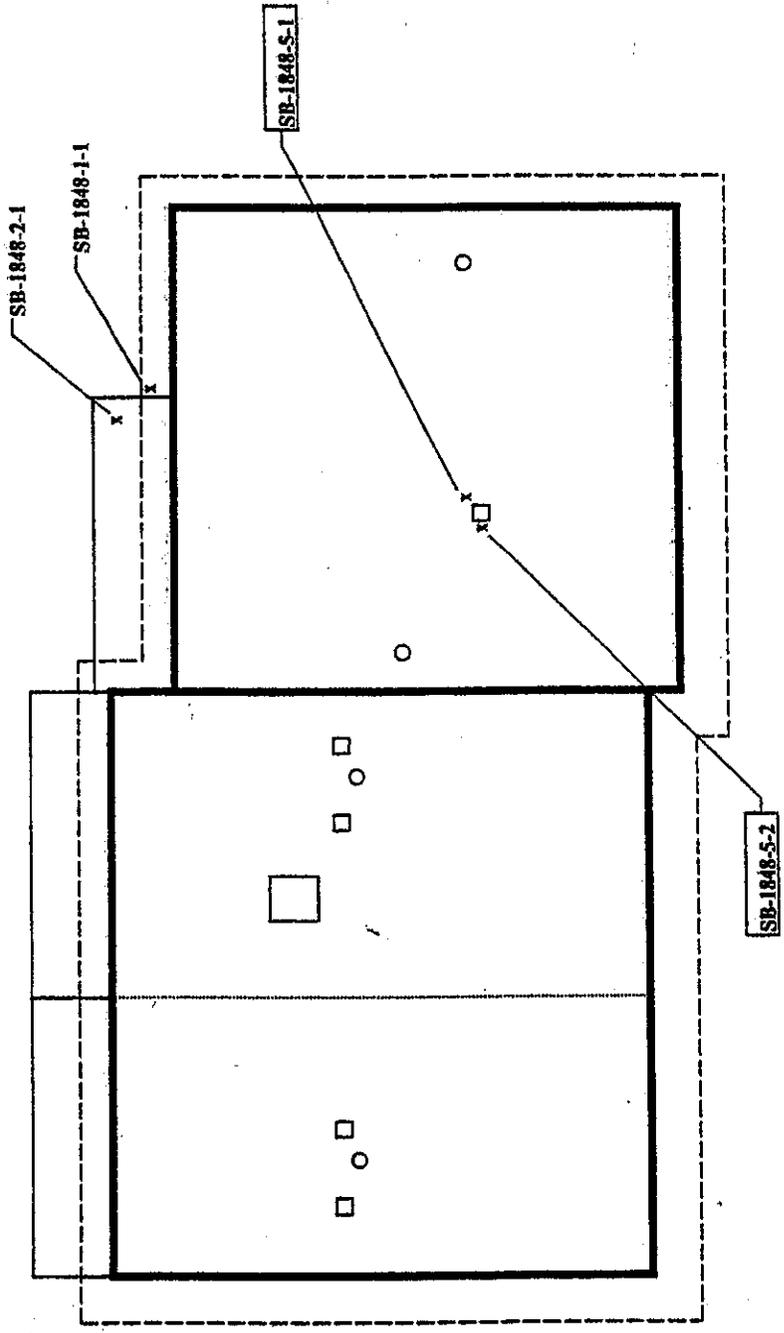
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Schofield Barracks, Military Housing Master Plan for Oahu



Re-Roofing Project  
 DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AK/AL,  
 Building 1860, HA-S-1, Schofield Barracks, Hawaii

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**LEGEND**  
 SB-1848-# = Sample ID  
 [Sample ID] = Asbestos-Containing Material  
 O = 2" diameter pipes  
 □ = 5 1/2" x 5 1/2" vents



DRAWING NOT TO SCALE  
 Ref. 1

Re-Roofing Project  
 DPW, Environmental Division  
 Asbestos Sampling Location Plan, Building Type AL/AM-3,  
 Building 1848, HA-S-1, Schofield Barracks, Hawaii

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 Schofield Barracks, Military Housing Master Plan for Oahu

Appendix B-3

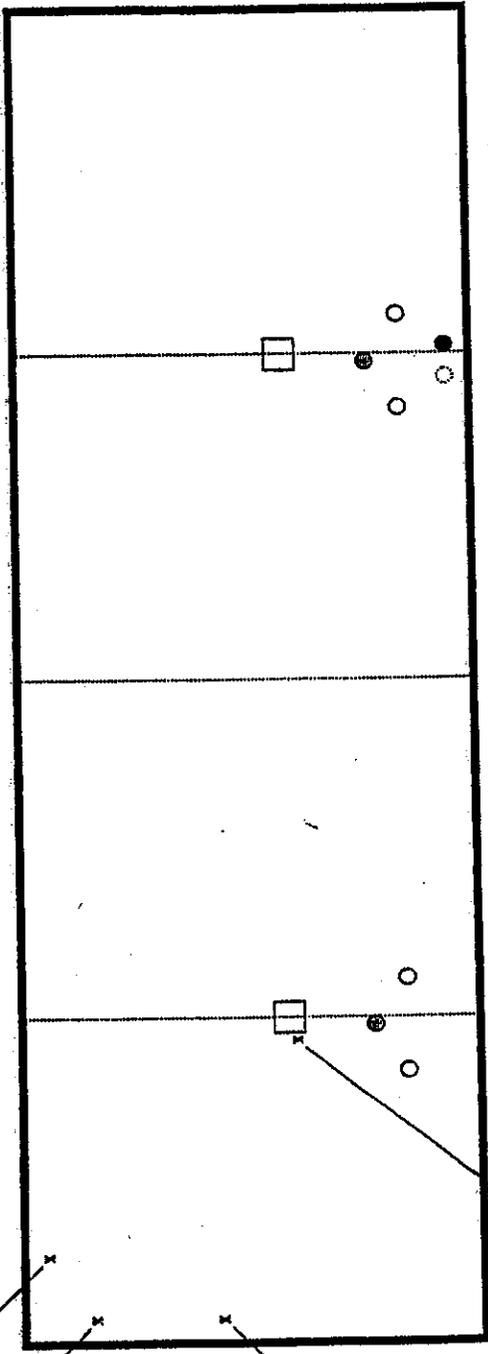
Housing Area T, Moyer Neighborhood

SB-4232-1-1

SB-4232-3-1

SB-4232-3-2

SB-4232-2-1



**LEGEND**

SB-4232-# = Sample ID

Sample ID = Asbestos-Containing Material

Sample ID = <1% asbestos

○ = 2½" diameter pipes

● = 5" diameter pipes

□ = 20½"x20½" vents

○ = 1" cable pipe

● = 3" light pipe

DRAWING NOT TO SCALE  
Ref. 1

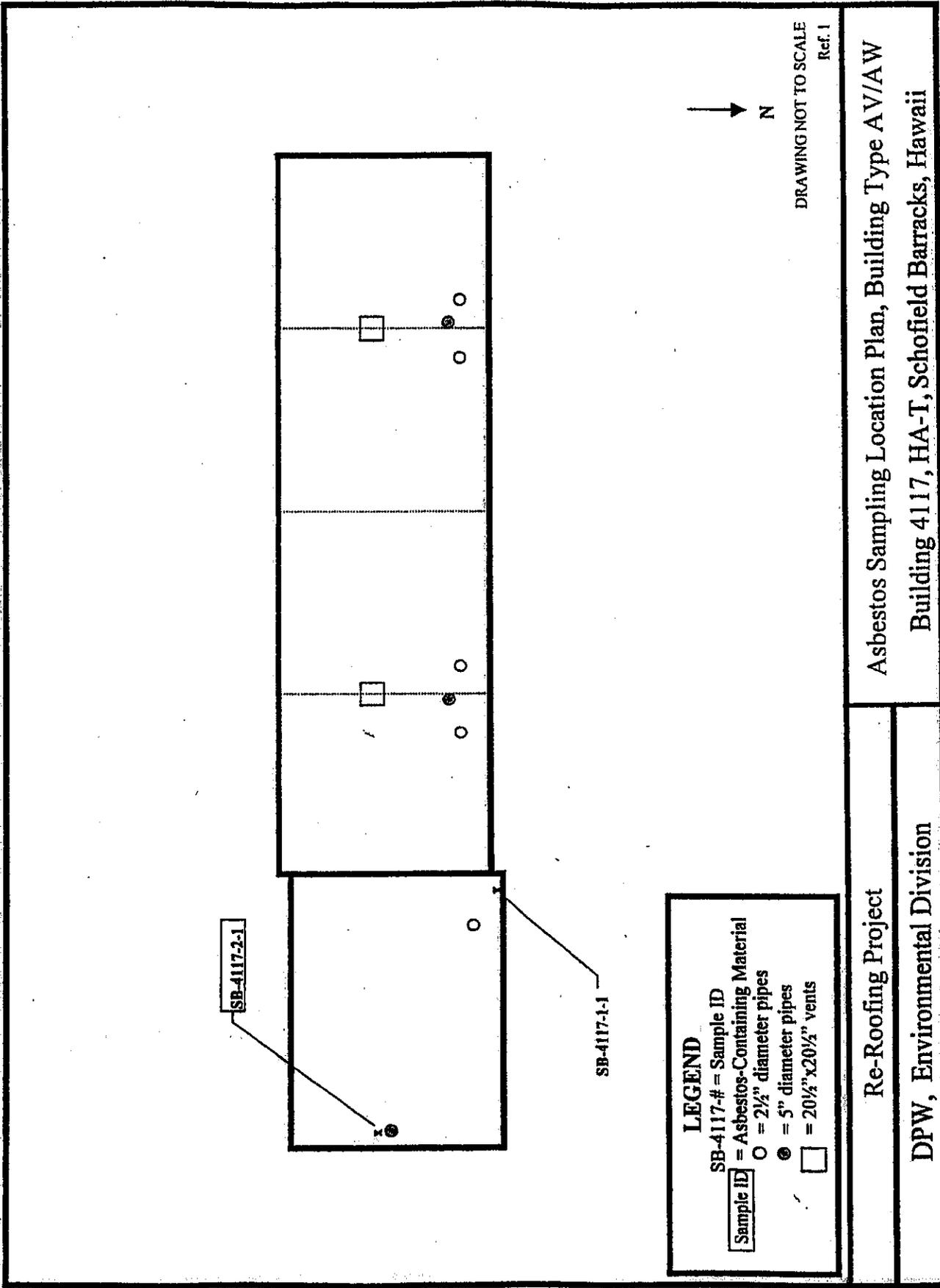


Asbestos Sampling Location Plan, Building Type AV  
Building 4232, HA-T, Schofield Barracks, Hawaii

Re-Roofing Project

DPW, Environmental Division

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SB-4117-2-1

SB-4117-1-1

**LEGEND**

SB-4117-# = Sample ID

Sample ID = Asbestos-Containing Material

○ = 2½" diameter pipes

⊙ = 5" diameter pipes

□ = 20½" x 20½" vents

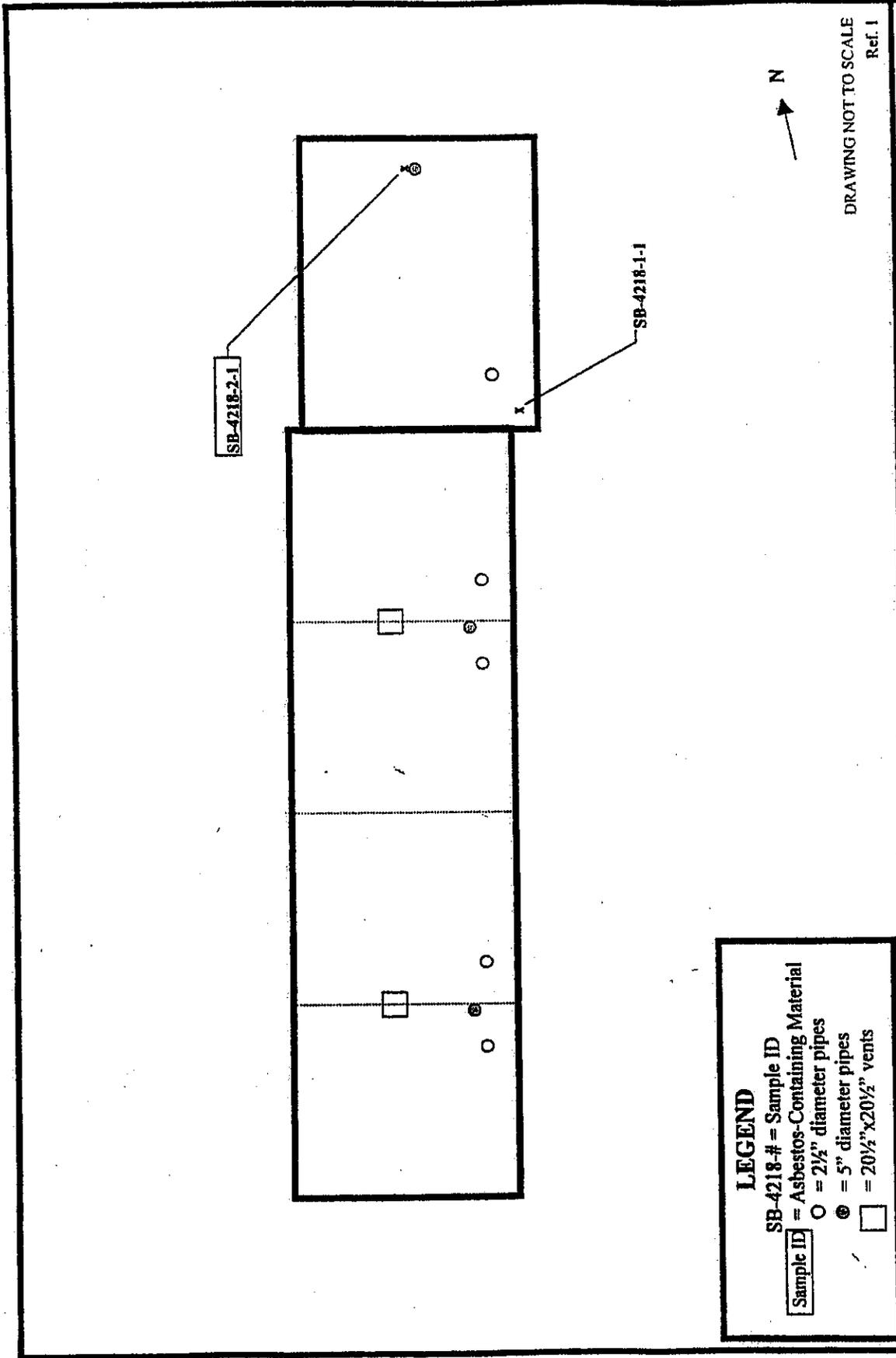
DRAWING NOT TO SCALE  
Ref. 1



Asbestos Sampling Location Plan, Building Type AV/AW  
Building 4117, HA-T, Schofield Barracks, Hawaii

Re-Roofing Project  
DPW, Environmental Division

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**LEGEND**  
 SB-4218-# = Sample ID  
 Sample ID = Asbestos-Containing Material  
 ○ = 2 1/2" diameter pipes  
 ⊗ = 5" diameter pipes  
 □ = 20 1/2" x 20 1/2" vents



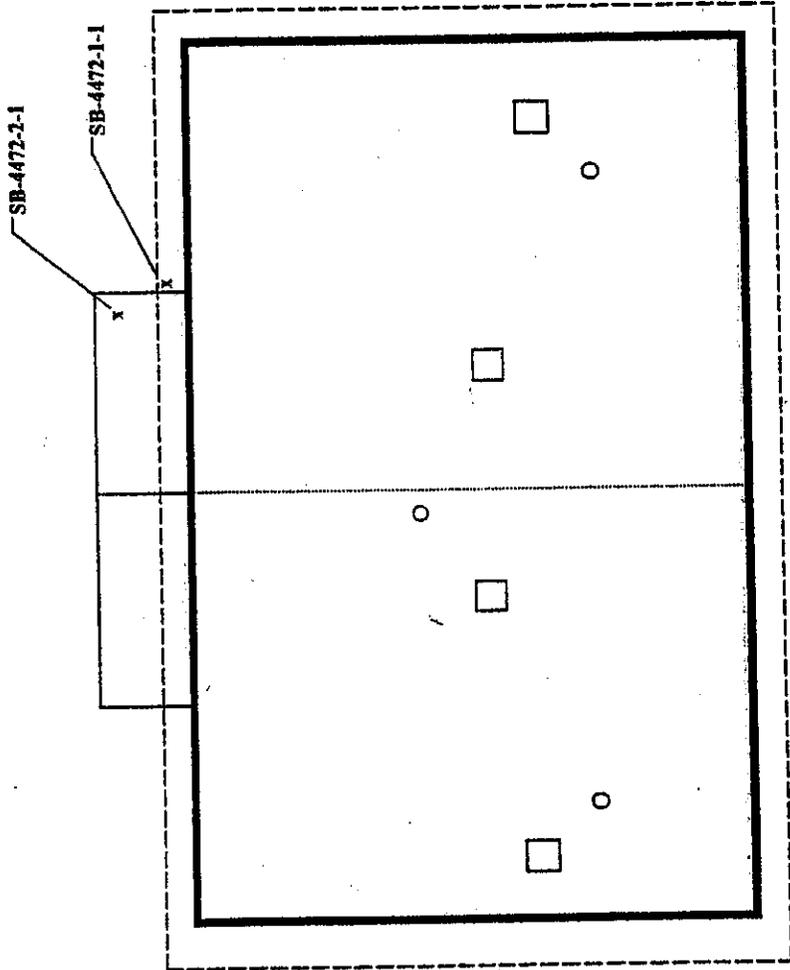
DRAWING NOT TO SCALE  
 Ref. 1

Re-Roofing Project  
 DPW, Environmental Division  
 Asbestos Sampling Location Plan, Building Type AV/AW-R  
 Building 4218, HA-T, Schofield Barracks, Hawaii

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Appendix B-4

Housing Area T-1, Aloala Neighborhood



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Ref. 1

**LEGEND**

- SB-4472-# = Sample ID
- Sample ID = Asbestos-Containing Material
- = 2½" diameter pipe
- = 10"x10" vent

Asbestos Sampling Location Plan, Building Type B-2,  
Building 4472, HA-T-1, Schofield Barracks, Hawaii

Re-Roofing Project

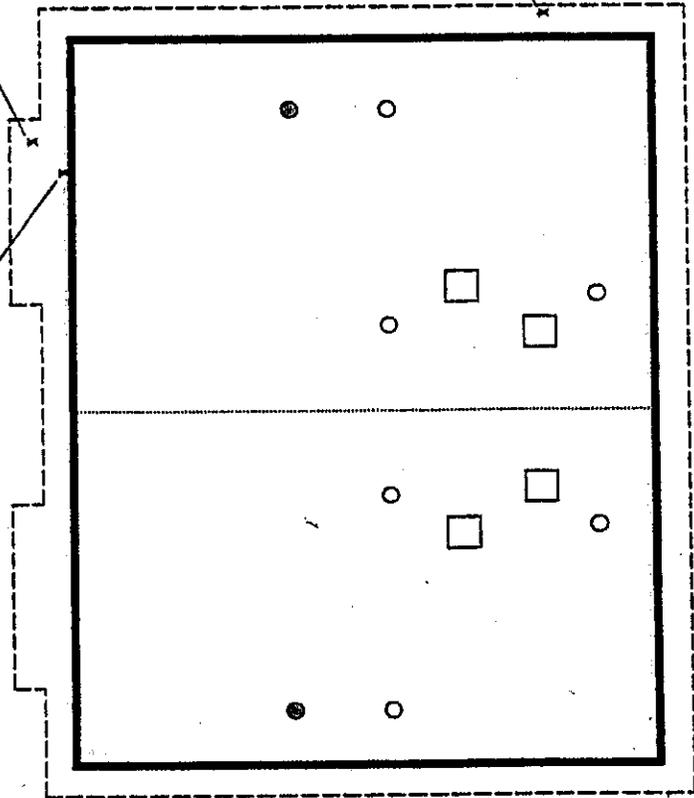
DPW, Environmental Division

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Schofield Barracks, Military Housing Master Plan for Oahu

SB-4420-4-1

SB-4420-2-1

SB-4420-1-1



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Ref. 1

**LEGEND**

- SB-4420-# = Sample ID
- [Sample ID] = Asbestos-Containing Material
- = 2 1/2" diameter pipes
- = 4" diameter pipes
- = 5 1/2" x 5 1/2" vents

Asbestos Sampling Location Plan, Building Type AY-1  
Building 4420, HA-T-1, Schofield Barracks, Hawaii

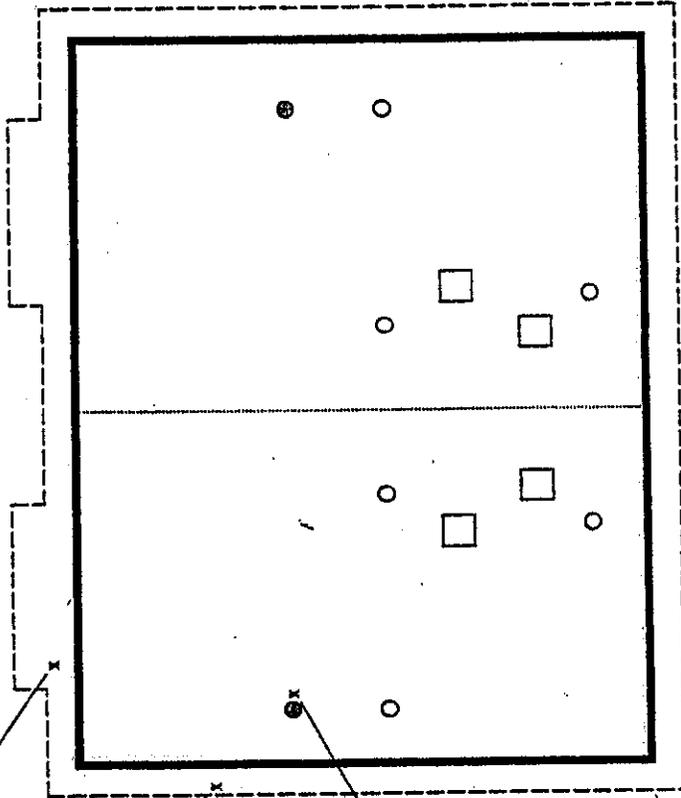
Re-Roofing Project  
DPW, Environmental Division

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing Master Plan for Oahu

SB-4446-2-1

SB-4446-1-1

SB-4446-3-1



DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**

SB-4446-# = Sample ID

Sample ID = Asbestos-Containing Material

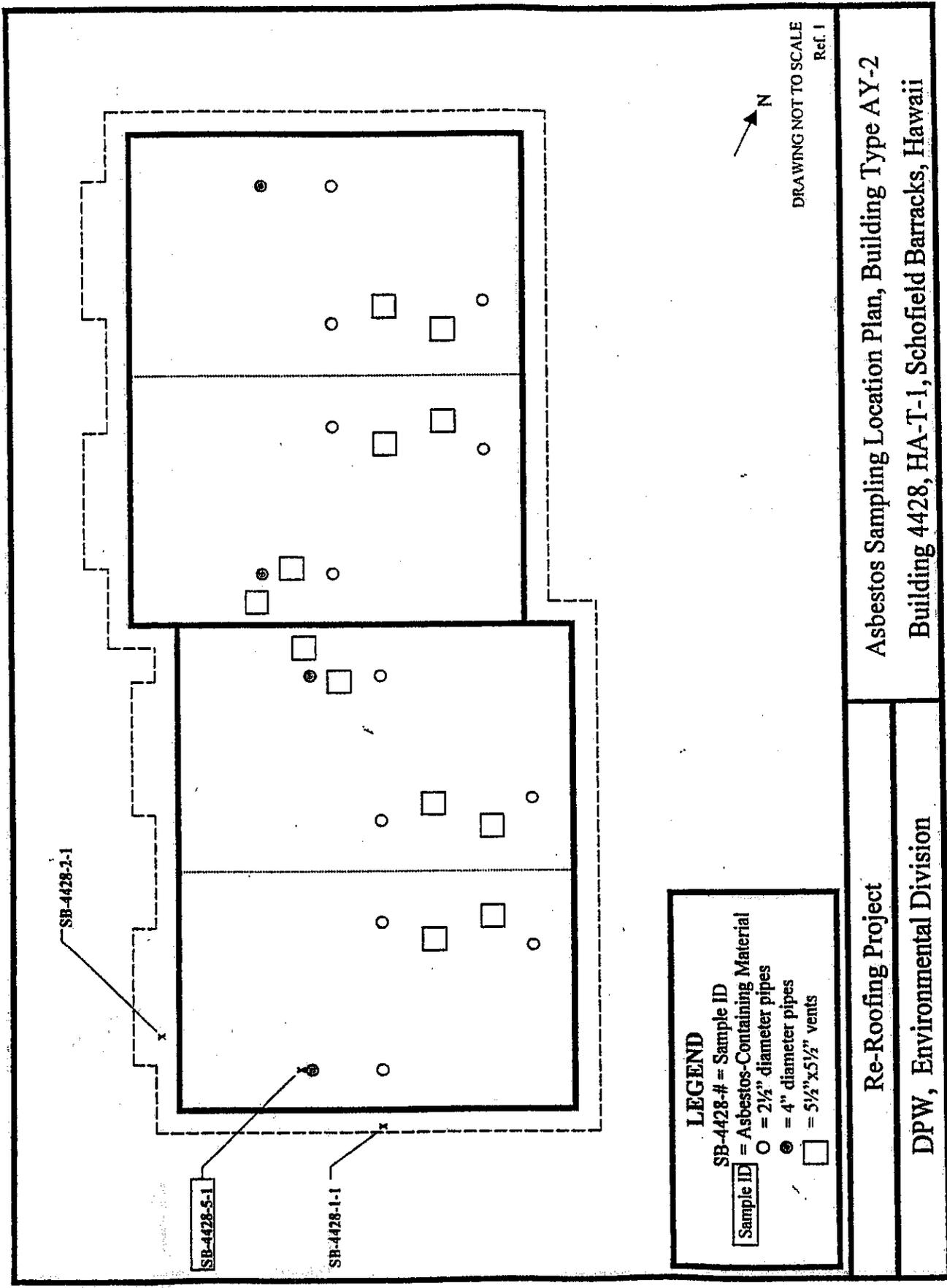
○ = 2½" diameter pipes

● = 4" diameter pipes

□ = 5½"x5½" vents

Re-Roofing Project	Asbestos Sampling Location Plan, Building Type AY-1
DPW, Environmental Division	Building 4446, HA-T-1, Schofield Barracks, Hawaii

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Schofield Barracks, Military Housing Master Plan for Oahu



**LEGEND**  
 SB-4428-# = Sample ID  
 [Sample ID] = Asbestos-Containing Material  
 ○ = 2½" diameter pipes  
 ⊙ = 4" diameter pipes  
 □ = 5½" x 5½" vents



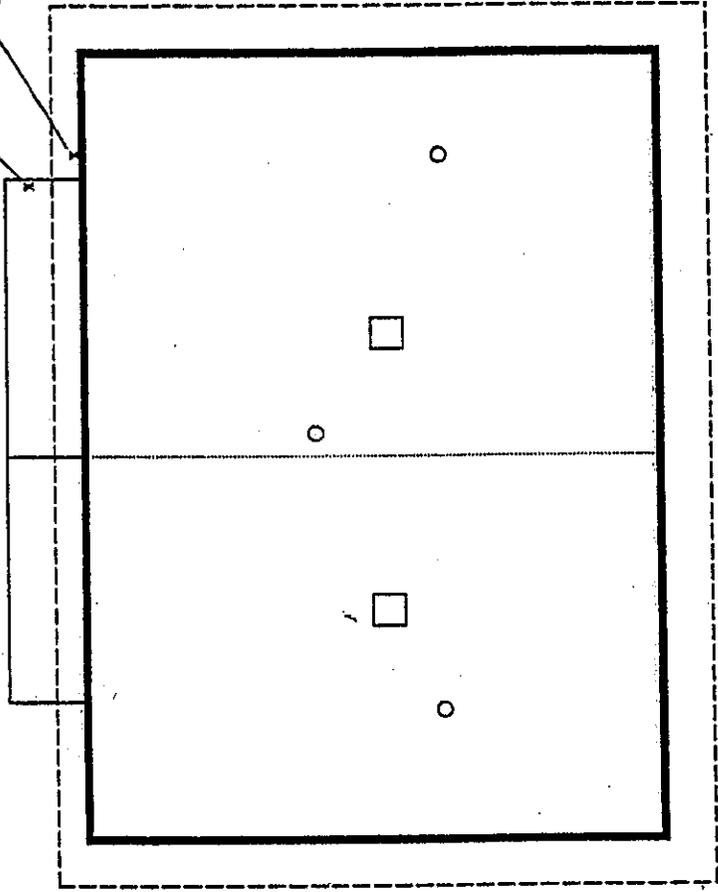
DRAWING NOT TO SCALE  
 Ref. 1

Re-Roofing Project  
 DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AY-2  
 Building 4428, HA-T-1, Schofield Barracks, Hawaii

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SB-4475-2-1  
SB-4475-1-1



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Ref. 1

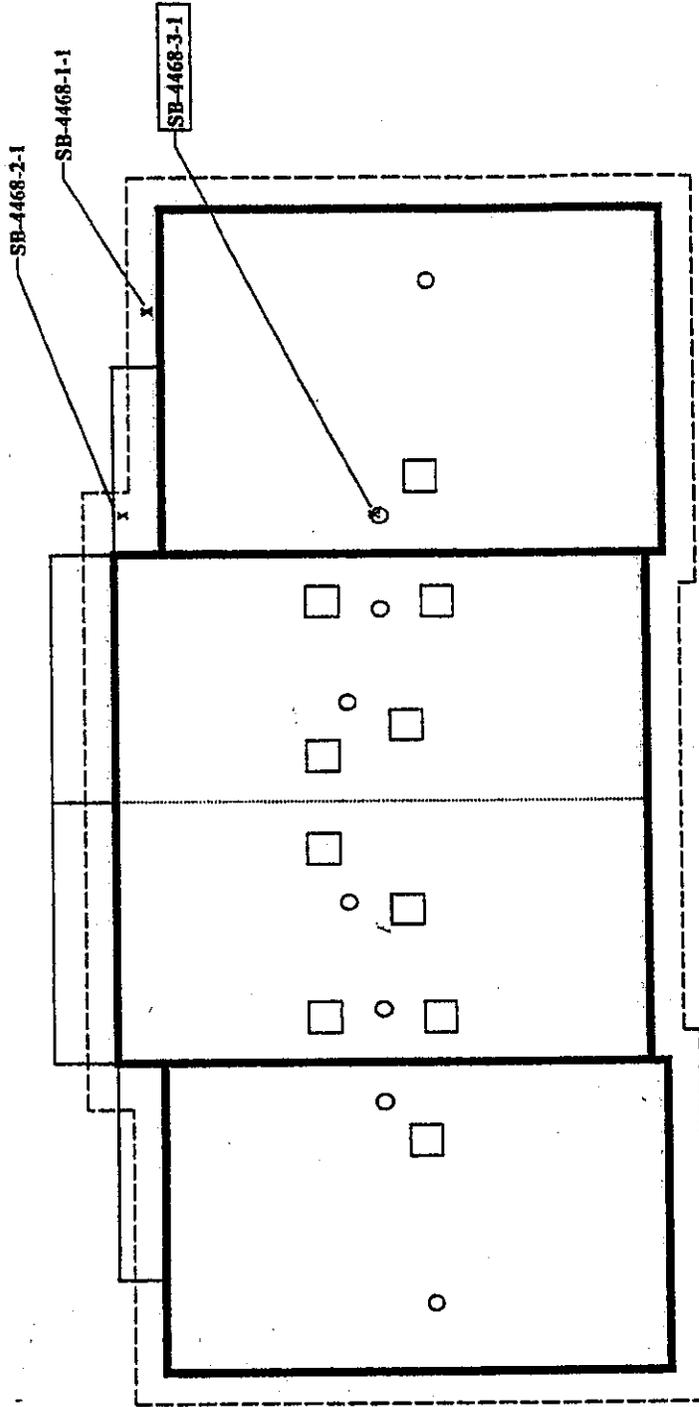
**LEGEND**  
SB-4475-# = Sample ID  
[Sample ID] = Asbestos-Containing Material  
○ = 2½" diameter pipe  
□ = 10"x10" vent

Asbestos Sampling Location Plan, Building Type AZ  
Building 4475, HA-T-1, Schofield Barracks, Hawaii

Re-Roofing Project

DPW, Environmental Division

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**LEGEND**

- SB-4468-# = Sample ID
- Sample ID = Asbestos-Containing Material
- = 2½" diameter pipe
- = 10" x 10" vent



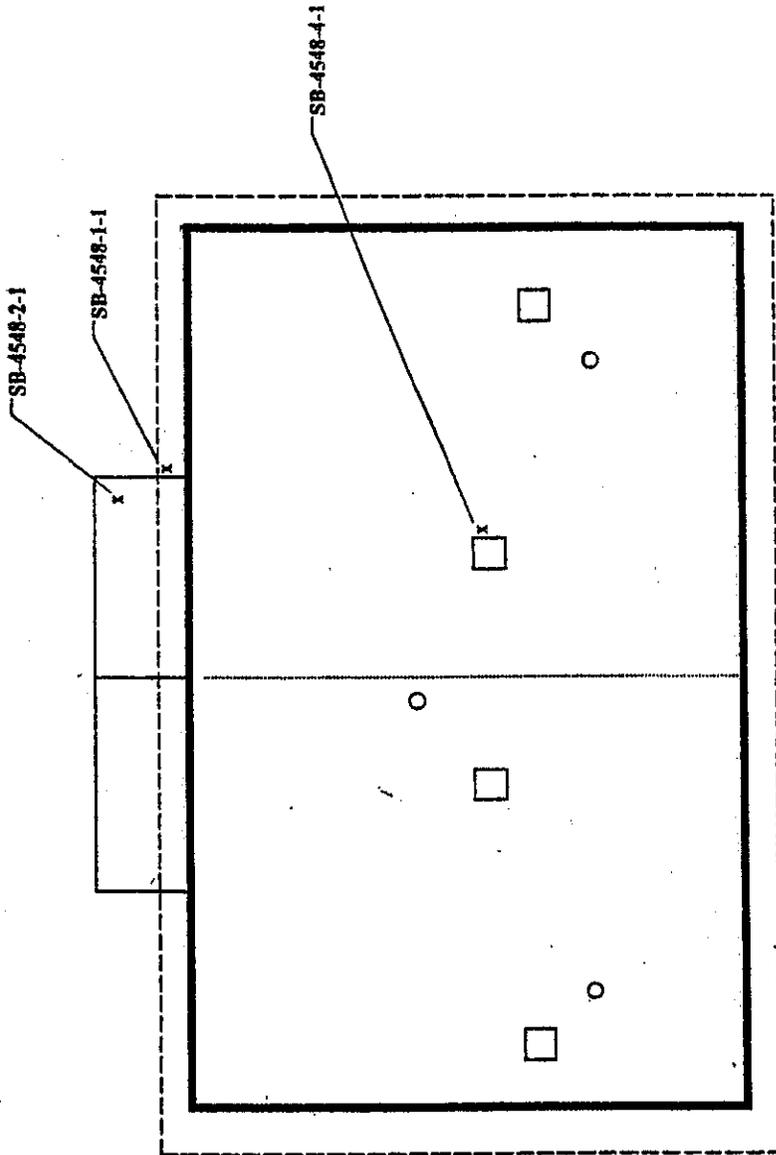
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Ref. 1

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AZ/BA,  
Building 4468, HA-T-1, Schofield Barracks, Hawaii

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Schofield Barracks, Military Housing Master Plan for Oahu



**LEGEND**

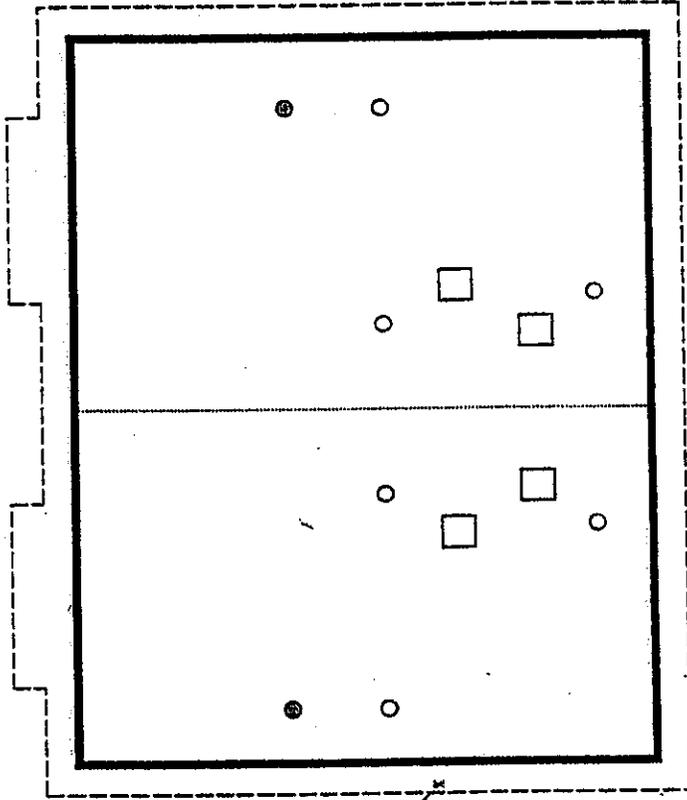
- SB-4548-# = Sample ID
- [Sample ID] = Asbestos-Containing Material
- = 2½" diameter pipe
- = 10"x10" vent



DRAWING NOT TO SCALE  
Ref. 1

<p><b>Re-Roofing Project</b></p>	<p><b>Asbestos Sampling Location Plan, Building Type B-2, Building 4548, HA-T-1, Schofield Barracks, Hawaii</b></p>
<p><b>DPW, Environmental Division</b></p>	

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SB-4525-1-1

**LEGEND**

- SB-4525-# = Sample ID
- Sample ID = Asbestos-Containing Material
- = 2 1/2" diameter pipes
- = 4" diameter pipes
- = 5 1/2" x 5 1/2" vents



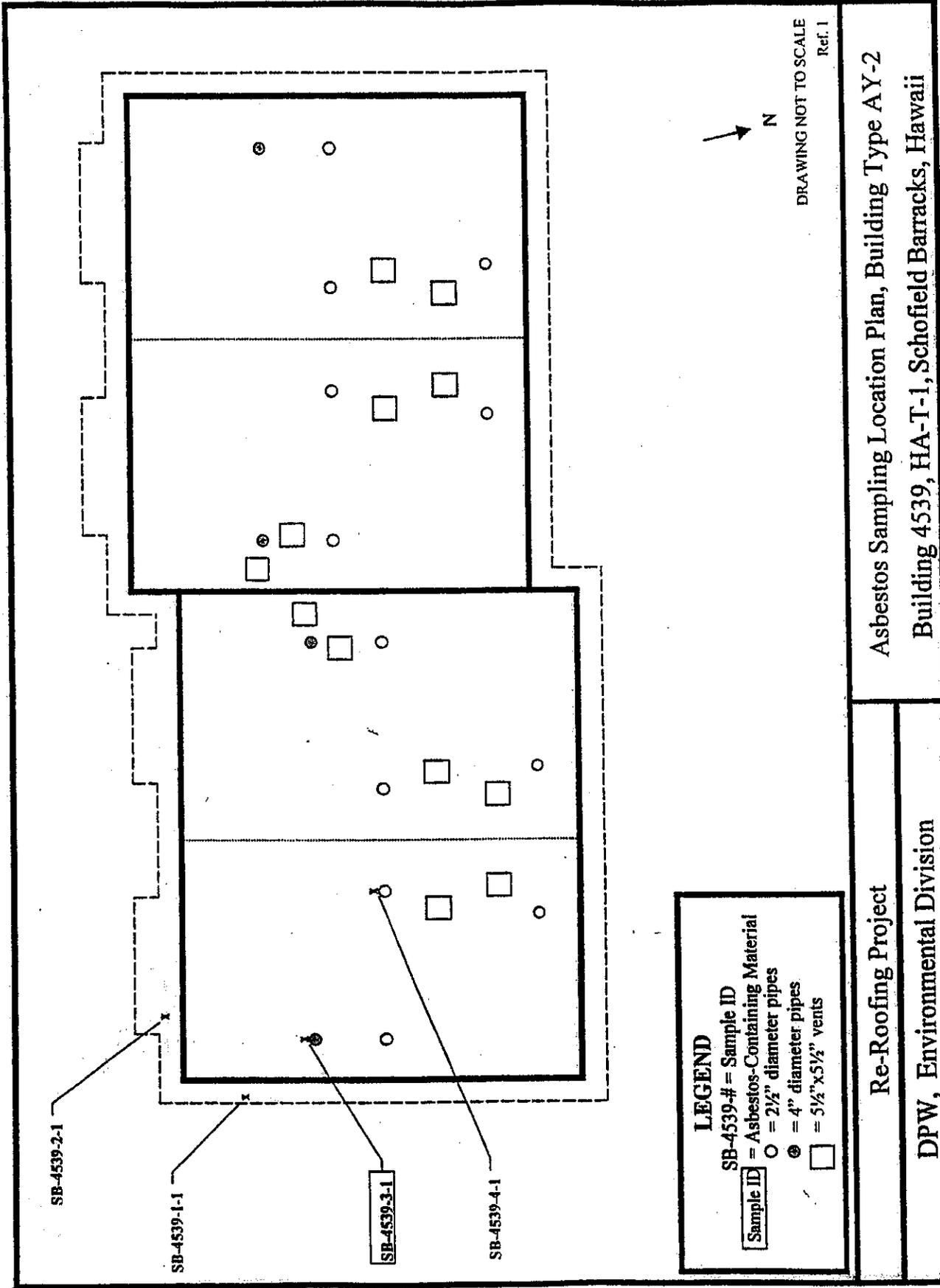
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Ref. 1

Re-Roofing Project

Asbestos Sampling Location Plan, Building Type AY-1  
Building 4525, HA-T-1, Schofield Barracks, Hawaii

DPW, Environmental Division

Watanabe & Associates, Inc., Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing, Master Plan for Oahu



**LEGEND**

- SB-4539-# = Sample ID
- = Asbestos-Containing Material
- = 2 1/2" diameter pipes
- ⊙ = 4" diameter pipes
- = 5 1/2" x 5 1/2" vents

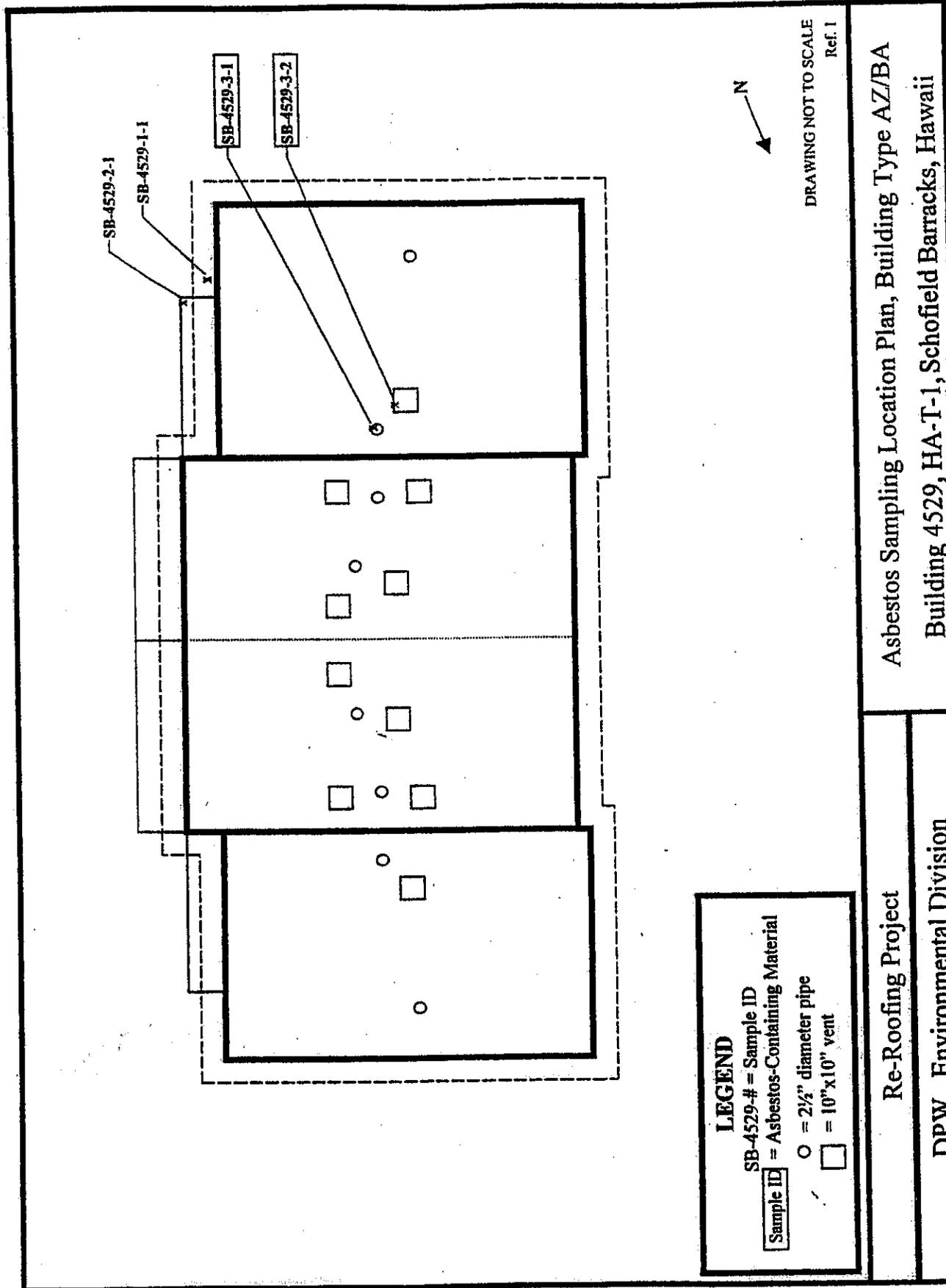
DRAWING NOT TO SCALE  
Ref. 1



Re-Roofing Project  
DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AY-2  
Building 4539, HA-T-1, Schofield Barracks, Hawaii

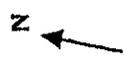
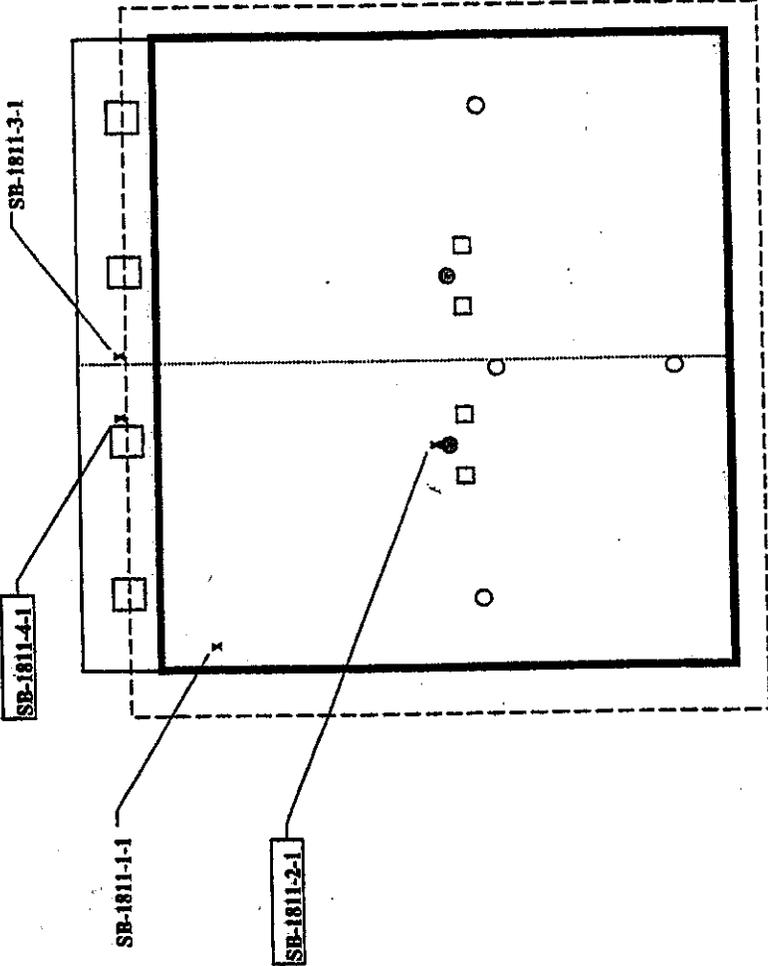
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Schofield Barracks, Military Housing Master Plan for Oahu

Appendix B-5

Housing Area T-2, Santa Fe Neighborhood



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Ref. 1

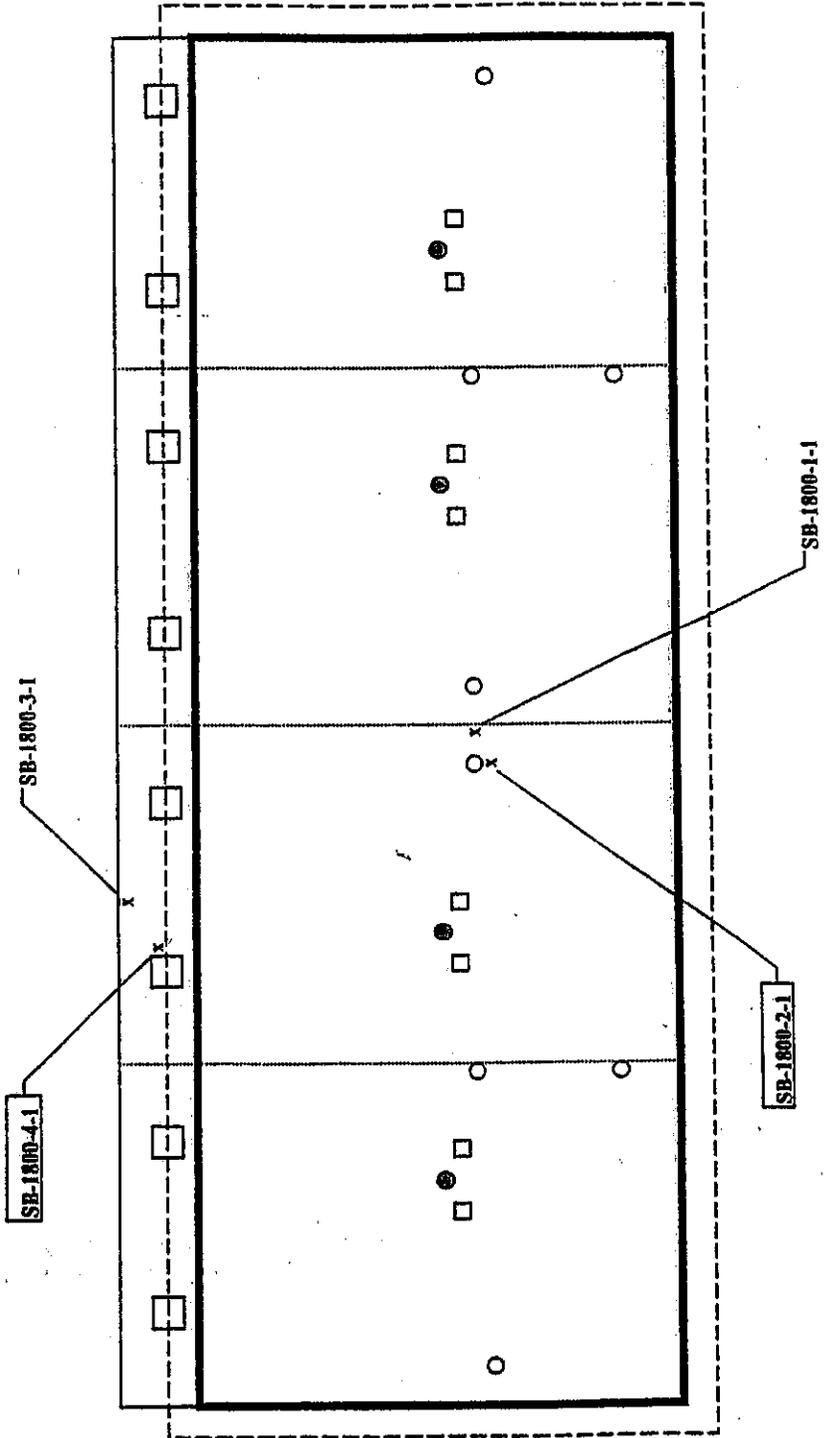
**LEGEND**

- SB-1811-# = Sample ID
- Sample ID | = Asbestos-Containing Material
- = 2" diameter pipes
- ⊙ = 4" diameter pipes
- = Vents
- = Skylights

Asbestos Sampling Location Plan, Building Type AN-1  
Building 1811, HA-T-2, Schofield Barracks, Hawaii

Re-Roofing Project  
DPW, Environmental Division

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**LEGEND**

- SB-1800-# = Sample ID
- Sample ID in box = Asbestos-Containing Material
- = 2" diameter pipes
- ⊙ = 4" diameter pipes
- = Vents
- = Skylights



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Ref. 1

Re-Roofing Project

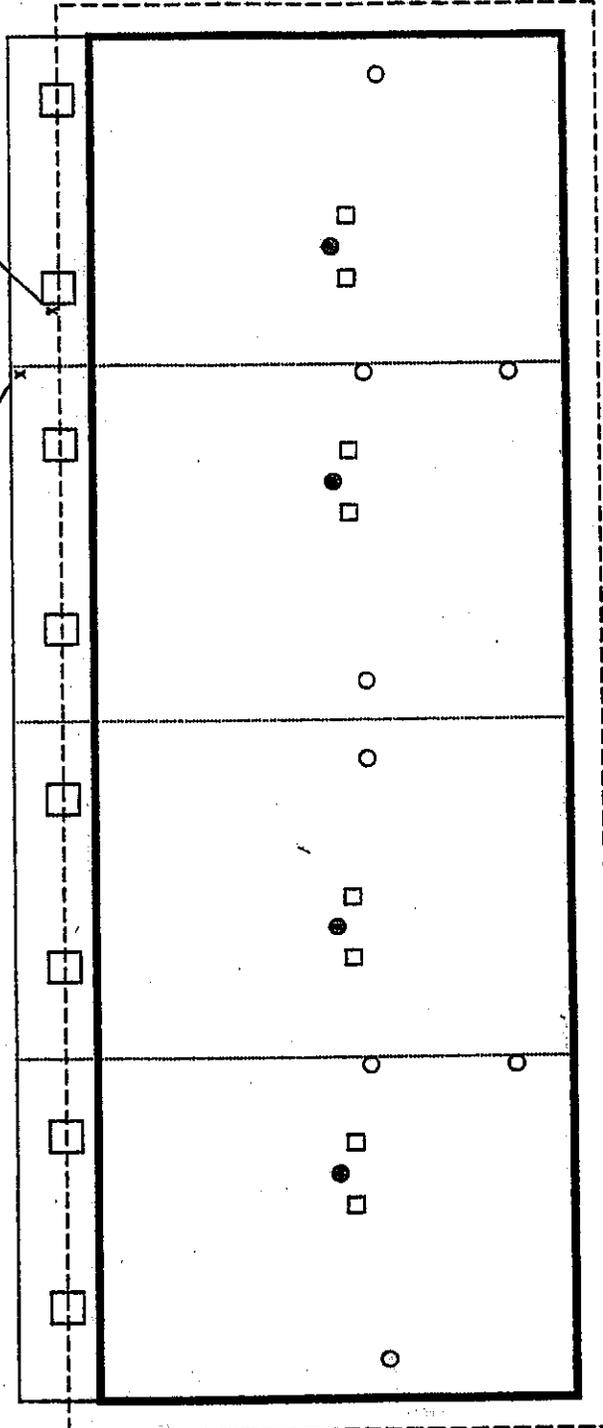
DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AN-2  
Building 1800, HA-T-2, Schofield Barracks, Hawaii

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Schofield Barracks, Military Housing Master Plan for Oahu

SB-1814-3-1

SB-1814-4-1



**LEGEND**

SB-1814-# = Sample ID  
Sample ID = Asbestos-Containing Material

- = 2" diameter pipes
- ⊙ = 4" diameter pipes
- = Vents
- ◻ = Skylights



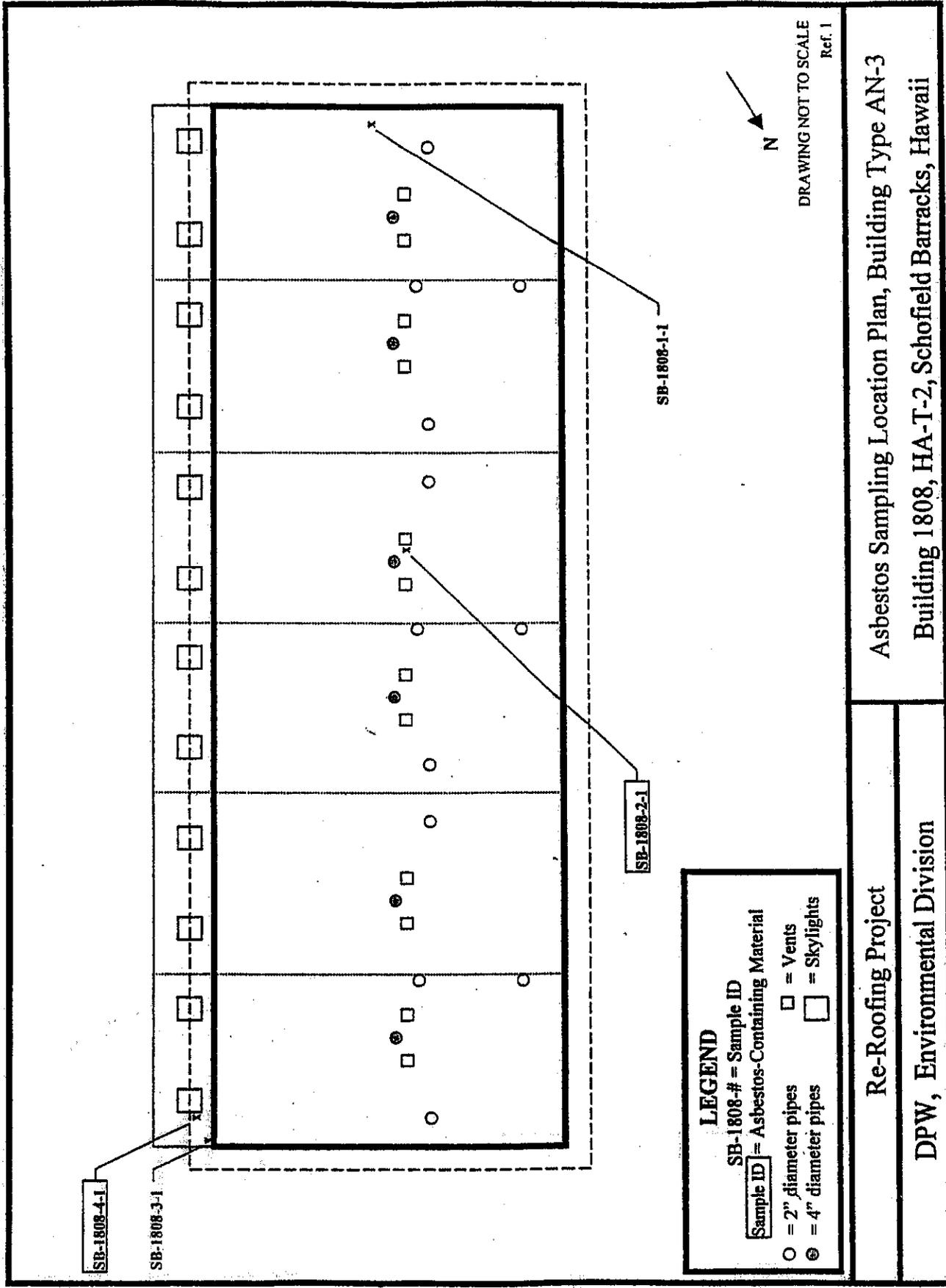
DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AN-2  
Building 1814, HA-T-2, Schofield Barracks, Hawaii

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**LEGEND**

SB-1808-# = Sample ID

Sample ID = Asbestos-Containing Material

○ = 2" diameter pipes

⊙ = 4" diameter pipes

□ = Vents

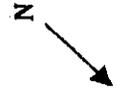
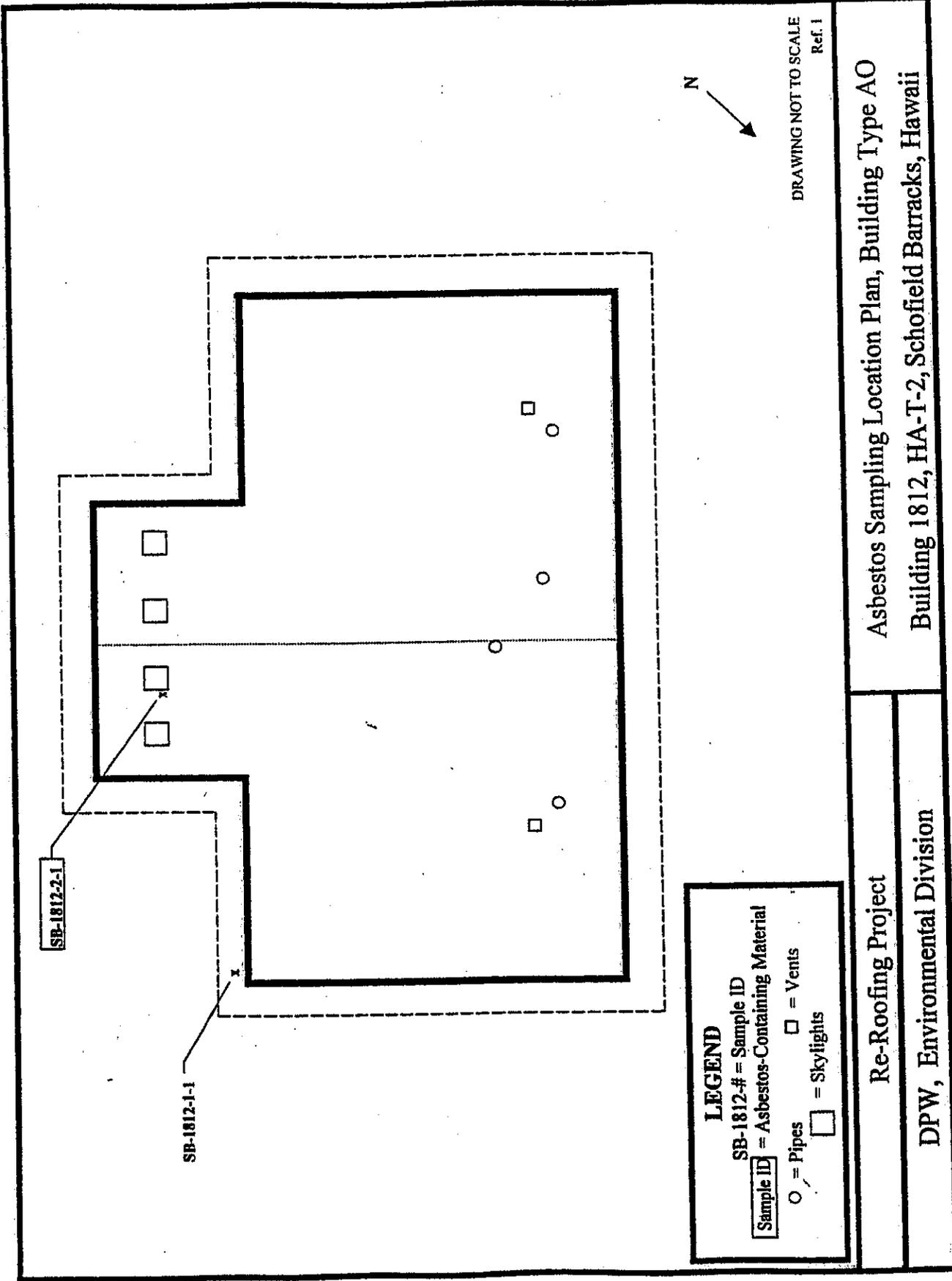
▣ = Skylights

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Re-Roofing Project  
DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AN-3  
Building 1808, HA-T-2, Schofield Barracks, Hawaii

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DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**

SB-1812-# = Sample ID

Sample ID = Asbestos-Containing Material

□ = Pipes      □ = Vents

○ = Pipes      □ = Skylights

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type AO  
Building 1812, HA-T-2, Schofield Barracks, Hawaii

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing Master Plan for Oahu

## Appendix C

### Asbestos Analytical Laboratory Results



Electron & Optical Microscopy Services

US Army Garrison Hawaii

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Job Name: Batch 000526-2

Job Location: Not Provided

Job Number: DOW002 (CLIN#-0002AA/14)

P.O. Number: DAPC50-00-D-0007

**CERTIFICATE OF ANALYSIS**

Chain Of Custody: 70284

Date Analyzed: 6/5/00

Person Submitting: Dale Kanehisa

Attention: Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0037601	SB-4468-1-1 AS	NAD	--	--	--	--	--	3	--	--	--	97	Black	LB	
0037604	SB-4472-1-1 AS	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0037605	SB-4548-1-1 AS	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	
0037606	SB-4529-1-1 AS	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0037607	SB-4475-1-1 AS	NAD	--	--	--	--	--	2	TR	--	--	98	Black	LB	
0037608	SB-4468-1-1 TP	NAD	--	--	--	--	--	--	25	--	--	75	Black	LB	
0037609	SB-4472-1-1 TP	NAD	--	--	--	--	--	--	25	--	--	75	Black	LB	
0037610	SB-4548-1-1 TP	NAD	--	--	--	--	--	--	25	--	--	75	Black	LB	
0037611	SB-4529-1-1 TP	NAD	--	--	--	--	--	--	25	--	--	75	Black	LB	
0037612	SB-4475-1-1 TP	NAD	--	--	--	--	--	--	25	--	--	75	Black	LB	
0037613	SB-4468-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	
0037614	SB-4472-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	
0037615	SB-4548-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	
0037616	SB-4529-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	
0037617	SB-4475-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	

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Electron & Optical Microscopy Services

Client: US Army Garrison Hawaii  
 Director of Public Works (DPW),  
 Environmental Division - Building 105  
 APVG-GWV

Chain Of Custody: 70284  
 Date Analyzed: 6/5/00

Person Submitting: Dale Kanehisa

Job Name: Batch 000526-2  
 Job Location: Not Provided  
 Job Number: DO#0002 (CLIN#-0002AA/14)

F.O. Number: DAPC50-00-D-0007

Attention: Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0037618	SB-4468-2-1 AS	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	LB	
0037619	SB-4472-2-1 AS	NAD	--	--	--	--	--	3	TR	--	--	97	Black	LB	
0037620	SB-4548-2-1 AS	NAD	--	--	--	--	--	TR	5	--	--	95	Black	LB	
0037621	SB-4529-2-1 AS	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	LB	
0037622	SB-4475-2-1 AS	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	LB	
0037623	SB-4468-2-1 T	NAD	--	--	--	--	--	--	35	--	--	65	Black	LB	
0037624	SB-4472-2-1 T	NAD	--	--	--	--	--	--	15	--	--	85	Black	LB	
0037625	SB-4548-2-1 T	NAD	--	--	--	--	--	TR	15	--	--	85	Black	LB	
0037626	SB-4529-2-1 T	NAD	--	--	--	--	--	TR	15	--	--	85	Black	LB	
0037627	SB-4475-2-1 T	NAD	--	--	--	--	--	TR	5	--	--	95	Black	LB	
0037628	SB-4468-3-1	2	2	--	--	--	--	--	--	--	--	98	Black	LB	
0037629	SB-4529-3-1	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed
0037630	SB-4529-3-2	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed
0037631	SB-4548-4-1	NAD	--	--	--	--	--	TR	TR	--	--	100	Gray	LB	

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AN AIHA (#8863), NVLAP (# 1143), & New York E.P.A. (#100707) Accredited Laboratories

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Electron & Optical Microscopy Services

Client: US Army Garrison Hawaii  
 Director of Public Works (DPW),  
 Environmental Division - Building 105 APVG-  
 GWV  
 Wheeler Army Airfield, Hawaii 96857-5000

CERTIFICATE OF ANALYSIS

Job Name: Batch 000526-3  
 Job Location: Not Provided  
 Job Number: DOR0002 (CLINK-0002AA/8)  
 P.O. Number: DAPC50-00-D-0007  
 Chain Of Custody: 70285  
 Date Analyzed: 6/6/00  
 Person Submitting: Dale Kanchisa

Attention: Steve Ozoa

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0037632	SB-1860-1-1 NAD AS	NAD	-	-	-	-	-	-	TR	-	-	100	Black	LB	
0037633	SB-1848-1-1 NAD AS	NAD	-	-	-	-	-	2	TR	-	-	98	Black	LB	
0037634	SB-1860-1-1 NAD TP	NAD	-	-	-	-	-	-	30	-	-	70	Black	LB	
0037635	SB-1848-1-1 NAD TP	NAD	-	-	-	-	-	10	-	-	-	90	Black	LB	
0037636	SB-1860-1-1 T NAD	NAD	-	-	-	-	-	TR	5	-	-	95	Black	LB	
0037637	SB-1848-1-1 T NAD	NAD	-	-	-	-	-	TR	-	-	-	100	Black	LB	
0037638	SB-1860-2-1 NAD AS	NAD	-	-	-	-	-	TR	5	-	-	95	Black	LB	
0037639	SB-1848-2-1 NAD AS	NAD	-	-	-	-	-	5	3	-	-	92	Black	LB	
0037640	SB-1860-2-1 T NAD	NAD	-	-	-	-	-	-	TR	-	-	100	Black	LB	
0037641	SB-1848-2-1 T NAD	NAD	-	-	-	-	-	-	5	-	-	95	Black	LB	
0037642	SB-1860-3-1 NAD	NAD	-	-	-	-	-	-	TR	-	TR	100	Black	LB	
0037643	SB-1860-4-1 NAD	NAD	-	-	-	-	-	-	-	-	-	100	Gray	LB	
0037644	SB-1848-5-1 2	2	2	-	-	-	-	-	-	-	-	98	Black	LB	
0037645	SB-1848-5-2	-	-	-	-	-	-	-	-	-	-	-	-	LB	Sample Not Analyzed

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Electron & Optical Microscopy Services

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DPW),  
Environmental Division - Building 105 APVG-  
GWV

Wheeler Army Airfield, Hawaii 96857-5000

Attention: Steve Ozoa

Job Name: Batch 000526-3

Job Location: Not Provided

Job Number: DO#0002 (CLIN#-0002AA/8)

P.O. Number: DAPCS0-00-D-0007

Chain Of Custody: 70285

Date Analyzed: 6/6/00

Person Submitting: Date Kanchisa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
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The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- 1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- 2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

Luis Bustillos

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Electron & Optical Microscopy Services

Client: US Army Garrison Hawaii  
 Address: Director of Public Works (DPW),  
 Environmental Division - Building 105  
 APVG-GWV

**CERTIFICATE OF ANALYSIS**

Job Name: Batch 000602-2  
 Job Location: Not Provided  
 Job Number: DO# 0002 (CLINF-0002AA/8)  
 P.O. Number: DAPC50-00-D-0007  
 Chain Of Custody: 70287  
 Date Analyzed: 6/13/2000  
 Person Submitting: Date Kanehisa

Attention: Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos	Mineral Wool	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0038796	SB-3403-1-1 TP	NAD	--	--	--	--	--	--	20	--	--	80	Black	AM	
0038797	SB-3434-1-1 TP	NAD	--	--	--	--	--	--	2	--	--	98	Black	AM	
0038798	SB-3440-1-1 TP	NAD	--	--	--	--	--	--	15	--	--	85	Black	AM	
0038799	SB-3403-1-1 T	NAD	--	--	--	--	--	--	5	--	--	95	Black	AM	
0038800	SB-3434-1-1 T	NAD	--	--	--	--	--	--	5	--	--	95	Black	AM	
0038801	SB-3440-1-1 T	NAD	--	--	--	--	--	--	15	--	--	85	Black	AM	
0038802	SB-3403-2-1	2	2	--	--	--	--	--	3	--	--	95	Black	AM	
0038803	SB-3434-2-1	--	--	--	--	--	--	--	2	--	--	98	Black	AM	Sample Not Analyzed
0038804	SB-3440-2-1	--	--	--	--	--	--	--	3	--	--	97	Black	AM	Sample Not Analyzed
0038805	SB-3434-3-1 AS	NAD	--	--	--	--	10	--	--	--	--	90	Black	AM	
0038806	SB-3440-3-1 AS	NAD	--	--	--	--	7	--	2	--	--	91	Black	AM	
0038807	SB-3434-3-1 T	NAD	--	--	--	TR	TR	--	TR	--	--	100	Black	AM	
0038808	SB-3440-3-1 T	NAD	--	--	--	TR	TR	--	TR	--	--	100	Black	AM	

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Electron & Optical Microscopy Services

US Army Garrison Hawaii

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWW

Wheeler Army Airfield, Hawaii 96857-5000

**CERTIFICATE OF ANALYSIS**

Job Name: Batch 000602-2

Job Location: Not Provided

Job Numbers: DO# 0002 (CLIN#-0002AA/8)

P.O. Number: DAFCS0-00-D-0007

Chain Of Custody: 70287

Date Analyzed: 6/13/00

Person Submitting: Date Kanehisa

Attention: Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
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1 The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.  
 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.

2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993  
 NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"

*Adam Marx*  
 Adam Marx

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Electron & Optical Microscopy Services

US Army Garrison Hawaii

Address: Director of Public Works (DPW),  
Environmental Division - Building 105 APVG-  
GWV

Job Name: Batch 000602-3

Job Location: Not Provided

Wheeler Army Airfield, Hawaii 96857-5000

Job Number: DO# 0002 (CLIN#-0002AAA/4)

P.O. Number: DAPC50-00-D-0007

Attention: Steve Orza

Page 1 of 1

Chain Of Custody: 70288

Date Analyzed: 6/13/00

Person Submitting: Dale Kanehisa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0038809	SB-4117-1-1 TP	NAD	--	--	--	--	--	--	10	--	--	90	Black	AM	
0038810	SB-4218-1-1 TP	NAD	--	--	--	--	--	--	10	--	--	90	Black	AM	
0038811	SB-4117-1-1 T	NAD	--	--	--	--	--	--	10	--	--	90	Black	AM	
0038812	SB-4218-1-1 T	NAD	--	--	--	--	--	--	5	--	--	95	Black	AM	
0038813	SB-4117-2-1	NAD	--	--	--	--	--	--	5	--	--	95	Black	AM	
0038814	SB-4218-2-1	2	2	--	--	--	--	--	--	--	--	98	Black	AM	

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- 1 **TEM RECOMMENDATION** - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- 2 **MATRIX REDUCTION RECOMMENDATION** - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"

*Adam Marx*  
Adam Marx

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Client: US Army Garrison Hawaii

Address: Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Attention: Steve Ozoa

**CERTIFICATE OF ANALYSIS**

Job Name: Batch 001109-2

Job Location: Not Provided

Job Number: DO# 0003 (CLIN#-0002AA/3)

P.O. Number: DAPC50-00-D-0007

Chain Of Custody: 76601

Date Analyzed: 11/20/2000

Person Submitting: Dale Kanchisa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0107604	SB3432-1-1 TP	NAD	--	--	--	--	--	--	10	--	--	90	Black	WW	
0107605	SB3432-1-1 T	NAD	--	--	--	--	--	--	--	--	--	100	Black	WW	
0107606	SB3432-2-1	10	10	--	--	--	--	--	TR	--	--	90	Black	WW	
0107607	SB3432-3-1	NAD	--	--	--	2	--	--	TR	--	--	98	Black	WW	
0107608	SB3432-3-1 T	NAD	--	--	--	TR	--	--	--	--	--	100	Black	WW	

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.

2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = No Asbestos Detected" TR = Trace equals less than 1% of this component"

*Wendy Wallace*  
Wendy Wallace

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**Client:** US Army Garrison Hawaii  
 Director of Public Works (DPW),  
 Environmental Division - Building 105  
 APVG-GWV  
 Wheeler Army Airfield, Hawaii 96857-5000

**Chain Of Custody:** 76610  
**Date Analyzed:** 12/04/2000  
**Person Submitting:** Dale Kanehisa

**Job Name:** Batch 001121-1  
**Job Location:** Not Provided  
**Job Number:** DO# 0003 (CLIN#-0002AA/24)  
**P.O. Number:** DAPCS0-00-D-0007

**Attention:** Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0110549	SB-1800-1-1 TP	NAD	-	-	-	-	-	5	-	-	-	95	Black	LB	
0110550	SB-1808-1-1 TP	NAD	-	-	-	-	-	-	5	-	-	95	Black	LB	
0110551	SB-1811-1-1 TP	NAD	-	-	-	-	-	-	5	-	-	95	Black	LB	
0110552	SB-1800-1-1 T	NAD	-	-	-	-	-	TR	TR	-	-	100	Black	LB	
0110553	SB-1808-1-1 T	NAD	-	-	-	-	-	-	TR	-	-	100	Black	LB	
0110554	SB-1811-1-1 T	NAD	-	-	-	-	-	TR	TR	-	-	100	Black	LB	
0110555	SB-1800-2-1	2	2	-	-	-	-	-	-	-	-	98	Black	LB	
0110556	SB-1808-2-1	-	-	-	-	-	-	-	-	-	-	-	-	LB	Sample Not Analyzed
0110557	SB-1811-2-1	-	-	-	-	-	-	-	-	-	-	-	-	LB	Sample Not Analyzed
0110558	SB-1800-3-1 TP	NAD	-	-	-	-	-	5	-	-	-	95	Black	LB	
0110559	SB-1808-3-1 TP	NAD	-	-	-	-	-	5	-	-	-	95	Black	LB	
0110560	SB-1811-3-1 TP	NAD	-	-	-	-	-	5	TR	-	-	95	Black	LB	
0110561	SB-1814-3-1 TP	NAD	-	-	-	-	-	5	-	-	-	95	Black	LB	
0110562	SB-1800-3-1 T	NAD	-	-	-	-	-	TR	-	-	-	100	Black	LB	
0110563	SB-1808-3-1 T	NAD	-	-	-	-	-	TR	-	-	-	100	Black	LB	

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AIHA (88863) NVLAP (# 1143) P. Name: Steve Ozoa

Client: US Army Garrison Hawaii Job Name: Batch 001121-I Chain Of Custody: 76610  
 Address: Director of Public Works (DPW), Environmental Division - Building 105 APVG-GWV Job Location: Not Provided Date Analyzed: 12/4/2000  
 Wheeler Army Airfield, Hawaii 96857-5000 Job Number: DC# 0003 (CLIN#-0002AA/24) Person Submitting: Dale Kanehisa  
 P.O. Number: DAPC50-00-D-0007

Page 2 of 3

Attention: Steve Ozon

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0110563	SB-1808-3-1 T	NAD	--	--	--	--	--	TR	--	--	--	100	Black	LB	
0110564	SB-1811-3-1 T	NAD	--	--	--	--	--	TR	--	--	--	100	Black	LB	
0110565	SB-1814-3-1 T	NAD	--	--	--	--	--	TR	--	--	--	100	Black	LB	
0110566	SB-1800-4-1	NAD	--	--	--	--	--	--	5	--	--	100	Black	LB	
0110567	SB-1808-4-1	NAD	--	--	--	--	--	--	TR	--	--	100	Black	LB	
0110568	SB-1811-4-1	2	2	--	--	--	--	--	--	--	--	98	Black	LB	
0110569	SB-1814-4-1	--	--	--	--	--	--	--	--	--	--	--	--	LB	Sample Not Analyzed
0110570	SB-1851-2-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0110571	SB-1853-2-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0110572	SB-1856-2-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0110573	SB-1851-2-1 TP	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0110574	SB-1853-2-1 TP	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0110575	SB-1856-2-1 TP	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0110576	SB-1851-2-1 T	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	LB	
0110577	SB-1853-2-1 T	NAD	--	--	--	--	--	TR	--	--	--	100	Black	LB	

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AN AIHA (#RR63) NVLAP (#1143) & NIOSH (#1143) Accredited

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Job Name:

Batch 001121-1

Job Location:

Not Provided

Job Number:

DO# 0003 (CLINH-0002AAJ74)

P.O. Number:

DAPC50-00-D-0007

Attention:

Steve Ozoa

Chain Of Custody: 76610

Date Analyzed: 12/04/2000

Person Submitting:

Date Kanehisa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos / Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0110579	SB-1853-6-1	NAD	--	--	--	--	--	--	TR	--	--	100	Brown	LB	
0110580	SB-1856-6-1	NAD	--	--	--	--	--	--	TR	--	--	100	Brown	LB	
0110581	SB-1882-6-1	NAD	--	--	--	--	--	--	TR	--	--	100	Brown	LB	
0110582	SB-1882-7-1	2	2	--	--	--	--	--	--	--	--	98	Black	LB	
0110583	SB-1882-7-2	--	--	--	--	--	--	--	--	--	--	--	Multi	LB	Sample Not Analyzed
0110584	SB-1882-8-1	4	4	--	--	--	--	--	--	--	--	96	Multi	LB	
0110585	SB-1882-8-2	--	--	--	--	--	--	--	--	--	--	--	--	LB	Sample Not Analyzed

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.

2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"



Luis Bustillos

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by these Laboratories, we expressly disclaim any knowledge or liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples. All rights reserved. AMA Analytical Services, Inc.

**Client:** US Army Garrison Hawaii  
**Address:** Director of Public Works (DPW),  
 Environmental Division - Building 105  
 APVG-QWV  
 Wheeler Army Airfield, Hawaii 96857-5000

**Job Name:** Batch 001213-5  
**Job Location:** Not Provided  
**Job Number:** DO# 0003 (CLIN#-0002AAJ37)  
**P.O. Number:** DAPCS0-00-D-0007

**Chain Of Custody:** 76625  
**Date Analyzed:** 12/27/2000  
**Person Submitting:** Dale Kanehisa

**Attention:** Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116058	SB-4446-2-1 T NAD	2	2									100	Black	WW	
0116060	SB-4420-4-1 3	3	3									98	Black	WW	
0116061	SB-4428-5-1 NAD GS	5										97	Black	WW	
0116062	SB-4428-5-1 5 BS	5	5									100	Grey	WW	
0116063	SB-4525-1-1 NAD AS	1					5					95	Black	WW	
0116064	SB-4539-1-1 NAD AS	1					5					95	Black	WW	
0116065	SB-4525-1-1 NAD TP	1							70			30	Black	WW	
0116066	SB-4539-1-1 NAD TP	1							70			30	Black	WW	
0116067	SB-4525-1-1 T NAD	1										100	Black	WW	
0116068	SB-4539-1-1 T NAD	1							TR			100	Black	WW	
0116069	SB-4539-2-1 NAD AS	2					10					90	Black	WW	
0116070	SB-4539-2-1 T NAD	2							5			95	Black	WW	
0116071	SB-4539-3-1 2	2	2									98	Black	WW	

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An AIHA (#8863), NVLAP (# 1141) & NIOSH (# 1488) Laboratory



Electron & Optical Microscopy Services

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Attention:

Steve Ozoa

**CERTIFICATE OF ANALYSIS**

Job Name:

Batch 000602-1

Job Location:

Not Provided

Job Number:

DO# 0002 (CLIN#-0002AAVZ)

P.O. Number:

DAPC50-00-D-0007

Chain Of Custody:

70286

Date Analyzed:

6/13/00

Person Submitting:

Date Kanchisa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0038793	SB-1812-1-1 TP	NAD	--	--	--	--	--	--	30	--	--	70	Black	AM	
0038794	SB-1812-1-1 T	NAD	--	--	--	--	--	--	5	--	--	95	Black	AM	
0038795	SB-1812-2-1	NAD	--	--	--	--	--	--	5	--	--	95	Black	AM	

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.

2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

*Adam Marx*  
Adam Marx

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Electron & Optical Microscopy Services

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

## CERTIFICATE OF ANALYSIS

Job Name:

Batch 001213-5

Job Location:

Not Provided

Job Number:

DO# 0003 (CLINF-0002AA/37)

P.O. Number:

DAPC50-00-D-0007

Chain Of Custody: 76625

Date Analyzed: 12/27/2000

Person Submitting: Dale Kanehisa

Attention: Steve Ozoa

### Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos / Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116044	SB-4420-1-1 NAD AS	NAD	-	-	-	-	TR	-	-	-	-	100	Black	WW	
0116045	SB-4428-1-1 NAD AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116046	SB-4446-1-1 NAD AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116047	SB-4420-1-1 NAD TP	NAD	-	-	-	-	2	-	TR	-	-	98	Black	WW	
0116048	SB-4428-1-1 NAD TP	NAD	-	-	-	-	-	-	80	-	-	20	Black	WW	
0116049	SB-4446-1-1 NAD TP	NAD	-	-	-	-	-	-	80	-	-	20	Black	WW	
0116050	SB-4420-1-1 T NAD	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	
0116051	SB-4428-1-1 T NAD	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	
0116052	SB-4446-1-1 T NAD	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	
0116053	SB-4420-2-1 NAD AS	NAD	-	-	-	-	TR	-	-	-	-	100	Black	WW	
0116054	SB-4428-2-1 NAD AS	NAD	-	-	-	-	5	-	TR	-	-	95	Black	WW	
0116055	SB-4446-2-1 NAD AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116056	SB-4420-2-1 T NAD	NAD	-	-	-	-	TR	-	TR	-	-	100	Black	WW	
0116057	SB-4428-2-1 T NAD	NAD	-	-	-	-	-	-	-	-	-	100	Black	WW	

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An AIHA (#8863), NVLAP (# 1143), & New York ELAP (#10920) Accredited Laboratory

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**AMA Analytical Services, Inc.**  
 Electron & Optical Microscopy Services

**Client:** US Army Garrison Hawaii  
 Director of Public Works (DPW),  
 Environmental Division - Building 105  
 APVG-GWV  
**Address:** Wheeler Army Airfield, Hawaii 96857-5000

**CERTIFICATE OF ANALYSIS**

**Job Name:** Batch 001213-5  
**Job Location:** Not Provided  
**Job Number:** DO# 0003 (CLIN#-0002AA/37)  
**P.O. Number:** DAPC50-00-D-0007  
**Chain Of Custody:** 76625  
**Date Analyzed:** 12/27/2000  
**Person Submitting:** Dale Kanehisa



**Attention:** Steve Ozos

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos/Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116058	SB-4446-2-1 T NAD								TR			100	Black	WW	
0116059	SB-4446-3-1 2	2	2									98	Black	WW	
0116060	SB-4446-4-1 3	3	3									97	Black	WW	
0116061	SB-4446-5-1 NAD											100	Gray	WW	
	GS														
	BS	5	5									95	Black	WW	
0116063	SB-4525-1-1 NAD						5					95	Black	WW	
	AS														
0116064	SB-4539-1-1 NAD						5					95	Black	WW	
	AS														
0116065	SB-4525-1-1 NAD								70			30	Black	WW	
	TP														
0116066	SB-4539-1-1 NAD								70			30	Black	WW	
	TP														
0116067	SB-4525-1-1 T NAD											100	Black	WW	
0116068	SB-4539-1-1 T NAD								TR			100	Black	WW	
0116069	SB-4539-2-1 NAD						10					90	Black	WW	
	AS														
0116070	SB-4539-2-1 T NAD								5			95	Black	WW	
0116071	SB-4539-3-1 2	2	2									98	Black	WW	
0116072	SB-4539-4-1 NAD											100	Gray	WW	

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Client: US Army Garrison Hawaii

Address: Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Attention: Steve Ozoa

**CERTIFICATE OF ANALYSIS**

Job Name: Batch 001213-5

Job Location: Not Provided

Job Numbers: DO# 0003 (CLIN#-0002AAA37)

P.O. Numbers: DAPC50-00-D-0007

Chain Of Custody: 76625

Date Analyzed: 12/27/2000

Person Submitting: Dale Kanehisa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos/Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116073	SB-4232-1-1 TP	NAD	--	--	--	--	--	--	25	--	--	75	Black	WW	
0116074	SB-4232-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	
0116075	SB-4232-2-1 BS	NAD	--	--	--	--	--	--	5	--	--	95	Black	WW	
0116076	SB-4232-2-1 WF	NAD	--	--	--	--	60	--	--	--	--	40	White	WW	
0116077	SB-4232-3-1	TR	TR	--	--	--	--	--	TR	--	--	100	Black	WW	
0116078	SB-4232-3-2	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	
0116079	SB-3908-1-1 TP	NAD	--	--	--	--	--	--	70	TR	--	30	Black	WW	
0116080	SB-3908-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	
0116081	SB-3908-2-1	2	2	--	--	--	--	--	--	--	--	98	Black	WW	
0116082	SB-3410-1-1 TP	NAD	--	--	--	--	--	--	60	--	--	40	Black	WW	
0116083	SB-3430-1-1 TP	NAD	--	--	--	--	--	--	70	--	--	30	Black	WW	
0116084	SB-3522-1-1 TP	NAD	--	--	--	--	--	--	60	--	--	40	Black	WW	
0116085	SB-3410-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	
0116086	SB-3430-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	
0116087	SB-3522-1-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	

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# AMA Analytical Services, Inc.

Electron & Optical Microscopy Services

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Attention:

Steve Ozoa

## CERTIFICATE OF ANALYSIS

Job Name:

Batch 001213-5

Job Location:

Not Provided

Job Number:

DO# 0003 (CLIN#-0002AA/37)

P.O. Number:

DAPC50-00-D-0007

Chain Of Custody:

76625

Date Analyzed:

12/27/2000

Person Submitting:

Date Kanehisa

NVLAP  
NY ELA  
AIHA

### Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116088	SB-3410-2-1	NAD	-	-	-	-	-	-	20	-	-	80	Black	WW	
0116089	SB-3430-2-1	2	2	-	-	-	-	-	TR	-	-	98	Black	WW	
0116090	SB-3522-2-1	-	-	-	-	-	-	-	-	-	-	-	-	WW	Sample Not Analyzed
0116091	SB-1851-1-1 AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116092	SB-1853-1-1 AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116093	SB-1856-1-1 AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116094	SB-1882-1-1 AS	NAD	-	-	-	-	5	-	-	-	-	95	Black	WW	
0116095	SB-1851-1-1 TP	NAD	-	-	-	-	-	-	40	-	-	60	Black	WW	
0116096	SB-1853-1-1 TP	NAD	-	-	-	-	-	-	40	-	-	60	Black	WW	
0116097	SB-1856-1-1 TP	NAD	-	-	-	-	-	-	40	-	-	60	Black	WW	
0116098	SB-1882-1-1 TP	NAD	-	-	-	-	-	-	40	-	-	60	Black	WW	
0116099	SB-1851-1-1 T	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	
0116100	SB-1853-1-1 T	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	
0116101	SB-1856-1-1 T	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	
0116102	SB-1882-1-1 T	NAD	-	-	-	-	-	-	TR	-	-	100	Black	WW	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge or liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

An AIHA (#8863), NVLAP (# 1143), & New York ELAP (# 10970) Accredited Laboratory

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Electron & Optical Microscopy Services

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Attention:

Steve Ozoa

**CERTIFICATE OF ANALYSIS**

Job Name: Batch 001213-5

Chain Of Custody: 76625

Job Location: Not Provided

Date Analyzed: 12/27/2000

Job Number: DO# 0003 (CLIN#-0002AA/37)

Person Submitting: Dale Kanehisa

P.O. Number: DAPC50-00-D-0007

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116103	SB-1856-3-1 AS	NAD	--	--	--	--	--	--	15	--	--	85	Black	WW	
0116104	SB-1856-3-1 TP	--	--	--	--	--	--	--	--	--	--	--		WW	Sample Not Analyzed: Not Enough Sample
0116105	SB-1856-3-1 T	3	3	--	--	--	--	--	TR	--	--	97	Black	WW	
0116106	SB-1856-5-1	3	3	--	--	--	--	--	TR	--	--	97	Black	WW	
0116107	SB-1856-5-1	--	--	--	--	--	--	--	--	--	--	--		WW	Sample Not Analyzed
0116108	SB-1882-5-1	--	--	--	--	--	--	--	--	--	--	--		WW	Sample Not Analyzed
0116109	SB-1882-5-2	--	--	--	--	--	--	--	--	--	--	--		WW	Sample Not Analyzed
0116110	SB-1911-9-1 AS	NAD	--	--	--	--	5	--	--	--	--	95	Black	WW	
0116111	SB-1911-9-2 AS	NAD	--	--	--	--	5	--	--	--	--	95	Black	WW	
0116112	SB-1911-9-1 TP	NAD	--	--	--	--	--	--	40	--	--	60	Black	WW	
0116113	SB-1911-9-2 TP	NAD	--	--	--	--	--	--	40	--	--	60	Black	WW	
0116114	SB-1911-9-1 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	
0116115	SB-1911-9-2 T	NAD	--	--	--	--	--	--	TR	--	--	100	Black	WW	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge or liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

**CERTIFICATE OF ANALYSIS**

Client: US Army Garrison Hawaii Job Name: Batch 001213-5 Chain Of Custody: 76625  
 Address: Director of Public Works (DPW), Environmental Division - Building 105 APVG-GWV Job Location: Not Provided Date Analyzed: 12/27/2000  
 Wheeler Army Airfield, Hawaii 96857-5000 Job Numbers: DO# 0003 (CLIN#-0002AAA/37) Person Submitting: Dale Kanchiza  
 P.O. Number: DAPC50-00-D-0007

Attention: Steve Ozoa

Page 6 of 6

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
1															
2															

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- 1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- 2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"

  
 Wendy Wallace

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge or liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accredited applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

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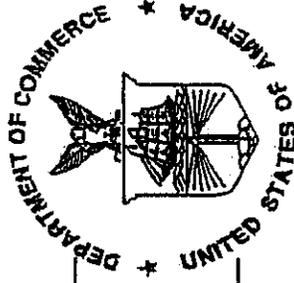
An AIHA (#8863), NVLAP (# 1143), & New York ELAP (#10920) Accredited Laboratory

## Appendix D

### Laboratory and Inspector Certificates

United States Department of Commerce  
National Institute of Standards and Technology

**NVLAP**<sup>®</sup>



ISO/IEC GUIDE 25:1990  
ISO 9002:1987

**Certificate of Accreditation**

**AMA ANALYTICAL SERVICES, INC.**  
LANHAM, MD

*is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:*

**BULK ASBESTOS FIBER ANALYSIS**

**June 30, 2001**

Effective through

*Ronald F. Mohrman*

For the National Institute of Standards and Technology

NVLAP Lab Code: 101143-0



# BREWER ENVIRONMENTAL SERVICES

Training Certificate

*This is to certify that*

**DALE KANEHISA**

*has attended the*

**AHERA Inspector/Management Planner Basic Course  
Accredited Under TSCA Title II**

**Certificate number: IAVII-MEC-AIMP-062498-01**

**June 23, 2000 - June 23, 2000**

*Dates of Attendance*

**June 23, 2001**

*Expiration Date*

*Training Provider:*

**BES IH Group**

**500 Alakawa Street, Building 220, 2nd Floor**

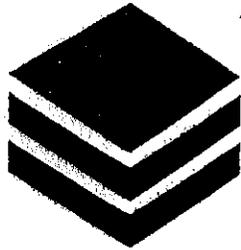
**Honolulu, Hawaii 96817**

**Phone: (808) 848-8866**

**Fax: (808) 847-5267**

**Mark T. Muranaka**

**Director, IH Group**



# M·E·T·A

Mayhew Environmental Training Associates

I N C O R P O R A T E D

Certificate # 7ME071972031005

*This is to certify that*

## Hector C. Laus

*has on 07/19/00, in HONOLULU, HI  
completed the requirements for asbestos accreditation under Section 206 of TSCA, Title II, 15 U.S.C. 2646*

### AHERA Asbestos Inspector Initial Course

*as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)  
on 07/17/00 - 07/19/00 and passed the associated examination on 07/19/00  
with a score of 70% or better*

CM =



*Michael Page*  
Instructor

*R. Bull Myl*  
President

Soc. Sec #: 586-76-2952  
Accreditation Expires: 07/19/01

M.E.T.A. - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382



# BREWER ENVIRONMENTAL SERVICES

*Training Certificate*

*This is to certify that*

**DONNA ROBINSON**

*has attended the*

**AHERA Inspector/Management Planner Basic Course  
Accredited Under J.SCA Title JJ**

**Certificate number: 1A711-MEC-AIMP-03172000-11**

**March 13, 2000 - March 17, 2000**

*Dates of Attendance*

**March 17, 2001**

*Expiration Date*

*Training Provider:*

**BES IH Group**

**500 Alakawa Street, Building 220, 2nd Floor**

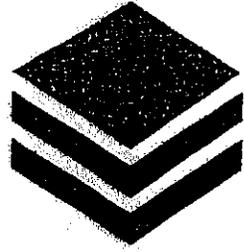
**Honolulu, Hawaii 96817**

**Phone: (808) 848-8866**

**Fax: (808) 847-5267**

**Mark T. Murawfaku, M.S., M.P.H.**

**Director, IH Group**



# M·E·T·A

Mayhew Environmental Training Associates

I N C O R P O R A T E D

Certificate # 7ME071972031004

*This is to certify that*

## Dean O. Shirota

*has on 07/19/00, in HONOLULU, HI*

*completed the requirements for asbestos accreditation under Section 206 of TSCA, Title II, 15 U.S.C. 2646*

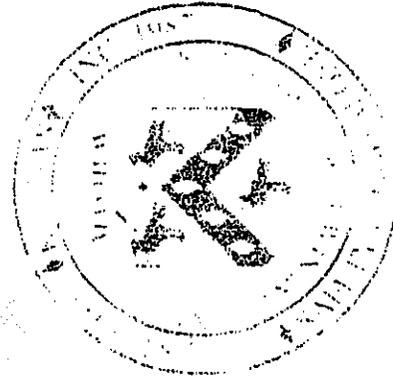
### AHERA Asbestos Inspector Initial Course

*as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)*

*on 07/17/00 - 07/19/00 and passed the associated examination on 07/19/00*

*with a score of 70% or better*

CM =



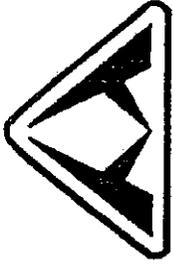
*[Signature]*  
Instructor

*[Signature]*  
President

Soc. Sec #: 576-96-8205

Accreditation Expires: 07/19/01

META - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382



**MURANAKA ENVIRONMENTAL CONSULTANTS, INC.**

*Training Certificate*

*This is to certify that*

**MITCH UEHARA**

*has attended the*

**AHERA Refresher Course for Inspectors  
Accredited Under TSCA Title II**

*Certificate number: IAVII-MEC-AI-072998-05*

*July 13, 1999*

*Date of Attendance*

*July 13, 2000*

*Expiration Date*

*Training Provider:*  
**Muranaka Environmental Consultants, Inc.  
500 Ala Kawa Street, Building 220, 2nd Floor  
Honolulu, Hawaii 96817**

**Phone: (808) 848-8866**

**Fax: (808) 847-5267**

**Mark T. Muranaka, M.S., M.P.H.**

*President*

# Appendix E

## Chain of Custody Forms

Directorate of Public Works, Environmental Division

AMA Batch #70284

Bldg. 105, Wheeler Army Airfield

# Chain of Custody Record

U.S. Army Garrison, Hawaii (APVG-GWV)

Schofield Barracks, HI 96857-5013

Ph: (808) 656-2878 ext. 1036

Fax: (808) 656-1039

DAPC50-00-D-0007

DO# 0002

CLIN#- 0002AA

Batch 000526-2

Sheet 1 of 1

Date Samples Shipped: 6 Days After Shipment Date

Date Analysis Required: May 26, 2000

(PLEASE FAX COPY OF CHAIN UPON RECEIPT OF SAMPLES)

Lab ID Number	Sample Number	PLM Asbestos (Bulk)	Lead (paint)	Lead (soil)	Lead (dust)	Sampling		Sample Description	Sample Container	Remarks (sample preservation, handling procedures, etc.)	
						Date	Time				
	SB-4468-1-1	X				5/25	1000	brown asphalt shingle; black tar paper; black tar	zip bag	Please return results in percentage and type of asbestos	
	SB-4472-1-1	X				5/25	1015	brown asphalt shingle; black tar paper; black tar	zip bag		
	SB-4548-1-1	X				5/25	1030	brown asphalt shingle; black tar paper; black tar	zip bag		
	SB-4529-1-1	X				5/25	1040	brown asphalt shingle; black tar paper; black tar	zip bag		
	SB-4475-1-1	X				5/25	1145	brown asphalt shingle; black tar paper; black tar	zip bag	Stop analysis at the first positive for each homogeneous area (either bagged or stapled together) Positive consists of any layer being	
	SB-4468-2-1	X				5/25	1000	brown asphalt sheet; black tar	zip bag		
	SB-4472-2-1	X				5/25	1015	brown asphalt sheet; black tar	zip bag		
	SB-4548-2-1	X				5/25	1030	brown asphalt sheet; black tar	zip bag		
	SB-4529-2-1	X				5/25	1040	brown asphalt sheet; black tar	zip bag		
	SB-4475-2-1	X				5/25	1145	brown asphalt sheet; black tar	zip bag		
	SB-4468-3-1	X				5/25	1000	black sealant	zip bag		
	SB-4529-3-1	X				5/25	1040	black sealant	zip bag		
	SB-4529-3-2	X				5/25	1040	black sealant	zip bag		
	SB-4548-4-1	X				5/25	1030	gray sealant	zip bag	Bill shipping for this batch to 0002AL	
Total number of samples						14					

Sampler(s): M. Uehara

RELINQUISHED By: (Signature) <i>M. Uehara</i>	Date/Time 5/25/00 4:30pm	RELINQUISHED By: (Signature) <i>[Signature]</i>	Date/Time 5/26/00 0900
RECEIVED BY: (Signature)	Date/Time	RECEIVED BY: (Signature)	Date/Time
SHIPPED BY: (Signature)	Date/Time	COURIER: (Signature)	Date/Time
		via FEDEX	LABORATORY: (Signature)
			Date/Time





Directorate of Public Works, Environmental Division  
 Bldg. 105, Wheeler Army Airfield  
 U.S. Army Garrison, Hawaii (APVG-GWV)  
 Schofield Barracks, HI 96857-5013  
 Phone: (808) 656-2878 ext. 1036 Fax: (808) 656-1039  
 POC: Dale Kanehisa

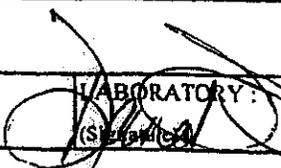
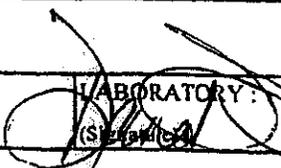
AMA Batch #70288  
**Chain of Custody Record**

DAPC50-00-D-0007  
 DO# 0002  
 CLIN#- 0002AA  
 Batch 000602-3  
 Sheet 1 of 1

Date Samples Shipped: June 2, 2000  
 Date Analysis Required: 8 Working Days After Shipment Date  
 (PLEASE FAX COPY OF CHAIN UPON RECEIPT OF SAMPLES)

Lab ID Number	Sample Number	PLM Asbestos (Bulk)	Lead (paint)	Lead (soil)	Lead (dust)	Lead (TCLP)	Sampling		Sample Description	Sample Container	Remarks (sample preservation, handling procedures, etc.)
							Date	Time			
	SB-4117-1-1	X					5/30	1100	black tar paper; black tar	zip bag	Please return results in percentage and type of asbestos
	SB-4218-1-1	X					5/30	1130	black tar paper; black tar	zip bag	
	SB-4117-2-1	X					5/30	1100	black sealant	zip bag	
	SB-4218-2-1	X					5/30	1130	black sealant	zip bag	
											Stop analysis at the first positive for each homogeneous area (either bagged or rubber banded together) Positive consists of any layer being
											Bill shipping for this batch to 0002AL
Total number of samples							4				

Sampler(s): M. Uehara

RELINQUISHED By: 	Date/Time: 6/2/00 11:30 AM	RELINQUISHED By:	Date/Time:
RECEIVED BY:	Date/Time:	RECEIVED BY:	Date/Time:
SHIPPED BY:	Date/Time:	COURIER: 	Date/Time:
		LABORATORY: 	Date/Time: 6/5/00

via FEDEX



Directorate of Public Works, Environmental Division  
 Bldg. 105, Wheeler Army Airfield  
 U.S. Army Garrison, Hawaii (APVG-GWV)  
 cho field Barracks, HI 96857-5013  
 Ph: (808) 656-2878 ext. 1036 Fax: (808) 656-1039  
 POC: Dale Kanehisa

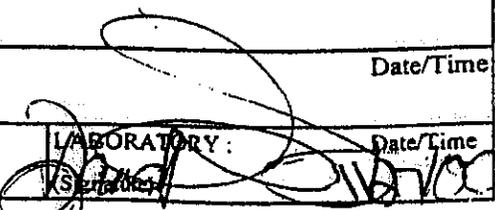
AMA Batch #76610  
**Chain of Custody Record**

DAPC50-00-D-0007  
 DO# 0003  
 CLIN#- 0002AA  
 Batch 001121-1  
 Sheet 1 of 1

Date Samples Shipped: November 21, 2000  
 Date Analysis Required: 6 Working Days After Shipment Date  
 (PLEASE FAX COPY OF CHAIN UPON RECEIPT OF SAMPLES)

Lab ID Number	Sample Number	PLM Asbestos (Bulk)	Lead (paint)	Lead (soil)	Lead (dust)	Lead (TCLP)	Sampling		Sample Description	Sample Container	Remarks (sample preservation, handling procedures, etc.)	
							Date	Time				
	SB-1800-1-1	X					11/16	1000	black tar paper; tar	zip bag	Please return results in percentage and type of asbestos	
	SB-1808-1-1	X					11/16	1030	black tar paper; tar	zip bag		
	SB-1811-1-1	X					11/16	1100	black tar paper; tar	zip bag		
	SB-1800-2-1	X					11/16	1000	black sealant	zip bag	Stop analysis at the first positive for each homogeneous area (either bagged or rubber banded together) Positive consists of any layer being	
	SB-1808-2-1	X					11/16	1030	black sealant	zip bag		
	SB-1811-2-1	X					11/16	1100	black sealant	zip bag		
	SB-1800-3-1	X					11/16	1000	black tar paper; tar	zip bag		
	SB-1808-3-1	X					11/16	1030	black tar paper; tar	zip bag		
	SB-1811-3-1	X					11/16	1100	black tar paper; tar	zip bag		
	SB-1814-3-1	X					11/20	1100	black tar paper; tar	zip bag		
	SB-1800-4-1	X					11/16	1000	black sealant	zip bag		
	SB-1808-4-1	X					11/16	1030	black sealant	zip bag		
	SB-1811-4-1	X					11/16	1100	black sealant	zip bag		
	SB-1814-4-1	X					11/20	1100	black sealant	zip bag	Bill shipping for this batch to 0002AL	
	SB-1851-2-1	X					11/17	1015	black asphalt sheet; tar paper; tar	zip bag		
	SB-1853-2-1	X					11/17	1045	black asphalt sheet; tar paper; tar	zip bag		
	SB-1856-2-1	X					11/17	1115	black asphalt sheet; tar paper; tar	zip bag		
	SB-1853-6-1	X					11/17	1045	gray sealant	zip bag		
	SB-1856-6-1	X					11/17	1115	gray sealant	zip bag		
	SB-1882-6-1	X					11/20	945	gray sealant	zip bag		
	SB-1882-7-1	X					11/20	945	black sealant	zip bag		
	SB-1882-7-2	X					11/20	945	black sealant	zip bag		
	SB-1882-8-1	X					11/20	945	gray/black sealant	zip bag		
	SB-1882-8-2	X					11/20	945	gray/black sealant	zip bag		
Total number of samples							24					

Sampler(s): D. Shirota, H. Laus

RELINQUISHED BY: (Signature) 	Date/Time 11/20/00 2pm	RELINQUISHED BY:	Date/Time
RECEIVED BY: (Signature)	Date/Time	RECEIVED BY:	Date/Time
SHIPPED BY: (Signature)	Date/Time	COURIER: (Signature)	Date/Time via FEDEX
		LABORATORY: (Signature) 	Date/Time



Directorate of Public Works, Environmental Division  
 Bldg. 105, Wheeler Army Airfield  
 U.S. Army Garrison, Hawaii (APVG-GWV)  
 Schofield Barracks, HI 96857-5013  
 Ph: (808) 656-2878 ext. 1036 Fax: (808) 656-1039  
 POC: Dale Kanehisa

AMA Batch #76625  
**Chain of Custody Record**

DAPC50-00-D-0007  
 DO# 0003  
 CLIN#- 0002AA  
 Batch 001213-5  
 Sheet 1 of 2

Date Samples Shipped: November 13, 2000  
 Date Analysis Required: 8 Working Days After Shipment Date  
 (PLEASE FAX COPY OF CHAIN UPON RECEIPT OF SAMPLES)

Lab ID Number	Sample Number	PLM Asbestos (Bulk)	Lead (paint)	Lead (soil)	Lead (dust)	Lead (TCLP)	Sampling		Sample Description	Sample Container	Remarks (sample preservation, handling procedures, etc.)
							Date	Time			
	SB-4420-1-1	X					12/12	1300	black asphalt shingle; tar paper; tar	zip bag	Please return results in percentage and type of asbestos
	SB-4428-1-1	X					12/12	1320	black asphalt shingle; tar paper; tar	zip bag	
	SB-4446-1-1	X					12/12	1400	black asphalt shingle; tar paper; tar	zip bag	
	SB-4420-2-1	X					12/12	1300	black asphalt sheet; tar	zip bag	Stop analysis at the first positive for each homogeneous area (either bagged or rubber banded together) Positive consists of any layer being
	SB-4428-2-1	X					12/12	1320	black asphalt sheet; tar	zip bag	
	SB-4446-2-1	X					12/12	1400	black asphalt sheet; tar	zip bag	
	SB-4446-3-1	X					12/12	1400	black sealant	zip bag	
	SB-4420-4-1	X					12/12	1300	black sealant	zip bag	
	SB-4428-5-1	X					12/12	1320	gray sealant; black sealant	zip bag	
	SB-4525-1-1	X					12/12	1340	black asphalt shingle; tar paper; tar	zip bag	
	SB-4539-1-1	X					12/12	1420	black asphalt shingle; tar paper; tar	zip bag	
	SB-4539-2-1	X					12/12	1420	black asphalt sheet; tar	zip bag	
	SB-4539-3-1	X					12/12	1420	black sealant	zip bag	
	SB-4539-4-1	X					12/12	1420	gray sealant	zip bag	
	SB-4232-1-1	X					12/12	1100	black tar paper; tar	zip bag	Bill shipping for this batch to 0002AL
	SB-4232-2-1	X					12/12	1100	black sealant; white fibers	zip bag	
	SB-4232-3-1	X					12/12	1100	black sealant	zip bag	
	SB-4232-3-2	X					12/12	1100	black sealant	zip bag	
	SB-3908-1-1	X					12/12	1050	black tar paper; tar	zip bag	
	SB-3908-2-1	X					12/12	1050	black sealant	zip bag	
	SB-3410-1-1	X					12/12	930	black tar paper; tar	zip bag	
	SB-3430-1-1	X					12/12	1010	black tar paper; tar	zip bag	
	SB-3522-1-1	X					12/12	950	black tar paper; tar	zip bag	
	SB-3410-2-1	X					12/12	930	black sealant	zip bag	
	SB-3430-2-1	X					12/12	1010	black sealant	zip bag	
Total number of samples							25				

Sampler(s): D. Kanehisa, D. Shirota

RELINQUISHED BY: (Signature)	Date/Time 12/13/00	RELINQUISHED BY:	Date/Time
RECEIVED BY: (Signature)	Date/Time	RECEIVED BY: (Signature)	Date/Time
SHIPPED BY: (Signature)	Date/Time	COURIER: (Signature)	Date/Time
		via FEDEX	LABORATORY: (Signature)



## **APPENDIX B**

**ASBESTOS SURVEY  
RE-ROOFING PROJECT  
FAMILY HOUSING AREA HA-W14B  
WHEELER ARMY AIRFIELD, OAHU, HAWAII**

Prepared for

Family Housing Division  
Directorate of Public Works  
U.S. Army Garrison Hawaii  
Schofield Barracks, Hawaii 96857-5013

January 2001

Prepared by

Environmental Division  
Directorate of Public Works  
U.S. Army Garrison Hawaii  
Schofield Barracks, Hawaii 96857-5013

APVG-GWV (200-1a)

MEMORANDUM FOR RECORD

Subject: Asbestos Survey, Wheeler Army Airfield Housing Area W14B Re-Roofing Project

1. Enclosed is a preliminary asbestos survey for subject above.
2. Questions pertaining to the survey can be directed to Dale Kanehisa at 656-2878 ext. 1036.

Encl.

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## 1.0 INTRODUCTION

The Directorate of Public Works (DPW), Environmental Division, performed a preliminary survey for asbestos-containing material (ACM) in Wheeler Army Airfield (WAAF) Housing Area (HA) W14B on May 23, 2000 and December 12, 2000. The survey was conducted by Dale Kanehisa (AHERA Inspector Certificate #IAVII-MEC-AIMP-062498-01), Mitch Uehara (AHERA Certificate #IAVII-MEC-AI-072998-05) and Donna Mason (AHERA Inspector Certificate #IAVII-MEC-AIMP-03172000-11). Thirty five buildings in housing area W14B are scheduled for re-roofing. The purpose of the survey was to identify the presence of ACM in the buildings to be re-roofed.

### 1.1 Site Description

WAAF HA-W14B, known as the Wilikina Neighborhood in the Comprehensive Neighborhood Plan (CNP) for Wheeler Army Airfield, is a multi-family housing area located in the southeastern portion of the installation. Thirty five buildings in this housing area are scheduled for re-roofing. Included in the project are buildings 700 through 735. There are two building types classified as 700A and 700B. The buildings, constructed in 1940, have sloped roofs with asphalt shingle and asphalt sheet roofing materials.

## 2.0 ASBESTOS INSPECTION

### 2.1 Methodology

The ACM survey included a visual inspection of all roofs in order to determine the location of suspect material. Roofs of approximately 10% of each building type were inspected for ACM.

The buildings inspected, by building type are as follows:

Type 700A: 722, 729, 732

Type 700B: 709, 725

### 2.2 Sample Collection

The asbestos sampling methods followed the Asbestos Hazard Emergency Response Act (AHERA) protocol. Sampling was conducted on all suspect material. At the inspector's discretion, varying numbers of bulk samples from each homogeneous area of miscellaneous material, including asphalt shingles, tar, and pipe sealant were collected.

The suspect ACM was first moistened. The samples were collected by dislodging a piece of the suspect ACM with a decontaminated collection tool, such as an utility knife, paint scraper, or tile-cutter, and placed in a plastic sample bag labeled with the sample number. The collection tool was decontaminated between sampling to prevent cross-contamination. The homogeneous area, sample description, location, friability, substrate, estimated amount, and sample identification were recorded in a sampling table. The sample identification number included the installation, facility ID, homogeneous area, and sample number.

### 2.3 Sample Analysis

The samples were packaged and shipped with a chain of custody to AMA Analytical Services, Inc., which is an accredited NVLAP laboratory. A total of 18 samples were sent for Polarized Light Microscopy (PLM) asbestos analysis. In addition, the laboratory was instructed to stop analysis of a homogeneous material when a positive result was detected.

### 2.4 Results

Results were interpreted as ACM if at least one sample of a homogeneous material was determined to contain 1% or greater, asbestos. Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos. The following tables present a summary of positive results based on the collection of bulk samples analyzed for asbestos.

#### Wiliikina Neighborhood, W14B

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
700A	M2	1) Black asphalt sheet w/brown & white stones 2a) Black tar	722, 729, 732: lanai roof	Yes	700 SF per building	1) 2%C 2a) NA
	M3	Black tar sealant	722, 729, 732: around pipes on roof	No	3 LF per building	6%C
700B	M3	Black tar sealant	709, 725: around pipes on roof	No	4 LF per building	15%C

Note: C = Chrysotile

ND = none detected

NA = not analyzed, previous sample of same homogeneous material tested positive

SF = square feet LF = linear feet

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer1).

The results of the sample analysis are located in Appendix A. The sample locations are shown in Appendix B. The analytical laboratory reports are found in Appendix C. Laboratory and inspector certificates are located in Appendix D. Chain of custody forms are found in Appendix E.

### 2.5 Disclaimer

Although the building was thoroughly inspected, the inspection does not implicitly guarantee that all ACM were identified because certain suspected materials may be. If suspected materials are uncovered during demolition, the suspected materials shall not be disturbed until additional sampling is done.

### 3.0 ADDENDUM

This research was supported in part by an appointment to the Postgraduate Environmental Management Participation Program at the U.S. Army Environmental Center administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and USAEC.

# Appendix A

## Asbestos Sample Area Identification Table

**ASBESTOS SAMPLE AREA IDENTIFICATION TABLE**

**Wheeler Army Airfield  
Wilikina (HA-W14B)**

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black asphalt shingle w/brown & white stones 2) Black tar paper 3) Black tar	Type 700A Buildings (722, 729, 732): roof Type 700B Buildings (709, 725): roof & front lanai	Yes	WAAF-722-1-1	1) ND 2) ND 3) ND
				WAAF-729-1-1	1) ND 2) ND 3) ND
				WAAF-732-1-1	1) ND 2) ND 3) ND
				WAAF-709-1-1	1) ND 2) ND
				WAAF-709-1-2	1) ND 2) ND
				WAAF-725-1-1	1) ND 2) ND
M2	1) Black asphalt sheet w/brown & white stones 2a) Black tar 2b) Black tar paper 3) Black tar	Type 700A Buildings (722, 729, 732): lanai roof Type 700B Buildings (709, 725): rear lanai	Yes	WAAF-722-2-1	1) 2%C 2a) NA
				WAAF-729-2-1	1) NA 2a) NA
				WAAF-732-2-1	1) NA 2a) NA
				WAAF-709-2-1	1) ND 2b) ND
				WAAF-709-2-2	1) ND 2b) ND 3) ND
				WAAF-725-2-1	1) ND 2b) ND
M3	Black tar sealant	Type 700A Buildings (722, 729, 732): around pipes on roof Type 700B Buildings (709, 725): around pipes on roof	No	WAAF-722-3-1	ND
				WAAF-729-3-1	6%C
				WAAF-732-3-1	NA
				WAAF-709-3-1	15%C
				WAAF-709-3-2	NA
WAAF-725-3-1	NA				

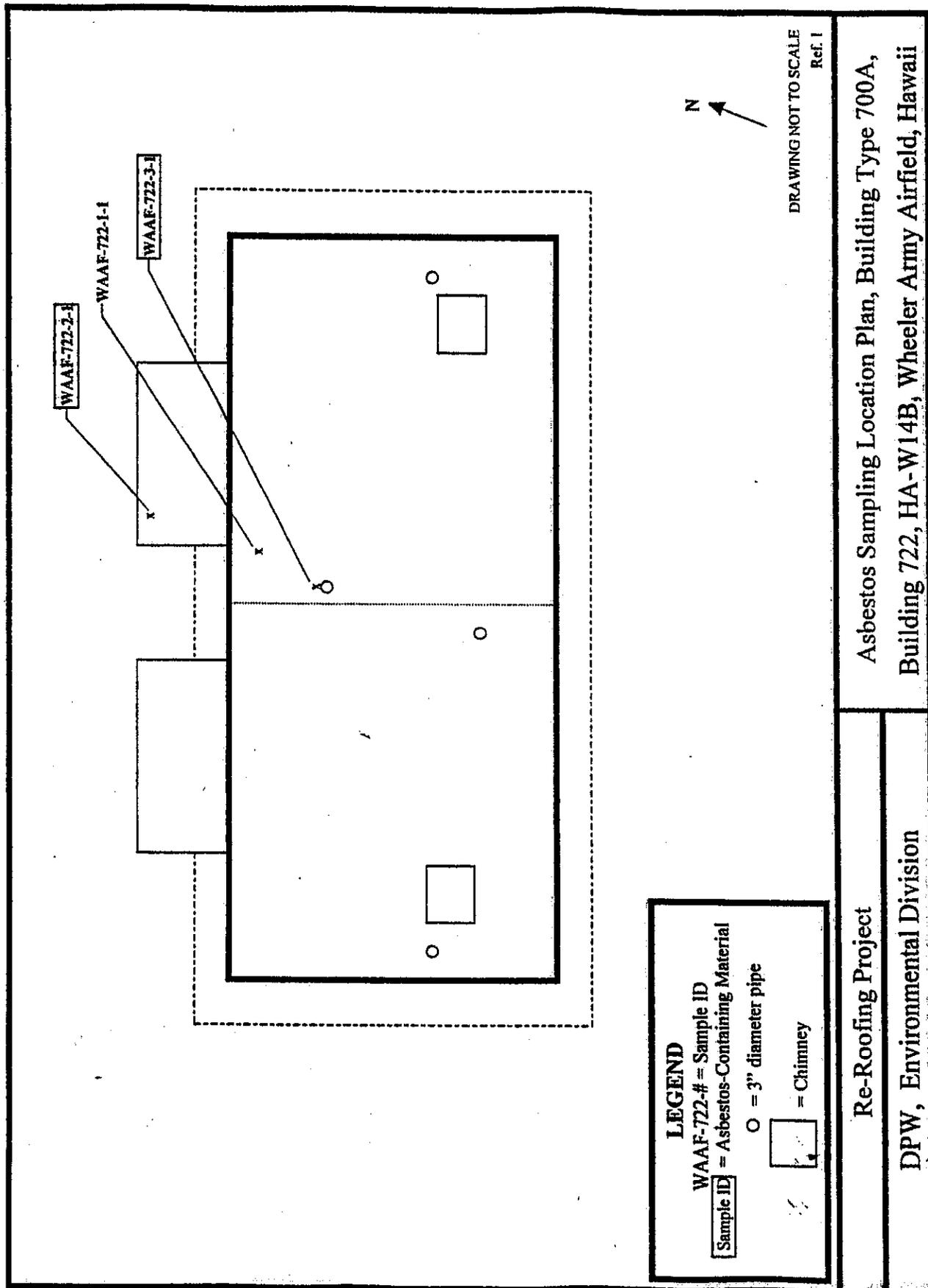
Note: C = Chrysotile  
 NA = not analyzed, previous sample of same homogeneous material tested positive  
 ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

# Appendix B

## Asbestos Sample Locations



**LEGEND**  
 WAAF-722-# = Sample ID  
 [Sample ID] = Asbestos-Containing Material  
 O = 3" diameter pipe  
 [rectangle with diagonal lines] = Chimney

Re-Roofing Project  
 DPW, Environmental Division

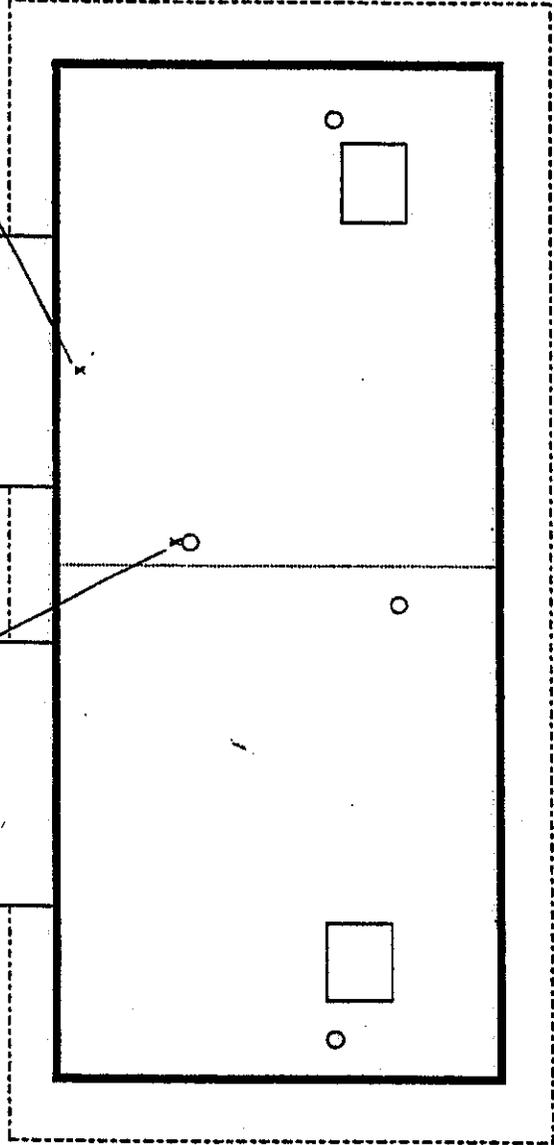
Asbestos Sampling Location Plan, Building Type 700A,  
 Building 722, HA-W14B, Wheeler Army Airfield, Hawaii

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
 Schofield Barracks, Military Housing Master Plan for Oahu

WAAF-729-2-1

WAAF-729-1-1

WAAF-729-3-1



**LEGEND**

WAAF-729-# = Sample ID

Sample ID = Asbestos-Containing Material

○ = 3" diameter pipe

□ = Chimney

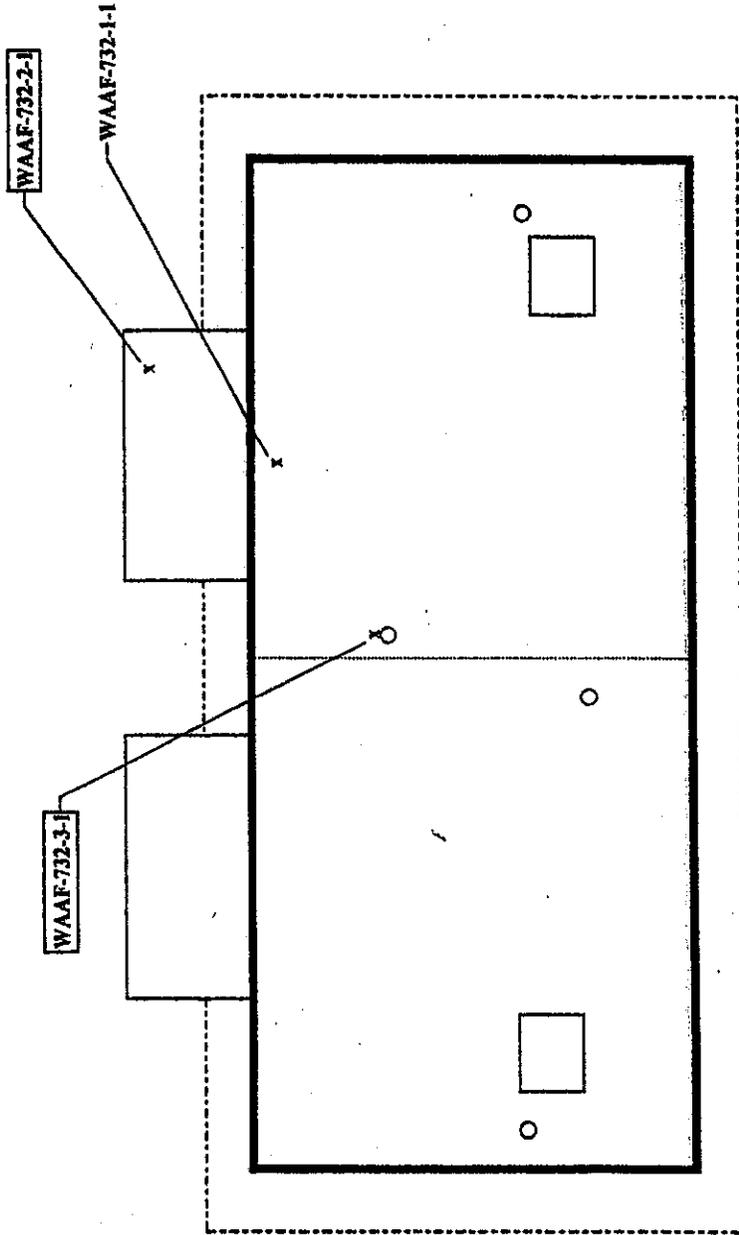
DRAWING NOT TO SCALE  
Ref. 1



Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type 700A,  
Building 729, HA-W14B, Wheeler Army Airfield, Hawaii



DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**

WAAF-732-# = Sample ID

Sample ID = Asbestos-Containing Material

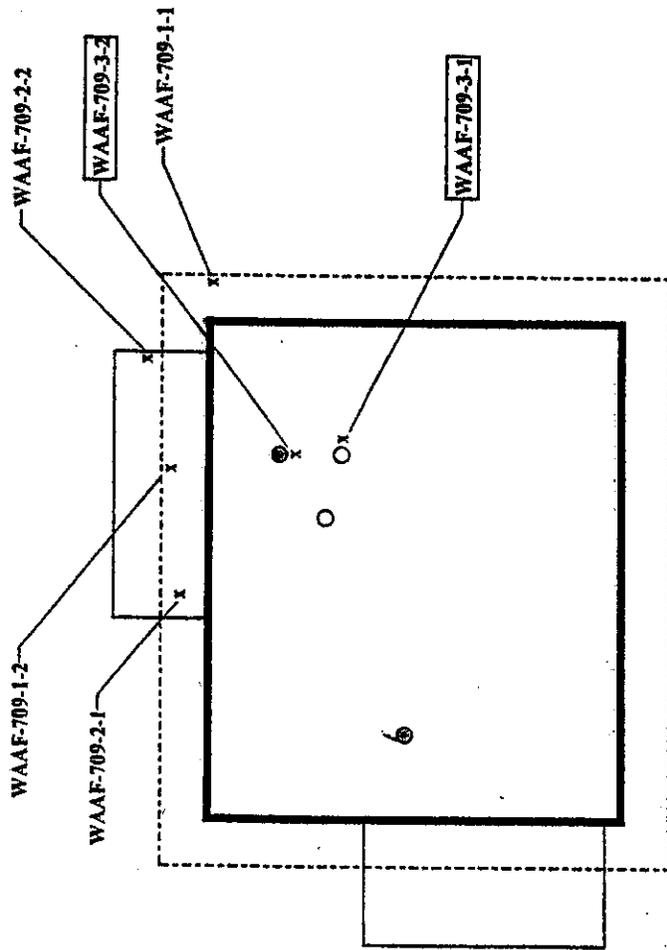
○ = 3" diameter pipe

□ = Chimney

Re-Roofing Project  
DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type 700A,  
Building 732, HA-W14B, Wheeler Army Airfield, Hawaii

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing Master Plan for Oahu



**LEGEND**

WAAF-709-# = Sample ID

Sample ID = Asbestos-Containing Material

○ = 3" diameter pipe

● = 5" diameter pipe



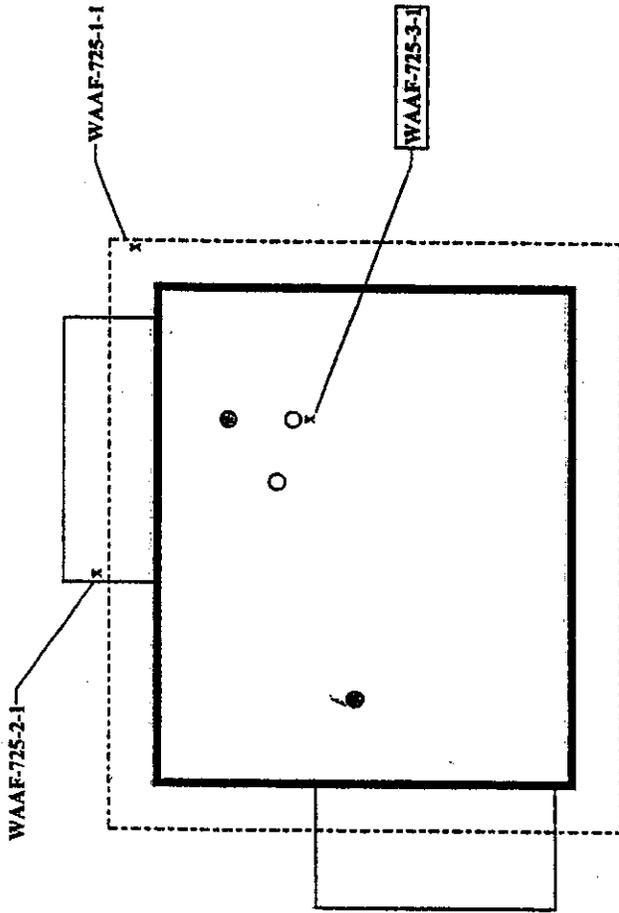
DRAWING NOT TO SCALE  
Ref. 1

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type 700B,  
Building 709, HA-W14B, Wheeler Army Airfield, Hawaii

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
Schofield Barracks, Military Housing Master Plan for Oahu



DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**

WAAF-725-# = Sample ID  
Sample ID = Asbestos-Containing Material

○ = 3" diameter pipe

● = 5" diameter pipe

Re-Roofing Project

DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type 700B,  
 Building 725, HA-W14B, Wheeler Army Airfield, Hawaii

<sup>1</sup>Mitsunaga & Associates, Inc. Comprehensive Neighborhood Plans,  
 Schofield Barracks, Military Housing Master Plan for Oahu

# Appendix C

## Asbestos Analytical Laboratory Results



Electron & Optical Microscopy Services

**Client:** US Army Garrison Hawaii  
 Director of Public Works (DPW),  
 Environmental Division - Building 105 APVG-  
 GWV  
**Address:** Wheeler Army Airfield, Hawaii 96857-5000

**Attention:** Steve Ozoa

## CERTIFICATE OF ANALYSIS

**Job Name:** Batch 000526-1  
**Job Location:** Not Provided  
**Job Number:** DO#0002 (CLIN#-0002AAA/9)  
**P.O. Number:** DAPCS0-00-D-0007  
**Chain Of Custody:** 70283  
**Date Analyzed:** 6/6/00  
**Person Submitting:** Dale Kanehisa

### Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0037585	WAAF-722-1-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0037586	WAAF-729-1-1 AS	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0037587	WAAF-732-1-1 AS	NAD	--	--	--	5	--	--	TR	--	--	95	Black	LB	
0037588	WAAF-722-1-1 TP	NAD	--	--	--	--	--	TR	35	--	--	65	Black	LB	
0037589	WAAF-729-1-1 TP	NAD	--	--	--	--	--	--	30	--	--	70	Black	LB	
0037590	WAAF-732-1-1 TP	NAD	--	--	--	--	--	TR	35	--	--	65	Black	LB	
0037591	WAAF-722-1-1 TP	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0037592	WAAF-729-1-1 TP	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0037593	WAAF-732-1-1 TP	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0037594	WAAF-722-2-1 AS	2	2	--	--	--	--	3	--	--	--	95	Black	LB	
0037595	WAAF-729-2-1 AS	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed
0037596	WAAF-732-2-1 AS	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed
0037597	WAAF-722-2-1 TP	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and ability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

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## CERTIFICATE OF ANALYSIS

Client: US Army Garrison Hawaii  
 Address: Director of Public Works (DPW),  
 Environmental Division - Building 105 APVG-  
 GWV  
 Wheeler Army Airfield, Hawaii 96857-5000

Job Name: Batch 000526-1  
 Job Location: Not Provided  
 Job Number: DO#0002 (CLIN#-0002AA/9)  
 P.O. Number: DAPC50-00-D-0007

Chain Of Custody: 70283  
 Date Analyzed: 6/6/00  
 Person Submitting: Dale Kanehisa

Attention: Steve Ozoa

### Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0037598	WAAF-729-2-1 T	--	--	--	--	--	--	--	--	--	--	--	--	LB	Sample Not Analyzed
0037599	WAAF-732-2-1 T	--	--	--	--	--	--	--	--	--	--	--	--	LB	Sample Not Analyzed
0037600	WAAF-722-3-1	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0037601	WAAF-729-3-1	6	6	--	--	--	--	--	--	--	--	94	Black	LB	
0037602	WAAF-732-3-1	--	--	--	--	--	--	--	--	--	--	--	--	LB	Sample Not Analyzed

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- 1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- 2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"

  
Luis Bustillos

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and ability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

Client: US Army Garrison Hawaii Job Name: Batch 001213-4 Chain Of Custody: 76624  
 Address: Director of Public Works (DPW), Environmental Division - Building 105 APVG-GWV Job Location: Not Provided Date Analyzed: 12/28/2000  
 Wheeler Army Airfield, Hawaii 96857-5000 Job Number: DO# 0003 (CLIN#-0002AA/9) Person Submitting: Dale Kanchisa  
 P.O. Number: DAPC50-00-D-0007

Attention: Steve Ozoa Page 1 of 3

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116023	WAAF-709-1-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116024	WAAF-709-1-2 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116025	WAAF-725-1-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116026	WAAF-709-1-1 TP	NAD	--	--	--	--	--	--	20	--	--	80	Black	LB	
0116027	WAAF-709-1-2 TP	NAD	--	--	--	--	--	--	20	--	--	80	Black	LB	
0116028	WAAF-725-1-1 TP	NAD	--	--	--	--	--	--	20	--	--	80	Black	LB	
0116029	WAAF-709-1-1 T	--	--	--	--	--	--	--	--	--	--	--	Black	LB	Sample Not Analyzed: Not Enough Sample
0116030	WAAF-709-1-2 T	--	--	--	--	--	--	--	--	--	--	--	Black	LB	Sample Not Analyzed: Not Enough Sample
0116031	WAAF-725-1-1 T	--	--	--	--	--	--	--	--	--	--	--	Black	LB	Sample Not Analyzed: Not Enough Sample
0116032	WAAF-709-2-1 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116033	WAAF-709-2-2 AS	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116034	WAAF-725-2-1 AS	NAD	--	--	--	--	--	5	TR	--	--	95	Black	LB	
0116035	WAAF-709-2-1 TP	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	

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Client: US Army Garrison Hawaii  
 Address: Director of Public Works (DPW),  
 Environmental Division - Building 105  
 APVG-GWV  
 Wheeler Army Airfield, Hawaii 96857-5000  
 Job Name: Batch 001213-4  
 Job Location: Not Provided  
 Job Number: DO# 0003 (CLIN#-0002AA/9)  
 P.O. Number: DAPC50-00-D-0007  
 Chain Of Custody: 76624  
 Date Analyzed: 12/28/2000  
 Person Submitting: Date Kanehisa

Attention: Steve Ozoa

## Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0116036	WAAF-709-2-2 TP	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116037	WAAF-725-2-1 TP	NAD	--	--	--	--	--	5	--	--	--	95	Black	LB	
0116038	WAAF-709-2-1 T	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed: Not Enough Sample
0116039	WAAF-709-2-2 T	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	LB	
0116040	WAAF-725-2-1 T	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed: Not Enough Sample
0116041	WAAF-709-3-1	15	15	--	--	--	--	--	--	--	--	85	Black	LB	
0116042	WAAF-709-3-2	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed
0116043	WAAF-725-3-1	--	--	--	--	--	--	--	--	--	--	--		LB	Sample Not Analyzed

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**CERTIFICATE OF ANALYSIS**

Client: US Army Garrison Hawaii  
 Address: Director of Public Works (DPW), Environmental Division - Building 105 APVG-GWV  
 Batch 001213-4  
 Job Name: Not Provided  
 Job Location: Not Provided  
 Job Number: DO# 0003 (CLIN#-0002AA/9)  
 P.O. Number: DAPC50-00-D-0007  
 Chain Of Custody: 76624  
 Date Analyzed: 12/28/2000  
 Person Submitting: Date Kanehisa

Page 3 of 3

Attention: Steve Ozoa

**Summary of Polarized Light Microscopy**

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments

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- 1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
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Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"

*Luis Bustillos*

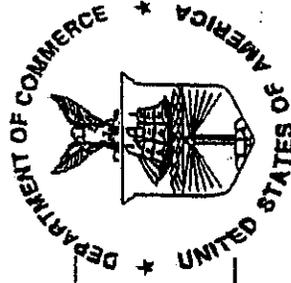
This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

## Appendix D

### Laboratory and Inspector Certificates

United States Department of Commerce  
National Institute of Standards and Technology

# NVLAP<sup>®</sup>



ISO/IEC GUIDE 25:1990  
ISO 9002:1987

## Certificate of Accreditation

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is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

**BULK ASBESTOS FIBER ANALYSIS**

June 30, 2001

Effective through

*Ronald F. Alderman*

For the National Institute of Standards and Technology

NVLAP Lab Code: 101143-0



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has attended the

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Accredited Under TSCA Title II

Certificate number: **LAVII-MEC-AIMP-062498-01**

**June 23, 2000 - June 23, 2000**

Dates of Attendance

**June 23, 2001**

Expiration Date

Training Provider:

BES IH Group

500 Alakawa Street, Building 220, 2nd Floor

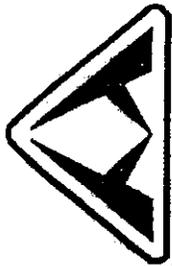
Honolulu, Hawaii 96817

Phone: (808) 848-8866

Fax: (808) 847-5267

Mark T. Muranaka

Director, IH Group



**MURANAKA ENVIRONMENTAL CONSULTANTS, INC.**

*Training Certificate*

*This is to certify that*

**MITCH UEHARA**

*has attended the*

**AHERA Refresher Course for Inspectors  
Accredited Under SSCU Title II**

**Certificate number: LAVII-MEC-AI-072998-05**

**July 13, 1999**

*Date of Attendance*

**July 13, 2000**

*Expiration Date*

*Training Provider:*  
**Muranaka Environmental Consultants, Inc.**  
**500 Ala Kawa Street, Building 220, 2nd Floor**  
**Honolulu, Hawaii 96817**  
**Phone: (808) 848-8866**  
**Fax: (808) 847-5267**

**Mark T. Muranaka, M.S., M.P.H.**

*President*

# Appendix E

## Chain of Custody Forms

C

C

Directorate of Public Works, Environmental Division  
 Bldg. 105, Wheeler Army Airfield  
 U.S. Army Garrison, Hawaii (APVG-GWV)  
 Schofield Barracks, HI 96857-5013  
 Ph: (808) 656-2878 ext. 1036 Fax: (808) 656-1039  
 POC: Dale Kanehisa

AMA Batch #70283

# Chain of Custody Record

DAPC50-00-D-0007  
 DO# 0002  
 CLIN#- 0002AA  
 Batch 000526-1  
 Sheet 1 of 1

Date Samples Shipped: 6 Days After Shipment Date  
 Date Analysis Required: May 26, 2000  
 (PLEASE FAX COPY OF CHAIN UPON RECEIPT OF SAMPLES)

Lab ID Number	Sample Number	PLM Asbestos (Bulk)	Lead (paint)	Lead (soil)	Lead (dust)	Sampling		Sample Description	Sample Container	Remarks (sample preservation, handling procedures, etc.)
						Date	Time			
	WAAF-722-1-1	X				5/23	1000	brown asphalt shingle; black tar paper; black tar	zip bag	Please return results in percentage and type of asbestos
	WAAF-729-1-1	X				5/23	1020	brown asphalt shingle; black tar paper; black tar	zip bag	
	WAAF-732-1-1	X				5/23	1045	brown asphalt shingle; black tar paper; black tar	zip bag	
	WAAF-722-2-1	X				5/23	1000	brown asphalt sheet; black tar	zip bag	
	WAAF-729-2-1	X				5/23	1020	brown asphalt sheet; black tar	zip bag	Stop analysis at the first positive for each homogeneous area (either bagged or stapled together) Positive consists of any layer being
	WAAF-732-2-1	X				5/23	1045	brown asphalt sheet; black tar	zip bag	
	WAAF-722-3-1	X				5/23	1000	black sealant	zip bag	
	WAAF-729-3-1	X				5/23	1020	black sealant	zip bag	
	WAAF-732-3-1	X				5/23	1045	black sealant	zip bag	
										Bill shipping for this batch to 0002AL
Total number of samples						9				

Sampler(s): M. Uehara

RELINQUISHED BY: *[Signature]* Date/Time: *5/23/00 4:30 pm* RELINQUISHED BY: *[Signature]* Date/Time: *5/20/00 0900*

RECEIVED BY: *[Signature]* Date/Time: RECEIVED BY: *[Signature]* Date/Time:

SHIPPED BY: *[Signature]* Date/Time: COURIER: *[Signature]* Date/Time: LABORATORY: *[Signature]* Date/Time:  
 via FEDEX



**APPENDIX C**

**ASBESTOS SURVEY  
RE-ROOFING PROJECT  
FAMILY HOUSING AREA HA-1100  
FORT SHAFTER, OAHU, HAWAII**

Prepared for

Family Housing Division  
Directorate of Public Works  
U.S. Army Garrison Hawaii  
Schofield Barracks, Hawaii 96857-5013

November 2000

Prepared by

Environmental Division  
Directorate of Public Works  
U.S. Army Garrison Hawaii  
Schofield Barracks, Hawaii 96857-5013

APVG-GWV (200-1a)

MEMORANDUM FOR RECORD

Subject: Asbestos Survey, Fort Shafter Housing Area 1100 Re-Roofing Project

1. Enclosed is a preliminary asbestos survey for subject above.
2. Questions pertaining to the survey can be directed to Dale Kanehisa at 656-2878 ext. 1036.

Encl.

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APPENDIX B: ASBESTOS SAMPLE LOCATIONS	
APPENDIX C: ASBESTOS ANALYTICAL LABORATORY RESULTS	
APPENDIX D: LABORATORY AND INSPECTOR CERTIFICATES	
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## 1.0 INTRODUCTION

The Directorate of Public Works (DPW), Environmental Division, performed a preliminary survey for asbestos-containing material (ACM) in Fort Shafter (FS) Housing Area (HA) 1100 on May 31, 2000. The survey was conducted by Dale Kanehisa (AHERA Inspector Certificate #IAVII-MEC-AIMP-062498-01), Mitch Uehara (AHERA Certificate #IAVII-MEC-AI-072998-05) and Donna Mason (AHERA Inspector Certificate # IAVII-MEC-AIMP-03172000-11). Seven buildings in housing area 1100 are scheduled for re-roofing. The purpose of the survey was to identify the presence of ACM in the buildings to be re-roofed.

### 1.1 Site Description

FS HA-1100, known as the Radar Hill Neighborhood in the Comprehensive Neighborhood Plan (CNP) for Fort Shafter, is a multi-family housing area located in the southeastern portion of the installation. Seven buildings in this housing area are scheduled for re-roofing. Included in the project are buildings 1155, 1156, 1159, 1162, 1165, 1168, and 1177. There are two building types classified as BB and GG. The buildings, constructed in 1978, have sloped roofs with asphalt shingle roofing material.

## 2.0 ASBESTOS INSPECTION

### 2.1 Methodology

The ACM survey included a visual inspection of all roofs in order to determine the location of suspect material. One roof of each building type was inspected for ACM. The buildings inspected, by building type are as follows:

Type BB: 1155

Type GG: 1156

Due to safety concerns pipes and vents of building 1156 were inaccessible and are not included in the survey.

### 2.2 Sample Collection

The asbestos sampling methods followed the Asbestos Hazard Emergency Response Act (AHERA) protocol. Sampling was conducted on all suspect material. At the inspector's discretion, varying numbers of bulk samples from each homogeneous area of miscellaneous material, including asphalt shingles, tar, and pipe sealant were collected.

The suspect ACM was first moistened. The samples were collected by dislodging a piece of the suspect ACM with a decontaminated collection tool, such as an utility knife, paint scraper, or tile-cutter, and placed in a plastic sample bag labeled with the sample number. The collection tool was decontaminated between sampling to prevent cross-contamination. The homogeneous area, sample description, location, friability, substrate, estimated amount, and sample identification were recorded in a sampling table. The sample identification number included the installation, facility ID, homogeneous area, and sample number.

### 2.3 Sample Analysis

The samples were packaged and shipped with a chain of custody to AMA Analytical Services, Inc., which is an accredited NVLAP laboratory. A total of five samples were sent for Polarized Light Microscopy (PLM) asbestos analysis. In addition, the laboratory was instructed to stop analysis of a homogeneous material when a positive result was detected.

### 2.4 Results

Results were interpreted as ACM if at least one sample of a homogeneous material was determined to contain 1% or greater, asbestos. Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos. The following tables present a summary of positive results based on the collection of bulk samples analyzed for asbestos.

#### Radar Hill Neighborhood, 1100

Building Type	Homogeneous Material ID	Description	Location	Friable	Amount	Results (ACM%)
BB	M2	Black tar sealant	1155: around roof projections	No	1155: 8 LF per building	3%C

Note: C = Chrysotile

ND = none detected

LR = living room DR = dining room B = bathroom HB = half bath

BR = bedroom U = utility room S = storage

K = kitchen HL = hallway E = entryway

SF = square feet LF = linear feet

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer1).

The results of the sample analysis are located in Appendix A. The sample locations are shown in Appendix B. The analytical laboratory reports are found in Appendix C. Laboratory and

inspector certificates are located in Appendix D. Chain of custody forms are found in Appendix E.

### 2.5 Disclaimer

Although the building was thoroughly inspected, the inspection does not implicitly guarantee that all ACM were identified because certain suspected materials may be. If suspected materials are uncovered during demolition, the suspected materials shall not be disturbed until additional sampling is done.

### 3.0 ADDENDUM

This research was supported in part by an appointment to the Postgraduate Environmental Management Participation Program at the U.S. Army Environmental Center administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and USAEC.

## Appendix A

### Asbestos Sample Area Identification Table

## ASBESTOS SAMPLE AREA IDENTIFICATION TABLE

### Fort Shafter Radar Hill (HA-1100)

Homogeneous Material ID	Material Description	Location	Friable	Sample ID	Results (ACM%)
M1	1) Black asphalt shingles w/white stones 2) Black tar paper	Type BB Building (1155): roof	Yes	FS-1155-1-1	1) ND
		Type GG Building (1168): roof		FS-1168-1-1	2) ND 1) ND
M2	Black tar sealant	Type BB Building (1155): around roof projections	No	FS-1155-2-1	3%C
M3	1) Black asphalt sheet w/white stones 2) Black tar	Type BB Building (1155): lanai roof	Yes	FS-1155-3-1	1) ND
		Type GO Building (1168): lanai roof, entryway		FS-1168-3-1	2) ND 1) ND

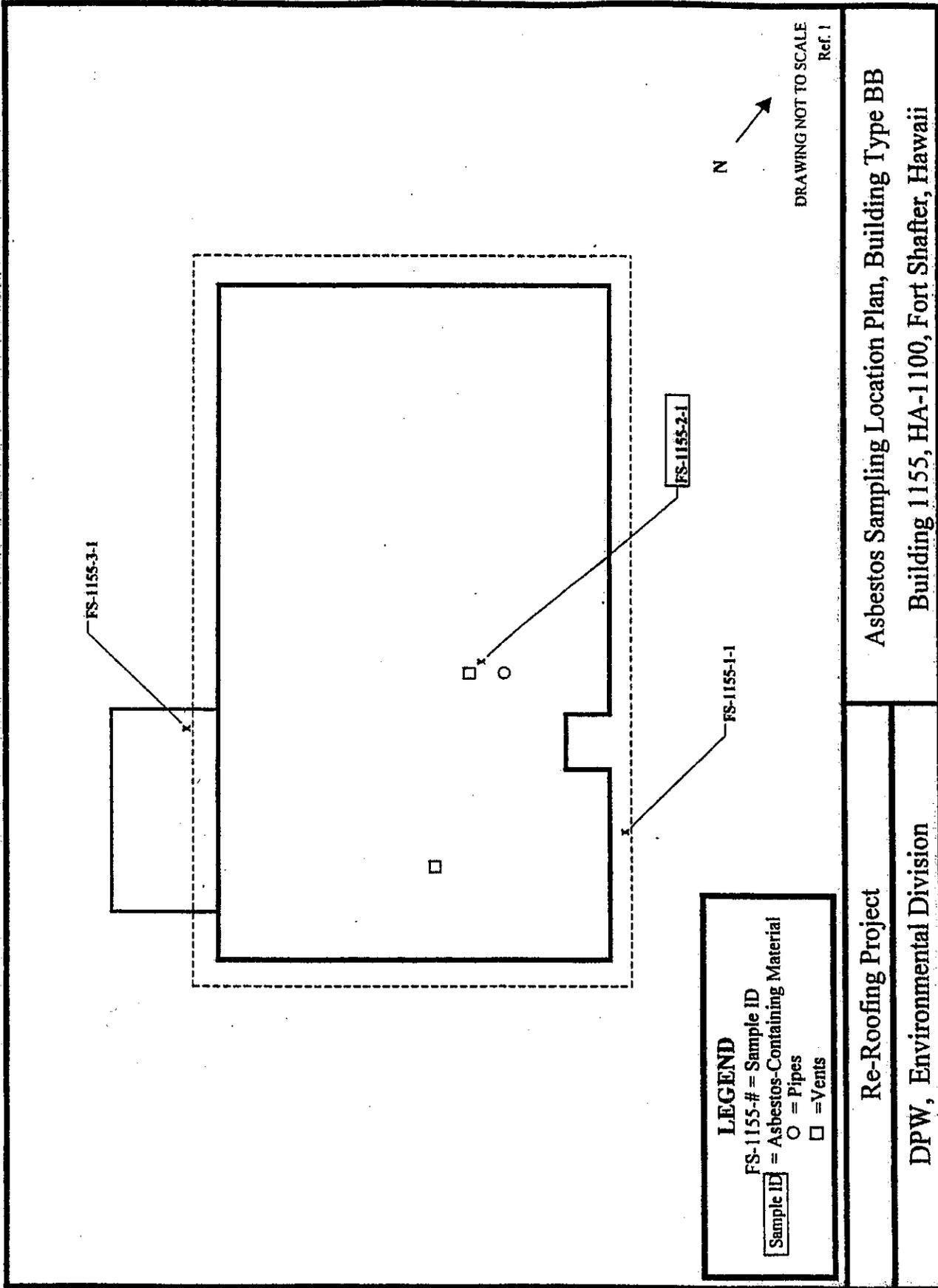
Note: C = Chrysotile    A = Amosite    O = Crocidolite, actinolite, tremolite, and anthophyllite  
 NA = not analyzed, previous sample of same homogeneous material tested positive  
 ND = none detected

For multiple tile and mastic layers, the layers are numbered from top to bottom in ascending order (e.g., layer 2 is below layer 1).

Samples were analyzed by PLM, therefore in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, homogeneous materials identified to contain <1% asbestos, are required to be further analyzed by the point count method to verify that the amount of asbestos is actually below 1% asbestos.

## Appendix B

### Asbestos Sample Locations

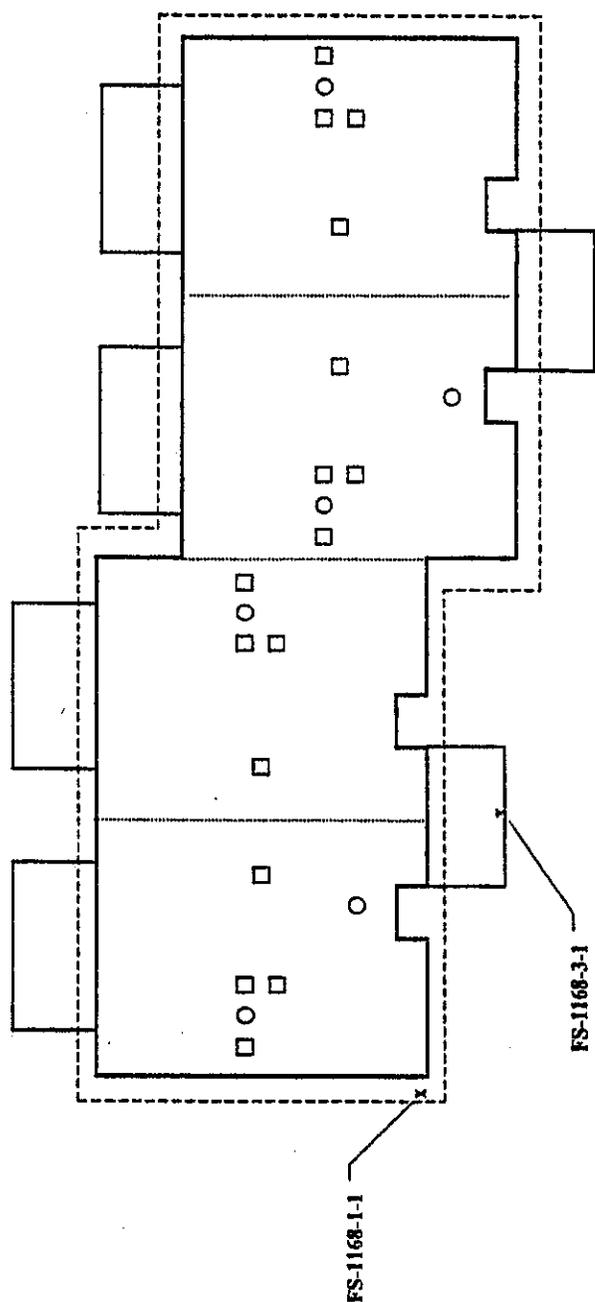


**LEGEND**  
 FS-1155-# = Sample ID  
 Sample ID = Asbestos-Containing Material  
 ○ = Pipes  
 □ = Vents

Re-Roofing Project  
 DPW, Environmental Division

Asbestos Sampling Location Plan, Building Type BB  
 Building 1155, HA-1100, Fort Shafter, Hawaii

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
 Schofield Barracks, Military Housing Master Plan for Oahu



DRAWING NOT TO SCALE  
Ref. 1

**LEGEND**  
 FS-1168-# = Sample ID  
 [Sample ID] = Asbestos-Containing Material  
 O = Pipes  
 □ = Vents

Asbestos Sampling Location Plan, Building Type GG  
 Building 1168, HA-1100, Fort Shafter, Hawaii

Re-Roofing Project  
 DPW, Environmental Division

Mitsunaga & Associates, Inc., Comprehensive Neighborhood Plans,  
 Schofield Barracks, Military Housing Master Plan for Oahu

## Appendix C

### Asbestos Analytical Laboratory Results

Client:

US Army Garrison Hawaii

Address:

Director of Public Works (DRW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

Attention:

Steve Ozza

CERTIFICATE OF ANALYSIS

Job Name: Batch 000602-4

Chain Of Custody: 70289

Job Location: Not Provided

Date Analyzed: 06/13/2000

Job Number: DO# 0002 (CLIN#-0002AA/5)

Person Submitting: Dale Kanehisa

P.O. Number: DAPC50-00-D-0007

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
0038815	FS-1155-1-1 AS	NAD	--	--	--	--	--	3	2	--	--	95	Black	AM	
0038816	FS-1168-1-1 AS	NAD	--	--	--	--	--	3	2	--	--	95	Black	AM	
0038817	FS-1155-1-1 TP	NAD	--	--	--	--	--	--	30	--	--	70	Black	AM	
0038818	FS-1168-1-1 TP	--	--	--	--	--	--	--	--	--	--	--		AM	Sample Not Analyzed - Not Enough Sample
0038819	FS-1155-2-1	3	3	--	--	--	--	--	--	--	--	97	Black	AM	
0038820	FS-1155-3-1 AS	NAD	--	--	--	--	--	10	--	--	--	90	Black	AM	
0038821	FS-1168-3-1 AS	NAD	--	--	--	--	--	2	--	--	--	98	Black	AM	
0038822	FS-1155-3-1 T	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	AM	
0038823	FS-1168-3-1 T	NAD	--	--	--	--	--	TR	TR	--	--	100	Black	AM	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

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Electron & Optical Microscopy Services

US Army Garrison Hawaii

Client: Director of Public Works (DPW),  
Environmental Division - Building 105  
APVG-GWV

Wheeler Army Airfield, Hawaii 96857-5000

## CERTIFICATE OF ANALYSIS

Job Name: Batch 000602-4

Job Location: Not Provided

Job Number: DO# 0002 (CLIN#-0002AA/5)

P.O. Number: DAPCS0-00-D-0007

Chain Of Custody: 70289

Date Analyzed: 06/13/2000

Person Submitting: Date Kanehisa

Attention: Steve Ozoa

Page 2 of 2

### Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Analyst ID	Comments
-------------------	-----------------	----------------	--------------------	-----------------	---------------------	------------------------	----------------------	--------------------	-----------------	-------------------	---------------	---------------------	--------------	------------	----------

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- 1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- 2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

Adam Marx

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of air samples.

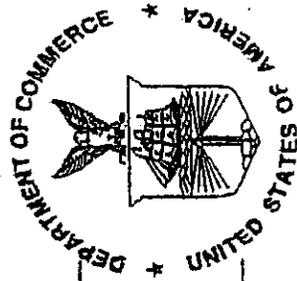
An AIHA (#8863), NVLAP (# 1143), & New York ELAP (# 10070) Accredited Laboratory  
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### Laboratory and Inspector Certificates

United States Department of Commerce  
National Institute of Standards and Technology

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## Certificate of Accreditation

ISO/IEC GUIDE 25:1990  
ISO 9002:1987

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LANHAM, MD

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**BULK ASBESTOS FIBER ANALYSIS**

June 30, 2001

Effective through

*Ronald F. Alderman*

For the National Institute of Standards and Technology

NVLAP Lab Code: 101143-0



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has attended the

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Accredited Under TSCA Title II*

Certificate number: *LAVII-MEC-AIMP-062498-01*

*June 23, 2000 - June 23, 2000*

*Dates of Attendance*

*June 23, 2001*

*Expiration Date*

*Training Provider:  
BES IH Group*

*500 Alakawa Street, Building 220, 2nd Floor*

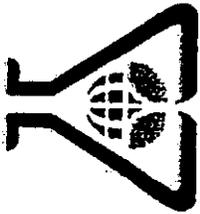
*Honolulu, Hawaii 96817*

*Phone: (808) 848-8866*

*Fax: (808) 847-5267*

*Mark T. Muranaka*

*Director, IH Group*



# BREWER ENVIRONMENTAL SERVICES

*Training Certificate*

*This is to certify that*

**DONNA ROBINSON**

*has attended the*

**AHERA Inspector/Management Planner Basic Course**  
*Accredited Under ISSCA Title II.*

*Certificate number: IAVII-MEC-AIMP-03172000-11*

*March 13, 2000 - March 17, 2000*

*Dates of Attendance*

*March 17, 2001*

*Expiration Date*

*Training Provider:*

**BES IH Group**

**500 Alakawa Street, Building 220, 2nd Floor**

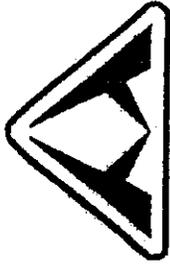
**Honolulu, Hawaii 96817**

**Phone: (808) 848-8866**

**Fax: (808) 847-5267**

**Mark T. Muranaka, M.S., M.P.H.**

**Director, IH Group**



**MURANAKA ENVIRONMENTAL CONSULTANTS, INC.**  
*Training Certificate*

*This is to certify that*

**MITCH UEHARA**

*has attended the*

**AHERA Refresher Course for Inspectors  
Accredited Under ISSCA Title I.I.**

*Certificate number: IAVII-MEC-AI-072998-05*

*July 13, 1999*

*Date of Attendance*

*July 13, 2000*

*Expiration Date*

*Training Provider:*  
Muranaka Environmental Consultants, Inc.  
500 Ala Kawa Street, Building 220, 2nd Floor  
Honolulu, Hawaii 96817  
Phone: (808) 848-8866  
Fax: (808) 847-5267

*Yale D. Myjama*  
Mark T. Muranaka, M.S., M.P.H.  
President

# Appendix E

## Chain of Custody Forms

Directorate of Public Works, Environmental Division  
 Bldg. 105, Wheeler Army Airfield  
 U.S. Army Garrison, Hawaii (APVG-GWV)  
 Schofield Barracks, HI 96857-5013  
 Ph: (808) 656-2878 ext. 1036 Fax: (808) 656-1039  
 POC: Dale Kanehisa

AMA Batch #70289  
**Chain of Custody Record**

DAPC50-00-D-0007  
 DO# 0002  
 CLIN#- 0002AA  
 Batch 000602-4  
 Sheet 1 of 1

Date Samples Shipped: June 2, 2000  
 Date Analysis Required: 8 Working Days After Shipment Date  
 (PLEASE FAX COPY OF CHAIN UPON RECEIPT OF SAMPLES)

Lab ID Number	Sample Number	PLM Asbestos (Bulk)	Lead (paint)	Lead (soil)	Lead (dust)	Sampling		Sample Description	Sample Container	Remarks (sample preservation, handling procedures, etc.)
						Date	Time			
	FS-1155-1-1	X				5/31	900	black asphalt shingles; black tar paper	zip bag	Please return results in percentage and type of asbestos
	FS-1168-1-1	X				5/30	930	black asphalt shingles; black tar paper	zip bag	
	FS-1155-2-1	X				5/31	900	black sealant	zip bag	
	FS-1155-3-1	X				5/31	900	black asphalt sheet; black tar	zip bag	
	FS-1168-3-1	X				5/30	930	black asphalt sheet; black tar	zip bag	
										Stop analysis at the first positive for each homogeneous area (either bagged or rubber banded together) Positive consists of any layer being
										Bill shipping for this batch to 0002AL
Total number of samples						5				

Sampler(s): M. Uehara

RELINQUISHED By: (Signature) <i>Dale Kanehisa</i>	Date/Time 6/1/00 11:30am	RELINQUISHED By: (Signature)	Date/Time
RECEIVED BY: (Signature)	Date/Time	RECEIVED BY: (Signature)	Date/Time
SHIPPED BY: (Signature)	Date/Time	COURIER: (Signature)	Date/Time via FEDEX

LABORATORY: *[Signature]* 6/5/00