

2. AMENDMENT/MODIFICATION NO. 0003	3. EFFECTIVE DATE 08 May 2002	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
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6. ISSUED BY  U.S. ARMY ENGINEER DISTRICT, ALBUQUERQUE CORPS OF ENGINEERS 4101 JEFFERSON PLAZA, N.E. ALBUQUERQUE, NEW MEXICO 87109-3435	7. ADMINISTERED BY (If other than Item 6)  CODE
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8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	(√)	9A. AMENDMENT OF SOLICITATION NO. DACA47-02-R-0004
	X	9B. DATED (SEE ITEM 11) 05 February 2002
		10A. MODIFICATION OF CONTRACTS/ORDER NO.
		10B. DATED (SEE ITEM 13)

**11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS**

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning \_\_\_\_\_ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

**13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

(√)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

**PROJECT: TWO PHASE DESIGN/BUILD, TELESCOPE ATMOSPHERE COMPENSATION LABORATORY, KIRTLAND AIR FORCE BASE, NEW MEXICO**

1. This is Amendment No. 3 to Solicitation No. DACA47-02-R-0004; 05 February 2002. The following revisions shall be incorporated into the specifications. All other provisions shall remain unchanged.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED
16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)	16C. DATE SIGNED

2. SOLICITATION, OFFER, AND AWARD, Standard Form 1442: In Block 13A, change the date for receipt of proposal for Phase Two from "5/16/02" to "5/20/02".
3. SECTION 00600, REPRESENTATIONS & CERTIFICATIONS: On page 47 of 174, delete Clause "Small Business Program Representations (May 2001) Alternate I (Oct 2000) & Alternate II (Oct 2000)" in its entirety and replace with Clause "52.219-1 Small Business Program Representations (Apr 2002) Alternate I (Apr 2002)", attached hereto.
4. SECTION 00700, CONTRACT CLAUSES: On page 105 of 174, delete Clause "52.222-26 Equal Opportunity (Feb 1999)" in its entirety and replace with Clause "52.222-26 Equal Opportunity (Apr 2002)", attached hereto.
5. SPECIFICATIONS: Delete the following listed pages and substitute the pages attached hereto. On the revised pages, for convenience, changes are emphasized by the amendment number in parentheses before and after changes from the previous issue. All portions of the revised (or new) pages shall apply whether or not changes have been indicated.

Delete Page

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01010-12	01010-12
01010-15	01010-15
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Appendix E, First page

Appendix E, First page

6. REVISIONS TO APPENDIX B, CHARETTE REPORT: Attached are revisions, pages 1 through 5, to the electrical requirements in the detailed space descriptions of Appendix B and are to be incorporated into Appendix B.

//////////LAST ITEM//////////

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 2002) ALTERNATE I (APR 2002)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 233320.

(2) The small business size standard is \$28.5 million.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a women-owned small business concern.

(4) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture: \_\_\_\_\_.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) (Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.) The offeror shall check the category in which its ownership falls:

( ) Black American.

( ) Hispanic American.

( ) Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

( ) Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

( ) Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern --

(1) That is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; or

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.222-26 EQUAL OPPORTUNITY (APR 2002)

(a) Definition. United States, as used in this clause, means the 50 States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, and Wake Island.

(b) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of \$10,000, the Contractor shall comply with paragraphs (b)(1) through (b)(11) of this clause, except for work performed outside the United States by employees who were not recruited within the United States. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. However, it shall not be a violation of this clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall also file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(8) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary

of Labor; or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraphs (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)

connections shall be provided for the building as required below. Ferrous materials for water line utilities less than 4 inches are not allowed. New gas and water service lines shall be connected to the main lines by hot tap if feasible. Interruption of utility services to adjacent facilities including gas, water, and sanitary sewer shall be minimized during construction of the TAC Lab and shall be coordinated with the base through the Contracting Officer. Utility bypasses shall be provided where necessary to ensure continued service to base facilities during construction. The Contractor is responsible for relighting all pilot lights affected by any service interruptions required for construction of the TAC Lab. All road crossings by utility lines shall be bored and sleeved with schedule 80 PVC or 6 mm (1/4 in) wall steel pipe. Utilities shall not cross roads by open cut without approval of the base through the Contracting Officer. See drawing sheet C2 for existing utilities information at Lovelace Road/Mount Washington Road intersection. These sheets may not reflect all existing utilities, their true location, or recent construction. It shall be the responsibility of the Contractor to verify the existence, location, size, depth and condition of the utilities. Existing utilities shall be shown on the new construction plans. Existing utilities shall be drawn with a line weight that distinguishes them from new utilities. The Contractor shall tie-in the utilities at the Lovelace Road/Mount Washington Road. Water and sanitary sewer lines shall not be installed in the same trench. Minimizing utility locations under the street is preferable. Utility distribution lines and sewer mains shall not be located within 10 feet of the building line. Existing utility distribution (water, sanitary sewer and gas) located under or within 10 feet of the new building addition shall be relocated as required.

**3.18.1 Cathodic Protection.** Cathodic protection shall be provided for all buried ferrous metallic utility components such as valves, fittings, bends, specials, ducts, utility boxes and appurtenances. Cathodic protection shall be provided for all buried ferrous metallic utility components such as valves, fittings, bends, specials, ducts, utility boxes and appurtenances. Refer to Chapter 8, ELECTRICAL DESIGN for additional information.

**3.18.2 Water Supply Requirements.** The Contractor shall design a complete, functional, and economic water supply system which provides the following: a) a water supply line for the existing 320,000-gallon HERTF fire demand tank which, currently has no permanent water supply; b) fire demand flow for the new TAC Lab fire suppression system and hydrants; and c) domestic water for the new TAC Lab facility. The source of water for tank filling and domestic demand shall be the existing 6-inch line water line near the Mount Washington Rd. and Lovelace Rd. intersection. See RFP drawing C2 for the existing water line location. The pressure in the existing 6-inch line shall not be dropped below 45 psi when water is withdrawn from this line to supply water to the HERTF tank and the TAC Lab facility.

**3.18.2.1 Water Supply Line for the Existing 320,000-Gallon HERTF Fire Demand Tank.** The existing tank shall be supplied with water, via a new water line, which is connected to the existing 6-inch water line near the Mount Washington Rd. and Lovelace Rd. intersection. See RFP drawing C2 for the water line location. Water pressure is 55 psi on the line to Building No. 9925. Two hydrants were tested in the same area, one inside the fence area by Building No. 9925 and the other by the fill stand. The hydrant pressure is 60 psi. The new water supply line shall be 6-inch minimum and shall be constructed within the fence-lines along Mount Washington Rd. from the connection point to the existing water line to

(3)

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3.18.4 **Sewer Flow Rates.** Flow rates for the TAC Lab shall be determined in accordance with AFM 88-11, Volume 1, Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances.

3.18.4.1 **Sewer Line Sizes and Velocities.** Laterals shall have a minimum diameter of 6 inches and mains shall be a minimum diameter of 8 inches. Lines shall be designed for a minimum velocity of 2.0 feet per second for the average daily flow rate and 2.5 feet per second for the 1/2 peak flow rate. When the required minimum average daily flow rate of 2.0 feet per second can not be met in gravity sewer lines (lateral or main), due to inadequate flow, a minimum slope of 0.6% for 6 inch lines, 0.4% for 8 inch lines, and 0.3% for 10 and 12" lines. Line velocity shall not exceed a maximum of 10 feet per second.

3.18.4.2 **Peak Flow Rate Formula.** The peak flow rate is equal to a constant (F) times the average daily flow rate.  $F = C/Q^{0.167}$  where, Q = average daily flow rate (mgd, gpd, or gph), and C = a constant (3.8 for mgd, 38.2 for gpd, or 22.5 for gph).

3.18.4.3 **Mannings Formula.** For gravity flow lines, Manning's formula shall be used:  $V = (1.486/n) R^{2/3} S^{1/2}$  where, 'n' values smaller than 0.013 shall not be permitted despite manufacturers' reports of 'n' values between 0.009 to 0.011.

(3) 3.18.4.4 **Cleanouts.** Double cleanouts shall be provided at the TAC Lab 5 foot line on the exterior of the building where it exits the building. Access to the force main shall be with marked cleanouts. Cleanouts shall be at 300-foot intervals and marked with permanent signs. The cleanouts shall have watertight seals. Plastic pipe and plastic caps cannot be used above ground. (3)

3.18.4.5 **Manholes.** Manholes shall be provided on the facility gravity sewer line and at points of change in direction, grade or size. Manholes shall also be provided at 400 feet maximum spacing. A fixed side rail ladder shall be provided for manhole depths greater than 12 feet. The word "sewer" shall be cast in manhole covers. The tops of manholes located within the line, shall be a minimum of 2'-6" above adjacent ground surface, except in roadways, where the top shall be flush with the pavement.

3.18.4.6 **Burial Depth.** Sanitary sewer lines shall have a minimum of 610 mm (2 ft) of cover in areas not subjected to vehicle loads and 910 mm (3 ft) if subjected to vehicular traffic.

3.18.4.7 **Sanitary Sewer Line Materials.** Materials for sanitary sewer lines shall comply with the requirements and standards in specification SECTION 02531 - SANITARY SEWERS. Ferrous materials shall not be used. Metallic and concrete pipe shall be removed from the guide specifications as they are not a viable option due to the corrosive nature of the soil.

3.18.4.8 **Force Main.** AFM 88-11, Vol. 2, shall be utilized for the design of the facility force main. Force mains shall be sized to minimize pumping head, with a 3.0 to 5.0 feet per second velocity.

(3) 3.18.5 **Gas.** The Contractor shall be aware of the existence of high and low pressure natural gas lines at the Lovelace Road/Mount Washington Road intersection. The gas pressure is 35-40 psi and the pipe size is 8 inches at the intersection of Lovelace Road and Mount Washington Road. The Contractor shall provide a new gas line for the facility which connects to the Lovelace Road/Mount Washington Road intersection. The new system line shall be designed in accordance with the National Fuel Gas (3)

3.19.2 **Contractor's Staging Area.** During construction, a temporary, 6-foot high, chain-link, security fence shall be provided around the perimeter of the Contractor's staging area to house the vehicles, supplies, and materials.

(3) 3.19.3 Deleted.

(3)

3.20 **Landscaping.** Landscaping methods shall be in accordance with the Base Compatibility Standards. Native and adapted species, selected from the approved Kirtland Air Force Base planting list, shall be used and shall be water independent. Turfed areas are not desired. Large plantings shall not be placed over buried utility lines. Landscape used for screening shall not interfere with servicing requirements for utilities.

3.20.1 **Screening.** Screen all electrical transformers and similar equipment.

3.21 **Calculations.** The design shall include but may not be limited to the following calculations. These calculations are not required for the proposal submittal. Refer to Section 00830 for guidance on calculation requirements for submittals.

3.21.1 **Water System.**

- a. Domestic Water Demand Calculations
- b. Distribution, Service Line, Fire Flow Calculations
- c. Fire Flow Demand and Sizing Calculations
- d. Domestic and Fire Demand Line Sizing
- e. Booster Pump(s), Sizing

3.21.2 **Storm Drainage for TAC Lab.**

- a. Runoff Calculations
- b. Drainage Patterns
- c. Storm Drain Calculations (if an underground or open channel system is used)
- d. Curb and surface inlet calculations (if an underground system is used)
- e. Dissipation structure calculations (if used)

3.21.3 **Gas Distribution.**

- a. Gas distribution and service verification/sizing calculations

3.21.4 **Sanitary Sewer.**

- a. Sanitary Sewer (average and peak flows demands and velocities)
- b. Lift Station(s), Force Mains, including electrical power supply

## 5. ARCHITECTURAL DESIGN

### 5.1 Scope.

5.1.1 **Conceptual Design.** The new facility is called the Telescope Atmosphere Compensation Laboratory (TAC Lab) and it is located on the Starfire Optical Range on Kirtland Air Force Base, New Mexico. Offerors are required to develop a conceptual design for a two story building and site development based on the following: the authorized scope of 54,175 gross square feet, Section 1010 of this Request for Proposal (RFP), the Detailed Space Descriptions and floor plan block diagram developed by DCSW Architects contained in the appendix to this RFP.

5.1.2 **Building Design.** Offerors are required to develop conceptual floor plans, exterior building elevations, typical wall sections and building sections illustrating proposed room sizes, adjacencies, finish materials, fenestration, building heights, roofing, and any other features necessary to describe the proposed design. The building design shall be in accordance with Kirtland Air Force Base Design Compatibility Guide. After award, minor revisions to the floor plan(s) may be required to better meet the mission requirements.

5.1.2.1 **Separate Mechanical Equipment Building.** At the offeror's option, provide a separate mechanical equipment building in accordance with the Mechanical section of this RFP. The building shall be sized to accommodate the contractor's proposed mechanical equipment, including horizontal and vertical clearances for installation, future replacement and maintenance as recommended by the mechanical equipment manufacturer. The building shall match the main building in exterior materials and colors. The gross square footage of the proposed building shall be provided within the authorized square foot scope for the project.

5.1.2.2 **Booster Pump Station(s).** Each booster pump station required by the proposed water supply system shall be housed in a pre-engineered metal utility building constructed on reinforced concrete foundations and floor slab. The facility shall be heated for freeze protection and insulated accordingly. Provide access, heat, power, ventilation and lighting in accordance with the civil, mechanical, and electrical requirements of this RFP. Provide a minimum roof slope of 3 in 12 and a minimum interior clear height to the bottom of the structural framing of 8'-0". Door and louver openings shall be provided as required by the equipment housed. Door hardware and keying shall be as required by this RFP. The square footage for Booster Pump Station(s) shall not count against the overall authorized scope.

(3)

(3)

5.1.3 **Furniture/Equipment Plan.** Offerors are required to develop preliminary systems furniture workstation layouts and moveable furniture and equipment layouts based on the program requirements to illustrate that the proposed spaces are sized adequately to accommodate functions, circulation and required clearances for maintenance and access of mechanical and electrical equipment.

5.2 **Applicable Standards.** Note: the latest edition is to be used.

5.2.1 Kirtland Air Force Base, New Mexico. Architectural Compatibility Guide (ACG) for Kirtland AF Operating Instruction 32-1001, 2 November 1998, Kirtland AFB, NM.

7.2.3 **HVAC Load Calculations.** Heat gain and loss calculations shall be in accordance with the current edition of the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals, Non-Residential Cooling and Heating Load Calculations. In lieu of manual hand calculations, the Trane Company, Trace 700, Version 4.0 program may be utilized (substitutions are not permitted). Calculations shall be performed on a room by room basis, and shall include 100 percent of the personnel, ventilation, lighting and equipment loads indicated. Load calculations shall include the design parameters listed in the Site Criteria paragraph. The cooling equipment shall be selected based on satisfying the sensible, latent and total calculated loads. Heating load calculations shall not utilize lighting or internal loads as supplementing the heating system. The heating and cooling load input and output shall be submitted using the ASHRAE Load Calculation Manual work sheets. If the Trane Company, Trace program is utilized, design submissions of the building load calculation analysis shall include the complete input data and the following cooling and heating output data (as a minimum): a) Systems summary (Airflow & Capacity Quantities, Engineering Checks and system checksums); b) System Peak Load Summaries; c) Internal Loads; d) System Psychrometric State Points; e) Building Envelope Composition (U-values, Areas, and ASHRAE 90 Analysis); f) Peak Airflow Loads.

7.2.4 **Equipment Release Data, Personnel, and Lighting Loads.** The following equipment heat gain requirements are for the cooling and ventilation parameters 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, etc.) and electrical heat generating equipment (i.e., av equipment, ups units, inverters, generators, electrical panels, transformers, etc.) that are installed within spaces being cooled.

	Occupancy (Office & Support Areas):	1 person / 9.29 m <sup>2</sup> (100 ft <sup>2</sup> )	
	Occupancy (Conference Rooms):	1 person / 2.32 m <sup>2</sup> (25 ft <sup>2</sup> )	
	Occupancy (Labs, etc.):	Per Detailed Space Descriptions	
	Office Equip. Sensible Heat Gain:	43.1 Watts/m <sup>2</sup> (4.0 Watts/ft <sup>2</sup> )	
	Lighting Load (100% to Space):	Per Elec. Calc. (Max. Demand)	
(3)	Sensible Load Safety Factor:	1.10 (Apply to all room loads, excluding laboratories, the server rooms and the coating facility.)	(3)

7.2.5 **Site Criteria.** Temperature conditions at Kirtland Air Force Base range from above 38° C in July to below -18° C in January. Summer relative humidity is approximately 18%.

Project Location:	Kirtland AFB, NM
Latitude:	35° 03' N
Longitude:	106° 37' W
Elevation:	1619 m (5311 ft.)
Prevailing Wind Direction:	Out of N (summer) Out of W (winter)
Prevailing Wind Mean Speed:	3.6 m/s (7 knots) (winter)

7.2.6 Outside Design Temperature Requirements:

Outside Summer:	36° C (96° F) DB
	16° C (61° F) WB
Outside Winter:	-11° C (12° F)
Air Cooled Condenser Temperature:	41° C (105° F)

Maximum U values W/m<sup>2</sup> K (Btu/hr ft<sup>2</sup> F)

Opaque Walls:	0.450 (0.08)
Gross Walls:	0.738 (0.13)
Roof & Ceiling:	0.147 (0.026)
Perimeter Loss Coefficient:	1.136 (0.20)

Degree Days 18.3° C (65° F) Base

Cooling:	757 (1394)
Heating:	2391 (4337)

7.2.7 Indoor Design Temperatures.

(3)	Summer Indoor Design Dry Bulb Temp. (Admin. Areas):	23.9° C (75° F)	
	Summer Indoor Design Temperature (Server Rooms & Labs):	21.1° C (70° F)	
	Summer Night Setback Temperature (Server Rooms & Labs):	26.7° C (80° F)	
	Summer Indoor Ventilation Temperature (Mech/Elec):	32.2° C (90° F)	(3)
	Winter Indoor Design Dry Bulb Temperature:	21° C (70° F)	
	Winter Night Setback Temperature:	13° C (55° F)	
	Freeze Protection (Mechanical & Electrical Rooms):	10° C (50° F)	

7.2.8 HVAC Equipment Selection Parameters. All heating, ventilation, and air conditioning equipment shall be sized and selected based on the calculated peak sensible and total loads for each space. Sizing equipment based on the calculated block loads will not be accepted. Heating coils located within terminal units shall be sized to produce a minimum heating supply air temperature of 105 deg. F based on the required heating air flow quantity calculated for each unit.

7.3 Heating, Ventilating, and Air Conditioning System Design, Equipment and Accessories.

7.3.1 Design Objectives and Provisions. Heating, ventilation, and air conditioning systems provided for the facility shall include the requirements stated herein and the requirements indicated in Appendix B. Designer shall pay close attention to the requirements indicated under section titled "Detailed Space Descriptions". The design shall also be in compliance with requirements indicated in the Interim Department of Defense Antiterrorism/Force Protection Construction Standards (FPCS).

7.3.1.1 General HVAC Considerations. Heating, ventilation, and air conditioning shall be provided for all spaces within the facility and shall be accomplished with indoor, ceiling, mezzanine and floor mounted chilled/hot water air handling units, variable air volume terminal units, hot water unit heaters, computer room air handling units, and hydronic radiant baseboard heaters. Four-pipe, reverse return hydronic cooling and heating systems shall be supplied from a packaged chilled water system and a gas-fired heating water boiler system. These units will require good part-load control

due to the high air rate required and the intermittent interior load. HVAC designs shall consider the effects of elevation in sizing equipment and ductwork. Placement of hvac equipment within the facility shall be coordinated with the architectural floor plans to insure proper clearances around all equipment can be achieved within the allotted floor area. Mechanical room areas shall be increased or decreased as needed to maintain the manufacturers recommended minimum service clearances and the clearances required for removal of the equipment. Ventilation (fresh) air requirements shall be in accordance with ASHRAE 62 (latest edition). Pressure classifications of ductwork shall be shown on the drawings, using the convention described in the SMACNA HVAC Systems Duct Design Manual.

### 7.3.2 Air Handling System Design.

7.3.2.1 **Office and Support Areas.** The first and second floor office and support areas (toilets, storage rooms, kitchens, hallways, etc.) shall be served by a minimum of two chilled/hot water air-handling units with variable air volume (vav) terminal units serving individual building zones.

7.3.2.1.1 **Non-Secure Areas.** Air handling systems and controls for these spaces shall maintain the space temperature to within 1.7° C (3° F) of set point. Individual vav boxes shall be provided to serve zones covering up to a maximum of 56 m<sup>2</sup> (600 ft<sup>2</sup>) in the large open office areas, and a maximum of 42 m<sup>2</sup> (450 ft<sup>2</sup>) in the hard-walled office areas or a maximum of two hard walled offices, whichever is less. In addition, each individual office and conference room with areas greater than 28 m<sup>2</sup> (300 ft<sup>2</sup>) will have its own vav box. All vav boxes will be supplied with a supplementary hot water heating coil.

7.3.2.1.2 **Secure Areas.** Secure areas shall not be served by vav boxes that serve the non-secure areas. Air handling systems and controls for these spaces shall maintain the space temperature to within 1.7° C (3° F) of set point. Individual vav boxes shall be provided to serve zones (excluding server rooms) covering up to a maximum of 37 m<sup>2</sup> (400 ft<sup>2</sup>) in the large open office areas, and a maximum of 32 m<sup>2</sup> (350 ft<sup>2</sup>) in the hard-walled office areas or a maximum of two hard walled offices, whichever is less. In addition, each individual office and conference room with areas greater than 28 m<sup>2</sup> (300 ft<sup>2</sup>) will have its own vav box. All vav boxes will be supplied with a supplementary hot water heating coil. All equipment and ductwork serving the secure areas of the facility shall fully comply with the requirements indicated in the DCID manual. Where two separate secure rooms are served by a single terminal unit, the designer shall insure that proper sound separation is made between the two spaces (coordinate with Architectural to acquire the required sound levels). Sound separation between spaces shall fully comply with the requirements indicated in the DCID manual.

7.3.2.2 **Optics Laboratories.** Each laboratory shall be served by individual chilled/hot water variable air volume air-handling units. All units will be supplied with a hot water heating coil. All laboratories shall be designed to maintain a Class 10,000 clean room environment. Air handling systems and controls for these spaces shall maintain the space temperature to within 0.6° C (1° F) of set point. The air handling units serving these spaces shall be sized to include an internal equipment sensible heat gain equivalent to 30 percent of the maximum electrical demand provided for the space.

(3)

(3)

7.3.2.3 **Electronics/Electrical Laboratories.** Each laboratory and the associated work areas shall be served by an individual chilled/hot water variable air volume air-handling unit. Air handling system and controls for these spaces shall be designed to maintain a Class 100,000 clean room environment and shall maintain the space temperature to within 1.7° C (3° F) of set point. The air handling units serving these spaces shall be sized to include an internal equipment sensible heat gain equivalent to 30 percent of the maximum electrical demand provided for the space. Individual vav boxes shall be provided to serve zones covering up to a maximum of 56 m<sup>2</sup> (600 ft<sup>2</sup>). All vav boxes will be supplied with a supplementary hot water heating coil.

(3)

7.3.2.4 **Coating Facility.** Coating facility shall be served by a dedicated chilled/hot water air-handling unit. Air handling system and controls for this space shall maintain the space temperature to within 2.8° C (5° F) of set point. The air handling units serving these spaces shall be sized to include an internal equipment sensible heat gain equivalent to 60 percent of the maximum electrical demand provided for the space.

(3)

7.3.2.5 **Machine Shop.** Machine shop areas shall be served by a dedicated chilled/hot water air-handling unit with variable air volume (vav) terminal units serving individual building zones. Individual vav boxes shall be provided to serve zones covering up to a maximum of 56 m<sup>2</sup> (600 ft<sup>2</sup>). All vav boxes will be supplied with a supplementary hot water heating coil. Air handling system and controls for this space shall maintain the space temperature to within 2.8° C (5° F) of set point. The air handling units serving these spaces shall be sized to include an internal equipment sensible heat gain equivalent to 60 percent of the maximum electrical demand supplied to the space.

(3)

7.3.2.6 **Server Rooms.** The secure and non-secure server/computer rooms will be served by individual ceiling mounted chilled/hot water or split system dx and hot water computer room air conditioning (CRAC) units with space mounted microprocessor controllers. The air conditioning units in the server rooms will be sized to include an internal equipment sensible heat gain equivalent to 50 percent of the maximum electrical demand provided for the space.

(3)

7.3.2.7 **Make-up Air Handling Units.** Outside air to all air handling units serving the spaces that are required to maintain a clean room environment shall be supplied by ceiling or floor mounted chilled/hot water make-up air units.

### 7.3.3 **Air Handling System Equipment and Accessories**

7.3.3.1 **Air Handling Units.** Air handling units shall be as specified in Section 15895 - AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. The air handling units shall be located in the interstitial spaces of the corridors and in the mechanical rooms. Units located in the mechanical rooms shall be mounted on reinforced concrete housekeeping pads with a 150 mm (6-inch) clear space from the unit to the edge of the pad. Provide the manufacturer's recommended service clearance or a minimum of 610 mm (24") clearance around the entire unit, whichever is greater. Units located in the interstitial spaces shall be floor or ceiling mounted (per architectural and structural design). The units, whether floor or ceiling mounted, shall be

- (3) provided with an engineered vibration isolation system for the entire unit (fan isolation alone is not acceptable) that will provide a minimum of 95% isolation (Transmissibility = 0.05). All components of the air handling units shall be factory installed products of the same manufacturer. As minimum, units shall be equipped with a supply fan, preheat coil, cooling coil, mixing box, pre-filter and final filter sections, controls, access sections, economizer, outside air/ventilation airflow measuring station, variable frequency drive (vfd) and vfd rated motor. Heating and chilled water circuits to air handlers shall be supplied with isolation valves, flow control valves, strainers, thermometers (inlet & outlet), calibrated balancing valves, and temperature and pressure plugs. Air handling units serving clean rooms and air handling units located in the ceiling/interstitial space shall be constructed with solid galvanized steel double wall panels that are factory insulated with a minimum of 51 mm (2 inch) thick insulation. Insulation shall be 24 kg/m<sup>3</sup> (1 ½ lb/ft<sup>3</sup>) density. Non clean room air handling units located in mechanical rooms shall be constructed with solid or perforated galvanized steel double-wall panels that are factory insulated with a minimum of 51 mm (2 inch) thick insulation. Insulation shall be 24 kg/m<sup>3</sup> (1 ½ lb/ft<sup>3</sup>) density. An insulated double wall condensate drain pan shall be supplied with each unit. Condensate drains shall be coordinated with the sanitary sewer design. Air handling unit locations shall be coordinated with all disciplines. Ventilation air shall be supplied to each unit in accordance with the ventilation system design parameters. The supply fan and return fan (if used) in each air handling unit shall be supplied with a variable frequency drive to control supply airflow to the system air distribution devices and return air to the air handling unit. Differential pressure switches (provide a minimum of two per air handler for units serving office areas) shall be supplied to signal the fan or fans to speed up or slow down in response to system pressure changes. Unless otherwise indicated, the units shall be capable of controlling the space temperature to +/- 0.5° C (1° F) of the set points indicated. Air handling units shall be equipped with local trouble alarm controls and audible horn. The audible horn shall be activated when the controller senses problems with the air handler and when space temperature requirements are not being met. The horn shall be installed near or on the air handler that it serves. All air handling units (excluding units serving clean rooms and the make-up air handling units) shall be equipped with a 100 percent air-side dry bulb economizer (utilizing outside air when possible for free cooling).

7.3.3.2 **Make-Up Air Handling Units.** Air handling units shall be as specified in Section 15895 - AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. The make-up air handling units shall be located in the interstitial spaces of the corridors or in the mechanical rooms. Units located in the mechanical rooms shall be mounted on reinforced concrete housekeeping pads with a 150 mm (6-inch) clear space from the unit to the edge of the pad. Provide the manufacturer's recommended service clearance or a minimum of 610 mm (24") clearance around the entire unit, whichever is greater. Units located in the interstitial spaces shall be floor or ceiling mounted (per architectural and structural design). The units, whether floor or ceiling mounted, shall be provided with an engineered vibration isolation system for the entire unit (fan isolation alone is not acceptable) that will provide a minimum of 95% isolation (Transmissibility = 0.05). All components of the air handling units shall be factory installed products of the same manufacturer. As minimum, units shall be equipped with a supply fan, preheat coil, cooling coil, mixing box, pre-filter and final filter sections,

controls, and access sections. Heating and chilled water circuits to make-up air handlers shall be supplied with isolation valves, flow control valves, strainers, thermometers (inlet & outlet), calibrated balancing valves, and temperature and pressure plugs. Make-up air handling units located in the mechanical rooms or the ceiling/interstitial space shall be constructed with solid galvanized steel double wall panels that are factory insulated with a minimum of 51 mm (2 inch) thick insulation. Insulation shall be 24 kg/m<sup>3</sup> (1 1/2 lb/ft<sup>3</sup>) density. An insulated double wall condensate drain pan shall be supplied with each unit. Condensate drains shall be coordinated with the sanitary sewer design. Air handling unit locations shall be coordinated with all disciplines. Air handling units shall be equipped with local trouble alarm controls and audible horn. The audible horn shall be activated when the controller senses problems with the air handler and when space temperature requirements are not being met. The horn shall be installed near or on the air handler that it serves.

**7.3.3.3 Computer Room Air Handling Units.** Chilled water computer room air handling units shall be as specified in Section 15895 - AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. The air handling units shall be designed specifically for computer room environmental control. The units shall automatically monitor and control heating, cooling, and filtering functions within the spaces being served. The units shall be configured for horizontal discharge of conditioned airflow with draw through air pattern. The units shall be provided with on board operator instructions and shall also be provided with built in instructions for field configuration. The unit controller shall display both the microprocessor control output signal and the mode of operation that the space requires. The controller shall retain run times, set points and configurations in an event of a power loss. The units shall be capable of controlling the space temperature to +/- 2.8° C (5° F). All components of the air handling units shall be factory installed products of the same manufacturer. As minimum, units shall be equipped with a supply fan, heating coil, cooling coil, main power disconnect, final filter section, drain pan and microprocessor controls with audible alarm functions. Provide unit supply and return smoke detectors as required by NFPA 90A. Detectors shall be powered from the fire alarm control system. Heating and chilled water circuits to air handlers shall be supplied with isolation valves, flow control valves, calibrated balance valves, thermometers, strainers and temperature and pressure plugs. Provide condensate drains and coordinate their discharge with the sanitary sewer design.

(3) 7.3.3.4 Deleted.

(3)

**7.3.3.5 Single Duct Terminal Units.** The zone air distribution systems shall utilize single outlet variable or constant air volume terminal units with hot water reheat coils. The heating coil shall be hot water type and hot water piping shall be equipped with 2 or 3-way modulating control valves, isolation valves, calibrated balance valves, strainers, and temperature and pressure

7.3.4.3.1 **Heating Water Pump.** Shaft seal shall be mechanical-seal type. Pump casing and bearing housing shall be close-grained cast iron. High points in the casing shall be provided with manual air vents; low points shall be provided with drain plugs. Impeller, impeller wearing rings, glands, casing wear rings, and shaft sleeve shall be bronze. Shaft shall be carbon or alloy steel, turned and ground. Pump and motor shall be mounted on a structural steel base with lipped edges or drain pan and tapped drainage openings. Pump motor shall be non-overloading and shall have the required capacity to prevent overloading with pump operating at any point on its characteristic curve. Pump speed shall not exceed 1,750 rpm. Pump shall be accessible for servicing without disturbing piping connections. The heating water pump shall be mounted on and anchored to a reinforced concrete housekeeping pad located within the mechanical room.

7.3.4.3.2 **Heating Water System Accessories.** Pump shall be provided with variable frequency drive (vfd) and vfd rated motor, check valve, pressure gauges (inlet and outlet), butterfly valve with memory stop (outlet), strainer, suction diffuser, pressure and temperature ports and isolation valves. Immersion type thermometers shall be provided on system supply and return lines. Provisions shall be made for thermal expansion with a diaphragm expansion tank with an air charge valve and pressure gauge and an air separator with automatic fill valve and air purger. A backflow preventer shall be provided for the chiller makeup water line.

(3) 7.3.4.4 **Other Heating Systems.** Hot water unit heaters shall be provided for mechanical and electrical rooms and designed to maintain a space temperature of 10 degrees C (50 degrees F). Baseboard heaters shall be provided in stairwells and designed to maintain a space temperature of 68 degrees C (20 degrees F). Gas fired or electric unit heaters shall be provided for pump station(s) and shall be designed to maintain a space temperature of 7.2 degrees C (45 degrees F). Heating water circuits to the heating units shall be supplied with isolation valves, flow control valves, calibrated balance valves, strainers and temperature and pressure plugs. (3)

7.3.5 **Cooling System Design and Equipment.** Cooling system shall be a conventional chilled water system or a thermal energy storage based chilled water system. Selection of the chilled water system shall be based on the results of a life cycle cost analysis. The specifications for this design shall be in accordance with Section 15650 - Central Refrigerated Air Conditioning System and/or Section 15848 - Thermal Energy Storage Units: Ice-On-Coil.

7.3.5.1 **Cooling System Alternatives.**

(3) 7.3.5.1.1 **Air Cooled Chillers.** Provide a minimum of two chiller units, each sized for a minimum of 40% of the total design load (including safety factors). The chillers shall be packaged air-cooled reciprocating, screw or scroll type with manufacturer's standard microprocessor controls. Units shall have a minimum cop of 2.93 (EER - 10.0). The chillers shall be mounted on and anchored to a reinforced concrete housekeeping pad sized 1'-0" from chiller unit to edge of pad (on all sides). Provide the manufacturer's specified maintenance clearances around each unit. Where multiple chiller units are required, units shall be provided with the manufacturer's standard microprocessor based chiller sequencer or plant manager control package. Sequencer shall provide stand alone chiller sequencing and shall be independent from the building DDC system. Chiller sequencing and control (3)

strategies shall be indicated on the construction drawings and specifications. Chiller sequencing and compressor staging shall not be controlled by the building DDC system, however chiller enable / disable shall be a function in the building DDS system.

(3) 7.3.5.1.2 **Packaged Thermal Energy Storage (TES) System.** Provide a packaged TES system consisting of a minimum of two chiller units and ice storage tank(s) assembly (all by the same manufacturer) that has a de-rated capacity sized for a minimum of 100% of the total design load (including safety factors). The chillers shall be packaged air-cooled reciprocating, screw or scroll type with manufacturer's standard microprocessor controls. Units shall have a minimum cop of 2.93 (EER - 10.0). Units shall be designed to provide full or partial storage based on the building peak cooling demand requirement and the results of a life cycle cost analysis. The TES system shall be mounted on and anchored to a reinforced concrete housekeeping pad sized 1'-0" from the TES unit to edge of pad (on all sides). Provide the manufacturer's specified maintenance clearances around each unit. Cooling load profiles used to size the system shall be submitted in the Design Analysis for review. Where multiple chiller units are required, units shall be provided with the manufacturer's standard microprocessor based chiller sequencer or plant manager control package. Sequencer shall provide stand alone chiller sequencing and shall be independent from the building DDC system. Chiller sequencing and control strategies shall be indicated on the construction drawings and specifications. Chiller sequencing and compressor staging shall not be controlled by the building DDC system, however chiller enable / disable shall be a function in the building DDS system. (3)

7.3.5.2 **Chiller and Equipment Enclosure.** Packaged chiller units or thermal energy storage system, air compressors and pumps may be located inside a separate mechanical equipment building or outside in an enclosed mechanical yard. The mechanical building shall be fully enclosed (including roof) and shall be sized to include proper equipment maintenance clearances. See the Architectural section of this RFP for additional building requirements. Heat rejected by the condensers on the chiller units shall be mechanically removed. See paragraph titled "**Special Cooling/Exhaust Systems**" for additional requirements.

7.3.5.3 **Chilled Water Pumping System.** The chilled water hydronic pumping system shall be either a constant volume with three-way valve reverse return piping system or a primary-secondary variable volume pumping system with two-way valve reverse return piping system. The system selected shall be based on the results obtained from the building energy use analysis and life cycle cost analysis. Life cycle cost analysis shall be submitted for approval prior to final selection. For primary-secondary systems, provide a separate "primary" constant volume pump for each chiller. For the "secondary" variable volume or the constant volume systems, provide a minimum of two chilled water distribution pumps, each sized for full capacity. The pumping system shall be designed to maintain the chiller manufacturer's minimum flow requirements. Manufacturer's recommended service clearance shall be provided. Chilled water piping from the mechanical yard to the building shall be installed in a pre-cast concrete trench with a solid, removable, galvanized steel or stainless steel cover. Rating for trench covers shall be Load Class A. Coordinate with the Civil discipline to provide proper drainage of the trench.

7.3.5.3.1 **Chilled Water Pumps.** Shaft seal shall be mechanical-seal type. Pump casing and bearing housing shall be close-grained cast iron. High points in the casing shall be provided with manual air vents; low points

shall be provided with drain plugs. Impeller, impeller wearing rings, glands, casing wear rings, and shaft sleeve shall be bronze. Shaft shall be carbon or alloy steel, turned and ground. Pump and motor shall be mounted on a structural steel base with lipped edges or drain pan and tapped drainage openings. Pump motor shall be non-overloading and shall have the required capacity to prevent overloading with pump operating at any point on its characteristic curve. Pump speed shall not exceed 1,750 rpm. Pump shall be accessible for servicing without disturbing piping connections. The chilled water pumps shall be mounted on and anchored to a reinforced concrete housekeeping pad located within the mechanical room. Pumps curves used for selection of chilled water pumps shall be based on the concentration of glycol used in the system. Pump curves based on water only shall not be used.

(3) 7.3.5.4 **Process Chilled Water System.** A process chilled water system shall be provided to serve the spaces indicated in the "Detailed Space Descriptions" located in Appendix B. Process chilled water system shall be designed to provide 10 gpm flow at 30-50 psig to each station. Cooling loads for each process chilled water station shall be based on a 5.6 degrees C (10 degrees F) temperature differential. Process chilled water system may be a separate system or integral to the building chilled water system. Each station shall be provided with insulated, 1" diameter, copper Type L distribution lines (supply and return) with ball valves in a common bulkhead panel located above the ceiling near the entry door. Chilled water distribution lines to each station shall also be provided with calibrated balancing valves and strainers. (3)

7.3.5.5 **Chilled Water System Accessories.** Pumps shall be provided with variable frequency drive (vfd) and vfd rated motor, check valve, pressure gauges (inlet and outlet), butterfly valve with memory stop (outlet), strainer, suction diffuser, pressure and temperature ports and isolation valves. Immersion type thermometers shall be provided on system supply and return lines. Provision shall be made for thermal expansion with a diaphragm expansion tank with an air charge valve and pressure gauge and an air separator with automatic fill valve and air purger. A backflow preventer shall be provided for the chiller makeup water line.

7.3.5.6 **Chilled Water Treatment System.** The chiller water shall be treated for freeze protection and to reduce corrosion and scaling. Water quality parameters can be found in the Water Quality and Treatment paragraph. An automatic feed type water treatment system shall be provided and shall be located within the mechanical room. In addition, provide filter type chemical feeders. The system shall automatically monitor the make up rate and inject the system with the glycol solution at the correct level so that the water treatment solution is maintained at the optimum level for full protection. A propylene glycol solution with corrosion inhibitors shall be used in the system and shall provide freeze protection down to -14° C (7° F). System capacities shall be de-rated as required for glycol. The use of electric resistance heating cable for freeze protection is not permitted.

7.3.6 **Hydronic System Piping.** Hydronic piping system shall be designed to be efficient, easily balanced, and accessible. Maximum fluid velocities in the piping systems shall not exceed 1.83 m/s (6 fps). Riser piping between floors shall be limited to mechanical chases. Riser piping located in interior partition or exterior walls is prohibited. Piping and fitting materials shall be copper conforming to ASTM B 88, type K or L or steel conforming to ASTM A 53, Schedule 40, type E or S. Unions or flanges shall

friction design method. A complete ducted return air system shall be provided (use of ceiling space as return air plenum is prohibited). All return ducts from spaces designated as "secure" shall be provided with a minimum 25 mm (1") thick internal acoustical liner and shall be designed to meet the noise requirements specified in the DCID. Where duct liner is not sufficient to meet the noise requirements specified in the DCID, provide sound baffles or duct silencers. Duct liner shall extend a minimum of 3.04 m (10 ft.) from each return grille. Ductwork locations shall be coordinated with all disciplines. All supply, return, intake, and exhaust ductwork shall be constructed of galvanized sheet metal and shall be as specified in Section 15895 - AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. 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 1.0 m (3 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. Flexible duct shall not be used for connection to air terminal units. The ductwork shall be insulated in accordance with Section 15080 - THERMAL INSULATION FOR MECHANICAL SYSTEMS. Ductwork, ductwork openings, and plenums shall be designed to a maximum RC of 30. Duct and air distribution devices shall meet the velocity requirements indicated in the 1999 ASHRAE Handbook.

(3)

(3)

**7.3.10.1 Duct Layout.** Duct distribution system shall be designed to be efficient, easily balanced, and accessible. Maximum air velocities in the medium pressure ducts (1.5 inches w.c. or greater) shall not exceed 2000 feet per minute (fpm). Maximum air velocities in the low pressure ducts (less than 373 Pa (1.5 inches w.c.)) shall not exceed 5.08 m/s (1000 fpm). Duct risers between floors shall be limited to mechanical chases. Duct layout shall be designed to include a minimum of 6 duct diameters of straight rigid sheet metal duct ahead of the inlet connections to vav terminal units. Duct layout shall also provide a straight section of duct (minimum of 8 duct diameters in length) down stream of the inlets and upstream of the outlets of each air handler. Installation height of all ductwork shall be indicated on the plans.

**7.3.11 Noise Analysis.** An acoustic analysis shall be performed for each air handler, air terminal unit and associated duct distribution system to assure minimal noise transmission to the spaces. The Room Criteria (Per the 1999 ASHRAE HVAC Applications Handbook, Chapter 46) shall be as follows:

Offices (open plan):	RC 30-35
Offices (private):	RC 25-30
Conference and Training Rooms:	RC 25-30
Circulation and Public Lobbies	RC 35-45

**7.3.12 Scrubbers.** Scrubber units designed to remove harmful chemicals from the exhaust air stream shall be provided for use at the Wash Room of the Coating Facility. All scrubbers shall be 99.999% efficient for HCL, nitric acid and lye. Designer shall coordinate with the user for quantity and proper sizing of the scrubber units. Provide scrubber system design calculations, coordination meeting notes and sizing information in the Design Analysis for review.

(3)

7.3.21 **Vibration and Noise Isolation.** All piping, ductwork, air handlers, pumps, exhaust fans, unit heaters and related equipment shall be properly isolated to prevent vibration and subsequent noise to 95% isolation (Transmissibility = 0.05). Designer shall provide supporting calculations which validates that all vibration isolation measures taken are in compliance with the requirements in this RFP.

(3)

7.3.22 **Seismic Design Requirements.** Protective measures shall be in accordance with UFGS 13080, UFGS 15070 and TI 5-809-04, Seismic Design for Buildings.

7.3.23 **Vacuum Pumps.** Provide all materials, labor, piping, electrical, supports, and appurtenances required to install the user supplied vacuum pumps. Contractor and/or Designer shall coordinate the vacuum pump requirements with the user. Provide vacuum system design calculations, coordination meeting notes and sizing information in the Design Analysis for review.

7.3.24 **Janitorial Central Vacuum System.** Provide all equipment and materials necessary for a fully functional janitorial central vacuum system serving the building. Provide a minimum of two low noise vacuum units (noise rating shall not exceed 70 decibels). Each unit supplied shall be provided with individual filter canisters, power, controls, and collection piping. Each system shall be capable of accommodating up to 3 operators simultaneously without loss of performance. Provide a 23 Liter (6 gallon) (minimum) dirt separator. Separator shall filter 99% of particles 3 microns or larger. Provide overhead, aboveground piping distribution system with branch piping to vacuum inlets located within the walls or other furred-in locations. Piping shall be Schedule 40 PVC and all elbows shall be large radius type. Each room shall be provided with one or more vacuum outlets that allow for complete coverage of the room with 7.8 m (25') of Contractor provided, crushproof vacuum hose. Provide a minimum of four (4) hose and wand assemblies for the entire facility. Designer shall coordinate the vacuum system requirements with the user. Provide central vacuum system design calculations, coordination meeting notes and sizing information in the Design Analysis for review.

7.3.25 **Laboratory Fume Hood System.** Provide a minimum of 600 cfm to each fume hood and solder station required in the "Detailed Space Descriptions indicated in Appendix B.

#### 7.4 **Heating, Ventilating, and Air Conditioning Control System.**

7.4.1 **Control System.** The Contractor shall be responsible for correct operation of the control system including, but not limited to, software, control relays, sensors, and control wiring. The Contractor shall provide a 40 hour training course in accordance with UFGS 15951.

a. Temperature Controls: Temperature controls shall be direct digital control and be designed per industry standards and in accordance with UFGS 15951 - Direct Digital Control for HVAC. Control drawings, schematics and I/O tables shall be provided during the design stages for review.

b. Direct Digital Controls: Control drawings shall include schematics, ladder diagrams and sequence of operation for all HVAC equipment. The DDC system shall include all application software and equipment to implement the control strategies that are contained in UFGS 15951 - Direct Digital Control

(3) 7.9.3.3 **Insulation.** All cold, hot, hot water recirculation, and vent piping, and other applicable domestic water equipment shall be insulated. The use of flexible cellular insulation conforming to ASTM C 534 or ASTM D 1056 is prohibited. Provide and install insulation in accordance with UFGS Section 15080 - THERMAL INSULATION FOR MECHANICAL SYSTEMS. (3)

7.9.4 **Special Systems.**

7.9.4.1 **Compressed Air.** A Class 1000 compressed air system with filters, receiver and refrigerated air dryer shall be provided for use in the facility. Air drops from the compressed air system shall be comprised of a 1/2" ball valve, pressure regulator with gauge, filter and drain and a 1/2" female quick disconnect hose coupling in a common bulkhead panel located above the ceiling near the entry door of each space indicated in the "Detailed Space Descriptions" located in Appendix B. Each station shall be capable of delivering 10 acfm at 100 psig.

7.9.4.2 **Emergency Shower/Eyewash Station.** Emergency shower/eyewash stations shall be provided as indicated in the "Detailed Space Descriptions" located in Appendix B. Units shall comply with ANSI Z3358.1. Units shall be constructed of corrosion resistant steel materials and shall be pedestal mounted.

7.9.4.3 **Gaseous Nitrogen System.** Provide a complete gaseous nitrogen distribution system for the facility. Connect the new supply line serving the new facility to the existing. Contractor shall field verify the exact location of the existing line prior to performing work. New nitrogen piping shall enter the building at a single location and be provided with a main shut-off valve and filtration/drying system. All nitrogen distribution piping, valves and accessories within the facility shall be stainless steel. Each nitrogen station shall be supplied from a 1/2" stainless steel line with a ball valve and pressure gauge in a common bulkhead panel located above the ceiling near the entry door of each space indicated in the "Detailed Space Descriptions" located in Appendix B. Each station shall be capable of delivering 10 acfm at 100 psig.

7.9.5 **Cathodic Protection.** Provide cathodic protection per requirements indicated in the Electrical Section of this RFP.

7.9.6 **Calculations Required.** Calculations shall be provided as indicated in this section and as required in section 01012 of this RFP.

7.10 Fire Suppression.

7.10.1 **References.** (All NFPA references specified shall be the latest available edition.)

- a. Air Force Material Command (AFMC) - Fire Protection Facilities Design Guide.
- b. Design and Construction Standards for Facilities (377CEGGOI 32-1001), dated 2 Nov. 1998.
- c. NFPA 13 - Installation of Sprinkler Systems.
- d. NFPA 24 - Installation of Private Fire Service Mains.
- e. NFPA 75 - Electronic Computer/Data Processing Equipment.
- f. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

dd. Air Force Criteria for Sensitive and Secured Information Installations (AFSSI 3030, May 1997).

ee. Air Force Engineering Technical Letter 99-4, Fire Protection Engineering Criteria Emergency Lighting and Marking of Exits.

ff. Architectural and Engineering Instructions Manual, Southwestern Division, U.S. Army Corps of Engineers (SWD-AEIM), dated August 1996.

gg. Manual for Physical Security Standards for Sensitive Compartmented Information Facilities (SCIF).

hh. US Army Corps of Engineers Standard Detail(s) 40-06-04, Lighting Fixtures, as published on the internet ("www.hnd.usace.army.mil/techinfo/fixtdwg.htm").

ii. Kirtland Air Force Base - Architectural Compatibility Standard.

jj. IEEE C62.41 (1991) Surge Voltage in Low Voltage AC Power Circuits.

kk. NACE RP0169 (1996) Control of External Corrosion on Underground or Submerged Metallic Piping Systems

ll. NACE RP0177 (1995) Mitigation of Alternating Current and Lightning Effects on Metallic Piping Systems

mm. NACE RP0190 (1995) External Protective Coatings for Joints, Fittings, and Valves on Metallic Underground or Submerged Pipelines and Piping Systems

8.1.7 **Specifications.** Specifications shall be provided as part of the design package for this project. The specifications shall be provided in accordance with requirements given in Section 01012. In addition to those requirements, if the Contractor uses specifications other than the UFGS, the Contractor shall edit the specifications used to include all of the submittal, installation, and QA requirements given in the UFGS.

## 8.2 Exterior Electrical.

8.2.1 **Scope.** The power for the new TACLAB facility shall be obtained from the Substation 20, located south of the existing SOR site. Note: Substation 20 is being replaced/upgraded by others. The contractor shall coordinate with the Substation 20 upgrade project and provide a design which connects to Substation 20 appropriately. From Substation 20 primary power will be brought to the project site in a new underground concrete encased duct bank with at least 1 spare 4" duct to a new pad mounted transformer. The new transformer shall be 4160 Volts primary and 480/277V secondary, 3 phase, delta-wye. From the transformer a 480/277V service shall feed a switchboard located in the electrical room. See service equipment below. Note: The contractor may assume that connections available at Sub 20 will include a 600 Amp (with adjustable trip), 4160 Volt circuit breaker, in an underground connection type of switchgear line-up, with a conduit stub out to the substation fence line.

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8.2.1.1 **Water Pump Booster Station Building.** In addition to the requirements given here and below for the TACLAB structure, power and telephone services shall be provided for each water pump booster station building (see Civil and Arch. Requirements). All systems and equipment shall be installed per the requirements below.

pads shall have a # 4/0 bare copper cable counterpoise ground which shall be buried and shall encircle the pad a minimum distance of 3 ft. out from the pad, and shall be buried at a minimum depth of 3 ft.

8.2.3.3 **Equipment Grounding.** One 3/4 in. x 10 ft. copper clad ground rod shall be installed in a conduit window of each equipment pad (where transformer pads have more than one conduit window, the ground rod shall be installed in the secondary/low voltage window). The pad's counterpoise shall be connected to the ground rod with two runs of # 4/0 copper cable. All underground grounding connections shall be exothermic type connections. All other equipment grounds shall be bonded to this ground rod with bronze saddle clamps. The equipment grounding conductors shall be AWG #4/0 bare copper.

8.2.4 **Service Entrance.** The building shall be fed from the transformer via secondary conductors in duct sized for the connected load of the building. The service entrance conductors shall not be larger than 500 kCM. If the ampacity of the total load exceeds the ampacity of 500 kCM wire, then parallel runs of conductors shall be used. Parallel runs shall be installed as required by the NEC.

8.2.5 **Sizing Feeders and Transformers.** Sizing calculations shall be provided, per the requirements given in Section 01012 of this RFP, for all equipment, feeders, and transformers. Estimated loads shall be included in the calculations for future and spare equipment, and all equipment required in this RFP.

8.2.5.1 **Transformers.** Transformers shall be sized to supply no less than the largest total demand load as determined by the National Electrical Code, Article 220, Part B. The calculated demand load shall not be more than 100% of the transformer nameplate capacity.

8.2.6 **Exterior Lighting.** IES Handbook recommendations, including cutoff fixtures and shields, shall be used to minimize light trespass. Voltage drop on lighting circuits shall not exceed 6 percent at the most distant fixture. Area lighting shall be provided for walks, the parking area(s), covered courtyards, and entry ways. However, this exterior lighting shall be kept to a minimum. Illumination shall be less than 1.0 footcandle peak maintained. Fixtures shall be Low Pressure Sodium (LPS), and all exterior fixtures shall be provided with a central Hand-OFF-Auto switch to allow shutoff of exterior lights during facility operations. Fixtures shall be visually compatible with the Base Compatibility Standards, and shall meet the State of New Mexico Dark Skies Lighting Standard. Bollards, pole mounted shoebox type fixtures, etc., shall be used. Fixtures shall be rated for wind gusts of up to 125 MPH. All exterior fixtures shall be submitted to the Contracting Officer for review. All fixtures, except soffit mounted, bollard type fixtures and those mounted in covered walkways shall be Low Pressure Sodium (LPS).

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8.2.7 **Communications Utilities.** Exterior communications utilities shall include the following. A new Fiber Optic (FO) exterior communications main truck line and a 400 pr., # 22 AWG. Cu., exterior communications main truck line shall be installed from the "RST5" in Bldg. 29010 (located at the corner where the Washington Rd. leaves Lovelace Rd) to the Comm. room in the new TAC LAB project building. The FO trunk line shall consist of a 24 fiber, Single Mode Fiber Optic, Direct Buried type cable, buried a minimum of 24 inches below grade. The copper cable shall be 400 pr., #22 AWG, Direct Buried type

- (3) minimum of 150% of the calculated demand load. The main panel shall have a single main circuit breaker (see note below) which shall serve as the building disconnecting means. The main panel shall have indicating instruments which shall show current and voltage for all three phases, line-to-ground and line-to-line. There shall be one meter for voltage and one for current. The service entrance equipment shall be provided with kWh demand meter(s) and instrumentation to monitor all power provided to the building, from the normal power source. All service equipment shall be "fully rated" for available fault current. This service entrance equipment shall provide power for all downstream devices, panels, step-down transformers, etc. Note: Due to the potentially large size of the service entrance, the service entrance equipment may be split into not more than three switchboards, each with its own main circuit breaker. However, these main circuit breakers shall be interlocked with shut trip devices and connected so that there is a single point of disconnect for all power to the building. (3)

8.3.2.1.1 **Electrical Equipment Room.** The service entrance equipment and other electrical power equipment shall be located in a separate electrical power equipment room within the building. The building design and layout shall provide a separate electrical equipment room for this purpose. Local feeder/branch panels may be located elsewhere in the building, as appropriate.

8.3.2.2 **System Ground.** The grounding electrode shall be a grounding counterpoise, which shall completely enclose the building. The counterpoise shall be installed a minimum of three feet outside the building foundation and a minimum of three feet BFG. The counterpoise shall consist of #4/0 bare copper cable which shall be connected to the building service entrance neutral/grounding bonding point with a minimum of two #4/0 copper cable grounding electrode conductors and per other requirements in the NEC. In addition the counterpoise shall be connected to the building grounding systems with #4/0 copper cables where required by NFPA 780 for lightning protection systems (a minimum of 4 connections shall be provided). Where they exist, additional electrodes such as User grounds or metal underground water pipes shall be bonded to the grounding system, but the required grounding electrode shall be the counterpoise. The grounding electrode conductors shall be physically protected, and shall be bonded to the electrode with exothermic welds. In addition, building steel, foundation slab rebar, and second floor slab rebar shall be bonded to the ground system. Grounding provided for SCIF areas shall be per the grounding requirements in the Director of Central Intelligence Directive 1/21 (DCID). The final design shall insure that the system will have no ground loops for protection of the equipment. All below ground or encased in concrete grounding connections shall be made with exothermic type connections.

8.3.2.2.1 **Grounding.** All circuits shall be equipped with a green ground no matter what type of load is connected. The ground shall be connected to the panel grounding bus per the NEC.

8.3.3 **Sizing Services and Feeders.** Sizing calculations shall be provided in the format used in the current edition of the National Electrical code, Chapter 9, Part B, **Examples**. Estimated loads shall be included in the calculations for future and spare equipment, and all equipment listed in the subparagraphs of "Interior Electrical, Dedicated Circuits".

8.3.3.1 **Panelboard Feeders.** Panelboard feeders from the service shall be sized to supply the full load rating of the panel that they serve. For instance, a panel with a 100 amp demand load shall be fed by 100 amp wire, minimum.

8.3.4 **Panelboards.** Secondary and local panelboards shall be sized for a minimum of 125% of the demand load they serve. They shall be fully rated for the available fault current, and furnished with main circuit breakers (unless feed from an upstream panel breaker, in which case they may have MLO), full sized plug-in or bolt-on branch breakers, insulated neutral busses and bonded equipment grounding busses. Panelboards located in finished areas shall be recessed, with flush fronts and hinged doors. Panelboards shall be located near the loads they serve. Twenty-five percent of single pole spaces (minimum) shall be provided for spares. The Contractor shall provide and install printed labels, in the panelboard, for all installed circuits. Panelboard buses shall be copper, aluminum buses shall not be allowed. Contractor shall removal all references to aluminum buses from specifications.

8.3.5 **Surge Protection.** The Building power supply system shall be provided with a surge protection system. The system shall consist of surge protection packages and modules installed in or connected to all panelboards, switchboards, and switchgear. The surge protection packages shall consist of three levels of protection; 1.) The main panel level (for service entrance panels, MDPs, MCCs, switchgear, etc.) 2.) The secondary panel level (for distribution panels, switchboards, etc.) 3.) The local panel level (local panelboards and power panels). One package of the appropriate size and level of protection shall be installed in all panels.

8.3.6 **Load Separation.** Panelboards, feeders, branch circuits, and receptacles which supply power for user computer and data processing loads shall be separately derived systems (a separate step down transformer). Data processing loads shall include, computers, servers, monitors, printers, and all other peripheral equipment associated with computer and data processing systems. All of these computer and data processing loads shall be separate and distinct from the panels, feeders, etc., which supply the HVAC, lighting and other non-computer type building loads.

8.3.6.1 **UPS.** Computer, data processing, building, and user loads, as listed in the Room-by-Room requirements in Appendix B and Appendix E, shall be provided with a power supply system which has provisions for a UPS system to be added at a later time (by others). The (future) UPS system provisions shall include a way to connect the (future) UPS system into the system (eg: Provide a simple connection between a step-down transformer and the panel it supplies, which can be re-connected with a UPS system in-line between the transformer and the panel.) Also, if the equipment is installed in a location where equipment and conduits are concealed, spare conduits shall be provided to allow the UPS system to be installed without removing walls or other finished installations.

(3) 8.3.6.1.1 **Floor Space for UPS.** For future UPS equipment (by others) the contractor shall provide an area/floor space 17' x 6' in area with a minimum height of 8'. This area shall be provided in a separate utility room located near the electrical and mechanical rooms. (3)

8.3.6.2 **Red Power.** Power supplies to secured computers and computer systems (red systems), as defined or listed in Appendix E, shall be provided with separately derived power supplies, which are installed with the required physical separations from non-secured systems, per the installation requirements for "Red" per the DOD Mil Handbook 232A, and for "SCIF" per DCID 1/21.

8.3.7 **Conductors.** All conductors shall be copper, aluminum is not allowed and not smaller than #12 AWG. Conductors #10 and #12 shall be solid; conductors #8 and larger shall be stranded. All conductors shall be

installed in metallic conduit. Nonmetallic electrical conduit (smurf tube) is not allowed. Wire types THW or THWN shall be used. Fixture whips shall be armored cable or conductors installed in metallic flex. Type NM wire is not acceptable.

**8.3.8 Branch Circuits, Receptacles and Outlets.** All general receptacle and lighting circuits shall be 20 Ampere circuits, minimum, fed by 20 Ampere circuit breakers, minimum. All branch circuits required by the National Electrical Code shall be provided. Receptacles on opposite sides of common walls shall be horizontally offset.

**8.3.8.1 Separate Circuits.** Lighting and receptacles shall be on separate branch circuits.

**8.3.8.2 Outlets per Circuit.** Receptacles which are for general use (ie: not installed for a specific defined load) shall be on circuits with a maximum of 6 duplex outlets, rated at 180VA, per circuit.

**8.3.8.3 General Purpose Receptacles.** General purpose receptacles shall be installed per the N.E.C. in hallways, equipment rooms, and other general use areas. Where not otherwise specified, a minimum of one duplex general purpose receptacle shall be provided for every 25 ft. of wall space, one per landing in stairwells, and two per wall in conference rooms.

**8.3.8.3.1 Receptacle Loading.** General use receptacles which do not have specific loads defined shall be assigned a demand load of 180VA per duplex outlet.

**8.3.8.4 Computer Loads.** Circuits terminating in receptacles shall be provided for all user provided computer loads, as defined in the Computer Connected Loads List, given in Appendix E.

**8.3.8.4.1 Computer Circuit Loading.** Where computer type loads are to be supplied, the demand loading shall be as follows: 250VA per CPU, 150VA per monitor, 400VA per personal printer, and 750 VA per heavy printer. These workstation loads shall be assumed to be continuous loads and the load demand factor shall be 100%.

**8.3.8.5 User Equipment Loads.** Circuits shall be provided for all user connected equipment loads, as defined in the Room-by-Room, in Appendix B and in Appendix E. Unless otherwise stated, these circuits shall be terminated in a surface mounted disconnect switch (which gives a place for future connections), sized to match the defined load/circuit capacity, and located as close to the defined load location as possible.

(3) **8.3.8.5.1 User Equipment Connected Load.** Where user equipment is defined, the connected load shall be as given. Where general use receptacles are required, the connected load shall be calculated at 180 VA per duplex receptacle. Where requirements are given in "circuits", the connected load shall be assumed to be 80% of the circuit breaker nameplate size (eg: for a 20A, 120V circuit, 80% of 20A = 16A, which at 120V gives 1920VA as a connected load for that circuit).

**8.3.8.5.2 User Equipment Demand Load.** Branch circuits shall be sized for the connected load. However, demand loads may be calculated based on demand/diversity factors per area within the building, as given below, and

upstream equipment may be sized for the calculated demand loads, plus the requirements given above for panels, service entrance, transformers, etc. The demand diversity factors for the areas within the building are as follows:

<u>Area</u>	<u>Demand/Diversity Factor</u>
Labs	100%
Computer/LAN Server Rms	100%
Conf. Rms.	50%
Conf. Rm. Vest.	50%
Coating Fac.	50%
Machine Shop	50%
Kitchen	50%
Electronic Crib	50%
Tech. Libr.	50%
Sleeping Area	50%
Exercise Rm.	50%
Showers, Locker	50%
Restrooms	50%
Janitor Closets	50%
Receiving and Storage	50%

8.3.8.5.3 **User Equipment in Offices.** In staff and scientist offices the equipment loading shall be assumed to be a minimum of one computer (CPU and monitor), and personal printer per office, sized as indicated above. The demand loading for the computer equipment shall be assumed to be 100%. Also, three general use receptacles at 180VA each shall be assumed per office. (Note: This should be equal to assuming one 20A, 120V circuit, with a demand of 70%, per office.)

8.3.8.6 **Non User Equipment Demand.** Interior lighting throughout the building shall be assumed to have a demand factor of 100%. Demand load factors from HVAC equipment shall be based on the HVAC system design under design basis conditions. Other miscellaneous equipment shall have demand factors per the NEC.

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8.3.9 **Isolated Grounds.** Isolated ground power supplies and/or receptacles are not required on this project.

operation control circuit in accordance with the requirements of ANSI A17.1. 3) Duct-mounted smoke detection shall be provided for air handling units in accordance with the requirements of NFPA 90A. The fire alarm control panel shall supply power to the detectors. 4) A smoke detector shall be provided at the fire alarm control panel location in accordance with NFPA 72. This detector shall be zoned separate from the abovementioned detectors. 5) Smoke detection shall be provided in other areas of the facility where required by criteria.

8.3.13.1.2 **Heat Detection:** Heat detectors (intermediate temperature rated) shall be provided for the elevator hoistway and the related equipment room in accordance with the requirements of NFPA 72. In addition to signaling the fire alarm control panel, the detectors shall initiate elevator power shunt trip in accordance with the requirements of ANSI A17.1.

8.3.13.1.3 **Manual Pull Stations:** Manual pull stations shall be provided at each exit and where elsewhere required by NFPA 101. The pull stations shall be located in accordance with NFPA 72 requirements and ADA Accessibility Guidelines.

8.3.13.1.4 **Flow Indicator Switches:** Each sprinkler system flow switch shall be connected to the fire alarm control panel via a separate zone. The "elevator system" flow switch(es) shall also shunt trip power to the elevator control unit.

8.3.13.2 **Indicating Devices.** Combination alarm horn/strobe units and strobe devices shall be located throughout the facility, in accordance with NFPA 72 and ADA Accessibility Guidelines. In addition, a weather-proof electric alarm bell shall be located on the wall outside of the sprinkler riser room.

8.3.13.3 **Supervisory Devices.** The fire alarm control panel shall supervise all sprinkler system control valve tamper switches. A separate zone shall be provided for all tamper switches which are not located within the same room.

8.3.13.4 **Output Controlled Devices.** Any alarm condition shall cause automatic shutdown of all supply air handling units which supply over 2000 cfm. In addition, any alarm condition shall also cause automatic closure of all combination fire/smoke dampers within the facility. All such dampers shall be powered from the fire alarm control panel (coordinate with the mechanical system provider).

8.3.14 **Telephone System.** The facility shall be pre-wired with a complete telephone system. Flush outlets shall be provided for all rooms and workstations as required herein. Wiring shall be homerun style back to the main communication room. All telephone homeruns shall be concealed. Conductors, wiring method and method of termination shall be CAT-5e, per TIA/EIA 568A or the latest approved version of the ANSI/TIA/EIA standards.. The telephone service entrance and backboard shall be located in a separated Telephone Room and shall have type 66 punch down blocks installed. The Contractor shall provide grounding equipment, service entrance equipment, all conductors and outlets throughout the building. The Contractor shall connect and terminate all wiring to the outlets at each location and to the punch down blocks on the backboards. A minimum of six (6) dedicated telephone links shall be provided to the KAFB Central Receiving System. Note: The PBX switching equipment, the actual handsets, and the final system start-up and checkout will be done by others.

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8.3.15.11.1 **Trunk Lines.** A single mode and a multimode FO cable shall be installed from each concentrator to its respective server. Trunk lines terminated in servers shall be terminated on individual/dedicated patch panels. See Concentrator List in Appendix E.

(3) 8.3.16 **CATV System.** Provide a CATV System throughout the building. The CATV system shall be provided with RG59 coaxial cable and with type B and C terminations. All CATV installations shall be provided per the Type C systems locations and quantities required in the Communications Requirements List. Cables for the Type C systems shall be provided with an outside jacket which is black. CATV service is currently not available in the TACLAB project area, therefore, the contractor shall provide the building with CATV connections, as required above, with all connections brought back to a common point in the communication room. The common point connections equipment shall be mounted on 3/4" plywood backboard in the communication room and a 2" Sch. 40 PVC conduit shall be stubbed out from the connection point in the communication room to a reasonable point along the road to the west of the TACLAB site. (3)

8.3.16.1 **Requirements.** Outlets and connects within the building shall be provided as required by the Communications Requirements List in Appendix E (Note: The requirements given in the Communications Requirements List in Appendix E supersede those given in the Room-By-Room requirements given in Appendix B.)

8.3.17 **PA System.** Provide a stand alone PA system throughout the building. The PA system shall be a one way system with speakers throughout the building and a central control consol. The central control consol shall be provided with a speaking station, amplifier, and full range volume controls. The PA system shall be zoned to allow for separately addressing the offices, labs, and the shops.

8.3.18 **Security Systems.** Security Systems shall be provided as follows.

8.3.18.1 **Access/Entry Control.** Card reader access and entry control security systems shall be provided for all building entrances, and at the entrance to each lab, conference room, secure computer room, and secure suite. The card reader and access control computer and associated hardware shall be located in the secured computer room.

8.3.18.2 **Intrusion Detection.** An intrusion detections system shall be provided for all building entrances and windows.

(3) 8.3.18.3 **SCIF Rooms/Areas.** SCIF Rooms and Areas shall be provided with security systems per the requirements of DCID 1/21. All areas listed as Secure Spaces in Appendix B (those areas shown in red on the TACLAB Bubble Chart, which is page 2 of Appendix B) shall be considered SCIF. (3)

8.3.18.4 **Front Gate.** The main site front entrance gate shall have entrance access controls, a CATV system, and gate operator controls all operated from the lobby of the TACLAB.

8.3.18.5 **Compatibility.** Security Systems shall be fully compatible with the Central KAFB Security Receiver Station. (Central KAFB Security Receiver Station is an Advantor System.)

8.3.19 **Motors.** All motors installed, whether supplied separately or as part of an equipment package, shall be appropriately rated for the duty cycle and service conditions of the location and the application.

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**2.3 Drawings:** All design drawings submitted shall be "D" size drawings, with a border having overall dimensions of 35.25" by 23.25". This border is available on the Albuquerque District web page at <http://www.spa.usace.army.mil/ec/cadd/index.htm>. All lettering shall be in all capitals, with a minimum height of 1/8" on full size drawing, and all lettering fonts shall be Microstation "Font # 1" or AutoCad "Roman Simplex" with a width factor of zero point 8 (0.8). In addition to these requirements, all drawings shall be prepared per the CAD standards given in the A/E/C CADD Standards Release 2.0, which is available on the internet at <http://tsc.wes.army.mil>. Drawings shall be in soft metric in accordance with Appendix L.

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**2.4 Design Analysis:** The Design Analysis shall be developed in accordance to the criteria specified within this RFP, Section 01010 and Appendix J. An electronic template of the Design Analysis is available to the Contractor. The Design Analysis shall include all features with the necessary calculations, tables, methods and sources used in determining equipment and material sizes and capacities, and shall provide sufficient information to support the design.

**2.5 Specifications:** Specifications shall be developed utilizing Corps of Engineers Guide Specifications, "Master Spec", or "Spectext" in conjunction with Section 01010 and Appendix H. If other than Corps guides are utilized, the Contractor shall insure that the specifications follow the Master Format. All specifications shall be in sufficient detail to fully describe and demonstrate the quality of materials, the installation and performance of equipment, and the quality of workmanship. If other than Corps guides are utilized, the Contractor shall edit the specifications used so that all of the submittal, quality control and testing requirements given in all of the guides are included in the specifications used. In addition, the quality control procedures used shall include the testing and quality control requirements given in the Quality Assurance/Quality Control found in Section 01451. If specific brand names or products are identified in the specifications, the Contractor shall provide an "or equal" statement and shall provide the salient characteristics that may be used in determining what is "equal". The Contractor shall not alter specifications Section 00800 or any Division 1 specifications during the design process. These shall be submitted verbatim with the Final, Corrected Final, and Construction Set specifications. The Contractor shall obtain Corps of Engineers Guide Specifications from the Albuquerque District office.

**2.6 Color Boards.** Color/finish boards shall be in accordance with Appendix I of this RFP.

**2.7 Electronic Data Deliverables.** Drawings shall be delivered in MicroStation™ 5.0 and AutoCAD™ 2000. Specifications shall be delivered in Microsoft MS Word 97™. Electronic data deliverables shall be on compact disk.

**2.8 Certification of Computer Media:** Certification of Computer Media shall be in accordance with Appendix K.

**2.9 Comprehensive Interior Design (CID).** The CID shall be accomplished by a registered Interior Designer and follow the requirements within Appendix N. The CID shall specifically provide a design of furnishings (furniture, workstations, wall hangings, waste receptacles, plants, and other similar items which are not physically attached to the facility) for all office spaces (open and closed) and the lobby areas.

## COMMUNICATION SYSTEMS - GENERAL DESCRIPTION & NOTES

### Network Type

- A Unclass Phones
- B Unclass Network
- C Facility CATV
- D Class Network #1
- E Class Network #2

### Network Descriptions (see notes pages for additional information and exceptions)

#### A Unclass Phones

- Standard conveyance from outlet to source termination
  - All lines home run to Comm Room
  - Individual 4 pair Cat5e cable for each outlet
  - Two outlets per drop in a quadplex arrangement shared with two unclass network outlets
- All runs will terminate in a punch block in the Comm Room

#### B Unclass Network

- Standard conveyance from outlet to source termination
- Two outlets per drop in a quadplex arrangement shared with two unclass phone outlets where appropriate
- Additional connections require four outlets per drop in a quadplex arrangement
- Individual 4 pair Cat5e cable for each outlet
- All lines run to appropriate concentrator as indicated on the 'Drops' sheet
- Each drop (quad network or dual network/dual phone) includes two pair multi-mode fiber terminated with SC style connectors
- Each copper drop will terminate in a copper patch panel (24 connections per 1U of rack space) at the appropriate concentrator
- Each fiber drop will terminate in a fiber patch (ST style connectors) panel (24 connections per 1U of rack space) at the appropriate concentrator

#### \*\* Additional Requirements for Type B connections within SCIF

- All conveyance must be within the perimeter of the SCIF
- All drops must be located at least 6 feet from a Type D or E Type Network drop
- All outlets located within the SCIF must have clear, plastic, locking covers (master keyed) to prevent accidental misuse

#### C Facility CATV

- Standard CATV wiring methods
- All lines home run to Unclass Server Room
- All drop locations require a mounting plate capable of supporting a monitor as required in Section 01010, paragraph 5.23.7.1 and paragraph 8.3.16
- BNC patch panel(s) required for all incoming cables in the Unclass Server Room

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#### D Class Network #1

- All conveyance must be within the perimeter of the SCIF
- All conveyance must be within closed metallic conduits (square channel, enclosed wireway, standard or flexible conduits are all permissible)
- All lines home run to the Secure Server Room
- Two phone outlets per drop in a quadplex arrangement shared with two network outlets
- Individual 4 pair Cat5e cable for each outlet

**REVISIONS TO THE ELECTRICAL REQUIREMENTS  
IN THE DETAILED SPACE DESCRIPTION  
OF APPENDIX B  
THE CHARETTE REPORT**

<b>ROOM ID</b>	<b>CHANGE REQUIRED</b> (In each case below change or add to the power requirements given in the existing Appendix B.)
1) Coating Facility – Wash Room	Change from two 120V outlets to two 120V 20A circuits
2) Opto-Mechanical Assembly Area	Change to: Two 120V 20A circuits Two 120V 20A UPS circuits Two 220V 30A 1 phase circuit Two 208V 50A 3 phase circuit One power tap per circuit in ceiling
3) Laser Lab	Change to: Two UPS 120V 20A circuits Three 220V 30A 1 phase circuits Four 208V 50A 3 phase circuits Three 480V 30A 3 phase circuits One power tap per circuit in ceiling
4) Specialized Electronic lab	Change, the “<” sign to a “,”
5) Wavefront Corrector Lab – Optics room	Change to: Two UPS 120V 20A circuits with one power tap per circuit in ceiling Two 120V 20A circuits with two wall outlets
6) Wavefront Corrector Lab – Electronics room	Change to: Eight UPS 120V 20A circuits Two UPS 120V 30A circuits Two UPS 208V 20A 3 phase circuits One 208V 30A 3 phase circuit Four 120V 20A circuits
7) Secure Vestibule	Add: one 120V 20A circuit
8) Secure Conference Facility – Vestibule	Add: one 120V 20A circuit

- 9) Secure Conference Facility – Conference room    Add:  
Two 120V 20A circuits with outlets on each wall
- 10) Secure Multi-media Lab – Common Area    Change to:  
Two 120V 20A circuits with outlets on each wall
- 11) Secure Multi-media Lab – Dark room    Change to:  
One 120V 20A circuit  
One 208V 20A single-phase circuit
- 12) Lobby    Change to:  
two 120V 20A circuits
- 13) Presentation Conference Room Vestibule    Change to:  
one 120V 20A circuit
- 14) Presentation Conference Room    Change to:  
two 120V 20A circuits
- 15) Presentation Conference Room Kitchenette    Change to:  
One 120V 20A circuits plus those needed for  
refrig, microwave, dishwasher, disposal, oven,  
range, and any other installed appliance
- 16) Technical Library    Change to:  
One 120V 20A circuit
- 17) Sleeping Area    Change to:  
One 120V 20A circuit total
- 18) Exercise room    Change to:  
One 120V 20A circuit
- 19) Showers/Lockers    Change to:  
One 120V 20A circuit in each half
- 20) Kitchen/Lunch room    Change to:  
Two 120V 20A circuits plus those needed for  
installed appliances
- 21) Rest Rooms    Add:  
one 120V 20A circuit
- 22) Janitor's Closet    Add:  
one 120V 20A circuit

- 23) Mechanical/Electrical room Add:  
one 120V 20A circuit
- 24) Receiving Office Add:  
one 120V 20A circuit
- 25) receiving Storage Add:  
one 120V 20A circuit
- 26) Offices Engineers/Scientists, Staff suites 1&2 Change to:  
One 120V 20A circuit in each office plus 15  
120V 20A circuits distributed for common area
- 27) Offices, support Staff Suite Change to:  
One 120V 20A circuit in each office plus ten  
120V 20A circuits distributed
- 28) Offices, Analysts Staff Suite Change to:  
one 120V 20A circuit for each office plus two  
120V 20A circuits distributed
- 29) Offices, Business Staff Suite Change to:  
one 120V 20A circuit for each office
- 30) Offices, Technician Light Lab Area 2 Change to:  
12 120V 20A circuits per area  
One 208V 20A circuit  
(Delete on-wall requirement)
- 31) Offices, Technician Light Lab Area 1 Change to:  
12 120V 20A circuits per area  
One 208V 20A circuit  
(Delete on-wall requirement)
32. Coating Facility - Coating Add:  
Two 120VAC 100A circuits  
Two 208V 400A three-phase circuits  
One 480V 400A three-phase circuit
33. Computer Server & Net Lab,  
Communications Change to:  
15 120V 20A circuits  
Two 208V 20A circuits

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|--|---|
| 34. Optical Metrology - Components Storage | Change to:<br>Four 120V 20A circuits with outlets evenly spaced,<br>two UPS 120V 20A circuits with outlets in ceiling,<br>one 208V 30A 3PH disconnect |
| 35. Optical Metrology - Metrology Lab      | Change to:<br>Four 120V 20A circuits with outlets evenly spaced,<br>two UPS 120V 20A circuits with outlets in ceiling,<br>one 208V 30A 3PH disconnect |
| 36. General Electronics - Laboratory       | Change to:<br>Six 120V 20A circuits with outlets evenly spaced,<br>two 208V 30A 3Ph disconnect  |
| 37. General Electronics - Work Area        | Change to:<br>Two 120V 20A circuits with outlets on each wall (delete 208V)   |
| 38. Specialized Electronics - Work Area    | Change to:<br>Two 120V 20A circuits distributed (delete 208V)   |
| 39. Electronics Crib                       | Change to:<br>Two 120V 20A circuits with outlets evenly spaced  |
| 40. Secure Suite 3 - Large Offices         | Change to:<br>Two 120V 20A circuits with outlets on each wall   |
| 41. Secure Suite 3 - Medium Offices        | Change to:<br>Two 120V 20A circuits with outlets on each wall   |
| 42. Secure Suite 3 - Small Offices         | Change to:<br>Two 120V 20A circuits with outlets on each wall   |
| 43. Secure Suite 3 - General Area          | Change to:<br>Two 120V 20A circuits with outlets on each wall   |
| 44. Technician Light Lab, area 1           | Delete: "drainage: wall sink"   |

45. All office and support spaces except  
janitor's closet, shower/lockers

Add:  
requirement for one outlet per wall

46. Shop and shop work area have electrical requirements duplicated -- they are in same room,  
requirements for shop are all that's needed for both