THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY

FACILITIES DESIGN CRITERIA

Version 2 – Revision 1 –August 2020

FOR THE

FACILITIES MANAGEMENT & LOGISTICS DEPARTMENT

THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY

NEWPORT NEWS, VIRGINIA

UNITED STATES DEPARTMENT OF ENERGY

August 2020

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FOREWORD

The Facilities Design Criteria (FDC) will be used for all Jefferson Lab's projects designed in-house and by A/E consultants.

The FDC is a living document and will be periodically reviewed and updated.

Technical content of the FDC is the responsibility of the Facilities Management and Logistics (FM&L) design group. Recommended changes with supporting rationale should be sent to the FM&L Architect. A criteria change request form is included in the Appendix of this document.

Submitted by:

C. Snetter
_____ Date: 8/31/2020
Christine Snetter, FDC Manager, TJNAF

Suresh Chandra
_____ Date: 8/31/2020
Suresh Chandra, Design Manager, TJNAF

Concurrence:

_____ Date: 8/31/2020
Joel Dolbeck, Facilities Engineering Manager, TJNAF

Approval:

John R. Sprouse
_____ Date: 31 Aug 2020
John Sprouse, Facilities & Logistics Division Manager, TJNAF

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FACILITIES DESIGN CRITERIA (FDC)

Revision Summary Sheet

FDC 2-15-100

This document is a complete update of the FDC and supersedes FDC, Version 2, dated January, 2016. As changes are made, they will be indicated in the table below. See Section I, Introduction, for document update requirements.

Description of Changes – Update of sections is shown below
Key Action: N=New R=Revision C=Change D=Deleted

Change No	Date	Action	Location and Nature of Change
0	Jan-2016		FDC, Version 2 superseded by this version, FDC, V2-Rev1
1	Aug-2020	R	Revised front cover sheet
1	Aug-2020	N	Added Signature page
1	Aug-2020	R	Revised this chart and added "Action" column
1	Aug-2020	D/R	Pg i, TOC: Deleted cover sheet and renumbered the Table of Contents (TOC)
1	Aug-2020	C	Pg I, TOC: Changed the name of item III
1	Aug-2020	R	Revised header on all sheets
1	Aug-2020	N	Added Key Action to summary sheet and action column
1	Aug-2020	N	Added link and page numbers to TOC
1	Aug-2020	R	TOC III: Revised information regarding usage of Division 1 Guard Specs
1	Aug-2020	N	Pg i, TOC III: Added specification section 017839
1	Aug-2020	N	Pg ii, TOC III: Added spec section 083323
1	Aug-2020	N	Pg ii, TOC III: Added spec sections 101426 and 105113
1	Aug-2020	N	Pg iii, TOC III: Added spec section 234100
1	Aug-2020	N	Pg iv, TOC III: Added spec sections 270500 and 280500
1	Aug-2020	N	Pg v, TOC IV: Added Fire Alarm drawing
1	Aug-2020	D	Pg v, TOC V, Appendix A: Deleted note in parenthesis
1	Aug-2020	R	Pg v, TOC V, Appendix B: Added more specification sections. Deleted section 261300
1	Aug-2020	N	Pg v, TOC V: Added Appendix F, Criteria Change (CCR) Form
1	Aug-2020	R	Pg 1: Revised reference to Federal standards website in last paragraph

1	Aug-2020	R	Page 2: Revised website reference in first paragraph. Revised paragraph 1.3.2 to reference the CCR form
1	Aug-2020	R	Page 3: Reformatted headings
1	Aug-2020	N	Page 3, 2.1A: Added "engineers" to discipline submittals
1	Aug-2020	N	Page 4: Added NFPA 101, Life Safety Code 2018
1	Aug-2020	N	Page 5: Added several code references.
1	Aug-2020	R	Pages 5 & 6: Updated code dates.
1	Aug-2020	N	Added Specifications Requirements cover sheet
1	Aug-2020	N	Division 01 Specifications:–Added all of Division 01 specifications
1	Aug-2020	R	Spec section 013529: Added roof safety requirements
1	Aug-2020	N	Division 03-General structural requirements: Added wind loads for critical buildings
1	Aug-2020	R	Division 050000: Added JLab website for welding requirements
1	Aug-2020	N	Added specification section 075323 EPDM and 075419 PVC roofing
1	Aug-2020	R	Specification Section 075700: Revised section for renovation only
1	Aug-2020	N	Specification Section 081113: Added glass lite to doors
1	Aug-2020	N	Added Spec section 083323, Overhead Coiling Door-with safety requirements
1	Aug-2020	N	Specification Section 087100: Added information for electronic door hardware.
1	Aug-2020	N	Specification section 095113: Added ceiling tile requirement
1	Aug-2020	R	Specification 102800: Revised information on provision of toilet accessories.
1	Aug-2020	N	Added spec section 105113, Metal Lockers
1	Aug-2020	N	Specification Section 101400: Added information for existing exterior signs
1	Aug-2020	R	Specification Section 13000: Added cleanroom required testing and commissioning
1	Aug-2020	R	Specification Section 211100: Revised pipe size requirements
1	Aug-2020	N	Specification Section 211313 and 211316: Added information regarding sprinkler pipe material
1	Aug-2020	N	Specification Section 221113: Added information for underground piping installation and recommended sizes for valve boxes on water distribution lines

1	Aug-2020	R	Spec Section 221116: Revised domestic water piping requirement
1	Aug-2020	N	Spec Section 222713: Added material for connecting meters to network system.
1	Aug-2020	R	Spec Section 222713 & 226413: Differentiated requirements for existing and new water meters.
1	Aug-2020	R	Spec Section 230513: Revised information about motors operated by a VFD's and lightning protection
1	Aug-2020	N	Added code requirement for HVAC electrical installation
1	Aug-2020	N	Specification Section 230533: Provided information for heat tracing on HVAC piping
1	Aug-2020	N	Specification Section 230533: Added requirements for more than two 120V circuits used for heat tracing.
1	Aug-2020	N	Specification Section 231713: Clarified information for wireless communications for meters
1	Aug-2020	N	Added Specification section 234100, Particulate Air Filtration with required type of HVAC filters
1	Aug-2020	N	Specification Section 232413: Added heat trace wire requirement for underground piping
1	Aug-2020	N	Specification Section 260500: Added code requirement for electrical installation. Added drawing requirements
1	Aug-2020	R	Specification Section 260513: Revised type of material for underground piping and referenced use of JLab specifications.
1	Aug-2020	R	Specification Section 260533: Provided information of JLab specific specifications
1	Aug-2020	N	Specification Section 260543: Added material size for encased conduit
1	Aug-2020	N	Specification Section 260553: Added information regarding raceways identification
1	Aug-2020	N	Specification Section 260913: Added meters material and connections information
1	Aug-2020	D	Spec Section 260923: Deleted information regarding provision of lighting control panels
1	Aug-2020	R	Spec Section 261200: Revised by adding information about specifications to use for pad mounted transformers
1	Aug-2020	N	Specification Section 261200: Added oil and switch requirements for Medium Voltage transformers

1	Aug-2020	N	Specification Section 262413: Added requirement for tester unit in switchboards, for all high power electronic loads and for digital meters Provided location for JLab specific electrical specifications
1	Aug-2020	N	Specification Section 262416: Added requirements for panelboard units and use of JLab specifications
1	Aug-2020	N/R	Specification Section 262419: Added and revised meter requirements
1	Aug-2020	N	Specification Section 262600: Added required loads for power distribution redundancy
1	Aug-2020	R	Specification Section 262713: Revised electric metering type
1	Aug-2020	N	Specification Section 262816: Added requirements for circuit breakers
1	Aug-2020	N	Specification Section 262923: Added requirements for motors operated by VFD
1	Aug-2020	N	Specification Section 263213: Added requirement for generator load bank testing. Added information on type of generators
1	Aug-2020	N	Added Specification Section 270500-Common Work Results for Communications. Added code requirements
1	Aug-2020	N	Added specification section 280500: Common Work Results for Electronic Safety and Security. Added code requirements
1	Aug-2020	R	Specification Section 328400: Revised plant irrigation and seed requirements
1	Aug-2020	N	Specification Section 329200: Added requirements for type of grasses
1	Feb-2020	D/C	Specification Section 330523.13: Deleted attachment and revised to require usage of JLab specifications
1	Feb-2020	N	Specification Section 336313: Added requirement for valve boxes in underground utility distribution structures
1	Aug-2020	N	Civil drawings: Added notes 7 & 8, minimum roadway widths and bollard requirements
1	Aug-2020	N	Architectural drawings: Added notes 5, 6, 7, 8 & 9 regarding conduits underside of roof, wind loads, fall protection, lightning protection certification and site bollards
1	Aug-2020	C	Structural drawings: Changed wind load requirements

1	Aug-2020	N	Plumbing drawings: Added note 5 for installation of underground piping
1	Aug-2020	N	Electrical drawings - Added notes 4 regarding conduits on the underside of roof
1	Aug-2020	N	Added Fire Alarm drawing requirements
1	Aug-2020	R	Appendix A Cover sheet: Revised description and added new information regarding document use.
1	Aug-2020	R	Appendix B Cover Sheet: Revised description and added information for document usage
1	Aug-2020	R	Appendix C Cover Sheet: Revised description, added information for document usage and JLab website link
1	Aug-2020	R	Appendix D Cover Sheet: Revised section description
1	Aug-2020	R	Appendix E Cover Sheet: Revised update requirements.
1	Aug-2020	N	Added Appendix F, Criteria Change Form

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TABLE OF CONTENTS

DIVISION 14 - CONVEYING EQUIPMENT (Not Used)

NOTE: * denotes Division 1 sections to be provided by the Designer A/E.

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I INTRODUCTION

1.1 Purpose and Scope

The Facilities Design Criteria (FDC) is a joint effort of all groups in Facilities Management to set design standards for preparing design drawings and specifications for Jefferson Lab's buildings and site. The intent is to specify materials and systems that have been installed in JLab's buildings and on site, which have proven to be the most efficient, cost effective, and workable solution. This document is used for translating design criteria into construction requirements that have been coordinated with industry standards.

The FDC follows the most recent edition of ARCOM Masterspec. The FDC is a guidance document with sample specification language intended to minimize the guesswork on what is best for installation at JLAB.

1.2 Goal

The design goal is to create a capital investment that meets the User's functional requirements, provides the most economical life cycle cost, and promotes energy efficiency and environmental conservation. JLab's design philosophy envisions a long and useful life for its buildings. Building systems components should be selected on the basis of life cycle costs within the design requirement. If an increased first or initial cost can be documented to show a reduced life cycle cost for JLab, particularly for operating and personnel costs, then the design should incorporate the more expensive first cost feature or system, if it does not cause the project cost to exceed its "design-not-to-exceed" budget. These issues shall be discussed with and approved by JLab.

The design shall meet or exceed the Federal legislative objectives stated in the Energy Policy Act of 2005 (EPACT 2005), Energy Independence and Security Act of 2007 (EISA 2007), Federal Executive Order (13693), 10 CFR Part 433, and related DOE Executive Orders defining specific agency energy and sustainability goals. Further, design shall comply with Federal High Performance and Sustainable Building (HPSB) Guiding Principles. Complete the EPA's Portfolio Manager database tool checklist to assure compliance with HPSB Portfolio Manager instructions. The most current Guiding Principles documents for sustainable Federal buildings are available at the following website: https://www.sustainability.gov/pdfs/guiding-principles-for-sustainable-federal-federal-buildings.pdf

10 CFR Part 433 requires Federal commercial buildings to be designed to achieve energy savings of at least 30 percent below ANSI/ASHRAE/IESNA Standard 90.1, if cost-effective. Moreover, the design shall meet or exceed ENERGY STAR® Building criteria to achieve an energy performance score of 75 or higher using the ENERGY STAR® Portfolio Manager rating tool as part of comprehensive facility audits. When evaluating the ENERGY STAR® target for a new or existing building, apply the more stringent standard set forth in the Table of Target Energy Performance Results and the values required under 10 CFR Part 433 or 435 (as applicable). The current Federal standards for commercial buildings is based on standard

90.1-2013, effective January 5, 2016. Refer to WBDG.org/ffc/fed/code-federal-regulations/10cfr-part-433

The EPA Target Finder calculator may be used for what-if scenarios to see the energy use associated with a given target performance level. The Target-Finder calculator can be found at www.energystar.gov/buildings/service-providers/design/step-step-process/evaluate-target/epa's-target-finder-calculator.

Projects must be designed to avoid inefficient use of space in terms of floor area and building volume. Exterior design features and materials should be consistent with architectural character of the surrounding buildings and site. The A/E's design shall provide an energy analysis for the specific project to establish the energy usage needed to meet a target. Standards and requirements for buildings on JLab site may be higher than the minimum requirements for the private sector but are necessary to meet the energy, performance, maintenance, safety, and accessibility standards for Federal property. Unless otherwise noted, Jefferson Lab Facilities Management Department and the A/E shall design facilities to the standards and requirements stated herein regardless of the project delivery method. JLab, however, reserves the right to change any requirements in this document, if future research reveals material or equipment that is better and more cost effective.

The requirements provide information to be used for New Construction (NC) and Remodeling/Repairs (R). Specific decisions of which system or material to be used will be determined during the planning and design phase of each project.

1.3 Document Update

Facilities Design Criteria is a living document and will be periodically reviewed, updated and made available to users as part of technical criteria for construction on JLab's site. Technical content of the FDC is the responsibility of Facilities and Logistics Management group. If information in the FDC conflicts with a specific project design, review comments from JLab and/or the Designer's code requirements interpretation, the procedures below shall be followed.

1. The designer shall notify JLab's Project Manager to provide direction on how to proceed.
2. Comments, suggestions and recommended changes are welcome. Recommended changes with supporting rationale shall be sent to the JLab Facilities Architect. A Criteria Change Request form is included in Appendix A.

II CODES AND REFERENCES

PART II- GENERAL

2.1 Definitions

A. "Approved": When used to convey Architect's and/or Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's and/or Engineer's duties and responsibilities as stated in the Conditions of the Contract.

B. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

C. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

D. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

E. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

F. "Provide": Furnish and install, complete and ready for the intended use.

G. The word CONCEALED shall be understood as referring to Work contained within building floors, walls or partitions; Work installed in the space between any type of suspended ceiling and the structural floor or roof above; Work installed within a structural shaft, chase or column; and other Work installed so as to be hidden from view.

H. The word EXPOSED shall be understood as referring to Work installed external to building floors, walls or partitions; Work installed in a room or space where any type of suspended ceiling is not specified; Work installed in penthouses, mechanical rooms and electrical rooms of all types; and all other Work installed so as to be exposed to view.

2.2 Required Applicable Codes and Standards

A. The following list of applicable criteria includes major codes and standards that are used to develop project designs at JLab. Codes and standard editions are based on the 2015 Virginia Uniform Statewide Building code and the DOE Standard 1066-99 and 2015 NFPA Life safety Code. Unless otherwise noted, all Life Safety issues shall be governed by the NFPA Life Safety Code. These criteria shall be based on current criteria applicable in Virginia at the time of design.

B. Applicability of Standards: Standards Conflict: If the Project designer discovers that direction in the FDC conflicts with standards specified by JLab, the Project Designer must express his concerns to JLab's Project Manager.

C. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list

ACI	ACI 318-14, Building Code Requirements for Structural Concrete
ADAAG	Americans with Disabilities Act (ADA)
	Architectural Barriers Act (ABA)
	2015 ADA Accessibility Standards
ASCE	ASCE 7 – Minimum Design Loads for Buildings and Other Structures, 2017
AISC	AISC 360 – 16, Specifications for structural steel buildings
ASHRAE	ASHRAE 90.1
ASME	ASME B31
CFR	29CFR 1910, Subpart D and CFR 1926
CFR	29CFR 1926 – Safety and Health Regulations for Construction Occupational Safety and Health Standards
DOE STD	DOE STD-1066-99 Fire Protection Design Criteria
DOE STD	DOE STD-1020-2016 – Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities
DOE order	DOE Order O 420.1C, Facility Safety
NFPA	NFPA 1 – Uniform Fire Code, 2018 (for fire department vehicle access requirements)
	NFPA 10 – Portable Fire Extinguishers, 2018
	NFPA 13 – Installation of Sprinkler Systems, 20192
	NFPA 24 – Installation of Private Fire service Mains and their Appurtenances, 2016
	NFPA 101 – Life Safety Code, 2018

NFPA 780 – Standard for Installation of Lightning Protection Systems, 2017

NFPA 70 – National Electrical Code (NEC), 2017

NFPA 70E – Standard for Electrical Safety in the Workplace

NFPA 72 – National Fire alarm and Signaling Code, 2019NFPA 101 – Life Safety Code, 2015

VCC Virginia Construction Code 2015 (VCC), (based on the 2015 edition of the International Building Code)

International Plumbing Code 2015 (as adopted/modified by VCC)

International Mechanical Code 2015 (as adopted/modified by the VCC)

International Fuel Gas Code 2015 (as adopted/modified by the VCC)

International Energy Conservation Code 2015 (as adopted/modified by the VCC)

Virginia Industrialized Building Safety Regulations, 2012Virginia Erosion and Sediment Control Handbook, 1992

Virginia Stormwater Management Handbook, 2014

2.3 Abbreviations and Acronyms

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000

BOCA	BOCA International, Inc. (See ICC)	
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DOE	Department of Energy www.energy.gov	(202) 586-9220
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999

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SPECIFICATION REQUIREMENTS

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DIVISION 01 – GENERAL REQUIREMENTS

This section provides General Requirements specific to JLab's remodeling and new construction designs. The usage is identified in each section by "NC" or "R".

011000	Summary
012900	Payment Procedures
013100	Project Management and Coordination
013200	Construction Progress Documentation
013300	Submittal Procedures
013529	Safety and Health Requirements
014000	Quality Requirements
015000	Temporary Facilities and Control
015719	Temporary Environmental Controls
017419	Construction Waste Management and Disposal
017700	Closeout Procedures
017823	Operation and Maintenance Data
017839	Project Record Documents
017900	Demonstration and Training*

019133 General Commissioning Requirements*

NOTE: *Denotes Division 1 sections to be provided by the A/E

DIVISION 01 - GENERAL REQUIREMENTS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
011000	Summary		NC/R		For all proprietary items, establish a justification and provide a memo to Jlab.
013300	Submittal Procedures		NC/R		Do not request samples for materials such as suspended ceiling grid, cans of paint, bags of mulch, etc. When in doubt, discuss with the Project Manager.
		Include copy of Jlab's Transmittal Form for Submittals.			A copy of the form is provided in Appendix F.
013100	Project Management and Coordination				Identify pre-installation conferences in technical specification sections as required by 1.3C.
013529	Safety and Health Requirements		NC/R		The A/E shall design all fall protection in accordance with the requirements of CFR 1910, Subpart D and CFR 1926. Provide parapets or railings on all buildings with roof top equipment.

DIVISION 01 - GENERAL REQUIREMENTS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
017419	Construction Waste Management and Disposal		NC/R		This specification section is applicable to large and small projects. The A/E shall use his discretion for application, and discuss and coordinate with Jlab's PM.
019133	General Commissioning Requirements	Statement shall be added to specify that general subcontractor shall ensure mechanical, electrical, control, and testing and balancing subcontractors support commissioning activities. Testing and balancing shall be performed under the mechanical subcontractor to facilitate effective work coordination. Also, include that they will be responsible for additional commissioning agent cost resulting from required retesting due to repeated testing after more than one system failure or work not being ready for commissioning as scheduled.	NC/R		This section shall be provided by the A/E. Include required information.

GENERAL STRUCTURAL REQUIREMENTS

DIVISION 03 – CONCRETE, 04-MASONRY, 05-METALS

This section provides general structural design requirements and specification requirements for Concrete, Masonry and Metals testing and inspection. The usage is identified in each section by "NC" or "R".

The following minimum loads shall be used for the design of all structures.

- Snow Loads: Ground snow load, 15 psf
- Wind Loads: 115 mph (3 second gust), Exposure B; 130 mph for critical buildings in accordance with the UBC
- Seismic Loads:
    1. Short Period Spectral Response Acceleration, S_s = 0.127
    2. 1-second Period Spectral Response Acceleration, S_1 = 0.05
    3. Soil site: Class D
- Importance Factors: Not less than 1.0

All existing site conditions shall be field verified prior to commencement of definitive design. The A/E shall be responsible for design for both facility construction and operations.

033000 Concrete

040000 General Masonry

050000 Metals, General

051200 Structural Steel Framing

055213 Metal Railings and Ladder

DIVISION 03 - CONCRETE					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
033000	Cast-in-Place Concrete	Testing and Inspecting: All independent testing required by work shall be arranged and paid for by the subcontractor.	NC/R		
		Require a preinstallation conference to be held at the project site. List items to be reviewed.	NC/R		

DIVISION 04 - MASONRY					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
040000	Masonry, General	Testing and Inspecting: All independent testing required by work shall be arranged and paid for by the subcontractor.	NC/R		
		Require a preinstallation conference to be held at the project site. List items to be reviewed.	NC/R		
		Require a mock-up if masonry or brick is the final finish.	NC/R		

DIVISION 05 - METALS					
SECTION No	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
050000	Metals, General	Testing and Inspecting: All independent testing required by work shall be arranged and paid for by the subcontractor.	NC/R		
		Require that all welding within buildings be accomplished by a process such as the GTAW (Gas Tungsten Arc Welding) that reduces the level of smoke generated and lowers hazards.	NC/R		Stick welding is unacceptable because it produces a lot of smoke. See Jlab ES&H Manual Welding and Brazing Supplement at https://www.jlab.org/ehs/ehsmanual/WeldBraze/Welding%20and%20Brazing%20Supplement.pdf
051200	Structural Steel Framing	Require a preinstallation conference at the project site.	NC/R		
055213	Metal Railings and Ladders		NC/R		Refer to fall protection design requirements in Division 01.

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

This section provides requirements for Thermal and Moisture Protection used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

072100	Thermal Insulation
074213	Metal Wall Panels
074216	Insulated Core Metal Wall Panels
075323	Ethylene Propylene-Diene-Monomer (EPDM) Roofing
075419	Polyvinyl-Chloride Roofing
075423	Thermoplastic Polyolefin (TPO) Roofing
075700	Coated Foam Roofing
076200	Sheet Metal flashing and Trim
078400	Firestopping

DIVISION 07 - THERMAL AND MOISTURE PROTECTION					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
072100	Thermal Insulation	Wall and roof insulation shall have a Resistance-value of no less than 19 and 30, respectively.	NC/R		
074213	Metal Wall Panels	Require a preinstallation conference at the project site. List items to be reviewed.	NC/R		
074216	Insulated Core Metal Panels	Require a preinstallation conference at the project site. List items to be reviewed.	NC/R		
075323	Ethylene-Propylene-Diene-Monomer (EPDM) Roofing	Require a preinstallation meeting before start of roof deck construction, conduct conference at site. List items to be reviewed.	NC/R		All replaced roofs will be mechanically adhered EPDM or PVC roofing. Include that UL certification for the lightning protection must be obtained under re-roof projects. Before executing a re-roof contract, electrical conduits must be relocated from the underside of the roof, under a separate contract. If FM quality control is specified, ensure that insurance for roofing is held by Factory Mutual.

DIVISION 07 - THERMAL AND MOISTURE PROTECTION					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
075419	Polyvinyl Chloride Roofing (PVC)	Require a preinstallation meeting before start of roof deck construction, conduct conference at site. List items to be reviewed.	NC/R		All replaced roofs will be mechanically adhered EPDM or PVC roofing. Include that UL certification for the lightning protection must be obtained under re-roof projects. Before executing a re-roof contract, electrical conduits must be relocated from the underside of the roof, under a separate contract. If FM quality control is specified, ensure that insurance for roofing is held by Factory Mutual.
075423	Thermoplastic Polyolefin (TPO) Roofing		NC/R		If FM quality control is specified, ensure that insurance for roofing is held by Factory Mutual.
		Require a preinstallation meeting before start of roof deck construction, conduct conference at site. List items to be reviewed.	NC/R		
075700	Coated Foam Roofing	Require a preinstallation meeting at the project site. List items to be reviewed. Warranty shall be for no less than 10 years and will be renewable for the next 10 years after re-coating is done. Warranty shall include repair to bird damage and blisters. Under warranty, leak repairs must be done	NC		Note that bird damage and roof blisters will only be required if manufacturer/installer provide it as an option. May not be enforceable if not an option.

DIVISION 07 - THERMAL AND MOISTURE PROTECTION					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		within one week and the other repairs within one month.			
076200	Sheet Metal Flashing and Trim	Require a preinstallation conference at the project site. List items to be reviewed.	NC/R		
078400	Firestopping	Require submittals and shop drawings for joint and penetration firestopping prior to installation.	NC/R		This requirement is to ensure that the assembly rating is achieved.

DIVISION 08 – OPENINGS

This section provides requirements for Openings at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

081113	Hollow Metal Doors
083323	Overhead Coiling Doors
087100	Door Hardware
088000	Glazing

DIVISION 08 - OPENINGS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
081113	Hollow Metal Doors	Specify welded frames with mitered corners.	NC		
083323	Overhead Coiling Door	Specify that safety clutch will be provided on all roll-up doors to prevent potential free fall			
		Specify welded or knock-down frames	R		
		Specify glass lite in exterior and egress doors to facilitate safe entering and exiting.	NC/R		
087100	Door Hardware		NC/R		Coordinate specialty hardware for access control doors with Jlab Project Manager.
		All Electrically controlled exit devices shall be made by Von Duprin, no substitutions.	NC/R		
		All exterior doors on buildings intended for occupancy shall at a minimum have sensors to report the doors open and closed condition.	NC/R		
			NC/R		Where electronic access control is used to control entry into a building, all leafs of a door set outfitted with exit hardware shall be electronically locked or unlocked.
088000	Glazing	Specify insulated windows with argon space.	NC/R		Air space may be specified if matching existing.

DIVISION 09 – FINISHES

This section provides requirements for Finishes used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

093000	Tiling and Stone Tiling
095113	Acoustical Ceiling
096516	Resilient Flooring
096813	Tile Carpeting
099100	Painting

DIVISION 09 - FINISHES					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
093000	Tiling and Stone Tiling	Provide a statement that the subcontractor shall examine all substrates prior to installation of new material.	NC/R		
095113	Acoustical Ceiling	Do not specify provision of samples of ceiling grid material.	NC/R		
		Request 2% maximum extra stock.	NC/R		
		Standard tile size shall be 2' x 2'	NC/R		
096516	Resilient Flooring	Provide a statement that the subcontractor shall examine all substrates prior to installation of new material.	NC/R		
		Request 2% maximum extra stock.	NC/R		
096813	Tile carpeting	Provide a statement that the subcontractor shall examine all substrates prior to installation of new material.	NC/R		
		Request 2% maximum extra stock.	NC/R		
099100	Painting	Specify that all office spaces shall have a minimum Level 4 finish.	NC/R		
		Do not specify provision of physical samples of cans of paint.	NC/R		
		Do not specify provision of extra stock paint.	NC/R		

DIVISION 10 – SPECIALITIES

This section provides requirements for Specialties used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

101400	Signage
102113	Toilet Compartments
102800	Toilet, Bath and Laundry Accessories
105113	Metal Locker

DIVISION 10 - SPECIALTIES					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
101400	Signage		NC/R		The A/E shall provide design, specification and cost estimate for interior building signs. Jlab will be responsible for purchasing signs.
		Exterior signage: Height of signs - Use Virginia State standards. If using metal, use galvanized steel. The minimum height measured vertically from the bottom of the sign to the top of the curb, or in the absence of a curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road where parking or pedestrian movements are likely to occur, or where the view of the sign might be obstructed, shall be 7 feet. Posts shall be 10 feet in length and level on all sides. No anchor base is required. Depth into the ground will be determined by the size of the sign. The post must extend to 1 inch below the top of the sign so as not to be visible from the front face of the sign.	R		
102113	Toilet Compartments	All bathroom partitions shall be solid plastic, high density polyethelene (HDPE) with a homogeneous color throughout.	NC/R		For repairs that do not require removal of all partitions, match existing.

DIVISION 10 - SPECIALTIES					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
102800	Toilet Bath and Laundry Accessories	Provide a statement that the subcontractor shall examine all substrates prior to installation of new material.	NC/R		Show location for all toilet accessories. Note in fixture schedule that Jlab will be responsible for providing and installing all paper towel dispensers, toilet paper dispensers, soap dispensers and seat cover holders. All other accessories are to be included in the design estimate.
					A requirement for the GC to provide backing support for JLAB accessories shall be included on the drawings.
105113	Metal Lockers	Provide single point latch control for use with built in combination or padlocks.	NC/R		

DIVISION 13 – CLEANROOMS

This section provides requirements for Cleanrooms used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

130000 General Requirements

DIVISION 13 - CLEANROOMS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
130000	Clean Rooms	The clean room manufacturer shall provide and have total responsibility for all mechanical equipment required to condition and pressurize clean room facilities.	NC/R		
		Require that the design meets ISO 14644-4 for design, construction and start-up of cleanrooms.	NC/R		
			NC/R		Provide risk analysis for contaminants in Cleanrooms.
			NC/R		For Clean room floor drains, provide design means similar to an air gap to prevent back-up into the cleanroom. Testing and commissioning is required.

DIVISION 21 – FIRE SUPPRESSION

This section provides requirements for Fire Suppression systems used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

210517	Sleeves & Sleeve Seals for Fire-Suppression Piping
211100	Facility Fire-Suppression Water-Service Piping
211200	Fire-Suppression Standpipes
211313	Wet-Pipe Sprinkler Systems
211316	Dry-Pipe Sprinkler Systems

DIVISION 21 - FIRE SUPPRESSION					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
210517	Sleeves & Sleeves for Fire-Suppression Piping	The incoming fire line passing through a foundation wall or floor slab on grade are installed with the minimum 1-inch to 3-inch radial clearance around the pipe and the clear space filled with asphalt mastic or similar flexible waterproofing material. (without regard to seismic classification of this area)	NC/R		This applies to all penetrations. All interior penetrations shall be firestopped.
211100	Facility Fire-Suppression Water-Service Piping	For existing buildings, the minimum pipe size is 8-inch ductile iron pipe (AWWA C151, Pressure Class 350). Larger pipe is used to meet hydraulic calculations.	R		Larger pipe is used to meet hydraulic calculations.
			NC/R		A post indicator valve assembly with a gate valve is used at the underground main for every incoming fire line to a building.
		Dry barrel fire hydrants conforming to the City of Newport News standard shall be used. Each hydrant is furnished with 3 nozzles with National (American) fire hose coupling screw thread. There are two 2 1/2- inch hose nozzles placed 180 degrees apart, and one 4-inch pumper nozzle.	NC/R		

DIVISION 21 - FIRE SUPPRESSION					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Fire Department Connections shall be freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire-department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet. Matching fire-department hose threads shall be American Standard.	NC/R		
		The minimum pipe size of incoming fire lines shall be 6" IPS	NC		This applies to above ground penetrations.
		The minimum pipe size of domestic potable water lines shall be 2" IPS copper.	NC/R		
211200	Fire Suppression Standpipes	Provide manual dry-type Class 1 Standpipe Systems for all underground and partially underground structuers. 175 psig minimum working pressure.	NC/R		
211313	Wet-Pipe sprinkler Systems	Industrial occupancies, other than experimental areas, have a minimum sprinkler design density of Ordinary Hazard Group 2 with a 1500 ft^2 area of sprinkler operation.	NC/R		
		Industrial occupancies in experimental areas have a minimum sprinkler design density of Ordinary Hazard Group 2 with a 3000 ft^2 area of sprinkler operation.	NC/R		

DIVISION 21 - FIRE SUPPRESSION					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		All other occupancies have a minimum sprinkler design density of Ordinary Hazard Group 1 with a 1500 ft^2 area of sprinkler operation.	NC/R		
		All sprinkler piping shall be black steel unless there is a compelling reason to use galvanized steel.	NC/R		
211316	Dry-Pipe Sprinkler Systems	Provide double interlock pre-action dry pipe sprinkler systems in radiation areas.	NC/R		
		All sprinkler piping shall be black steel unless there is a compelling reason to use galvanized steel.	NC/R		

DIVISION 22 – PLUMBING

This section provides requirements for Plumbing systems used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

220513	Electrical Requirements for Plumbing
220533	Heat Tracing for Plumbing Piping
221113	Facility Water Distribution Piping
221116	Domestic Water Piping
222713	Plumbing Metering
224000	Plumbing Fixtures and Trim
226313	Gas Distribution Piping
226413	Natural Gas Metering

DIVISION 22 - PLUMBING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
220513	Electrical Requirements for Plumbing	Electrical control panels shall be provided with voltages above 50 volts isolated from voltages below 50 volts to minimize ARC flash and electrical shock hazards.	NC/R		
220533	Heat Tracing for Plumbing Piping	For heat tracing, include the requirement for shop drawings and manufacturer's representative inspection prior to installation of the insulation.	NC/R		
221113	Facilitiy Water Distribution Piping	All piping shall be designed and installed in compliance with AWWA codes. Include pressure system design information table on drawings.	NC/R		
		Underground piping shall be installed in appropriately designed bedding. Pipe bedding shall be inspected prior to backfilling. The Subcontractor shall be responsible for quality control of installation. Jlab's Inspector will provide quality assurance.	NC/R		Trench details shall be included on construction drawings.
			NC/R		Configure specification for "combined water service and fire-service mains".

DIVISION 22 - PLUMBING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Valve boxes on all water distribution lines 6" or larger shall be 12" in diameter (v/s 6" or 8"). If possible and cost effective set these boxes in a 24" square by 4" thick concrete pad.
221116	Domestic Water Piping	Domestic water piping under floor shall be cement lined asphalted coated ductile-Iron pipe.	NC/R		
			NC/R		Consult with JLAB on design of plumbing systems including domestic hot/cold water, grey water, sanitation plumbing, and sewers (both gravity and force main).
		Installation procedure shall include provision for vertical bracing when installing water distribution valves "transition collar". Require that transition collar bolts be retorked after the pipe has been at operating temperature for an hour or so as the temperature change may affect initial operation.	NC/R		
222713	Plumbing Metering	For water meters use Badger disc or turbine meters with Recordall Transmitter Registers (RTR) pulse output capability.	NC/R		Connect meters to existing network system using Cat 6 cable

DIVISION 22 - PLUMBING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		For water meters with wired communications use Ethernet Communications -ADAM I/O module with integral 10/100 based-T Ethernet interface.	NC/R		
		The existing water meters use wireless communications use Sedona Wireless Pulse Counting Panel with integral antenna compatible with existing wireless network frequency.	NC/R		In the future, Jlab is planning to move away from wireless communications. Coordinate and discuss planned new system with JLab.
224000	Plumbing Fixtures and Trim	All water closets, urinals, and lavoratories shall be wall hung.	NC/R		
226313	Gas Distribution Piping	All piping shall be designed and installed in compliance with ASME B31 codes. Include pressure system design information table on drawings.	NC/R		ASME section varies depending on gas being used.
		Normally closed solenoid valves with orifice holders shall be incorporated in gas piping (nitrogen, helium, argon, etc.) that pose oxygen deficiency hazards if leaks or other failures that would release the gas in the area occurs. The solenoid valves shall be located outside the area and interfaced with area ventilation equipment to fail closed if the area ventilation is off.	NC/R		

DIVISION 22 - PLUMBING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
226413	Natural Gas Metering	Provide rotary gas meters with temperature compensation and pulse output	NC		
		Ethernet Communications - ADAM I/O module with integral 10/100 based-T Ethernet interface	NC		
		Existing system use wireless communications - Sedona Wireless Pulse Counting Panel with integral antenna compatible with existing wireless network frequency.	NC		In the future, Jlab is planning to move away from wireless communications. Coordinate and discuss planned new system with JLab.

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

This section provides requirements for Heating, Ventilation and Air Conditioning used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

230513	Electrical Requirements for HVAC Equipment
230533	Heat Tracing for HVAC Piping
230548.13	Vibration Controls for HVAC
230593	Testing Adjusting and Balancing for HVAC
230800	Commissioning of HVAC
230900	Instrumentation and Control for HVAC
232713	Natural Gas Metering
232113	Hydronic Piping Systems
232114	Low Conductivity Water Piping
232123	HVAC Pumps
232413	Underground Distribution Piping Systems
232500	HVAC Water Treatment
234100	Particulate Air Filtration
236000	Water Chillers
236500	Cooling Towers
238123	Computer Room Air Conditioners

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
230513	Electrical Requirements for HVAC Equipment	Electrical control panels shall be provided with voltages above 50 volts isolated from voltages below 50 volts to minimize ARC flash and electrical shock hazards.	NC/R		For critical systems, provide power to panel from two sources.
		Provide lightning protection on all cooling towers and roof mounted equipment	NC/R		
		For all refrigerant areas, provide alarm notification on exterior of doors to the subject area.	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		For any motor operated by a VFD, 1. 50 hp and below shall be provided with shaft grounding rings. 2. 51-99 hp shall be provided with at least one ceramic bearing. 3. Motors 100 hp and above shall be provided with shaft grounding ring and at least one ceramic bearing. 4. All motors operated by VFD shall have inverter rated windings. If motors are located in an area that lends itself to easy inspection and maintenance, a ground ring may be approved in lieu of a ceramic bearing.	NC/R		
		For any motor operated by a VFD, provide inverter rated motors.	NC/R		
		Electrical installation of HVAC equipment shall be in accordance with the 2017 NEC and personnel shall be trained in both the 2017 NEC and the 2015 NFPA 70E.	NC/R		
		Under Field Quality Control section of Part 3, add the requirement for the manufacturer's representative to inspect the installation, witness the	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		testing and provide written approval prior to application of coverings.			
230523.13	Butterfly Valves for HVAC Piping	Butterfly valves for HVAC Piping 4" and larger shall have gear type operators.	NC/R		
230533	Heat Tracing and HVAC Piping	For heat tracing include the requirement for shop drawings and manufacturer's representative inspection prior to installation of the insulation.	NC/R		The Designer shall indicate on drawings and specifications that all galvanized piping shall be heat traced and insulated.
		If more than two 120 V circuits are required for heat tracing, a Heat Trace Controller shall be provided to use power from one circuit and distribute this power to all of the heat trace branches on a particular piece of equipment (cooling tower).			
		All heat tracing components shall be tested prior to application of insulation. Heat trace cable shall have an end of line visual indicating device that lights			

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		up when power is applied to the heat trace cable.			
230548.13	Vibration Controls for HVAC		NC/R		During the Conceptual Design phase, the A/E shall work with JLAB Facilities to establish acoustical requirements for spaces.
			NC/R		Equipment and piping vibration/noise isolation design should be in accordance with the sound and vibration principles outlined in the ASHRAE Handbook, HVAC Applications, Chapter 48
230593	Testing and Balancing	Testing and balancing shall be performed under the mechanical subcontractor to facilitate effective work coordination. Acceptable testing companies are Testing Specialties, Virginia air Balance and C-W Tesco.	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
230800	Commissioning of HVAC	Statement shall be added to specify mechanical and control subcontractors shall support commissioning activities and be responsible for additional commissioning agent cost resulting from required retesting due to repeated testing after more than one system failure or work not being ready for commissioning as scheduled.	NC/R		
230900	Instrumentation and Control for HVAC	All HVAC equipment (even exhaust fans) shall be controlled and monitored by unitary direct digital controllers. The acceptable control manufacturer(s) shall be specified by Jefferson Lab.	NC/R		
		Provide control point lists and sequences of operation on mechanical control drawings.	NC/R		
		Statement shall be added to specify control subcontractors shall support commissioning activities and be responsible for additional commissioning agent cost resulting from required retesting due to repeated testing after more than one system	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		failure or work not being ready for commissioning as scheduled.			
		DDC controllers shall be manufactured to accept two sources of power. Power to DDC controllers shall come from separate sources such that the loss of either one will not impact operation of the controller. Selection of sources shall take in account of power outages due to routine maintenance.	NC/R		
231713	Natural Gas Metering	Rotary gas meters with temperature compensation and pulse output.	NC/R		
		Ethernet Communications - ADAM I/O module with integral 10/100 based-T Ethernet interface.	NC/R		
		The existing system has wireless communications - Sedona Wireless Pulse Counting Panel with integral antenna compatible with existing wireless network frequency.	NC/R		In the future, JLab is planning to move away from wireless communications. Coordinate and discuss planned new system with JLab.

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
232113	Hydronic Piping Systems	Low conductivity water (LCW) system piping shall be 304 stainless steel piping unless alternatives are approved by Jefferson Lab.	NC/R		
		Low conductivity water (LCW) system nitrogen pressure regulators shall be self relieving type with pressure gauges.	NC/R		
		Low conductivity water (LCW) filter housings shall be polished stainless steel housings. Hinged lids with bolt, wingnuts, or similar fasteners shall be utilized where practicable.	NC/R		
		All piping systems shall be designed in accordance with applicable ASME B31 Codes. Required pressure vessels shall comply with ASME Boiler Pressure Vessel Codes.	NC/R		ASME sections will be selected during design. Piping varies depending on fluid pressure and temperature.
			NC/R		Address how pipes should be cleaned prior to connection to existing system.

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
					The A/E shall provide specific guidelines for relief device selection for hydronic, compressed air and gas systems.
		LCW system valves shall have Veton (fluorocarbon rubber) seats	NC/R		
232123	HVAC Pumps	Pumps shall be laser aligned when installed and documented.	NC/R		Designer shall size pump strainers.
232413	Underground Distribution Piping Systems	Underground piping shall be installed in appropriately designed bedding. Pipe bedding shall be inspected prior to backfilling. Trench details shall be included on contruction drawings.	NC/R		
		All underground piping shall be installed with a trace wire. Wire shall be #10 insulated, Solid Copper wire. Splices shall be connected via wire nuts and taped with rubber tape (minimum).	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
232500	HVAC Water Treatment	Water treatment shall be provided by the currrent Jefferson Lab water treatment subcontractor which currently is Chemtreat. Consult water treatment subcontractor when specifying water treatment equipment and chemicals are to be provided.	NC/R		
234100	Particulate Air Filtration	Considering COVID-19 concerns and current sustainable design factors, Merv-14 filters should be utilized on recirculated air handling air streams. Outdoor air pre-filters can be lower rated filters like MERV-8. System utilizing washable filters should not be used.	NC/R		
236000	Water Chillers	CFC or HCFC refrigerants are not acceptable for any type chiller specified.	NC/R		
		Large chillers shall be factory tested.			Determine other testing specific to the type of chiller.
		All chillers shall be provided with manufacturer provided unitary controllers that will be interfaced with building control system.	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
236500	Cooling Towers	All cooling towers shall be installed with at least 6 feet clearance below the tower lower basin support structure.	NC/R		
		Cooling towers shall be installed with separate bypass and equalizer piping. Bypass piping shall be piped into the lower tower basin and not into tower pump suction piping.	NC/R		
		Tower fan motors shall be controlled by variable frequency drives (VFD's).	NC/R		
		Cooling tower bypass valves are to be pneumatic actuated modulating control valves.	NC/R		Valve type and operational parameters shall be specified.
		Cooling tower lower basins shall be of stainless steel construction.	NC/R		
			NC/R		Evaluate installation of strainers to protect plate and frame heat exchangers attached to cooling towers.
		Cooling tower fans shall be belt driven. No gear reducers shall be utilized.	NC/R		

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
238123	Computer Room Air Conditioners	Only Liebert computer room air conditioning systems shall be utilized.	NC/R		
		Computer units manufacturer provided control modules shall be interfaced with the building direct digital control system. Discharge air temperature in addition to other typical parameters shall be monitored.	NC/R		
		Provide units with Site-scan monitoring	NC/R		

DIVISION 26 – ELECTRICAL

This section provides requirements for Electrical systems used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

260500	Electrical General Requirements
260513	Medium Voltage Cables
260519	Low-Voltage Electrical Power Conductors
260519.13	Under-carpet Cables
260526	Grounding
260529	Supports
260533	Raceways and Boxes
260543	Underground Ducts
260553	Identification
260573	Fault Current and Coordination Study
260913	Power Monitoring and Control
260923	Lighting Control Devices
261116	Secondary Unit Substations
261200	Medium Voltage Transformer

261300	Medium Voltage Switchgear
262200	Low Voltage Transformers
262300	Low Voltage Switchboards
262413	Switchboards
262416	Panelboards
262419	Motor Control Centers
262500	Enclosed Bus Assemblies
262600	Power Distribution Units
262713	Electricity Metering
262726	Wiring Devices
262816	Enclosed Switches and Circuit Breakers
262913	Enclosed Controllers
262923	Variable Frequency Devices (VFD's)
263213	Generators
263600	Transfer Switches
264113	Lightning Protection System
265100	Interior Lighting
265600	Exterior Lighting

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
260500	Electrical General Requirements		NC		Where any type of sleeve is placed through a sheet steel wall, provide a flange around the sleeve with a gasket to make it water tight. Provide a 4" RGS nipple sleeve through all electrical room exterior walls or additional locations as identified so that temporary cables can be brought in from a generator. Provide sleeve with a threaded cap on exterior side of building.
			R		Where any type of sleeve is placed through a sheet steel wall, provide a flange around the sleeve with a gasket to make it water tight. Consult with JLab Electrical Manager, regarding requirements for temporary generator.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Add the following paragraph under Part 3: Quality Assurance: Jefferson Lab will perform inspections at key phases of the work. It is the responsibility of the Contractor to request and coordinate the following inspections prior to covering the work. If Jefferson Lab approval is not received prior to covering up the work, the Contractor will be responsible for removing and replacing the work at no additional cost to Jefferson Lab to facilitate the inspection. Jefferson Lab inspections are required for sub-surface, grounding, rough-in, and heat trace before insulation. DESIGNER: Consult with the Jefferson Lab Facilities Electrical Manager for additional recommended phases to be added to the above paragraph.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Provide Coordination Drawings for approval for each electrical and mechanical room. Coordination drawings shall indentify each electrical distribution item with size coordinated with approved equipment submittals. Shop drawings shall identify each mechanical item with size coordinated with approved equipment submittals. Coordination drawings shall show areas reserved for control devices and shall show equipment maintenance clearance requirements.	NC/R		Provide coordination drawings for mechanical and similar systems.
		Electrical installation shall be in accordance with the 2017 NEC and personnel shall be trained in both the 2017 NEC and the 2015 NFPA 70E.	NC/R		
260513	Medium Voltage Cables		NC/R		Use Jlab Specifications shown in Appendix B
260519	Low-Voltage Electrical Power Conductors	Class 1 and 2 Control Circuits: Conductors shall be stranded.	NC/R		Solid conductors not permitted. Separate 300V cables from 600V cables on systems where voltages above 300V peak to peak exist. Separate control voltage cables and components (50V or less) from higher voltages.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Leave 12 inches of slack at outlets and junction boxes.
260519.13	Undercarpet cables		NC/R		Not permitted.
260526	Grounding		NC/R		Include spec for UFER ground where possible (new slabs/foundations).
			NC/R		A/E is required to develop a grounding plan that Jlab will use to inspect the grounding installation. Only Grounding Electrode Conductors shall be shown, but their points of contact shall be identified so that each can be individually examined.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
260529	Supports	Exterior supports shall be be 3" galvanized steel pipe embedded in 12" x 3' concrete encased foundation at each pipe for lightweight equipment. For heavy equipment or equipment racks with multiple large equipment, provide 6" x 2" x 1/4" galvanized steel channel embedded in 18" x 3' deep concrete foundation. Any welded equipment shall be hot-dipped galvanized following fabrication. All outdoor equipment shall be mounted using through bolts or welded studs with washers and lock washers. Hardware shall be stainless steel. Any modifications to the support made after fabrication shall be coated with galvanized spray paint.	NC/R		
260533	Raceways and Boxes		NC/R		Exterior boxes shall be stainless steel. Use JLab specifications provided in Appendix.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Underground conduit shall be PVC sch 80. It shall be changed to PVC coated RGS conduit, underground. All RGS connection points shall be coated with field applied PVC coating. PVC coating shall extend 12" above finished grade or to bottom of equipment, whichever is shorter.	NC/R		
		EMT conduit fitting shall be steel, no die-cast.	NC/R		
		Conduit exposed outdoors subject to damage shall be RGS. Where conduit is installed outdoors but not subject to damage, Sch 80 PVC may be used. Remodel shall match existing unless extensive replacement is required.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Add statement: When using air pressure to install pull strings into empty conduits, protect interior of buildings and equipment from water intrusion through penetrations of new or existing conduits. In new construction, every conduit penetrating an exterior wall shall have an LB or junction box installed on the exterior of the building. Include a note on the AHA that whenever pull strings are installed, the cover of LB/junction box shall be removed and a rag shall be placed in the conduit entering the building to prevent inadvertent contamination by water in conduits from entering the interior of the building. In existing buildings, care shall be exercised to install strings from the interior of the building to the exterior. Where normal means will not permit diverting the water, the equipment shall be disassembled and removed prior to applying air pressure.
			NC/R		Minimum raceway size is ½”

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
260543	Underground ducts		NC/R		Concrete encasement is required for 15 kV circuits. Under paved areas, they shall be steel reinforced to a distance of 6' on both sides.
		Encased conduit shall be schedule 40.	NC/R		Encased conduit shall be schedule 40. Type EB conduit is not permitted
		Manhole Accessories: Racks shall be non-metallic (fiberglass). See Jlab Spec.	NC/R		
			NC/R		No fixed ladders.
			NC/R		Note, the Water table is high so the sump in the bottom of the manhole/handhole will have to be broken out or otherwise penetrated to allow ground water to seep in.
260553	Identification		NC/R		Raceways don't have to be identified except for Fire Alarm Systems (painted red). Use JLab specifications.
			NC/R		Junction boxes have to have panelboard and circuit numbers written or adhesive embossed tape (Dymo labels) on the covers.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Device Covers must have panelboard and circuit numbers labelled using embossed adhesive tape (Dymo labels).
		All equipment labels and signs shall be engraved plastic (Normal power - black with white letters, Generator backed power - Red with white letters) and shall be fastened to the equipment with self-tapping machine screws. Equipment mounted outdoors shall be fastened with stainless steel screws.	NC/R		
260573	Fault Current and Coordination Study		NC/R		Fault current, overcurrent device protection study and arc flash labels shall be done using SKM PowerTools software - no exceptions are permitted. All project and data files shall be submitted after work is complete. Work shall be validated on Jlab computers before payment is made. For small jobs, only a fault current analysis is required. For small jobs, overcurrent protective device coordination can be done in the field duirng startup and operation.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Submit data sheets for each fuse and breaker included in the study with the settings for each breaker.
260913	Power Monitoring and Control	Meters shall be Shark 50B or approved equal with integral Modbus over TCP/IP interface. Where meters are connected as a group to the internet, install main meter gateway with the ability to receive Modbus over RS485 connections and translate them over TCP/IP to the network. Downstream meters to be installed with Modbus over RS485 in series with one another back to main meter gateway.	NC/R		All installed meters shall be connected to the closest network switch. Where meters are connected as a group to the internet, install main meter gateway with the ability to receive Modbus over RS485 connections and translate them over TCP/IP to the network. Downstream meters to be installed with Modbus over RS485 in series with one another back to main meter gateway.
			NC/R		Where CTs are connected, provide a shorting block for each CT. The shorting block shall be labeled to identify which CT it is associated with. When voltage signal is brought to a meter panel, a fuse block with finger-safe fuses shall be installed close to the source of power. All meter panels shall be UL Labeled or Listed.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		• Badger disc or turbine meters with Recordall Transmitter Registers (RTR) pulse output capability • Ethernet Communications – ADAM I/O module with integral 10/100 based-T Ethernet interface • Wireless Communications – Sedona Wireless Pulse Counting Panel with integral antenna compatible with existing wireless network frequency	NC/R		
					The EMMS monitors consumption and rate of consumption/flow for electric (Kwh/Kw), water (Gallons/GPM) and natural gas (CCF) utilities throughout the site. All metering devices must, at a minimum, be capable of providing above relevant data units. The EMMS utilizes an EPICS (VES) software program to view, analyze and report preparation for all metered data. A communications system of both Ethernet (TCP/IP) and wireless network devices connect all metering equipment to the VES web server.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
260923	Lighting Control Devices		NC/R		Outdoor lighting. Outdoor lights shall be controlled by a lighting contactor mounted in an enclosure with a HOA switch automatically controlled by a photocell. This includes parking lighting, door lights walkway lights etc.
			NC/R		Indoor occupancy sensors shall be installed in all rooms where permitted by the code (not electrical rooms or mechanical rooms). They shall be at least dual technology. In offices and conference rooms, the use of ceiling mounted sensors with remote relays mounted above the suspended ceiling shall be used. Relays shall be controlled by switches at the doors to turn lights off when the room is occupied.
261116	Secondary Unit Substations		NC/R		All meters (pressure, temperature and oil level) have to be monitored by the DDC system. Provide wiring from the transformer to the DDC system.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Transformers have to be installed on pads with curbs high enough to trap spilled oil (complete rupture of tank). Include Jlab details on drawings to provide a sump and filter to allow rainwater to drain. Curbs and pad size have to be coordinated with enclosure doors (Primary and Secondary fusing compartments).
			NC/R		We want fuses on the Primary and Secondary. No Circuit Breakers.
			NC/R		Generally, we don't want Secondary Unit Substations. We want Padmounted transformers.
			NC/R		Top: The top of the tank shall be removable and large enough to service bushings, fuseholders, gauges,and switches. This shall be noted on the drawings.
261200	Medium Voltage Transformer		NC/R		We want Padmounted transformers. See JLab specifications provided in Appendix B

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		.	NC/R		Transformers have to have an adjacent secondary side switchboard with one or more circuit breakers. Use Jlab details.
			NC/R		The pad has to have an oil containment curb and a sump and filter to allow rainwater to drain from the pad. Use the Jlab details on the drawings.
			NC/R		The filter is a Basic Concepts Petro-Pipe
			NC/R		Provide gauges with contacts for the pressure, temperature, and oil level in the transformer. Extend signals to the DDC system.
			NC/R		Provide a trench in the pad from the transformer to the switchboard. Use Jlab detail.
			NC/R		Provide two sets of bushings for loop feed operation (A&B). Bushings shall be 600 A. For use on a 15 kV system (either 12.47 kV or 13.2 kV). Provide one set of Surge arrestors on the A input side. Terminations shall be molded rubber type.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Insulating oil for transformers shall be mineral oil. Edible seed type oil is not permitted.
			NC/R		For loop feed operation: Provide three, two position switches A-On/Off, B-On/Off, X-On/Off all on primary side.
			NC/R		Impedance: 5%
			NC/R		Stainless steel tank base.
			NC/R		Provide bayonet and current limiting fuses. Bayonet fuse holders shall have flapper valves.
		Provide transformers with Schrader Valves to service transformers.	NC/R		
		Oil filled transformers shipped under vacuum shall be serviced prior to startup to remove vacuum and provide nitrogen blanket a pressure coordinated with temperature.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Switches for A and B primary feeds shall be rated 550 A, minimum. X switches shall be rated for transformer primary current.	NC/R		
		Oil filled transformers shall be supplied with provisions for adding fans in the future. Transformers shall be supplied with tube and fin radiators.	NC/R		
			NC/R		Transformers have to be installed on pads with curbs high enough to trap spilled oil (complete rupture of tank). Include Jlab details on drawings to provide a sump and filter to allow rainwater to drain. Curbs and size of pad have to be coordinated with enclosure doors (Primary and Secondary compartments and switchboard door).
261300	Medium Voltage Switchgear		NC/R	See Attachment	Use Jlab Specification provided in Appendix B

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
262200	Low Voltage Transformers		NC/R		Use ventilated transformers, indoors and outdoors. Where installed anywhere except designated electrical rooms, provide expanded metal screens over openings at top of transformer, indoors and outdoors.
262300	Low Voltage Switchgear		NC/R		We normally use switchboards, not switchgear.
262413	Switchboards	In all areas except TED Building and Test Lab, use GE or Eaton. In TEDF and Test Lab, use Square D.	NC/R		Use JLAB specifications provided in Appendix B
			NC/R		Two levels of ground fault are required. One at the main circuit breaker and another at the next level.
			NC/R		Space heaters are required outdoors.
			NC/R		Provide a set of mechanical lugs on each switchboard per service for connection of #4/0 cables to be connected to a temporary generator. Provide one set per 400 A of service rating.
			NC/R		Provide TVSS devices, preferrably integral to the switchboard

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Provide meters in switchboards for connection to Energy management System.
			NC/R		Provide analog voltage meters.
			NC/R		Provide all breakers with padlocking devices.
			NC/R		No series rated devices.
			NC/R		All breakers shall be adjustable LSIG.
			NC/R		Exterior switchboards shall have control power transformers to provide power to a GFCI convenience outlet and switchboard heaters.
			NC/R		Install all switchboards on housekeeping pads including outdoors.
			NC/R		Breaker setting devices: Provide 4 each devices required to set breakers with no load connected.
		To Section 2-Products, add: Provide a Panduit Verisafe Voltage Tester Unit in the cover of each switchboard. Mount in metering compartment.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Provide switchboards with fused switches for all high power electronic loads. Circuit breakers may be used for general purpose loads (lighting, typical building loads, etc). Main switch at transformers shall also be fused (bolted pressure switch with ground fault protection).	NC/R		
		Provide digital meters as described in section 260913.	NC/R		
262416	Panelboards	In all areas except TEDF and Test Lab, use GE or Eaton. In TED Building and Test Lab, use Square D.	NC/R		In all areas except TEDF and Test Lab, use GE or Eaton. In TEDF and Test Lab, use Square D.
			NC/R		Provide panelboards at cooling towers to provide power to heat tape and other electrical auxiliaries. Include electric heating for water to emergency showers and eyewashes. Include heat tape on eyewashes and showers.
			NC/R		All panelboards shall have hinged outer covers (door-in-door design).
		Square D panelboards shall be provided with padlocking devices.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		No fuses
			NC/R		Circuit breakers shall be bolt-on type.
			NC/R		Short Circuit Rating - Fully rated, no series rating without approval during design.
		To Section 2-Products, add: Provide unit rated for voltage of each panelboard. Device may be mounted in the door of the panelboard adjacent to the hinge on the side of the panelboard enclosure (surface mounted units only) or in an adjacent box attached (nippled) to the panelboard.	NC/R		
		Provide switchboard with Verisafe Voltage detection unit by Panduit	NC/R		
262419	Motor Control Centers	GE or Eaton	NC/R		
			NC/R		Provide meters in Motor Control Centers for connection to Energy management System.
		Meters shall be in accordance with JLab specification Section 260913.	NC/R		Do not provide analog meters.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Provide red and green lights for each starter bucket.
			NC/R		Provide current switches on each bucket to use as an alarm to indicate a no load condition.
			NC/R		If a DDC or other type of control system is required to operate the equipment supplied by the MCC, the power circuit for that central controller shall come from an enclosed circuit breaker in the MCC.
			NC/R		Auxiliary relays shall be wired to the DDC system to indicate a power outage or tripped circuit breaker.
			NC/R		Circuit Breakers shall have settings for connection to NEMA Premium Efficiency motors.
262500	Enclosed Bus Assemblies		NC/R		Shop Drawings shall include coordination with both sides of enclosed bus assemblies to be used.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Plug-in devices shall have disconnecting means.
262600	Power Distribution Units	Shall be Emerson with SNMP cards for remote monitoring.	NC/R		
			NC/R		Circuits shall be dropped under raised floor to a junction box. Provide at least 10 spare 3/4" conduits from the PDU to the junction box.
		Circuit Breakers shall be bolt-on type, GE or Eaton.	NC/R		
			NC/R		Where multiple circuits are furnished to equipment racks for redundancy, connected load shall not be greater than 40% of PDU rating.
262713	Electricity Metering	Use Shark 50B or approved Modbus over TCP/IP equal.	NC/R		
262726	Wiring devices	Welding outlets: Hubbell 460R7W, provide each with a non-fused disconnect switch and a matching plug HBL460P7W.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Switched Receptacle: Meltric decontactor series Switch Rated Plugs and Receptacles. Provide on all remote mechanical equipment requiring means of disconnect. Example, exhaust fans, supply fans, remotely located pumps and fans, etc.
			NC/R		208/120 V receptacles: 5 wire, L21-30R. Any other 208 V receptacle requires special permission.
			NC/R		480 V receptacles: L22-30R
262816	Enclosed Switches and circuit breakers	Breaker shall be GE or Eaton.	NC/R		
			NC/R		Switches shall be heavy duty.
			NC/R		Breakers: In general, 250-400 A shall be thermal magnetic with adjustable magnetic trip setting. Over 400 A shall have electronic trip setting with LSIG functions.
		Outdoor enclosures and enclosures in washdown areas shall be stainless steel, NEMA 4X.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Breakers 1200 A and above: Provide adjustable instantaneous trip setting	NC/R		
			NC/R		Coordination Study: Circulate available arcing current and set instantaneous current trip setting below this value.
		Circuit Breakers where GFCI is required: Provide 150V to ground and less	NC/R		
		Single phase receptacles shall be protected up to 50A	NC/R		
		Three phase receptacles shall be protected up to 100A	NC/R		
		Require GFPE testing after equipment is installed (as part of commissioning).	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
262913	Enclosed Controllers		NC/R		Control circuits - use integral CPTs. Coordinate voltage with DDC control. Normally, we want a relay in the enclosed controller that is controlled by the DDC controller. This relay would control voltage to the coil. Any time delay would be via a true-on delay relay in the enclosed controller and not dependant on programming from the DDC.
			NC/R		Overload relays shall be solid state type that will provide single phase protection.
			NC/R		Combination starters are not allowed with fuses. Provide circuit breakers or non-fused switches.
		Units shall have UL Label	NC/R		
			NC/R		Connection, terminals, etc operating at or above 50 V shall have finger safe covers over exposed terminals.
			NC/R		Low voltage sections and equipment (<50 V) shall be segregated from voltages 50 V and over with covers and barriers or placed in other adjacent enclosures.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Outdoor enclosures and enclosures in washdown areas shall be stainless steel, NEMA 4X.	NC/R		
			NC/R		Provide auxilary relays so that the DDC system is alerted when the starter overloads are tripped or there is a power failure.
262923	Variable Frequency Devices (VFD's)		NC/R		In general, bypass magnetic controllers are not required. See mechanical section 230513 for HVAC electrical requirements for motors operated by VFD's
			NC/R		Provide 5% line reactors in each VFD.
			NC/R		Include monitoring of VFD status in DDC control. In particular, we want to know when it fails or there is a power outage.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Go back to sections which specifiy motors that are controlled by VFDs. Require motors to be "Inverter Rated". Also, Require that those same motors have to have at least one ceramic bearing. Where motors are located where they can be easily inspected and maintained, a ground ring may be substituted for the ceramic bearing.
		For motors operated by VFD, 1. 50 hp and below shall be provided with shaft grounding rings. 2. 51-99 hp shall be provided with at least one ceramic bearing. 3. Motors 100 hp and above shall be provided with shaft grounding ring and at least one ceramic bearing. 4. All motors operated by VFD shall have inverter rated windings.	NC/R		
263213	Generators		NC/R		Identify source for jacket water heater, stator heater, and battery charger.
			NC/R		The A/E shall specify Natural Gas generators, which are preferred by Jlab. This type will be installed based on use. Discuss condition with JLab.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Provide a circuit for a convenience outlet at the generator.
			NC/R		Diesel tanks shall have double wall tanks with a sensor to indicate a leak in the outler tank.
			NC/R		Remote alarms: Generator summary alarm, inner tank leak, generator running, battery low voltage, battery charger malfunction.
		Muffler: 85 dBA or less (Industrial)	NC/R		
			NC/R		Provide battery charger at the generator.
			NC/R		Provide two output circuit breakers, minimum. One for normal generator output and a second to use to hookup 4/0 cables with camlock connectors for connection to a load bank.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Provide catwalks and steps to provide passive fall protection in accordance with OSHA 1910 to maintain generator. Catwalks, stairs and handrails shall be designed by the manufacturer or the manufacturer's representative and coordinated with door swings of the enclosure access doors.
			NC/R		On-site load tests shall be conducted in July and August.
			NC/R		Insert UFER ground in pad even if it isn't used.
		Provide a Load Bank Connection Box connected to dedicated generator output circuit breaker for connection of camlock cables for annual generator load bank testing.	NC/R		
263600	Transfer Switches	Outdoor enclosures shall be NEMA 4X, stainless steel.	NC/R		
			NC/R		Alarms for Normal Power Outage and Load on Generator to DDC system.

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Only contactor type switches are allowed.
			NC/R		Provide pre-action switches capable of providing a signal of advance warning of switching from Emergency to Normal. Switch shall be adjustable from 0-60 seconds, minimum.
			NC/R		Provide neutral switching for alternate supply units that are configured as separately derived sources. Otherwise, do not switch neutrals.
264113	Lightning Protection System.	Require UL Master Label	R		
		Certified by UL.	NC/R		
		Ground rods copper clad steel, 3/4" x 10'	NC/R		
			NC/R		Include bonding point to electrical grounding electrode.
		For existing systems (additions) require updated UL Master Label.	NC/R		
265100	Interior Lighting	Use LED fixtures instead of fluorescent.	NC/R		

DIVISION 26 - ELECTRICAL					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		LED Exit signs with battery backup..	NC/R		
		LED Emergency Lights with battery backup (assuming no generator.	NC/R		
			NC/R		On the lighting plan, show the paths of egress that the Architect comes up with and show lights that illuminate that path.
			NC/R		Lighting arrangement shall be coordinated around fixed equipment to enable maintenance access.
265600	Exterior Lighting	Use LED fixtures whenever possible.	NC/R		
					Use luminaire mounted photocells only where approved. Otherwise, use electrical contactors that are photocell controlled with HOA switches.

DIVISION 27 – COMMUNICATIONS

This section provides requirements for Communications systems used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

270500 Common Work Results for Communications

271300 Communications Backbone Cabling

271500 Communications Horizontal Cabling

275123 Intercommunications and Program Systems

DIVISION 27 - COMMUNICATIONS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
270500	Common Work Results for Communications	Electrical installation shall be in accordance with the 2017 NEC and personnel shall be trained in both the 2017 NEC and the 2015 NFPA 70E.	NC/R		
271300	Communications Backbone Cabling	Manufacturers for fiber & copper: CommScope or SYSTIMAX Solutions	NC/R		
		FDU Manufacturer: CommScope	NC/R		
		UTP Hardware: Leviton and CommScope	NC/R		
		Data jacks to be colored blue for Cat6 cabling. Silver for Cat6A cabling	NC/R		
		All fiber to terminate with type LC ends. Single-Mode fiber to terminate with grey colored ends. Multi-Mode to terminate with blue colored ends	NC/R		
			NC/R		For every network rack/cabinet, a receptacle on house power is required. If available, an additional receptacle on emergency power is required. The type of receptacle is dependant on the design. Consult with JLAB SME

DIVISION 27 - COMMUNICATIONS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
		Innerduct to be 1" or 2" colored orange. All fiber not armored, and in an open raceway must be enclosed in innerduct.	NC/R		
		Indoor fiber Colors: Single-Mode yellow, Multi-Mode orange	NC/R		
271500	Communications Horizontal Cabling	Manufacturers: CommScope or SYSTIMAX Solutions	NC/R		
		UTP Hardware: Leviton and CommScope	NC/R		
		Use Blue for Cat6 cabling and silver for Cat6A cabling	NC/R		
		Provide 7' blue patch cord with jack sleeve for all installed ports plus 25%	NC/R		
275123	Intercommunications and Program Systems				Voice and IP phone sets are provided by Jlab.

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

This section provides requirements for Electronic Safety and Security systems used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

280500	Common Work Results for Electronic Safety and Security
283500	Refrigerant Detection and Alarm

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
280500	Common Work Results for Electronic Safety and Security	Electrical installation shall be in accordance with the 2017 NEC and personnel shall be trained in both the 2017 NEC and the 2015 NFPA 70E.	NC/R		
283500	Refrigerant Detection and Alarm	Provide refrigerant alarm lights and audible alarms at all refrigerant area entries. When feasible, refrigerant monitor control interface shall be installed outside the refrigerant area to enable evaluation of the measured refrigerant concentration level without entering the refrigerant area. Refrigerant alarms shall be monitored and remotely alarmed by the building direct digital control system.	NC/R		

DIVISION 31 – EARTHWORK

This section provides requirements for Earthwork used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

310000	Earthwork, General
312000	Earth Moving
312319	Dewatering

DIVISION 31 - EARTHWORK					
SECTION NO.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
310000	General Requirement	Testing and Inspecting: All independent testing required by work shall be arranged and paid for by the subcontractor.	NC/R		
312000	Earth Moving		NC/R		On site soil type SC is acceptable for backfill in nonpaved areas. Imported SC material is not acceptable for backfill.
312319	Dewatering		NC/R		Provide Dewatering specifications if project requires dewatering.
			NC/R		Projects with a large dewatering requirement needs to have site condition information to size the dewatering equipment.
			NC/R		At Jlab, water table is approximately 5 feet below grade.

DIVISION 32 – EXTERIOR IMPROVEMENTS

This section provides requirements for Exterior Improvements used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

320000	General Requirements
321216	Asphalt Paving
321313	Concrete Paving
328400	Planting Irrigation
329200	Turf and Grasses

DIVISION 32 - EXTERIOR IMPROVEMENTS					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
320000	General Requirements		NC/R		Include as-built location requirements from Division 01 sections for all underground utilities installed or encountered.
321216	Asphalt Paving		NC/R		Fire lanes and fire hydrant access roads shall be a minimum of 26 feet wide and capable of supporting 80,000 lbs vehicles set on stabilizing outriggers. Minimum thickness for asphalt shall be 2 1/2" base course with 1 1/2" topping (wearing course).
321313	Concrete Paving		NC/R		Fire lanes and fire hydrant access roads shall be a minimum of 26 feet wide and capable of supporting 80,000 lbs vehicles set on stabilizing outriggers.
328400	Planting Irrigation		NC/R		Jlab will decide where irrigation will be used on new or modified landscape.
329200	Turf and Grasses		NC/R		Provide native turf and grasses only.
			NC/R		Use seeds appropriate to climate conditions in the zone area. Stabilize with seed aide (granular stabilizer) at a rate of 50lb/msqft

DIVISION 33 - UTILITIES

This section provides requirements for Utilities used at JLAB that may be used for remodeling or new construction. The usage is identified in each section by “NC” or “R”.

330523.13	Horizontal Directional Drilling
334100	Storm Utility Drainage Piping
334600	Subdrainage
336313	Underground Utility Distribution Structures

DIVISION 33 - UTILITIES					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
330523.13	Horizontal Directional Drilling		NC/R		Use specifications from JLab masterspec folder and noted in the Appendix
334100	Storm Utility Drainage Piping		NC/R		Include a trench detail section on drawings.
			NC/R		Obtain existing site drawings and available information from Jlab prior to proceeding with stormwater calculations.
		Require flared end sections on the inlets and outlets of all storm drainage piping 12" or larger in diameter.	NC/R		
334600	Subdrainage		NC/R		Provide filter fabric on the inside surface of the trench instead of around the piping.
336313	Underground Utility Distribution Structures		NC/R		Do not use plastic manholes and/or valve boxes.
			NC/R		Designer needs to identify the material to be used for manholes, valve boxes, handholes, etc.

DIVISION 33 - UTILITIES					
SECTION No.	SECTION NAME	SPECIFICATION	NC/R	ATTACHMENT	REMARKS
			NC/R		Valve boxes on all water distribution lines 6" or larger shall be 12" in diameter (v/s 6" or 8"). If possible and cost effective set these boxes in a 24" square by 4" thick concrete pad.

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DRAWINGS REQUIREMENTS

CIVIL DRAWINGS

This section provides information that JLAB requires to be noted on Civil drawings.

1. Jefferson Lab ground control system shall be maintained across all site drawings (JLAB will provide control point locations and descriptions).
2. A full size model of the site shall be maintained throughout the CAD design process; use properly scaled and rotated ("twisted") paper space viewports for plotting.
3. All site drawings shall be plotted at a minimum scale indicated in the CAD drawing standards included in Appendix A.
4. Contour interval shall be ½ foot or less.
5. Add the following note to the Civil existing site utility drawing, "Refer to Division 1 specifications for utility locate requirements".
6. Include soil borings in the construction contract drawings.
7. All roadways shall be a minimum of 26'-0" wide. Exceptions will be considered on individual project basis.
8. Site bollards must be appropriately designed for site areas. Barriers/bollards can be permanent or removable; however, they must be designed to enhance the aesthetics of the site. Jersey barriers are acceptable for temporary use.

ARCHITECTURAL DRAWINGS

This section provides information that JLAB requires to be incorporated in the design or noted on Architectural drawings.

1. Provide Life Safety /Fire Exiting Requirements Plan and Building Code data on one of the General Information sheets in front of the architectural plans.
2. Depending on the size of the project, provide a global reference plan.
3. For installation of bathroom accessories, include a requirement that the Construction Contractor shall provide backing support for JLab accessories.
4. The design of steps or stairs located below the water table and require waterproofing, shall be with vertical and horizontal surfaces only, and not sloped surfaces. Based on JLab's experience, poor quality work resulting in leaks to the building has occurred when waterproofing was applied to sloped and slanted surfaces.
5. Conduits must be relocated from the underside of the roof, under a separate contract, prior to executing a re-roof project.
6. Design wind speed for reroof or original roofs will be per the IBC code. Design wind speed of critical buildings, as described in the IBC, will be 130mph.
7. Unless otherwise required by design, use parapets around building perimeter to satisfy code requirements for fall protection.
8. UL certification for lightning protection must be obtained under new and re-roof projects.
9. Site bollards must be appropriately designed for site areas. Barriers/bollards can be permanent or removable; however, they must be designed to enhance the aesthetics of the site. Jersey barriers are acceptable for temporary use.

STRUCTURAL DRAWINGS

This section provides information that JLAB requires to be noted on Structural drawings.

1. Include general structural requirements indicated below and on cover sheet of Structural specifications on drawings.
   The following minimum loads shall be used for the design of all structures.

   - Snow Loads: Ground snow load, 15 psf
   - Wind Loads: 115 mph (3 second gust), Exposure B
     130 mph for critical buildings
   - Seismic Loads:
     4. Short Period Spectral Response Acceleration, S_s = 0.127
     5. 1-second Period Spectral Response Acceleration, S_1 = 0.05
     6. Soil site: Class D
   - Importance Factors: Not less than 1.0

2. All existing site conditions shall be field verified prior to definitive design.

MECHANICAL DRAWINGS

This section provides information that JLAB requires to be noted on Mechanical drawings.

1. Provide a drawing for mechanical points list.
2. Provide power to control panel from two sources.
3. Provide trench details on mechanical drawings or reference the civil drawings for the trench detail.
4. Provide design table for all pressure systems. (A sample design table is included in Appendix D).

PLUMBING DRAWINGS

This section provides information that JLAB requires to be noted on Plumbing drawings.

1. Provide details for distribution piping.
2. Provide design data on first sheet.
3. Provide design table for all pressure systems. (A sample design table is included in Appendix D).
4. Provide riser diagrams.
5. Provide trench detail for underground piping. Installation procedure shall include provision for vertical bracing when installing water distribution valves "transition collar". Require that transition collar bolts be re-torqued after the pipe has been at operating temperature for an hour or so as the temperature change may affect initial operation.

FIRE PROTECTION DRAWINGS

This section provides information that JLAB requires to be noted on Fire Protection drawings.

1. Provide the building construction code data on first sheet.
2. Provide sprinkler heads under open stairwell risers.

ELECTRICAL DRAWINGS

This section provides information that JLAB requires to be noted on Electrical drawings.

1. Provide a Grounding plan, One Line Diagram and Riser Diagrams.
2. Coordinate access control with hardware specifications.
3. Secondary Unit Substations: Note that the top of the tank shall be removable and large enough to service bushings, fuse-holders, gauges, and switches.
4. Conduits must be relocated from the underside of the roof, under a separate contract, prior to executing a re-roof project.

FIRE ALARM DRAWINGS

This section provides information that JLAB requires for separation of drawings.

1. Provide separate drawings for Fire Alarm system. These drawings shall not be included as part of the Electrical drawings.

APPENDICES

APPENDIX A

This section identifies the current copy of Division 1, General Requirements specifications developed for use in the design of projects on JLab's site. Use the most current copy from JLab Facilities master spec folder. The project manager shall provide specifications to the A/E at the start of each design task. These documents must be edited, as required, for the specific project.

The list of specification sections are included in the Table of Contents. These specifications will be updated periodically; therefore, as indicated above, at the beginning of each project, the A/E shall request the most current set of specifications from JLAB.

DO NOT alter or erase the date in the top right hand corner of the documents.

APPENDIX B

This section identifies JLab's technical specification sections in Division 26 and Division 33 to be used for design projects. See table of contents for list of specifications.

The most current sections shall be obtained from JLab Facilities master spec folder. These specifications will be updated periodically; therefore, at the beginning of each project, the A/E shall request the most current set of specifications from JLab.

DO NOT alter or erase dates in the upper right hand corner of the document.

APPENDIX C

This section references JLab's site-specific Fire Protection requirements to be used for design projects. Obtain a current copy from the JLab website at

https://www.jlab.org/ehs/ehsmanual/Fire/Ch1.htm

APPENDIX D

This section includes a sample of the Design Data Table to be used for Pressure Systems design projects.

PRESSURE SYSTEM DESIGN TABLE (Sample)

DESIGN DATA TABLE		
SYSTEM	A/C REFRIGERANT SUCTION	A/C REFRIGERANT HOT GAS / LIQUID
DESIGN WORKING PRESSURE	120 PSIG, NOMINAL	400 PSIG, NOMINAL
DESIGN WORKING TEMPERATURE	35°F, NOMINAL	115°F, NOMINAL
ASME CODE	B31.5	B31.5
SYSTEM FLUID	R410A	R410A
PIPING MATERIAL	COPPER TYPE ACR	COPPER TYPE ACR
FABRICATION ORGANIZATION	CONTRACTOR	CONTRACTOR
DESIGN ORGANIZATION	H&A	H&A
JOINT EXAMINATION REQUIREMENTS	VISUAL	VISUAL
TESTING REQUIREMENTS	NOTE 1	NOTE 1
MISCELLANEOUS	NOTE 2	NOTE 2
REMARKS: 1. AIRTIGHT TESTING METHOD TO 535 PSIG. SEE MANUFACTURER'S INSTALLATION MANUAL. 2. FOR ADDITIONAL REQUIREMENTS, SEE SPECIFICATIONS.		

APPENDIX E

This section includes a copy of JLab's Office Space Policy to be used for design projects.

Space Management Policy		
Number: 301.04	Revision: 0	Effective Date: 1 May 2020

POLICY

It is the policy of JSA to respond to all space needs in an expeditious and systematic manner that supports the optimal use of space as a mission readiness resource in a strategically planned and cost effective manner. The need for office, technical, and storage space at Jefferson Lab is continually fluctuating based on programmatic requirements and the associated levels of funding. Filling these requirements involves a careful planning and procurement process.

This policy applies to all DOE and JSA owned/leased space for the benefit of Jefferson Lab. The Laboratory Director and Chief Operating Officer (COO) have delegated the implementation of this policy to the Facilities Management & Logistics (FM&L) Division.

Jefferson Lab operates under a landlord-tenant arrangement where space is allocated to divisions for specific use in support of the Lab's mission. Each division shall designate a space coordinator who is responsible managing the utilization of the space allocated to their division in accordance with Lab space management policy, principles, and procedures. No division “owns” the space that has been allocated to it. All space is subject to reallocation to meet the overall needs and best interests of the Lab.

Office space is allocated based on the standards outlined in Attachment 1. The required amount of supporting administrative space (conference rooms, break rooms, copy/print rooms, etc.) is determined through communication with affected divisions and is provided based on available resources. Such administrative space is typically deemed for general use and therefore not included in any specific division’s space allocation.

The amount of technical and storage space allocated varies widely based on programmatic requirements and requires careful planning, communication, and coordination between FM&L and affected divisions to determine the specific needs. To assist divisions with storage space needs beyond what can be accommodated within their current space allocations, FM&L Property Management retains a contingency of storage space designated as “central storage”. Regardless of where items are stored, however, all items located in designated storage spaces shall have an identified use for a specific task or project and must comply with JSA Policy 302 – Property Management.

DEFINITIONS

Director’s Council – Composed of the (i) Laboratory Director, (ii) Deputy Director for Science and Technology, (iii) Chief Planning Officer, (iv) Chief Operating Officer, (v) Associate Director of Accelerator Operations, Research and Development, (vi) Associate Director of Experimental Nuclear Physics, (vii) Associate Director of Theoretical and Computation Physics, and (viii) Engineering Manager.

Division Heads – For the purposes of this policy, Division Managers are the (i) Chief Planning Officer, (ii) Chief Operating Officer, (iii) Associate Director of Accelerator Operations, Research and Development, (iv) Associate Director of Experimental Nuclear Physics, (v) Associate Director of Theoretical and Computation Physics, (vi) Engineering Manager, (vii) Environmental, Safety and Health Manager, (viii) Chief Information Technology Officer, (ix) Chief Financial Officer, (x) Human Resources Director, and (xi) Facilities and Logistics Manager.

Department Heads – For the purposes of this policy, Department Heads are a secondary organizational hierarchy within a division. Department Managers oversee broad functional areas within a division which are typically comprised of several groups or teams. See attachment 3 for a list of departments.

Office Heads – For the purposes of this policy, Office Heads are a secondary organizational hierarchy within a division. Office Heads oversee a specialized functional area within a division and the organization they manage is typically smaller and less complex than a department. See attachment 3 for a list of offices.

Group Leaders – For the purposes of this policy, Group Leaders are a tertiary organizational level within a division. Reporting to Department Managers, Group Leaders oversee a specialized functional area within the division. See attachment 3 for a list of groups.

REFERENCES

DOE Order 430.1C “Real Property Asset Management” (RPAM)
JSA Policy 302 – Property Management (addressing storage)

RESPONSIBILITIES

Laboratory Director – Serves as the final authority to resolve disputes regarding the application of this policy.

Director’s Council – Approves or disapproves space change requests presented by FM&L. The Directors Council decision on each space change request ensures all space changes benefit from the collective view of senior leadership regarding Laboratory priorities and the best allocation of resources.

FM&L Division – Establishes and maintains the space management policy and the change request process. Retains official records of all approved space allocations, communicates with division space coordinators, periodically audits space utilization, and provides recommendations for changes to space allocation or use. Periodically evaluates policy effectiveness and revises the policy as operating conditions change.

Space Coordinators – Responsible managing the utilization of the space allocated to their division in accordance with Space Management policy, principles, and procedures. Communicates with FM&L who has overall responsibility for space regarding emerging space needs.

JSA Property Manager – Manages the Lab's contingency of central storage and periodically monitors the use of storage space allocated to other divisions to ensure compliance with Property Management policy, principles, and procedures. Responsible for recommendations regarding significant changes to the allocation of storage space or storage related resources.

PROCEDURE

1. Space is to be used for the purpose for which it was designed or allocated. All requests to relocate, modify, or change the use of a space shall be submitted in writing to the FM&L for approval prior to implementation.

2. When space becomes available (employee separation, project completion, absence of funding, etc.), FM&L will communicate with the affected division space coordinator to determine whether the space should remain part of an existing space allocation or be reallocated to meet overall needs and best interests of the Lab.

3. Requests for additional space shall be submitted in writing to FM&L for approval. Before consideration is given to increasing a division's space allocation, the division space coordinator is responsible for demonstrating that emerging space needs cannot be met using the current allocation.

4. Requests for items to be placed in central storage shall be submitted to the JSA Property Manager using the online storage request form. Justification for all items stored is reviewed on an annual basis thereafter.

5. Division space coordinators are permitted to work together to seek joint resolution of common space needs (temporary or permanent), however, FM&L shall be included in all such negotiations. Resolutions which require changes to existing space allocations shall be submitted in writing to FM&L for approval.

6. Disputes between divisions concerning the use of spaces shall be submitted in writing to FM&L for resolution. If FM&L is unable to resolve the dispute, the issue will be presented to Director's Council for resolution.

7. Requests for exemptions to the office space standards shall be submitted in writing to FM&L for review and will be presented to Director's Council for resolution. All requests shall include the following (at a minimum):

    - Description of the exemption being requested
    - Justification
    - Name and classification of affected person(s)

8. Annual space utilization surveys will be conducted by FM&L in accordance with DOE Order 430.1C “Real Property Asset Management” (RPAM). These surveys are intended to confirm that spaces are being used as intended and serve to document the current level of utilization (fully utilized, over-utilized, under-utilized, or not utilized). Division space coordinators are encouraged to participate in these surveys.

Originator and Process Owner:	Rusty Sprouse, FM&L	Date: X
Concurrence:	Michael W. Maier, COO	Date: X
Approved By:	Stuart Henderson, Laboratory Director	Date: X

Attachment 1 – Office Space Standards

Office space standards are intended as an aid in programming allocations for new construction and major renovation projects. They are not to be considered mandatory allotments, nor are they intended to imply entitlement, as actual space assignments will vary based on architectural and other space restrictions.

Description	Space Type	SF/Person
▪ Directorate	Private Office	350
▪ Associate Director (AD) and Deputy ▪ Division Head and Deputy	Private Office	200
▪ Department Manager ▪ Office Manager ▪ Group Leader ▪ Post-Doctoral Fellow (2 per office) ▪ Staff Scientist ▪ Senior Administrator (SSA) ▪ Senior Computer Scientist (SSCS, PSCS, SPCS) ▪ Senior Engineer (SSE, PSE, SPE)	Private Office	120
▪ Admin Support/Secretarial (>50% of time is in office) ▪ Administrator (SA I, SA II, SA III) ▪ Associate/Coordinator (AC I, AC II, ESM) ▪ Computer Scientist (SCS I, SCS II, SCS III) ▪ Engineer (SE I, SE II, SE III) ▪ Technician/Drafter (>50% of time is in office)	Open Office Workstation	72
▪ Student Intern (>50% of time is in office) ▪ User (short, intermediate, and long term)	Open Office Workstation	54
▪ Accelerator Operator ▪ Admin Support/Secretarial (<50% of time is in office) ▪ Construction/Facilities Support ▪ Skilled Trade ▪ Student Intern (<50% of time is in office) ▪ Technician/Drafter (<50% of time is in office) ▪ User (transient) ▪ Visitor	Benching System	25

Attachment 2 – Summary of Classifications and Abbreviations

Series	Classification	Abbreviation
Associate Director	Associate Director	AD
Administrator	Staff Administrator I	SA I
	Staff Administrator II	SA II
	Staff Administrator III	SA III
	Senior Staff Administrator	SSA
Scientist / Computer Scientist	Post-Doctoral Fellow	PD
	Staff Scientist I	SS I
	Staff Scientist II	SS II
	Staff Scientist III	SS III
	Senior Staff Scientist	SSS
	Principal Staff Scientist	PSS
	Special Staff Scientist	SPS
Engineer	Staff Engineer I	SE I
	Staff Engineer II	SE II
	Staff Engineer III	SE III
	Senior Staff Engineer	SSE
	Principal Staff Engineer	PSE
	Special Engineer	SPE
Associate / Coordinator	Associate / Coordinator	AC I
	Senior Associate / Coordinator	AC II
	Engineering Support Manager	ESM
Administrative Support / Secretarial	Administrative Support / Secretary I	AS I
	Administrative Support / Secretary II	AS II
	Administrative Support / Secretary III	AS III
	Administrative Support / Secretary IV	AS IV
Construction / Facilities Support	Construction / Facilities Support I	CF I (discontinued)
	Construction / Facilities Support II	CF II
	Construction / Facilities Support III	CF III
Technician / Drafter / Accelerator Operator	Technician / Drafter	TD I
	Technologist / Design Drafter	TD II
	Senior Technologist / Designer	TD III
	Accelerator Operator	AO
Skilled Trade	Skilled Trades	ST I
	Senior Skilled Trades	ST II
Student Intern	High School Student Intern	SI I
	Undergraduate Student Intern	SI II
	Graduate Student Intern	SI III
	Graduate Student Research Asst.	GSRA
	Undergrad Student Research Assistant	USRA
	Undergrad Co-Op Student	CS

Attachment 3 – Identification of Departments, Groups and Offices

Accelerator Division

- Center for Advanced Studies of Accelerators (CASA) Department
  - Accelerator Physics Group
  - Accelerator R&D Group
  - Computational Physics Group
  - Diagnostic Development Group
- Center for Injectors & Sources Office
- Operations Department
  - Injector Group
  - Operability Group
  - Operations Group
  - Systems Group
- Superconducting Radio Frequency (SRF) R&D Department
  - Processes & Materials
  - Special Projects
- Superconducting Radio Frequency (SRF) Operations Department
  - Cavity Processing Group
  - Cryomodule Assembly Group
  - SRF Beam Support Group
  - SRF Engineering Group
  - SRF Project Support Group
  - Technical Facilities Group

Business & Finance Division

- Accounting & Finance Department
  - Accounting Systems Group
  - Financial Systems Group
- Procurement Department
  - Construction & Services Group
  - Major Supplies Group
  - Small Supplies Group

Chief Operating Officer Division

- Communications Office
- Legal Office
- Performance Assurance Office

Chief Planning Officer Division

- Budget Office
- Directorate Support Office
- Project Advisors Office
- Project Controls Office

Engineering Division

- Cryogenics Department
  - Engineering Group
  - Fabrication Group
  - Operations Group
- Electrical Engineering Department
  - DC Power Group
  - Instrumentation & Control Systems Group
  - Safety Systems Group
  - SRF Systems Group
  - Support Group(
- Mechanical Engineering Department
  - Alignment Metrology Group
  - Machine Shop Group
  - Mechanical Engineering Group

Experimental Nuclear Physics Division

- Administration Office
- Detector & Imaging Office
- Hall A Department
  - Coordination Group
  - Engineering Group
- Hall B Department
  - Coordination Group
  - Engineering Group
- Hall C Department
  - Coordination Group
  - Engineering Group
- Hall D Department
  - Engineering Group
  - Coordination Group
- Fast Electronics Office
- Magnet Office
- Polarized Target Office

Environmental, Safety & Health Division

- Environmental, Safety & Health Department
  - Environmental Group
  - Industrial Hygiene Group
  - Safety Group
- Radiological Control Department
  - Field Operations Group
  - Instrumentation Group
  - Radiation Physics
- Occupational Medicine Office

Facilities Maintenance & Logistics Division

- Engineering Department
  - Planning Group
  - Design Group
  - Construction Group
- Maintenance & Operations Department
  - Electrical Group
  - Fire Protection Group
  - Mechanical Group
  - Structural Group
- Security & Services Office
- Property & Logistics Office

Human Resources Division

- Human Resources Office
- Science Education Office

Information Technology Division

- Computing and Network Infrastructure Department
  - Cyber Security Group
  - User Services and Help Desk Group
  - Networking & Telecommunications Group
  - Scientific Computing Operations Group
  - Systems Group
- Management Information Systems Office
  - Information Resources Group
- Scientific Computing Office
  - Experimental Physics Software and Computing Infrastructure Group
  - Performant Cluster Scientific Computing Infrastructure Group

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APPENDIX F

This section includes a copy of the Criteria Change Request form for submitting a change or addition to the Facilities Design Criteria (FDC).

Criteria Change Request Form

Complete the form below to submit questions, comments, suggestions and recommendations for Facilities Design Criteria (FDC). Send your request directly to the Facilities Management and Logistics design group architect. Your request will be reviewed with the appropriate person. If there are additional questions regarding your request, someone will contact you directly.

Name_____

Organization_____

Email_____

Phone_____

Problem: _____

_____
_____
_____

Suggestion, Change or Addition: _____

_____
_____
_____
_____

Solution (decision to be noted by FM&L appropriate personnel)

_____
_____
_____