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WHOLE BARRACKS RENEWAL
PHASE 4B, QUAD E

STATEMENT OF WORK

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U.S. ARMY CORPS OF ENGINEERS
Honolulu Engineer District

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3	STRUCTURAL CONCEPT DESIGN AND CALCULATIONS
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7	GEOTECHNICAL INVESTIGATION REPORT
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9	PLUMBING AND HVAC DESIGN ANALYSIS
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CHAPTER 1

DESIGN OBJECTIVES

1-1 SCOPE OF WORK. Design and construction shall comply with the specifications and requirements contained in this Request for Proposals (RFP). The design and technical criteria contained and cited in this RFP establish minimum standards for design and construction quality. The concept drawings provided are for bidding purposes only. The Contractor shall develop final design in accordance with this RFP. The objective of this solicitation is to renovate and improve an existing Brigade Complex . This contract shall consist of the design for renovation and improvement of the existing Buildings 549 and 552 of Quad E located on a site bounded by Lewis Street, Waianae, Foote and Heard Avenues.

1-1.1 Site The site is described on the RFP drawings included as part of this solicitation.

1-1.2 Site Work**. Site work includes all design and construction of site features described in the RFP, including but not limited to upgrading of the existing water distribution/fire protection/sewer/drainage systems, site grading, new curbs/gutters, new walkways, new AC paved access roads, additional parking, new surfacing/striping/goal posts for the basketball court, installation of traffic gates and bicycle racks/slabs.**

1-1.3 Special Utilities and Supplementary Construction. Not required/not applicable.

1-1.4 Demolition Considerations and Requirements. Existing water/sewer/drainage facilities, fencing, AC pavement, curbing and walkways within Quad E shall be removed as required for AT/FP standoff requirements. In compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, the National Park Service (NPS), the Advisory Council for Historic Preservation (ACHP), the Hawaii State Historic Preservation Officer (SHPO), the Historic Hawai'i Foundation (HHF), the Outdoor Circle (OC), and other interested parties shall be afforded the opportunity to review and comment on demolition proposals before any decisions are made final.

1-1.5 Environmental Considerations and Mitigation Requirements. A programmatic Environmental Assessment was completed to address USARHAW's Whole Barracks Renewal Program and a Finding of No significant Impact (FONSI) was signed by the Installation Commander 20 July 1995. A supplemental Environmental Assessment has been completed for the Quad renovations.

1-2 APPLICABLE CRITERIA. Applicable design and construction criteria references are listed in the RFP sections and Attachments of the Statement of Work. Criteria shall be taken from the most current references as of the RFP issue date. Referenced codes and standards are minimum acceptable criteria. Administrative, contractual, and procedural features of the contract shall be as described in other sections of the RFP.

1-3 DESIGN QUALITY. The main objectives of this solicitation are to obtain an improved Brigade Complex including support facilities and associated site development within funds available, and to maximize design quality. Design quality is achieved through the optimization of interior planning, integration of buildings with the site, sustainability, selection of building systems for low-cost maintenance and operation, and an overall balance of aesthetics and functionality.

1-4 DESIGN REQUIREMENTS. Requirements stated in this RFP are minimums. Designs may incorporate factory fabricated components or modules.

1-5 ENERGY AND RESOURCES CONSERVING FEATURES. Public Law 102-486, Executive Order 12902, and Federal Regulations 10 CFR 435, require federal buildings to be designed and constructed to reduce energy consumption in a life cycle, cost-effective manner using renewable energy sources when economical. Products designed to conserve energy and resources by either controlling the amounts of consumed energy or by operating at increased efficiencies should be considered. Minimum requirements for this project are listed in the Statement of Work.

1-6 INSTALLATION REAL PROPERTY MASTER PLAN. The installation real property master plan provides comprehensive documentation of the existing conditions of natural, man-made, and human resources. It also guides future land-use development. Design of this project shall incorporate the design guidance and criteria contained in the Schofield Barracks Real Property Master Plan, excerpts of which are contained in an attachment to the Statement of Work.

1-7 ACCESSIBILITY REQUIREMENTS. All areas and facilities required to be accessible to physically disabled persons shall conform to the Uniform Federal Accessibility Standards (UFAS) Federal Standard 795, and the Americans With Disabilities Act Accessibility Guidelines (ADAAG). The following areas shall be accessible:

1-7.1 Areas that may be used by non-military employees or visitors. Specific areas are indicated in the Statement of Work.

1-7.2 Handicap accessible visitor and non-military employee parking spaces near buildings as indicated in Chapter 3 of the Statement of Work.

1-7.3 Minimum of one accessible pedestrian route linking handicap accessible parking areas with accessible building entrances.

1-8 ANTITERRORISM AND FORCE PROTECTION CONSIDERATIONS. Refer to Chapter 6, Structural Design and Attachment 3, Structural Concept Design and Calculations.

1-9 HISTORIC PRESERVATION (SECTION 106): In compliance with Section 106 of the NHPA of 1966, NPS, ACHP, SHPO, HHF, OC, and other interested parties shall be afforded the opportunity to review and comment on all design proposals before any decisions are made final.

1-10 ORGANIZATIONAL STRUCTURE. The renovated buildings under this solicitation will be occupied by soldiers. This solicitation will provide working and living accommodation spaces for enlisted personnel.

<u>Building 549:</u>

- One Small COF
- One Small COF
- One Medium COF
- One Small Battalion Headquarters
- Mechanical Central Plant
- Renovate existing Gymnasium space on the 3rd Floor

<u>Building 552:</u>

150PN Unaccompanied Enlisted Personnel Housing (UEPH)

CHAPTER 2

FUNCTIONAL AND AREA REQUIREMENTS

2-1 GENERAL REQUIREMENTS

2-1.1 Building Functionality. Functional spaces depicted on the RFP Concept Architectural Design Drawings have been coordinated with the proper contacts and have been sized and arranged for efficient use and circulation. The Design Build contractors shall incorporate the RFP Concept Architectural Design into their design proposal. The floor plan layout and relationship of functional spaces depicted in the RFP Concept Architectural Design Drawings serves as a guide only. During Design Development, the selected Design Build contractor shall incorporate any changes to the floor plan layout into their documents as approved by the Contracting Officer at no additional cost to the contract. All architectural criteria must be met and accounted for, see paragraph 5-2 Applicable Codes and Standards.
2-1.2 Gross building area definition. Gross building area is measured to the outside face of exterior enclosure walls. Gross area includes floor areas, penthouses, mezzanines, and other spaces as follows:

2-1.2.1 Areas calculated as half space. Gross area includes one-half the area of exterior covered areas such as balconies, entries, loading platforms, breezeways, exterior corridors, and porches. Exterior covered areas are measured from the face of the enclosure wall to the edge of the covered area served. Open Stairs count as half space for each floor they serve.

2-1.2.2 Excluded space. The following spaces are excluded from gross area calculations: Attic areas where average clear height does not exceed 2.13m [7 feet]; crawl spaces; exterior uncovered loading platforms; open courtyards; normal roof overhangs and soffits for weather protection; uncovered ramps and steps; utility tunnels; raceways; mechanical equipment platforms and catwalks.

2-1.3 Gross area limitations. Refer to RFP Concept Design Drawings for gross building area limitations for this RFP. Proposals shall not exceed authorized gross area limitations.

2-1.4 Net area definition. Net area is measured to the inside face of the room or space walls.

2-1.5 Net Area Requirements. Refer to RFP Concept Design Drawings for net area requirements for programmed spaces included in this chapter. The space is sized to accommodate the required function, comply with code requirements, and other requirements of the RFP.

2-1.6 Finish Requirements. Room finishes stated in the following paragraphs are minimums.

2-1.7 Furniture Requirements. The contractor is required to work with the customer to develop a Comprehensive Interior Design Package (CID) for Buildings 549 and 552 of Quad E. Refer to SOW Chapter 14 for CID requirements. A Furnishings/Fixtures/Equipment (FF&E) paragraph description has been provided for each space for each of Buildings 549 and 552 of Quad E, (i.e. paragraphs 2-2.1.1.2, 2-2.1.2.2, 2-2.1.3.2, etc…). These paragraphs determine which items are Government furnished and installed or Contractor furnished and installed. The contractor is required to work with the customer to determine specific furniture criteria such as acceptable materials, finishes and quality levels. The number and location of furnishings serve as an indicator of the number of power, data and communications connection points. See electrical section for more detail. The Furnishings described in the FFE paragraph for all spaces in Chapter 2 are for information only and is a starting point for the CID discussion purposes between the customer and the successful contractor.

2-1.7.1 The contractor is not required to purchase the Furnishings (tables, chairs, sofa, bed, etc.) for the programmed spaces unless noted otherwise. Also, the contractor is not required to provide equipment that is not installed (refrigerator, microwave, washer, and dryer).

2-2 BUILDING 549 - COMPANY OPERATIONS FACILITIES FUNCTIONAL AND AREA REQUIREMENTS. RFP Concept Design Drawings is separate and is included with this Specification Manual to describe the complete scope of work for this project. The company operations facilities (COF)

building(s) shall consist of administrative areas, heavy equipment storage and light equipment storage for each company, support spaces, and common locker/shower facilities for one medium and two small Company Operations Facilities (COF). COF functions and areas that occur in Building 549 shall be as follows:

2-2.1 COF Administrative Areas. One group of administrative areas per company. Company leadership will manage the organization, receive visitors, and conduct day-to-day business from the COF administrative areas. Entrance shall be separate and distinct from the entrances to company light equipment storage areas and to COF administrative areas. Each COF Administrative area shall be provided with a Company Identification Sign (5 total) see paragraph 5-8.2.6. Military personnel will staff the facility. The following areas for each company is required:

2-2.1.1 Company Commander Office (CO OF). One per company located on the second floor. Room shall be accessed through the Admin Office. Occupants: 1, and occasional visitors.

2-2.1.1.1 Function: Private office for commanding officer.

2-2.1.1.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: one desk with return, one credenza, one bookcase, two legal-size four-drawer file cabinets, one conference table, four side chairs, and one desk chair.

2-2.1.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.1.4 Other requirements: Provide 914 mm 3’-0” wide door into room. Room shall have exterior window.

2-2.1.2 Executive Officer Office (XO OF). One per company located on the second floor. Room shall be accessed through the Admin Office. Occupants: 1, and occasional visitors.

2-2.1.2.1 Function: Private office for the company executive officer.

2-2.1.2.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair and one desk chair.

2-2.1.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.2.4 Other requirements: Provide 914 mm 3’-0” wide door into room. Room shall have exterior window.

2-2.1.3 First Sergeant (1SG OF). One per company located on the second floor. Room shall be accessed through the Admin Office. Occupants: 1, and occasional visitors.

2-2.1.3.1 Function: Private office for the company first sergeant (highest ranking non-commissioned officer).

2-2.1.3.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, two side chairs and one desk chair.

2-2.1.3.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.3.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-2.1.4 Training Officer (TNG OF). One per company located on the second floor. Room shall be accessed through the Admin Office. Occupants: 1, and occasional visitors.

2-2.1.4.1 Function: Private office for the company Training Officer.

2-2.1.4.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, two side chairs and one desk chair.

2-2.1.4.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.4.4 Other requirements: Provide 914 mm [3'-0"] wide door into room. Exterior window is desirable.

2-2.1.5 Non-commissioned Officer in Charge (NOIC). One per company located on the second floor. Room shall be accessed through the Admin Office. Occupants: 1, and occasional visitors.

2-2.1.5.1 Function: Private office for non commissioned officer.

2-2.1.5.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, two side chairs and one desk chair.

2-2.1.5.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.5.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-2.1.6 Admin Office (ADMIN). One per company located on the second floor, including interior circulation. Room shall be accessed through the Waiting Area. Occupants: 2 clerks, and occasional visitors.

2-2.1.6.1 Function: Office for company administrative clerks, storage of files, access to private offices. Clerks will have visual control of waiting area and conference room door.

2-2.1.6.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: two clerk desks with returns and desk chairs. The following items will be Contractor furnished and installed: reception desk (built-in casework), as indicated on the concept design drawings separating the Admin Office from the Waiting Area. The counter on the Waiting Area side shall be 1016 mm high x 305 mm deep. Admin side of reception desk shall be at desk height, and shall accommodate computer and monitor (not in contract), and writing area. Provide task lighting at all writing surfaces. Provide built-

in communication and power receptacles or grommets in desk top to access wall receptacles. Desk shall have knee space and minimum two cabinets with hinged doors, and two drawers. Drawers and cabinets shall have keyed locks. Desk components shall have plastic laminate countertop, drawer, and door fronts. Provide a floor anchor for one GFGI security safe. Coordinate anchor location with furniture layout; refer to paragraph 5-7.2.8.

2-2.1.6.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.6.4 Other requirements: Provide 914 mm [3'-0"] wide entry door into room from Waiting Area.

2-2.1.7 Administrative Area Corridor. Circulation to building spaces shall comply with applicable code egress requirements. Unless otherwise required, administrative area corridor shall be capable of being secured from exterior entrances and from any adjacent public, unsecured corridors.

2-2.1.7.1 Function: Circulation and means of egress.

2-1.1.7.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: one handicap accessible electric water cooler; fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-2.1.7.3 Finishes:
Floor: vinyl composition tile.
Base: resilient cove base.
Walls: impact resistant gypsum wallboard with painted finish.
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.8 Administration Storage (STOR). One per company located on the second floor. Room shall be accessed from the Administration area.

2-2.1.8.1 Function storage for folding tables, display easels, etc.

2-2.1.8.2 Furnishings/Fixtures/Equipment:

2-2.1.8.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.8.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-2.1.9 Waiting Area (WAITING). One per company located area on the second floor, incorporated into the Administrative Area Corridor. Occupants: Two or more visitors; additional visitors (e.g. those waiting to attend a large meeting in the conference room) will wait in the adjacent corridor.

2-2.1.9.1 Function: Waiting and reception area for company soldiers and visitors. Control point for access to admin office and conference room.

2-2.1.9.2 Furnishings/Fixtures/Equipment (FFE): the following items will be government furnished and installed: two side chairs; one 1219 mm high x 1829 mm wide [4'-0" x 6'-0"] wall mounted bulletin board.

2-2.1.9.3 Finishes: Match Administrative Area Corridor.

2-2.1.10 Platoon Office (PLT). Two to Four platoon offices per company located on the second floor as depicted on the RFP Concept Design Drawings. Offices shall be accessed directly from the Administrative Area Corridor, or through a common space that is accessed from the Administrative Area Corridor. Occupants: 1 in each office, and occasional visitors.

2-2.1.10.1 Function: Private office for platoon leaders or other administrators.

2-2.1.10.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: one desk with return, one side chair and one desk chair.

2-2.1.10.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.10.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-2.1.11 Conference Room (CONF). One per company located on the second floor. Room shall be accessed from the Waiting Area (preferable), or through the Admin Office. Admin clerks shall have visual control of Conference Room door. Occupants: up to 22 persons.

2-2.1.11.1 Function: Conference room for company leadership, staff, and visitors. Functions will include staff meetings, hearings, disciplinary sessions, and training.

2-2.1.11.2 Furnishings/Fixtures/Equipment: the following items will be government furnished and installed: tables and chairs for minimum 22 people; one marker board (minimum 2438 mm wide x 1219 mm high [8'-0" x 4'-0"]) and one 2438 mm wide [8'-0"]. The following item will be Contractor furnished and installed: recessed ceiling mounted, motorized projection screen; 2438 mm wide [8'-0"].

2-2.1.11.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.11.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-2.1.12 Conference Room Storage (STOR). One per company located on the second floors. Room shall be accessed from the Conference Room.

2-2.1.12.1 Function: Closet for storage of folding tables, display easels, etc.

2-2.1.12.2 Furnishings/Fixtures/Equipment:

2-2.1.12.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-2.1.12.4 Other requirements: Provide pair 914 mm [3'-0"] wide entry doors.

2-2.1.13 Toilet (TOI). Two private unisex toilet rooms per company located on the second floor COF Administration area. Room shall be sized to comply with handicap accessibility requirements. Room shall be accessed from Administrative Area Corridor.

2-2.1.13.1 Function: Unisex single-occupant toilet, lavatory, and shower; for use by staff and visitors.

2-2.1.13.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: one floor mounted toilet, one wall-hung lavatory, mirror with shelf above lavatory, paper towel dispenser/waste receptacle, soap dispenser, toilet tissue dispenser, one toilet seat cover dispenser; and one ceramic tile shower enclosures and shower fixture and fittings.

2-2.1.13.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile wainscot 1219 mm high with painted water-resistant gypsum board above.
Ceiling: painted gypsum wallboard.

2-2.1.13.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-2.1.14 Janitor Closet (JAN). One per company located on the second floors.

2-2.1.14.1 Function: Service sink and storage of cleaning supplies, soap, and paper products.

2-2.1.14.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: one floor mounted mop sink, mop rack for three mops, and minimum 1524 linear mm of wall mounted stainless steel shelving.

2-2.1.14.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted water-resistant gypsum wallboard.
Ceiling: painted gypsum wallboard

2-2.1.14.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-2.2 COF HEAVY EQUIPMENT STORAGE AREAS. One group of Heavy Equipment Storage areas per company consisting of Equipment Maintenance Area, Arms Vault, and Unit Storage. COF Heavy Equipment Storage Areas are required for one medium and two small Company Operations Facilities (COF). COF Heavy Equipment Storage areas will be used to store, clean, and repair company operational equipment and weapons. Main entrance to Heavy Equipment Storage areas will be from paved service area inside the Quad; service area will be used for loading company equipment on and off of large trucks. Entrance shall be separate and distinct from the entrances to company administrative areas and to other COF Light Equipment Storage areas. Each COF Heavy Equipment Storage Area shall be provided with a Company Identification Sign (5 total), see para. 5-8.2.6. The sign will be located at the exterior wall space adjacent to the entrance. Only able-bodied military personnel will occupy COF supply areas; handicapped accessibility is not required. Heavy equipment storage areas for the COFs will have full height CMU. The following areas for each company are required:

2-2.2.1 Equipment Maintenance Area (EQUIP MAINT). One for each company area on the first floor.

2-2.2.1.1 Function: Equipment cleaning, repair and access to COF storage spaces.

2-2.2.1.2 Furnishings/Fixtures/Equipment: The following items will be Contractor furnished and installed: stainless steel equipment cleaning sinks 711 mm x 711 mm x 172 mm deep [28" x 28" x 6 ¾"], (three sinks), locate near exterior doors. Provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-2.2.1.3 Finishes:
Floor: sealed concrete
Base: none

Walls: painted concrete, or painted concrete masonry unit walls separating COF heavy storage areas.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.2.1.4 Other requirements: All entry doors into Equipment Maintenance Area shall have auxiliary deadlocks (thumb turn inside, keyed cylinder outside).

2-2.2.2 Arms Vault (ARMS VAULT). One Arms Vault for each company on the first floor. Construction of Arms Vault shall comply with paragraph 5-7.2. Coordinate with the authority having jurisdiction for specific construction requirements.

2-2.2.2.1 Function: Storage and issue of weapons.

2-2.2.2.2 Furnishings/Fixtures/Equipment: The following items will be Contractor furnished and installed: arms rack anchor rings on all walls inside Arms Vault; refer to paragraph 5-7.2. Arms racks are not in contract.

2-2.2.2.3 Finishes:
Floor: sealed concrete
Base: none.
Walls: painted concrete, or painted concrete masonry units.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.2.2.4 Other requirements: requirement for dehumidifier.

2-2.2.3 Unit Supply Storage (UNIT SUPPLY). One Unit Supply Storage for each company on the first floor. Provide access from Equipment Maintenance.

2-2.2.3.1 Function: Storage of miscellaneous equipment.

2-2.2.3.2 Furnishings/Fixtures/Equipment: None.

2-2.2.3.3 Finishes:
Floor: sealed concrete
Base: none
Walls: Provide painted concrete masonry units.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.2.3.4 Other requirements: Provide a pair of 914 mm wide hollow metal doors. Doors shall have hold open devices with auxiliary deadlocks (thumb turn inside, keyed cylinder outside).

2-2.3 COF LIGHT EQUIPMENT STORAGE AREAS. One group of Light Equipment Storage areas per company consisting of General Storage, NBC Storage, Comm Storage, Fire Control Storage, and TA-50 Gear Storage. COF Light Equipment Storage Areas are required for five mediums and two small Company Operations Facilities (COF). Individual TA-50 gear lockers shall be provided: minimum 80 lockers for Medium COF and 40 lockers for each Small COF. Each COF Light Equipment storage shall be provided with a Company Identification Sign (5 total), see para. 5-8.2.6. Military personnel will staff the facility. The following areas for each company are required.

2-2.3.1 General Storage (GEN STORAGE). Provide one General Storage for each company located on the second floor.

2-2.3.1.1 Function: Storage of soldier and miscellaneous equipment.

2-2.3.1.2 Furnishings/Fixtures/Equipment: None

2-2.3.1.3 Finishes:
Floor: vinyl composition tile

Base: resilient base
Walls: Provide painted impact resistant gypsum wallboard,
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.3.1.4 Other requirements: Provide pair 914 mm [3'-0"] wide hollow metal doors.

2-2.3.2 Nuclear, Biological and Chemical Equipment Storage (NBC). One NBC Storage for each company on the first floor.

2-2.3.2.1 Function: Storage of equipment for use in defense of nuclear, biological or chemical warfare.

2-2.3.2.2 Furnishings/Fixtures/Equipment: None.

2-2.3.2.3 Finishes:
Floor: sealed concrete
Base: resilient base
Walls: painted gypsum wallboard.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.3.2.4 Other requirements: Provide 914 mm [3'-0"] wide hollow metal door. The walls, doors, floors and ceiling must be constructed to meet Risk Level I requirements as specified in AR 190-51, Appendix B.

2-2.3.3 Communications Storage (COM STOR). One Communications Storage for each company on the first floor.

2-2.3.3.1 Function: Storage of radios and communications field gear.

2-2.3.3.2 Furnishings/Fixtures/Equipment:

2-2.3.3.3 Finishes:
Floor: sealed concrete
Base: resilient base
Walls: painted gypsum wallboard.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.3.3.4 Other requirements: Provide 914 mm [3'-0"] wide hollow metal door. The walls, doors, floors and ceiling must be constructed to meet Risk Level II requirements as specified in AR 190-51, Appendix B.

2-2.3.4 TA-50 Gear Storage (TA-50 GEAR). One TA-50 Gear Storage for each company located on the second floor. Size and configure area to accommodate as many TA-50 locker units per company (allow minimum 2438 mm [8'-0"] clearance between parallel rows of lockers; minimum 914 mm [3'-0"] between open locker doors and obstructions). These quantities shall be verified with the Company Commanders.

2-2.3.4.1 Function: Gear lockers for storage of individual soldier's TA-50 field gear.

2-2.3.4.2 Furnishings/Fixtures/Equipment: The following items will be Contractor furnished and installed: TA-50 gear lockers; lockers size: minimum 559 mm (w) x 914 mm (d) x 1067 mm (h) [22"w x 36"d x 42"h]. Lockers shall be stacked two high.

2-2.3.4.3 Finishes:
Floor: sealed concrete
Base: resilient base.
Walls: impact resistant gypsum board wallboard separating TA-50 Storage from adjacent COF spaces.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.3.4.4 Other requirements: Provide a pair of 914 mm [3'-0"] wide hollow metal doors.

2-2.3.5 Fire Control (FR CNT). One Fire Control Room for each company on the first floor.

2-2.3.5.1 Function: Storage

2-2.3.5.2 Furnishings/Fixtures/Equipment: None.

2-2.3.5.3 Finishes:
Floor: sealed concrete
Base: resilient base.
Walls: painted gypsum wallboard
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.3.5.4 Other requirements: Provide 914 mm [3'-0"] wide entry door. The walls, doors, floors and ceiling must be constructed to meet Risk Level II requirements as specified in AR 190-51, Appendix B.

2-2.4 BUILDING 549 SUPPORT AREAS. Only able-bodied personnel will occupy these support areas; handicapped accessibility is not required, except that stairs and corridors shall comply with handicapped accessibility requirements of applicable codes.

2-2.4.1 Mechanical Room(s) (MECH). Dedicated areas for mechanical equipment located on the first and second floors of Building 549. Each company shall have independent operation and control of HVAC system for its own spaces, but mechanical equipment may serve more than one company, and mechanical rooms may be combined. Mechanical rooms shall not be used for storage or other purposes. Access will be limited to authorized personnel. Provide floor openings and vertical shaft spaces as necessary.

2-2.4.1.1 Function: Spaces for HVAC, water heating, and other plumbing and mechanical equipment.

2-2.4.1.2 Furnishings/Fixtures/Equipment: None.

2-2.4.1.3 Finishes: Floor: sealed concrete
Base: resilient cove base
Walls: painted impact resistant gypsum board.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.4.1.4 Other requirements: Doors shall have storeroom function lockset master-keyed to existing system.

2-2.4.2 Mechanical Central Plant (CENTRAL PLANT) A dedicated area for mechanical central plant on the first floor of Building 549.

2-2.4.2.1 Function: Mechanical Room for HVAC and hot water equipment including, but not limited to, equipment as indicated and in the Statement of Work

2-2.4.2.2 Furnishings/Fixtures/Equipment: As required by Statement of Work and as indicated. Concrete floor slab shall be of sufficient strength and be designed for the equipment provided.

2-2.4.2.3 Finishes:
Floor: sealed concrete; non-slip coating.
Base: none
Walls: painted concrete masonry units
Ceiling: exposed to structure, paint.

2-2.4.2.4 Other requirements: Provide adequate drainage away from building.

2-2.4.3 Electrical Room(s) (ELEC). Dedicated areas for electrical equipment located on the first and second floors of Building 549. Each company shall have independent metering and control of the electrical system for its own spaces, but electrical equipment may serve more than one company, and electrical rooms may be combined. Electrical rooms shall not be used for storage or other purposes. Access will be limited to authorized personnel. Provide floor openings and vertical shaft spaces as necessary.

2-2.4.3.1 Function: Spaces for electrical equipment.

2-2.4.3.2 Furnishings/Fixtures/Equipment: None.

2-2.4.3.3 Finishes: Floor: sealed concrete
Base: resilient cove base
Walls: painted gypsum wallboard or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.4.3.4 Other requirements: Electrical service to buildings shall be underground. Doors shall have storeroom function lockset master-keyed to existing system.

2-2.4.4 Telecommunication Room (TELE). Dedicated interior room(s) for communication distribution equipment located on the first and second floors of Building 549. Room(s) shall be dedicated to one company, and shall not be combined with mechanical or electrical rooms. Access will be limited to authorized personnel. Each company requires one main communication room on the first floor; minimum size 3048 mm [10'-0"] x 3353 mm [11'-0"]. Provide secondary communication room for each company on the second floor. Minimum dimensions of secondary communication rooms shall be 2134 mm [7;-0"] x 3048 mm [10'-0"]. Provide floor openings and vertical shaft spaces as necessary. All spaces having telephone or computer data outlets shall be located to allow a maximum cable length of 90 m [295 feet] between outlet and communication room

2-2.4.4.1 Function: Telephone and data network support spaces for the COF.

2-2.4.4.2 Furnishings/Fixtures/Equipment: None.

2-2.4.4.3 Finishes: Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.4.4.4 Other requirements: Provide minimum 914 mm [3'-0"] wide door with storeroom function lockset master-keyed to existing system.

2-2.4.5 Exterior Stairs. Allows circulation to upper floor of the building. Comply with applicable code egress requirements. This description covers all Exterior Stairs at for Buildings 549.

2-2.4.5.1 Function: Circulation and means of egress.

2-2.4.5.2 Furnishings/Fixtures/Equipment (FFE): None.

2-2.4.5.3 Finishes: Landing floor: sealed concrete with slip-resistant finish texture.
Base: exterior wall material
Treads: Sealed concrete with slip-resistant nosing
Risers: sealed concrete
Walls: exterior wall materials
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.4.5.4 Other requirements: Stairs shall comply with handicap accessibility requirements of applicable codes. Railing shall be designed in accordance with applicable codes. Refer to Chapter 5 for hardware and security requirements for exterior doors.

2-2.4.6 Breezeway (BREEZEWAY). Occurs on the first floor of Building 549. Refers to an unair-conditioned, covered corridor space that is enclosed on the long sides, but open to the exterior on the ends. The Breezeway is required to allow circulation to building spaces and comply with applicable code egress requirements.

2-2.4.6.1 Function: Circulation and means of egress.

2-2.4.6.2 Furnishings/Fixtures/Equipment (FFE): Provide mechanical and electrical systems to comply with applicable codes. All fixtures and equipment shall be suitable for exterior locations. The following item shall be Contractor furnished and installed: provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-2.4.6.3 Finishes:
Floor: sealed concrete
Base: Exterior wall material
Walls: Exterior wall material
Ceiling: painted exterior gypsum soffit board.

2-2.4.6.4 Other requirements: With the exception of fire sprinkler systems, no piping, conduit or ductwork shall be exposed in breezeway. Provide slip resistant finish texture on concrete floor.

2-2.4.7 Exterior Corridor (LANAI). Refers to an unair-conditioned, covered circulation space that is enclosed on one long side (adjacent to the building), and has a guardrail on the other side. Allow circulation to building spaces. Exterior corridor shall comply with applicable code egress requirements. Exterior corridors serve as a link with the stairs and other circulation components.

2-2.4.7.1 Function: Circulation and means of egress.

2-2.4.7.2 Furnishings/Fixtures/Equipment (FFE): Provide mechanical and electrical systems to comply with applicable codes. The following items will be Contractor furnished and installed: fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes. All fixtures and equipment shall be suitable for exterior locations.

2-2.4.7.3 Finishes:
Floor: sealed concrete
Base: Exterior wall material
Walls: Exterior wall material
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-2.4.7.4 Other requirements: Handicap accessible. With the exception of fire sprinkler systems, no piping, conduit or ductwork shall be exposed in exterior corridor. Provide slip resistant finish texture on concrete floor. Guardrails shall be designed in accordance with applicable codes.

2-2.5 Common Locker/Shower Facilities (MEN TOILET/SHOWER) (WOMEN TOILET/SHOWER). There shall be one group of men's and one group of women's common locker/shower facilities shared by the COFs in Building 549. The first floor, of Building 549 shall have two (2) COF Toilet/Showers. Quantities of lockers and plumbing fixtures for men and women vary by shared Companies size. Provide the quantity of lockers and fixtures for the shared Small and Medium Company Operations Facilities on the first and second floor of Building 549 and as indicated in the table below. Soldiers will use locker rooms before and after physical training. Handicapped accessibility is not required. Additional entrances may be provided from a common public corridor in the COF. Entrances shall be separate and distinct from the entrances to company supply and administrative areas. Entrance vestibules shall be provided. Entrances shall provide visual privacy into the spaces.

Table 2-2.5 Locker Room Plumbing Fixture and Locker Quantities

	MEDIUM COMPANY		SMALL COMPANY	
	MEN	WOMEN	MEN	WOMEN
Lockers	82	8	34	8
WC	2	1	2	1
Urinals	1	-	1	-
Lavatories	2	1	1	1
Showers	5	1	4	1

2-2.5.1 Women's Locker Room. Provide one or more rooms, sized to accommodate the number of lockers and plumbing fixtures required for the shared Companies served. Provide entrance(s) with vestibule. For egress purposes, the occupant load shall be equal to the higher of the following numbers: a) the number of lockers in the room, or b) the code determined number of occupants calculated by multiplying room area x the occupant load factor.

2-2.5.1.1 Function: Toilets, showers and lockers for female soldiers.

2-2.5.1.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: floor mounted toilets, wall-hung lavatories, and ceramic tile shower enclosures in the quantities indicated in the table above. Provide toilet partitions at each toilet. Provide the following toilet accessories: one mirror with shelf above each lavatory; one paper towel dispenser/waste receptacle per two lavatories (or fraction thereof); one soap dispenser per lavatory; one sanitary napkin disposal per toilet; one toilet tissue dispenser per toilet; one toilet seat cover dispenser per toilet; one soap holder per shower; one shower curtain and rod at each shower; two double pin robe hooks at each dressing compartment; one robe hook on each toilet partition door; one sanitary napkin and tampon vending machine. Provide 305 mm [1'-0"] of locker room bench per 5 lockers provided. Provide two wall mounted GFCI electric outlets per two lavatories (or fraction thereof); mount adjacent to mirrors. Provide electric water cooler (EWC) at entrance vestibule from exterior. Provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-2.5.1.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile.
Ceiling: painted water resistant gypsum board.

2-2.5.1.4 Other requirements: Provide 914 mm [3'-0"] wide entry door. Locks shall be as specified in paragraph 5-4.9.5.3.

2-2.5.2 Men's Locker Room. Provide one or more rooms, sized to accommodate the number of lockers and plumbing fixtures required for the shared Companies served. Provide entrance(s) with vestibule. For egress purposes, the occupant load shall be equal to the higher of the following numbers: a) the number of lockers in the room, or b) the code determined number of occupants calculated by multiplying room area x the occupant load factor.

2-2.5.2.1 Function: Toilets, showers and lockers for male soldiers.

2-2.5.2.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: floor mounted toilets, wall-hung lavatories, and ceramic tile shower enclosures in the quantities indicated in the table above. Provide toilet partitions at each toilet. Provide the following toilet accessories: one mirror with shelf above each lavatory; one paper towel dispenser/waste receptacle per two lavatories (or fraction thereof); one soap dispenser per lavatory; one toilet tissue dispenser per toilet; one toilet seat cover dispenser per toilet; one soap holder per shower; one shower curtain and rod at each shower; one double pin robe hook outside each shower; one robe hook on each toilet partition door. Provide 305 mm [1'-0"] of locker room bench per 5 lockers provided. Provide two wall mounted GFCI

electric outlets per two lavatories (or fraction thereof); mount adjacent to mirrors. Provide electric water cooler (EWC) at entrance vestibule from exterior. Provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-2.5.2.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile.
Ceiling: painted water resistant gypsum board.

2-2.5.2.4 Other requirements: Provide 914 mm [3'-0"] wide entry door. Locks shall be as specified in paragraph 5-4.9.5.3.

2-3 BUILDING 549 - GYMNASIUM FUNCTIONAL AND AREA REQUIREMENTS.

2-3.1 Function: Multi-function space.

2-3.2 Furnishings/Fixtures/Equipment: reuse existing basketball backboards

2-3.3 Minimum Finishes:
Floor: Remove existing wood floor and install new wood floor after floor slab has been reinforced. Finish floor, stripe as directed and seal.
Base: none
Walls: paint existing walls-and decorative wall elements; new seismic work cannot cover existing decorative wall elements. Contractor must incorporate eclectic wall features into the seismic wall design and cannot conceal existing Historic features.
Ceiling: clean and paint existing metal deck and truss roof structure.

2-4 BUILDING 549 - SMALL BATTALION HEADQUARTERS (HQ) FUNCTIONAL AND AREA REQUIREMENTS. One Small Battalion Headquarters (HQ) is located on the third floor of Building 549, with the exceptions that Classroom No. 3 is located on the 2nd floor of Building 549. The Battalion HQ shall consist of administrative areas, classrooms, and support spaces. One elevator is required for Buildings 549. Mechanical and electrical systems must provide the battalion with independent operation and control.

Leadership and staff will manage the organization, receive visitors, and conduct the business of the battalion from the administrative areas (Command section, S-1, S-2, S-3, and S-4). Soldiers will visit the facility to conduct administrative business, or attend training classes. Military personnel will staff the facility; military and non-military personnel will visit the facility to meet with leadership or attend meetings. Although only able-bodied military personnel will be on staff, all spaces except shower rooms, and utility areas (janitor closets, mechanical, electrical, communication, and elevator machine rooms) shall comply with handicapped accessibility requirements, see Chapter 5, paragraph 5-9. Functions and areas are as follows:

2-4.1 Command Section. There shall be one group of offices per battalion, with accompanying administration area and reception area.

2-4.1.1 Commanding Officer (CO). One per battalion. Occupants: 1, and occasional visitors.

2-4.1.1.1 Function: Private office for battalion commanding officer with direct access to Conference Room and private Toilet Room.

2-4.1.1.2 Furnishings/Fixtures/Equipment: The following items shall Government furnished and installed: one desk, one credenza, one bookcase, two legal-size four-drawer file cabinets, one conference table, six side chairs, and one desk chair.

2-4.1.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.1.4 Other requirements: Provide 914 mm [3'-0"] wide door into room and to Conference Room. Room shall have exterior window.

2-4.1.2 Commanding Officer Private Toilet Room (TOILET) One private toilet room per Commanding Officer Office. Occupants: 1 per toilet room.

2-4.1.2.1 Function: single-occupant toilet and lavatory, for use by Commanding Officer.

2-4.1.2.2 Furnishings/Fixtures/Equipment: The following items will be Contractor furnished and installed: floor mounted toilet and wall-hung lavatory; the following toilet accessories: one mirror with shelf; one paper towel dispenser/waste receptacle; one soap dispenser; one toilet tissue dispenser; one toilet seat cover dispenser, robe hook on door.

2-4.1.2.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: painted gypsum wallboard.
Ceiling: painted gypsum wallboard.

2-4.1.2.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.1.3 Executive Officer (XO). One per battalion. Occupants: 1, and occasional visitors.

2-4.1.3.1 Function: Private office for battalion executive officer.

2-4.1.3.2 Furnishings/Fixtures/Equipment: The following items shall Government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.1.3.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.3.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.1.4 Command Sergeant Major (CSM). One per battalion. Occupants: 1, and occasional visitors.

2-4.1.4.1 Function: Private office for battalion command sergeant major.

2-4.1.4.2 Furnishings/Fixtures/Equipment: The following items shall Government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.1.4.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.4.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.1.5 Duty Officer (DUTY OF). One per battalion. Occupants: 1.

2-4.1.5.1 Function: Duty Officer provides physical security of the building, and visual control of the entrances and lobby, as well as functioning as an information source for visitors.

2-4.1.5.2 Furnishings/Fixtures/Equipment: The following items shall Government furnished and installed: one desk with return, one legal-size four-drawer file cabinet, one side chair, and one desk chair.

2-4.1.5.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.5.4 Other requirements: Provide 914 mm [3'-0"] wide door into room; door shall have glass vision panel.

2-4.1.6 Waiting (WAITING) One per battalion adjacent to the Reception Area and S-1. Occupants: Four or more visitors.

2-4.1.6.1 Function: Waiting area for visitors

2-4.1.6.2 Furnishings/Fixtures/Equipment: The following items will be government furnished and installed: Four side chairs and one magazine table at Bldg 549.

2-4.1.6.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.7 Reception (REC). One per battalion. Command Section shall be accessed through the Reception area.

2-4.1.7.1 Function: Control area for visitors to Command Section.

2-4.1.7.2 Furnishings/Fixtures/Equipment: The following will be government furnished and installed: three systems furniture workstations.

2-4.1.7.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.7.4 Other requirements: Provide 914 mm [3'-0"] wide door into room; door shall have entry function lockset and glass vision panel.

2-4.1.8 Conference Room (CONF). One room at Building 549. The CO Office shall have direct access to a Conference Room. Occupants: up to 26 persons.

2-4.1.8.1 Function: Conference room for battalion leadership, staff, and visitors. Functions will include staff meetings, hearings, disciplinary sessions, and training.

2-4.1.8.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and

installed for each conference room: conference table and seating for up to 26 persons. Provide one marker board (minimum 2438 mm wide x 1219 mm high [8'-0" x 4'-0"]). The following item will be Contractor furnished and installed: recessed ceiling mounted, motorized projection screen; 2438 mm wide [8'-0"].

2-4.1.8.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.1.8.4 Other requirements: Provide 914 mm [3'-0"] wide doors into room.

2-4.1.9 Toilet Room (M) and (W). Two Men and two Women accessible toilet for each Battalion. Occupants: 1 per toilet room.

2-4.1.9.1 Function: single-occupant toilet and lavatory, for use by staff.

2-4.1.9.2 Furnishings/Fixtures/Equipment: The following items will be Contractor furnished and installed: floor mounted toilet and wall-hung lavatory; the following toilet accessories: one mirror with shelf; one paper towel dispenser/waste receptacle; one soap dispenser; one toilet tissue dispenser; one toilet seat cover dispenser, robe hook on door; and toilet seat cover dispenser.

2-4.1.9.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile wainscot 1219 mm high with painted water-resistant gypsum board above.
Ceiling: painted gypsum wallboard.

2-4.1.9.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.2 S-1 Section. One group of offices per battalion. Command Section shall be accessed through the S-1 Clerical/Central Files area.

2-4.2.1 S-1 Officer (S-1 OFF). Two per battalion. Rooms shall be accessed through the S-1 Clerical/Central Files area. Occupants: 1 per office, and occasional visitors.

2-4.2.1.1 Function: Private office for S-1 officer.

2-4.2.1.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed for each office: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.2.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.2.1.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.2.2 S-1 Clerical/Central Files (S-1). One per battalion. S-1 Clerical/Central Files shall be accessed from the Waiting room. The area shall have direct access to S-1 private offices, and the Reception area. The following items will be Contractor furnished and installed: Provide counter (built-in casework), as indicated in the Concept Design Drawings, separating the Waiting Room from S-1 Cleric/Central Files. The counter on the corridor side shall be minimum 1524 mm [5'-0"] wide x 1016 mm [3'-4"] high x 305 mm [12"] deep. Occupants: 4 staff and occasional visitors.

2-4.2.2.1 Function: Open office area for S-1 admin staff; access to S-1 and Command offices.

2-4.2.2.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: four systems furniture workstations.

2-4.2.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.2.2.4 Other requirements: Provide 914 mm [3'-0"] wide door into room. Exterior window is desirable.

2-4.3 Support Operations Office. One group of offices per battalion.

2-4.3.1 Support Operations Office (SPO OFF). Two per battalion. Rooms shall be accessed through the SPO Open Office area. Occupants: 1 per office and occasional visitors.

2-4.3.1.1 Function: Private office for SPO officer.

2-4.3.1.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed for each office: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.3.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.3.1.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.3.2 Support Operations Open Office (SPO). One per battalion. Occupants: Minimum 9 staff at Building 549 and minimum 4 staff at Building 550 with occasional visitors.

2-4.3.2.1 Function: Open office area for SPO admin staff.

2-4.3.2.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: one systems furniture workstations for each staff member.

2-4.3.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.3.2.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.4 S-2 SECTION. One group of offices per battalion.

2-4.4.1 S-2 Officer (S-2 OF). One per battalion. Room shall be accessed through the S-2 OPS area. Occupants: 1, and occasional visitors.

2-4.4.1.1 Function: Private office for S-2 officer.

2-4.4.1.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.4.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard or painted veneer plaster
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.4.1.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.4.2 S-2 OPS area. (S-2 OPS). One per battalion. S-2 OPS shall be accessed from the corridor. The area shall have direct access to S-2 private offices. Occupants: 2 staff, and occasional visitors.

2-4.4.2.1 Function: Open office area for S-2 admin staff; access to S-2 Office.

2-4.4.2.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: two systems furniture workstations.

2-4.4.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.4.2.4 Other requirements: Provide 914 mm [3'-0"] wide door into room. Exterior window is desirable. Minimum ceiling height 2642 mm [8'-8"].

2-4.5 S-3 SECTION. One group of offices per battalion.

2-4.5.1 S-3 Officer (S-3 OF). One per battalion. Room shall be accessed through the S-3 Clerical/Central Files area. Occupants: 1, and occasional visitors.

2-4.5.1.1 Function: Private office for S-3 officer.

2-4.5.1.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.5.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.5.1.4 Other requirements: Provide 914 mm [3'-0"] wide door into room. Exterior window is desirable.

2-4.5.2 S-3 Clerical/Central Files (S-3). One per battalion. The area shall have direct access to S-3 private office and to storage and supplies. Occupants: 10 staff at Building 549 and 7 staff at Building 550, and occasional visitors.

2-4.5.2.1 Function: Open office area for S-3 admin staff; access to S-3 office.

2-4.5.2.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: one systems furniture workstations for each staff member.

2-4.5.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.5.3 S-3 Storage & Supplies (S-3 SUP). One per battalion. Room shall be under control of, and accessed from, S-3 Clerical/Central Files area.

2-4.5.3.1 Function: Storage of miscellaneous equipment for S-3 Section.

2-4.5.3.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: portable shelving.

2-4.5.3.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard or
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.6 S-4 SECTION. One group of offices per battalion.

2-4.6.1 S-4 Officer (S-4 OF). Two per battalion. Room shall be accessed through the S-4 Clerical/Central Files area. Occupants: 1 per office, and occasional visitors.

2-4.6.1.1 Function: Private office for S-4 officers.

2-4.6.1.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: one desk with return, one bookcase, two legal-size four-drawer file cabinets, one side chair, and one desk chair.

2-4.6.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.6.1.4 Other requirements: Provide 914 mm [3’-0”] wide door into room. Exterior window is desirable.

2-4.6.2 Repair and Utilities Office. (R & U). One per battalion. Room shall have two means of access through the S-4 Clerical/Central Files area and from the Hallway. Occupants: 2 per office, and occasional visitors.

2-4.6.2.1 Function: Office.

2-4.6.2.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: two desks with return, two bookcases, two legal-size four-drawer file cabinets, and two desk chairs.

2-4.6.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.6.3 S-4 Clerical/Central Files (S-4). One per battalion. S-4 Clerical/Central Files shall be accessed from the lobby or corridor. The area shall have direct access to S-4 private offices. Occupants: 8 staff, and occasional visitors.

2-4.6.3.1 Function: Open office area for S-4 admin staff; access to S-4 office.

2-4.6.3.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: eight systems furniture workstations.

2-4.6.3.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.6.3.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.6.4 S-4 Storage & Supplies (S-4 SUP). Minimum one per battalion. Room shall be under control of, and accessed from, S-4/Clerical/Central Files area.

2-4.6.4.1 Function: Storage of miscellaneous equipment for S-4 Section.

2-4.6.4.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: portable shelving.

2-4.6.4.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard or
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.6.4.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.7 Siprnet Room (SIPRNET). One Siprnet Room per battalion. The construction of the Siprnet Room shall be similar to that of the Arms Vault, see paragraph 5-7.2. Coordinate with the authority having jurisdiction for specific construction requirements. See SOW Ch 9 Electrical Systems, para. 9-2.6 for additional requirements regarding this space.

2-4.7.1 Function: Telecommunications vault for classified information.

2-4.7.2 Furnishings/Fixtures/Equipment: None.

2-4.7.3 Finishes:
Floor: sealed concrete
Base: none.
Walls: painted concrete.
Ceiling: painted concrete.

2-4.7.4 Other requirements: Provide 914 mm [3'-0"] wide hollow metal door into room.

2-4.8 CLASSROOM AREAS. Classrooms shall be accessed from an interior corridor or exterior corridor (Lanai).

2-4.8.1 Small Classroom (CLASSRM NO. 1). Each classroom shall be located to allow access from and interior corridor or exterior corridor (Lanai). Occupants: up to 20 persons in each room.

2-4.8.1.1 Function: Soldier training and other meetings.

2-4.8.1.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and installed: tables and chairs for up to 15 occupants; one lectern; one marker board (minimum 3658 mm wide x 1219 mm high [12'-0" x 4'-0"]) and one 2438 mm wide [8'-0"]
The following items will be Contractor furnished and installed: Provide recessed ceiling mounted, motorized projection screen; 2438 mm wide [8'-0"]. Coordinate with user and add requirements for cable television outlets, television support brackets, or other equipment.

2-4.8.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.8.1.4 Other requirements: Provide 914 mm [3'-0"] wide doors into room.

2-4.8.2 Medium Classrooms (CLASSRM NO. 2). The classrooms shall be located to allow access from an interior or exterior corridor (Lanai). Occupants: up to 40 persons in each room.

2-4.8.2.1 Function: Soldier training and other meetings.

2-4.8.2.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and installed: tables and chairs for up to 40 occupants; one lectern; one marker board (minimum 3658 mm wide x 1219 mm high [12'-0" x 4'-0"]) and one 2438 mm wide [8'-0"]
The following items will be Contractor furnished and installed: Provide recessed ceiling mounted, motorized projection screen; 2438 mm wide [8'-0"]. Coordinate with user and add requirements for cable television outlets, television support brackets, or other equipment.

2-4.8.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.8.2.4 Other requirements: Provide 914 mm [3'-0"] wide doors into room.

2-4.8.3 Classroom Toilet Facilities (M) AND (W). Building 549 - One Men's and one Women's Toilet at the second floor Classroom. Provide the quantity of toilet fixtures as indicated on the drawings and on the table below. Handicapped accessibility is required. Entrance vestibules shall be provided. Entrances shall have visual privacy into the spaces.

Table 2-8.3 Toilet Plumbing Fixture Quantities

	BATTALION HQ	
	MEN	WOMEN
WC	X	X
Urinals	X	-
Lavatories	X	X

2-4.8.3.1 Function: Toilets for male soldiers.

2-4.8.3.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: floor mounted toilets, wall-hung lavatories, and ceramic tile shower enclosures in the quantities

indicated in the table above. Provide toilet partitions at each toilet. Provide the following toilet accessories: one mirror with shelf above each lavatory; one paper towel dispenser/waste receptacle per two lavatories (or fraction thereof); one soap dispenser per lavatory; one toilet tissue dispenser per toilet; one toilet seat cover dispenser per toilet; one soap holder per shower; one robe hook on each toilet partition door. Provide two wall mounted GFCI electric outlets per two lavatories (or fraction thereof); mount adjacent to mirrors.

2-4.8.3.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile.
Ceiling: painted water resistant gypsum board.

2-4.8.3.4 Other requirements: Provide 914 mm [3'-0"] wide entry door. Locks shall be as specified in paragraph 5-4.9.5.3.

2-4.8.3.5 Function: Toilets for female soldiers.

2-4.8.3.6 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: floor mounted toilets, and wall-hung lavatories. Provide toilet partitions at each toilet. Provide the following toilet accessories: one mirror with shelf above each lavatory; one paper towel dispenser/waste receptacle per two lavatories (or fraction thereof); one soap dispenser per lavatory; one sanitary napkin disposal per toilet; one toilet tissue dispenser per toilet; one toilet seat cover dispenser per toilet; one robe hook on each toilet partition door; one sanitary napkin and tampon vending machine. Provide two wall mounted GFCI electric outlets per two lavatories (or fraction thereof); mount adjacent to mirrors.

2-4.8.3.7 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile.
Ceiling: painted water resistant gypsum board.

2-4.8.3.8 Other requirements: Provide 914 mm [3'-0"] wide entry door. Locks shall be as specified in paragraph 5-4.9.5.3.

2-4.8.4 Resource Center (RESOURCE CENTER). Each classroom shall be located to allow direct access from the main corridor with direct egress out of the building. Occupants: up to 20 persons in each room.

2-4.8.4.1 Function: Soldier training and other meetings.

2-4.8.4.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and installed: tables and chairs for up to 20 occupants; one lectern; one marker board (minimum 3658 mm wide x 1219 mm high [12'-0" x 4'-0"]) and one 2438 mm wide [8'-0"]
The following items will be Contractor furnished and installed: Provide recessed ceiling mounted, motorized projection screen; 2438 mm wide [8'-0"]. Coordinate with user and add requirements for cable television outlets, television support brackets, or other equipment.

2-4.8.4.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.8.4.4 Other requirements: Provide 914 mm [3'-0"] wide doors into room.

2-4.8.5 Classroom/Learning Resource Center (CLASSROOM LRC). Each classroom shall be located to allow direct access from the main corridor with direct egress out of the building. Occupants: up to 40 persons in each room.

2-4.8.5.1 Function: Soldier training and other meetings.

2-4.8.5.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and installed: tables and chairs for up to 40 occupants; one lectern; one marker board (minimum 3658 mm wide x 1219 mm high [12'-0" x 4'-0"]) and one 2438 mm wide [8'-0"]
The following items will be Contractor furnished and installed: Provide recessed ceiling mounted, motorized projection screen; 2438 mm wide [8'-0"]. Coordinate with user and add requirements for cable television outlets, television support brackets, or other equipment.

2-4.8.5.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.9 Message Mail Center (MESSAGE CENTER). Provide one on the third floor for each Battalion.

2-4.9.1 Function: Mail distribution.

2-4.9.1.1 Furnishings/Fixtures/Equipment: The following item will be Contractor furnished and installed: counter (built-in casework), separating the Message Mail Center from the corridor. The counter on the corridor side shall be minimum 1524 mm [5'-0"] wide x 1016 mm [3'-4"] high x 305 mm [12"] deep; provide locking overhead roll-down door to secure the opening when unattended; roll-down door hood shall not be visible from corridor side. Counter material shall be plastic laminate

2-4.9.1.2 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.9.1.3 Other requirements: Provide 914 mm [3'-0"] wide door into room; door shall have entry function lockset and glass vision panel.

2-4.10 Re-Enlist Office (RE-ENLIST). One per battalion. Occupants: 3, and occasional visitors.

2-4.10.1 Function: Office for re-enlistment personnel.

2-4.10.2 Furnishings/Fixtures/Equipment: the following item will be government furnished and installed: three desks with returns, three bookcases, three legal-size four-drawer file cabinets, three side chairs, and three desk chairs.

2-4.10.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.10.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.2-4.11 Chaplain (CHAPLAIN). One at Building 549. Occupants: 1, and visitors.

2-4.11.1 Function: Private office for Chaplain and visitors.

2-4.11.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: one desk with return, one bookcase, two side chairs, and one desk chair.

2-4.11.3 Finishes:
Floor: carpet
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.11.4 Other requirements: Provide 914 mm [3'-0"] wide door into room.

2-4.12 Chaplain Reception/Waiting (WAITING). Adjacent and with direct access to the Chaplain's office.

2-4.12.1 Function: waiting area for visitors to Chaplain services.

2-4.12.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: one desk with return, one bookcase, one desk chair, five side chairs, one corner tables, and one magazine rack.

2-4.12.3 Finishes:
Floor: carpet
Base: resilient base
Walls: painted gypsum wallboard
Ceiling: Suspended acoustic tile ceiling grid system.

2-4.13 Battalion HQ Common Areas. The following Common areas of the Battalion HQ are required to be handicapped accessible except the janitor closet and shower rooms.

2-4.13.1 Lobby, Corridors, and Vestibules. Provide as required to allow access to building spaces. Unless otherwise required, minimum width of main corridors shall not be less than 1829 mm [6'-0"]. Corridor width shall comply with applicable egress codes.

2-4.13.1.1 Function: Entry to the facility; egress and circulation through the building.

2-4.13.1.2 Furnishings/Fixtures/Equipment: the following items will be Contractor furnished and installed: wall mounted electric water cooler. Provide mechanical and electrical systems to comply with applicable codes. Provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes. Provide interior signage to identify major spaces. Provide one building directory near each main entrance and one building directory near first floor elevator doors. The following item will be Government furnished and installed: Provide one 1219 mm high x 1829 mm wide [4'-0" x 6'-0"] wall mounted bulletin board.

2-4.13.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base.
Walls: painted gypsum wallboard
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.13.1.4 Other requirements: Handicap accessible.

2-4.13.2 Vending Area (VENDING). one area on the third floor for each battalion.

2-4.13.2.1 Function: Space for soft drink and snack vending machines, and ice machine-dispenser.

2-4.13.2.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and

installed: one ice cube machine-dispenser designed for hotel ice bucket filling, capable of producing minimum 250 lbs. of regular ice cubes in 24 hours, with 180 lb. Storage; ice machine manufacturer's automatic cleaning system to clean and sanitize the water distribution system of the machine at scheduled intervals. Ice machine shall be Energy Star compliant; four full-size soft drink and snack vending machines. Vending machines will not require plumbing connections.

2-4.13.2.3 Finishes:
Floor: vinyl composition tile
Base: resilient base
Walls: painted gypsum wallboard.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.13.2.4 Other requirements: Provide electrical power to accommodate vending machines and to comply with applicable codes.

2-4.14.1 Janitor Closet (JAN). One on the third floor. Room shall be accessed from the Hallway.

2-4.14.1.1 Function: Service sink and storage of cleaning supplies, soap, and paper products.

2-4.14.1.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: one floor mounted mop sink, mop rack for three mops, and minimum 1524 linear mm of wall mounted stainless steel shelving.

2-4.14.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted water-resistant gypsum wallboard.
Ceiling: painted gypsum wallboard

2-4.15 BUILDING 549 SUPPORT AREAS. The following areas for the Battalion HQ building are required. Handicapped accessibility is not required in mechanical rooms, electrical and communications closets, and elevator machine room. All other support spaces shall be handicap accessible.

2-4.15.1 Mechanical Room(s) (MECH). Dedicated areas for mechanical equipment located on the third floor. Each battalion shall have independent operation and control of HVAC system for its own spaces, but mechanical equipment may serve more than one battalion, and mechanical rooms may be combined. Mechanical rooms shall not be used for storage or other purposes. Access will be limited to authorized personnel. Rooms shall allow easy equipment removal and maintenance. Provide floor openings and vertical shaft spaces as necessary.

2-4.15.1.1 Function: Spaces for HVAC, water heating, and other plumbing and mechanical equipment.

2-4.15.1.2 Furnishings/Fixtures/Equipment: None.

2-4.15.1.3 Finishes:
Floor: sealed concrete
Base: resilient cove base
Walls: painted gypsum wallboard and painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.15.1.4 Other requirements: Doors shall have storeroom function lockset master-keyed to existing system.

2-4.15.2 Electrical Room(s) (ELEC). Dedicated areas for electrical equipment located on the third floor. Each battalion shall have independent metering and control of the electrical system for its own spaces, but electrical equipment may serve more than one battalion, and electrical rooms may be

combined. Electrical rooms shall not be used for storage or other purposes. Access will be limited to authorized personnel. Rooms shall allow easy equipment removal and maintenance.

2-4.15.2.1 Function: Spaces for electrical equipment.

2-4.15.2.2 Furnishings/Fixtures/Equipment: None.

2-4.15.2.3 Finishes: Floor: sealed concrete
Base: resilient cove base
Walls: painted gypsum wallboard or painted veneer plaster, or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.15.2.4 Other requirements: Electrical service to buildings shall be underground. Doors shall have storeroom function lockset master-keyed to existing system.

2-4.15.3 Telecommunication Room (TELE). Dedicated room(s) for communication distribution equipment located on the third floor. Each room shall be dedicated to a single battalion, and shall not be combined with mechanical or electrical rooms. Each battalion shall have one main communication room; minimum size 3048 mm [10'-0"] x 3353 mm [11'-0"]. In two-story buildings, the communication room shall be located on the second floor. Provide additional communication rooms as needed; all spaces having telephone or computer data outlets shall be located to allow a maximum cable length of 90 m [295 feet] between outlet and communication room. Minimum dimensions of secondary communication rooms shall be 2134 mm [7;-0"] x 3048 mm [10'-0"]. Provide floor openings and vertical shaft spaces as necessary. Rooms shall be accessed from corridors. Access will be limited to authorized personnel.

2-4.15.3.1 Function: Distribution areas for telephone, data network, and cable television.

2-4.15.3.2 Furnishings/Fixtures/Equipment: None.

2-4.15.3.3 Finishes: Floor: vinyl composition tile.
Base: resilient cove base
Walls: painted gypsum wallboard, or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.15.3.4 Other requirements: Door shall have minimum 914 mm [3'-0"] wide door with lockset master-keyed to existing system. Provide three 102 mm [4"] empty conduits connecting vertically stacked communication rooms.

2-4.15.4 Elevator (ELEV). One hydraulic passenger elevator for each building.

2-4.15.4.1 Function: Vertical conveyance of people and furniture.

2-4.15.4.2 Furnishings/Fixtures/Equipment: Passenger elevator: 2,500 lb. capacity, minimum 75 feet per minute speed; center opening doors. Refer to Chapter 5 for additional requirements.

2-4.15.4.3 Cab finishes: Floor: vinyl composition tile
Walls: plastic laminate
Ceiling: suspended translucent panel
Car door and front: satin finish stainless steel
Hoistway entrance doors and frame: satin finish stainless steel

2-4.15.4.4 Other requirements: Handicapped accessible.

2-4.15.5 Elevator Machine Room (MACH). One on the first floor of each building. Size to comply with equipment and code requirements.

2-4.15.5.1 Function: Space for hydraulic elevator equipment.

2-4.15.5.2 Furnishings/Fixtures/Equipment: None.

2-4.15.5.3 Finishes: Floor: sealed concrete
Base: resilient cove base
Walls: painted concrete, or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.15.6 Interior Corridor (HALLWAY). Required to allow circulation to building spaces, and comply with applicable code egress requirements. Due to security, climate, and force protection concerns, interior corridors are the preferred means of circulation between living units and other building spaces.

2-4.15.6.1 Function: Circulation and means of egress.

2-4.15.6.2 Furnishings/Fixtures/Equipment (FFE): Provide mechanical and electrical systems to comply with applicable codes. Provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-4.15.6.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base.
Walls: impact resistant gypsum wallboard with painted finish.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-4.15.6.4 Other requirements: Handicap accessible.

2-4.15.7 Exterior Corridor (LANAI). Refers to an unair-conditioned, covered circulation space that is enclosed on one long side (adjacent to the building), and has a guardrail on the other side. It is required to allow circulation to building spaces and comply with applicable code egress requirements. Exterior corridors may be provided to link breezeways with stairs and other circulation components. Exterior corridors shall not be used to provide access to living units

2-4.15.7.1 Function: Circulation and means of egress.

2-4.15.7.2 Furnishings/Fixtures/Equipment (FFE): Provide mechanical and electrical systems to comply with applicable codes. Provide fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes. All fixtures and equipment shall be suitable for exterior locations.

2-4.15.7.3 Finishes:
Floor: sealed concrete
Base: Exterior wall material
Walls: Exterior wall material
Ceiling: painted underside of concrete structure above

2-4.15.7.4 Other requirements: Handicap accessible. Other than the fire sprinkler systems, no piping, conduit or ductwork shall be exposed in exterior corridor. Exceptions to this requirement will be allowed with written approval from the Contracting Officer. Provide slip resistant finish texture on concrete floor. Guardrails shall be designed in accordance with applicable codes.

2-5 BUILDING 552 - UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH) FACILITIES FUNCTIONAL AND AREA REQUIREMENTS. The UEPH building(s) shall consist of living units, common areas, and support spaces that will occupy all three floors of Building 552. Each living unit shall be designed to be occupied by one or two soldiers. It shall have 66 Two-person living units and 18 One-person living units to house a total of 150 enlisted personnel. The one-person living unit Living units and common areas are equally distributed among three floors in Building 552. Only able-bodied military personnel will occupy UEPH Buildings; handicapped accessibility is not required except at the ground floor exterior corridor and ground floor areas accessible to the general public such as the Toilets and

Game Rooms. Building spaces and areas shall be as follows:

2-5.1 Areas Comprising the Two-Person Living Unit (1+1 Module). Each Two-Person living unit, or module, will contain two individual living/sleeping rooms with closets, and a shared service area with Kitchen, and a shared bathroom. Spaces are as follows.

2-5.1.1 Individual Living/Sleeping Room (BEDROOM). Two per module.

2-5.1.1.1 Function: Private bedroom and living space for one enlisted person.

2-5.1.1.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: One twin bed with headboard and footboard 102mm x 2083mm [40" x 85"]; one dresser 712mm wide x 458mm deep x 661mm high [28" x 18" x 26" high]; one nightstand 485mm wide x 435mm deep x 535mm high [19" x 17" x 21" high]; one desk 1524mm wide x 762 deep (with keyboard tray retracted) x 762mm high [60" wide x 30" deep x 30" high]; one desk chair 500mm wide x 535mm deep x 851mm high [19-1/2" x 21" x 33-1/2" high] and one entertainment center 914 mm wide x 610 mm deep [36" x 24"].

2-5.1.1.3 Minimum Finishes:
Floor: vinyl composition tile
Base: resilient cove base.
Walls: gypsum wallboard with full-height Interior Textured Acrylic Wall Finish (Duroplex).
Ceiling: painted gypsum wallboard.

2-5.1.1.4 Other requirements: Living/sleeping room shall have at least one exterior operable window with insect screen. Window shall meet egress requirements of NFPA 101 and Unified Facilities Criteria (UFC) 1-200-01 and International Building Code (IBC). Window shall not be located adjacent to an exterior corridor or breezeway. Door between service area and living/sleeping room shall have electronic lockset. Door between public corridor and service area shall have electronic lockset. Provide minimum of one combination telephone/data outlet in each Living /Sleeping room. Provide minimum of one cable television outlet in each Living/Sleeping room. Coordinate outlet locations with furniture arrangement. Refer to Chapter 9 Electrical Systems.

2-5.1.2 Closet (CLOSET). One per living/sleeping room.

2-5.1.2.1 Function: Private walk-in closet for clothing and storage of boxes and field gear.

2-5.1.2.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: rod and shelf, as indicated on the RFP Concept Drawings.

2-5.1.2.3 Minimum Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard
Ceiling: painted gypsum wallboard.

2-5.1.2.4 Other requirements: Door shall have passage function latchset and be equipped with a hasp so the occupant can provide his/her own padlock.

2-5.1.3 Kitchen (KITCHEN). One per module.

2-5.1.3.1 Function: Circulation space, food preparation area, and eating area for occupants.

2-5.1.3.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: one refrigerator-freezer (minimum 9 total cubic feet); one microwave oven (min .9 cubic feet, 800 watts) mounted under wall cabinets, one 762mm [30"] slide-in electric range. The following item will be Contractor furnished and installed: minimum 1500 linear mm [5'-0"] of 600mm [2'-0"] deep kitchen base cabinets and countertop (including range width), and 2100 linear mm [7'-0"] of 300mm [12"] deep

wall cabinets. Wall cabinets shall be minimum 600mm [2'-0"] high; provide 600 mm [2'-0"] clear between countertop and bottom of wall cabinets at sink. Base cabinets shall have minimum of two 300 mm [12"] wide drawers; provide plastic laminate countertop with integral side and backsplashes at walls. Provide single compartment, stainless steel kitchen sink with food strainer/stopper, minimum inside dimensions 400mm x 400mm x 175mm deep [1'-4" x 1'-4" x 7" deep], with chrome-plated, single handle, washerless mixing faucet (refer to Chapter 8); provide fire extinguisher mounted inside base cabinet. One 4-burner electric range hood with exterior exhaust and garbage disposal.

2-5.1.3.3 Minimum Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard; Wall area between countertop and wall cabinets: plastic laminate.
Ceiling: painted gypsum wallboard.

2-5.1.3.4 Other requirements: Door between public corridor and service area (entry door into module) shall have interlocking threshold.

2-5.1.4 Bathroom (BATHROOM). One per module.

2-5.1.4.1 Function: Bathing and toilet facilities for either occupant; storage for both occupants' bath articles.

2-5.1.4.2 Furnishings/Fixtures/Equipment (FFE): All the following items listed will be Contractor furnished and installed: Lavatory that shall be minimum 475mm x 475mm [19" x 19"] self-rimming vitreous china, or cast-filled acrylic or solid surfacing material integrally molded to countertop; provide chrome-plated washerless faucet with pop-up drain (refer to Chapter 8); Countertop shall be minimum 900mm [3'-0"] wide cast-filled acrylic, acrylic solid surfacing material, or plastic laminate with integrally molded, 100mm high coved backsplash. Provide 102mm high side splash at side walls. Provide plastic laminate surfaced vanity base cabinet with hinged door(s) and minimum two 225mm [9"] wide drawers. Provide 6mm [1/4"] thick x minimum 1050mm [3'-6"] high mirror glass, full width of vanity countertop, with wall mounted vanity light fixture above mirror (refer to Chapter 9). Provide one recessed medicine cabinet, two soap holders, and two toothbrush/tumbler holders. Provide floor-mounted toilet with full seat and seat cover (lid). Provide bathtub, chrome-plated brass showerhead, and anti-scald single-handle mixing valve (refer to Chapter 8). Provide two minimum 600mm [2'-0"] long towel bars mounted on walls outside tub/shower enclosure, two wall mounted soap holders in the tub/shower, and one door mounted robe hook with two hooks. Provide wall mounted retractable clothesline across tub/shower. Provide mildew-resistant vinyl shower curtain with stainless steel curtain hooks and chrome-plated brass shower curtain rod. Provide single roll toilet tissue dispenser.

2-5.1.4.3 Minimum Finishes:
Floor: ceramic tile
Base: ceramic tile sanitary cove base
Walls: full height ceramic tile. Walls around shower/tub enclosure shall be full height ceramic tile.
Ceiling: painted water resistant gypsum board.

2-5.1.4.4 Other requirements: HVAC system shall exhaust bathroom air; refer to Chapter 10. Door shall have privacy function lockset.

2-5.2 Areas Comprising the <u>One-Person Living Unit</u> (1+0 TYPE A) (1+0 TYPE B) and (1+0 TYPE C). Each One-Person living unit, or module, will contain a living/sleeping room with closet, a service area with Kitchen, and a bathroom. Spaces are as follows.

2-5.2.1 Living/Sleeping Room (BEDROOM). One per module.

2-5.2.1.1 Function: Private bedroom and living space for one senior enlisted person.

2-5.2.1.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and

installed: One twin bed with headboard and footboard 102mm x 2083mm [40” x 85”]; one dresser 712mm wide x 458mm deep x 661mm high [28” x 18” x 26” high]; one nightstand 485mm wide x 435mm deep x 535mm high [19” x 17” x 21” high]; one desk 1524mm wide x 762 deep (with keyboard tray retracted) x 762mm high [60” wide x 30” deep x 30” high]; one desk chair 500mm wide x 535mm deep x 851mm high [19-1/2” x 21” x 33-1/2” high] and one entertainment center 914 mm wide x 610 deep mm [36” x 24”.

2-5.2.1.3 Minimum Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: gypsum wallboard with full-height Interior Textured Acrylic Wall Finish (Duroplex).
Ceiling: painted gypsum wallboard.

2-5.2.1.4 Other requirements: Living/sleeping room shall have at least one exterior operable window with insect screen. Window shall meet egress requirements of NFPA 101 and Unified Facilities Criteria (UFC) 1-200-01 and International Building Code (IBC). Window shall not be located adjacent to an exterior corridor or breezeway. Provide minimum of one combination telephone/data outlet on in each Living /Sleeping room. Provide minimum of one cable television outlet in each Living/Sleeping room. Coordinate outlet locations with furniture arrangement. Refer to Chapter 9 Electrical Systems.

2-5.2.2 Closet (CLOSET). One per living/sleeping room.

2-5.2.2.1 Function: Private walk-in closet for clothing and storage of boxes and field gear.

2-5.2.2.2 Furnishings/Fixtures/Equipment (FFE): The following items will be Contractor furnished and installed: rod and shelf, as indicated on RFP Contract Drawings.

2-5.2.2.3 Minimum Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard or painted veneer plaster
Ceiling: painted gypsum wallboard.

2-5.2.2.4 Other requirements: Door shall have passage function latchset and be equipped with a hasp so the occupant can provide his/her own padlock.

2-5.2.3 Kitchen (KITCHEN). One per module.

2-5.2.3.1 Function: Circulation space, food preparation area, and eating area for occupant and visitors.

2-5.2.3.2 Furnishings/Fixtures/Equipment: The following items will be Government furnished and installed: one refrigerator-freezer (minimum 9 total cubic feet); one microwave oven (min .9 cubic feet, 800 watts) mounted under wall cabinets, one 762mm [30”] slide-in electric range. The following item will be Contractor furnished and installed: minimum 1500 linear mm [5’-0”] of 600mm [2’-0”] deep kitchen base cabinets and countertop (including range width), and 2100 linear mm [7’-0”] of 300mm [12”] deep wall cabinets. Wall cabinets shall be minimum 600mm [2’-0”] high; provide 600 mm [2’-0”] clear between countertop and bottom of wall cabinets at sink. Base cabinets shall have minimum of two 300 mm [12”] wide drawers; provide plastic laminate countertop with integral side and backsplashes at walls. Provide single compartment, stainless steel kitchen sink with food strainer/stopper, minimum inside dimensions 400mm x 400mm x 175mm deep [1’-4” x 1’-4” x 7” deep], with chrome-plated, single handle, washerless mixing faucet (refer to Chapter 8); provide fire extinguisher mounted inside base cabinet. One 4-burner electric rangehood with exterior exhaust and garbage disposal.

2-5.2.3.3 Minimum Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard; Wall area between countertop and wall cabinets: plastic laminate.
Ceiling: painted gypsum wallboard.

2-5.2.3.4 Other requirements: Door between public corridor and service area (entry door into module) shall have interlocking threshold.

2-5.2.4 Bathroom (BATHROOM). One per module.

2-5.2.4.1 Function: Bathing and toilet facilities for occupant; storage for occupants' bath articles.

2-5.2.4.2 Furnishings/Fixtures/Equipment (FFE): All the following items listed will be Contractor furnished and installed: Lavatory that shall be minimum 475mm x 475mm [19" x 19"] self-rimming vitreous china, or cast-filled acrylic or solid surfacing material integrally molded to countertop; provide chrome-plated washerless faucet with pop-up drain (refer to Chapter 8); Countertop shall be minimum 900mm [3'-0"] wide cast-filled acrylic, acrylic solid surfacing material, or plastic laminate with integrally molded, 100mm high coved backsplash. Provide 102mm high side splash at side walls. Provide plastic laminate surfaced vanity base cabinet with hinged door(s) and minimum two 225mm [9"] wide drawers. Provide 6mm [1/4"] thick x minimum 1050mm [3'-6"] high mirror glass, full width of vanity countertop, with wall mounted vanity light fixture above mirror (refer to Chapter 9). Provide one recessed medicine cabinet, two soap holders, and two toothbrush/tumbler holders. Provide floor-mounted toilet with full seat and seat cover (lid). Provide bathtub, chrome-plated brass showerhead, and anti-scald single-handle mixing valve (refer to Chapter 8). Provide two minimum 600mm [2'-0"] long towel bars mounted on walls outside tub/shower enclosure, two wall mounted soap holders in the tub/shower, and one door mounted robe hook with two hooks. Provide wall mounted retractable clothesline across tub/shower. Provide mildew-resistant vinyl shower curtain with stainless steel curtain hooks and chrome-plated brass shower curtain rod. Provide single roll toilet tissue dispenser.

2-5.2.4.3 Finishes:
Floor: ceramic tile
Base: ceramic tile sanitary cove base
Walls: full height ceramic tile. Walls around shower/tub enclosure shall be full height ceramic tile.
Ceiling: painted water resistant gypsum board.

2-5.2.4.4 Other requirements: HVAC system shall exhaust bathroom air; refer to Chapter 10. Door shall have privacy function lockset.

2-5.3 BUILDING 552 UEPH COMMON AREAS. Common areas will be shared by soldiers. Spaces are as follows:

2-5.3.1 Game Room (GAME ROOM). Two per floor except one per floor at the first floor of Building 551. Provide area for vending machines and ice machine-dispensers.

2-5.3.1.1 Function: additional space for building occupants to entertain.

2-5.3.1.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and installed: one ice cube machine-dispenser designed for hotel ice bucket filling, capable of producing minimum 250 lbs. of regular ice cubes in 24 hours, with 180 lb. storage; one ice machine manufacturer's automatic cleaning system to clean and sanitize the water distribution system of the machine at scheduled intervals; Ice machine shall be Energy Star compliant; four full-size soft drink and snack vending machines. Vending machines will not require plumbing connections. Game machines. One refrigerator-freezer (minimum 20 total cubic feet); one microwave oven (min 1.0 cubic feet, 850 watts) mounted under wall cabinets and one 30". The following item will be Contractor furnished and installed: minimum 1500 linear mm [5'-0"] of 600mm [2'-0"] deep kitchen base cabinets and countertop (including range width), and 2100 linear mm [7'-0"] of 300mm [12"] deep wall cabinets. Wall cabinets shall be minimum 600mm [2'-0"] high; provide 600 mm [2'-0"] clear between countertop and bottom of wall cabinets at sink. Base cabinets shall have minimum of two 300 mm [12"] wide drawers; provide plastic laminate countertop with integral side and backsplashes at walls. Provide single compartment, stainless steel kitchen sink with food strainer/stopper, minimum inside dimensions 400mm x 400mm x 175mm deep [1'-4" x 1'-4" x 7" deep], with chrome-plated, single handle, washerless mixing faucet (refer to

Chapter 8); provide fire extinguisher mounted inside base cabinet. One 4-burner electric cooktop, rangehood with exterior exhaust and garbage disposal.

2-5.3.1.3 Finishes:
Floor: vinyl composition tile.
Base: resilient cove base.
Walls: painted gypsum wallboard,
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.3.1.4 Other requirements: Provide a 914 mm [3'-0"] wide entry door. Provide electrical power to accommodate vending machines, game machines, and to comply with applicable codes.

2-5.3.2 Men's Toilet (M). Two private toilet rooms per floor. Room shall be accessed from Game Room for the Second and Third Floors. Room shall be accessed from the Lanai at the Ground Floor.

2-5.3.2.1 Function: Men's single-occupant toilet and lavatory.

2-5.3.2.2 Furnishings/Fixtures/Equipment (FFE): the following items will be Contractor furnished and installed: one floor mounted toilet, one wall-hung lavatory, mirror with shelf above lavatory, paper towel dispenser/waste receptacle, soap dispenser, one toilet seat cover dispenser; and toilet tissue dispenser.

2-5.3.2.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile wainscot 1219 mm high with painted water-resistant gypsum board above.
Ceiling: painted gypsum wallboard.

2-5.3.2.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-5.3.3 Women's Toilet (W). Two private toilet rooms per floor. Room shall be accessed from Game Room for the Second and Third Floors. Room shall be accessed from the Lanai at the Ground Floor.

2-5.3.3.1 Function: Women's single-occupant toilet and lavatory.

2-5.3.3.2 Furnishings/Fixtures/Equipment (FFE): the following items will be Contractor furnished and installed: one floor mounted toilet, one wall-hung lavatory, mirror with shelf above lavatory, paper towel dispenser/waste receptacle, soap dispenser, one toilet seat cover dispenser; and toilet tissue dispenser.

2-5.3.3.3 Finishes:
Floor: ceramic tile.
Base: ceramic tile.
Walls: ceramic tile wainscot 1219 mm high with painted water-resistant gypsum board above.
Ceiling: painted gypsum wallboard.

2-5.3.3.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-5.3.4 Janitor Closet (JAN). One per floor.

2-5.3.4.1 Function: Service Sink, and storage of cleaning supplies.

2-5.3.4.2 Furnishings/Fixtures/Equipment: the following items will be Contractor furnished and installed: floor mop sink, mop rack for three mops, and minimum 1829 linear mm of wall mounted stainless steel shelving.

2-5.3.4.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base.

Walls: painted water-resistant gypsum wallboard, or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.3.4.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-5.3.5 Laundry Area(s) (LAUNDRY). One per floor. Provide one clothes washer per 12 soldiers, and one clothes dryer per 8 soldiers (round fractional numbers to the next highest whole number). Minimum of one laundry room on each floor of the UEPH facility. Provide minimum five washers and seven dryers in each room.

2-5.3.5.1 Function: Self-service washers and dryers and clothes folding areas for residents.

2-5.3.5.2 Furnishings/Fixtures/Equipment: the following items will be Government furnished and installed: commercial quality clothes washers and dryers (each minimum 2.5 cubic feet capacity), non-coin operation; Stacked dryers are preferred; Appliances shall be Energy Star compliant; two vandal-resistant waiting chairs per each four washers. The room shall accommodate one wall mounted laundry product vending machine in each laundry room.
The following item will be Contractor furnished and installed: minimum 1800 linear mm [6'-0"] of 600 mm [2'-0"] deep base cabinets and countertops for folding clothes; provide one each service sink.

2-5.3.5.3 Finishes:
Floor: quarry tile
Base: quarry tile
Walls: painted water resistant gypsum wallboard, or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.3.5.4 Other requirements: Conceal utilities from view, but provide easy maintenance access; locate utility connections 914 mm [36"] above finish floor, unless otherwise recommended by manufacturer. Provide one floor drain for every four washers; locate outside of traffic area. Provide venting of dryer exhaust as on RFP Concept Drawings with lint catchment system. Lint catchment system shall be designed to be maintained within the Laundry Room. Partitions around laundry rooms shall extend to underside of floor above. Provide 914 mm [3'-0"] wide door(s) into room.

2-5.3.6 Storage (STOR.). Eight per floor.

2-5.3.6.1 Function: storage.

2-5.3.6.2 Furnishings/Fixtures/Equipment

2-5.3.6.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base.
Walls: paint finish
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.3.6.4 Other requirements: Provide 914 mm [3'-0"] wide entry door.

2-5.4 BUILDING 552 UEPH SUPPORT AREAS. Support areas include circulation spaces such as stairs and corridors, mechanical, electrical, and communications spaces. Spaces are as follows:

2-5.4.1 Interior Corridor. (HALLWAY) Provide as required to allow circulation to building spaces, and comply with applicable code egress requirements. Due to security, climate, and force protection concerns, interior corridors are the preferred means of circulation between living units and other building spaces.

2-5.4.1.1 Function: Circulation and means of egress.

2-5.4.1.2 Furnishings/Fixtures/Equipment (FFE): Provide mechanical and electrical systems to comply with applicable codes. The following items will be Contractor furnished and installed: fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes.

2-5.4.1.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base.
Walls: painted finish.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint. Suspended acoustic tile ceiling grid system at Third Floor.

2-5.4.1.4 Other requirements: Handicap accessible.

2-5.4.2 Exterior Corridor (LANAI). Refers to an unconditioned, covered circulation space that is enclosed on one long side (adjacent to the building), and has a guardrail on the other side. Allow circulation to building spaces. Exterior corridor shall comply with applicable code egress requirements. Exterior corridors provide link with stairs and other circulation components. Exterior corridors shall not be used to provide access to living units

2-5.4.2.1 Function: Circulation and means of egress.

2-5.4.2.2 Furnishings/Fixtures/Equipment (FFE): Provide mechanical and electrical systems to comply with applicable codes. The following items will be Contractor furnished and installed: fire extinguishers in semi-recessed fire extinguisher cabinets to comply with applicable codes. All fixtures and equipment shall be suitable for exterior locations.

2-5.4.2.3 Finishes:
Floor: sealed concrete
Base: Exterior wall material
Walls: Exterior wall material
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.4.2.4 Other requirements: Handicap accessible. With the exception of fire sprinkler systems, no piping, conduit or ductwork shall be exposed in exterior corridor. Provide slip resistant finish texture on concrete floor. Guardrails shall be designed in accordance with applicable codes.

2-5.4.3 Exterior Stairs. Required to allow circulation to upper floors of the building, and to comply with applicable code egress requirements. This description covers all Exterior Stairs for Building 552.

2-5.4.3.1 Function: Circulation and means of egress.

2-5.4.3.2 Furnishings/Fixtures/Equipment (FFE):

2-5.4.3.3 Finishes: Landing floor: sealed concrete with slip-resistant finish texture.
Base: Exterior wall material
Treads: Sealed concrete with slip-resistant finish texture. Provide slip-resistant nosing.
Risers: sealed concrete.
Walls: exterior wall materials
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.4.3.4 Other requirements: Stairs shall comply with handicap accessibility requirements of applicable codes. Railings shall be designed in accordance with applicable codes. Refer to Chapter 5 for hardware and security requirements for exterior doors.

2-5.4.4 Mechanical Areas (MECH). Dedicated interior spaces and exterior areas for plumbing, fire protection, and HVAC equipment. Size and locate rooms to allow equipment removal and maintenance Provide floor openings and vertical shaft spaces as necessary.

2-5.4.4.1 Function: Mechanical support spaces for the UEPH building.

2-5.4.4.2 Furnishings/Fixtures/Equipment: None.

2-5.4.4.3 Finishes:
Floor: sealed concrete
Base: resilient cove base
Walls: painted gypsum wallboard, or painted concrete masonry units
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.4.4.4 Other requirements: Locate air intake and exhaust openings to provide optimum indoor air quality. Roof mounted equipment shall not be used. Provide masonry screen walls with lockable metal access gates around outdoor equipment areas (refer to Chapter 3); comply with force protection standards. Doors shall have storeroom function lockset master-keyed to existing system.

2-5.4.5 Electrical Rooms (ELEC). Dedicated interior spaces and exterior areas for electrical equipment. Rooms shall allow easy equipment removal and maintenance. Provide floor openings and vertical shaft spaces as necessary.

2-5.4.5.1 Function: Electrical support spaces for the UEPH building.

2-5.4.5.2 Furnishings/Fixtures/Equipment: None.

2-5.4.5.3 Finishes:
Floor: sealed concrete
Base: resilient cove base
Walls: painted gypsum wallboard.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.4.5.4 Other requirements: Electrical service to the building shall be underground. Door shall have storeroom function lockset master-keyed to existing system. .

2-5.4.6 Telecommunication Room (TELE). Dedicated interior rooms for communication equipment. Rooms shall allow easy equipment removal and maintenance.

2-5.4.6.1 Function: Telephone and data network support spaces for the UEPH building.

2-5.4.6.2 Furnishings/Fixtures/Equipment: As required by Statement of Work.

2-5.4.6.3 Finishes:
Floor: vinyl composition tile
Base: resilient cove base
Walls: painted gypsum wallboard.
Ceiling: patch existing exposed ceiling to match existing adjacent and paint.

2-5.4.6.4 Other requirements: Communication service to the building shall be underground. Provide minimum 914 mm [3'-0"] wide door with storeroom function lockset master-keyed to existing system. . Provide floor openings and vertical shaft spaces as necessary. Provide a minimum of three 102 mm [4"] diameter empty conduits between vertically stacked communication rooms.

2-5.4.7 Fire Pump Room (FIRE PUMP). One at the first floor of Building 552.

2-5.4.7.1 Function: Room for fire pump equipment including, but not limited to, equipment as indicated.

2-5.4.7.2 Furnishings/Fixtures/Equipment: As required by Statement of Work and as indicated. Concrete floor slab shall be of sufficient strength and be designed for the equipment provided.

2-5.4.7.3 Finishes:
Floor: sealed concrete; non-slip coating.
Base: none
Walls: painted concrete masonry units
Ceiling: exposed to structure, paint.

2-5.4.7.4 Other requirements: Provide adequate drainage.

CHAPTER 5

ARCHITECTURAL DESIGN

5-1 DESIGN GOALS. Overall architectural goals for the Whole Barracks Renewal Brigade Complex QUAD E are to provide a functional, visually appealing campus of facilities that is a source of pride for residents, other facility users, and the installation. This chapter applies to all buildings under this RFP unless specifically noted otherwise.

5-1.1.1 The architectural floor plan is established and approved as shown in the RFP Concept Design Drawings. All architectural criteria must be met and accounted for, see paragraph 5-2 Applicable Codes and Standards. Any changes shall be brought to the attention of the Contracting Officer for resolution in writing.

5-1.1.2 Furnishings, Fixtures and Equipment (FF&E): FF&E is part of this project. Fixtures and Equipment (lighting, plumbing, mechanical equipment, etc.) described for programmed spaces shall be provided by the contractor as part of the base bid. Interior Furnishings (tables, chairs, sofa, bed, etc.) will be Government furnished and installed. Refer to SOW Chapter 2, Furniture Requirements for scope of Furnishings, Fixtures, and Equipment that will be required to be provided by the contractor. Any furniture layout depicted in the RFP concept design drawings will be adhered to and not deviated from without approval of the customer. The number and location of furnishings serve as an indicator of the number of power, data and communications connection points. See electrical section for more detail.

5-1.2 Existing Quad Building Background and New Space Planning Intent
The existing Quad consists of four buildings-three stories each - constructed in 1920. The buildings were originally open sleeping and living spaces and until recently, a mixture of office and living spaces. **Only two of the four buildings in this Quad will be renovated under this RFP.**

5-1.2.1 Building 549: will provide administrative spaces for one (1) small Battalion Headquarters, one (1) medium Company Operations Facility (COF) and two (2) small Company Operations Facilities (COFs). Areas include equipment maintenance, storages, arm vaults, toilets, showers, lockers, building utility and service areas are on the first floor. Conference rooms, platoon offices, TA-50 gear storage, general storage, offices, training rooms, building utility and service areas are on the second floor. The third floor will be renovated to house a small Battalion Headquarters and classrooms. The existing gymnasium on the third floor will be renovated. An elevator will be installed to provide ADA accessibility to the Battalion Headquarters. Portions of the first floor will house a central mechanical plant for mechanical equipment that serves the entire Quad.

Building 549's total floor area is approximately 6,159 SM.

5-1.2.2 Building 552: will provide barracks facilities for 50 persons per floor or a total of 150 personnel per building. Laundry rooms, game rooms, mechanical rooms, electrical rooms, telecom rooms, and janitor closets will be provided on every floor. Building 552's total floor area is approximately 8,045 SM and is part of the first phase of construction. The central chiller plants air conditioning cooling tower will be located on the roof of Building 552.

5-1.2.3 The selected contractor will be required to demolish all of the existing interior partitions as well as the complete flooring system in the toilet and shower areas. Also, the selected contractor will be required to determine the location of existing partitions with respect to the proposed Concept Design Drawings, in order to remove as required. This may include concrete masonry walls that are not structural. The roofing will also have to be removed. All buildings will require the removal of existing windows and doors and provide a larger opening to install new fenestrations (door & windows) as designed to meet the approval of State Historic Preservation Office (SHPO). Adjacent wall finishes, both interior and exterior shall match the existing surfaces before the new windows are installed. Additionally, all existing plumbing, mechanical and electrical items need to be removed as indicated.

5-1.2.4 The Quad E building renovation design intent is to follow the Department of the Army Facilities Standardization Program for a Standard Company Operations Facility and Battalion Headquarters.

5-1.3 Exterior Design Objectives. Design buildings to enhance the visual environment of the installation. Exterior materials, roof forms, and detailing shall comply with the Installation Design Guide and concept design drawing, and shall be compatible with the immediate local context. Use durable, low-maintenance materials.

5-1.4 Interior Design Objectives. Arrange spaces in an efficient, functional manner. Provide simple circulation schemes that allow easy way finding within buildings. Use durable materials and furnishings that can be easily maintained and replaced. Maximize use of day lighting and operable windows. Use interior surfaces that are easy to clean and light in color; avoid trendy or bright color schemes. Provide telephone/data jacks on multiple walls to allow optional locations for furniture. Structure interior spaces to allow maximum flexibility for future modifications; companies and battalions often change size or mission, requiring reconfiguration of facilities. Refer to SOW Chapter 14-Comprehensive Interior Design for detailed information and CID Package requirements.

5-1.5 Material and Product Selection Criteria. Materials shall meet the requirements of the SOW. The SOW includes a range of specificity: some material requirements are specific (no option); other material requirements allow a range of options. The SOW requirements establish a minimum quality level.

5-2 APPLICABLE CODES AND STANDARDS. Except as specified otherwise in the RFP, design and construction of facilities shall comply with the latest editions (as of the date of the RFP) of the following. Major criteria and references for building design are as listed but not limited to this list. Additional requirements are included throughout the RFP.

5-2.1 National Fire Codes, published by the National Fire Protection Association (NFPA), including NFPA 101 Life Safety Code.

5-2.2 International Building Code (IBC), 2003

5-2.3 Americans With Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG), 1998.

5-2.4 Unified Facilities Criteria (UFC) 4-010-01 Department of Defense Minimum Antiterrorism Standards for Buildings October 8, 2003.

5-2.5 AR 190-11, Physical Security of Arms, Ammunition, & Explosives, Appendix G, para G-1a-e(1-4) dated 12 Feb 98.

5-2.6 American Architectural Manufacturer's Association (AAMA)

5-2.7 Architectural Woodworking Institute, AWI Quality Standards

5-2.8 Builders Hardware Manufacturers Association, ANSI/BHMA

5-2.9 Underwriters Laboratories.

5-2.10 Tile Council of America (TCA) Handbook for Ceramic Tile Installation.

5-2.11 The Schofield Barracks Installation Design Guide (IDG), excerpts of which are included in an appendix to the Statement of Work.

5-2.12 UFC 3-600-01 Design: Fire Protection Engineering for Facilities (17 April 2003)

5-2.13 TI 800-01, Design Criteria, 20 July 1998

5-2.14 UFC 1-200-01, Design: General Building Requirements, July 31, 2002

5-2.15 Department of the Army Facilities Standardization Program, Standard Company Operations Facility, Dated February 1994.

5-2.16 Department of the Army Facilities Standardization Program, Standard Design for Brigade and Battalion Headquarters Facility, Dated August 1995.

5-2.17 AR 190-51, Security of Unclassified Army Property (Sensitive and Nonsensitive), Appendix B.

5-3 IBC OCCUPANCY AND BUILDING TYPE CLASSIFICATIONS.

5-3.1 General. Occupancy classifications, construction types, allowable areas, maximum building heights, and fire separation requirements shall comply with the requirements of the International Building Code. Prior to issuance of the RFP, the design district shall coordinate with the authority having jurisdiction to determine occupancy classifications. Consult with the users to determine the hazard classification of items to be stored in the supply spaces.

5-3.2 Construction: The existing buildings in Quad E are three-story buildings that have concrete and masonry construction. The roof structures are unprotected steel. The building type is Type II-B, non-combustible, non-rated construction.

5-3.3 **Occupancy Classification. Building 552 is classified as R-2 occupancies. Building 549 is classified as a mixed occupancy, which include A-3, B and S-1 occupancies**.

5-3.4 NFPA Classification. The NFPA 101 classification for Buildings 552 is New Apartment Building occupancy. Building 549 is a mixed occupancy.

5-3.5 Barrack Buildings. Occupancy classification: Residential R-2.

5-3.6 **Company Operations Facilities Occupancy classification of administrative areas, and locker room facilities: Business Group B. Occupancy classification for supply areas: Storage Group S, Division 1.**

5-3.7 Battalion Headquarters. Occupancy classification of administrative areas: Business Group B. Occupancy classification of classroom areas: Assembly Group A-3.

5-4 EXTERIOR DESIGN.

5-4.1 General the buildings are considered historical and any exterior construction shall be sensitive to the original design. See the Historic Narrative for detailed narrative on the historic importance, general design intent and requirements, see SOW 15. The exterior design should closely replicate the original 1920 design. The Concept Design Drawings contrast the original design where the building must conform to NFPA 101, Life Safety Code

5-4.2 Acceptable Materials and Colors. Exterior elements of the facilities shall comply with the attached architectural concept design drawings and the Installation Design Guide (IDG) unless required otherwise by applicable codes or this Statement of Work

5-4.3 Quad Building Superstructure: No specific requirement for the type of structural system is imposed other than to meet the applicable regulations, to dimensionally fit within the space allocated for structure and to accommodate the exterior materials shown on the exterior elevations and building sections.

5-4.4 Detached Building Structures. Concept design is based on a load-bearing masonry exterior wall with a manufactured steel truss roof structure.

5-4.4.1 Alternative pre-cast concrete beams or trusses, pre-engineered steel structure, or conventional steel rafter / purlin systems.

5-4.5 Exterior Closure:

5-4.5.1 Exterior Finishes. Emphasis shall be placed on low maintenance and durability for exterior finish materials. Materials shall be residential in size, scale, and texture. Exterior wall materials shall be painted concrete or concrete masonry unit:

5-4.5.2 Termite decay and protection for exterior wood materials (siding, trims, etc.) shall be in accordance with National Wood Window and Door Association (NWWDA) Standards. Each piece of treated material shall bear identification of the testing agency to indicate performance in accordance with NWWDA.

5-4.5.3 Trim elements. Aluminum or vinyl clad wood trim is preferred over painted or stained wood trim. Painted exterior surfaces shall be minimized. When exterior exposed wood trim is used the following requirements apply:

5-4.5.4 Exposed wood, such as window trim, door sills, window sills, railings and balusters, trellis, wood fencing, arbors, solar shading devices including louvers, arbors, and trellis shall be treated for rot resistance in accordance with NWWDA Industry Standards I.S.4, Water Repellent Preservative Treatment for Millwork.

5-4.5.5 Exterior surfaces requiring painting shall receive a minimum of one prime coat and two finish coats of paint. Wood trim frames, etc., shall be back primed. Exterior semi-transparent low sheen stains, two coats, are acceptable, where appropriate for wood, plywood, etc.

5-4.5.6 Existing exterior stair treads and landings shall be provided with non-slip type treads. Existing exterior stairs shall be provided with metal railings.

5-4.6 Roofs. Roofing material and color shall comply with the attached architectural concept design drawings. Roofing system shall have Underwriters Laboratory (UL) Class A rating for fire resistance, UL 90 wind resistance rating, and Factory Mutual (FM) 1-90 fire and wind resistance rating.

5-4.6.1 **Quad Buildings, and Fire Pump Building Roofs. Built-up roofs shall have a minimum pitch of 1:24 (1/2-inch: 1 foot.).**

5-4.6.1.1 **Built-Up Roofing. Provide 4-ply, built-up roofing on rigid board insulation over existing metal decking for Quad Building Roofs. Provide 4-ply, built-up roofing on rigid board insulation over existing concrete or existing metal decking for Fire Pump Building**. Provide manufacturers 20-year finish warranty. Built-up roofing shall have high reflectivity, low emissivity meeting Energy star certification.

5-4.6.2 Roof water. Conductor heads, scuppers and downspouts shall be provided for all roof areas. Provide calculation of gutter and downspout size if the existing conductor heads, scuppers and downspout dimensions cannot be determined. **Calculations should be in accordance with SMACNA-03, Architectural Sheet Metal Manual.** Downspouts draining onto a lower roof shall have metal or plastic splash deflectors. Downspouts shall be connected to the underground storm drainage system. Provide cast iron boot at the bottom of all downspouts.

5-4.6.3 Rainfall Calculations: Conductor heads, scuppers and downspouts shall be adequately sized to meet the following Design Rainfall Intensities: Schofield Barracks: Design Rainfall Intensity (hourly in inches for a 5-minute period to be expected once in 10 years) = 188 mm (7.4 inches).

5-4.6.4 Roof surface. Roof surfaces shall be light colored to minimize heat gain. Roof water shall be diverted away from entrances and foundations.

5-4.6.5 Roof Eave. Existing Quad Building roof eave shall be removed and restored to its original Historic design and character. Use durable, low-maintenance materials. Refer to Architectural Concept Design Drawings for detail reference.

5-4.6.6 Sheet Metal Work. All Sheet metal material shall be copper.

Note: Flashing - Continuous stepped flashing shall be installed at walls adjacent to roof slope. Design to

facilitate easy maintenance and removal of roofing without removing or damaging the wall sidings. Provide metal drip edge of flashing at roof eaves.

5-4.7 Trim and Flashing. Materials shall comply with the RFP concept design drawings. Gutters, downspouts, and fascias shall be copper; comply with SMACNA Architectural Sheet Metal Manual; provide 20-year manufacturers finish warranty.

5-4.8 Miscellaneous Exterior Elements. Comply with the attached architectural concept design drawings. It is advisable to prohibit any use of exterior wood with painted finish; require pre-finished metal trim. Coordinate with user to include requirements for any building-mounted operational items such as communications antennae, special lighting, warning beacons, etc.

5-4.9 Exterior Doors and Frames.

5-4.9.1 Doors. Provide Historic doors as indicated on the concept design drawings. Refer to RFP concept design drawings for door types and details. Fully glazed doors shall comply with wind load requirements of applicable codes. Telecomm Room doors shall be secured per AR 380-19 Information Systems Security.

5-4.9.4.1 Hollow Metal Doors and Frames. Comply with ANSI A250.8/SDI 100. Doors shall be Level 3, physical performance Level A, Model 2; insulated; top edge closed flush. Frames shall be Level 3, 14 gauge, with continuously welded corners and seamless face joints. Doors and frames shall be constructed of hot dipped zinc coated steel sheet, complying with ASTM A653, Commercial Steel, Type B, minimum A60 coating weight; factory primed. Anchors and accessories shall be zinc coated. Frames in masonry shall have bituminous back-coating, plaster guards, and shall be grouted solid. Provide concealed wall and head anchors in frame sufficient to support the weight of the grouted frame. Provide minimum four concealed wall anchors at masonry rough openings. Provide minimum one concealed head anchor for frame rough openings greater than three feet. Fire-rated openings shall comply with NFPA 80, and the requirements of the labeling authority.

5-4.9.5 Exterior Door Finish Hardware.

5-4.9.5.1 Hinges. ANSI/BHMA A156.1; template, full mortise, heavy duty, anti-friction ball bearing, minimum size 114 mm x 114 mm [4 ½" x 4 ½ "], stainless steel, non-removable pins.

5-4.9.5.2 Locksets for Typical Exterior Door. Provide stand-alone programmable electronic door locksets with audit capabilities. The lockset construction shall be all metal, heavy-duty, and mortise. The lockset is equipped with hidden mechanical key override, an anti-pick latch and dead bolt, and a magnetic stripe reader. Each magnetic stripe card will be programmed to gain access into its respective module and sleeping/living rooms. Lockset shall be Kaba Ilco, Solitaire 710-II Series. The lockset shall include knob and lever torque test and "Ultra" finish with two-year warranty.

5-4.9.5.3 Latchset and Deadlock for Typical Exterior Barracks Bedroom or Kitchen to Lanai Doors. Provide latchset and deadbolt with blank plate on the outside and turn lever on inside to prevent an occupant on the Lanai from being locked out.

Note: This type of hardware is required in accordance with NFPA 101, 7.2.1.5.1. The Lanai is considered as part of the barracks unit and the Lanai door must remain unlocked when the occupant is on the lanai. The maximum travel distance within a dwelling unit to the corridor door shall not exceed 125 feet in buildings protected throughout by an approved, supervised automatic sprinkler system. This was discussed with the HED AHJ on 23 June 2003.

5-4.9.5.4 Locksets for Typical Exterior Utility and Maintenance Doors. spaces with doors covered by this paragraph include: Mechanical Rooms, Electrical Rooms, Telecommunication Rooms, Communication Rooms, Toilets, Janitor, and Stairwell. ANSI/BHMA A156.13; series 1000, grade 1, mortise lockset with removable core, non-ferrous base metal.

5-4.9.5.5 Exit (Panic) Devices. ANSI/BHMA 156.3; heavy-duty touch-pad type, through-bolted

mounting. Listed and labeled for panic protection based on UL 305. Doors shall be provided with exit device if required by Building Code.

5-4.9.5.6 Closers. ANSI/BHMA A156.4; series C02000, Grade 1, hydraulic, factory-sized, adjustable to meet field conditions. Provide for all exterior doors, all doors to living units, and all doors opening to corridors and as required by codes. At exterior doors to lobbies, corridors, mechanical rooms, janitors closets, and COF supply areas provide overhead holders or closers with hold-open capability.

5-4.9.5.7 Auxiliary Hardware. ANSI/BHMA A156.16. Provide wall or floor stops for all exterior doors that do not have overhead holder/stops. Provide solid wood backing in the stud wall cavity for wall-mounted doorstops. Provide other hardware as necessary for a complete installation.

5-4.9.5.8 Thresholds. **ANSI/BHMA A156.21; non-ferrous metal. Provide at all exterior doors. Provide inter-locking type threshold for Barracks Building 552 Living Unit only (threshold for Interior corridor door).**

5-4.9.5.9 Weatherstripping. ANSI/BHMA A156.22. Provide at all exterior doors.

5-4.9.5.10 Kick Plates. ANSI/BHMA A156.6; stainless steel, 254 mm [10”]high x 51 mm [2”] less than door width. Provide at push side of all doors with closers.

5-4.9.5.11 Locks and keys. Lock cylinders shall have six pin tumblers and interchangeable cores, which are removable by a control key. Provide a master keying system. Locks for each organizational unit, including exterior storage shall be keyed alike. Contractor shall obtain the key bitting report from the hardware manufacturer and provide the report to DPW at the end of the project. Locks and keys shall conform to the standards and requirements of the Builders Hardware Manufacturers Association (BHMA) listed above.

5-4.10 Exterior Windows. Provide Historic windows as indicated on the concept design drawings. Refer to concept design drawings for window types and details. Fully glazed windows shall comply with wind load requirements of applicable codes. All sleeping rooms shall have operable windows complying with egress requirements of applicable codes. Windows shall be operable and shall have locks.

5-4.10.1 Screens. Fiberglass screens shall be provided at all operable windows and be of window manufacturer's standard design. Fiberglass insect screens, 18 x 16 mesh size, shall be provided for all windows and sliding glass doors and should be the window or door manufacturers standard design for use with the windows and doors being provided. Insect screen frames shall be removable type for easy cleaning.

5-4.10.2 Exterior Glass and Glazing. To comply with force protection minimum standards: Single glazing and the inner pane of insulated glass assemblies in exterior windows and doors shall be minimum 6 mm (1/4-inch) annealed laminated glass.

5-4.11 Insulation. Insulation shall be provided to meet the following requirements:

5-4.11.1 Thermal and sound insulation shall have a flame spread rating of 25 or less and a smoke development rating of 50 or less exclusive of the vapor barrier when tested in accordance with ASTM E 84. A vapor barrier shall be provided on the warm side of exterior and ceiling insulation for thermal insulation.

5-4.11.2 Urethane is not allowed as an insulation material.

5-4.11.3 Thermal Insulation. Provide exterior wall, floor, and roof/ceiling assemblies with thermal transmittance (U-values) required to comply with the proposed energy calculations for the facilities. Insulation shall not be installed directly on top of suspended acoustical panel ceilings.

5-4.12 Louvers: Aluminum-framed louvered panels. Louver finish shall be Kynar 500 or approved equal. Kynar 500 properties: a fluoroploymer-polyvinylidene fluoride (PVDF). Finish shall be factory applied and oven baked. Total overall dry film thickness shall be 0.025mm (1mil) thick.

5-4.13 Exterior Railings. All exterior handrails and guardrails shall be replaced. Existing railing design does not conform to original historic design for Quad E. Design of exterior handrails and guardrails shall conform to historic character of Quad E. The design shall be coordinated with the State Historical Preservation Office. Exterior railing materials, including bolts and fasteners shall be painted hot-dipped galvanized steel. Design shall comply with all applicable codes. Final handrail design shall be approved by DPW.

5-5 INTERIOR DESIGN.

5-5.1 Floors and Flooring Material

5-5.1.1 Floors. Comply with requirements of applicable codes. Non-combustible construction is preferable, even where combustible materials are allowed by code. Floor finish materials shall be as specified in functional and area requirements listed in Chapter 2 of the Statement of Work.

5-5.1.2 Ceramic Tile. Comply with ANSI A 137.1 and the recommendations of Tile Council of America (TCA) Handbook For Ceramic Tile Installation. Provide marble threshold under doors where a ceramic tile floor meets a different floor finish. All grout joints shall be sealed.

5-5.1.3 Vinyl Composition Tile. Vinyl composition tile shall conform to ASTM F 1066, Class 2, through pattern tile, Composition 1, asbestos-free, and shall be 12 inches square and 1/8 inch thick. The tile shall have the color and pattern uniformly distributed throughout the thickness of the tile. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.

5-5.1.4 Resilient Base. Base shall be manufacturers standard rubber, coved style (installed with resilient flooring). Base shall be 4 inches high and a minimum 1/8-inch thick. Job formed corners shall be provided.

5-5.1.5 Carpet. Carpet construction shall be woven; Type: Broadloom 3.6m minimum usable carpet width; Pile Type: Level Loop; Pile Fiber: Commercial 100% branded federally registered trademark nylon continuous filament; Pile Height: minimum 3.4mm in accordance with ASTM D418; Yarn Pile: minimum 2; Pile density: minimum 4696; Dye method: solution dyed; backing material: backing material shall be 100% synthetic material. Static control shall be provided to control static buildup to less than 3.5 kV when tested at 20% RH and 21 degrees C in accordance with AATCC TM 134.

5-5.1.6 Concrete Floors: All concrete floors on the first floor of all Quad E Buildings that will receive vinyl composition tile or carpet shall be provided with hardener/sealer that conforms to the following requirements:

5-5.1.6.1 Qualifications: the installer of hardener/sealer shall be certified and shall be on a list of preapproved applicators of the product.

5-5.1.6.2 Technical Representative: Hardener/sealer manufacturer's Technical Representative shall be made available for initial training of applicators and field observation during installation of the hardener/sealer. Technical Representative shall certify installations for warranty.

5-5.1.6.3 Warranty: Hardener/sealer manufacturer's "Full System 10 year warranty" on the replacement of all flooring material and labor that delaminates due to moisture migration, excessive vapor emissions or contaminates, shall be provided on all concrete floors to receive carpet and resilient flooring.

5-5.2 Interior Walls and Partitions. Comply with requirements of applicable codes. Non-combustible construction is preferable, even where combustible materials are allowed by code. The use of 16 mm [5/8"] Type X gypsum board shall be utilized where drywall partition is required.

5-5.2.1 Offices and Administration areas are to have full height drywall on metal stud partitions with sound insulation. The use of 16 mm [5/8"] Type X gypsum board shall be utilized where drywall partition is required.

5-5.2.2 Interior walls: Masonry or concrete walls at Arms Room, Heavy storage areas for the Company Operation Facilities (COF) shall have full height masonry or concrete walls.

5-5.2.3 Arms Vault needs to meet requirements at AR 190-11, Physical Security of Arms, Ammunition, and Explosives. Additional Arms Vault requirements are explained in SOW Ch 5, paragraph 5-7.2 and SOW Ch 6, paragraph 6.5-4

5-5.2.4 Interior seismic walls: these walls will be made of concrete. The wall finish shall be smooth; no visible snap-ties or formwork is permitted. These walls will be furred with 64 mm [2-1/2”] metal studs and gypsum board.

5-5.2.5 Metal Support Systems. Non-load bearing metal studs and furring shall comply with ASTM C 645; stud gauge shall be as required by height and loading, but shall not be less than 25 gauge. Maximum stud spacing: 406 mm [16”] on center. Provide galvanized finish.

5-5.2.6 Gypsum Board. Comply with ASTM C 36. Minimum panel thickness: 16 mm [5/8”]. Provide Type X panels in fire-rated assemblies. Provide moisture resistant panels at locations subject to moisture. Provide abuse-resistant panels where indicated in functional and area requirements. Joint treatment: ASTM C 475. Screws ASTM C 646. Drywall installation: ASTM C 840.

5-5.2.7 Ceramic Tile: Comply with ANSI A 137.1 and the recommendations of Tile Council of America (TCA) Handbook For Ceramic Tile Installation. Substrate for wall tile shall be cement backer board (gypsum board is not acceptable).

5-5.2.8 Concrete seismic wall on existing concrete wall: these conditions occur at the exterior facing concrete walls. The finish surface shall be smooth for paint application.

5-5.3 Telecommunication Room (Tele)

5-5.3.1 Require coordination with Schofield Barracks Physical Security Office, Harold Evans, and the Directorate of Information Management, Marion Robinson.

5-5.3.2 Telecommunication rooms that may house SIPR servers shall be treated as classified open storage areas.

5-5.3.3 Security for Telecomm rooms shall be per AR 380-19 information systems security.

5-5.4 Ceilings. Ceiling finish materials shall be as specified in functional and area requirements listed in Chapter 2 of the Statement of Work, as indicated on the Concept Design Drawings, and comply with requirements of applicable codes. Textured ceiling finish may be provided in areas other than laundry or bathrooms. Interior finish on walls and ceilings shall be in accordance with NFPA 101. Provide access doors to maintain and service equipment above the ceiling.

5-5.4.1 Acoustic Ceiling Tile. Acoustic tile shall be smooth, nondirectional finish on scratch-resistance surface. Acoustic tile shall be washable, humidity resistant, and soil resistant. Provide acoustic tile complying with Class A: Flame Spread 25 or under (UL Labeled) per ASTM E 1264; NRC: 0.70 minimum; CAC: 35 minimum; Light Reflect Coefficient: 0.89 minimum.

5-5.4.2 Fiberglass Ceiling Tile. Fiberglass ceiling tile (frp) shall be easy-to-clean panel and made of fiberglass reinforced plastic. Panel surface allows dirt and grease to be cleaned off quickly and easily. As a frp panel it is extremely resistant to most stains and chemicals. The entire panel is moisture resistant and does not support mold or mildew, and it will not rust or corrode. Provided fiberglass tile complying with Class A: Flame Spread 25 or under (UL Labeled) per ASTM E 1264. Light Reflect Coefficient: 0.89 minimum.

5-5.5 Interior Doors and Frames. Provide hollow metal doors, or flush wood solid core doors at UEPH and administration spaces. Provide hollow metal doors at COF supply spaces. All frames shall be

hollow metal. Hollow metal doors and frames shall have a minimum A60 galvanizing. Hollow metal frames shall have a minimum of 3 wall anchors and one floor anchor per jamb.

5-5.5.1 Wood Doors. Provide flush wood solid core doors complying with National Wood Window and Door Association (NWWDA) I.S.-1A. Stile edges shall be non-finger jointed hardwood compatible with face veneer. Provide American Woodwork Institute (AWI) Grade A hardwood face veneer for transparent finished doors; provide AWI Sound Grade hardwood face veneer for painted doors. Transparent finished doors are preferred.

5-5.5.2 Hollow Metal Doors. Comply with ANSI A250.8/SDI 100. Doors shall be Level 2, physical performance Level B, Model 2; top edge closed flush, factory primed. Anchors and accessories shall be zinc coated.

5-5.5.3 Hollow Metal Frames. Comply with ANSI A250.8/SDI 100. Frames shall be Level 2, 16 gauge, with continuously welded corners and seamless face joints; factory primed. Anchors and accessories shall be zinc coated. Frames in masonry shall have bituminous back-coating, plaster guards, and shall be grouted solid. All hollow metal doors frames shall be painted (typical).

5-5.5.4 Arms Vault doors and frames needs to meet opening requirements at AR 190-11, Physical Security of Arms, Ammunition, and Explosives. Additional Arms Vault Door and Frame requirements are explained in SOW Ch 5, paragraph 5-7.2.

5-5.5.5 Telecom Room doors and frames to meet opening requirements for Secret-rated work.

5-5.5.6 Fire-rated and Smoke Control Doors and Frames. Comply with International Building Code (IBC), NFPA 80, and requirements of labeling authority. Doors and frames shall bear labels from Underwriters Laboratories (UL), Factory Mutual Engineering and Research (FM) or War. Comply with positive pressure testing requirements of IBC.

5-5.6 Interior Door Finish Hardware.

5-5.6.1 Hinges. ANSI/BHMA A156.1; template, full mortise; Grade 1, ball bearing on doors with closers; Grade 2, bearing on doors without closers. Minimum 114 mm x 114 mm [4 ½" x 4 ½ "], stainless steel metal.

5-5.6.2 Locksets for Typical Interior Door. Provide stand-alone programmable electronic door locksets with audit capabilities. The lockset construction shall be all metal, heavy-duty, and mortise. The lockset is equipped with hidden mechanical key override, an anti-pick latch and dead bolt, and a magnetic stripe reader complying with ISO standards and ABA dimensional specifications. Each magnetic stripe card will be programmed to gain access into its respective module and sleeping/living rooms. Lockset shall be Kaba Ilco, Solitaire 710-II Series. The lockset shall include knob and lever torque test and "Ultra" finish with two-year warranty ANSI/BHMA A156.13; mortise lockset with removable core; non-ferrous base metal.

5-5.6.3 Locksets for Barracks Living Units entry doors shall have lever handle on Corridor side and knob handle on room side. Locksets shall have clutching device.

5-5.6.4 Locksets for Typical Interior Utility and Maintenance Doors. spaces with doors covered by this paragraph include: Mechanical Rooms, Electrical Rooms, Telecommunication Rooms, Communication Rooms, Toilets, Janitor and Stairwell. ANSI/BHMA A156.2; series 4000, Grade 1, non-ferrous base metal, removable core.

5-5.6.5 Exit (Panic) Devices. ANSI/BHMA 156.3; heavy-duty touch-pad type, through-bolted mounting. Listed and labeled for panic protection based on UL 305. Doors shall be provided with exit device if required by code.

5-5.6.6 Closers. ANSI/BHMA A156.4; series C02000, Grade 1, hydraulic, factory-sized, adjustable to meet field conditions. Provide for all entry doors to living units, all doors opening to corridors and as required by codes.

5-5.6.7 Auxiliary Hardware. ANSI/BHMA A156.16. Provide wall or floor stops for all doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.

5-5.6.8 Kick Plates. ANSI/BHMA A156.6; stainless steel, 254 mm [10”]high x 51 mm [2”] less than door width. Provide at push side of all doors with closers.

5-5.7 Roof Structure. The exposed metal roof truss and metal roof deck shall be cleaned and painted.

5-5.8 Casework.

5-5.8.1 Service Areas in Living Units and Coffee Areas in Admin Areas.
Bathroom Vanity in Living Units
Barracks Building CQ Station Reception Desk
Vanity at Public Toilets

The following typical casework description shall apply to the spaces described above:
Provide architectural cabinetwork complying with AWI Quality Standards, Section 400, Custom Grade cabinets with high-pressure decorative laminate finish, meeting NEMA LD3 standards. Horizontal laminate: nominal .050” thick; vertical laminate: nominal .028” thick. Door and drawer edges shall be plastic laminate: nominal .028” thick. Countertop shall be post-formed high-pressure decorative laminate with waterfall front edge and integral coved backsplash, or solid surfacing material. Cabinets shall be constructed as specified and shall meet requirements of KCMA A161.1. The use of any particleboard material for cabinet construction is not permitted.

5-5.8.2 Other casework. Provide architectural casework complying with AWI Section 400, Custom Grade cabinets with high-pressure decorative laminate finish meeting NEMA LD3 standards. Horizontal laminate: nominal 1.27mm [.050”] thick; vertical laminate: nominal 0.71mm [.028”] thick. Door and drawer edges shall be plastic laminate: nominal 0.71mm [.028”] thick. Work surfaces and counter shall be high-pressure decorative laminate, or solid surfacing material.

5-5.9 Window Treatments. Provide horizontal aluminum mini-blinds at all exterior windows. Blinds shall have one-inch wide by .008-inch thick slats with anti-static, anti-microbial polyester baked enamel finish. Provide heavy-duty 25mm x 38mm [1” x 1-1/2”] steel headrail, and tubular steel bottom rail finished to match slats.

5-5.10 Toilet Partitions. Toilet partition panels shall be floor supported and reinforced to receive partition-mounted accessories. Finish shall be laminated plastic on solid phenolic core. Toilet partition hardware shall be stainless steel. Latching devices, pulls, and hinges for handicap compartments shall comply with Title III of the American Disability Act and Accessibility Guidelines.

5-5.11 Elevators. The contractor shall provide the services of an elevator inspector employed by an independent testing company to inspect the elevator, witness the final testing, and certify elevator. The inspector shall meet all qualification requirements of ASME QEI-1 and shall be certified in accordance with ASME QEI-1. The contractor shall provide an elevator certificate signed by the inspector for each elevator. The certificate shall be provided to the Contracting Officer within 30 days of the completion of testing.

5-5.12 Sound Attenuation.

5-5.12.1 Testing. Certified proof-of-performance field tests will be conducted to demonstrate that the wall systems as constructed provide the required sound isolation. Tests for air-borne sound shall be made in compliance with ASTM E336. Tests for impact sound shall be made in compliance with ASTM E1007. Testing of 10 percent (minimum) of each type of wall system is required. Location of test sites will be chosen at random by the Contracting Officer.

5-5.12.2 Any wall system found to be inadequate shall have the deficiencies corrected and the additional

qualifying tests conducted at the contractor's expense. Testing at the contractor's expense of greater than 10 percent of each system may be required if the Contracting Officer determines that the quality of construction requires this additional testing.

5-5.12.3 Walls shall be designed to provide the minimum airborne sound transmission ratings and impact isolation ratings stated in Table 5-5.12

TABLE 5-5.12 - SOUND TRANSMISSION STANDARDS
FOR WALL CONSTRUCTION

Area	FSTC[1]
Walls at Barracks Bldgs. 552 between 1+1 units & single units	50
Walls at Barracks Bldgs. 552 at all Other Locations	40
Walls at Bldg. 549 at all Other Locations	40
Walls at Conference Rooms	50
Walls at Administration Spaces	40
Walls at all Mechanical Rooms	50
Operable partition at Classroom	47

Note[1]: Field Sound Transmission Class. See ASTM E336.

5-6 PAINT FINISHES AND COATINGS

5-6.1 Interior surfaces, except factory pre-finished material, shall be painted a minimum of one prime coat and two finish coat. Baths and laundry rooms, and all their painted trim shall be finish painted with semi-gloss latex. Natural finished interior doors are acceptable. All other areas shall be water-based latex low sheen washable eggshell finish for walls/trims and water-based latex low sheen washable eggshell finish for ceilings. Oil-based paint is not allowed except for surfaces that require special coating. Interior paint finish may be textured. When semi-gloss and low sheen painted surfaces are adjacent to each other, the wall surfaces in the room shall be finished with semi-gloss paint to avoid having two different finishes adjacent to each other.

5-6.2 All exterior surfaces including all utility appendages, shall receive a minimum of one prime coat and two finish coats of paint. Exterior paint shall be water-based latex. Exterior low sheen stains (two coats) will be acceptable, where appropriate for wood. Oil-based paint is not allowed except for surfaces that require special coating.

5-6.3 All painting work conform to and be in compliance with Unified Facilities Guide Specifications, Division 09-FINISHES, Section 09900, Paintings and Coatings.

5-6.4 Paints used on surfaces in areas of high humidity where mildew is possible and on fabric or vapor barrier over insulation shall contain a mildewcide. The mildewcide 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 and insecticides shall not be used in paints.

5-6.5 Colors shall be as approved from schemes submitted with proposal. All interior paint surfaces shall be painted off-white. Each proposal shall include three basic exterior and interior color coordinated schemes and color samples. Final selection of exterior colors will be made by the Installation Commander (USAGE-HI). Exterior color selections shall conform to the Installation Exterior Architectural Plan (IEAP).

All exterior wood trim to include framing members around garage door openings shall be “back-primed”

(surfaces that will be inaccessible to field painting after installation of the wood trim shall be primed with one coat of primer before installation).

5-7 PHYSICAL SECURITY REQUIREMENTS.

5-7.1 Anti Terrorism / Force Protection. Designs shall conform to the Department of Defense Minimum Antiterrorism Standards for Buildings, listed as Reference 5-2.4. Contractors' proposals will be deemed acceptable provided they comply with the Physical Security Requirements described in paragraphs described below. UEPH buildings are classified as troop billeting structures; COFs, Locker Room Facilities, and Battalion HQs are classified as primary gathering structures

5-7.1.1 The AT/FP standard used to develop the proposed design is the Department of Defense Minimum Antiterrorism Standards for Buildings. Agreements regarding definitions include the following: (refer to Civil, Structural, Mechanical and Electrical Sections for additional information)

5-7.1.2 **Laminated minimum 1/4 inch thick annealed glass is required for all exterior windows and doors, defined in para. B-3.1.1. Window frames shall be provided as defined in para. B-3.1.2.**

5-7.1.3 Exterior doors that are not designated as Historic Type (See concept design drawings) are required to be hollow metal door type.

5-7.2 Arms Vault at Company Operations Facilities. Physical Security of Arms shall be in compliance with AR 190-11. Refer to SOW Ch 6, for structural Arms Vault requirements. Refer to SOW Ch 2 for Arms Vault in Building 549. New floors, walls, and ceilings shall be provided for each Arms Vault. Unless more stringent construction features are required by life safety or building codes, minimum construction requirements shall be as follows:

5-7.2.1 Floor. 152 mm [6"] slab on grade; reinforced with minimum 152 mm x 152 mm MW 25.8 x MW 25.8 [6 x 6, W4 x W4] welded wire fabric, on vapor barrier, on 152 mm [6"] deep porous fill.

5-7.2.2 Walls. 206 mm [8"] thick cast-in-place concrete reinforced with 15M [#5] bars at 152 mm [6"] on center, each way, each face. Concrete masonry units reinforced in a similar manner, as described, will be permitted.

5-7.2.3 Ceiling. 206 mm [8"] thick cast-in-place concrete reinforced with 15M [#5] bars at 152 mm [6"] on center, each way, each face.

5-7.2.4 Door and Frame. **Provide 44mm [1-3/4"] thick hollow metal door, industrial type construction, minimum14 ga. skin plate thickness, and internally reinforced vertically with continuous steel stiffeners spaced 152mm [6"] max. on center. Provide steel bar type, Dutch door style daygate with metal shelf for issuing arms and ammo. Comply with egress requirements of applicable codes. See Attachment 19 for Arms Vault Door and Daygate Details.**

5-7.2.5 Penetrations. Penetrations shall be minimized. All openings or penetrations in Vault floor, walls or ceiling greater than .062 m^2 [96 square inches] shall be protected with welded steel rod-and-bar grid weighing 39.6 kg/m2 [8.1 lb./sf], consisting of 25.4 mm x 4.8 mm [1" x 3/16"] vertical bearing bars at 25 mm [1"] on center, and 8 mm [5/16"] diameter horizontal rods at 50 mm [2"] on center; or equivalent protection.

5-7.2.6 Arms Rack Anchor Rings. Provide 10 mm [3/8"] diameter stainless steel bar bent into U-shape (25 mm inside radius). Overall length shall be 127 mm [5"]; embed 76 mm [3"] of horizontal legs (open end) in pre-drilled epoxy filled holes. U-shaped end will protrude from floor to provide anchorage for GFGI arms racks. Orient the projecting U-shape vertically. Provide anchor rings at 3'-0" on center along the floor inside the Arms Vault -Verify with DPW for exact installation and mounting location.

5-7.2.7 Floor Anchors for GFGI Security Safes. Provide 10 mm [3/8"] diameter stainless steel bar bent into U-shape (25 mm inside radius) with 2" long 90-degree returns at ends of vertical legs. Overall height shall be 127 mm [5"]; embed 76 mm [3"] of vertical legs (open end) in concrete floor slab; 51 mm [2"] of U-

shaped end will protrude above slab to provide anchorage for GFGI security safe.

5-8 SIGNAGE

5-8.1 Directional, Informational, and Motivational Signage. Signs consist of exterior building signage, interior signage, Interior building directories, directional signs, and identification signs. All Exterior and Interior Signage shall comply with TM 5-807-10. Coordinate with installation facilities engineer (DPW) for location of all signs, color of sign, and verbiage to be included on all signs. All exterior signs and interior Building Directory Signs shall be constructed of minimum 0.090-inch think aluminum sheets. All other signs shall be constructed of minimum 4.76 mm [3/16-inch] thick plastic acrylic sheets. All signage shall comply with requirements of ADAAG and UFAS. Refer to Attachment No. 1 for Sign Types described below.

5-8.2 Exterior Signs: provide the following Exterior Building Sign Types:

5-8.2.1 Provide a total of two Exterior Building Identification Signs, one per building, Type D4, Sign grid 1, size: 762 mm H x 1067 mm W [30”H x 42”W].

5-8.2.2 Provide a total of four Exterior Building Number Signs, two per building, Type C8, wall mounted, Sign grid 1, size: 457 mm H x 1372 mm W [18”H x 54”W].

5-8.2.3 Provide all exterior doors with Room Identification Sign, Type BB2, wall mounted, size: 229 mm H x 229 mm W [9”H x 9”W].

5-8.2.4 Provide a total of six Exterior Guide Signs, Type AA5, wall mounted, size: 3 modules of 70 mm H x 457 mm [W 2-3/4”H x 18”W].

5-8.2.5 Provide a total of six Exterior Guide Signs, Type AA6, ceiling mounted, size: 3 modules of 102 mm H x 610 mm W [4”H x 24”W].

5-8.2.6 Provide a total of seven Company Identification Sign, Type BB2 (similar), wall mounted, size: 305 mm H x 610 mm W [12”H x 24”W]. Text Size=1” Cap with ½” line spacing vertically in lieu of 3/8”.

5-8.3 Interior Signs: provide the following Interior Building Sign Types:

5-8.3.1 Provide four Building Directory Signs, two per building, Type AA1, wall mounted, Sign grid 2, size: 1067 mm H x 1219 mm [42”H x 48”W].

5-8.3.2 Provide all interior doors with Room Identification Sign, Type BB2, wall mounted, size: 229 mm H x 229 mm] 9”H x 9”W].

5-8.3.3 Provide the following signs for each arms vault. All signs shall be visible to personnel when the door to the arms vault is open.

A. Restricted Area Sign. Sign Type G-3. Size 2’-0” (H) X 2’-6” (W). Text shall be as specified in AR 190-13, para 6-4. Sign shall be affixed to the outside of the vault wall adjacent to the vault door at eye level.
B. Intrusion Detection Sign (IDS) Sign shall be constructed as specified in AR 190-11, Appendix F, Figure F-1. The sign shall be affixed to the outside of the vault wall adjacent to the vault door at eye level.
C. Hazard Warning Symbol. The sign shall be as specified in FM 4-30.13. It shall be either NSN 7690-01-081-9584 or 7690-01-082-6709; Fire Symbol 4, Diamond Shape.

5-8.4 See accessibility section for accessible signage requirements.

5-9 ACCESSIBILITY FOR HANDICAPPED (PHYSICALLY IMPAIRED) PERSONS, BARRIER FREE DESIGN.

5-9.1 Accessibility will be based on requirements of the Americans with Disabilities Act (ADA.) Public accommodation will be provided as described in the ADA Architectural Guidelines (ADAAG.). Refer to SOW Chapter 2 for ADA requirements for individual spaces.

5-9.2 Proposed accommodations generally consist of the following:

5-9.2.1 Public areas will be ADA-compliant.

5-9.2.2 Entries and exits accessible as required by ADA.
5-9.2.3 An accessible path to all offices will be provided.
5-9.2.4 Toilets Rooms to be ADA-compliant.
5-9.2.5 All common use areas will be ADA-compliant.
5-9.2.6 ADA-compliant directional and identification signage will be provided.
5-9.2.7 All employee-only spaces will be provided with ADA-compliant approach, entry, turn-around and exit.
5-9.2.8 Where disabled employees presently exist, provide path and floor area space suitable for accommodation should be provided. No disabled employees have been identified.
5-9.2.9 ADA-compliant fire alarm systems are described in the Fire Protection Design Analysis.
5-9.2.10 ADA-compliant communication systems are described in the Electrical Design Analysis.

CHAPTER 6

STRUCTURAL DESIGN

6-1.1 6-1 GENERAL. The structural criteria established herein shall be used for structural loading, design and installation of all structural systems and foundations, including manufacturing, erection, supervision, testing, and quality assurance of the completed installation of the buildings. A concept structural design which includes seismic and antiterrorism/force protection design has been prepared by the Government and is an attachment to this RFP. The contractors shall incorporate the concept structural design into their design proposal, however the concept design may be changed due to innovation or economic efficiency, not withstanding requirements of all other sections of this RFP and provided all structural criteria herein are met and accounted for in a rational analysis and stamped by a structural engineer licensed in the U.S. The winning offeror shall provide final structural design in compliance with the structural design criteria listed below.

6-2 DESIGN CRITERIA. Structural design criteria and guidance are contained in the following documents. Editions that are current at the date of issue of the RFP shall apply.

6-2.1. TI 800-01, Design Criteria
6-2.2. TI 809-04, Seismic Design for Buildings
6-2.3. TI 809-05, Seismic Evaluation and Rehabilitation for Buildings
6-2.4. TM 5-853-1, Security Engineering, Vols 1-3 (For Official Use Only)
6-2.5. MIL HNDBK 1013/1A, Design Guidelines for Physical Security of Facilities
6-2.6. AR 190-11, Physical Security of Arms, Ammunition, and Explosives, with Change 1
6-2.7. ASCE 7, Minimum Design Loads for Buildings and Other Structures
6-2.8. Unified Facilities Guide Specifications (UFGS)
6-2.9. EM 1110-2-2002, Evaluation and Repair of Concrete Structures
6-2.10. UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, 8 Oct, 2003
6-2.11. UFC 1-200-01, Design: General Building Requirements, dated 31 July 2002
6-2-12. 2000 International Building Code (IBC 2000)
6-2-13. 2003 International Building Code (IBC 2003)

6-3 MINIMUM LOAD STANDARDS. Design loads and load combinations shall be in accordance with 2000 IBC, except as otherwise indicated by this chapter. Additional seismic and anti-terrorism requirements are covered under criteria listed in paragraphs that follow. Design loads shall meet the minimum load standards shown in Table 6-1.

TABLE 6-1 - MINIMUM LOAD STANDARDS

LOAD TYPE	REQUIREMENT
Dead Load	Actual
Roof Live Load	1 kPA (20 psf)
Balconies, First Floor Corridor, Stair, Dining & Serving Room	4.8 kPa (100 psf)
Corridor above first floor	3.8 kPa (80 psf)
Dining and Serving Room	4.8 kPa (100 psf)
Kitchen and Dishwashing Room	12 kPa (150 psf)
Residential Live Load	1.9 kPa (40 psf)
Classroom Live Load	1.9 kPa (40 psf)
Office and Restroom Live Load	2.4 kPa (50 psf)
Light Storage Live Load	3.5 kPa (70 psf)
Stair and Exitways	4.8 kPa (100 psf)
Mechanical and Electrical	7.2 kPa (150 psf)

Room Live Load	
Wind Load Criteria	105 MPH Basic Wind Speed Exposure “C” in accordance with ASCE 7
Seismic Load Criteria	Refer to Seismic Evaluation and Rehabilitation Report

6-4 MINIMUM MATERIAL STRENGTHS AND PROPERTIES.

6-4.1 Foundation. Foundation shall be concrete footings and/or thickened slab edges compatible with the soil and climatic conditions of the site. Allowable soil bearing pressure shall be 3500 psf for footings bearing on undisturbed residual soil.

6-4.2 Reinforced Concrete. Concrete Requirements. All concrete shall conform to IBC 2000 or IBC 2003.

6-4.2.1 Minimum concrete strength at 28 days: 21 Mpa (3000 psi) with water-cement ratio not more than 0.45.

6-4.2.2 Minimum concrete thickness:

Slab-on-grade: Non-structural interior slab-on-grade design shall be in accordance with TI 809-02. Non-structural interior slab-on-grade system shall consist of minimum 102 mm (4”) concrete slab over vapor barrier over granular termite barrier over separation geotextile over capillary water barrier. Welded wire reinforcement shall be secured at mid-depth of slab by mechanical means such as precast concrete spacers or reinforcing chairs. All slabs-on-grade shall be moist cured for a minimum of 7 days followed by curing by curing compound for another 3 weeks. Curing compound shall be dissipating type compatible with any floor seal or floor covering adhesive.

Structural members. The thickness of all structural members shall conform to ACI 318, Building Code Requirements for Reinforced Concrete.

6-4.2.3 The minimum yield strength Fy of reinforcing steel shall be 275 Mpa (40,000 psi).

6-4.3 Concrete Masonry Units (CMU).

6-4.3.1 Reinforced masonry assemblies shall have a minimum compressive strength of 10.34 Mpa (1500 psi).

6-4.3.2 Cmu shall conform to ASTM C 90, Type II, except oven-dry weight shall be no less than 581 kg per cubic meter (119 pcf) for hollow load bearing units.

6-4.3.3 Mortar shall be Type “S” conforming to ASTM C 270.

6-4.3.4 Grout shall conform to ASTM C 476 with a minimum compressive strength of 15 Mpa (2000 psi).

6-4.4 Structural Steel.

6-4.4.1 Structural steel shall conform to ASTM A 36 or better.

6-4.4.2 Anchor bolts shall conform to ASTM A 307. Machine bolts shall conform to ASTM A 325.

6-4.4.3 All welds shall be accomplished by certified welders in conformance with AWS D1.1, Structural Welding Code.

6-4.4.4 All steel shall be primed in the shop. Exposed steel shall be hot-dip galvanized.

6-4.5 Light Gage (Cold-Formed) Steel Construction. Design and construction shall be in accordance with IBC 2000 or IBC 2003.

6-4.5.1 Fasteners. All screws, bolts, anchor bolts and expansion shields shall be stainless steel or finished with zinc, cadmium or co-polymer coatings. Pneumatically driven pins or nails will not be permitted. All welded connections shall be designed in accordance with Section E of the AISI Specification. All welding shall be accomplished in accordance with AWS D1.3 standards. All weld areas shall be re-touched with the appropriate paint or cold galvanized to retain corrosion resistance.

6-4.5.2 Protective Coating. Exposed light gage steel members will not be allowed. All light gage steel used for exterior applications shall have minimum G-90 hot dip zinc coating in accordance with ASTM A 525. Exterior applications include all steel members directly supporting exterior siding or roof sheathing. Interior applications shall have a minimum G-60 hot dip zinc coating in accordance with ASTM A 525.

6-4.6 Miscellaneous Metal Items. All railings, handrails, anchor bolts, plates, and steel embedded in concrete, metal studs and runners, and other miscellaneous metal items shall be galvanized. All damaged galvanized areas not embedded shall be repaired with galvanizing repair compound. All metal items listed above that are exposed to the weather or exterior shall be hot-dip galvanized or coated with inorganic zinc primer.

6-4.7 Structural Wood.

6-4.7.1 Wood structural members are not allowed.

6-5 SPECIAL REQUIREMENTS.

6-5.1 AISC Certification requirements: All fabrication of structural steel shall be accomplished by an AISC certified Category Sbd fabricating plant.

6-5.2 Materials Testing. As a minimum, the following concrete tests shall be performed: air content, slump, unit weight, temperature, and strength. Refer to United Facilities Guide Specification Section 03300, Cast-in-Place Structural Concrete, for sampling and testing standards. All costs for testing shall be borne by the Contractor.

6-5.3 Arms Vaults. The arms vault in each Company Operations Facility shall meet the requirements of AR 190-11. Refer also to paragraph 5-7.2, “Arms Vault at Company Operations Facilities”.

6-5.4 Antiterrorism/Force Protection (AT/FP). This project is classified as a major renovation for inhabited structures of troop billeting and primary gathering structures which shall be designed and constructed to meet DOD AT/FP design criteria, UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, 8 Oct, 2003.

The Government has prepared a concept site plan which employs operational options for parking areas and roadways to meet all AT/FP standoff distance requirements of UFC 4-010-01 and to obviate the need to harden the existing Quad E buildings for anti-terrorism blast loads. Refer to Statement of Work, Chapter 3, Site Planning and Design, for AT/FP operational options in the site concept design.

The Government has prepared a report, entitled Seismic Evaluation Study and Progressive Collapse Vulnerability Assessment for Whole barracks Renewal, Phase 4B Renovations of Quad ‘E’ Schofield

Barracks, Oahu, Hawaii by SSFM International, dated, November 21, 2003 (attachment 3) which shall be the basis for final progressive collapse design. The progressive collapse requirements shall be integrated with the seismic rehabilitation plan described in the following paragraph, so that strengthened or new structural members may serve dual functions. Anti-terrorism/force protection design shall also comply with the statement of work chapters on Historical Preservation and Site Development Plan.

New windows shall meet requirements of UFC 4-010-01. Window criteria include minimum ¼" nominal laminated glass for all exterior windows and glazed doors with 3/8" minimum frame bite for structural glazed windows and 1" bite for window systems that are not structurally glazed.

6-5.6 Seismic Evaluation and Rehabilitation. Army regulations require that the buildings of Quad E be evaluated to determine possible requirements for structural rehabilitation to mitigate seismic hazards. The Government has prepared a report entitled "Seismic Evaluation Study and Progressive Collapse Vulnerability Assessment for Whole Barracks Renewal, Phase 4B Renovation of Quad 'E' Schofield Barracks, Oahu, Hawaii ", by SSFM International, dated Nov 21, 2003 is attached. The contractors shall incorporate the seismic evaluation into their design, and include seismic rehabilitation costs in their work. **To give the contractor the opportunity for design innovation and economy, the design need not follow the seismic evaluation study exactly, provided the seismic forces specified in the report are accounted for in a rational analysis developed by a licensed structural engineer, and load path requirements are met.** The seismic design criteria for the seismic concept design include TI 809-05, Seismic Evaluation and Rehabilitation for Buildings, and TI 809-04, Seismic Design of Buildings. The contractor has the option of using IBC 2000 or IBC 2003 for the seismic design criteria in lieu of TI 809-05.

Requirements for seismic rehabilitation shall be integrated with AT/FP and Historic Preservation requirements.

6-5.6. Concrete Damage Repair. No major concrete repairs are anticipated. Miscellaneous spalling and cracking shall be repaired following methods prescribed in EM 1110-2-2002, Evaluation and Repair of Concrete Structures.

6-5.7 Existing and New Structural Systems. Existing structural systems shall be analyzed and retrofitted to insure new live loads provided in IBC 2000 or Table 6-1 can be supported. Provide all work necessary for final design but not shown on concept design. New live loads shall include but not limited to new cooling tower, machine rooms, locker rooms, and arms rooms.

New footings or enlarged footings shall be provided where required for required building loads (including seismic loads). Foundation design shall be based on attached "Preliminary Geotechnical investigation Report for Proposed Cooling tower Pad, FY03 Whole Barracks Renewal Project Phase 4B, Quad E, Schofield Barracks, Oahu, 9 Apr 2003" (Attachment 7).

There are a limited number of structural as-built drawings for Quad E. The bidder shall assume that existing structural members are adequate for existing floor loads. The contractor shall strengthen the existing structure where the new floor plan requires increased floor live load over existing floor live load. Where there is an increase in live loads, the contractor shall perform nondestructive and destructive tests as required, after award of the contract, to verify actual existing structural conditions and to verify structural adequacy.

Limited asbuilt drawing information for the Quad E roof is available (see included asbuilt drawings). The bidders shall use appropriate engineering judgment for roof design. Contractor shall provide destructive and nondestructive investigative testing of the roof after award of contract. Final roof design shall be based on testing results.

CHAPTER 16

ENVIRONMENTAL REQUIREMENTS

16-1 ENVIRONMENTAL ISSUES: Overall environmental goal for the Whole Barracks Renewal Brigade Complex QUAD E **(buildings 549 and 552)** is to provide a safe and healthy environment for residents, facility users and the installation.

16-2 POTENTIAL ENVIRONMENTAL CONCERNS:

1) Proper removal of asbestos building materials and deteriorated lead paint;
2) Proper disposal of barracks and administrative space demolition debris which contain asbestos and lead paint;
3) Proper handling and disposal of the PCB containing light ballast from the fluorescent light fixtures;
4) Proper disposal of excavated soil resulting from removal and disposal of possible leaking underground heating oil storage tanks associated with former boiler room activities;
5) Proper handling and disposal of mercury lamp switches.
6) Worker safety protection due to exposure during construction.

16-3 ASBESTOS: An asbestos survey for QUAD E has been completed. A copy of the report prepared by Soil and Land Use Technologies, Inc. is provided in Attachments 12, Asbestos Inspection Reports, Schofield Barracks, Quad E, **Buildings 549 and 552**.

16-3.1 Notification. Under 40 CFR Part 61, Subpart M, owners of buildings and/or their Contractors are required to notify applicable State and Local agencies and/or EPA Regional Office prior to any demolitions, or renovations of "facilities" where asbestos material will be disturbed. In addition, the Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAPS) requires special removal, handling, and disposal practices to be followed during demolitions and renovations of all facilities. Contractor shall complete EPA notification form, postmarked at least 10 working days prior to the start of any demolition (including where no asbestos is present) or renovation activity that will disturb asbestos.

16-3.2 Removal: The selected contractor shall remove all asbestos containing material identified on project drawings for the renovation. The removal shall be in accordance with 29 CFR 1926.1101, Asbestos in Construction and Hawaii Administrative rules (HAR) Chapters 11-501 - 11-504. If additional asbestos is identified, that was not identified in the report, it shall be brought to the attention of the Government before proceeding with any action. After abatement, encapsulation shall be applied to these surfaces. Please see Asbestos Specification 13280 - Asbestos Abatement in Attachment 12.

16-3.3 Disposal. Asbestos containing building materials shall only be disposed of at Federal/State or local landfills approved for this purpose. Please see applicable State of Hawaii Laws under Section 16.9. Please review the document, State of Hawaii Department of Health Solid and Hazardous Waste Branch Office of Solid Waste Management Disposal of Asbestos-Containing Waste Materials (Eff. January 1, 2003)." All applicable laws under this guidance must be followed.

16-4 LEAD: Due to the age of the facility (Quad E), it is assumed that lead is present on all painted surfaces.

16-4.1 Removal. The selected contractor shall remove lead in accordance with 29 CFR1926.62 and be a listed EPA certified lead firm on the EPA Region 9 website. Contractor shall remove all loose and flaking paint observed above the false ceiling and on walls, pillars that will not be demolished. The selected Contractor shall conduct work in accordance with 29 CFR 1926.62 and Section 13282, Lead in Construction (Attachment 15).

16-4.2 Disposal. Please review the document "State of Hawaii Department of Health Solid and Hazardous Waste Branch Office of Solid Waste Management Disposal of Lead-Based Paint Waste (eff. January 1, 2003." Please see applicable Federal and State Laws under Section 16.9. The waste

generated for Quad E is exempt from hazardous waste laws.

16-5 PCB LIGHT BALLASTS. The PCB Containing Ballasts in the fluorescent light fixtures must be removed prior to the disposal of the light fixture. A hazardous material survey has been conducted for Quad E), by Myounhee Noh and Associates. Please Refer to Attachment 13, "UST, PCB Ballast and Mercury Light Switch Inspection for Quad B, D, E and Building 3004. Schofield Barracks."

16-5.1 Identification of PCB Light Ballast (Capicitors):

The following guidelines should be used in identifying capacitors that contain PCB's:

- All capacitors manufactured through 1979 contain PCB's
- Capacitors manufactured after 1979 that do not contain PCBs are labeled "NO PCBs".
- If a capacitor is not labeled "NO PCBs", it is assumed to contain PCBs.

16-5.2 Disposal Options. Disposal of the PCB containing light ballasts is to be accomplished in accordance with 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and use Prohibitions.

16-5.2.1 Subtitle D Landfills: Many small capacitors are disposed of in this manner due to low cost; however, the PCB's are not eliminated from the environment.

16-5.2.2 PCB Removal/Recycling. This option involves the removal of the four-ounce capacitor and the potting material from the ballast. The remaining materials are recycled for scrap metal. The only PCB recycling company on island is Saleesco USA, Honolulu HI and can be reached at 1-800-368-9095.

16-6 UNDERGROUND STORAGE TANKS: Disposal of contaminated soil resulting from the removal of underground heating oil tanks shall be sampled to determine if it is to be considered hazardous/non-hazardous or State of Hawaii Department of Health (HDOH) chemicals of concern in accordance with the Technical Guidance Manual for Underground Storage Tank Closure and Release Response. Chemicals of concern are associated with past site activities. If the soil is hazardous, it must be remediated locally or shipped to the mainland for disposal at a RCRA permitted landfill or incinerated. If the soil is non-hazardous it can be handled locally provided HDOH criteria are observed.

16-6.1.1 When petroleum impacted soil (discoloration and strong petroleum odor) is uncovered by the Contractor while excavating soil for the project, the COR representative from the Corps of Engineers, shall be notified of the discovery. The Contractor shall then notify the Directorate of Public Works (DPW) and the excavation shall stop. The Corps of Engineers technical advisor will visit the site and indicate the quantity of samples to be taken.

16-6.2 The Contractor will be requested to conduct a Site Investigation (SI) at the project site by collecting subsurface soil samples (using hydraulic direct push technique or drilling of borings) to fully delineate the vertical and horizontal extent of the contamination. Soil samples shall be analyzed in accordance with *Table 7.2 - Recommended Chemical Analysis for UST Closure and Release Response dated 9/18/92 of the Hawaii Department of Health (HDOH) Technical Guidance Manual for Underground Storage Tank Closure and Release Response (UST-TGM).* Based on the laboratory analytical, and the site's characteristics, the Contractor shall evaluate the migration pathways of the contaminant through the soil and the potential receptors of such contamination. Any required remediation of contamination shall be done under a separate action.

16-6.3 Sampling Analysis Plan (SAP)

16-6.3.1 The Contractor shall prepare a site-specific sampling and analysis plan. The plan shall identify responsibilities and qualifications of all personnel, the Contractor's methods, equipment, procedures and tentative schedule for conducting fieldwork. The SAP shall contain maps showing the tentative sampling locations and rational for selecting those locations. The plan shall be reviewed by the

Government before the start of fieldwork. The plan shall include a detailed discussion of the technical approach to be used to implement the requirements for field activities, laboratory activities, and report of analytical data.

16-6.3.2 The SAP shall address chemical quality management including data quality objectives (DQOs) for on-site testing as well as laboratory testing. The SAP shall propose the process for assigning sample identification, field documentation, QA/QC samples, test methods, sample packing, chain of custody, and shipping etc. The SAP shall include provision for collecting and analyzing ten percent field QA/QC samples. The Government will designate an USACE validated laboratory for QA sample analysis.

16-6.3.3 Test Items and Suggested Analytical Methods

Analyses and Sites	*Method*
-Polynuclear Aromatic Hydrocarbons (PAHs)	*8100* *8310* *8270C*
Aromatic and Halogenated Volatile Organic Compounds (including Methyl Ethyl Ketone)	*8021B* *8260B*
Lead/Cadmium	*6000/* *7000*
PolyChlorinated Biphenyls (PCBs)	*8082*
TPH- Diesel/Oil Range Organics (excavated area)	*8015B*
TPH-Gasoline Range Organics	*8015B*
TCLP (stockpile)	*TCLP*
TPH- Diesel/Oil Range Organics (stockpiles)	*8015B*

16-6.3.4 Site Investigation (SI) Report. The Contractor shall prepare a SI report to be submitted after evaluation of laboratory data.

The report shall, at a minimum, include the following elements:

- Summary of work performed including but not limited to the narrative of the field work, mobilization and demobilization, site set up, analytical data and location maps were samples were taken, etc.
- Relevant Conversation Records that had impacted the SOW, project costs.
- Evaluation of potential migration pathways and receptors.
- Source of contamination and recommended course of action.

The report shall be submitted to the Government for review. Should the levels exceed the regulatory clean up levels, determination of the disposal method will be discussed with the Contracting Officer's Representative and the State of Hawaii Department of Health, Hazard Evaluation & Emergency Response (HEER) Office.

16-7 MERCURY SWITCHES. The mercury containing switches, usually found in thermostats and silent light switches must be removed and disposed of properly prior to building demolition. Each switch may contain approximately 3,500 milligrams of mercury in a small electrical switch. The mercury may be disposed of at a hazardous waste landfill or recycled. A hazardous material survey has been conducted for Quad E. The report is located in Attachment 13, "UST, PCB Ballast and Mercury Light Switch Inspection for Quad B, D, E and Building 3004. Schofield Barracks."

16-8 SAFETY. Occupational Safety and Health Administration (OSHA) 29 CFR 1926, Safety and Health Regulations for Construction, will be followed at all times during construction for worker safety protection. Debris and soil containing fuels and hazardous construction materials are assumed to be a concern to worker health and the appropriate personnel protection equipment shall be used.

16-9 APPLICABLE FEDERAL AND STATE LAWS AND ACTIONS. Except as specified otherwise in the RFP, design and construction facilities shall comply with the latest editions (as of the date on the RFP) of the following. Major environmental federal/State and local guidance and regulations are listed below:

16-9.1 Asbestos

16-9.1.1 29 CFR 1926.1101 Asbestos in Construction

16-9.1.2 Hawaii Revised Statute (HRS) Chapter 342P.

16-9.1.3 Hawaii Administrative Rules (HAR), Title 11, Chapters 501 - 504.

16-9.1.4 Hawaii Administrative Rules, Title 12 Chapter 145.1, HIOSH Construction Standard, Asbestos.

16-9.1.5 Hawaii Administrative Rules, Title 16, Chapter 77, Subchapter 19, Asbestos Contractors, Department of Commerce and Consumer Affairs (DCCA)

16-9.1.6 Resource Conservation Recovery Act , Subtitle D

16-9.2 Lead

16.9.2.1 According to Section 403 of the Toxic Substance Control Act (TSCA), as amended, the Environmental Protection Agency (EPA) defines lead-based paint (LBP) as paint with lead levels equal to or exceeding 1.0 milligram per square centimeter (mg/cm2) or 0.5% by weight.

16-9.2.2 The Department of Housing and Urban Development (HUD) had similarly defined lead-based paint as any paint, varnish, shellac or other coating that contains lead equal of greater than 1.0 mg/cm2 as measure by x-ray fluorescent (XRF) or laboratory analysis, or 0.5% by weight (5,000 ug/g, 5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

16-9.2.3 In 1978, the consumer product Safety Commission (CPSC) banned the sale of residential paint containing greater than 0.06% lead (a trace amount). The CPSC also prohibited the used of such paint in residences and other areas where consumers have direct contact with painted surfaces.

16-9.2.4 The EPA policy entitled, “Update on Lead-base Paint”, dated August 2000 states that residential LBP waste is not subject to Resource Conservation & Recovery Act (RCRA) Subtitle C (federal hazardous waste) regulations. “Contractors can manage residential lead based paint waste as household waste.” Residential sources of LBP waste include, but are not limited to single-family homes, apartment buildings, row houses, military barracks and college dormitories.

16-9.2.5 EPA defined “residential lead-based paint waste” in a Federal Register “Proposed Rule”, October 23, 2001 (Vol. 66, No. 205). Residential lead-based paint waste is waste generated as a result of lea-based paint activities (including abatement, renovation, rehabilitation, and remodeling) in homes and other residences. The term includes, but is not limited to lead-based paint debris, chips, dust, and sludge. The term does not include LBP waste from demolition activities.

16-9.2.6 The EPA interprets residential LBP waste to be household waste under 40 CFR 261.4(b)(1).

16-9.2.7 Hazardous waste regulations, known on the federal level as RCRA Subtitle C are enforced within the State of Hawaii Under Hawaii Revised Statutes (HRS) 342J and Hawaii Administrative rules

(HAR) Title 11, Chapters 261 through 280. Chapter 11-261, HAR defines “household waste” as “any material derived from households (including single and multiple residences, hotels and motel, bunk houses, ranger stations, crew quarters, campgrounds, picnic grounds and day use recreation areas)

16-9.2.8 Solid waste regulations, are enforced within the State of Hawaii under HRS 342H and HAR Title 11, Chapters 58.1 (11-58.1), and provide broader authority to the Department of Health (DOH) than Federal regulations, known as RCRA subtitle D.

16-9.2.9 Hawaii Administrative Rules, Title 12 Chapter 148.1, HIOSH Construction Standard, Lead.

16.10 MERCURY & UST

Solid and Hazardous Disposal Act as amended by the Resource Conservation and Recovery Act, and amendments (RCRA), Public Law 94-580, Solid Waste Disposal Act. Among other items, this Act requires Federal Agencies must obtain permits for their hazardous waste treatment, storage and disposal facilities. Proper shipping papers (manifests), packaging, and labeling must be used when transporting hazardous waste. The 1984 amendments apply the requirements to persons who generate as little as 100 kilograms of hazardous waste in any month and require registration and controls on underground tanks used for storing oil and hazardous waste.

16-11 POLYCHLORINATED BIPHENYLS (PCB)

16-11.1 Hawaii Administrative Rule (HAR) 11-273 and 40 CFR Part 273, Hazardous Waste Management Standards for Universal Waste Management.

16-11.2 Toxic Substances Control Act, Public Law 94-469, as amended. This Act requires Federal Agencies to properly manage the use and disposal of all toxic substances and management of Polychlorinated Biphenols (PCB) and items that contain PCB.

16. 12 SAFETY AND HEALTH

Hawaii Revised Statute, Chapter 396, Occupational Safety and Health Law and Corps of Engineers, Engineering Manual (EM-385-1-1), Safety and Health Requirements Manual.

ATTACHMENTS

No.	DESCRIPTION
1	SIGN TYPES
2	WATER ANALYSIS
3	STRUCTURAL CONCEPT DESIGN AND CALCULATIONS
4	LIST OF AS BUILT STRUCTURAL DRAWINGS
5	FIRE ALARM SEQUENCE OF OPERATION MATRIX
6	TELECOMM DETAILS
7	GEOTECHNICAL INVESTIGATION REPORT
8	LIST OF DRAWINGS - RFP CONCEPT DESIGN
9	PLUMBING AND HVAC DESIGN ANALYSIS
10	FIRE PROTECTION DESIGN & CALCULATIONS
11	SUSTAINABLE DESIGN SPiRiT CHECKLIST
12	ASBESTOS INSPECTION REPORT
13	UST, PCB BALLAST & MERCURY LIGHT
14	SECTION 13280A ASBESTOS ABATEMENT
15	SECTION 13282N LEAD IN CONSTRUCTION
16	SECTION 13286N HANDLING OF LIGHTING BALLAST AND LAMPS CONTAINING PCBs AND MERCURY
17	DIVISION 01 - GENERAL REQUIREMENTS
18	HISTORICAL ARCHITECTURAL SURVEY
19	DAYGATE DETAIL
20	PROGRAMMATIC AGREEMENT
21	SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

ATTACHMENT 3

STRUCTURAL CONCEPT DESIGN
AND
CALCULATIONS

(AM-0005)

CHAPTER 6

STRUCTURAL DESIGN & CALCULATIONS

STRUCTURAL DESIGN

GENERAL

The structural criteria established herein shall be used for structural loading, design and installation of all structural systems and foundations, including manufacturing, erection, supervision, testing, and quality assurance of the completed installation of the buildings. A concept structural design which includes seismic and antiterrorism/force protection design has been prepared by the Government and is an attachment to this RPF. The offerors shall incorporate the concept structural design into their design proposal, however the concept design may be changed due to innovation or economic efficiency, not withstanding requirements of all other sections of this RFP and provided all structural criteria herein are met and accounted for in a rational analysis and stamped by a structural engineer licensed in the State of Hawaii. The winning offeror shall provide final structural design in compliance with the structural design criteria listed below.

DESIGN CRITERIA

Structural design criteria and guidance are contained in the following documents. Editions that are current at the date of issue of the RFP shall apply.

TI 809-04, Seismic Design for Buildings
TI 809-05, Seismic Evaluation and Rehabilitation for Buildings
ASCE 7, Minimum Design Loads for Buildings and Other Structures
UFC 1-200-01, Design: General Building Requirements, dated 31 July 2003
UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, 31 Jul, 2002
ACI 318, Building Code Requirements for Structural Concrete
AISC, 9th Edition, Minimum Design Loads for Buildings and Other Structures
Department of Defense Minimum Anti-Terrorism/Force Protection Construction Standards, Guidance on Structural Requirements

LATERAL LOADS

The buildings will be designed to meet the requirements of TI 809-05 Seismic Evaluation and Rehabilitation for Buildings. The following parameters will be used.

Use Group	I (Standard Occupancy Structures)
Performance Objective	Life Safety
Soil Type	S_E
Seismic Design	D
Spectral Acceleration	$S_s = 0.60$ g S1 = 0.17 g (MCE -2% POE in 50 yrs.)

ASCE 7-98 Minimum Design Loads for Buildings and Other Structures will be used for wind load requirements. The following parameters will be used:

3-Second Gust Speed	105 mph
Importance Factor	1.0
Exposure	"C"

LIVE LOADS

Roof Live Loads:	20 psf
Floor Live Loads	
Administration:	50 psf
Barracks:	40 psf
Exit corridors/balconies	100 psf
Gymnasium/Auditorium	100 psf

MINIMUM MATERIAL STRENGTHS AND PROPERTIES

Foundation:
Foundation shall be concrete footings and/or thickened slab edges compatible with the soil and climatic conditions of the site. Allowable soil bearing pressure shall be 3500 psf for footings bearing on undisturbed residual soil.

Reinforced Concrete:	
Cast-In-Place	f'c = 3000 psi
Shotcrete	f'c = 4000 psi
Concrete Masonry Units (CMU):	
ASTM C90, Type II	f'm = 1500 psi
Grout	f'c = 2500 psi
Mortar	ASTM 270, Type S
Reinforcing Steel:	
Rebar	ASTM 615, Grade 60
Welded Wire Fabric	ASTM A185
Structural Steel:	
W-shapes, Channels, Angles	ASTM A992, A36
Anchor bolts, Threaded rods	ASTM A307
Steel Pipes	ASTM A53, Grade B
HSS	ASTM A500, Grade B
Welding Electrodes	E70XX

SPECIAL REQUIREMENTS

AISC Certification Requirements

All fabrication of structural steel shall be accomplished by an AISC certified Category Sbd fabricating plant.

Materials Testing

As a minimum, the following concrete tests shall be performed: air content, slump, unit weight, temperature, and strength. Refer to United Facilities Guide Specification Section 03300, Cast-in-Place Structural Concrete, for sampling and testing standards. All costs for testing shall be borne by the Contractor.

Special Inspection

Continuous or periodic special inspection by a certified inspector shall be performed on seismic-resisting systems in accordance with IBC 2000, Section 1704. See also Unified Facilities Guide Specification Section 01452, Special Inspection for Seismic-Resisting Systems, for inspection requirements and other details.

Arms Vaults

The arms vault in each Company Operations Facility shall meet the requirements of AR 190-11.

Anti-terrorism/Force Protection (AT/FP)

This project is classified as a major renovation for inhabited structures of troop billeting and primary gathering structures which shall be designed and constructed to meet DOD AT/FP design criteria, UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, 31 Jul, 2002.

The Government has prepared a concept site plan which employs operational options for parking areas and roadways to meet all AT/FP standoff distance requirements of UFC 4-010-01 and to obviate the need to harden the existing Quad E buildings for anti-terrorism blast loads.

The Government has also prepared an independent anti-terrorism/force protection assessment and retrofit (AT/FP concept design) report, entitled *Seismic Evaluation Study and Progressive Collapse Vulnerability Assessment for Whole Barracks Renewal, Phase 4B; Renovations of Quad "E"; Schofield Barracks, Oahu, Hawaii*, by SSFM International, Inc., dated November 21, 2003 (attached) to provide compliance to other AT/FP requirements of UFC 4-010-01.

New windows shall meet requirements of UFC 4-010-01, paragraph B-3.1 as indicated by the AT/FP concept design.

The offerors shall incorporate AT/FP concept design report requirements into their design proposal submissions and shall include associated retrofit costs in their price proposal submissions. The AT/FP concept design shall be the basis for final design and actual construction. The AT/FP concept design retrofit upgrades shall be integrated with the seismic rehabilitation plan described in the following paragraph, so that strengthened/new structural members may serve dual functions. Anti-terrorism/force protection design shall be comply with the statement of work chapters on Historical Preservation.

Seismic Evaluation and Rehabilitation

Army regulations require that the buildings of Quad E be evaluated to determine possible requirements for structural rehabilitation to mitigate seismic hazards. The Government has prepared an independent seismic evaluation and rehabilitation (concept seismic design) report to minimize risks to offerors due to unknown conditions. The seismic concept design report entitled, *Seismic Evaluation Study and Progressive Collapse Vulnerability Assessment for Whole Barracks Renewal, Phase 4B; Renovations of Quad "E"; Schofield Barracks, Oahu, Hawaii*, by SSFM International, Inc., dated November 21, 2003 is attached to this RFP. The concept design assumes design base shears due to seismic forces are greater than those calculated for wind loads. The offerors shall incorporate the seismic concept design into their design proposal submissions, and include seismic rehabilitation costs in their price proposal submissions. To give the offeror the opportunity for design innovation and economy, the design proposal need not follow the concept design exactly, provided the seismic forces specified in the report are accounted for in a rational analysis developed by a licensed structural engineer, and load path requirements are met. The seismic design criteria for the seismic concept design include TI 809-05, Seismic Evaluation and Rehabilitation for Buildings, and TI 809-04, Seismic Design of Buildings. The winning offeror shall incorporate the newer seismic design criteria, Design Criteria (IBC 2000 as amended by UFC 1-200-01) as a basis for their final seismic design.

As stated in the previous paragraph, requirements for seismic rehabilitation shall be integrated with AT/FP retrofit requirements.

Concrete Damage Repair

No major concrete repairs are anticipated. Miscellaneous spalling and cracking shall be repaired following methods prescribed in EM 1110-2-2002, Evaluation and Repair of Concrete Structures.

Existing and New Structural Systems

Existing structural systems shall be analyzed and retrofitted to insure new live loads provided in this section can be supported.

Seismic Evaluation Study and Progressive Collapse Vulnerability Assessment for Whole Barracks Renewal, Phase 4B Renovations of Quad "E" Schofield Barracks, Oahu, Hawaii

DRAFT

For

U.S. Corps of Engineers
Fort Shafter, Oahu, HI

REPORT

November 21, 2003

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INTRODUCTION

This independent study report addresses seismic, wind, and live load rehabilitation and progressive collapse issues for Quad "E" buildings at Schofield Barracks, Oahu, Hawaii for compliance with the Revised Statement of Work dated 14 February 2002, entitled *"FY04 MCA PN 52268 and BUP PN52269 Whole Barracks Renewal Brigade Complex Phase 4B Quad E Schofield Barracks, Oahu, Hawaii (Design Charette and Concept Design)"*.

Purpose of Study

The U.S. Army Corps of Engineers (COE) issued a Task Order Scope of Work (SOW) for renovations to Quad "E" at Schofield Barracks, HI. As stated in the SOW, SSFM International, Inc. was tasked to develop a preliminary design for the Quad "E" renovations, which incorporates requirements to meet seismic, wind, and gravity load criteria and progressive collapse considerations. Our report proposes a suggested retrofit strategy for each structure. This study is not intended to dictate final design; the Design Build contractor is responsible for the final design and retrofit to meet the RFP requirements. In accordance with terms stipulated in the agreement with U.S. Army Engineer District, Honolulu, dated 14 February, SSFM International, Inc. investigated the conditions of the existing buildings that compose Quad "E", performed structural analyses, and provided the following renovation/ retrofit recommendations.

SSFM accomplished the work in the following manner:

A. Limited as-built drawings provided by COE were reviewed. Where the drawings for the Quad "E" buildings did not provide sufficient information or details of the structural elements, additional information from as-built drawings of a similar artillery barracks project, built at the same time, were assumed to be applicable. The sizes and spans of the structural elements were nearly identical.

B. On-site inspections were conducted on May 21, 2003 and May 29, 2003 by SSFM to:

1. Verify that accessible portions of the building structural framing conform to available as-built drawings.
2. Perform general visual inspection of the existing buildings' conditions.
3. Identify structural deficiencies as they related to retrofitting the existing structures.

C. The individual Quad "E" buildings were analyzed for compliance with seismic and AT/FP criteria as stated in the SOW documents.

D. This written letter report summarizes the investigations, conclusions and recommendations prepared.

Seismic Evaluation and Rehabilitation Criteria

Seismic evaluations of the Quad "E" buildings were based on criteria detailed in TI 809-05, *"Seismic Evaluation and Rehabilitation for Existing Buildings"*. Minimum standards applicable for assessing and mitigating unacceptable seismic hazards were introduced and discussed. Structural, nonstructural, and geotechnical/site hazards were considered for seismic evaluation.

The minimum seismic performance level deemed appropriate for Quad "E" of potential significant seismic hazard was "Life Safety" (LS). Under LS performance levels, building structural systems may experience extensive damage following a design level earthquake. Essential functions will probably be materially disrupted and repairs will be required before re-occupancy of the building. Structural damage is anticipated to be medium and repair may be deemed economically impractical.

The Seismic Use Group was determined to be "Standard Occupancy Structures".

Rehabilitation of the Quad "E" building was based on criteria detailed in TI-809-05, and non-structural elements shall conform to applicable sections in TI-809-04, "Seismic Design for Buildings". Design base shears due to seismic forces were calculated to be greater than those for wind loads. Base shear due to seismic loads were found to be approximately 6,200 kips for Building 549 and 7,900 kips for Buildings 550, 551 and 552.

Wind Evaluation Criteria

Wind evaluation was based on analyses performed in accordance with ASCE 7-98, *"Minimum Design Loads for Buildings and Other Structures"*. The design wind speed for the subject buildings was determined to be 105 MPH, based on the 3-second gust definition. The wind hazard analyses were limited to those roof-framing elements subjected to uplift pressures.

Live Load Evaluation Criteria

The gravity load evaluation was based on the proposed occupancy use and the corresponding appropriate live loads. These live loads are based on ASCE 7-98, "Minimum Design Loads for Buildings and Other Structures".

BACKGROUND

Description of Buildings

Quad "E" consists of four structures: Buildings 549, 550, 551, and 552. The buildings were designed around 1917, and functioned as an administration office (Building 549) and bachelors enlisted quarters (Buildings 550, 551 & 552) for soldiers. The buildings are three-story structures constructed of exterior concrete bearing walls with interior concrete frames.

Building 549

Building 549 is a three-story structure rectangular in plan with approximate overall dimensions of 363 feet by 61 feet. Refer to Appendix P for photos. The typical building roof height is approximately 43 feet with typical floor-to-floor heights of 12 feet, 7 inches. On the courtyard side of the building, an exterior lanai on each of the upper floors serves as a common corridor for the building. Concrete stairs are located at the exterior lanais and serves as the only means to travel from floor-to-floor. A high ceiling auditorium-type space is located in the center of the building and extends from the third floor to the high roof, and is currently used as a gymnasium. The high roof is approximately 52 feet above the ground floor. The remodeled structure will be used primarily as an administrative type facility.

The structural system of Building 549 is comprised primarily of exterior concrete bearing walls with interior concrete moment frames. Concrete moment frames serve to support gravity loads only, while the bearing walls act as shear walls to resist lateral loads. Suspended floors at each level are 7" thick cast-in-place concrete slabs and act as diaphragms. **There is a 2" thick non-structural concrete topping on top of the suspended floors.** In 1967, the original wood roof was replaced with 3" metal decking and open web steel joists on steel trusses. The metal decking also acts as a diaphragm. These diaphragms distribute building inertial loads into the concrete shear walls throughout the structure. A concrete slab-on-grade forms the ground floor. Gravity loads are carried into the soil via isolated column spread footings and continuous wall footings.

Building 550, 551, & 552

Buildings 550, 551, and 552 are three-story structures rectangular in plan, each structure having two wings located on the courtyard sides of the quad. The footprint for the rectangular body of each building encompasses an approximate area of 363 feet by 72 feet and each wing of each building is approximately 36 feet by 33 feet. The typical building

height for Building 550 is approximately 41 feet. The typical floor-to-floor height of all three buildings is 12 feet, 7 inches. Like Building 549, on the courtyard side of the buildings, an exterior lanai on each of the upper floors serves as a common corridor for the building. Concrete stairs are located at these exterior lanais and serves as the only means to travel from floor-to-floor. On the roadside face of the building, there are also lanai-type corridors; however, stairways are not provided. The remodeled Building 550 will become an administrative and maintenance area with an arms vault. Buildings 551 and 552 will serve as living quarters for soldiers.

Structural systems of Buildings 550, 551 & 552 are similar to that of Building 549 (see description above for details). Around 1964, the original wood roof at Building 550 was replaced with metal decking and open web steel joists. It is not known when the original wood roofs of Buildings 551 & 552 were replaced, but is estimated to be around the same time as when the roof of Building 549 was replaced, since the roof framing systems are nearly identical.

Level of Protection

According to UFC4-010-01 criteria a 'Low Level of Protection' is to be met. This was confirmed by Security Officer Harold Evans at the Design Charette.

RESULTS OF EVALUATION

Tier 1 Seismic Evaluation

A Tier 1 evaluation is a checklist format review detailed in TI-809-05. TI-809-05 largely references Federal Emergency Management Agency (FEMA) 310, *"Handbook for the Seismic Evaluation of Buildings – A Prestandard"*. Tier 1 conclusions indicated that a Tier 2 investigation was necessary.

Checklist items listed in the Tier 1 evaluation were examined and accordingly evaluated both by visual inspection as well as by reviewing as-built drawings. A visual inspection of the Quad "E" buildings was conducted during on-site investigations.

Wind and Live Load Evaluation

The wind and gravity load evaluations are based on analyses performed in accordance with ASCE 7-98. The analyses identified structural elements that were overstressed when subjected to recommended wind or live loads.

Table 1: Evaluation and Recommendations

Table 1 illustrates a list of structural deficiencies and accompanying recommendations that resulted from the Tier 1 seismic, wind and live load evaluations.

Building 549

Evaluated under General Basic & Supplemental Structural Checklists, Geologic Site Hazards and Foundations Checklist, and Basic Nonstructural Component Checklist

	Item being Evaluated	Reason for Deficiency	Recommendation
	Structural		
SEISMIC	Soft Story	Stiffness at 3rd floor level less than 70% of stiffness at level below.	Assume roof level acts like a one-story penthouse and assume vertical load distribution acceptable
	Mass	Roof mass less than 50% of 3rd floor mass	Assume roof level acts like a one-story penthouse and assume vertical load distribution acceptable
	Reinforcing Steel	Horizontal reinforcing steel ratio in shear walls less than 0.0025.	Since stresses in shear walls from Tier 1 analysis are low and there is significant redundancy in the number of walls, assume low steel ratio is adequate.
	Transfer to shear walls	No positive connection from metal deck roof diaphragm to shear walls	Provide direct connection to transfer loads from metal deck diaphragm to concrete shear walls. Refer to Table 2: Retrofit List.
	Deflection compatibility	Girders for interior gravity frames do not have shear capacity to develop plastic moments at ends.	Reinforce ends of girders to increase shear capacity. Refer to Table 2: Retrofit List.
	Wall Proportions	Height-to-thickness ratio exceeded established allowable limit.	Demolish non-complying, non-load bearing CMU partition walls.
	Diaphragm Continuity	Diaphragm offset at concrete roof beam level	Provide direct load path from diaphragm at concrete beam level to shear walls. Refer to Table 2: Retrofit List.
WIND			
	Anchorage	Anchorage of steel columns to concrete framing insufficient	Provide additional anchorage to concrete. Refer to Table 2: Retrofit List.
LIVE	Girders	Inadequate shear strength of girders	Reinforce ends of girders to increase shear capacity. Refer to Table 2: Retrofit List.
	Slabs	Inadequate bending capacity of slabs based on assumed minimum reinforcing steel ratio. Insufficient information available in drawings.	Install FRP to underside of suspended slabs. Refer to Table 2: Retrofit List.

Table 1: Evaluation and Recommendations

Table 1 illustrates a list of structural deficiencies and accompanying recommendations that resulted from the Tier 1 seismic, wind and live load evaluations.

Building 549

Evaluated under General Basic & Supplemental Structural Checklists, Geologic Site Hazards and Foundations Checklist, and Basic Nonstructural Component Checklist

Item being Evaluated		Reason for Deficiency	Recommendation
Structural			
SEISMIC	Soft Story	Stiffness at 3rd floor level less than 70% of stiffness at level below.	Assume roof level acts like a one-story penthouse and assume vertical load distribution acceptable
	Mass	Roof mass less than 50% of 3rd floor mass	Assume roof level acts like a one-story penthouse and assume vertical load distribution acceptable
	Reinforcing Steel	Horizontal reinforcing steel ratio in shear walls less than 0.0025.	Since stresses in shear walls from Tier 1 analysis are low and there is significant redundancy in the number of walls, assume low steel ratio is adequate.
	Transfer to shear walls	No positive connection from metal deck roof diaphragm to shear walls	Provide direct connection to transfer loads from metal deck diaphragm to concrete shear walls. Refer to Table 2: Retrofit List.
	Wall Proportions	Height-to-thickness ratio exceeded established allowable limit.	Demolish non-complying, non-load bearing CMU partition walls.
	Diaphragm Continuity	Diaphragm offset at concrete roof beam level	Provide direct load path from diaphragm at concrete beam level to shear walls. Refer to Table 2: Retrofit List.
WIND			
	Anchorage	Anchorage of steel columns to concrete framing insufficient	Provide additional anchorage to concrete. Refer to Table 2: Retrofit List.
LIVE	Girders	Inadequate shear strength of girders	**Provide steel beams and girders.** Refer to Table 2: Retrofit List.
	Slabs	Inadequate bending capacity of slabs based on assumed minimum reinforcing steel ratio. Insufficient information available in drawings.	**Provide steel beams and girders.** Refer to Table 2: Retrofit List.

Non-Structural (Seismic Only)		
Suspended lath and plaster	Not attached for each 10 square feet of area	Remove suspended lath and plaster at roof level
Integrated suspended ceiling & lay-in tiles	Not braced against lateral load induced forces. Lay-in tiles not secured with clip at exitways and corridors.	Provide diagonal wire or rigid members to structure. Provide clips at exitways and corridors
Light fixtures in suspended ceiling and heavy equipment	Not braced against lateral load induced forces.	Provide proper anchorage and bracing.
Tall narrow contents or furniture;	Not anchored or braced against lateral load induced forces.	Provide proper anchorage.
Piping	Not braced against lateral load induced forces	Provide proper bracing according to NFPA-13 or flexible couplings to accommodate displacements

Building 550

Evaluated under General Basic & Supplemental Structural Checklists, Geologic Site Hazards and Foundations Checklist, and Basic Nonstructural Component Checklist

	Item being Evaluated	Reason for Deficiency	Recommendation
	Structural		
SEISMIC	Reinforcing Steel	Horizontal reinforcing steel ratio in shear walls less than 0.0025.	Since stresses in shear walls from Tier 1 analysis are low and there is significant redundancy in the number of walls, assume low steel ratio is adequate.
SEISMIC	Transfer to shear walls	No positive connection from metal deck roof diaphragm to shear walls	Provide direct connection to transfer loads from metal deck diaphragm to concrete shear walls. Refer to Table 2: Retrofit List.
SEISMIC	Wall Proportions	Height-to-thickness ratio exceeded established allowable limit.	Demolish non-complying, non-load bearing CMU partition walls
SEISMIC	Roof Panel Connections	Roof panels connected to steel framing at spacing greater than 12 inches	Neglect diaphragm capacity of metal decking
WIND	Bottom chord stability	Bottom chord of steel joists unbraced	Provide bracing of bottom chords of steel joists. Refer to Table 2: Retrofit List.
LIVE	Girders	Inadequate shear strength of girders	**Provide steel beams and girders.** Refer to Table 2: Retrofit List.

	Slabs	Inadequate bending capacity of slabs based on assumed minimum reinforcing steel ratio. Insufficient information available in drawings.	**Provide steel beams and girders.** Refer to Table 2: Retrofit List.
Non-Structural (Seismic Only)			
Suspended lath and plaster		Not attached for each 10 square feet of area	Remove suspended lath and plaster at roof level
Integrated suspended ceiling & lay-in tiles		Not braced against lateral load induced forces. Lay-in tiles not secured with clip at exitways and corridors.	Provide diagonal wire or rigid members to structure. Provide clips at exitways and corridors
Light fixtures in suspended ceiling and heavy equipment		Not braced against lateral load induced forces.	Provide proper anchorage and bracing.
Tall narrow contents or furniture		Not anchored or braced against lateral load induced forces.	Provide proper anchorage.
Piping		Not braced against lateral load induced forces	Provide proper bracing according to NFPA-13 or flexible couplings to accommodate displacements

Buildings 551/552

Evaluated under General Basic & Supplemental Structural Checklists, Geologic Site Hazards and Foundations Checklist, and Basic Nonstructural Component Checklist

Item being Evaluated		Reason for Deficiency	Recommendation
Structural			
SEISMIC	Soft Story	Stiffness at 3rd floor level less than 70% of stiffness at level below.	Assume roof level acts like a one-story penthouse and assume vertical load distribution acceptable
	Mass	Roof mass less than 50% of 3rd floor mass	Assume roof level acts like a one-story penthouse and assume vertical load distribution acceptable
	Reinforcing Steel	Horizontal reinforcing steel ratio in shear walls less than 0.0025.	Since stresses in shear walls from Tier 1 analysis are low and there is significant redundancy in the number of walls, assume low steel ratio is adequate.
	Transfer to shear walls	No positive connection from metal deck roof diaphragm to shear walls	Provide direct connection to transfer loads from metal deck diaphragm to concrete shear walls. Refer to Table 2: Retrofit List.
	Wall Proportions	Height-to-thickness ratio exceeded established allowable limit.	Demolish non-complying, non-load bearing CMU partition walls

WIND	Bottom chord stability	Bottom chord of steel joists unbraced	Provide bracing of bottom chords of steel joists. Refer to Table 2: Retrofit List.
	Anchorage	Anchorage of steel columns to concrete framing insufficient	Provide additional anchorage to concrete. Refer to Table 2: Retrofit List.
LIVE	Girders	Inadequate shear strength of girders	**Provide steel beams and girders.** Refer to Table 2: Retrofit List.
	Slabs	Inadequate bending capacity of slabs based on assumed minimum reinforcing steel ratio. Insufficient information available in drawings.	**Provide steel beams and girders.** Refer to Table 2: Retrofit List.
Non-Structural (Seismic Only)			
Suspended lath and plaster		Not attached for each 10 square feet of area	Remove suspended lath and plaster at roof level
Integrated suspended ceiling & lay-in tiles		Not braced against lateral load induced forces. Lay-in tiles not secured with clip at exitways and corridors.	Provide diagonal wire or rigid members to structure. Provide clips at exitways and corridors
Light fixtures in suspended ceiling and heavy equipment		Not braced against lateral load induced forces.	Provide proper anchorage and bracing.
Tall narrow contents or furniture;		Not anchored or braced against lateral load induced forces.	Provide proper anchorage.
Piping		Not braced against lateral load induced forces	Provide proper bracing according to NFPA-13 or flexible couplings to accommodate displacements

Tier 2 Evaluation

A tier 2 evaluation was performed for items "non-compliant" in the Tier 1 checklists. Tier 2 evaluation is also based on criteria detailed in TI-809-05, but is different from Tier 1 since it requires use of an analytical procedure in lieu of a structural checklist. The analysis technique chosen was the Linear Static Procedure (LSP) as described in TI-809-05, Section 5.2 and quantified in FEMA 310, Sections 4.2.2 and 4.2.3. Seismic shear forces were calculated in accordance with FEMA 310, Section 3.5.2. Results from the analysis indicated that portions of the existing structural system did not meet minimum Tier 2 standards.

REPAIR RECOMMENDATIONS

Portions of Quad "E" existing structures did not meet minimum structural acceptance criteria. Repairs proposed in this report incorporate improvements to enhance seismic and wind performance and to support proposed live loads, yet comply with the standards necessary for historical preservation. Table 2 lists each repair item required by a Tier 2 analysis performed for each of the buildings. The issues included in Table 1 that are not contained in Table 2 shall also be addressed. Plans for the repairs are illustrated on figures

in Appendix F. As stated in the RFP, in order to allow for design innovation and economy, this document should be used for guidance only. A final design may vary substantially with the layout illustrated; however, the issues addressed in this report should be accounted for through rational analysis developed by an appropriately licensed engineer.

Table 2: Retrofit List

Building 549

Retrofit repairs listed are in conjunction with layouts illustrated on drawings in Appendix F FIGURES. Tier 2 acceptance criteria addresses seismic capacity; all criteria are noted in the "Issues" column below.

Location	Floors	Element	Retrofit	Issues
Throughout	2nd & 3rd	Girder	**Install steel beams and girders**	Primary: Live load; Secondary: Seismic
Throughout	2nd & 3rd	Slab	**Install steel beams and girders**	Live load, AT/FP
Line E	2nd & 3rd	Slab	Install concrete beam	AT/FP
Exterior Walls, including Line D	1st, 2nd and 3rd	Walls	Install shotcrete to interior surfaces of exterior walls	AT/FP
Lines 1 thru 7 & 13.6 thru 20 (between A & D)	Roof	Diaphragm	Horizontal x-bracing at concrete roof beams	Seismic
Lines 7 & 7.4 (between B & C)	Roof	Diaphragm	5" concrete slab infill	Seismic
Lines D & E (between 7.4 & 13.6)	Roof	Diaphragm	Horizontal x-bracing at metal deck level	Seismic
Lines A & D (between 7.4 & 13.6)	Gym roof	Diaphragm	Horizontal x-bracing at top chord of trusses	Seismic
Lines 7.4, 13.6, A & D	Gym roof	Metal deck	Channel ledger from metal deck to shear wall	Seismic
Lines E, A, 1 & 20	Roof	Metal deck	Channel ledger from metal deck to shear wall	Seismic
Lines 7.4 & 13.6	Roof	Angle Ledger	Drill additional bolts thru ledger angle to concrete shear wall	Seismic
Lines 7.4 & 13.6 (between lines D & E)	Roof	Strut	Install drag strut to concrete shear wall	Seismic
Lines C & B	Roof	Anchor bolts	Install additional anchor bolts from steel column to concrete column	Wind

Building 550

Retrofit repairs listed are in conjunction with layouts illustrated on drawings in Appendix F FIGURES. Tier 2 acceptance criteria addresses seismic capacity; all criteria are noted in the "Issues" column below.

Location	Floors	Element	Retrofit	Issues
Throughout	2nd & 3rd	Girder	**Install steel beams and girders**	Primary: Live load; Secondary: Seismic
Throughout	2nd & 3rd	Slab	**Install steel beams and girders**	Live load, Progressive Collapse
Line F	2nd & 3rd	Slab	Install concrete beam	Progressive Collapse
Exterior Walls including Line E	1st, 2nd and 3rd	Walls	Install shotcrete to interior surfaces of exterior walls	Progressive Collapse
Throughout	Roof	Diaphragm	Horizontal x-bracing at concrete roof beams	Seismic
Exterior walls at Latrines	Roof	Metal deck	Channel ledger from metal deck to shear wall	Seismic
Lines B, C, D & E	Roof	Diaphragm	Drill & Bond steel beams to concrete beams & infill gap between beams	Seismic
Throughout	Roof	Open web steel joists	Install struts at third points to brace bottom chord	Wind

Buildings 551, 552

Retrofit repairs listed are in conjunction with layouts illustrated on drawings in Appendix FIGURES (F). Tier 2 acceptance criteria addresses seismic capacity; all criteria are noted in the "Issues" column below.

Location	Floors	Element	Retrofit	Issues
Throughout	2nd & 3rd	Girder	**Install steel beams and girders**	Primary: Live load; Secondary: Seismic
Throughout	2nd & 3rd	Slab	**Install steel beams and girders**	Live load, Progressive Collapse
Line F	2nd & 3rd	Slab	Install concrete beam	Progressive Collapse
Exterior Walls including Line E	1st, 2nd and 3rd	Walls	Install shotcrete to interior surfaces of exterior walls	Progressive Collapse
Typical between lines B & E	Roof	Diaphragm	Horizontal x-bracing at concrete roof beams	Seismic
Lines F, A, 1, 6, 11, 16, 21 & Exterior walls at Latrines	Roof	Metal deck	Channel ledger from metal deck to shear wall	Seismic

Between lines 5 & 7, 15 & 17	Roof	Open web steel joists	Install struts at third points to brace bottom chord	Wind
Lines C & D	Roof	Anchor bolts	Install additional anchor bolts from steel column to concrete column	Wind

PROGRESSIVE COLLAPSE VULNERABILITY ASSESSMENT

Per the *Department of Defense Minimum Anti-Terrorism/Force Protection Construction Standards, Guidance on Structural Requirements*, dated **5th March, 2001** and *ASCE 7-98 Minimum Design Loads for Buildings and Other Structures*, typical scenarios were reviewed which involved removal of primary load-carrying elements on the building perimeter. The perimeter of the structure is defined as the exterior bearing wall of the building.

Structural members considered include existing concrete walls, and the exterior columns and beams at the exterior corridor. Typical members were selected for both the first floor and the upper floors.

Following the procedures in the Progressive Collapse Design guidelines, the following scenarios were reviewed:

- Concrete shear walls: analyzed based on the removal of a section of the shear wall with a length equal to two times the height of the wall; and removal of a section of the shear wall with a length equal to the height of the wall at building corners;
- Beams: analyzed to determine the adequacy of the beams with the loss of one supporting column below; and
- Columns: analyzed for their ability to withstand loss of lateral support at one floor level.

Also, all floor capacities were analyzed to ensure they could withstand load reversals due to explosive effects by applying a net uplift equal to the dead load plus one-half the live load.

Shear Walls

Typical existing shear walls were reviewed for the buildings. Per the *Department of Defense Minimum Anti-Terrorism/Force Protection Construction Standards, Guidance on*

Structural Requirements, dated 5th March, 2002, a width equal to two times the height was removed, and a width equal to the height of the wall at corner of buildings was removed.

The wall above the removal location was analyzed to determine whether it would support self- weight as well as the weights of the slabs previously supported by the wall that was removed and the wall and slab systems above, as appropriate. The existing walls were found to have inadequate shear capacity and new 150mm shotcrete walls are proposed to be installed on the interior surfaces of the existing exterior walls.

Beams

A typical existing beam at the exterior corridor frame was analyzed to determine its ability to withstand the loss of a supporting column. The beam was determined to have insufficient bending capacity due to the lack of continuous bottom reinforcing at the location of the removed column. **The beam reinforcing is based on available reference drawings.**

Columns

Columns were analyzed at the exterior corridors of Buildings 549, 550, 551, and 552. The unsupported height of these columns was doubled, assuming one floor slab was disconnected from the column. **These columns were determined to have sufficient capacity to support all tributary dead and live loads with the increase in column unsupported length.**

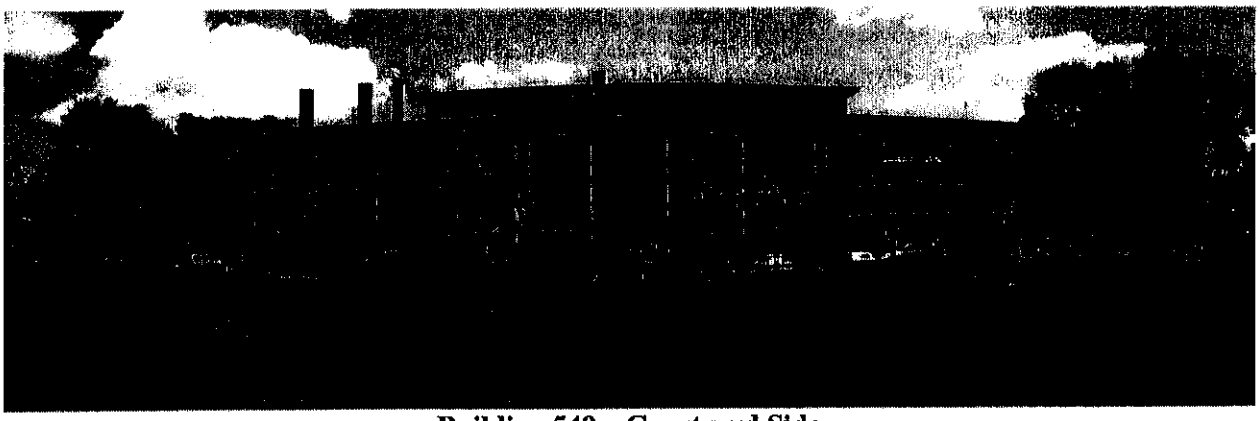
Load Reversal

Suspended concrete slabs were analyzed for load reversals effects due to explosive effects. A net uplift equal load equal to the dead load plus one-half the live load was used as the design load. Based on reinforcing steel shown on reference drawings, the slabs and beams were found to have inadequate flexural capacity for the imposed uplift load. **The installation of steel beams and girders is recommended to reduce the flexural demands on existing slabs and beams.**

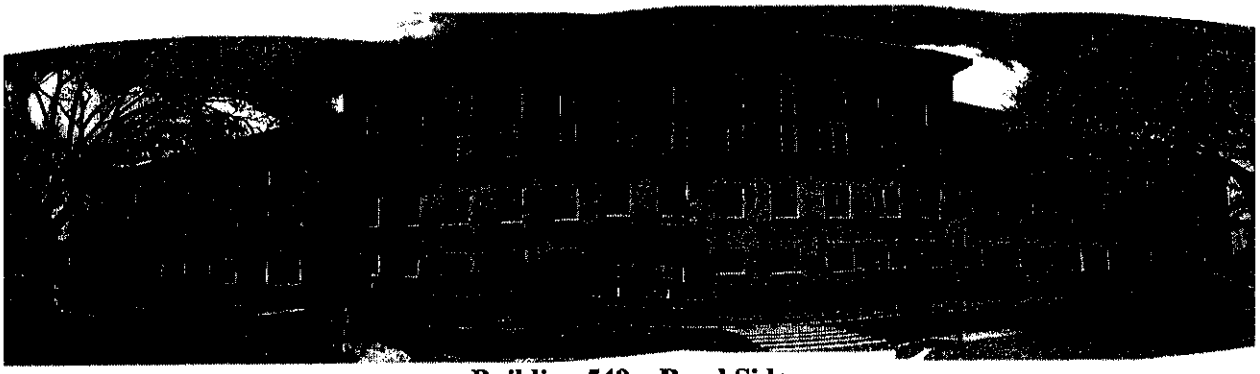
DISCLAIMER AND QUALIFICATIONS

The opinions and recommendations contained in this report are based on the visual observations and as-built construction documents as performed under the scope of this project. This report does not address any other portions of the structure or property other than those areas mentioned, nor does it accord warranty, either expressed or implied, for any portion of the existing structures.

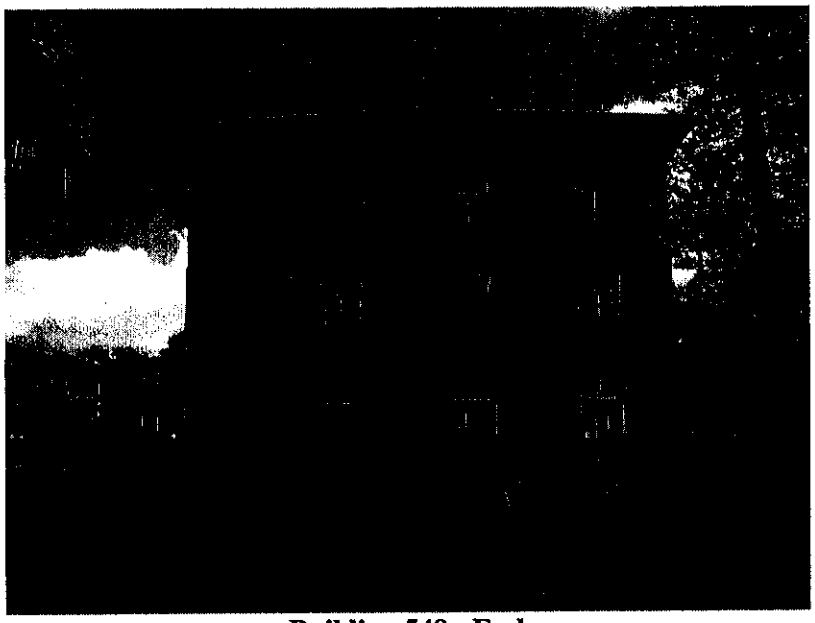
APPENDIX P
PHOTOGRAPHS



Building 549 – Courtyard Side

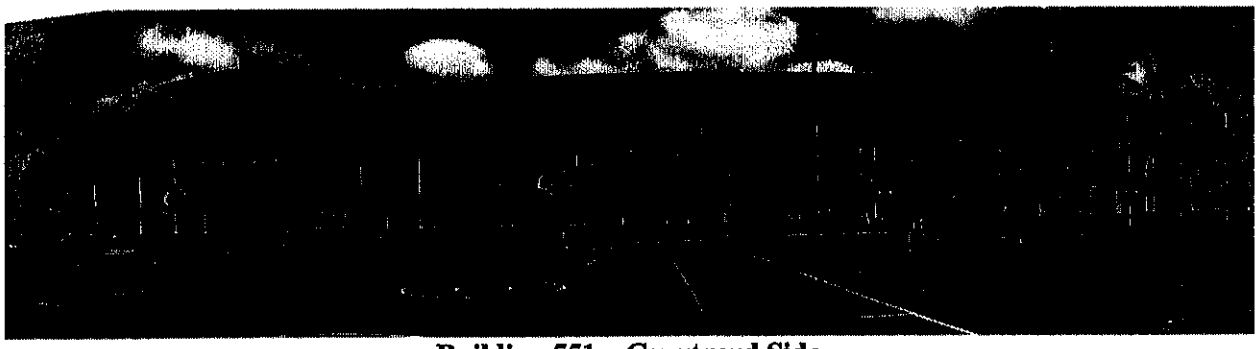


Building 549 – Road Side

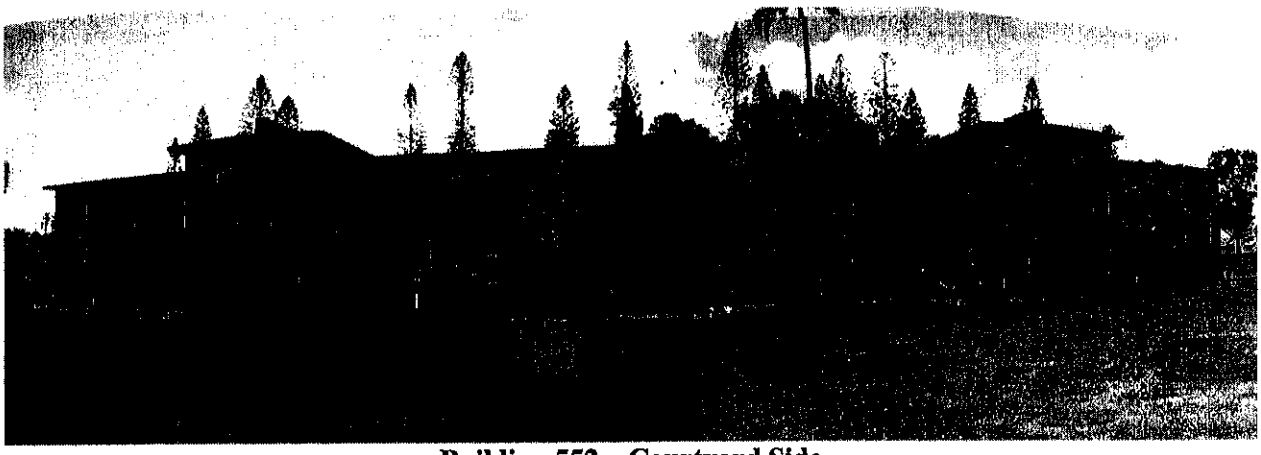


Building 549 - End

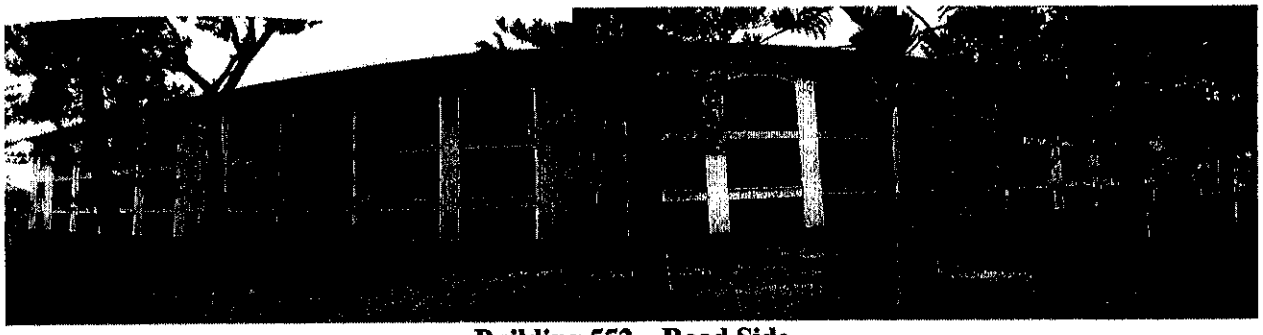
Building 550- Courtyard Side



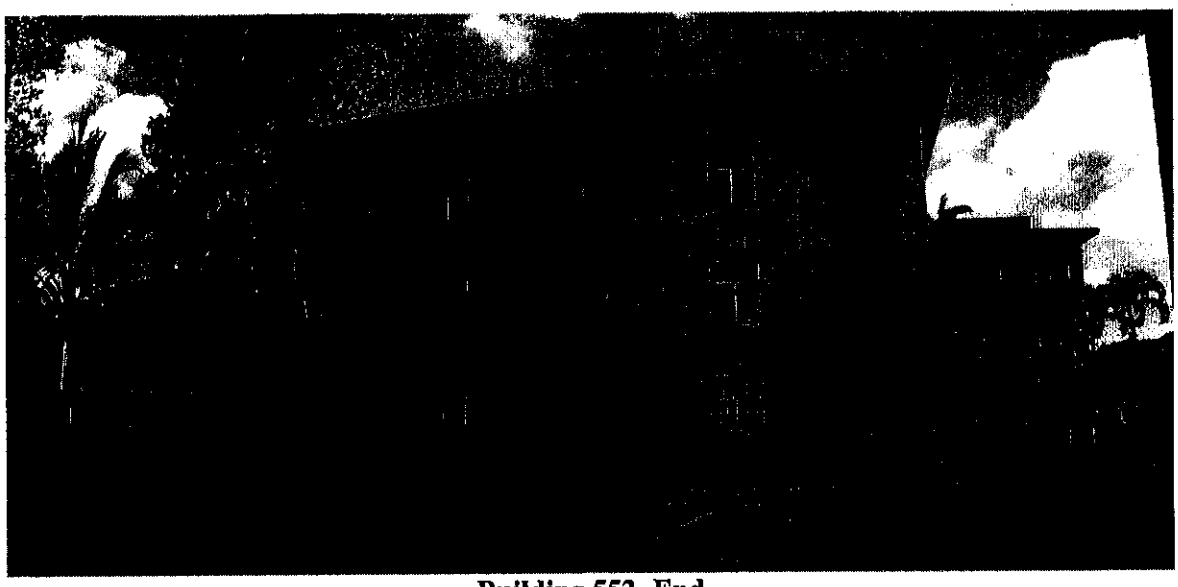
Building 551 – Courtyard Side



Building 552 – Courtyard Side



Building 552 – Road Side



Building 552- End

APPENDIX F
FIGURES

(Am-0005) See RFP Design Concept Drawings

APPENDIX C
STRUCTURAL CALCULATION

SSFM INTERNATIONAL, INC.
501 Sumner Street, Suite 502
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Project Managers, Planners, & Engineers
American Consulting Engineers Council, Member

STRUCTURAL CALCULATIONS

PROJECT: Whole Barracks Renewal, Phase 4B
Renovations of Quad "E"
Schofield Barracks, Oahu, Hawaii

SSFM 2002_032.002

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August 4, 2003

REVISIONS:

This work was prepared by me
or under my supervision.
Expiration of this license:
4/30/04

DESIGN CRITERIA

PROJECT: Quad 'E', Whole Barracks Renewal, Ph 4B Schofield Barracks Wahiawa, Hawaii	**DATE:** 5/7/03
CONTRACT NO.	**JOB NO.**

GENERAL

A. STRUCTURE DESCRIPTION: 363'-4"x 60'-10" three-story exterior concrete bearing wall & interior concrete frame with steel-framed truss joist roof (Bldg 549)
363'-4"x 71'-8" three-story exterior concrete bearing wall & interior concrete frame with steel-framed truss joist roof (Bldgs 550, 551 & 552)

B. OCCUPANCY CATEGORY: n/a

MATERIALS (EXISTING-circa 1917)

A. CONCRETE:
f'c @ 28 days= 1500 psi (footings & walls)
f'c @ 28 days= 2000 psi (all others)
Notes:

B. REINFORCING STEEL:
ASTM A15 **, GRADE** Intermediate (f_y=40 ksi)
Notes: _____

C. STRUCTURAL STEEL:
W shapes, Channels, Angles **ASTM** A9 (F_{te}=60 ksi, F_{ye}=33 ksi)
Notes:

D. CMU:
f_{me}= 900 psi (good condition) v_{me}= 27 psi (running bond/good condition)
Notes:

MATERIALS (NEW)

A. CONCRETE:
F'c @ 28 days= 3000 psi (cast-in-place)
F'c @ 28 days= 4000 psi (shotcrete)
Notes:

B. REINFORCING STEEL:
ASTM 615 **, GRADE** 60 (typical)
ASTM A185 (Welded Wire Fabric)
Notes: _____

C. STRUCTURAL STEEL:
W shapes, Channels, Angles **ASTM** A36

Bolts, Threaded Rods	**ASTM** A307	
Pipes	**ASTM** A53, gr B	
HSS	**ASTM** A500, gr. B	
Welding electrodes	E70XX	
Notes:		

D. CMU: **f'm=** 1500 psi **f'c=** 2500 psi (grout)
Special Inspection? y / n
Notes:

LIVE LOAD

A. UNIFORM: 20 psf (roof) 50 psf (typ admin. floor) 100 psf (exit corridors/balconies)
40 psf (typ barracks floor)

B. SPECIAL: 1. 100 psf gymnasium/auditorium
2.

C. NOTES:

WIND LOAD (ASCE 7-98)

BLDG 549
A. STRUCTURE IS: **enclosed** / unenclosed / open
B. WIND VELOCITY= 105 mph (3-second gust)
C. EXPOSURE: A / B / C / D
D. WIND IMPORTANCE FACTOR Iw= 1.00 (see occupancy category)
E. MAX ROOF HEIGHT= 52.16± ft **TYP ROOF HEIGHT=** 42.29± ft
F. NOTES:

BLDGs 550, 551 & 552
A. STRUCTURE IS: **enclosed** / unenclosed / open
B. WIND VELOCITY= 105 mph (3-second gust)
C. EXPOSURE: A / B / C / D
D. WIND IMPORTANCE FACTOR Iw= 1.00 (see occupancy category)
E. AVE ROOF HEIGHT= 41.50± ft
F. NOTES: at Bldg 550, typical roof is lowered to 38'±

SEISMIC LOAD (TI 809-05)

A. SPECTRAL ACCELERATION: **Ss=** 0.60 g **S1=** 0.17 g **(MCE- 2% POE in 50 yrs)**
B. SEISMIC USE GROUP: I (standard occupancy)
C. SOIL PROFILE TYPE: S_A / S_B / S_C / S_D / S_E / S_F
D. PERFORMANCE OBJECTIVE: life safety
E. SEISMIC DESIGN CATEGORY: A / B / C / D / E / F
F. NOTES:

MISCELLANEOUS LOAD

A. TEMPERATURE:

B. NOTES:

SOIL/FOUNDATION

A. Geotechnical Report: Geotechnical Investigation Report for Proposed Cooling Tower Pad; FY03 Whole Barracks Renewal Project; Phase 4B, Quad E, Schofield Barracks, Oahu prepared by Geolabs

B. Date of Geotech Report: April 9, 2003

C. NOTES: Soil Class=MH (very stiff to hard), ASBP=3500psf

SPECIAL PROJECT NOTES/LIMITATIONS

REFERENCES

1. TI 809-05 ..... Seismic Evaluation and Rehabilitation for Buildings
2. TI 809-04 ..... Seismic Design for Buildings
3. UFC 1-200-01 ..... Design: General Building Requirements
4. UFC 4-010-01 ..... DoD Minimum Antiterrorism Standards for Buildings
5. 97 UBC ..... Uniform Building Code
6. ACI 318/95 ..... Building Code Requirements for Structural Concrete
7. AISC, 9th Edition ..... Manual of Steel Construction
8. ASCE 7-98 ..... Minimum Design Loads for Buildings and Other Structures

QUAD 'E' RENOVATIONS: SUMMARY D/C RATIOS

GRAVITY ANALYSIS						
ELEMENT	LOCATION	ACTION	DEM. (D)	CAP. (C)	UNITS	D/C
SLAB[1,2]	TYP ADMIN (2ND & 3RD FLR)	FLEXURE	6.5	3.86	k*ft	1.42
	3RD FLR GYM	FLEXURE	6.88	3.86	k*ft	1.78
	TYP CORRIDOR (2ND & 3RD FLR)	FLEXURE	1.98	0.62	k*ft	3.19
	TYP BARRACKS (2ND & 3RD FLR)	FLEXURE	5.11	3.86	k*ft	1.32
GIRDER	2ND FLR ADMIN	FLEXURE	138	233	k*ft	0.58
		SHEAR	35.8	29.3	k	1.22
	3RD FLR ADMIN	FLEXURE	138	218	k*ft	0.62
		SHEAR	35.8	22.5	k	1.59
	3RD FLR GYM	FLEXURE	185	218	k*ft	0.78
		SHEAR	42.9	22.5	k	1.91
	2ND FLR BARRACKS	SHEAR	33.5	29.3	k	1.14
COLUMNS[1]	1ST FLR ADMIN	AXIAL	152	272	k	0.56
	2ND FLR ADMIN	AXIAL	87	185	k	0.47
FOOTINGS[1]	TYP INTERIOR COL ADMIN	FLEXURE	55.6	240	k*ft	0.23
		1 WAY SHEAR	8.1	64.4	k	0.13
		PUNCH SHEAR	92.1	451	k	0.20
	TYP EXTERIOR COLUMN[2,8]	FLEXURE	1.74	9.61	k*ft	0.18
		1 WAY SHEAR	0	16.2	k	0.00
		PUNCH SHEAR	41.8	102	k	0.41
	TYP INTERIOR COL BARRACKS	FLEXURE	53.5	240	k*ft	0.22
		1 WAY SHEAR	7.8	64.4	k	0.12
		PUNCH SHEAR	88.6	451	k	0.20
SOILS[3]	TYP INTERIOR COL ADMIN	BEARING PRESS.	4.61	3.5	ksf	1.37
	TYP EXT. LONG. WALL ADMIN[6]	BEARING PRESS.	3.86	3.5	ksf	1.13
	TYP EXT. LONG. WALL ADMIN[7]	BEARING PRESS.	3.5	3.5	ksf	1.00
	TYP EXT. END WALL ADMIN	BEARING PRESS.	2.49	3.5	ksf	0.71
	TYP EXT. LONG. WALL GYM	BEARING PRESS.	2.3	3.5	ksf	0.66
	TYP EXTERIOR COL[8]	BEARING PRESS.	4.42	3.5	ksf	1.26
	TYP INTERIOR COL ADMIN	BEARING PRESS.	4.71	3.5	ksf	1.35
	TYP EXT. LONG. WALL BARRACKS[6]	BEARING PRESS.	3.92	3.5	ksf	1.12
	TYP EXT. LONG. WALL BARRACKS[7]	BEARING PRESS.	3.46	3.5	ksf	0.99

WIND ANALYSIS (UPLIFT)						
ELEMENT	LOCATION	ACTION	DEM. (D)	CAP. (C)	UNITS	D/C
METAL DECK[9]	GYM ROOF	FLEXURE	83.4	105	ksf	0.79
	TYP ROOF (BLDGS 549, 551, 552)	FLEXURE	83.4	105	ksf	0.79
METAL DECK CONN.[9]	TYP ROOF (BLDGS 549, 551, 552)	TENSION	0.46	0.88	k	0.52
	TYP ROOF (BLDG 550)	TENSION	0.23	0.74	k	0.31
OPEN-WEB JOISTS[8]	GYM ROOF	FLEXURE	9.4	15	ksi	0.63
	TYP ROOF (BLDGS 549, 551, 552)- 18"	FLEXURE	11.9	11.4	ksi	1.04
	TYP ROOF (BLDGS 549, 551, 552)- 14"	FLEXURE	13.5	15.2	ksi	0.89
	TYP ROOF (BLDG 550)	FLEXURE	3.59	0.2	ksi	17.95
ANCHOR BOLTS[4]	TYP ROOF (BLDGS 549, 551, 552)	TENSION	8.26	4.3	k	1.92

SEISMIC ANALYSIS- TRANSVERSE (TIER 1)						
ELEMENT	LOCATION	ACTION	DEM. (D)	CAP. (C)	UNITS	D/C
METAL DECK DIAPHRAGM	GYM ROOF	SHEAR	3.41	2.29	klf	1.49
	TYP ROOF[5]	SHEAR	2.29	2.29	klf	1.00
SHEAR WALLS	3rd FLOOR (BLDG 549)	SHEAR	0.043	0.077	ksi	0.56
	2nd FLOOR (BLDG 549)	SHEAR	0.063	0.077	ksi	0.82
	1st FLOOR (BLDG 549)	SHEAR	0.055	0.077	ksi	0.71
	3rd FLOOR (BLDGS 550, 551, 552)	SHEAR	0.027	0.077	ksi	0.35
	2nd FLOOR (BLDGS 550, 551, 552)	SHEAR	0.049	0.077	ksi	0.64
	1st FLOOR (BLDGS 550, 551, 552)	SHEAR	0.063	0.077	ksi	0.82

SEISMIC ANALYSIS- LONGITUDINAL (TIER 1)						
ELEMENT	LOCATION	ACTION	DEMAND (D	CAPACITY (C	UNITS	D/C
METAL DECK DIAPHRAGM	GYM ROOF	SHEAR	3.41	2.29	klf	1.49
	TYP ROOF[5]	SHEAR	2.29	2.29	klf	1.00
SHEAR WALLS	3rd FLOOR (BLDG 549)	SHEAR	0.043	0.077	ksi	0.56
	2nd FLOOR (BLDG 549)	SHEAR	0.063	0.077	ksi	0.82
	1st FLOOR (BLDG 549)	SHEAR	0.055	0.077	ksi	0.71
	3rd FLOOR (BLDGS 550, 551, 552)	SHEAR	0.027	0.077	ksi	0.35
	2nd FLOOR (BLDGS 550, 551, 552)	SHEAR	0.049	0.077	ksi	0.64
	1st FLOOR (BLDGS 550, 551, 552)	SHEAR	0.063	0.077	ksi	0.82

Notes:

1

2 Where no original details are available, reinforcing based on similar project "1477- ARTILLERY BARRACKS, SCHOFIELD BARRACKS" dated November 1917. Sizes of members similar to Quad 'E' buildings.

3 Where insufficient details are available from "1477-ARTILLERY BARRACKS, SCHOFIELD BARRACKS", reinforcing based on minimum temperature/shrinkage steel ratio (approx. 0.0018) from 1920s. Material testing recommended to verify actual reinforcing

4 Capacity based on letter-report dated April 9, 2003 by Fujiwara Higa & Associates, Inc.

5 Steel column to concrete column connection

6 Assumes diaphragm at concrete roof beam level effective

7 Where corridor occurs. Footing size for exterior columns scaled from drawings.

8 Where no corridor occurs

9 Based on compression capacity of bottom chord

At corner condition.

6/10/03

Quad_E_DemCapsummary.xls

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SHEET 2 OF _____

BASE SHEAR COEFFICIENT

$V = C_s W = 1.1(0.60)W = 0.66W$

$S_a = \frac{S_{D1}}{T} \le S_{DS}$ $\quad \frac{0.39}{1.39} = 1.0 > 0.60 \Rightarrow$ use 0.60g

$S_{D1} = \frac{2}{3} F_v S_1 = \frac{2}{3}(2.4)(0.17g) = 0.39 > 0.2g$ ⇒ High seismicity

$S_{DS} = \frac{2}{3} F_a S_1 = \frac{2}{3}(1.5)(0.60g) = 0.60 > 0.5g$

$T = C_t h_n^{3/4} = 0.02(52.16')^{3/4} = 0.39\ s$

$C = 1.1$

BLDG 549: $h_n = 12.58' + 12.58' + 21.00' + 6.0' = 52.16'$ TO GYM ROOF

$12.58' + 12.58' + 16.50' + \frac{1.25'}{2} = 42.29'$ TO TOP ROOF

$12.58' + 12.58 + 12.00' = 37.16'$ TO LOW ROOF TRUSS

BLDGS 550, 551 & 552: $h_n = 12.58' + 12.58' + 12.00' + 4.33' + \frac{1.25'}{2} \approx 42.12'$

SAY 42.29'

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SHEET 3 OF

DEAD LOADS (BLDG 549)

TYP ROOF:

B.U. ROOFING W/INSUL		5 PSF
3" METAL DECK		3 PSF
STEEL JOISTS	10PLF/10' OC	1 PSF
STEEL BMS	25 PLF×2/6' =	1 PSF
PARTITIONS		5 PSF
MECH DUCTS	=	2 PSF
		~~12~~ 18 PSF @ 42.29'

CONC TRELLIS BMS
ASSUME 10" × 10" BMS
$(0.83')^2 \times 150\ pcf \times (20' + 16.58') / (20' \times 16.58') = 11.4$ PSF

CEILING (ACOUSTICAL)	2.0 PSF
INSULATION (BATT)	1.0 PSF
MISC	3 ~~7.5~~ PSF
	11.4 ~~12~~ PSF @ 37.16'

GYM ROOF:

3" METAL DECK		3 PSF
TRUSS JOISTS		
(6.5 PLF + 9.5 PLF + 8.2 PLF × 1.41)/10	=	2.8 PSF
CROSS BRACING		1 PSF
MISC.		2.2 PSF
		9 PSF ~~@ 52.16'~~
BUILT-UP ROOFING		2.5 PSF
RIGID INSUL		2.5 PSF
		14 PSF @ 52.16'

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DEAD LOADS (BLDG 549)

TYP. FLOOR: (INTERIOR SPACE)

7" SLAB	88 PSF
14"x14" GIRDER $\frac{(1.17')^2 \times 150\,PCF \times 2}{50'}$ =	8 PSF
PARTITIONS	10 PSF
FLOORING	2 PSF
INSULATION (BATT)	1.0 PSF
CEILING (ACOUSTICAL)	2.0 PSF
MECH. DUCTS	2.0 PSF
COLUMNS (14"x14") $\frac{(1.17')^2 \times 150 \times 12' \times 2}{50' \times 20'}$ =	5 PSF
MISC.	5 PSF
	123 PSF

TYP. FLOOR: (EXTERIOR CORRIDOR)

4" SLAB	50 PSF
2.25' x 0.5' EXT. GIRD. $\frac{2.25' \times 0.5' \times 150\,PSF}{10.83'}$	15.6 PSF
0.83' x 4' COLS $\frac{0.83' \times 4' \times 150\,PSF \times 12'}{10.83' \times 20'}$ =	27.6 PSF
MISC	3.8 PSF
	97 PSF

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WIND LOADS (BLDG 54A)

EXTERIOR LONG WALLS TRIB TO TYP FLOOR : 0.83' x 12' x 150 PCF x 20' = 29.9 k/20' = 1.50 klf

~~0.83' - 4'-5 x 6.5' x 150 PCF x 2~~ <6.5> k/20' OPENINGS

23.4 k/20' = 1.17 klf [10"]

~~1.21 klf - 0.33 klf = 0.88 klf~~ [8"]

EXTERIOR END WALLS TRIB TO TYP FLOOR 1.50 klf (ASSUME SOLID) [10"]

1.21 klf [8"]

INTERIOR SHEAR WALLS :

LINES 1, 4 : 1.17' x 12' x 150 PCF = 2.11 klf [14"]

13, 16 1.0' x 12' x 150 PCF = 1.80 klf [12"]

LINES 10 & 11 0.67' x 12' x 150 PCF = 1.20 klf [8"]

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SHEET 6 OF _____

MASS CALCULATION (BLDG 544)

AT ELEV = 52.16' [GYM ROOF]

GYM ROOF 56' × 128' × 14 PSF = 100.4 K

6" CONC WALLS 52.16' − 42.29' = $\frac{9.87'}{2}$ = 4.94' ≈ SAY 5'

5' × 0.5' × 0.150 PCF = 0.38 KLF

0.38 KLF × 2 [122' + 50'] 30.7 K

231 K

AT ELEV = 42.29' [TYP ROOF]

TYP ROOF 23 PSF × [123.67' × 66.83'] = 190.1 K

190.1 K

23 PSF × [122' × 13.83'] = 38.8 K

419 K

WALLS AT GYM 1' × 0.5' × 0.150 PCF = 0.08 KLF

0.83' × 4' × 0.150 PCF = 0.50 KLF OR 0.25 KLF where windows occur

(42.29' − 37.16') = $\frac{5.13'}{2}$ = 2.57'

2.57' × 0.83' × 150 pcf = 0.32 KLF

0.90 KLF OR 0.65 KLF

0.90 KLF × [122' + 50'] = 154.8 K

0.65 KLF × 122' = 79.3 K

234.1 K

EXTERIOR WALLS $\frac{433'}{2}$ = 0.17' × 0.5' × 150 PCF = 0.16 KLF

0.16 KLF × [363.53' + 2 [60.83' + 120.67']] = 116.2 K

769 K

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MASS CALCULATION (BLDG 549)

AT ELEV = 37.16' [ROOF TRELLIS LEVEL]

TRELLIS BMS 11.4 PSF × [60.83' × 120.67'] × 2 = 167.4 K

EXTERIOR WALLS 0.16 KLF × 2 [363.33' + 60.83'] = 135.7 K
$\frac{1.17 \text{ KLF}}{2}$ × 2 [363.33' + 60.83'] = 496.3 K } 632.0 K

LANAI COLUMNS 0.83' × 4' × 6' × 150 PCF × 24 COLS = 71.7 K

871 K

AT ELEV = 25.16' [3RD FLOOR]

INTERIOR FLOOR 123 PSF × 18,600 # = 2288 K
A = 50' × 363.33' + 2 [20' × 10.83'] = 18,600 #

LANAI FLOOR 97 PSF × 3502 # = 340 K
A = 10.83' × 323.33' = 3502 #

EXTERIOR WALLS
1.17 KLF × [363.33'] = 426 K
0.88 KLF × 363.33' = 320 K
1.21 KLF × 60.83' × 2 = 147 K

INTERIOR WALLS
7.4 $\frac{1.50 \text{ KLF} + 1.80 \text{ KLF}}{2}$ × 50' = 83 K
13.6 1.50 KLF × 50' = 75 K
10 8 11 ½ × 1.20 KLF × 50' × 2 = 60 K

3738 K

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MASS CALCULATION (BLDG 549)

FT ELEV = 12.58 [2ND FLR]

INTERIOR FLOOR 2288 K

LANAI FLOOR 140 K

EXTERIOR WALLS 425 K

$$\frac{(1.17\,kif + 0.88\,kif)}{2} \times [363.33' + (60.83' \times 2)]$$ 497 K

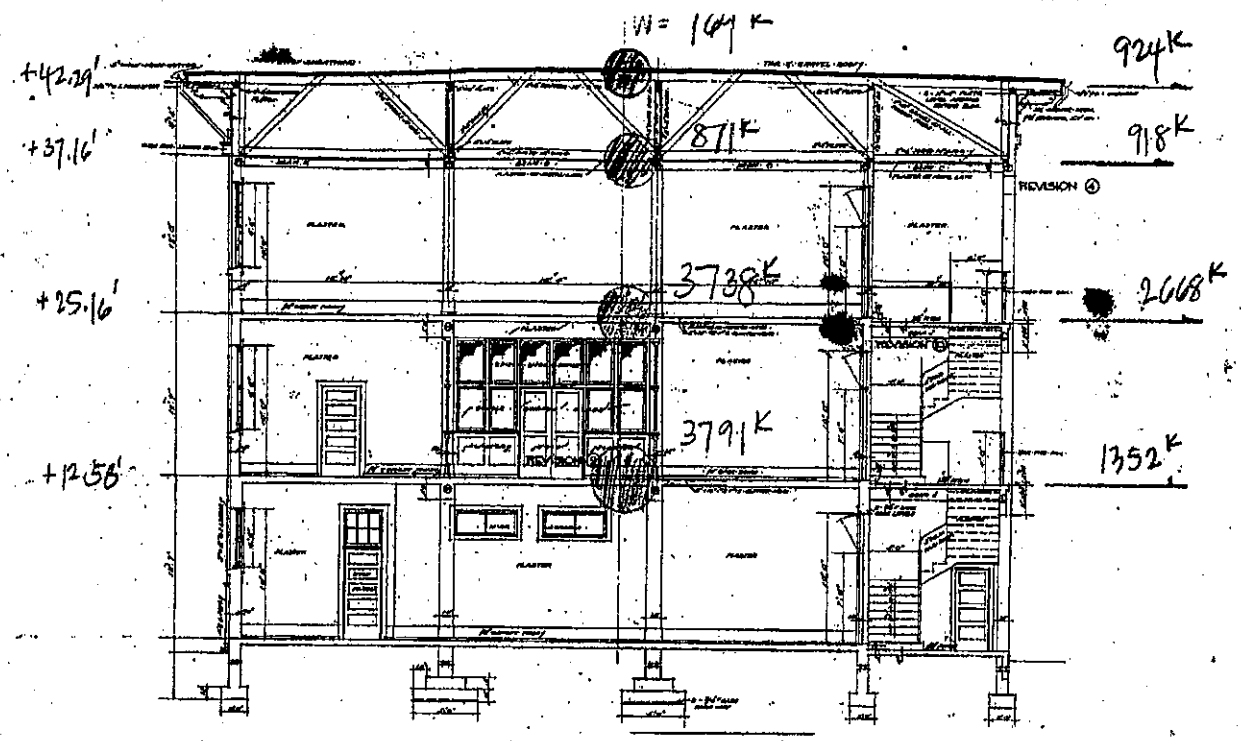
INTERIOR WALLS 98 K

(7.4) $\left[\frac{2.11\,kif + 1.80\,kif}{2}\right] \times 50' =$

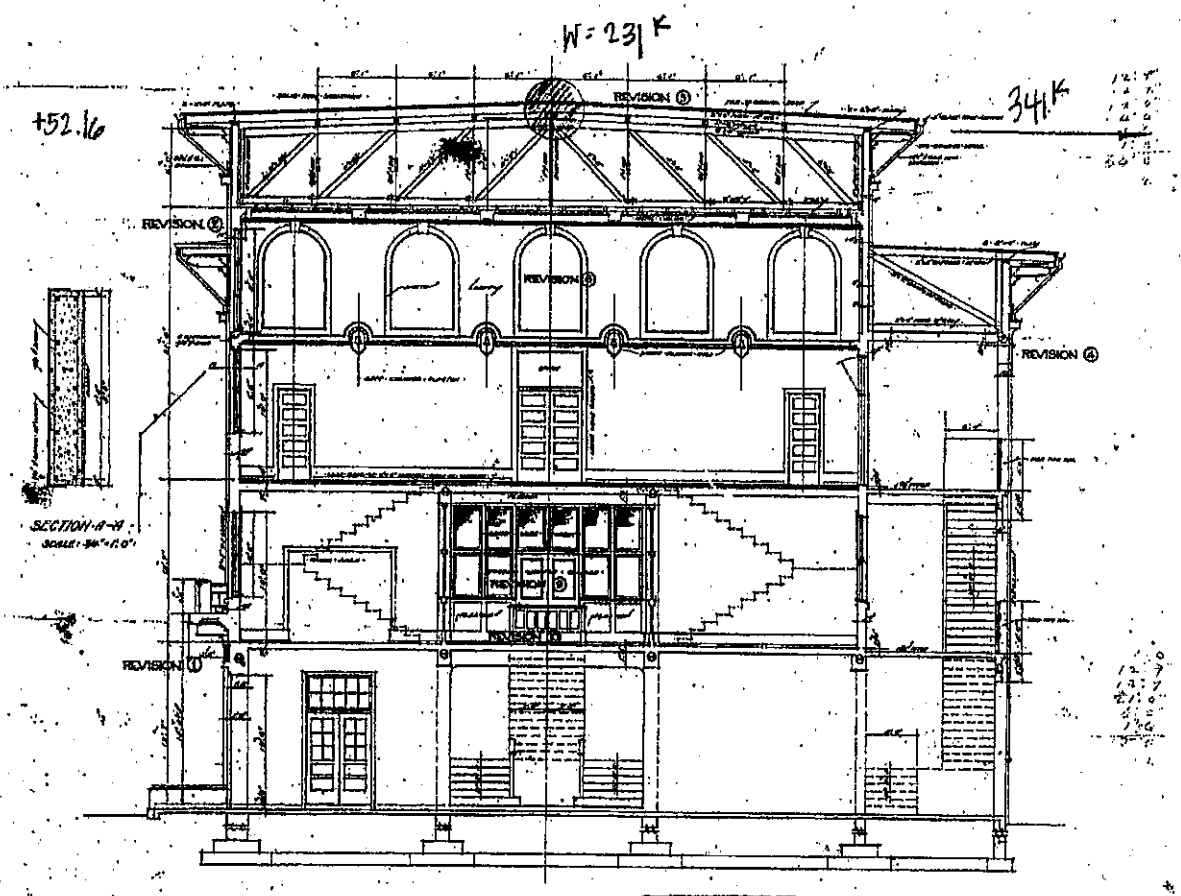
(3.6) 83 K

(10) & (11) 60 K

3791 K



SECTION: A-A 9169 K SUBTOTAL



SECTION: C-C 9400 K TOTAL MASS

BLDG 549

JOB NO. 1454	OFFICE OF CONSTRUCTING QUARTERMASTER HONOLULU, T. H.	DRAWN BY V.A.H.
SHEET NO. 6	ADMINISTRATION BLDG. SCHOFIELD BARRACKS	TRACED BY M.O.T.
SCALE 3/4" = 1'-0"	SECTIONS	DATE MAR. 1946

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BASE SHEAR - BLDG 549

WHILE GEOMETRIC IRREGULARITIES EXIST, WE CAN ASSUME THE GYM ROOF IS A ONE-STORY PENTHOUSE EXEMPT FROM HAVING TO PERFORM LINEAR DYNAMIC PROCEDURE.

$V_{base} = 0.66\, W_{total} = 0.66\,(9400^K) = 6204^K$

	W_i	h_i	$W_i h_i$	$\frac{W_i h_i}{\Sigma W_i h_i}$	V_{base}	V_i
GYM ROOF	231^K	52.16'	12,049	0.055	6204^K	341^K
TTP ROOF	769^K	42.29'	32,521	0.149		924^K
ROOF TRUSS	871^K	37.16'	32,366	0.148		918^K
3rd FLOOR	3738^K	25.16'	94,048	0.430		2668^K
2ND FLOOR	3791^K	12.58'	47,691	0.218		1352^K
			218,675	1.0 ✓		6204^K ✓

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CHECK SHEAR WALLS (TIER 1 - BLDG 549)

TRANSVERSE DIR

GYM ROOF : $A_{WALL} = 6'' \times 50' \times 12 \times 2 \text{ walls} = 7200^{\#}$

$$v_{avg} = \frac{1}{m}\left(\frac{V_j}{A_w}\right) \qquad \text{(EQ 3-1 - FEMA 310)}$$

$$= \frac{1}{4.0}\left(\frac{341^k}{7200^{\#}}\right)$$

$$= 0.012 \text{ ksi}$$

TYP ROOF & TRELLIS :

$$A_{WALL\,①} = 8'' \times (60.83' - 3 \text{ WINDOWS} \times 5'\tfrac{1}{2})12 = 4400^{\#}$$

$$V_j^{①} = \frac{924^k + 918^k}{362.33'} \times \frac{120.67'}{2} = 5.07 \text{ klf} \times 60.33' = 306^k$$

$$v_{avg} = \frac{1}{4.0}\left(\frac{306^k}{4400^{\#}}\right) = 0.017 \text{ ksi}$$

$$A_{WALL\,⑭} = 10'' \times (150' - 12' \text{ DOORS}) \times 12 = 4560^{\#}$$

$$V_j^{⑭} = \frac{341^k}{2} + \left[5.07 \text{ klf} \times \left(\frac{120.67' + 122'}{2}\right)\right] = 786^k$$

$$v_{avg} = \frac{1}{4.0}\left(\frac{786^k}{4560^{\#}}\right) = 0.043 \text{ ksi}$$

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CHECK SHEAR WALLS (TIER 1 - BLDG 549)

3RD FLOOR : $V_j = 34^K + 92^K + 91^K + 266^K = 485^K$

$A_{wall} = 4400^{\#} \times 2 =$ 8800# [Lines (1) & (20)]

$(16.83' \times 2 - 3' \text{ DOOR}) 12 \times 12'' =$ 4415# [Line (7.4)]

$(50' \times 12) \times 10'' =$ 6000# [Line (13.6)]

19,215#

$v_{avg} = \frac{1}{4.0}\left(\frac{485^K}{19,215^K}\right) = 0.063$ ksi $< \begin{cases} 2\sqrt{f'_c} = 2\sqrt{1500} = 77 \text{ psi} \\ 100 \text{ psi} \end{cases}$

∴ <O.K.>

2ND FLOOR : $V_{base} = 620^K$

$A_{wall} = 10' \times (60.83' - 3 \text{ WINDOWS} \times 5'\pm) 12 =$ 5500# (1)

5500# (20)

$14'' \times [19.33' + 3' + 3'] 12 =$ 4255# (7.4)

$12'' \times [34.17' + 3' - (3' \times 20 \text{ DOORS})] 12$ 4488# (13.6)

$8'' \times [60.83' - 16.33' + 6' \text{ DOOR}] 12$ 3696# (10)

$8'' \times [60.83' - 5' \text{ DOOR} - 5' \text{ WINDOW}] 12$ 4880# (11)

28519#

$v_{avg} = \frac{1}{4.0}\left[\frac{620^K}{28319^{\#}}\right] = 0.055$ ksi ∴ <O.K.>

∴ TRANSVERSE CONC SHEAR WALLS O.K.

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CHECK SHEAR WALLS (TIER 1 - BLDG 94)

LONGITUDINAL DIR.

GYM ROOF: $A_{wall} = 6'' \times (122' + (122' \times 0.5))12 = 13{,}176^{\#}$

$v_{avg} = \frac{1}{4}\left(\frac{34K}{7200^{\#}}\right) = 7$ psi

SINCE SHEAR WALL MEETS SAME AT 2ND & 3rd LEVELS, CHECK @ 2ND FLOOR

$A_{wall} = 10'' \times (\frac{1}{2} \times 363.33' \times 12) = 21{,}800^{\#}$

$8'' \times (\frac{1}{2} \times 363.33' \times 12) = 17{,}440^{\#}$

$10'' \times 48'' \times 16$ LANAI GLS $= 7680^{\#}$

$46{,}920^{\#}$

$v_{avg} = \frac{1}{4}\left(\frac{485^{K}}{46{,}920^{\#}}\right) = 0.026$ ksi

2ND FLOOR (BASE): $A_{wall} = 21{,}800^{\#} \times 2 + 7680^{\#} = 51{,}280^{\#}$

$v_{avg} = \frac{1}{4}\left(\frac{620^{K}}{51{,}280^{\#}}\right) = 0.030$ ksi $<$ $\begin{cases} 2\sqrt{f'_c} = 77 \text{ psi} \\ 100 \text{ psi} \end{cases}$

∴ <O.K.>

∴ LONGITUDINAL CONC SHEAR WALLS O.K.

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DEAD LOADS (BLDGS 550, 551, 552)

TYP ROOF: ~~18~~ 23 PSF @ 42.29'
11.4 PSF @ 37.16' (CONC TRELLIS BMS)

TYP FLOOR: 123 PSF
(INTERIOR SPACE)

TYP FLOOR: ASSUME SAME AS BLDG 549 97 PSF
(EXTERIOR CORRIDOR)

LATRINE WING:

7" SLAB	88 PSF
FLOORING	5 PSF
CEILING, INSUL, DUCTS	10 PSF
BATH FIXTURES	5 PSF
MISC	2 PSF
	110 PSF

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DEAD LOADS (BLDGS 550, 551 & 552)

EXTERIOR LONG WALLS TRIB. TO TYP FLOOR : 0.67' x 10' x 150 PCF x 20' = 201 K/20' = 1.21 KLF

0.67' x 5.5' x 6.5' x 150 PCF x 2 = 7.2 K/20' = ⟨0.36 KLF⟩
WINDOWS

0.85 KLF

EXTERIOR END & LATRINE WALLS TRIB TO TYP FLOOR : 1.21 KLF (ASSUME SOLID)

INTERIOR WALLS ALONG LINES ⑥, ⑪, ⑯ : 1.21 KLF

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MASS CALCULATION (BLDG 550-552)

AT ELEV = 42.29' (TYP ROOF)

TYP ROOF — ASSUME 3'-0" OVERHANG

77.67' × 369.33' × 23 PSF = 660 K

39.5' × 39.33' × 23 PSF × 2 = (LATRINES) 64 K

EXTERIOR WALLS

$\frac{4.33'}{2}$ = 2.17' × 0.67' × 150 PCF = 0.22 klf

0.22 klf × (363.33' × 4 + 71.67' × 2) 351 K

$\frac{42.29' - 25.58'}{2}$ × 0.67' × 0.15 kcf = 0.84 klf

0.84 klf × (35.5' × 3 + 2 × 33.33') = 145 K × 2 = (LATRINES) 291 K

355 K (LATRINES) 1011 K (MAIN)

AT ELEV = 37.16' (ROOF TRELLIS LEVEL)

TRELLIS BMS 11.4 PSF × (71.67' × 363.33') = 297 K

WALLS 351 K

$\frac{0.85 \text{ klf}}{2}$ × 2(363.33') 309 K

$\frac{1.21 \text{ klf}}{2}$ × 5(71.67') = 216 K 876 K

1173 K (MAIN)

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MASS CALCULATION (BLDG 550-552)

AT ELEV = 25.16' & 12.58' (2ND & 3RD Floor)

INTERIOR FLOOR

A= 50' × 363.33' × 123 PSF = 18,167# — 2234K

EXTERIOR CORRIDOR

A= 363.33' × 10.83' × 97 PSF × 2 = 3934# — 763K

LATRINE

A= 33.33' × 35.5' × 110 PSF × 2 = (LATRINE) 260K

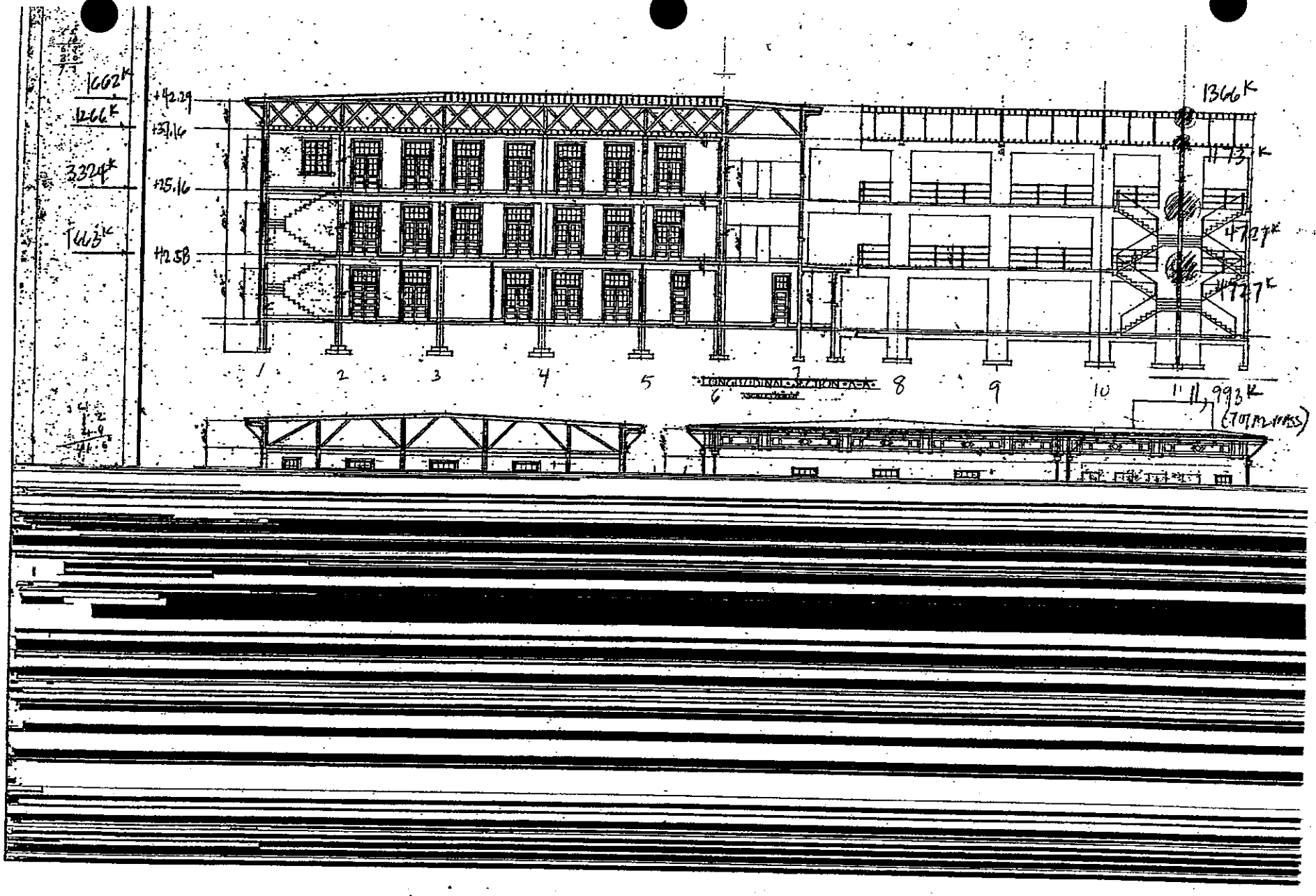
WALLS (INTERIOR & EXTERIOR)

0.85 klf × 363.33' × 2 = 617K

1.21 klf × 5 (71.67') = 434K

1.21 klf × (3 × 35.5' + 2 × 33.33') × 2 = (LATRINE) 419K

679 (LATRINE) 4048K (MAIN)



BLDGS 550, 551 & 552

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BASE SHEAR - BLDGS 550-552

$V_{base} = 0.66(11{,}993^K) = 7915^K$

	w_i	h_i	$w_i h_i$	$\frac{w_i h_i}{\Sigma w_i h_i}$	V_{base}	V_i
TYP ROOF	1366	42.29	57.8×10^3	0.21	7915	1662^K
RAFTRUSS	1173	37.16	43.6×10^3	0.16	↓	1266^K
3rd Floor	4727	25.14	118.9×10^3	0.42		3324^K
2nd Floor	4727	12.58	59.5×10^3	0.21		1663^K
			279.8×10^3	1.0 ✓		7915^K ✓

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CHECK SHEAR WALLS (TIER - BLDGS 550-552)

TRANSVERSE DIRECTION

$W_{roof} = 1662^k / 363.33' = 4.57$ klf

TYP ROOF:

$V_{⑥}^{roof} = 4.57 \text{ klf} \times \frac{181.67'}{2} = 415^k$

$A_{⑥}^{roof} = 6'' \times (71.67' \times 12) = 5160^{\#}$

$v_{avg} = \frac{1}{4.0}\left(\frac{415^k}{5160^{\#}}\right) = 0.020$ ksi

TYP ROOF & TRELLIS:

$W_{trellis} = 1266^k / 363.33' = 3.48$ klf

$\Sigma W = 4.57 \text{ klf} + 3.48 \text{ klf} = 8.05$ klf

$V_{⑥} = 8.05 \text{ klf} \times \frac{181.67'}{2} = 732^k$

$A_{⑥} = 8'' \times (71.67' \times 12) = 6880^{\#}$

$v_{avg} = \frac{1}{4.0}\left(\frac{732^k}{6880^{\#}}\right) = 0.027^{\#}$

∴ TRANSVERSE WALLS OK. FOR SHEAR

3rd Floor & 2nd Floor:

$V = 1662^k + 1266^k + 3324^k = 6252^k$ (3rd Floor)

$V_{base} = 7915^k$

$A = 12[71.67' - (3 \times 5' \text{ WINDOWS})] \times 8'' = 5440^{\#}$ ①

$5440^{\#}$ ㉑

$12[71.67'] \times 8'' = 6880^{\#}$ ⑥

$6880^{\#}$ ⑪

$6880^{\#}$ ⑯

$31520^{\#}$

$v_{avg}^{max} = \frac{1}{4}\left(\frac{7915^k}{31520^{\#}}\right) = 0.063 \text{ ksi} < \begin{cases} 77 \text{ PSI} \\ 1000 \text{ PSI} \end{cases}$ ∴ <OK>

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CHECK SHEAR WALLS (TIER 1 - BLDGS 550-552)

LONGITUDINAL DIRECTION

TYP ROOF & TRELLIS:

$V = 1662^K + 1266^K = 2928^K$

$w = \frac{2928^K}{71.67' + 35.5'} = 27.3\ k/f$

$V_{exterior\ wall/corridor} = 27.3\ k/f \times \frac{50' + 10.83'}{2} = 831^K$

$A = 363.33' \times 1/2 \times 12 \times 6'' = 13{,}079^{\#}$

$v_{avg} = \frac{831^K}{13079^{\#}} \times \frac{1}{4} = 0.016\ ksi$

2ND FLOOR:

$V_{base} = 7915^K$

$A_{total} = 363.33' \times 1/2 \times 12 \times 8'' = 17440^{\#}$ (B)

$17440^{\#}$ (E)

$10'' \times 48'' \times 16\ COLS = 7680^{\#}$
$10'' \times 8.83' \times 12 \times 2 = 2119^{\#}$
$(17.67' - 5.5'\ WINDOW)\ 12 \times 8'' \times 2 = 2336^{\#}$
$\Big\}\ 12{,}136^{\#}$ (A)

$12{,}136^{\#}$ (F)

$59{,}152^{\#}$

$v_{avg} = \frac{7915^K}{59152^{\#}} \times \frac{1}{4} = 0.034\ ksi < \begin{cases} 2\sqrt{f'_c} \\ 100\ PSI \end{cases}$

∴ LONGITUDINAL WALL OK. FOR SHEAR

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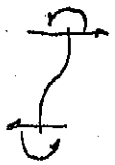
CHECK SHEAR CAPACITIES OF INTERIOR COLUMNS & BEAMS VS. PLASTIC MOMENT CAPACITY OF TYP FRAME @ 1st FLOOR - TIER 1



$V_p = \frac{81.8^{k\cdot ft} \times 2}{16.91'} = 15^k$

IF PINNED BASE, $V_p = 7.5^k$

$M_n^{14''\,col} = 785^{k\cdot in} = 65.5^{k\cdot ft}$ ∴ SAY $M_p = 1.25(65.5^{k\cdot ft}) = 81.8^{k\cdot ft}$

$A_s = 2 \times 1^{\#}$ $b = 14''$ $f'_c = 2ksi$

$f_y = 40\,ksi$ $d = 14'' - 2'' - \frac{1}{2}'' = 11.5''$

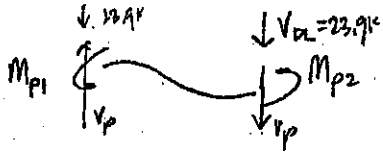
$V_n = 2\sqrt{f'_c}\, b_w d + \frac{A_s f_y d}{s}$

$= 2\sqrt{2000 \times 1.25}\; 14''(11.5'') + \frac{2(0.25'')^2(40 \times 1.25)(11.5)}{12''}$

$= 16.1^k + 6.0$

$= 22.1^k > 15^k$ ∴ <O.K.>

FOR BMS:



$M_{p2} = 2675^{k\cdot in} = 223^{k\cdot ft} \times 1.25 = 279^{k\cdot ft}$

$A_s = 4^{\#}$

$d = 20'' - 2.5'' = 17.5''$

$b = 60''$ (SAY)

$M_{p1} = 1572^{k\cdot in} = 131^{k\cdot ft} \times 1.25 = 164^{k\cdot ft}$

$A_s = 2^{\#} + (0.75'')^2 = 2.56^{\#}$

$d = 17.5''$

$b = 14''$

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CHECK SHEAR CAPACITY OF INTERIOR BMS VS. PLASTIC MOMENTS AT 1ST FLOOR

$$V_p = \frac{M_{p2} + M_{p1}}{L_{BM}} = \frac{279^{k\cdot ft} \quad 464^{ft}}{20' - 1.17'} = 23.5^k$$

$$V_{DL} = \quad 23.9^k$$

$$V_{UF} = 47.4^k$$

$$V_n = 2\sqrt{2000 \times 1.25}\,(17.5'')\,14'' + \text{6 BARS IN PLASTIC HINGE} \times (0.25'')^2 (40 \times 1.25)$$

$$= 24.5^k + 18.8^k$$

$$= 43.3^k \approx 47.4^k \quad \therefore \text{SAY O.K.}$$

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TIER 2

CHECK DIAPHRAGM SHEAR - BLDG 549

3" - 20 GA DECK w/ 4 - 1/2" ϕ PUDDLE WELDS @ SUPPORTS & 1 1/2" TSW @ 24" o.c.

$v_{cap} = 286\ PLF \times 2 = 572\ PLF \times (m = 4) = 2.29\ klf$

FEMA 273 (5.8.1.3) FEMA 310 (TABLE 4-3)

TRANSVERSE DIRECTION

@ GYM :

$w = \frac{341^k}{122'} = 2.80\ klf$

$v = \frac{341^k}{2} / 50' = 3.41\ klf >> 2.29\ klf$ ∴ <N.G.>

∴ PROVIDE X-BRACING AT ROOF LEVEL

@ TYP ROOF :

$w = \frac{924^k}{363.33'} = 2.54\ klf$

$v = 2.54\ klf \times \frac{120.67'}{2} / 66.83' = 2.29\ klf = 2.29\ klf$

∴ <O.K.>

diaphragm ratio $= \frac{120.67}{60.83} = 2.0$ ∴ <O.K.>

25

TABLE 25–ALLOWABLE DIAPHRAGM SHEAR, q (plf), AND FLEXIBILITY FACTORS, F, FOR TYPE N-24 DECK WITH BUTTON PUNCHES (BP) OR 1½" TOP SEAM WELDS (TSW) AT SIDELAPS [1]

GAGE	SIDELAP ATTACH-MENT		SPAN (ft-in.)								
			6'-0"	7'-0"	8'-0"	9'-0"	10'-0"	11'-0"	12'-0"	14'-0"	16'-0"
24/4 WELD PATTERN AT SUPPORTS											
22	BP @ 24"	q	234	216	189	180	163	158	145	130	119
		F	21.3+166R	23.3+143R	26.7+125R	28.4+111R	31.8+100R	33.2+91R	36.6+83R	41.1+71R	45.4+62R
	BP @ 12"	q	285	260	241	227	216	207	198	184	173
		F	18.0+166R	19.8+143R	21.5+125R	23.1+111R	24.6+100R	26.1+91R	27.4+83R	29.9+71R	32.1+62R
	TSW @ 24"	q	234	231	201	202	181	183	167	158	151
		F	15.5+166R	13.9+143R	14.1+125R	12.9+111R	13.1+100R	12.1+91R	12.2+83R	11.5+71R	11.0+62R
	TSW @ 12"	q	343	324	309	298	289	282	276	267	260
		F	11.4+166R	10.7+143R	10.1+125R	9.6+111R	9.2+100R	8.8+91R	8.5+83R	8.0+71R	7.5+62R
20	BP @ 24"	q	355	323	283	266	240	231	212	189	171
		F	16.3+96R	18.2+82R	20.9+72R	22.5+64R	25.3+58R	26.8+52R	29.6+48R	33.8+41R	37.8+36R
	BP @ 12"	q	415	374	344	321	303	289	277	253	235
		F	14.3+96R	16.0+82R	17.6+72R	19.1+64R	20.5+58R	21.9+52R	23.2+48R	25.7+41R	28.1+36R
	TSW @ 24"	q	384	371	322	320	286	287	262	245	232
		F	12.3+96R	11.3+82R	11.5+72R	10.6+64R	10.8+58R	10.1+52R	10.2+48R	9.7+41R	9.3+36R
	TSW @ 12"	q	540	505	479	459	443	429	418	401	389
		F	9.4+96R	8.9+82R	8.5+72R	8.1+64R	7.8+58R	7.5+52R	7.2+48R	6.8+41R	6.5+36R
18	BP @ 24"	q	637	568	498	461	416	394	362	324	296
		F	10.6+41R	12.0+35R	13.8+31R	15.2+27R	17.1+24R	18.5+22R	20.5+20R	23.9+17R	27.3+15R
	BP @ 12"	q	710	632	574	530	494	466	443	407	381
		F	9.7+41R	11.0+35R	12.2+31R	13.5+27R	14.7+24R	15.9+22R	17.1+20R	19.4+17R	21.6+15R
	TSW @ 24"	q	819	773	670	652	582	576	524	483	453
		F	8.4+41R	7.9+35R	8.0+31R	7.6+27R	7.7+24R	7.3+22R	7.4+20R	7.2+17R	6.9+15R
	TSW @ 12"	q	1096	1011	948	899	860	828	802	761	730
		F	6.7+41R	6.4+35R	6.2+31R	6.0+27R	5.8+24R	5.6+22R	5.5+20R	5.2+17R	5.0+15R
16	BP @ 24"	q	918	812	712	654	590	554	509	453	411
		F	7.5+21R	8.6+18R	9.9+16R	11.0+14R	12.5+12R	13.6+11R	15.1+10R	17.9+9R	20.7+8R
	BP @ 12"	q	1000	884	797	731	678	636	601	547	508
		F	7.0+21R	8.0+18R	9.0+16R	10.0+14R	11.0+12R	12.0+11R	13.0+10R	15.0+9R	17.0+8R
	TSW @ 24"	q	1197	1137	1002	982	891	888	821	774	742
		F	6.1+21R	5.8+18R	5.9+16R	5.7+14R	5.8+12R	5.6+11R	5.7+10R	5.5+9R	5.4+8R
	TSW @ 12"	q	1558	1453	1378	1322	1280	1248	1223	1190	1170
		F	5.0+21R	4.8+18R	4.7+16R	4.6+14R	4.5+12R	4.4+11R	4.3+10R	4.1+9R	3.9+8R

[1] Footnotes 2–6 of Table 24 apply to this table.

TABLE 26–ALLOWABLE DIAPHRAGM SHEAR VALUES, q (plf), AND FLEXIBILITY FACTORS, F, FOR TYPE N-24 DECK WITH VERCO SHEARTRANZ® AND 1½" TOP SEAM WELDS (TSW) AT SIDELAPS [1,2]

GAGE	SIDELAP ATTACH-MENT		SPAN (ft- in.)									
			END LAP NOT WELDED					END LAP WELDED WITH 1-INCH FILLET WELD				
			6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"
24/4 WELD PATTERN AT SUPPORTS												
22	TSW @ 12"	q	620	620	540	450	380	750	670	540	450	380
		F	11.5	12.2	12.6	12.9	13.1	11.5	12.2	12.6	12.9	13.1
20	TSW @ 12"	q	750	750	650	540	460	1020	810	650	540	460
		F	9.2	9.8	10.3	10.6	10.8	9.2	9.8	10.3	10.6	10.8
18	TSW @ 12"	q	1000	1000	Use N Deck Values			1430	1080	Use N Deck Values		
		F	6.5	7.0				6.5	7.0			

[1] See Figure 6 for SHEARTRANZ® details.
[2] The flexibility limitations shown in Table 7 may be used in lieu of a rational analysis of the anticipated deflections.

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CHECK DIAPHRAGM SHEAR - BLDG 549

LONGITUDINAL DIRECTION

C GYM: $v = \frac{341^K/2}{122'} = 1.40 \text{ klf} < 2.29 \text{ klf}$ ∴ DIAPHRAGM O.K.

C TYP ROOF: $v = \frac{924^K/2/2}{120.67'} = 1.91 \text{ klf} < 2.29 \text{ klf}$ ∴ DIAPHRAGM O.K.

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CHECK SHEAR AT EXTERIOR LANAI COLUMNS - LONG DIRECT. - BLDG 549

IF DO NOT PROVIDE CHEVRON BRACE AT COLUMN LINES:

$V_{roof} = 924^k / 2 = 462^k$

$A = 16 \text{ columns} \times 10'' \times 48'' = 7680 \#$

$v_{wall} = \frac{1}{4} \frac{462^k}{7680^\#} = 0.015 \text{ ksi} \quad \therefore < 0.K >$

CHECK SLENDERNESS RATIO OF CONCRETE WALL AT GYM & OUT OF PLANE WALL FORCE

$\frac{KL}{r} = \frac{(1.0)(21.0' + 6.1' - 3')12}{3''} = 96.4 \approx 100$

say $r = 0.30(t) = 0.30(10'') = 3''$

FEMA 310: 4.2.5 -

$400 S_{DS} = 400(0.60) = 240 \text{ PLF} \times 2 \text{ FLEX DIAPHRAGM} = 480 \text{ PLF}$

$\alpha S_{DS} W = 0.4(0.60) \times \frac{27.1'}{2} \times \underbrace{\left(\frac{10''}{12} \times 150 \text{ PCF}\right)}_{125 \text{ PSF}} = 405 \text{ PLF} \times 2 \text{ FLEX} = 810 \text{ PLF}$

$W_{vert} = 0.4(0.60)(125 \text{ PSF}) = 30 \text{ PLF}$

$M = \frac{wL^2}{8} = \frac{(0.030 \text{ PLF})(27.1')^2}{8} = 2.75 \text{ K-ft}$

$M_n = 163 \text{ K-in} = 13.6 \text{ K-ft} > 2.75 \text{ K-ft} \quad \therefore < O.K. >$

$A_s = 0.56^\#/1 \qquad f'_c = 1.5 \text{ ksi}$

$f_y = 40 \text{ ksi} \qquad b = 12'' \qquad d = 10'' - 1.5'' \text{ CLR} - 0.5''\varnothing = 8''$

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(TIER 2)

CHECK OUT OF PLANE BENDING OF EXTERIOR WALLS TYPICAL FLOOR TO FLOOR

$W_{vert} = 0.4(0.600)(0.67' \times 150\ PCF) = 0.024\ PLF$

$M_n = 16.5^{k\cdot in} = 1.38\ k\cdot ft$

$A_s = 0.141\#/2 = 0.07\#$ (13/8" Φ @ 2'-0")

$f_y = 40\ ksi$ $d = 8" - 1.5"\ CLR - 0.5"\ \pm = 6"$

$f'_c = 1.5\ ksi$

$b = 12"$

$M = \frac{wL^2}{8} = \frac{(0.024\ PLF)(12.58')^2}{8} = 0.47\ k\cdot ft$ (typical floor to floor)

$< M_n = 1.38\ k\cdot ft$ ∴ (o.k.)

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CHECK OUT OF PLATE ANCHORAGE INTO DIAPHRAGM - BLDG 549

$T = 810\ PLF \times 10' = 8.1^K$

$V_{cap}^{2\text{-}3/4''\phi\ BOLTS} = 4.4^K/bolt \times 2 = 8.8^K$ ∴ CROSS TIES O.K.

CHECK WALL REINF RATIO (TIER 1)

AT EXTERIOR LANAI: $\rho_v = \frac{A_s}{A_g} = \frac{6 \times (0.375'')^2}{10'' \times 48''} = 0.0018 > 0.0015$

$\rho_h = \frac{(0.375'')^2 \times 2}{10'' \times 24''} = 0.0012 < 0.0025$ ∴ N.G, CHECK TIER 2

AT TYPICAL GYM WALL:

$\rho_v = \frac{10 \times (0.75'')^2}{60'' \times 10''} = 0.009 > 0.0015$

$\rho_h = \frac{2(0.25'')^2}{10'' \times 12''} = 0.001 < 0.00.25$ ∴ N.G., CHECK TIER 2

AT TYPICAL WALL:

$\rho_h = \rho_v = \frac{(0.375'')^2}{8'' \times 12''} = 0.0015 = 0.0015$

< 0.0025 ∴ N.G. CHECK TIER 2

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BASIC WIND PRESSURES

WIND LOADS PER ASCE 7-98 (SEE APPENDIX)

V = 105 mph
STRUCTURE IS ENCLOSED
EXP: C
I = 1.0
MAX ROOF HT = 52.16' ROOF SLOPE = 1/2"/FT
<10°

GET UPLIFT ON ROOF
REF: ASCE 7-98 FIG 6-5A
EXT. PRESSURE COEF. GCp
TABLE 6-7 INT. PRESS. COEF. GCpi

$$p = q_h(GCp) - q_i(GCpi)$$

@ H = 53', EXP C, K_z = 1.10 FROM TABLE 6-5

$q = .00256\, K_z V^2 I = 0.00256 \times 1.10 (105)^2 \times 1.0$
= 31.0 psf
@ AVG ROOF HT = SAY 53' q_h = 31.0 psf

GCpi = ±0.18
q_i GCpi = (0.18×31) = ± 5.6 psf

STRUCTURE PLAN SIZE = 60'-10" X 363'-4"

a = lesser of 10% X 60.83 = 6.1' — USE
or 0.4h = 0.4 x 53 = 21.2
≥ 4% 60.83' = 2.4'
or ≥ 3'

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CHECK 3" MTL DECK (CONT'D)

SUMMARY OF PRESSURES

LOCATION	TRIB A	GCp	$P_e = q_h GC_p$ (31.0)	P_i	$P_e + P_i$
RANGE	≤ 10 SF	-2.8	-86.8	± 5.6	-92.4
RANGE	≥ 100 SF	-0.8	-24.8		-30.4
FIELD	≤ 10 SF	-1.0	-31.0		-36.6
FIELD	≥ 100 SF	-0.9	-27.9		-33.5
EDGES W/O OH	≤ 10 SF	-1.8	-55.8		-61.4
EDGES W/O OH	≥ 100 SF	-1.1	-34.1		-39.7
ALL AREAS	≤ 10 SF	+0.3	+9.3		+14.9
	≥ 100 SF	+0.2	+6.2	+5.6	+11.8

MTL DK DROP.

3" MTL DK FROM ORIG. DESIGN
$S_{min} = 0.40$ IN³
$I_{min} = 0.82$ IN⁴
gage = 20 GA
24" WIDE PANEL
2 3/4" WIDE THROUGH @ TOP

SPAN = 10'

LOADS: MTL DK 3 psf
INSUL 1
RU ROOF'G 5
DL = 9 psf
LL = 20
DL = 29 psf

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CHECK 3" MTL DECK (cont'd)

ASSUME SIMPLY SUPPORTED SINGLE SPAN

FROM LOAD TABLES FOR ASC TYPE HR ROOF DECK (SEE APPENDIX)

FOR 10' SPAN x 20 GA,
ALLOW $w_{DL+LL} = 79$ psf > 29 - OK

@ BEAMS $w = 92.4$ psf uniform
DL = 9.0
net uniform: 83.4 psf < 1.33 x 79 OK
> 105

REST ROOF DECK OK

(25% EXCESS CAP.)

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TYP OW JOISTS @ 18" DEEP (TYP)

FROM FIELD NOTES: TOP CHORD: 2LS 1 3/4 x 1 3/4 x 1/8
BOT CHORD: 2LS 1 3/4 x 1 3/4 x 1/8
INTERIM WEB: 2L 1 x 1 x 1/8 ±

LOADS: 3" MTL DK: 3 psf
BU ROOFING: 5
INSUL: 1
OW JSTS @ 10': 2
CEILING (PLAST'D): 10
CEILING (ACOUST): 1
MISC: 3
SDL = 25 psf
LL = 16
DTL = 41 psf @ 10' = 410 LB/FT

SPAN = 27' CLR
MK = 18LA04

TA = 27K ΔD = 270 JK
>100

FIELD MEASUREMENTS CORRESPOND TO 18LA04 O.I.M. JOISTS (SEE APPENDIX)

REFERENCE: STD SPEC & LOAD TABLES FOR OPEN-WEB STEEL JOISTS BY THE STEEL JOIST INSTITUTE (1962) (SEE APPENDIX)

FOR 18LA04 x 27' ALLOW DTL = 378 #/'
8% OVERLOADED

NOTE: W/O PLAST'D CEIL. DTL = (15+16) 10 = 310 < 378#

OTHER UPLIFT W/O PLAST'D CEIL'G (DL = 25-10 = 15 psf)

$P = \gamma GC_p - \gamma_i GC_{pi} = 31(0.90) - (0.18 \times 31)$
$= 23.3$ psf

MIN DL = 15.0

NET UPLIFT 18.5 psf x 10' = 185 #

UPL. M: $\frac{1}{8} \times 0.185 (27)^2 = 16.9$ K

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TYP OW. JST *18" CONTD

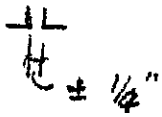
$d = 18 - 2 \times 0.484 = 17.0''$

$T_{IC} = \frac{16.9 \times 12}{17.0} = 11.9^k$

CHK BOTTOM CHORD (TOP CHORD IN TENSION)

BRACING PROVIDED @ 1/3 PTS (OR $\frac{1}{3} \times 27.2' = 9'$)

PANEL ~ 18"



SEGMENT $\left(\frac{KL}{r}\right)_{YY} = \frac{1.0 \times 18}{0.484} = 37.2$

2 LS $\left(\frac{KL}{r}\right)_{YY} = \frac{1.0 \times 9' \times 12}{0.818} = 132 > 37.2$

ALLOW $P_{AX} = 8.57$ KSI @ 1.33 = 11.4 KSI
≈ 11.9

CLOSE ENOUGH

REST OW. JST OK FOR UPLIFT W/ 1/3 PT. BRACING

OK FOR REST ROOM W/O PLAST'D CEIL

8% OVERSTRESSED W/ PLAST'D CEIL'G.

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EXT 14" O.W. JSTS

DWGS INDICATE 14 J6 @ 10' oc 16'-10" c/c

CUR SPAN ~ 16'

FROM FIELD NOTES: TOP CH: 2 L's 1 3/8 x 1 3/8 x 1/8 (probably 1 1/4" x 1 1/4")
BOT CH: 2 - 3/4" ϕ RODS
WEBS: 1/2" ϕ RODS

REFER TO "18" O.W. JSTS"

FIELD MEASUREMENTS CORRESPOND TO 14 J 6

MAX D+L W/ PLASTO CEIL = 410 #/' (SEE ADDENDUM)
MAX D+L W/O PLASTO CEIL = 310
MAX UPLIFT W/O PLASTO CEIL = 105 #/'

FROM LOAD TABLES FOR 16' SPAN
SPCG = 5', ALLOW w = 85 psf
∴ SPCG = 10', ALLOW w = 1/2 x 85 = 42.5 psf

OK w = 42.5 psf x 10' = 425 #/' > 410 OK

FOR UPLIFT M = 0.105 (16)²/8 = 5.92 'k

d = 14 - 0.359 - 1/4 = 13.4"

T = 5.92 x 12/13.4 = 5.31 k

TOP CHORD P/A = 5.31 / (0.297 x 2) = 8.93 ksi OK

BOT CHORD f_a = 5.31 / (2 x 0.196) = 13.5 ksi

BRACING PROVIDED @ 1/3 PT (= 3.2')

2 - 1/2" ϕ RODS 1'-6" APART

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14" O.W. JSTS (Control)

CHECK SECTION PROP OF 2 RODS 1/2" EACH

$I_o = 2 \times 0.7854 (0.25)^4 = 0.00614$

$2Ad^2 = 2[3.14(0.25)^2(0.375)^2] = 0.0522$

$EI = 0.06136 \text{ in}^4$

$A = 2(3.14)(0.25)^2 = 0.393 \text{ in}^2$

COMP. $r = \sqrt{\frac{0.06136}{0.393}} = 0.395 \rightarrow \frac{KL}{r} = \frac{1.0 \times 2 \times 12}{0.395} = 97.2$

FOR SINGLE ROD $KL/r = \frac{1.0 \times 14''}{0.25/2} = 112$

$P_a = 11.40$ KSI @ 1.332 15.2 KSI > 13.5 OK

EXIST 14" OW JST OK

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12" O.W. JSTS @ 24" @ BLDG 550

FROM FIELD MEASUREMENTS

TOP CH = 2 LS 1 x 1 x 1/8
BOT CH = 2 - 1/2" ø ROD
WEB = 1/2" ø ROD

REF: SHERFIELD OPEN-WEB STEEL JOISTS
MEASUREMENTS CORRESPOND TO SHERFIELD
12J2 JOIST. (SEE APPENDIX)

FROM "18" OPEN-WEB JSTS"

WOHC W/O PLAST'D CEIL = DHL = 15 + 20 = 35 PSF

SPCG = 2' SPAN = 16' CLR TYP

WDHL = 2' x 35 = 70 LB/FT.

FROM LOAD TABLES FOR 16' SPAN
ALLOW W = 221 LB/FT > 70 OK

NOTE. NO BRACING OF BOT CHORD SEEN.

FOR UPLIFT MUST BRACE BOT CHORD

CHECK UPLIFT NET WDL = 18.5 PSF x 2' = 37#.

$M = \frac{1}{8} \times 37(16)^2 = 1184$ LB-FT.

$T = C = 1184 \div 12 / 11.47 = 1239$ #

bot ch. $f_a = \frac{1239}{0.345} = 3591$ PSI

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12" OW JST (Cont'd) @ BUDG 550

For 2 - 1/2" ϕ RODS (bot CH) 1/2" ϕ PAILT

$r_{comp.} = 0.395$

for KL=10' $F_a = 3.591$ @ 3/4 = 2.7 ksi

$\frac{KL}{r} = 200$ MAX

MAX ALLOW $L = \frac{200 \times 0.395}{1.0} = 79'' = 6.58'$

12" OW JST - ADD LATERAL BLOCKING @ 6' ± OC MAX (1/3 PTS)

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TYP. GYM JOISTS @ 10' o.c. (BLDG 549)

THIS A = 45 x 10 = 450 sf
LL = 16 psf

CHECK LOADS

ROOF DL = 10 psf (NO CEILING)
LL = 16

P1 DL = 25 psf x 10' = 250 lb/ft @ 4.25' = 1.105 k

P2 DL = 260 lb/ft x 3.25' = 845 lb

P3 DL = 260 lb/ft x 2.5' = 650 lb

V2 1.105 + 0.845 + 0.65 = 5.92 k

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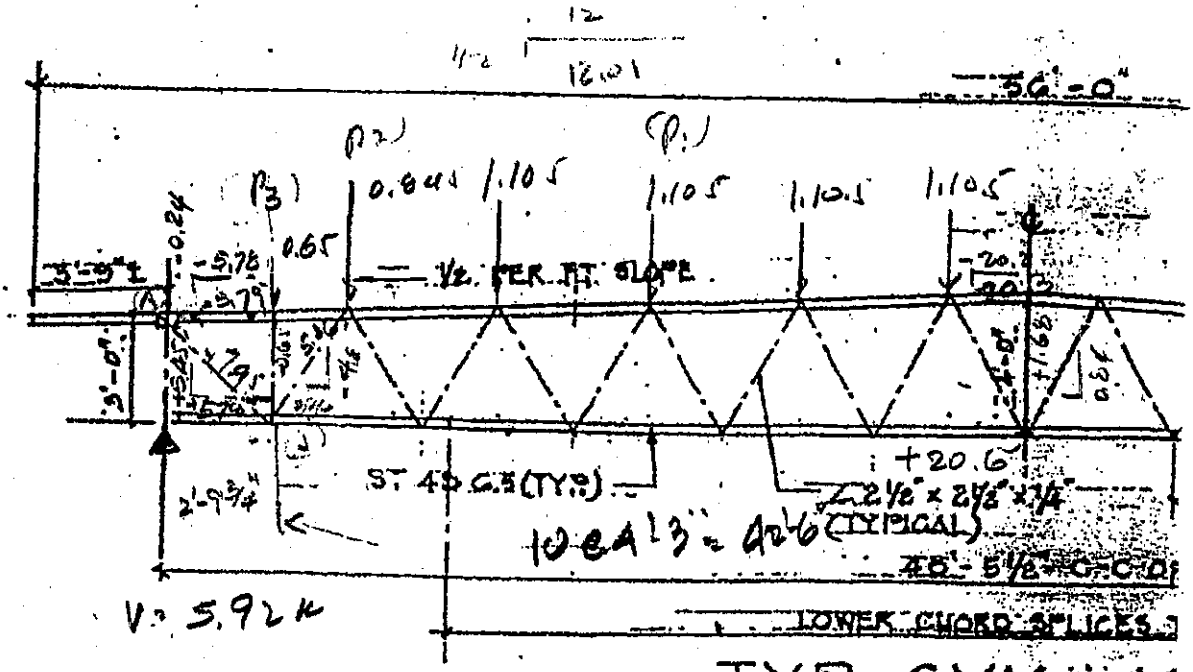
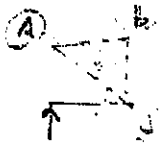




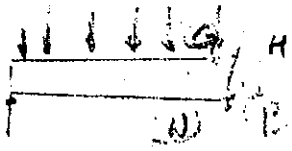
D+L LOADS

$\Sigma M_{(B)} = 0 = V\,2.95 - A_{JH}\,3.05 \rightarrow \therefore A_{JH} = \frac{2.95V}{3.05} = 0.977V$

$\therefore A_{JH} = 0.977V = 0.977 \times 5.92 = 5.78^k$

$A_{JV} = \frac{2.81}{2.95} A_{JH} = \frac{2.81}{2.95}[0.977V]$

$= 0.921V = 5.45^k$



$\Sigma M_G = 0 = V \times 22.10 - 0.65 \times 19.29 - 0.845 \times 17.0 - 1.105(12.75 + 8.50 + 4.25) - N_P \times 3.731$

$N_P = \frac{22.1 \times 5.92 - 19.29 \times 0.65 - 17.0 \times 0.845 - 1.105(25.5)}{3.731}$

$= 20.6^k$

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TYP GYM TRUSS (CONT'd)

$$\Sigma M_{p20} = V \times 24.23 - GH_H \times 3.82 - 1.105[2.125 + 6.375 + 10.625 + 14.875] - 0.845 \times 19.125 - 0.65 \times 21.42] = 0$$

$$\therefore GH_H = \frac{5.98 \times 24.23 - 1.105[34] - 0.845 \times 19.125 - 0.65 \times 21.42}{3.82}$$

$$= 20.2 \text{ k}$$

$$GH_{V2} = \frac{0.5}{12} \times 20.2 = 0.84 \text{ k}$$

$$GH = \frac{12.01}{12} \times 20.2 = 20.3 \text{ k}$$

DUE TO SYM. $HP_{V2} = 2 \times 0.84 = 1.68$ k (tens)

MAX AX LOAD IN TOP CHORD = -20.3 k

MAX AX LOAD IN DIAG = + 7.95 k - 5.86

MAX AX LOAD IN BOT CHORD = + 20.6 k

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GYM TRUSS (cont'd)

CHECK W/ WIND LOAD

TRIB A = 10' × 48 = 480 SF > 100 SF

TYP AREAS: $p = q(GC_p) - q_i(GC_{pi})$

$\therefore p = 31.0(-0.9) - 31.0(0.18) = 33.5$ psf
DL = 10
NET UPLIFT = 23.5 psf

$w = 23.5 \times 10' = 235$ LB/FT.

$P_1 = 4.25' \times 0.235 = 1.0^k$
$P_2 = 3.25' \times 0.235 = 0.76^k$
$P_3 = 2.50 \times 0.235 = 0.59^k$

$\therefore V = -(4 \times 1.0 + 0.76 + 0.59) = -5.35^k$

FROM DTL ANALYSIS $AJ_H = 0.977$ $V = -5.23^k$ (comp)
$AJ_V = 0.921$ $V = -4.93^k$
$\therefore AJ = -7.19^k$ comp

$$NP = -\left[\frac{22.1 \times 5.35 - 19.29 \times 0.76 - 17.0 \times 0.65 - 1.0(23.5)}{3.731}\right]$$

$= -18.0^k$ (comp)

$$GH_H = \frac{21.23 \times 5.35 - 1.00(34) - 0.76 \times 19.125 - 0.59 \times 21.42}{3.82}$$

$= 17.9$ (tens)

$GH_V = (0.5/12)\ 17.9 = +0.75$ $GH = \frac{12.01}{12} \times 17.9 = 17.9^k$

$HP_V = 2 \times 0.75 = -1.50$ (comp)

Top CH $P_{ext} = +17.9^k$ Bot CH $P_{ext} = -18.0$ Pin UNG = -7.19/4 = 2.30

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GYM TRUSS (cont'd)

TOP CHORD @ D+L LOADS

$M = 0.260\,k/' (4.25)^2/8 = 0.59$ k'

$P_{u+} = -20.3$ k

SECTION = WT 5 X 9.5

$f_b = \frac{12 \times 0.59}{1.74} = 4.04$ ksi

$f_a = \frac{20.3}{2.81} = 7.22$ ksi

L_u = sag 4.25'

$(KL/r)_{yy} = \frac{1.0 \times 4.25 \times 12}{0.874} = 62$ $F_a = 17.24$

$C_m = 1.0$ note: roof deck provides lateral bracing of top chord

$\therefore F_b = 0.6 F_y = 0.6 \times 33 = 20$ ksi

$\left(\frac{KL}{r}\right)_{xx} = \frac{1.0 \times 4.25 \times 12}{1.55} = 32.9$

$F'_{ex} = 137.13$

$\frac{f_a}{F_a} + \frac{C_m f_b}{\left(1 - \frac{f_a}{F'_e}\right) F_b} = \frac{7.22}{17.24} + \frac{1.0 \times 4.04}{\left(1 - \frac{7.22}{137.13}\right) 20}$

$= 0.63 < 1.00$ OK

TOP CHORD @ UPLIFT — ok by inspn

$M_{up} = \frac{1}{8} \times 0.235 (4.25)^2 = 0.59$ $f_b = 0.59/1.74 = 0.408$

TOP CHORD OK

$f_a = \frac{12.5}{2.51} = 6.37$

$\frac{f_{bx}}{F_b} = 0.24 < \frac{1}{3}$

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GYM FILES (Cont'd)

WT 4. X 6.5

BOT CHORD @ OTC

$P_{AX} = +20.6$ $f_t = \frac{20.6}{1.92} = 10.72$ ksi < 0.6 X 33 = 20 ok

BOT CHORD @ UPLIFT

COMP'N = 10.0 K

NOTE: BOT CHORD BRACED LATERALLY @ 8.5'

$f_a = \frac{10}{1.92} = 9.4$ ksi

$\left(\frac{KL}{r}\right)_{XX} = \frac{1.0 \times 8.5 \times 12}{1.73} = 82.9$ — $F_a = 13.0$ ksi

$\left(\frac{KL}{r}\right)_{YY} = \frac{1.0 \times 4.25 \times 12}{0.86} = 60.5$

$\frac{f_a}{F_a} = \frac{9.4}{13.0}$

BOT CHORD OK

TYP DIAG 2 2½ x 2½ x 1/4

MAX COMP'N = 7.19 K LU = 4.29'

$\frac{KL}{r} = \frac{1.0 \times 4.29 \times 12}{0.481} = 105$

$F_a = 12.33$

$f_a = \frac{7.19}{1.19} = 6.04$ KSI < F_a ok

$\frac{f_a}{F_a} = 0.49$

DIAGS. OK

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CHECK OUTRIGGERS @ 6'-0" C 4x5.4

CANTI = 3'-0"

PER END OF CANTI = 15' x 6' (9 psf) = 81 #
LL = 15' x 6' x 20 = 180 #
= 161 #

DL-MOM = ½ x (5.6)(3)² + 161(3) = 534 ft-#

$f_b = \frac{12 \times 534}{1.93} = 3320$ psi OK

CHECK UPLIFT PL = 3 x ½ x 6 = 9 SF < 10

UPLIFT P = 1.5 x 6 x 72.4 = 836 #

M = 836 x 3 − ½(90)(3)² = 2091

$f_b = \frac{12 \times 2091}{1.93} = 13001$ psi OK

OUTRIGGER BM C 4x5.4 OK

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PERM W14×30 BM @ ROOF (BLDG 550) SPAN = 20'

$w_{DL} = 16.58'(15+16) = 249 + 265 = 514$ #/'

$M = 1/8 \times 0.514(20)^2 = 25.7$ 'k

$f_b = \frac{12 \times 25.7}{41.9} = 7.4$ ksi < 22 ok

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CHECK AB HOLD-DOWN REQ'T @ ROOF COL C GYM

GYM TRUSS TA = 29' x 20' = 580 SF

FOR TYP ROOF AREAS UPLIFT = 33.5 psf
W/O PLAST'D CEIL DL = 9.0

NET UPL = 24.5 psf x 580
= 14,210 LB

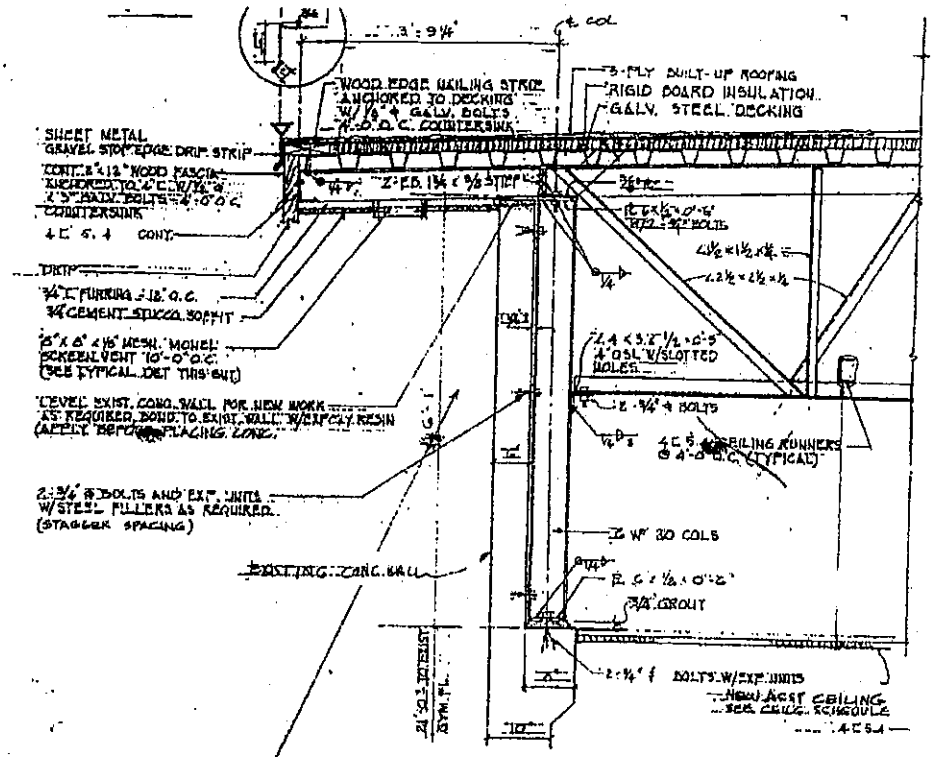
CAP OF 3/4" Ø EXP BOLTS f'_c = 3000 psi for GYM renovation.

TENSION VALUE = 1615 LB W/O INSP
SHEAR VALUE = 4185 LB } SEE APPENDIX

FROM DWG DET. (SEE ATTACHED SHT)

2 - 3/4" Ø EXP BOLTS @ BASE OF COL
+ 6 - 3/4" Ø EXP BOLTS VERTICALLY SPACED FROM COL TO WALL VERT. FACE.

CAP OF 6 - 3/4" Ø EXP BOLTS = 6 x 4185
= 25,110 #
@ 1.33 = 33,396 #
> 14,21
OK


℄ COL
3-PLY BUILT-UP ROOFING
RIGID BOARD INSULATION
GALV. STEEL DECKING
WOOD EDGE NAILING STRIP ANCHORED TO DECKING W/ 1/8" ϕ GALV. BOLTS 4'-0" O.C. COUNTERSUNK
SHEET METAL GRAVEL STOP EDGE DRIP STRIP
CONT. 2"x12" WOOD FASCIA ANCHORED TO 4"C W/ 1/2" ϕ x 5" GALV. BOLTS 4'-0" O.C. COUNTERSUNK
4"C 5.4 CONT.
DRIP
3/4" C FURRING @ 12" O.C.
3/4" CEMENT STUCCO SOFFIT
8"x 8" x 16" MESH. MONEL SCREEN VENT 10'-0" O.C. (SEE TYPICAL DET THIS SHT)
LEVEL EXIST. CONC. WALL FOR NEW WORK AS REQUIRED. BOND TO EXIST. WALL W/ EPOXY RESIN (APPLY BEFORE PLACING CONC.)
2-3/4" ϕ BOLTS AND EXP. UNITS W/ STEEL FILLERS AS REQUIRED. (STAGGER SPACING)
EXISTING CONC. WALL
2 W 30 COLS
3/4" GROUT
2-3/4" ϕ BOLTS W/ EXP. UNITS
NEW ACST CEILING SEE CEILING SCHEDULE
4"C 5.4
CEILING RUNNERS @ 4'-0" O.C. (TYPICAL)
2-3/4" ϕ BOLTS AND EXP. UNITS
2-3/4" ϕ BOLTS W/ EXP. UNITS
4"x3"x1/2"x0'-5" 4" OSL W/ SLOTTED HOLES
2-3/4" ϕ BOLTS
2 L 4 x 2 1/2 x 1/4
2 L 2 1/2 x 2 1/2 x 1/4
2 L 2 1/2 x 1/2 x 0'-6" W/ 1/2" ϕ BOLTS
24'-0" TO FIRST FLR. FIN. FL.
TYPICAL SECTION
SCALE: 1" = 1'-0"
2
6A 6A
NOTE: REMOVE EXISTING CORNICE PROJECTIONS AND PATCH ALL HOLES AND RECESSES WITH STUCCO. PATCH TO MATCH EXISTING SURFACES.

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CHECK COL HOLD DOWN @ FLOOR COL @ TYP AMBAS

EXIST FIELD CONDITION: 2-3/4"Ø EXP BOLTS

TRIB A = 20' x 16.83' = 337 SF

UPLIFT (GROSS) = 33.5 psf
MIN DL W/O CEIL ? 9.0
net upl. = 24.5 psf x 337 = 8257 LB

FROM FIELD NOTES: 2-3/4"Ø EXP BOLTS @ EG COL

TENSION VALUE = 1615 LB W/O INSP.

CAP OF 2-3/4"Ø EXP BOLTS: 1,615 x 2 x (.33)
= 4.3K < 8.25

ADD 2 MORE 3/4"Ø EXP
BOLTS @ EG COL.

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GRT CAPACITY DECK PLUG WELD @ 3" DECK

FROM "BASIC WIND PRESSURE" MAX UPLIFT FOR TRIB A OK @ 10 SF = 92.4 psf @ O.H.

FROM ORIG DWGS DK SPAN = 10'
DK PANEL = 2'
WELDS / PANEL = 4 - 1/2" ⌀ PLUGS

REFERENCE: COLD FORM STEEL MANUAL BY AISI

$P = \frac{d^2 p_{xr}}{4}$ or $P = 0.88\, t d_a F_u$ for $\frac{d_a}{t} \le \frac{140}{\sqrt{F_y}}$

$p_u = 60$ $t = 20$ GA = 0.0359"
$d = 1/2"$

$d_e = (0.7d - 1.5t) = 0.7 \times 0.5 - 1.5 \times 0.0359 = 0.37"$

$0.55 d = 0.55 \times 0.5 = 0.275" < 0.37$

∴ use $d_e = 0.275"$

$d_a = d - t = 0.50 - 0.0359 = 0.464$

$\frac{d_a}{t} = \frac{0.464}{0.0359} = 12.9$ $\frac{140}{\sqrt{F_y}} = \frac{140}{\sqrt{60}} = 18 > 12.9$

∴ $P = 0.88\, t d_a F_u$
$= 0.88 \times 0.0359 \times 0.464 \times 60 = 0.88$ K / WELD

467

REQ'D CAP = 92.4 psf × 10' = 924 LB / FT.

FULL W. CAP = 0.88 K/WELD × 4 WELD / 2' = 1760 LB/FT
> 924 OK

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GET CAPACITY OF DECK PLUG WELD @ BLDG 550.

NO INFORMATION ON DECK BUT ASSUME 22 GA ($t = 0.0299$)

WELDS @ 15" o.c.
SPAN = 2'

∴ UDLIPT = 92.4 psf × 2' = 185 LB/FT.

CHECK WELD CAP. ASSUMING 1/2" PLUG WELDS @ 15" o.c.

$d_e = (0.7d - 1.5t) = 0.7 \times 0.5 - 1.5 \times 0.0299 = 0.305$

$0.55d = 0.55 \times 0.5 = 0.275 < 0.305$

∴ USE $d_e = 0.275$

$d_a = d - t = 0.50 - 0.0299 = 0.470$

$\frac{d_a}{t} = \frac{0.470}{0.0299} = 15.7 \qquad \frac{140}{\sqrt{F_y}} = \frac{140}{\sqrt{60}} = 18. > 15.7$

∴ $P = 0.88 t d_a F_y = 0.88 \times 0.0299 \times 0.470 \times 60$
$= 0.742 K$ / WELD

EQUIVALENT CAP $= 0.742 \times \frac{1}{15/12} = 0.594$ K/FT.

REQ'D CAP = 92.4 psf × 2' = 184 LB/FT < 0.594 OK

OR REQ'D CAPL $184 \text{ #/ft} \times \frac{15}{12} = 230$ #

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TYP INTERIOR SLAB @ (ADMIN AREA)

REST SLAB t = 7" d = 7 - 1 - 0.19/2 = 5.9" REXST REIN UNKNOWN
SPAN = 16'-10" c/c
= 15'-8" CLR
fy = 40 ksi
f'c = 2000 psi

LOADS: 7" SLAB = 88 psf
PART. = 20
INSUL, CEIL ETC: 12

EDL	= 120 psf	@ 1.2 =	144 psf
LL	= 50	@ 1.6 =	80
Σ D+L	= 168 psf	WU =	224 psf

REQ'D - Mu = $\frac{1}{10} \times 0.224 (15.67)^2$ = 5.50 'K/'.

REQ'D + Mu = $\frac{1}{11} \times 0.224 (15.67)^2$ = 5.00 'K/'.

Rein t = 7" d = 5.9"

ASSUME 1/2" REINF = 200 bd / fy = $\frac{200(12'')5.9}{40,000}$ = 0.34/'

Say 0.33 IN²/'

Tu = 0.33 · fy = 13.2 K/'.

$a_u = \frac{13.2}{0.85 \times 2 \times 12} = 0.647$

d - a/2 = 5.9 - 0.647/2 = 5.58

CAP · Mu = 0.90 × 13.2 × 5.58/12 = 5.52 'K/'.
~ 5.55 ok

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TYP. INTERIOR SLAB (CONT'D) (ADMIN AREA)

NOTE: EXIST. DWGS SHOW "CLINTON WIRE MESH," BUT NO SIZE NOTED. MESH BENT @ SUPPORTS.

REFERENCE: KIDDER/PARKER ARCHITECTS' AND BUILDERS' HANDBOOK 18TH EDITION (SEE APPENDIX)
BLDG CONSTRUCTED IN 1917 ±

MIN TEMP REINF FOR WIRE FABRIC = 0.0018 A_c
= 0.0018 × 7×12
= 0.151 IN²/FT.
F_y=60 KSI

T_u = 60 × 0.151 = 9.06 K

a_u = 9.06/0.85 × 2 × 12 = 0.444"

d − a_u/2 = 5.9 − 0.444/2 = 5.68"

CAP M_u = 0.9 × 9.06 × 5.68/12 = 3.86 K'

REQ'D M_u = 3.50 > 3.86 NG.

FOR WWF w/ F_y=60 KSI F_y $A_{s\,min}$ = 0.22 IN²/FT.

T_u = 0.22 × 60 = 13.2 K a_u = 13.2/(0.85 × 2 × 12) = 0.647"

d − a_u/2 = 5.9 − 0.647/2 = 5.58"

CAP M_u = 0.9 × 13.2 × 5.58/12 = 5.52 > 5.00 OK

REINF UNKNOWN: IF WWF w/ F_y=60 USED REQ'D A_s = 0.22 IN²/FT.
IF REBAR w/ F_y=40 KSI CAN USE REQ'D A_s = 0.33

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SHEET 55. OF

TYP. INT. SLAB @ GYM (BLDG 549)

NOTE: REFER TO "TYP INT. SLAB @ ADMIN"

LOADS: 7" SL = 88 psf
MISC = 12
DL = 100 psf @ 1.22 120 LB/SF
LL = 100 @ 1.62 160
w = 200 psf w = 280 psf

REQ'D $-M_u = \frac{1}{10} \times 0.280 (15.67)^2 =$ 6.88
REQ'D $+M_u = \frac{1}{11} \times 0.280 (15.67)^2 =$ 6.25

FROM "TYP INT SLAB @ ADMIN

FOR MIN AS = 0.0015 Ag = 0.157 in²/ft

CAP MIN = 3.66 k/ft < 6.88 78% OVER

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SHEET 56 OF

TYP INT. SL AT PARAPETS

NOTE: SIM TO "TYP INT SLBS @ ADMIN.

LOADS: 7" CONC SL = 88 PSF
PART = 20
INSUL, CEIL, MISC = 12
DL = 120 @ 1.2 = 144
LL = 40 @ 1.6 = 64
Σ 160 CUW = 208 LB/FT

REQ'D $-M_u = \frac{1}{10} \times 0.208 (15.67)^2 = 5.11$ K/'

REQ'D $+M_u = \frac{1}{11} \times 0.208 (15.67)^2 = 4.64$

FROM "TYP INT SLAB @ ADMIN"

FOR MIN. $A_s = 0.0018 A_c = 0.0018 \times 12 \times 7 = 0.187$
Φ 12g = 60

CAP $M_u = 3.86$ K/FT < 5.11

OVERLOAD % 32%

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SHEET 5.7 OF

TYP. RFXT CORR. SLAB - TYP

t = 4" d = 4 - 1 - 1/2 x 0.19 = 2.9"

SPAN 1 = 10'-10" c/c (TRANSV. DIRECTION OF BLDG)
SPAN 2 = 20'-0" c/c (LONGIT. DIRECTION OF BLDG)

NOTE: TRY 1-WAY SLAB x 10'-10" c/c

CL SPAN = ≅ 10'-0"

LOADS: 4" SLAB = 50 psf @ 1.2 = 60 psf
LL = 100 psf @ 1.6 = 160
Σ DL = 150 psf w_u = 220 psf

REQ'D M_u = 1/8 x 0.220 (10)² = 2.75 k'/'

ASSUME MIN REINF = 200 lbs/sq

= 200 x 12 x 2.9 / 40,000 = 0.174 in²

T_u = 0.174 x f_y = 6.94 k

a_u = 6.94 / (0.85 x 2 x 12) = 0.34

d - a_u/2 = 2.9 - 0.34/2 = 2.73"

CAP M_u = 0.9 x 6.94 x 2.73/12 = 1.42 k'/' < 2.75 NG

TRY R_c = 0.35 T_u = 40 x 0.35 = 14 k

a_u = 14 / (0.85 x 2 x 12) = 0.69 d - a_u/2 = 2.56"

CAP M_u = 0.9 x 14 x 2.56/12 = 2.68 ~ 2.75 ok

CLOSE AS POSSIBLE SCRS

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SHEET 58 OF

CORRIDOR SLAB (CONT'd)

L = 20' c/c
S = 10.83' c/c — 10' CLR

$m = \frac{10.83}{20} = 0.54 \sim 0.50$

LOAD CASE 3 - 2 SIDES DISCONTINUOUS

ASSUME $d_{max} = 4 - 1/2 \times 0.19 - 0.19 = 2.72''$

$M = C w s^2 = C(0.220)(10.0)^2 = 220\ C$

MAX SHORT WAY $M_{max} = 0.090 \times 220 = 1.98^{k'}$
(@ FIRST INT SUP'T)

MAX LONG WAY $M_{max} = 0.041 \times 220 = 0.902$

W/ MIN STL = $0.0018 \times 12 \times d = 0.086$ IN²/'

$T_u = 0.086 \times 40 = 3.46^k/'$

$a_u = \frac{3.46}{0.85 \times 2 \times 12} = 0.169''$

$d - a_u/2 = 2.72 - 0.169/2 = 2.38$

CAP $M_u = 0.9 \times 3.46 \times 2.38/12 = 0.62'^k < 1.98$

GRT REQ'D AS S.W.
REQ'D $M_u = 1.98^{IK}/IN$

TRY AS = .27 $T_u = 0.27 \times 40 = 10.8^k$
$a_u = 10.8/0.85 \times 24/12 = 0.529''$
$d - a_u/2 = 2.72 - 0.529/2 = 2.46''$
CAP $M_u = 0.9 \times 10.8 \times 2.46/12 = 1.99 > 1.98^{OK}$

GRT REQ'D AS LW
REQ'D $M_u = 0.902$
TRY AS = 0.12 $T_u = 4.8^k$
$a_u = 0.235''$ $d - a_u/2 = 2.60$
CAP $M_u = 0.9d$
> 0.902

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SHEET 59. OF

CORRIDOR SLAB (cont'd)

NOTE: DRAWINGS FOR BLDG 549 INDICATE A 4" WALL SLAB W/ 1" COVER W/ "CLINTON WIRE MESH" (NO SIZE OR SPEC OR WIRES NOTED).
∴ d = 4 − 1 − 0.19/2 = 2.9 MAX
& 2.9 − 0.19 = 2.72 MIN (FOR 2-WAY SL)
ALSO FOR WIRE MESH f_y = 60 ksi
FOR WIRE MESH MIN TEMP A_{SL} = 0.0018 × 12 × 4 = 0.086

SW A_s − tiny A_s = 0.18

T_u = 0.18 × 60 = 10.8 k
a_u = 10.8/0.85 × 2 × 12 = 0.529
d − a_u/2 = 2.72 − 0.529/2 = 2.46

CAP M_u = 0.9 × 10.8 × 2.46/12 = 1.99
> 1.95 OK

LW A_s tiny A_s = 0.08

T_u = 4.8
a_u = 0.235"
d − a_u/2 = 2.60

CAP M_u = 0.93 k'
> 0.902 OK

CORRIDOR SLAB − ONE WAY ACTION w/ d = 2.9
NO REINF INFO ALTHO "CLINTON WIRE MESH" NOTED IN DWGS (SIZE, SPEC OR WIRES NOT KNOWN).
FOR REBAR, GRADE 40 REQ'D A_s = 0.35 IN²/FT.
FOR WWR: REQ'D A_s = 0.24 IN²/FT.

CORRIDOR SLAB − 2-WAY ACTION w/ d = 2.72" MIN

FOR REBAR WILL REQUIRE 0.27 IN²/FT. Gr 40
FOR WWR REQ'D A_s = 0.18 IN²/FT.

MIN TEMP A_{SL} = 0.0018 × 12 × 4 = 0.086 IN²/FT

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SHEET 60 OF

TYP. INT. BM @ ADMIN – 3RD FL

b × h = 14" × 20" (2ND FL)
= 12" × 20" @ 3RD FL

f'c = 2000 psi
fy = 40,000 psi

SPAN = 20' c/c
CL SPAN = 18'-10"

TRIB A = 16.83 × 18.83 = 311
R = (311 − 150) × 0.08% = 129%

LOADS: 7" SLAB = 88 psf
PART. = 20
MISC = 12
DL 1 = 120 psf @ 16.83' = 2020#
BM DL = 14 × 13 × 150/144 = 190
EDL = 2210 @ 1.2 = 2652#
LL = 50 (1 − 0.129) × 16.83' = 733 @ 1.6 = 1173
EWL: 2443 WUL = 3825

REQ'D − MU = 1/3 × 3825 (16.83)/2 = 136 K

REQ'D + MU = 1/3 × 3.825 (16.83)² = 123 K

FROM REQ'D DWGS.

TOP BARS: 6 – 1" Ø BARS
BOT BARS: 7 – 1" Ø BARS (#C 2" 3@ 3½)
STIRR: #4" Ø : 3", 2@6", 9", FROM FACE OF
KS SUP'T & BAL @ 12" o.c.

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SHEET 61 OF

TYP. INT BM (cont'd) @ ADMIN AREA - 3rd FL

@ SUPPORTS $A_s = 6 \text{ IN}^2$ $T_u = 60 \times 40 = 240^k$

$a_u = 240/0.85 \times 2.0 \times 16 = 11.76$

$d - a_u/2 = (20 - 2) - 11.76/2 = 12.11''$

CAP $M_u = 0.9 \times 240 \times 12.11/12 = 218^{'k} > 136^{'k}$ OK

@ MIDSPAN $y_b = (4@2 + 3@3.5)\frac{1}{7} = 2.64''$

$A_s = 7 \text{ IN}^2$ $T_u = 7 \times 40 = 280^k$ $a_u = \frac{280}{0.85 \times 2 \times 12} = 13.7$

$d - a_u/2 = 20 - 2.64 - 13.7/2 = 10.5''$

CAP $M_u = 0.9 \times 280 \times 10.5/12 = 220^{'k} > 123^{'k}$ OK

CHECK SHEAR

max $V = 3.825 \times 1.15 \times 18.83/2 = 41.4^k$

max V @ d away $= 41.4 - \frac{18}{12} \times 3.825 = 35.8^k$

$V_c = 2\sqrt{f'_c}\, bd = 2\sqrt{2000}\, \frac{14 \times 17.5}{1000} = 21.9^k$ (16.4)

$\phi V_c = 0.85 \times 21.9 = 18.6^k$ (0.75)

REQ'D $\phi V_s = 35.8 - 18.6 = 17.2^k$ (17.6) (19.4^k)

REQ'D $A_v = \frac{17.2 \times 12}{0.85 \times 40 \times 17.5} = 0.44 \text{ IN}^2/'$ (0.71) (0.44)

@ d away : A_v: 1/4" ⌀ @ 9" o.c. = 0.14 < 0.36 (=0.44)

CHECK MORE CLOSELY

1/4" ⌀ @ 9" o.c. $\phi V_s = 0.75 \times 0.14 \times 40 \times 17.5/12 = 6.1^k$

$\phi V_c = 16.4$ (22.5)

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SHEET 62 OF

TYP INT BM (cont'd) (Admin Area - 3rd FL)

@ supports min. A_s = 4-1" ϕ @ d = 18"

$\rho = \frac{4}{12 \times 18} = 0.0185$

$2500\ b\rho f_w \frac{V_u d}{M_u} = 2500 \times 12 \times 18 \times \frac{0.0185}{1000} \frac{V_u d}{M_u}$

$= 9.99 \frac{V_u d}{M_u}$

$\therefore V_c = 18.35 x + 9.99 \frac{V_u d}{M_u}$

$A_v = \frac{(V_u - \phi V_c) s}{\phi f_y d} = \frac{(V_u - \phi V_c) 12''/'}{0.85 \times 40 \times 18}$

$= 0.0196 [V_u - \phi V_c]$

$0.0222 [V_u - \phi V_c]$

$V_u = 41.4 - 3.825 x$

$\min M_u = 41.4 x - \frac{3.825}{2} x^2$

x	$V_u = 41.4 - 3.825x$	$M_u = 41.4x - \frac{3.825}{2}x^2$	$\frac{V_u d}{M_u}$	$V_c = 18.35x + 9.9 \frac{V_u d}{M_u}$	V_c max = 9.5 √f'c bd = 33.8 k	V_c min = 2√f'c bd = 19.3 k	needed A_v $V_u - \phi V_c$	$s = \frac{(V_u - \phi V_c)}{\text{needed } A_v \times f_y d}$	provide A_v
2	33.8	75.2	0.54	23.7	33.8	19.3	13.7	0.269	1/4"ϕ 9" = 0.140 *
3	30.0	110	0.47	22.4			15.9	0.224	1/4"ϕ 12" = 0.100
4	26.1	135	0.29	21.2			8.04	0.158	
5	22.3	159	0.21	20.5			4.97	0.096	
6	18.5	179	0.15	19.9			1.89	0.031	
7	14.6	196	0.11	19.5			—	—	

from longit rebar or add shear rebar from col face to 4' away

* get cap on bent bar @ 2.25 = 3' away from supt

$V_s = 2.0 \times 60 \sin 45° = 56$ k — ok

shear crit @ 2' from face of support to bent bar

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SHEET 63 OF

TYP GYM FL BM @ 3RD FL note: COL = 12" CLR L = 19

SIM TO TYP FLR BM [12 × 20] Red LL = (1 − 0.129) 100 = 0.87 l

LOADS: 7" SLAB 88 psf
MISC = 12
BM = 10
DL = 110 psf × 16.83' = 1857 # @ 1.2 = 2227 #
LL ~ 87 psf × 16.83' = 1464 @ 1.6 = 2343
T DL 2 3315 WU = 4565

REQ'D −Mu = 1/10 × 4.565 (19)² = 165 k

REQ'D +Mu = 1/11 (4.565)(19)² = 150 k

REINF SAME AS "TYP FLR BMS"

MOM CAP @ SUPPORTS = 218 > 165 OK (32% EXCESS)

MOM CAP @ MIDSPAN = 220 > 150 OK (46% EXCESS)

CHECK SHEAR – SAME AS "TYP FLR BM"

MAX Vu @ FACE OF SUP'T = 4.565 × 19/2 × 1.15 = 49.8 k
Vux = 49.8 − 4.565 x

Mu = 49.8 x − 4.565/2 x²

NOTE: REFER TO "TYP. INT. BM"

@ FACE OF SUPPORT d = 18"

@ "d" Vus = 49.8 − 4.565 × 1.5 = 42.9 k

PW MW = 42.9 @ 9" = 0.104 NO CHK MORE CLOSELY

MIN Vc = 2√2000 12 × 18 × 1/1000 = 19.3 k

REQ'D Av = (42.9 − 0.85 × 19.3) 12 / (0.85 × 40 × 18) = 0.102 in²/ft
0.75

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TYP. GYM FLR BM. @ 3RD FLR

X	Vu = 49.6 - 1.565x	Mu = 49.6x - 1.565/2 x²	Vu d/12 / Mu ≤ 1.0	Vc = 16.327 + 9.99 Vu d/12 / Mu	REQ'D φVs = Vu - φVc	REQ'D Av = (Vu - φVc)s / φfyd	PROV'D Av
2	40.7	90	0.68	25.1	21.9 ~~19.3~~	0.329	← 2-1" ϕ @ 9" NG
3	36.1	129	0.42	22.6	19.2 ~~16.9~~	0.330 0.342	*
4	31.5	163	0.29	21.3	15.5 ~~13.4~~	0.265 0.274	*
5	27.0	192	0.21	20.5	11.6 ~~9.6~~	0.125 ~~0.186~~	*
6	22.4	217	0.16	19.9	7.5 ~~5.5~~	0.107 0.166	*

* CAPACITY OF 2 - 1" ϕ BENT BARS @ 2 - 4.0" AWAY FROM FACE OF SUPPORT

$V_s = A_v f_y \sin\alpha = 2.0 \times 40 \times \sin 45° = 56^k$

$\phi V_s = 0.85 \times 56 = 47.6^k$ (0.75, 42) - OK

SHEAR CRIT FROM FACE OF SUP'T TO BENT BARS

BM CRIT FOR SHEAR FROM FACE OF SUP'T TO BENT BARS (± 4" AWAY)
REPAIR BM. THIS REGION W/ CARBON FIBERS

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2ND FL BMS Adm...

SIM to TYP INT BM exc. b = 14"

REQ'TS SAME AS TYP FL BM

REQ'D $-M_u = 136$ REQ'D $+M_u = 123$

CAPACITY = 12 REBAR:

@ SUPPORTS $A_s = 6.0$ IN^2 $T_u = 6.0 \times 40 = 240^k$

$a_u = \frac{240}{0.85 \times 2 \times 14} = 10.1''$ $d - a_u/2 = 20 - 2 - \frac{10.1}{2} = 12.95''$

CAP $M_u = 0.9 \times 240 \times \frac{12.95}{12} = 233^{k'}$

@ MIDSPAN $A_s = 7$ IN^2 $T_u = 7 \times 40 = 280$

$a_u = \frac{280}{0.85 \times 2 \times 14} = 10.02''$ $d - a_u/2 = 20 - 2.64 - \frac{10.02}{2} = 12.32$

CAP $M_u = 0.9 \times 280 \times \frac{12.32}{12} = 258^{k'}$

CHECK SHEAR

$V_x = 41.9 - 3.625x$ @ d: $V_d = 41.9 - \frac{14}{12} \times 3.625 = 35.7^k$

$M_x = 41.4x - \frac{3.625}{2}x^2$ $M_d = 41.4 \times 14 - \frac{3.625}{2}(14)^2 = 57.8^{k'}$

ρ @ supports $= \frac{4.0}{14 \times 18} = 0.0159$

$2500\rho\, bd \frac{V_u d}{M} = \underbrace{2500 \times 0.0159 \times 14 \times 18}_{10.017} / 1000 \left[\frac{V_d}{M_u}\right]$

$= 10.017 \frac{V_d}{M_u}$

$V_c = 1.9\sqrt{f'_c}\, bd = 1.9 \times \sqrt{2500} \times \frac{14 \times 18}{1000} = 21.41^k$

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CHECK TYP INT 2ND FLR BEAM @ ADMIN CONTROL

$V_c = 1.9\sqrt{f'_c}\,bd + 2500\rho \frac{Vd}{M_u} bd$

$= 21.41 + 10.017 \frac{Vd}{M_u}$

@ d away : $V_c = 21.41 + 10.017 \times \frac{35.7 \times 18/12}{57.8} = 30.7^k$

$\phi V_c = 0.75 \times 30.7 = 23.0^k$

$V_s = \frac{A_v f_y d}{s}$ #4 @ 9" o.c. $A_v = 0.14$

$= \frac{0.14 \times 60^k/\square'' \times 18}{12} = 8.4^k$

$\phi V_s = 0.75 \times 8.4 = 6.3^k$

$\therefore$ CAP $\phi V_c + \phi V_s = 23 + 6.3 = 29.3^k$

REQ'D $V_u = 35.7^k > 29.3^k$ 21% OVERSTR

2ND FL BM:
FLEXURE OK - 71% EXCESS CAP.
SHEAR 21% OVERSTRESSED

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TYP 2ND PL BARRACKS BM [14'x20']

NOTE SIM TO 3RD PL EXC. BL 14' & L = 40

note: red. L = (10 - 0.129)/40 = 35 psf

3RD PL L = (11.0 - 0.129)/50 = 44

Reduction in L = (44 - 35) 16.83' = 151 #/' @ 1.6 = 241

∴ by RATIO w/ 3RD PL TYP PL 10 mm BM

WW @ 2ND PL BARRACKS: 3821 - 241 = 3583 #/'

∴ REDID - Mu = $\frac{3583}{3821}$ x 136 = 127 k < 233

REDID V @ d = $\frac{3583}{3821}$ x 35.6 = 33.5 k < 29.3

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CORRIDOR RXT. BM

b x h = 6" x 2'-3" ±
SPAN = 20' c/c & 16' CLR

LOADS: CONC SLAB = 6.5' x 60 psf = 330 #/'
BM = 0.5' x 1.92' x 150 = 144
RAILING 3' 10 psf x 4' = 40
EQL = 514 @ 1.2 = 617 #/'
LL = 5.5' x 100 psf = 550 @ 1.6 = 880
Σ = 1064 1497 #/'

MAX NEG MOM = Fo x 1.497 (16)² = 38.3 'k

MAX POS MOM = Fi x 1.497 (16)² = 34.8 'k

FROM RXT DWGS: b x h = 6" x 27"
2-3/4" ϕ STR @ 1½" + 1-3/4" ϕ BOTT @ 3"
@ MIDSPAN = (2 x 1.5 + 1 x 3) ÷ 3 = 2"
1/4" ϕ STIRR 5@6, 2@9" FROM SUPPORTS, BAL @ 12"

@ MIDSPAN d = 27 - 2 = 25"
Tu = 40 x 8 x 3/4 x 3/4 = 67.5 'k a = 67.5 / (0.85 x 6 x 8) = 6.61"
d - a/2 = 25 - 6.61/2 = 21.7"
CAP Mu = 0.9 x 67.5 x 21.7/12 = 110 > 38.3

@ SUPPORT AS = 2-3/4" ϕ
Tu = 2 x 40 x 3/4 x 3/4 = 45 'k
a = 45/0.85 x 2 x 6 = 4.41"
d - a/2 = 25 - 4.41/2 = 22.8"

CAP Mu = 0.9 x 45 x 22.8/12 = 76.9 'k
> 38.3

EXCESS CAP = 200%

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CORR EXT BM (CONT'd)

CHECK SHEAR

$V_u = 1.15 \times 1.497 \times 16/2 = 13.8^k$

Cd away $V_u = 13.8 - \frac{25}{12} \times 1.497 = 10.7^k$

$\phi V_c = 0.85 \times 2\sqrt{2000} \times \frac{6 \times 25}{1000} = 17.2^k$

"480 c2 $\phi V_s = \frac{0.85 \times 0.10 \times 60}{12} \times 25 = 7.1$

$\Sigma V = 24.3^k > 13.8$

Excess = 19%

CORR BM @ EXT WALL LINK.

Note: wall is BRG wall ∴ BM is req'd only over opngs.

Ext BM = 10" x 27" w/ 2-3/4" Φ bars

Pg insp bm is ok

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SHEET 70 OF

TYP COL @ CORRIDOR — INFL AREA = 40' × 5.42' = 216 SF

ROOF TRIB A = 20 × 5.42' = 108 SF
TYP FL TRIB A = 20 × 5.42 = 108 SF

ROOF DL = 0.035 KSF × 108 SF = 3.8 K @ 1.2 = 4.6 K
3RD FL DL = 0.097 KSF × 108 = 10.5 @ 1.2 = 12.6
Σ BELOW 3RD FL = 14.3 K 17.2 K
2ND FL = 0.097 × 108 = 10.5 @ 1.2 = 12.6
Σ BELOW 2ND FL 24.8 K 29.8 K

ROOF LL = 0.020 × 108 = 2.2 K @ 1.6 = 3.5 K
3RD FL LL = 0.10 × 108 = 10.8
Σ BELOW 3RD FL = 13.0 @ 1.6 = 20.8 K
2ND FL = 0.10 × 108 = 10.8
Σ LL BELOW 2ND FL = 23.8 @ 1.6 = 38.1 K

ROOF Σ DL = 3.8 + 2.2 = 6.0 K (PU = 4.6 + 3.5 = 8.1)

BELOW 3RD FL Σ DL = 14.3 + 13.0 = 27.3 K (PU = 17.2 + 20.8 = 38.0)

BELOW 2ND Σ DL = 24.8 + 23.8 = 48.6 (PU = 29.8 + 38.1 = 67.9)

COL = 10" × 48" w/6 - 3/8" ϕ VERT & 3/8" ϕ TIES @ 24"

CHECK @ GRID FL

H = 12'-7" FLR/FL

HU = 12.58 - 0.58 = 12'

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TYP. EXT. CORN. COL (CONT'D)

$f'_c = 2000$ psi $f_y = 40$ ksi

for tied cols $\phi P_n = 0.80\phi[0.85 f'_c(A_g - A_s) + f_y A_s]$

6 3/8" ϕ : $A_s = 3/8 \times 3/8 \times 6 = 0.64$ in^2

$A_g = 10 \times 48 = 480$ in^2

$A_g - A_s = 480 - 0.64 = 479.36$ in^2

$\therefore \phi P_n = 0.80 \times 0.70[0.85 \times 2 \times 479.36 + 0.64 \times 40] =$

$= 0.56[816 + 3.3.6] = 481 + 19 = 500$ k

$\gg 67.9$ k

CHECK TIE REQ'T:

MAX SPCG = 16 [VERT BAR DIA] = $16 \times 3/8 = 6$"
OR = 48 [TIE BAR DIA] = $48 \times 3/8 = 18$"
OR = LEAST DIM OF COL = 10"

ACTUAL SPCG = 24" > 6"

$\rho_g = \frac{0.64}{480} = 0.00175 < 0.01$

THIS "COL" DOES NOT CONFORM TO A TIED COL

CAN REDUCE 50% FOR 1/2 STIRRUPS.

REQ'D $A_{st} = 0.01 \times 480 = 4.80$ in^2

MAX TIE SPCG ALLOWED = 6" > 24"

CHECK AS BRG WALL

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TYP EXT CONN CA (CONT'd)

NOTE: try CHECKING AS A CONC WALL

$A_g = 480 \text{ IN}^2$ (= 10 × 48)

$P_{u2} = 67.9$

$\frac{P_u}{A_g} = \frac{67.9}{480} = 0.141 \text{ ksi}$

$\text{on } \phi P_{NW} = 0.55 \phi f'_c A_g \left[1 - \frac{kL}{32h}\right]$

$= 0.55 \times 0.70 \times 2 \times 10 \times 48 \left[1 - \left(\frac{1.0 \times 12 \times 12}{32 \times 10}\right)^2\right]$

$= 147 \text{ K} > 67.9 \text{ K}$ ok

CAN TREAT AS BRG WALL

STRESSES OK

EXCESS = $\frac{147}{67.9} = 2.1$

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TYP. INT. COLS. (W/O GYM FL LOADS)

TRIB A = 20' x 16.83' = 337 SF/FLR

INFL. AREA: 40 x 33.67 = 1346 USE R = 0.6 (MAX)

ROOF DL = 337 x 0.035/KSF = 11.8K @ 1.2 = 14.4
LL = 337 x 0.016 = 5.4 @ 1.6 = 8.6
D+L BELOW ROOF = 17.2K Pu = 22.4K
3RD FL DL = 337 x 0.133 = 44.8 @ 1.2 = 53.8
RED LL = 337 x 0.01 x 0.6 = 6.7 @ 1.6 = 10.8
Σ D+L BELOW 3RD FL = 68.9K Pu = 87.0K
2ND FL DL = 44.8 @ 1.2 = 53.8
2ND FL LL = 6.7 @ 1.6 = 10.8
Σ D+L BELOW 2ND FL = 120.4K Pu = 151.6K

GR'D → 2ND FL

H = (11'-7") - 7" = 12' = 144"
EXT COL = 14x14 w/ 4-1" Ø BARS

Ag = 14x14 = 196
As = 4x1.0 = 4
Ag-As = 192

Pu = 151.6K M1 = M2 = 0

FOR TIED COL CAP $\phi P_n = 0.80\phi[0.85 f'_c(A_g - A_s) + f_y A_s]$
$= 0.80 \times 0.70[0.85 \times 2(196 - 4) + 40 \times 4]$
$= 0.56[326 + 160] = 272K$

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CHECK TYP INT COLS W/O GYM FC LOADS (cont'd)

$L_u = 12'$

$\frac{KL}{r} = \frac{1.0 \times 12 \times 12}{0.3 \times 14} = 34$

END MOMS M_1 & $M_2 = 0$

$\therefore 34 - 12 \frac{M_1}{M_2} = 34 = \frac{KL}{r}$

Note: Since shear walls provide lateral-force resistance col is non-sway.

since $34 - 12 \frac{M_1}{M_2} = 34 \not< \frac{KL}{r}$

CAN NEGLECT SLENDERNESS

since $\phi P_N > P_u$ - ok

Least col ok Excess $= \frac{272}{151.2} = 179$

79% EXCESS CAP

BETW 2ND & 3RD FLS

$P_u = 87.0^k$

col = 12x12 w/ 4 - 3/4" ϕ $A_g - A_s = 12 \times 12 - 4(3/4)^2 = 141.75$ (2.25)

$\phi P_n = 0.80 \phi [0.85 f'_c (A_g - A_s) + f_y A_s]$
$= 0.80 \times 0.70 [0.85 \times 2 (141.75) + 60 \times 2.25]$
$= 0.56 \times [241 + 90] = 185^k$

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typ int col @ GYM AREA

ROOF TL = 0
Typ FL TL = 20' × 16.33' = 337 SF

NO PARTITION

3RD FL DL = 337 × (0.133 − 0.020) = 38K @ 1.2 = 45.7K
LL = 337 × 0.10 × 0.40 = 13.5 @ 1.6 = 21.6
Σ BELOW 3RD FL = 51.5 PU = 67.3

2ND FL DL = 337 × 0.133 = 44.8 @ 1.2 = 53.8
LL = 337 × 0.15 × 0.42 = 6.7 @ 1.6 = 10.8

Σ BELOW 2ND FL = 103.0 PU = 131.9K

Note: COL CAPS & TYP. COL
∴ still OK

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TYP. INT COL FTG @ ADMIN

EP DTL @ COL W/O SYM BL LOADS: 120.4 K & Pu = 151.6 K)
REQ'D SIZE: 5'-0" x 5'-0" x 12" W/ 3'-0" SQ PEDESTAL x 12"
B - 3/4" ⌀ EW
B - 3/4" ⌀ SW

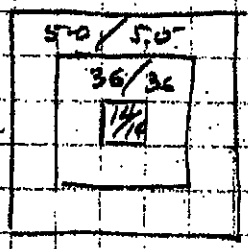
SOIL P = $\frac{120.4}{5 \times 5}$ = 4.81 KSF

ALLOW SP = 3.50 KSF > 4.81

38% OVERSTRESS

CHECK FTG REINF FOR STRESSES

$\frac{P_u}{A_f} = \frac{151.6}{5 \times 5} = 6.06$ KSF



CHECK @ FACE OF PEDESTAL
AVG d = 12" - 3 - 3/4 = 8.25
min d = 12 - 3 - 3/4 - 3/8 = 7.5"

PUNCHING V @ d/2 FROM MEM. FACE

$V_u = 6.06\left[5 \times 5 - \frac{(36+7.5)^2}{144}\right] = 70.0$ K

$b_o = 4(36 + 7.5) = 175.2$"

$V_c = \left(2 + \frac{4}{\beta_c}\right)\sqrt{f'_c}\, b_o d$ ✓ col dimen.

($\beta_c = \frac{L}{S}$ c/w)

$V_c = (2 + 4)\sqrt{2000}\,\frac{175.2 \times 8.25}{1000} = 367$

$\phi V_c = 0.75 \times 367 = 275$ K > 75.8 OK

$M_u = \frac{1}{2} \times 6.06\left[\frac{5-3}{2}\right]^2 \times 5' = 15.1$ K

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TYP INT. FTG (cont'd) @ Δ dmin $f'_c = 1500$ psi

$T_u = 8 \times (3/4)^2 \times 40 = 180^k$

$a_u = \frac{180}{0.85 \times 1.50 \times 5 \times 12} = 2.35''$

$d - a_u/2 = 7.8 - 2.35/2 = 6.62'$

CAP $M_u = 0.9 \times 180 \times 6.62/12 = 89.4^{'k} > 15.1$ ok

BM SHEAR @ d away

BM $V = 6.08 \times 1.5 \times 5 \times \left(\frac{5.0 - 3.0}{2} - \frac{7.8}{12}\right) = 10.7^k$

$V_c = 2\sqrt{f'_c}\, bd = 2\sqrt{1500}\, 60'' \times \frac{7.8'}{1000} = 36.3^k$

$\phi V_c = 36.3 \times 0.70 = 25.4^k > 10.7$ ok

CHECK @ FACE OF COL

$d_{min} = 7.8 + 12 = 19.8''$ $d_{avg} = 8.25 + 12 = 20.25$

Punching $V @ d/2 = 6.08\left[5 \times 4.67 - \frac{(14 + 20.25)^2}{144}\right] = 92.1$

$b_o = 4(14 + 20.25) = 137''$

$V_c = \left(2 + \frac{4}{1}\right)\sqrt{1500} \times \frac{137 \times 20.25}{1000} = 645^k$

$\phi V_c = 0.70 \times 645 = 451^k > 92.1$ ok

$M_u = \frac{1}{2}(6.08)\left(\frac{5 - 1.17}{2}\right)^2 \times 5' = 55.6$ ok

$a_u = 180/0.85 \times 1.5 \times 36 = 3.92$ $\therefore d - \frac{a_u}{2} = 19.8 - \frac{3.92}{2} = 17.8$

CAP $M_u = 0.9 \times 180 \times 17.8/12 = 240^{'k} > 55.6$ ok

$V_u = 6.08[5 - 1.17/12 - 7.8/12] \times 1.5 \times 16 = 78.1^k$

$\phi V_c = 0.70\sqrt{1500}\, 13 \times 18.8/1000 = 126.8^k > 78.1^k$ ok

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TYP INT. FTG @ BARRACKS BLDG

NOTE SIM TO ADMIN BLDG BUT LL2 60 psf

REPEAT TO TYP INT COL FTG @ ADMIN BLDG

ROOF	DL = 337 SF × 0.035 ksf =	12.0 k	@ 1.2 =	14.4 k
	LL = 337 × 0.016 =	5.4	@ 1.6 =	8.6
3RD FL	DL = 337 × 0.137 =	44.8	@ 1.2 =	53.8
	LL = 337 × 0.04 × 0.42 =	5.4	@ 1.6 =	8.6
2ND FL	DL = 337 × 0.137 =	44.8	@ 1.2 =	53.8
	LL = 337 × 0.04 × 0.42 =	5.4	@ 1.6 =	8.6
Σ :		117.8 k		146.2 k

$SP = \frac{117.8}{5 \times 5} = 4.71$ ksf 35% OVERSTRESS

FTG SECTION OK - LOADS < COL @ ADMIN. BLDG

@ ULT: $SP = \frac{146.2}{5 \times 5} = 5.85$ ksf

NOTE: DETAILS SAME AS TYP INT FTGS @ ADMIN

RELATIVE VALUES RATIO OF SOIL PRESSURES

$RATIO = \frac{5.85}{6.08}$ [ADMIN VALUES]

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TYP EXT COL FTG

REINF FTG: 2' WIDE x 12" - NO LENGTH NOTED ON DWGS
REINF - CLINTON WIRE MESH - NO SIZE OR SPCG OF WIRES NOTED IN DWGS

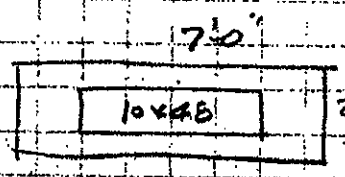
E COL D+L = 48.6 K P_u = 67.9 K

COL = 10" x 48"

NEED FTG A = $\frac{48.6}{3.5 \text{ ksf}}$ = 13.9 SF → 2' x 7.0'

ASSUMING EXT FTG = 2' x 7'

$P_u = \frac{67.9 \times 7}{2 \times 7} = 4.98$ ksf



t = 12 d_{AVG} = 12 - 3 - 3/16 = 8.8"
d_{min} = 8.8 - 3/16 x 1/2 = 8.7"

PUNCHING V c d/2
(18.8) (56.8)

b_o = (10+8.8)2 + (48+8.8)2 = 157 or b_o' = 2x24 = 48

$V_o = 4.98[2 \times 7 - \frac{18.8 \times 56.8}{144}] = 32.8$ K or $V_o' = 4.98[2 \times 7 - 2 \times \frac{56.8}{12}]$ = 22.6 K

$V_c = (2 + \frac{4}{\beta_c})\sqrt{f'_c}\, b_o d$ $\beta_c = \frac{48}{10} = 4.8$

$= (2 + \frac{4}{4.8})\sqrt{1500} \times \frac{157 \times 8.8}{1000}$ or $V_c' = (2 + \frac{4}{4.8})\sqrt{1500} \times \frac{48 \times 8.8}{1000}$

= 146 K = 46.4 K

ϕV_c = 146 K x .70 = 102 K > 32.8 OK $\phi V_c'$ = 46.4 x .7 = 32.4 > 22.6 OK

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Typ. Ext wall Ftg (cont'd)

Bm shear @ d away

$V_d = \left[\frac{7-4}{2} - \frac{8.7}{12}\right] 4.98 \times 2' = 7.72^k$

$V_c = 2\sqrt{f'_c}\, bd = 2\sqrt{1500}\, \frac{24 \times 8.7}{1000} = 16.1^k$

$\phi V_c = 0.7 \times 16.1 = 11.3^k > 7.7^k$ ok

Check reqd As @ col face

$M_u = \frac{1}{2} \times 4.98 \left[\frac{7-4}{2}\right]^2 \times 2' = 11.2^{'k}$

Try $A_s = 0.15 \times 72 = 0.3^{in^2}$

$T_u = 0.30 \times 60 = 18^k$ — $a = \frac{18.0}{0.85 \times 7^{ksi} \times 24^{in}} = 0.368$

$d - a/2 = 8.7 - \frac{0.368}{2} = 8.4'$

CAP $M_u = 0.9 \times 18 \times 8.4'/12 = 11.3^{'k} > 11.2$

NO SIZE & SPCG OF CONTROL WIRE MESH NOTED ON DWGS. WILL REQUIRE MIN $A_s = 0.15^{in^2}/ft$

NOTE: BY SCALING EXIST DWGS FTG SCALES 5'-6' long

CHECK FTG ASSUMING 2'-0" x 5'-6" x 12" FTG w/ MIN REINF = .0018 b h

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TYP. INT. COL. CONN. FTG (Cont'd)

$\Sigma D + L = 48.6^k$ $\Sigma D_u = 67.9^k$

ASSUME 2'-0" x 5'-6" x 12" FTG (NO SCALING)
w/ MIN REINF = 0.0018 bh

DL $SP = \frac{48.6}{2 \times 5.5} = 4.41$ ksf > 3.50

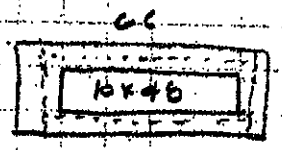
ULT $SP = \frac{67.9}{2 \times 5.5} = 6.17$ ksf

ASSUME MIN REINF = 0.0018 x 12 x 12 = 0.259 IN²/FT

t = 12" d AVG = 12 - 3 - 0.188 = 8.81
d MIN = 8.81 - ½ x 0.188 = 8.72

PUNCH SHEAR @ d/2 AWAY

COL IS 10" x 40"
FTG IS 24 x 66



b_o = PERIMETER @ d/2 AWAY FROM COL FACE

b_{o1} = SECTION THRU FTG @ d/2 FROM COL

$b_o = (10 + 8.81)2 + (40 + 8.81)2 = 151"$ $b_{o1} = 24 \times 2 = 48"$

$V_o = 6.17\left[2 \times 5.5 - \frac{(10.81 \times 50.81)}{144}\right] = 41.6^k$ $V_{o1} = 6.17\left[5.5 - \frac{50.81}{12}\right]2 = 10.3$

$V_c = \left(2 + \frac{4}{\beta}\right)\sqrt{f'_c}\, b_o d$ $\beta = \frac{40}{10} = 4.0$

$= \left(2 + \frac{4}{4.0}\right)\frac{\sqrt{1500}}{1000} b_o d = 0.110\, b_o d$

$V_{co} = 0.110 \times 151 \times 8.81 = 146^k$ $V_{o1} = 0.110 \times 24 \times 2 \times 8.81 = 46.5$

$\phi V_{co} = 0.70 \times 146 = 102^k > 41.6$ $V_{o1} = 0.70 \times 46.5 = 32.5^k$
> 10.3

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TYP RET CONC COL (CONT'D)

BM SHEAR @ d away

L.W "OVERHANG" = $\frac{5.15-4.0}{2} = 0.75'' < d$ ∴ not crit

S.W "OVERHANG" = $\frac{2.0-0.63}{2} = 0.59'' < d$ ∴ not crit

Since PTG extension beyond face < "d" bm shear not critical

$\phi V_c = 0.75 \times 2\sqrt{f'_c} \times \frac{24 \times 8.72}{1000} = 16.2^k$

FLEXURE L.W (more critical than S.W)

$-M_u = \frac{0.17}{2}(0.75)^2 = 1.74^k/ft = 3.48$

min $A_s = 0.0010 \times 12 \times 12 = 0.259\ in^2/ft$

$T_u = 60 \times 0.259 = 15.6^k$ $a_u = \frac{15.6}{0.85 \times 4 \times 12} = 1.02''$

$d - a_u/2 = 8.72 - \frac{1.02}{2} = 8.21''$

CAP $M_u = 0.9 \times 15.6 \times \frac{8.21}{12} = 9.61\ ^k/ft$
$= 19.22^k$
> 3.48

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TYP. PLND WALL FTG

ROOF = 567' × 0.035 kf =	0.20 ⅓ @	1.2 =	0.24
WL = 567' × 0.012 (CEIL) =	0.07	@ 1.6 =	0.11
3RD FL = 567 (0.133 − 0.005) =	0.73	@ 1.2 =	0.87
WL = 567' (0.050 × 0.4) =	0.11	@ 1.6 =	0.18
2ND FL (SAME AS 3RD) = 0.73 + 0.11 =	0.84	=	1.05
10" WALL 0.125 ksf × 37' =	4.63	@ 1.2 =	5.55
6" WALL = 0.075 × 61' =	0.45	@ 1.2 =	0.54
Σ	7.02		8.54

EXT FTG = 240"

SOIL P = $\frac{7.02}{2.8}$ = 2.49 ksf < 3.50

surplus CAP = 41% OK

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TYP. RST WALL FTG AWAY FROM GYM AREA @ COMM + ADMIN

DOOR DL = 14' × 0.035 kf =	0.49 k	@ 1.2 =	0.59 k
LL = 14' × 0.012 ksf =	0.17	@ 1.6 =	0.27
3RD FL = (0.183 − 0.005) 8.5' =	1.09	@ 1.2 =	1.31
COMM = (0.097 − 0.027) 5' =	0.22	@ 1.2 =	0.26
LL = 0.050 × 0.4 × 8.5' =	0.17	@ 1.6 =	0.27
COMM LL = 0.10 × 0.4 × 5' =	0.20	@ 1.6 =	0.32
2ND LL (SAME AS 3RD FL) =	1.68		2.16
* 10" CONC WALL = 0.125 ksf × 37' × 0.60 =	2.77	@ 1.2 =	3.33
6" CONC CURB = 0.075 × 6' =	0.45	@ 1.2 =	0.54
Σ =	7.24 k		9.05

* ASSUME NET WALL = 60% OF TOTAL WALL AREA

RST FTG = 1'-10" WIDE W/ "CLINTON WIRE MESH" (NO WIRE SIZE ON SPCG NOTED ON PLANS)

SOIL P = $\frac{7.24}{1.83}$ = 3.96 ksf − 13% OVERSTRESSED.

TYP. WALL FTG @ REAR AWAY FROM GYM AREA + ADMIN

ROOF DL = 0.49 + 0.17 =	0.66 k	W = 0.53 + 0.27 =	0.80 k
3RD FL DL = 1.09 + 0.17 =	1.26	W = 1.31 + 0.27 =	1.58
2ND FL DL =	1.26	W =	1.58
WALLS = 2.77 + 0.45 =	3.22	W = 3.33 + 0.54 =	3.87
W =	6.40 k	Σ W =	7.89

RST FTG = 1'-10" − SP = $\frac{6.40}{1.83}$ = 3.497 ksf

NO SURPLUS CAP.

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TYP WALL FTG @ GYM CONC WALL

ROOF DL = 25 psf × 30' =	750 LB/FT	@ 1.2 =	900 #/'
LL = 12 psf × 30' =	360	@ 1.6 =	576
3RD LL (GYM) (133 - 20) 14' =	1582	@ 1.2 =	1896
LL = 100 × 0.4 × 14' =	360	@ 1.6 =	896
2ND LL (ADMIN) 133 × 8.5' =	1130	@ 1.2 =	1357
CONC = (133 - 20) 5 =	565	@ 1.2 =	678
LL = 50 × 0.4 (8.5') =	170	@ 1.6 =	272
WIND LL = 100 × 0.4 × 5' =	200	@ 1.6 =	320
10" CONC WALL = 125 psf × 46' =	5750	@ 1.2 =	6900
6" CONC WALL = 75 psf × 6' =	450	@ 1.2 =	540
Σ	11,517		14337

(L) FTG = 5'-0" WIDE

∴ SP = $\frac{11517}{5}$ = 2303 psf < 3500 - OK

EXCESS = $\frac{3500}{2303}$ = 1.5:1 (47%)

NO DETAIL ON FTG REINF FOUND ON DWGS

SSFM INTERNATIONAL
SSFM International, Inc.
501 Sumner Street, Suite 502 • Honolulu, Hawaii 96817-5304
Ph: (808) 531-1308 Fax: (808) 521-7348

PROJ. NO.
PROJECT
PREPARED BY DATE
CHECKED BY DATE
SHEET 86 OF

TYP EXT WALL @ DARKROOMS

Note: Sim to Admin except LL2 40 psf VS 50 psf

Red. LL2 0.4×40 = 16 psf VS 0.4×50 = 20

For 2 flrs Δw = (20-16) psf = 4 psf

Bldg walls @ Admin Ew = 7.02 k/ft
Deduct ΔLL2 4 psf × 8.67'×2 / 1000 = 0.05

Ew = 6.97 k/

SP = 6.97/2.83 = 2.46 kcf

Conn Ext wall
@ Admin Ew = 7.24 k/
Ded. ΔLL2 4 psf × 8.5'×2 / 1000 = 0.07

Ew = 7.17 k/

SP = 7.17/1.83 = 3.92 kcf

Ext rear wall
@ Admin Ew = 6.40 k/
Ded ΔLL2 4 psf × 8.5×2 / 1000 = 0.07

Ew = 6.33 k/

SP = 6.33/1.83 = 3.46 kcf

(*) **Wire Fabrics** are especially advantageous for use in floor systems of structural steel or reinforced-concrete frames, as they are less likely to be displaced in erection and the distribution of the reinforcement provides more effectively against unequal temperature-stresses than larger units more widely spaced. The wire is manufactured under Standard Specifications for for cold-drawn wire. The basic difference between HOT-ROLLED BARS and COLD-DRAWN WIRE is an increase in ultimate strength of the latter, using the material of the same low carbon-content and ductility as that employed in the hot-rolled bar, through the action of cold-working of the metal. The cold-drawn wire has no definite yield-point, the wire continuing to stretch gradually with increased stress even after the true elastic limit of the material has been passed, compared to the sudden large elongation of the hot-rolled product at its yield-point. Slabs reinforced with wire fabric will develop a large number of small and well-distributed cracks with large deformation and deflection before failure. With steel of the same ultimate strength, cold-drawn wire can be stressed with the same degree of safety about 25% beyond the hot-rolled product.

On the other hand, the increased strength due to cold working may be offset by the high temperatures transmitted through the protective covering outside of the reinforcement when attacked by fire. In a 2 000° F. fire, the temperature of the reinforcement may reach as high as 1 700°, sufficient to anneal the wire when cooled.† Another disadvantage of the cold-drawn product is the lack of flexibility of the material and the difficulty of unrolling the wire and holding it in place in the concrete floor-forms. Because of this difficulty, low-carbon mild steel is frequently substituted in practice still using the higher working stresses permitted with cold-drawn wire. Furthermore, electric welding of the fabric at mesh intersections is not effectively accomplished on mild steel hot-drawn products, and samples of welded fabric selected in the field are apt to show the properties of ordinary hot-rolled mild steel in physical tests.

Triangle Mesh Wire Reinforcement. Under this name the American Steel and Wire Company is manufacturing a wire fabric of cold-drawn steel wire for the reinforcement of fire-proof floors. A detail of the standard material is shown in Fig. 89. The triangular mesh is built up of either single or stranded longitudinals with the cross-wires or bond-wires running diagonally across the width of the fabric. It is claimed that the triangular mesh affords an even distribution of the steel, reinforcing in every possible direction and that the strength is increased by reason of the truss-construction. The longitudinal wires in Triangular Mesh are invariably spaced 4 in on centers but the diagonal wires may be spaced either 4 or 8 in apart. The manufacturers can furnish different styles, giving variations in the cross-sectional area as shown in Table XVII. The material is furnished either galvanized or plain. This type of fabric results in greater load-bearing capacity than electrically welded rectangular mesh of equal areas and weights.

American Electrical Welded Fabric, shown in Fig. 90, is also manufactured by the American Steel and Wire Company in sizes of mesh and weights in Table XVIII. The cross-wires are rigidly secured to the longitudinals to prevent the latter from slipping in place. It is furnished either plain or galvanized.

Clinton Welded-Wire Fabric is manufactured by the Wickwire Spencer Steel Co., New York, of sizes and mesh similar to American fabric.

*A.S.T.M. Spec. A 82-27.

† Cinder Concrete Floor Construction, Trans. Am. Soc. C. E., Vol. LXXIX, 1916.

Table XVII. Triangle Mesh Woven Wire Concrete Reinforcement

Style No.	Number and gauge of wires each, longitudinal, A. S. & W. Co.'s steel wire gauge	Sectional area longitudinals, sq in per ft width	Effective sectional areas, sq in per ft of fabric: Transverse	Effective sectional areas, sq in per ft of fabric: Longitudinal	Approximate weight, lb per 100 sq ft
Longitudinals Spaced 4 in. Cross Wires No. 14 Gauge, Spaced 4 in					
032	1—No. 12 gauge	.026	.022	.032	22
040	1—No. 11 gauge	.034	.022	.040	25
049	1—No. 10 gauge	.043	.022	.049	28
058	1—No. 9 gauge	.052	.022	.058	32
068	1—No. 8 gauge	.062	.022	.068	35
080	1—No. 7 gauge	.074	.022	.080	40
093	1—No. 6 gauge	.087	.022	.093	45
107	1—No. 5 gauge	.101	.022	.107	50
126	1—No. 4 gauge	.120	.022	.126	57
146	1—No. 3 gauge	.140	.022	.146	65
153	1—¼ in	.147	.022	.153	68
168	1—No. 2 gauge	.162	.022	.168	74
180	2—No. 6 gauge	.174	.022	.180	78
208	2—No. 5 gauge	.202	.022	.208	89
245	2—No. 4 gauge	.239	.022	.245	103
267	3—No. 6 gauge	.261	.022	.267	111
287	3—No. 5½ gauge	.281	.022	.287	119
309	3—No. 5 gauge	.303	.022	.309	128
336	3—No. 4½ gauge	.330	.022	.336	138
365	3—No. 4 gauge	.359	.022	.365	149
395	3—No. 3½ gauge	.389	.022	.395	160
Longitudinals Spaced 4 in. Cross Wires No. 14 Gauge, Spaced 8 in					
036P	1—No. 12 gauge	.026	.009	.036	17
044P	1—No. 11 gauge	.034	.009	.044	20
053P	1—No. 10 gauge	.043	.009	.053	24
062P	1—No. 9 gauge	.052	.009	.062	27
072P	1—No. 8 gauge	.062	.009	.072	31
084P	1—No. 7 gauge	.074	.009	.084	35
097P	1—No. 6 gauge	.087	.009	.097	40
Longitudinals Spaced 4 in. Cross Wires No. 12½ Gauge, Spaced 8 in					
03R	1—No. 12 gauge	.026	.014	.041	21
04R	1—No. 11 gauge	.034	.014	.049	24
05R	1—No. 10 gauge	.043	.014	.058	28
07R	1—No. 9 gauge	.052	.014	.067	31
07R	1—No. 8 gauge	.062	.014	.077	35
08R	1—No. 7 gauge	.074	.014	.089	40
10R	1—No. 6 gauge	.087	.014	.102	44
Longitudinals Spaced 4 in. Cross Wires Nos. 14 and 12½ Gauge, Spaced 2 in (This material is used principally for cement gun work)					
No.	Number of wires each, longitudinal	Gauge of wires each, longitudinal	Gauge of cross wires	Approximate weight, lb per 100 sq ft	
	1	12	14	31	
	1	10	14	37	
	1	8	14	44	
	1	6	14	53	
	1	12	12½	42	
	1	10	12½	48	
	1	8	12½	55	
	1	6	12½	64	

Standard lengths 150, 200 and 300 ft.

Approximately 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 and 56 in.

Plain or galvanized.

Strength: Standard, 70,000 to 85,000 lb per sq in.

Total thickness of slab = 4.67+0.25 + 1.50 = 6.42 in, in which the distance below the rods is increased from 1 in, to 1½ in, as the two layers of rods cannot lie in the same plane.

Accept the larger of these values, giving a slab-thickness of 6½ in.

(6) By formula

$$\text{Short direction} \quad A_s = \frac{M}{f_s jd} = \frac{28\,240}{18\,000 \times 0.883 \times 5.25} = 0.34 \text{ sq in}$$

$$\text{Long direction} \quad A_s = \frac{M}{f_s jd} = \frac{26\,438}{18\,000 \times 0.883 \times 4.75} = 0.35 \text{ sq in}$$

Accept ½-in rounds 7 in on centers both ways.

Note that the formula $A_s = pbd$ could be used to determine the steel area, but in this case the depth required by moment (see (4) and (5)) has been slightly increased to give an even half inch (6½ in) and there is no object in supplying steel to balance the additional concrete.

(7) The computation for shear is omitted as unnecessary.

(8) By formula

Bond stress in short direction

$$u = \frac{V}{\Sigma ojd} = \frac{1\,765/2}{(1.7 \times 1.57) \times 0.875 \times 5.25} = 72 \text{ lb per sq in}$$

Bond stress in long direction

$$u = \frac{V}{\Sigma ojd} = \frac{1\,224/2}{(1.7 \times 1.57) \times 0.875 \times 4.75} = 55 \text{ lb per sq in}$$

in which V is one-half the load carried in each direction on a 1-ft strip; 1.7 the number of rods in the slab, in each direction, per ft of width (7 in on centers); 1.57 the perimeter of the cross-section of a ½-in round rod in inches; 0.875 the value of j used in shear and bond computations; 5.25 and 4.75 are the effective depths, d, of the slab in each direction, in inches.

This bond stress is acceptable for plain rods. All reinforcement should be anchored at terminations and lapped over supports.

This design is made in accordance with the requirements of the more severe building ordinances, employing the full computed amount of reinforcement without any reductions by reason of flat-plate action. The distribution of the reinforcement is shown in Fig. 18. Under Bending Moments in Slabs will be found the moment reductions recommended by the author for two-way slabs.

Distribution of Reinforcement in Slabs. In order to provide for the negative bending moments over supports in continuous slabs, a portion of the main reinforcement is raised at about the fifth point of the clear span and carried over the supporting beam, or wall, at a height of one inch below the top of the slab. In the case of SLIGHTLY RESTRAINED SPANS, it is good practice to raise from one-third to one-half of the steel adjacent to the supports: this occurs where concrete slabs are carried by spandrel beams. Where the slabs are FULLY CONTINUOUS, however, it is desirable to raise alternate rods from each span, thereby giving the same sectional area over supports as at mid-spans.

Three times the effective depth of the slab is usually taken as the MAXIMUM SPACING FOR CONCRETE REINFORCEMENT. Where a small unframed opening occurs in a slab, the rods should be spread past the sides and in no case terminate against the face of an opening.

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Fig. 19 shows various methods of arranging slab reinforcement. Some building codes permit a reduction in the steel placed in the outer quarters of panels reinforced in two directions. The Joint Code recommends, on two-way slabs, that the bending moments and resulting steel areas be reduced by 50% in the outer quarters of the panel.

When designing one-way slabs it is necessary to provide shrinkage and temperature reinforcement at right-angles to the principal reinforcement. The Joint Code recommends that:

Reinforcement for shrinkage and temperature stresses normal to the principal reinforcement shall be provided in floor and roof slabs where the principal reinforcement extends in one direction only. Such reinforcement shall provide for the following minimum ratios of reinforcement area to

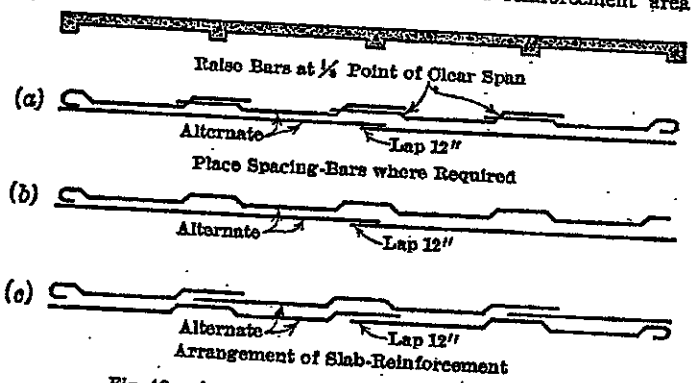

Fig. 19. Arrangement and Bending of Slab Steel

concrete area, but in no case shall such reinforcing bars be placed farther apart than five times the slab thickness nor more than 18 in:

Floor slabs where plain bars are used	0.0025
Floor slabs where deformed bars are used	0.002
Floor slabs where wire fabric is used, having welded intersections not farther apart in the direction of stress than 12 in	0.0018
Roof slabs where plain bars are used	0.003
Roof slabs where deformed bars are used	0.0025
Roof slabs where wire fabric is used, having welded intersections not farther apart in the direction of stress than 12 in	0.0022

The thickness of PROTECTIVE COVERING of concrete required below the reinforcement of slabs is normally 1 in; this should be taken as a clear distance measured from the face of the rod or bar.

Compression Reinforcement in Beams and Girders

Method Used in Design. The use of compression reinforcement is occasionally necessary through the MID-SPANS OF RECTANGULAR BEAMS when architectural considerations require a limited cross-section of concrete. A critical condition also exists OVER THE SUPPORTS OF CONTINUOUS BEAMS OF T SECTION where the lower portion of the member is subjected to compressive stresses due to the action of the negative moment. Since most codes permit

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Table XVIII. American Electrically Welded Fabric

Spacing of wires, in		Gauge number		Sect. area, sq in per ft		Weight per 100 sq ft lb
Longit.	Trans.	Longit.	Trans.	Longit.	Trans.	
2	16	1	7	.377	.018	140
2	16	2	8	.325	.015	119
2	16	3	8	.280	.015	104
2	16	4	9	.239	.013	89
2	16	5	10	.202	.011	75
2	16	6	10	.174	.011	65
2	16	7	11	.148	.009	55
3	16	1	7	.252	.018	96
3	16	2	8	.216	.015	83
3	16	3	8	.187	.015	72
3	16	4	9	.159	.013	61
3	16	5	10	.135	.011	52
3	16	6	10	.116	.011	45
3	16	7	11	.098	.009	38
3	16	8	12	.082	.007	32
4	16	3	8	.140	.015	56
4	16	4	9	.120	.013	48
4	16	5	10	.101	.011	40
4	16	6	10	.087	.011	35
4	16	7	11	.074	.009	30
4	12	8	12	.062	.009	26
4	12	9	12	.052	.009	22
4	12	10	12	.043	.009	19
4	12	12	12	.026	.009	13
4	12	5	5	.101	.034	48
4	12	6	6	.087	.029	42
4	12	7	7	.074	.025	35
4	12	8	8	.062	.021	30
6	12	0	6	.148	.029	65
6	12	2	2	.108	.054	59
6	12	3	3	.093	.047	51
6	12	4	4	.080	.040	44
6	12	5	5	.067	.034	37
6	12	6	6	.058	.029	32
6	12	7	7	.049	.025	27
6	8	12	12	.017	.013	11
6	6	0	0	.148	.148	107
6	6	1	1	.126	.126	91
6	6	2	2	.108	.108	78
6	6	3	3	.093	.093	68
6	6	4	4	.080	.080	58
6	6	5	5	.067	.067	49
6	6	6	6	.058	.058	42
6	6	7	7	.049	.049	36
6	6	8	8	.041	.041	30
6	6	9	9	.035	.035	25
6	6	10	10	.029	.029	21
6	6	12	12	.017	.017	13

Table XVIII (Continued). American Electrically Welded Fabric

Spacing of wires, in		Gauge number		Sect. area, sq in per ft		Weight per 100 sq ft lb
Longit.	Trans.	Longit.	Trans.	Longit.	Trans.	
4	4	4	4	.120	.120	85
4	4	6	6	.087	.087	62
4	4	8	8	.062	.062	44
4	4	10	10	.043	.043	31
4	4	12	12	.026	.026	19
4	4	14	14	.015	.015	11
3	3	10	10	.057	.057	41
3	3	12	12	.035	.035	25
2	2	10	10	.086	.086	60
2	2	12	12	.052	.052	37
2	2	14	14	.030	.030	21
2	4	12	12	.052	.026	28
2	4	14	14	.030	.015	16

Rolls: Standard lengths 150, 200 and 300 ft. For No. 2 gauge wires and larger, flat sheets only.

Widths: Multiples of the spacing of longitudinal wires up to a maximum width which varies with the size and spacing of the longitudinals. Approximate maximums 56 to 72 in for 2-in spacing, 84 to 96 in for 3 or 4-in spacing, and 96 to 120 in for 6-in spacing.

Tensile Strength: Standard, 60,000 to 70,000 lb per sq in; 70,000 to 80,000 lb furnished when ordered.

Weights: All above weights are based on a width of 60 in measured from center to center of the outside or selvage longitudinal wires.

shows the monolithic character of the weld, and in tension tests strands of wire always fail outside of the junction. The claim is made of perfect adhesion between reinforcement and concrete and no obstructions to

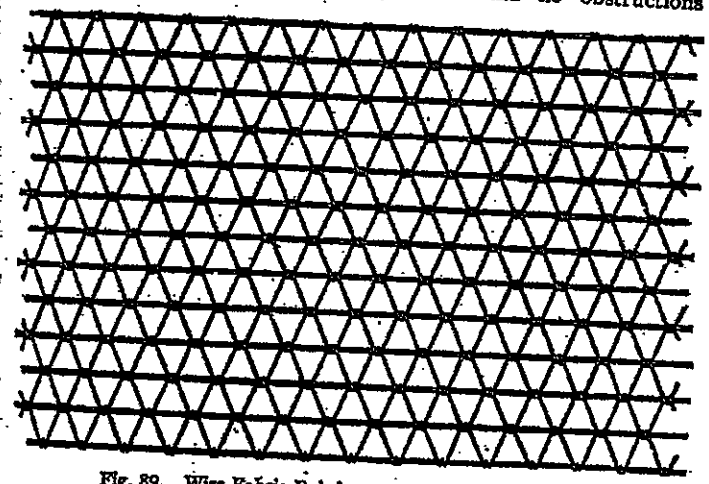

Fig. 89. Wire-Fabric Reinforcement, Triangular Mesh

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Infantry Barrack Building 550 (Progressive Collapse)
Twice the height of wall **NOT GOOD**
(25.167 ft. exterior wall removed at 1st floor)

Beam Length	L =	25 ft	Concrete Compressive Strength	f_c =	2000 psi
Beam Depth (total)	H =	14.46 ft	Steel Yield Strength	f_y =	40000 psi
Beam width	b =	8 in	Steel Elastic Modulus	E_s =	29000000 psi
Slab thickness	t =	6 in	Reinforced Concrete Wt. Density		150 pcf
Tension Rebar diameter	d_b =	0.75 in	Conc. Elastic Modulus	E_c =	2549117.494 psi
No. of bars	n =	2	Tension Steel Force	T_c =	$A_s f_y$
			Concrete Force (compression)	C_c =	$0.85 f_c ba$
				a =	2.598744 in

Roof Dead Load	RDL =	8 psf
Roof Live Load	RLL =	20 psf
Floor Live Load	FLL =	100 psf
Mechanical Load	ML =	2 psf
Partitions Load	PL =	20 psf
Roof Tributary Width	r_1 =	13.83 ft

Material Strengths

Steel Increase Factor	IF_s =	1.1		
Concrete Increase Factor	IF_c =	1.1		
Steel Yield Strength	fd_y =	$IF_s * f_y$	fd_y =	44000 psi
Concrete Comp. Strength	fd_c =	$IF_c * f_c$	fd_c =	2200 psi

Distributed Load Along Span of Beam
@ Roof Level:

A. Dead Load

- Weight of roof	W_{roof} =	110.65 lb/ft
- Weight of Beam	W_b =	200 lb/ft

B. Live Load

- Weight of Roof	W_r =	276.63 lb/ft

@ 3rd Level

A. Dead Load

- Weight of Beam Above	W_{b1} =	265.5 lb/ft
- Weight of Beam Below	W_{b2} =	178.5 lb/ft
- Weight of Slab	W_s =	1037.4 lb/ft
- Mechanical	W_m =	27.663 lb/ft
- Partitions	W_p =	276.63 lb/ft

B. Live Load

- Weight of Floor	W_r =	1383.2 lb/ft

@ 2nd Level

A. Dead Load

- Weight of Beam	$W_b =$	558 lb/ft
- Weight of Slab	$W_s =$	1037.4 lb/ft
- Mechanical	$W_m =$	27.663 lb/ft
- Partitions	$W_p =$	276.63 lb/ft

B. Live Load

- Weight of Floor	$W_r =$	1383.2 lb/ft

Total Dead Load	$W_{dl} =$	3817.5 lb/ft
Total Live Load	$W_{ll} =$	3042.9 lb/ft
Total Distributed Load	$W_t =$	**5338.9** lb/ft

AVERAGE MOMENT OF INERTIA

Area of Tension Steel Rebar	$A_b =$	0.4418 in^2
Area of Tension Steel	$A_s =$	0.8836 in^2

Beam Moment Check

Tension Steel Force	$T =$	38877 lb
Concrete Force (compression)	$C_c =$	38877 lb
Ultimate Moment Capacity	$M_u =$	**557.95** lb-ft
Moment due to Distributed Load	$Mw =$	417.1 k-ft
Total Moment Demand	$M_{tot} =$	**417.1** k-ft

$M_{tot} < M_u$ **OKAY**

Beam Shear Check

Depth of Beam for shear	$d_v =$	113 in
Beam shear capacity	$\Phi V_c =$	72083 lb
Shear due to Distributed load	$V_d =$	133473 lb
Total Shear Demand	$V_{tot} =$	133473 lb

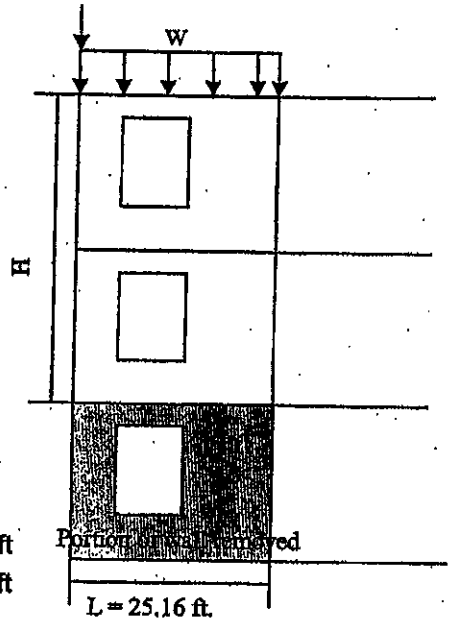
$V_{tot} > \Phi V_c$ **NOT GOOD**

Administration Building 549 (Progressive Collapse)
Deep Cantilever Beam - **NOT GOOD**
(12.58 ft. of exterior wall removed at 1st floor)

Beam Length	L =	25.16 ft	Concrete Compressive Stre	f_c =	2000 psi
Beam Depth (total)	H =	24.58 ft	Steel Yield Strength	f_y =	40000 psi
Beam width	b =	8 in	Steel Elastic Modulus	E_s =	29000000 psi
Slab thickness	t =	6 in	Reinforced Concrete Wt. Density		150 pcf
Tension Rebar diameter	d_b =	0.5 in	Shear Reinforcement Diame	d_v =	0.25 in
No. of bars	n =	2	Conc. Elastic Modulus	E_c =	2549117 psi

Tension Steel Force T_c = Asf_y
Concrete Force (compressi C_c = $0.85f_cba$
a = 1.154997

Roof Dead Load	RDL =	8 psf
Roof Live Load	RLL =	20 psf
Floor Live Load	FLL =	100 psf
Mechanical Load	ML =	2 psf
Partitions Load	PL =	20 psf
Tributary Width		8.415 ft



Material Strengths

Steel Increase Factor	IF_s =	1.1
Concrete Increase Factor	IF_c =	1.1
Steel Yield Strength	fd_y =	IF_s*f_y
Concrete Comp. Strength	fd_c =	IF_c*f_c

fd_y = 44000 psi
fd_c = 2200 psi

Distributed Load Along Span of Beam

@ Roof Level:

A. Dead Load
- Weight of roof W_{roof} = 110.64 lb/ft
- Weight of wall W_w = 337.5 lb/ft

B. Live Load
- Weight of Roof W_r = 168.3 lb/ft

@ 3rd Level

A. Dead Load
- Weight of Wall W_w = 1200 lb/ft
- Weight of Slab W_s = 841.5 lb/ft
- Mechanical W_m = 16.83 lb/ft
- Partitions W_p = 168.3 lb/ft

B. Live Load
- Weight of Floor W_r = 841.5 lb/ft

@ 2nd Level

A. Dead Load

- Weight of Wall	$W_w =$	841.5 lb/ft
- Weight of Slab	$W_s =$	841.5 lb/ft
- Mechanical	$W_m =$	16.83 lb/ft
- Partitions	$W_p =$	168.3 lb/ft

B. Live Load

- Weight of Floor	$W_r =$	841.5 lb/ft

Total Dead Load	$W_{dl} =$	4542.9 lb/ft
Total Live Load	$W_{ll} =$	1851.3 lb/ft
Total Distributed Load	$W_t =$	5468.6 lb/ft

Point Loads on Beam

@ Roof Level:

A. Dead Load

- Weight of 10x10 Beam	$W_b =$	876.56 lb

Total Live Load	$W_{ll} =$	876.56 lb
Total Point Load	$W_t =$	876.56 lb

AVERAGE MOMENT OF INERTIA

Area of Tension Steel Rebar	$A_b =$	0.1963 in^2
Area of Tension Steel	$A_s =$	0.3927 in^2

Beam Moment Check

Tension Steel Force	T =	17279 lb
Concrete Force (compression)	$C_c =$	17279 lb
Ultimate Moment Capacity	$M_u =$	414733 lb-in
Moment due to Distributed Load	Mw =	3E+06 lb-in
Moment due to Point Load	Mp =	455827 lb-in
Total Moment Demand	$M_{tot} =$	4E+06 lb-in

$M_{tot} < M_u$ NOT GOOD

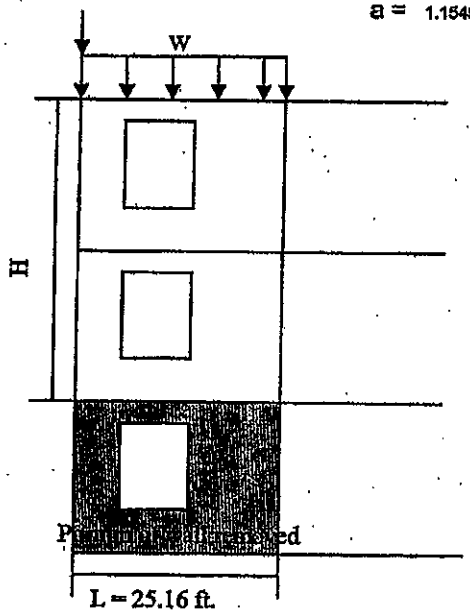
OKAY

NOT GOOD

Infantry Barrack Building 550 (Progressive Collapse)
Deep Cantilever Beam - **NOT GOOD**
(12.58 ft. of exterior wall removed at 1st floor)

Beam Length	L =	25.16 ft	Concrete Compressive Strength	f_c =	2000 psi
Beam Depth (total)	h =	24.58 ft	Steel Yield Strength	f_y =	40000 psi
Beam width	b =	8 in	Steel Elastic Modulus	E_s =	29000000 psi
Slab thickness	t =	6 in	Reinforced Concrete Wt. Density		150 pcf
Tension Rebar diameter	d_b =	0.5 in	Shear Reinforcement Diameter	d_v =	0.25 in
No. of bars	n =	2	Conc. Elastic Modulus	E_c =	2549117.494 psi
			Tension Steel Force	$T_c = Asf_y$	
			Concrete Force (compression)	$C_c = 0.85f_cba$	
				a =	1.154997299

Roof Dead Load	RDL =	8 psf
Roof Live Load	RLL =	20 psf
Floor Live Load	FLL =	100 psf
Mechanical Load	ML =	2 psf
Partitions Load	PL =	20 psf
Tributary Width		13.83 ft



Material Strengths

Steel Increase Factor	IF_s =	1.1
Concrete Increase Factor	IF_c =	1.1
Steel Yield Strength	fd_y =	IF_s*f_y
Concrete Comp. Strength	fd_c =	IF_c*f_c
fd_y =	44000 psi	
fd_c =	2200 psi	

Distributed Load Along Span of Beam
@ Roof Level:

A. Dead Load

- Weight of roof	W_{roof} =	110.64 lb/ft
- Weight of Beam (A')	W_b =	200 lb/ft

B. Live Load

- Weight of Roof	W_r =	276.6 lb/ft

@ 3rd Level

A. Dead Load

- Weight of Wall	W_w =	1200 lb/ft
- Weight of Slab	W_s =	1037.25 lb/ft
- Mechanical	W_m =	27.66 lb/ft
- Partitions	W_p =	276.6 lb/ft

B. Live Load

- Weight of Floor	W_r =	1383 lb/ft

@ 2nd Level

A. Dead Load

- Weight of Wall	W_w =	1258.3 lb/ft
- Weight of Slab	W_s =	1037.25 lb/ft
- Weight of Beam	W_b =	608 lb/ft
- Mechanical	W_m =	27.66 lb/ft
- Partitions	W_p =	276.6 lb/ft

B. Live Load

- Weight of Floor	W_f =	1383 lb/ft

Total Dead Load	W_{dl} =	5022.71 lb/ft
Total Live Load	W_{ll} =	3042.6 lb/ft
Total Distributed Load	W_t =	**6544.01** lb/ft

Point Loads on Beam

@ Roof Level:

A. Dead Load

- Weight of 10 x 10 Beam	W_b =	1440.625 lb

Total Live Load	W_{ll} =	1440.625 lb
Total Point Load	W_t =	**1440.625** lb

AVERAGE MOMENT OF INERTIA

Area of Tension Steel Rebar	A_b =	0.19635 in^2
Area of Tension Steel	A_s =	0.392699 in^2

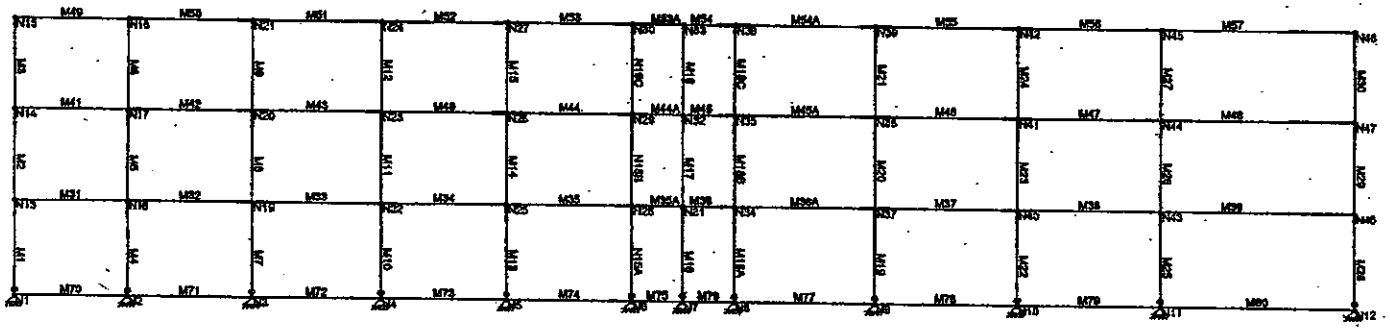
Beam Moment Check

Tension Steel Force	T =	17278.76 lb
Concrete Force (compression)	C_c =	17278.76 lb
Ultimate Moment Capacity	M_u =	**414733.5** lb-in
Moment due to Distributed Load	Mw =	4142526 lb-in
Moment due to Point Load	Mp =	749149.3 lb-in
Total Moment Demand	M_{tot} =	**4891675** lb-in

$M_{tot} < M_u$ **NOT GOOD**

OKAY

NOT GOOD



SSFM Engineers, Inc.	YFH Whole Barracks Renewal Quad E (Building 550)	August 1, 2003
IT Administrator		9:06 AM
2002_032.0002		Model.r2d

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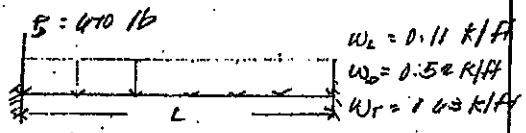
PROJ. NO. _____
PROJECT _____ 0197
PREPARED BY JRG DATE 6/23/03
CHECKED BY _____ DATE _____
SHEET 1 OF _____

① Load calcs. for Beams (M49 - M51) Bldg 550, 551 & 552

@ Roof Level



A) Dead Load

roof & framing = 8 psf $\left(\frac{10.833}{2}\right)$ = 43.33 lb/ft

weight of wall = (4.66')$\left(\frac{6}{12}\right)$(150 pcf) = 349.50 lb/ft

weight of F Beam = $\left(\frac{10''}{12}\right)$(1')(150 pcf) = 125 lb/ft

w_D = 43.33 + 349.50 + 125 = 517.83 lb/ft

Weight of E Beam (P_D) = $\left(\frac{11.875''}{12}\right)\left(\frac{10''}{12}\right)\left(\frac{10.833}{2}\right)$(150 pcf) = 670 lb

B) Live Load

roof = 20 psf $\left(\frac{10.833}{2}\right)$ = 108.3 lb/ft = w_L

② For Beams M44-M48 (@ 3rd Level)

A) Dead Load

weight of L Beam = (2.25')$\left(\frac{6''}{12}\right)$(150 pcf) = 168.75 lb/ft

weight of slab = $\left(\frac{6''}{12}\right)\left(\frac{10.833}{2}\right)$(150 pcf) = 406.2 lb/ft

Mechanical = 2 psf $\left(\frac{10.833}{2}\right)$ ~ 10.83 lb/ft

Partitions = 20 psf $\left(\frac{10.833}{2}\right)$ = 108.3 lb/ft

w_D = 168.75 + 406.2 + 10.83 + 108.3 = 694.08 lb/ft.

B) Live Load

Floor	40 psf
Exit corridors	100 psf
Balcony	
	140 psf

w_L = 140 psf $\left(\frac{10.833}{2}\right)$ = 758.31 lb/ft

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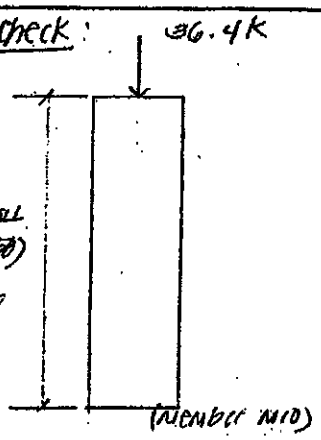
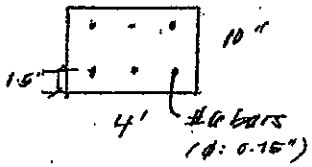
PROJECT
PREPARED BY DATE
CHECKED BY DATE
SHEET OF

COLUMN check:



increased factor: (11%)
$f'_c = 2{,}200$ psi; $f_y = 44{,}000$ psi



$d = 10" - 1.5" = 8.5"$

$A_s = 6\left(\frac{\pi}{4}\right)\left(\frac{3}{8}\right)^2 = 2.65 \text{ in}^2$

$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{2.65(44{,}000)}{0.85(2200)(4')(12")} = 1.30 \text{ in}$

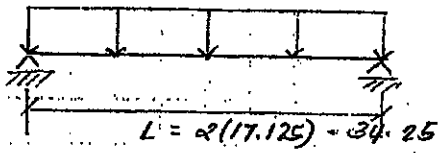
$M_n = A_s f_y \left(d - \frac{a}{2}\right) = 2.65(44{,}000)\left(8.5 - \frac{1.30}{2}\right)\left(\frac{1}{12"}\right)$

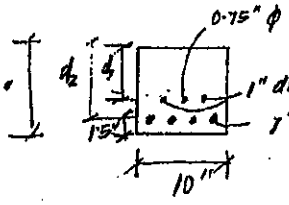
$M_n = 76.3$ k-ft

Fr. Model (Member 10): $M_u = 23.8$ k-ft $\Rightarrow \therefore M_n > M_u \therefore$ okay

Beam check: span of Beam is doubled

(H-beam)





$d_1 = 20 - 2 - 1.5 = 16.5$
$d_2 = 20 - 1.5 = 18.5$

$A_s = 6\left(\frac{\pi}{4}\right)(1)^2 + 10\left(\frac{\pi}{4}\right)(0.75)^2 = 5.15 \text{ in}^2$

$d = \frac{2\left(\frac{\pi}{4}(1)^2(16.5)\right) + \frac{\pi}{4}(0.75)^2(1)(16.5) + 4\left(\frac{\pi}{4}\right)(1)^2(18.5)}{6\left(\frac{\pi}{4}(1)^2\right) + \frac{\pi}{4}(0.75)^2}$

$d = 17.7$ in.

$a = \frac{A_s f_y}{0.85(f'_c)b} = \frac{5.15(44{,}000)}{0.85(2200)(10")} = 12.12 \text{ in.}$

$M_n = 5.15(44{,}000)\left(17.7 - \frac{12.12}{2}\right)$

$M_n = 219.8$ k-ft

Fr. Model (Member 10): $M_u = 73.8$ k-ft $\Rightarrow M_n > M_u \therefore$ okay

099

```
OOOOOOO    OOOOO    OOOOO    OOOOO    OOOOO    OO
OO    OO  OO   OO  OO   OO  OO   OO  OO   OO  OO
OO    OO  OO   OO  OO   OO  OO   OO  OO   OO  OO
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OO         OOOOO   OO   OO   OOOOO    OOOOO   OOOOO   (TM)
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Computer program for the Strength Design of Reinforced Concrete Sections

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100

General Information:
==========

File Name: I:\2002\20EA2D~0.002\30_CAL~1\EXT~1~~1.COL
Project: Quad E Progressive Collapse
Column: Interior
Code: ACI 318-95

Engineer: JRG
Units: English

Run Option: Investigation
Run Axis: X-axis

Slenderness: Considered
Column Type: Architectural

Material Properties:
==========

f'c = 2.75 ksi
Ec = 2989.11 ksi
fc = 2.3375 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

fy = 44 ksi
Es = 29000 ksi
Rupture strain = Infinity

Section:
==========

Rectangular: Width = 10 in

Depth = 48 in

Gross section area, Ag = 480 in^2
Ix = 92160 in^4
Xo = 0 in

Iy = 4000 in^4
Yo = 0 in

Reinforcement:
==========

Rebar Database: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: User-defined; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.7

Layout: Rectangular
Pattern: Equal Bar Spacing (Cover to longitudinal reinforcement)
Total steel area, As = 0.66 in^2 at 0.14%
6 #3 Cover = 1.5 in

Slenderness:
==========

Sway Criteria:

X-axis: Braced column.

Column	Axis	Height ft	Width in	Depth in	I in^4	f'c ksi	Ec ksi
Design	X	25.17	10	48	92160	2.75	2989.11
Above	X	12	10	48	92160	2.75	2989.11
Below	X	(no column specified...)					

X-Beams Location	Length ft	Width in	Depth in	I in^4	f'c ksi	Ec ksi
Above Left	20	12	12	1728	2.75	2989.11
Above Right	20	12	12	1728	2.75	2989.11
Below Left	(no beam specified...)					
Below Right	(no beam specified...)					

Effective Length Factors:

Axis	Psi(top)	Psi(bot)	k(Braced)	k(Sway)	klu/r
X	130.442	999.000	1.000	(N/A)	21.80

Moment Magnification Factors:

Stiffness reduction factor, phi(K) = 0.75
Cracked-section coefficients: cI(beams) = 0.35; cI(columns) = 0.7

0.2*Ec*Ig + Es*Ise (X-axis) = 6.14e+007 kip-in^2

X-axis	Braced				Sway	
Ld/Comb	Pc(kip)	Betad	Cm	Delta	Pc(kip)	Delta
1 U1	3916	0.698	0.000	1.000 *	--- N/A ---	

* Slenderness need not be considered.

Load Combinations:

U1 = 1.000*Dead + 0.500*Live + 0.200*Lateral

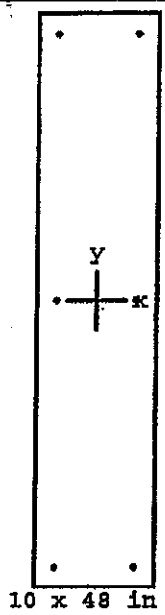
Service Loads:

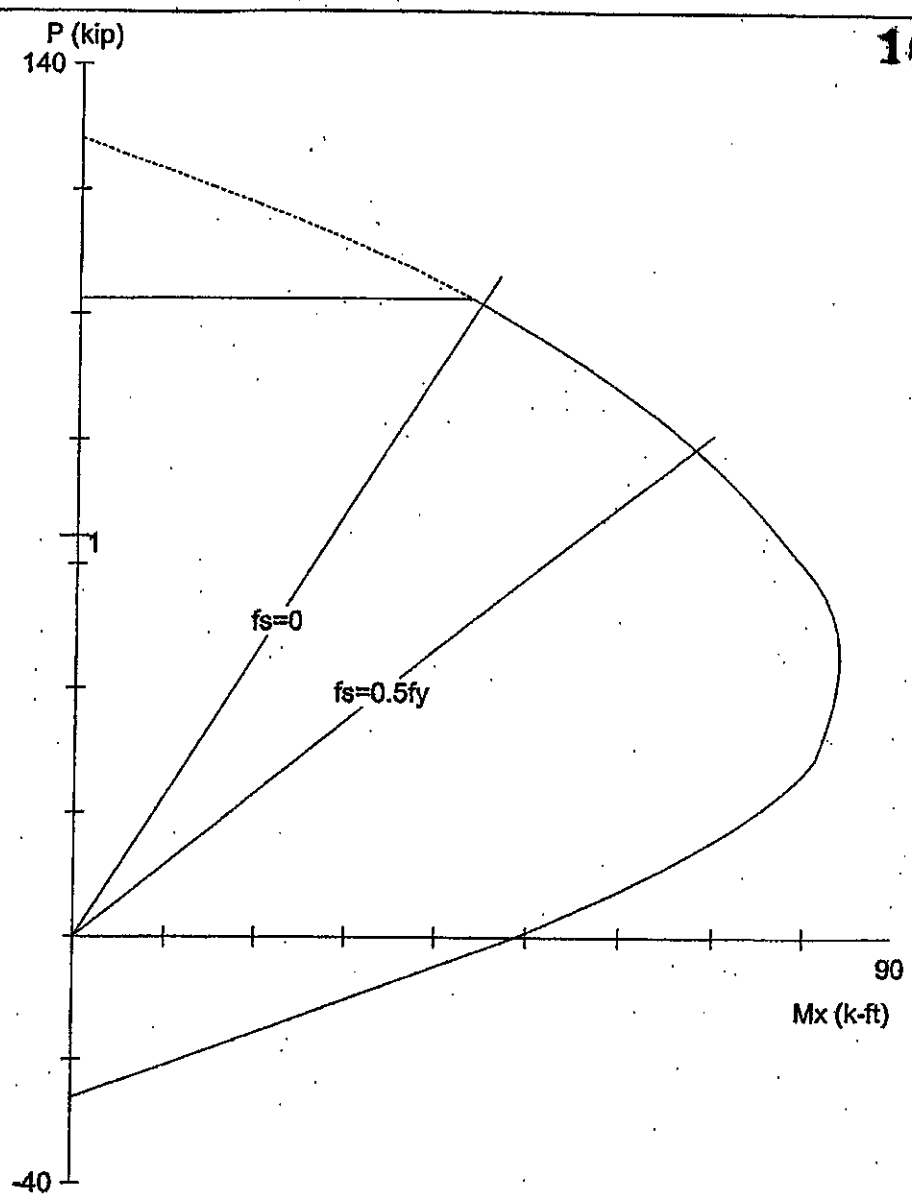
No.	Load Case	Axial Load kip	Mx @ Top k-ft	Mx @ Bot k-ft	My @ Top k-ft	My @ Bot k-ft
1	Dead	45.0	0.0	0.0	0.0	0.0
	Live	39.0	0.0	0.0	0.0	0.0
	Latl	0.0	0.0	0.0	0.0	0.0

Factored Loads and Moments with Corresponding Capacities: (see user's manual for notation)

No.	Load Combo	Pu kip	Mux k-ft	fMnx k-ft	fMn/Mu
1	1 U1	64.5	0.0	77.1	999.999

*** Program completed as requested! ***





Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

Slenderness: Considered

Column type: Structural

Bars: ASTM A615

Date: 08/04/03

Time: 11:01:19

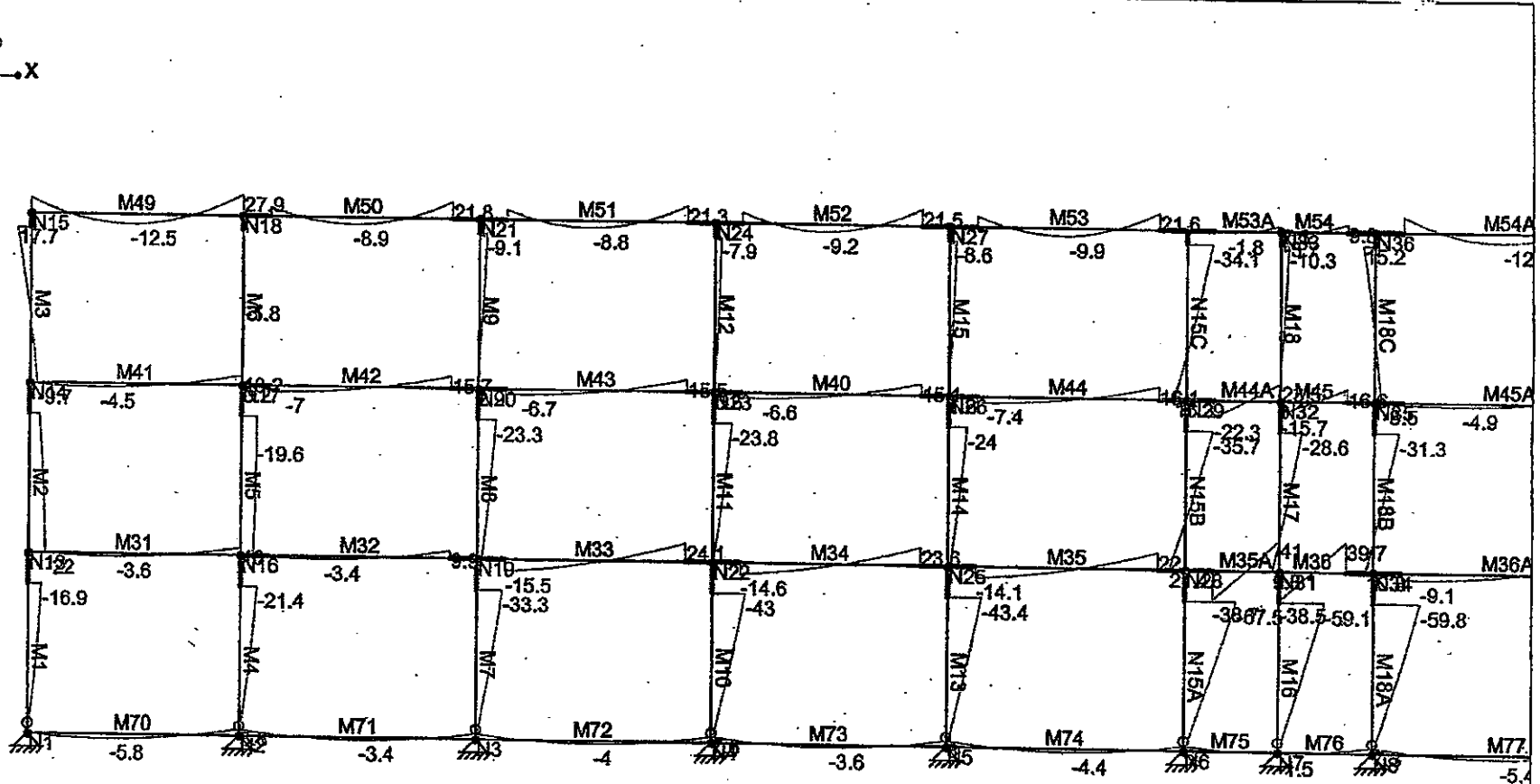
PCACOL V3.00 (PCA 1999) - Licensed to: SSFM International, Inc., Honolulu, HI

File: I:\2002\20EA2D~0.002\30_CAL~1\EXT~1~~1.COL

Project: Quad E Progressive Collapse

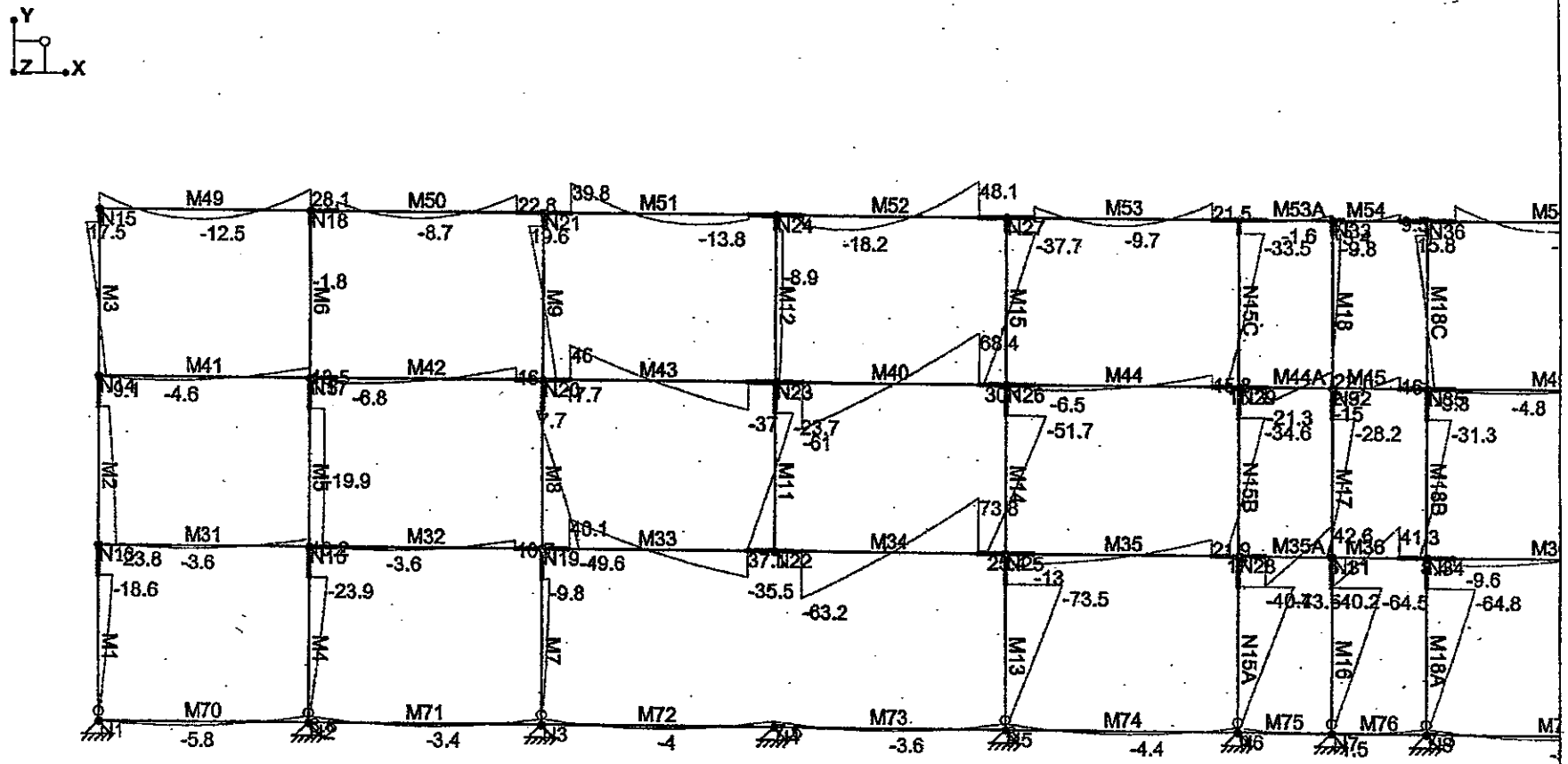
Column: Interior		Engineer: JRG	
f'c = 2.75 ksi	fy = 44 ksi	Ag = 480 in^2	6 #3 bars
Ec = 2989 ksi	Es = 29000 ksi	As = 0.66 in^2	Rho = 0.14%
fc = 2.3375 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 92160 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 4000 in^4
Beta1 = 0.85		Clear spacing = 6.25 in	Clear cover = 1.50 in
Confinement: Other	phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.7		

ky(braced) = 1, ky(sway) = N/A



Solution: LC 1, BLC
Member Bending Moments (K-ft)

SSFM Engineers, Inc.	YFH Whole Barracks Renewal Quad E (Building 550)	July 31, 2003
IT Administrator		3:39 PM
2002_032.0002		Model.r2d



Solution: LC 1, BLC
Member Bending Moments (K-ft)

SSFM Engineers, Inc.	YFH Whole Barracks Renewal Quad E (Building 550)	July 31, 2003
IT Administrator		3:49 PM
2002_032.0002		Model.r2d

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PROJ. NO. 2002.032.005
PROJECT Guade Progressive Collapse Analysis
PREPARED BY JRG DATE 7/31/03
CHECKED BY _____ DATE _____
SHEET 1 OF 2

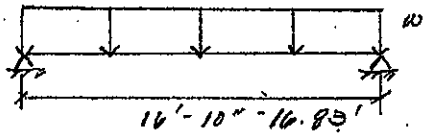
Slab check (Admin. Bldg.) Bldg 549

① vertical check

A) Dead Load

- Partition = 20 psf
- Mech./Elec = 5 psf

25 psf



(1ft strip) 25 psf (1') = 25 lb/ft

- 7" thick slab = 150 pcf $(\frac{7}{12})(1')$ = 87.5 lb/ft

Dead Load = 25 + 87.5 = 112.5 lb/ft

B) Live Load

- Office = 50 psf (1') = 50 lb/ft

Combination Load = 1.4 DL + 1.7 LL

1.4(112.5) + 1.7(50) = 242.5 lb/ft

w = 242.5 lb/ft

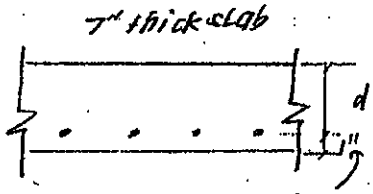
$$M_u = \frac{w\ell^2}{8} = \frac{242.5(16.83)^2}{8} = 8.59 \text{ k-ft}$$

$$\text{or } \frac{w\ell^2}{10} = 6.87 \text{ k-ft}$$

$f'_c = 2000$ psi ; $f_y = 40$ ksi

$A_s = 0.18 \text{ in}^2/\text{ft}\ (1') = 0.18 \text{ in}^2$

$$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{0.18 \text{ in}^2 (40{,}000 \text{ lb/in}^2)}{0.85(2000 \text{ lb/in}^2)(1')(12")} = 0.353 \text{ in.}$$



Assume same as barracks (see reinf. detail for barracks.)

$$M_n = A_s f_y \left(d - \frac{a}{2}\right)$$

$$= \left(40{,}100 \frac{\text{lb}}{\text{in}^2}\right)(0.18 \text{ in}^2)\left(6 - \frac{0.353}{2}\right)$$

$M_n = 41.9$ k-in $(\frac{1}{12}) = 3.45$ k-ft $< M_u = 8.59$ k-ft Not good

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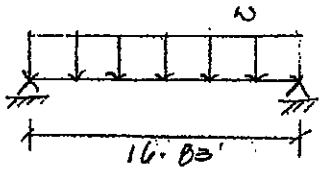
② Uplift check (Progressive)

ⓐ Dead Load = 112.5 lb/ft
Live Load = 50 lb/ft



Load combination = DL + 0.5 LL

$w = 112.5 + 0.5(50) = 137.5$ lb/ft

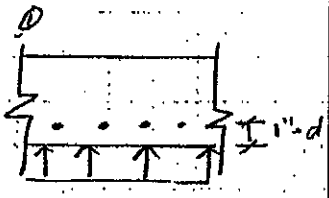
$$M_u = \frac{wl^2}{8} = \frac{137.5(16.83)^2}{8} = 4.87 \text{ k-ft}$$

$$\text{or } \frac{wl^2}{10} = 3.89 \text{ k-ft}$$

$f'_c = 2000$ psi ; $f_y = 40$ ksi increase strength by 10%

increased strengths: $f'_c = 2{,}200$ psi
$f_y = 44$ ksi

case 1:



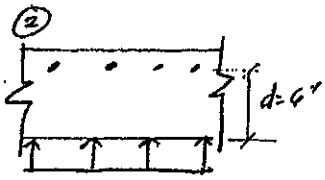
$A_s = 0.18 \text{ in}^2/\text{ft}\ (1') = 0.18 \text{ in}^2$

$$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{0.18(44{,}000)}{0.85(2200)(12")} = 0.353 \text{ in.}$$

$$M_n = (44000)(0.18)\left(1 - \frac{0.353}{2}\right)$$

$M_n = 6.52$ k-in $\left(\frac{1}{12}\right) = 0.54$ k-ft $< M_u$ ∴ Not good.

case 2.



$A_s = 0.18 \text{ in}^2$
$a = 0.353$ in

$$M_n = 44000(0.18)\left(4 - \frac{0.353}{2}\right)$$

$M_n = 46.1$ k-in $\left(\frac{1}{12}\right) = 3.84$ k-ft $< M_u = 4.87$ k-ft ∴ Not good

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PROJ. NO. 2002.037.002

PROJECT Quad E

PREPARED BY JKG DATE 7/31/03

CHECKED BY _____ DATE _____

SHEET 1 OF 2

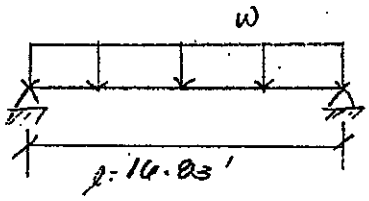
Slab check (~~Barracks~~ Infantry Bldg) Bldgs. 550, 551 & 552

① vertical check

A) Dead Load

- Partition : 20 psf
- Mech./Elec : 5 psf

25 psf



1 ft strip 25 psf (1') = 25 lb/ft

- 6" thick slab = 150 pcf $\left(\frac{6''}{12}\right)(1') = 75$ lb/ft

Deadload = 25 + 75 = 100 lb/ft

B) Live Load

- Office = 50 psf (1') = 50 lb/ft

Combination Load = 1.4DL + 1.7LL

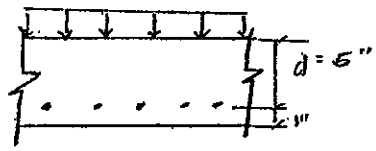
1.4(100) + 1.7(50)

w = 225 lb/ft

$$M_u = \frac{w\ell^2}{8} = \frac{225\,(16.83')^2}{8} = 7.97 \text{ k-ft}$$

$$\frac{w\ell^2}{10} = 6.37 \text{ k-ft}$$

6" thick slab



$A_s = 0.18 \text{ in}^2/\text{ft}\ (1') = 0.18 \text{ in}^2$

$$a = \frac{A_s f_y}{0.85 f'_c b} = \frac{0.18\,(40{,}000)}{0.85(2000)(12")} = 0.353 \text{ in.}$$

$$M_n = f_y A_s \left(d - \frac{a}{2}\right)$$

$$= 40{,}000\,(0.18)\left(5 - \frac{0.353}{2}\right)\left(\frac{1}{12'}\right)$$

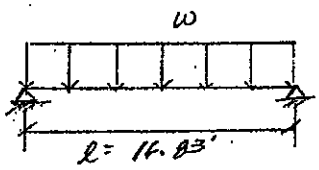
$M_n = 2.89$ k-ft $< M_u = 7.97$ k-ft ∴ Not good

SSFM INTERNATIONAL
SSFM International, Inc.
501 Sumner Street, Suite 502 • Honolulu, Hawaii 96817-5304
Ph: (808) 531-1308 Fax: (808) 521-7348

PROJ. NO. 2002.032 002
PROJECT Quad E
PREPARED BY JKG DATE 7/31/03
CHECKED BY DATE
SHEET 2 OF 2

② uplift check (Progressive)

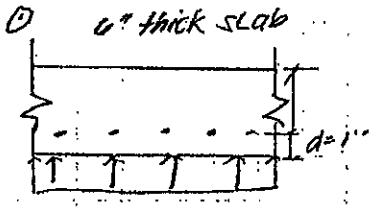
A) Dead Load = 100 lb/ft
Live Load = 50 lb/ft



Load combination = DL + 0.5 LL
100 + 0.5 (50)
w = 125 lb/ft

$M_u = \frac{wl^2}{8} = \frac{125(16.83)^2}{8} = 4.43$ k-ft
or $\frac{wl^2}{10} = 3.54$ k-ft

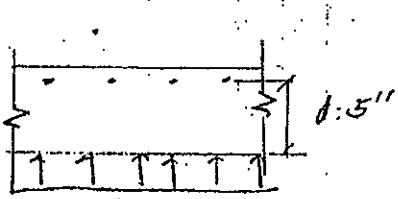
Case 1:



$A_s = 0.18$ in²/ft (1') = 0.18 in²
$a = 0.353$ in.

$M_n = 0.18(44{,}000)(1 - \frac{0.353}{2})$
$M_n = 6.52$ k-in $(\frac{1}{12}) = 0.54$ k-ft < $M_u = 4.43$ ∴ Not good

Case 2:

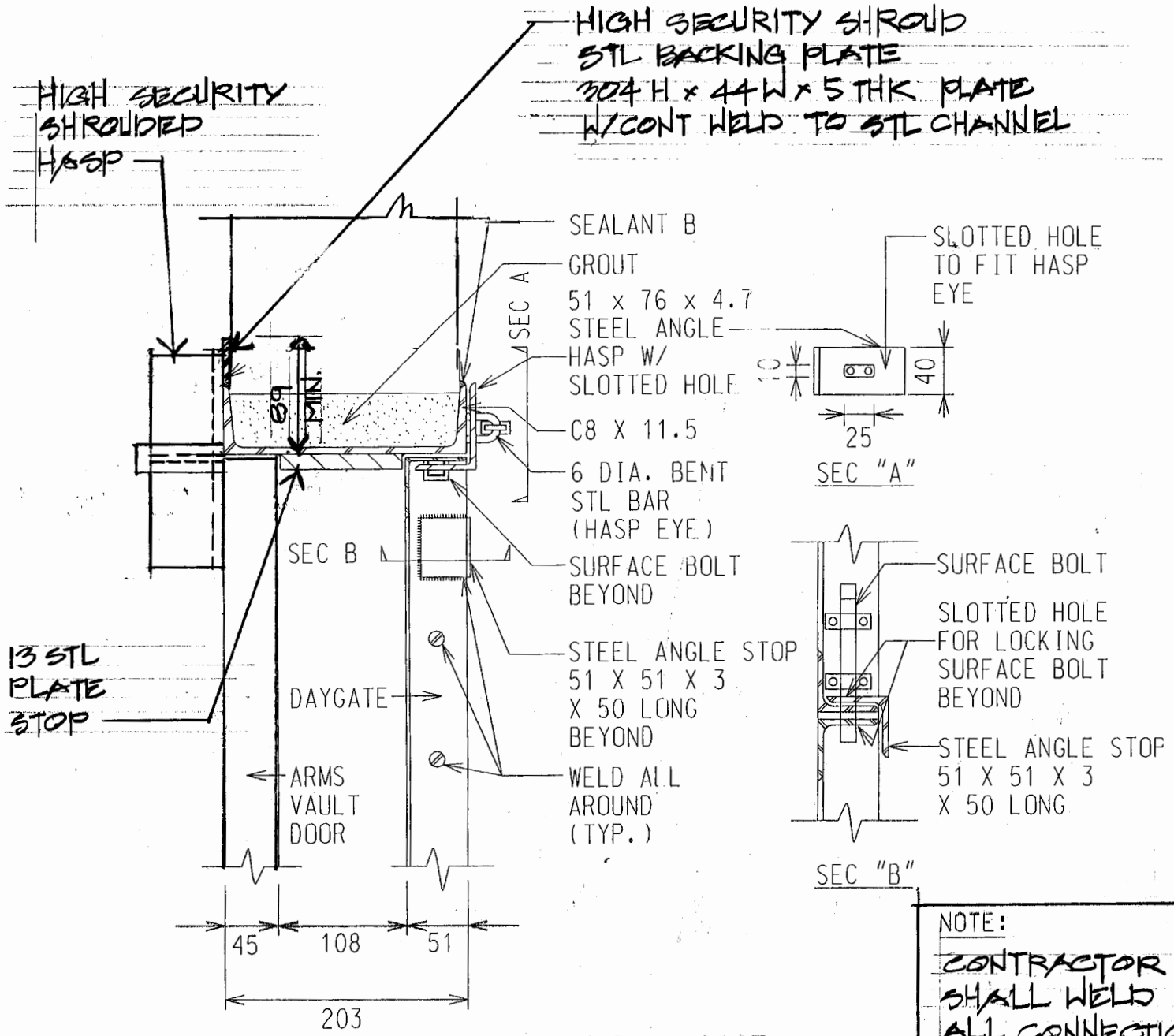


$M_n = 0.18(44{,}000)(5 - \frac{0.353}{2})$
$M_n = 38.2$ k-in $(\frac{1}{12}) = 3.18$ k-ft

$M_n = 3.18$ k-ft < M_u ∴ Not good

ATTACHMENT 19

DAYGATE DETAIL

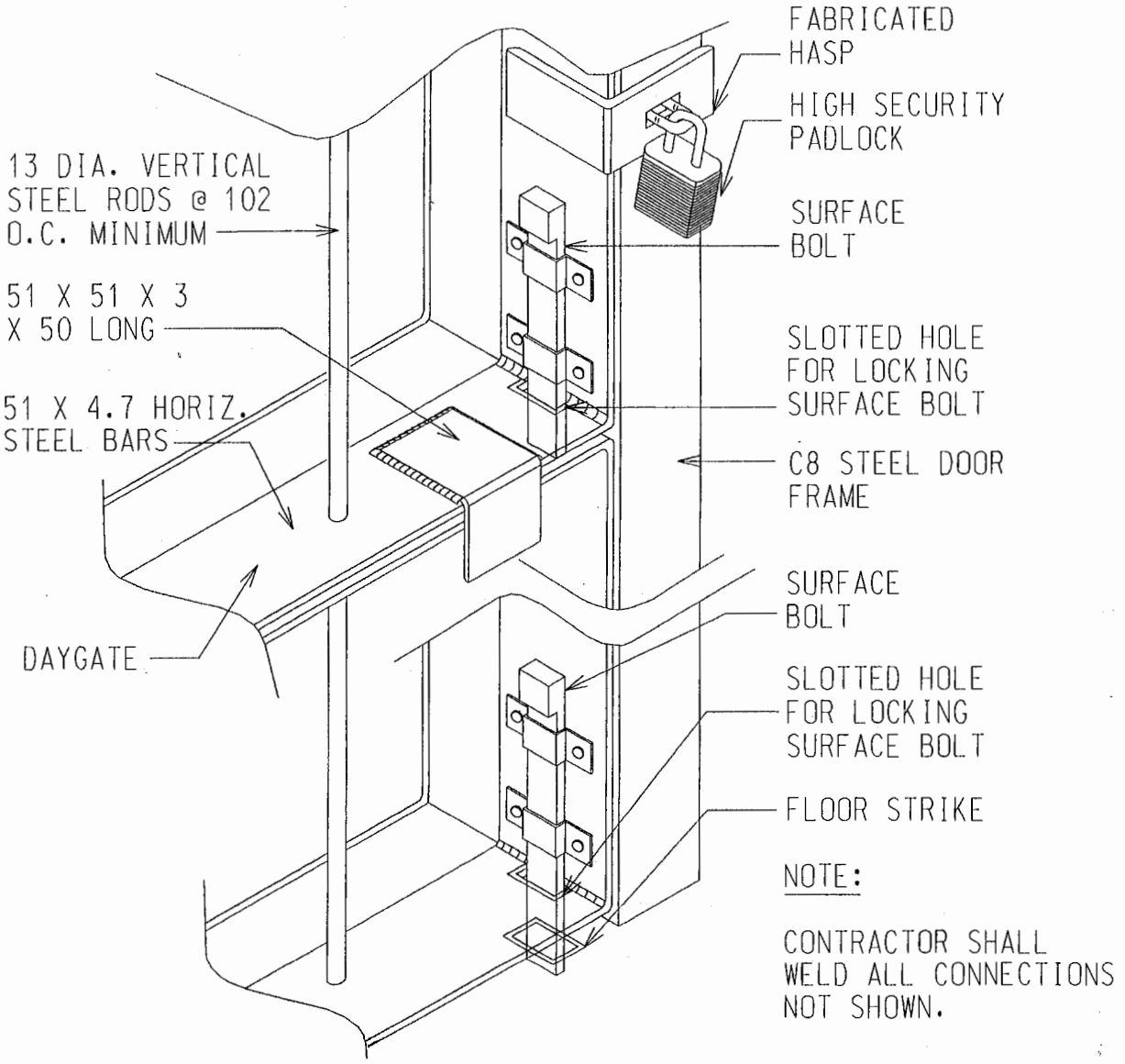


NOTE:
CONTRACTOR SHALL WELD ALL CONNECTIONS NOT SHOWN

FABRICATED HASP AND ANGLE STOP DETAIL OF ARMS VAULT

SCALE 1:5

SHEET 1 OF 2



NOTE:

CONTRACTOR SHALL WELD ALL CONNECTIONS NOT SHOWN.

PARTIAL ISOMETRIC VIEW OF DAYGATE FROM INSIDE OF ARMS VAULT

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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 43	Administrative Rules, Title 11, Community Noise 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 a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Records

Environmental Protection Plan; G.

Within 30 calendar days of receipt of task order 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 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.

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 Reduction of Exposure of Unprotected Erodible Soils

Earthwork brought to final grade shall be finished as indicated and specified. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in instances where the constructed feature obscures borrow areas, quarries, and waste material areas, these areas shall not initially be cleared in total. Clearing of such areas shall progress in reasonably sized increments as needed to use the areas developed as approved by the Contracting Officer.

3.1.1.4 Protection of Disturbed Areas

Such methods as necessary shall be utilized to effectively prevent erosion and control sedimentation, including but not limited to the following:

a. Retardation and Control of Runoff: Runoff from the construction site shall be controlled by construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses, and any measures required by areawide plans approved under Paragraph 208 of the Clean Water Act.

b. Erosion and Sedimentation Control Devices: The Contractor shall construct or install all temporary and permanent erosion and sedimentation control features as indicated on the drawings. Temporary erosion and sediment control measures such as berms, dikes, drains, grassing, and mulching shall be maintained until permanent drainage and erosion control facilities are completed and operative.

3.1.1.5 Contractor Facilities and Work Areas

a. 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.

b. Temporary Excavations and Embankments: Temporary excavations and embankments for plant and/or work areas shall be controlled to protect adjacent areas from despoilment.

3.1.2 Disposal of Wastes

Disposal of wastes shall be as specified in Section 01900 MISCELLANEOUS PROVISIONS, the task order, and as specified hereinafter.

3.1.2.1 Solid Wastes

Solid wastes (excluding clearing debris) 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 comply with site procedures and with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

3.1.2.2 Chemical Wastes:

Chemicals shall be dispensed in a way to adequately ensure no spillage to ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in corrosion resistant containers with care taken to ensure compatibility. Collection drums shall be monitored and removed to a staging or storage area when contents are within six inches of the top. All waste shall be disposed of in accordance with Federal 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 Historical, Archeological, and Cultural Resources

Existing historical, archeological, and cultural resources within the Contractor's work area will be so designated by the Contracting Officer if any has been identified. The Contractor shall take precautions to preserve all such resources as they existed at the time they were pointed out to him. The Contractor shall provide and install all protection for these resources so designated and shall be responsible for their preservation during this contract. If during excavation or other construction activities in areas with existing or known resources, as well as in any other work area, any unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. These resources or cultural remains (prehistoric or historic surface or subsurface) include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rocks or coral alignments, paving, wall, or other constructed features; and any indication of agricultural or other uses. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer. When so notified, the Contracting Officer will initiate action so that prompt and proper data recovery can be accomplished.

3.1.4 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.

3.1.4.1 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.

3.1.5 Fish and Wildlife Resources

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

3.1.6 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 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.

3.1.6.1 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 excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, 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.

3.1.6.2 Hydrocarbons and Carbon Monoxide

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

3.1.6.3 Odors

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

3.1.6.4 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.

3.1.7 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 HIDOH, Chapter 43.

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.

-- End of Section --

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SECTION 01900

MISCELLANEOUS PROVISIONS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Organization Plan; G.

Provide a diagram depicting the proposed management organization. The chart shall clearly identify lines of authority and areas of responsibility. Include a narrative description of how the management team will operate, and the specific duties and responsibilities of the key individuals.

The narrative shall describe the Offeror's proposed on-site organization and structure, and shall describe how the Offeror intends to monitor and control timeliness, quality, and safety of the work at the job site, including the work of any subcontractors on all phases of the contract.

Identify the individuals proposed to fill the key management positions: Project Manager, Project Superintendent, Contractor Quality Control System Manager, Design Quality Control Manager, Safety and Health Manager. Provide resumes for each individual. Resumes must support the individual's qualifications to perform in the selected position.

Provide copies of letters of direction to each key personnel from an appropriate officer of the company.

Accident Prevention Plan

Activity Hazard Analyses; G.

SD-03 Product Data

Equipment Data

A list of all equipment furnished under this contract. This list shall include, but not be limited to, each piece of equipment with a serial number, and shall include all information shown on the manufacturer's nameplate, so as to positively identify the piece of equipment. This list shall also include the cost of each piece of equipment (less installation costs) F.O.B. construction site. This list shall be furnished as soon as possible after

equipment is purchased. The list shall consist of one (1) reproducible and three (3) copies, and shall be furnished to the Contracting Officer not later than thirty (30) calendar days prior to completion of any segment of the contract work which has an incremental completion date.

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-06 Test Reports

Inspection of Existing Conditions..

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 Contracting Officer, prior to construction.

Dust Control; G

Method(s) of dust control.

Excavation/Trenching Clearance

Prior to start of any excavation or trenching work, the Contractor shall obtain clearance, in writing, from the appropriate communications agency and base or area engineer. Copies of all correspondence shall be provided the Contracting Officer. Normal coordination time for obtaining the necessary permits is approximately fifteen (15) calendar days. The Contractor shall advise the Contracting Officer promptly when it appears that the normal coordination time will be exceeded.

Condition of Contractor's Operation or Storage Area

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

SD-07 Certificates

Products Containing Recovered Materials

The Contractor shall submit manufacturer's certification attesting that product meets or exceeds EPA's recovered material guidelines.

1.2 PROJECT MANAGEMENT ORGANIZATION

1.2.1 General

The Contractor is responsible for ensuring that the contract is adequately staffed to manage all of the work in full accordance and compliance with the contract requirements.

1.2.2 Organization Plan

The contractor shall submit an organization plan describing the organization it intends to structure for managing this contract. The plan shall include lines of authority, position responsibilities, and qualifications of the proposed staff. The project staff shall minimally consist of the following key personnel: Project Manager, Project Superintendent, Contractor Quality Control System Manager, Design Quality Control Manager, Safety and Health Manager. Each of the individuals selected to fill these positions is subject to acceptance by the Contracting Officer.

1.2.3 Organizational Changes

The Contractor shall maintain the project management staff at full strength at all times. When it is necessary to make changes to the staff, the Contractor shall revise the Organization Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance at least fourteen (14) calendar days prior to implementation of the changes.

Substitutions for any accepted key personnel must be submitted for review and acceptance by the Contracting Officer prior to the start of work by that individual. The Contractor is informed that the Government will be allowed at least 30 days to respond. Any delays resulting from this process shall be the responsibility of the contractor and shall not be a basis for any equitable contract adjustment.

1.2.4 Project Manager

The Project Manager shall be responsible for the contractor's overall management and coordination of this contract and shall be the central point of contact with the Government for performance of all work under this contract including warranty. The Project Manager shall oversee construction accomplishment, administer all instructions, and answer all questions from the Contracting Officer pertaining to the work during the life of the contract, including the warranty period. The Project Manager shall be responsible for the complete coordination of all work in this contract. The Project Manager will be responsible for ensuring that adequate internal controls and review procedures are followed in order to eliminate conflicts, errors and omissions, and for ensuring that all technical requirements are met. Another individual may be designated to temporarily act for the Project Manager, however, forty-eight (48) hours advance notice in writing of such change shall be requested to the Contracting Officer, and no change shall be made without prior acceptance by the Contracting Officer.

The Project Manager shall have a recognized four-year college degree in engineering, architecture, or related technical field, and at least five (5) years experience in managing and supervising Department of Defense construction projects of similar size and scope.

1.2.5 Project Superintendent

A Project Superintendent shall be assigned. This individual shall have a minimum of five years experience as a superintendent on Department of Defense construction projects similar in size and scope to this contract. The project superintendent shall have overall responsibility for all operations on the jobsite. The superintendent shall be assigned no other duties.

1.2.6 Contractor Quality Control

To assure compliance with contract requirements, the Contractor shall establish and maintain quality control for materials and work, including design, 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.

1.2.7 Safety

1.2.7.1 General

Site activities performed in conjunction with this contract may pose safety hazards that require specialized expertise to effectively address and eliminate. The Contractor shall be responsible for preparing and implementing an effective safety and health program throughout the entire duration of the contract.

1.2.7.2 Accident Prevention Plan (APP)

The contractor shall prepare an Accident Prevention Plan in accordance with the provisions of FAR 52.236-13 (Section 00700) and Section 00800, paragraph S-36.18. The Accident Prevention Plan shall address the contractor's overall safety program for the entire contract. The APP shall consist of the forms and documents listed in Section 00800, S36.18, ACCIDENT PREVENTION PLAN, covering the overall safety considerations for the contract as a whole.

1.2.7.3 Site-Specific Safety and Health Plan (SSHP)

The contractor shall prepare a site-specific safety and health plan addressing the safety aspects specific to the work ordered. Work on a feature of work shall not commence prior to receiving the Contracting Officer's written acceptance of both the contract Accident Prevention Plan and the site-specific safety and health plan.

The SSHP shall be prepared in accordance with the requirements specified in this section and shall comply with all federal, state, and local health and safety requirements, e.g., the Occupational Safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926) and the U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1). The SSHP shall address those elements that are specific to the feature of work that have potential for negative effects on the safety and health of workers, the public, and other personnel on site.

An Activity Hazard Analysis (AHA), POD Form 184-R, rev 16 Oct 98, shall be submitted for all phases of construction specific to the feature of work and worksite. Work on a construction phase cannot begin until the AHA is submitted and accepted.

The SSHP shall identify the individual responsible for jobsite safety. This individual shall be present at the jobsite at all times during construction. Copies of the accepted SSHP and Accident Prevention Plan shall be available at the jobsite at all times. All workers shall know the location of these plans. All workers shall receive a safety briefing covering applicable sections of these plans prior to the start of construction.

Daily safety and health inspections shall be conducted to determine if site operations are conducted in accordance with the accepted SSHP and contract requirements. Results and observations made during these inspections shall be noted in the contractor's daily report.

1.2.7.4 Safety and Health Manager

The Safety and Health Manager shall have direct responsibility for the overall management of the contractor's Safety Program for the entire contract, as required by the US Army Corps of Engineers Safety and Health Requirements Manual, EM385-1-1, and other applicable safety standards. This individual shall have a minimum of five (5) years experience in safety on Department of Defense construction projects similar in size and scope to this contract. All members of the safety staff are subject to review and acceptance by the Contracting Officer. The Safety and Health Manager shall have no other duties.

1.3 AS-BUILT DRAWINGS

As-built drawings shall be in accordance with Section 01780 CLOSEOUT SUBMITTALS.

1.4 DUST CONTROL

The amount of dust resulting from the Contractor's work 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 flooding and pollution. Measures shall also be taken for dust control along haul routes and equipment parking areas.

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, the Contracting Officer may prune them, subject to written approval.

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

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 quantity of salvaged or recycled materials shall be maintained by the Contractor during the length of the project and submitted to the Contracting Officer 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.

1.7.1 Title to Materials

Title to all materials and equipment to be removed, except as indicated or specified otherwise, 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 the Contractor's receipt of notice to proceed. Items indicated to be removed shall be removed and disposed of by the Contractor outside the limits of Government-controlled property at the Contractor's responsibility and expense before the completion and final acceptance of the work and such materials shall not be sold on the site.

1.7.2 Rubbish and Debris

Rubbish and debris shall be removed from Government-controlled property daily unless otherwise directed, so as not to allow accumulation inside or outside the building. Materials that cannot be removed daily shall be stored in areas designated by the Contracting Officer.

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 that 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 area shall remain operable and shall not be affected by the Contractor's work, unless otherwise approved in writing in advance by the Contracting Officer.

1.8.4 Staking and Flagging Existing Utilities

The Contractor, prior to start of any excavation or trenching work, shall verify the location of all utility lines shown on the drawings which are within the areas of work, and shall mark, stake, or flag each utility line along trench alignments and under areas of excavation under this project, as approved. Existing utility lines shall be located by walking trench alignments with approved equipment for locating underground pipes and cables. Utility lines so located shall be noted on the drawings.

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 CONTRACTOR PARKING

Parking for the Contractor's, his employee's, and subcontractors' personal vehicles is limited to areas within the limits of construction. Personal vehicle parking is prohibited anywhere else within the boundaries of Schofield Barracks Military Base.

1.11 GOVERNMENT PROJECT OFFICE

The Contractor shall provide, for use by Government supervisory and inspection personnel, a job-site office space with a floor area not less than 500 square feet, with minimum twice-per-week janitorial service. This office space may be within the Contractor's project office building if adjacent to the job site and if separated by a solid partition; otherwise a separate facility, adjacent to the job site, shall be provided. The office

shall be provided with windows and screens, air conditioning to maintain not more than 22 degrees C, electricity, wall outlets, ceiling lights, (1) telephone and (3) cellular phones or (4) cellular phones, (3) office desks with drawers, (3) layout tables, (5) ergonomic chairs, (4) legal-size five-drawer locking file cabinets, (3) 3-shelf bookcase, (3) plan racks, (1) fire extinguisher, and (3) computers.

Provide potable drinking water and temporary toilet facilities for Government personnel. Contractor's copier and fax machine shall be available for use by Government personnel. Contractor shall provide (4) vehicle parking spaces for Government personnel at the project office. The cost of utilities including two telephone lines with different telephone numbers (one number for the telephone instrument and one for the modem), air conditioning, and operation and maintenance costs of the Government project office shall be borne by the Contractor. The government will be responsible for its long distance calls. Upon completion of the project, the project office and furnishings shall be removed and disposed of by the Contractor.

1.11.1 Computer Requirements

The Contractor shall provide computers for use by Government personnel assigned to this contract. These computers shall be Dell Optiplex GX270 or approved equal (proposed "equal" systems require approval by the Government prior to contract award), minimally configured as follows:

a. **DESKTOP REQUIREMENTS**

Feature	**Requirement**
OptiPlex GX260 Small Minitower	Pentium ® 4 Processor, 2.80GHz, 512K/8000MHZ FSB, 512K
Memory:	1.0GB DDR Non-ECC SDRAM, 333RAM, or higher (2DIMMs max)
Keyboards:	PS/2 Keyboard
Monitors:	17 inch flat panel display (17.0 viewable)
Boot Hard Drives:	80GB EIDE 7200RPM
Card Reader:	5.25 inch PCMCIA Reader with Required PCI Controller Card
Floppy Drives:	Internal 1.44 MB 3.5 Inch Floppy Drive
Operating System(s):	Windows ® XP Professional, SP1 with media and NTFS
Mouse.	Microsoft PS/2 2-Button IntelliMouse with Scroll
Network Adapters (NICs):	Integrated Intel Gigabit (10/100/1000) with Alert Standards Format

a. **DESKTOP REQUIREMENTS**

Feature	**Requirement**
1st Removable Media and DVD+RW Options	8X DVD+RW/+R drive with Roxio software
Audio Solutions	Inergrated Sound Blaser Compatible
Speakers:	External speakers
Documentation:	Resourse CD containing Diagnostics and Drivers for Dell OptiPlex systems
Additional Hard Drive or ZIP Drive:	Zip 250 Disk Drive
Energy Star Label:	Energy Star Label
Hardware Support Services:	3 Yr Same Day 4 Hr Response Parts + Onsite Labor (M-F 8am-6pm)
Optional Support Services	Gold Technical Support, OptiPlex, 3 Years
Installation Support:	No Installation
Mouse Pad:	Mouse Pad
Power Protection:	American Power Conversation (APC) Back-UPS ES 350
Additional Software:	Microsoft Office 2003 Adobe Acrobat 6.0

b. **CONNECTIVITY REQUIREMENTS**

The Government Project Office shall be provided with one high speed internet connection (RoadRunner ™ or DSL) with a minimum download speed of 3 Mbps and a minimum upload speed of 1.5 Mbps, and one static IP address.

c. **NETWORKING REQUIREMENTS**

The Government Project Office shall be configured with a local area network that includes a Cisco Catalyst 3750G 24PS 10/100 switch (or equal) with a minimum of twenty-four (24) ports. Wiring shall be CAT6 twisted pair cabling terminated with RJ-45 connectors, which will run from the cable-modem/switch to each of the workstations and/or other devices.

The Contractor shall have delivered all required computer hardware and software directly to the Government Project Office in factory-sealed, unopened boxes. Any boxes delivered with damaged or tampered seals will be rejected by the Government and shall be replaced by the Contractor at no additional cost to the Government. The Government will perform set up of the computers in the Government Project Office.

The Contractor shall provide all software licenses and software updates for the duration of the contract. Hardware shall be provided with a 3-year manufacturer's onsite maintenance contract. Should the construction contract last longer than 3 years, at the end of the maintenance contract, the Contractor shall provide new computers, similar to the above, except configured to the standard at that time. The Government will provide specifications for replacement workstations and hardware.

At the end of the construction contract, the Government will turn over all contractor-provided hardware and software to the Contractor. Hard drives will be wiped clean of all software, including the operating system.

1.11.1.1 Other Devices (minimum requirements)

Printer: Hewlett-Packard Laserjet 5100TN or 5100DTN or approved equal (must be HP PCL compatible), Digital Camera: Kodak LS443 with additional 256 MB memory card, or approved equal.

1.11.1.2 Connectivity Requirements

The Government Project Office shall be provided with one high speed internet connection (RoadRunner ™ or DSL) with a minimum download speed of 3 Mbps and a minimum upload speed of 1.5 Mbps, and one static IP address.

1.12 WORKING DIRECTIVES

1.12.1 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 jobsite at all times during construction.

1.12.2 **(DELETED)**

1.13 COMMERCIAL TELEPHONE SERVICE LINES

Availability of existing commercial telephone service lines are extremely limited and/or non-existent. Contractor shall coordinate with Verizon Hawaii to verify the extent of commercial telephone service lines available and what actions may be necessary to obtain said service in the magnitude required to satisfy its operational requirements. Notwithstanding the actual level of commercial telephone service lines available, the Contractor shall be responsible for all costs and necessary actions.

1.14 INSPECTION

1.14.1 Final Inspection and Acceptance

The Contractor shall give the Contracting Officer, a minimum of fourteen (14) calendar days advance notice prior to final inspection for acceptance by the Contracting Officer. The Contractor upon notification by the Contracting Officer shall promptly and satisfactorily correct all deficiencies found on final inspection.

1.15 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)

ATTACHMENT 20

PROGRAMMATIC AGREEMENT

PROGRAMMATIC AGREEMENT
BETWEEN THE UNITED STATES ARMY GARRISON, HAWAII
AND
THE HAWAI'I STATE HISTORIC PRESERVATION OFFICER

REGARDING THE RENOVATION OF BARRACKS IN QUADS B, C, D, AND E
SCHOFIELD BARRACKS MILITARY RESERVATION
WAHIAWA, O'AHU ISLAND, HAWAI'I

WHEREAS, the United States Army Garrison, Hawaii (USAG-HI) has determined that the Renovation of Barracks in Quads B, C, D, and E (hereafter referred to as the Undertaking) on Schofield Barracks Military Reservation (SBMR) may have an adverse effect on the Schofield Barracks Historic District, and has consulted with the Hawai'i State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. section 470f); and

WHEREAS, Quads B, C, D, and E are part of the Schofield Barracks Historic District, which is listed on the National Register of Historic Places, and have been assessed to have Category II significance in the Schofield Barracks Cultural Resource Management Plan published in 2000; and

WHEREAS, USAG-HI has undertaken a historic building study of Quads B, C, D, E, and F to identify feature(s), or set of features, that may be considered contributing element(s) to the significance of one or more Quads; and

WHEREAS, the historic building study, cited above, has set out its finding in a report (hereafter referred to as the Report) titled, "Schofield Barracks: Historic Architectural Survey, Quads B, C, D, E & F", which is hereby attached to this Programmatic Agreement (PA) as Appendix A; and

WHEREAS, USAG-HI has consulted with the Historic Hawai'i Foundation (HHF) in compliance with Section 106 of the National Historic Preservation Act, 16 U.S.C. 470f, and its implementing regulations, 36 CFR Part 800 (NHPA); and

WHEREAS, USAG-HI has consulted with the Office of Hawaiian Affairs (OHA) for which SBMR may have religious and cultural significance, and the Outdoor Circle (OC), regarding the effects of the Undertaking on Quads B, C, D, and E, and have invited both OHA and OC to sign this PA as concurring parties; and

WHEREAS, the Report has been transmitted, as part of the Section 106 consultation process, to SHPO and HHF for review, and is intended for transmittal to any other agency or party indicating interest in the Undertaking; and

WHEREAS, in accordance with 36 CFR Section 800.6(a)(1), USAG-HI has notified the Advisory Council on Historic Preservation (Council) of its adverse effect determination with specified documentation and the Council has chosen not to participate in the consultation pursuant to 36 CFR Section 800.6(a)(1) (iii);

WHEREAS, members of the public were provided an opportunity to comment on the Undertaking in the preparation, compilation, and completion of an Environmental Assessment for the Undertaking; and

NOW, THEREFORE, USAG-HI, SHPO, and HHF agree that upon USAG-HI's decision to proceed with the Undertaking, USAG-HI shall insure that the following stipulations are implemented in order to take into account the effects of the Undertaking on historic properties.

Stipulations

USAG-HI shall carry out the following measures to avoid, minimize, or mitigate the adverse effects on historic properties:

I. Prior to any approved alterations or demolition, the existing structures shall be photographically documented per Historic American Building Survey (HABS) Standards, Level 2.

II. All character defining features of the barracks comprising each Quad listed in the Report shall be retained.

III. The visual character contributing to the historic significance of Quads B, C, D, and E, individually or as a whole, shall be retained.

IV. All of the projects shall be designed and constructed with the supervision of a qualified Historical Architect (hereafter referred to as the Architect of Record, or AOR) whose credentials will be reviewed and approved of by USAG-HI, SHPO, and HHF. The AOR will be appointed to have oversight on all project designs and any subsequent design changes and amendments, revisions, or alterations. The AOR shall have proven acceptable historic preservation experience and meet or exceed the Secretary of Interiors Standards as a Historical Architect. The AOR shall have the authority to perform the following, in consultation with USAG-HI and its designated representative and the SHPO, HHF, and any other interested parties.

A. Review all project designs and subsequent construction work, from start of project during the design phases to the end of all construction phase, to ensure that all character defining feature(s) listed in the Report for each Quad is (are) protected and preserved, and that the Standards have been met.

B. Change, amend, revise, alter, etc., any design element(s) deemed to adversely affect any character defining feature(s) listed in the Report to insure protection and preservation of such feature(s).

C. As appropriate, remove detracting features and restore character defining features in each building of each Quad as listed and recommended in the Report.

V. Rehabilitation of Quads B, C, D, and E and construction of new buildings shall be consistent with The Secretary of the Interiors Standards for Rehabilitation & Illustrated

Guidelines for Rehabilitating Historic Buildings, (1997). Both the exterior and the interior work will retain, repair, or replace, in-kind, all character defining features.

VI. SHPO and HHF shall be provided the opportunity to review and comment on all design drawings to coincide with each project's pre-determined design submittal phases (i.e., 10%, 35%. 65%, and 90%) until final design completion.

VII. Any major changes, addition, mitigation, and variation, such as window and or glass types and colors, roof and roofing configurations, frontage addition and re-alignment, etc., to the barracks in each Quad shall be performed in consultation with SHPO, HHF, and other interested parties in accordance with Section 106 of NHPA.

VIII. As the rehabilitation is completed for each Quad (or project), SHPO, HHF, and USAG-HI will evaluate compliance with the Standards. Should specific details need to be included in any future contracts, USAG-HI will make adjustments immediately to insure the future projects include the required modifications.

IX. DISPUTE RESOLUTION. Should any party to this agreement object at any time to any actions proposed or the manner in which the terms of this PA are implemented, USAG-HI shall consult with the objecting party(ies) to resolve the objection. If USAG-HI determines, within 30 days, that such objection(s) cannot be resolved, USAG-HI will:

A. Forward all documentation relevant to the dispute to the Council in accordance with 36 CFR Section 800.2(b)(2). Upon receipt of adequate documentation, the Council shall review and advise USAG-HI on the resolution of the objection within 30 days. Any comment provided by the Council, and all comments from the parties to the MOA, will be taken into account by USAG-HI in reaching a final decision regarding the dispute.

B. If the Council does not provide comments regarding the dispute within 30 days after receipt of adequate documentation, USAG-HI may render a decision regarding the dispute. In reaching its decision, USAG-HI will take into account all comments regarding the dispute from the parties to the PA.

C. USAG-HI's responsibility to carry out all other actions subject to the terms of this PA that are not the subject of dispute remain unchanged. USAG-HI will notify all parties of its decision in writing before implementing that portion of the Undertaking subject to dispute under this stipulation. USAG-HI's decision will be final.

X. AMENDMENTS AND NONCOMPLIANCE. If any signatory to this PA, including any invited signatory, determines that its terms will not or cannot be carried out or that an amendment to its terms must be made, that party shall immediately consult with the other parties to develop an amendment to this PA pursuant to 36 CFR 800.6(c)(7) and 800.6(c)(8). The amendment will be effective on the date a copy, signed by all of the original signatories, is filed with the Council. If the signatories cannot agree to appropriate terms to amend the PA, any signatory may terminate the agreement in accordance with Stipulation XI below.

XI. TERMINATION. If this PA is not amended following the consultation set out in Stipulation IX, it may be terminated by any signatory or invited signatory. Within 30 days

following termination, the USAG-HI shall notify the signatories if it will initiate consultation to execute an Memorandum of Agreement with the signatories under 36 CFR 800.6(c)(1) or request the comments of the Council under 36 CFR 800.7(a) and proceed accordingly.

XII. The stipulations of this agreement are subject to the provisions of the Anti-Deficiency Act. If compliance with the Anti-Deficiency Act alters or impairs the Army's ability to implement the stipulations of this agreement, the Army will consult with all parties to this PA in accordance with Stipulation XI.

EXECUTION of this PA by USAG-HI, SHPO, HHF, the submission of documentation and filing of this PA with the Council pursuant to 36 CFR Section 800.6(b)(1) (iv) prior to Adjutant General's approval of this Undertaking, and implementation of its terms, evidences that USAG-HI has taken into account the effects of this Undertaking on historic properties and afforded the Council an opportunity to comment.

SIGNATORIES:

Approved: United States Army Garrison, Hawaii

_____

DAVID L. ANDERSON Date
Colonel, U.S. Army
Commander
U.S, Army Garrison, Hawaii

Approved: HAWAII STATE HISTORIC PRESERVATION OFFICE

_____

PETER T. YOUNG Date
State Historic Preservation Officer

Concur: HISTORIC HAWAI'I FOUNDATION

_____

DAVID SCOTT Date
Executive Director
Historic Hawai'i Foundation

ATTACHMENT 21

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Final

Supplemental Environmental Assessment for the Renovation of Quads B, C, D, E and F at Schofield Barracks Military Reservation, Oahu, Hawaii for the Whole Barracks Renewal Program

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Proposing Agency:

U.S. Army Garrison, Hawaii
Directorate of Public Works
Schofield Barracks Military Reservation, Hawaii 96857-5000

May 2001

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1.1 Introduction

The preparation of this Supplemental Environmental Assessment (EA) complies with the substantive provisions of the Council of Environmental Quality (CEQ) National Environmental Protection Act (NEPA) regulations, 40 CFR Part 1500 and Army Regulation 200-2.

This Supplemental EA is tiered to the *Final Programmatic EA and Finding of No Significant Impact for the U.S. Army Whole Barracks Renewal Program, Oahu, Hawaii* (hereafter referred to as the *Final Programmatic EA*) that was completed in July 1995 for the Department of the Army. The *Final Programmatic EA* is hereby incorporated by reference.

As indicated in AR 200-2, tiering refers to the coverage of general matters in broader environmental documents (e.g., the *Final Programmatic EA*) with subsequent narrower statements or environmental analyses (e.g., this Supplemental EA). Tiering is appropriate when it helps the decision maker to focus on issues that are ripe for decision and exclude from consideration issues already decided or not yet ripe.

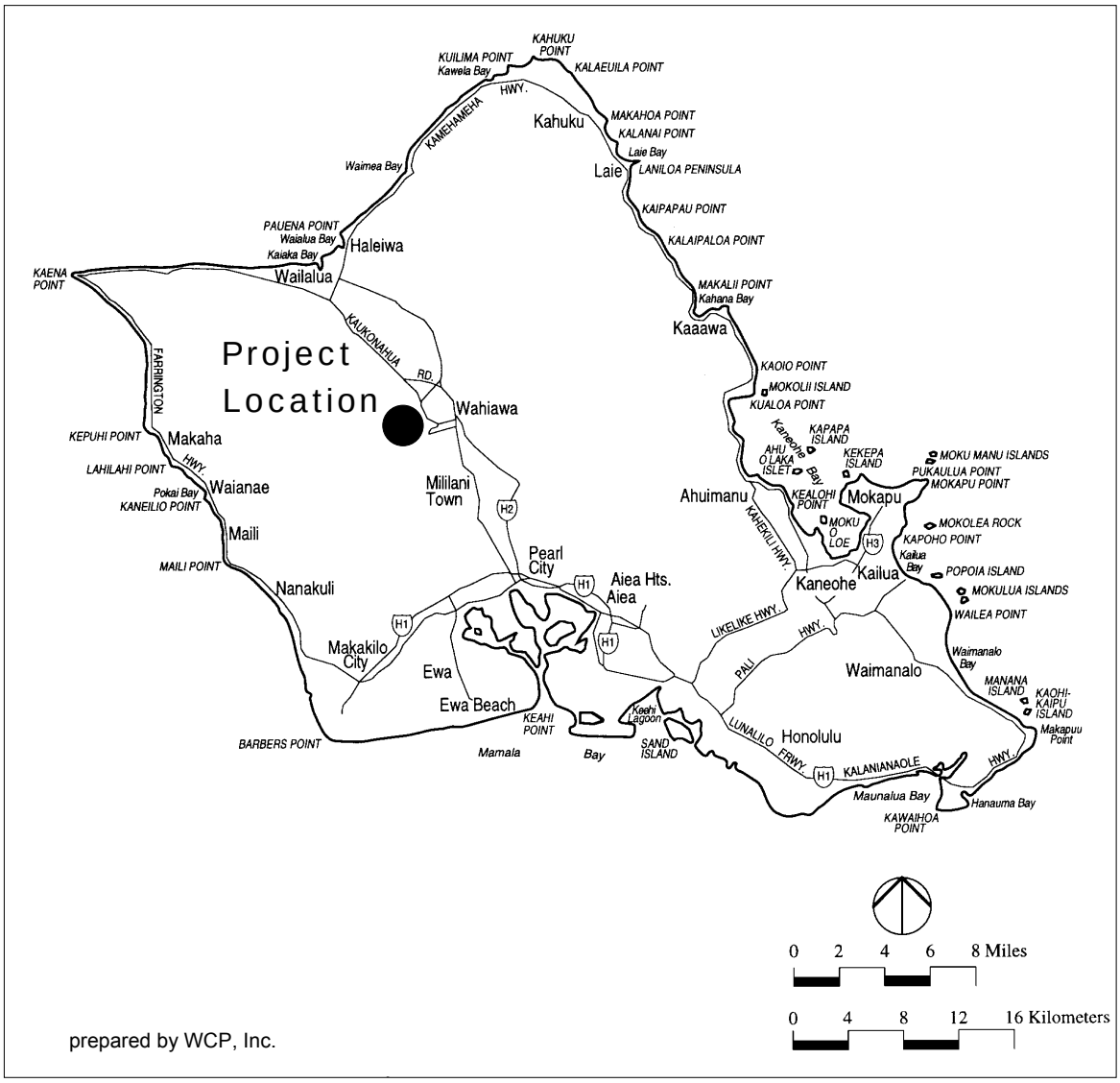
The purpose of the *Final Programmatic EA* was to evaluate the Whole Barracks Renewal (WBR) Program: a long-term Army-wide effort to modernize unaccompanied personnel living facilities at the 25th Infantry Division (ID) Light (L) and U.S. Army, Hawaii (USARHAW) installations. Actions considered in the programmatic analysis included the construction of new barracks plus support facilities and the renovation of existing substandard barracks located on the island of Oahu, Hawaii at Schofield Barracks Military Reservation, Helemano Military Reservation (HMR), Wheeler Army Airfield (WAAF), Fort Shafter and Tripler Army Medical Center (TAMC). The timeframe for the WBR Program is a period of over 50 years (depending on funding availability) beginning with Fiscal Year 1995 (FY95).

Statements in the *Final Programmatic EA* indicated that a Supplemental EA would be prepared to adequately assess any site-specific potential impacts under conditions existing near the time of implementation prior to each phase of WBR Program actions after FY98. The intent of this supplemental environmental impact analysis is to address the environmental consequences of the proposed Army project to renovate and operate Quads B, C, D, E and F at Schofield Barracks Military Reservation.

1.2 Project Location

Schofield Barracks Military Reservation is located on the island of Oahu, the third largest and most populous island in the Hawaiian Archipelago. The installation is bounded by the remnants of two shield volcanoes, the Koolau Mountain Range to the east and the Waianae Mountain Range to the west. Between the mountain ranges lies the Leilehua or Schofield Plateau. Schofield Barracks Military Reservation is located on this north central plateau in the Wahiawa District of Oahu (see Figure 1). Access to the installation is via Kamehameha Highway, the H-2 Freeway, Kaukonahua Road, Kunia Road, and Wilikina Drive.

Figure 1: General Location



Project actions will affect the buildings in Quads B, C, D, E and F on the Main Post of Schofield Barracks Military Reservation (see Figures 2 and 3).

Figure 2: Project Vicinity

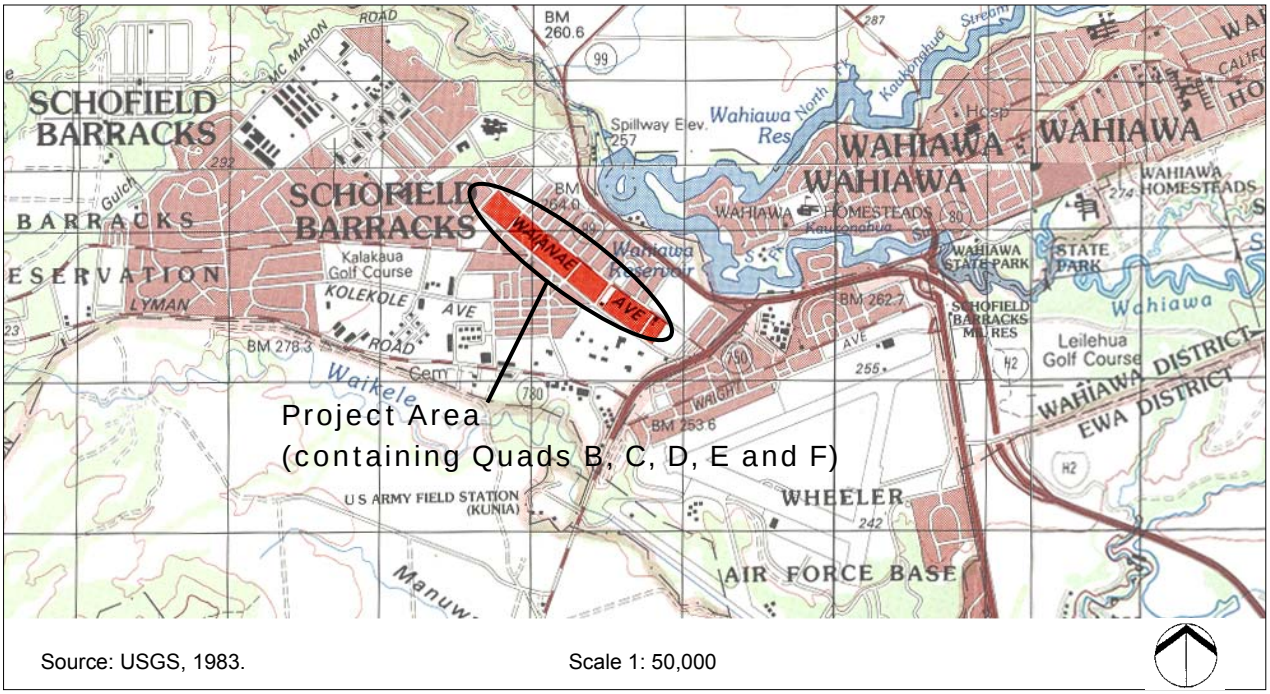
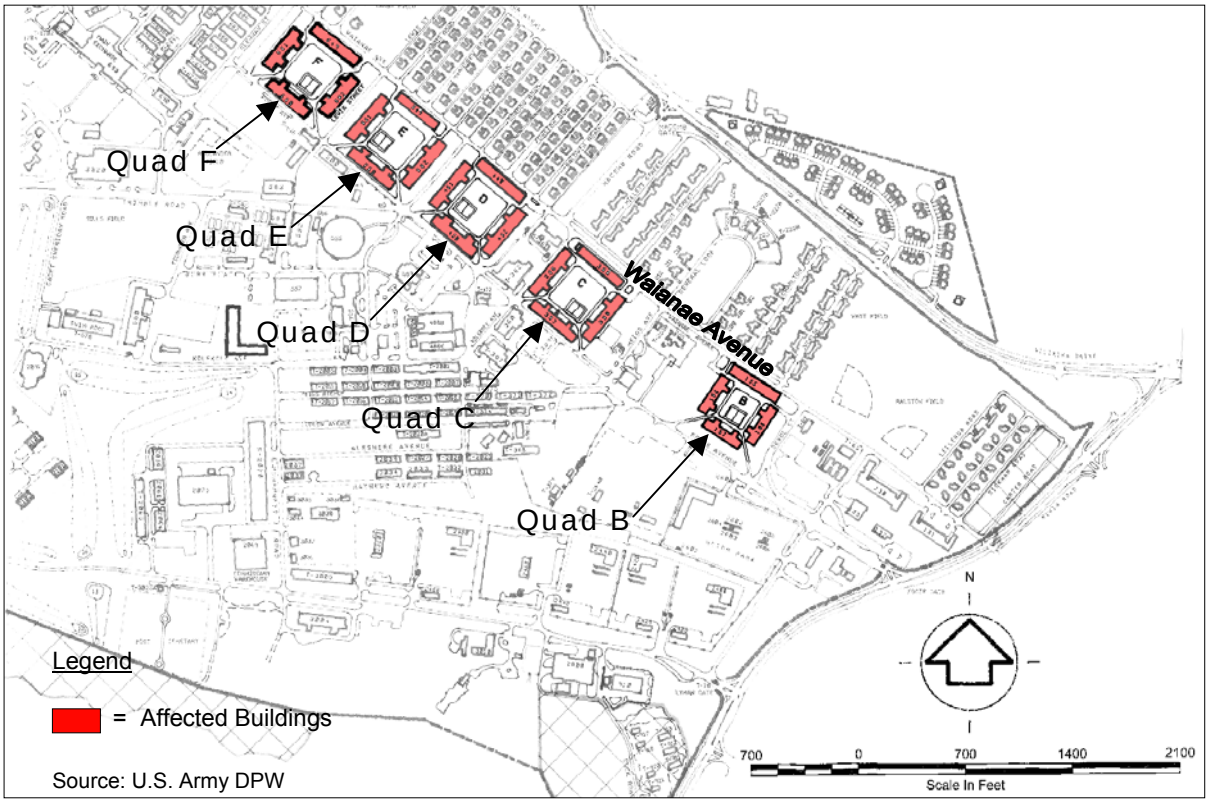
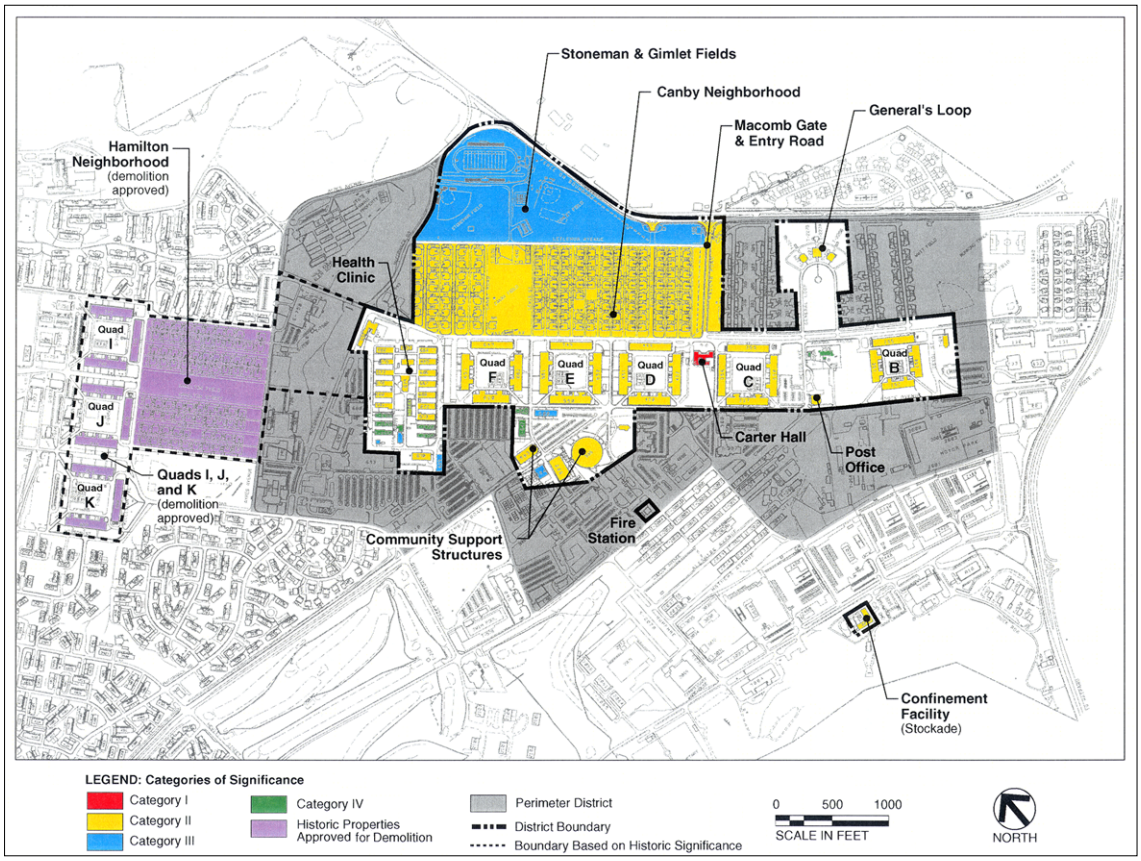


Figure 3: Project Sites on Schofield Barracks Military Reservation



As depicted in Figure 4, the Quads that would be affected by project actions are located within the Schofield Barracks Historic District which is listed on the State and National Register of Historic Places.

Figure 4: Schofield Barracks Historic District



Source: Belt Collins Hawaii, et al., 2000

1.3 Background

Information in this section is excerpted from *A History of Schofield Barracks Military Reservation* (Alvarez, 1982) and from previous investigations performed by the Army and its contractors.

In 1899, shortly after the annexation of Hawaii, land for Schofield Barracks Military Reservation was acquired by a Presidential Executive Order that set aside 14,604.95 acres for a military reservation. A temporary Army installation was established on a portion of these lands in 1908. The installation "was envisaged as the major defender of the corridor which led to the Pearl Harbor Naval Station on Oahu's southern coast" (Alvarez, 1982, pg.2). In 1909, it was first occupied by elements of the 5th Calvary Regiment. Under Capt. Castner's supervision, 250 buildings were erected by 1911. Between 1911 and 1917, the initial planning and construction of a permanent post occurred. By 1914, the population of the installation was approximately 6,000 troops. Although the onset of World War I initially had little impact on the installation,

construction was temporarily halted. In 1917, Schofield Barracks Military Reservation became a training camp for officers and all of its tenants were eventually called to war. Construction resumed with the return of the troops by 1920. In 1936, the discovery of a reliable potable water source finally solved the water shortage that had plagued the installation from its inception. As a result, Schofield Barracks Military Reservation increased in military value and developed rapidly while receiving much of the newest military technology.

Following the attack on Pearl Harbor and during the Korean War, Schofield Barracks Military Reservation served as a combat troop staging area and basic training center. It housed the 24th and 25th Infantry Divisions (ID), both of which served abroad following the end of World War II. In 1954, the 25th ID was called back to headquarters at Schofield Barracks Military Reservation. Following the Korean War, United States Army Support Command, Hawaii (USASCH) headquarters were established at Fort Shafter due to various command restructuring. During the Vietnam conflict, Schofield Barracks Military Reservation again served as a combat troop staging center but not as a training center. Additional acreage was leased, bringing the total area of the post to 17,597.00 acres. The 25th ID, whose headquarters have been housed at Schofield Barracks Military Reservation since 1971, was configured into a light (L) division of approximately 10,000 soldiers in 1986.

1.4 Mission of Schofield Barracks Military Reservation

The military mission at Schofield Barracks Military Reservation is to support the 25th ID (L) and U.S. Army Hawaii (USARHAW) by providing training, administrative, housing, and community facilities. References to the 25th ID (L) and USARHAW will hereafter appear as U.S. Army. Depot and repair facilities, a medical facility, and community and housing support are also provided.

According to the *Final Programmatic EA* (pg. 4-48), there are 17,169 enlisted Army personnel on Oahu, of which 7,850 are authorized to occupy unaccompanied billeted space such as barracks buildings in Quads B, C, D, E and F. Approximately 6,700 of these soldiers are billeted at Schofield Barracks Military Reservation (Ibid). The total population of approximately 19,500 persons at Schofield Barracks Military Reservation constitutes the highest concentration of military personnel and dependents in Hawaii (U.S. Army, 1993).

General operations performed at Schofield Barracks Military Reservation include administration, training, and small-scale industrial operations such as vehicle repair and maintenance, weapons refinishing, laundry, etc. Major industrial operations are not performed on-base. Both nonfiring (e.g., field tactical training, tactical problem solving, and routine bivouacking) and firing training activities occur at Schofield Barracks Military Reservation. Live ammunition is included in some firing activities.

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2.1 Purpose of the Action

As stated in Section 1.2 of the *Final Programmatic EA* (pg. 1-3), the WBR Program was adopted by the Army to provide improved living standards for all eligible single enlisted personnel assigned to U.S. Army installations. Each Quad needs to comply with the standards promulgated by the Army's WBR Program which define the major planning goals and objectives. These goals and objectives are as follows:

1. Provide improved living standards at U.S. Army installations for all eligible bachelor enlisted personnel.
2. Accomplish these changes without displacing additional soldiers from on-post accommodations to housing within the local economy during barracks renovations.
3. Maintain unit integrity at the Brigade level whenever possible.
4. Provide operational headquarters spaces for the battalion and company headquarters displaced by barracks renovations and locate the headquarters in proximity to assigned billeting areas.
5. Modernize and expand existing dining facilities.
6. Provide adequate gym facilities.

2.2 Need for the Action

The *Final Programmatic EA* concluded that the overall WBR Program would not have any unmitigable, significant adverse effects on the environment (pg. 7-1). A detailed level of analysis was provided in the *Final Programmatic EA* for Phase One actions of the WBR Program (e.g., FY95, FY97 and FY98 projects). A similar level of detail was unavailable for subsequent actions not yet programmed as of July 1995; therefore the *Final Programmatic EA* calls for the preparation of site-specific environmental documentation for subsequent actions (Ibid). As shown in Table 2-1 on page 2-25 of the *Final Programmatic EA*, the proposed renovation of Quads C and D, E and F, and B are WBR Program actions planned for Phases 3, 5, and 15, respectively. A funding allocation for the repair of 2,848 existing substandard units has resulted in the rescheduling of the renovation of the Quads, such that the preparation of this Supplemental EA is necessary at this time.

Renovation of Quads B, C, D, E and F is considered necessary because the affected buildings are in an obsolescent state whereby its occupants are subject to substandard living conditions. Repairs are necessary to allow the buildings to conform to current standards intended to provide soldiers with a higher degree of privacy, security, and comfort. Buildings in the Quads were constructed between 1915 and 1931 with the last

major renovation occurring in the latter part of the 1970s. The Quads were designed to provide centralized housing, dining, and administrative space for troops stationed at Schofield Barracks Military Reservation. As a result of the original design, soldiers housed in the Quads are allotted small living spaces (90 square feet per man) and bathroom facilities do not allow for privacy. The existing buildings lack proper plumbing, lighting, ventilation, and partitions for security, privacy, comfort and noise abatement. With the current configuration and organization, the living quarters for single soldiers are located in the same building as unit operations and headquarters facilities. For all of these reasons, the living spaces in the barracks are inconsistent with the living standards of today.

3.1 The Proposed Action: Repair and Renovate Existing Assets

The Proposed Action to repair and renovate Quads B, C, D, E and F would provide the soldiers of the U.S. Army with adequate facilities for living and working. Buildings used as barracks will be completely renovated to improve living conditions for unaccompanied enlisted soldiers. Dining facilities will be repaired and renovated. Billeting functions will be separated from unit operations and headquarters facilities to provide a higher degree of privacy, security, and comfort for the soldier. Company operations facilities with arms vaults, equipment maintenance areas, unit storage and equipment storage areas will be repaired. Intrusion detection systems (IDS) will be installed in all arms vaults. The actions to be accomplished for Quad F are described below to provide an example of the nature of proposed repair and renovation work that will be adapted for the other Quads. The timing and types of actions to be accomplished for the other Quads are dependent on funding availability and associated considerations.

Quad F. Work would commence in FY01. Structural upgrades for all four buildings would be accomplished to meet current standards. Existing concrete block walls would be identified. Flooring, windows and air handling units in the buildings would be replaced. A covered soldier gear wash area within Quad F would be provided for the cleaning of personal gear. (The area would also be used as a covered recreational area for social gatherings).

- Building 649. The existing barracks building would be repaired to provide improved living spaces for 92 unaccompanied enlisted personnel. Repair work to be accomplished would renovate the living/sleeping rooms, baths, walk-in closets, service areas, janitor's closets, mechanical rooms, electrical rooms and telecommunication rooms.
- Building 650. The dining facility would be repaired. Brigade headquarters and community support functions (e.g., laundry and activity rooms) would be provided.
- Building 651. The existing barracks building would be repaired to provide improved accommodations for 50 unaccompanied enlisted personnel. Repair work to be accomplished would renovate the living/sleeping rooms, baths, walk-in closets, service areas, janitor's closets, mechanical rooms, electrical rooms and telecommunication rooms.
- Building 652. Company operations facilities with arms vaults, equipment maintenance areas, unit storage and equipment storage areas would be repaired to adequately accommodate one (1) medium company/three (3) small companies. Intrusion detection systems (IDS) would be installed in all arms vaults. A small battalion headquarters and a troop aid station would be provided.

The following buildings would be affected by repair and renovation work:

Quad B: Buildings 155, 156, 157 and 158.
Quad C: Buildings 355, 356, 357 and 358.
Quad D: Buildings 449, 450, 451 and 452.
Quad E: Buildings 549, 550, 551 and 552.
Quad F: Buildings 649, 650, 651 and 652.

According to the *Schofield Barracks Cultural Resource Management Plan* (Belt Collins Hawaii et al., 2000), the Quads located within the Schofield Barracks Historic District were evaluated as historically significant (pg. 2-5). The unique architectural character attributed to Quads B, C, D, E and F is hereby described in the following excerpts from the *Schofield Barracks Cultural Resource Management Plan* (pg. 2-8):

> Quad B. These concrete Quadrangle barracks were constructed between 1914 and 1918 for the enlisted men of the 3rd Engineer and Special Troops. The buildings were designed in a Second Renaissance Revival style. Classical elements—such as arcades, arched openings, enriched cornices with decorative brackets, dentils, and a diamond frieze—are characteristic of this style. Buildings in this style are generally large, usually three stories, and organized into distinct horizontal divisions by pronounced belt or string courses. The administrative building has a central entry with a decorative concrete, brick, and plaster surround at the open passage leading to the central courtyard. The four buildings each have arcaded galleries or walkways on their courtyard elevations.
>
> Quad C. Buildings 356 and 358 (in 1915) and buildings 355 and 357 (in 1916) were constructed as barracks for the 35th Infantry. Like the buildings in Quad B, they were designed in a Second Renaissance Revival style. (See Quad B description for additional information).
>
> The Quad C administrative building, along Waianae Avenue, has a central entry with a decorative concrete, brick, and plaster surround at the open passage leasing to the central courtyard. All four buildings have arcaded galleries or walkways on their courtyard elevations.
>
> Quad D. These four buildings were constructed in 1921 as barracks for the 27th Infantry. (See Quad C for a general description).
>
> The administrative building, along Waianae Avenue, has a central entry with a decorative concrete, brick, and plaster surround at the open passage leasing to the central courtyard. Unlike Quads B and C, the original barracks buildings (450, 451, and 452) in this Quad are double-loaded with galleries on the courtyard and exterior elevations, and have arched openings on both sides of the buildings. The ground floor galleries at the exterior elevations were enclosed in a 1950s renovation.
>
> Quad E. These four buildings were constructed in 1920 as barracks for the 21st Infantry. (See description of Quads C and D for additional information).

Quad F. This Quad was constructed in 1931 as the 19th Infantry barracks. The buildings were constructed in a simple utilitarian style with flat roof and cornice and little or no decorative detailing. They also do not have the arched openings at the exterior balconies seen in buildings of other Quads, but rather have rectangular openings. Quad F has the same layout as the other Quads, with three barracks buildings and single administration building around a central courtyard. All original windows and doors have been replaced, but the structures otherwise retain their original appearance.

The completion of WBR Program actions for Quads B, C, D, E and F is expected to provide up to 156,250 square meters (187,500 square yards) of usable interior space.

Currently, Quads B, C, D and E are occupied; only Quad F is vacant. WBR Program actions are expected to be coordinated to avoid displacing soldiers in off-post facilities. Other WBR Program actions (e.g., the construction of new on-post housing assets) are expected to provide the necessary facilities for the relocation of soldiers from buildings currently in use. Repair and renovation work will be coordinated to occur in an orderly fashion that minimizes the disruptions to affected personnel.

3.2 Alternative 1: Lease Existing Housing Assets Off-Post and Renovation

With this alternative, the U.S. Army would lease existing housing assets in areas surrounding Schofield Barracks Military Reservation. Renovation work on operations and support facilities would occur as described for the Proposed Action. Soldiers' quarters on Schofield Barracks Military Reservation, however, would not be renovated because the soldiers currently housed in those units would be assigned to rental units in nearby areas. The U.S. Army would provide monthly stipends to each soldier to cover expenses (i.e., rent).

3.3 Alternative 2: Purchase Existing Housing Assets Off-Post and Renovation

With this alternative, the U.S. Army would buy existing housing assets in areas surrounding Schofield Barracks Military Reservation. Renovation work on operations and support facilities would occur as described for the Proposed Action. Soldiers' quarters on Schofield Barracks Military Reservation, however, would not be renovated because the soldiers currently housed in those units would be assigned to the purchased condominium or single-family homes in nearby areas.

3.4 Alternative 3: Move to Excess Facilities on Other Installations

Operational military installations on Oahu that contain barracks include Hickam Air Force Base, Pearl Harbor and Marine Corps Base Hawaii, Kaneohe Bay. It is reported that none of these facilities can accommodate the Army unaccompanied housing requirement (Department of the Army, 1995, pg. 3-2). This fact, when considered with the transfer of uses formerly housed at the recently closed Barber's Point Naval Air

Station to other installations such as the Marine Corps Base Hawaii, Kaneohe Bay or Hickam Air Force Base further limits the availability of excess facilities on other installations. The Army is not expected to utilize the vacated air station as a result of its transfer to the State of Hawaii. In light of these considerations, the alternative to move to excess facilities on other installations is not regarded as a viable alternative and it is hereby dismissed from further consideration.

3.5 Alternative 4: Maintain the Status Quo (No Action)

With no action, existing conditions at Schofield Barracks Military Reservation remain unchanged. Currently, single enlisted soldiers are housed in substandard barracks buildings that lack proper plumbing, lighting, ventilation, and partitions for security, privacy, comfort and noise abatement. In addition, the configuration and organization of existing barracks do not meet current Army WBR Program standards that separate billeting from unit operations and headquarters facilities. For all of these reasons, the no action alternative is not a viable alternative and is hereby dismissed from further consideration.

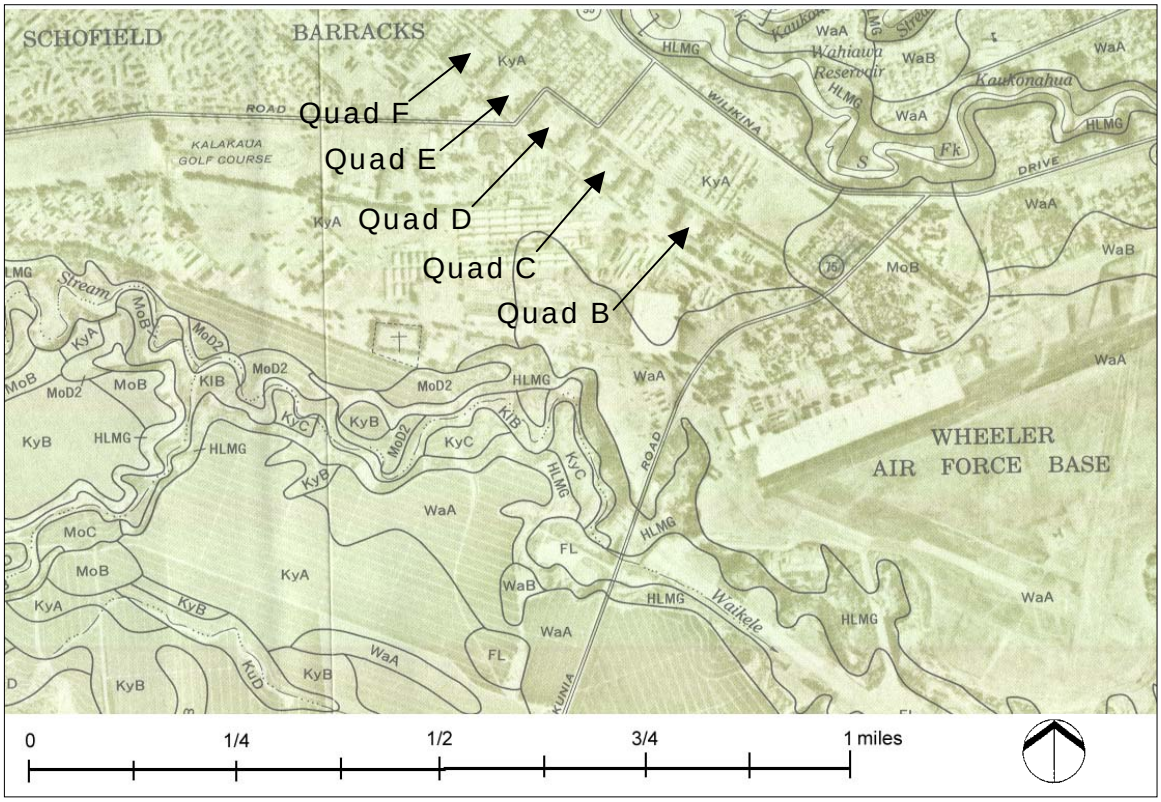
4.1 Topography, Soils and Geology

Refer to Sections 4.1 and 4.1.1 of the *Final Programmatic EA* (pgs 4-1 to 4-3) for relative information pertaining to the affected topography, soils and geology at Schofield Barracks Military Reservation. Additional site-specific information is hereby provided.

The Quads are located on the Main Post of Schofield Barracks Military Reservation where the topography is relatively flat. Slight variations in elevation are localized. The general area lies within the range of 840 and 880 feet above mean sea level.

According to the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (U.S. Department of Agriculture, Soil Conservation Service, 1972), the soil type underlying the Quads is Kunia silty clay, 0 to 3 percent slopes (KyA). This series consists of well-drained soils on the upland terraces and fans of Oahu. The soils are used for sugarcane, pineapple, homesites and military reservations. The KyA soil type has moderate permeability and slow runoff. The erosion hazard is no more than slight.

Figure 5: Soils



Source: Oahu Island, Hawaii - Sheet 41 (U.S. Department of Agriculture, Soil Conservation Service, 1972).

4.2 Water Resources

Refer to Sections 4.2 and 4.2.1 of the *Final Programmatic EA* (pgs. 4-6 to 4-12) for the discussion of water resources on Oahu and at Schofield Barracks Military Reservation, respectively. The water resources discussion in Section 4.2.1 covers surface water, ground water and flood hazards. Site-specific information is hereby provided.

There are no major surface water features in the project area containing Quads B, C, D, E and F. With respect to the flood hazard, the Quads fall (along with all of Schofield Barracks Military Reservation) within Zone D on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). Zone D is a classification for areas in which flood hazards are undetermined (FEMA, 1990). As depicted on available topographic maps, the project area is generally flat and not traversed by natural drainageways such as streams. Nevertheless, the Army considers Schofield Barracks Military Reservation as an area of possible but undetermined flood potential (Department of the Army, 1983). The risks from tsunamis are of lesser concern because Schofield Barracks Military Reservation is situated a considerable distance from the coastline and lies well outside the tsunami inundation zone.

4.3 Flora and Fauna

Refer to Sections 4.3 and 4.3.2 of the *Final Programmatic EA* (pgs. 4-18 to 4-23) for the discussion of flora and fauna at WBR project sites and at Schofield Barracks Military Reservation, respectively. Quads B, C, D, E and F are located on the main cantonment area of Schofield Barracks Military Reservation which does not contain suitable habitats for endangered, threatened or listed endangered or threatened species of flora or fauna.

Ornamental species found in urbanized areas are present in the project area. The species that were observed in the vicinity of Quad F are listed below; similar species exist in the vicinity of the remaining Quads.

COMMON NAME	BOTANICAL NAME
Palms:	
Royal Palm	*Roystonea elata*
Coconut Palm	*Cocos nucifera*
Areca Palm	*Dypsis lutescens*
Fan Palm	*Livingstona chinesis*
Manila Palm	*Veitchia merrillii*
Trees:	
Monkeypod	*Samanea saman*
Brassia	*Brassica spp*.
Chinese Banyan	*Ficus Microcarpa*
Benjamina Banyan	*Ficus benjamina*
Eucalyptus	*Eucalypute robusta*
Earpod	*Enterolobium cyclocarpum*
Norfolk Island Pine	*Araucaria columnaria*

COMMON NAME	BOTANICAL NAME
Shrubs:	
Cactus (prickly pear)	*Optuna ficus-indica*
Mock Orange	*Murray paniculata*
Hibiscus	*Hibiscus tiliaceus*
Bouganvillea	*Bouganvillea spp.*
Grasses:	
Common Bermuda	*Cynodon datctylon manienie*

4.4 Air Quality

The discussion of climate, regulatory standards and ambient air quality is provided in Sections 4.4 through 4.4.3 of the *Final Programmatic EA* (pgs. 4-25 to 4-28). Hawaii, in general, has air that is "relatively clean and low in pollution" (Univ. of Hawaii, Dept. of Geography, 1983). On Schofield Barracks Military Reservation, minor localized impacts to air quality probably occur as a result of nearby aircraft operations, fuel transfers, motor vehicle traffic, laundry operations, and automotive care operations; however, it is presumed that both state and federal ambient air quality standards are being met.

4.5 Noise Quality

The discussion of noise quality (including applicable criteria) is provided in Section 4.5 through 4.5.2 of the *Final Programmatic EA* (pgs. 4-28 to 4-32). Quads B, C, D, E and F lie well within Noise Zone I on Schofield Barracks Military Reservation (which implies that noise quality in the project area is at an acceptable level for noise sensitive land uses such as housing).

4.6 Historic and Archaeological Resources

Refer to Section 4.6.1 of the *Final Programmatic EA* (pgs. 4-36 to 4-37) for the discussion of historical and archaeological resources at Schofield Barracks Military Reservation. Site-specific information is hereby provided.

Schofield Barracks Military Reservation is considered significant because of its size, its involvement in World War II and its physical characteristics (Belt Collins Hawaii et al., 2000, pg. 2-1). Quads B, C, D, E and F were constructed between 1914 and 1931 and are located within the Schofield Barracks Historic District that was listed on the State and National Register of Historic Places in September 1997 and July 1998, respectively. The last major renovation occurred in the 1970s and involved renovation of the building interiors and exterior windows and doors.

Although Quads C, D, E, and F form the nucleus of the district, the *Schofield Barracks Cultural Resource Management Plan* (Belt Collins Hawaii et al., 2000, pgs. 4-6 to 4-14)

indicates that the Quads can be renovated and retained for operational needs of the military when specific criteria are met and Section 106 consultation is completed.

No significant subsurface archaeological or cultural deposits are expected to be present at the Quads since they all lie within urbanized areas. The results of an archaeological survey and subsurface testing conducted for the *Final Programmatic EA* indicates a low probability for the occurrence of unrecorded archeological sites, particularly in developed portions of Schofield Barracks Military Reservation due to destructive land use patterns during the premodern period (Ogden Environmental and Energy Services Co., Inc., 1997, pg. 29). Prior to Army use, the area was used for ranching, for commercial agriculture and probably for continuing subsistence agriculture (Ibid). With the development of Army facilities and especially during the intensive World War II buildup, the landscape in the project area underwent extensive alterations and modifications that may have destroyed most traces of earlier use (Ibid).

4.7 Aesthetics

Refer to Section 4.7.1 of the *Final Programmatic EA* (pgs. 4-43 to 4-44) for a discussion of aesthetics at Schofield Barracks Military Reservation. Site-specific information is hereby provided.

Each Quad consists of four buildings arranged around a large open space used for recreation and training. The architectural integrity and exterior facades of the buildings are significant features to be preserved because the Quads lie within an historic district. Plates 1 through 4 depict the style and character of buildings in Quad F. Quads B, C, D and E exhibit a comparatively similar architectural style and character to that of Quad F since all buildings were constructed within the same relative period of time.

Plate 1: Building 649, View Facing East From Courtyard

Plate 2: Building 650, View Facing Northwest

Plate 3: Building 651, View Facing South From Glennan St.

Plate 4: Building 652, View Facing North

4.8 Socioeconomics

Refer to Section 4.8.1 of the *Final Programmatic EA* (pgs. 4-47 to 4-52) for the discussion of socioeconomics (including population, housing, local business and quality of life).

4.9 Land Use Plans and Policies

Refer to Sections 4.9 and 4.9.1 of the *Final Programmatic EA* (pgs. 4-52 to 4-59) for the discussion of land use plans and policies on Army installations and at Schofield Barracks Military Reservation, respectively. Site-specific information is hereby provided.

The buildings comprising Quads B, C and D are designated on the Long-Term Land Use Plan for Schofield Barracks Military Reservation as troop housing (TR) whereas the buildings comprising Quads E and F are designated as family housing (FH). The open space at the center of each Quad is designated as outdoor recreation (OR).

The Quads are situated on Federal land whereby State and City land use designations are not enforceable. Nevertheless, the State land use designation for the project sites is Urban. The City and County of Honolulu zoning designation for all of Schofield Barracks Military Reservation is Military and Federal; the Development Plan designation for the area containing Quads B, C, D, E and F is Medium Density Apartments. The Quads do not lie within the City's Special Management Area.

4.10 Hazardous and Toxic Materials/Wastes

Refer to Sections 4.10 and 4.10.1 of the *Final Programmatic EA* (pgs. 4-62 to 4-64) for the discussion of hazardous and toxic materials/wastes as they pertain (from a regulatory perspective) to Hawaii and to WBR project sites at Schofield Barracks Military Reservation, respectively. Site-specific information is hereby provided.

Quads B, C, D, E and F were constructed between 1915 and 1931 when lead and asbestos containing materials (ACM) were widely used and the detrimental effects of such materials were not known. The hazards associated with lead and ACM must therefore be addressed before repair or renovation work may begin.

Existing buildings in the Quads are used for billeting, dining, operations, administration and support functions. Concerns pertaining to hazardous and toxic materials storage or usage, or hazardous waste generation or management (i.e., treatment, storage, disposal, or reclamation) include small amounts of solvents, petroleum products or other washing solutions used for equipment operation or maintenance in company operations facilities. Heating fuel USTs (which are not regulated) may also be present in the Quads. Radioactive materials are associated with the arms facility in Building 652 (refer to Plate 5). Flammable gas is present in Building 652 (refer to Plate 6).

Plate 5: Arms Room at Building 652 with Radioactive Materials Caution Sign

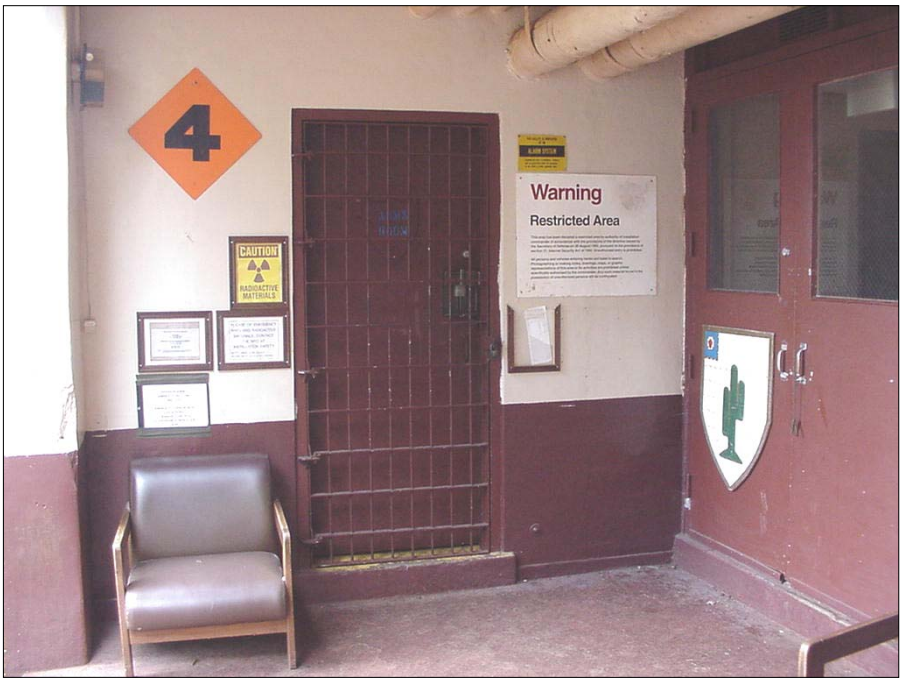


Plate 6: Flammable Gas Mark on Door to Room at Southwest End of Building 652

4.11 Circulation and Traffic

Refer to Section 4.11.1 of the *Final Programmatic EA* (pgs. 4-65 to 4-68) for the discussion of circulation and traffic at Schofield Barracks Military Reservation. Site-specific information is hereby provided.

Four roadways bound the affected area and provide vehicular access to the Quads: Foote Avenue, Glennan Street, Waianae Avenue and Devol Street. Foote and Waianae Avenues are parallel primary connectors and two of the most traveled roadways on Schofield Barracks Military Reservation (Department of the Army, 1995, pg. 4-66). Cross streets between the Quads include Lewis Street, Heard Avenue, Kolekole Avenue and Meigs Avenue.

Peak hour traffic along Foote and Waianae Avenues was reportedly congested (Belt Collins and Associates, 1993); however, intersections involving these roadways were not identified as having unacceptable levels of service. Traffic recommendations such as road realignments, extensions, widening, and closures to support future land-use changes at Schofield Barracks Military Reservation are being implemented to coordinate with land use changes and facility projects.

Traffic control within the Main Post of Schofield Barracks Military Reservation is provided as needed with devices such as stop signs and signals or with personnel directing the traffic flow. For all of these reasons, it is generally presumed that circulation and traffic on Schofield Barracks Military Reservation and in the vicinity of the Quads is acceptable and manageable.

4.12 Water Supply System

Refer to Section 4.12.1 of the *Final Programmatic EA* (pg. 4-70) for the discussion of the water supply system at Schofield Barracks Military Reservation. Existing water lines and mains are typically aligned along the major streets and roadways in the vicinity of the project sites.

4.13 Wastewater Facilities

Refer to Section 4.13.1 of the *Final Programmatic EA* (pgs. 4-73 to 4-74) for the discussion of the wastewater facilities at Schofield Barracks Military Reservation. Existing sewer lines and mains are typically aligned along the major streets and roadways in the vicinity of the project sites.

4.14 Solid Waste System

The disposal of solid waste (including green waste and ordnance items) is discussed in Section 4.14 of the *Final Programmatic EA* (pg. 4-77). As mentioned in the *Final Programmatic EA*, the Army strives to minimize its waste stream through waste reduction strategies such as recycling, waste reduction and reuse (Ibid).

4.15 Power and Communications

Refer to Section 4.14.1 of the *Final Programmatic EA* (pg. 4-77) for the discussion of power and communications at Schofield Barracks Military Reservation. Power and communications service is supplied to the project sites via a combination of overhead and underground lines.

4.16 Public Services (Police, Fire, Health, Outdoor Recreation)

The discussion of police, fire, health, and outdoor recreation facilities at the affected Army installations is provided in Sections 4.16.1 through 4.16.4 of the *Final Programmatic EA* (pgs. 4-79 to 4-82). Site-specific information is hereby provided.

The Physical Security Section office at Schofield Barracks Military Reservation is located in Building 690 at the end of Glennan Street in the vicinity of Redlander Field. A Fire Station (S494) is located near the intersection of Kolekole and Heard Avenues. A health clinic, dental clinic, and urgent care clinic are located in a facility situated along Glennan Street and opposite Quad F. The Quads also have smaller troop clinics. Parks and recreational facilities within a mile of the Quads include ball fields, a bowling alley, a craft shop, the physical fitness center, a sports dome, a swimming pool, the tennis center, a theater and a woodworking craft center.

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5.1 Topography, Soils and Geology

The discussion of significance criteria pertaining to the topography, soils and geology is hereby excerpted from the *Final Programmatic EA* (pg. 5-1). Project actions are determined to have a significant adverse environmental impact if the following consequences occur: major changes are made to the topography; increased soil erosion and resulting sedimentation reduces ground water quality below existing standards; or people and/or property are exposed to geologic hazards (i.e., earthquakes, landslides, mud slides or ground failure).

5.1.1 The Proposed Action: Repair and Renovate Existing Assets. No major changes to the topography would occur as a result of repair and renovation work. Ground disturbing activities (e.g., excavation, trenching) are expected to be accomplished only to the extent necessary to repair and/or replace obsolescent plumbing systems and related subsurface infrastructure systems. The nature of repairs may have minor, short-term erosion and sedimentation impacts.

With respect to earthquakes, all of Oahu lies within an earthquake zone classified as Seismic Zone 2A; Zone 0 refers to areas with least seismic activity whereas Zone 4 denotes an area with greatest seismic activity. Earthquakes are natural occurrences that have the potential to affect the affected property and building. The threat from these hazards will always exist because humans have little control over the frequency and intensity of an unpredictable event. Nevertheless, public and certain types of private buildings must conform to structural design standards for earthquake resistance per the Uniform Building Code (UBC) Requirements for Seismic Zone 2A.

MITIGATION: Standard erosion control measures will be implemented during ground disturbing activities to minimize erosion impacts. Any soils that are exposed during excavation or trenching would be revegetated or otherwise covered with an impermeable surface as soon as practicable. The Proposed Action will comply with regulations for protection from seismic hazards such as adherence to the UBC standards (as amended by the City and County of Honolulu) and Occupational Safety and Health Administration (OSHA) excavation standards. The need for seismic retrofitting will be determined from a condition assessment of the buildings in Quads B, C, D, E and F by an architect who has considerable historic preservation experience (refer to Section 5.6.1). The seismic work must be accomplished under the supervision of the architect who has considerable historic preservation experience per Section 106 consultation.

5.1.2 Alternative 1: Lease Off-Post Assets and Renovation. Similar impacts as discussed for the Proposed Action would occur, but to a lesser extent since no repair or renovation of barracks would occur. Only operations and support facilities would be renovated.

MITIGATION: The measures are the same as for the Proposed Action.

5.1.3 Alternative 2: Purchase Off-Post Assets and Renovation. Similar impacts as discussed for the Proposed Action would occur, but to a lesser extent since no repair or renovation of barracks would occur. Only operations and support facilities would be renovated.

MITIGATION: The measures are the same as for the Proposed Action.

5.2 Water Resources

The measure of significant impacts to water resources is discussed in the *Final Programmatic EA* (pg. 5-4). Project actions are determined to have a significant adverse environmental impact if the following consequences occur: absorption rates, drainage patterns or surface runoff volumes and velocities change; surface or ground water quality deteriorates below regulatory standards; water demand increases beyond sustainable consumption levels; area available for ground water recharge is reduced; or people and property become exposed to water-related hazards such as flooding.

5.2.1 The Proposed Action: Repair and Renovate Existing Assets. Proposed repair and renovation work is expected to have no major impact on water resources, especially since these types of resources (e.g., streams or major drainageways) do not exist at the project sites. Repair and renovation will result in no new large open areas being replaced with impermeable surfaces. Repair and renovation work may generate surface runoff if it rains heavily during ground disturbing activities (i.e., excavation, trenching), but this impact would be minor and temporary. The runoff would need to be controlled at the project site. In the long-term, man-made drainage systems at the project sites will be maintained and repaired or replaced as necessary. Proper maintenance of all drainage devices and systems at the project site is expected to minimize the threats to people and property from the (undetermined) flooding hazard.

No increase in water consumption is anticipated since project actions would relocate personnel who are already drawing from the same water source. Any perceived increase in water consumption resulting from the creation of more private living quarters is expected to be minimized by the use of water-saving devices as promulgated by the 1991 Uniform Plumbing Code, Section 1010, Water Conservation.

MITIGATION: No mitigation is required.

5.2.2 Alternative 1: Lease Off-Post Assets and Renovation. With Alternative 1, similar impacts as described for the Proposed Action would occur, with the exception that water consumption levels at Schofield Barracks Military Reservation may marginally decrease as soldiers move to off-post housing. Soldiers occupying leased units in the surrounding communities would impact private or municipal water systems. Ultimately, the same hydrological system provides the water source for the water supply systems of the Army, municipality and private entities in the area surrounding the installation.

MITIGATION: No mitigation is required.

5.2.3 Alternative 2: Purchase Off-Post Assets and Renovation. Similar impacts as described for the Proposed Action would occur, with the exception that water consumption levels at Schofield Barracks Military Reservation may marginally decrease. Private or municipal water systems are expected to be affected by the soldiers who occupy purchased units off-post.

MITIGATION: No mitigation is required.

5.3 Flora and Fauna

Significance criteria with respect to flora and fauna are discussed in the *Final Programmatic EA* (pg. 5-9). Project actions are determined to have a significant adverse environmental impact on the flora if the following consequences occur: disturbances or removal of native vegetation, threatened or endangered species, or trees included on the City and County of Honolulu Exceptional Tree List. Significance criteria used to determine the extent of impacts to wildlife species includes the extent of habitat loss or gain, and the presence or absence of threatened, endangered or protection species including migratory avifauna. The loss of sensitive habitat is indicative of significant impacts, whereas minor relocation and/or modification of habitats are indicative of adverse but not significant impacts.

5.3.1 The Proposed Action: Repair and Renovate Existing Assets. No threatened, endangered, or protected species of flora or fauna are known to exist at Quads B, C, D, E and F (which are all highly urbanized sites). Ornamental flora species disturbed during repair and renovation work are expected to be replanted or replaced.

MITIGATION: No mitigation is required.

5.3.2 Alternative 1: Lease Off-Post Assets and Renovation. Similar impacts as described for the Proposed Action would occur, but to a lesser degree since no repair or renovation of on-post housing assets would occur. Only operations and support facilities would be renovated.

MITIGATION: No mitigation is required.

5.3.3 Alternative 2: Purchase Off-Post Assets and Renovation. Similar impacts as described for the Proposed Action would occur, but to a lesser degree since no repair or renovation of on-post housing assets would occur. Only operations and support facilities would be renovated.

MITIGATION: No mitigation is required.

5.4 Air Quality

Significance criteria pertaining to air quality are discussed in the *Final Programmatic EA* (pgs. 5-12 to 5-13). Project actions are determined to have a significant adverse environmental impact on air quality if the following consequences occur: potential air emission concentrations predicted to occur from the implementation of a proposed project combined with the ambient concentrations for criteria pollutants exceed State or Federal Ambient Air Quality Standards (AAQS).

5.4.1 The Proposed Action: Repair and Renovate Existing Assets. The impacts of repair and renovation work that may generate fugitive dust and air pollutant emissions from heavy equipment or workers' vehicles are expected to be localized and temporary. As a result of modernization, project actions are expected to employ energy conservation measures that will minimize emissions from electrical power generation. For example, the Army will utilize passive solar water heating systems, low pollutant-emitting systems for water heating and integrated energy systems that serve more than one dwelling with a centralized unit, as applicable and appropriate. Other measures that can conserve energy include the avoidance of large glass areas, the efficient use of shading, the deliberate placement of high usage rooms to avoid summer heat and the proper use of attic fans or other ventilation systems. Maximizing natural light will also help to minimize electricity usage. Air quality impacts attributed to project actions are therefore considered to be insignificant.

The positive impact of project actions would be the potential decrease of vehicular emissions from commutes between the residence and work site.

MITIGATION: Fugitive dust control measures will be implemented during repair/renovation work in compliance with State and county requirements.

5.4.2 Alternative 1: Lease Off-Post Assets and Renovation. Similar impacts as described for the Proposed Action would occur, but to a lesser degree since no repair or renovation of on-post housing assets would occur. Housing soldiers in leased off-post units may increase their commuting distance, thereby increasing pollutant vehicular emissions as compared to the Proposed Action.

MITIGATION: Mitigation is the same as for the Proposed Action.

5.4.3 Alternative 2: Purchase Off-Post Assets and Renovation. Similar impacts as described for the Proposed Action would occur, but to a lesser degree since no repair or renovation of on-post housing assets would occur. Housing soldiers in purchased off-post units may increase their commuting distance, thereby increasing pollutant vehicular emissions as compared to the Proposed Action.

MITIGATION: Mitigation is the same as for the Proposed Action.

5.5 Noise Quality

The discussion of significance criteria pertaining to noise quality is hereby excerpted from the *Final Programmatic EA* (pg. 5-16). Project actions are determined to have a significant adverse environmental impact on air quality if on-site operational noise levels exceed 65 Ldn. Moreover, project actions that generate noise exceeding 65 Ldn would have a significant impact on sensitive noise receptors (i.e., schools, residences, etc.).

5.5.1 The Proposed Action: Repair and Renovate Existing Assets. Noise generated by repair and renovation work is expected to be temporary and intermittent due to the nature of proposed work that would be accomplished primarily during daylight hours in accordance with curfew periods similar to those of the State Department of Health (DOH) permit system to avoid the nuisance to sensitive noise receptors. Anticipated short-term noise impacts from repair and renovation work are therefore not considered a threat to public health and welfare. In the long-term, project actions would not introduce new major noise sources to the area since proposed uses (e.g., barracks, operational facilities) have occurred at the project sites from as early as 1915. Furthermore, project actions are not expected to increase traffic volumes or increase traffic-related noise levels to a significant degree.

MITIGATION: No mitigation is required.

5.5.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action but the degree of impact would be less since no repair or renovation of living quarters would occur.

MITIGATION: No mitigation is required.

5.5.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action but the degree of impact would be less since no repair or renovation of living quarters would occur.

MITIGATION: No mitigation is required.

5.6 Historic and Archaeological Resources

Legislation and regulations pertaining to the treatment and consideration of historic and archaeological resources include Section 106 of the National Historic Preservation Act of 1966 (P.L. 89-665), as amended and its implementing guidelines in 36 CFR Part 800; Title 36 CFR 60.4; *Army Regulation 200-4, Cultural Resources Management* (Department of the Army, 1998); U.S. Army Technical Manual *TM 5-801-1* (November 1975); and U.S. Army Technical Manual *TM 5-801-2* (February 1977). The following paragraphs describe the applicable legislation and regulations.

> Section 106 of the National Historic Preservation Act of 1966, as amended is designed to ensure that historical properties (i.e., significant cultural resources) are considered during federal project planning and execution.
>
> Title 36 CFR 60.4 defines the criteria to be used in determining significance and National Register eligibility.
>
> *Army Regulation 200-4, Cultural Resources Management* is the Army's policy for managing cultural resources to meet legal compliance requirements and to support the military mission.
>
> U.S. Army Technical Manual *TM 5-801-1* provides additional background on the identification, evaluation, and treatment of historic resources.
>
> U.S. Army Technical Manual *TM 5-801-2* specifies maintenance procedures for the preservation of historic properties.

The Schofield Barracks Historic District is a priority for preservation because it contains numerous significant properties within a contiguous historic setting. The Preservation Program that includes recommendations for adaptive reuse of existing historic properties and treatment recommendations for specific architectural resources at the installation is contained in Chapter 4 of the *Schofield Barracks Cultural Resource Management Plan* (Belt Collins Hawaii et al., 2000, pgs. 4-1 to 4-31). The Army has established modification limitations for significant architectural properties that are intended to ensure that no irreversible alteration is made to a historic property without approval by the proper authorities. These modification limitations are defined on pages 4-3 to 4-4 of the *Schofield Barracks Cultural Resource Management Plan*.

5.6.1 The Proposed Action: Repair and Renovate Existing Assets. The Army has initiated Section 106 consultation with the Hawaii State Historic Preservation Division (SHPD) (refer to Appendix A). The Hawaii State Historic Preservation Officer (SHPO) concurred with the Army's determination that the Quads are significant historic properties within the Schofield Barracks Historic District and that proposed renovations to the Quads would have an adverse effect (refer to Appendix A). The SHPO concluded that mitigation of this adverse effect could be developed in a Programmatic Agreement between the Army, SHPD, the Historic Hawaii Foundation and the Advisory Council on Historic Preservation.

MITIGATION: A Programmatic Agreement will be developed in consultation with the State Historic Preservation Officer, Historic Hawaii Foundation and the Advisory

Council on Historic Preservation. A Historic Structures Report that identifies significant architectural elements that must be retained in interior or exterior renovations and determines structural integrity of the buildings will be completed. An Architect of Record who has considerable historic preservation experience will be actively involved in the design and construction of each renovation.

5.6.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action but the degree of impact would be less since no repair or renovation of living quarters would occur.

MITIGATION: The measures are the same as for the Proposed Action.

5.6.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action but the degree of impact would be less since no repair or renovation of living quarters would occur.

MITIGATION: The measures are the same as for the Proposed Action.

5.7 Aesthetics

The measure of significant impacts to aesthetic resources is discussed in the *Final Programmatic EA* (pgs. 5-23 to 5-24). Project actions are determined to have a significant adverse environmental impact if the following consequences occur: natural resources of high scenic quality are directly affected; the visual/aesthetic setting of designated park or recreation areas that depend on the landscape setting are directly or indirectly affected; project actions result in structures that contrast sharply in line, form, color, scale and texture with existing facilities and other elements of the landscape; or project actions create a long-term inconsistent image of the existing facility from public viewpoints such as from public areas and major roadways.

5.7.1 The Proposed Action: Repair and Renovate Existing Assets. Concerns pertaining to aesthetic resources will be addressed as a result of mitigation intended to preserve and protect the important features and characteristics of the Schofield Barracks Historic District. Repair and renovation work is expected to improve the overall appearance of affected buildings and the resulting effect is considered a benefit.

MITIGATION: As previously indicated in Section 5.6, a Programmatic Agreement will be developed in consultation with the State Historic Preservation Officer, Historic Hawaii Foundation and the Advisory Council on Historic Preservation. A Historic Structures Report that identifies significant architectural elements that must be retained in interior or exterior renovations and determines structural integrity of the buildings will be completed. An Architect of Record who has considerable historic preservation experience will be actively involved in the design and construction of each renovation.

5.7.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action but the degree of impact would be less since no repair or renovation of living quarters would occur. Buildings that are not repaired or renovated may result in an adverse impact if the architectural appearance or structural integrity of these buildings is allowed to deteriorate over time.

MITIGATION: The measures are the same as for the Proposed Action.

5.7.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action but the degree of impact would be less since no repair or renovation of living quarters would occur. Buildings that are not repaired or renovated may result in an adverse impact if the architectural appearance or structural integrity of these buildings is allowed to deteriorate over time.

MITIGATION: The measures are the same as for the Proposed Action.

5.8 Socioeconomics

Significance criteria with respect to socioeconomic considerations are discussed in the *Final Programmatic EA* (pg. 5-26). Project actions may have either a beneficial or detrimental impact social and economic impact as determined by the changes to housing demand, employment, local business, standard of living (including retention and morale), access to recreation and compatibility of the project with its surroundings. Of particular interest are situations in which the residents of surrounding communities (e.g., Mililani, Wahiawa) feel that adverse impacts would result from project actions.

5.8.1 The Proposed Action: Repair and Renovate Existing Assets. The proposed action is intended to improve the living conditions for soldiers whereby morale, retention rates and unit readiness would be positively affected. Completion of proposed repair and renovation work is expected to facilitate the redistribution of soldiers currently occupying on-post barracks to Quads B, C, D, E and F to prevent their displacement to off-post housing in the surrounding communities.

Employment opportunities would be created from project actions to repair and renovate the existing Quads. A substantial portion of labor and materials utilized for project actions is expected to be supplied by local business. As indicated in the *Final Programmatic EA* (pg. 5-31), community organizations (i.e., the Mililani and Wahiawa Neighborhood Boards) that participated in the consultation process for the *Final Programmatic EA* generally expressed support for WBR Program actions with many residents indicating that the program is in the best interests of community and soldiers.

MITIGATION: No mitigation is required.

5.8.2 Alternative 1: Lease Off-Post Assets and Renovation. This alternative would generate similar positive impacts as discussed for the Proposed Action; however, fewer employment opportunities would be created since existing on-post housing assets would not be repaired or renovated. Displaced personnel (from on-post to off-post housing) would represent a change of less than one percent of the total populations of Wahiawa and Mililani (consisting of approximately 48,000 persons), whereby project actions under Alternative 1 should not greatly impact the demographic character of affected communities. As noted in Section 3.2, Alternative 1 would scatter personnel throughout communities surrounding Schofield Barracks Military Reservation, thereby contributing to the deterioration of unit integrity and unit readiness, slower response times during emergencies, and greater coordination and communication needs.

MITIGATION: No mitigation is required.

5.8.3 Alternative 2: Purchase Off-Post Assets and Renovation. This alternative would generate similar positive impacts as discussed for the Proposed Action; however, fewer employment opportunities would be created since existing on-post housing assets would not be repaired or renovated. Displaced personnel would represent a change of less than one percent of the total populations of Wahiawa and Mililani, whereby project actions under Alternative 2 should not greatly impact the demographic character of affected communities. As noted in Section 3.3, Alternative 2 would scatter personnel throughout communities surrounding Schofield Barracks Military Reservation, thereby contributing to the deterioration of unit integrity and unit readiness, slower response times during emergencies, and greater coordination and communication needs.

MITIGATION: No mitigation is required.

5.9 Land Use Plans and Policies

Significance criteria pertaining to land use plans and policies are discussed in the *Final Programmatic EA* (pg. 5-32). Project actions are determined to have a significant short-term adverse impact on land use if access or operation of an adjacent or nearly land use activity is disrupted to the extent that a major alteration in the activity would be required. Disruptions that are temporary in nature that do not alter the activity function are considered insignificant. Project actions are determined to have a significant long-term adverse impact on land use if the activity is incompatible and conflicts with the surrounding land use. Noncompliance of the proposed project with the governing land use plans and policies is also considered to be a significant adverse land use impact.

5.9.1 The Proposed Action: Repair and Renovate Existing Assets. The completion of project actions would result in land uses that currently exist at Quads B, C, D, E and F. Billeting, unit operations, administration and community support functions are compatible with surrounding land uses and consistent with the long-term land use plans and policies for Schofield Barracks Military Reservation.

MITIGATION: No mitigation is required.

5.9.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action. No mitigation is required.

MITIGATION: No mitigation is required.

5.9.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action. No mitigation is required.

MITIGATION: No mitigation is required.

5.10 Hazardous and Toxic Materials/Wastes

The discussion of significance criteria pertaining to the hazardous and toxic materials/wastes is hereby excerpted from the *Final Programmatic EA* (pg. 5-34). The potential for significant exposure is dependent on the characteristics of the chemical(s) of concern, the concentration(s) at which they are found in the environment and the routes of exposure for those contaminants. Project actions are determined to have a significant adverse environmental impact if the public or the environment is exposed to toxic and hazardous materials that exceed background conditions or regulatory requirements (e.g., EPA Preliminary Remediation Goals, DOH criteria). Significant impacts would also occur if project actions generated toxic or hazardous materials in a manner that neglected public and environmental safety.

5.10.1 The Proposed Action: Repair and Renovate Existing Assets. Buildings in the Quads may contain lead-based paint and ACM due to their age. As a result, the concerns associated with the Proposed Action include the generation of debris such as lead-based paint and asbestos during repair and renovation work.

Hazardous materials (e.g., solvents used for equipment maintenance and operation, flammable gas, radioactive materials stored in arms vaults) that may be present at the project sites have the potential to be spilled or otherwise released if they are not properly handled; however, these hazardous and toxic materials (HTM) are expected to be properly removed or disposed prior to repair and renovation work in accordance with appropriate standards. In the long-term, small amounts of HTM may be used or stored in operations areas or in the arms vaults located at the Quads. Heating fuel USTs may also be present in the Quads.

MITIGATION: Quads B, C, D, E and F must be tested for lead and ACM prior to the start of any repair or renovation work. If lead or asbestos is encountered, handling and disposal will be accomplished in accordance with appropriate OSHA standards, Federal Asbestos Hazardous Emergency Response Act and Chapter 324P Hawaii Revised Statutes. Storage and handling of hazardous materials will be accomplished in accordance with the applicable standards pertaining to those materials. Any existing heating fuel USTs will be replaced with propane systems or above-ground storage tanks (ASTs).

A spill response plan will be prepared in accordance with regulatory requirements and personnel will be knowledgeable in the use of on-site spill response equipment that will be used for immediate containment and removal of any released materials.

5.10.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action.

MITIGATION: The measures are the same as for the Proposed Action.

5.10.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action.

MITIGATION: The measures are the same as for the Proposed Action.

5.11 Circulation and Traffic

Significance criteria with respect to circulation and traffic are discussed in the *Final Programmatic EA* (pgs. 5-37 to 5-38). Project actions are determined to have a significant adverse if the project results in a traffic increase that is substantial in relation to the existing traffic load and capacity of the street system. For residential parking areas, insufficient numbers of parking stalls as specified in the design guidelines is considered to be a significant impact. Furthermore, project activities that conflict with existing or proposed pedestrian access are considered to be potentially significant.

5.11.1 The Proposed Action: Repair and Renovate Existing Assets. Short-term traffic impacts may occur during repair and renovation work as a result of heavy equipment operations and the mobilization of workers at the project sites. Potential short-term traffic impacts are expected to be intermittent and therefore insignificant. In the long-term, the project would result in no operational impacts on circulation patterns. The completion of project actions may in fact improve circulation for both civilian and military personnel since soldiers housed at Schofield Barracks Military Reservation would have shorter or no commutes between their living quarters, work and community support facilities. As indicated in Section 4.11, the installation master plan includes improvements to traffic patterns internally and between facilities, whereby the project would have no long-term effect on traffic (Department of the Army, 2000).

MITIGATION: A Traffic Control Plan will be prepared and incorporated as a project design feature to mitigate potential traffic and circulation impacts during repair and renovation work. The plan will include (but not be limited to) detouring, lane closures, flagging operations and construction times, ongoing ingress and egress for adjacent uses, safety precautions to maintain safe access to residents and pedestrians around or near activities and procedures to maintain adequate access to surrounding facilities during work periods.

5.11.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, soldiers living off-post would still commute between their living quarters and on-post destinations. The slight increase in vehicular traffic entering/exiting the installation is expected to be insignificant.

MITIGATION: The measures are the same as for the Proposed Action.

5.11.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, soldiers living off-post would still commute between their living quarters and on-post destinations. The slight increase in vehicular traffic entering/exiting the installation is expected to be insignificant.

MITIGATION: The measures are the same as for the Proposed Action.

5.12 Water Supply System

The measure of significant impacts to the water supply system is discussed in the *Final Programmatic EA* (pgs. 5-41 to 5-42). Project actions are determined to have a significant adverse environmental impact if the water demand generated by the project exceeds the capacity of water distribution systems and/or water supplies operated by the Army or City and County of Honolulu. A significant impact may also occur if the water allotment permitted by the Department of Land and Natural Resources (DLNR) for an applicable facility does not meet the projected water needs of proposed activities. Adverse but insignificant impacts are associated with major expansion of existing water distribution lines. Adverse, short-term, insignificant impacts are associated with the relocation of existing distribution lines during the duration of proposed work. Negligible impacts are associated with project actions requiring only line extensions that tie into existing distribution lines without requiring line improvements.

5.12.1 The Proposed Action: Repair and Renovate Existing Assets. No water demand increase and no significant impacts to water system services are anticipated. At most, repair work would include the replacement of water mains, water lines, valves, manholes and fire hydrants. Water service may be temporarily disrupted during periods of work; however, this impact is considered short-term and temporary.

MITIGATION. No mitigation is required.

5.12.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, soldiers living off-post would impact the water systems in their areas. The resulting impacts are expected to be negligible because the total number of displaced soldiers represents less than one percent of the total inhabitants of the surrounding communities of Mililani and Wahiawa.

MITIGATION. No mitigation is required.

5.12.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, soldiers living off-post would impact the water systems in their areas. The resulting impacts are expected to be negligible because the total number of displaced soldiers represents less than one percent of the total inhabitants of the surrounding communities of Mililani and Wahiawa.

MITIGATION. No mitigation is required.

5.13 Wastewater Facilities

The measure of significant impacts to wastewater facilities is discussed in the *Final Programmatic EA* (pg. 5-43). Project actions are determined to have a significant adverse environmental impact if wastewater generated by the project exceeds the capacity of wastewater treatment facilities operated by the Army or City and County of Honolulu. Adverse but insignificant impacts are associated with major expansion of existing distribution lines and facilities or existing collection lines. Adverse, short-term, insignificant impacts are associated with the relocation of existing collection lines during proposed work. Negligible impacts are associated with project actions requiring only line extensions that tie into existing collection lines without requiring line improvements.

5.13.1 The Proposed Action: Repair and Renovate Existing Assets. The Proposed Action includes the modernization of existing facilities for soldiers on Schofield Barracks Military Reservation. Dining facilities would generate industrial wastewater from food service activities, such as grease. Pre-treatment devices such as grease traps would be installed in accordance with standard treatment practices. Sinks, toilets and other fixtures would utilize modern flow-restricted designs that would result in no increase in wastewater flows over existing conditions. The existing Schofield wastewater treatment plant (WWTP) is expected to accommodate the wastewater generated by project actions. Concerns pertaining to the adequacy of the collection system in the project area are expected to be addressed comprehensively in the Schofield Barracks Real Property Master Plan.

MITIGATION: No mitigation is required.

5.13.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, on-post living quarters would not be modernized since soldiers would instead occupy off-post housing units. The resulting impacts to the wastewater collection system in the surrounding community are expected to be negligible because the total number of soldiers displaced by this alternative represents less than one percent of the total inhabitants of Mililani and Wahiawa.

MITIGATION: No mitigation is required.

5.13.3 Alternative 2: Purchase Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, on-post living quarters

would not be modernized since soldiers would instead occupy off-post housing units. The resulting impacts to the wastewater collection system in the surrounding community are expected to be negligible because the total number of soldiers displaced by this alternative represents less than one percent of the total inhabitants of Mililani and Wahiawa.

MITIGATION: No mitigation is required.

5.14 Solid Waste System

Significance criteria pertaining to solid waste collection and disposal are discussed in the *Final Programmatic EA* (pgs. 5-48 to 5-49). Project actions are determined to have a significant impact if the operational contribution to the waste stream exceeds the capacity of the City and County of Honolulu landfill or other waste disposal method. Otherwise, the effects to the solid waste system are considered to be negligible. A potentially significant impact would also occur if the project did not support State of Hawaii waste reduction goals (Chapter 342-G) expressed in the State Integrated Solid Waste Management Plan (State of Hawaii, 1991).

5.14.1 The Proposed Action: Renovation. The Proposed Action would generate solid waste including debris, waste construction materials, etc. that may be transported to either a municipal landfill or to the H-Power facility for disposal. The Army currently employs waste reduction and recycling policies. The Army is currently developing a recycling program that will strive to meet the recycling policy of the City and County of Honolulu. Waste is currently reduced and/or recycled prior to disposal to the municipal landfill. The capacity of the landfill or other solid waste disposal methods is not expected to be exceeded; therefore no significant impacts are anticipated. The operation of the Quads is expected to result in no increase in solid waste volumes.

MITIGATION: No mitigation is required.

5.14.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, a smaller quantity or volume of solid waste would be generated since on-post housing assets would not be repaired or renovated. The resulting impacts to the solid waste collection system from the soldiers who occupy off-post housing units are expected to be negligible because the total number of soldiers displaced by this alternative represents less than one percent of the total inhabitants of Mililani and Wahiawa.

MITIGATION: No mitigation is required.

5.14.3 Alternative 2: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, a smaller quantity or volume of solid waste would be generated since on-post housing assets would not be repaired or renovated. The resulting impacts to the solid waste collection system from the soldiers who occupy off-post housing units are expected to be negligible because the total number

of soldiers displaced by this alternative represents less than one percent of the total inhabitants of Mililani and Wahiawa.

MITIGATION: No mitigation is required.

5.15 Power and Communications

Significance criteria pertaining to power and communications are discussed in the *Final Programmatic EA* (pg. 5-50). Project actions would not be significant unless the utility is unable to accommodate the projected consumption demand. Service disruptions during the work period or the installation of additional power or communication lines are considered to be short-term, adverse but insignificant impacts.

5.15.1 The Proposed Action: Repair and Renovate Existing Assets. The Proposed Action would generate no major increases in power consumption. The Army would employ energy conservation measures through the use of energy-efficient equipment and systems. Power would continue to be purchased from the Hawaiian Electric Company and communications service would continue to be provided from GTE Hawaiian Tel (now Verizon Hawaii, Inc.). Power and communication systems within Schofield Barracks Military Reservation would consist of an Army-owned and Army-maintained distribution system. Modernization may include improvements to transformers and the installation of electrical line, lighting and manholes. Electrical systems within the buildings of Quads B, C, D, E and F may also be upgraded. Similarly, the telephone cable system at Schofield Barracks Military Reservation may be upgraded to support personal service in individual rooms. Modernization may include improvements to cables, ducts, manholes, etc. The impacts of proposed repair and renovation work may disrupt power and communication systems but these effects are expected to be short-term and temporary.

MITIGATION: No mitigation is required.

5.15.2 Alternative 1: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action because the soldiers who occupy off-post housing assets would still generate a demand for power and communications services; however, the Army will have limited control over the use of energy conservation measures in off-post housing assets. The impacts of proposed repair and renovation work may disrupt power and communication systems but these effects are expected to be short-term and temporary.

MITIGATION: No mitigation is required.

5.15.3 Alternative 2: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action because the soldiers who occupy off-post housing assets would still generate a demand for power and communications services; however, the Army will have limited control over the use of energy conservation

measures in off-post housing assets. The impacts of proposed repair and renovation work may disrupt power and communication systems but these effects are expected to be short-term and temporary.

MITIGATION: No mitigation is required.

5.16 Public Services (Police, Fire, Health, Outdoor Recreation)

Significance criteria pertaining to public services are discussed in the *Final Programmatic EA* (pg. 5-53). Project actions are determined to have a significant impact to law enforcement and fire protection services if the increase in the demand for these services results in the inability of police and fire units to respond to emergencies within their operational standards. Typical standards for law enforcement are a five-minute response time for life threatening calls. With respect to fire protection, the standard is adequate fire hydrant flow. Significant impacts to health care service or outdoor recreation facilities would be an increased demand beyond the capacity of services or facilities to adequately respond to the demand.

5.16.1 The Proposed Action: Repair and Renovate Existing Assets. The Proposed Action would generate no major increases in the demand for police or fire protection services because the Quads would serve the same population of soldiers within existing structures. For these reasons, no increase in the demand for health care services or outdoor recreation facilities is anticipated.

MITIGATION: No mitigation is required.

5.16.2 Alternative 2: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, the soldiers who occupy off-post housing assets may generate a negligible demand for police and fire protection from the stations that serve the communities of Mililani and Wahiawa. The soldiers who occupy off-post housing are expected to continue to utilize the health care services and outdoor recreation facilities at Schofield Barracks Military Reservation.

MITIGATION: No mitigation is required.

5.14.3 Alternative 3: Lease Off-Post Assets and Renovation. Anticipated impacts would be the same as for the Proposed Action; however, the soldiers who occupy off-post housing assets may generate a negligible demand for police and fire protection from the stations that serve the communities of Mililani and Wahiawa. The soldiers who occupy off-post housing are expected to continue to utilize the health care services and outdoor recreation facilities at Schofield Barracks Military Reservation.

MITIGATION: No mitigation is required.

This Supplemental EA concludes that the Proposed Action to repair, renovate and/or modernize Quads B, C, D, E and F as described for the Proposed Action, Alternative 1 and Alternative 2 does not constitute a major federal action having significant effects on the quality of the human environment. Furthermore, an Environmental Impact Statement (EIS) is not required as defined by the Council of Environmental Quality regulations (40 CFR 1500-1508) and Army Regulation 200-2.

Based on the analysis of environmental consequences of the Proposed Action and alternatives, the U.S. Army will implement the Proposed Action based on the following reasons:

- Unit integrity will be maintained and military readiness will not be sacrificed. Alternatives 1 and 2 will result in soldiers being moved off-post and scattered throughout the surrounding community, thereby resulting in slower response times during emergencies and greater coordination/communication needs.
- Repair, renovation and/or modernization of living and working quarters is anticipated to be less costly in the long-term than either leasing or purchasing off-post assets.

It is recommended that a Finding of No Significant Impact (FNSI) be prepared and a notice of availability of the EA and FNSI be given to the public by making them available in the State of Hawaii Department of Health, Office of Environmental Quality Control (OEQC) Bulletin.

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SECTION 7.0 REFERENCES CITED

Alvarez, Patricia M. 1982. *A History of Schofield Barracks Military Reservation*.

Belt Collins and Associates, 1993. *Schofield Barracks Real Property Master Plan Volume I and Volume II Utilities Assessment*. May. (As cited in Department of the Army, 1995).

Belt Collins Hawaii, Mason Architects and International Archaeological Research Institute, Inc. 2000. *Schofield Barracks Cultural Resource Management Plan*. April.

Department of the Army. 1975. *Technical Manual 5-801-1*. November. (As cited in Department of the Army, 1995.)

Department of the Army. 1977. *Technical Manual 5-801-2*. February. (As cited in Department of the Army, 1995.)

Department of the Army. 1983. Environmental Assessment for Army Continuing Education System Library Building, Schofield Barracks, Hawaii. December. (As cited in Department of the Army, 1995).

Department of the Army. 1995. *Final Programmatic Environmental Assessment and Finding of No Significant Impact for the U.S. Army Whole Barracks Renewal Program, Oahu, Hawaii*. July.

Department of the Army. 1998. *Army Regulation 200-4, Cultural Resources Management*. October 1.

Department of the Army. 2000. (Form 1391 for project actions). Various dates.

Federal Emergency Management Agency. 1990. (National Flood Insurance Program, Flood Insurance Rate Map, City and County of Honolulu, Hawaii). September.

Ogden Environmental and Energy Services Co., Inc. 1997. *Historic Preservation Measures FY 1995-2006 Whole Barracks Renewal Program at Various Army Installations and the FY95/96 New Infantry Brigade Complex, Schofield Barracks, Oahu Island, Hawaii*. November. (As cited in Department of the Army, 1995.)

State of Hawaii. 1991. *State Integrated Solid Waste Management Plan*.

United States Army, Hawaii. 1993. *Programmatic Environmental Assessment, Capital Investment Strategy, Facility Category Group 72100, Unaccompanied Enlisted Personnel Housing and Dining Facilities*. July. (As cited in Department of the Army, 1995.)

United States Department of Agriculture, Soil Conservation Service. 1972. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. August.

University of Hawaii, Department of Geography. 1983. Atlas of Hawai‘i, Second Edition.

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