

Michael Baker

I N T E R N A T I O N A L

*Alfside Business Park
100 Alfside Drive
Moon Township PA 15108-2783
PH: (412)-269-6300
FAX: (412) 376-3980*

SPECIFICATIONS

***FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AIR FORCE BASE***

***TRAVIS AFB, CA
PROJECT NO. XDAT181081
CONTRACT NO. W912QR-17-D-0027***

35% Final Design Submittal

January 14, 2022

Prepared by:

**Design/Build Team
Michael Baker International
9755 Clairemont Mesa Blvd
Suite 100
San Diego, CA 92124-1333**

POC: Josh Rose

FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AFB, CA

SPECIFICATIONS
35% DESIGN SUBMITTAL
DESIGN-BUILD
TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

** Only Division 01 specifications will be included in this submittal

DIVISION 01 - GENERAL REQUIREMENTS

01 00 00	General Designs
01 10 10	Specific Technical Engineering and Design Criteria
	Appendix A: Cybersecurity
	Appendix B: Fire Hydrant Flow Test
	Appendix C: Life Cycle Cost Analysis (LCCA)
	Appendix D: Contract Security Clause for Travis Air Force Base
	Appendix E: Travis AFB i33-110
	Appendix F: Maintainability and Durability List
01 10 11	Functional Design Criteria Room by Room Designs
	Appendix A: Room Data Sheets
01 32 01.00 10	Project Schedule
01 33 00	Submittal Procedures
01 33 16	Design After Award
	Appendix A: Hydroseed Mix
01 33 29	Sustainability Reporting
01 35 26	Governmental Safety Requirements
01 42 00	Sources for Reference Publications
01 45 00.00 10	Quality Control
01 45 00.15 10	Resident Management System Contractor Mode (RMS CM)
01 45 35	Special Inspections
01 50 00	Temporary Construction Facilities and Controls
01 56 00	Environmental General Requirements
	Appendix A: Structural Testing and Investigation
	Appendix B: Hazardous Materials Survey Report
	Appendix C: Pre-Performance Contractor Environmental Info
	Appendix D: SC5 Type 2 Install Detail
	Appendix E: Procedure for Approval of Boiler-Chiller Water Discharge to Sanitary Sewer
	Appendix F: Sanitary Sewer Discharge Request Form
	Appendix G: Stormwater Pollution Prevention Plan (SWPPP)
	Appendix H: Stormwater Pollution Prevention Training
	Appendix I: Sanitary Sewer Wastewater Training
	Appendix J: Projects requiring a SWPPP and NPDES permit
	Appendix K: Projects not requiring a SWPPP and NPDES permit
01 57 19	Temporary Environmental Controls
01 57 23	Temporary Storm Water Pollution Control
01 74 19	Construction Waste Management and Disposal
01 78 00	Closeout Submittals
01 78 23	Operation and Maintenance Data
01 78 24.00 10	Facility Data Requirements

** Anything other than Division 01 specifications are TOC information only and will be included at a later date

DIVISION 02 - EXISTING CONDITIONS

02 41 00 [Demolition]] and [[Deconstruction]

DIVISION 03 - CONCRETE

03 30 00 Cast-In-Place Concrete
03 33 00 Cast-In-Place Architectural Concrete
03 42 13.00 10 Plant-Precast Concrete Products for Below Grade Construction
03 45 00 Precast Architectural Concrete
03 62 16 Metallic Non-Shrink Grouting

DIVISION 04 - MASONRY

04 20 00 Unit Masonry

DIVISION 05 - METALS

05 05 23.13 10 Ultrasonic Inspection of Weldments
05 05 23.16 Structural Welding
05 12 00 Structural Steel
05 14 00.13 Welding Structural Aluminum Framing
05 30 00 Steel Decks
05 40 00 Cold-Formed Metal Framing
05 50 13 Miscellaneous Metal Fabrications
05 50 14 Structural Metal Fabrications
05 52 00 Metal Railings
05 72 00 Decorative Metal Specialties

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 10 00 Rough Carpentry
06 20 00 Finish Carpentry
06 41 16.00 10 Plastic-Laminate-Clad Architectural Cabinets
06 61 16 Solid Surfacing Fabrications

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 05 23 Pressure Testing an Air Barrier System for Air Tightness
07 13 53 Elastomeric Sheet Waterproofing
07 14 00 Fluid-Applied Waterproofing
07 19 00 Water Repellents
07 21 13 Board and Block Insulation
07 21 16 Mineral Fiber Blanket Insulation
07 22 00 Roof and Deck Insulation
07 27 10.00 10 Building Air Barrier System
07 27 19.01 Self-Adhering Air Barriers
07 27 36 Spray Foam Air Barriers
07 42 13 Metal Wall Panels
07 60 00 Flashing and Sheet Metal
07 61 14.00 20 Steel Standing Seam Roofing
07 81 00 Spray-Applied Fireproofing
07 84 00 Firestopping
07 92 00 Joint Sealants

DIVISION 08 - OPENINGS

08 31 00	Access Doors and Panels
08 34 01	Forced Entry Resistant Components
08 34 02	Bullet-Resistant Components
08 34 73	Sound Control Door Assemblies
08 41 13	Aluminum-Framed Entrances and Storefronts
08 51 13	Aluminum Windows
08 56 53	Blast Resistant Tempered Glass Windows
08 71 00	Door Hardware
08 81 00	Glazing
08 87 23.13	Safety Films
08 91 00	Metal Wall and Door Louvers

DIVISION 09 - FINISHES

09 06 00	Schedules for Finishes
09 29 00	Gypsum Board
09 30 10	Quarry Tiling
09 51 00	Acoustical Ceilings
09 62 38	Static-Control Flooring
09 65 00	Resilient Flooring
09 66 16	Terrazzo Floor Tile
09 68 00	Carpeting
09 69 13	Rigid Grid Access Flooring
09 72 00	Wallcoverings
09 84 00	Acoustical Wall Panels
09 90 00	Paints and Coatings

DIVISION 10 - SPECIALTIES

10 14 00.10	Exterior Signage
10 14 00.20	Interior Signage
10 21 13	Toilet Compartments
10 22 39	Folding Panel Partitions
10 26 00	Wall and Door Protection
10 28 13	Toilet Accessories

DIVISION 12 - FURNISHINGS

12 21 00	Window Blinds
12 32 00	Manufactured Wood Casework
12 36 00	Countertops
12 48 13	Entrance Floor Mats and Frames
12 50 00.13 10	Furniture and Furniture Installation
12 59 00	Systems Furniture

DIVISION 13 - SPECIAL CONSTRUCTION

13 48 73	Seismic Control for Mechanical Equipment
----------	--

DIVISION 21 - FIRE SUPPRESSION

21 13 13.00 10	WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION
----------------	---

TABLE OF CONTENTS

DIVISION 22 - PLUMBING

22 00 00	Plumbing, General Purpose
22 05 48.00 20	Mechanical Sound, Vibration, and Seismic Control
22 07 19.00 40	Plumbing Piping Insulation

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

23 00 00	Air Supply, Distribution, Ventilation, and Exhaust Systems
23 05 15	Common Piping for HVAC
23 05 48.00 40	Vibration and Seismic Controls for HVAC Piping and Equipment
23 05 48.19	[Seismic] Bracing for HVAC
23 05 93	Testing, Adjusting, and Balancing for HVAC
23 09 00	Instrumentation and Control for HVAC
23 09 13	Instrumentation and Control Devices for HVAC
23 09 13.34 40	Control Valves, Self-Contained
23 09 23.02	BACNET Direct Digital Control for HVAC And Other Building Control Systems
23 09 33.00 40	Electric and Electronic Control System for HVAC
23 09 53.00 20	Space Temperature Control Systems
23 11 20	Facility Gas Piping
23 21 13.00 20	Low Temperature Water (LTW) Heating System
23 21 23	Hydronic Pumps
23 23 00	Refrigerant Piping
23 25 00	Chemical Treatment of Water for Mechanical Systems
23 30 00	HVAC Air Distribution
23 31 13.00 40	Metal Ducts
23 34 23.00 40	HVAC Power Ventilators
23 36 00.00 40	Air Terminal Units
23 37 13.00 40	Diffusers, Registers, and Grills
23 52 00	Heating Boilers
23 52 43.00 20	Low Pressure Water Heating Boilers (Under 800,000 BTU/hr Output)
23 64 10	Water Chillers, Vapor Compression Type
23 64 26	Chilled, Chilled-Hot, and Condenser Water Piping Systems
23 72 00.00 10	Energy Recovery Systems
23 82 19.00 40	Fan Coil Units

DIVISION 25 - INTEGRATED AUTOMATION

25 05 11	Cybersecurity for Facility-Related Control Systems
----------	--

DIVISION 26 - ELECTRICAL

26 05 00.00 40	Common Work Results for Electrical
26 05 26.00 40	Grounding and Bonding for Electrical Systems
26 05 48.00 10	Seismic Protection for Electrical Equipment
26 08 00	Apparatus Inspection and Testing
26 20 00	Interior Distribution System
26 24 13	Switchboards
26 24 16.00 40	Panelboards
26 33 53	Static Uninterruptible Power Supply (UPS)

26 51 00 Interior Lighting

DIVISION 26 – ELECTRICAL...continued

26 52 00.00 40 Emergency Lighting

26 53 00.00 40 Exit Signs

DIVISION 27 - COMMUNICATIONS

27 10 00 Building Telecommunications Cabling System

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 05 23:00 40 Grounding and Bonding for Electronic Safety and Security

28 08 10 Electronic Security System Acceptance Testing

28 10 05 Electronic Security Systems (ESS)

28 31 76 Interior Fire Alarm and Mass Notification System, Addressable

SUBMITTAL REGISTER DIVISION 01

SUBMITTAL REGISTER FUTURE PROJECT

**SPECIFICATIONS
35% DESIGN SUBMITTAL
BUILDING INTERIORS
TABLE OF CONTENTS**

FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AIR FORCE BASE, CA

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION TABLE OF CONTENTS
DIVISION 01 - GENERAL REQUIREMENTS
SECTION 01 00 00
GENERAL DESIGNS

11/21

PART 1	GENERAL
1.1	REFERENCES
1.2	SUBMITTALS
1.3	VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS
1.4	SCRAP MATERIAL
1.5	WRITTEN GUARANTEES AND GUARANTOR'S LOCAL REPRESENTATIVE
1.6	PRICING OF CONTRACTOR-FURNISHED PROPERTY
1.7	TEMPORARY ELECTRIC WIRING
1.7.1	Temporary Power and Lighting
1.7.2	Construction Equipment
1.7.3	Circuit Protection
1.8	UTILITIES
1.9	GENERAL SAFETY REQUIREMENTS
1.9.1	General
1.9.2	The Prime Contractor's Superintendent
1.9.3	Activity Hazard Analysis
1.9.4	Violations
1.9.5	Fire Prevention
1.9.5.1	Inspections
1.9.6	Recordkeeping/Reporting Requirements
1.9.7	Accident Reporting
1.10	PLANNED UTILITY OUTAGES AND STREET CLOSURES
1.11	EXCAVATION PERMITS
1.12	WELDING PERMIT
1.13	TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER
1.14	SPECIAL CONSTRUCTION PROCEDURES
1.15	CONTRACTOR SAFETY PERSONNEL REQUIREMENTS
1.16	HAZARDOUS NOISE AREA
1.17	COLOR SCHEME FOR CONTRACTOR FACILITIES

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

PART 3 EXECUTION

3.1 AFTER AWARD DOCUMENTS

-- End of Section Table of Contents --

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 00 00

GENERAL DESIGNS
11/21

PART 1 GENERAL

1.1 REFERENCES

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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70

(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4)
National Electrical Code

U.S. AIR FORCE (USAF)

AFI 91-204

(2006) US Air Force Safety Investigations and Reports

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1

(2014) Safety and Health Requirements Manual

ER 415-1-15

(1989) Construction Time Extensions for Weather

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1904

Recording and Reporting Occupational Injuries and Illnesses

29 CFR 1910

Occupational Safety and Health Standards

29 CFR 1926

Safety and Health Regulations for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section **01 33 00** SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

Worker's Compensation Claims

1.3 VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS

In addition to complying with the requirements outlined in FAR Part 22.13, FAR Provision 52.222-38, FAR Clause 52.222-35, FAR Clause 52.222-37, DFARS 222.13 and Department of Labor regulations, U.S. Army Corps of Engineers

(USACE) contractors and subcontractors at all tiers are encouraged to promote the training and employment of U.S. veterans while performing under a USACE contract. While no set-aside, evaluation preference, or incentive applies to the solicitation or performance under the resultant contracts, USACE contractors are encouraged to seek out highly qualified veterans to perform services under this contract. The following resources are available to assist USACE contractors in their outreach efforts:

Federal Veteran employment information at
<http://www.fedshirevets.gov/index.aspx>

Department of Labor Veterans Employment Assistance
<http://www.dol.gov/vets/>

Department of Veterans Affairs-VOW to Hire Heros Act
<http://benefits.va.gov/vow/>

Army Wounded Warrior Program -
<http://wtc.army.mil/modules/employers/index.html>

U.S. Chamber of Commerce Foundation-Hiring Our Heros
<http://www.hiringourheroes.org/>

Guide to Hiring Veterans - Reference Material
http://www.whitehouse.gov/sites/default/files/docs/white_house_business_council_-_guide_to_hiring_veterans_0.pdf

1.4 SCRAP MATERIAL

Materials specified to be removed and become the property of the Contractor are designated as scrap, and the Contractor, by signing this contract, hereby acknowledges that he has made due allowance for value, if any, of such scrap in the contract price.

1.5 WRITTEN GUARANTEES AND GUARANTOR'S LOCAL REPRESENTATIVE

Prior to completion of the contract, obtain and furnish to the Contracting Officer's representative written guarantees for all the equipment and/or appliances furnished under the contract. Furnish with each guarantee: The name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and/or appliances are installed, who, upon request of the Using Service's representative, will honor the guarantee during the guaranty period and will provide the services prescribed by the terms of the guarantee.

1.6 PRICING OF CONTRACTOR-FURNISHED PROPERTY

Promptly furnish and must cause any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property. List this information on Resident Management System (RMS) Contractor Quality Control (CQC) Module furnished by the Government. See example forms at the end of this section.

1.7 TEMPORARY ELECTRIC WIRING

1.7.1 Temporary Power and Lighting

Provide construction power facilities in accordance with the safety requirements of the **NFPA 70** and **EM 385-1-1**. Enforce all the safety requirements of electrical extensions for the work of all subcontractors. All work must be accomplished by skilled electrical tradesmen in a workmanlike manner, as approved by the Contracting Officer.

1.7.2 Construction Equipment

In addition to the requirements of **EM 385-1-1**, all temporary wiring conductors installed for operation of construction tools and equipment must be either Type TW or THW contained in metal raceways, or may be multiconductor cord. Temporary wiring must be secured above the ground or floor in a workmanlike manner and must not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in strict accordance with the provisions of the National Electrical Code.

1.7.3 Circuit Protection

In addition to the present requirements in **EM 385-1-1** and **NFPA 70**, all 15 and 20-ampere receptacle outlets used for obtaining power during construction must have ground fault circuit interrupters (GFCI) for personnel protection. Block and brick saws must also be equipped with GFCI. The Contracting Officer may allow an exception to this requirement for circuits for concrete vibrators or circuits operating at other than 60 Hertz normal (in both cases an assured grounding program as described in the **NFPA 70**, except utilizing the daily inspection frequency of the grounding means of such equipment, may be permitted). The assured grounding program will not be permitted as a substitute for usage of GFCI'S except as described above. All generator-powered 15- and 20-ampere, 60 Hertz receptacle outlets must have GFCI'S, and must be properly grounded. Provide a testing means which will impose a measured fault of 5 milliampere, plus or minus 1 milliampere, and result in tripping the GFCI unit.

1.8 UTILITIES

Immediately notify the Contracting Officer in writing if utilities not shown on the plans and not visible as to the date of this contract are encountered within the construction limits of the entire project, and such utilities will interfere with construction operations, to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are removed or relocated as directed by the Contracting Officer, an equitable adjustment in the contract price must be made pursuant to the Contract Clause CHANGES to cover the cost of any additional pertinent work or delay.

1.9 GENERAL SAFETY REQUIREMENTS

1.9.1 General

For information regarding specific Safety Requirements see Section **01 35 26** GOVERNMENTAL SAFETY REQUIREMENTS. Refer to **EM 385-1-1**, and the Occupational Safety and Health Act (OSHA) Standards for Construction **29 CFR 1926**; General Industry Standards **29 CFR 1910**; and the National Fire

Protection Association Codes are applicable to this contract. In case of conflict the most stringent requirement of the standards is applicable.

1.9.2 The Prime Contractor's Superintendent

The Prime Contractor's superintendent must take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis (see below), tool box meetings, walk-through inspections, correction of violations, etc., and including that of the subcontractor's work.

1.9.3 Activity Hazard Analysis

Based on the construction schedule, submit a activity hazard analysis of each major phase of work prior to entering that phase of activity. The analysis must include major or high risk hazards, as well as commonly recurring deficiencies that might possibly be encountered for that operation, and must identify proposed methods and techniques of accomplishing each phase in a safe manner. The Prime Contractor's superintendent must take active participation in the Activity Hazard Analysis, including the subcontractors' work. Prior to start of actual work a meeting must be held with Prime Contractor, Government, and affected subcontractor to review the Activity Hazard Analysis. In addition, job site meetings must be held to indoctrinate foreman and workers on details of this analysis.

1.9.4 Violations

If recurring violations and/or gross violation indicate that the safety performance is unsatisfactory, corrective action must be taken as directed, and at the discretion of the Contracting Officer the retention or some part thereof will be withheld from the progress payment until corrective action has been completed.

1.9.5 Fire Prevention

Fourteen calendar days notice must be given to the Contracting Officer for coordination with the Facility Fire Department prior to conducting any fire hazardous operation. Cutting or welding will be permitted only in areas that are or have been made fire safe. Where possible, all combustibles must be located at least **35 feet** horizontally from the work site. Where such location is impracticable, combustibles must be protected with fire blankets and/or protective welding screens to prevent slag from running out of the work area. Edges of covers at the floor must be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. Do not allow any welding/cutting or open flame operations in facilities that are protected by a wet pipe fire sprinkler or an automatic detection system, if the system is out of service. First priority of work will be to return the suppression/detection system to operational condition. Return the fire detection and/or suppression system back to an operational status (if possible) during periods that the facility is unoccupied, and at the end of the work day. Post a fire guard for a 24 hour period (or certify to the Fire Department that the facility is safe) after welding, cutting, and open flame operations in a facility when: (a) fire detection and suppression system can not be returned to service; (b) fire detection or suppression systems do not exist. Other fire prevention precautions must be in accordance with the latest National Fire Codes.

1.9.5.1 Inspections

All construction sites are subject to fire and safety inspections without notice. Any violation of fire and safety standards may result in a work stoppage at the expense of the Contractor.

1.9.6 Recordkeeping/Reporting Requirements

On all contract operations, record and report all accident exposure and experience incident work. (This includes exposure and experience of the prime contractor and sub-contractor(s)). As a minimum these records must include exposure work-hours and a log of occupational injuries and illnesses. (OSHA Form 300 or state equivalent as prescribed by 29 CFR 1904). Refer to EM 385-1-1, 01.D.04.

1.9.7 Accident Reporting

In addition to the requirements for reporting accidents in accordance with EM 385-1-1, Section 1, submit at the 50 percent point and 100 percent of project completion, a written summary of worker's compensation claims filed by workers on the project. The report will include all subcontractors. The main report covering the Prime Contractor claims will be certified as "correct and true" by the Contractor's compensation insurance carrier. The same certification will be required for subcontractor reports. Per AFI 91-204, report pertinent facts regarding mishaps involving reportable damage or injury to the Air Force and shall cooperate in any Air Force safety investigation. Cooperation may include toxicology testing.

1.10 PLANNED UTILITY OUTAGES AND STREET CLOSURES

All utility outages and street closures must be of as short a duration as possible and must be scheduled as far in advance as possible with the Contracting Officer, in no case less than 28 calendar days before the outage or closure. Obtain from the Contracting Officer in writing a statement or schedule giving the permissible times of outages or closures for particular installations and the maximum time allowed for each. Strictly observe such schedules and the contractor will be held responsible for any violations.

a. Street Closure:

Obtain approval in writing from the Contracting Officer before he can close any street or parking lot access. The request for closure must be submitted in writing to the Contracting Officer 7 working days prior to planned closing and must include the section to be closed and length of time of closure.

1.11 EXCAVATION PERMITS

All excavation permits will be issued to the Contractor from the Base Civil Engineer (BCE) through the Contracting Officer. The appropriate form, for this request, may be obtained from the Contracting Officer. Processing time required by the BCE is 14 calendar days. Questions concerning the excavation permit should be directed to the Contracting Officer.

a. Excavation Permit:

The Contractor will be required to obtain an excavation permit on AF Form 103 from the Base Civil Engineer prior to performing any required

excavation under this contract. The form must be accompanied by a sketch showing size, depth, location, and extent of all excavation and trenching included in the contract. The completed form must be submitted to the Base Civil Engineer with a copy to the Resident Engineer at least 28 working days prior to intended date of excavation. During the 28-day period the Base Civil Engineer and Base Communications Officer will make known to the Contractor by drawings, staking, or both, the location of all known buried utilities and communication lines. In these identified areas, only hand excavation will be permitted.

Reference is made to the article of the contract entitled "Permits and Responsibilities," which obligates the Contractor to obtain all required licenses and permits.

1.12 WELDING PERMIT

Where welding of any nature is to be performed on Travis Air Force Base, apply for a welding permit, see ENVIRONMENTAL PERMITS/AUTHORITY TO PROCEED GUIDANCE within the appendices to this RFP for contact information. A permit will be issued within two working days with instructions for welding, fire protection.

1.13 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE, Section 00 73 00, entitled "DEFAULT (FIXED-PRICE CONSTRUCTION)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

- a. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
- b. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY

WORK DAYS BASED ON (5) DAY WORK WEEK

MEAN INCREMENT DAYS PER MONTH

DISTRICT MILITARY INSTALLATIONS

STATE INSTALLATIONS

TRAVIS AFB

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
(03) (01) (00) (00) (00) (02) (04) (01) (01) (01) (01) (03)

Upon execution of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. Refer to [ER 415-1-15](#).

1.14 SPECIAL CONSTRUCTION PROCEDURES

a. Haul Route Cleanup:

Clean, sweep, or pick up, as necessary, mud, rocks, trash, or any other type of debris spilled along haul routes, immediately after passage. Cleanup must be performed to the satisfaction of the Contracting Officer.

b. Tree Relocation:

Trees, plants, shrubs, etc., designated for salvage must be carefully removed and replanted at locations on Travis AFB as shown on the drawings. Excavation must be accomplished so as to avoid unnecessary damage to roots, limbs and foliage, and the plant must be maintained in good condition until replanted in its new location.

c. Pavement Excavation:

Notify the Contracting Officer of the starting date, location, and scope of any cutting and removal of pavement. Also report the length of time necessary to complete the work, replace the pavement and make the parking lot or street fully operational. When pavement excavation will be continuous for more than 5 days, the schedule of work for each day must be submitted. The daily schedule must be updated as necessary by each Monday if total duration is greater than 5 working days. The notification will be in writing and submitted to the Contracting Officer for approval at least 7 work days prior to the start of work.

1.15 CONTRACTOR SAFETY PERSONNEL REQUIREMENTS

See Section [01 35 26](#) GOVERNMENTAL SAFETY REQUIREMENTS for all safety requirements.

1.16 HAZARDOUS NOISE AREA

Work area for this contract is located within a high noise area and can be hazardous to the human ear. The Contractor is responsible for providing adequate ear protection as may be required for Contractor's personnel at the job site.

1.17 COLOR SCHEME FOR CONTRACTOR FACILITIES

All Contractor storage and operational facilities including temporary structures, signs and fencing, that remain at the site must be compatible with the color scheme used on the project signs as directed by the Contracting Officer.

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

The Government will provide an optical disk at the preconstruction conference that contains the following:

- a. One set of "as-designed" electronic CADD drawing files in the specified software and format, revised to reflect all amendments, of the Government's conceptual site and facility design.
- b. A submittal register data file in comma separated value (CSV) format for import into the Resident Management System (RMS).
- c. Informational copies of the contract specifications and drawings, the original solicitation drawings and specifications, plus all amendments in Portable Data Format (PDF).

PART 3 EXECUTION

3.1 AFTER AWARD DOCUMENTS

- a. After AWARD the Government will provide, without charge one copy of the CAD drawings of the Government's conceptual site and facility design.
- b. Provide hard copy sets in the quantities identified in Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD). Provide these documents within 5 work days after the Government releases the Contractor's design for construction.
- c. Provide the Resident Engineer a copy ("hard" and "PDF") of the signed Bond and Notice to Proceed within 5 working days after receipt from the Contracting Officer.

-- End of Section --

SECTION TABLE OF CONTENTS
DIVISION 01 - GENERAL REQUIREMENTS
SECTION 01000

17 Oct 2019

1.1	PRINCIPAL FEATURES	3
1.2	DEMOLITION, REMOVALS, AND EXCESS MATERIALS	3
1.3	EXCAVATION	3
1.4	UTILITY OUTAGES	4
1.5	CONTRACTOR'S STORAGE AREA	4
1.6	CONTRACTOR SECURITY OF JOB SITE	4
1.7	CONTRACTOR WORK TRAILER (ON SITE OFFICE)	4
1.8	WORKING HOURS	4
1.9	FIRE PREVENTION	5
1.9.1	Fire Prevention Rules	5
1.9.1.1	Smoking	5
1.9.1.2	Fire Reporting	5
1.9.1.3	Heating	5
1.9.1.4	Electrical	5
1.9.1.5	Housekeeping	6
1.9.1.6	Flammable Liquids	6
1.9.1.7	Liquid Powered Equipment	7
1.9.1.8	ARC Welding, Torch Welding, Cutting, and Brazing	7
1.9.1.9	Asphalt and Tar Kettles	7
1.10	SUBMITTAL REQUIREMENTS	8
1.11	REVIEW OF SUBMITTALS	8
1.11.1	Channel of Submission	8
1.11.2	Shop Drawings	9
1.11.3	Approvals of Substitutions	9
1.12	TRADE NAMES	9
1.13	PROTECTION	9
1.14	MAINTENANCE	9
1.15	SPECIFICATIONS	9
1.16	CALL FOR FINAL INSPECTION	9
1.17	PROGRESS CHART	10
1.18	CONTRACTOR DAILY REPORT TO INSPECTOR	10
1.19	FLIGHTLINE ACCESS	10
1.20	EQUIPMENT LIST AND MAINTENANCE MANUALS	11
1.21	AS-BUILT DRAWINGS	11
1.21.1	GeoBase Spatial Data Requirements	13
1.22	QUALITY CONTROL	14
1.23	BASE REGULATIONS	14
1.24	PEST MANAGEMENT	14
1.25	LEAD BASED PAINT REMOVAL, CONTAINMENT AND DISPOSAL	15
1.25.1	Contractor to Provide	15
1.25.2	Containment of LBP	17
1.25.3	Safety and Health Compliance	17
1.25.4	Removal of LBP	17
1.25.5	Disposal and Transportation	17
1.25.6	Daily Cleanup	18
1.26	ASBESTOS CONTAINING MATERIAL REMOVAL, CONTAINMENT AND DISPOSAL	18
1.26.1	Demolition	18
1.26.2	Compliance	18
1.26.3	Management of ACM	19
1.26.4	Submittals	19
1.26.4.1	Health and Safety Plan	19

1.26.4.2	Materials	20
1.26.4.3	Additional Requirements (If Required):	20
1.27	SPECIAL WORKING CONDITIONS AND WORK SCHEDULE.....	21
1.28	Street Closures and Traffic Control.....	21
1.29	CONTRACTOR'S RESPONSIBILITIES:	21
1.29.1	Contractor Site Visit Prior to Closing	21
1.29.2	Advanced Notification	21
1.29.3	Emergency Telephone Number of Contractor's Representative.....	22
1.30	ENVIRONMENTAL MANAGEMENT	22
1.30.1	Contractor's Responsibilities for Regulatory Compliance.....	22
1.30.2	Hazardous Materials Registration	22
1.30.3	Recycling and Solid Waste	22
1.30.5	Air Quality	23
1.30.6	Building Demolition, Asbestos, Lead, PCB (Polychlorinated Biphenyl)	23
1.30.7	Hazardous Materials and Hazardous Wastes Handling.....	24
1.30.8	Hazardous and Non-Hazardous Wastes Manifesting	25
1.30.9	Water	25
1.30.10	Spills	28
1.30.11	Environmental Impact Analysis Program.....	29
1.30.12	Natural and Cultural Resources Management.....	29
1.31	TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY - DD FORM 1354	29
1.32	UTILITIES PRIVATIZATION	32
1.32.1	Electrical Distribution System	32
1.32.2	Water Utility Distribution System	33

-- End of Section Table of Contents --

DIVISION 1 - GENERAL

SECTION 01000

SPECIAL PROVISIONS

1.1 PRINCIPAL FEATURES

The principal features are defined in the Scope of Work for Each delivery order as assorted pavement projects across Travis AFB, CA.

1.2 DEMOLITION, REMOVALS, AND EXCESS MATERIALS

All materials, equipment, and refuse generated through the demolition work required by this contract shall become the property of the contractor and shall be disposed of by the contractor off base at the contractor's expense unless specifically listed otherwise in the drawings or demolition section of the specifications. The contractor should be aware that within the confines of Fairfield, California, including Travis Air Force Base, if the contractor subcontracts for the removal of debris/refuse that the City of Fairfield has an exclusive franchise agreement with Solano Garbage Company, (707) 422-4244, to perform such service. Hazardous material removal and disposal shall be accomplished in accordance with all applicable codes and regulations and shall be the sole responsibility of the contractor.

1.3 EXCAVATION

Excavation of any kind is prohibited prior to processing a duly executed Excavation Permit 60 AMW Form 55. Excavation Permits are only valid for a 90 calendar day period and only as much excavation work that can be accomplished in 90 days shall be processed on any individual Excavation Permit. The contractor shall mark the area to be excavated at the site in white chalk paint prior to processing the Excavation Permit and shall provide a drawing/sketch of the area to be excavated along with the Excavation Permit form. The contractor shall maintain the utility markings for the 90 days or until all excavation is completed. Excavation prior to completion of such permit shall be at the contractor's risk. Any damage to utilities or other government property as a result of such excavation shall be repaired or replaced by the contractor at no additional cost to the government. Any damage to utilities owned or maintained by other companies will be repaired by the contractor or will be paid for by the contractor for the company to repair the utility at the company's option. Processing the permit is the responsibility of the contractor and will require the contractor to take the drawings and permit to Bldg 878 Conference Room on Tuesday at 1000 hours for coordination. It must be submitted no later than 0900 hours that morning to be considered for the 1000 hours coordination. In addition, the contractor shall contact Underground Service Alert for review and coordination by commercial telephone, gas, and electrical companies before submitting the Excavation Permit. Depending on personnel availability, complete processing may be expected to take up to 10 working days. The contractor will be notified when the Excavation Permit is signed and ready.

Environmental Element, 60 CES/CEIE - If the evidence of possible soil contaminants is found in the process of excavation and/or soil removal, Natural Resources

Management, 60 CES/CEAN, shall be notified immediately by submitting notification through the Contracting Officer.

1.4 UTILITY OUTAGES

Outages for utility tie-ins/shut downs require prior approval of the Contracting Officer. All requests for outages shall be submitted in writing to the Contracting Officer at least 21 calendar days in advance of the proposed date unless specifically indicated otherwise elsewhere in the contract documents.

1.5 CONTRACTOR'S STORAGE AREA

At the time of contract award, the Government may assign an outside area to the contractor for the storage of his supplies and equipment. The contractor shall provide an identification sign posted at the area, stating contract title (S), contract number (S), contractor's name, original contract completion date (s), and emergency phone number for all contracts currently in progress at TAFB. The contractor shall be responsible for his own security and weatherproofing. Missing or damaged material shall be replaced by the contractor at no additional cost to the Government at the completion of the contract. The location of the contractor storage area will be determined by the Contracting Officer. Base policy is to locate all contractor storage areas in a confined area off of Hangar Avenue behind David Grant Medical Center. Contractors are required to perform basic housekeeping within the designated area on a regular basis, to include repairing fence material, subject to quality assurance inspection by base personnel.

1.6 CONTRACTOR SECURITY OF JOB SITE

The Contractor shall be required to fence off the construction site and have all access gates secured with keyable locks. The fence shall be of chain link with brown fabric and be 6 feet high minimum. The Contractor shall furnish the duplicate gate keys to the base fire chief, and the designated construction inspector.

- a. All temporary fences and structures that the contractor uses to protect his materials shall be removed at project completion.
- b. The storage area shall be cleaned of all debris and demolition material and repaired as required to bring the site back to its original condition.

1.7 CONTRACTOR WORK TRAILER (ON SITE OFFICE)

The Contractor may provide an on site office trailer as necessary for the accomplishment of the work. The trailer shall conform to the following criteria: Trailer shall be well maintained, and not appear in a condition requiring extensive repair, trailer color shall be light beige for the body, with optional medium to dark brown trim. In no case shall a trailer be permitted on the work site unless color is approved by the Contracting Officer. It may be required to locate contractor work trailer in an area not adjacent to the construction site. Location of the contractor work trailer must be approved by the Contracting Officer.

1.8 WORKING HOURS

Work shall be performed during normal work-week, 7:30 a.m. to 4:30 p.m., Monday through Friday, excluding Federal Legal Holidays and/or days not worked by the Government in observance of such Federal Legal Holidays. Work shall not be performed at any time other than the normal work-week without obtaining written approval of the Contracting Officer at least seven (7) calendar days in advance.

1.9 FIRE PREVENTION

Responsibility: The Base Fire Chief or his representative will attend pre-construction conferences to brief contractors on pertinent fire regulations and to provide guidance for fire safe operations during contract performance. Fire prevention guidance will be furnished to the contractor for briefing his personnel.

1.9.1 Fire Prevention Rules

1.9.1.1 Smoking

- a. Use of cigars, cigarettes, matches, and mechanical lighters is prohibited in buildings used for storage, repair, processing, or servicing except in areas designated as "Authorized Smoking" as approved by the Base Fire Chief or his designated representative. Areas so designated shall be marked by suitable signs.
- b. Discarded smoking materials shall be placed in special non-combustible receptacles. At the close of business, or upon cessation of operations each day, these receptacles shall be removed from the building and the contents disposed of in a fire-safe manner.
- c. Smoking is prohibited in any facility or area where any painting is being done. Smoking is prohibited within 50 ft of storage, repair, servicing, processing. Smoking is prohibited within 100ft of any hazardous vapors or materials being used.

1.9.1.2 Fire Reporting

Any person who discovers a fire shall report it immediately, even when it is extinguished without the aid of the Fire Department. This shall be done by:

- a. Sounding the alarm locally be activating the installed fire alarm or by shouting to notify the occupants.

b. Telephone reporting of fires:

1. All base phones: Dial 424-4911.
2. To report a fire using a cell phone: Dial 707-424-4911.

c. Giving the Fire Department the following information:

1. Building number or physical address.
2. Type of fire (building, grass, automobile, electrical, metals, fuels, etc.)
3. Exact location of the fire in the building (1st, 2nd, 3rd floor, north end, south end, etc.)
4. Name of person reporting the fire.

1.9.1.3 Heating

Non-explosion proof electrical heaters and all open flame heaters are prohibited for use in any facility or area where volatile vapors are present or may accumulate.

1.9.1.4 Electrical

- a. During Fire Prevention inspections, all appliances deemed unsafe and connected to an electrical distribution system shall be disconnected from the electrical system until approved by a competent electrician.
- b. In buildings where volatile liquids are used and/or stored, only vapor-proof type drop cords shall be used.
- c. All flexible cords on appliances shall be UL listed and rated for the type of working being accomplished. Cords shall be continuous lengths and kept in good condition without splice tape.

1.9.1.5 Housekeeping

- a. Trash shall not be allowed to remain in any area or building overnight.
- b. Only non-combustible trash containers and waste paper containers shall be used.
- c. Trash shall not be allowed to accumulate on the floors, in attics, or underneath stairwells or buildings. Attics and the area underneath stairwells shall not be used for storage without prior written approval of the Base Fire Chief by submitting request through the Contracting Officer.
- d. Outdoor trash receptacles shall be located at a reasonable safe distance from buildings. Trash and litter, including scrap lumber, shall not be stacked less than twenty (20) feet from any building.
- e. Rags shall be kept in a metal container with metal lid. Oily rags shall be removed from the building at the end of each work day. All containers shall be properly labeled with contents.

1.9.1.6 Flammable Liquids

- a. Flammable liquids shall be stored only in designated buildings and areas with "FLAMMABLE" AND "NO SMOKING" signs prominently posted.
- b. Gasoline shall not be stored in any building on Travis AFB without written approval from the Base Fire Chief by submitting request through the Contracting Officer.
- c. A supplemental supply of flammable liquids kept on the premises shall be limited to the amount necessary for one day's use. This supply shall be kept in approved safety cans stenciled with the name of contents and the word "FLAMMABLE".
- d. All paint storage sheds shall be at least fifty (50) feet from any building.
- e. All spray painting shall be done in compliance with established industry safety practices and current regulations.
- f. Blow torches or any type of open flame are prohibited for removing paint or tile from any type of surface.
- g. The tanks on any small gasoline powered engine shall be drained and purged before storing in any building on Travis AFB unless a specific building is designated for this purpose and approved in writing by the Base Fire Chief by submitting request through the Contracting Officer.

1.9.1.7. Liquid Powered Equipment

- a. In all areas where an accumulation of explosive gases is likely to occur from the use of power equipment, adequate ventilation shall be maintained.
- b. Privately owned vehicles shall not be parked in any building or structure other than those designated and approved in writing for this purpose.

1.9.1.8 ARC Welding, Torch Welding, Cutting, and Brazing

- a. Welding, cutting, or brazing permit is needed regardless of proximity to facility, other than approved welding shops, will require permission from the Fire Department and the issuance of a Welding Permit. Any open flame (welding, tar kettles, etc.) will require a welding permit. Call 424-2328 to have a permit issued.
- b. Backflow protection shall be provided by an approved device that shall prevent oxygen from flowing into the fuel gas supply system or fuel gas from flowing into the oxygen supply system.
- c. Flashback protection shall be provided by an approved device that shall prevent the flame from passing into the fuel gas supply system.
- d. Only certified welders shall operate welding equipment.
- e. All equipment shall be inspected daily for damage, loose connections, and unsafe conditions. Repair or replacement shall be made if required.
- f. When precautionary measures have been taken and fire hazards continue to exist, a fireguard provided with suitable fire extinguishing equipment shall be stationed near the welding location.
- g. During any work in which a concentration of flammable vapors or dust is likely, all open flames shall be extinguished and the building shall be adequately ventilated. Precautions shall be taken to insure that electrical circuits are not activated.
- h. Do not shut off water mains and fire hydrants or perform any maintenance that will interfere with the water supply on the Base without first notifying the Base Fire Protection Branch, 424-3886.
- i. For all potential fire hazards and actual emergencies not specifically covered in this section, the exercise of good common sense will usually suffice. When in doubt, call the Fire Prevention Section for assistance, 424-2328 or 424-3683.

1.9.1.9 Asphalt and Tar Kettles

- a. Asphalt and tar kettles shall be located a minimum of twenty (20) feet from any building. Kettles in use shall be continuously supervised.
- b. Asphalt and tar kettles shall be equipped with a temperature gauge. The temperature gauge shall be kept visible and in good working order.

- c. Containers of compressed gas for heating tar shall be secured to prevent falling.
- d. Two (2) portable fire extinguishers shall be provided. Each extinguisher shall have a minimum rating of 10 BC. These extinguishers shall be fully charged and within fifteen (15) feet of the tar kettle during kettle operations.
- e. For all potential fire hazards, call the Fire Department for assistance at 424-3886.
- f. For actual emergencies not specifically covered in this guide, call 424-4911 from Base phones.

1.10 SUBMITTAL REQUIREMENTS

For submittal requirements refer to the contract documents and the technical specifications. If exact products are specified in the contract documents, and the contractor intends to use those same products in the construction work, submittal requirements in Section J, Attachment 4, and the technical specifications for catalogue cuts, manufacturer's literature, and samples are waived. The contractor shall provide a list of products that fall into this "intended use of exact product specified" category along with the manufacturer's installation/application instruction for each product on the list. This list and manufacturer's installation/application instructions shall be provided at the pre-construction conference for review and approval by the Contracting Officer.

1.11 REVIEW OF SUBMITTALS

The Government's review will be limited to determination of the submittals' conformance with design concept and general requirements of the project. Approval by the Government shall not absolve the contractor from his responsibilities for specific performance of the item or items submitted. Time allowed for original and any subsequent reviews shall be ten (10) working days after receipt by the Contracting Officer, except for substitutions. Submittals consist of the following:

- a. Shop drawings (4 copies).
- b. Catalog cuts and manufacturer's literature (4 copies).
- c. Samples (2 copies).
- d. Manufacturer's Installation Instructions.

1.11.1 Channel of Submission

Submittals will be accepted only from the contractor (not sub-contractor or material supplier). Contractor shall check submittals for completeness, accuracy for construction purposes, and conformance with contract requirements. Contractor shall indicate his approval on each submittal. All material submittals shall be provided to the Contracting Officer for approval utilizing AF Form 3000.

1.11.2 Shop Drawings

Shop drawings shall be prepared by persons competent and experienced in trade involved. Drafting skill is not a requirement but accuracy and completeness are. Drawings shall reflect field measurements and conditions and shall show the relationship of the item to adjacent materials.

1.11.3 Approvals of Substitutions

With any request for approval of substitutions, the contractor shall submit to the Government complete data including performance and chemical makeup for both specified and proposed item. For all products that differ from those specified, the word "substitution" shall be clearly indicated in the element description of AF Form 3000. Approvals of substitutions will require 20 working days for review after submittal to the Contracting Officer.

1.12 TRADE NAMES

Trade names of specific products in this specification are used only for purposes of defining general quality and performances. They are not used to preclude the use of products of equal characteristics by other manufacturers. The Government reserves the right to determine equality. Physical dimensions, color, and texture will also be considered in determining equality. All items will be submitted one time for approval.

1.13 PROTECTION

Contractor shall be solely responsible for furnishing, erecting, maintaining, and removing all protective barriers, signs, temporary lighting, etc., required for protection of persons and property. Open flame devices of any kind are prohibited. Driving vehicles on grassed areas is prohibited during construction unless a request has been submitted in writing and approved by the Contracting Officer.

1.14 MAINTENANCE

During the construction period, all vegetation at the construction site and the storage area shall be maintained by the contractor. Maintenance shall include mowing grass and/or weeds at least weekly. All damaged or dead vegetation shall be replaced as directed by the Contracting Officer at no additional cost to the Government.

1.15 SPECIFICATIONS

These specifications are divided into several trade sections for convenience and not to establish the limits of the work required of any trade. It shall be the contractor's responsibility to allocate the work between appropriate trades. In the event of a discrepancy between the contents of the accompanying drawings and specification(s), the specifications shall govern.

1.16 CALL FOR FINAL INSPECTION

To assure that all members of the inspection party can be notified and can make necessary arrangements to be available, the contractor shall provide the Contracting Officer with the proposed date for final inspection not less than seven (7) calendar days in advance. A pre-inspection will be made by the inspector prior to the scheduled final inspection. If the contract is not deemed complete, the final inspection will be postponed until the Government is satisfied that the project is ready. If construction deficiencies are identified, request for re-inspection shall be given at least two (2) working days in advance of the proposed date.

1.17 PROGRESS CHART

Reference FAR 52-236.15. The salient features of the Progress Schedule shall consist of a minimum of one item for each division of the specification. The divisions shall follow the CSI format below. The contractor need list only divisions that are used in the specifications. He may further subdivide each division as to best suit his needs. On the Progress Schedule, the contractor shall also provide columns breaking down labor and material percentages for each element of work so that they total the percentage in Column "C" on the schedule.

CSI Format:

- | | |
|----------------------------------|--------------------------|
| 1. Environmental | 10. Doors and Windows |
| 2. Submittals | 11. Finishes |
| 3. General | 12. Specialties |
| 4. Site Work | 13. Equipment |
| 5. Concrete | 14. Furnishings |
| 6. Masonry | 15. Special Construction |
| 7. Metals | 16. Conveying Systems |
| 8. Wood & Plastic | 17. Mechanical |
| 9. Thermal & Moisture Protection | 18. Electrical |

1.18 CONTRACTOR DAILY REPORT TO INSPECTOR

The Contractor shall provide a daily report to the Civil Engineering Construction Inspector through the Base Contracting Officer, or his designated representative. The daily report may be turned in on a weekly basis to the Base Contracting Office.

1.19 FLIGHTLINE ACCESS

- a. General: For entry of contractor-owned vehicles to Travis AFB flightline, the contractor shall comply with the following procedures in accordance with TAFBI 13-103, Vehicle Operations on the Flightline.
- b. Application and Approval Procedures for Commercial Vehicular Entry Into Travis AFB Flightline:
- Applications shall be prepared in letter form (3 copies) on company letterhead stationery, signed by the senior company representatives on Travis AFB, and submitted to the Chief, Airfield Management, 60 OSS/OSAA through the Contracting Officer. As a minimum, applications shall include the following information:

- Total number of vehicles requiring entry.
- Type, make, state of registration, and license number of each contractor vehicle.
- Location of company/firm name on each vehicle.
- Air Force contract number, type, and expiration date of contract.
- Frequency of entry into flightline areas on official business and justification therefore.

(f) An approval by the contract monitoring military unit/agency indicating mission necessity.

2. Approved applications (originals) will be returned through channels to the applicant. Applicant shall retain this letter for the duration of the contract period. The second copy will be forwarded to
60 SFS/SFA and the third copy will be retained by Base Operations, 60 OSS/OSAA. Base Operations shall be notified by letter immediately of any changes to paragraph 1.19.B.1.

1.20 EQUIPMENT LIST AND MAINTENANCE MANUALS

- a. The contractor shall provide an equipment listing for all installed equipment. The listing shall be sequentially numbered and, as a minimum, contain the following information for each equipment item:
Type/description, date installed, date warranty expires, installed location, manufacturer, model number, serial number, Hp, volts and amps.
- b. For all equipment required by this contract, the contractor shall also provide four (4) copies of complete maintenance and repair manuals including parts listings, flow diagrams, and control diagrams. Equipment list and maintenance manuals shall be provided and approved prior to final acceptance of work under this contract.
- c. Install or replacement of bathroom equipment/dispensers or suitable substitute (i.e. toilet paper dispensers, paper towel dispensers, and wall mounted devices).

1.21 AS-BUILT DRAWINGS

- a. By definition, the as-built drawings are an accurate record of the construction as actually installed and completed including all the information shown on the original set of contract drawings, unless work was deleted by modification or additive bid, and a record of all deviations, modifications or additions to the contract drawings however minor, which were incorporated in the work from notice to proceed until final acceptance.
- b. Throughout the course of the work, the Contractor shall keep two RECORD SETs of drawings and specifications. They shall be marked in red showing changes and deviations from the original contract set. Each change shall be dated and initialed by the Contractor and the Contracting Officer. Changes shall be drawn as accurately as possible given field conditions and shall show all changes. Where changes were due to an approved change order or a field order, enter at the location of change, the change order number or field order number. Prior to final inspection, the Contractor shall submit a RECORD SET to the Government for review. The Project Inspector and Project Engineer will compare the RECORD SET with actual construction conditions for accuracy. The drawings shall include but not be limited to the following information:
 1. The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions of permanent features.
 2. The location and dimensions of any changes within the building or structure.
 3. Correct grade or alignment of structures or utilities if any changes were made from contract plans.
 4. Changes in details of design or additional information obtained

10/17/19
from working drawings specified to be prepared and/or furnished by the Contractor including but not limited to fabrication, erection, installation plans and placing details, bolt sizes, dimensions of equipment foundations, etc.

5. All changes and modifications which result from the final inspection.
 - c. After receipt of the Government approved RECORD SET (red lines) along with a CD containing the original electronic design drawings, the Contractor shall prepare and submit an AS BUILT - redrawn in AutoCAD (.dwg) with actual construction conditions - set of drawings on 24" x 36" (D size) sheets. All site and building drawings will be to scale. All dimensions shall be expressed in inch-pound (English Imperial) and Standard International (SI) metric units. Travis AFB is presently using AutoCAD Map 2000 and utilizing Paper Space and Model Space in its drawing files. All drawing files must be compatible with Travis AFB CADD system. All files shall be DWG (AutoCAD) format. All drawings shall be drawn full size (1 to 1). Model Spaces shall be identical to the hard copy and only contain the data shown in the Model Space for that file. Also submit two CDs with digital AS BUILT - sets of drawings on CD prepared using AutoCAD, version 2000 or higher, for Windows and in pdf format. All CDs and electronic and hardcopy drawings shall be labeled with the building number, drawing number, project number, project name, company name, and the date the CD/drawing was made. The drawing sheets shall be numbered consecutively starting with the cover sheet as sheet number 1. Sheet numbering shall be reflected as, for example, 1 of 8, 2 of 8, 3 of 8, etc. All electronic and hardcopy drawings shall be marked "AS BUILT" on each sheet with revision date. Show all changes that have been made and noted on the Government approved RECORD SET of drawings. Submit the final "AS BUILT" drawings on CD and hardcopy not later than 30 days after project completion. The Project Manager and Construction Inspector shall QC "AS BUILT" electronic files for correct data before submission to Engineering Technicians to archive. Electronic and hardcopy "AS BUILT" drawings shall be developed and delivered in the format specified by the latest version of the Tri-Service Spatial Data Standards (TSSDS). The TSSDS can be downloaded from the Tri-Service Center's Internet website at ***tsc.wes.army.mil***.
 - d. All electronic drawings shall be in the following format:
 1. Digital data files shall be provided in Vector format (modifiable drawings) and saved as a DWG file utilizing AutoCAD 2014, Release 15 platform or higher and pdf format in separate folders.
 2. CADD data shall be provided on CD-ROM labeled "AS BUILT" with the building number, drawing number, project number, project name, company name, and the date the CD was made.
 3. No zipped, compressed or spliced files will be accepted.
 4. Drawing files may contain only one drawing per filename.
 5. Electronic drawings must include an index specifying file names as they correspond to sheet names, i.e. for 0397M3.dwg, 03-97 is the assigned drawing number and M3 is the sheet name.
 6. The Contractor shall ensure that the drawings which use external file references (XFREF's) shall be attached without device or directory specifications.
 7. After design completion and Government acceptance the Contractor shall retain a copy of a digital media (with all files included) for at least one year and during this period of time, will

provide up to 2 additional copies of each to the Government at no additional cost.

8. Upon delivery of the final design drawings the Contractor shall provide a CD with the electronic CADD files for the government to review to ensure the files are completed and correct. The A-E shall submit two copies of the approved final design drawings on CD.

9. All software and electronic files shall be virus free.

e. The Contractor is encouraged to have the original Architect-Engineer complete the work under this section, as they will be most familiar with the drawings and requirements.

1.21.1 GeoBase Spatial Data Requirements

a. Structures shall require the submission of geospatial/mapping data. This includes, but is not limited to, building and structure footprints, utilities, infrastructure, survey data, etc. Contract requirements for the collection and delivery of georeferenced geospatial data shall specify either mapping or survey grade Global Positioning System (GPS) or traditional survey methods of data collection. The use of either mapping or survey grade GPS technology will depend on the precision requirements of the data. Deliverables that involve digital maps or other geospatial data must be delivered in a georeferenced Geographic Information System (GIS) format which would include Environmental Systems Research Institute's (ESRI) shapefile and geodatabase formats. Detailed specifications for data precision, data collection, attribution, and file format delivery should be included in each contract.

b. All deliverables that involve maps or other geospatial data must meet the following requirements:

1. All maps and associated data must comply with the latest version of Spatial Data Standards for Facilities, Infrastructure, and Environmental (SDSFIE) available from the Air Force GeoBase website at <https://www.sdsfieonline.org/Components/USAF>. These data will be organized using SDSFIE 3.1.0.1 specifications (latest available as of February 2019) for file, feature class and attribute nomenclature. Guidance on the latest version of SDSFIE is available from the Installation's Geo Integration Office (GIO), 60 CES/CENME. Information must be collected at no less than 1:1200 scale for base cantonment areas and 1:4800 for large undeveloped base areas. Spatial data will meet or exceed National Map Accuracy Standards at those scales. Class and Feature level metadata will be provided in accordance with Air Force GeoBase Guidance and Governance and will use Federal Geographic Data Committee (FGDC), Content Standards for Digital Geospatial Metadata (CSDGM) for organization. Further guidance regarding data and metadata standards is available from the Installation GIO.

2. Geospatial data must be delivered in a georeferenced GIS format (feature-based file structures including one-to-one cardinality between spatial records and attribute records). All attribute data as specifically outlined in the contract must be included either in the GIS data file or as a separate table with a SDSFIE key variable that may be used to relationally join the separate table with the GIS data file. All geospatial data must be delivered in the Geographic Coordinate System WGS 1984. Further guidance on mapping units, coordinate systems, and projections is available from the Installation GIO.

10/17/19

3. Mapping or Survey Grade GPS or comparable traditional survey methods will be used to collect geospatial data. The use of mapping or survey grade GPS will depend on the precision requirements of the data. These requirements will be identified in the specifications for all activities where geospatial data are involved. In the case of specifications involving utility construction, location and attribute data will be obtained at the time of excavation. Further information about precision requirements should be obtained from the Installation GIO.

1.22 QUALITY CONTROL

The contractor shall maintain strict quality control during the construction period. The contractor shall provide a full time construction superintendent IAW FAR 52.236-6 Superintendence by the Contractor at all times during the period of construction. The construction superintendent shall maintain daily construction logs identifying daily progress. The construction logs shall be made available to the Government Inspector when requested by the Government.

1.23 BASE REGULATIONS

The contractor shall conform to all Base Regulations and directive (as specifically identified at the pre-Construction conference) that pertain to security, safety, traffic, fire, and personnel clearance, insofar as they apply to the contractor's activities.

1.24 PEST MANAGEMENT

a. Terms explained:

1. PESTICIDE - Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, any substance or mixture of substance used as a plant regulator, defoliant or desiccant.
2. PEST MANAGEMENT - Pest control or prevention by a comprehensive approach that considers various suppression techniques, the habitat of the pest, and relationship between the pest populations and the ecosystem.
3. PESTS - Includes numerous insects and related lower animals, terrestrial and aquatic plants (weeds), domestic and feral rodents, birds, feral predatory animals, snakes, nematodes, snails, algae, fungal plant diseases, marine wood borers, and other organisms, other than domestic animals, THAT ARE NOT DESIRABLE.
- b. All pest management work shall comply with all federal, state, and local statutes and regulations regarding the application, transfer, treatment, storage, and disposal of pesticides. All pest management work shall also comply with Air Force Instruction 32-1053.
- c. All pesticide applicators shall possess current state certifications. All applications shall be made under the direct supervision of certified personnel.
- d. Certification and licensing documentations shall be submitted to the Contracting Officer within fourteen (14) days after the contract has been awarded and prior to start of work.
- e. Plan of pest management operation (including names of pesticides to be used) shall be submitted to the Air Force for review at least ten (10)

10/17/19

calendar days before starting work.

f. Contractor shall furnish the Contracting Officer labels of all pesticides used and the dates when used. This information will be used for the completion of the RCS: DO-M(A&AR) 1080, The Installation Pest Control Summary Report.

g. All pesticides shall be stored, transported and disposed of in accordance with all applicable federal, state, and local statutes, regulations, and ordinances.

h. Protective clothing and equipment shall be provided for and used by all persons engaged in the mixing and application of pesticides.

1.25 LEAD BASED PAINT REMOVAL, CONTAINMENT AND DISPOSAL

Work includes all labor, material and equipment for removal of lead based paint (LBP) as specified herein. The Government requires that the contractor be aware of the need for worker health and safety requirements, and the special handling of LBP on surfaces of material being painted, renovated and removed under this project. The contractor is responsible for establishing control measures to preclude any adverse effects to workers, health, public health or the environment. The contractor is also responsible for complying with all applicable rules or regulations of local, state, or federal regulatory agencies.

1.25.1 Contractor to Provide

The contractor and any subcontractor shall provide the following submittals at the pre-construction meeting unless otherwise specified. Each submittal will include as a minimum, sections to address each item listed under the respective plan:

a. Health and Safety Plan: This includes all protective equipment requirements, training, posting of signs, personal hygiene, decontamination, medical surveillance, emergency response, organization work plans and controls regarding the removal of LBP, painting preparation and the control of lead paint debris:

1. The governing Permissible Exposure Level (PEL) for all work under this contract involving the potential exposure to lead is fifty micrograms per cubic meter of air averaged over an 8-hour period (50 ug/m3 or .05 mg/m3). The contractor shall assure that workers will not be exposed to concentrations greater than this PEL without proper personnel protective equipment. This is a minimum standard set by the government for this work which does not absolve the contractor of complying with all applicable regulations.

2. In addition, this plan will include provisions that all employees involved with lead based paint shall be tested for lead content in their blood before they begin work involving the removal or handling of lead based paint. Blood testing of all contractor and subcontractor employees shall be conducted on a monthly basis during the duration of the contract. All results of employees'

blood tests shall be submitted to Contracting, 60 CONS/LGCA, within ten (10) working days of the sample being taken for Natural Resources Management, 60 CES/CEAN, to review and use.

b. Work Practices and Engineering Controls Plan: This plan will outline the following requirements:

1. Required training (including but not limited to Hazard Communication).
 2. Posting of Signs as prescribed in California Code of Regulations Title 22, 22264.14.
 3. On the exterior, the establishment of 10-foot zone of control for lead paint dust and debris shall be established.
 4. Sealing of critical barriers (minimum 2 layers 6 mil).
 5. Ground covers shall be placed over the established zone of control.
 6. Containment and storage of paint debris.
 7. Any necessary housekeeping to assure that no paint debris is left unattended during the performance of the contract.
- c. LBP Management: The contractor shall be required to submit a hazardous waste management plan within twenty (20) calendar days after issuance of Notice to Proceed for Contracting Officer's approval. The hazardous waste management plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations and shall address:
1. Identification of LBP associated with the work.
 2. Estimated quantities of wastes to be generated and disposed of.
 3. Names and qualifications of each contractor that will be transporting, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of EPA, state, and local hazardous waste permits and EPA identification numbers to the Contracting Officer. Also furnish copies of any required notification to EPA, state, or local agencies to the Contracting Officer.
 4. Names and qualifications (experience and training) of personnel who will be working on-site with LBP.
 5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
 6. Spill prevention, containment, and cleanup contingency measures to be implemented, including spills that may occur on Travis Air Force Base. The government will not be responsible for spills that occur on Travis Air Force Base.
 7. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and contained daily.

10/17/19

8. Cost for LBP disposal according to this plan.

1.25.2 Containment of LBP

The contractor shall conduct the LBP removal in accordance with the Contracting Officer approved Health and Safety Plan and the Environmental Release Safety Plan. The contractor shall be responsible for correct packaging of hazardous waste which is generated during the project. The contractor shall assume that all dust and debris generated during the removal of LBP items and finishes in the areas listed above are hazardous waste and shall be handled, containerized and stored as such. Provisions must be made for inclement weather. The contractor shall be responsible for cleaning all soil contamination attributed to his failure to contain the lead dust and debris. The contractor shall utilize every precaution to not allow LBP debris to enter the Sanitary Sewer or Storm Drain System. Under no circumstances shall the contractor dispose of any waste water contaminated with LBP as a result of construction activities into a storm drainage system. The waste water may be disposed into the sanitary sewer system after being tested by the contractor and approved by Natural Resources Management, 60 CES/CEAN.

1.25.3 Safety and Health Compliance

In addition to the minimum requirements of this specification, the contractor shall comply with the laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting and disposing of LBP materials. The contractor shall comply with the applicable requirements of the current issue of 29 CFR 1910. and applicable 29 CFR 1926. The contractor shall submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. The contractor shall make all required notifications and shall provide the Contracting Officer with a copy of same. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply. The contractor shall comply with all federal, state, regional, and local laws, regulations, ordinances and other directives. All health and safety plans should be reviewed and coordinated on by 60 AMDS/SGPB.

For occupational safety related mishaps, immediately notify the Contract Office Rep (COR) of any US government property damage sustained by contract activities which may occur at any geographic point on TAFB. The COR will in-turn notify Wing Safety. Request hazard information from Wing Safety through the COR when contract activities occur in/around confined spaces. Notify all affected US government employees when hazardous energy control procedures may be implemented to support equipment moves. The notification must include expectations of the affected US government employees.

1.25.4 Removal of LBP

The contractor shall provide any drums or other appropriate devices to containerize the waste in accordance with Title 22 of the California Code of Regulations or other applicable rules and regulations. Hazardous waste can be stored on base for no longer than ninety (90) days, at a designated accumulation point approval by the Contracting Officer.

1.25.5 Disposal and Transportation

The contractor shall provide drums or other appropriate devices to containerize the waste in accordance with federal, state, and local directives. The contractor shall properly transport and dispose of all LBP generated from this project. The contractor shall properly label and placard all drums, vehicles and tanks used to transport LBP from this

10/17/19

project. The contractor shall provide a correctly prepared shipping manifest for all shipments of LBP to Natural Resources Management, 60 CES/CEAN. The contractor shall be responsible for complying with all federal, state, and local permitting regulations when handling, transporting, and disposing of LBP. The contractor shall provide the name and location of the permitted disposal facility to the Contracting Officer.

1.25.6 Daily Cleanup

In accordance with the Contracting Officer approved Health and Safety Plan and the Environmental Release Control Plan, all plastic wrapped items, bags and debris shall be containerized and placed in the LBP container(s). The contractor will exercise extra precaution to assure that no paint chips are left on the job site at the end of each day's performance. The contractor shall clean all soil contamination attributed to his failure to contain the LBP dust and debris.

1.26 ASBESTOS CONTAINING MATERIAL REMOVAL, CONTAINMENT AND DISPOSAL

Exposure to asbestos contaminants is a recognized hazard of human health. Therefore, the Government has determined that work under this contract may involve exposure to friable Asbestos Containing Material (ACM) exceeding the regulatory limit of one percent. All friable Asbestos Containing Material (ACM) exceeding the regulatory limit is to be considered as hazardous waste. The Government will provide all known asbestos data to the contractor upon request to the Contracting Officer. Information provided by the Government concerning known asbestos data has been derived from a previously prepared non-intrusive survey, and shall be used for guidance purpose only. All test results available to the Government to date will be provided upon request.

1.26.1 Demolition

During the course of demolition of Category 1 nonfriable asbestos-containing material (asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products) that has or will become friable, or Category 1 nonfriable asbestos-containing material that may become or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation, the provisions outlined in Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2, paragraph 11-2-303, shall apply. The contractor shall notify the BAAQMD of such activities and obtain all required permits and authorizations prior to the commencement of demolition or renovation activities. The contractor SHALL coordinate with 60 CES/CEAN prior to contacting BAAQMD. The contractor shall comply with Reporting and Notification requirements set forth in BAAQMD Regulation 11, Rule 2, Paragraph 11-2-400. The Contractor shall not communicate directly with any outside regulatory agency unless authorized to do so by 60 CES/CEAN.

1.26.2 Compliance

- a. The contractor has sole responsibility for compliance with all applicable federal, state, and local requirements regarding the health and safety of its employees. These requirements include, but are not limited to, the applicable provisions of the Title Codes of Federal Regulations (CFR), Title Codes of California (CCR), and Bay Area Air Quality Management District (BAAQMD) regulatory guidelines regarding asbestos. Contractor must ensure safe and healthful working conditions for its employees.
- b. The contractor shall comply with all applicable federal, state, and local legal requirements regarding the handling, storage, transportation, and disposal of any ACM. The requirements include, but are not limited to, Code of Federal Regulations (CFR) California Code of Regulations (CCR), and Bay Area Air Quality Management District (BAAQMD). The contractor has

10/17/19

responsibility for determining the legal requirements that apply to his activities as well as compliance with those requirements. The provisions of paragraph 1.26.3, MANAGEMENT OF ACM, are intended to assure such exposure does not occur.

c. The contractor shall comply with all applicable federal, state, and local requirements regarding air emissions. The contractor has responsibility for determining the legal requirements that apply to his activities as well as compliance with those requirements.

d. Depending on the amount of excavation that is to occur can dictate whether a storm water permit is required.

1.26.3 Management of ACM

a. The contractor is responsible for the handling, storage, transportation, and disposal of any ACM generated under this contract. For any hazardous waste that may be generated by the contractor during work under this contract, the contractor shall provide a hazardous waste management plan in accordance with the Travis Air Force Base Hazardous Waste Management Plan which is available from Natural Resources Management, 60 CES/CEAN, Building 570, Travis Air Force Base.

b. The contractor shall furnish copies of all permits for the storage, transportation, and disposal of any ACM. The contractor shall complete all shipping manifests for the transportation of ACM and provide these to Natural Resources Management, 60 CES/CEAN, for signature prior to removal from Travis Air Force Base.

c. The contractor shall be responsible for representative sampling and analysis of ACM or materials suspected of containing asbestos generated waste during this project. If the contractor determines that a waste is hazardous, as defined by all governing regulatory agencies such as CAL EPA, OSHA, DOD, AF and the local Bay Area Air Quality Control Board, etc., then the waste shall be managed in accordance with Section 01560.

d. Any question regarding whether a particular waste is hazardous or non-hazardous shall be directed to the Contracting Officer. The contractor shall share with the Contracting Officer all of the testing methodology, data, and results of all tests performed for hazardous waste or material. The contractor shall provide this information within two (2) working days of his/her receipt of such data and results. The provisions of this information to the Contracting Officer shall not be construed or used as a defense to relieve the contractor of his/her responsibilities under any law or regulatory agency's requirements.

e. Under no circumstances will the contractor remove from the base any ACM without ensuring complete and full compliance with all existing environmental laws and regulations.

f. ACM will be placed in secured, properly labeled containers provided by the contractor. Non-hazardous waste will be placed in other containers provided by the contractor.

g. If any provision of this section is inconsistent with any applicable laws, regulations, or rules concerning the treatment, storage, or disposal of hazardous or non-hazardous wastes, such laws, regulations, and rules shall control.

1.26.4 Submittals

1.26.4.1 Health and Safety Plan

10/17/19

a. If friable asbestos materials with concentrations exceeding the regulatory limit are encountered during the execution of this contract, then the provisions outlined in the following paragraphs will apply. The contractor shall provide for review and acceptance by the Contracting Officer and 60 AMDS/SGPB with a Health and Safety Plan signed by a Certified Industrial Hygienist. No work on area affected by the Health and Safety Plan or its revisions will commence until acceptance of the plan or its revisions by the Contracting Officer. Should the contractor change his/her management procedures for work processes, storage, transporters, or disposal sites, the contractor shall notify the Contracting Officer in a reasonable time to allow the Government to review the changes before the changes are implemented. This notification shall include submission by the contractor or a revised Health and Safety Plan incorporating the changes. A revised Health and Safety Plan shall also be submitted by the contractor at any time during the performance of the contract that a previously unknown hazardous waste or material is encountered.

b. The Health and Safety Plan shall address, but not be limited to, the health related standards and protective measures proposed to be utilized by the contractor during work involving exposure to asbestos.

c. The Health and Safety Plan shall also identify the engineering and work practice controls proposed to be implemented by the contractor. Such controls will be identified to assure the Government that there will be no release to the environment of asbestos for which liability may be imposed on the Government.

d. Non-Hazardous Waste Disposal: Provide name, address, and phone number of properly-permitted sanitary landfill that is to be used for disposal of non-hazardous waste and debris. Such landfill must be operated in compliance with all applicable federal, state, and local legal requirements.

e. ACM Disposal: Provide name, address, and phone number of properly-permitted landfill that is to be used for disposal of asbestos waste and debris. Such landfill must be operated in compliance with all applicable federal, state, and local legal requirements.

1.26.4.2 Materials

a. Disposal Bags and Sheeting: Provide 6 mil or thicker plastic disposal bags for asbestos.

b. Disposal Bins: Provide disposal bins for collection of non-hazardous waste prior to disposal by the contractor. The contractor shall provide properly labeled disposal bins for collection of ACM prior to disposal by the contractor. All bins shall be secured when not in use to prevent deposit of unauthorized waste and debris.

1.26.4.3 Additional Requirements (If Required):

a. Plastic bags utilized to contain asbestos waste must be clear for the purpose of inspecting the waste contained inside the bags. Unclear or colored plastic for the bagging of ACM is not acceptable.

b. Bags containing ACM must be HEPA vacuumed to remove as much air as possible within the bag. The neck of the bag shall be completely twisted. The twisted portion of the bag shall be duct-taped at the base of the neck and candy-caned wrapped with duct-tape to the end of the twisted portion of the bag. This process must allow enough space for the twisted portion of

the bag to be bent into an upside down "U" shape or otherwise known as "goosenecked." Once the bag has been goosenecked, it must be duct-taped to secure the twisted portion of the bag in this position.

c. In addition to the requirements of Section 01000 above, Section 01560, ENVIRONMENTAL GENERAL REQUIREMENTS and Section 02080, ASBESTOS ABATEMENT, shall also apply.

1.27 SPECIAL WORKING CONDITIONS AND WORK SCHEDULE

The following special working conditions and work schedule shall apply to the contract:

Identify the special working conditions or indicate not applicable

Modifications to the work schedule shall be coordinated with the Contracting Officer.

1.28 STREET CLOSURES AND TRAFFIC CONTROL

- a. Contractor must receive base approval for road closure/partial road closure via TAFB Form 55, "Evacuation Permit" instructions, Part V.
- b. All lanes of traffic shall remain open from 7:00 a.m. to 8:30 a.m. and from 3:30 p.m. to 5:30 p.m. Monday through Friday when utility cuts must be made. A minimum of one lane of traffic will be open in each direction from 8:30 a.m. to 3:30 p.m. Monday through Friday when utility cuts are made.
- c. The contractor will provide all necessary signs, barricades, channelizing devices, markers and manpower to provide traffic control when the work is in or near streets in accordance with the State of California Department of Transportation Standard Specifications (latest edition).
- d. Any necessary detours will be coordinated with the Contracting Officer at least two weeks before the detour is set up. Trenches shall not remain open for more than a period of 36 hours. Flaggers may be required to stop traffic intermittently as necessitated by work progress.
- e. All trucks, in-bound deliveries traffic shall use South Gate and out-bound deliveries traffic use Main Gate only.

1.29 CONTRACTOR'S RESPONSIBILITIES:

1.29.1 Contractor Site Visit Prior to Closing

The Government will conduct a site visit to the construction site. The date and time of the site visit is identified in the solicitation documents. It is the contractor's sole responsibility to attend the site visit, and to observe all conditions at the site which may impact a contractor's potential proposal. The Government does not expect the contractor to do any physical testing and/or removal of items at the site visit. The contractor is responsible for observance of those conditions directly exposed to view.

1.29.2 Advanced Notification

- a. The Contractor shall notify the Contracting Officer of the date work will commence under this contract at least one (1) working day prior to beginning work.

b. The Contractor shall notify the Contracting Officer at least one (1) working day in advance of any period when work will not be in progress during the performance of this contract.

1.29.3 Emergency Telephone Number of Contractor's Representative

In an effort to insure the protection of the interests of both the Contractor and the Government, the Contractor is hereby requested to furnish at least one name and telephone number of a representative to be contacted, during other than normal working hours, in the event of an emergency. This information is requested to be supplied at the Pre-Construction Conference which will be held within the time specified in the contract.

1.30 ENVIRONMENTAL MANAGEMENT

1.30.1 Contractor's Responsibilities for Regulatory Compliance

In the event that the Contractor, its employees, or agents fail to comply with applicable environmental laws or regulations, or otherwise engage in negligent or unlawful acts which result in damage to the environment or enforcement against the government by any enforcement agency, the Contractor shall be solely responsible for payment of, or reimbursement for, any and all costs, expenses, or other assessments against the government resulting from such act or omission. Such costs and expenses include, but are not limited to, any fines, fees, or other punitive or civil assessments levied against the government by state or federal enforcement agencies, or any expense otherwise directly or indirectly incurred by the government as a result or consequence of such acts or omissions of the contractor, its agents, or its employees. In the event that the Contractor, its agents, or employees engage in such acts or omissions, and after receiving notice from the government to correct or otherwise repair, remove, or otherwise abate the effects of such actions or omissions, fails to expeditiously respond to such notice, the Contractor agrees to compensate and reimburse the government for any and all costs incurred by the government to repair, remove or otherwise abate such condition. The failure of the government to independently identify acts or omissions of the Contractor which fail to comply with applicable laws or regulations, or which otherwise result in damage to the environment, or which result in enforcement action against the government, shall not relieve the Contractor of his responsibilities under this paragraph.

1.30.2 Hazardous Materials Registration

Contractor shall ensure hazardous material use is authorized, tracked, and managed in accordance with Section 3.3 of the Environmental General Requirements (Section 01 56 00).

1.30.3 Recycling and Solid Waste

a. References:

Resource Conservation and Recovery Act, Section 6002; 40 CFR Part 247; Executive Order 13101, September 14, 1998 - Greening the Government Through Waste Prevention, Recycling and Federal Acquisition.
Engineering Technical Letter (ETL) 00-1, dtd Jan 5 2000, EPA Guideline Items in Construction and Other Civil Engineering Specifications; Comptroller General Division No. B-238290; Office of Federal Procurement Policy Ltr 92-4; HQ USAF/CC and SAF Ltr, 25 Sep 92 DASD (Production and Logistics)

Memorandum, 3 Feb. 93; EO 13101, *Greening the Government Through Waste Prevention, Recycling and Federal Acquisition*, 14 September 98.

- b. All paper deliverables shall be on double-sided, recycled, chlorine-free paper.
- c. The Contractor shall recycle, all recyclable waste generated during construction. Recycling bins are located in the industrial area for cardboard, white paper, mixed paper and clean wood. Aluminum, glass, and plastic may be turned in at the recycling center located on Lot 741. Scrap metal, waste oil, and ferrous materials may be recycled through the Defense Marketing and Reutilization Organization (DRMO). Additional information about recycling efforts may be directed to the CEIE Office of Recycling.
- d. The contractor shall not place non-recyclable waste refuse into designated and labeled recycling bins located throughout the base.
- e. Any requirement for compost or humus for landscaping purposes must utilize the material generated at Travis AFB, Lot 741 if available. If sufficient supply does not exist, local vendors may be utilized to supplement material requirements. The contractor shall submit proposal based on commercial cost of compost or humus.

1.30.4 Affirmative Procurement

All EPA guideline item purchases must be in accordance with Engineering Technical Letter 00-1.

1.30.5 Air Quality

- a. Contractors shall obtain the necessary air permits for their own equipment (emission sources) and provide Natural Resources Management, 60 CES/CEAN, with a copy of the permits for regulatory inspections.
 - b. Contractors shall coordinate with Natural Resources Management, 60 CES/CEAN, prior to installing any new stationary source or modifying an existing permitted emission source, (i.e. aircraft engine test cells, boilers, power generators, incinerators, paint/fiberglass spray booths, bead blasting booths, underground/aboveground organic liquid storage tanks, oil water separators, open burning, aeration of contaminated soil, removal of underground/aboveground storage tanks) or use of any material regulated by the Bay Area Air Quality Management District.
 - c. Contractors shall coordinate and obtain the necessary air permits from regulatory agencies for any new or modified source. Copies of original permits shall be sent directly to Natural Resources Management, 60 CES/CEIE. Natural Resources Management, 60 CES/CEIE, will keep original copies and make necessary copies for contractors when permits arrive.
 - d. Contractors are responsible for ensuring environmental compliance with the federal, state and local air district requirements.
- #### 1.30.6 Building Demolition, Asbestos, Lead, PCB (Polychlorinated Biphenyl)
- a. Contractors must comply with Travis AFB Instruction 32-109 paragraphs 3.6 through 3.17.1 before demolition starts and paragraph 4.10.1 and all of section 5 when demolition is complete.
 - b. Buildings shall not be demolished without prior coordination with Natural Resources Management, 60 CES/CEIE.

10/17/19

- c. Buildings shall not be demolished or renovated without prior surveys for asbestos materials, lead base paint, PCB and other hazardous materials.
- d. Contractors shall provide Natural Resources Management, 60 CES/CEIE, with a copy of their asbestos demolition notification form with assigned job number at least 10 working days in advance of any planned demolition.
- e. Any asbestos removal which takes place indoors occupied by DOD employees must have third party clearance samples reviewed by 60 AMDS/SGPB.

1.30.7 Hazardous Materials and Hazardous Wastes Handling

- a. Contractors are responsible for any hazardous materials (HM) and hazardous wastes (HW) used or stored on-base, to include proper handling, labeling, packaging, storage, transport and disposal in accordance with all applicable federal, state, local, and Travis AFB regulations.
- b. Contractors are responsible for the analysis, characterization and identification of hazardous wastes generated by their operation. Characterization shall be in accordance with Title 22 California code of regulations and reviewed by Natural Resources Management, 60 CES/CEIE.
- c. HW treatment is not allowed on-site without approval and oversight from Natural Resources Management, 60 CES/CEIE. HW treatment permits from the California Environmental Protection Agency, Department of Toxic Substances Control are required in all cases.
- d. Contractors are responsible for ensuring compliance with Section 3.5 of the Environmental General Requirements (01 56 00) when they bring any aboveground storage tank to the base for contractor use.
- e. Contractors are responsible for spills occurring on their sites or caused by their operations. Report spills beyond contractor ability to contain and clean-up to the Base Fire Department, 424-4911 immediately. Report any spill impacting soil, water or utility to the Fire Department at 424-4911 immediately. Clean up spills completely and promptly.
- f. Contractors must be familiar with both federal and state hazardous waste regulations. California regulations are at times more stringent than federal regulations. Some examples are the regulations dealing with used oil, used antifreeze, used batteries, and used tires. Though classified as hazardous wastes, these items can and should be disposed of through a certified recycler, rather than disposed of as a hazardous waste. Another example is the difference in the definition of an empty container. The federal definition allows three percent of the product to remain in the container. In California "empty" means all material must be removed from the container. Empty containers must be labeled as empty with the date clearly marked on the container. An empty container must be managed as hazardous waste or refilled with the same product within one year of the date it is identified as empty.
- g. Contractors are subject to Solano County Health Department, California Department Of Toxic Substances Control, Federal EPA, Travis Installation Management Flight, 60 CES/CEI, and 60 AMDS/SGPB audits while working on Travis AFB.
- h. Polychlorinated Biphenyls (PCBs)

10/17/19

1. Contractors are responsible for properly managing PCBs and waste generated from PCB contaminated materials including light ballast's. Proper management includes but is not limited to handling, marking, labeling, packaging, transporting, and disposing of PCBs. When managing PCBs, the contractor must follow federal, state, and local standards. The Code of Federal Regulations (CFR) outlines procedures for handling PCBs above 50 parts per million (ppm). California also regulates PCBs as hazardous waste above five ppm.
2. Because PCBs are an extremely toxic material, contractors shall ensure measures are in-place to prevent injury to personnel, accidental releases, and environmental contamination. Spilled material must be cleaned-up promptly and reported to Natural Resources Management, 60 CES/CEIE. Waste PCB material can not remain on-site for more than 90 days. While in storage, contractors will comply with all applicable requirements that govern PCB hazardous waste management. A representative from Natural Resources Management, 60 CES/CEAN, must sign all manifests for PCBs destined for disposal. The contractor must provide laboratory analysis for all manifested PCBs.

1.30.8 Hazardous and Non-Hazardous Wastes Manifesting

- a. Documentation: Prior to removing transporting or disposing of any hazardous or non hazardous waste from the base (excluding soil which is managed under Section 1556 of this specification) the Contractor shall forward hazardous waste manifests, non-hazardous waste data forms, land disposal restrictions, waste profiles, laboratory analyses, and/or material safety data sheets to Natural Resources Management, 60 CES/CEIE, for review and/or signature. All documents must be correctly and completely filled out by the Contractor before contacting Natural Resources Management, 60 CES/CEIE, for review and signature. All records required for hazardous waste clean up, removal, packaging, waste profiling, transportation and disposal will be furnished to Natural Resources Management, 60 CES/CEAN, by the Contractor.
- b. Government-supplied Information: At the Contractor's request Natural Resources Management, 60 CES/CEIE, will provide the base's mailing address, telephone number, appropriate US EPA ID and state generator's ID numbers to be used on all hazardous waste manifests generated at Travis AFB. The contractor shall ensure this information is correctly annotated on each hazardous waste manifest.
- c. Scheduling: The Contractor shall notify the Contracting officer or the appointed contract inspector of the requirement for an inspection when the bin is 40 percent full and again when it is ready to be manifested off-base. Natural Resources Management, 60 CES/CEIE, will provide the contractor with an authorized individual, to review and/or sign hazardous and non-hazardous waste manifests and other supporting documents. Contractors shall notify the government's contracting officer or contract inspector 72 hours in advance to schedule an Environmental Flight, 60 CES/CEIE, review and/or document signature. An appointment may be scheduled with only 24 hours notice if the situation warrants. Individuals requesting reviews or signatures without an appointment may be turned away until the next available time on the schedule.

1.30.9 Water

- a. Wastewater, groundwater and rainwater shall not be discharged to the sanitary sewer system, nor shall wastewater be discharged to the storm sewer system, without approval from the base Environmental Flight, 60 CES/CEAN. Contaminated groundwater and contaminated rainwater shall not be discharged

to the storm water system. Section 1556 contains guidelines for disposing of wastewater.

- b. Discharge of hazardous wastewater is not permitted under any circumstances.
 - c. During the construction phase, contractors are responsible for preventing pollutants, i.e. soil erosion, construction material, petroleum products, chemicals etc., from entering the storm drainage system.
 - d. The Contractor shall use "best management practices" in controlling construction site run-off and erosion, to include proper stockpiling of excavated soils, use of sediment traps, proper storage of material, inspection, monitoring, etc.
 - e. Contractors shall not discharge anything into the storm drainage system.
 - f. Permitted construction site (NPDES associated with construction activities) contractors are responsible for ensuring compliance with the general permit requirements, such as annual reports, monitoring, etc. Notices Of Intent (NOI's) shall be submitted to Natural Resources Management, 60 CES/CEAN, 30 days prior to construction start.
 - g. Water/wastewater discharges to storm, sanitary sewer systems and Tower Area Removal Action (TARA) project.
1. Requirements for sanitary sewer discharges: Provide the Compliance Section of Natural Resources Management, 60 CES/CEANC, and 60 AMDS/SGPB copies of all analytical results of all water type prior to discharge.

(a) Groundwater Discharge:

- (1) Approval and fee payment to regulatory agency are required for ground water discharge to sanitary sewer system. The approval/regulatory agency is the Fairfield Suisun Sewer District (FSSD) Phone : (707) 429-8930
 - (2) For each groundwater discharge approved by FSSD to Travis AFB's sanitary sewer system, the contractor shall notify Natural Resources Management, 60 CES/CEAN, prior to the discharge by sending:
 - a. a. Copy of disposal request including the analytical result
 - b. b. Copy of Discharge Permit or copy of the invoice (quantity)
 - c. c. Point of discharge
 - d. d. Date of discharge
 - e. e. Regulator inspection time and date
- (b) Wastewater Discharge:
- (1) Prior approval of wastewater discharges to the sanitary sewer system resulting from, construction/building maintenance activities, such as cleaning fuel pipelines,

hydroblast operations or other short/one time discharges is required by Natural Resources Management, 60 CES/CEAN.

(2) All wastewater discharges shall be in accordance with the Fairfield-Suisun Sewer District permit for Travis Air Force Base and the Local Sewer Ordinance No. 91-1.

(3) The Contractor shall provide all equipment/treatment units such as filtration system, oil/water separator and etc. in treating the wastewater to meet FSSD Ordinance.

(4) The Contractor shall provide documents and analytical reports to support characterization of the wastewater.

2. Requirements for non storm water discharges into storm water system

(a) Groundwater Discharge

(1) A Permit from the Regional Water Quality Control Board is required.

(2) A copy of the permit shall be sent to Natural Resources Management, 60 CES/CEAN.

3. Other Water Discharges

(a) Non-storm water discharges to the storm drainage system as a result of construction activities, such as hydrotesting requires a permit. The regulating agency is:

California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612
Phone: (510) 286-0846

(b) Dischargers shall obtain the permit and meet all permit requirements, such as analytical and permit fees, etc.

(c) The discharge permit form may be obtained from Natural Resources Management, 60 CES/CEAN.

(d) All correspondence to regulating agencies shall be coordinated with Natural Resources Management, 60 CES/CEAN, prior to submittal to the agencies.

4. TARA; the contractor shall obtain written approval from the Installation Restoration Program manager for all water discharges to the TARA project.

(a) Sources of Water Allowed

- (1) Purging groundwater from monitoring wells
- (2) Decontamination activities associated with sampling at Travis Air Force Base

(3) Small quantity of dewatering water, maximum 3000 gallons per day at 60 gallons per minute.

(b) Conditions For Discharging Water

(1) Point of contact is the Installation Restoration Program Manager, in Natural Resources Management, 60 CES/CEAN.

(2) Water with dissolved fuels and dissolved halogenated hydrocarbon solvents only. No free product (pure fuel, solvent, sheen) allowed.

(3) No more than 1,000 gallons of water shall be added in any 5-hour period at a maximum flow of 60 gallons per minute.

1.30.10 Spills

a. The Contractor shall take immediate containment actions as necessary to minimize effects of any spill or leak. The Contractor shall be responsible for all costs involved in the containment, reporting, clean up and disposal of any chemical leaks or spills. Cleanup shall be in accordance with applicable Federal, state, and local laws and regulations at no cost to the Government.

b. If a spill occurs on the installation, the Contractor shall immediately report spills beyond contractor ability to contain and clean-up to the Base Fire Department, 424-4911. Report any spill impacting soil, water or utility to the Base Fire Department at 424-4911 immediately. The Contractor shall not contact or communicate with any outside agency regarding spills occurring on Base. Off the installation, the Contractor shall report spills related to project activities to the Department of Transportation National Response Center (NRC), the Installation Environmental Coordinator, and the Contracting Officer immediately following discovery and shall also comply with applicable state requirements. A written follow-up shall be submitted to the Contracting Officer, not later than 7 days after the initial report. The written report shall be in narrative form and as a minimum include the following:

1. Description of the material spilled (including identity, quantity, and manifest number).
2. Whether amount spilled is EPA/state reportable and when and to whom it was reported.
3. Exact time and location of spill, including description of the area involved.
4. Receiving stream or waters.
5. Cause of incident and equipment and personnel involved.
6. Injuries or property damage.
7. Duration of discharge.
8. Containment procedures initiated.

9. Summary of any communications Contractor has with press, agencies, or Government officials other than Inspector, Engineer and Contracting Officer.

10. Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.

1.30.11 Environmental Impact Analysis Program

h. All construction phases of the project shall comply with 32 CFR 989, "Environmental Impact Analysis Program (EIAP)."

1. The project proponent shall submit an AF Form 813 to the EIAP Program Manager at 60 CES/CEIE, to start the environmental impact analysis process well in advance before the construction contract is awarded.

2. The contractor shall attach a signed AF Form 813 to an AF IMT Form 103, "Excavation Permit" or "Dig Permit" as it is commonly called and submit it to CE Customer Service, 60 CES/CEOER. A signed AF Form 813 can be obtained from the EIAP Program Manager after it is processed in advance of the contract award.

1.30.12 Natural and Cultural Resources Management

The contractor shall comply with Travis Air Force Base's "Integrated Natural Resources Management Plan" and "Integrated Cultural Management Plan."

1.31 TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY - DD FORM 1354

Thirty days prior to beneficial occupancy date (BOD), the contractor will submit to the Contracting Officer a completed DD Form 1354, Transfer and Acceptance of Military Real Property, in addition to a Real Property Checklist (next three pages). The DD Form 1354 may be obtained at the following website:

<http://www.dtic.mil/whs/directives/infomgt/forms/ddforms1000-1499.htm>

Instructions for completing the DD Form 1354 can be found at

<http://www.hnd.usace.army.mil/techinfo/UFC/UFC1-300-08/UFC1-300-08.pdf>

REAL PROPERTY CHECKLIST – Revised 13 Dec 2012

Complete Checklist then transfer info onto DD Form 1354 and submit both to Real Property

XDAT NO. _____ BLDG # _____
 PROJECT TITLE _____
 DATE OF BENEFICIAL OCCUPANCY _____
 TOTAL COST OF PROJECT _____
 NAME & PH# OF BASE PROJECT MANAGER (Do not use contractor's information) _____

BUILDING DIMENSIONS:

Building Size SF _____
 Length LF _____
 Width LF _____
 Height LF _____
 Number of Floors _____
 Primary Construction Material _____
(i.e concrete, wood, steel frame, asphalt)

SYSTEMS AND PLANTS INSTALLED IN A BUILDING:

Please use the building number when adding the Systems and Plants below, as they are considered part of the building and don't have their own facility number. The costs of these items SHOULD BE INCLUDED in the total cost of the building (line item #1, column 18). Unit of Measurement (UOM), is still required for each of the items.

Category Code & Nomenclature

880-211	Closed Head Auto Sprinklers	SF	_____	HD	_____
880-212	Open Head Deluge system	SF	_____	HD	_____
880-221	Auto Fire Detection System	SF	_____	EA	_____
880-222	Manual Fire Alarm System	EA	_____		
880-231	CO2 Fire System	EA	_____		
880-232	Foam Fire System	EA	_____		
880-233	Other Fire System	EA	_____		
880-234	Halon 1301 Fire System	EA	_____		
872-841	Security Alarm System	EA	_____		
890-125	A/C Plt less than 5 TR	TR	_____	SF	_____
890-121	A/C Plt 5 to 25 TR	TR	_____		
826-122	A/C Plt 25 to 100 TR	TR	_____		
826-123	A/C Plt over 100 TR	TR	_____		
890-272	EMCS Field Equip	EA	_____		
821-115	Heating Plt 750/3500	MB	_____		
821-116	Heating Plt over 3500	MB	_____		
811-147	Elec E/Pwr Gen Plt	KW	_____		
890-161	Support Structure	EA	_____		

(Support Structure is replacement for Utility Vault / Cat Code 890-187)

OUTSIDE INFRASTRUCTURE SERVING BUILDING:

<u>Facility #</u>	<u>Category Code & Nomenclature</u>		
1806	842-245 Water Mains	LF _____	Cost _____
1805	822-245 Hot Water Mains	LF _____	Cost _____
1858	822-265 Steam Heat Mains	LF _____	Cost _____
1857	890-144 Cmprs Air Distr	LF _____	Cost _____
1856	824-464 Gas Mains	LF _____	Cost _____
1829	832-266 San Sewage Mains	LF _____	Cost _____
1838	812-223 Primary Dist Line OH	LF _____	Cost _____
1839	812-225 Primary Dist Line UG	LF _____	Cost _____
1834	812-224 Sec Dist Line OH	LF _____	Cost _____
1835	812-226 Sec Dist Line UG	LF _____	Cost _____
1808	843-314 Fire Protect Water Main	LF _____	Cost _____

RELATED FACILITIES

<u>Facility #</u>	<u>Category Code & Nomenclature</u>		
1929	872-245 Fence, Boundary	LF _____	Cost _____
1906	872-248 Fence, Interior	LF _____	Cost _____
1930	872-247 Fence, Scty/Veh Bar	LF _____	Cost _____
1830	871-183 Storm Drain	LF _____	Cost _____
1701	851-143 Curbs and Gutters	LF _____	Cost _____
1702	851-145 Driveway	SY _____	Cost _____
1703	852-262 Veh Parking N/Org	SY _____	Cost _____
1707	851-147 Road	SY _____ LF _____	Cost _____
1706	852-289 Sidewalk	SY _____ LF _____	Cost _____
1807	843-315 Fire Hydrants	EA _____	Cost _____
1859	135-583 Telephone Duct Fac	MI _____	Cost _____
1860	135-586 Telephone Pole Fac	MI _____	Cost _____
1923	812-928 Traffic Lights	EA _____	Cost _____
1847	812-926 Exterior Lighting (Non-TWCF street or parking area)	EA _____	Cost _____
1845	812-926 Exterior Lighting (TWCF street or parking area)	EA _____	Cost _____

10/17/19

RECREATION FACILITIES: *(New Recreation Facilities will require a facility number assigned to it which will be available upon request from Real Property)*

750-178	Athletic Fld, Softball	AC	EA	Cost
750-172	Athlt Fld, Baseball	AC	EA	Cost
750-175	Athlt Fld, FB/Soc	AC	EA	Cost
750-177	Athlt Fld, Track	AC	EA	Cost
750-347	Court, Tennis	SF	EA	Cost
750-349	Crt, Rectn	SF	EA	Cost
750-581	Misc O/Rectn Felty	SF	EA	Cost
750-371	O/D Rectn Pavilion	SF	EA	Cost
750-811	Swimmers Bath Hse	SF	EA	Cost

**** The Catcodes and Nomenclature listed above are the ones most commonly used. If installing systems, utilities or other facilities not listed above, please refer the Real Property Category Code listing and annotate additions on the DD 1354.**

1.32 UTILITIES PRIVATIZATION

1.32.1 Electrical Distribution System

- a. Overview. The electrical distribution utility system at Travis AFB is owned and operated by City Light & Power ("system owner") as part of the USAF utilities privatization (UP) program. The electrical distribution system includes but is not limited to all electrical manholes and lids, hand holes, access points, overhead distribution poles, distribution lines, transformers, switchboxes and any other connecting facility.
- b. Access. In order to gain access to the electrical distribution system, permission must be granted by the system owner in writing prior to the contract start date. Access to the electrical distribution system includes but is not limited to: The uncovering of manholes and hand holes or any other access points, the capping of or tapping into service feeders, transformers, switchboxes and any other connecting facilities. For questions regarding access to these systems the system owner can be contacted at:

City Light & Power,
Inc.
260 Hangar Ave.
Travis AFB, CA 94535
bge@clpinc.com
- c. Permanent connections, and disconnections. The contractor is responsible for contacting, coordinating, compensating, and establishing a contract with the system owner for new installations, or for the removal of connecting facilities. A point of demarcation is to be identified by the Government and the requested scope of work will be performed by the system owner up to that point of demarcation.

Permanent connections to the electrical distribution system are to

10/17/19

include but are not limited to: The disconnection from, the capping off of, or otherwise altering or splicing of a service feeder. The addition and the removal of transformers, switchgear, panelboards, and other facilities connected to the distribution system.

d. Modifications to existing infrastructure. The contractor is responsible for contracting, coordinating, compensating, and establishing a contract with the system owner to construct new installations, or for the removal of existing infrastructure. A point of demarcation is to be identified by the Government and the requested scope of work will be performed by the system owner up to that point of demarcation.

Modifications to existing infrastructure are to include but are not limited by: The raising/lowering of manholes and hand holes or other adjustment of their location. The removal or adjustment of light and utility poles.

e. Contract between system owner and Contractor. The system owner will develop the SOW and a cost proposal for the project. Once the SOW and proposal are agreed upon, the Contractor shall sign the proposal and issue a purchase order to the system owner. System owner is operating under the UP electrical contract and is not obligated by the requirements, terms or conditions that were included in the contract with the Government. Furthermore, the system owner is not responsible for submittal requirements regarding materials, schedules, insurance, design drawings, certified payroll, safety plans, or testing results. Additionally, the system owner is not a subcontractor to the Contractor and will not sign a subcontract agreement.

1.32.2 Water Utility Distribution System

a. Overview. The exterior water distribution utility system at Travis AFB is owned and operated by California Water Service Company (Cal Water) as part of the USAF utilities privatization (UP) program. The water distribution system includes, but is not limited to, exterior potable water distribution pipes, fire hydrants, exterior backflow preventers, potable water wells, exterior potable water valves, and potable water tanks. The Installation owns and operates the potable water assets located inside buildings.

b. Coordination with Cal Water. In order to gain access to the water distribution system, permission must be granted by Cal Water in writing prior to the contract start date. Access to the water distribution system includes, but is not limited to: uncovering of valve vaults/boxes, shutting off or opening valves. For questions regarding the water distribution system, Cal Water can be reached at:

California Water Service Company
867 Ellis Dr
Travis AFB, CA 94535
cthacker@calwater.com

Cal Water is operating under the water UP contract and is not obligated by the requirements, terms, or conditions that were included in the Contractor's contract with the Government. Only DLA Energy has the authority to direct Cal Water. Furthermore, Cal Water is not responsible for the Contractor's submittal requirements regarding

10/17/19

materials, schedules, insurance, design drawings, certified payroll, safety plans, or testing results. The Contractor shall document any meetings, discussion, or other communication with Cal Water, and provide a copy to the Contracting Officer and Cal Water's COR.

c. Rough Order of Magnitude (ROM) Estimates. For project planning, the Contractor may request a ROM estimate from Cal Water. The ROM estimate is not binding. The Contractor should provide the following information for Cal Water to prepare the ROM estimate: number of tie-ins; types of service (e.g. fire, domestic); proposed connection points; linear feet of pipe; estimated daily water demand in gallons per day, estimated peak water demand in gallons per hour, number of people to be served, total fixture count, fire suppression demand. Cal Water requires two weeks to prepare ROM estimate.

d. Modifications to Existing Infrastructure

Unless otherwise provided in writing from Cal Water, only Cal Water and Cal Water's subcontractors are authorized to modify the existing infrastructure. Modifications to existing infrastructure include, but are not limited to: repairs, raising or lowering of service lines and appurtenances, or other adjustment of their location; installation of valves and appurtenances, making new connections; disconnection or capping of service lines; removal or abandonment of appurtenances. The Contractor shall be responsible for identifying modifications to the existing system and notifying the Contracting Officer in writing. The Contractor shall be responsible for contacting, coordinating, establishing an agreement with, and compensating Cal Water for any modifications to Cal Water's existing infrastructure. Additionally, Cal Water is not a subcontractor to the Contractor and will not sign a subcontract.

e. Damages and Repairs. The Contractor shall immediately notify the Contracting Officer, Cal Water, and Cal Water's COR of any damages caused by the Contractor to Cal Water's property. The Contractor shall be responsible for the cost to repair damages. Unless otherwise provided in writing from Cal Water, Cal Water will complete the repairs and bill the responsible party.

f. Connections and Disconnections. Any temporary or permanent connections and/or disconnections to be completed by Cal Water must be approved in advance by DLA Energy. DLA Energy's approval process is briefly outlined below:

1. The Contracting Officer will forward the requirements to Cal Water's COR, who will then forward to DLA Energy.
2. DLA Energy will request a proposal from Cal Water.
3. DLA Energy will evaluate Cal Water's proposal.
4. DLA Energy and Cal Water will conduct negotiations.
5. Once all items of negotiation have been finalized, DLA Energy will issue a modification to Cal Water's contract to authorize the connection(s) or disconnection(s).

Once DLA Energy's approval is granted, the Government will identify a point of demarcation (POD). The Contractor shall be responsible for work downstream of the POD. Any infrastructure that is intended or will connect to Cal Water's existing asset must comply with Cal

10/17/19
Water's specifications (Tab 1, Tab 2, Tab 3, Tab 4). Cal Water shall have the right to reasonably inspect the Contractor's construction of system components for which Cal Water will take ownership.

g. Temporary Connections. The Contractor shall provide the following information regarding any temporary service connections to the Contracting Officer:

1. Name of temporary customer
2. Cost
3. Date to be installed
4. Expected duration of connection
5. Description of connection, including route and type of material
6. Point of contact, title, and phone number

h. At least ten (10) working days prior to a requested outage the Contractor shall request, and the Base Civil Engineer shall approve, all temporary outages of any utility services required for the performance of work under this contract. No outage will be performed without prior written approval from 60 CES.

-----End of Section-----

FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AIR FORCE BASE, CA

35% FINAL DESIGN SUBMITTAL
SPECIFICATIONS
DESIGN-BUILD

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 00 00

JANUARY 14, 2022

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 10 10

SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA

11/21

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 STRUCTURAL DESIGN
 - 1.2.1 GENERAL
 - 1.2.2 ENGINEER OF RECORD
 - 1.2.3 GENERAL DESIGN CRITERIA
 - 1.2.4 DESIGN CRITERIA
 - 1.2.4.1 Serviceability
 - 1.2.4.2 Foundation Settlement Strength
 - 1.2.4.3 Vertical Deflection of Suspended Horizontal Framing Members
 - 1.2.4.4 Horizontal Deflection (drift)
 - 1.2.4.5 Construction Tolerances
 - 1.2.5 Durability - Time Reliability
 - 1.2.6 DESIGN LOADS
 - 1.2.6.1 Dead Loads
 - 1.2.6.2 Roof Live Loads
 - 1.2.6.3 Live Loads
 - 1.2.6.4 Snow Loads
 - 1.2.6.5 Wind Loads
 - 1.2.6.6 Seismic Loads
 - 1.2.6.7 AT/FP Loads
 - 1.2.7 CONCRETE DESIGN
 - 1.2.7.1 General
 - 1.2.7.2 Testing
 - 1.2.7.3 Forms
 - 1.2.7.4 Reinforcing Materials
 - 1.2.7.5 Concrete Mixing Operation
 - 1.2.8 Foundation Design
 - 1.2.8.1 General
 - 1.2.8.2 Design Loads
 - 1.2.8.3 Slabs-On-Grade
 - 1.2.8.4 Slab-On-Grade Control Joints
 - 1.2.8.5 Stoops, Ramps and Porches
 - 1.2.8.6 Equipment Pads
 - 1.2.9 Steel
 - 1.2.9.1 Steel Material
 - 1.2.9.2 Steel Deck
 - 1.2.10 Masonry
- 1.3 ARCHITECTURAL DESIGN
 - 1.3.1 Scope
 - 1.3.1.1 Floor Plans
 - 1.3.1.2 Elevations
 - 1.3.1.3 Asbestos
 - 1.3.2 External Activities
 - 1.3.3 Internal Activities

- 1.3.4 Space Allocations
 - 1.3.5 Fire Safety
 - 1.3.6 Security
 - 1.3.7 Acoustical Design
 - 1.3.8 Gutter and Downspouts
 - 1.3.9 Building Envelope Insulation and Sealing
 - 1.3.9.1 General
 - 1.3.9.2 Sealant
 - 1.3.10 Envelope Openings
 - 1.3.10.1 Exterior Doors
 - 1.3.10.1.1 Acoustically Rated Doors
 - 1.3.10.2 Door Frames
 - 1.3.10.3 Exterior Storefront
 - 1.3.10.4 Exterior Windows
 - 1.3.10.5 Insulated Glass Unit
 - 1.3.10.6 Polycarbonate Sheet Glazing
 - 1.3.11 Miscellaneous Metal
 - 1.3.11.1 Sheet Metalwork
 - 1.3.11.2 Seismic Joint Covers
 - 1.3.12 Air Barrier Requirements
 - 1.3.12.1 Air Barrier Performance
 - 1.3.12.2 Air Barrier Joints
 - 1.3.12.3 Air Barrier Support
 - 1.3.12.4 Air Barrier Penetrations
 - 1.3.12.5 Air Barrier Service Life
 - 1.3.12.6 Air Intakes
 - 1.3.12.7 Compartmentalize Spaces Under Negative Pressure
 - 1.3.12.8 Inspection and Testing
 - 1.3.13 Interior Doors
 - 1.3.13.1 Interior Hollow Metal Doors
 - 1.3.13.2 Hollow Metal Frames
 - 1.3.13.3 Acoustically Rated Doors
 - 1.3.13.4 Vision Lites
 - 1.3.13.5 Electrical Room Doors
 - 1.3.14 Door Hardware
 - 1.3.14.1 General
 - 1.3.14.2 Hinges
 - 1.3.14.3 Non-Mortise Locks and Latches
 - 1.3.14.4 Bored Locks and Latches
 - 1.3.14.5 Mechanical Push Button Locks
 - 1.3.14.6 Exit Devices
 - 1.3.14.7 Cores and Cylinders
 - 1.3.14.8 Closers
 - 1.3.14.9 Finishes and Materials
 - 1.3.14.10 Kick-Plates
 - 1.3.15 Insulation and Sealants
 - 1.3.15.1 Blanket Insulation
 - 1.3.15.1.1 Sound Attenuation Fire Blankets (SAFB)
 - 1.3.15.2 Caulking and Sealants
 - 1.3.15.2.1 Acoustical Sealants
 - 1.3.16 Cabinets and Casework
 - 1.3.16.1 General
 - 1.3.16.2 Cabinet Finish
 - 1.3.16.3 Cabinet Guides
 - 1.3.16.4 Cabinet hardware
 - 1.3.16.5 Break-Room Cabinetry
 - 1.3.16.6 Toilet Accessories
 - 1.3.16.7 Hand Sanitizer Dispenser
- 1.4 INTERIORS

- 1.4.1 Interior Partitions
 - 1.4.1.1 Non-Load Bearing Metal Framing and Furring
 - 1.4.1.2 Load Bearing Metal Framing and Furring
 - 1.4.1.3 Gypsum Wallboard
 - 1.4.1.3.1 Fire and Mold Resistant
 - 1.4.1.3.2 Acoustically Enhanced
 - 1.4.1.3.3 Joint Treatments
 - 1.4.1.3.4 Screws
 - 1.4.1.3.5 Accessories
 - 1.4.2 Cement Board/Cementitious Backer Unit
 - 1.4.2.1 Joint Reinforcement
 - 1.4.2.2 Fastener
 - 1.4.3 Ceilings
 - 1.4.3.1 Gypsum Board Ceiling System
 - 1.4.3.2 Acoustical Ceiling System
 - 1.4.3.3 Exposed Structural
- 1.5 FIRE PROTECTION DESIGN
 - 1.5.1 GENERAL
 - 1.5.1.1 Qualified Fire Protection Engineer (QFPE)
 - 1.5.1.2 Sprinkler System Specialist
 - 1.5.1.3 Design Documentation
 - 1.5.1.4 Hydraulic Calculation
 - 1.5.2 Occupancy Classification
 - 1.5.3 Sprinkler Density Requirements
 - 1.5.4 Design Area
 - 1.5.4.1 Increased Design Area
 - 1.5.5 Hose Demand
 - 1.5.6 Water Supply
 - 1.5.7 Underground Equipment Requirements
 - 1.5.8 Aboveground Equipment Requirements
 - 1.5.8.1 Backflow Prevention Assembly
 - 1.5.8.2 Check Valves
 - 1.5.8.3 Local Alarm
 - 1.5.8.4 Valves
 - 1.5.8.5 Flow and Tamper Switches
 - 1.5.8.6 Fire Department Connection
 - 1.5.8.7 Sprinkler Pipe
 - 1.5.8.8 Pipe Reducers
 - 1.5.8.9 Sprinklers
 - 1.5.8.10 Installation Requirements
 - 1.5.8.11 Sprinkler System
 - 1.5.8.12 Main Drains
 - 1.5.8.13 Auxiliary Drains
 - 1.5.8.14 Witnessing Tests
- 1.6 FIRE ALARM AND MASS NOTIFICATION SYSTEMS
 - 1.6.1 Fire Alarm Equipment
 - 1.6.2 Fire Alarm System
 - 1.6.2.1 Initiating and Indicating Circuits
 - 1.6.2.2 User Coordination
 - 1.6.2.3 Annunciator Panel
 - 1.6.2.4 Minimum Designer Qualifications
 - 1.6.2.5 Submittals
 - 1.6.2.6 Testing
 - 1.6.2.7 Preliminary Tests
 - 1.6.2.8 Acceptance Test
 - 1.6.2.9 Field Training
 - 1.6.2.10 Fire Alarm Reporting Zones and Zone Schedule
 - 1.6.2.11 Closure of Fire-Rated Openings
 - 1.6.2.12 Fire Alarm and Detection System Authority Having

- Jurisdiction
 - 1.6.2.13 Fire Alarm System Disconnecting Means
 - 1.6.3 Mass Notification System
- 1.7 MECHANICAL DESIGN
 - 1.7.1 Design Submittal
 - 1.7.2 Design Analysis
 - 1.7.3 Calculations
 - 1.7.4 Drawings
 - 1.7.5 Equipment Catalogue Sheets
 - 1.7.6 Seismic Protection
 - 1.7.7 Equipment
 - 1.7.7.1 Ancillary Equipment
 - 1.7.8 Concrete Pads
 - 1.7.9 Expansion Joints/Anchors/Guides
 - 1.7.10 Insulation
 - 1.7.11 Elevation
 - 1.7.12 Testing, Adjusting, and Balancing (TAB)
 - 1.7.13 Commissioning
 - 1.7.14 Training
 - 1.7.15 Access Panels
- 1.8 HVAC DESIGN
 - 1.8.1 Facility Operational Hours
 - 1.8.2 Fuel Sources
 - 1.8.3 Site Criteria
 - 1.8.4 Outside Design Temperature Requirements
 - 1.8.5 Indoor Design Temperatures
 - 1.8.6 Summer Indoor Design for Mechanical and Electrical Rooms
 - 1.8.7 Energy Conservation
 - 1.8.8 Life Cycle Cost Analysis
 - 1.8.9 Cooling Systems
 - 1.8.9.1 Cooling System Sizing Requirements
 - 1.8.9.2 Equipment Heat Release Data, Personnel, and Lighting Loads
 - 1.8.9.3 Basis of Design (cooling and air systems)
 - 1.8.10 Heating Systems
 - 1.8.10.1 Heating System Selection Criteria
 - 1.8.10.2 Personnel Loads
 - 1.8.10.3 Equipment Loads
 - 1.8.10.4 Basis of Design (heating design)
 - 1.8.11 Outdoor Air Requirements for Ventilation
 - 1.8.12 Exterior Ground Mounted Equipment
 - 1.8.13 Roof Mounted Equipment
 - 1.8.13.1 Ductwork and Piping
 - 1.8.14 Antiterrorism and Force Protection
 - 1.8.15 Pressurization
 - 1.8.15.1 Building Pressurization
 - 1.8.15.2 Space Pressurization
 - 1.8.16 Sound and Vibration Control
 - 1.8.17 Duct System Design
 - 1.8.18 Louvers
 - 1.8.19 Volume Dampers
 - 1.8.20 Air Filters
 - 1.8.21 Fire Dampers
 - 1.8.22 Diffusers, Grilles and Registers
 - 1.8.23 HVAC System Selection and Design
 - 1.8.23.1 Administration Areas, Break Rooms, Offices, Conference Rooms, Circulation Areas, and Similar Occupancies
 - 1.8.23.2 Telecommunications Room
 - 1.8.23.3 Electrical Rooms
 - 1.8.23.4 Mechanical Rooms

- 1.8.23.5 Bathrooms
- 1.8.23.6 Seismic Bracing
- 1.8.24 Equipment Efficiency
- 1.8.25 HVAC Controls
- 1.8.25.1 Control System
- 1.8.25.2 Building Control Systems
- 1.8.25.3 Point Schedule
- 1.8.25.3.1 Pulse Initiators
- 1.9 PLUMBING DESIGN
 - 1.9.1 Materials
 - 1.9.2 Vibration/Noise Isolation
 - 1.9.3 Water
 - 1.9.3.1 Domestic Water
 - 1.9.3.1.1 Domestic Water Supply Pressure
 - 1.9.3.1.2 Insufficient Water Pressure
 - 1.9.3.2 Domestic Water Supply
 - 1.9.3.3 Water Softener
 - 1.9.3.4 Domestic Water Piping System Requirements
 - 1.9.3.5 Domestic Water Heating Systems
 - 1.9.3.6 Diaphragm Expansion Tank
 - 1.9.3.7 Hose Faucets
 - 1.9.3.8 Landscape Irrigation Connection
 - 1.9.3.9 Backflow Prevention Devices
 - 1.9.3.10 Cold Water Service for Appliances
 - 1.9.3.11 Maximum Velocity
 - 1.9.4 Domestic Waste
 - 1.9.4.1 Domestic Waste Piping
 - 1.9.4.2 Floor Drains
 - 1.9.4.3 Traps
 - 1.9.4.4 Stops
 - 1.9.4.5 Cleanouts
 - 1.9.4.6 Waste Connections for Appliances
 - 1.9.4.7 Condensate Drain Piping and Insulation
 - 1.9.4.8 Cross Tees
 - 1.9.4.9 Vent Stacks
 - 1.9.5 Plumbing Fixtures
 - 1.9.5.1 Water Closets
 - 1.9.5.2 Urinals
 - 1.9.5.3 Service (Mop) Sinks
 - 1.9.5.4 Lavatories
 - 1.9.5.5 Kitchen Sink
 - 1.9.5.6 Drinking-Water Coolers with Bottle Filling Station
 - 1.9.6 Appliances
 - 1.9.6.1 Sink Food Disposal
 - 1.9.6.2 Refrigerator (NIC)
 - 1.9.6.3 Ice Machine (NIC)
 - 1.9.6.4 Valves
 - 1.9.7 Thermostatic Mixing Valves
- 1.10 ELECTRICAL DESIGN
 - 1.10.1 GENERAL
 - 1.10.1.1 Outage Coordination
 - 1.10.1.2 UL Label
 - 1.10.1.3 PCB Standards
 - 1.10.1.4 New Equipment
 - 1.10.1.4.1 Capacity
 - 1.10.1.4.2 Short Circuit
 - 1.10.1.4.3 Arc Flash
 - 1.10.1.5 Warning Signs and Safety Labels
 - 1.10.1.6 Nameplates and Identification Tags

- 1.10.2 DESIGN REQUIREMENTS
 - 1.10.2.1 Studies and Calculations
 - 1.10.2.1.1 Voltage drop calculations
 - 1.10.2.1.2 Arc flash analysis
 - 1.10.2.1.3 Lighting calculations
 - 1.10.2.2 Drawings and Documents
- 1.10.3 EXTERIOR ELECTRICAL
 - 1.10.3.1 General Requirements
 - 1.10.3.1.1 Labeling
 - 1.10.3.1.2 Available Fault Current
 - 1.10.3.1.3 Fault and Overcurrent Protection
 - 1.10.3.1.4 Equipment Grounding
 - 1.10.4 Lightning Protection
 - 1.10.5 Grounding and Bonding
 - 1.10.6 Exterior Lighting
 - 1.10.6.1 Exterior Lighting Levels
 - 1.10.6.2 Exterior Lighting Fixtures
 - 1.10.6.3 Exterior Lighting Coordination
 - 1.10.6.4 Controls and Wiring
 - 1.10.7 Exterior Receptacles
 - 1.10.8 LV Enclosures
 - 1.10.9 INTERIOR ELECTRICAL
 - 1.10.9.1 General
 - 1.10.9.2 Protective Coordination
 - 1.10.9.3 Service Entrance
 - 1.10.9.3.1 Service and Distribution Equipment
 - 1.10.9.3.2 Interior Building Distribution Voltage
 - 1.10.9.4 Panelboard Feeders
 - 1.10.9.5 Panelboards
 - 1.10.9.5.1 Grounding Systems
 - 1.10.9.6 Conduits and Conductors
 - 1.10.9.6.1 Routing
 - 1.10.9.6.2 Wiring Temperature Rating
 - 1.10.9.7 Conduit Stub-Ups
 - 1.10.9.7.1 Conduit Supports
 - 1.10.9.8 Motors
 - 1.10.9.9 Motor Control
 - 1.10.9.10 Branch Circuits, Receptacles and Outlets
 - 1.10.9.10.1 Separate Circuits
 - 1.10.9.10.2 Receptacles
 - 1.10.9.10.3 Ground Fault Current Interrupting (GFCI) Receptacles
 - 1.10.9.10.4 Telecommunication Room Receptacles
 - 1.10.9.10.5 Equipment Power
 - 1.10.9.11 Surge Protection
 - 1.10.9.12 Grounding
 - 1.10.9.13 Interior Lighting
 - 1.10.9.13.1 Light Fixture Quality
 - 1.10.9.13.2 Lighting Illumination Levels
 - 1.10.9.13.3 Fixture Installation
 - 1.10.9.13.4 Fixture Selection Considerations
 - 1.10.9.13.5 Pendant Mounted Fixtures
 - 1.10.9.13.6 Exit and Emergency Lighting
 - 1.10.9.13.7 Lighting Circuiting Requirements
 - 1.10.9.13.8 Light Fixture Sources
 - 1.10.9.13.9 Occupancy Sensors
 - 1.10.9.14 Seismic Considerations
 - 1.10.9.15 Device Body and Cover plate Colors and Labeling
 - 1.10.9.16 Bonding
 - 1.10.9.17 Emergency Power Off

- 1.11 LIFE SAFETY DESIGN
 - 1.11.1 REFERENCES
 - 1.11.2 BUILDING CONSTRUCTION AND HAZARDS
 - 1.11.2.1 Occupancy
 - 1.11.2.2 Hazard
 - 1.11.2.3 Type of Construction
 - 1.11.2.4 Automatic Sprinklers
 - 1.11.2.5 Separation of Occupancies
 - 1.11.3 BUILDING AREA
 - 1.11.4 BUILDING HEIGHT
 - 1.11.5 EXIT REQUIREMENTS
- 1.12 CYBERSECURITY DESIGN
 - 1.12.1 PROJECT SCOPE
 - 1.12.1.1 SITE / CIVIL EXTERIOR
 - 1.12.1.2 FACILITY INTERIOR
 - 1.12.2 REFERENCES
 - 1.12.2.1 P1332 Dormitory Renovations B1332 RFP
 - 1.12.2.2 Building Codes
 - 1.12.2.3 United Facilities Criteria
 - 1.12.2.4 Other Referenced Documents
 - 1.12.3 DESIGN CRITERIA
 - 1.12.4 DESIGN APPROACH

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 10 10

SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA
11/21

PART 1 GENERAL

1.1 REFERENCES

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

ACOUSTICAL SOCIETY OF AMERICA (ASA)

ASA S3.2 (2020) American National Standard Method for Measuring the Intelligibility of Speech Over Communication Systems (ASA 85)

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI 1010 (2002) Self-Contained, Mechanically Refrigerated Drinking-Water Coolers

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA/WDMA/CSA 101/I.S.2/A440 (2017) North American Fenestration Standard/Specification for Windows, Doors, and Skylights

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 36 (2018) High-performance Sequences of Operation for HVAC Systems

ASHRAE 62.1 (2010) Ventilation for Acceptable Indoor Air Quality

ASHRAE 70 (2006; R 2021) Method of Testing the Performance of Air Outlets and Inlets

ASHRAE 90.1 - IP (2013) Energy Standard for Buildings Except Low-Rise Residential Buildings

ASHRAE 135 (2020; Errata 2021) BACnet-A Data Communication Protocol for Building Automation and Control Networks

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A112.6.1M (1997; R 2017) Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use

ASME A112.19.1/CSA B45.2 (2013) Enameled Cast Iron and Enameled Steel Plumbing Fixtures

ASME A112.19.2/CSA B45.1

(2018; ERTA 2018) Standard for Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M

(2019) Standard Specification for Carbon Structural Steel

ASTM A53/A53M

(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A463/A463M

(2015; R 2020; E 2020) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

ASTM A500/A500M

(2021) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A572/A572M

(2021) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

ASTM A615/A615M

(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A653/A653M

(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A706/A706M

(2016) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A992/A992M

(2020) Standard Specification for Structural Steel Shapes

ASTM B221

(2020) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM C90

(2016) Standard Specification for Loadbearing Concrete Masonry Units

ASTM C94/C94M

(2021) Standard Specification for Ready-Mixed Concrete

ASTM C270

(2019a; E 2019) Standard Specification for Mortar for Unit Masonry

ASTM C473

(2019) Standard Test Methods for Physical Testing of Gypsum Panel Products

ASTM C476	(2020) Standard Specification for Grout for Masonry
ASTM C518	(2017) Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C534/C534M	(2020a) Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM C552	(2021) Standard Specification for Cellular Glass Thermal Insulation
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C645	(2014; E 2015) Nonstructural Steel Framing Members
ASTM C665	(2017) Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C734	(2015; R 2019) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C834	(2017) Standard Specification for Latex Sealants
ASTM C919	(2012; R 2017) Standard Practice for Use of Sealants in Acoustical Applications
ASTM C954	(2018) Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C955	(2017) Standard Specification for Cold-Formed Steel Structural Framing Members
ASTM C1002	(2020) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C1047	(2019) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C1325	(2021) Standard Specification for

	Fiber-Mat Reinforced Cementitious Backer Units
ASTM C1396/C1396M	(2017) Standard Specification for Gypsum Board
ASTM D217	(2019b) Standard Test Methods for Cone Penetration of Lubricating Grease
ASTM D1003	(2013) Haze and Luminous Transmittance of Transparent Plastics
ASTM D1056	(2020) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D3273	(2016) Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E136	(2019a) Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C
ASTM E779	(2019) Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827	(2011; R 2017) Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
ASTM E2178	(2021a) Standard Test Method for Air Permeance of Building Materials
ASTM E2190	(2010) Standard Specification for Insulating Glass Unit Performance and Evaluation
	BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)
ANSI/BHMA A156.1	(2021) Butts and Hinges
ANSI/BHMA A156.2	(2017) Bored and Preassembled Locks and Latches
ANSI/BHMA A156.3	(2020) Exit Devices
ANSI/BHMA A156.4	(2013) Door Controls - Closers
ANSI/BHMA A156.5	(2020) Cylinder and Input Devices for Locks
ANSI/BHMA A156.6	(2015) Architectural Door Trim

ANSI/BHMA A156.9	(2020) Cabinet Hardware
ANSI/BHMA A156.13	(2017) Mortise Locks & Latches Series 1000
ANSI/BHMA A156.18	(2020) Materials and Finishes
ANSI/BHMA A156.36	(2010) Auxiliary Locks
IEEE 142	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) (2007; Errata 2014) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
IGMA TB-1200	INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA) (1983; R 2016) Guidelines for Insulating Glass Dimensional Tolerances
ICS 705-1	INTELLIGENCE COMMUNITY STANDARD (ICS) (2010) Physical and Technical Security Standard for Sensitive Compartmented Information Facilities
ICC IBC	INTERNATIONAL CODE COUNCIL (ICC) (2018) International Building Code
NFPA 10	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) (2018; ERTA 1-2 2018) Standard for Portable Fire Extinguishers
NFPA 13	(2019; Errata 19-1; Errata 19-2; TIA 19-1; TIA 19-2; TIA 19-3; TIA 19-4; Errata 19-3; Errata 20-4; TIA 19-5; TIA 19-6) Standard for the Installation of Sprinkler Systems
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 70E	(2021) Standard for Electrical Safety in the Workplace
NFPA 72	(2019; TIA 19-1; ERTA 1 2019; TIA 21-1; ERTA 1 2021) National Fire Alarm and Signaling Code
NFPA 80	(2019) Standard for Fire Doors and Other Opening Protectives
NFPA 90A	(2021) Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 101	(2021) Life Safety Code
NFPA 780	(2020) Standard for the Installation of

Lightning Protection Systems

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST SP 800-53

(2020; Rev 5) Security and Privacy Controls for Information Systems and Organizations

NIST SP 800-82

(2015; Rev 2) Guide to Industrial Control Systems (ICS) Security

PLUMBING AND DRAINAGE INSTITUTE (PDI)

PDI WH 201

(2010) Water Hammer Arresters Standard

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8

(2017) Specifications for Standard Steel Doors and Frames

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-568.2

(2018d) Balanced Twisted-Pair Telecommunications Cabling and Components Standards

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01

(2019; with Change 1, 2020) DoD Building Code

UFC 1-200-02

(2020) High Performance and Sustainable Building Requirements

UFC 3-101-01

(2020; with Change 1, 2021) Architecture

UFC 3-301-01

(2019) Structural Engineering

UFC 3-410-01

(2013; with Change 8, 2021) Heating, Ventilating, And Air Conditioning Systems, With Change 8

UFC 3-410-02

(2018; with Change 2, 2021) Direct Digital Control for HVAC and Other Building Control Systems

UFC 3-420-01

(2021) Plumbing Systems

UFC 3-470-01

(2018) Utility Monitoring And Control System (UMCS) Front End And Integration

UFC 3-520-01

(2015; with Change 2, 2021) Interior Electrical Systems, With Change 2

UFC 3-530-01

(2019) Interior And Exterior Lighting Systems And Controls, With Change 4

UFC 3-560-01

(2017, with Change 2, 2019) Operations and Maintenance: Electrical Safety

UFC 3-575-01

(2012; with Change 1, 2021) Lightning And Static Electricity Protection Systems, With Change 1

UFC 3-600-01

(2016; with Change 6, 2021) Fire Protection Engineering for Facilities

UFC 4-010-01

(2018; with Change 1, 2020) DoD Minimum Antiterrorism Standards for Buildings

UFC 4-010-06

(2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems

UFC 4-021-01

(2008; with Change 1, 2010) Design And O&M: Mass Notification Systems, With Change 1

UFC 4-730-10

(2019; with Change 1, 2021) Fire Stations, With Change 1

UNDERWRITERS LABORATORIES (UL)

UL 83

(2017; Reprint Mar 2020) UL Standard for Safety Thermoplastic-Insulated Wires and Cables

UL 464

(2016; Reprint Sep 2017) UL Standard for Safety Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories

UL 1480

(2016; Reprint Sep 2017) UL Standard for Safety Speakers for Fire Alarm and Signaling Systems, Including Accessories

1.2 STRUCTURAL DESIGN

1.2.1 GENERAL

This project shall repair and renovate Dormitory B1332 at Travis AFB, CA. The original structure was built in 1954. It is a three story cast-in-place concrete frame. Columns and perimeter grade beams are supported on caissons. This building was renovated and retrofitted structurally in 1992 by adding CMU block and cast-in-place concrete shear walls. This structure is designated as Risk Category II per Table 2-2 of **UFC 3-301-01**. The structural work consists of renovation and repair of, but not necessarily limited to, the following items.

- a. The Engineer of Record (EoR) shall determine the type of foundation to be used for any new addition or equipment pads based on the geotechnical data and the Contractor's approved Final Geotechnical Report.
- b. Attachment provisions for architectural, mechanical, and electrical elements
- c. Interior and exterior equipment pads

1.2.2 ENGINEER OF RECORD

All structural calculations shall be checked, reviewed and initialed by a registered structural and/or civil engineer other than the original EoR. The EoR shall stamp final structural calculations and final structural drawings.

1.2.3 GENERAL DESIGN CRITERIA

The design drawings shall contain structural notes which shall contain loading criteria, a list of the strengths of the engineering materials used, the design soil values, and any other data that would be pertinent to this building.

1.2.4 DESIGN CRITERIA

1.2.4.1 Serviceability

The provisions of the most recent edition of the International Building Code (IBC) and **UFC 3-301-01** shall be followed

1.2.4.2 Foundation Settlement Strength

An adequate level of protection against failure due to uniform and/or differential foundation settlement or general shear shall be provided.

1.2.4.3 Vertical Deflection of Suspended Horizontal Framing Members

Building serviceability shall not be impaired by vertical deflections. Vertical deflections shall be limited to the following criteria.

1. L/360 at roof live loads
 2. L/240 at roof dead and live loads
 3. L/600 for masonry walls and lintels
- ### 1.2.4.4 Horizontal Deflection (drift)

Horizontal drift shall not exceed the limits set forth in the most recent edition of the IBC when the structure is subjected to the required seismic or wind loads.

1.2.4.5 Construction Tolerances

Allowable variations from level, or specific slopes, shall be as follows:

- a. For overall length, or surface of 10 feet or less: plus or minus 1/8-inch
- b. Up to 20 feet: plus or minus 1/4-inch
- c. Up to 40 feet: plus or minus 3/8-inch

1.2.5 Durability - Time Reliability

Structural components shall be protected from condensed moisture that could impair their structural adequacy through deterioration.

Special attention shall be given to protection for corrosion or oxidation of metals, spalling of concrete, leaching of mortar, and deterioration of adhesives. Prevention of these hazards shall be especially important.

The materials used in structural elements, components, and assemblies shall be resistant to or protected from damage by exposure to normal climatic conditions.

1.2.6 DESIGN LOADS

General: Design loads shall be included in the structural notes on the contract drawings. See the most recent edition of [UFC 3-301-01](#) for minimum floor live loads, ground snow loads, wind speed and seismic data. For Important Factors for seismic, snow and ice refer to [UFC 3-301-01](#), Table 2-2

1.2.6.1 Dead Loads

The structural system shall be designed and constructed to safely support all dead loads, permanent or temporary.

1.2.6.2 Roof Live Loads

Minimum Roof Live Load = 20 pounds per square foot (reducible).

1.2.6.3 Live Loads

Minimum Floor Live Load = See the most recent version of [UFC 3-301-01](#).

1.2.6.4 Snow Loads

The minimum ground snow load shall be zero pounds per square foot. The frost penetration depth shall be zero inches.

1.2.6.5 Wind Loads

The minimum wind speed shall be 93 MPH, Exposure C.

1.2.6.6 Seismic Loads

The EoR shall use the web-based United States Geological Survey (USGS) Earthquake Ground Motion Parameters Calculator, latest version to determine the seismic data.

1.2.6.7 AT/FP Loads

See the most recent edition of [UFC 4-010-01](#). Use Low Level of Protection.

1.2.7 CONCRETE DESIGN

1.2.7.1 General

All foundation walls and footings shall be constructed of reinforced cast-in-place concrete. All project concrete shall have a minimum compressive strength of 4,500 pounds per square inch at 28 days and a maximum water/cement ratio of 0.45.

1.2.7.2 Testing

Testing of concrete work shall be done at the contractor's expense by an approved independent testing laboratory.

1.2.7.3 Forms

Materials for forms shall be plywood, metal, metal-framed, reinforced fiberglass, or plywood-faced, to provide continuous, straight, smooth, exposed surfaces.

1.2.7.4 Reinforcing Materials

Reinforcing bars shall meet the minimum requirements of [ASTM A615/A615M](#) and/or [ASTM A706/A706M](#), minimum Grade 60, deformed.

1.2.7.5 Concrete Mixing Operation

[ASTM C94/C94M](#).

1.2.8 Foundation Design

The contractor's EoR shall design the foundation for equipment pads and slabs on grade in accordance with the provisions set forth in the Final Geotechnical Report.

1.2.8.1 General

Foundation notes shall be included in the architectural drawings.

1.2.8.2 Design Loads

The allowable soil bearing pressure and pertinent soil properties shall be given in the Final Geotechnical Report.

1.2.8.3 Slabs-On-Grade

The EoR shall determine the thickness of the slab-on-grades for all areas. Floor slabs-on-grade for lightly-loaded areas shall be a minimum of **6 inches** thick reinforced with a minimum size No. 4 bar with a minimum area of reinforcing of 0.18 percent of the slab cross sectional area per foot wide slab located **2 inches** clear from the top surface of the slab. The preferred slab-on-grade reinforcing is No. 4 at 16 inches on center in each direction.

Fiber mesh reinforcing in the slab concrete will not be allowed as a replacement for steel.

1.2.8.4 Slab-On-Grade Control Joints

Slab-on-grade control joints shall be located at a spacing no greater than **15 feet** on center each direction. The length of this area shall not exceed 1-1/4 times the width. The joints can be either contraction joints (weakened plane joints) or construction joints. Reentrant corner bars shall be required as part of the reinforcement requirements.

1.2.8.5 Stoops, Ramps and Porches

Small stoops, ramps and porches shall be soil supported, turned-down-edge

type and be slip-doweled to the building foundation.

1.2.8.6 Equipment Pads

Pads for interior and exterior mechanical and electrical equipment shall be shown on the contract drawings.

1.2.9 Steel

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

Connection for structural steel will be welded, or bolted with high strength bolts. All connections shall be detailed on the final plans.

1.2.9.1 Steel Material

- a. Deformed Reinforcement ([ASTM A615/A615M](#)) shall have a minimum yield strength, $F_y = 60,000$ psi.
 - b. Deformed Reinforcement ([ASTM A706/A706M](#)) shall have a minimum yield strength, $F_y = 60,000$ psi.
 - c. Wide Flange Shapes shall have a minimum yield strength ([ASTM A572/A572M](#) Gr. 50 or [ASTM A992/A992M](#)), $F_y = 50,000$ psi.
 - d. Hollow Structural Section (HSS) shall have minimum yield strength ([ASTM A500/A500M](#) Gr. B), $F_y = 46,000$ psi.
 - e. Round Pipe (PS) shall have a minimum yield strength ([ASTM A53/A53M](#), Type E or S), $F_y = 35,000$ psi.
 - f. Angles and Channels shall have a minimum yield strength ([ASTM A36/A36M](#)), $F_y = 36,000$ psi.
 - g. Plates and Construction Material shall have minimum yield strength, $F_y = 36,000$ psi.
 - h. Anchor Rods shall be determined by the EoR.
 - i. Roof Deck shall be galvanized, conform to [ASTM A653/A653M](#), have a minimum thickness of [0.0359 inches](#) and have a minimum depth of [1.5 inches](#).
 - j. Structural Cold Formed Steel framing shall be galvanized, conform to [ASTM A653](#) and have a minimum thickness of [0.047 inches](#). Galvanizing is not required for metal building system components such as purlins, girts, and clips.
- ##### 1.2.9.2 Steel Deck
- Where steel deck is used show required section modulus and moment of inertia on drawings. Steel decks shall be minimum 20 gage with galvanized G90 coating. Button-punching of metal deck panels shall not be authorized. Mechanical fasteners, either powder actuated, pneumatically driven, or self-drilling screws may be used in lieu of welding, provided product data has been submitted and approved.

1.2.10 Masonry

All structural masonry walls shall be fully grouted. CMU (ASTM C90, Type I or II) shall have minimum compressive strength of 1,900 psi.

Mortar shall conform to ASTM C270, Type S, with Portland cement.

Masonry grout shall conform to ASTM C476 and shall have a minimum compressive strength at 28 days (f'm) of 2,000 psi.

All horizontal wall reinforcement shall be placed using bond beam type masonry units. Lintel units will not be used in lieu of bond beam units. Exterior masonry walls shall be in accordance with TMS 420-13.

1.3 ARCHITECTURAL DESIGN

1.3.1 Scope

The design provided within this RFP has been developed with coordination for the Installation and their various user groups. While the intent of this RFP is to allow the Contractor the flexibility to construct this facility in an economical manner without sacrificing good engineering practices, the Contractor's flexibility must also comply with the requirements and intents of this RFP. The Government desires low and/or no maintenance finish materials to the greatest extent possible. Deviations from the Travis AFB Facilities Excellence Guide (2008) for exterior materials must be approved by the Contracting Officer.

1.3.1.1 Floor Plans

The Government's intent in providing floor plans is to establish maximum allowable building footprints, general arrangement and relationships of spaces of the user's organization and to identify areas of the facility that have specific requirements developed during the Design Charrette. Building dimensions are provided for general information only. Changes from the Government's conceptual design are allowed under the provisions described in Paragraph 1.5.

1.3.1.2 Elevations

This project entails the patching and painting of the exterior cement plaster finish. Paint color will match existing. Aside from replacement of doors and windows, there will be no change in the building exterior.

1.3.1.3 Asbestos

Asbestos containing materials shall not be used in the new construction.

1.3.2 External Activities

The site is located within a controlled area required for this mission and is adjacent to existing MQ-9 Remotely Piloted Aircraft (RPA) operations and maintenance functions. The site has been previously disturbed and is located within an MQ-9 mission compatible use area. Vehicular parking is located South of the building entries. Personnel access the facility by walking. Dedicated circulation paths shall be provided. Additional paved walkways shall be provided for exit doors and utility rooms. See paragraphs 6 and 10 for more information on exterior site use requirements. REVISE NEXT SUBMITTAL

1.3.3 Internal Activities

Supporting the internal GCS's is the SOC, GCS maintenance, and data center/server room. The internal layout will provide wide hallways for the maneuvering of GCS equipment. Each squadron will have separate functional areas within the GCS's and SOC modules. The majority of the second floor is within a secure environment. Only the break area and building support space is unclassified. The secure section includes the following modules: squadron command suites; squadron operations to include mission planning areas, weapons and tactics, intelligence, and security office; GCS mission briefing rooms, flight commander's offices, and the mass briefing room. REVISE NEXT SUBMITTAL

1.3.4 Space Allocations

Area calculations are provided in Section 01 10 11 FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS.

1.3.5 Fire Safety

Per the International Building Code, the construction type shall be Type IIB (non-rated). The interior of the building shall be fully sprinklered (see paragraph 13 "Fire Protection"). All interior finishes on walls and ceilings of exits shall be Class A or Class B, per UFC 3-600-01 and NFPA 101. In case of conflict, UFC 3-600-01 supersedes NFPA 101. Interior floor finish shall be Class I. Fire Department access shall be provided around the perimeters of this facility. Contractor is responsible for providing all design and construction to meet UFC 3-600-01, NFPA 101, and applicable portions of the International Building Code.

1.3.6 Security

The threat severity level for this facility has been set at "minimum" by the Travis Security, as described in UFC 4-010-01. The project requires security design features. Annunciation of threats to occupants will be provided. See paragraph 16 Building Security System for further information.

1.3.7 Acoustical Design

The target sound level within the facility is 50 dB for secure spaces. See Section 01 10 11 FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS for room specific requirements.

1.3.8 Gutter and Downspouts

Design gutters and downspouts following the method identified by the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) Architectural Sheet Metal Manual, block at all downspout locations, or provide direct connection to an underground storm water drainage system via downspout boots. In all cases, roof water shall be diverted away from entrances and foundations. Scuppers may be used in conjunction with low slope roof systems. Factory finish color on gutters, downspouts, scuppers, miscellaneous trim, etc., shall match that of the metal wall panels and/or SSMR system.

1.3.9 Building Envelope Insulation and Sealing

1.3.9.1 General

The building envelope shall be sealed against moisture and air by a layer of continuous insulation as required by [UFC 3-101-01](#) and [UFC 1-200-02](#). Thermal resistance of insulation shall be not less than the R-values determined from the "U" factors indicated in [ASHRAE 90.1 - IP](#). R-values shall be determined at 75 degrees F in accordance with [ASTM C518](#). Provide only thermal insulating materials recommended by the manufacturer for the type of application required. Insulation shall be a standard product of a manufacturer, factor marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages.

1.3.9.2 Sealant

Sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall cure to a rubber like consistency. All sealants shall be the nonhardening type. Roof panel standing seam ribs shall have a continuous sealant that is factory installed.

1.3.10 Envelope Openings

1.3.10.1 Exterior Doors

All unglazed exterior door assemblies, excluding storefront assemblies shall have a polyurethane core foamed-in-place or laminated to each outer panel, with a minimum compressive strength of 20 pounds per square inch and a minimum density of 1.8 pounds per cubic foot. All hollow metal door and frame assemblies shall be constructed as required by [SDI/DOOR A250.8](#) to meet or exceed a heavy duty, Grade 11, Model 2, seamless hollow steel construction, and shall be constructed with flush end closures at the top and flush closures or recessed channels at the bottom. All steel doorframes shall be of welded construction. All doors shall be a minimum of [3 feet](#) wide by [7 feet](#) high. Sleeping room doors shall be painted the color of the sleeping room on the interior side. The outside shall be painted to match the existing door color. Exterior acoustically rated door assemblies shall be per [ACOUSTICALLY RATED DOORS](#).

1.3.10.1.1 Acoustically Rated Doors

All exterior doors shall open out to the exterior. All hollow metal doors and door frame assemblies shall be painted.

1.3.10.2 Door Frames

Exterior steel door frames shall be of welded construction, factory or field finished. Where used in masonry construction, door frames shall have [4-inch](#) heads to match standard concrete masonry unit block modules.

1.3.10.3 Exterior Storefront

Exterior storefront shall be a blast resistant storefront or curtain wall type assembly. Storefront entrance assemblies and windows shall be from the same manufacturer and coordinated for appearance, stile and rail sizing, and glazing position. Exterior assemblies shall be of thermal break construction. Doorframe and trim moldings shall be extruded of 6063-T5 aluminum allow and tempter ([ASTM B221](#) alloy G.S. IOPrT5). Glazing

gasket for doors and frames shall be EPDM elastomeric extrusions. Blast resistant storefront systems shall be used. All screws and miscellaneous fasteners shall be aluminum, stainless steel or zinc plated steel. All doors shall be a minimum of 3 feet wide by 7 feet high. See the Drawings for additional information.

1.3.10.4 Exterior Windows

Exterior windows shall be horizontal sider type, Heavy Commercial Class, Grade 40 (F-HC40) as indicated on architectural drawings, extruded 6063-T3 aluminum alloy framed, with anodized aluminum complying with Travis AFB Design Guidelines. Frames shall be a manufacturer's standard configuration and shall meet performance requirements of [AAMA/WDMA/CSA 101/I.S.2/A440](#).

1.3.10.5 Insulated Glass Unit

All glazing shall use insulated glass units with a minimum of two panes of glass (depending on STC, or other applicable requirements) separated by a dehydrated airspace, hermetically sealed. Dimensional tolerances shall be as specified in [IGMA TB-1200](#). The units shall conform to [ASTM E2190](#). Spacer shall be roll-formed, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone. Glazing shall consist of a clear outboard pane of light-reducing 1/4-inch thick glass, and a clear inboard pane consisting of two 1/8-inch panes laminated with a minimum 0.030-inch clear PVB interlayer. All insulated glazing units shall have a minimum Total Visible Light Transmittance of 40%, minimum shading coefficient of 0.29, maximum solar heat gain coefficient of 0.28, and a maximum solar transmittance of 36%.

1.3.10.6 Polycarbonate Sheet Glazing

Fixed clerestory windows shall use gray tinted polycarbonate sheet glazing. Light transmittance shall be tested in accordance with [ASTM D1003](#) with a minimum 86% transmittance. Glazing shall be UV protected to prevent yellowing for the duration of the warranty.

1.3.11 Miscellaneous Metal

All exterior metal, including handrails, guardrails, louvers, gates, bollards, stairs and miscellaneous shapes or trim shall be anodized, or factory painted aluminum, or painted steel. Anodized aluminum finishes shall be medium or dark bronze AA-M12 C22 A42, minimum 0.7 mils, Class I, per Aluminum Association Designation System. All miscellaneous prefabricated components, shall be specified to have factory applied finishes, in colors to coordinate with the facility. All other miscellaneous metal items, exposed to view, that do not have a factory finish, shall be painted with urethane glass enamel (automotive type finish). Louvers shall have bird or insect screens, as appropriate, and should withstand 60 MPH winds without moisture penetration.

1.3.11.1 Sheet Metalwork

Flashing shall be installed in conformance with the SMACNA Architectural Sheet Metal Manual.

1.3.11.2 Seismic Joint Covers

Where required, seismic joint covers shall be constructed of extruded aluminum with anodized satin finish for walls and ceilings and with standard mill finish for floor covers and exterior covers.

1.3.12 Air Barrier Requirements

Contractor must comply with the air barrier design, construction, and testing requirements of **UFC 3-101-01**, **UFGS 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM** and **UFGS 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS**. Provide a continuous air barrier around the building, in accordance with **ASHRAE 90.1 - IP**. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings. Provide plans, sections, and design details as indicated in **UFC 3-101-01** and **UFGS 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM**.

1.3.12.1 Air Barrier Performance

The air barrier material(s) shall have an air permeance not to exceed 0.004 cfm / sf at 0.3 inch wg when tested in accordance with **ASTM E2178**. Building air leakage must not exceed 0.4 cfm/sf at 0.3-inch water.

1.3.12.2 Air Barrier Joints

Join and seal the air barrier material of each assembly in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.

1.3.12.3 Air Barrier Support

Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement, or damage, and transfer the load to the structure.

1.3.12.4 Air Barrier Penetrations

Seal all penetrations and openings. Any unavoidable penetrations of the air barrier by electrical boxes, plumbing fixture boxes, and other assemblies must be made airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly. Do not install lighting fixtures with ventilation holes through the air barrier.

1.3.12.5 Air Barrier Service Life

The air barrier must be durable and last the anticipated service life of the assembly.

1.3.12.6 Air Intakes

Damper and control to close all ventilation or make-up air intakes and exhausts, etc. when leakage can occur during inactive periods.

1.3.12.7 Compartmentalize Spaces Under Negative Pressure

Compartmentalize spaces under negative pressure such as boiler rooms and mechanical rooms and provide make-up air for combustion.

1.3.12.8 Inspection and Testing

Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by [ASTM E779](#) or [ASTM E1827-96](#).

Accomplish tests as identified in UFGS [07 05 23](#) PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS. Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation. Notify the Contracting officer at least 10 working days prior to performing the pressure tests. Provide written test results confirming the results of all tests.

Require Corrective Measures if Test Fails. If the pressure test fails, use diagnostic test methods described in [07 05 23](#) PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS to discover the leak locations. Provide additional permanent sealing measure to reduce or eliminate leak sources. Retest and repeat until the building envelope passes the pressure test. Document diagnostic tests, corrective measures, and retesting procedures in the test reports.

1.3.13 Interior Doors

1.3.13.1 Interior Hollow Metal Doors

Interior doors shall be factory finished, Level 4 Maximum Duty, full flush hollow metal units complying with [SDI/DOOR A250.8](#). Fire rated doors shall comply with [NFPA 80](#). Door finish color shall be coordinated with interior color palette.

1.3.13.2 Hollow Metal Frames

Comply with [SDI/DOOR A250.8](#), Level 4, with welded corners. Fire rated frames shall comply with [NFPA 80](#) Finish color of frames shall be coordinated with interior color palette.

1.3.13.3 Acoustically Rated Doors

Interior doors shall be hollow metal or solid core wood. Solid core wood doors shall be custom grade, with AA grade red oak, quarter sawn or plain sliced veneer except as noted. Doors shall be factory finished with tinted polyurethane with a low gloss sheen. All doors shall be a minimum of 7 feet high. Hollow metal frames shall be painted to be compatible with interior color scheme. Rated doors in hallways, storage areas and other areas requiring ratings are to have full neoprene gasketing and hardware as required by code. Provide acoustically rated doors and frames as required to meet the noise reduction ratings indicated elsewhere in this document. STC ratings for doors shall include the entire door and frame assembly.

1.3.13.4 Vision Lites

Vision lites must meet code requirements for fire ratings where applicable. Install vision lites at Doors TBD and other appropriate locations.

1.3.13.5 Electrical Room Doors

Doors to electrical closets shall swing outward 180 degrees to provide easy access.

1.3.14 Door Hardware

1.3.14.1 General

Provide hardware manufactured to template and complying with BHMA A156 Series requirements. Hardware for fire-rated door assemblies shall be listed and comply with requirements of NFPA 80. Exit hardware shall comply with NFPA 101 criteria. Hardware at security doors shall be coordinated with the Installation access control and alarm system requirements. Door hardware shall be reviewed and approved by be Base Locksmith before installation.

1.3.14.2 Hinges

Comply with Builders Hardware Manufacturers Association ANSI/BHMA A156.1. Hinges shall be ball-bearing, stainless steel with BHMA 630 finish. Hinges at exterior and security doors shall be constructed with nonremovable pins. Hinges for exterior electrical room doors shall allow door to swing open 180 degrees.

1.3.14.3 Non-Mortise Locks and Latches

Comply with ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Levers or knobs are acceptable.

1.3.14.4 Bored Locks and Latches

Comply with ANSI/BHMA A156.2, Series 4000, Grade 1. Levers or knobs are acceptable.

1.3.14.5 Mechanical Push Button Locks

Comply with ANSI/BHMA A156.36. Provide heavy-duty mechanical push button ("cipher") locks on all exterior personnel doors. Levers or knobs are acceptable.

1.3.14.6 Exit Devices

Comply with ANSI/BHMA A156.3, Grade 1. Coordinate with security requirements for alarms and reentry criteria.

1.3.14.7 Cores and Cylinders

Comply with ANSI/BHMA A156.5. Provide cylinders for new locks that are fully compatible with products of the Schlage Lock Corporation having fully interchangeable cores compatible with the Travis keying system per the Travis security criteria cores shall match other dorms facilities on the base.

1.3.14.8 Closers

Door closers shall be in accordance with ANSI/BHMA A156.4. Sleeping room exterior doors shall have closers.

1.3.14.9 Finishes and Materials

Architectural builder's hardware shall be per [ANSI/BHMA A156.18](#).

1.3.14.10 Kick-Plates

Comply with [ANSI/BHMA A156.6](#). Doors in Apparatus Bays, utility rooms and support areas will have stainless steel kick plates (10 inches tall x 2 inches less the width of the door) each side. Except for sleeping rooms, all door shall have kick plate on booth sided of door.

1.3.15 Insulation and Sealants

1.3.15.1 Blanket Insulation

Interior partition blanket insulation shall comply with [ASTM C665](#), Type 1. Insulation shall be UL-labeled mineral wool.

1.3.15.1.1 Sound Attenuation Fire Blankets (SAFB)

SAFB shall be mildew-proof and moisture-resistant. Nominal density shall be 2.5 pcf with an R-value of 3.7 per inch of thickness. Blankets shall be rated non-combustible when tested according to [ASTM E136](#), and have 0 flame spread and 0 smoke developed ratings in accordance with [ASTM E84](#).

1.3.15.2 Caulking and Sealants

Caulking and sealants shall be selected according to materials they are being applied to for compatibility. These sealants and caulks shall be either a two component, rubber base, chemical-curing compound based on polysulfide and/or polyurethane; or a single-component, rubber base, chemical-curing compound such as polysulfides, polyurethanes, and silicones. Caulking shall occur around all door frames, all window frames, and at all material changes. The minimum joint width shall be 1/4 inch, and joint widths shall have a back-stop material provided in the joint, in excess of 1/4 inch and the depth of all joints shall be equal to the width. Color of caulking and sealants shall match adjacent materials.

1.3.15.2.1 Acoustical Sealants

Latex rubber or polymer-based acoustical sealant conforming to [ASTM C834](#) and [ASTM C919](#) and having a maximum flame spread of 25 and a maximum smoke developed rating of 50 when tested in accordance with [ASTM E84](#). Acoustical sealant must have consistency of 250 to 310 when tested in accordance with [ASTM D217](#), and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in [ASTM C734](#). Sealant shall be paintable and must be non-staining.

1.3.16 Cabinets and Casework

1.3.16.1 General

As a minimum, cabinets/casework shall be custom grade in accordance with Architectural Woodwork Institute (AWI), plastic laminate or stained wood panels over plywood, per AWI custom grade standards. Interior cabinet finishes shall be plastic laminate or melamine. Plastic laminate concealment panels for pipes under countertops shall be removable for maintenance accessed in toilet rooms.

1.3.16.2 Cabinet Finish

The finished material of exposed fronts and ends of cabinets, door and drawer fronts shall be plastic laminate in the Toilets and non-secure Break Room and stained wood in the secure Break Room. Cabinet finish shall be a light to medium color. Vinyl edge banding on cabinetry is not permitted.

1.3.16.3 Cabinet Guides

Top-mounted center drawer guides will not be permitted. Cabinet drawer guides shall be a minimum of 20-gauge steel with double rollers, heavy-duty commercial type and soft closure feature.

1.3.16.4 Cabinet hardware

Cabinet hardware shall conform to [ANSI/BHMA A156.9](#). Cabinet hinges shall be concealed offset and spring-loaded, "European" style, commercial grade and with soft closure feature.

1.3.16.5 Break-Room Cabinetry

Cabinetry shall be 2 tiered surfaces at the bar portion (one bar height/one countertop height). Plastic laminate upper and lower cabinets with solid surface countertops and backsplash. Upper cabinets shall be **40-inches** high.

1.3.16.6 Toilet Accessories

Toilet accessories shall be provided in all restrooms, as appropriate. Provide heavy-duty steel waste receptacles, toilet paper dispensers, paper towel dispensers, soap dispensers, and mirrors per acceptable industry practice. All toilet accessories shall be brushed stainless steel or chrome finished steel.

1.3.16.7 Hand Sanitizer Dispenser

Hand sanitizer dispensers shall be wall mounted, battery operated, top fill, automatic, touchless type that dispenses sanitizer when a hand is placed in proximity of a sensor. Dispenser shall have a view window to monitor quantity of hand sanitizer product remaining. Dispenser shall have a small tray below the dispensing portal to catch wasted sanitizer. Batteries shall have a small tray below the dispensing portal to catch wasted sanitizer. Batteries shall be of a standard size such as AA cells. Contractor shall supply and install sanitizer dispensers complete with mounting brackets, batteries as recommended by manufacturer, sanitizer solution, and one bottle of refill sanitizer solution for each dispenser installed.

1.4 INTERIORS

1.4.1 Interior Partitions

Interior partitions shall be constructed of steel framing with gypsum wall board facings. Where required to be sound attenuation or fire rated, wall construction shall extend from floor slab to structure above.

1.4.1.1.1 Non-Load Bearing Metal Framing and Furring

Provide framing smaller than 6 inches complying with ASTM C645, 20-gauge (0.0329-inch thickness) minimum. Provide steel framing with galvanized G-60 coating per ASTM A653/A653M, G-60 or a TI-25 Aluminum coating per ASTM A463/A463M.

1.4.1.1.2 Load Bearing Metal Framing and Furring

Provide framing 6 inches and larger that complies with ASTM C955, 16-gauge (0.0598-inch thickness) minimum. Provide steel framing with galvanized G-60 coating per ASTM A653/A653M, G-60 or a TI-25 Aluminum coating per ASTM A463/A463M.

1.4.1.1.3 Gypsum Wallboard

All gypsum wallboard to be painted shall be finished to Level 4 or 5, as appropriate.

1.4.1.1.3.1 Fire and Mold Resistant

Unless otherwise specified, use 5/8-inch gypsum wall board with a fire- and water-resistant core with tapered edges, conforming to the requirements of ASTM C1396/C1396M, Type X. Face paper shall be moisture/mold/mildew resistant with a score of 10, when tested in accordance of ASTM D3273.

1.4.1.1.3.2 Acoustically Enhanced

Use 5/8-inch Type X acoustically enhanced gypsum wallboard, conforming to ASTM E90. Face paper and gypsum core should also be moisture/mold/mildew resistant, with a rating of 10 when tested in accordance with ASTM D3273.

1.4.1.1.3.3 Joint Treatments

Joint treatment compounds & tapes shall conform to the requirements of ASTM C475.

1.4.1.1.3.4 Screws

Screws shall conform to the requirements of ASTM C1002 and ASTM C954 where applicable.

1.4.1.1.3.5 Accessories

Corner beads, edge trim, casing, and control/expansion joints shall conform to the requirements of ASTM C1047, and shall be corrosion protective coated steel designed for its intended use. Flanges shall be free of dirt, grease, and other materials that may adversely affect the bond of joint treatment.

1.4.2 Cement Board/Cementitious Backer Unit

Use 5/8-inch cement board for tile base in high-moisture areas such as bathrooms and kitchens, as required by UFC 3-101-01. Use 1/2-inch wallboard in UL listed fire rated wall assemblies. Cementitious water durable wallboard with fiberglass reinforcing faces shall comply with ANSI A118.9 and ASTM C1325. Cement board shall also be moisture/mold/mildew resistant, with a rating of 10 when tested in accordance with ASTM D3273.

Density shall be 72 pounds per cubic foot. Water absorptions shall not be greater than 8% when tested for 24 hours in accordance with [ASTM C473](#).

1.4.2.1 Joint Reinforcement

Use a 2-inch wide alkali resistant fiberglass mesh tape.

1.4.2.2 Fasteners

Use corrosion resistant as recommended by the cement board manufacturer, complying with [ASTM C1002](#).

1.4.3 Ceilings

1.4.3.1 Gypsum Board Ceiling System

Use a designated gypsum ceiling board, complying with [ASTM C1396/C1396M](#) suspended on a drywall suspension system. In humid areas provide water-resistant gypsum board ceilings with a smooth plaster finish.

1.4.3.2 Acoustical Ceiling System

Provide 24-inch by 24-inch by 3/4-inch thick acoustical units (having an LR-1 Light Reflectance Coefficient of 0.75 (minimum) and a Noise Reduction Coefficient of 0.75 (minimum). Units to be Class A, non-combustible, with a maximum flame spread rating of 25 and a maximum smoke development rating of 450 per [ASTM E84](#). Installation of acoustical ceilings shall comply with [ASTM C636/C636M](#). Ceiling tile at Vestibule shall have a mesh or wire or perforated metal panel. Mesh, wire or perforated metal panels shall have an NRC rating of 0.75 (minimum).

1.4.3.3 Exposed Structural

Where spaces are moisture-prone, exposed structural members will be hot dipped zinc galvanized. Where spaces are fire rated, exposed structural members will have a fireproofing material applied to them.

1.5 FIRE PROTECTION DESIGN

Each facility shall be fully protected by an automatic sprinkler system that is designed and installed in accordance with the requirements of [UFC 3-600-01](#) and [NFPA 13](#) with the exceptions noted below. The use of Unified Facilities Guide Specifications is mandatory.

1.5.1 GENERAL

1.5.1.1 Qualified Fire Protection Engineer (QFPE)

A designate individual as QFPE shall have working knowledge of all five aspects of fire protection engineering. The aspects are as follows:
Building code analysis, life safety code analysis, design of automatic detection and suppression systems, water supply analysis, and a multi-discipline review of the entire project. The QFPE shall involve in every aspect of the design, construction, testing/commissioning as it relates to fire protection and life safety in accordance with [UFC 3-600-01](#). The QFPE shall ensure the project meets all requirements of identified applicable codes and criteria. Written copy of resume indicating education, professional registration and work experience, along with a letter attesting to the compliance with QFPE requirements shall be

submitted to the Contracting Officer for approval.

1.5.1.2 Sprinkler System Specialist

All hydraulic calculations and drawings showing the layout of the sprinkler system shall be done by a registered Fire Protection Engineer, or a National Institute for Certification in Engineering Technologies (NICET) Level 4 technician who has had at least four (4) years of current experience in the design of fire protection systems. Written proof of registration and experience shall be submitted to the Contracting Officer for approval.

1.5.1.3 Design Documentation

A comprehensive design plan shall be prepared to show all fire protection systems and shall be approved by the Base Fire Department and the Designated Fire Protection Engineer (DFPE).

1.5.1.4 Hydraulic Calculation

Hydraulic calculations shall be performed using approved computer software. Hydrant flows shall be added to all hydraulic sprinkler calculations as indicated in **UFC 3-600-01**. Pressure drop through meter, valves, backflow preventer installed on the incoming fire water line shall be included for hydraulic calculations.

1.5.2 Occupancy Classification

The facilities contain multiple occupancy classifications as stipulated per **NFPA 13** and **UFC 3-600-01**. Examples of such occupancy classifications are listed below:

Light Hazard. Administrative Areas, Conference Rooms, Break Rooms, Corridors, Restrooms, etc.
Ordinary Hazard. Janitor's Closets, Communication Rooms, Mechanical Room, Electrical Rooms, Server Room, etc.

1.5.3 Sprinkler Density Requirements

Light, Ordinary, and Extra Hazard areas shall have minimum design density and sprinkler K-factor in accordance with Table 9-3 of **UFC 3-600-01** section 9-7. Storage areas shall comply with the requirements of **NFPA 13**.

1.5.4 Design Area

Ordinary, and Extra hazard areas shall have minimum design area in accordance with Table 9-3 of **UFC 3-600-01** section 9-7. Light hazard areas shall have a minimum design of 0.12 gpm/SF over 3,000 SF with light hazard sprinkler spacing in accordance with **NFPA 13**. Storage areas shall have a minimum design area in accordance with **NFPA 13**. A sufficient number of hydraulic calculation runs shall be provided in order to prove the hydraulically most demanding areas.

1.5.4.1 Increased Design Area

Design area must be increased by 30 percent for sloped ceilings that exceed a pitch of 2 in 12.

1.5.5 Hose Demand

Hose demand shall comply with Table 9-4 of **UFC 3-600-01**, section 9-7 and/or **NFPA 13** requirements. Exterior hose demand shall be included in the hydraulic calculations. The demand shall be assumed to occur at a fire hydrant located nearest to the buildings' sprinkler service line point-of-connection to the water distribution system and for a 60-minute duration.

1.5.6 Water Supply

Fire sprinkler water supply shall be brought into the Riser Room. Refer to Flow Test Data in Appendices for available water supply.

1.5.7 Underground Equipment Requirements

All equipment, piping, etc. is existing to remain.

1.5.8 Aboveground Equipment Requirements

All equipment, piping, etc., shall meet the requirements of UFGS **21 13 13.00 10** WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION and as specified herein. All equipment, piping, etc., shall be UL Listed and/or Fire Marshall approved for fire protection service. All system components shall be designed for a working pressure of not less than 175 psi unless otherwise indicated.

1.5.8.1 Backflow Prevention Assembly

Existing to remain.

1.5.8.2 Check Valves

Alarm check valves or riser check valves shall be provided for each system riser with a flanged inspection plate. A flow indicating device and all other appurtenances required per **NFPA 13** shall be provided. Flow indicator shall be connected to a local-alarm circuit, transmitted-alarm circuit, and power supply.

1.5.8.3 Local Alarm

An electrically operated bell shall be located on an outside wall adjacent to the sprinkler riser. See paragraph FIRE ALARM AND MASS NOTIFICATION SYSTEMS for more information on the transmitted alarm signal to the Fire Department.

1.5.8.4 Valves

Manually operated sprinkler control valves shall be butterfly valves. Each valve shall be supervised with a tamper switch.

1.5.8.5 Flow and Tamper Switches

Each flow switch and tamper switch shall be connected to the fire alarm control panel.

1.5.8.6 Fire Department Connection

Existing to remain.

1.5.8.7 Sprinkler Pipe

Sprinkler pipe 2 inches and less shall be schedule 40 black steel pipe conforming to **ASTM A53/A53M**, Type F. Sprinkler pipe larger than 2 inches shall be minimum schedule 10. Galvanized piping is not permitted to be used in dry pipe, pre-action, or wet pipe sprinkler system.

1.5.8.8 Pipe Reducers

Pipe reducers shall be made with one-piece tapered reducing fittings. Grooved-end or rubber-gasket reducing couplings are not allowed for use.

1.5.8.9 Sprinklers

Sprinklers shall be used in accordance with their listed spacing limitations. Sprinkler temperature classification shall be in accordance with **NFPA 13**. All sprinklers in light hazard and ordinary hazard locations shall be quick response type. Pendant sprinklers shall be either recessed or concealed type. Pendant sprinklers shall have a polished chrome or white enamel finish. No mixing of head types, including finishes is allowed. If necessary for use, sidewall sprinklers shall be specifically listed for use in the respective hazard occupancy protected. Sidewall sprinklers shall have a polished chrome or white enamel finish.

1.5.8.10 Installation Requirements

The underground fire sprinkler service line is existing to remain.

1.5.8.11 Sprinkler System

The entire sprinkler system shall be seismically protected. Seismic protection shall include flexible couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required per **NFPA 13** for protection of piping against damage from earthquakes. Branch lines shall also be equipped with sway braces at the end sprinkler head and at intervals not exceeding 30 ft. (exception: when pipe support hangars are less than **6-inches** long).

1.5.8.12 Main Drains

Main drain piping shall discharge at a safe location outside of the building. The discharge shall be arranged so as not to cause damage to adjacent construction during discharge.

1.5.8.13 Auxiliary Drains

Auxiliary drains shall be provided where required by **NFPA 13**. Drain valves shall be used where drain plugs are otherwise permitted by **NFPA 13**. Where branch lines terminate at low points and form trapped sections, such branch lines shall be manifold to a common drain line and routed to an auxiliary drain.

1.5.8.14 Witnessing Tests

The Fire Department shall witness all flush tests, flow tests, and hydrostatic tests. In addition, the Fire Prevention Office shall be

contacted prior to any testing of the new automatic fire suppression system.

1.6 FIRE ALARM AND MASS NOTIFICATION SYSTEMS

1.6.1 Fire Alarm Equipment

Each facility shall be provided with a combined Fire Alarm/Mass Notification Control Panel, compliant with UFC. Locate it in electrical room or elsewhere in consultation and coordination with Fire Marshall. New Fire Alarm and Mass Notification System (MNS) shall be compatible with the existing Fire Station's Monaco central fire receiving system. Provide lightning protection as recommended by fire alarm equipment supplier. Each transmitter and interface device shall be the manufacturer's current commercial product completely assembled, wired, tested at the factory and delivered ready for installation and operation.

All signaling and indicating circuits shall be Class A. All notification circuits shall be Class A.

Battery calculations for all devices shall be included in the drawings. All circuits shall have voltage drop calculations for strobes and speakers included in the design drawings.

1.6.2 Fire Alarm System

Provide a fully operational addressable (with built in intelligence) FACP and fire alarm system that is solid state microprocessor-based, and in strict accordance with [NFPA 72](#). Locate the FACP in the electrical room and/or at a location as required by Fire Marshall. The system shall include not only a FACP\MNS combination panel but also radio transmitter, power supplies, initiating devices, notification appliances, conduit, wire, fittings, and all accessories required to provide a complete operating system. Combination FACP/MNS is meant not only to alert local people but also send signal over to the Fire Station. The complete Fire Alarm System shall be the product of FireLite or Notifier. The FACP shall provide dynamic supervision of system electronics, wiring, manual pull stations, smoke detectors, software, and other detection devices. The FACP shall be capable of measuring and adjusting the sensitivity of detectors from the FACP.

An alphanumeric display shall be provided to display custom messages and give readings of detector sensitivity, detector by detector. The FACP shall have the ability to perform multiple operations at the same time. These operations shall include but not be limited to timed functions and multiple configured sequences. Provide main fire alarm control panel with the local capacity to accept the total number of analog/digital inputs and signaling line circuits. Provide additional fire alarm local processors as required. The number of signaling line circuits and indicating appliance circuits required for the initiating and indicating devices shown on the plans shall be determined by the manufacturer's limit of devices per circuit.

Each device on a signaling line circuit shall be checked continuously to include the following: sensitivity, response, opens, shorts, ground faults, functionality and status. Provide a 20% spare capacity for future modifications. Combined FACP/transceiver shall be provided with a 24-volt D.C. battery backup and re-charging system sized to meet system requirements in accordance with [NFPA 72](#). FACP back-up battery shall be

capable of operating the system under quiescent load for a minimum of 60 hours and then shall be capable of operating the system during a fire or other emergency condition for a period of 15 minutes at maximum connected load or 60 minutes of mass notification at the maximum connected load immediately upon loss of power, whichever is greater. Provide separate power branch circuits for the fire alarm control panel/transceiver, including the appropriate conduit, wires, dedicated circuit breakers, and ground wiring. Label each branch circuit at the panel board as Fire Alarm Control Panel/Transceiver respectively.

The fire alarm system shall use the MNS system for notifications. Speaker installation shall comply with paragraph 4-6 of **UFC 4-021-01** to provide acceptable sound quality in large or noisy areas. Speakers shall incorporate a high efficiency speaker for maximum output at minimum power across a frequency range of 400Hz to 4000Hz. Speakers used in exterior locations shall be specifically listed or approved for outdoor use and be provided with metal housing and protective grills. A weather-proof alarm speaker shall be located on the wall outside of each sprinkler riser room.

MNS intelligibility requirements shall be per **UFC 4-021-01** paragraph 6-5.3.1. Audible appliances shall provide a sound level of at least 15db above ambient and 5db above maximum sound level. CIS level of .8 or minimum sound level of 75db is required.

Provide carbon monoxide (CO) detection in areas where fossil fuels are burned, and as per **NFPA 72** and other criteria. Activation of detectors shall sound a local alarm. CO detectors shall be monitored as a non-latching supervisory alarm initiating device. Activation of CO detectors shall not sound a general building alarm.

Zone alarm shall indicate appliance circuits separately to aid troubleshooting. Wiring for signaling line circuits shall be minimum #16 AWG twisted pair with shielded jacket per **NFPA 72**. Indicating appliance circuits for combination audible speaker and visual strobes or visual strobes-only notification appliances shall be Class B, #14 AWG minimum. Fire alarm visual strobes shall be ABA rated, clear color, marked "ALERT", one to three Hertz flash rate, and candela output in conformance with the guidance in Section 18.5 of **NFPA 72**. Conduit for all fire alarm system shall be minimum **3/4 inch**. All applicable cables shall be per the transceiver or FACP manufacturer's recommendations. All conduits in rooms with finished ceilings shall be installed concealed above acoustical ceiling or in walls. Conduit in areas without finished ceilings may be exposed. Sprinkler water flow switch alarm and PIV tamper switch shall be required to be distinguished by device type, and a room number for water flow switch only.

Install strobes and speakers for the Fire Alarm/MNS in all spaces with two or more occupants. Per Air Force policy, any office where 2 or more chairs exist is considered a space with two or more occupants.

1.6.2.1 Initiating and Indicating Circuits

Initiating circuits shall use class B wiring. Notification circuits shall use class B wiring. Required detectors shall be installed in accordance with **NFPA 72**. Any required smoke detectors provided shall be photoelectric, unless noted otherwise. Provide supervision of water flow switch(es) to annunciate a general building alarm upon a sprinkler system activation. Provide duct smoke detectors in main return air ducts and in main supply air ducts of the building HVAC systems, where duct air flows

are above levels stipulated in the **NFPA 72**. Duct smoke detectors shall be addressable and 100% compatible with the FACP.

Provide control interlocking circuits via the duct detectors to shut down the air handler motor starter. Wherever required, HVAC interlocks shall be provided in fire alarm control panel to shutdown selected ventilation equipment upon alarm activation. Provide indicating circuits with sufficient number of combination alarm audible and visual or visual-only indicating appliances within building to notify all occupants upon alarm. All interior audio speakers shall conform to the applicable requirements of **UL 464** and **UL 1480**, and shall generate a unique audible sound from other devices provided in the building and surrounding area.

1.6.2.2 User Coordination

Coordination with the User on the installation of the Fire Alarm/MNS, to include all smoke detectors and necessary audible/visual signals to the satisfaction of Fire Marshall or Fire Chief.

1.6.2.3 Annunciator Panel

Provide a graphic annunciator panel, located at the main entrance.

1.6.2.4 Minimum Designer Qualifications

Design of fire alarm system shall be done by a registered NICET Level 4 Designer, with at least 3 years of current and applicable experience in similar designs. The design drawings must bear the Designer's NICET Level 4 Certification and signature.

1.6.2.5 Submittals

Fire alarm system submittals shall include spare parts data, and battery, charger and voltage drop calculations for the fire alarm system. Submittals shall include detail drawings and instructions for the fire alarm reporting system. Submittals shall also include Fire Alarm and MNS Operations Matrix and battery back-up calculations. Drawings shall include but are not limited to the system's riser diagram, device layout and point-to-point wiring, battery calculations, and voltage drop calculations for all circuits (initiating, signaling, strobe, and speaker). Submittals shall include detailed test procedures, submitted 60 days prior to performing system tests. Test reports in booklet form showing all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system, shall be submitted. Each test report shall document all readings, test results and indicate the final position of controls. All submittals shall be signed and stamped by the qualified fire alarm system installer.

1.6.2.6 Testing

Notify the Contracting Officer 30 days before the preliminary and acceptance tests are to be conducted. The tests shall be performed in accordance with the approved test procedures in the presence of the Contracting Officer. The control panel manufacturer's representative shall be present to supervise all tests. All instruments and personnel required for the tests will be provided.

1.6.2.7 Preliminary Tests

Upon completion of the installation, the system shall be subjected to functional and operational performance tests including tests of each installed initiating and notification appliance. Tests shall include the meggering of all system conductors to determine that the system is free from grounded, shorted, or open circuits. The megger test shall be conducted prior to the installation of fire alarm equipment. If deficiencies are found, corrections shall be made, and the system shall be retested to assure that it is functional.

1.6.2.8 Acceptance Test

Testing shall be in accordance with **NFPA 72**. The recommended tests in **NFPA 72** shall be considered mandatory and shall verify that all previous deficiencies have been corrected. The test shall include but are not limited to the following:

- a. Test of each function of the control panel.
- b. Test of each circuit in both trouble and normal modes.
- c. Tests of alarm initiating devices in both normal and trouble conditions.
- d. Tests of each control circuit and device.
- e. Tests of each alarm notification appliance.
- f. Tests of the battery charger and batteries.
- g. Complete operational tests under emergency power supply.
- h. Visual inspection of all wiring connections.
- i. Opening the circuit at each alarm initiating device and notification appliance to test the wiring supervisory feature.
- j. Ground fault.
- k. Short circuit faults.
- l. Stray voltage.
- m. Loop resistance.
- n. Intelligibility testing of the system shall be accomplished in accordance with **NFPA 72** for Voice Evacuation Systems, IEC 60268-16 and **ASA S3.2**.

1.6.2.9 Field Training

Provide field training course (minimum 8 hours) in operation and maintenance of the fire alarm system for Fire personnel as stipulated by Contracting Officer.

1.6.2.10 Fire Alarm Reporting Zones and Zone Schedule

As a minimum, provide separate dedicated fire alarm zones for: 1 zone for

each water flow switch, 1 zone for OS&Y valves in riser room, 1 zone for all duct smoke detectors. Each of the above distinct zones shall be reported to the Fire Department. Confirm zone schedule defined herein with the Fire Department and modify to comply with Fire Department directions as necessary.

1.6.2.11 Closure of Fire-Rated Openings

If any fire-rated openings exist in any facilities, then provide interlocks between the FACP and all "fire-rated openings" to automatically close them upon the FACP going into an ALARM condition, as required.

1.6.2.12 Fire Alarm and Detection System Authority Having Jurisdiction

The Authority Having Jurisdiction (AHJ) for the fire alarm and detection systems designed and installed for this project is the Installation Fire Marshall. The fire alarm system design drawings and specifications shall be submitted to the Fire Marshall for review and approval. Submittal shall be through the Contracting Officer.

1.6.2.13 Fire Alarm System Disconnecting Means

A dedicated circuit shall feed the fire alarm system and shall be provided with a clearly marked circuit breaker.

1.6.3 Mass Notification System

Each facility shall receive a Mass Notification System (MNS) in accordance with **UFC 4-021-01**. The new control panel Autonomous Control Unit (ACU) shall be a combined Fire Alarm/Mass Notification System Panel. Provide local operating consoles (LOCs) near the main fire exits. Mass Notification System shall be wired Class B per **NFPA 72**. In anticipation of forthcoming update to **UFC 4-021-01**, which will change Air Force MNS requirements for visual notification to match the Navy requirements, provide combined Fire Alarm/MNS strobes colored clear/white, labeled "ALERT". Also, provide LED text signs in accordance with Navy visual appliance network requirements. Operating mass notification audible signals shall take precedence over and mute audible signals from the fire alarm system and also from the local audio system. Coordinate preferred type of mass notification system with Installation through the Contracting Officer.

1.7 MECHANICAL DESIGN

1.7.1 Design Submittal

Complete mechanical systems design calculations shall be submitted in accordance with requirements indicated in RFP Section **01 33 16 DESIGN AFTER AWARD** and the succeeding paragraphs.

1.7.2 Design Analysis

Provide a design analysis/narrative for the criteria usage, outdoor and indoor design conditions, HVAC system selection, U-factors, ventilation rates, control strategies, personnel loads, equipment loads, domestic water, domestic waste, natural gas, systems; domestic plumbing fixtures, fire protection, force protection requirements, etc.

1.7.3 Calculations

Provide calculations leading to sizing of distribution systems, selection of equipment, power requirements, controls, fans, ductwork, air handling units, cooling coils, heating coils, boilers, hydronic piping, hydronic pumps, filters, diffusers, grilles, registers, condensing units, louvers, domestic water heater, domestic water pump, plumbing fixture count, domestic waste pipe size, domestic water pipe size, building loads, fire sprinklers, fire pumps, etc.

1.7.4 Drawings

Drawings shall be complete and detailed showing the location of all major equipment components, routing of major ductwork, layout of HVAC zones, routing of all fluid lines, location of all fire risers, system type (wet pipe, dry pipe, etc.), water density for the various buildings/rooms, etc. Listed are examples of required drawings: legend and abbreviations, ductwork drawings, hydronic piping drawings, domestic water drawings, sanitary waste and vent piping drawings, control drawings including schematics, ladder diagrams, I/O schedule, and sequence of operation for all HVAC equipment, equipment schedule drawings, elevations/cross-sections, enlargements of mechanical rooms, details, fire pump details, fire protection drawings, etc.

1.7.5 Equipment Catalogue Sheets

Provide catalogue cuts of all major components.

1.7.6 Seismic Protection

All equipment per Section 13 48 73 SEISMIC PROTECTION FOR MECHANICAL EQUIPMENT shall be seismically braced.

1.7.7 Equipment

Equipment selection and layout shall comply with the manufacturer's recommended clearances and code clearances and shall be annotated on the drawings.

1.7.7.1 Ancillary Equipment

All ancillary equipment such as unions, strainers, shut-off valves, check valves, gauges, air vents, relief valves, sight glasses, vibration dampers, escutcheons, expansion joints, dirt legs, balancing valves, regulators, switches, sleeves, caulking, sealants, etc., shall be provided for the proper installation, operation, servicing, and removal of all equipment without the need to shut down an entire system. Details shall show all ancillary equipment.

1.7.8 Concrete Pads

All floor mounted and ground mounted equipment indoors and outdoors shall be mounted on 6-inch thick concrete housekeeping pads, unless otherwise indicated. Drawings shall indicate the size and locations of all housekeeping pads.

1.7.9 Expansion Joints/Anchors/Guides

Expansion of all piping will be computed by the method outlined in the

ASHRAE Handbook, Equipment. Expansion of plastic piping will be determined from the Plastic Pipe Institute Technical Report PPI- TR21, Thermal Expansion and Contraction of Plastic Pipe. If expansion joints are required, drawings and calculations shall be provided.

1.7.10 Insulation

Hot water, hot water re-circulation, ductwork, air handlers, pumps, and other applicable equipment shall be insulated. Insulation applied to piping located outside of the facility or underground within a concrete trench shall be cellular glass conforming to **ASTM C552**, Type II, and Type III and the insulation shall be installed with the manufacturer's recommended factory applied jacket. The use of flexible cellular insulation conforming to **ASTM C534/C534M** or **ASTM D1056** is prohibited. Insulation materials and installation shall be in accordance with Section **23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS**. Insulation requirements will be indicated in the contract documents.

1.7.11 Elevation

Design and selection of all equipment shall take into account the effects of elevation, provide calculations.

1.7.12 Testing, Adjusting, and Balancing (TAB)

Submit all Testing, Adjusting, and Balancing (TAB) reports. TAB will be required on HVAC, plumbing, and fire protection systems. The "Design Agent's Representative" will be a member of the design team, i.e. from the AE. The "Design Agent's Representative" will actively participate in the process, including review of all submittals contained herein and participation in TAB verification. The use of Section **23 05 93 TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS** is mandatory.

1.7.13 Commissioning

Submit all commissioning reports. Commissioning of all HVAC, plumbing, and fire protection systems is mandatory and shall be in accordance with ETL 90-10 (Commissioning of Heating, Ventilating, and Conditioning (HVAC) Systems Guide Specification). The "Design Agent's Representative" will be included as a member of the commissioning team for the pre-commissioning checklists and will participate in the functional performance tests. The following representatives will participate in the commissioning process:

- a. Contractor's Chief Quality Control Representative
- b. Contractor's Mechanical Representative
- c. Contractor's Electrical Representative
- d. Contractor's Testing, Adjusting, and Balancing Representative
Contractor's Controls Representative
- e. Design Agent's Representative
- f. Contracting Officer's Representative
- g. Using Agency's Representative
- h. EMCS Agency's Representative

1.7.14 Training

A training plan shall be submitted. Training shall be provided for the operation, trouble-shooting guidelines, part ordering, controls, sequence of operation, preventative maintenance, preventive maintenance schedules, safety guidelines, etc., for the base maintenance personnel, building occupants/battalion chief, energy manager, etc. Training shall be done on-site, and all equipment Operation and Maintenance manuals shall be provided. Eight personnel shall be trained on the following for the hours specified below:

- a. HVAC Systems 8 hours
- b. HVAC Controls 8 hours
- c. Plumbing Systems 4 hours
- d. Fire Protection System 4 hours

1.7.15 Access Panels

Access panels/doors shall be provided as required for all HVAC, Plumbing, and Fire Protection equipment and appurtenances such as fire dampers, valves, water hammer arrestors, etc.

1.8 HVAC DESIGN

1.8.1 Facility Operational Hours

24 hours per day, 7 days per week

1.8.2 Fuel Sources

Heating: Natural Gas

Cooling: Electric

1.8.3 Site Criteria

The following site conditions and data shall be used in system design:

Project Location: Travis AFB, CA

Latitude: 38 degrees 16' N

Longitude: 121 degrees 55' W

Elevation: 63 ft.

ASHRAE Standard 90.1 Climate Zone: 3B

1.8.4 Outside Design Temperature Requirements

Design Temperatures shall be based on engineering weather data from Appendix D and these design requirements. The following design temperatures are provided for initial reference:

Outside Summer (1%): 94.9 degrees F DB, 66.9 degrees F WB

Outside Winter (99.0%): 34.4 degrees F DB

1.8.5 Indoor Design Temperatures

Indoor design temperatures shall be as indicated in Section 01 10 11 FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS.

1.8.6 Summer Indoor Design for Mechanical and Electrical Rooms

See Section 01 10 11 FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS for specific room requirements.

1.8.7 Energy Conservation

The facility shall be designed in accordance with the Energy Policy Act of 2005, the Energy Independence and Security Act of 2007, EO 13693, and the implementation requirements found in "Guiding Principles for Sustainable Federal Buildings and Associated Instructions" (HPSB Guiding Principles) as required in **UFC 1-200-02**. The facility shall achieve an energy consumption level that is at least 30 percent below the level required under **ASHRAE 90.1 - IP** in a life cycle cost effective manner. If 30% energy consumption cannot be achieved based on life cycle cost effectiveness, then the Contractor shall step the percentage down until a life cycle cost effective manner is achieved. See also paragraph 5 Sustainable Design for more information.

An Energy Compliance Analysis (Building Simulation Program) utilizing TRANE Trace version 700, Carrier Hourly Analysis Program (HAP), or another full simulation software to provide system energy consumptions is required.

The Building Simulation Program shall document all inputs and outputs.

Provide a summary sheet detailing the building components (insulation values, fenestration, envelope construction, etc), lighting parameters, HVAC parameters, equipment efficiencies, energy consumption savings, etc., for the Baseline Design versus the Proposed Design as defined per the latest **ASHRAE 90.1 - IP**.

Provide a short report giving the estimated utility consumption for building HVAC, lighting, water etc. The utility consumption estimates shall include estimated plug loads.

1.8.8 Life Cycle Cost Analysis

A Life Cycle Cost Analysis (LCCA) was performed to determine the baseline mechanical systems described below. The design-build contractor may suggest alternate systems insofar as they are proven to be more life cycle cost effective than the baseline systems.

The BLCC program reports will document all inputs and outputs.

The actual site utility costs at the installation shall be input into the BLCC program for the ICC equipment selection.

Evaluation of cooling and heating systems shall include a comparison of three or more system types as allowable based on the region and building characteristics, building design features and available

energy sources. The final design shall include a short (a few pages describing results, methods, reason for selection and why, etc.) summary report and Building Life Cycle Cost (BLCC) program output and input. See basis of design (cooling and heating) for one of the required system types.

Provide reasonably detailed cost estimates for each system studied as part of the design analysis.

The life cycle cost analysis shall run for a minimum of 25 years and shall include any final salvage values and annual costs for operation and maintenance based upon ASHRAE estimation methods for those costs. Salvage costs shall be documented in cost estimates and should generally be restricted to larger equipment items such as boilers, chillers, cooling towers, pumps, and large air handlers, for example.

The maintenance report shall, within a few pages, provide detail for major equipment such as, air handlers, condensers, chillers, pumps, the proprietary maintenance and replacement intervals and material requirements.

1.8.9 Cooling Systems

1.8.9.1 Cooling System Sizing Requirements

The capacity of the HVAC system shall be selected based upon the maximum and minimum cooling needs of the facility. System capacity shall be selected such that it is able to turn down and meet the minimum cooling and dehumidification needs of the facility during cooler seasons when only minimal cooling is required.

1.8.9.2 Equipment Heat Release Data, Personnel, and Lighting Loads

Internal load heat gains for the cooling and ventilation parameters are to be included (100%) in the mechanical HVAC load calculations, unless indicated otherwise. In addition, the design shall include any heat gain loads from mechanical heat generating equipment (i.e., motors, compressors, fans, etc.) and electrical heat generating equipment (i.e., audio-visual equipment, UPS units, inverters, generators, electrical panels, transformers, etc.) that are installed within spaces being cooled that are not listed below. Lighting Loads (100% to Space) shall be per electrical calculations, maximum demand.

1.8.9.3 Basis of Design (cooling and air systems)

The following is to be used as basis of design. Capacities given are minimum capacities. If during the design, the HVAC loads determine greater capacities, the greater loads shall be used.

- a. The building shall be served by a 4-pipe hydronic system with terminal fan coil units.
- b. The existing Carrier brand air-cooled condensing unit shall remain and be reused.
- c. The terminal units serving the dormitory rooms shall not be ducted. The fan coil units shall be located in a soffit in the space whereby return air shall be taken directly into the unit and supply air blown from the unit directly into the space. Maintenance access to the fan

- coil units shall be from a panel below.
- d. Fan coil units serving common areas shall be ducted to the space served.
 - e. Fresh air shall be supplied by a dedicated outside air system (DOAS) unit and ducted directly to the fan coil units. The DOAS unit shall also provide exhaust from the building. Exhaust air shall pass through an energy recover ventilator (ERV). The DOAS unit shall be capable of 4415 cubic feet per minute (cfm) of total airflow and a total cooling capacity of 42,000 British thermal units per hour (btu/h).
 - f. Two chilled water pumps capable of a flow rate of 98 gallons per minute (gpm) at 65 feet of head pressure, controlled by variable frequency drives (VFD), shall circulate chilled water through the system in an N+1 configuration; each pump shall be capable of 100% of the scheduled system flow rate.

1.8.10 Heating Systems

1.8.10.1 Heating System Selection Criteria

Terminal units shall provide uniform, consistent and comfortable space conditions with zoned temperature control. Minimum ventilation rates shall be maintained according to [ASHRAE 62.1-2019](#) during heating. For all systems, equipment shall be located for ease of maintenance access with minimal disruptions. Locating terminal units above ceilings is acceptable insofar as access to maintain the equipment is provided.

- a. The use of cast iron boilers is prohibited. Provide boiler water testing sample points on all hot water systems. Provide chemical feeding systems on all hot water heating systems. Provide automatic, pilotless, ignition systems on all gas-fired equipment. Install thermostats on heating supply and return lines. Install pressure gauges with valves on suction and discharge lines to all pumps. Install gas pressure gauges with valves on all gas trains on boilers.

1.8.10.2 Personnel Loads

The number of assigned personnel per room shall be based on SECTION [01 10 11](#) FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS. If a room does not give the assigned number of personnel, then the Occupant Density per square footage as outlined in [ASHRAE 62.1-2013](#) shall be utilized.

1.8.10.3 Equipment Loads

Equipment loads shall be based on SECTION [01 10 11](#) FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS and typical office equipment not listed i.e., printers, coffee pots, fax machines (miscellaneous loads).

1.8.10.4 Basis of Design (heating design)

The following is to be used as basis of design. Capacities given are minimum capacities. If during the design, the HVAC loads determine greater capacities, the greater loads shall be used.

- a. Two (2) sealed combustion boilers with an input capacity of 260,000 btu/h, located in the mechanical room, shall serve the heating

- requirements of the building. Heating water shall be supplied to the DOAS unit and fan coil units. The boilers will have individual circulating pumps.
- b. Two heating water pumps capable of a flow rate of 65 gpm at 50 feet of head pressure, controlled by VFD, shall circulate chilled water through the system in an N+1 configuration; each pump shall be capable of 100% of the scheduled system flow rate.
 - c. The DOAS unit shall be capable of 4415 cubic feet per minute (cfm) of total airflow and a total heating capacity of 90,300 British thermal units per hour (btu/h).

1.8.11 Outdoor Air Requirements for Ventilation

The building shall be provided with outside air in accordance with **ASHRAE 62.1-2019**, based on occupancy and/or type of space. Air distribution systems shall be designed to ensure that minimum outside air requirements are provided to the building year round. Infiltration shall not be considered as supplementing the outside air requirements.

1.8.12 Exterior Ground Mounted Equipment

Ground mounted equipment may include air cooled chillers in a mechanical yard.

1.8.13 Roof Mounted Equipment

Rooftop mounted equipment may include outdoor air intakes or exhaust air hoods. All roof mounted equipment in direct sunlight will be exposed to an ambient temperature of 140 degrees F due to direct sunlight heating. All equipment must be rated or derated for this operation.

1.8.13.1 Ductwork and Piping

All ductwork and piping shall run under the roof and/or inside when possible. Ductwork and piping exposed to outdoors shall be insulated per Unified Facilities Guide Specification Section **23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS**.

1.8.14 Antiterrorism and Force Protection

Refer to **UFC 4-010-01** DoD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS, Change 1, 1 October 2013, Appendix B-4. As each is applicable to the equipment layout of the final design, implement Standard 16 Air Intakes, Standard 17 Mail Room and Loading Dock Ventilation, Standard 18 Emergency Air Distribution Shutoff, Standard 19 Equipment Bracing, and Standard 20 Under Building Access.

1.8.15 Pressurization

1.8.15.1 Building Pressurization

The building as a whole shall be maintained at a neutral pressure with respect to the outside air.

1.8.15.2 Space Pressurization

Requirements for differential pressurization shall be analyzed for

adjoining spaces especially for spaces such as restrooms, janitor's closets, protective clothing locker, disinfecting facility, and other areas as outlined in Section 01 10 11 , etc. to prevent infiltration of toxic vapors, exhaust fumes, etc. from entering into the administrative and personnel living spaces. Control strategies for HVAC systems shall be incorporated to maintain the proper differential pressure between adjoining spaces as required by building codes and regulatory agencies.

1.8.16 Sound and Vibration Control

The entire HVAC system to include all ductwork, piping, etc., shall be designed and installed to insure that the required acoustical environments for all occupied spaces are met. HVAC systems shall be designed in accordance to UFC 3-450-01. Also, it is highly recommended that the HVAC designer consult the Sound and Vibration Control and the Sound and Vibration Fundamentals chapters of the ASHRAE Handbooks. The use of UFGS 22 05 48.00 20 MECHANICAL SOUND, VIBRATION, AND SEISMIC CONTROL is mandatory. The designer of record shall provide calculations of expected sound levels and provide detailed drawings showing the methodology to counter any excessive sounds and vibrations. Sound pressure testing shall be conducted per UFC 3-450-01 with COR present. Typical room criteria are listed below:

Bedrooms/Dormrooms: NC 20-30 (N)

Large Offices (open plan): NC 35-40 (N)

Small Offices (private): NC 30-35 (N)

Small Conference/Class Rooms: NC 25-35 (N)

Circulation and Public Lobbies: NC 40-45 (N)

Break Rooms and Game Rooms: NC 40-45 (N)

Sound quality (N) Neutral (Bland) shall be the only sound-quality descriptor used.

1.8.17 Duct System Design

Ducted return system and not a plenum system shall be employed. A ducted supply plenum may be used for the GCS and LAN spaces. All supply, return, intake, and exhaust ductwork shall be constructed of galvanized sheet metal, unless otherwise not permitted, and shall be as specified in the Unified Facilities Guide Specifications. All duct fittings (including elbows, tees, and offsets) shall be constructed of rigid sheet metal. Non-metallic flexible duct run outs to air distribution devices shall be insulated and shall be limited to 5 ft. in total length. Flexible duct shall only be used on straight runs of ducts (horizontal or vertical) and shall not be installed with elbows or with offsets greater than 1/2 duct diameter. The ductwork shall be insulated in accordance with UFGS Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS. Duct and air distribution devices shall meet the velocity requirements indicated in the ASHRAE Handbook - HVAC Applications.

1.8.18 Louvers

Louvers shall be constructed of extruded aluminum and shall be factory finished as required to match the architectural features of the building.

The location of all outside air intake louvers shall be located a minimum of 10'-0" above finish grade. All louvers shall utilize bird/insect screens.

1.8.19 Volume Dampers

Manual balancing dampers shall be furnished with accessible operating mechanisms. Where operators occur in finished portions of the building, operators shall be chromium plated with all exposed edges rounded. Volume dampers shall be provided for all supply ducts to diffusers, and outside, return, and exhaust air ducts to ensure proper balancing and mixing within the system. Dampers integral with registers or diffusers will not be considered volume dampers for the purpose of balancing.

1.8.20 Air Filters

Air filters shall be provided in accordance with **UFC 3-410-01** FA and UFGS **23 00 00** AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. The air filters shall be located in the air handling equipment. Placement of filters within ceilings, ducts or factory/field assembled filter banks is prohibited.

1.8.21 Fire Dampers

Fire dampers shall be provided according to **NFPA 90A** when required by code. Fire dampers shall be as specified in UFGS **23 00 00** AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. The designer shall indicate on the construction drawings the location of each fire damper and details of the damper installations.

1.8.22 Diffusers, Grilles and Registers

Air distribution devices shall be factory fabricated of steel, corrosion resistant steel, or aluminum and shall distribute the specified quantity of air evenly over space intended without causing noticeable drafts and air movements in occupied zones or dead spots anywhere in the conditioned area. Inlets and outlets shall be sound rated and certified according to **ASHRAE 70**. Diffusers and registers shall be as specified in UFGS **23 30 00** HVAC AIR DISTRIBUTION and shall be color coordinated with the architectural design.

1.8.23 HVAC System Selection and Design

HVAC system selection and design shall be in accordance with the following criteria with the order of precedence as follows:

- (1) RFP requirements (both Section **01 10 10** and Section **01 10 11**), (2) **UFC 3-410-01**, and (3) other applicable criteria.

1.8.23.1 Administration Areas, Break Rooms, Offices, Conference Rooms, Circulation Areas, and Similar Occupancies

Refer to paragraphs above for cooling and heating system types and Section **01 10 11** FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS for specific room requirements.

Note: Rooms such as the maintenance, and storage rooms may or may not be permitted to be supplied from the centralized variable air volume air handling unit and/or return air shall not be permitted back to the air handling unit. A/E designer shall review requirements in Section **01 10 11**

FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS and determine the appropriate HVAC application for all zones.

1.8.23.2 Telecommunications Room

This room shall be conditioned 24 hours-per-day, 365 days-per-year with a dedicated system per EIA/TIA 569 (TI-800-01).

1.8.23.3 Electrical Rooms

Provide mechanical cooling as necessary to maintain a maximum temperature of 90 F in electrical rooms. Set point shall not be lower than 90 F.

1.8.23.4 Mechanical Rooms

Provide mechanical heating and cooling as necessary to maintain a minimum temperature of 45 F and maximum temperature of 90 F in mechanical and fire riser rooms. Cooling set point shall not be lower than 90 F.

1.8.23.5 Bathrooms

These areas shall be indirectly conditioned by transfer air from adjacent spaces.

1.8.23.6 Seismic Bracing

Seismic bracing shall comply with UFGS 13 48 73 SEISMIC CONTROL FOR MECHANICAL EQUIPMENT.

1.8.24 Equipment Efficiency

Minimum equipment efficiencies shall be in accordance with [ASHRAE 90.1](#).

1.8.25 HVAC Controls

1.8.25.1 Control System

Provide a BACnet building automation system. Correct operation of the control system including, but not limited to, software, graphics, programming, control relays, and control wiring is the responsibility of the Contractor. Provisions shall be made for the BACnet control system to be fully compatible with and connect to the existing base-wide system with the ability to monitor energy use and HVAC status and alarm signals. Provide seamless integration with the existing base Energy Management Control System (EMCS) Operators Workstation (OWS) located in Building 877 and update the existing EMCS OWS database to include floor plan graphics and AT/FP activation notification. New control system shall be carried on new local area network (LAN) to be installed at the facility.

1.8.25.2 Building Control Systems

Building level controls shall be in accordance with UFGS 23 09 23.02 BACNET DIRECT DIGITAL CONTROL FOR HVAC AND OTHER BUILDING SYSTEMS. Provide pre-programmed stand-alone single or multiple loop microprocessor PID controllers to monitor/control the operation of all mechanical systems/subsystems. All facility network / equipment controllers shall be able to operate independent of main base central EMCS system. Consider the anticipated occupancy pattern when developing HVAC control sequence of operations in order to ensure that overall life cycle cost is minimized.

Evaluate opportunities such as occupancy sensors in this facility.

BUILDING SYSTEMS. The DDC system shall include all application software and equipment to implement the sequences of operation listed in UFGS 23 09 93 SEQUENCES OF OPERATION FOR HVAC CONTROL. Pneumatically operated control devices shall not be used. The building shall be provided with tamper-proof temperature sensors with remote adjustment. The design package shall satisfy the requirements set forth in UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems, including but not limited to:

- a. Provide for remote monitoring, including advance meters, HVAC, generators, etc. Use remote sensors so that controllers can be centrally located in the mechanical room.
- b. Provide logical grouping of controllers, adapters, relays, and power supplies in an easily accessible controls cabinet mounted away from vibrating machinery.
- c. Provide electronic system terminal strips cross-referenced to the control schematic to facilitate troubleshooting and calibration.
- d. Provide control schematic, elementary diagram, control sequence, description of components, control panel details, legends, and schedules in the design.
- e. Provide a system with at least the minimum points listed in UFC 3-410-01 Appendix D.

Specific HVAC and Plumbing system and equipment control requirements shall include:

- a. Wired controllers for fan coil units to eliminate battery replacement.
- b. High space temperature alarms.
- c. Local outside air sensor on North face of build and protected from the elements.
- d. Domestic hot water supply temperature monitoring and low temperature alarm.
- e. Perform point to point verification and function testing from base EMCS OWS to ensure graphics are accurate and new control points / systems function as designed.

1.8.25.3 Point Schedule

Refer to UFC 3-410-02 DDC for HVAC and Other Building Systems, and base point schedules on HVAC system type that most resembles the type of system being designed.

The point types shall be coordinated with the Energy Management Staff during the design charrette. EMCS Override Restrictions/Limitations: Points such as status and alarms for filters, space temperature, etc shall be provided. Overrides, start/stop, lockouts relays, reset switches, etc., shall be coordinated with the client and the EMCS department during the design charrette.

1.8.25.3.1 Pulse Initiators

Provide water, gas, and electric meters with pulse initiators as required per base standards.

1.9 PLUMBING DESIGN

1.9.1 Materials

Supply, Drain, Waste, and Vent Piping Systems: Piping system for outside of the five-foot line of the building is to be as specified under the civil portion of the design criteria. Vent piping shall be combined wherever possible to reduce the number of roof penetrations required.

1.9.2 Vibration/Noise Isolation

Water hammer arresters shall be used to minimize water system noise in accordance with **PDI WH 201**. Velocities in Domestic Water shall be a maximum of 6 feet per second.

1.9.3 Water

1.9.3.1 Domestic Water

System design and installation shall be in accordance with **UFC 3-420-01** Plumbing Systems

1.9.3.1.1 Domestic Water Supply Pressure

See paragraph 6 Civil Design for domestic water supply pressure and paragraph 13 Fire Protection for requirements.

1.9.3.1.2 Insufficient Water Pressure

If the water supply pressure is determined to be inadequate a booster pump and a diaphragm expansion tank will be supplied. The diaphragm expansion tank shall be sized to prevent the booster pump from cycling on-off excessively.

1.9.3.2 Domestic Water Supply

Water service for the facility shall be brought into the Mechanical Room.

1.9.3.3 Water Softener

Provide water softener as necessary for hydronic system components, according to the equipment manufacturer water quality requirements.

1.9.3.4 Domestic Water Piping System Requirements

All domestic water pipe within and attached to the building shall be replaced with new properly sized type L copper pipe with soldered fittings. The domestic cold and hot water piping systems shall be designed for a maximum system piping loss of 10 psig at full system flow. Maximum fluid flow rates in the hot or cold piping system shall not exceed 10 feet per second. The piping shall be extended to fixtures, outlets, and equipment. The domestic hot water and cold-water piping system shall be arranged and installed to permit draining. The supply line to each item of equipment or fixture, except faucets, flush valves, or other control

valves that are supplied with integral stops, shall be equipped with a shutoff valve to enable isolation of the item for repair and maintenance without interfering with operation of other equipment or fixtures. Shutoff valves shall be installed to allow isolation of each building wing on each floor. Supply piping to all fixtures shall be anchored to prevent movement.

1.9.3.5 Domestic Water Heating Systems

Domestic water heaters shall be provided and located in the Mechanical Room. Size domestic water heater(s) to adequately serve the needs of the facility. Design shall be in accordance with ASHRAE Handbook - HVAC Applications, "Service Water Heating." Minimum thermal efficiency shall be no less than 80 percent unless noted otherwise. All water heaters provided shall be fully automatic with safety controls. Provide a ICCA comparing domestic water heating system types. Per **UFC 1-200-02** High Performance and Sustainable Building Requirements and EISA Section 523, meet at least 30% of the domestic hot water demand through the installation of solar water heating if life cycle cost effective.

1.9.3.6 Diaphragm Expansion Tank

Provide a diaphragm expansion tank on the cold-water line between the backflow preventer and the domestic hot water storage tank.

1.9.3.7 Hose Faucets

Provide a minimum of 1 hose bibbs on each face of the building exterior, spaced approximately **150 feet** apart, and one yard hydrant or hose bibb in each mechanical yard.

1.9.3.8 Landscape Irrigation Connection

Provide water connection for landscape irrigation system. Provide backflow devices on site as required.

1.9.3.9 Backflow Prevention Devices

Backflow prevention devices shall be provided as needed to prevent cross-contamination of the domestic water within the confines of the building and at the service entrance.

1.9.3.10 Cold Water Service for Appliances

Water line connections for refrigerators, ice machines, and the like shall be provided. Each water connection shall terminate in a bronze angle valve. Valves shall be fitted with provisions for a **1/4 inch** stainless steel braided tubing screw fitting. Each valve shall be provided in a manufacturer's standard recessed wall box constructed of sheet steel or plastic. Steel wall boxes shall have a corrosion resistant epoxy enamel finish and color shall be coordinated with the architectural design. Refer to paragraph Plumbing Fixtures for the type and quantity of appliances.

1.9.3.11 Maximum Velocity

The design flow rate for domestic water shall not exceed 10 feet per second.

1.9.4 Domestic Waste

All lavatory and sink drains and P-traps shall be coordinated with architectural work. The building Sanitary Sewer shall be designed in accordance with the International Plumbing Code. Coordinate location of floor sinks and floor drains with the structural discipline for floor sloping requirements. Provision shall be made to collect condensate drains and drain to the sanitary sewer.

1.9.4.1 Domestic Waste Piping

Minimum buried waste or vent pipe size shall be 2-inch diameter and minimum building drain size shall be 4-inch diameter.

1.9.4.2 Floor Drains

Floor drains shall be provided for all bathrooms, mechanical room, and fire riser room. All floor drains to have trap primers installed. Drains for condensate lines to have trap primers or other automatic means to flush and dilute condensate.

1.9.4.3 Traps

Traps for lavatories and sinks shall be chromium-plated, adjustable-bent tube, 20-gauge brass, or plastic (ABS) if not exposed.

1.9.4.4 Stops

Stops will be provided on water supply lines to all plumbing fixtures. All incoming water lines to sinks and toilets shall have 90 degree turn wall shutoffs (stops) with separate braided stainless steel supply lines. No combination shutoffs with supply lines are permitted. Supply lines must be removable without removal of shutoff from supply.

1.9.4.5 Cleanouts

Interior cover plates for cleanout plugs shall be brass or stainless steel. Floor cleanouts shall not be allowed in admin areas, corridors, break rooms, and other similar type rooms, especially for any room that has carpeting, wood floors, vinyl coverings, etc. Cleanouts shall be the same size as the pipe. Provide an approved two-way cleanout immediately outside of the facility at the lower end of the building drain. Major horizontal trunk lines shall have cleanouts at far end, in center, and at the exit to the street. All vertical drops between floors shall have cleanouts on each floor.

1.9.4.6 Waste Connections for Appliances

Provide waste connections for all required appliances.

1.9.4.7 Condensate Drain Piping and Insulation

Condensate drains from HVAC equipment shall meet the requirements set forth in the International Plumbing Code. All drain piping shall be copper. The piping shall include a trap of sufficient depth to overcome static pressure of the unit. All piping shall be insulated with 1-inch thick mineral fiber or 1-1/2 inch thick cellular glass. Piping shall be extended to the floor drain or floor sink. If condensate drains in occupied rooms cannot be located in an aesthetically ideal location,

provide condensate pumps to drain condensate elsewhere.

1.9.4.8 Cross Tees

Use of cross tees prohibited on drain lines. All straight cross tees on sewer piping are to be replaced with 2 single wye or 2 sanitary tees where possible to avoid future cross snaking of the lines. If not possible due to space constraints, a double combination wye tee may be used with written approval in advance of the base CE project manager.

1.9.4.9 Vent Stacks

Vent stacks in attic spaces shall have expansion joints to keep piping from cracking.

1.9.5 Plumbing Fixtures

The type, quantity, and requirements of fixtures required shall be based on the architectural narrative, any floor plan provided, and the requirements listed below. Fixtures shall adhere to the requirements indicated in UFGS 22 00 00 PLUMBING, GENERAL PURPOSE. Low water consumption fixtures shall be utilized unless otherwise indicated. Flush fixtures shall have both automatic infrared flush control and manual flush control.

1.9.5.1 Water Closets

Manual flush valve-type; not battery powered, elongated bowl, floor mounted. Seat: White plastic, elongated, open front.

1.9.5.2 Urinals

Urinals shall be low flow, maximum 0.5 GPF.

1.9.5.3 Service (Mop) Sinks

Provide service sink in Janitor Room. Precast terrazzo, 6-inch drop front, 24 by 24 by 12, corner. Trap standard, floor mounted.

1.9.5.4 Lavatories

All lavatories shall be manufacturer's standard sink depth, enameled cast iron or vitreous china, oval type, and shall comply with ASME A112.19.1/CSA B45.2 or ASME A112.19.2/CSA B45.1. Strainer shall be copper alloy or stainless steel. Countertop lavatories shall be self-rimming. Wall hung lavatories shall be carrier supported.

1.9.5.5 Kitchen Sink

Kitchen sinks shall be a double bowl constructed of 18-gauge stainless steel. Sink shall be self-rimming stainless-steel ledge and seamlessly drawn. Sink shall be fully undercoated to dampen sound and prevent condensation. Sink to have four holes. Provide with 12 inch swing spout, separate hot and cold-water cross handles, retractable hand spray, brass valve bodies, polished chrome finish. Sink to accept disposal.

1.9.5.6 Drinking-Water Coolers with Bottle Filling Station

Provide drinking water coolers conforming to AHRI 1010 with more than a

single thickness of metal between the potable water and the refrigerant in the heat exchanger, wall-hung, bubbler style, air-cooled condensing unit, 4.75 gph minimum capacity, stainless-steel splash receptor and basin, bottle filler and stainless-steel cabinet. Bubblers shall be controlled by push levers or push bars, front mounted or side mounted near the front edge of the cabinet. Bubbler spouts shall be mounted at maximum of 36 inches above floor and at front of unit basin. Spouts shall direct water flow at least 4 inches above unit basin and trajectory parallel or nearly parallel to the front of unit. Provide ASME A112.6.1M concealed steel pipe chair carriers. See architectural section for locations.

1.9.6 Appliances

All appliances provided under this contract shall be Energy Star Compliant, provided by same manufacturer, and shall be color coordinated. The following appliances and/or utility connections shall be provided or accommodated for:

1.9.6.1 Sink Food Disposal

Sink food disposal shall be commercial grade with 2 stainless steel anti-jam swivel impellers, stainless steel grind chamber & under-cutter blade, 6 inch food waste throat opening, 5-3/8 inch diameter stainless steel turntable, siphon breaker to prevent backflow of dirty water & solenoid valve to ensure water is in grind chamber when disposer is running, dynamically balanced, case alloy grind ring with dual stage grinding action, and have a 1 horsepower rated motor.

1.9.6.2 Refrigerator (NIC)

Provide cold water stub-out and shut-off valves.

1.9.6.3 Ice Machine (NIC)

Provide cold water make-up and an indirect waste connection (floor sink with grate).

1.9.6.4 Valves

All plumbing fixture valves shall be provided in accordance with the International Plumbing Code. Valves shall be provided on supplies to equipment and fixtures. Valves 2-1/2 inches and smaller shall be chrome plated bronze with threaded bodies for pipe and solder-type connections for tubing. Valves 3 inches and larger shall have flanged iron bodies and bronze trim. Pressure ratings shall be based upon the application.

1.9.7 Thermostatic Mixing Valves

Combination thermostatic and pressure-balanced shall be provided for each showerhead and shall be line size and shall be constructed with rough or finish bodies either with or without plating. Each valve shall be constructed to control the mixing of hot and cold water and to deliver water at a desired temperature regardless of pressure or input temperature changes. The control element shall be of an approved type. The body shall be of heavy cast bronze, and interior parts shall be brass, bronze, corrosion-resisting steel or copper. The valve shall be equipped with necessary stops, check valves, unions, and sediment strainers on the inlets. Mixing valves shall maintain water temperature within 5 degrees F of any setting.

1.10 ELECTRICAL DESIGN

1.10.1 GENERAL

Electrical work in this project includes the demolition of existing electrical and telecom services and the construction of new power, lighting, communications and fire alarm/mass notification systems for two new buildings to comply with applicable UFCs, standards and codes. Minimum electrical design includes telecom work, service feeders, pad mounted receptacles, and all associated conduit, wiring, and connections for these systems.

Demolition shall include the complete removal of equipment, conduit, wiring, fixtures and/or devices with all its accessories and attachments, unless stated otherwise. Contractor is responsible for disposal of all demolished materials according to California and Federal Regulations.

1.10.1.1 Outage Coordination

Electrical work including any outage requirements for connections to existing electrical system shall be coordinated through the Contracting Officer. A formal outage request a minimum of 21 days in advance of any power utility outages required. Outage durations shall be minimized in duration and number to the maximum extent possible.

1.10.1.2 UL Label

All electrical material and equipment shall be Underwriters Laboratories, Inc. (UL) listed, UL labeled (if not available), or be labeled by a similar organization acceptable to the Government. The label or listing will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency.

1.10.1.3 PCB Standards

Electrical equipment supplied shall be free of Polychlorinated Biphenyl's (PCB).

1.10.1.4 New Equipment

All electrical equipment/materials will be new and installed within 24 months of production.

1.10.1.4.1 Capacity

All feeders, main service switchboard(s), transformers, distribution panel boards, and panel boards shall have 25% spare capacity. Use the demand and diversity factors as recommended in [NFPA 70](#), unless stated otherwise.

1.10.1.4.2 Short Circuit

All equipment protective devices shall be properly coordinated to provide selective tripping. Series rated protective equipment and/or devices will not be allowed.

1.10.1.4.3 Arc Flash

All electrical systems shall comply with [NFPA 70E](#).

1.10.1.1.5 Warning Signs and Safety Labels

Provide and install all warning signs and safety labels required for the installation, operation, and maintenance of the building's electrical systems including the following:

- a. General use safety labels.
- b. Arc flash warning labels shall be generic as per **UFC 3-560-01** Figure 1-4.
- c. Short circuit rating and load information labels on panels.

Safety labels and warning signs shall be readable from each accessible side. Space the signs in accordance with **NFPA 70E**.

1.10.1.1.6 Nameplates and Identification Tags

Provide and install all nameplates and identification tags required for the installation, operation, and maintenance of the building's electrical systems including the following:

- a. Panel Nameplates. Include panel numbers, motor control centers, disconnects, motors, electrical devices, and controls. All electrical equipment, devices, and controls shall be clearly identified and tagged.
- b. Laminated plastic nameplates for each switchboard, panelboard, equipment enclosure, motor controller, relay, and switch identifying its function, number and, when applicable, source of power and location of source of power. Provide melamine plastic nameplates, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be **1-inch by 2-1/2-inches**. Lettering shall be a minimum of **0.25 inch** high normal block style.
- c. Cable and Wire Numbers. Provide cable numbers on all cables (both ends) and wire numbers on all wires at their termination points.
- d. Motor Numbers. Tag motors with motor numbers on permanently attached tags. Motor number shall be as shown on power one line and control schematics.
- e. Control Stations. Tag all control stations with the control station number, description of motor, and motor number with a laminated plastic nameplate.
- f. Controls. Tag and identify all controls and control wiring (such as HVAC controls). Tag and identification shall agree with the control schematics provided.

1.10.2 DESIGN REQUIREMENTS

1.10.2.1 Studies and Calculations

Provide design studies and calculations for all facility spaces and loads as applicable in accordance with this Request For Proposal. Design studies

and calculations will include the following:

Load calculations and electrical load summary. Include connected loads, demand loads, and diversity factors for each panelboard, switchboard, etc. in the electrical distribution system. Include 25% spare capacity when sizing feeders, main service switchboard(s), transformers, distribution panel boards, and panel boards. Use the demand and diversity factors as recommended in **NFPA 70** unless stated otherwise.

Short circuit calculations methods. Use infinite primary current available on the primaries of all transformers for calculation of the secondary short circuit current. Maximum calculated short circuit available at the input to downstream panel for a given panel AIC rating (max. of approximately 90% of rated panel rating):

Rated panel AIC rating. Maximum calculated short circuit available.

10KAIC	9.0KA
14KAIC	12.5KA
18KAIC	16.0KA
22KAIC	20.0KA
25KAIC	22.5KA
28KAIC	25.0KA
32KAIC	29.0KA
35KAIC	31.5KA
42KAIC	38.0KA
50KAIC	45.0KA
65KAIC	60.0KA
100KAIC	90.0KA

A summary chart of short circuit calculations (not the actual calculations) is to be incorporated into the electrical drawing set. Include a circuit breaker protective device coordination study. All equipment protective devices shall be properly coordinated to provide selective tripping. Series rated protective equipment and/or devices will not be allowed. Surge protection shall be incorporated in the coordination analysis. The studies shall be performed by a registered professional engineer with demonstrated experience in power system coordination in the last three years.

1.10.2.1.1 Voltage drop calculations

Calculations shall demonstrate the worst-case voltage drop for the main electrical service, distribution panels, branch circuit panels, and any other devices/equipment indicated on the one-line diagram. The maximum voltage drop shall be no greater than 5% total, with no more than 3% to the feeder panel and 3% in the branch circuit. A summary chart of voltage calculations (not the actual calculations) is to be incorporated into electrical drawing set.

The voltage to all motors and other loads shall not be lower than 460V for 480v supply (20v drop) at transformer secondary terminals, 200V for 208v supply (8v drop) at transformer secondary terminals, 115V for 120v supply (5v drop) at transformer secondary terminals when motor is running.

All motors shall have no less than 440v or 220v or 190v or 110v at the motor when starting from a 480v or 240v or 208v or 120v supply, respectively.

All high inertial fans and similar loads (starting time greater than 8 seconds) shall have no less than 450v or 225v or 196v or 112v at the motor when starting from a 480v or 240v or 208v or 120v supply, respectively.

Exterior lighting circuits to be limited to 5% voltage drop starting with nominal voltage at the service transformer.

1.10.2.1.2 Arc flash analysis

Include all electrical systems per requirements set forth in the current version of **NFPA 70E**. The calculations shall be performed according to the IEEE Standard 1584. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, panelboards, etc.) where work could be performed on energized parts. Panels should be labeled as per **UFC 3-560-01** Figure 1-4.

1.10.2.1.3 Lighting calculations

Lighting calculations for all exterior and interior spaces shall utilize computational software to provide "point-by-point" values for each room and/or area. A summary of results shall be provided, which lists averages and uniformity (average to minimum) for each room or exterior area, as well as the full "point-by-point" calculations.

1.10.2.2 Drawings and Documents

Provide all drawings and documentation required to install, operate, and maintain the building's electrical systems. Include the following:

- a. Drawing Index. Provide and keep current throughout the life of the project a drawing list with current revision number for each drawing.
- b. Building Services Power and Lighting Plan Drawings. Provide plan drawings showing all lighting, exit signs, emergency lighting, convenience outlets, specialty outlets, and power to all building service and HVAC equipment. The building services power and lighting plans shall show circuits and luminaire and device type for all indicated lighting and devices. Lighting Plan Drawings shall show lighting controls, such as switches, occupancy sensors, vacancy sensors, photosensors and all other lighting controls. Include a control schematic for all lighting controls.
- c. Power One-Line Drawings. Provide a power one-line showing the distribution of power as a single line representation including feeder cables, switchgear with protective devices and rating, power systems, panelboards, inverters, and motor control systems.
- d. Grounding Drawings. Provide grounding drawings detailing all ground rod placements, ties to building steel, major electrical equipment, and exterior process equipment and storage tanks. Include installation details of components, connections, and test grounding stations. The following items are to be tied directly to the main grounding busbar or the service entrance panel grounding busbar:
 1. Ufer ground.
 2. Building steel.

3. Comm. rooms grounding busbar(s).
4. Metal water pipes.
5. Metal gas lines.
6. Lightning ground ring.
7. All downstream electrical panels fed from service entrance panel.
8. Secondary neutral grounding of stepdown or step up or isolating transformers sized per NEC 250.66 for separately derived systems. This grounding conductor shall be run with the primary feeder conductors to the transformer.
9. All grounds shall be labeled at busbar so that each of the grounding electrodes may be tested. The grounding busbar shall be readily accessible.
- e. Panel Schedules. Provide power and lighting panel schedules for lighting and instrument power panels. Panel schedules shall show in tabular format the electrical connections in the distribution boards.
- f. Installation Details and Schematics. Provide details and schematics as required to clearly identify installation conditions and/or special building systems.

1.10.3 EXTERIOR ELECTRICAL

1.10.3.1 General Requirements

1.10.3.1.1 Labeling

All materials, equipment, fixtures and appurtenances shall be Underwriters Laboratories, Inc. (UL) labeled, or if not available with the UL label, be labeled by a similar organization acceptable to the Government.

1.10.3.1.2 Available Fault Current

Use available fault current contribution of the transformer based upon actual impedance and characteristics for the basis of the final system design. Use infinite primary current available on all transformers in the calculation of secondary fault current. MV switches shall be rated for interrupting 12KA.

1.10.3.1.3 Fault and Overcurrent Protection

Overcurrent and fault protection devices shall be coordinated with line-side and load-side fuses or circuit breakers to isolate any electrical fault or overload from the rest of the system. All new work shall use circuit breakers only (no fuses).

1.10.3.1.4 Equipment Grounding

All equipment shall be grounded in accordance with UFC and NEC requirements.

1.10.4 Lightning Protection

Provide Lightning Protection in accordance with the latest **NFPA 780** and **UFC 3-575-01**.

1.10.5 Grounding and Bonding

Provide a grounding and bonding bar in the main electrical room, with all grounding leads (including communication, grounding electrode, etc.) brought on this bar. This bar will act as a main grounding inspection and testing point for all ground leads. The grounding system shall adhere to the requirements of **IEEE 142** and the overall grounding system shall not exceed a maximum acceptable resistance of 5 ohms between the grounding electrode system and ground. Comm. spec. requirement of 5 ohms overrides the NEC requirement of 25 ohms.

1.10.6 Exterior Lighting

Provide exterior lighting at all building entrances in accordance with the **UFC 3-530-01** requirements. Lamps shall be LED and shall be controlled both by photocell and exterior motion sensors. Exterior lighting shall not be on the same circuits as interior lights. Lighting located on exterior of building shall have circuits segregated from walkway or parking lot lighting. Note that all exterior lighting is to be rated for operation at 50° C and have a minimum of 5-year life at 50° C. Provide lighting at all parking lots. Lamps shall meet Travis AFB Installation Facilities Standards (IFS) Lighting Requirements.

1.10.6.1 Exterior Lighting Levels

Follow **UFC 3-530-01** and IES Lighting Handbook recommendations for lighting levels of exterior lighting. Where conflicting lighting intensity levels are given between documents, follow the light level specified in the **UFC 3-530-01** first, and then the IES Lighting Handbook second.

1.10.6.2 Exterior Lighting Fixtures

All exterior fixtures shall be full cutoff. Louvers and/or hoods shall be used where needed to minimize light trespass.

1.10.6.3 Exterior Lighting Coordination

Coordinate exterior fixtures and lighting with requirements of **UFC 3-530-01**. All exterior fixtures shall be submitted to the Contracting Officer for review and approval.

1.10.6.4 Controls and Wiring

Each lighting circuit shall carry its own neutral. Shared neutrals between lighting circuits are not allowed. Provide photoelectric controls and motion sensors as required by **UFC 3-530-01** for exterior lighting.

1.10.7 Exterior Receptacles

Provide exterior duplex receptacles, located as required by the UFCs and NEC, and/or at **100-foot** maximum intervals along the building perimeter. Receptacles shall be GFCI type with "in-use", weatherproof cover. In addition, locate receptacles near exterior mechanical equipment for maintenance. Exterior receptacles shall be on separate dedicated circuits

from all interior receptacle circuits. Exterior GFCI receptacles shall have no wires connected to their load terminals. Mechanical yard receptacles shall be on separate circuit(s) from other exterior receptacles.

1.10.8 LV Enclosures

All low voltage enclosures mounted outside (disconnect switches, panelboards, junction boxes, switchgear, HVAC control enclosures, VFD enclosures, etc.) shall be rated NEMA 3 not NEMA 3R due to the presence of windblown dust in Southern Nevada. Any gaskets and adhesives used must be rated for service at 150 deg F in very low humidity (under 5%).

1.10.9 INTERIOR ELECTRICAL

1.10.9.1 General

Design, furnish, install, and test a complete new interior electrical system. Provide power and controls for all new equipment and coordinate installation with the User. Restore power to any accidentally disconnected equipment. Some equipment will be provided by the Government. For Government provided equipment, match power, voltage, and receptacle type required for proper operation. Coordinate all Government- furnished, Contractor-installed equipment prior to any rough-ins. All conduit and conductor installation in secure areas must follow current **ICS 705-1** specs and shall be inspected by the security office prior to drywall and ceiling installation. Circuits for the electrical system in the SECURE areas shall penetrate the SECURE perimeter at only one point. Electronic isolation for both conduits and circuits is required at the perimeter.

1.10.9.2 Protective Coordination

Overcurrent and fault protection devices shall be coordinated with line-side and load-side fuses or circuit breakers to isolate any electrical fault or overload from the rest of the system. Some breaker sizes may not coordinate under some fault conditions. Good engineering practices shall be used, and devices shall coordinate for all overload conditions. No series rated protective equipment shall be used.

1.10.9.3 Service Entrance

1.10.9.3.1 Service and Distribution Equipment

Facility service entrance equipment shall be service rated, consisting of a main switchboard sized according to load calculations per the UFCs and NEC, and located in the main electrical room. The main breaker shall be listed for operation at 100 percent of it's rating.

1.10.9.3.2 Interior Building Distribution Voltage

Interior building distribution voltage shall be 208/120 volt. Provide additional distribution panels to cover the entire building. Voltage drop shall be limited to 5% per the NEC (combined voltage drop on both feeders and branch circuits to the furthest outlet of power, heating, and lighting loads shall be 5% or less). All circuit breakers shall be 100% rated. All electrical equipment buses shall be copper. To reduce voltage drop, cable length between panel and load shall be kept to a minimum. Provide a voltage drop calculation for each 208/120V branch circuit over **100 feet** in length.

1.10.9.4 Panelboard Feeders

Size of panelboard feeders, panelboards, and main circuit breakers (in the panelboard) shall be calculated per NEC and UFCs to ensure proper device coordination.

1.10.9.5 Panelboards

Distribution and branch circuit panels shall be fully rated for the available fault current, and furnished with a main circuit breaker, unless fed from an upstream panel breaker in the same room. Provide panels with full-sized, bolt-on, branch breakers, copper main busses, insulated copper neutral bus and bonded equipment grounding bus. Provide a minimum of 15% spare circuit breakers and 10% space for future use in each panel. Provide and install printed panel labels with descriptive names for all installed circuits and electronic copies of the labels for future modification. Dedicated panels for telecommunications/computer loads shall have a surge suppressor.

1.10.9.5.1 Grounding Systems

Provide a new grounding system for the new electrical service per the UFCs and NEC. Provide separate grounding systems for both the electrical and telecommunication systems per the UFCs and NEC Article 250. Both grounding systems shall be brought to a common Master Ground Bar located in electrical room. This master ground shall be a wall mounted copper bar.

1.10.9.6 Conduits and Conductors

Wiring shall consist of 600-volt insulated single conductors type THWN, THHN, or THW conforming to **UL 83**, installed in raceways consisting of electrical metallic tubing (EMT), or rigid galvanized steel conduit (RGS). Insulation type shall be suitable for the application according to the NEC. Flexible metallic conduit shall be provided to vibrating equipment where required. Use of Metal Clad (MCC), Armored Cable (AC), Non-Metallic Sheathed Cables (NMC), and Electrical Non-Metallic Tubing (ENT) are prohibited. All conductors shall be copper. The minimum branch-circuit conductor size shall be No. 12 American Wire Gauge (AWG). Number of current-carrying conductors per conduit shall be a maximum of six (6). Provide each single 20 amp branch circuit for either lighting or convenience receptacles with a dedicated neutral conductor. Shared neutrals are not allowed on this project. Class 1 remote control and signal circuit conductors shall be not less than No. 14 AWG. Class 2 remote control and signal circuit conductors shall be not less than No. 16 AWG. Class 3 low-energy, circuit conductors shall be not less than No. 22 AWG.

1.10.9.6.1 Routing

Routing of raceways and cables shall be parallel or perpendicular to walls and ceilings. Conduit coupling fittings shall be compression type. No set screw fittings shall be accepted. Fire-stop any cable or raceway penetrations through rated wall assemblies to maintain fire resistance ratings. Provide labels identifying the manufacturer of the fire-stopping system and date of installation next to each location. Raceways shall be concealed within finished walls, suspended ceilings, and floors. Raceways crossing structural expansion joints, seismic joints, or wall foundations shall be provided with suitable expansion fittings on both sides or other

suitable means to compensate for the building expansion and contraction. The minimum conduit size for power to equipment and fire alarm circuits shall be 3/4-inch. The minimum conduit size for telecommunications cabling systems shall be 1-inch. Conduit can be 1/2-inch, as a minimum size, for lighting and receptacle circuits such as 2#12 with 1#12 ground conductors feeding a receptacle or a light. All wiring and conduit shall be concealed except in mechanical rooms, electrical/telecommunication utility rooms, apparatus bays, and apparatus bay support and supply areas.

1.10.9.6.2 Wiring Temperature Rating

Where wiring is connected to devices rated at 100 amperes or less, utilize the ampacity limit listed for 60°C wire in allowable ampacity table 310-15(B) (16) in the NEC whether or not the wire is rated at a higher temperature. For wiring over 100 amperes, wiring rated at 75°C or greater shall be used.

1.10.9.7 Conduit Stub-Ups

Where conduits are to be stubbed up through concrete floors, a short sweep shall be installed below grade to transition from the horizontal run of conduit to a vertical run. A conduit coupling fitting, threaded on the inside shall be installed, to allow terminating the conduit flush with the finished floor. Wiring shall be extended in rigid threaded conduit (RGS) only, except that where required flexible conduit may be used 6-inches above the floor. Empty or spare conduit stub-ups shall be plugged flush with the finished floor with a threaded, recessed plug.

1.10.9.7.1 Conduit Supports

Except where otherwise permitted by NFPA 70, conduits and electrical metallic tubing (EMT) shall be securely and rigidly fastened in place at intervals of not more than 10 feet and within 3 feet of boxes, cabinets, and fittings, with approved pipe straps, wall brackets, conduit clamps, conduit hangers, threaded C-clamps, beam clamps or ceiling trapeze. Loads and supports shall be coordinated with supporting structure to prevent damage or deformation to the structure. Loads shall not be applied to joist bridging. Attachment shall be by wood screws to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat-treated or spring-steel-tension clamps on steel work. Nail- type nylon anchors or threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine screws. Raceways or pipe straps shall not be welded to steel structures. Cutting the main reinforcing bars in reinforced concrete beams or joists shall be avoided when drilling holes for support anchors. Holes drilled for support anchors, but not used, shall be filled. In partitions of light steel construction, sheet-metal screws may be used. Raceways shall not be supported using wire or nylon ties. Raceways shall be independently supported from the structure. Upper raceways shall not be used as a means of support for lower raceways. Supporting means will not be shared between electrical raceways and ceiling grids. Except where permitted by NFPA 70, wiring shall not be supported by ceiling support systems. Conduits shall be fastened to sheet-metal boxes and cabinets with two locknuts where required by NFPA 70, where insulating bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, a single locknut and bushing may be used. Thread-less fittings for electrical metallic tubing shall be of a type approved for the conditions encountered. Additional support for horizontal runs is not required when

EMT rests on steel stud cutouts.

1.10.9.8 Motors

Motors above 1/2 horsepower shall be three-phase. 1/2 horsepower and smaller motors may be rated at 115 volts single phase. Provide protection against single phasing when a phase loss occurs for all three phase motors. Provide high efficiency motors for those motors operating over 750 hours per year or as directed by the UFCs. Unless otherwise specified, all motors shall be continuous-duty classification based on a 40 C ambient temperature reference. Polyphase motors shall be squirrel-cage type, having normal-starting-torque and low-starting current characteristics, unless other characteristics are specified in other sections of these specifications or shown on contract drawings. When electrically driven equipment furnished under other sections of these specifications materially differs from the design, the necessary adjustments will need to be made to the wiring, disconnect devices and branch-circuit protection to accommodate the equipment actually installed. All motors located outside or in vented mechanical rooms with no HVAC shall be rated for continuous operation at 49 C or 120 F. Roof mounted motors shall be rated at a higher temperature than 49 C due to sunlight radiant heating. Motors used with VFDs shall be suitable for operation at the necessary turndown ratio and at the highest ambient temperature when operating at the lowest speed.

1.10.9.9 Motor Control

Each motor or group of motors requiring a single control and not controlled from a motor-control center shall be provided with a suitable controller and devices that will perform the functions as specified for the respective motors. Each motor of 1/8 hp or larger shall be provided with thermal-overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload-protection device shall be provided either integral with the motor or controller or shall be mounted in a separate enclosure. Unless otherwise specified, the protective device shall be of the manually reset type. Single or double pole tumbler switches specifically designed for alternating-current operation only may be used as manual controllers for single-phase motors having a current rating not in excess of 80% of the switch rating. Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motors directly, provided the devices used are designed for that purpose and have an adequate horsepower rating. When the automatic-control device does not have such a rating, a magnetic starter shall be used, with the automatic-control device actuating the pilot-control circuit. When combination manual and automatic control is specified, and the automatic-control device operates the motor directly, a double-throw, three position tumbler or rotary switch shall be provided for the manual control; when the automatic-control device actuates the pilot control circuit of the magnetic starter, the latter shall be provided with a three-position selector switch marked MANUAL-OFF-AUTOMATIC. Connections to the selector switch shall be such that only the normal automatic regulatory control devices will be bypassed when the switch is in the Manual position; all safety control devices, such as low- or high-pressure cutouts, high- temperature cutouts, and motor-overload protective devices, shall be connected in the motor-control circuit in both the Manual and the Automatic positions of the selector switch. Control circuit connections to any MANUAL-OFF- AUTOMATIC switch or to more than one automatic regulatory control device shall be made in accordance with wiring diagram approved by the Contracting Officer unless such diagram is included on the drawings. All controls shall be 120V or

less unless otherwise indicated. All motor control units located outside or in vented mechanical rooms with no HVAC shall be rated for continuous operation at 49° C or 120° F and shall have NEMA 3 or NEMA 4 ratings. In HVAC cooled mechanical rooms, NEMA 12/13 shall be the minimum requirement to protect against splashing water and dust. Roof top mounted motor control shall be rated at higher temperatures than 49° C due to sunlight radiant heating. Motor controls in mechanical or electrical rooms shall be consolidated into NEMA rated (not IEC rated) Motor Control Centers. In general, all motors rated at 208V or 480V. rated at 1HP or large are to have NEMA Size 1 starters or larger. Control circuits are to be pilot operated, not line operated. Through the door disconnects are prohibited. All motor disconnects shall be heavy duty rated. VFD are to have heavy duty ratings and have suitable environment ratings (NEMA 12/13, NEMA 3, NEMA 4, not NEMA 3R).

1.10.9.10 Branch Circuits, Receptacles and Outlets

All general receptacle and lighting circuits shall be fed by 20-ampere circuits, minimum, fed by 20-ampere circuit breakers, minimum. Provide dedicated branch circuits required by this RFP, the UFCs and the NEC. Receptacles on opposite sides of common walls shall be horizontally offset.

1.10.9.10.1 Separate Circuits

Lighting and receptacles shall be on separate branch circuits.

1.10.9.10.2 Receptacles

Receptacles shall be provided in accordance with UFCs and Room by Room Criteria requirements of Section 01 10 11 and Appendix, One-Line and Telecom Details. Select color and wall plate to coordinate with room finishes. Provide receptacles to serve all user equipment including but not limited to CATV, printers, copiers, fax machines etc. All receptacles shall have a label on device plate with circuit and panel designations. The density of receptacles per circuit shall take into account the expected quantity of large loads to avoid overloading of branch circuits. Large combination printers/fax machines/copiers (with possible printer server computer) shall be fed from a dedicated circuit. These machines typically have from 12-15A current draw. Use the loads shown in Appendix T, One-Line and Telecom Details, for all workstation load calculations. Where a load is not indicated in Appendix, use 360VA for standard computers. Provide enough general-purpose receptacles in bullpen type areas such that all offices areas may be reached within 20 feet.

1.10.9.10.3 Ground Fault Current Interrupting (GFCI) Receptacles

GFCI receptacles shall be provided as required by the NFPA 70, and within 6 feet of each sink or wet basin. Provide at least one GFCI receptacle in each restroom, janitor's closet and exterior near entrances and as required in paragraph 14.3.11. Provide GFCI receptacles in mechanical equipment yard within 25 feet of all equipment. Except as otherwise noted, receptacles that are required to have ground-fault protection may either be fed by a ground fault interrupting circuit breaker or have integral ground fault trip. GFCI receptacles are not to be shared (i.e. on separate dedicated circuits) between restrooms, janitors' closets, kitchenettes, mechanical rooms, and exterior mechanical yards. Exterior GFCI receptacles are not have any connections to the LOAD terminals of the GFCI.

1.10.9.10.4 Telecommunication Room Receptacles

Provide 120 volt, 20-amp duplex convenience receptacles in each telecommunication room at a minimum of 6 foot intervals around the perimeter walls. Convenience receptacles in the telecommunications room shall be provided such that there are at least two circuits for convenience outlets in this room and no more than six receptacles on one circuit. Provide a dedicated 20-amp circuit and a quadruplex receptacle for each 19 in rack or cabinet. In addition, provide one twist lock type receptacle (208v, single phase) fed from a 30-amp circuit, located above every data/voice rack or future rack location. Label each outlet with its respective circuit breaker number. The main telecom room shall support at least 36 racks. Each half of the main telecommunication room shall have a dedicated panel, one for each squadron. Refer to the conceptual electrical 1-line (Appendix T, One-Line and Telecom Details) for more information. Use 3.8kW per rack for load estimates.

1.10.9.10.5 Equipment Power

Provide hard-wired dedicated circuits for power equipment or receptacles adjacent to equipment, as required by applicable sections of [NFPA 70](#) and/or the equipment manufacturer, to serve equipment listed herein and in other narrative paragraphs that form a part of this RFP.

1.10.9.11 Surge Protection

The facility power supply system shall include a complete surge protection system. The system shall consist of surge protection devices installed in Main Switchboard, MCC, Distribution panels as per [UFC 3-520-01](#) and to dedicated telecommunication/computer panels.

1.10.9.12 Grounding

Provide a separate, green, insulated ground conductor for all branch circuits or feeders. Connect ground wire to ground bus in panel, outlet box, and grounding terminal on outlet.

1.10.9.13 Interior Lighting

Lighting fixtures shall be provided for all rooms, corridors and interior areas. All lighting fixtures used shall be LED. The lighting design shall meet the requirements of [UFC 3-530-01](#) and the Room by Room Criteria sheets of Section [01 10 11](#). "Lighting Illumination Levels" are to be interpreted as taking precedence over fixtures called out in [UFC 4-730-10](#). The color temperature for all luminaires shall be 4000K and have a CRI of 80 or better. In offices, corridors, common spaces, lobbies and/or higher finish areas, utilize architectural fixtures such as direct\indirect pendants or volumetric troffers, down lights, track lights or accent sconces as appropriate for the space. Lights in mechanical rooms with no HVAC and other rooms without HVAC are to be rated for a minimum of 50° C or 122° F. Lighting fixtures shall meet requirements of Travis AFB Installation Facilities Standards (IFS) Lighting Requirements document.

1.10.9.13.1 Light Fixture Quality

All light fixtures and their components shall be "specification-grade" or better, painted after fabrication.

1.10.9.13.2 Lighting Illumination Levels

Lighting for the facility shall be designed per the Room-by-Room Lighting, UFC, and the IES Lighting Handbook. Where conflicting lighting intensity levels are given between documents, follow the light level specified in the Room-by-Room Lighting first, **UFC 3-530-01** second, and then the light level specified in the IES Lighting Handbook third. Provide detailed lighting calculations with average foot-candle levels and uniformity ratios (average to minimum) in every room as explained in paragraph 14.2.1.6.

1.10.9.13.3 Fixture Installation

Install fixtures in such a manner that illumination is not obstructed and is suitable for the finished area. Provide the initial installation of lamps throughout, so that at the date of formal acceptance of the work, all fixtures and lamps are functional.

1.10.9.13.4 Fixture Selection Considerations

The fixtures selected shall meet requirements as stated in the Room-By-Room Section and the UFCs. Lighting fixtures shall not be provided with receptacles. In bathrooms, provide adequate light at the mirror and within water closets compartments. Provide industrial LED fixtures with protective wire grills for rooms where the ceiling is exposed to the roof (Mechanical and Electrical Rooms). See Section **01 10 11** for additional description.

1.10.9.13.5 Pendant Mounted Fixtures

Pendant mounted fixtures shall be mounted such that bottom of fixture is 8 feet minimum above finished floor. Fixtures shall not be supported from the underside of the roof deck, but rather beams, joists or other structural supports.

1.10.9.13.6 Exit and Emergency Lighting

Provide exit and emergency lighting in accordance with the requirements of **NFPA 101** and **NFPA 70** in all areas. Provide battery backup for a minimum of 90 minutes for exit and emergency lighting fixtures. Exit lighting fixtures shall use a light emitting diode (LED) light source and shall be red color. The exit and emergency lighting shall meet requirements as stated in **UFC 3-530-01**. Emergency lighting shall also be provided in all critical spaces. See the room datasheets for additional information.

1.10.9.13.7 Lighting Circuiting Requirements

Lighting circuits shall not be loaded above 12 amps. This is to allow for future modifications/additions while staying under the 16 amp maximum branch circuit continuous lighting loading. Each circuit shall have its own neutral. No shared neutrals shall be used.

1.10.9.13.8 Light Fixture Sources

Provide labeling on each fixture with lamp type, wattage, manufacturer's name, mailing address and phone number for obtaining of replacement parts. Lighting Control. Control switches or manual overrides for general room lighting shall be located at room entrances for all locations. Each room or distinct functional area within each room shall be individually

switched. Dimming controls shall consist of programmable dimming controls (individual slide-type dimmers or Chelsea switches) where required. Provide three and four way switching for rooms with multiple entrances. Use of daylight photocell sensors is required in areas where applicable.

1.10.9.13.9 Occupancy Sensors

Occupancy sensors are required in the bathrooms, storage, electrical room, mechanical room and telecommunication room. Provide manual overrides for all occupancy sensor locations in coordination with paragraph 14.4.16.9 "Lighting Control" above.

1.10.9.14 Seismic Considerations

Provide seismic bracing or restraints for electrical equipment (transformers, lighting fixtures, etc.) in accordance with the requirements of this RFP and TI 809-04, and per specification Section 26 05 48.00 10 SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT. Seismic drawings and calculations shall be stamped and signed by a Registered Professional Structural Engineer.

1.10.9.15 Device Body and Cover plate Colors and Labeling

Device bodies and cover plates for wall switches and power and communications outlets shall be a color which harmonizes with the room in which they are located. All devices in the same room shall be the same color, unless otherwise noted or required. Label all junction boxes showing all the panel and circuit numbers for conductors contained in junction box. Use a printed label in finished areas and a marker in unfinished areas.

1.10.9.16 Bonding

All metallic conductive parts including steel structures, heating, ventilating, and air conditioning (HVAC) ducts, process, media delivery systems, utility ducts and electrical conduits shall be bonded at separation joints throughout the length of the system to assure grounding continuity and safety of personnel from accidental contact. All external metallic penetrations such as electrical conduits, ducting and steam lines shall be bonded to the building grounding system.

1.10.9.17 Emergency Power Off

Provide wall mounted emergency power off switches at IOS, Servers and Simulator rooms.

1.11 LIFE SAFETY DESIGN

This facility must be designed to meet or exceed the minimum construction and life safety standards as required by the referenced national and internal federal codes and criteria. Provide a design analysis as required by **UFC 3-600-01** Design: Fire Protection Engineering for Facilities, with a complete life safety analysis citing the appropriate code references. The preliminary life safety analysis below does not relieve the Contractor from this obligation.

1.11.1 REFERENCES

UFC 1-200-01, Unified Facilities Criteria, DoD Building Code (General

Building Requirements), with Change 1, 1 October 2020

UFC 3-600-01, Unified Facilities Criteria, Design: Fire Protection Engineering for Facilities, with Change 6, 6 May 2021

ICC IBC, International Building Code (IBC), 2018

NFPA 101, Life Safety Code, 2021

NFPA 10, Standard for Portable Fire Extinguisher, 2022

NFPA 13, Installation of Sprinkler Systems, 2022

NFPA 72, National Fire Alarm and Signaling Code, 2022

NFPA 80, Standard for Fire Doors and Fire Windows, 2022

1.11.2 BUILDING CONSTRUCTION AND HAZARDS

Construction. Existing DoD facilities must comply with **UFC 1-200-01**. Existing construction must comply with **UFC 3-600-01**.

Basic Criteria. Use IBC 2018 for types of building construction, allowable floor area, building height limits, occupancy separation and building separation distance, except as modified by **UFC 1-200-01**, **UFC 3-600-01**.

Basic Criteria. Use **NFPA 101** (most recent release) for means of egress, safety to life, interior finish ratings and fire resistance ratings of non-bearing partitions. For conflicts between IBC and **NFPA 101**, conform to **NFPA 101**.

1.11.2.1 Occupancy

Business B, IBC, 304.

Business **NFPA 101**, 38

Residential Group R-2, IBC, 310.

Hotel and Dormitories **NFPA 101**, 28

Storage S-1, IBC, 311

Storage, **NFPA 101**, 42

1.11.2.2 Hazard

Light hazard: offices and sleeping rooms

Ordinary hazard: mechanical/electrical spaces, **UFC 3-600-01**, Appendix B-1.2.

Storage hazard: Class IV miscellaneous storage up to 12ft

Light Hazard for Class A fires, **NFPA 10**, 5.4.1.1.1.

Ordinary Hazard for Class A fires, **NFPA 10**, 5.4.1.1.2.

Class A: ordinary combustible materials, NFPA 10, 5.2.1.

Class C: energized electrical equipment, NFPA 10, 5.2.3.

1.11.2.3 Type of Construction

Type IIB: UFC 3-600-01, Appendix D.

Type IIB: IBC, Tables 504.3, 504.4, 506.2, 601, and 602.

1.11.2.4 Automatic Sprinklers

Fully sprinklered required, UFC 3-600-01, 9-7.1

1.11.2.5 Separation of Occupancies

For fully sprinklered buildings. No separation required.

1.11.3 BUILDING AREA

For Type IIB Construction:

B: 69,000 square feet (Table IBC, 506.2).
 Frontage allowance: 17,250 square feet (IBC 506.3).
 Total: 86,250 square feet.

R-2: 48,000 square feet (Table IBC, 506.2).
 Frontage allowance: 12,000square feet (IBC 506.3).
 Total: 60,000 square feet.

S-1: 52,500 square feet (Table IBC, 506.2).
 Frontage allowance: 13,125 square feet (IBC 506.3).
 Total: 65,625 square feet.

1.11.4 BUILDING HEIGHT

For Type IIB Construction:

R-2 (most stringent occupancy).
 Sprinklered facility, IBC, Table 504.3 and 504.4.
 Allowed: 3 stories, 60 feet.
 Actual: 3 story, 35 feet at roof.

1.11.5 EXIT REQUIREMENTS

Occupant Load Factor

FIRST FLOOR OCCUPANT LOAD CALCULATIONS: NFPA 101, TABLE 7.3.1.2 AND UFC 3-600-01 TABLE 10-1			
USE	OCCUPANT LOAD FACTOR (SQ.FT / PERSON)	AREA (SQ.FT)	OCCUPANT LOAD
ASSEMBLY	15	869	58
BUSINESS	150	3,982	27

FIRST FLOOR OCCUPANT LOAD CALCULATIONS: NFPA 101, TABLE 7.3.1.2 AND UFC 3-600-01 TABLE 10-1

MECHANICAL, ELECTRICAL, OTHER BUILDING EQUIPMENT	500	413	1
STORAGE	500	144	0
DORMITORIES	200	6,092	31
TOTAL OCCUPANT LOAD			116
EXITS PROVIDED=2		IRE=27	EXITS PROVIDED=2
INDIVIDUAL ROOM EXITS FROM EVERY SLEEPING ROOM AREA ARE PROVIDED			

SECOND FLOOR OCCUPANT LOAD CALCULATIONS: NFPA 101, TABLE 7.3.1.2 AND UFC 3-600-01 TABLE 10-1

USE	OCCUPANT LOAD FACTOR (SQ.FT / PERSON)	AREA (SQ.FT)	OCCUPANT LOAD
ASSEMBLY	15	719	48
BUSINESS	150	3,665	25
MECHANICAL, ELECTRICAL, OTHER BUILDING EQUIPMENT	500	107	0
STORAGE	500	900	2
DORMITORIES	200	6,109	31
TOTAL OCCUPANT LOAD			105
EXITS PROVIDED=2			EXITS PROVIDED=2
INDIVIDUAL ROOM EXITS FROM EVERY SLEEPING ROOM AREA ARE PROVIDED			

THIRD FLOOR OCCUPANT LOAD CALCULATIONS: NFPA 101, TABLE 7.3.1.2 AND UFC 3-600-01 TABLE 10-1

USE	OCCUPANT LOAD FACTOR (SQ.FT / PERSON)	AREA (SQ.FT)	OCCUPANT LOAD
BUSINESS	150	3,679	25
MECHANICAL, ELECTRICAL, OTHER BUILDING EQUIPMENT	500	107	0
STORAGE	500	900	2

THIRD FLOOR OCCUPANT LOAD CALCULATIONS: NFPA 101, TABLE 7.3.1.2 AND UFC 3-600-01 TABLE 10-1		
DORMITORIES	200	34
	6,814	
	TOTAL OCCUPANT LOAD	61
EXITS PROVIDED=2		EXITS PROVIDED=2
INDIVIDUAL ROOM EXITS FROM EVERY SLEEPING ROOM AREA ARE PROVIDED		

Egress Capacity:

Level Components: 0.2-inches/person, NFPA 101, Table 7.3.3.1.

Stairways: 0.3 inches/person, NFPA 101, Table 7.3.3.1.

Minimum Width of Doors

32-inches, NFPA 101, 7.2.1.2.3.

1.12 CYBERSECURITY DESIGN

1.12.1 PROJECT SCOPE

1.12.1.1 SITE / CIVIL EXTERIOR

Exterior upgrades include replacement of all exterior doors and windows to meet ATEP requirements, general repair and patching of stucco, re-painting of stucco, replacement of stair treads, recoat second and third floor balconies/exterior corridors with epoxy-based product.

Additional repair is required to install scuppers at stair landing area, remove tree and stump on south side of building, replace damaged section of concrete sidewalk on south and west side of building. Upgrades include accessibility features to replace door hardware with accessible lever handles, common accessible; restroom, common kitchen area, laundry, and resident storage, four sleeping rooms with mobility features, and two sleeping rooms with communication features, on the first floor.

Configuration of the dorm is to remain as is, 2+2 configuration. The facility shall be compatible with applicable DoD, Air Force, and base design standards. The facility must also be able to withstand seismic effects as prescribed in applicable codes and design guides. Facility will be designed as permanent construction in accordance with DoD Unified Facilities Criteria (UFC).

1.12.1.2 FACILITY INTERIOR

This Design Analysis provides a roadmap that defines the cybersecurity requirements that need to be met to create the Contract Drawings and Specifications for this submission package.

The Scope of Work is to meet the cybersecurity requirements for Facility renovation: P1332 the project is to include upgrades and renovation of Interior Core Areas, Standard Sleeping Rooms, Typical Mobility Sleeping Rooms; Electrical, Fire Protection, Mechanical systems, and Plumbing.

Upgrade renovations include replacement of acoustical tile ceilings, gypsum, or plaster popcorn ceilings (hard ceilings will not be removed unless work is being performed in that area), replacement of wall/ceiling coverings (only if impacted by construction), paint all walls and hard ceiling/soffits, replacement of flooring finishes, replacement of interior doors, hardware, lighting, electrical fixtures, and plumbing fixtures.

1.12.2 REFERENCES

1.12.2.1 P1332 Dormitory Renovations B1332 RFP

- a. RFP base document plus Amendments
- b. Project Facility Related Control Systems Specifically:
 - 1. Engineering System Requirements - HVAC
 - 2. Engineering System Requirements - Fire Protection / Mass Notification
 - 3. Engineering System Requirements - Electronic Security Systems (ESS) Access Control / CCTV

1.12.2.2 Building Codes

International Building Code 2018 (as modified per [UFC 1-200-01](#))

1.12.2.3 United Facilities Criteria

- a. [UFC 1-200-01](#), General Building Requirements
- b. [UFC 3-410-02](#), Direct Digital Control for HVAC and Other Building Control Systems
- c. [UFC 3-470-01](#), Utility Monitoring and Control System (UMCS) Front End Integration
- d. [UFC 4-010-06](#), Cybersecurity of Facility-Related Control Systems

1.12.2.4 Other Referenced Documents

- a. ABA Accessibility Standard for Department of Defense Facilities June 2009
- b. [ASHRAE 135](#)
- c. [ASHRAE 36](#)
- d. [TIA-568.2](#) Balanced Twisted-Pair Telecommunication Cabling and Components Standards
- e. [NIST SP 800-82](#) R2
- f. [NIST SP 800-53](#) R5

1.12.3 DESIGN CRITERIA

- a. Risk Management Framework (RMF)
 - 1. The RMF is the DoD process, described in [UFC 4-010-06](#) Cybersecurity of Facility-Related Control Systems, for applying

cybersecurity to information technology (IT) systems. This includes building control systems.

2. The goal of the RMF process is to reduce and mitigate risk and vulnerabilities until the risk is acceptable to the System Owner (SO), Authorizing Official (AO), and the (ISSM) Information System Security Manager. For application of the RMF to control systems, the determination of cybersecurity risk reduction must also account for any additional risks to system functionality due to the application of security controls based on CIA Impact levels.
3. The decision of whether a level of risk is acceptable is made by the assigned government AO. The designer provides project specific input into the risk analysis process.

1.12.4 DESIGN APPROACH

a. Risk Management Framework (RMF)

1. Step 1 Per **UFC 4-010-06**: Involve the System Owner (SO), Information System Security Manager (ISSM), and the Authorizing Official (AO) to determine the Confidentiality (data security), Integrity (incorrect information), and Availability (failure) (C-I-A) impact levels (LOW, MODERATE, or HIGH) for the Facility-Related Control Systems (FRCS). These impact levels could vary for the individual Facility-Related Control Systems (FRCS) The final impact levels will be determined by the SO, ISSM, and AO. Travis AFB AO / POC is representing the government for the project. Travis AFB AO / POC will be providing MBI with the final approved CIA impact level and coordinate the selection of appropriate security controls from the CCI list for the Facility-Related Control Systems (FRCS).
2. Step 2 and Step 3 Per **UFC 4-010-06**: Obtain a list of relevant controls and Control Correlation Identifiers (CCIs) from the Travis AFB AO / POC. **NIST SP 800-82** and the RMF Knowledge Service (link provided in **UFC 4-010-06**) provide guidance on determining controls from C-I-A ratings and this list of controls can identify corresponding CCIs.
3. Step 4 and Step 5 Per **UFC 4-010-06**: Categorize each CCI into one or more of the following categories: DoD-Defined, Designer, Non-Designer, Platform Enclave, and/or Impractical. Once each CCI is categorized, incorporate the CCI into the design and provide explanation of any changes to standard CCI requirements. CCI notations are provided in the Section titled **25 05 11 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS** and correlate to the categorized CCI list.

b. Requirements at Each Design Phase

1. Basis of Design

- a) Provide a single submittal indicating the C-I-A impact level of the control system and listing the security controls generated during Step 2 (above) along with recommendations and justifications for further tailoring of the security control set.

2. Design Submittals

- a) Concept Design Submittal (10-15%)
 - 1) Provide single submittal indicating the CCIs resulting from the approved tailored control list (Step 3 above) and an initial classification list for each CCI (Step 4 above).
 - b) Design Development Submittal (30-50%)
 - 1) The final classification of each CCI (Step 4 above).
 - 2) The changes to standard CCI requirements identified in Step 5 (above), along with an explanation of the changes.
 - 3) The CCIs which have been incorporated into the control system design (Step 5 above), any changes from standard requirements, or selections made when multiple options are available.
 - 4) Information for others as required (Step 5 above).
 - c) Pre-Final Design Submittal (90%)
 - 1) Provide a submittal updating the Design Development Submittal.
 - d) Final Design Submittal (100%)
 - 1) Provide a submittal updating the Pre-Final Design Submittal with complete final information.
- 3. Mechanical, Electrical, and Fire Protection Requirements
 - a) Mechanical, electrical, and fire protection specific requirements shall be detailed in their respective design narratives and specifications.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

THIS PAGE INTENTIONALLY LEFT BLANK

FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AIR FORCE BASE, CA

35% FINAL DESIGN SUBMITTAL
SPECIFICATIONS
DESIGN-BUILD

Appendix A: Cybersecurity

Appendix: Cyber Security C-I-A Impact Level / Controls List / CCI List

Table 1: Baseline C-I-A Impact Level Ratings

Authorizing Official (AO)	System Group	System	Existing Authority to Operate (ATO)?	C-I-A Impact Level
Travis AFB AO POC	UMCS	HVAC	Existing ATO to be validated by ISSM	LOW-LOW-LOW – ISSM must validate
Travis AFB AO POC	FLS	Fire Alarm Reporting System	Existing ATO to be validated by ISSM	LOW-LOW-LOW – ISSM must validate
Travis AFB AO POC	FLS	Mass Notification System	Existing ATO to be validated by ISSM	LOW-LOW-LOW – ISSM must validate
Travis AFB AO POC	ESS	Physical Access Control System	Existing ATO to be validated by ISSM	LOW-LOW-LOW – ISSM must validate
Travis AFB AO POC	ESS	Closed-Circuit Television (CCTV)	Existing ATO to be validated by ISSM	LOW-LOW-LOW – ISSM must validate

Table 2: NIST 800-82 R2 Section G-1 Security Control Baselines

CNTL NO.	CONTROL NAME	LOW
AC-1	Access Control Policy and Procedures	AC-1
AC-2	Account Management	AC-2
AC-3	Access Enforcement	AC-3
AC-4	Information Flow Enforcement	Not Selected
AC-5	Separation of Duties	Not Selected
AC-6	Least Privilege	Not Selected
AC-7	Unsuccessful Logon Attempts	AC-7
AC-8	System Use Notification	AC-8
AC-10	Concurrent Session Control	Not Selected
AC-11	Session Lock	Not Selected
AC-12	Session Termination	Not Selected
AC-14	Permitted Actions without Identification or Authentication	AC-14
AC-17	Remote Access	AC-17
AC-18	Wireless Access	AC-18
AC-19	Access Control for Mobile Devices	AC-19
AC-20	Use of External Information Systems	AC-20
AC-21	Collaboration and Information Sharing	<u>AC-21</u>
AC-22	Publicly Accessible Content	AC-22
AT-1	Security Awareness and Training Policy and Procedures	AT-1
AT-2	Security Awareness Training	AT-2
AT-3	Role-Based Security Training	AT-3

AT-4	Security Training Records	AT-4
AU-1	Audit and Accountability Policy and Procedures	AU-1
AU-2	Audit Events	AU-2
AU-3	Content of Audit Records	AU-3
AU-4	Audit Storage Capacity	AU-4 (1)
AU-5	Response to Audit Processing Failures	AU-5
AU-6	Audit Review, Analysis, and Reporting	AU-6
AU-7	Audit Reduction and Report Generation	Not Selected
AU-8	Time Stamps	AU-8
AU-9	Protection of Audit Information	AU-9
AU-10	Non-repudiation	Not Selected
AU-11	Audit Record Retention	AU-11
AU-12	Audit Generation	AU-12
CA-1	Security Assessment and Authorization Policies and Procedures	CA-1
CA-2	Security Assessments	CA-2
CA-3	System Interconnections	CA-3
CA-5	Plan of Action and Milestones	CA-5
CA-6	Security Authorization	CA-6
CA-7	Continuous Monitoring	CA-7
CA-8	Penetration Testing	Not Selected
CA-9	Internal System Connections	CA-9
CM-1	Configuration Management Policy and Procedures	CM-1
CM-2	Baseline Configuration	CM-2
CM-3	Configuration Change Control	Not Selected
CM-4	Security Impact Analysis	CM-4
CM-5	Access Restrictions for Change	Not Selected
CM-6	Configuration Settings	CM-6

CM-7	Least Functionality	CM-7 (1)
CM-8	Information System Component Inventory	CM-8
CM-9	Configuration Management Plan	Not Selected
CM-10	Software Usage Restrictions	CM-10
CM-11	User-Installed Software	CM-11
CP-1	Contingency Planning Policy and Procedures	CP-1
CP-2	Contingency Plan	CP-2
CP-3	Contingency Training	CP-3
CP-4	Contingency Plan Testing	CP-4
CP-6	Alternate Storage Site	Not Selected
CP-7	Alternate Processing Site	Not Selected
CNTL NO.	CONTROL NAME	LOW
CP-8	Telecommunications Services	Not Selected
CP-9	Information System Backup	CP-9
CP-10	Information System Recovery and Reconstitution	CP-10
CP-12	Safe Mode	CP-12
IA-1	Identification and Authentication Policy and Procedures	IA-1
IA-2	Identification and Authentication (Organizational Users)	IA-2 (1) (12)
IA-3	Device Identification and Authentication	IA-3
IA-4	Identifier Management	IA-4
IA-5	Authenticator Management	IA-5 (1) (11)
IA-6	Authenticator Feedback	IA-6
IA-7	Cryptographic Module Authentication	IA-7

IA-8	Identification and Authentication (NonOrganizational Users)	IA-8 (1) (2) (3) (4)
IR-1	Incident Response Policy and Procedures	IR-1
IR-2	Incident Response Training	IR-2
IR-3	Incident Response Testing	Not Selected
IR-4	Incident Handling	IR-4
IR-5	Incident Monitoring	IR-5
IR-6	Incident Reporting	IR-6
IR-7	Incident Response Assistance	IR-7
IR-8	Incident Response Plan	IR-8
MA-1	System Maintenance Policy and Procedures	MA-1
MA-2	Controlled Maintenance	MA-2
MA-3	Maintenance Tools	Not Selected
MA-4	Nonlocal Maintenance	MA-4
MA-5	Maintenance Personnel	MA-5
MA-6	Timely Maintenance	Not Selected
MP-1	Media Protection Policy and Procedures	MP-1
MP-2	Media Access	MP-2
MP-3	Media Marking	Not Selected
MP-4	Media Storage	Not Selected
MP-5	Media Transport	Not Selected
MP-6	Media Sanitization	MP-6
MP-7	Media Use	MP-7
PE-1	Physical and Environmental Protection Policy and Procedures	PE-1
PE-2	Physical Access Authorizations	PE-2
CNTL NO.	CONTROL NAME	LOW
PE-3	Physical Access Control	PE-3
PE-4	Access Control for Transmission Medium	Not Selected
PE-5	Access Control for Output Devices	Not Selected
PE-6	Monitoring Physical Access	PE-6
PE-8	Visitor Access Records	PE-8

PE-9	Power Equipment and Cabling	Not Selected
PE-10	Emergency Shutoff	Not Selected
PE-11	Emergency Power	PE-11 (1)
PE-12	Emergency Lighting	PE-12
PE-13	Fire Protection	PE-13
PE-14	Temperature and Humidity Controls	PE-14
PE-15	Water Damage Protection	PE-15
PE-16	Delivery and Removal	PE-16
PE-17	Alternate Work Site	Not Selected
PE-18	Location of Information System Components	Not Selected
PL-1	Security Planning Policy and Procedures	PL-1
PL-2	System Security Plan	PL-2 (3)
PL-4	Rules of Behavior	PL-4
PL-7	Security Concept of Operations	
PL-8	Information Security Architecture	Not Selected
PS-1	Personnel Security Policy and Procedures	PS-1
PS-2	Position Risk Designation	PS-2
PS-3	Personnel Screening	PS-3
PS-4	Personnel Termination	PS-4
PS-5	Personnel Transfer	PS-5
PS-6	Access Agreements	PS-6
PS-7	Third-Party Personnel Security	PS-7
PS-8	Personnel Sanctions	PS-8
RA-1	Risk Assessment Policy and Procedures	RA-1
RA-2	Security Categorization	RA-2
RA-3	Risk Assessment	RA-3
RA-5	Vulnerability Scanning	RA-5
SA-1	System and Services Acquisition Policy and Procedures	SA-1
SA-2	Allocation of Resources	SA-2
SA-3	System Development Life Cycle	SA-3

SA-4	Acquisition Process	SA-4 (10)
SA-5	Information System Documentation	SA-5
SA-8	Security Engineering Principles	Not Selected
SA-9	External Information System Services	SA-9
SA-10	Developer Configuration Management	Not Selected
CNTL NO.	CONTROL NAME	LOW
SA-11	Developer Security Testing and Evaluation	Not Selected
SA-12	Supply Chain Protection	Not Selected
SA-15	Development Process, Standards, and Tools	Not Selected
SA-16	Developer-Provided Training	Not Selected
SA-17	Developer Security Architecture and Design	Not Selected
SC-1	System and Communications Protection Policy and Procedures	SC-1
SC-2	Application Partitioning	Not Selected
SC-3	Security Function Isolation	Not Selected
SC-4	Information in Shared Resources	Not Selected
SC-5	Denial of Service Protection	SC-5
SC-7	Boundary Protection	SC-7
SC-8	Transmission Confidentiality and Integrity	Not Selected
SC-10	Network Disconnect	Not Selected
SC-12	Cryptographic Key Establishment and Management	SC-12
SC-13	Cryptographic Protection	SC-13
SC-15	Collaborative Computing Devices	SC-15
SC-17	Public Key Infrastructure Certificates	Not Selected
SC-18	Mobile Code	Not Selected
SC-19	Voice Over Internet Protocol	Not Selected
SC-20	Secure Name /Address Resolution Service (Authoritative Source)	SC-20
SC-21	Secure Name /Address Resolution Service (Recursive or Caching Resolver)	SC-21
SC-22	Architecture and Provisioning for Name/Address Resolution Service	SC-22

SC-23	Session Authenticity	Not Selected
SC-24	Fail in Known State	Not Selected
SC-28	Protection of Information at Rest	Not Selected
SC-39	Process Isolation	SC-39
SC-41	Port and I/O Device Access	SC-41
SI-1	System and Information Integrity Policy and Procedures	SI-1
SI-2	Flaw Remediation	SI-2
SI-3	Malicious Code Protection	SI-3
SI-4	Information System Monitoring	SI-4
SI-5	Security Alerts, Advisories, and Directives	SI-5
SI-6	Security Function Verification	Not Selected
SI-7	Software, Firmware, and Information Integrity	Not Selected
SI-8	Spam Protection	Not Selected
SI-10	Information Input Validation	Not Selected
SI-11	Error Handling	Not Selected
SI-12	Information Handling and Retention	SI-12
SI-13	Predictable Failure Prevention	Not Selected
SI-14	Non-Persistence	Not Selected
SI-15	Information Output Filtering	Not Selected
SI-16	Memory Protection	Not Selected
SI-17	Fail-Safe Procedures	<u>SI-17</u>

Table 3: UFC 4-010-06 Table H-4 Designer CCI for LOW and MODERATE Impact Control Systems

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-001682	AC-2(2)	The information system automatically removes or disables emergency accounts after an organization defined time period for each type of account.	DoD-Defined Enclave Designer Non-Designer Impractical
CCI-001361	AC-2(2)	The organization defines a time period after which temporary accounts are automatically terminated.	DoD-Defined Enclave Designer Non-Designer Impractical
CCI-001365	AC-2(2)	The organization defines a time period after which emergency accounts are automatically terminated.	DoD-Defined Enclave Designer Non-Designer Impractical
CCI-000017	AC-2(3)	The information system automatically disables inactive accounts after an organization-defined time period.	DoD-Defined Enclave Designer Non-Designer Impractical
CCI-000217	AC-2(3)	The organization defines a time period after which inactive accounts are automatically disabled.	DoD-Defined Designer Impractical
CCI-000018	AC-2(4)	The information system automatically audits account creation actions.	Enclave Designer Impractical
CCI-001403	AC-2(4)	The information system automatically audits account modification actions.	Enclave Designer Impractical
CCI-001404	AC-2(4)	The information system automatically audits account disabling actions.	Enclave Designer Impractical
CCI-001405	AC-2(4)	The information system automatically audits account removal actions.	Enclave Designer Impractical

CCI-002130	AC-2(4)	The information system automatically audits account enabling actions.	Enclave Designer Impractical
CCI-001683	AC-2(4)	The information system notifies organization-defined personnel or roles for account creation actions.	Enclave Designer
CCI-001684	AC-2(4)	The information system notifies organization-defined personnel or roles for account modification actions.	Enclave Designer
CCI-001685	AC-2(4)	The information system notifies organization-defined personnel or roles for account disabling actions.	Enclave Designer
CCI-001686	AC-2(4)	The information system notifies organization-defined personnel or roles for account removal actions.	Enclave Designer
CCI-000048	AC-8(a)	The information system displays an organization-defined system use notification message or banner before granting access to the system that provides privacy and security notices consistent with applicable federal laws, Executive Orders, directives, policies, regulations, standards, and guidance.	Enclave Designer Impractical
CCI-002247	AC-8(a)	The organization defines the use notification message or banner the information system displays to users before granting access to the system.	DoD-Defined Enclave Designer Impractical
CCI-002243	AC-8(a)(1)	The organization-defined information system use notification message or banner is to state that users are accessing a U.S. Government information system.	DoD-Defined Enclave Designer Impractical
CCI-002244	AC-8(a)(2)	The organization-defined information system use notification message or banner is to state that information system usage may be monitored, recorded, and subject to audit.	DoD-Defined Enclave Designer Impractical
CCI-002245	AC-8(a)(3)	The organization-defined information system use notification message or banner is to state that unauthorized use of the information system is prohibited and subject to criminal and civil penalties.	DoD-Defined Enclave Designer Impractical
CCI-002246	AC-8(a)(4)	The organization-defined information system use notification message or banner is to state that use of the information system indicates consent to monitoring and recording.	DoD-Defined Enclave Designer Impractical

CCI-000050	AC-8(b)	The information system retains the notification message or banner on the screen until users acknowledge the usage conditions and take explicit actions to log on to or further access.	Enclave Designer
CCI-002248	AC-8(c)(1)	The organization defines the conditions of use which are to be displayed to users of the information system before granting further access.	DoD-Defined Enclave Designer Impractical
CCI-000139	AU-5(a)	The information system alerts designated organization-defined personnel or roles in the event of an audit processing failure.	Enclave Designer Impractical
CCI-000140	AU-5(b)	The information system takes organization defined actions upon audit failure (e.g., shut down information system, overwrite oldest audit records, stop generating audit records).	Enclave Designer Impractical
CCI-001490	AU-5(b)	The organization defines actions to be taken by the information system upon audit failure (e.g., shut down information system, overwrite oldest audit records, stop generating audit records).	Enclave Designer Non-Designer Impractical

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-000258	CA-3(b)	The organization documents, for each interconnection, the interface characteristics.	Enclave Designer Non-Designer
CCI-000550	CP-10	The organization provides for the recovery and reconstitution of the information system to a known state after a disruption.	Enclave Designer Non-Designer
CCI-000551	CP-10	The organization provides for the recovery and reconstitution of the information system to a known state after a compromise.	Enclave Designer Non-Designer
CCI-000552	CP-10	The organization provides for the recovery and reconstitution of the information system to a known state after a failure.	Enclave Designer Non-Designer
CCI-000764	IA-2	The information system uniquely identifies and authenticates organizational users (or processes acting on behalf of organizational users).	Enclave Designer Impractical
CCI-000765	IA-2(1)	The information system implements multifactor authentication for network access to privileged accounts.	Enclave Designer Impractical
CCI-001953	IA-2(12)	The information system accepts Personal Identity Verification (PIV) credentials.	Enclave Designer Impractical

CCI-001954	IA-2(12)	The information system electronically verifies Personal Identity Verification (PIV) credentials.	Enclave Designer Impractical
CCI-000777	IA-3	The organization defines a list of specific and/or types of devices for which identification and authentication is required before establishing a connection to the information system.	DoD-Defined Enclave Designer Impractical
CCI-000778	IA-3	The information system uniquely identifies an organization defined list of specific and/or types of devices before establishing a local, remote, or network connection.	Enclave Designer Impractical
CCI-001958	IA-3	The information system authenticates an organization defined list of specific and/or types of devices before establishing a local, remote, or network connection.	Enclave Designer Impractical
CCI-000192	IA-5(1)(a)	The information system enforces password complexity by the minimum number of upper case characters used.	Enclave Designer
CCI-000193	IA-5(1)(a)	The information system enforces password complexity by the minimum number of lower case characters used.	Enclave Designer
CCI-000194	IA-5(1)(a)	The information system enforces password complexity by the minimum number of numeric characters used.	Enclave Designer
CCI-000205	IA-5(1)(a)	The information system enforces minimum password length.	Enclave Designer

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-001619	IA-5(1)(a)	The information system enforces password complexity by the minimum number of special characters used.	Enclave Designer
CCI-000195	IA-5(1)(b)	The information system, for password-based authentication, when new passwords are created, enforces that at least an organization-defined number of characters are changed.	Enclave Designer
CCI-000196	IA-5(1)(c)	The information system, for password-based authentication, stores only cryptographically-protected passwords.	Enclave Designer Impractical
CCI-000197	IA-5(1)(c)	The information system, for password-based authentication, transmits only cryptographically protected passwords.	Enclave Designer
CCI-000199	IA-5(1)(d)	The information system enforces maximum password lifetime restrictions.	Enclave Designer
CCI-000200	IA-5(1)(e)	The information system prohibits password reuse for the organization defined number of generations.	Enclave Designer Non-Designer Impractical

CCI-001618	IA-5(1)(e)	The organization defines the number of generations for which password reuse is prohibited.	DoD-Defined Enclave Designer Impractical
CCI-002041	IA-5(1)(f)	The information system allows the use of a temporary password for system logons with an immediate change to a permanent password.	Enclave Designer Impractical
CCI-002002	IA-5(11)	The organization defines the token quality requirements to be employed by the information system mechanisms for token-based authentication.	DoD-Defined Enclave Designer Impractical
CCI-002003	IA-5(11)	The information system, for token-based authentication, employs mechanisms that satisfy organization-defined token quality requirements.	Enclave Designer Impractical
CCI-000206	IA-6	The information system obscures feedback of authentication information during the authentication process to protect the information from possible exploitation/use by unauthorized individuals.	Enclave Designer Impractical
CCI-000803	IA-7	The information system implements mechanisms for authentication to a cryptographic module that meet the requirements of applicable federal laws, Executive Orders, directives, policies, regulations, standards, and guidance for such authentication.	Enclave Designer Impractical
CCI-003051	PL-2(a)(2)	The organization's security plan for the information system explicitly defines the authorization boundary for the system.	Enclave Designer Non-Designer

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-000236	PM-11(b)	The organization determines information protection needs arising from the defined mission/business processes and revises the processes as necessary, until an achievable set of protection needs are obtained.	Enclave Designer Non-Designer
CCI-001054	RA-5(a)	The organization scans for vulnerabilities in the information system and hosted applications on an organization-defined frequency.	Enclave Designer Non-Designer
CCI-001055	RA-5(a)	The organization defines a frequency for scanning for vulnerabilities in the information system and hosted applications.	DoD-Defined Enclave Designer Impractical
CCI-001056	RA-5(a)	The organization scans for vulnerabilities in the information system and hosted applications when new vulnerabilities potentially affecting the system/applications are identified and reported.	Enclave Designer Non-Designer

CCI-001641	RA-5(a)	The organization defines the process for conducting random vulnerability scans on the information system and hosted applications.	Enclave Designer Non-Designer Impractical
CCI-001643	RA-5(a)	The organization scans for vulnerabilities in the information system and hosted applications in accordance with the organization-defined process for random scans.	Enclave Designer Non-Designer
CCI-001057	RA-5(b)	The organization employs vulnerability scanning tools and techniques that facilitate interoperability among tools and automate parts of the vulnerability management process by using standards for: enumerating platforms, software flaws, and improper configurations; formatting checklists and test procedures; and measuring vulnerability impact.	Enclave Designer Non-Designer Impractical
CCI-001058	RA-5(c)	The organization analyzes vulnerability scan reports and results from security control assessments.	Enclave Designer Non-Designer
CCI-001059	RA-5(d)	The organization remediates legitimate vulnerabilities in organization-defined response times in accordance with an organizational assessment risk.	Enclave Designer Non-Designer Impractical
CCI-003116	SA-4(10)	The organization employs only information technology products on the FIPS PUB 201-2-approved products list for Personal Identity Verification (PIV) capability implemented within organizational information systems.	Enclave Designer Impractical
CCI-001093	SC-5	The organization defines the types of denial of service attacks (or provides references to sources of current denial of service attacks) that can be addressed by the information system.	Enclave Designer

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-002385	SC-5	The information system protects against or limits the effects of organization-defined types of denial of service attacks by employing organization-defined security safeguards.	Enclave Designer
CCI-002386	SC-5	The organization defines the security safeguards to be employed to protect the information system against, or limit the effects of, denial of service attacks.	Enclave Designer Non-Designer
CCI-001097	SC-7(a)	The information system monitors and controls communications at the external boundary of the system and at key internal boundaries within the system.	DoD-Defined Enclave Designer Impractical

CCI-002544	SC-41	The organization defines the information systems or information system components on which organization-defined connection ports or input/output devices are to be physically disabled or removed.	Enclave Designer Non-Designer
CCI-002545	SC-41	The organization defines the connection ports or input/output devices that are to be physically disabled or removed from organization-defined information systems or information system components.	Enclave Designer Non-Designer
CCI-001241	SI-3(c)(1)	The organization configures malicious code protection mechanisms to perform periodic scans of the information system on an organization-defined frequency.	Enclave Designer Non-Designer
CCI-001253	SI-4(a)(1)	The organization defines the objectives of monitoring for attacks and indicators of potential attacks on the information system.	DoD-Defined Enclave Designer Impractical
CCI-002645	SI-4(b)	The organization defines the techniques and methods to be used to identify unauthorized use of the information system.	Enclave Designer Non-Designer
CCI-002110	AC-2(a)	The organization defines the information system account types that support the organizational missions/business functions.	Designer
CCI-000213	AC-3	The information system enforces approved authorizations for logical access to information and system resources in accordance with applicable access control policies.	Designer
CCI-000043	AC-7(a)	The organization defines the maximum number of consecutive invalid logon attempts to the information system by a user during an organization-defined time period.	DoD-Defined Designer Impractical
CCI-000044	AC-7(a)	The information system enforces the organization defined limit of consecutive invalid logon attempts by a user during the organization-defined time period.	Designer
CCI-001423	AC-7(a)	The organization defines the time period in which the organization-defined maximum number of consecutive invalid logon attempts occurs.	DoD-Defined Designer Impractical

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-002236	AC-7(b)	The organization defines the time period the information system will automatically lock the account or node when the maximum number of unsuccessful attempts is exceeded.	DoD-Defined Designer Impractical
CCI-002237	AC-7(b)	The organization defines the delay algorithm to be employed by the information system to delay the next login prompt	DoD-Defined Designer Impractical

		when the maximum number of unsuccessful attempts is exceeded.	
CCI-002238	AC-7(b)	The information system automatically locks the account or node for either an organization-defined time period, until the locked account or node is released by an administrator, or delays the next login prompt according to the organization-defined delay algorithm when the maximum number of unsuccessful attempts is exceeded.	Designer Impractical
CCI-000061	AC-14(a)	The organization identifies and defines organization defined user actions that can be performed on the information system without identification or authentication consistent with organizational missions/business functions.	Designer
CCI-000232	AC-14(b)	The organization documents and provides supporting rationale in the security plan for the information system, user actions not requiring identification and authentication.	Designer
CCI-001438	AC-18(a)	The organization establishes usage restrictions for wireless access.	Designer Non-Designer
CCI-001439	AC-18(a)	The organization establishes implementation guidance for wireless access.	Designer Non-Designer
CCI-002323	AC-18(a)	The organization establishes configuration/connection requirements for wireless access.	Designer Non-Designer
CCI-001441	AC-18(b)	The organization authorizes wireless access to the information system prior to allowing such connections.	Designer Non-Designer
CCI-000123	AU-2(a)	The organization determines the information system must be capable of auditing an organization-defined list of auditable events.	Designer Non-Designer
CCI-001571	AU-2(a)	The organization defines the information system auditable events.	DoD-Defined Designer Impractical
CCI-000125	AU-2(c)	The organization provides a rationale for why the list of auditable events is deemed to be adequate to support after-the-fact investigations of security incidents.	Designer Non-Designer
CCI-001485	AU-2(d)	The organization defines the events which are to be audited on the information system on an organization defined frequency of (or situation requiring) auditing for each identified event.	Designer Non-Designer

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-000130	AU-3	The information system generates audit records containing information that establishes what type of event occurred.	Designer
CCI-000131	AU-3	The information system generates audit records containing information that establishes when an event occurred.	Designer
CCI-000132	AU-3	The information system generates audit records containing information that establishes where the event occurred.	Designer
CCI-000133	AU-3	The information system generates audit records containing information that establishes the source of the event.	Designer
CCI-000134	AU-3	The information system generates audit records containing information that establishes the outcome of the event.	Designer
CCI-001487	AU-3	The information system generates audit records containing information that establishes the identity of any individuals or subjects associated with the event.	Designer Impractical
CCI-001848	AU-4	The organization defines the audit record storage requirements.	Designer Non-Designer
CCI-001849	AU-4	The organization allocates audit record storage capacity in accordance with organization-defined audit record storage requirements.	Designer Non-Designer
CCI-000159	AU-8(a)	The information system uses internal system clocks to generate time stamps for audit records.	Designer
CCI-001889	AU-8(b)	The information system records time stamps for audit records that meets organization-defined granularity of time measurement.	Designer
CCI-001890	AU-8(b)	The information system records time stamps for audit records that can be mapped to Coordinated Universal Time (UTC) or Greenwich Mean Time (GMT).	Designer
CCI-000169	AU-12(a)	The information system provides audit record generation capability for the auditable events defined in AU-2(a) at organization defined information system components.	Designer
CCI-001459	AU-12(a)	The organization defines information system components that provide audit record generation capability.	DoD-Defined Designer Impractical
CCI-000171	AU-12(b)	The information system allows organization-defined personnel or roles to select which auditable events are to be audited by specific components of the information system.	Designer Impractical

CCI-001910	AU-12(b)	The organization defines the personnel or roles allowed select which auditable events are to be audited by specific components of the information system.	DoD-Defined Designer Impractical
CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-000172	AU-12(c)	The information system generates audit records for the events defined in AU-2(d) with the content defined in AU-3.	Designer
CCI-002102	CA-9(a)	The organization defines the information system components or classes of components that that are authorized internal connections to the information system.	Designer
CCI-002103	CA-9(b)	The organization documents, for each internal connection, the interface characteristics.	Designer
CCI-002104	CA-9(b)	The organization documents, for each internal connection, the security requirements.	Designer
CCI-002105	CA-9(b)	The organization documents, for each internal connection, the nature of the information communicated.	Designer
CCI-000293	CM-2	The organization develops and documents a current baseline configuration of the information system.	Designer
CCI-000363	CM-6(a)	The organization defines security configuration checklists to be used to establish and document configuration settings for the information system technology products employed.	Designer
CCI-000364	CM-6(a)	The organization establishes configuration settings for information technology products employed within the information system using organization-defined security configuration checklists.	Designer
CCI-000365	CM-6(a)	The organization documents configuration settings for information technology products employed within the information system using organization-defined security configuration checklists that reflect the most restrictive mode consistent with operational requirements.	DoD-Defined Designer Non-Designer Impractical
CCI-001588	CM-6(a)	The organization-defined security configuration checklists reflect the most restrictive mode consistent with operational requirements.	DoD-Defined Designer Non-Designer Impractical
CCI-001755	CM-6(c)	The organization defines the information system components for which any deviation from the established configuration settings are to be identified, documented and approved.	DoD-Defined Designer Non-Designer Impractical
CCI-000381	CM-7(a)	The organization configures the information system to provide only essential capabilities.	Designer

CCI-000380	CM-7(b)	The organization defines for the information system prohibited or restricted functions, ports, protocols, and/or services.	Designer
CCI-000382	CM-7(b)	The organization configures the information system to prohibit or restrict the use of organization-defined functions, ports, protocols, and/or services.	Designer

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-001761	CM-7(1)(b)	The organization defines the functions, ports, protocols and services within the information system that are to be disabled when deemed unnecessary and/or non-secure.	Designer
CCI-001762	CM-7(1)(b)	The organization disables organization-defined functions, ports, protocols, and services within the information system deemed to be unnecessary and/or non-secure.	Designer Impractical
CCI-000389	CM-8(a)(1)	The organization develops and documents an inventory of information system components that accurately reflects the current information system.	Designer
CCI-000392	CM-8(a)(2)	The organization develops and documents an inventory of information system components that includes all components within the authorization boundary of the information system.	Designer
CCI-000398	CM-8(a)(4)	The organization defines information deemed necessary to achieve effective information system component accountability.	DoD-Defined Designer Non-Designer Impractical
CCI-002855	CP-12	The information system, when organization-defined conditions are detected, enters a safe mode of operation with organization-defined restrictions of safe mode of operation.	Designer
CCI-002856	CP-12	The organization defines the conditions, that when detected, the information system enters a safe mode of operation with organization-defined restrictions of safe mode of operation.	Designer
CCI-002857	CP-12	The organization defines the restrictions of safe mode of operation that the information system will enter when organization-defined conditions are detected.	Designer
CCI-000176	IA-5(b)	The organization manages information system authenticators by establishing initial authenticator content for authenticators defined by the organization.	Designer Non-Designer
CCI-001544	IA-5(c)	The organization manages information system authenticators by ensuring that authenticators have sufficient strength of mechanism for their intended use.	Designer Non-Designer Impractical

CCI-001989	IA-5(e)	The organization manages information system authenticators by changing default content of authenticators prior to information system installation.	Designer
CCI-000182	IA-5(g)	The organization manages information system authenticators by changing/refreshing authenticators in accordance with the organization defined time period by authenticator type.	DoD-Defined Designer Non-Designer Impractical
CCI-001610	IA-5(g)	The organization defines the time period (by authenticator type) for changing/refreshing authenticators.	DoD-Defined Designer Non-Designer Impractical

CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-001611	IA-5(1)(a)	The organization defines the minimum number of special characters for password complexity enforcement.	DoD-Defined Designer Impractical
CCI-001612	IA-5(1)(a)	The organization defines the minimum number of upper case characters for password complexity enforcement.	DoD-Defined Designer Impractical
CCI-001613	IA-5(1)(a)	The organization defines the minimum number of lower case characters for password complexity enforcement.	DoD-Defined Designer Impractical
CCI-001614	IA-5(1)(a)	The organization defines the minimum number of numeric characters for password complexity enforcement.	DoD-Defined Designer Impractical
CCI-001615	IA-5(1)(b)	The organization defines the minimum number of characters that are changed when new passwords are created.	DoD-Defined Designer Impractical
CCI-000198	IA-5(1)(d)	The information system enforces minimum password lifetime restrictions.	Designer Impractical
CCI-001616	IA-5(1)(d)	The organization defines minimum password lifetime restrictions.	DoD-Defined Designer Impractical
CCI-001617	IA-5(1)(d)	The organization defines maximum password lifetime restrictions.	DoD-Defined Designer Impractical
CCI-003053	PL-2(a)(4)	The organization's security plan for the information system provides the security categorization of the information system including supporting rationale.	Designer Non-Designer
CCI-000207	PM-5	The organization develops and maintains an inventory of its information systems.	Designer Non-Designer Impractical

CCI-001048	RA-3(a)	The organization conducts an assessment of risk of the information system and the information it processes, stores, or transmits that includes the likelihood and magnitude of harm from the unauthorized access, use, disclosure, disruption, modification, or destruction.	Designer Non-Designer
CCI-003124	SA-5(a)(1)	The organization obtains administrator documentation for the information system, system component, or information system services that describes secure configuration of the system, component, or service.	Designer Non-Designer
CCI-003125	SA-5(a)(1)	The organization obtains administrator documentation for the information system, system component, or information system services that describes secure installation of the system, component, or service.	Designer Non-Designer
CCI-003126	SA-5(a)(1)	The organization obtains administrator documentation for the information system, system component, or information system services that describes secure operation of the system, component, or service.	Designer Non-Designer
CCI #	800-53 Control Text Indicator	CCI Definition	Responsibility
CCI-003127	SA-5(a)(2)	The organization obtains administrator documentation for the information system, system component, or information system services that describes effective use and maintenance of security functions/mechanisms.	Designer Non-Designer
CCI-003128	SA-5(a)(3)	The organization obtains administrator documentation for the information system, system component, or information system services that describes known vulnerabilities regarding configuration and use of administrative (i.e., privileged) functions.	Designer Non-Designer
CCI-003129	SA-5(b)(1)	The organization obtains user documentation for the information system, system component, or information system service that describes user-accessible security functions/mechanisms and how to effectively use those security functions/mechanisms.	Designer Non-Designer
CCI-003130	SA-5(b)(2)	The organization obtains user documentation for the information system, system component or information system service that describes methods for user interaction which enables individuals to use the system, component, or service in a more secure manner.	Designer Non-Designer
CCI-003131	SA-5(b)(3)	The organization obtains user documentation for the information system, system component or information system service that describes user responsibilities in maintaining the security of the system, component, or service.	Designer Non-Designer

CCI-002530	SC-39	The information system maintains a separate execution domain for each executing process.	Designer
CCI-002546	SC-41	The organization physically disables or removes organization-defined connection ports or input/output devices on organization-defined information systems or information system components.	Designer Impractical
CCI-002623	SI-3(c)(1)	The organization defines the frequency for performing periodic scans of the information system for malicious code.	DoD-Defined Designer Impractical
CCI-002773	SI-17	The organization defines the fail-safe procedures to be implemented by the information system when organization-defined failure conditions occur.	Designer
CCI-002774	SI-17	The organization defines the failure conditions which, when they occur, will result in the information system implementing organization-defined fail-safe procedures.	Designer
CCI-002775	SI-17	The information system implements organization defined fail-safe procedures when organization defined failure conditions occur.	Designer

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B: Fire Hydrant Flow Test

October 20th, 2021
1040 Hours

Hydrant flow tests for Building 1332 between Boothey Avenue, Prallow street and Collins drive at Travis Air Force Base.
Fairfield, California.

Flow test results

Pressure Hydrant
Static Pressure: 48 psi
Residual Pressure: 41 psi

Flow Hydrant 1
Outlet size: 2 ½" (1 Outlets)
Nozzle Coefficient: 0.8

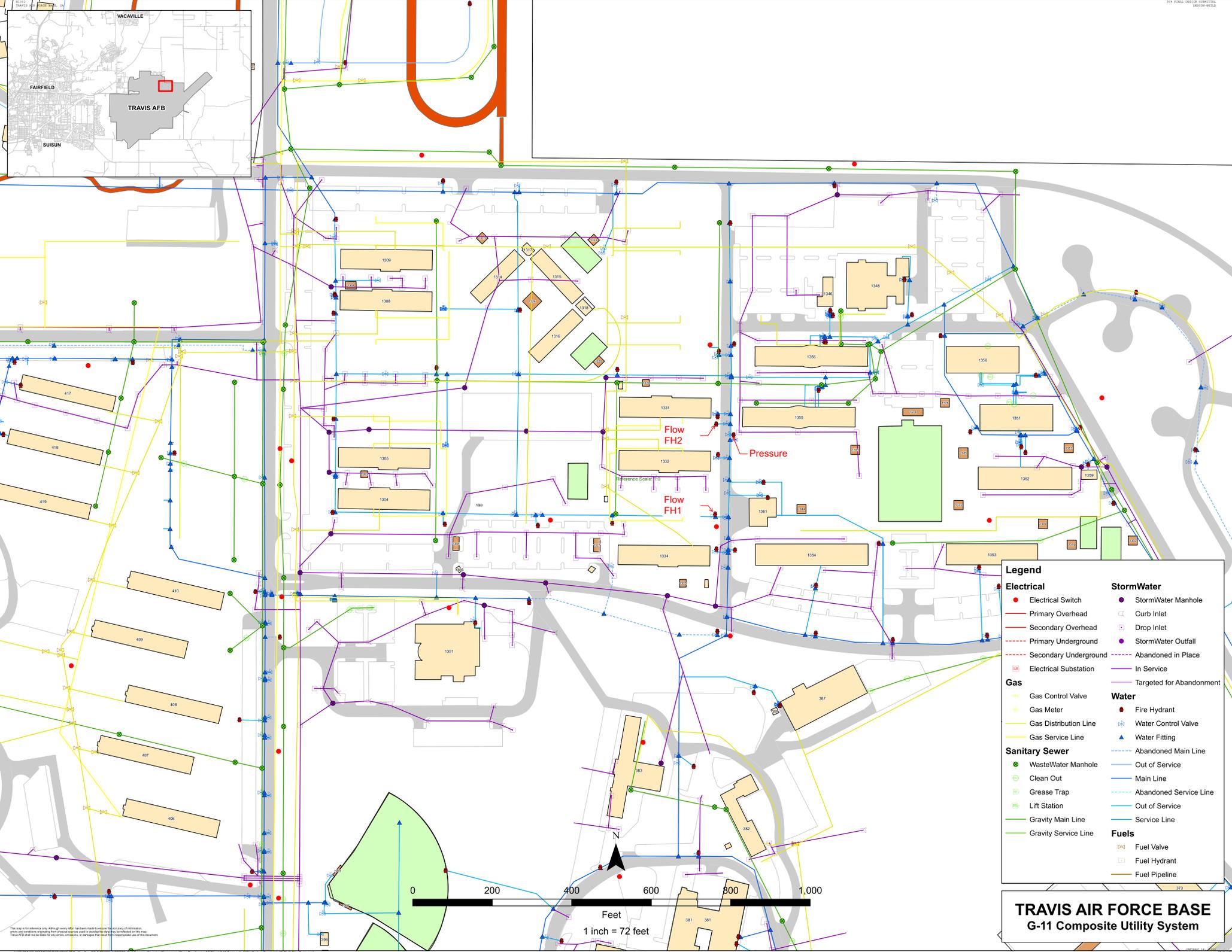
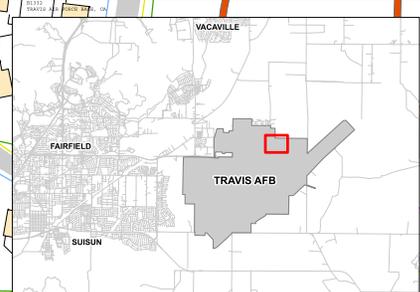
Flow Hydrant 2
Outlet size: 2 ½" (2 Outlets)
Nozzle Coefficient: 0.8

Flow hydrant #	Pitot Pressure (psi)	Flow (NFPA 291) (gpm)	Coefficient	Adjusted flow (gpm)
FH 1	21 (per outlet)	854 x 1= 854	0.8	683
FH 2	20 (per outlet)	834 x 2= 1,668	0.8	1,334
Total flow from all hydrants				2,017

Tests were performed and witnessed by:
Alfonso Doblado, PE – Michael Baker International
Raymond Lim – Michael Baker International
Valery – CalWater representative

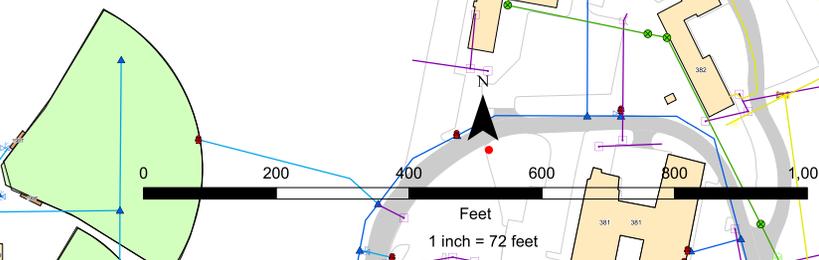


Alfonso Doblado, PE
Fire Protection Engineer
Michael Baker International



Legend

Electrical	StormWater
● Electrical Switch	● StormWater Manhole
— Primary Overhead	□ Curb Inlet
— Secondary Overhead	□ Drop Inlet
— Primary Underground	● StormWater Outfall
- - - Secondary Underground	- - - Abandoned in Place
⊞ Electrical Substation	— In Service
	— Targeted for Abandonment
Gas	Water
● Gas Control Valve	● Fire Hydrant
● Gas Meter	⊞ Water Control Valve
— Gas Distribution Line	⊞ Water Fitting
— Gas Service Line	- - - Abandoned Main Line
Sanitary Sewer	— Out of Service
● WasteWater Manhole	— Main Line
● Clean Out	- - - Abandoned Service Line
● Grease Trap	— Out of Service
⊞ Lift Station	— Service Line
— Gravity Main Line	Fuels
— Gravity Service Line	⊞ Fuel Valve
	□ Fuel Hydrant
	— Fuel Pipeline



**TRAVIS AIR FORCE BASE
G-11 Composite Utility System**

This map is for reference only. Although every effort has been made to ensure the accuracy of the information, errors and omissions are possible. The user assumes all responsibility for any errors, omissions, or damages that may result from the use of this information.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix C: Life Cycle Cost Analysis (LCCA)



INTERNATIONAL

Travis Air Force Base B-1332
Travis AFB, Fairfield, CA 94535
HVAC Mechanical Life Cycle Cost Analysis

Executive Summary

This project consists of a repair of the existing HVAC systems in Building 1332 located at Travis Air Force Base. Per UFC 1-200-02 Section 1-6 “High Performance and Sustainable Building Requirements” and UFC 3-410-01 Section 3-1 “Heating, Ventilating, and Air conditioning Systems”, three energy efficient HVAC systems were selected and compared to one another in a Life Cycle Cost Analysis (LCCA) to determine the most cost-effective system over the expected service life of the building (40 years according to UFC 1-200-02 section 1.6). The selected components must meet or exceed the ASHRAE 90.1 baseline for this building type, which is 3 floors or fewer and less than 25,000 square feet in Climate Zone 3. The three systems were modeled in Trace 700 and the energy outputs were compiled for an LCCA in the BLCC5 software package.

The three alternatives are described as follows:

Alternative 1:

Constant volume (CV) fan coil units (FC) would be provided to condition the air in each space. Conditioned outside air would be supplied to the FC units at or near space setpoint temperature by a dedicated outside air system (DOAS) unit. Building exhaust would be routed back to the DOAS unit’s energy recovery ventilator. Heating and cooling would be provided at the FC units and DOAS unit via a 4-pipe hydronic system (chilled water supply and return, heating water supply and return). Chilled water would be supplied by an air-cooled chiller and associated pumps. Heating would be supplied by two redundant boilers and associated pumps.

Alternative 2:

A variable refrigerant volume system would be installed with constant volume fan coil (FC) units supplying conditioned air in each space. The system would operate under modular outdoor condensing units/heat pumps.

Alternative 3:

Through-the-wall packaged terminal air-conditioners (PTAC) would condition each space. They would be the exclusive means of heating and cooling for each individual space.

BLCC5 Summary	Alternative 1 Present Value (\$)	Alternative 2 Present Value (\$)	Alternative 3 Present Value (\$)
Initial Cost	126,022	246,575	112,050
Energy Consumption Cost	1,008,743	1,046,772	1,305,532
Repair and Replacement Cost	69,159	135,317	61,492
Remaining Value	-21,423	-41,917	-19,048
Total Life-Cycle Cost	1,182,501	1,386,747	1,460,026
Electricity Rate	\$0.197/kWh		
Natural Gas Rate	\$9.41/MMBtu		

NIST BLCC 5.3.21: Lowest LCC

SPECIFICATIONS
DESIGN SUBMITTAL
DESIGN-BUILD

Consistent with Federal Life Cycle Cost Methodology and Procedures, 10 CFR, Part 436, Subpart A

General Information

File Name: C:\Projects\Travis AFB\LCCA\Travis AFB BLCC5.xml

Date of Study: Fri Nov 05 15:21:27 MDT 2021

Analysis Type: MILCON Analysis, Energy Project

Project Name: Travis AFB 1332 Dorm Repair

Project Location: California

Analyst: Anthony Russo

Base Date: November 1, 2021

Beneficial Occupancy Date: November 1, 2021

Study Period: 40 years 0 months (November 1, 2021 through October 31, 2061)

Discount Rate: 1.5%

Discounting Convention: Mid-Year

Lowest LCC

Comparative Present-Value Costs of Alternatives (Shown in Ascending Order of Initial Cost, * = Lowest LCC)

Alternative	Initial Cost (PV)	Life Cycle Cost (PV)
PTAC	\$112,050	\$1,460,026
Fan Coil	\$126,022	\$1,182,501 *
VRF	\$246,575	\$1,386,747

NIST BLCC 5.3.21: Summary LCC

SPECIFICATIONS
DESIGN SUBMITTAL
DESIGN-BUILD

Consistent with Federal Life Cycle Cost Methodology and Procedures, 10 CFR, Part 436, Subpart A

General Information

File Name: C:\Projects\Travis AFB\LCCA\Travis AFB LCC5.xml

Date of Study: Fri Nov 05 15:16:18 MDT 2021

Analysis Type: MILCON Analysis, Energy Project

Project Name: Travis AFB 1332 Dorm Repair

Project Location: California

Analyst: Anthony Russo

Base Date: November 1, 2021

Beneficial Occupancy Date: November 1, 2021

Study Period: 40 years 0 months (November 1, 2021 through October 31, 2061)

Discount Rate: 1.5%

Discounting Convention: Mid-Year

Discount and Escalation Rates are NOMINAL (inclusive of general inflation)

Alternative: Fan Coil LCC Summary

	Present Value	Annual Value
Initial Cost Paid By Agency	\$126,022	\$4,213
Energy Consumption Costs	\$1,008,743	\$33,721
Energy Demand Costs	\$0	\$0
Energy Utility Rebates	\$0	\$0
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0
Routine Annually Recurring OM&R Costs	\$0	\$0
Routine Non-Annually Recurring OM&R Costs	\$0	\$0
Major Repair and Replacement Costs	\$69,159	\$2,312
Less Remaining Value	-\$21,423	-\$716
	-----	-----
Total Life-Cycle Cost	\$1,182,501	\$39,530

Alternative: VRF LCC Summary

	Present Value	Annual Value
Initial Cost Paid By Agency	\$246,575	\$8,243
Energy Consumption Costs	\$1,046,772	\$34,992
Energy Demand Costs	\$0	\$0

JANUARY 14, 2022

Energy Utility Rebates	\$0	\$0	35% FINAL DESIGN SUBMITTAL	SPECIFICATIONS
Water Usage Costs	\$0	\$0	DESIGN-BUILD	
Water Disposal Costs	\$0	\$0		
Routine Annually Recurring OM&R Costs	\$0	\$0		
Routine Non-Annually Recurring OM&R Costs	\$0	\$0		
Major Repair and Replacement Costs	\$135,317	\$4,523		
Less Remaining Value	-\$41,917	-\$1,401		
	-----	-----		
Total Life-Cycle Cost	\$1,386,747	\$46,357		

Alternative: PTAC LCC Summary

	Present Value	Annual Value
Initial Cost Paid By Agency	\$112,050	\$3,746
Energy Consumption Costs	\$1,305,532	\$43,642
Energy Demand Costs	\$0	\$0
Energy Utility Rebates	\$0	\$0
Water Usage Costs	\$0	\$0
Water Disposal Costs	\$0	\$0
Routine Annually Recurring OM&R Costs	\$0	\$0
Routine Non-Annually Recurring OM&R Costs	\$0	\$0
Major Repair and Replacement Costs	\$61,492	\$2,056
Less Remaining Value	-\$19,048	-\$637
	-----	-----
Total Life-Cycle Cost	\$1,460,026	\$48,807

NIST BLCC 5.3.21: Comparative Analysis

REVISIONS
SPECIFICATIONS

Consistent with Federal Life Cycle Cost Methodology and Procedures, 10 CFR, Part 436, Subpart A, Federal Energy Management Program, 41 CFR, Part 101-11.6

Base Case: Fan Coil

Alternative: VRF

General Information

File Name: C:\Projects\Travis AFB\LCCA\Travis AFB BLCC5.xml
Date of Study: Fri Nov 05 15:22:28 MDT 2021
Project Name: Travis AFB 1332 Dorm Repair
Project Location: California
Analysis Type: MILCON Analysis, Energy Project
Analyst: Anthony Russo
Base Date: November 1, 2021
Beneficial Occupancy Date: November 1, 2021
Study Period: 40 years 0 months (November 1, 2021 through October 31, 2061)
Discount Rate: 1.5%
Discounting Convention: Mid-Year

Comparison of Present-Value Costs PV Life-Cycle Cost

Initial Investment Costs:

Capital Requirements as of Base Date \$126,022 \$246,575 -\$120,553

Future Costs:

	Base Case	Alternative	Savings from Alternative
Energy Consumption Costs	\$1,008,743	\$1,046,772	-\$38,029
Energy Demand Charges	\$0	\$0	\$0
Energy Utility Rebates	\$0	\$0	\$0
Water Costs	\$0	\$0	\$0
Routine Recurring and Non-Recurring OM&R Costs	\$0	\$0	\$0
Major Repair and Replacements	\$69,159	\$135,317	-\$66,158
Residual Value at End of Study Period	-\$21,423	-\$41,917	\$20,493

Subtotal (for Future Cost Items)	\$1,056,479	\$1,140,172	-\$83,693

Total PV Life-Cycle Cost

\$1,182,501 \$1,386,747 -\$204,246

Net Savings from Alternative Compared with Base Case

PV of Non-Investment Savings -\$38,029

- Increased Total Investment \$166,217

NOTE: Meaningful SIR, AIRR and Payback can not be computed unless incremental savings and total savings are both positive.

353 FINAL DESIGN SUBMITTAL TRAVIS AIR FORCE BASE, CA DESIGN-BUILD

Energy Savings Summary

Energy Savings Summary (in stated units)

Energy Type	-----Average	Annual	Consumption-----	Life-Cycle
Type	Base Case	Alternative	Savings	Savings
Electricity	213,235.0 kWh	238,893.0 kWh	-25,658.0 kWh	-1,026,249.8 kWh
Natural Gas	290.7 MBtu	0.0 MBtu	290.7 MBtu	11,628.4 MBtu

Energy Savings Summary (in MBtu)

Energy Type	-----Average	Annual	Consumption-----	Life-Cycle
Type	Base Case	Alternative	Savings	Savings
Electricity	727.6 MBtu	815.1 MBtu	-87.5 MBtu	-3,501.7 MBtu
Natural Gas	290.7 MBtu	0.0 MBtu	290.7 MBtu	11,628.4 MBtu

Emissions Reduction Summary

Energy Type	-----Average	Annual	Emissions-----	Life-Cycle
Type	Base Case	Alternative	Reduction	Reduction
Electricity				
CO2	40,664.22 kg	45,557.24 kg	-4,893.02 kg	-195,707.32 kg
SO2	3.84 kg	4.30 kg	-0.46 kg	-18.47 kg
NOx	36.85 kg	41.28 kg	-4.43 kg	-177.35 kg
Natural Gas				
CO2	15,356.28 kg	0.00 kg	15,356.28 kg	614,209.09 kg
SO2	123.93 kg	0.00 kg	123.93 kg	4,956.86 kg
NOx	2.15 kg	0.00 kg	2.15 kg	85.89 kg
Total:				
CO2	56,020.50 kg	45,557.24 kg	10,463.26 kg	418,501.77 kg
SO2	127.77 kg	4.30 kg	123.47 kg	4,938.39 kg
NOx	39.00 kg	41.28 kg	-2.29 kg	-91.46 kg

NIST BLCC 5.3.21: Comparative Analysis

REVISIONS
SPECIFICATIONS

Consistent with Federal Life Cycle Cost Methodology and Procedures, 10 CFR, Part 436, Subpart A, Part 436.22, REV A, ENCL 5.3.21

DESIGN SUBMITTAL
DESIGN-BUILD

Base Case: Fan Coil

Alternative: PTAC

General Information

File Name: C:\Projects\Travis AFB\LCCA\Travis AFB BLCC5.xml

Date of Study: Fri Nov 05 15:23:19 MDT 2021

Project Name: Travis AFB 1332 Dorm Repair

Project Location: California

Analysis Type: MILCON Analysis, Energy Project

Analyst: Anthony Russo

Base Date: November 1, 2021

Beneficial Occupancy Date: November 1, 2021

Study Period: 40 years 0 months (November 1, 2021 through October 31, 2061)

Discount Rate: 1.5%

Discounting Convention: Mid-Year

Comparison of Present-Value Costs PV Life-Cycle Cost

Initial Investment Costs:

Capital Requirements as of Base Date \$126,022 \$112,050 \$13,972

Future Costs:

Energy Consumption Costs	\$1,008,743	\$1,305,532	-\$296,790
Energy Demand Charges	\$0	\$0	\$0
Energy Utility Rebates	\$0	\$0	\$0
Water Costs	\$0	\$0	\$0
Routine Recurring and Non-Recurring OM&R Costs	\$0	\$0	\$0
Major Repair and Replacements	\$69,159	\$61,492	\$7,668
Residual Value at End of Study Period	-\$21,423	-\$19,048	-\$2,375

Subtotal (for Future Cost Items) -----
\$1,056,479 \$1,347,976 -\$291,497

Total PV Life-Cycle Cost \$1,182,501 \$1,460,026 -\$277,525

Net Savings from Alternative Compared with Base Case

PV of Non-Investment Savings -\$296,790

- Increased Total Investment -\$19,264

NOTE: Meaningful SIR, AIRR and Payback can not be computed unless incremental savings and total savings are both positive.

353 FINAL DESIGN SUBMITTAL DESIGN-BUILD

Energy Savings Summary

Energy Savings Summary (in stated units)

Energy Type	-----Average	Annual	Consumption-----	Life-Cycle
Type	Base Case	Alternative	Savings	Savings
Electricity	213,235.0 kWh	297,947.0 kWh	-84,712.0 kWh	-3,388,248.1 kWh
Natural Gas	290.7 MBtu	0.0 MBtu	290.7 MBtu	11,628.4 MBtu

Energy Savings Summary (in MBtu)

Energy Type	-----Average	Annual	Consumption-----	Life-Cycle
Type	Base Case	Alternative	Savings	Savings
Electricity	727.6 MBtu	1,016.6 MBtu	-289.0 MBtu	-11,561.2 MBtu
Natural Gas	290.7 MBtu	0.0 MBtu	290.7 MBtu	11,628.4 MBtu

Emissions Reduction Summary

Energy Type	-----Average	Annual	Emissions-----	Life-Cycle
Type	Base Case	Alternative	Reduction	Reduction
Electricity				
CO2	40,664.22 kg	56,818.93 kg	-16,154.70 kg	-646,143.83 kg
SO2	3.84 kg	5.36 kg	-1.52 kg	-60.99 kg
NOx	36.85 kg	51.49 kg	-14.64 kg	-585.53 kg
Natural Gas				
CO2	15,356.28 kg	0.00 kg	15,356.28 kg	614,209.09 kg
SO2	123.93 kg	0.00 kg	123.93 kg	4,956.86 kg
NOx	2.15 kg	0.00 kg	2.15 kg	85.89 kg
Total:				
CO2	56,020.50 kg	56,818.93 kg	-798.42 kg	-31,934.74 kg
SO2	127.77 kg	5.36 kg	122.41 kg	4,895.87 kg
NOx	39.00 kg	51.49 kg	-12.49 kg	-499.64 kg

ENERGY CONSUMPTION SUMMARY

By Michael Baker Intl

	Elect Cons. (kWh)	Gas Cons. (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 1					
Primary heating					
Primary heating		290,729	28.5 %	290,729	306,031
Other Htg Accessories	4,424		1.5 %	15,100	45,303
Heating Subtotal	4,424	290,729	30.0 %	305,829	351,334
Primary cooling					
Cooling Compressor	22,190		7.4 %	75,735	227,226
Tower/Cond Fans	1,698		0.6 %	5,795	17,387
Condenser Pump			0.0 %	0	0
Other Clg Accessories	876		0.3 %	2,990	8,970
Cooling Subtotal....	24,764		8.3 %	84,519	253,584
Auxiliary					
Supply Fans			0.0 %	0	0
Pumps	2,153		0.7 %	7,347	22,042
Stand-alone Base Utilities			0.0 %	0	0
Aux Subtotal....	2,153		0.7 %	7,347	22,042
Lighting					
Lighting	181,895		61.0 %	620,807	1,862,607
Receptacle					
Receptacles			0.0 %	0	0
Cogeneration					
Cogeneration			0.0 %	0	0
Totals					
Totals**	213,235	290,729	100.0 %	1,018,502	2,489,567

* Note: Resource Utilization factors are included in the Total Source Energy value.

** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

ENERGY CONSUMPTION SUMMARY

By Michael Baker Intl

	Elect Cons. (kWh)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 2				
Primary heating				
Primary heating	16,205	6.8 %	55,307	165,939
Other Htg Accessories		0.0 %	0	0
Heating Subtotal	16,205	6.8 %	55,307	165,939
Primary cooling				
Cooling Compressor	33,514	14.0 %	114,384	343,186
Tower/Cond Fans	2,751	1.2 %	9,391	28,175
Condenser Pump		0.0 %	0	0
Other Clg Accessories	4,527	1.9 %	15,452	46,361
Cooling Subtotal....	40,793	17.1 %	139,227	417,722
Auxiliary				
Supply Fans		0.0 %	0	0
Pumps		0.0 %	0	0
Stand-alone Base Utilities		0.0 %	0	0
Aux Subtotal....		0.0 %	0	0
Lighting				
Lighting	181,895	76.1 %	620,807	1,862,607
Receptacle				
Receptacles		0.0 %	0	0
Cogeneration				
Cogeneration		0.0 %	0	0
Totals				
Totals**	238,893	100.0 %	815,341	2,446,268

* Note: Resource Utilization factors are included in the Total Source Energy value.

** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

ENERGY CONSUMPTION SUMMARY

By Michael Baker Intl

	Elect Cons. (kWh)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 3				
Primary heating				
Primary heating	81,776	27.5 %	279,100	837,384
Other Htg Accessories		0.0 %	0	0
Heating Subtotal	81,776	27.5 %	279,100	837,384
Primary cooling				
Cooling Compressor	31,394	10.5 %	107,148	321,476
Tower/Cond Fans	2,007	0.7 %	6,848	20,547
Condenser Pump		0.0 %	0	0
Other Clg Accessories	876	0.3 %	2,990	8,970
Cooling Subtotal....	34,277	11.5 %	116,986	350,994
Auxiliary				
Supply Fans		0.0 %	0	0
Pumps		0.0 %	0	0
Stand-alone Base Utilities		0.0 %	0	0
Aux Subtotal....		0.0 %	0	0
Lighting				
Lighting	181,895	61.1 %	620,807	1,862,607
Receptacle				
Receptacles		0.0 %	0	0
Cogeneration				
Cogeneration		0.0 %	0	0
Totals				
Totals**	297,947	100.0 %	1,016,893	3,050,985

* Note: Resource Utilization factors are included in the Total Source Energy value.

** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

System Checksums

By Michael Baker Intl

FC-1

Fan Coil

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: Sum of		Mo/Hr: Heating Design			Cooling		Heating		
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: Peaks		OADB: 30			SADB	55.0	82.1		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0		
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	81.4	68.0		
Envelope Loads				Envelope Loads				Fn MtrTD		0.0	0.0		
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Fn Frict	0.0	0.0		
Roof Cond	16,423	0	16,423	7	18,271	9	Roof Cond	-12,567					
Glass Solar	79,999	0	79,999	35	85,724	40	Glass Solar	0					
Glass/Door Cond	20,260	0	20,260	9	19,632	9	Glass/Door Cond	-64,396	-64,396	31.00			
Wall Cond	31,249	0	31,249	14	35,975	17	Wall Cond	-36,537	-36,537	17.59			
Partition/Door	0	0	0	0	0	0	Partition/Door	0	0	0.00			
Floor	0	0	0	0	0.00	0	Floor	0	0	0.00			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	Adjacent Floor	0.00	0.00	0.00			
Infiltration	0	0	0	0	0	0	Infiltration	0	0	0.00			
Sub Total ==>	147,930	0	147,930	66	159,602	75	Sub Total ==>	-113,500	-113,500	54.63			
Internal Loads				Internal Loads				Nom Vent		1,765	1,765		
Lights	56,695	14,174	70,869	31	56,695	27	Lights	0	0	0.00			
People	36,337	0	36,337	16	25,436	12	People	0	0	0.00			
Misc	0	0	0	0	0	0	Misc	0	0	0.00			
Sub Total ==>	93,032	14,174	107,206	48	82,131	39	Sub Total ==>	0	0	0.00			
Ceiling Load	0	0	0	0	0	0	Ceiling Load	0	0	0.00			
Ventilation Load	-26,926	0	-26,926	-12	-29,372	-14	Ventilation Load	-5,890	-5,890	2.84			
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0	0			
Dehumid. Ov Sizing	0	0	0	0	0	0	Ov/Undr Sizing	0	0	0.00			
Ov/Undr Sizing	0	0	0	0	0	0	Exhaust Heat	0	0	0.00			
Exhaust Heat	-2,661	-2,661	-1	-1	0	0	OA Preheat Diff.	-88,355	42.53				
Sup. Fan Heat	0	0	0	0	0	0	RA Preheat Diff.	0	0.00				
Ret. Fan Heat	0	0	0	0	0	0	Additional Reheat	0	0.00				
Duct Heat Pkup	0	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00				
Underflr Sup Ht Pkup	0	0	0	0	0	0	Supply Air Leakage	0	0.00				
Supply Air Leakage	0	0	0	0	0	0	Grand Total ==>	-119,390	-207,745	100.00			
Grand Total ==>	214,036	11,513	225,549	100.00	212,360	100.00	Grand Total ==>	-119,390	-207,745	100.00			

AIRFLOWS		
	Cooling	Heating
Diffuser	7,636	7,636
Terminal	7,636	7,636
Main Fan	7,636	7,636
Sec Fan	0	0
Nom Vent	1,765	1,765
AHU Vent	1,765	1,765
Infil	0	0
MinStop/Rh	0	0
Return	9,401	9,401
Exhaust	1,765	1,765
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	23.1	23.1
cfm/ft²	0.37	0.37
cfm/ton	322.39	
ft²/ton	876.69	
Btu/hr-ft²	13.69	-10.00
No. People	104	

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	18.8	225.6	212.1	7,636	81.4	61.1	48.3	55.0	50.6	47.8
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	4.9	58.7	58.9	1,765	95.0	67.0	54.6	65.0	56.5	54.6
Total	23.7	284.2								

AREAS			
	Gross Total	Glass ft²	(%)
Floor	20,764		
Part	0		
Int Door	1		
ExFlr	0		
Roof	6,946	0	0
Wall	13,497	2,169	16
Ext Door	1,939	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-119.4	7,636	68.0	82.1
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-88.4	1,765	30.0	75.0
Total	-207.8			

System Checksums

By Michael Baker Intl

VRF-001

Variable Refrigerant Flow

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design			Cooling	Heating			
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 30			SADB	55.0	82.1		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0		
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	81.4	68.0		
Envelope Loads				Envelope Loads							Ret/OA	81.4	68.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Fn MtrTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Fn BldTD	0.0	0.0		
Roof Cond	16,423	0	16,423	7	18,271	9	-12,567	6.05	Fn Frict	0.0	0.0		
Glass Solar	79,999	0	79,999	35	85,724	40	0	0.00					
Glass/Door Cond	20,260	0	20,260	9	19,632	9	-64,396	31.00					
Wall Cond	31,249	0	31,249	14	35,975	17	-36,537	17.59					
Partition/Door	0	0	0	0	0	0	0	0.00					
Floor	0	0	0	0	0.00	0	0	0.00					
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Infiltration	0	0	0	0	0	0	0	0.00					
Sub Total ==>	147,930	0	147,930	66	159,602	75	-113,500	54.63					
Internal Loads				Internal Loads							AIRFLOWS		
Lights	56,695	14,174	70,869	31	56,695	27	0	0.00	Diffuser	7,636	7,636		
People	36,337	0	36,337	16	25,436	12	0	0.00	Terminal	7,636	7,636		
Misc	0	0	0	0	0	0	0	0.00	Main Fan	7,636	7,636		
Sub Total ==>	93,032	14,174	107,206	48	82,131	39	0	0.00	Sec Fan	0	0		
Ceiling Load	0	0	0	0	0	0	0	0.00	Nom Vent	1,765	1,765		
Ventilation Load	-26,926	0	-26,926	-12	-29,372	-14	-5,890	2.84	AHU Vent	1,765	1,765		
Adj Air Trans Heat	0	0	0	0	0	0	0	0	Infil	0	0		
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	MinStop/Rh	764	764		
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	Return	9,401	9,401		
Exhaust Heat	0	-2,661	-2,661	-1	0	0	0	0.00	Exhaust	1,765	1,765		
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	Rm Exh	0	0		
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	Auxiliary	0	0		
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	Leakage Dwn	0	0		
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	Leakage Ups	0	0		
Supply Air Leakage	0	0	0	0	0	0	0	0.00					
Grand Total ==>	214,036	11,513	225,549	100.00	212,360	100.00	-119,390	-207,745	100.00	ENGINEERING CKS			

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	18.8	225.6	212.1	7,636	81.4	61.1	48.3	55.0	50.6	47.8
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	4.9	58.7	58.9	1,765	95.0	67.0	54.6	65.0	56.5	54.6
Total	23.7	284.2								

AREAS			
	Gross Total	Glass ft²	(%)
Floor	20,764		
Part	0		
Int Door	1		
ExFlr	0		
Roof	6,946	0	0
Wall	13,497	2,169	16
Ext Door	1,939	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-119.4	7,636	68.0	82.1
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-88.4	1,765	30.0	75.0
Total	-207.8			

System Checksums

By Michael Baker Intl

PTAC-1

Packaged Terminal Air Conditioner

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: Sum of		Mo/Hr: Heating Design			Cooling		Heating		
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: Peaks		OADB: 30			SADB	55.0	82.1		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0		
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	81.4	68.0		
Envelope Loads				Envelope Loads						Ret/OA	81.3	68.0	
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Fn MtrTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Fn BldTD	0.0	0.0		
Roof Cond	18,271	0	18,271	8	18,271	Roof Cond	-12,567	6.05	Fn Frict	0.0	0.0		
Glass Solar	82,636	0	82,636	35	85,724	Glass Solar	0	0.00					
Glass/Door Cond	21,593	0	21,593	9	19,632	Glass/Door Cond	-64,396	31.00					
Wall Cond	35,936	0	35,936	15	35,975	Wall Cond	-36,537	17.59					
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00					
Floor	0	0	0	0	0.00	Floor	0	0.00					
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	Adjacent Floor	0.00	0.00					
Infiltration	0	0	0	0	0	Infiltration	0	0.00					
Sub Total ==>	158,436	0	158,436	66	159,602	Sub Total ==>	-113,500	54.63					
Internal Loads				Internal Loads						AIRFLOWS			
Lights	56,695	14,174	70,868	30	56,695	Lights	0	0.00	Diffuser	7,636	7,636		
People	36,337	0	36,337	15	25,436	People	0	0.00	Terminal	7,636	7,636		
Misc	0	0	0	0	0	Misc	0	0.00	Main Fan	7,636	7,636		
Sub Total ==>	93,032	14,174	107,206	45	82,131	Sub Total ==>	0	0.00	Sec Fan	0	0		
Ceiling Load	0	0	0	0	0	Ceiling Load	0	0.00	Nom Vent	1,765	1,765		
Ventilation Load	-24,265	0	-24,265	-10	-29,372	Ventilation Load	-5,890	2.84	AHU Vent	1,765	1,765		
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0	Infil	0	0		
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	MinStop/Rh	0	0		
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0.00	Return	9,401	9,401		
Exhaust Heat	-3,102	-3,102	-1	-1	0	OA Preheat Diff.	-88,355	42.53	Exhaust	1,765	1,765		
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0.00	Rm Exh	0	0		
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	0	0.00	Auxiliary	0	0		
Duct Heat Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Leakage Dwn	0	0		
Underflr Sup Ht Pkup	0	0	0	0	0	Supply Air Leakage	0	0.00	Leakage Ups	0	0		
Supply Air Leakage	0	0	0	0	0	Grand Total ==>	-119,390	-207,745	100.00				
Grand Total ==>	227,204	11,072	238,275	100.00	212,360	Grand Total ==>	-119,390	-207,745	100.00				

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	19.9	238.3	222.3	7,636	81.4	61.1	48.3	55.0	49.9	45.4
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	4.9	58.7	58.9	1,765	95.0	67.0	54.6	65.0	56.5	54.6
Total	24.8	297.0								

AREAS			
	Gross Total	Glass	
		ft²	(%)
Floor	20,764		
Part	0		
Int Door	1		
ExFlr	0		
Roof	6,946	0	0
Wall	13,497	2,169	16
Ext Door	1,939	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-88.4	1,765	30.0	75.0
Total	-207.8			

Zone Checksums

By Michael Baker Intl

101 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 15		Mo/Hr: 9 / 15		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Cooling	Heating	
Outside Air:		OADB/WB/HR: 93 / 65 / 46		OADB: 93		OADB: 93		OADB: 30		OADB: 30		SADB	55.0	81.9
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	80.0	68.0
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Btu/h		Btu/h	Btu/h		Return	81.1	68.0
Envelope Loads				Envelope Loads				Envelope Loads				Ret/OA	81.1	68.0
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn MtrTD	0.0	0.0
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn BldTD	0.0	0.0
Roof Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn Frict	0.0	0.0
Glass Solar	1,002	0	1,002	36	1,002	39	0	0.00	0	0	0.00			
Glass/Door Cond	204	0	204	7	204	8	-602	26.07	-602	-602	26.07			
Wall Cond	864	0	864	31	864	33	-781	33.83	-781	-781	33.83			
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00			
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00			
<i>Sub Total ==></i>	2,070	0	2,070	74	2,070	80	-1,383	59.90	-1,383	-1,383	59.90			
Internal Loads				Internal Loads				Internal Loads						
Lights	557	139	696	25	557	22	0	0.00	0	0	0.00			
People	357	0	357	13	250	10	0	0.00	0	0	0.00			
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00			
<i>Sub Total ==></i>	914	139	1,053	38	807	31	0	0.00	0	0	0.00			
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00			
Ventilation Load	-313	0	-313	-11	-289	-11	-58	2.51	-58	-58	2.51			
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00			
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00			
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00			
Exhaust Heat	0	-22	-22	-1	0	0	0	0.00	0	0	0.00			
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00			
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00			
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00			
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00			
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00			
<i>Grand Total ==></i>	2,670	117	2,788	100.00	2,587	100.00	-1,441	100.00	-1,441	-2,309	100.00			

AIRFLOWS		
	Cooling	Heating
Diffuser	93	93
Terminal	93	93
Main Fan	93	93
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	110	110
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	18.6	18.6
cfm/ft²	0.46	0.46
cfm/ton	331.84	
ft²/ton	727.68	
Btu/hr-ft²	16.49	-11.32
No. People	1	

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.2	2.8	2.7	93	81.1	61.0	48.2	55.0	50.3	46.7
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.3	3.4								

AREAS			
	Gross Total	Glass ft²	(%)
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	261	19	7
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1.4	93	68.0	81.9
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-2.3			

Zone Checksums

By Michael Baker Intl

102 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 18			Mo/Hr: 7 / 18		Mo/Hr: Heating Design							Cooling	Heating		
Outside Air:		OADB/WB/HR: 89 / 64 / 48			OADB: 89		OADB: 30							SADB	55.0	87.3	
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ret/OA					
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Fm MtrTD					
Envelope Loads					Envelope Loads										AIRFLOWS		
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00	Diffuser	67	67			
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	Terminal	67	67			
Roof Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	Main Fan	67	67			
Glass Solar	179	0	179	9	179	10	0	0.00	0	0	0.00	Sec Fan	0	0			
Glass/Door Cond	175	0	175	8	175	9	-602	26.07	-602	-602	26.07	Nom Vent	17	17			
Wall Cond	992	0	992	48	992	53	-781	33.83	-781	-781	33.83	AHU Vent	17	17			
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00	Infil	0	0			
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00	MinStop/Rh	0	0			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Return	84	84			
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00	Exhaust	17	17			
Sub Total ==>	1,345	0	1,345	65	1,345	72	-1,383	59.90	-1,383	-1,383	59.90	Rm Exh	0	0			
Internal Loads					Internal Loads										ENGINEERING CKS		
Lights	557	139	696	34	557	30	0	0.00	0	0	0.00	% OA	25.9	25.9			
People	357	0	357	17	250	13	0	0.00	0	0	0.00	cfm/ft²	0.33	0.33			
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00	cfm/ton	303.28				
Sub Total ==>	914	139	1,053	51	807	43	0	0.00	0	0	0.00	ft²/ton	923.67				
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00	Btu/hr-ft²	12.99	-11.32			
Ventilation Load	-296	0	-296	-14	-289	-16	-58	2.51	-58	-58	2.51	No. People	1				
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Dehumid. Ov Sizing			0	0			0	0.00			0.00						
Ov/Undr Sizing	0		0	0	0	0	0	0.00			0.00						
Exhaust Heat		-29	-29	-1			0	0.00		-868	37.59						
Sup. Fan Heat			0	0			0	0.00			0.00						
Ret. Fan Heat		0	0	0			0	0.00			0.00						
Duct Heat Pkup		0	0	0			0	0.00			0.00						
Underflr Sup Ht Pkup			0	0			0	0.00			0.00						
Supply Air Leakage		0	0	0			0	0.00			0.00						
Grand Total ==>	1,963	111	2,074	100.00	1,863	100.00	-1,441	100.00	-1,441	-2,309	100.00						

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION				
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass ft² (%)	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F	
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb							
Main Clg	0.2	2.1	2.0	67	81.5	61.1	48.2	55.0	50.0	45.8	Floor	204					
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0					
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1					
											ExFlr	0					
Total	0.2	2.7									Roof	0	0	0			
											Wall	261	19	7			
											Ext Door	21	0	0			
											Total	-2.3					

Zone Checksums

By Michael Baker Intl

103 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES			
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design			Cooling		Heating	SADB	55.0	78.6
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 30			Ra Plenum		68.0	Return	81.3	68.0
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ret/OA	Fn MtrTD	Fn BldTD	Fn Frict		
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Tot Sens Btu/h	(%)	81.3	0.0	0.0	0.0		
Envelope Loads				Envelope Loads							AIRFLOWS			
Skylite Solar	0	0	0	0	0	0	0	0.00	Diffuser		81	81		
Skylite Cond	0	0	0	0	0	0	0	0.00	Terminal		81	81		
Roof Cond	0	0	0	0	0	0	0	0.00	Main Fan		81	81		
Glass Solar	1,083	0	1,083	43	1,083	48	0	0.00	Sec Fan		0	0		
Glass/Door Cond	191	0	191	8	191	9	-602	32.98	Nom Vent		17	17		
Wall Cond	457	0	457	18	457	20	-297	16.29	AHU Vent		17	17		
Partition/Door	0	0	0	0	0	0	0	0.00	Infil		0	0		
Floor	0	0	0	0	0.00	0	0	0.00	MinStop/Rh		0	0		
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Return		98	98		
Infiltration	0	0	0	0	0	0	0	0.00	Exhaust		17	17		
Sub Total ==>	1,731	0	1,731	69	1,731	77	-899	49.27	Rm Exh		0	0		
Internal Loads				Internal Loads							ENGINEERING CKS			
Lights	557	139	696	28	557	25	0	0.00	% OA		21.4	21.4		
People	357	0	357	14	250	11	0	0.00	cfm/ft²		0.40	0.40		
Misc	0	0	0	0	0	0	0	0.00	cfm/ton		315.62			
Sub Total ==>	914	139	1,053	42	807	36	0	0.00	ft²/ton		796.46			
Ceiling Load	0	0	0	0	0	0	0	0.00	Btu/hr-ft²		15.07	-8.95		
Ventilation Load	-262	0	-262	-10	-289	-13	-58	3.17	No. People		1			
Adj Air Trans Heat	0	0	0	0	0	0	0	0						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00						
Exhaust Heat	0	-25	-25	-1	0	0	-868	47.56						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00						
Grand Total ==>	2,383	115	2,497	100.00	2,248	100.00	-957	100.00						

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION				
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass ft² (%)	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F	
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb							
Main Clg	0.2	2.5	2.4	81	81.3	61.1	48.2	55.0	50.0	45.6	Floor	204	-1.0	81	68.0	78.6	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	0.0	0	0.0	0.0	
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1	0.0	0	0.0	0.0	
											ExFlr	0	0.0	0	0.0	0.0	
Total	0.3	3.1									Roof	0	0.0	0	0.0	0.0	
											Wall	112	-0.9	17	30.0	75.0	
											Ext Door	21	-1.8				
											Total						

Zone Checksums

By Michael Baker Intl

104 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 15			Mo/Hr: 7 / 15		Mo/Hr: Heating Design							Cooling	Heating		
Outside Air:		OADB/WB/HR: 95 / 67 / 55			OADB: 95		OADB: 30							SADB	55.0	89.0	
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ret/OA					
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Fn MtrTD					
Envelope Loads					Envelope Loads										Fn BldTD	0.0	0.0
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn Frict	0.0	0.0			
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00						
Roof Cond	0	0	0	0	0	0	0	0.00	0	0	0.00						
Glass Solar	206	0	206	15	18	0	0	0.00	0	0	0.00						
Glass/Door Cond	243	0	243	17	21	-602	-602	32.98	-602	-602	32.98						
Wall Cond	175	0	175	12	15	-297	-297	16.29	-297	-297	16.29						
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00						
Floor	0	0	0	0	0	0	0	0.00	0	0	0.00						
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00						
<i>Sub Total ==></i>	625	0	625	44	55	-899	-899	49.27	-899	-899	49.27						
Internal Loads					Internal Loads												
Lights	557	139	696	49	49	0	0	0.00	0	0	0.00						
People	357	0	357	25	22	0	0	0.00	0	0	0.00						
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00						
<i>Sub Total ==></i>	914	139	1,053	74	71	0	0	0.00	0	0	0.00						
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ventilation Load	-216	0	-216	-15	-25	-58	-58	3.17	-58	-58	3.17						
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00						
Exhaust Heat	0	-41	-41	-3	0	0	0	0.00	0	0	0.00						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00						
Grand Total ==>	1,323	98	1,421	100.00	1,142	100.00	-957	100.00	-957	-1,825	100.00						

AIRFLOWS		
	Cooling	Heating
Diffuser	41	41
Terminal	41	41
Main Fan	41	41
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	58	58
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	42.2	42.2
cfm/ft²	0.20	0.20
cfm/ton	246.79	
ft²/ton	1,225.55	
Btu/hr-ft²	9.79	-8.95
No. People	1	

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.1	1.4	1.2	41	82.1	61.4	48.5	55.0	49.0	42.1
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.2	2.0								

AREAS			
	Gross Total	Glass	
		ft²	(%)
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	112	19	17
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-1.8			

Zone Checksums

By Michael Baker Intl

105 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design			Cooling		Heating		
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 30			SADB	55.0	78.6		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0		
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	81.3	68.0		
Envelope Loads				Envelope Loads							Ret/OA	81.3	68.0
Skylite Solar	0	0	0	0	0	0	0	0.00	Fn MtrTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	0	0	0.00	Fn BldTD	0.0	0.0		
Roof Cond	0	0	0	0	0	0	0	0.00	Fn Frict	0.0	0.0		
Glass Solar	1,083	0	1,083	43	1,083	48	0	0.00					
Glass/Door Cond	191	0	191	8	191	9	-602	32.98					
Wall Cond	457	0	457	18	457	20	-297	16.29					
Partition/Door	0	0	0	0	0	0	0	0.00					
Floor	0	0	0	0	0.00	0	0	0.00					
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Infiltration	0	0	0	0	0	0	0	0.00					
Sub Total ==>	1,731	0	1,731	69	1,731	77	-899	49.27					
Internal Loads				Internal Loads							AIRFLOWS		
Lights	557	139	696	28	557	25	0	0.00	Diffuser	81	81		
People	357	0	357	14	250	11	0	0.00	Terminal	81	81		
Misc	0	0	0	0	0	0	0	0.00	Main Fan	81	81		
Sub Total ==>	914	139	1,053	42	807	36	0	0.00	Sec Fan	0	0		
Ceiling Load	0	0	0	0	0	0	0	0.00	Nom Vent	17	17		
Ventilation Load	-262	0	-262	-10	-289	-13	-58	3.17	AHU Vent	17	17		
Adj Air Trans Heat	0	0	0	0	0	0	0	0	Infil	0	0		
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	MinStop/Rh	0	0		
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	Return	98	98		
Exhaust Heat	0	-25	-25	-1	0	0	0	0.00	Exhaust	17	17		
Sup. Fan Heat	0	0	0	0	0	0	-868	47.56	Rm Exh	0	0		
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	Auxiliary	0	0		
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	Leakage Dwn	0	0		
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	Leakage Ups	0	0		
Supply Air Leakage	0	0	0	0	0	0	0	0.00	ENGINEERING CKS				
Grand Total ==>	2,383	115	2,497	100.00	2,248	100.00	-957	-1,825	100.00	% OA	21.4	21.4	
											cfm/ft²	0.40	0.40
											cfm/ton	315.62	
											ft²/ton	796.46	
											Btu/hr-ft²	15.07	-8.95
											No. People	1	

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION						
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass	Lvg	Capacity	Coil Airflow	Ent	Lvg		
	ton	MBh			MBh	cfm	°F	°F	gr/lb	°F								°F	gr/lb
Main Clg	0.2	2.5	2.4	81	81.3	61.1	48.2	55.0	50.0	45.6	Floor	204		Main Htg	-1.0	81	68.0	78.6	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0		Aux Htg	0.0	0	0.0	0.0	
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1		Preheat	0.0	0	0.0	0.0	
											ExFlr	0							
											Roof	0	0	0	Humidif	0.0	0	0.0	0.0
											Wall	112	19	17	Opt Vent	-0.9	17	30.0	75.0
Total	0.3	3.1									Ext Door	21	0	0	Total	-1.8			

Zone Checksums

By Michael Baker Intl

106 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES					
Peaked at Time:		Mo/Hr: 7 / 15			Mo/Hr: 7 / 15		Mo/Hr: Heating Design			Mo/Hr: Heating Design			Cooling			Heating				
Outside Air:		OADB/WB/HR: 95 / 67 / 55			OADB: 95		OADB: 95			OADB: 30			SADB			Ra Plenum				
Space Sens. + Lat.	Plenum Sens. + Lat.	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Return	Ret/OA	Fn MtrTD	Fn BldTD	Fn Frict	
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)						
Envelope Loads					Envelope Loads					Envelope Loads										
Skylite Solar	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0.00	85.0	88.0	0.0	0.0	0.0	
Skylite Cond	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0.00	80.0	68.0	0.0	0.0	0.0	
Roof Cond	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0.00	82.1	68.0	0.0	0.0	0.0	
Glass Solar	206	0	206	15	206	18	0	0	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0	
Glass/Door Cond	243	0	243	17	243	21	-602	32.98	-602	-602	32.98	-602	-602	32.98	0.0	0.0	0.0	0.0	0.0	
Wall Cond	175	0	175	12	175	15	-297	16.29	-297	-297	16.29	-297	-297	16.29	0.0	0.0	0.0	0.0	0.0	
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0	
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0	
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0	
<i>Sub Total ==></i>	625	0	625	44	625	55	-899	49.27	-899	-899	49.27	-899	-899	49.27						
Internal Loads					Internal Loads					Internal Loads										
Lights	557	139	696	49	557	49	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0	
People	357	0	357	25	250	22	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0	
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0	
<i>Sub Total ==></i>	914	139	1,053	74	807	71	0	0.00	0	0	0.00	0	0	0.00						
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Ventilation Load	-216	0	-216	-15	-289	-25	-58	3.17	-58	-58	3.17	-58	-58	3.17						
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Exhaust Heat	0	-41	-41	-3	0	0	0	0.00	0	0	0.00	0	0	0.00						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Grand Total ==>	1,323	98	1,421	100.00	1,142	100.00	-957	100.00	-957	-1,825	100.00	-957	-1,825	100.00						

AIRFLOWS		
	Cooling	Heating
Diffuser	41	41
Terminal	41	41
Main Fan	41	41
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	58	58
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	42.2	42.2
cfm/ft²	0.20	0.20
cfm/ton	246.79	
ft²/ton	1,225.55	
Btu/hr-ft²	9.79	-8.95
No. People	1	

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.1	1.4	1.2	41	82.1	61.4	48.5	55.0	49.0	42.1
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.2	2.0								

AREAS			
	Gross Total	Glass	
		ft²	(%)
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	112	19	17
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-1.8			

Zone Checksums

By Michael Baker Intl

107 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES																																																
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design			Cooling		Heating																																																
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 30			SADB	55.0	78.6																																																
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0																																																
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	81.3	68.0																																																
Envelope Loads				Envelope Loads							Ret/OA	81.3	68.0																																														
Skylite Solar	0	0	0	0	0	0	0	0.00	Fn MtrTD	0.0	0.0																																																
Skylite Cond	0	0	0	0	0	0	0	0.00	Fn BldTD	0.0	0.0																																																
Roof Cond	0	0	0	0	0	0	0	0.00	Fn Frict	0.0	0.0																																																
Glass Solar	1,083	0	1,083	43	1,083	48	0	0.00	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">AIRFLOWS</th> </tr> <tr> <th></th> <th>Cooling</th> <th>Heating</th> </tr> </thead> <tbody> <tr> <td>Diffuser</td><td>81</td><td>81</td> </tr> <tr> <td>Terminal</td><td>81</td><td>81</td> </tr> <tr> <td>Main Fan</td><td>81</td><td>81</td> </tr> <tr> <td>Sec Fan</td><td>0</td><td>0</td> </tr> <tr> <td>Nom Vent</td><td>17</td><td>17</td> </tr> <tr> <td>AHU Vent</td><td>17</td><td>17</td> </tr> <tr> <td>Infil</td><td>0</td><td>0</td> </tr> <tr> <td>MinStop/Rh</td><td>0</td><td>0</td> </tr> <tr> <td>Return</td><td>98</td><td>98</td> </tr> <tr> <td>Exhaust</td><td>17</td><td>17</td> </tr> <tr> <td>Rm Exh</td><td>0</td><td>0</td> </tr> <tr> <td>Auxiliary</td><td>0</td><td>0</td> </tr> <tr> <td>Leakage Dwn</td><td>0</td><td>0</td> </tr> <tr> <td>Leakage Ups</td><td>0</td><td>0</td> </tr> </tbody> </table>			AIRFLOWS				Cooling	Heating	Diffuser	81	81	Terminal	81	81	Main Fan	81	81	Sec Fan	0	0	Nom Vent	17	17	AHU Vent	17	17	Infil	0	0	MinStop/Rh	0	0	Return	98	98	Exhaust	17	17	Rm Exh	0	0	Auxiliary	0	0	Leakage Dwn	0	0	Leakage Ups	0	0
AIRFLOWS																																																											
	Cooling	Heating																																																									
Diffuser	81	81																																																									
Terminal	81	81																																																									
Main Fan	81	81																																																									
Sec Fan	0	0																																																									
Nom Vent	17	17																																																									
AHU Vent	17	17																																																									
Infil	0	0																																																									
MinStop/Rh	0	0																																																									
Return	98	98																																																									
Exhaust	17	17																																																									
Rm Exh	0	0																																																									
Auxiliary	0	0																																																									
Leakage Dwn	0	0																																																									
Leakage Ups	0	0																																																									
Glass/Door Cond	191	0	191	8	191	9	-602	32.98																																																			
Wall Cond	457	0	457	18	457	20	-297	16.29																																																			
Partition/Door	0	0	0	0	0	0	0	0.00																																																			
Floor	0	0	0	0	0.00	0	0	0.00																																																			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																																			
Infiltration	0	0	0	0	0	0	0	0.00																																																			
Sub Total ==>	1,731	0	1,731	69	1,731	77	-899	49.27																																																			
Internal Loads				Internal Loads																																																							
Lights	557	139	696	28	557	25	0	0.00																																																			
People	357	0	357	14	250	11	0	0.00																																																			
Misc	0	0	0	0	0	0	0	0.00																																																			
Sub Total ==>	914	139	1,053	42	807	36	0	0.00																																																			
Ceiling Load	0	0	0	0	0	0	0	0.00																																																			
Ventilation Load	-262	0	-262	-10	-289	-13	-58	3.17																																																			
Adj Air Trans Heat	0	0	0	0	0	0	0	0																																																			
Dehumid. Ov Sizing			0	0			0	0.00																																																			
Ov/Undr Sizing	0		0	0	0	0	0	0.00																																																			
Exhaust Heat		-25	-25	-1			-868	47.56																																																			
Sup. Fan Heat			0	0			0	0.00																																																			
Ret. Fan Heat		0	0	0			0	0.00																																																			
Duct Heat Pkup		0	0	0			0	0.00																																																			
Underflr Sup Ht Pkup			0	0			0	0.00																																																			
Supply Air Leakage		0	0	0			0	0.00																																																			
Grand Total ==>	2,383	115	2,497	100.00	2,248	100.00	-957	100.00																																																			

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.2	2.5	2.4	81	81.3	61.1	48.2	55.0	50.0	45.6
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.3	3.1								

AREAS			
	Gross Total	Glass	
		ft²	(%)
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	112	19	17
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-1.8			

Zone Checksums

By Michael Baker Intl

108 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 15			Mo/Hr: 7 / 15		Mo/Hr: Heating Design			Cooling		Heating					
Outside Air:		OADB/WB/HR: 95 / 67 / 55			OADB: 95		OADB: 30			SADB		Ra Plenum		Return			
		Ret/OA			Fn MtrTD		Fn BldTD			Fn Frict							
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total						
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)						
Envelope Loads					Envelope Loads												
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00						
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00						
Roof Cond	0	0	0	0	0	0	0	0.00	0	0	0.00						
Glass Solar	206	0	206	15	206	18	0	0.00	0	0	0.00						
Glass/Door Cond	243	0	243	17	243	21	-602	32.98	-602	-602	32.98						
Wall Cond	175	0	175	12	175	15	-297	16.29	-297	-297	16.29						
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00						
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00						
Sub Total ==>	625	0	625	44	625	55	-899	49.27	-899	-899	49.27						
Internal Loads					Internal Loads												
Lights	557	139	696	49	557	49	0	0.00	0	0	0.00						
People	357	0	357	25	250	22	0	0.00	0	0	0.00						
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00						
Sub Total ==>	914	139	1,053	74	807	71	0	0.00	0	0	0.00						
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ventilation Load	-216	0	-216	-15	-289	-25	-58	3.17	-58	-58	3.17						
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00						
Exhaust Heat	0	-41	-41	-3	0	0	0	0.00	0	0	0.00						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00						
Grand Total ==>	1,323	98	1,421	100.00	1,142	100.00	-957	100.00	-1,825	-1,825	100.00						

AIRFLOWS		
	Cooling	Heating
Diffuser	41	41
Terminal	41	41
Main Fan	41	41
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	58	58
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	42.2	42.2
cfm/ft²	0.20	0.20
cfm/ton	246.79	
ft²/ton	1,225.55	
Btu/hr-ft²	9.79	-8.95
No. People	1	

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.1	1.4	1.2	41	82.1	61.4	48.5	55.0	49.0	42.1
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.2	2.0								

AREAS			
	Gross Total	Glass ft²	(%)
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	112	19	17
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1.0	41	68.0	89.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-1.8			

Zone Checksums

By Michael Baker Intl

109 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES			
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design			Cooling		Heating	SADB	55.0	78.6
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 30			Ra Plenum		68.0	Return	81.3	68.0
Space Sens. + Lat.	Plenum Sens. + Lat.	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Fn MtrTD	Fn BldTD	Fn Frict			
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Tot Sens Btu/h	(%)						
Envelope Loads				Envelope Loads							AIRFLOWS			
Skylite Solar	0	0	0	0	0	0	0	0.00	Diffuser	81	81			
Skylite Cond	0	0	0	0	0	0	0	0.00	Terminal	81	81			
Roof Cond	0	0	0	0	0	0	0	0.00	Main Fan	81	81			
Glass Solar	1,083	0	1,083	43	1,083	48	0	0.00	Sec Fan	0	0			
Glass/Door Cond	191	0	191	8	191	9	-602	32.98	Nom Vent	17	17			
Wall Cond	457	0	457	18	457	20	-297	16.29	AHU Vent	17	17			
Partition/Door	0	0	0	0	0	0	0	0.00	Infil	0	0			
Floor	0	0	0	0	0	0	0	0.00	MinStop/Rh	0	0			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Return	98	98			
Infiltration	0	0	0	0	0	0	0	0.00	Exhaust	17	17			
Sub Total ==>	1,731	0	1,731	69	1,731	77	-899	49.27	Rm Exh	0	0			
Internal Loads				Internal Loads							ENGINEERING CKS			
Lights	557	139	696	28	557	25	0	0.00	% OA	21.4	21.4			
People	357	0	357	14	250	11	0	0.00	cfm/ft²	0.40	0.40			
Misc	0	0	0	0	0	0	0	0.00	cfm/ton	315.62				
Sub Total ==>	914	139	1,053	42	807	36	0	0.00	ft²/ton	796.46				
Ceiling Load	0	0	0	0	0	0	0	0.00	Btu/hr-ft²	15.07	-8.95			
Ventilation Load	-262	0	-262	-10	-289	-13	-58	3.17	No. People	1				
Adj Air Trans Heat	0	0	0	0	0	0	0	0						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00						
Exhaust Heat	0	-25	-25	-1	0	0	-868	47.56						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00						
Grand Total ==>	2,383	115	2,497	100.00	2,248	100.00	-957	100.00						

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION				
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass ft² (%)	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F	
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb							
Main Clg	0.2	2.5	2.4	81	81.3	61.1	48.2	55.0	50.0	45.6	Floor	204	-1.0	81	68.0	78.6	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	0.0	0	0.0	0.0	
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1	0.0	0	0.0	0.0	
											ExFlr	0	0.0	0	0.0	0.0	
Total	0.3	3.1									Roof	0	0.0	0	0.0	0.0	
											Wall	112	-0.9	17	30.0	75.0	
											Ext Door	21	-1.8				

Zone Checksums

By Michael Baker Intl

110 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES				
Peaked at Time:		Mo/Hr: 7 / 15			Mo/Hr: 7 / 15		Mo/Hr: Heating Design							Cooling	Heating				
Outside Air:		OADB/WB/HR: 95 / 67 / 55			OADB: 95		OADB: 30							SADB	55.0	89.0			
Space Sens. + Lat.	Plenum Sens. + Lat.	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Return	Ret/OA	Fn MtrTD	Fn BldTD	Fn Frict
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)					
Envelope Loads					Envelope Loads														
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	82.1	68.0	0.0	0.0	0.0
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	82.1	68.0	0.0	0.0	0.0
Roof Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0
Glass Solar	206	0	206	15	206	18	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0
Glass/Door Cond	243	0	243	17	243	21	-602	32.98	-602	-602	32.98	-602	-602	32.98	0.0	0.0	0.0	0.0	0.0
Wall Cond	175	0	175	12	175	15	-297	16.29	-297	-297	16.29	-297	-297	16.29	0.0	0.0	0.0	0.0	0.0
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0.0	0.0	0.0	0.0	0.0
<i>Sub Total ==></i>	625	0	625	44	625	55	-899	49.27	-899	-899	49.27	-899	-899	49.27					
Internal Loads					Internal Loads														
Lights	557	139	696	49	557	49	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
People	357	0	357	25	250	22	0	0.00	0	0	0.00	0	0	0.00	58	58	0	0	0
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	17	17	0	0	0
<i>Sub Total ==></i>	914	139	1,053	74	807	71	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Ventilation Load	-216	0	-216	-15	-289	-25	-58	3.17	-58	-58	3.17	-58	-58	3.17	0	0	0	0	0
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Exhaust Heat	0	-41	-41	-3	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0	0	0
Grand Total ==>	1,323	98	1,421	100.00	1,142	100.00	-957	100.00	-957	-1,825	100.00	-957	-1,825	100.00					

AIRFLOWS		
	Cooling	Heating
Diffuser	41	41
Terminal	41	41
Main Fan	41	41
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	58	58
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	42.2	42.2
cfm/ft²	0.20	0.20
cfm/ton	246.79	
ft²/ton	1,225.55	
Btu/hr-ft²	9.79	-8.95
No. People	1	

COOLING COIL SELECTION										
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh	MBh	cfm	°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.1	1.4	1.2	41	82.1	61.4	48.5	55.0	49.0	42.1
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.2	2.0								

AREAS			
	Gross Total	Glass	(%)
		ft²	
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	112	19	17
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity	Coil Airflow	Ent	Lvg
	MBh	cfm	°F	°F
Main Htg	-1.0	41	68.0	89.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-1.8			

Zone Checksums

By Michael Baker Intl

111 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Cooling	Heating	
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 92		OADB: 30		OADB: 30		SADB	55.0	80.8
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Tot Sens	(%)	Btu/h	Btu/h	(%)	Return	81.2	68.0
Envelope Loads				Envelope Loads				Envelope Loads				Ret/OA	81.2	68.0
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn MtrTD	0.0	0.0
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn BldTD	0.0	0.0
Roof Cond	0	0	0	0	0	0	0	0.00	0	0	0.00	Fn Frict	0.0	0.0
Glass Solar	1,098	0	1,098	41	1,098	45	0	0.00	0	0	0.00	AIRFLOWS		
Glass/Door Cond	176	0	176	7	176	7	-602	28.46	-602	-602	28.46	Diffuser	88	88
Wall Cond	644	0	644	24	644	26	-588	27.78	-588	-588	27.78	Terminal	88	88
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00	Main Fan	88	88
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00	Sec Fan	0	0
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Nom Vent	17	17
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00	AHU Vent	17	17
Sub Total ==>	1,918	0	1,918	71	1,918	79	-1,190	56.23	-1,190	-1,190	56.23	Infil	0	0
Internal Loads				Internal Loads				Internal Loads				MinStop/Rh	0	0
Lights	557	139	696	26	557	23	0	0.00	0	0	0.00	Return	105	105
People	357	0	357	13	250	10	0	0.00	0	0	0.00	Exhaust	17	17
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00	Rm Exh	0	0
Sub Total ==>	914	139	1,053	39	807	33	0	0.00	0	0	0.00	Auxiliary	0	0
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00	Leakage Dwn	0	0
Ventilation Load	-262	0	-262	-10	-289	-12	-58	2.74	-58	-58	2.74	Leakage Ups	0	0
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	ENGINEERING CKS		
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00	% OA	19.8	19.8
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00	cfm/ft²	0.43	0.43
Exhaust Heat	0	-23	-23	-1	0	0	-868	41.03	0	0	0.00	cfm/ton	322.11	
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	ft²/ton	750.43	
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00	Btu/hr-ft²	15.99	-10.37
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00	No. People	1	
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00			
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00			
Grand Total ==>	2,570	116	2,686	100.00	2,435	100.00	-1,247	100.00	-1,247	-2,116	100.00			

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION					
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass	Lvg	Capacity	Coil Airflow	Ent	Lvg	
	ton	MBh			MBh	cfm	°F	°F	gr/lb	°F								°F
Main Clg	0.2	2.7	2.6	88	81.2	61.0	48.2	55.0	50.0	45.7	Floor	204		Main Htg	-1.3	88	68.0	80.8
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0		Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1		Preheat	0.0	0	0.0	0.0
											ExFlr	0		Humidif	0.0	0	0.0	0.0
Total	0.3	3.3									Roof	0	0	Opt Vent	-0.9	17	30.0	75.0
											Wall	201	19	Total	-2.1			
											Ext Door	21	0					

Room Checksums

By Michael Baker Intl

327 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES		
Peaked at Time: Mo/Hr: 9 / 14					Mo/Hr: 9 / 14					Mo/Hr: Heating Design					Cooling Heating		
Outside Air: OADB/WB/HR: 92 / 65 / 50					OADB: 92					OADB: 30					SADB 55.0 80.1		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Ra Plenum	Return	Ret/OA	Fn MtrTD	Fn BldTD	Fn Frict
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	80.0	81.1	81.1	0.0	0.0	0.0
Envelope Loads					Envelope Loads					Envelope Loads							
Skylite Solar	0	0	0	0	0	0	0	0.00	0	0	0.00						
Skylite Cond	0	0	0	0	0	0	0	0.00	0	0	0.00						
Roof Cond	485	0	485	16	485	18	-369	16.82	-369	-369	16.82						
Glass Solar	1,083	0	1,083	36	1,083	40	0	0.00	0	0	0.00						
Glass/Door Cond	191	0	191	6	191	7	-602	27.43	-602	-602	27.43						
Wall Cond	457	0	457	15	457	17	-297	13.55	-297	-297	13.55						
Partition/Door	0	0	0	0	0	0	0	0.00	0	0	0.00						
Floor	0	0	0	0	0.00	0	0	0.00	0	0	0.00						
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Infiltration	0	0	0	0	0	0	0	0.00	0	0	0.00						
Sub Total ==>	2,215	0	2,215	74	2,215	81	-1,268	57.80	-1,268	-1,268	57.80						
Internal Loads					Internal Loads					Internal Loads							
Lights	557	139	696	23	557	20	0	0.00	0	0	0.00						
People	357	0	357	12	250	9	0	0.00	0	0	0.00						
Misc	0	0	0	0	0	0	0	0.00	0	0	0.00						
Sub Total ==>	914	139	1,053	35	807	30	0	0.00	0	0	0.00						
Ceiling Load	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ventilation Load	-262	0	-262	-9	-289	-11	-58	2.64	-58	-58	2.64						
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00	0	0	0.00						
Exhaust Heat	0	-21	-21	-1	0	0	-868	39.56	0	0	0.00						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00	0	0	0.00						
Grand Total ==>	2,867	118	2,986	100.00	2,733	100.00	-1,326	100.00	-1,326	-2,194	100.00						

AIRFLOWS		
	Cooling	Heating
Diffuser	98	98
Terminal	98	98
Main Fan	98	98
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	116	116
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	17.6	17.6
cfm/ft²	0.48	0.48
cfm/ton	331.06	
ft²/ton	687.24	
Btu/hr-ft²	17.46	-10.76
No. People	1.0	5.0/1000 ft²

COOLING COIL SELECTION										
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh	MBh	cfm	°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.3	3.0	2.9	98	81.1	61.0	48.2	55.0	50.1	46.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.3	3.6								

AREAS			
	Gross Total	Glass	(%)
		ft²	
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	204	0	0
Wall	112	19	17
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity	Coil Airflow	Ent	Lvg
	MBh	cfm	°F	°F
Main Htg	-1.3	98	68.0	80.1
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-2.2			

Room Checksums

By Michael Baker Intl

328 SR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 15			Mo/Hr: 7 / 15		Mo/Hr: Heating Design							Cooling	Heating		
Outside Air:		OADB/WB/HR: 95 / 67 / 55			OADB: 95		OADB: 30							SADB	55.0	87.2	
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Coil Peak	Percent Of Total	Ret/OA					
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Tot Sens	(%)	Btu/h	Btu/h	(%)	Fn MtrTD					
Envelope Loads					Envelope Loads										AIRFLOWS		
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	0	0	0.00	Diffuser	62	62			
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	0	0	0.00	Terminal	62	62			
Roof Cond	584	0	584	29	34	Roof Cond	-369	16.82	-369	-369	16.82	Main Fan	62	62			
Glass Solar	206	0	206	10	12	Glass Solar	0	0.00	0	0	0.00	Sec Fan	0	0			
Glass/Door Cond	243	0	243	12	14	Glass/Door Cond	-602	27.43	-602	-602	27.43	Nom Vent	17	17			
Wall Cond	175	0	175	9	10	Wall Cond	-297	13.55	-297	-297	13.55	AHU Vent	17	17			
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	0	0	0.00	Infil	0	0			
Floor	0	0	0	0	0	Floor	0	0.00	0	0	0.00	MinStop/Rh	0	0			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	Adjacent Floor	0.00	0.00	0.00	0.00	0.00	Return	79	79			
Infiltration	0	0	0	0	0	Infiltration	0	0.00	0	0	0.00	Exhaust	17	17			
Sub Total ==>	1,209	0	1,209	60	70	Sub Total ==>	-1,268	57.80	-1,268	-1,268	57.80	Rm Exh	0	0			
Internal Loads					Internal Loads										ENGINEERING CKS		
Lights	557	139	696	35	32	Lights	0	0.00	0	0	0.00	% OA	27.9	27.9			
People	357	0	357	18	14	People	0	0.00	0	0	0.00	cfm/ft²	0.30	0.30			
Misc	0	0	0	0	0	Misc	0	0.00	0	0	0.00	cfm/ton	287.20				
Sub Total ==>	914	139	1,053	52	47	Sub Total ==>	0	0.00	0	0	0.00	ft²/ton	943.69				
Ceiling Load	0	0	0	0	0	Ceiling Load	0	0.00	0	0	0.00	Btu/hr-ft²	12.72	-10.76			
Ventilation Load	-214	0	-214	-11	-17	Ventilation Load	-58	2.64	-58	-58	2.64	No. People	1.0	5.0/1000 ft²			
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0.00	0	0	0.00						
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0.00	0	0	0.00						
Exhaust Heat	-30	-30	-2	-2	0	OA Preheat Diff.	-868	39.56									
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0.00									
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	0	0.00									
Duct Heat Pkup	0	0	0	0	0	System Plenum Heat	0	0.00									
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00									
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00									
Grand Total ==>	1,909	109	2,018	100.00	1,727	Grand Total ==>	-1,326	100.00	-1,326	-2,194	100.00						

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION						
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass	Lvg	Capacity	Coil Airflow	Ent	Lvg		
	ton	MBh			MBh	cfm	°F	°F	gr/lb	°F								°F	gr/lb
Main Clg	0.2	2.0	1.8	62	81.6	61.2	48.4	55.0	49.5	44.0	Floor	204		Main Htg	-1.3	62	68.0	87.2	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0		Aux Htg	0.0	0	0.0	0.0	
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1		Preheat	0.0	0	0.0	0.0	
											ExFlr	0							
Total	0.2	2.6									Roof	204	0	0	Humidif	0.0	0	0.0	0.0
											Wall	112	19	17	Opt Vent	-0.9	17	30.0	75.0
											Ext Door	21	0	0	Total	-2.2			

Room Checksums

By Michael Baker Intl

329 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 14		Mo/Hr: 9 / 14		Mo/Hr: Heating Design			Cooling		Heating		
Outside Air:		OADB/WB/HR: 92 / 65 / 50		OADB: 92		OADB: 30			SADB	55.0	82.9		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0		
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	81.0	68.0		
Envelope Loads				Envelope Loads							Fn MtrTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Fn Frict	0.0	0.0		
Roof Cond	469	0	469	14	469	15	Roof Cond	-369	13.78				
Glass/Solar	1,098	0	1,098	33	1,098	36	Glass Solar	0	0.00				
Glass/Door Cond	176	0	176	5	176	6	Glass/Door Cond	-602	22.48				
Wall Cond	782	0	782	24	782	26	Wall Cond	-781	29.17				
Partition/Door	0	0	0	0	0	0	Partition/Door	0	0.00				
Floor	0	0	0	0	0.00	0	Floor	0	0.00				
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	Adjacent Floor	0.00	0.00				
Infiltration	0	0	0	0	0	0	Infiltration	0	0.00				
Sub Total ==>	2,525	0	2,525	77	2,525	83	Sub Total ==>	-1,752	-1,752	65.43			
Internal Loads				Internal Loads									
Lights	557	139	696	21	557	18	Lights	0	0.00				
People	357	0	357	11	250	8	People	0	0.00				
Misc	0	0	0	0	0	0	Misc	0	0.00				
Sub Total ==>	914	139	1,053	32	807	27	Sub Total ==>	0	0	0.00			
Ceiling Load	0	0	0	0	0	0	Ceiling Load	0	0.00				
Ventilation Load	-262	0	-262	-8	-289	-10	Ventilation Load	-58	2.16				
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0				
Dehumid. Ov Sizing	0	0	0	0	0	0	Ov/Undr Sizing	0	0.00				
Ov/Undr Sizing	0	0	0	0	0	0	Exhaust Heat	0	0.00				
Exhaust Heat	0	-19	-19	-1	0	0	OA Preheat Diff.	-868	32.41				
Sup. Fan Heat	0	0	0	0	0	0	RA Preheat Diff.	0	0.00				
Ret. Fan Heat	0	0	0	0	0	0	Additional Reheat	0	0.00				
Duct Heat Pkup	0	0	0	0	0	0	System Plenum Heat	0	0.00				
Underflr Sup Ht Pkup	0	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00				
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0.00				
Grand Total ==>	3,177	120	3,297	100.00	3,043	100.00	Grand Total ==>	-1,810	-2,678	100.00			

AIRFLOWS		
	Cooling	Heating
Diffuser	109	109
Terminal	109	109
Main Fan	109	109
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	127	127
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	15.8	15.8
cfm/ft²	0.54	0.54
cfm/ton	338.93	
ft²/ton	631.95	
Btu/hr-ft²	18.99	-13.13
No. People	1.0	5.0/1000 ft²

COOLING COIL SELECTION										
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh	MBh	cfm	°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.3	3.3	3.2	109	81.0	61.0	48.2	55.0	50.1	46.2
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.3	3.9								

AREAS			
	Gross Total	Glass	
		ft²	(%)
Floor	204		
Part	0		
Int Door	1		
ExFlr	0		
Roof	204	0	0
Wall	261	19	7
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity	Coil Airflow	Ent	Lvg
	MBh	cfm	°F	°F
Main Htg	-1.8	109	68.0	82.9
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.9	17	30.0	75.0
Total	-2.7			

Room Checksums

By Michael Baker Intl

330 SR

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES			
Peaked at Time:		Mo/Hr: 7 / 14		Mo/Hr: 7 / 14		Mo/Hr: Heating Design			Cooling		Heating	SADB	55.0	89.9
Outside Air:		OADB/WB/HR: 94 / 67 / 57		OADB: 94		OADB: 30			Ra Plenum		68.0	Return	81.4	68.0
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ret/OA <th>Fn MtrTD <th>Fn BldTD <th>Fn Frict <td colspan="2"></td> </th></th></th>	Fn MtrTD <th>Fn BldTD <th>Fn Frict <td colspan="2"></td> </th></th>	Fn BldTD <th>Fn Frict <td colspan="2"></td> </th>	Fn Frict <td colspan="2"></td>		
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Tot Sens Btu/h		81.4	0.0	0.0	0.0		
Envelope Loads				Envelope Loads							AIRFLOWS			
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Cooling		Heating			
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Diffuser	74	74			
Roof Cond	569	0	569	24	569	28	-369	13.78	Terminal	74	74			
Glass Solar	216	0	216	9	216	10	0	0.00	Main Fan	74	74			
Glass/Door Cond	206	0	206	9	206	10	-602	22.48	Sec Fan	0	0			
Wall Cond	554	0	554	23	554	27	-781	29.17	Nom Vent	17	17			
Partition/Door	0	0	0	0	0	0	0	0.00	AHU Vent	17	17			
Floor	0	0	0	0	0.00	0	0	0.00	Infil	0	0			
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MinStop/Rh	0	0			
Infiltration	0	0	0	0	0	0	0	0.00	Return	91	91			
Sub Total ==>	1,545	0	1,545	65	1,545	75	-1,752	65.43	Exhaust	17	17			
Internal Loads				Internal Loads							ENGINEERING CKS			
Lights	557	139	696	29	557	27	0	0.00	% OA	23.4	23.4			
People	357	0	357	15	250	12	0	0.00	cfm/ft²	0.36	0.36			
Misc	0	0	0	0	0	0	0	0.00	cfm/ton	302.07				
Sub Total ==>	914	139	1,053	44	807	39	0	0.00	ft²/ton	831.01				
Ceiling Load	0	0	0	0	0	0	0	0.00	Btu/hr-ft²	14.44	-13.13			
Ventilation Load	-202	0	-202	-9	-289	-14	-58	2.16	No. People	1.0	5.0/1000 ft²			
Adj Air Trans Heat	0	0	0	0	0	0	0	0						
Dehumid. Ov Sizing	0	0	0	0	0	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	0	0	0.00						
Exhaust Heat	0	-26	-26	-1	0	0	-868	32.41						
Sup. Fan Heat	0	0	0	0	0	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	0	0	0.00						
Grand Total ==>	2,257	113	2,369	100.00	2,062	100.00	-1,810	-2,678	100.00					

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION					
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass ft²	Gross (%)	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F	
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb								
Main Clg	0.2	2.4	2.2	74	81.4	61.4	49.5	55.0	50.0	45.6	Floor	204	Main Htg	-1.8	74	68.0	89.9	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0		Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1		Preheat	0.0	0	0.0	0.0
											ExFlr	0		Humidif	0.0	0	0.0	0.0
Total	0.3	3.0									Roof	204		Opt Vent	-0.9	17	30.0	75.0
											Wall	261		Total	-2.7			
											Ext Door	21						

Room Checksums

By Michael Baker Intl

331 STORAGE

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 15		Mo/Hr: 7 / 15		Mo/Hr: Heating Design			Cooling		Heating		
Outside Air:		OADB/WB/HR: 95 / 67 / 55		OADB: 95		OADB: 30			SADB	55.0	83.1		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Ra Plenum	80.0	68.0		
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens		Return	82.0	68.0		
Envelope Loads				Envelope Loads							Ret/OA	82.0	68.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Fn MtrTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Fn BldTD	0.0	0.0		
Roof Cond	2,340	0	2,340	37	2,340	Roof Cond	-1,478	-1,478	22.28	Fn Frict	0.0	0.0	
Glass Solar	0	0	0	0	0	Glass Solar	0	0	0.00				
Glass/Door Cond	63	0	63	1	63	Glass/Door Cond	-160	-160	2.41				
Wall Cond	759	0	759	12	759	Wall Cond	-1,287	-1,287	19.40				
Partition/Door	0	0	0	0	0	Partition/Door	0	0	0.00				
Floor	0	0	0	0	0.00	Floor	0	0	0.00				
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	Adjacent Floor	0.00	0.00	0.00				
Infiltration	0	0	0	0	0	Infiltration	0	0	0.00				
Sub Total ==>	3,161	0	3,161	50	3,161	Sub Total ==>	-2,925	-2,925	44.10				
Internal Loads				Internal Loads							AIRFLOWS		
Lights	2,231	558	2,788	44	2,231	Lights	0	0	0.00	Diffuser	188	188	
People	1,430	0	1,430	22	1,001	People	0	0	0.00	Terminal	188	188	
Misc	0	0	0	0	0	Misc	0	0	0.00	Main Fan	188	188	
Sub Total ==>	3,660	558	4,218	66	3,232	Sub Total ==>	0	0	0.00	Sec Fan	0	0	
Ceiling Load	0	0	0	0	0	Ceiling Load	0	0	0.00	Nom Vent	69	69	
Ventilation Load	-862	0	-862	-14	-1,159	Ventilation Load	-232	-232	3.49	AHU Vent	69	69	
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0	0	Infil	0	0	
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0	0.00	MinStop/Rh	0	0	
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0	0.00	Return	258	258	
Exhaust Heat	0	-150	-150	-2	0	OA Preheat Diff.	-3,476	52.41	Exhaust	69	69		
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0.00	Rm Exh	0	0		
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	0	0.00	Auxiliary	0	0		
Duct Heat Pkup	0	0	0	0	0	System Plenum Heat	0	0.00	Leakage Dwn	0	0		
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Leakage Ups	0	0		
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00					
Grand Total ==>	5,960	407	6,367	100.00	5,234	Grand Total ==>	-3,157	-6,633	100.00				

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION						
	Total Capacity		Sens Cap.	Coil Airflow	Enter DB/WB/HR		Leave DB/WB/HR			Gross Total	Glass	Ent	Lvg						
	ton	MBh			MBh	cfm	°F	°F	gr/lb					°F	°F	gr/lb	MBh	cfm	°F
Main Clg	0.5	6.4	5.6	188	82.0	61.4	48.5	55.0	49.2	42.8	Floor	817		Main Htg	-3.2	188	68.0	83.1	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0		Aux Htg	0.0	0	0.0	0.0	
Opt Vent	0.2	2.3	2.3	69	95.0	67.0	54.6	65.0	56.5	54.6	Int Door	1		Preheat	0.0	0	0.0	0.0	
											ExFlr	0							
Total	0.7	8.7									Roof	817	0	0	Humidif	0.0	0	0.0	0.0
											Wall	399	0	0	Opt Vent	-3.5	69	30.0	75.0
											Ext Door	21	0	0	Total	-6.6			

Room Checksums

By Michael Baker Intl

332 LOBBY

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK					TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 15			Mo/Hr: 7 / 15		Mo/Hr: Heating Design							Cooling	Heating		
Outside Air:		OADB/WB/HR: 95 / 67 / 55			OADB: 95		OADB: 30							SADB	55.0	88.9	
Space Sens. + Lat.	Plenum Sens. + Lat.	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total (%)	Space Sens	Coil Peak	Percent Of Total (%)	Ret/OA	80.0	68.0			
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Tot Sens		Btu/h	Btu/h		Fn MtrTD	81.7	68.0			
Envelope Loads					Envelope Loads										Fn BldTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	0	0	0.00	Fn Frict	0.0	0.0			
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	0	0	0.00						
Roof Cond	564	0	564	30	564	Roof Cond	-356	16.55	-356	-356	16.55						
Glass Solar	0	0	0	0	0	Glass Solar	0	0.00	0	0	0.00						
Glass/Door Cond	252	0	252	14	252	Glass/Door Cond	-639	29.68	-639	-639	29.68						
Wall Cond	256	0	256	14	256	Wall Cond	-264	12.25	-264	-264	12.25						
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	0	0	0.00						
Floor	0	0	0	0	0.00	Floor	0	0.00	0	0	0.00						
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	Adjacent Floor	0.00	0.00	0.00	0.00	0.00						
Infiltration	0	0	0	0	0	Infiltration	0	0.00	0	0	0.00						
Sub Total ==>	1,072	0	1,072	58	1,072	Sub Total ==>	-1,259	58.48	-1,259	-1,259	58.48						
Internal Loads					Internal Loads												
Lights	538	134	672	36	538	Lights	0	0.00	0	0	0.00						
People	345	0	345	19	241	People	0	0.00	0	0	0.00						
Misc	0	0	0	0	0	Misc	0	0.00	0	0	0.00						
Sub Total ==>	883	134	1,017	55	779	Sub Total ==>	0	0.00	0	0	0.00						
Ceiling Load	0	0	0	0	0	Ceiling Load	0	0.00	0	0	0.00						
Ventilation Load	-207	0	-207	-11	-279	Ventilation Load	-56	2.59	-56	-56	2.59						
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0	0	0	0						
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	0	0	0.00						
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0.00	0	0	0.00						
Exhaust Heat	0	-31	-31	-2	0	OA Preheat Diff.	-838	38.92	0	0	0.00						
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0.00	0	0	0.00						
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	0	0.00	0	0	0.00						
Duct Heat Pkup	0	0	0	0	0	System Plenum Heat	0	0.00	0	0	0.00						
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	0	0	0.00						
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00	0	0	0.00						
Grand Total ==>	1,748	104	1,852	100.00	1,572	Grand Total ==>	-1,315	100.00	-2,154	-2,154	100.00						

AIRFLOWS		
	Cooling	Heating
Diffuser	57	57
Terminal	57	57
Main Fan	57	57
Sec Fan	0	0
Nom Vent	17	17
AHU Vent	17	17
Infil	0	0
MinStop/Rh	0	0
Return	73	73
Exhaust	17	17
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	29.6	29.6
cfm/ft²	0.29	0.29
cfm/ton	281.67	
ft²/ton	981.67	
Btu/hr-ft²	12.22	-10.93
No. People	1.0	5.0/1000 ft²

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.2	1.9	1.7	57	81.7	61.2	48.4	55.0	49.5	43.8
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.6	0.6	17	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.2	2.4								

AREAS			
	Gross Total	Glass ft²	(%)
Floor	197		
Part	0		
Int Door	1		
ExFlr	0		
Roof	197	0	0
Wall	82	0	0
Ext Door	84	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1.3	57	68.0	88.9
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-0.8	17	30.0	75.0
Total	-2.2			

Room Checksums

By Michael Baker Intl

333 STORAGE

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK			TEMPERATURES			
Peaked at Time:		Mo/Hr: 7 / 15		Mo/Hr: 7 / 15		Mo/Hr: Heating Design			Cooling			Heating		
Outside Air:		OADB/WB/HR: 95 / 67 / 55		OADB: 95		OADB: 30			SADB			Ra Plenum		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Return	Ret/OA	Fn MtrTD	Fn BldTD	Fn Frict	
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Tot Sens Btu/h	(%)	80.0	81.8	0.0	0.0	0.0	
Envelope Loads				Envelope Loads				Envelope Loads						
Skylite Solar	0	0	0	0	0	0	0	0.00						
Skylite Cond	0	0	0	0	0	0	0	0.00						
Roof Cond	868	0	868	33	868	40	-548	20.60						
Glass Solar	0	0	0	0	0	0	0	0.00						
Glass/Door Cond	63	0	63	2	63	3	-160	6.01						
Wall Cond	473	0	473	18	473	22	-577	21.70						
Partition/Door	0	0	0	0	0	0	0	0.00						
Floor	0	0	0	0	0.00	0	0	0.00						
Adjacent Floor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Infiltration	0	0	0	0	0	0	0	0.00						
<i>Sub Total ==></i>	1,404	0	1,404	54	1,404	65	-1,285	48.31						
Internal Loads				Internal Loads				Internal Loads						
Lights	827	207	1,034	40	827	38	0	0.00						
People	530	0	530	20	371	17	0	0.00						
Misc	0	0	0	0	0	0	0	0.00						
<i>Sub Total ==></i>	1,358	207	1,564	60	1,198	55	0	0.00						
Ceiling Load	0	0	0	0	0	0	0	0.00						
Ventilation Load	-319	0	-319	-12	-430	-20	-86	3.23						
Adj Air Trans Heat	0	0	0	0	0	0	0	0						
Dehumid. Ov Sizing			0	0			0	0.00						
Ov/Undr Sizing	0		0	0	0	0	0	0.00						
Exhaust Heat		-51	-51	-2			0	0.00						
Sup. Fan Heat			0	0			0	0.00						
Ret. Fan Heat		0	0	0			0	0.00						
Duct Heat Pkup		0	0	0			0	0.00						
Underflr Sup Ht Pkup			0	0			0	0.00						
Supply Air Leakage		0	0	0			0	0.00						
<i>Grand Total ==></i>	2,443	156	2,598	100.00	2,173	100.00	-1,371	100.00						

AIRFLOWS		
	Cooling	Heating
Diffuser	78	78
Terminal	78	78
Main Fan	78	78
Sec Fan	0	0
Nom Vent	26	26
AHU Vent	26	26
Infil	0	0
MinStop/Rh	0	0
Return	104	104
Exhaust	26	26
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	33.0	33.0
cfm/ft²	0.26	0.26
cfm/ton	271.41	
ft²/ton	1,052.60	
Btu/hr-ft²	11.40	-8.78
No. People	1.5	5.0/1000 ft²

COOLING COIL SELECTION										
	Total Capacity		Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR			Leave DB/WB/HR		
	ton	MBh			°F	°F	gr/lb	°F	°F	gr/lb
Main Clg	0.2	2.6	2.3	78	81.8	61.3	48.4	55.0	49.3	43.3
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.1	0.9	0.9	26	95.0	67.0	54.6	65.0	56.5	54.6
Total	0.3	3.5								

AREAS			
	Gross Total	Glass ft²	(%)
Floor	303		
Part	0		
Int Door	1		
ExFlr	0		
Roof	303	0	0
Wall	179	0	0
Ext Door	21	0	0

HEATING COIL SELECTION				
	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1.4	78	68.0	83.8
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	-1.3	26	30.0	75.0
Total	-2.7			

ENTERED VALUES PLANTS

By Michael Baker Intl

Cooling Plant: Cooling plant - 001

Sizing method: Peak
 Heat rejection type: None
 Secondary distribution pump: None
 Secondary pump consumption: 0 Ft Water
 Thermal storage type: None
 Thermal storage capacity: 0 ton-hr
 Thermal storage schedule: Off (0%)

Geothermal Loop			
TLoop Ent Bldg:	None	Flow scheme:	Fully mixed
TLoop schedule:	None	Loop fluid glycol:	0%
Flow rate:	100.00% of condenser flow rate	Heat exchanger approach:	0°F
Loop pump	None		
Pump F.L. rate:	0.00ft water		

Equipment tag: CH-1		Cooling Type: 90.1-13 Min AC Chiller <150 tons Path A		Cooling plant - 001
Operating Mode	Capacity	Energy Rate	Pumps Type	Full Load Consumption
Cooling:		10.1000 EER (compressor only)	Chilled water: 90.1-13 Min Var Vol Chilled Water Pump	85.00 Ft Water
Heat recovery:			Condenser water: None	
Tank charging:			Heat recovery or aux cond: None	
Tank charging & heat recovery:			Free cooling: None	
Heat Rejection and Thermal Storage		Equipment Options		
Heat rejection type: 90.1 Min Air Cooled Condenser		Sequencing type: Single	Free clg type: None	Energy source:
Thermal storage type: None		Demand lim priority:	Fluid cooler type: None	Reject cond heat: Heat Reject.Equip
T-storage capacity: 0 ton-hr		Dsn chilled water delta T: 12 °F	Load shed econ: no	Cond. heat to plant:
T-storage schedule: Storage		Dsn cond water delta T: 10 °F	Evap precooling: no	Equip schedule: Available (100%)
			Hot gas reheat No	
Reset Based On	Reset Curve	Max Reset TD		
Chilled Water:None	None	10°F		
Condenser Water:None	None	0°F		

Heating Plant: Heating plant - 001

Sizing method: Peak
 Cogeneration type: None
 Secondary distribution pump: None
 Secondary pump consumption: 0 Ft Water
 Thermal storage type: None
 Thermal storage capacity: 0 ton-hr

Equipment tag: Boiler - 001		Heating Type: Default Boiler		Heating plant - 001
Heating capacity:		Thermal storage type:	None	
Energy rate: 96.00 % Effic.		Thermal storage capacity:	0 ton-hr	
		Thermal storage schedule:	Storage	
Hot water pump type: Heating water circ pump		Equipment schedule:	Available (100%)	
Hot water pump cons: 50.00 Ft Water		Demand limiting priority:		

Base Utilities

Plant assigned to: Stand-alone Type: None	Description: Demand limiting priority:	Schedule: Off (0%) Hourly demand: 0.00 kW
--	---	--

**ENTERED VALUES
PLANTS**
By Michael Baker Intl

Miscellaneous accessories

Plant assigned to: Cooling plant - 001
Equipment tag: All

Type: None
Description:

Schedule: Off (0%)
Energy: 0.00 kW

**ENTERED VALUES
PLANTS**
By Michael Baker Intl

Cooling Plant: Cooling plant - 001

Sizing method: Peak
Heat rejection type: None
Secondary distribution pump: None
Secondary pump consumption: 0 Ft Water
Thermal storage type: None
Thermal storage capacity: 0 ton-hr
Thermal storage schedule: Off (0%)

Geothermal Loop			
TLoop Ent Bldg:	None	Flow scheme:	Fully mixed
TLoop schedule:	None	Loop fluid glycol:	0%
Flow rate:	100.00% of condenser flow rate	Heat exchanger approach:	0°F
Loop pump	None		
Pump F.L. rate:	0.00ft water		

Equipment tag: CU-01 Cooling Type: 90.1-13 Min VRF HP >240 MBh Cooling plant - 001

Operating Mode	Capacity	Energy Rate	Pumps	Type	Full Load Consumption
Cooling:		9.5000 Packaged EER	Chilled water:	Default water pump	0.00 Ft Water
Heat recovery:	12.9 Mbh/ton	3.2000 Packaged COP	Condenser water:	None	
Tank charging:			Heat recovery or aux cond:	None	
Tank charging & heat recovery:			Free cooling:	None	
Heat Rejection and Thermal Storage			Equipment Options		
Heat rejection type:	90.1 Min Air Cooled Condenser	Sequencing type:	Single	Free clg type:	None
Thermal storage type:	None	Demand lim priority:		Fluid cooler type:	None
T-storage capacity:	0 ton-hr	Dsn chilled water delta T:	10 °F	Load shed econ:	no
T-storage schedule:	Storage	Dsn cond water delta T:	10 °F	Evap precooling:	no
				Hot gas reheat:	No
Reset Based On	Reset Curve	Max Reset TD			
Chilled Water:	None	10,000°F			
Condenser Water:	None	0°F			

Package energy breakout	Primary fan	Secondary fan	Exhaust fan	Optional ventilation fan	Condenser fan
Included in full load energy rate	Yes	No	No	No	Yes

Apply same fans for heat recovery energy breakout: No

Heating Plant: Heating plant - 002

Sizing method: Peak
Cogeneration type: None
Secondary distribution pump: None
Secondary pump consumption: 0 Ft Water
Thermal storage type: None
Thermal storage capacity: 0 ton-hr

Equipment tag: ElecHeat - 001 Heating Type: Default electric resistance Heating plant - 002

Heating capacity:		Thermal storage type:	None
Energy rate:	100.00 % Effic.	Thermal storage capacity:	0 ton-hr
		Thermal storage schedule:	Storage
		Equipment schedule:	Available (100%)
		Demand limiting priority:	

**ENTERED VALUES
PLANTS**
By Michael Baker Intl

Base Utilities

Plant assigned to: Stand-alone Type: None	Description: Demand limiting priority:	Schedule: Off (0%) Hourly demand: 0.00 kW
--	---	--

Miscellaneous accessories

Plant assigned to: Cooling plant - 001 Equipment tag: All	Type: None Description:	Schedule: Off (0%) Energy: 0.00 kW
--	----------------------------	---------------------------------------

**ENTERED VALUES
PLANTS**
By Michael Baker Intl

Cooling Plant: Cooling plant - 001

Sizing method: Peak
Heat rejection type: None
Secondary distribution pump: None
Secondary pump consumption: 0 Ft Water
Thermal storage type: None
Thermal storage capacity: 0 ton-hr
Thermal storage schedule: Off (0%)

Geothermal Loop			
TLoop Ent Bldg:	None	Flow scheme:	Fully mixed
TLoop schedule:	None	Loop fluid glycol:	0%
Flow rate:	100.00% of condenser flow rate	Heat exchanger approach:	0°F
Loop pump	None		
Pump F.L. rate:	0.00ft water		

Equipment tag: PTAC-001 Cooling Type: 90.1-13 Min PTAC Standard Size 15 MBh Cooling plant - 001

Operating Mode	Capacity	Energy Rate	Pumps	Type	Full Load Consumption
Cooling:		9.5000 Packaged EER	Chilled water:	None	
Heat recovery:			Condenser water:	None	
Tank charging:			Heat recovery or aux cond:	None	
Tank charging & heat recovery:			Free cooling:	None	
Heat Rejection and Thermal Storage			Equipment Options		
Heat rejection type:	90.1 Min Air Cooled Condenser	Sequencing type:	Single	Free clg type:	None
Thermal storage type:	None	Demand lim priority:		Fluid cooler type:	None
T-storage capacity:	12 gal/ton	Dsn chilled water delta T:	12 °F	Load shed econ:	no
T-storage schedule:	Heatpump	Dsn cond water delta T:	0 °F	Evap precooling:	no
				Hot gas reheat:	No
Reset Based On	Reset Curve	Max Reset TD			
Chilled Water:None	None	0°F			
Condenser Water:None	None	0°F			

Package energy breakout	Primary fan	Secondary fan	Exhaust fan	Optional ventilation fan	Condenser fan
Included in full load energy rate	Yes	No	No	No	Yes

Apply same fans for heat recovery energy breakout: No

Heating Plant: Heating plant - 002

Sizing method: Peak
Cogeneration type: None
Secondary distribution pump: None
Secondary pump consumption: 0 Ft Water
Thermal storage type: None
Thermal storage capacity: 0 ton-hr

Equipment tag: Boiler - 001 Heating Type: Default electric resistance Heating plant - 002

Heating capacity:	Thermal storage type:	None
Energy rate: 100.00 % Effic.	Thermal storage capacity:	0 ton-hr
	Thermal storage schedule:	Storage
	Equipment schedule:	Available (100%)
	Demand limiting priority:	

**ENTERED VALUES
PLANTS**
By Michael Baker Intl

Base Utilities

Plant assigned to: Stand-alone Type: None	Description: Demand limiting priority:	Schedule: Off (0%) Hourly demand: 0.00 kW
--	---	--

Miscellaneous accessories

Plant assigned to: Cooling plant - 001 Equipment tag: All	Type: None Description:	Schedule: Off (0%) Energy: 0.00 kW
--	----------------------------	---------------------------------------

SYSTEM ENTERED VALUES

By Michael Baker Intl

FC-1 - Fan Coil

Design Air Conditions

Max Min

Cooling supply:	Supply duct temperature diff: 0.0 °F	Design humidity ratio diff:
Leaving cooling coil:	Reheat Temperature diff: 0.0 °F	Min room relative humidity:
Heating supply:		

Optional Ventilation

Configuration: Cool / Heat	Cooling SADB: 65 °F	Cooling SADB hi limit:	Cooling schedule: Available (100%)
Control method: Fixed Setpoints	Heating SADB: 75 °F	Cooling SADB low limit:	Heating schedule: Available (100%)
Deck location: Room Direct	Cooling SADP:	Cooling SADP hi limit:	
Level location:		Cooling SADP low limit:	

Advanced Options

Cooling coil sizing method: Block	Supply fan motor location: Supply	Night purge schedule: Off (0%)
Cooling coil location: Room	Return fan motor location: Return	Optimum start schedule: Off (0%)
Block cooling airflow:	Supply fan configuration: Blow Thru	Optimum stop schedule: Off (0%)
Ventilation deck location: Room Direct	Supply fan sizing: Peak	
Supply duct location: Return Air	Fan mechanical efficiency : 75%	CO2-based DCV: None
Return air path: PLENUM	Apply Std62 People Avg: No	System ventilation flag: Sum Room OA Reqs
	Std62 Max Vent (Z) Ratio:	
Reset per worst case room schedule: Off (0%)		Supply air path / duct location: Return Air
Max reset:		Space convective gains to occupied layer:
Use system default outside air reset: Yes		Underfloor plenum height:
		Conductive resistance of raised floor: 0.8 hr-ft ² -°F/Btu
		Upstream nominal leakage fraction: 0 %
		Downstream constant leakage fraction: 0 %
		Aux cooling coil losses to plenum: 0 %
Auxiliary cooling coil	Control Method	Control Type
Auxiliary heating coil	Activate After Primary System	None
Auxiliary fan	No Fan	None

Coils

Capacity

Schedule

Diversity

Main cooling: 100.0 % of Design Capacity by adjusting a	Available (100%)	People 100%
Aux cooling:	Available (100%)	Lights 100%
Main heating: 100.0 % of Design Capacity	Available (100%)	Misc loads 100%
Aux heating:	Available (100%)	
Preheat: 100.0% of Design Capacity	Available (100%)	
Reheat: 100.0 % of Design Capacity	Available (100%)	
Humidification: 100.0 % of Design Capacity	Available (100%)	

Fans

Type

Static Press.

90.1 SP Adj

Full Load Energy Rate

Schedule

Efficiency

Priority

Primary	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90
Secondary	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	85
Return	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90
System Exhaust	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90
Room Exhaust	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	85
Optional ventilation	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	90
Auxiliary	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	85
Fan Cycling					Cycle with occupancy	0.0 ft

SYSTEM ENTERED VALUES

By Michael Baker Intl

VRF-001 - Variable Refrigerant Flow

Design Air Conditions

Max Min

Cooling supply:	Supply duct temperature diff: 0.0 °F	Design humidity ratio diff:
Leaving cooling coil:	Reheat Temperature diff: 0.0 °F	Min room relative humidity:
Heating supply:		

Optional Ventilation

Configuration: Cool / Heat	Cooling SADB: 65 °F	Cooling SADB hi limit:	Cooling schedule: Available (100%)
Control method: Fixed Setpoints	Heating SADB: 75 °F	Cooling SADB low limit:	Heating schedule: Available (100%)
Deck location: Room Direct	Cooling SADB:	Cooling SADB hi limit:	
Level location:		Cooling SADB low limit:	

Advanced Options

Cooling coil sizing method: Block	Supply fan motor location: Supply	Night purge schedule: Off (0%)
Cooling coil location: Room	Return fan motor location: Return	Optimum start schedule: Off (0%)
Block cooling airflow:	Supply fan configuration: Blow Thru	Optimum stop schedule: Off (0%)
Ventilation deck location: Room Direct	Supply fan sizing: Peak	
Supply duct location: Return Air	Fan mechanical efficiency : 75%	CO2-based DCV: None
Return air path: PLENUM	Apply Std62 People Avg: No	System ventilation flag: Sum Room OA Reqs
	Std62 Max Vent (Z) Ratio:	
Reset per worst case room schedule: Off (0%)		Supply air path / duct location: Return Air
Max reset:		Space convective gains to occupied layer:
Use system default outside air reset: Yes		Underfloor plenum height:
		Conductive resistance of raised floor: 0.8 hr-ft ² -°F/Btu
		Upstream nominal leakage fraction: 0 %
		Downstream constant leakage fraction: 0 %
		Aux cooling coil losses to plenum: 0 %
Auxiliary cooling coil	Control Method	Control Type
Auxiliary heating coil	Activate After Primary System	None
Auxiliary fan	No Fan	None

Coils

Capacity

Schedule

Diversity

Main cooling:	100.0 % of Design Capacity by adjusting a	Available (100%)	People 100%
Aux cooling:		Available (100%)	Lights 100%
Main heating:	100.0 % of Design Capacity	Available (100%)	Misc loads 100%
Aux heating:		Available (100%)	
Preheat:	100.0% of Design Capacity	Available (100%)	
Reheat:	100.0 % of Design Capacity	Available (100%)	
Humidification:	100.0 % of Design Capacity	Available (100%)	

Fans

Type

Static Press.

90.1 SP Adj

Full Load Energy Rate

Schedule

Efficiency

Priority

Primary	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90
Secondary	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	85
Return	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90
System Exhaust	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90
Room Exhaust	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	85
Optional ventilation	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	90
Auxiliary	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	85
Fan Cycling					Cycle with occupancy	0.0 ft

SYSTEM ENTERED VALUES

By Michael Baker Intl

PTAC-1 - Packaged Terminal Air Conditioner

Design Air Conditions	Max	Min
Cooling supply:		Supply duct temperature diff: 0.0 °F
Leaving cooling coil:		Reheat Temperature diff: 0.0 °F
Heating supply:		Design humidity ratio diff:
		Min room relative humidity:

Optional Ventilation			
Configuration: Cool / Heat	Cooling SADB: 65 °F	Cooling SADB hi limit:	Cooling schedule: Available (100%)
Control method: Fixed Setpoints	Heating SADB: 75 °F	Cooling SADB low limit:	Heating schedule: Available (100%)
Deck location: Room Direct	Cooling SADP:	Cooling SADP hi limit:	
Level location:		Cooling SADP low limit:	

Advanced Options		
Cooling coil sizing method: Peak	Supply fan motor location: Supply	Night purge schedule: Off (0%)
Cooling coil location: Room	Return fan motor location: Return	Optimum start schedule: Off (0%)
Block cooling airflow:	Supply fan configuration: Blow Thru	Optimum stop schedule: Off (0%)
Ventilation deck location: Room Direct	Supply fan sizing: Peak	
Supply duct location: Return Air	Fan mechanical efficiency : 75%	CO2-based DCV: None
Return air path: PLENUM	Apply Std62 People Avg: No	System ventilation flag: Sum Room OA Reqs
	Std62 Max Vent (Z) Ratio:	
Reset per worst case room schedule: Off (0%)		Supply air path / duct location: Return Air
Max reset:		Space convective gains to occupied layer:
Use system default outside air reset: Yes		Underfloor plenum height:
		Conductive resistance of raised floor: 0.8 hr-ft ² -°F/Btu
		Upstream nominal leakage fraction: 0 %
		Downstream constant leakage fraction: 0 %
		Aux cooling coil losses to plenum: 0 %
Auxiliary cooling coil	Control Method	Control Type
Auxiliary heating coil	Activate After Primary System	None
Auxiliary fan	No Fan	None

Coils	Capacity	Schedule	Diversity
Main cooling:	100.0 % of Design Capacity by adjusting a	Available (100%)	People 100%
Aux cooling:		Available (100%)	Lights 100%
Main heating:	100.0 % of Design Capacity	Available (100%)	Misc loads 100%
Aux heating:		Available (100%)	
Preheat:	100.0% of Design Capacity	Available (100%)	
Reheat:	100.0 % of Design Capacity	Available (100%)	
Humidification:	100.0 % of Design Capacity	Available (100%)	

Fans	Type	Static Press.	90.1 SP Adj	Full Load Energy Rate	Schedule	Efficiency	Priority
Primary	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90	
Secondary	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	85	
Return	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90	
System Exhaust	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	90	
Room Exhaust	None	0.0 in. wg	0.0 in. wg	0.00000 kW	Available (100%)	85	
Optional ventilation	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	90	
Auxiliary	None	0.0 in. wg	NA	0.00000 kW	Available (100%)	85	
Fan Cycling					Cycle with occupancy	0.0 ft	

**ENTERED VALUES
ROOM ASSIGNMENTS**

By Michael Baker Intl

35%

Alternative 1

ASSIGNED ROOMS

Description

FC-1

- 101 SR
- 102 SR
- 103 SR
- 104 SR
- 105 SR
- 106 SR
- 107 SR
- 108 SR
- 109 SR
- 110 SR
- 111 SR
- 112 SR
- 119 SR
- 120 SR
- 121 SR
- 122 SR
- 123 SR
- 124 SR
- 125 SR
- 126 SR
- 127 SR
- 128 SR
- 129 SR
- 130 SR
- 131 LAUNDRY
- 132 MECHANICAL
- 133 LOBBY
- 134/135 OFFICE
- 137/138 MENS/MMNS
- 139 JAN
- 140 ELEC
- 141/142 GAMEROOM
- 201 SR
- 202 SR
- 203 SR
- 204 SR
- 205 SR
- 206 SR
- 207 SR
- 208 SR
- 209 SR
- 210 SR
- 211 SR
- 212 SR
- 219 SR
- 220 SR
- 221 SR
- 222 SR
- 223 SR

ENTERED VALUES ROOM ASSIGNMENTS

By Michael Baker Intl

224 SR
225 SR
226 SR
227 SR
228 SR
229 SR
230 SR
231 STORAGE
232 LOBBY
233 STORAGE
236 LOUNGE
237 STUDY
301 SR
302 SR
303 SR
304 SR
305 SR
306 SR
307 SR
308 SR
309 SR
310 SR
311 SR
312 SR
313 SR
315 SR
317 SR
319 SR
320 SR
321 SR
322 SR
323 SR
324 SR
325 SR
326 SR
327 SR
328 SR
329 SR
330 SR
331 STORAGE
332 LOBBY
333 STORAGE

UNASSIGNED ROOMS

Description

101/102 BATH
103/104 BATH
105/106 BATH
107/108 BATH
109/110 BATH
111/112 BATH
119/120 BATH
121/122 BATH
123/124 BATH

ENTERED VALUES ROOM ASSIGNMENTS

By Michael Baker Intl

125/126 BATH
127/128 BATH
129/130 BATH
201/202 BATH
203/204 BATH
205/206 BATH
207/208 BATH
209/210 BATH
211/212 BATH
219/220 BATH
221/222 BATH
223/224 BATH
225/226 BATH
227/228 SR
229/230 BATH
301/302 BATH
303/304 BATH
305/306 BATH
307/308 BATH
309/310 BATH
311/312 BATH
319/320 BATH
321/322 BATH
323/324 BATH
325/326 BATH
327/328 BATH
329/330 BATH

Alternative 2

ASSIGNED ROOMS

Description

VRF-001
101 SR
102 SR
103 SR
104 SR
105 SR
106 SR
107 SR
108 SR
109 SR
110 SR
111 SR
112 SR
119 SR
120 SR
121 SR
122 SR
123 SR
124 SR
125 SR
126 SR
127 SR

ENTERED VALUES ROOM ASSIGNMENTS

By Michael Baker Intl

128 SR
129 SR
130 SR
131 LAUNDRY
132 MECHANICAL
133 LOBBY
134/135 OFFICE
137/138 MENS/MMNS
139 JAN
140 ELEC
141/142 GAMEROOM
201 SR
202 SR
203 SR
204 SR
205 SR
206 SR
207 SR
208 SR
209 SR
210 SR
211 SR
212 SR
219 SR
220 SR
221 SR
222 SR
223 SR
224 SR
225 SR
226 SR
227 SR
228 SR
229 SR
230 SR
231 STORAGE
232 LOBBY
233 STORAGE
236 LOUNGE
237 STUDY
301 SR
302 SR
303 SR
304 SR
305 SR
306 SR
307 SR
308 SR
309 SR
310 SR
311 SR
312 SR
313 SR
315 SR

ENTERED VALUES ROOM ASSIGNMENTS

By Michael Baker Intl

317 SR
319 SR
320 SR
321 SR
322 SR
323 SR
324 SR
325 SR
326 SR
327 SR
328 SR
329 SR
330 SR
331 STORAGE
332 LOBBY
333 STORAGE

UNASSIGNED ROOMS

Description

101/102 BATH
103/104 BATH
105/106 BATH
107/108 BATH
109/110 BATH
111/112 BATH
119/120 BATH
121/122 BATH
123/124 BATH
125/126 BATH
127/128 BATH
129/130 BATH
201/202 BATH
203/204 BATH
205/206 BATH
207/208 BATH
209/210 BATH
211/212 BATH
219/220 BATH
221/222 BATH
223/224 BATH
225/226 BATH
227/228 SR
229/230 BATH
301/302 BATH
303/304 BATH
305/306 BATH
307/308 BATH
309/310 BATH
311/312 BATH
319/320 BATH
321/322 BATH
323/324 BATH
325/326 BATH
327/328 BATH

**ENTERED VALUES
ROOM ASSIGNMENTS**

35%

By Michael Baker Intl

329/330 BATH

Alternative 3

ASSIGNED ROOMS

Description

PTAC-1

- 101 SR
- 102 SR
- 103 SR
- 104 SR
- 105 SR
- 106 SR
- 107 SR
- 108 SR
- 109 SR
- 110 SR
- 111 SR
- 112 SR
- 119 SR
- 120 SR
- 121 SR
- 122 SR
- 123 SR
- 124 SR
- 125 SR
- 126 SR
- 127 SR
- 128 SR
- 129 SR
- 130 SR
- 131 LAUNDRY
- 132 MECHANICAL
- 133 LOBBY
- 134/135 OFFICE
- 137/138 MENS/WMNS
- 139 JAN
- 140 ELEC
- 141/142 GAMEROOM
- 201 SR
- 202 SR
- 203 SR
- 204 SR
- 205 SR
- 206 SR
- 207 SR
- 208 SR
- 209 SR
- 210 SR
- 211 SR
- 212 SR
- 219 SR
- 220 SR
- 221 SR

ENTERED VALUES ROOM ASSIGNMENTS

By Michael Baker Intl

222 SR
223 SR
224 SR
225 SR
226 SR
227 SR
228 SR
229 SR
230 SR
231 STORAGE
232 LOBBY
233 STORAGE
236 LOUNGE
237 STUDY
301 SR
302 SR
303 SR
304 SR
305 SR
306 SR
307 SR
308 SR
309 SR
310 SR
311 SR
312 SR
313 SR
315 SR
317 SR
319 SR
320 SR
321 SR
322 SR
323 SR
324 SR
325 SR
326 SR
327 SR
328 SR
329 SR
330 SR
331 STORAGE
332 LOBBY
333 STORAGE

UNASSIGNED ROOMS

Description

101/102 BATH
103/104 BATH
105/106 BATH
107/108 BATH
109/110 BATH
111/112 BATH
119/120 BATH

ENTERED VALUES ROOM ASSIGNMENTS

By Michael Baker Intl

121/122 BATH
123/124 BATH
125/126 BATH
127/128 BATH
129/130 BATH
201/202 BATH
203/204 BATH
205/206 BATH
207/208 BATH
209/210 BATH
211/212 BATH
219/220 BATH
221/222 BATH
223/224 BATH
225/226 BATH
227/228 SR
229/230 BATH
301/302 BATH
303/304 BATH
305/306 BATH
307/308 BATH
309/310 BATH
311/312 BATH
319/320 BATH
321/322 BATH
323/324 BATH
325/326 BATH
327/328 BATH
329/330 BATH

ENTERED VALUES
ROOM BY ROOM
By Michael Baker Intl

Room Description: 101 SR

Zone Description: No Zone

System Description: FC-1

GENERAL INFORMATION	PEOPLE	AIRFLOW INFORMATION
Floor Area: 204 ft ² Flr-Flr Height: 10.0 ft Plenum Height: 0.0 ft Height Above Fir: Slab Cnstr Type: 4" LW Concrete Room Mass: Time delay based on actual mass Ceiling R-Value: 1.786 hr-ft ² -°F/Btu Is There Carpet?: YES Design Clg DB / Drift Point: 80.0 °F / 84.0 °F Design Htg DB / Drift Point: 68.0 °F / 64.0 °F Design Relative Humidity: 50 % Moisture Capacitance: Medium Clg Tstat: None Htg Tstat: None Thermostat Location: Room Floor Multiplier: 1 Humidistat Location: Room Room Multiplier: 1 CO2 Sensor Location: None Room Type: Conditioned	People Type: Hotel/Motel Room # of People: 200 sq ft/person People Sensible: 245 Btu/h People Latent : 105 Btu/h People Schedule: Cooling Only (Design) Workstation: 1.0 workstation/person LIGHTS Lighting Type: Recessed fluorescent, not vented, 80% load to space Fixture Type: RECFL-NV % Load to RA: 20 % Lighting Schedule: Cooling Only (Design) Lighting Amount: 1.000 W/sq ft Ballast Factor: 1.0	Cooling (Peop-based) Heating (Area-based) Vent Type: Dwelling Unit Dwelling Unit Vent Value: 5.00 cfm/person 0.06 cfm/sq ft Vent Schedule: Available (100%) Infil Type: None None Infil Value: 0.00 air changes/hr 0.00 air changes/hr Infil Schedule: Available (100%) Vav Airflow: Vav Sched: Available (100%) Supply: To be calculated To be calculated Aux Supply: To be calculated To be calculated Room Exhaust: Rm Exh Sched: Available (100%) Std 62.1-2004 Cooling Ez: Ceiling clg supply, ceiling return 100 % Heating Ez: Ceiling supply > Trm+15°F(8°C), ceiling return 80 % Er: Default based on system type

Description	Area/ Amount	Dir	Tilt	Const Type / Schedule	U Value Btu/h-ft ² -°F	Alpha	Glass				Adj Temp/ Grnd Refl	Pct Sen/ Cool Tmp	Pct Rm/ Heat Tmp	Pct Ret/ Perm Len	Rad Frc/ Loss Coef
							Type / Energy Type	Area ft ²	Shade Coef	U Value Btu/h-ft ² -°F					
WEST	150 ft ²	270	0	90.1-07 Min Wall Nonres	0.0849	0.90									
SOUTH	133 ft ²	180	0	90.1-07 Min Wall Nonres	0.0849	0.90									
DOOR				Door			Standard Door	21	0.00	0.20	Overhang - None	None	0.00		
WINDOW				Window			90.1-2013 Window	19	0.29	0.60	Overhang - None	None	0.00		

ENTERED VALUES
ROOM BY ROOM
 By Michael Baker Intl

Room Description: 102 SR

Zone Description: No Zone

System Description: FC-1

GENERAL INFORMATION	PEOPLE	AIRFLOW INFORMATION	
Floor Area: 204 ft ² Flr-Flr Height: 10.0 ft Plenum Height: 0.0 ft Height Above Fir: Slab Cnstr Type: 4" LW Concrete Room Mass: Time delay based on actual mass Ceiling R-Value: 1.786 hr-ft ² -°F/Btu Is There Carpet?: YES Design Clg DB / Drift Point: 80.0 °F / 84.0 °F Design Htg DB / Drift Point: 68.0 °F / 64.0 °F Design Relative Humidity: 50 % Moisture Capacitance: Medium Clg Tstat: None Htg Tstat: None Thermostat Location:Room Floor Multiplier: 1 Humidistat Location:Room Room Multiplier: 1 CO2 Sensor Location:None Room Type:Conditioned	People Type: Hotel/Motel Room # of People: 200 sq ft/person People Sensible: 245 Btu/h People Latent : 105 Btu/h People Schedule: Cooling Only (Design) Workstation: 1.0 workstation/person LIGHTS Lighting Type: Recessed fluorescent, not vented, 80% load to space Fixture Type: RECFL-NV % Load to RA: 20 % Lighting Schedule: Cooling Only (Design) Lighting Amount: 1.000 W/sq ft Ballast Factor: 1.0	Cooling (Peop-based) Vent Type: Dwelling Unit Vent Value: 5.00 cfm/person Vent Schedule: Available (100%) Infil Type: None Infil Value: 0.00 air changes/hr Infil Schedule: Available (100%) Vav Airflow: Vav Sched: Available (100%) Supply: To be calculated Aux Supply: To be calculated Room Exhaust: Rm Exh Sched: Available (100%) Heating (Area-based) Dwelling Unit 0.06 cfm/sq ft None 0.00 air changes/hr To be calculated To be calculated Std 62.1-2004 Cooling Ez: Ceiling clg supply, ceiling return 100 % Heating Ez: Ceiling supply > Trm+15°F(8°C), ceiling return 80 % Er: Default based on system type	

Description	Area/ Amount	Dir	Tilt	Const Type / Schedule	U Value Btu/h-ft ² -°F	Alpha	Glass				Adj Temp/ Grnd Refl	Pct Sen/ Cool Tmp	Pct Rm/ Heat Tmp	Pct Ret/ Perm Len	Rad Frc/ Loss Coef
							Type / Energy Type	Area ft ²	Shade Coef	U Value Btu/h-ft ² -°F					
WEST	150 ft ²	270	0	90.1-07 Min Wall Nonres	0.0849	0.90									
NORTH	133 ft ²	0	0	90.1-07 Min Wall Nonres	0.0849	0.90									
DOOR				Door			Standard Door	21	0.00	0.20	Overhang - None	None	0.00		
WINDOW				Window			90.1-2013 Window	19	0.29	0.60	Overhang - None	None	0.00		

ENTERED VALUES

ROOM BY ROOM

By Michael Baker Intl

Room Description: 103 SR

Zone Description: No Zone

System Description: FC-1

GENERAL INFORMATION	PEOPLE	AIRFLOW INFORMATION	
Floor Area: 204 ft ² Flr-Flr Height: 10.0 ft Plenum Height: 0.0 ft Height Above Flr: Slab Cnstr Type: 4" LW Concrete Room Mass: Time delay based on actual mass Ceiling R-Value: 1.786 hr-ft ² ·°F/Btu Is There Carpet?: YES Design Clg DB / Drift Point: 80.0 °F / 84.0 °F Design Htg DB / Drift Point: 68.0 °F / 64.0 °F Design Relative Humidity: 50 % Moisture Capacitance: Medium Clg Tstat: None Htg Tstat: None Thermostat Location:Room Floor Multiplier: 1 Humidistat Location:Room Room Multiplier: 1 CO2 Sensor Location:None Room Type:Conditioned	People Type: Hotel/Motel Room # of People: 200 sq ft/person People Sensible: 245 Btu/h People Latent : 105 Btu/h People Schedule: Cooling Only (Design) Workstation: 1.0 workstation/person Lighting Type: Recessed fluorescent, not vented, 80% load to space Fixture Type: RECFL-NV % Load to RA: 20 % Lighting Schedule: Cooling Only (Design) Lighting Amount: 1.000 W/sq ft Ballast Factor: 1.0	<u>Cooling (Peop-based)</u> Vent Type: Dwelling Unit Vent Value: 5.00 cfm/person Vent Schedule: Available (100%) Infil Type: None Infil Value: 0.00 air changes/hr Infil Schedule: Available (100%) Vav Airflow: Vav Sched: Available (100%) Supply: To be calculated Aux Supply: To be calculated Room Exhaust: Rm Exh Sched: Available (100%) Std 62.1-2004	<u>Heating (Area-based)</u> Dwelling Unit 0.06 cfm/sq ft None 0.00 air changes/hr To be calculated To be calculated Cooling Ez: Ceiling clg supply, ceiling return 100 % Heating Ez: Ceiling supply > Trm+15°F(8°C), ceiling return 80 % Er: Default based on system type

Description	Area/ Amount	Dir	Const Type / Tilt Schedule	U Value Btu/h-ft ² ·°F	Alpha	Type / Energy Type	Area ft ²	Shade Coef	U Value Btu/h-ft ² ·°F	External Shading	Internal Shading	Adj	Pct	Pct	Pct	Rad	
												Temp/ Grnd Refl	Sen/ Cool Tmp	Rm/ Heat Tmp	Ret/ Perm Len	Frc/ Loss Coef	
SOUTH	133 ft ²	180	0 90.1-07 Min Wall Nonres	0.0849	0.90												
DOOR			Door			Standard Door	21	0.00	0.20	Overhang - None	None	0.00					
WINDOW			Window			90.1-2013 Window	19	0.29	0.60	Overhang - None	None	0.00					

Room Description: 104 SR

Zone Description: No Zone

System Description: FC-1

GENERAL INFORMATION	PEOPLE	AIRFLOW INFORMATION	
Floor Area: 204 ft ² Flr-Flr Height: 10.0 ft Plenum Height: 0.0 ft Height Above Flr: Slab Cnstr Type: 4" LW Concrete Room Mass: Time delay based on actual mass Ceiling R-Value: 1.786 hr-ft ² ·°F/Btu Is There Carpet?: YES Design Clg DB / Drift Point: 80.0 °F / 84.0 °F Design Htg DB / Drift Point: 68.0 °F / 64.0 °F Design Relative Humidity: 50 % Moisture Capacitance: Medium Clg Tstat: None Htg Tstat: None Thermostat Location:Room Floor Multiplier: 1 Humidistat Location:Room Room Multiplier: 1 CO2 Sensor Location:None Room Type:Conditioned	People Type: Hotel/Motel Room # of People: 200 sq ft/person People Sensible: 245 Btu/h People Latent : 105 Btu/h People Schedule: Cooling Only (Design) Workstation: 1.0 workstation/person Lighting Type: Recessed fluorescent, not vented, 80% load to space Fixture Type: RECFL-NV % Load to RA: 20 % Lighting Schedule: Cooling Only (Design) Lighting Amount: 1.000 W/sq ft Ballast Factor: 1.0	<u>Cooling (Peop-based)</u> Vent Type: Dwelling Unit Vent Value: 5.00 cfm/person Vent Schedule: Available (100%) Infil Type: None Infil Value: 0.00 air changes/hr Infil Schedule: Available (100%) Vav Airflow: Vav Sched: Available (100%) Supply: To be calculated Aux Supply: To be calculated Room Exhaust: Rm Exh Sched: Available (100%) Std 62.1-2004	<u>Heating (Area-based)</u> Dwelling Unit 0.06 cfm/sq ft None 0.00 air changes/hr To be calculated To be calculated Cooling Ez: Ceiling clg supply, ceiling return 100 % Heating Ez: Ceiling supply > Trm+15°F(8°C), ceiling return 80 % Er: Default based on system type

Description	Area/ Amount	Dir	Const Type / Tilt Schedule	U Value Btu/h-ft ² ·°F	Alpha	Type / Energy Type	Area ft ²	Shade Coef	U Value Btu/h-ft ² ·°F	External Shading	Internal Shading	Adj	Pct	Pct	Pct	Rad	
												Temp/ Grnd Refl	Sen/ Cool Tmp	Rm/ Heat Tmp	Ret/ Perm Len	Frc/ Loss Coef	
NORTH	133 ft ²	0	0 90.1-07 Min Wall Nonres	0.0849	0.90												
DOOR			Door			Standard Door	21	0.00	0.20	Overhang - None	None	0.00					
WINDOW			Window			90.1-2013 Window	19	0.29	0.60	Overhang - None	None	0.00					

FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AIR FORCE BASE, CA

35% FINAL DESIGN SUBMITTAL
SPECIFICATIONS
DESIGN-BUILD

Appendix D: Contract Security Clause for Travis AFB

CONTRACT SECURITY CLAUSE FOR TRAVIS AIR FORCE BASE, CALIFORNIA

Supersedes **Contract Security Requirements** dated **15 Jun 12**.

20 Jun 13

1. Security Requirements. Travis Air Force Base is designated as a closed base. In order to promote security and safety, all employees desiring access must adhere to installation entry requirements, to include, identity proofing and vetting. This includes a National Crime Information Center (NCIC) and California Law Enforcement Telecommunication System (CLETS) check. Identity proofing and vetting is not required for employees if they have a current favorable government security clearance which can be verified through the Joint Personnel Adjudication System (JPAS).
2. The primary contractor will ensure all employees possess proper credentials allowing them to work in the United States and ensure illegal aliens are not employed and/or transported onto the installation. At least one of the following forms of identification will be required for identity proofing:
 - United States Passport
 - Permanent Registration Card/Alien Registration Receipt Card (Form I-1551)
 - Foreign Passport with a temporary (I-1551) stamp or temporary (I-1551) printed notation on a machine readable immigrant visa.
 - Employment authorization document that contains a photograph (Form I-766)
 - Current/valid Driver's License
 - Identification card issued by Federal, State or local Government
 - U.S. Coast Guard Merchant Mariner Legacy Card
 - U.S. Coast Guard New Merchant Mariner Credential

Additional supplemental sources of identity proofing which may be requested during increased FPCONS or Random Antiterrorism Measures (RAMs) include, but are not limited to:

- School identification card with photograph
- U.S. Military or draft record
- Native American Tribal Document
- U.S. Social Security Card issued by the Social Security Administration (SSA)
- Certification of Birth Abroad issued by the Department of State (Form FS-545 or Form DS-1350)
- Original or certified copy of a birth certificate issued by a state, county, municipal authority or outlying possession of the United States bearing an official seal
- U.S. Citizen ID Card (Form I-197)
- ID Card for use of Resident Citizen in the United States (Form I-179)

- Unexpired employment authorization document issued by the Department of Homeland Security (DHS) which includes, a) Form I-94 identifying the holder as an asylee, or b) other documentation issued by DHS or the former Immigration and Naturalization Service that identifies the holder as an asylee, lawful permanent resident, refugee or other status authorized to work in the United States incident to status
- Foreign Military or Government Identification Credentials
- Foreign passport with a current arrival-departure record (Form I-94) bearing the same name as the passport and containing an endorsement of the alien's nonimmigrant status, if that status authorizes the alien to work for the employer
- In the case of a nonimmigrant alien authorized to work for a specific employer incident to status, a foreign passport with Form I-94 or Form I-94A bearing the same name as the passport and containing an endorsement of the alien's nonimmigrant status, as long as the endorsement has not yet expired and the proposed employment is not in conflict with any restrictions or limitations identified on the form.

The contractor shall not be entitled to any compensation for delays or expenses associated with complying with the provision of this clause. Furthermore, nothing in this clause shall excuse the contractor from proceeding with the contract as required.

3. Identity Proofing and Vetting. Employees whose background reveals any of the following disqualifiers will not be allowed installation access. All employees will be vetted based on the following disqualifying base access criteria:
- The individual is known to be or reasonably suspected of being a terrorist or belongs to an organization with known terrorism links/support.
 - The installation is unable to verify the individual's claimed identity.
 - There is a reasonable basis to believe the individual:
 - Has submitted fraudulent information concerning his or her identity.
 - Will attempt to gain unauthorized access to classified documents, information protected by the Privacy Act, information that is proprietary in nature, or other sensitive or protected information.
 - Will unlawfully or inappropriately use an access credential outside the workplace.
 - Based on an individual's criminal or dishonest history, that issuance of an access credential poses an unacceptable risk to the installation/mission.
 - The individual:
 - Has/had been barred from entry/access to a Federal installation or facility.
 - Is wanted by Federal or civil law enforcement authorities, regardless of offense or violation.
 - Has been incarcerated within the past ten years, regardless of offense/violation, unless released on proof of innocence.
 - Has any conviction for espionage, sabotage, treason, terrorism, or murder.

- Name appears on any Federal or State agency’s watch list or hit list for criminal behavior or terrorist activity.
 - Has been convicted of a firearms or explosive violation within the past ten years.
 - Has been convicted of sexual assault, armed robbery, rape, child molestation, child pornography, trafficking in humans, drug possession with intent to sell or drug distribution.
- There is a reasonable basis to believe
- Based on the individual’s material, intentional false statement, deception, or fraud in connection with Federal or contract employment, that issuance of an access credential poses an unacceptable risk to the installation/mission.
 - Based on the nature or duration of the individual’s alcohol abuse without evidence of substantial rehabilitation, that issuance of an access credential poses an unacceptable risk to the installation/mission.
 - Based on the nature or duration of the individual’s illegal use of narcotics, drugs, or other controlled substances without evidence of substantial rehabilitation, that issuance of an access credential poses an unacceptable risk to the installation/mission.
 - A statutory or regulatory bar prevents the individual’s contract employment; or would prevent Federal employment under circumstances that furnish a reasonable basis to believe that issuance of a access credential poses an unacceptable risk to the installation/mission.
 - The individual has knowingly and willfully engaged in acts or activities designed to overthrow the U.S. Government by force.

Employees will be identity proofed and vetted each time a pass is issued. Security Forces may conduct random screenings at any time; if, disqualifying base access information is found employees may have their passes revoked.

Employees with disqualifying base access information will be issued a denial access letter immediately revoking their base access privileges. Employees requesting to contest the adjudication, denial of installation access, or requesting a waiver/exception to policy must submit a written rebuttal/request within 10 business days of receipt of the barment letter to 60 AMW/CC, through 60 SFS/CC, Attention: 60 SFS/S5R, Bldg 381, 540 Airlift Drive, Suite C-101, Travis AFB 94535-2451.

4. Primary Contractor Responsibilities. The primary contractor will be responsible for the conduct of all employees working under that contract. Additionally, the primary contractor will:

Coordinate base entry requirements with the USACE.

Advise employees working on the installation they are subject to identity proofing and vetting against criteria specified in para. 3. Any employee who does not complete or sign the form will be denied installation access.

Advise employees base passes are only valid for the purpose, person and vehicle for which it was issued. Use of the base pass for any other purpose or by any other person will result in the pass being confiscated. Employees who misuse their pass may be subject to barment actions. If a pass is lost, notify the Pass and Registration Office immediately.

- To obtain a pass, personnel will need a valid state or government photo identification.
- To obtain a vehicle pass, personnel will need a driver license, registration and insurance.

Provide written notification, within 24 hrs, to the USACE of any changes in employee's status. This includes, but is not limited to, the employee being fired or quitting their position with the company.

Retrieve government issued personal and vehicle passes from employees which no longer need installation access. Passes will be turned into the USACE upon expiration.

Obtaining a Base Pass. Provide an EAL (Entry Authority List) of all employees on company letterhead which require a base pass. All requests for a base pass will be submitted through the Base Contracting Office NLT 45 days prior to the contract start date. Exceptions will be made for short-notice contracts where the award date and performance start date are less than 45 days. A base pass will be issued for a maximum of one year. Prior to renewing a base pass, return the old base pass to the Pass and Registration for destruction. Ensure the EAL includes:

- Contract number
- Work site or location
- Inclusive dates of the contract
- Work schedule (include days of the week and time periods employees are on base)
- Employee's full name, date of birth, and social security number

Only persons who have undergone identity proofing and vetting and have no disqualifying base access information can serve as a sponsor. Persons appointed as sponsors will meet employees at the Visitor Control Center and ensure they are advised of security language contained herein.

5. Employee Responsibilities. All employees requiring reoccurring and unescorted access onto the installation must:
 - Carry their DoD ID card or installation pass on their person while on the installation.
 - Register privately owned vehicles in accordance with installation policies.
 - On request, present their DoD ID card or installation pass to security personnel. Refusal may be grounds for further administrative or punitive action.
 - If issued a Command Access Card (CAC), present documentation from the local security office or CAC sponsor confirming that the CAC has been reported lost or stolen.
 - Turn in access credentials to the USACE when the credential expires or when the basis for obtaining the credential no longer exists.

6. Increased Force Protection Condition (FPCON). During FPCON Normal, Alpha and Bravo; employees without a base issued pass must be sponsored onto the installation. During FPCON Charlie and Delta the base will curtail non-essential operations/functions and non-essential employees will be suspended at the direction of the installation commander. All employees attempting installation access; thereafter, will be physically escorted unless FPCON Mission-Essential designation has been approved in advance and is indicated on the base pass.
7. Restricted Area Badges. Employees may be submitted for unescorted entry into restricted areas if required for their contract. Contact the security manager for the military agency responsible for the project.
8. Escort Requirements. The following escort requirements apply:
 - Installation. Sub-contractors must be escorted at all times.
 - Controlled/Restricted Areas. Employees not in possession of a restricted area badge will be escorted at all times when working within controlled, restricted or other sensitive areas. Escorts can be either the military agency responsible for the project or an employee in possession of a restricted area badge. The military agency or employee in possession of a restricted area badge will follow existing procedures and instructions for obtaining entrance to controlled, restricted and sensitive areas.
9. Lost Base Passes or Restricted Area Badges.
 - Base Passes. The employee's supervisor will investigate and provide written notification for a lost base pass to the USACE. Written notification should include an explanation from the employee on how, when, where and what steps have been taken to locate the missing base pass. If a replacement is needed, forward the notification with the request for a base pass.
 - Restricted Area Badges (RAB). Employees issued a RAB must report the loss immediately to the security manager of the military agency that submitted the RAB request. The individual who lost the RAB will provide a written explanation on how, when, where and what steps have been taken to locate the missing RAB. The security manager will conduct their own inquiry and forward a report of investigation [with squadron commander endorsement]; the member's written explanation and the original AF Fm 2586 to the Pass and Registration office. A new RAB will not be issued until the investigation is complete.
10. Information Protection Security Training. IAW AFI 31-401, AFGM_1 para 8.5. Security Managers are required to provide initial uncleared or cleared training to all contractors within 90 days of assignment, this includes specialized security training. The security manager is required to track and document the completed training. The contractor will be required to participate in the government's in-house and web-based security training program under the

terms of the contract. The government will provide the contractor with access to the on-line system after appropriate vetting qualification have been met.

11. For Official Use Only Information. Agency information marked “For Official Use Only” or bearing other sensitivity marking will be handled in accordance with agency information security program regulations and instructions. This information will not be divulged or disclosed without agency permission. Contractor personnel will ensure information that is considered sensitive or proprietary is not compromised.
12. Anti-terrorism Force Protection Training. IAW AFI 10-245 and TAFB OPLAN 10-245, all employees with contracts over 90 days, will complete initial and annual Level I Anti-Terrorism Awareness training at <https://atlevel1.dfic.mil/at/>. All personnel will be responsible to provide proof (copy of training certificates) of training to the Anti-terrorism Advisor/Representative responsible for the unit they are contracted.
13. Operations Security (OPSEC). IAW AFI 10-701, 60 AMW will consider OPSEC for all contractual requirements and determine if any contract contains any form of critical and/or sensitive information or activities. These requirements will be defined on the contract and SOW/PWS. If OPSEC requirements exist, then the 60 AMW OPSEC Program Manager will be contacted to review the SOW/PWS. This review may result in possible training requirements, in addition to what is stated below. For unclassified contracts, the DD Form 254, *Department of Defense Contract Security Classification Specification*, can be used to specify OPSEC requirements in lieu of defining these requirements on the contract and SOW/PWS. For classified contracts, the DD Form 254 is mandatory. Additionally, the 60 AMW OPSEC Program Manager or functional Unit OPSEC Coordinator will administer specific OPSEC training or training materials to all contract employees within 90 days of initial assignment to the contract (AFI 10-701, 5.2.4). The Installation (60 AMW) OPSEC Program Manager can be contacted at 424-3261/1375.

THIS PAGE INTENTIONALLY LEFT BLANK

FY22 REPAIR ENLISTED DORM
B1332
TRAVIS AIR FORCE BASE, CA

35% FINAL DESIGN SUBMITTAL
SPECIFICATIONS
DESIGN-BUILD

Appendix E: Travis AFB i33-110

**BY ORDER OF THE COMMANDER
TRAVIS AIR FORCE BASE**

**TRAVIS AIR FORCE BASE
INSTRUCTION 33-110**



03 APRIL 2012
Certified Current 13 May 2016
Communications and Information
STANDARD COMMUNICATIONS
INFRASTRUCTURE

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available on the e-Publishing website at www.e-publishing.af.mil for downloading or ordering.

RELEASABILITY: There are no release ability restrictions on this publication.

OPR: 60 CS/SCXP

Certified by: 60 CS/CC
(Lt Col Michael E. Phillips)
Pages: 15

This Travis Air Force Base Instruction implements Air Force Policy Directive (AFPD) 33-1, *Information Resources Management*. It provides policy, direction, and guidance for planning and implementation of communication infrastructure for Military Construction (MILCON) and building renovation projects. This instruction also implements Engineering Technical Letter (ETL) 02-12, *Communications and Information System Criteria for Air Force Facilities* and Unified Facilities Criteria (UFC) 3-580-01, *Telecommunications Building Cabling Systems Planning and Design*. It establishes responsibilities and procedures for base agencies, architects, engineers, and contractors to plan, design, review, and evaluate telecommunications cabling and distribution systems. It contains base standards for pre-wiring new construction under Military Construction Program (MCP), Combined Defense Improvement Projects (CDIP), and remodeled facilities. Furthermore, it identifies minimum essential factors to be considered when telecommunications pre-wiring support is addressed. This instruction applies to all units, assigned and/or associated with Travis Air Force Base (TAFB).

Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/>. The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

1. General.

1.1. **Purpose.** The purpose of this instruction is to provide design criteria for planning telecommunications cabling and distribution systems in building construction and renovation efforts. Pre-wiring shall be included in all military facility construction projects accomplished with 3300 series funding in accordance with Air Force ETL 02-12. All pre-wiring must comply with the ETL 02-12, UFC 3-580-01, and this instruction. Compliance with these instructions will improve maintenance by establishing a standard for communications systems facility. Department of Defense (DOD) publications direct the use of commercial standards whenever they meet DOD needs. The commercial standards referenced in ETL 02-12 and UFC 3-580-01 shall be followed along with this instruction.

1.2. **Scope.** Project design packages will comply with:

- 1.2.1. Local minimum communications standards.
- 1.2.2. Building communications and distribution system.
- 1.2.3. Telephone/Local Area Network (LAN) entrance cables.
- 1.2.4. Communications equipment rooms.
 - 1.2.4.1. Telecommunications cabling and termination.
 - 1.2.4.2. Telecommunications outlets.
 - 1.2.4.3. Testing requirements.

2. Responsibilities.

- 2.1. 60 CES Construction/Renovation Design Package Office of Primary Responsibility.
 - 2.1.1. Present all communications requirements to 60 CS at the earliest opportunity before the Request for Purchase (RFP) is finalized, or no later than the 60% level design review for design-built projects.
 - 2.1.2. Present 60 CS a complete design package for review to include a draft of the Requirements Document and drawings, the DD Form 1391, *Military Project Construction Data*, and a list of any deviations from the Communications-Computer Systems (C-CS) criteria which must be approved by the Communications and Information Systems Officer (CSO) or his representative.
 - 2.1.3. Allow 15 days for communications squadron review of all design packages. The Base Telephone Systems Office and base telephone maintenance contractor may be needed to provide assistance with the incorporation of new infrastructure. The Base System Telecommunications Engineer Manager (STEM-B) may also need to provide communications engineering assistance. Any assistance requested will be coordinated through 60 CS Plans and Implementation during the monthly STEM-B site visit.
 - 2.1.4. Notify 60 CS Plans and Implementation of any changes in project scope.
- 2.2. 60 CS Communications Plans and Implementation.
 - 2.2.1. Coordinate design packages with all appropriate communications agencies.
 - 2.2.2. Receive and maintain comments on design packages. Ensure design packages comply with standards in this document and support the current base blueprint document.

- 2.2.3. Forward design review comments to the 60 CES and attend design meetings as required.
- 2.2.4. Ensure the most efficient wire or cable distribution system is included in the facility design.
- 2.2.5. Check design packages to ensure current and projected communications requirements are considered for flexibility to accommodate future additions or changes.
- 2.2.6. Ensure appropriate 60 CS personnel are involved in all phases of the project.
- 2.2.7. Coordinate any changes or deviations to TAFBI 33-110, ETL 02-12 and UFC 3-580-01.

3. Personnel Certification Requirements.

- 3.1. Personnel involved in design and construction shall have expertise in engineering and installation of telecommunications, cabling, and distribution systems. If requested by the CSO, contract personnel shall provide adequate proof of their individual skill by demonstrating their technical expertise and methods of testing and documentation.
 - 3.1.1. The contracting company shall have a minimum of five years experience in the design, application, and installation and testing of the specified systems and equipment.
 - 3.1.2. The contractor shall employ Registered Communications Distribution Designers (RCDD) to perform systems engineering and design.
 - 3.1.3. All supervisors and installers assigned to the installation of a system or any of its components shall have industry training for each area of installation and have factory certification on all components used in the installation. General electrical trade staff (electricians) will not be used for the installation of the fiber optic and copper cables and associated hardware.
 - 3.1.4. All installers assigned to the installation of a system or any of its components shall have a minimum of one year experience in the installation of the specified fiber optic and copper cable and associated hardware. Installation supervisors shall have a minimum of three years experience in the installation of the specified fiber optic and copper cable and associated hardware.

4. Manufacturers Minimum Qualifications.

- 4.1. The equipment and hardware provided under all contracts will be from manufacturers that have a minimum of three years experience in producing the types of systems and equipment specified.

5. Local Minimum Standards.

- 5.1. To minimize the long-term cost of the infrastructure, the following local standards are established and may only be changed when approved in writing by the CSO. These standards are intended to promote common skills among maintenance personnel throughout the base and to minimize the necessity for excessive spare parts and variations in telecommunications equipment:
 - 5.1.1. Base Fiber Optic Cable (FOC) outside plant backbone connections in support of Information Transfer Nodes (ITNs): Asynchronous Transfer Mode (ATM) or

Switched/Gigabit Ethernet Connections 48-strand Single Mode (SM) FOC 8.3/125 micron.

5.1.2. Base FOC outside plant satellite connection in support of End Building Nodes (EBNs): Switched Ethernet Connections 12-strand (minimum) SM FOC 8.3/125 micron.

5.1.3. New Construction: Install a minimum of 50 pair #23 American Wire Gauge (AWG) copper (CAT 6A or latest standard) outside plant cable.

5.1.4. All cable used for telecommunications outlets shall be four pair, #23 AWG, solid copper conductor, green CAT 6A or higher standard, UL tested and certified. Each cable shall be dedicated to one device or outlet only.

5.1.5. Whenever exposed in air circulation areas, only plenum rated cable will be used.

5.1.6. All telecommunications outlets shall provide a minimum of four Universal Service Ordering Code (USOC) CAT 6A RJ-45 or latest standard type jacks utilizing Telecommunications Industry Association (TIA) 568-B for voice/data/LAN. All 4 pairs within the cable shall be terminated to USOC CAT6A RJ-45 or latest standard type jack. All CAT 6A patch panels shall have 110 interface on the back side. Panel width shall be as required to fit in a standard 19” equipment rack.

5.1.7. Information outlet spacing in office areas shall be based upon one quad outlet for each eight (8) linear feet of useable perimeter wall space or one for each 100 square foot of floor space, whichever provides a higher outlet density. All other locations will be provided with outlet density as determined by the CSO or his representative.

5.1.8. Administrative telephone wiring will be based on the single-line instrument concept with individual cable running from the wall outlet to the Telecommunications Room (TR) via the cross connect cabinet if required. Each jack will be wired “homerun” from jack to the nearest TR. Splitting cable pairs to multiple jacks is not authorized.

5.1.9. All outside plant copper cable conductors shall be #26 AWG in cable sizes above 2100 Pair. All copper conductors for cables less than 2100 pair will not be less than #23 AWG.

5.1.10. All Outside Plant cable will be filled core type, and meet Rural Utilities Service (RUS) Professional Engineer 39 (PE-39) or PE-89 specifications.

6. Comprehensive Requirements. Comprehensive requirements apply to all telecommunications systems.

6.1. Building Communications Distribution System.

6.1.1. All primary backbone conduits shall be installed in locations as determined by the CSO or his representative and shall provide adequate size and quantity to meet current requirements plus 100% growth for future use to preclude digging at a later date to meet emerging requirements.

6.1.2. When new construction or renovation takes place, the design, installation, and all related costs necessary to extend the conduit and manhole (MH) system to the new location shall be included in the project in accordance with ETL 02-12, UFC 3-580-01, and AFI 65-601V, *Budget Guidance and Procedures*. Multiple service entrance locations

will be required for all facilities housing command and control systems to provide redundant survivable service.

6.1.3. A manhole with a minimum of two 4” conduit/duct bank lateral systems with tracer and pull rope will be used for required cables plus 100 percent spare ducts (not less than 1 spare) for expansion and maintenance in all primary duct banks.

6.1.4. Manholes shall be installed for all connections to the existing cable plant as required and maintained at a maximum spacing of 350 feet. Additional manholes may be required to provide adequate control of connection and distribution of the cable plant.

6.1.5. All manholes and handholes shall be designed and constructed to meet the requirements of Technical Order (T.O.) 31W3-10-22, *Telecommunications Engineering Outside Plant Telephone*. Manholes shall provide a clear inside floor space measurement of 8’ x 10’. An alternate size of 6’ x 8’ may be approved only when no primary backbone cable passes through the manhole (lateral or dead end service only). All manholes shall provide a clear height no less than 7 ft. Conduits shall enter the MH 4 to 5 inches above finish floor on the end and be perpendicular to the wall in approximate location. Mandatory items include grounding bus bar and rod and related conductors and wiring, a ladder or step, cable rack support, a 50 cubic foot sump (French drain), pull in iron/anchor, frame and a manhole cover cast with the word “COMMUNICATIONS” exposed to the surface. All manhole covers will be round and provided with a locking bar or other locking device to allow use of a padlock or other restriction to unauthorized entry.

6.1.6. Power and communications cables will be separated by 12” of well tamped, fine earth protection in accordance with T.O. 31W3-10-12, *Outside Plant Cable Placement*. The cable at the top of the crossing, whether power or communications cable, will receive the same additional protection (see [paragraph 6.1.8](#)). In addition, if the cable crosses over the main, extend additional cable protection 3’ from each side of the crossing. Where highway, railroad and runway crossings occur, cable at such crossings must be placed underground using a metallic conduit or Schedule 80 Polyvinyl Chloride (PVC) conduit. Polyvinyl Chloride conduit may be direct buried if 30-36” of cover is provided. If steel pipe conduit is used, boring procedures will be followed to ensure protection of existing utilities or resources. Where PVC conduits are installed, a metallic #10 AWG copper tracer wire at minimum will be installed within the conduit or 6” above the duct bank to assist in future location efforts, with bonding to occur inside each manhole and at CER grounding frame.

6.1.7. Stub up a minimum of two 4” lateral conduits no less than 6” above the finished floor level adjacent to the telephone punch down board continuous to the nearest splice or service point as determined by the 60 CS if both fiber and copper are available from a single location. The two lateral entrance conduits will each have three 3-cell Maxcell innerduct to be used for fiber. If a diverse path is required for both fiber and copper, a minimum of four 4” conduits is required (two for fiber and two for copper). All conduits will have three 3-cell Maxcell innerducts. Conduits are to be sealed or capped air tight to prevent water from entering the TR.

6.1.8. Provide 36" minimum cover for all conduit duct banks and 36" minimum cover for laterals measured to top of conduit. The 60 CS will provide termination of cable connections in the manhole.

6.1.9. When determined necessary to simplify installations, conduit will be curved to provide gentle sweeps with a minimum radius of 25 feet for a total bending radius not to exceed 180 degrees between manholes, hand holes, or pull locations.

6.1.10. All conduits shall be sloped toward each opposing manhole at a slope of 3" per 100' of run to promote drainage of any accumulated liquids.

6.1.11. When specified, hand holes will be nominally 6'W x 8'L x 7'H inner dimensions or a standard 36" x 60" x 36" substructure box. Mandatory items include grounding bus bar and rod and related conductors and wiring, a sump hole (French drain), and a traffic rated cover with a locking bar or other locking device to allow use of a padlock or other restriction to unauthorized entry.

6.2. Telephone Entrance Cable.

6.2.1. The contractor will provide underground exterior service cable, gel filled, IAW RUS PE-39 or PE-89 from the main communications panel to the nearest manhole tie-in or service point with sufficient vacant pairs to provide each facility with currently required circuits plus 50 percent spare pairs as determined by the CSO or his representative.

6.2.2. Splice cases used to splice copper cable into the base infrastructure will be stainless steel. A transition splice will be made between the exterior copper gel-filled cable and dry-filled intra-building cable in the TR in accordance with TIA/EIA 569A standard.

6.2.3. In accordance with Underwriters Laboratories (UL) 497, all Building Entrance Terminals (BET's) will be provided with three-electrode gas tube or solid state type 5-pin rated for the application. Provide gas tube protection modules in accordance with RUS Bulletin 345-83 and shall be heavy duty, A>10kA, B>400A, C>65A where A is the maximum single impulse discharge current in accordance with National Electrical Manufacturers Association (NEMA) C62.61. The gas modules shall shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils, in accordance with UL 497. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

6.2.4. Building Entrance Terminals (BET) used for the termination of outside cables, 300 pair or less in size, will have a built in splice chamber with 710 type splice modules. Equipment side (house) of the BET will use 25 pair Telco type connections to station equipment. BETs of this type will not be stacked more than three high.

6.2.5. Building Entrance Terminals used to terminate cable sizes greater than 400 pair will be a #23 AWG stubbed 355 series type blocks with 3BIE type gas protectors and be mounted in a vertical buss arrangement.

6.2.6. The contractor shall conduct appropriate testing and provide 100% continuity test results to 60 CS Base Telephone Systems Office. Use Optical Time-Domain Reflectometer (OTDR) to perform the test.

6.3. LAN Fiber Optic Entrance Cable.

6.3.1. Single mode fiber optic (SM FOC) will be used for inside and outside premise. At a minimum, 48 strands SM FOC (8.3/125 micron) will be designed as part of a new facility construction project. Facility use and user requirements will dictate whether more fiber optic cable is required. Refer to Paragraph 5 of this document for local minimum standards.

6.3.2. All FOC will be home run from the closest primary or secondary information transfer node (ITN) to the new facility. Fiber optic cable will not be spliced in any manholes.

6.3.3. All FOC entering the building will terminate in the TR in a 19” rack floor mounted FOC patch panel with LC connectors.

6.3.4. Fiber optic cable terminations at the far end (primary or secondary ITN) will be performed by the base. The contractor shall provide manufacturer test results and conduct industry standard OTDR testing on cable and provide 100% continuity test results to 60 CS Base Telephone Systems.

6.4. Telecommunication Rooms (TR).

6.4.1. A TR will be provided for Communications-Computer System (C-CS) switching and transmission equipment, private branch exchanges (PBXs, gateways, power supplies, etc.) main distribution frame(s), LAN equipment racks, fiber optic cable termination, patch panels and other equipment needed for termination of the building's interior wiring systems and to interface the local service equipment with the exterior base cable system. The primary TR will be located on the first floor with an exterior door only to provide uninterrupted access by authorized personnel. The TR must have a lockable door and keyed to 60 CS specifications. As a minimum, the TR should have ¾ inch plywood backboard from no greater than 1 foot above the finished floor level to no less than 7 feet above the finished floor level. Plywood will be sealed and fire rated. BETs are required for all primary TRs. Install telephone distributing posts (mushrooms) as required by number of connecting blocks in all TRs. The size of the TR will not be less than the specifications found in Table 1.

Table 1. TR Size Requirements.

Building Usable Area (Square Feet)	TR Size (Square Feet)	Number of 4” Entrance Conduits
<20,000	400	3
20,000 to 100,000	500	4
100,000 to 200,000	900	5
Every additional 200,000	600+	+1

NOTE: Room size will have a 2:1 ratio in length to width.

6.4.2. Adequate installation and maintenance space, environmental control and power typical to an office environment (heated and cooled), shall be included to support equipment and any necessary cable entry requirements. No other building support

equipment including mechanical equipment, plumbing equipment, and electrical panels will be placed in the TR. Maintenance space and access space will not be utilized for any other purpose and will be free and clear of all obstructions to a height of 8 feet to allow for adequate cooling and servicing of equipment. Storage of any type is prohibited in the TR.

6.4.3. The TRs will be provided with space as required and will be so located that the distance measured along the routing path of the cable will not exceed 295 feet including vertical distances to wall telecommunications outlets to maintain the integrity of the digital data signal. Where multiple TR rooms are required, attention must be given to their strategic placement to support interconnection via 4 inch conduit or 6 inch wide by 2 inch deep minimum cable trays between each room as well as to the primary TR in which the cable head/fiber connections are to be located. Where it is necessary to interconnect more than one TR, single-mode (SM) fiber optical cable will be used. A 1 inch innerduct will be provided inside the 4 inch conduit or conduit raceway with pull cord ensuring a direct path between each TR. For telephone interconnection, provide #23 AWG copper wire cable between the TRs.

6.4.4. Circuit connectivity from the telecommunications outlet jacks to the TR will be provided through 1¼ inch minimum conduit stubbed to 12 inches above the finished ceiling using the most direct route available, complete with pull cords. A 6 inch wide by 2 inch deep minimum above the ceiling cable through/raceway may be used to connect rooms provided plenum type cable is used or provided. Where cable trays are provided, conduits will be extended to the cable tray and be terminated. The through/raceway will run above the ceiling on the top of proper support structures using the most direct route between the TRs. Conduit fill will not exceed the 40% rule as stipulated in the National Fire Protection Association (NFPA) 70 and TIA/EIA.

6.4.5. Type 630B wall jacks will be provided for wall-mounted telephones in the TR, electrical and mechanical rooms mounted 60 inches above the finished floor.

6.4.6. A controlled and secured access to the TR is required to allow 24-hour uninterrupted access by authorized technicians. The TR on the first floor will have exterior access only. Locking door knobs shall be utilized with key ways and locks keyed alike to match the 60 CS master key. Only authorized personnel by the CSO will possess key to the TRs.

6.4.7. Temperature in the TR will be maintained between 65-78 degrees Fahrenheit.

6.4.8. A minimum of two-gang 120 VAC power outlets on a separate 20-Amp power outlet circuit with isolated ground will be provided. Additionally, a minimum of two-gang 220-240 VAC 30-Amp power outlet circuit with isolated ground for use in powering uninterrupted power supply (UPS) will also be provided. An additional duplex convenience outlet will be located away from the telecommunications outlets to provide power to operate service and maintenance equipment. Sufficient lighting will be provided in all TR areas to promote a safe and acceptable work area.

6.4.9. Ground all devices, cable sheaths, protectors and other equipment in accordance with T.O. 31W3-10-22, ANSI/EIA/TIA 607, MIL Standard 188-124B, and the NFPA 70. Provide a single-point ground for all communications/electronic equipment for the

building within the TR. Provide a telecommunications main grounding bus bar (TMGB) at a minimum of 6 inches high by 24 inches long. The ground riser from the ground plate to the single main electrical service entrance ground must be a #1 AWG or larger copper conductor directly connected to the ground plate with no taps. The resistance of the ground riser must be 5 ohms or less measured from the main building ground point. All connections of wire-to-wire and/or wire-to-ground rod must be exothermic-welded. Extend #6 AWG or larger copper ground wires from the TR ground plate to each secondary TR within the building and connect a telecommunications grounding bus bar (TGB) in the TR. Bond each TMGB and TGB to non-current-carrying metal building parts such as metal framing in the TR as required by the NEC.

6.5. Telecommunications Room (TR).

6.5.1. The primary TR will be provided as required to serve approximately every 10,000 ft² of usable floor space. Other TRs will serve as a secondary interconnection point between the telephone/LAN modular jack outlets and the main communications frame in the TR. Wall and floor space will be provided for installation and maintenance of equipment such as frames or backboards. Such equipment will be concealed and secured as required for TRs and will not be installed in common use areas. It must be fully accessible and maintainable as outlined for TR room equipment.

6.5.2. All cable in the TR will be tagged according to room and jack number to indicate its associated jack number and location. All LAN runs must be continuous from wall outlet to patch panels in the TRs. Installation of plugs and plugging house cable into active electronic equipment is strictly prohibited.

6.6. Cabling and Termination.

6.6.1. Horizontal Cables (Telephone and LAN). Connect individual subscriber telephone and LAN outlets to their respective 110-type patch panels in the TR. Horizontal cable for both telephone and LAN must be 4-pair #23 AWG solid copper, 100 ohm, CAT 6A or better plenum rated unshielded twisted pair (UTP) cable. Use only cable that has passed UL network certification program and is UL-listed and labeled. Green CAT 6A cables will be used for voice, LAN, and data. Tag and label cables at least 6 inches at both ends.

6.6.2. Telephone Riser Cables. Provide connection between the telephone patch panel in the TR and the telephone patch panels or distribution frame in the TR. Telephone riser cable must be multi-pair (sized as required to support all horizontal cables terminated in the TR plus 50% spare pairs) #23 AWG solid copper, 100 Ohm, CAT 6A UTP cable. They must meet the requirements of EIA/TIA-568-B or latest standard.

6.6.3. CAT 6A wiring will be terminated in a standard 19" rack mounted CAT 6A patch panel located in the TR situated in a central location within the building. Cable length will not exceed 295 ft.

6.6.4. Pairing and color-coding for jacks will be in accordance with EIA/TIA-568B standards in [Table 2](#)

Table 2. TIA 568-B LAN/DATA Wiring Standard.

PIN #	COLOR	PIN #	COLOR
1	W/ORANGE	5	W/BLUE
2	ORANGE	6	GREEN
3	W/GREEN	7	W/BROWN
4	BLUE	8	BROWN

6.6.5. The 60 CS contractor will have a minimum of ten working days to complete the cross connects, install equipment, and verify the system prior to occupancy by the tenant starting from receipt of the work order.

6.6.6. To clearly identify cables and their usage, each cable will be labeled at both ends by identifying their room and outlet number. Each outlet cover plate will also carry the outlet designation, as shall the termination jack on the patch panel or termination block. A permanent type label affixed to the cable or outlet jack cover to preclude damage due to age or other mechanical means will identify all cable and terminations. Automated embossed labels are required. Pen and ink label is not authorized.

6.7. Telecommunications Outlets.

6.7.1. In general office areas, a quad-plex modular telecommunications outlet plate with four each USOC RJ-45 or latest standard type jacks will be provided every 8 linear feet around the usable room perimeter or one for each 100 square feet of net floor area whichever provides greater density. All wall outlet components will be certified as CAT 6A or higher and jacks will be USOC RJ-45 or higher type wall jacks with a removable outer bezel. Green jacks will be used to identify all CAT 6A jacks.

6.7.2. Telecommunications outlets will be mounted at 18” above the floor to the centerline of the cover plate unless noted otherwise.

7. Periodic, Pre-Final, Final Inspections to include Testing and Documentation.

7.1. All telecommunications cable will be certified and tested utilizing the Optical Time-Domain Reflectometer (OTDR) test equipment in accordance with EIA/TIA standards with written test result to be provided to the 60 CS. Where deficiencies of any type are discovered upon testing, the contractor will make all necessary repairs, including replacement if necessary, at no cost to the government.

7.2. Revised drawings which reflect the actual “as built” conditions will be maintained throughout the construction phase. A copy will be provided to the 60 CS with the cable certification records upon completion of the work but prior to final acceptance of the work to allow 60 CS to perform a final review of drawings and inspect installations.

7.3. Cyberspace Infrastructure Planning System (CIPS)/CIPS Visualization Component (CVC). The CVC is the basis of "as built" cable records and will be provided to the 60 CS upon final project acceptance. The drawings will show cross-connect and termination points for each cable pair, locations and identification number for each modular outlet, and the location and value of each line amplifier and multi-port device throughout the inside plant cable system. The outside plant drawings will be geospatial referenced and include the conduit, innerduct, cable types, cable count, cable size, and length. All manholes, handholes, and pull boxes will have complete butterfly details to include geospatial referenced location,

entry points, grounding, bonding, racks/ladders, or other equipment installed. Three copies of these drawings will be updated to final "as built" conditions by the construction contractor and turned over to the 60 CS along with one electronic copy of outside plant drawings utilizing Vizio. As-built drawings will be provided to 60 CS NLT than 30 days after facility is accepted by the base.

7.4. In-progress inspections by 60 CS personnel are required during construction. Trenches may be inspected to verify conduit size and quantity, cable type, earth cover compliance, and accuracy of "red line" base cable record or contract drawings. The general contractor performing the work is solely responsible for requesting in progress inspections to the base before backfill or installation of walls during cable certifications.

7.5. All installed cables (fiber and copper) will be tested by the installer and may be in the presence of 60 CS personnel or its representatives. Baseline test records will be provided to the 60 CS in printed and digital format. All CAT 6A cables will be tested and certified to 155 Mbps (500 MHz) to ensure they are usable at higher data transmission speed. UL testing standard for new cable including fiber optic testing of single-mode cable will be followed.

8. Other Considerations.

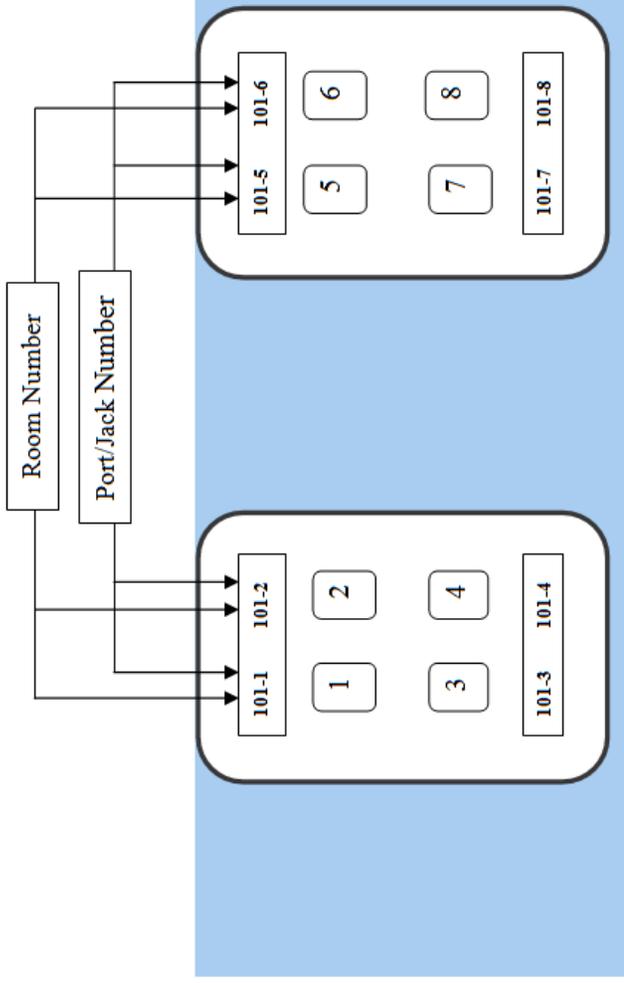
8.1. Classified Systems (Secure Internet Protocol Router Network (SIPRNET) and Defense Red Switch Network (DRSN)).

8.1.1. Classified requirements may vary and will be taken on a case-by-case basis. Customer units must identify classified LAN and telephone requirements to the 60 CS during preliminary design planning. Due to the specific nature of the security and COMSEC requirements for these systems, it is difficult to address these requirements in generalized terms.

8.2. Modular Furniture.

8.2.1. Modular furniture configuration will be supported by the standard wall jack. Telephone and LAN wiring systems in areas with pre-wired workstations, furniture systems or modular walls must have sufficient flexibility and connectivity to enable rearrangement without modification to the permanent communications wiring in the facility. Suitable patch cords and connectors must be provided. Permanent splices/connections are prohibited. Patch cords will be permanently labeled with the corresponding outlet number and will be at the expense of the customer.

Figure 1. CAT 6A Four-Gang Wall Plate Numbering



Note: Starting from the main room entrance location, use room number followed by ascending numeric for each telecommunications outlet and move clockwise around the room perimeter. Mark each cable end, each wall outlet on the face of the cover plate and at the patch panel under the corresponding panel jack. Post the drawing with the identification of outlets and room numbers in the TR upon completion.

DWIGHT C. SONES, Colonel, USAF
Commander, 60th Air Mobility Wing

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

- AFPD 33-1, *Information Resources Management*, 27 June 2006
- AFI 32-1022, *Planning and Programming for Nonappropriated Fund Facility Construction Projects*, 20 May 2009
- AFI 32-1065, *Grounding Systems*, 01 October 1998
- AFI 33-101, *Commanders Guidance and Responsibilities*, 18 November 2008
- AFI 33-150, *Management of Cyberspace Support Activities*, 30 November 2011
- AFMAN 33-360, *Management of Records*, 1 March 2008
- AFI 65-601 V1, *Budget Guidance and Procedures*, 03 March 2005
- BICSI, *Telecommunications Distribution Methods Manual*, 12th Edition
- ETL 02-12, *Communications and Information Systems Criteria for Air Force Facilities*, 27 June 2002
- UFC-3-580-01, *Telecommunications Building Cabling Systems Planning and Design*, 22 June 2007
- Joint Technical Architecture-Air Force, *Building Wiring Architecture*
- Joint Technical Architecture-Air Force, *Voice Switching Systems Architecture*
- Joint Technical Architecture-Air Force, *Information Technology Infrastructure Architecture*
- Joint Technical Architecture-Air Force, *Local Area Network Architecture*
- National Fire Protection Association (NFPA) 70, *National Electrical Code*, 99th Edition
- TO 31W3-10-22, *Telecommunications Engineering*, 15 September 2009
- TO 31W3-10-12, *Outside Plant Cable Placement*, 30 October 2004
- International Electrical and Electronics Engineers (IEEE) Association
- ANSI/EIA/TIA, *Telecommunications Building Wiring Standards*, 11th Edition

Prescribed Forms

None

Adopted Forms

- AF 847, *Recommendation for Change of Publication*, 22 September 2009

Abbreviations and Acronyms

- AFI—Air Force Instruction
- ANSI—American National Standards Institute
- ATM—Asynchronous Transfer Mode

AWG—American Wire Gauge
BCE—Base Civil Engineer
BCSO—Base Communications Systems Officer
BDF—Base Distribution Frame
BET—Building Entrance Terminal
CAT—Category
CATV—Community Access (cable) Television
COMSEC—Communications Security
DRSN—Defense Red Switch Network
EBN—End Building Node
EIA—Electronic Industries Alliance
EMSEC—Emissions Security
ETL—Engineering Technical Letter
FOC—Fiber Optic Cable
IDF—Intermediate Distribution Frame
ITN—Information Transfer Node
JTA—AF-Joint Technical Architecture-Air Force
LAN—Local Area Network
MM—Multi-mode
NCC—Network Control Center
NEC—National Electric Code
NFPA—National Fire Protection Association
NIPRNET—Non-secure Internet Protocol Router Network
O&M—Operations and Maintenance
SIPRNET—Secure Internet Protocol Router Network
SLC—Single Line (instrument) Concept
SM—Single Mode
STEM—B-Base System Telecommunications Engineering Manager
TR—Telecommunications Room
TGB—Telecommunications Grounding Busbar
TIA—Telecommunications Industry Association
TMGB—Telecommunications Main Ground Busbar

TP—Twisted Pair

UL—Underwriters Laboratory

USACE—U.S. Army Corps of Engineers

USOC—Universal Service Ordering Code

UTP—Unshielded Twisted Pair

VAC—Volt Alternating Current

VSWR—Voltage Standing Wave Ratio

Appendix F: Maintainability and Durability List

Maintainability & Durability List

Installation Design Guidelines and Standards

The following is a list of design/construction preferences at Travis Air Force Base. It has been developed with the Travis Air Force Base Civil Engineer, Operation Branch staff..

- A. Section 01010, General Paragraphs: All references to the Officer in Charge of Construction, Engineer, Owner, Architect, etc. shall be changed to Contracting Officer.
- B. Section 01011, Additional General Paragraphs:
 1. Station Permits – Increase processing period to 14 days.
 2. Asbestos Material – This paragraph should be entitled Hazardous Materials and updated to include all the hazardous materials that can be encountered on a site such as PCB's, lead paint, hydrocarbons as well as asbestos.
 3. Project Signs shall be brown with white lettering.
- C. Section 01300, Submittals: The number of submittals required should be tailored to the type of contract such as CQC, non-CQC, and the type of submittal submitted such as contractor approved or Government approved. Contact the EIC to determine whether the contract requires a CQC or a QC Manager. Contractors must send a minimum of two (2) copies of contractor approved (record only) submittals or Government approved submittals unless otherwise indicated. Two soft copies of the submittal shall be submitted as well on disc. Carefully review submittal requirements to ensure the Government reviews and approves critical submittals but delegates approval authority to the contractor's CQC representative or QC manager for all others. All submittals dealing with colors and architectural finish decisions must be Government approved since they will be coordinated with the Travis AFB BCE staff.
- D. Section 01730, O&M Data: Provide a minimum of 14 day notice for all operational tests and acceptances. O&M manuals must be submitted 21 days prior to instruction of government personnel. Provide original O&M manuals from the manufacturer. Provide instruction to the BCE maintenance staff for any new mechanical and electrical system installed or equipment.
- E. Section 02050, Demolition and Removal: Prior to any demolition, areas affected by the demolition shall be tested for the presence of lead or asbestos. ACM or LBP shall be handled in accordance to federal, state and local regulations.

F. Section 02510, A/C for Vehicular Traffic: Traffic lines solid/striped will be applied with the best, longest lasting paint (yellow/white) that is approved for use in this area and the appropriate rumble dot reflective road markers will be used (including fire hydrant). Crosswalks, stop bars, arrows, verbiage, numbers or special markings (signs/symbols) should be a thermoplastic type pavement marking that is applied using heat and it has reflective qualities built into the material. Parking lot striping will be white and applied with the best, longest lasting paint that is approved for use in this area. For asphalt concrete overlays mill existing and use a fabric when there is sub-base failure. All new and remodeled facilities require water meters that meter the whole facilities consumption. AFI 32-1061

G. Section 02811, Irrigation Sprinkler System: Provide Hunt manufactured or equivalent type pop-up sprinklers for coverage of landscape lawns. If the area to be landscaped is not in a "greenbelt" location then the proper type of landscape trees or shrubs/bushes and/or rock are used then a bubbler type or drip watering system will be installed instead of pop-up sprinklers. The irrigation system needs to be divided into enough sections so that they function properly at the lowest level of pressure in the water mains. No underground watering devices should be used and consideration must be made for the special climate conditions at Travis AFB. If proper pressure is not available, a pump system can be used to compensate. The irrigation controllers shall be Rain Master from Green Tech. Provide a five (5) year warranty on the stainless steel housing. System shall have a radio antenna for both monitoring and for use of the handheld test units. More specifics can be obtained from Maintenance Engineering Contract QA section.

Irrigation system MUST be connected downstream of the water meter.

H. Section 02950, Trees, Plants, etc.: Coordinate with Travis AFB Facilities Excellence Guide. Provide a 40 to 50 foot green area in front of all new buildings if possible (see section G). Hydro seed large pasture areas and sod small lawn areas. For raised planter boxes, use brick or pre-fab units as barriers between vegetation and grass lawns (cement brick mold preferred). Concrete mow strips are preferred when separating lawn from adjacent mulch, groundcover or decomposed granite surfaces. Avoid deciduous vegetation. (Use grass around trees instead of ground cover. Use geo textile material between the rock and soil in rock beds. Smaller flower and plant beds are preferred for ease of maintenance.)

I. Section 03300, Cast-in-Place Concrete: Place sidewalks against curb where appropriate. 4' minimum 6' preferred.

J. Section 04200, Unit Masonry: The CMU shall be split face and in some applications, scored block. Use an integral colored CMU with an applied clear water repellent. Contractor shall follow manufacturer's instructions to achieve the moisture protection required to protect interior finishes. Colors should be coordinated with Travis Architectural Guide.

K. Section 05120, Structural Steel: Do not place structural steel elements in front of windows. Coordinate placement of structural steel with placement of mechanical, electrical and plumbing systems.

- L. Section 05311, Steel Roof Decking: Avoid placement of decking which runs parallel with the standing seam metal roof system. This decreases the chance of a wavy roof surface and reduces construction costs. Minimize roof penetrations and place away from streets.
- M. Section 05500, Metal Fabrications: No galvanized or painted steel handrails for exterior handrails. Galvanized steel hand railing can be used in non-public areas such as catwalks, interior roof access ladders, etc. For exposed exterior handrails, Travis requires anodized shape stock aluminum systems with a dark bronze color. Do not use pipe stock.
- N. Section 05600, Metal Building System: The building system must meet all local and state structural requirements. Colors must be coordinated with the Travis Facilities Excellence Guide and color submitted to be "Government Approved".
- O. Section 06101, Carpentry: Not Used.
- P. Section 07232, Insulation: Use a minimum of R19 in walls and R30 in ceilings.
- Q. Section 07241, Exterior Insulation and Finish System (Dryvit type): Use Dryvit type system whenever possible. Color shall match the Fed Spec 595A color per Travis Facilities Excellence Guide. Submit color samples for Base Architect approval.
- R. Section 07414, Preformed Steel Standing Seam Roofing: Use on pitched roofs at a 12 to 4 ratio (min. 12 to 3 ratio). Minimize roof penetrations. If used, keep away from street view as much as possible. System shall be 18" wide, 22 gauge and color shall be in accordance with Travis Facilities Excellence Guide. Provide color sample on material to be used for Base Architect approval.
- S. Section 07600, Flashing and Sheetmetal: Fascia and gutters shall match color of standing seam metal roofing. Downspouts shall match field color of building. Factory finish is required for fascia and gutters and preferred for downspouts. Provide exterior gutters and avoid interior gutters and drains.
- T. Section 07920, Sealants: Sealant colors for exterior windows, doors or other penetrations such as metal conduit or ductwork should match either the surrounding finish (stucco, Dryvit, CMU) or the metal framing of the windows and doors. Lines of sealant shall be crisp and well adhered to the surface.
- U. Section 08110, Steel Doors and Frames: Colors shall be in accordance with Travis Facilities Excellence Guide. Color submittals shall be for Base Architect approval.
- V. Section 08120, Aluminum Doors and Frames: Use factory finished dark bronze anodized aluminum store front entrances in accordance with Travis Facilities Excellence Guide. Color submittals shall be for Base Architect approval.

W. Section 08210, Wood Doors: Use solid wood core (no particle board) for interiors in all administrative type facilities. Consider interior metal doors only for industrial facilities.

X. Section 082150, Aluminum Windows: Finish shall be anodized dark bronze and in accordance with Travis Facilities Excellence Guide. Slimline frame preferred. Refer to UFC 4-010-01, B-3.1 for requirements on Windows and Skylights. Submit color samples for Base Architect approval.

Y. Section 08710, Finish Hardware: Schlage Cylinders are required. Contact ROICC or CEN to ensure sole source approval authority has been obtained for this item. The specific requirement is for Schlage 21-001 (6-pin unit standard) at "D" Series locks and Schlage 21-002 (6-pin) at "A" Series locks. Coordinate with facility user and Base Locksmith for required/compatible keying system.

Z. Section 08800, Glazing: Glazing shall be double glazed with 1/2" airspace, bronzetinted. Inner pane shall be 1/4" thick laminated glass to comply with UFC 4-010-01. For new facilities provide a maximum of 30% total glazing. Use thermo pane. Ensure window area does not allow the project to exceed the energy budget.

AA. Section 09211, Acoustic Plaster: Consult latest Travis Architectural Compatibility Guide. All interior finish color submittals shall be Government Approved.

BB. Section 09250, Gypsum Board: Skim coat should be required in the finish process for all architectural interior gypsum board finishes.

CC. Section 09310, Ceramic Tile, Quarry Tile and Paver: Require tile setters to float all walls receiving tile with mortar bed. Avoid thin set tile installation on walls framed with steel studs. Studs sitting in their tracks and backing materials such as screws project out through a tin set installation. For bathrooms use 4 x 4 ceramic tile floor to ceiling. Bull noise all corners. Use quarry tile with built-in mats at entry ways whenever appropriate.

DD. Section 09500, Acoustic Treatments: Use are white 2 x 2 units. Ensure grid finish is white. Let in or reveal edge tile. Consult latest Travis Architectural Compatibility Guide.

EE. Section 09660, Resilient Tile Flooring: Provide 4 inch high cove vinyl base.

FF. Section 09690, Carpet Tile or Carpet: Provide patterned carpet whenever carpet is to be used. If padded carpet tiles are used, have them glued down.

GG. Section 09900, Painting: No flat paint for interior walls. Satin or eggshell is preferred for administrative spaces and Semi-gloss is preferred in any areas where sinks or showers are present. Select office and administrative spaces require a quality vinyl wallcovering the full length of the wall. Industrial areas are to be painted. Use neutral colors for all interior finishes. Travis paint contractor uses Sherwin Williams 27778 Beige and or Sherwin Williams 7010 White Duck for interior projects. For exterior projects the base contractor uses Sherwin Williams 33717 Beige for walls, 20117 Brown for trims and Terracotta for metal roofs and trim. Consult latest Travis Architectural Compatibility Guide (for exterior colors too). High impact epoxy systems for floors in shop areas. Provide 1 gallon of spare paint for each type of interior or exterior paint used.

HH. Section 09955, Vinyl-Coated Wall Coverings: Use vinyl wall covering for offices and common areas.

II. Section 10162, Toilet Partitions: Ceiling suspended or mounted plastic partitions. No metal. Provide countertops made of plastic laminate over plywood with rolled continuous edges.

JJ. Section 10201, Metal Wall and Door Louvers: No change other than colors should be in accordance with latest Travis Architectural Compatibility Guide.

KK. Section 10440, Signs: Consult latest Unified Facilities Criteria, UFC 3-120-01 (Air Force Sign Standard) and Americans with Disabilities Act (ADA) standards. Handicapped signs do not have to be brown and white but can be blue and white; however, the back of the sign should be refaced in brown according to the base standard. The poles should be square and black in color (powder coated or anodized). Consult the QAP for the Sign Contract information on poles and signage. Consult latest Travis Architectural Compatibility Guide. Signs submittal to be Government approved. Provide brown and white project signs. All lettering is white. Provide interior and exterior signs for all buildings. Interior signs to match interior color scheme.

LL. Section 10800, Toilet and Bath Accessories: Provide one pump type surface wall mounted soap dispenser per sink. Provide recessed towel dispensers.

MM. Section 12510, Horizontal Blinds: Provide at exterior windows unless otherwise noted.

NN. Section 15000, General Requirements, Mechanical: Exposed conduit is acceptable for mechanical and industrial areas. Concealed conduit is required for all other areas.

OO. Section 15200, Noise, Vibration and Seismic Controls: Use seismic vibration isolators under pumps. Provide earthquake safety features for gas lines.

PP. Section 15250, Insulation of Mechanical System: Ensure all systems requiring insulation are addressed. Dual piping systems act as conduits for two separate mechanical systems, such as cooling and heating. The insulation required for the single conduit must be appropriate for both systems.

QQ. Section 15330, Fire Extinguisher Sprinkler Systems:

1. The following pressure and flowrate values are conservatives and will allow contractors the ability to calculate their costs for bidding purposes. Contract Travis BCE for an update if available. Since these figures are conservative, they minimize the chance of an underdesigned sprinkler system:

Static Pressure: 45
psig Residual
Pressure: 40 psig
Flowrate: 500 gpm

2. This specification section should also require field verification of these figures after award and requires Contracting Officer presence during field testing.

3. Travis requires a fully supervised system, paddle wheel type flow switches, hydraulic powered gongs (not electric), concealed sprinkler piping clearly labeled or identified, and interior fire risers.

4. All fire extinguisher cabinets shall be flush mount type whenever possible. Provide fire controls at entry and recess panels in walls whenever possible.

RR. Section 15400, Plumbing: Travis prefers wall hung fixtures and vanities with lavatories. Trap primers for all floor drains. Water closets are to be 1.6 gallons per flush and urinals 1.0 gpf. Showerheads are to 2.5 gpm, chrome-plated single mixing valve, pressure and temperature compensated. Lavatories are to be 2.0 gpm, countertop enameled cast iron with automatic controls in public areas, but chrome-plated single handle mixing valve in private bathrooms. Water heaters are to be gas fired if gas is available. Piping shall be copper for above ground water and either cast iron or ABS for sanitary. Provide self-seating sinks. Include clean-outs.

SS. Section 15492, Fuel Gas Piping: Gas meter are required per AFI 32-1061. PE pipe for below ground and steel for above ground. Provide earthquake safety features such as auto shut valve for gas piping.

TT. Section 15530, Air Condition Refrigerant Piping: All pipes running to exterior chiller/compressor units shall be in trench fully insulated with storm drain at low point of sloped trench floor to evacuate all water entering trench. Steel plating to cover trenching. Use four pipe system.

UU. Section 15556, Low Pressure Water Boilers:

1. Designers must ensure that placement of boilers allow extraction of boiler internal tubing by repair personnel, without complex semi-demolition of room walls, wall louvers, etc. Maintenance requirements must be considered during design of this system. A minimum of 2 foot clearance is required for inspection and maintenance. This same comment applies to HVAC Chillers and Air Handlers.
 2. All boilers are to be 90% or greater efficiency for energy conservation. Insulated fiberglass pipe for below ground use No underground piping allowed. Use copper for all line sizes if diameter is less than 6 inches and steel if it's 6 inches or greater. Specify ball valves for 2 inches and less lines and ball valves for up to six inch and butterfly for larger valves. Include seismic vibration isolators under pumps and all equipment is to be bolted to the concrete deck. Automatic electric ignition is to be provided. For gas fired heating systems, high efficiency condensing furnaces are required.
 3. Use radiant heating in industrial shop and maintenance facilities.
- X. Section 15780, Air Cooled Condensing Units: Use four pipe systems. Use rubatex insulation to insulate chilled water lines. No underground piping allowed. Use copper for all linesizes. Ball valves are to be used for 6 inch and smaller lines. Butterfly valves for lines greater than 6 inches. Seismic vibration isolators under all pumps and all equipment is to be bolted to the concrete deck. No roof mounted equipment. Do not specify a water cooling tower without approval.

WW. Section 15850, Air Handling and Distribution System:

1. Designers shall ensure that system components are placed in a manner that allows removal of filters, coils and motors. System must be designed with serviceability in mind. A minimum of 2 foot clearance is required for inspection and maintenance. Coordination with other systems must be done. Size of mechanical rooms should be determined by future maintenance requirements. Avoid electrical and mechanical systems in same room if possible. No roof mounted equipment.
 2. Naturally ventilate attic spaces. Provide makeup air, especially to bathrooms and use low noise, high efficiency fans in bathroom.
- XX. Section 15895, Ductwork: Have designer draw actual ductwork on construction plan per the A-E design guide. Drawing must show all ducting in detail at the appropriate sealing. All components must be labeled indicating size or type changes, transition, registers, diffusers, flowrates and direction of flows. Design drawings presented in a line diagram method or format are not desired. Drawing system in appropriate scale reveals interferences with structural and architectural elements that can be corrected before award and thus avoid a costly contract modification during construction. It also allows the contractor to accurately calculate his costs. Provide balancing dampers in branch ducting. Fire dampers shall have maintenance access and be identified on the print for easy access and repair.

YY. Section 15910, DDC Controls: Request for most current spec used by Travis AFB from CE.

ZZ. The second course shall be taught in the field, using the operating equipment at the project attend the course. The course shall consist of hands-on training under the constant monitoring of the instructor. Course content should duplicate Operator Training I course as applied to the installed system. The instructor shall determine the level of the password to be issued to each student before each session. Upon completion of this course, students should be fully proficient in the operation of each system function. Prepare a written report describing the skill level.

- a. The system maintenance course shall be taught at the project site
 1. Repair instruction (written) including schematics of field equipment
 2. Troubleshooting, checkout and calibration of the working system shall

ZZ. Section 15950, HVAC & Control Systems: Install electric, natural gas and water meters iaw AFI 32-1061. All utilities connection points MUST be downstream of (after) the meters. Use DDC controls:

See section 15910.

Use Honeywell Excel 5000.

Use tankless natural gas water heaters if applicable.

If control panel is located in a mechanical room where heat/cooling water lines are located the panel will be in a weatherproof enclosure.

Install wall to wall concrete in equipment yards where chillers and condensers are housed.

If split face or cinder block walls are installed around chillers and/or condensing units ensure they have airflow holes located at the bottom of the wall to spaced close together and high enough to prevent recirculation of hot air. Use the wall at Bldg 185 as the standard.

Heat pumps will not be used for space heating unless natural gas is not available.

AAA. Section 16312, Interior Switchboard: Locate all switchboards in separate electric rooms with required clearances in front of all boards, panels and MCC in accordance with the National Electrical Code and the Unified Facility Criteria (UFC). All main switch boards shall have Kilowatt hour meters installed as required by AFI 32-1061. All main switchboards and subpanels shall have Copper bus bars. Contractors shall post final wiring diagrams in electric rooms. Electrical panel boxes in non-industrial areas are not to be placed in public view and be identified clearly through use of a circuit directory as required by the National Electrical Code

AAB. Section 16375, Underground Electrical: Provide all primary and secondary services underground. Primary cables need to be 15 KV EPR with tape shielding. All conductors are to be copper only. Use 250 MCM Copper conductors for 600 amp sectionalizing switch inputs and #2 copper for 200 amp sectionalizing switch load feeding outputs Plan for fiber optics communication services when underground duct is being constructed.

AAB-1. Section 16376, Overhead Electrical: All Overhead primary and secondary conductors shall be aluminum with steel center (ACSR)

BBB. Section 16420, Interior Wiring: With the exception of mechanical rooms, electrical rooms and industrial areas all conduit systems in new and remodeled construction areas shall be concealed.

CCC. Section 16462, Pad Mounted Transformers: Preliminary cost estimates and new facility locations need to address the location of the nearest 12,470 volt source. All new pad mounted transformers for new construction or remodels, with no exceptions, shall operate at 12,470 volts, have an ON/OFF switch on the primary side and fused. No exposed conduits are allowed. Bollards are required if the transformer is placed near traffic. Consult BCE for further requirements such as connectors. Specific color should be in accordance with latest Travis Architectural Compatibility Guide.

CCC-1 Section 16463, Sectionalizing Switchgear: All new sectionalizing switchgear shall be of the pad mounted above ground variety rated at 15,000 volts. Exceptions being where they may cause traffic hazards, in these cases and only with Base Civil Engineering approval, they may be mounted in manholes. Bollards will be required if the switch is placed near traffic. Consult BCE for further requirements such as connectors. Specific color shall be in accordance with latest Travis Architectural Compatibility Guide.

DDD. Section 16530, Exterior Lighting Parking Lots Etc.: Fixtures, support arms and poles shall have a Dark Bronze finish. Fixtures shall be of the shoe box type. All exterior lighting systems shall be mounted on Concrete pedestals. All exterior lighting systems shall operate at or below 480 volts. Energy efficient, 250 watt high pressure sodium lamps shall be used for exterior lights.

DDD-1 Section 16531, Street lighting: Fixtures shall be Cobra Head Type and shall operate at or below 480 volts. Energy efficient, 250 watt high pressure sodium lamps shall be used. Fixtures shall be mounted on steel arms and steel 30 foot poles on concrete pedestals

General Architectural Notes

- Provide open floor plans using modular furniture and private offices for supervisors.
- Use mechanical doors with automatic openers at the primary entrance of major facilities.
- Use American and Metric measurements on drawings and in specifications when directed.
- Recess wall mounted drinking fountains.
- Install interior wind breaks/vestibules at entrances based on the prevailing wind.
- Provide rear screen, dual projection in all conference areas.
- In offices:
 - Provide wall covering floor to ceiling. Provide chair rails in heavily trafficked areas.
 - Use dark patterned carpet.
 - Provide mini-blinds for all exterior windows.
 - Provide quality veneer oak cabinets (no particle board) on plywood backing.

GGG. All electrical work will conform with the most current National Electrical Code, the Unified Facility Criteria; active Engineering Technical Letters); and shall be installed in a neat and workmanlike manners as specified by NFPA70E Article 110.12 and ANSI/NECA 1-2000, Standard Practices for Good Workmanship in Electrical Contracting.

HHH DUMPSTER ENCLOSURES

Enclosures should be constructed of ribbed CMU block and have heavy duty metal doors and latches installed. The enclosures should be wide enough to accommodate two 6 cubic yard dumpsters. Requirements larger than this will need to be addressed through Maintenance Engineering prior to design, renovation and/or construction.

III Travis Fire Department Fire Protection Systems Requirements Document 2006

The intent of this document is to identify and coordinate the Travis Air Force Base requirements for Fire Alarm and Fire Suppression systems. It was written to clarify what the base requires, for all new construction and major renovation that involves the fire protection

systems. The basis of this requirements document is the Unified Facilities Criteria 3-600-01, NFPA 72, International Building Code and NFPA 5000. In certain sections the user will find this document will be more restrictive than all of the above mentioned codes. The Travis Fire Prevention Office, acting as the Authority Having Jurisdiction reserves the right to require a more restrictive system.

INDEX:

Page 2. Fire alarm and detection systems overview.

Sec 1. Overview

Sec 2. Circuits

Page 3. Fire alarm and detection systems overview continued.

Sec 3.

Notification Sec

4. Transmission

Fire Suppression systems

Sec 1. Overview

Page 4. Fire Suppression systems

Sec 2 Light Hazard Systems

Fire Alarm and Detection Systems

1. Overview

Fire detection, manual pull stations, public notification and transmission of all signals represents the minimum level of fire protection system allowed by the Travis Fire Department. In facilities that are not required to be protected by a fire suppression system, a fully addressable alarm system consisting of smoke and heat detectors, manual pull stations and notification devices are required. This system shall transmit all signals by means of a Monaco transceiver (see section 4).

This system shall be designed by a NICET level III technician and stamped by a registered fire protection engineer (FPE). The Travis Fire Prevention Office reserves the right to ask for proof of these certifications at any time during the design or installation of the system.

The designer of record shall have at least five years of recorded experience. If a separate firm or company is used for the design but not installation of the system, then the designer or representative from the designer shall be at the final acceptance test to answer any design questions.

All fire alarm and detection systems shall be designed using the following equipment choices. For base consistency and ease of maintenance either a Notifier, Simplex, Firelite, Siemens, or a Monaco Fire Alarm Control Panel (FACP) shall be used. Each system must be compatible with and able to output zoned devices to the Monaco transceiver. This transceiver shall be a minimum of sixteen zones for transmission to the Fire Department. (Normally a Monaco BT2-8 or BTX shall be used)

On every fire alarm and detection system a remote annunciator shall be located near the front / main entry door. For complex buildings or buildings of multiple stories an engraved graphic annunciator with LED lights shall be used. For all other facilities a liquid crystal display textural annunciator is acceptable.

2. Circuits

The only acceptable type of fire alarm circuit on Travis Air Force Base is Class "A". All Signaling Line Circuits (SLC) shall be style 6 or 7. All Notification Appliance Circuits (NAC) shall be style Z. If an Initiating Device Circuit (IDC) is used for any non-addressable device it must be Style D or E.

All wiring must be done in conduit throughout the facility and follow NFPA 70 for installation. No wire nuts will be allowed in the system, either terminate wire directly to each device or use terminal strips. At no point shall "T" taping of devices be allowed on any circuit. Wires must be labeled at the panel with the circuit designator and a circuit legend shall be placed on the inside of the FACP door. The conduit shall either be striped on ten foot centers with a minimum of four inches of red paint or be painted in its entirety. All J-box covers shall be painted red for fire alarm use.

Batteries and voltage shall be sized to accommodate 60 hours of stand-by time with 15 minutes of alarm. Include a 20% safety factor when calculating battery size. Include voltage drop calculations and battery calculations on the plans for review by the Travis Fire Prevention Office. Batteries shall be labeled at the time of installation with the date for maintenance purposes. Commercial power circuit breaker shall be labeled as "Fire Alarm Circuit", be painted red, location identified in the FACP and have a mechanical lock.

3. Notification

Each NAC shall use enough devices to notify all building occupants of a fire emergency. Notification can be from horn / strobe assemblies utilizing a temporal III pattern or speaker / strobe units and a voice alarm. Each building shall be evaluated to see if mass notification is required. If this is the case then the NAC shall use speaker units with voice commands and be capable of manual override. The intension of this is for future upgrade to combine the mass notification with the NAC.

Strobes shall be sized and mounted as defined in NFPA 72. In bathrooms and other small public areas strobes of 15 candela are acceptable. Warehouses and store rooms will be looked at with a common sense approach. Consider using ceiling mounted devices in these areas where wall mounted devices are or will be blocked. It may be necessary to add more strobes to compensate for low audibility of speaker units.

4. Transmission

Transmission to the Fire Department's receiving station shall be by RF transceiver. The base system is Monaco and runs on frequency 139.6750. It has to be a narrow band system to comply with federal mandate. Most small building shall use a model BT2-8 that comes equipped with 16 zones of transmission. Larger facilities and networked systems may require the larger BTX model with expansion to 124 zones.

Alarm outputs shall be grouped and transmitted. Typical examples include one zone for water flow alarms, one zone for manual pull stations, a detector zone, a supervisory zone and a common trouble zone. As the building becomes more complex the zones are more specific, second floor east side pull stations, smoke detector communications room, water flow pre-actionect.

Supervisory devices shall transmit a separate signal. Duct detectors shall be transmitted as supervisory and not activate the NAC. They will be used to shutdown the associated HVAC unit. Water control valves shall send a supervisory signal when moved out of a normal position. Fire pump controllers shall send a supervisory signal if any out of normal condition exists.

Trouble signals shall be grouped with like signals. In small building applications use of a common trouble zone is authorized. In larger buildings troubles may need to be broken down to eliminate complications or geographic inconvenience.

A zone breakdown sheet is included with this package. It's intended to be used by the design element as a proposed breakdown. Drawings of the system shall include this breakdown for review by the Travis Fire Prevention Office.

Fire Suppression Systems

1. Overview

There is no typical fire suppression system installed at Travis Air Force Base. With that said, some of the systems we currently have are standard wet pipe, pre-action and dry pipe sprinkler systems. Low and high expansion foam systems for hangers, total flood deluge systems and total flood and local inert agent systems. Needless to say the base has seen it all at one time or another. For the purpose of this document, wet pipe systems in different occupancies will be the focus since they make up the bulk of the installed systems.

All new facilities shall have a suppression systems installed.

For systems covering specific hazards like aircraft hangers, Engineering Technical Letters (ETL) published by the Air Force's Civil Engineering Department shall be used. If a special system is being designed anyone can access these ETL's at www.afcesa.af.mil or by contacting the Travis Fire Prevention Office directly. Other special systems shall be handled on a system by system basis.

2. Light Hazard Systems

This kind of hazard class comprises the bulk of our facilities in part or the whole facility. Here at Travis we have moved to a very conservative design stance. Because most modern offices have a much larger fire load then in the past, the design density for light hazard areas shall be increased. Typically Air Force offices are modular furniture, lots of paper work and other ordinary combustibles and a high concentration of electrical equipment. Use either .12 over 3000 square feet with light hazard spacing or use .10 over 3000 square feet with ordinary head spacing.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 10 11

FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS

11/21

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 REQUIREMENTS
 - 1.2.1 Note
- 1.3 ENVIRONMENTAL INTERIOR DESIGN
- 1.4 FINISH NOTICE
- 1.5 ROOM NUMBERS
- 1.6 DESIGN OPTIONS

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 10 11

FUNCTIONAL DESIGN CRITERIA ROOM BY ROOM DESIGNS
11/21

PART 1 GENERAL

1.1 REFERENCES

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

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-02

(2020) High Performance and Sustainable Building Requirements

1.2 REQUIREMENTS

This section defines the requirements of the project on an exterior space and room-by-room basis, in conjunction with Section **01 10 10 SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA**. The Contractor is responsible for coordinating with the Using Agency, the Corps of Engineers, and Travis AFB personnel to verify that the requirements are still valid and complete. The intent of this section is to clarify the functional requirements of the building and site for the offerors before the final design is complete; however, the Contractor is responsible for providing a complete design, and to construct a facility ready for operations.

1.2.1 Note

Areas listed are for conceptual design purposes only. Flexibility to alter room sizes is allowable, provided total square footage does not exceed amounts authorized by the 1332 programming document.

1.3 ENVIRONMENTAL INTERIOR DESIGN

The selection of finishes shall take environmentally sustainable attributes into consideration when selections are made. See **UFC 1-200-02** for interior finish selection requirements. Consider manufacturers for acoustical ceiling tile, carpet, resilient flooring, etc. as much as possible that are closed-loop recyclable. At a minimum, the manufacturer's product shall contain a recovered materials preference program, to assure the use of recovered materials to the maximum extent possible without jeopardizing the intended use of the item. Product should meet or exceed the requirements of **UFC 1-200-02**, unless written justification is provided that a product is not available competitively within a reasonable time frame, does not meet appropriate performance standards, or is only available at an unreasonable price. See **01 10 10 SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA** for additional Sustainability requirements.

1.4 FINISH NOTICE

Color/texture and finishes listed by manufacturer are suggestion to research only and are not intended to limit the selection to products of

the manufacturers indicated. The selections named serve only to indicate the color and qualities which are minimum requirement guidelines, though several other materials may be appropriate. Finishes shall be durable, suitable for the function and area in which they are used, and aesthetically pleasing. Finishes will conform to Architectural and Interior Design Standards of Travis AFB and the Air Force.

1.5 ROOM NUMBERS

The room numbers referred to in this document correlate to the room number indicated on the drawing sheets. The contractor and their chosen design agent may renumber the rooms as appropriate during their design process. Reference the following Room Data Sheets.

1.6 DESIGN OPTIONS

There are no design options identified.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

Appendix A: Room Data Sheets

