

UNITED STATES  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
LANGLEY RESEARCH CENTER  
HAMPTON, VIRGINIA

SPECIFICATIONS  
FOR  
UPGRADES TO HIRF AND SAFETY LABORATORIES  
BUILDING 1220

LOCATED IN  
WEST AREA  
LANGLEY RESEARCH CENTER, HAMPTON, VIRGINIA

SPECIFICATION NO. 1-LBK-4200042301

DATE: 12-12-03

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

The work to be performed under these specifications consists of Upgrades to the High Intensity Radiated Fields (HIRF) Lab, the Vehicle Emulation Lab (VEL) of the Systems and Airframe Failure Emulation Testing and Integration (SAFETI) labs, and architectural modifications for improved access to the VEL Control Room. All work is at Building 1220, West Area, of the Langley Research Center.

The Contractor shall furnish all plant, equipment, tools, materials, labor and services necessary for or incidental to a complete and finished job as shown on the drawings listed below and as specified herein.

All references to the Contracting Officer contained in this specification, or any severable part thereof, shall be determined to mean the Contracting Officer or the Contracting Officer's Technical Representative. If any question arises concerning the "authorization" status of a Contracting Officer Technical Representative, the Contractor shall immediately refer the question, in writing, to the Contracting Officer. Any references to "as directed", "approved by", "witnessed by", or "submitted to", shall be determined to mean the Contracting Officer.

Where "as indicated" and "as specified" are written it shall refer to "as indicated on the drawings," and "as specified in the specifications". The specifications will always take precedence over the drawings.

Where "day" or "days" are written it shall mean calendar day or days, unless otherwise stated in the specification.

Where "hour" or "hours" are written it shall mean clock hours, unless otherwise stated in the specification.

01 HIRF - Work Package No. 1

The work to be done under these specifications consists of modifications to the Radio Frequency (RF) chambers of the HIRF lab to provide for the entry modifications to the large test articles and an access panel connecting chambers A and B for collaborative testing.

The work to be performed includes, but is not limited to, the following:

1. Provide a new pneumatically operated, double-shielding, sliding pocket door for access to existing reverberation chamber A of the HIRF lab.

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2. Provide a new overhead motorized coiling door integrated into the exiting Building 1220 hangar door panels.
3. Provide a drawbridge style loading ramp with motorized winch system.
4. Reroute existing raceways and components attached to the hanger door panels and the side of the RF reverberation chamber to accommodate installation of new doors and ramp.
5. Provide process air piping as required to support operation of the new door installation.
6. Provide power and controls for the new motorized roll-up door and ramp motorized winch system.

### 02 SAFETI - Work Package No. 2

The work to be done under this specification consists of providing an EMI/RFI shielding enclosure around the Vehicle Emulation Lab's cockpit.

The work to be performed includes, but is not limited to the following:

1. Provide EMI/RFI shielding enclosure around the Vehicle Emulation Lab simulator. Provide temporary support and/or repositioning of the VEL as required to install the shielding enclosure.
2. Modify the VEL cockpit entrance to accommodate shielding enclosure installation.
3. Demolition and removal of Room 130E, a small mechanical room located directly behind the VEL simulator. Remove exhaust fan thermostat, electrical components and raceways from the construction indicated for demolition and relocate to accessible walls to remain.
4. Provide VEL ventilation ductwork and provide EMI/RFI shielded wave guide air vents at ductwork penetrations in the shielding enclosure.
5. Provide RF filters for power and signal circuits. Reroute cockpit cables to accommodate shielding enclosure installation.

### 03 HALLWAY - Work Package No. 3

The work to be done under this specification consists of providing a hallway to connect the Vehicle Emulation Lab to the Closed Loop Lab.

The work to be performed includes, but is not limited to the following:

1. Modifications to Room 136 to provide improved access between the Vehicle Emulation Lab and the Closed Loop Lab.

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2. Provide a new entry to Room 130C, including a new door, landing, guardrail and stairs at the new entry.
3. Relocate existing outlets, thermostats, and reroute raceways at new wall openings.

1.2 SUBMITTALS (Not Applicable)

1.3 DRAWINGS

After contract award, a maximum of ten sets of full size contract drawings will be furnished to the Contractor without charge.

1.3.1 Contract Drawings

The work shall conform to these specifications and the drawings listed below:

<u>DRAWING NO.</u>	<u>REV.</u>	<u>SHEET NO.</u>	<u>TITLE</u>
<u>GENERAL</u>			
1241146	-	OG-001	Title Sheet
<u>HIRF - Work Package 1</u>			
1241147	-	1S-101	HIRF - New Work and Partial Plans
1241148	-	1S-301	HIRF - Hangar Door Demolition, New Work Elevations, and Section
1241149	-	1S-501	HIRF - Rigging Plan and Elevation, Coiling Metal Door Details
1241150	-	1S-502	HIRF - Mast and Ramp Details
1241151	-	1M-101	HIRF - Mechanical Plans and Notes
1241152	-	1E-101	HIRF - Electrical Demolition Plan
1241153	-	1E-102	HIRF - Electrical New Work Plan and New One-Line Diagram
1241154	-	1E-601	HIRF - Existing One-Line Diagram
1241155	-	1E-602	HIRF - Panelboard Schedules
<u>SAFETI -Work Package 2</u>			
1241156	-	2A-101	SAFETI - Demolition Plan, New Work Plan and Notes
1241157	-	2A-301	SAFETI - Section and Details
1241158	-	2M-101	SAFETI - Mechanical Plans and Notes
1241159	-	2E-101	SAFETI - Electrical Demolition Plan
1241160	-	2E-102	SAFETI - Electrical New Work Plan
<u>HALLWAY - Work Package 3</u>			
1241161	-	3A-101	HALLWAY - Demolition and New Work Plan
1241162	-	3A-501	HALLWAY - Section and Details
1241163	-	3E-101	HALLWAY - Electrical Demolition and

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<u>DRAWING NO.</u>	<u>REV.</u>	<u>SHEET NO.</u>	<u>TITLE</u>
			New Work Plans

1.4 LOCATION OF WORK

The work to be done under these specifications is located in the West Area of Langley Research Center, as indicated on Contract Drawing 1241146.

1.5 SCHEDULE

1.5.1 General Schedule Requirements

The Contractor shall commence work within ten (10) calendar days after date of receipt of Notice to Proceed. All work as required by these specifications shall be completed within 270 consecutive calendar days after date of receipt of Notice to Proceed.

1.5.2 Special Work Scheduling Requirements

The Contractor shall ensure all equipment and materials required for a complete installation are on-site prior to beginning any work requiring a facility shutdown period.

Facility 1220 will be in use throughout the period of contract performance; therefore, all work requiring a power outage shall be performed on weekends, during scheduled weekend outages. See Section 01011 of these specifications for additional requirements regarding outages.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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SECTION 01011

GENERAL AND ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

This section covers Langley Research Center's unique general and administrative requirements.

1.2 SUBMITTALS

The Contractor shall submit the following in accordance with Section 01330, Submittals:

SD-04 Drawings

As-Built Contract Drawings

SD-08 Statements

Materials and Equipment Substitutions

Application for Making Connection to Utilities

Utility Outage Requests

Plumbing Worker's Qualifications

Electrical Worker's Qualifications

Mechanical Worker's Qualifications

SD-18 Records

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Monthly Technical Progress Narrative

Certified Payrolls

SD-19 Operation and Maintenance Manuals (O&M)

1.3 PRECONSTRUCTION CONFERENCE

The Contractor shall attend a preconstruction conference scheduled by the Contracting Officer. Work on-site shall not commence prior to the conference. Subcontractor representatives may attend.

Discussion will address project orientation, key points of contact, safety issues, permits, the on-site location of the Contractor's office, if any, and other pertinent issues. The Contractor shall be prepared to review and discuss the specifications and drawings with the Contracting Officer to resolve any post award questions prior to construction start.

1.4 PROJECT MEETINGS

The Contractor shall attend monthly project meetings scheduled by the Contracting Officer. Subcontractor representatives may attend.

1.5 SECURITY REQUIREMENTS AND REGULATION OBSERVANCE

1.5.1 References

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

LAPD 1600.3	(March 2000) Langley Research Center Security Policy
LAPD 1600.4	(August 1999) Firearms and Dangerous Weapons Policy
LAPD 1600.5	(August 1999) Workplace Violence and Threatening Behavior
LAPD 1700.7	(March 2001) Traffic Management
LAPD 1700.8	(June 1999) Parking Regulations
NPG 1371.2A	(April 2003) Procedures and Guidelines for Processing Request for Access to NASA by Foreign Nationals or Representatives

1.5.2 Identification Badges

At all times while on LaRC property, the Contractor shall require its employees, subcontractors and agents to wear badges which will be issued by the NASA Contract Badge and Pass Office, located at 1 Langley Boulevard (Building No. 1228). Badges shall be issued only between the hours of 6:30

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a.m. and 3:30 p.m., Monday through Friday. Temporary ID badges will be issued upon submission of a completed Langley Form 227, "Construction/Contractor Badge and/or Vehicle Permit Request". The Contractor will be held accountable for these badges and may be required to validate outstanding badges with the NASA LaRC Security Office. Immediately after employee termination or contract completion, badges shall be returned to the NASA Contract Badge and Pass Office.

### 1.6 SCHEDULING OF WORK

The established hours of work at Langley Research Center are 7:00 a.m. to 4:30 p.m. Monday through Friday, excluding U.S. Government holidays and closings declared by Administrative or Executive Order.

In order that the necessary and proper inspection of the Contractor's work may be effectively accomplished, and to assure the availability of required Government facilities, the Contractor shall schedule work performance to be compatible with the established work week, hours of work and legal holidays observed by the Government organization having cognizance over the work performed at the particular work site. No work shall be performed during other hours without prior authorization of the Contracting Officer.

All requests for overtime work shall be submitted to the Contracting Officer or the Contracting Officer's authorized representative for approval two calendar days prior to the proposed overtime.

The Contractor shall give at least three calendar days notice to the Contracting Officer and the Safety and Facility Assurance Office of the date when the contract work will begin at the site.

If the Contractor suspends work at any time, it shall notify the Construction Inspection Service (CIS) and shall not again resume work without notifying the CIS in advance.

### 1.7 ADDRESSING CORRESPONDENCE, SUBMITTALS AND INVOICES

All correspondence, submittals and invoices shall be clearly marked with the assigned Government contract number. Unless otherwise specified herein, the Contractor shall submit an original and five copies of all correspondence and submittals.

The Contractor shall submit all shop drawings, test reports, equipment data sheets, and any other technical data under an original cover letter and with copies as required by these specifications. Samples shall be accompanied by a cover letter and appropriate copies.

Correspondence and submittals shall be addressed to the designated Government addressee(s) and mail stop(s) shown in the Submittal Summary of Section 01330 to the following address:

All correspondence to the Contracting Officer or Contract Administrator shall be addressed as follows:

Contracting Officer/Contract Administrator, Mail Stop 126

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Contract NNL \_\_\_\_\_  
NASA, Langley Research Center  
Hampton, Virginia 23681-0001

All correspondence to the Contracting Officer Technical Representative (COTR) shall be addressed as follows:

COTR, Mail Stop 465  
Contract NNL \_\_\_\_\_  
NASA, Langley Research Center  
Hampton, Virginia 23681-0001

Progress payment, final payment invoices, and Contractor's release form (NASA Form 778) shall be addressed as follows:

Accounts Payable and Employee Services Branch, Mail Stop 175  
Contract NNL \_\_\_\_\_  
NASA, Langley Research Center  
Hampton, Virginia 23681-0001

Certified payrolls shall be addressed as follows:

Construction Services Unit, Mail Stop 428  
Contract NNL \_\_\_\_\_  
NASA, Langley Research Center  
Hampton, Virginia 23681-0001

Submittals to the Safety and Facility Assurance Office shall be addressed as follows:

Safety and Facility Assurance Office, Mail Stop 429  
Contract NNL \_\_\_\_\_  
NASA, Langley Research Center  
Hampton, Virginia 23681-0001

Submittals to the Environmental Management Office shall be addressed as follows:

Environmental Management Office, Mail Stop 418  
Contract NNL \_\_\_\_\_  
NASA, Langley Research Center  
Hampton, Virginia 23681-0001

1.8 SCHEDULE OF CONSTRUCTION, MONTHLY PROGRESS SCHEDULES AND MONTHLY TECHNICAL PROGRESS NARRATIVES

1.8.1 Schedule of Construction

Within 30 calendar days after date of receipt of Notice to Proceed, the Contractor shall submit to the Contracting Officer for approval, 6 copies of a practical and feasible schedule of construction on Form LF-107, Contract Progress Schedule Report (Attachment 1). This schedule shall indicate the sequence of work the Contractor plans to complete the contract within the specified completion period and shall include, as a minimum, the

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following categories of work:

- Mobilization
- Equipment submittals
- Equipment delivery and testing
- Equipment installation
- AS-Builts
- Punch list
- Closeout with completion of all submittals and removal
- Demobilization

Upon Contracting Officer approval of the schedule of construction, the Contractor shall utilize this approved schedule for its contract progress schedule reporting. The Contractor shall adhere to the approved schedule of construction. The schedule of construction shall not be altered without the written approval of the Contracting Officer. In the event of changes in the schedule of construction, under applicable provisions of the contract, the Contractor shall resubmit to the Contracting Officer the schedule of construction reflecting such changes.

Questions, concerns, and information pertaining to the project shall be submitted to the Contracting Officer on Form 253, Request for Information, Attachment 2 to this section.

1.8.2 Monthly Progress Schedules and Monthly Technical Progress Narratives

The Contractor shall submit to the Contracting Officer the following reports covering work accomplished each month of contract performance. The technical progress narrative and the monthly progress schedule, on Form LF-107, (Attachment 1), shall be prepared covering a period from the tenth of one month through the ninth of the following month and shall be submitted so as to be received no later than the 15th of the month in which the reporting period ends. The Contractor shall certify the accuracy of monthly reports being submitted by signing the technical progress narrative and block 4 of Form LF-107.

1.8.2.1 Monthly Progress Schedules

The Contractor shall prepare monthly progress schedules, on Form LF-107, in accordance with the instructions on the reverse side of the form and shall show both the NASA approved schedule and the Contractor's current working schedule.

1.8.2.2 Monthly Technical Progress Narratives

Monthly technical progress narratives shall be brief, factual, and informal and shall be prepared in accordance with the following format:

A cover page containing:

Contract number and title.

Period of performance being reported.

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Contractor's name and signature.

Date of publication.

Summary outlook - A short statement summarizing the current time status in relation to plan as well as the outlook for achieving major goals.

Status versus plans.

Significant progress - A description of overall progress plus a separate description for each reporting category on the Form LF-107 on which effort was expended during the reporting period.

Problem areas - A description of current problems and their schedule and resource implication which may impede performance.

Corrective actions - A description of corrective action which has been taken or which is planned to correct any existing problem.

Plans - A description of work to be performed during the next reporting period.

Recommendations - Recommendations for action on the part of Langley Research Center.

1.9 AS-BUILT CONTRACT DRAWINGS

The Contractor shall maintain a red-lined set of contract construction drawings that reflect current "As-Built" conditions in accordance with specification Section 01330, SD-04 Drawings, "As-Built Contract Drawings."

The Contractor shall submit the as-built drawings to the Contracting Officer at the end of the contract period prior to final payment.

1.10 OPERATION AND MAINTENANCE (O&M) MANUAL

The Contractor shall submit to the Contracting Officer for approval the Operation and Maintenance (O&M) Manuals for the equipment specified under the various headings of these specifications. These submittals shall be complete and detailed.

1.11 PRICE BREAKDOWN FOR DETERMINING PROGRESS PAYMENTS

The Contractor shall submit a price breakdown if it intends to request progress payments. Where several items are involved, each shall be shown separately. This breakdown shall be prepared using the items, major parts, and components which were approved by the Contracting Officer for the schedule of construction, as required above, to provide a schedule/price correlation for use in the assessment of progress payments, and shall separate equipment and material prices from labor prices for each portion of the work. No progress payments will be made until the price breakdown as submitted has been approved by the Contracting Officer.

1.12 PRICE BREAKDOWN FOR MODIFICATION PROPOSALS

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The Contractor shall furnish an itemized price breakdown within 14 calendar days of receipt of a Government change order or request for proposal. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract and overhead costs as well as profit, and shall cover all work involved to accomplish the modification whether deleted, added, or changed. Subcontractor costs shall also be supported by similarly detailed price breakdown. If the proposal includes a requested time extension, a detailed justification shall also be furnished. The Attachment 3, Estimate for Contract Modification Change Item forms shall be used to furnish this price breakdown.

### 1.13 MINIMUM EMPLOYEE COMPENSATION

The U.S. Department of Labor Wage Determination, Enclosure 4 of the Solicitation, establishes the minimum compensation levels for laborers and mechanics employed on site at the Langley Research Center.

Certified payrolls for on-site work of the prime Contractor and all subcontractors shall be submitted weekly as required by Section 01330.

### 1.14 CONTRACTOR RELEASE FORM

The Contractor shall execute and submit a Contractor Release Form, NASA Form 778, at contract completion.

### 1.15 BULLETIN BOARD

Immediately upon beginning site work, the Contractor shall provide at the job site a weatherproof bulletin board for displaying the fair employment poster, wage rates, and safety bulletins and posters. The bulletin board shall be located in a conspicuous place, easily accessible to all employees. Legible copies of the aforementioned data shall be displayed until on-site work is complete.

### 1.16 ORDER STATUS REPORTS

Upon request of the Contracting Officer, the Contractor shall promptly submit reports showing the status of any orders or subcontracts which may delay or are delaying the overall contract schedule. Order status reports shall include:

Contract or order number, date submitted to the supplier, date accepted by the supplier, supplier's name and address.

Delivery date needed to meet contract schedule.

Delivery date agreed to by the supplier, and any subsequent changes in that date.

Reasons for changes in delivery dates.

Effect which the latest promised delivery date will have on the

contract schedule.

A summary of the Contractor's efforts to bring the promised delivery date in line with the requirements of the contract schedule, including efforts made to place the order or subcontract with other suppliers.

1.17 SALVAGE MATERIAL AND EQUIPMENT

Any items of material designated by the Contracting Officer as salvage shall remain the property of the Government.

The Contractor shall segregate, itemize, deliver, and off-load items designated as salvage at the Contracting Officer designated storage area located at Building 1240 on the Langley Research Center.

The Contractor shall maintain property control records for material or equipment designated as salvage. The Contractor's system of property control may be used if approved by the Contracting Officer. The Contractor shall be responsible for storage and protection of salvaged materials and equipment until disposition by the Contracting Officer. Any salvage materials which are of a hazardous nature shall be handled as required by Section 01060, Langley Safety and Environmental Requirements, and applicable Federal and/or State and local regulations.

The Contractor shall submit to the Contracting Officer a written short/damaged property non-conformance report within two calendar days of removal of salvage material or equipment if such equipment is not in the condition or quantity contractually specified.

The Contractor shall replace or repair, at no cost to the Government, all salvaged materials and equipment which are broken, damaged, or lost due to the Contractor's negligence while such items are in the Contractor's possession.

1.18 MATERIALS AND EQUIPMENT

Materials and equipment provided by the Contractor shall be standard catalog products of manufacturers regularly engaged in the manufacture of the products unless otherwise specified herein.

Materials and equipment shall meet the requirements of the contract and shall be suitable for the specified installation. Where two or more units of the same equipment class are furnished, the equipment shall be from the same manufacturer and shall be interchangeable. Materials and equipment shall be new and free from defects.

Where equipment specified by designations of the manufacturer requires modification to fully meet contract requirements, such modification shall be made by the Contractor without additional cost to the Government.

Where two or more types of equipment or materials are specified without indication of preference, it shall be optional with the Contractor which one is used; but the same type shall be used throughout.

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Where equipment or materials are specified by the designations of the manufacturer, "or equal", the Contractor, if it elects to furnish other than the brand name product, is responsible for any necessary redesign, relocation and rework of associated construction, at any time during the course of the contract. The proposed materials or equipment substitution with any required redesign, relocation, or rework data shall be submitted for approval of the Contracting Officer.

All equipment and material data, including location, function, and characteristics shall be furnished to the Contracting Officer for approval as specified in the following sections. Machinery, equipment, materials, and articles furnished without such approval shall be at the risk of subsequent rejection, and will not be considered in computing progress payments.

### 1.19 MATERIAL AND EQUIPMENT INSTALLATION

The Contractor shall install material and equipment in accordance with the requirements of the contract drawings and Government approved recommendations of the manufacturers. Degradation of the designated fire ratings of walls, partitions, ceilings, and floors by the installation shall not be permitted.

### 1.20 HANDLING/PROTECTION OF CONTRACTOR MATERIAL AND EQUIPMENT

All shipments shall be addressed to the Contractor and the Contractor shall be responsible for their receipt, unloading, handling, and storage at the site. The Government will not accept deliveries on behalf of the Contractor or its subcontractors, nor assume any responsibility for security of materials, equipment or supplies delivered to the site.

The Contractor shall at all times protect and preserve all contractually required materials, supplies and equipment of every description (including property which may be Government-furnished or owned) and all work performed. If, as determined by the Contracting Officer, material, equipment, supplies and work performed are not adequately protected by the Contractor, such property may be protected by the Government and the cost thereof will be charged to the Contractor.

When Government-owned equipment is to be utilized by the Contractor at the construction site, the Contractor shall jointly inventory such equipment with the assigned Inspector, mutually agreeing as to condition and quantities. Upon completion of the inventory, the Contractor shall accept the equipment and give the Government a signed receipt. The Contractor shall be responsible for the equipment, its protection from damage, and availability for installation. Even in the absence of such a joint inventory, the Contractor assumes full responsibility for such Government-owned equipment when it comes into its possession. The Contractor shall submit a record of existing conditions prior to use of Government-owned equipment.

### 1.21 ON-SITE CLEAN-UP AND DISPOSAL OF MATERIALS

If the operations of the Contractor result in deposition of dirt or other

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debris on any area, it shall clean such facilities at such intervals and in such manner to prevent the formation of undesirable quantities of mud or dust, and avoid making any other nuisance.

The Contractor shall not dispose of materials of hazardous or environmentally damaging nature into the storm or sanitary sewer systems. The Contractor shall be responsible for proper handling and disposal of hazardous wastes generated by its activities in accordance with applicable federal, state and local regulations. See Section 01060, "Langley Safety and Environmental Requirements", for additional hazardous waste disposal requirements.

Scrap materials removed and not specified for reuse or for return to the Government shall become the property of the Contractor and shall be removed from the Government premises and properly dispositioned.

When construction work is performed in Government facilities and the Government continues to use these areas, the Contractor shall keep floors and platforms swept clean or vacuumed daily of any debris created by its work. Debris shall be stored in closed metal containers and shall be removed from these areas at least weekly.

In other construction areas, the Contractor shall collect and store all waste material, scrap lumber and rubbish in piles or containers. This material shall be removed weekly from the site or more often if the material constitutes a fire hazard.

The Contractor shall clean application equipment promptly and thoroughly with a suitable solvent after each use and store the solvent in a clean, covered, well-ventilated container.

At the end of each working day, the Contractor shall collect and remove paint materials, rubbish, rags and other similar materials shall be collected and removed from the project area.

At the completion of the work, the Contractor shall remove all paint spots from finished surfaces and leave the project in a clean condition.

### 1.22 UTILITY OUTAGES AND POWER CONNECTIONS

#### 1.22.1 Utility Outages

Work shall be scheduled to hold outages to a minimum.

Utility outages required during the prosecution of work that affect existing systems shall be scheduled at the convenience of the Government. Any interruption of utilities or services that would interfere with the operation of a facility will be permitted only on week-ends between the hours of 12:00 midnight Friday and 10:00 p.m. on the following Sunday. The Contracting Officer may permit interruptions at other times. Any utilities or service connections made at other than normal working hours shall be at no additional cost to the Government. Permission to make such an interruption shall be requested in writing to the Contracting Officer at least seven calendar days prior to the day of interruption.

## UPGRADE TO HIRF AND SAFETI LABS

The Contractor shall schedule all work necessitating power shutdowns or outages with the Contracting Officer by submitting a written request for utility outage stating the date and time the desired interruption will commence, the anticipated period of interruption, and feeders and circuits to be interrupted. No interruption shall be made without authorization from the Contracting Officer. If a scheduled power interruption is to extend into the regular working hours, the Contractor shall notify the Contracting Officer 24 hours in advance.

### 1.22.2 Application for Connecting to Government Electrical Utilities

Prior to making connection to any part of the Government's electrical power distribution system, the Contractor shall make application to the Contracting Officer stating the date, time, location, and the service required. The Contractor shall also state when such connection is desired.

Before granting the Contractor permission for such connection, the Government will make the necessary checks of the Contractor's system to assure its adequacy and safety and that the Government's supply is adequate at that point for such connection.

The Contractor shall perform the initial energizing of all new electrical equipment in the presence of an authorized representative of the Contracting Officer.

Prior to connecting into any existing Government electrical utility, the Contractor shall conform to the requirements of Section 01060, Langley Safety and Environmental Requirements.

### 1.23 WELDING REQUIREMENTS PRIORITY

In the event of a conflict between the requirements of Sections 05055, 05120, 05140, and 05510 and the requirements of any other specification section or contract drawing, the requirements of Sections 05055, 05120, 05140, and 05510 shall prevail.

### 1.24 USE OF GOVERNMENT PREMISES

The Contractor shall submit to the Contracting Officer a record of existing conditions detailing damaged Government property as agreed upon with the Contracting Officer.

#### 1.24.1 Boundaries and Site Requirements

Boundary lines on drawings are for delineation of the general working area. Such lines do not relieve the Contractor of its responsibility for completing construction features, utility runs or tie-ins which cross or extend beyond such limit lines as provided by specifications or drawings requirements. The site will be made available "as is", and unless otherwise specified, the Contractor shall be responsible for clearing the site area, roads, utilities, and other off-site areas of all obstructions, both natural and manmade, which would interfere with the performance of the work.

1.24.2 Adjacent Premises and Existing Services

Government premises adjacent to the construction will be made available for use by the Contractor, without cost, whenever such use will not interfere with other Government uses or purposes. The Contractor shall promptly vacate such premises if ordered to do so by the Contracting Officer. When the contract work is to be connected to existing buildings or other construction, the Contractor shall do such repairs and cleanup as may be necessary to leave the completed work in a neat and orderly condition.

Existing services shall be maintained without interruptions, or, if interrupted by the operations of the Contractor, shall be promptly restored. The Contractor shall establish and maintain adequate drainage, from the beginning of construction, in the prescribed work areas, and shall avoid making drainage problems in adjacent or other work areas. The Contractor may block existing roads and sidewalks only by permission of the Contracting Officer obtained two calendar days in advance. The Contractor shall provide a temporary by-pass during such operations, unless otherwise directed.

1.24.3 Vehicle Weight Limits

Roads at the Langley Research Center are limited to axle loads of less than 32,000 pounds. The Contractor shall not exceed these limits. When it is necessary to cross curbing or sidewalks, the Contractor shall construct secure bridges across them, and at the completion of all work, such bridges shall be removed.

1.24.4 Heavy Equipment Movement

Heavy equipment such as cranes, pile drivers, or bulldozers shall not be moved on the paved roadways of the Langley Research Center without prior approval of the Contracting Officer or its designee. Tracked equipment shall be transported on trailers unless the Contracting Officer issues a prior approval to the contrary. Movement of heavy equipment over the paved roadways of the Langley Research Center shall be only at times acceptable to the Contracting Officer and shall not obstruct vehicular traffic. In no event shall such equipment traverse temporary roadway bridging without the Contracting Officer's prior approval.

1.25 BARRICADES AND TRAFFIC CONTROL

The Contractor shall conduct all work to minimize obstruction of traffic, and traffic shall be maintained on at least one half of the roadway width at all times. Approval of the Contracting Officer shall be obtained before starting any activity that will obstruct traffic. Barricades and traffic control devices shall comply with Section 01060, Signs, Signals and Barricades.

1.26 ON-SITE UTILITIES

1.26.1 Water

## UPGRADE TO HIRF AND SAFETI LABS

Water will be furnished by the Government without charge. The Contractor shall make all necessary connections to the existing water mains, shall furnish all equipment and shall run the water lines required, connecting at points and following routes approved by the Contracting Officer. Lines shall be installed and maintained in a sanitary and watertight manner, and shall be removed and capped at the completion of the contract. Water will be made available within 150 feet of the job site.

### 1.26.2 Electrical Power

The Government will furnish electric power for general construction purposes, with a maximum demand of 25 kilowatts, without cost to the Contractor. This electrical energy will be made available to the Contractor from the NASA distribution system. The Contractor shall furnish and install a disconnect switch, suitably protected from the weather, and fused for 75 amps or less, at the delivery point designated. The Contractor shall connect the switch to the designated power source. All temporary lines extended from the disconnect switch shall be furnished by the Contractor, and shall be installed and maintained in a safe and workmanlike manner. The installation of the construction power system shall comply with OSHA requirements and with Article 527 of the National Electrical Code. All temporary lines and the disconnect switch shall be removed by the Contractor at the completion of the contract. This electrical energy is provided for lighting, motor-driven construction equipment, heaters and humidity control of equipment and machinery, and general construction purposes only.

### 1.26.3 Telephone Service

The Government will not provide telephone service for use by the Contractor.

### 1.27 DUST CONTROL

The Contractor shall maintain the project site boundaries free from dust which would cause a hazard or nuisance to others.

### 1.28 ON-SITE WATER CONTAMINATION

The Contractor shall not pollute streams, lakes, beaches, waterways, or reservoirs. Refuse, fuels, oils, bitumens, calcium chloride, acids, and toxic materials shall be disposed of in a manner to prevent their entry into the water. The Contractor shall comply with applicable federal, state, and municipal laws concerning pollution of rivers and streams. Work under this contract shall be performed in such a manner that objectionable conditions will not be created on or adjacent to project site areas.

### 1.29 ON-SITE GOVERNMENT/CONTRACTOR/SUBCONTRACTOR COORDINATION

The existing facility will be occupied by the Government during construction. The Contractor shall coordinate its work with the Contracting Officer to ensure minimum interference with Government activities during construction.

Other Contractors will be working at the site of the work during the

## UPGRADE TO HIRF AND SAFETI LABS

performance of this contract. The Government will be responsible for the coordination of work between on-site prime Contractors.

The Contractor shall be responsible for familiarizing each of its subcontractors with all requirements (this includes administrative as well as technical) of the contract affecting each subcontractor, respectively. The Contractor shall be responsible for coordinating the work of its subcontractors or suppliers to prevent any interference or omission whatsoever. The divisions or sections of the specifications shall not be interpreted as limiting or defining the work for purposes of dividing the work among subcontractors, or to limit the work performed by any trade.

The Contractor shall be responsible to the Government for acts and omissions of its own employees and of subcontractors and their employees. The Contracting Officer will not undertake to settle any differences between the Contractor and its subcontractors, or between subcontractors. All business pertaining to the contract shall be conducted through the Contractor. If the Contractor specifically authorizes in writing a subcontractor to act as its agent, it shall state the specific authority conferred. The Contractor shall also be bound by any agreement made between the agent acting within the scope of its authority and the Government.

The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work. The Contractor shall conduct its work so as not to impede or interfere with the work of such other Contractors or persons engaged in or about the site. Whenever any work performed by the Contractor adjoins or affects any work by any other Contractor, the Contracting Officer will decide any disputes between the Contractor and such other Contractor. The Contracting Officer's decision, in writing, shall be final and conclusive upon both parties.

If the Contractor causes damage to the work or property of any other Contractor on the project, the Contractor shall, upon due notice, repair such damage or pay for such repair as directed by the Contracting Officer. If such other Contractor sues the Government on account of any damage alleged to have been so sustained, the Government will notify this Contractor who shall defend such proceeding, and if any judgment or award against the Government arises therefrom, this Contractor shall indemnify it and shall reimburse the Government for all attorneys' fees and court costs which the Government has incurred.

The Contractor shall not endanger any work of any other Contractors by cutting, excavating or otherwise altering any work of any other Contractor, except with the written consent of the Contracting Officer.

If a dispute arises between the various on-site Contractors as to their responsibility for cleaning up as required, the Government may clean up and charge the cost thereof to the several Contractors as the Contracting Officer shall determine to be just.

### 1.30 SANITARY CONVENIENCES

## UPGRADE TO HIRF AND SAFETI LABS

When work under the contract does not involve major construction of new facilities, but involves work to be performed in or near existing facilities, the existing sanitary conveniences may be used by the Contractor's employees. If this privilege is abused by lack of care or consideration of others, the Contracting Officer may deny further use of these conveniences.

### 1.31 PLUMBING WORKERS' QUALIFICATIONS

All plumbing work shall be performed by plumbing tradesmen who have in their possession a current Apprentice, Journeyman, or Master's plumbing license card, as issued by the Commonwealth of Virginia. When plumbing tradesmen do not have such a Virginia card or license, the Contractor shall submit to the Contracting Officer for approval evidence that such tradesmen have equivalent permits issued by other Governmental jurisdictions. Such equivalency submittal shall include documentation defining the criteria required for licensing by the involved jurisdiction, so that the Contracting Officer can determine that valid equivalency exists.

### 1.32 ELECTRICAL WORKERS' QUALIFICATIONS

All electrical work shall be performed by electrical tradesmen who have in their possession a current Apprentice, Journeyman, or Master's Electrical License Card, as issued by the Commonwealth of Virginia. When electrical tradesmen do not have such a Virginia license, the Contractor shall submit to the Contracting Officer for approval, evidence that such tradesmen have equivalent permits issued by other Governmental jurisdictions. Such equivalency submittals shall include documentation defining the criteria required for licensing by the involved jurisdiction, so that the Contracting Officer can determine that valid equivalency exists.

### 1.33 MECHANICAL WORKERS' QUALIFICATIONS

All mechanical work shall be performed by mechanical tradesmen who have in their possession a current Apprentice, Journeyman, or Master's mechanical license card, as issued by the Commonwealth of Virginia. When mechanical tradesmen do not have such a Virginia card or license, the Contractor shall submit to the Contracting Officer for approval, evidence that such tradesmen have equivalent permits issued by other Governmental jurisdictions. Such equivalency submittal shall include documentation defining the criteria required for licensing by the involved jurisdiction, so that the Contracting Officer can determine that valid equivalency exists.

### 1.34 INSPECTION RECORDS

In accordance with FAR Clause 52.246-12, "Inspection of Construction", (August 1996), the Contractor shall maintain daily inspection records and make them available to the Contracting Officer. Attachment 4, Daily Construction Report, shall be used to maintain the required inspection records.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --



INSTRUCTIONS FOR COMPLETING OF THE CONTRACT PROGRESS SCHEDULE REPORT  
(Previously NASA C-63)

Obtain forms from the NASA-Langley Research Center Contracting Officer.

Refer to the submittal instructions in the contract Statement of Work (SOW) \_\_\_\_\_ for space and flight projects, and sections 01011 and 01330 for facilities projects.

**Block Entries**

1. The ending date of the accounting month being reported.
2. The contract title as shown on the cover page of the contract.
3. The full name and address of the contractor (if a division of the contractor is performing the work, use the division name and address).
4. Contractor's Project Manager's signature and date approved.
5. The complete NASA contract number and latest modification number.
6. The date the NASA Project Manager for space and flight projects/Contracting Officer's Technical Representative (COTR), for facilities projects approved the original baseline schedule. If the original baseline schedule is revised, ONLY USE the date the NASA Project Manager/COTR approves the revision.
7. The WBS reporting categories agreed to in the current negotiated contract. (See SOW \_\_\_\_\_ or section 01011.)
8. The attached chart shall be used to show the schedules and status of the Work Breakdown Structure (WBS) reporting categories.

Top line: The calendar years.

Second line: The first letter of each month starting with the month of the contract award.

Time-now indicator: Make a vertical broken line to indicate the end of the reporting month.

Shaded blocks: Use open triangles to indicate the start and completion milestones. This line shall show the current NASA-approved schedule for each WBS reporting category.

Unshaded blocks: Use an open schedule bar to indicate the time span of the Contractor's current operating schedule. Place an open triangle at the end of the open bar to represent the completion milestones. The contractor's current operating schedule may be the same as, or different from the current NASA-approved baseline schedule.

To show schedule status to time-now, determine the length of time allocated in the baseline schedule for the technical achievement to date. Then blacken the schedule bar to the time point in the baseline schedule that represents this technical achievement to date. Blacken the completion triangle at the point in time each milestone is actually achieved. Consider any modifications made in the current working schedule. NOTE: The percent-ratio of the blackened portion of the schedule bar to its total schedule is not necessarily the same as the percent completion of the technical objective. The percent of manhours or dollars used to date is not a measure of schedule progress for end-item WBS categories.

Use arrows (< >) to indicate a break in scheduled activity.

Place a number (1,2,3, etc.) within a triangle to indicate number of times officially rescheduled. The baseline triangles are a permanent part of the schedules. After displaying the prior milestone triangle for 1 month, it should be deleted (leaving only the current re-scheduled triangle).

9. Evaluate the progress toward meeting the technical objective of each reporting category. Enter an estimated percentage that indicates the progress toward the technical objective actually achieved as of the Report for Month Ending date.

Consider all aspects of progress: technical specifications met, quality, production of hardware, software achievement, etc. Subjective factors, such as complexity of tasks, state-of-the-art, and level of confidence that the objective can be achieved, should be considered. Use actual costs or manhours to date as a guide to determine technical achievement ONLY if there is a direct correlation.

**Request for Information (R.F.I.)**

Distribution:

TO:

FROM:

Contract No.:

Project/Delivery  
Order (DO) Number:

Project Title:

**TO BE COMPLETED BY REQUESTOR**

RFI No.:

Date Submitted:

Title:

**REPLY BELOW**

REVIEWER:

M/S:

DATE TO REVIEWER:

DATE FROM REVIEWER:

REVIEWER: *(printed name)*

SIGNATURE:

Date:

COTR: *(printed name)*

SIGNATURE:

Date to Requester

PROJECT TITLE: \_\_\_\_\_

MODIFICATION DESCRIPTION: \_\_\_\_\_

PRIME CONTRACTOR'S WORK			Revisions/Comments	
1. Direct Materials				
2. Sales Tax on Materials	4.50 % of line 1	4.50 %		
3. Direct Labor (including fringe benefits)				
*4. Insurance & Taxes	_____ % of line 3	%		
5. Rental Equipment				
6. Sales Tax on Rental Equipment	4.50 % of line 5	4.50 %		
7. Equipment Ownership and Operating Expenses				
8. SUBTOTAL (Add lines 1-7)				
9. Overhead (Field + Home Office)	_____ % of line 8	%		
10. SUBTOTAL (Add lines 8 and 9)				
11. Prime Profit	_____ % of line 10	%		
12. SUBTOTAL (Add lines 10 and 11)				

Prime Remarks: \_\_\_\_\_

SUBCONTRACTOR'S WORK			Revisions/Comments	
13. Direct Materials				
14. Sales Tax on Materials	4.50 % of line 13	4.50 %		
15. Direct Labor (including fringe benefits)				
*16. Insurance & Taxes	_____ % of line 15	%		
17. Rental Equipment				
18. Sales Tax on Rental Equipment	4.50 % of line 17	4.50 %		
19. Equipment Ownership and Operating Expenses				
20. SUBTOTAL (Add lines 13-19)				
21. Overhead (Field + Home Office)	_____ % of line 20	%		
22. SUBTOTAL (Add lines 20 and 21)				
23. Profit	_____ % of line 22	%		
24. SUBTOTAL (Add lines 22 and 23)				

Sub's Remarks: \_\_\_\_\_

SUMMARY			Revisions/Comments	
25. Prime Contractor's Work (from line 12)				
26. Subcontractor's Work (from line 24)				
27. Prime's Commission on Subcontractor Work	_____ % of line 20	%		
28. SUBTOTAL (add lines 25, 26, and 27)				
29. Prime Contractor's Bond	_____ % of line 28	%		
30. TOTAL COST (Add lines 28 and 29)				

Estimated time extension and justification \_\_\_\_\_

Prime Contractor Name: \_\_\_\_\_

Subcontractor Name: \_\_\_\_\_

Signature of Preparer \_\_\_\_\_

Title of Preparer \_\_\_\_\_

\*THIS ITEM MAY ONLY INCLUDE LABOR BURDEN FOR FICA, FUTA, SUTA, AND WORKER'S COMP.

**BREAKDOWN OF DIRECT COSTS**

DATE \_\_\_\_\_

Work Items Prime Contractor	QTY	UNIT	MATERIAL COST		LABOR COST		O = Owned R = Rental	EQUIPMENT			
			Per Unit	Total	Per Unit	Total		Qty	Rate	Owned	Rental
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											
16.											
17.											
18.											
19.											
20.											
<b>DIRECT Prime Contractor's TOTAL</b>											

Mat/Cost  
Total

Labor/Cost  
Total

Owned  
Total

Rental  
Total

Work Items Subcontractor	QTY	UNIT	MATERIAL COST		LABOR COST		O = Owned R = Rental	EQUIPMENT			
			Per Unit	Total	Per Unit	Total		Qty	Rate	Owned	Rental
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											
16.											
17.											
18.											
19.											
20.											
<b>DIRECT Subcontractor's TOTAL</b>											

Mat/Cost  
Total

Labor/Cost  
Total

Owned  
Total

Rental  
Total



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SECTION 01060

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SECTION 01060

LANGLEY SAFETY AND ENVIRONMENTAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

AASHTO D-MUTCD-3 (2001) Manual for Uniform Control of  
Traffic Devices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ANSI/ASTM F 496 (2002) Standard Specification for the  
In-Service Care of Insulating Gloves and  
Sleeves

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A14.1 (2000) Safety Requirements for Ladders -  
Portable Wood

ANSI A14.2 (2000) Safety Requirements for Portable  
Metal Ladders

ANSI A14.5 (2000) Safety Requirements for Fiberglass  
Ladders

ANSI/SIA A92.2 (2002) For Vehicle Mounted Elevating and  
Rotating Aerial Devices

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B15.1 (2000) Safety Standard for Mechanical  
Power Transmission

CODE OF FEDERAL REGULATIONS (CFR)

10 CFR Parts 0-199 Nuclear Regulatory Commission

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29 CFR Part 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR Part 1910	Occupational Safety and Health Standards
29 CFR Part 1926	Safety and Health Regulations for Construction

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 95	(2002) Recommended Practice for Insulation Testing of AC Electric Machinery (2300 V and Above) With High Direct Voltage
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LANGLEY RESEARCH CENTER (LaRC)

LAPD 1700.7	(March 2001) Traffic Management
LAPG 1710.5	(March 2003) Ionizing Radiation
LAPG 1710.10	(August 2003) Safety Clearance Procedures (Lockout/Tagout)
LAPG 1710.40	(June 2003) Safety Regulations Covering Pressurized Systems
LAPG 1740.6	(May 2001) Personnel Safety Certification
LAPG 8800.1	(September 2002) Environmental Program Manual

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA-STD-8719.11	(2000) NASA Safety Standard for Fire Protection
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2002) Standard for Portable Fire Extinguishers
NFPA 30	(2000) Flammable and Combustible Liquids Code
NFPA 31	(2001) Standard for the Installation of Oil-Burning Equipment
NFPA 51	(2002) Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes
NFPA 51B	(1999) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work

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NFPA 54	(2002) National Fuel Gas Code
NFPA 58	(2001) Liquefied Petroleum Gas Code
NFPA 70	(2002) National Electrical Code
NFPA 101	(2003) Life Safety Code
NFPA 211	(2000) Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances

VIRGINIA ADMINISTRATIVE CODE (VAC)

9 VAC-20-60 Virginia Hazardous Air Pollutants

1.3 SUBMITTALS

The Contractor shall submit to the Contracting Officer in accordance with the requirements of Section 01330, "Submittals" the following:

SD-08 Statements

Safety Plan

Application for Work on Energized Electrical Circuits Below 600 Volts

Electrical Safety Workers' Qualifications

Application for Making Connection to Government Electrical Utilities

Power Outage Request

List of Riggers

1.4 GENERAL SAFETY REQUIREMENTS

1.4.1 Safety Plan

On-site work shall not commence prior to the Contracting Officer's approval of the Safety Plan.

The Contractor safety plan is a written plan prepared by the Contractor summarizing the overall safety program that will cover the employees and equipment used to fulfill the contract. The safety plan should address all aspects of the contract performance to include manufacturing, construction, transportation, and testing. It is not intended that the Contractor's normal industrial home-plant safety rules and directives be subject to NASA approval. However, it is intended to ensure that the Contractor has an adequate safety program for on-site work. Attachment 1, Safety Program Guide, to this section provides a list of items required to be addressed in the safety plan; however, special safety procedures may be required,

## UPGRADE TO HIRF AND SAFETI LABS

depending on the scope of work, environmental conditions or area of operation.

The safety plan shall contain a brief summary and scope of the work to be performed.

The Contractor's safety representative, responsible for ensuring compliance with all applicable rules and regulations, shall be identified in the safety plan.

### 1.4.2 Recordkeeping

The Contractor shall have a log and summary of all recordable occupational injuries and illnesses for their company, on an OSHA 300, "Log of Work-Related Injuries and Illnesses," and OSHA 300A, "Summary of Work-Related Injuries and Illnesses," or their equivalent at a central place. The on-site Contractor shall have the address and telephone number of the central place where the OSHA 300 and 300A logs are maintained and shall have personnel available at the central place during normal business hours to provide information from the records maintained there, by telephone or mail. (OSHA 29 CFR Part 1904)

### 1.4.3 Safety Briefing

The Contractor's on-site Superintendent, as well as a subcontractor representative from each on-site subcontractor supporting the effort, shall attend a Safety Briefing at the Safety and Facility Assurance Office, Building 1162, Room 122, Langley Research Center (LaRC), prior to any on-site activity. Briefing time is 7:30 a.m., Monday, Wednesday and Friday. This effort will be coordinated with the required badging activity. The prime contractor shall provide a list of all prime and subcontracted personnel to the LaRC Badge and Pass Office to acquire badges.

### 1.4.4 Inspections

In accordance with Section 107 of the Contract Work Hours and Safety Standards Act, a representative of the NASA Langley Research Center shall have the right of entry to any on-site area of contract performance to ensure compliance with all applicable rules and regulations. (OSHA 29 CFR Part 1926.3)

Any condition that threatens the safety or security of (1) personnel (2) Government property or equipment, or (3) information, or any conditions that affect LaRC's environmental compliance may be subject to immediate work stoppage by the Contracting Officer (CO), the Contracting Officer's Technical Representative (COTR), or the CO's designated inspection representative, and shall not resume until directed by the Contracting Officer.

### 1.4.5 Housekeeping

During the course of construction, alteration, or repairs the Contractor shall keep form and scrap lumber with protruding nails, and all other

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debris cleared from work areas, passageways, and stairs, in and around buildings or other structures.

### 1.4.6 Illumination

The Contractor shall light construction areas, aisles, stairs, ramps, runways, corridors, offices, shops, and storage areas where work is in progress with either natural or artificial illumination. (OSHA 29 CFR Part 1926.26)

### 1.4.7 Ladders

All ladders shall comply with ANSI A14: wood ladders (ANSI A14.1), metal ladders (ANSI A14.2), and fiberglass ladders (ANSI A14.5).

### 1.4.8 Motor Vehicles and Mechanized Equipment

All contractor-owned vehicles shall abide by LaRC traffic regulations in accordance with LAPD 1700.7, "Traffic Management," and OSHA regulations in accordance with OSHA 29 CFR Part 1926.600 through 1926.606.

## 1.5 SAFETY CLEARANCE PROCEDURES/LOCKOUT/TAGOUT

All contractors performing work at Langley Research Center (LaRC) shall comply with the safety clearance procedures described in LAPG 1710.10, "Safety Clearance Procedures (Lockout/Tagout)." Failure to comply with LAPG 1710.10 will result in the exclusion of the individual responsible for violating LAPG 1710.10 from LaRC. The LaRC Lockout/Tagout procedures involve the use of red tags, red locks, associated locking hardware, LaRC issued personal locks, and LaRC issued lock boxes.

### Lockout/Tagout Overview

(Terminology: "Protected Person" refers to any person who after placing a personal lock on the lockout/tagout where required becomes protected by a lockout/tagout; "Responsible Person" refers to a person who has lockout/tagout responsibility for a group of protected persons; and "Requester" refers to the individual who requests the lockout/tagout. The requester may be an individual who only has lockout/tagout responsibility for him/herself or may be the responsible person who has lockout/tagout responsibility for a group of workers.)

When lockout/tagout is required, the requester contacts the Facility Coordinator who is responsible for the system/item requiring lockout/tagout. The Facility Coordinator then contacts a qualified Safety Operator who performs the required lockout/tagout. At LaRC, the only persons authorized to perform lockout/tagout are Safety Operators who have in their possession a current NASA Langley Form 453, "NASA Langley Safety Operator Permit." Once the lockout/tagout has been completed, the Safety Operator contacts the requester, communicates the limits of the lockout/tagout, demonstrates the effectiveness of the lockout/tagout, and delivers red tag stub(s), lock box when required, and personal lock(s) to the requester. When the requester no longer requires the protection of the lockout/tagout, he/she signs the red tag stub(s) and delivers the

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signed red tag stub(s), the lock box if used, and personal lock(s) to the Facility Coordinator. The Facility Coordinator contacts the Safety Operator who clears the lockout/tagout.

### 1.6 ELECTRICAL SAFETY

#### 1.6.1 General Electrical Safety Requirements

Before commencing work on any mechanical equipment or systems, which have electrical connections or contain combustible, or other dangerous gases or fluids, such equipment shall be properly grounded, and/or made safe in accordance with LaRC safety regulations concerning these materials. No work (other than performing routine electrical tasks such as taking electrical measurements, replacing plug-in components, or changing fuses) shall be performed on energized power circuits without prior approval of the Contracting Officer. All references to "qualified electrical," "properly instructed," or "less-qualified" contained in this section shall be as defined in Section 01011, "General and Administrative Requirements".

Only qualified electrical people shall perform the work. If work is planned to be performed on energized circuits, the Contractor shall submit to the Contracting Officer a written application defining the procedure(s) to be used, for approval. Work shall not proceed until approval is received.

A properly instructed electrical person shall be present when non-electrical work such as grounds-keeping is being performed in an energized substation.

All personnel shall wear safety glasses or goggles when making electrical measurements, inspecting internal wiring of panels, or working with tools in proximity to any energized power circuits. Safety glasses or goggles shall be worn when performing other types of electrical work including control modification and/or checkout.

Identification markings on building light and power distribution panels, circuits, and components for establishing safe work conditions shall not be relied upon.

Ground wires or connections to frames or cases shall not be removed from any energized equipment.

Earth return is not to be used in the wiring of any power circuit.

Temporary electrical wiring shall be supported by suitable wood or other insulating materials.

Temporary electrical wiring and portable electrical cords shall be kept out of water at all times unless the cable is approved by the National Electrical Code (NEC) for that purpose.

When fishing a conductive tape or wire through a conduit, personnel shall be stationed to prevent the free ends of the tape or wire from contacting energized equipment.

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All portable electrical tools (except battery operated) shall have ground-fault protection.

The cases of all portable electrical motor-driven hand tools shall be grounded by use of standard three-prong plugs and receptacles and all other electrical equipment supplied with 50 volts or above shall have their cases or frames connected to ground, except:

- o Devices operated solely from self-contained batteries.
- o Devices that have cases and all exposed parts protected by insulating material.
- o "Double insulated" tools.
- o Devices supplied with less than 150 volts to ground for which exceptions have been granted by the Office of Safety and Facility Assurance.

Tools, equipment, and other potential sources of ignition used in hazardous locations shall comply with Article 500 of NFPA 70, "National Electric Code."

Welding or burning shall not be permitted in the immediate vicinity of electrical equipment unless specifically authorized by the Contracting Officer.

Only devices designed for voltage testing and rated for the nominal voltage of the circuit under test shall be used to make voltage checks. The Contractor shall verify test voltage indicators immediately before and after use by application to an energized circuit or by using an appropriate test unit.

Only fiberglass or wood ladders shall be used near electrical hazards. Metal ladders shall be marked with signs or decals reading CAUTION--DO NOT USE NEAR ELECTRICAL EQUIPMENT. Ladders shall be clean and in good condition.

Portable electrical hand tools shall be unplugged when not in use.

Before maintaining or repairing any electrical equipment, the equipment shall be disconnected from the power source.

Equipment that has frayed cords or three-wire cord ends that have had the grounding prong removed shall not be used. Qualified electrical personnel shall repair faulty equipment and tools.

Exposed energized circuits shall not be approached closer than the following distances, for any reason, unless such parts are adequately guarded:

Alternating Current	Minimum Distances
Voltage Range - Phase-to-Phase	

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600 - 10,000 volts

2 feet

Lineman's type rubber gloves shall be tested at least every 180 calendar days for the circuit voltages involved in accordance with ANSI/ASTM F 496-022, "Standard Specification for the In-Service Care of Insulating Gloves and Sleeves". In addition, a standard air test (ANSI/ASTM F 496-022, "Standard Specification for In-Service Care of Insulating Gloves and Sleeves (2002)") shall be performed immediately before use. Leather protectors shall always be worn over lineman's rubber gloves.

Rubber gloves shall not be relied upon for protection from energized circuits of more than 3500 volts to ground.

Fuses shall not be removed on energized circuits above 600 volts. Fuses shall not be removed from loaded energized circuits. Procedures to be used when removing or replacing fuses on unloaded energized circuits shall conform to the following for circuits:

- o Rated 50 to 600 volts, insulated fuse tongs or extractors manufactured exclusively for fuse removal shall be used.

1.6.2 Special Electrical Safety Requirements

1.6.2.1 Electrical Safety Workers' Qualifications and Duties

All appointed safety workers shall be electrical tradesmen.

- o The Contractor shall appoint a Safety Supervisor knowledgeable of contract safety requirements specified herein. The Safety Supervisor shall be available at the worksite during all work and shall be responsible for the safety of each of the Contractor's work teams.

- o The Contractor shall appoint an Assistant Safety Supervisor who shall take over the responsibilities and perform all duties of the Safety Supervisor if the Safety Supervisor is not present.

- o The Contractor shall furnish to the Contracting Officer, in writing, the names and qualifications of the Safety Supervisor and Assistant Safety Supervisor prior to commencement of work. This submittal is in addition to the Safety Plan required above.

- o When working in energized substations, manholes, and cable tunnels, the Contractor shall:

- o Assign an employee knowledgeable of the safety required, and without other duties, to assist the Safety Supervisor to assure the safety of the work area whenever the work involves the handling of lengths of conduit, bus, steel or large equipment.
- o Assign additional employees, knowledgeable of the safety required and without other duties, for the protection of the workers when the work is so divided and extensive

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that one safety employee cannot effectively maintain the safety surveillance over the workers and their operations.

- o Ensure no work is performed without a minimum of two (2) employees present in any one-work team, one of which shall be a safety team leader.

### 1.6.2.2 Equipment Safety Tests and Checks

The following tests shall be performed prior to energizing electrical equipment for the first time:

- o Initial energizing of all electrical equipment shall be performed in the presence of the Contracting Officer.
- o All power feeder circuit breakers shall be checked for proper adjustment and operation in accordance with the manufacturer's instructions. Molded case circuit breakers without solid state trip devices are excluded from this requirement.
- o All wiring shall be field verified for conformity to the design, fabrication, and functional requirements.

### 1.6.2.3 High Voltage Insulation Testing of Electrical Equipment

For high voltage dielectric testing, the Contractor shall perform the following actions:

- o Verify lockout/tagout procedure for the applicable circuits.
- o Secure the area.
- o Perform a low voltage dielectric test (Megger test).
- o Perform grounding procedures.

These tests shall be in accordance with Section 5, IEEE Std 95-2002.

### 1.6.2.4 Rules Governing Contractor Connection Into Government Electrical Utilities

Prior to connecting into any part of the Government electrical power distribution system, the Contractor shall:

- o Make written application to the Contracting Officer stating the date time, location, and the service desired.
- o Jointly with the Contracting Officer, make the necessary checks of the Contractor's system and the Government's supply to assure their compatibility and safety.

### 1.6.2.5 Switching

All electrical switching that is required for clearance to work on

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equipment operating from electrical circuits shall only be performed by Government personnel who have been authorized as LaRC Safety Operators for the specific equipment.

When work is to be performed on secondary circuits or equipment, which are only disconnected from sources of power by oil switches, the following procedures shall be performed:

- o Obtain concurrence from the Contracting Officer.
- o Verify status of de-energized oil switch.
- o Perform tests to verify that there is no voltage on the load side of the transformer from phase-to-phase and from each phase-to-ground.
- o Apply locks/tags. Indicate on the lock/tag that no work shall be performed on the high voltage (primary) side of the equipment.
- o Apply protective grounding as close as physically possible to the load side of the transformer or power source.

### 1.6.2.6 Removal of Electrical Equipment and/or Wiring

When equipment is designated to be permanently removed, the electrical wiring, conduit, enclosure, and control boxes shall be removed back to the source of feed, unless noted in the drawings or specifications. Where practicable, the power source shall be deenergized and disconnected prior to disconnecting the load or cutting the cables.

## 1.7 UNDERGROUND UTILITIES AND OPERATIONS

### 1.7.1 Water Connections

Contamination of potable water supply is prohibited. LaRC utilizes the necessary safeguards to protect against possible contamination of the fresh water supply caused by backflow or back siphonage. These safeguards are:

- o Where the possibility of cross-connection may exist, backflow prevention devices, or the equivalent, shall be installed and tested periodically.
- o Any suspect cross-connection or suspect contamination of fresh water shall be immediately reported to the Contracting Officer.

## 1.8 RADIATION SAFETY PRECAUTIONS

Contractors using radioactive materials and radiation producing machines shall:

- o Comply with the applicable rules and regulations as specified in 10 CFR Parts 0-199, "Nuclear Regulatory Commission."
- o Comply with the requirements of LAPG 1710.5, "Ionizing Radiation."

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### 1.9 PRESSURE VESSELS

The design, fabrication, inspection, testing, installation, and use of pressure vessels, piping, and associated equipment covered by these specifications shall conform to LAPG 1710.40, Safety Regulations Covering Pressurized Systems.

### 1.10 DEMOLITION OPERATIONS

Demolition operations shall be conducted to ensure the safe passage of persons to and from facilities occupied and used by the Government and to prevent damage to adjacent buildings, structures, and other facilities. Demolition operations shall be in accordance with OSHA 29 CFR Part 1926.850 through 1926.859.

### 1.11 PAINTING AND COATING OPERATIONS

The Contractor shall protect all adjacent materials and equipment against damage from spillage, dripping and spatter of coating materials. All building materials and equipment shall be left clean, with all damaged surfaces corrected. Provide "WET PAINT" signs to indicate newly painted surfaces.

The Contractor shall provide adequate ventilation for all interior spaces during application and drying of coatings, to prevent the build-up of toxic or explosive concentrations of solvent vapors.

### 1.12 FIRE PREVENTION AND PROTECTION

#### 1.12.1 General Requirements

Fire prevention and protection shall be in accordance with NASA-STD-8719.11, "NASA Safety Standard for Fire Protection".

All hot work, as defined in NASA-STD-8719.11, shall have a "Hot Work Permit" issued by the Fire Department. Hot Work will not be permitted until a Hot Work Permit has been issued and posted. Deviations or waivers from this and the following requirements must be presented to the LaRC Fire Chief, in writing, for review and consideration. Only the LaRC Fire Chief can grant deviation or waiver approval.

#### 1.12.2 Welding, Flame Cutting and Melting

All welding and cutting operations including, but not limited to, the use of acetylene and propane torches, propane heat guns, grinders, electric arc welders, and activities such as brazing, shall be done in accordance with the publications of the American Welding Society, and the National Fire Protection Association NFPA 51 and NFPA 51B, Chapter 22 of the "Virginia Statewide Fire Prevention Code" (13 VAC-5-51).

#### 1.12.3 Prohibitions

Hot work activities shall not be performed on the following:

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- o Combustible walls or ceilings or those containing combustible insulation.
- o Tanks or pipes that have held flammable liquids, (unless they have been thoroughly purged and tested for residual vapors).
- o Pipes or other metal in contact with combustible materials if ignition of material is possible due to conduction.
- o Metal partitions, walls, ceilings, or roofs having a combustible covering.
- o Walls or partitions of combustible sandwich-type panel construction.
- o Automatic sprinkler systems after initial installation of systems have been completed.

### 1.12.4 Safeguards

- o Contractor shall remove flammable liquids, oily deposits, and combustible materials within 35-feet of the hot work area.
- o Contractor shall cover or shield combustible materials that cannot be removed with flameproof covers, fire resistant guards, or fire resistant curtains.
- o Contractor shall cover cracks in walls, floors, ducts, or other concealed spaces within 35-feet of the hot work area to prevent the passage of sparks or slag to adjacent areas.
- o Prior to beginning hot work, Contractor shall remove combustible materials from the opposite side of walls, partitions, ceilings or roofs.
- o Nearby personnel shall be protected from heat, sparks, and/or slag, through the use of fire resistive screens or shields.

Special precautions, as recommended by the LaRC Fire Chief and approved by the Contracting Officer, shall be taken to avoid unwanted activation of automatic detection or suppression systems due to the use of hot work equipment.

### 1.12.5 Firewatch

The Contractor shall assign a firewatch for every job involving hot work. The firewatch personnel shall not have any other collateral duties to distract or occupy them.

The firewatch personnel shall know the location of fire alarm pull stations in the work area and shall have two fully charged, 10-pound, ABC multi-purpose, dry chemical fire extinguishers available at all times. Facility fire extinguishers shall not be used to satisfy this requirement. The firewatch personnel shall be qualified in the proper use of fire extinguishers for controlling or extinguishing incipient fires.

The firewatch personnel shall continuously monitor the work area for any smoldering fires or hot spots during the period the hot work is being conducted, and for a period of 30 minutes following the termination of the hot work operation. The firewatch personnel shall immediately notify other workers if any dangerous conditions develop, and call the LaRC Fire Department, at 911 on Center telephones or 864-2222 on cellular telephones.

1.12.6 Means of Egress

An unobstructed means of egress in accordance with NFPA 101, "Life Safety Code," shall be maintained at all times, for use by construction workers and LaRC employees.

1.12.7 Fire Protection and Detection Systems

During building alterations and modifications, where the building is protected by fire detection and/or protection systems, such systems shall be maintained in an operable condition at all times. Shut down for any reason shall be pre-approved and coordinated with the LaRC Fire Chief or designee.

If it is necessary to place any existing fire detection or protection system out of service, temporary protection measures such as the termination of all hazardous operations, or frequent inspections of the area involved with a 24-hour per day firewatch may be required by the LaRC Fire Chief or designee.

The Contractor shall make regular checks on the fire sprinkler, and standpipe control valves will be regularly checked at the end of each work period to ascertain that such systems are in service.

If fire sprinkler heads are located within a demolition area, all heads subject to physical damage shall be fitted with guards.

If smoke detectors are located such that dust and/or gases resulting from the construction may adversely affect them, the following procedures shall be adhered to:

- o Place sequentially numbered plastic bags around each smoke detector in the affected area each day before renovation begins.
- o Post manual instructions and inform all Contractor personnel on how to manually signal a fire condition.
- o If the area in question contains a special hazard, an employee of the Contractor shall be dedicated as a firewatch for the period that detectors are bagged.
- o Remove all bags at the end of each work day until renovation work is completed. Bags shall be removed sequentially and recorded, to ensure that every bag is removed.

1.12.8 Portable Fire Extinguishers

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The suitability, distribution, and maintenance of portable fire extinguishers shall be in accordance with NFPA 10, "Standard for Portable Fire Extinguishers." The Contractor shall provide and maintain at least one 10-pound, multipurpose dry chemical fire extinguisher in a visible location on each floor of the construction area and at each usable stairway, at all times. The Contractor shall provide and maintain two 4-A, 60-B:C rated fire extinguishers within 25 feet of each asphalt (tar) kettle, during the period such kettle is being utilized, and one additional 4-A, 60-B:C fire extinguisher on the roof being covered. Contractor employees shall be instructed in the proper use of extinguishers.

### 1.12.9 Temporary Heaters

When open-flame heating devices or other temporary heating equipment are used, the Contractor shall obtain a written permit from the Fire Chief for each use.

- o A list of temporary heating equipment, to be used on-site, shall be provided to the LaRC Fire Chief.
- o The temporary heating equipment shall be installed, used, and maintained in accordance with the manufacturer's instructions, including clearance to combustible material, equipment and/or construction areas.
- o Chimney or vent connectors, where required by direct-fired heaters, shall be maintained at least 18-inches from combustibles and shall be installed in accordance with NFPA 211, "Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances."
- o Oil-fired heaters shall be designed and installed with features in accordance with NFPA 31, "Standard for the Installation of Oil-Burning Equipment."
- o Fuel supplies for liquefied petroleum gas-fired heaters shall be in accordance with NFPA 54, "National Fuel Gas Code," and NFPA 58, "Standard for the Storage and Handling of Liquefied Petroleum Gases."
- o Refueling operations shall be conducted in accordance with NFPA 58.
- o Temporary heating equipment, where utilized, shall be monitored for safe operation and maintained by properly trained personnel.
- o All heating equipment approved by the Contracting Officer, shall be provided with safeguards, such that when tilted or tipped over, their power source will be automatically shut off.
- o Temporary burner-type heaters that are in use during other than normal working hours shall have an hourly firewatch provided.
- o Burner-type heaters are not permitted in areas where painting or similar operations may create an explosive atmosphere.

1.12.10 Removal of Combustible Waste Material

The Contractor shall remove accumulations of combustible waste material including, paper/plastic packing and wrappings, scrap lumber, dust, and other construction rubbish from the structure and its immediate vicinity at the end of each work shift or more frequently as necessary for safe operations.

The Contractor shall promptly dispose of materials subject to spontaneous ignition, such as oily waste and rags used with paint, linseed oil or other flammable or combustible liquids. Such materials shall only be placed in noncombustible receptacles with tight-fitting lids that are physically located away from any building or structure.

1.12.11 Disposal of Rubbish

The burning or incineration of rubbish, such as construction debris, brush, or trees is prohibited on LaRC. The Contracting Officer will provide direction as to the appropriate method of disposal.

1.12.12 Flammable and Combustible Liquids

Flammable and combustible liquids shall be stored and handled in accordance with NFPA 30, "Flammable and Combustible Liquids Code."

Open flames and smoking shall not be permitted in flammable and combustible liquid storage areas. Such areas shall be appropriately posted as "NO SMOKING" areas.

Flammable liquids, including Class I and Class II liquids, shall be kept and transported in the appropriate safety containers as defined in 29 CFR Part 1926.152.

Class I liquids shall be dispensed only where there are no open flames or other sources of ignition within the possible path of vapor travel.

Bulk storage of flammable liquids is prohibited unless the LaRC Fire Chief or designee has granted prior approval.

1.12.13 Smoking

Smoking shall only be permitted in areas designated by the LaRC Fire Chief or designee. The Contractor shall provide receptacles of non-combustible construction designed for collection of waste smoking material.

1.12.14 Non-Emergency Use of Fire Hydrants

Requests for the non-emergency use of fire hydrants shall be made to the LaRC Fire Chief or designee prior to use. Requests may be approved with the following restrictions:

- o The hydrant user shall install one valve on the 4-1/2-inch port on each hydrant to be used. (This 4-1/2-inch port with the valve installed is reserved for LaRC Fire Department use only.)

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- o One or both of the 2-1/2-inch fire hydrant ports shall be reserved for non-emergency use. The hydrant user shall provide an approved 2-1/2-inch gate valve on one or both of the 2-1/2-inch fire hydrant ports, reduced down to 1-1/2-inches.

### 1.12.15 Fire Department Access

Main access roadways shall not be obstructed in any manner.

The Contractor shall provide unobstructed access from the street to fire hydrants and to outside connections for standpipes, sprinklers, or other fire extinguishing equipment, whether permanent or temporary, shall be provided and maintained at all times.

Unobstructed access to the main fire alarm control panel, permanent, temporary, or portable first-aid fire equipment shall be provided and maintained at all times.

### 1.13 USE OF EXPLOSIVES

The use of explosives is not permitted.

### 1.14 FALL PROTECTION (OSHA 29 CFR PART 1926.500 THROUGH 1926.503)

Fall protection devices and systems shall be in accordance with OSHA 29 CFR Part 1926.500.

The Contractor shall provide fall protection devices and systems for employees in accordance with OSHA 29 CFR Part 1926.501, when working at a height greater than 6 feet.

Body belts are not acceptable as part of a personal fall arrest system. Personnel shall use a full body harness with shock absorbing lanyard.

### 1.15 LIFTING OPERATIONS

#### 1.15.1 General

Only capable and experienced riggers and equipment operators shall be engaged in on-site lifting operations. In establishing the qualification of such riggers and equipment operators, it is essential that such personnel be knowledgeable about and capable of: determining center of gravity (C.G.) of items to be lifted; determining load weights; calculating lifting line strengths and the margins of safety; calculating sling tension loads; using common slings and hitches; selecting proper sizes and the use of chocks; using hydra-sets; using proof loading specifications; use of hand signals; using and determining strength of knots; using and determining strength of shackles/hooks; and the factors causing distortion of loads (blocking). Personnel involved in these operations shall have at least four years experience in such efforts.

Certification Letter for Operators of Non-Government Owned Lifting Equipment  
The Contractor shall provide a certification letter to the Contracting

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Officer listing all qualified riggers and equipment operators who will be working on-site stating; (1) their years of experience, (2) specialized training, and (3) medical qualifications, (i.e., any visual, hearing, or other physical limitations). This letter shall be submitted to the Contracting Officer prior to on-site lifting operations.

If lifting operations are being conducted in an unskillful manner, the Contracting Officer may, in accordance with FAR Clause 52.236-5, Material and Workmanship, require the Contractor to remove from the work any employee failing to follow appropriate procedures.

### 1.15.2 Lifting Devices

All Contractor-furnished lifting devices used on-site shall meet the minimum requirements of the applicable ANSI specifications incorporated in OSHA 29 CFR Part 1910, Occupational Safety and Health Standards, Subpart N, Materials Handling and Storage, and OSHA 29 CFR Part 1926, Safety and Health Regulations for Construction, Subpart N, Cranes, Derricks, Hoists, Elevators, and Conveyors.

All mobile/truck-mounted cranes must have a current annual inspection and "Certification of Load Test". The Certification must be kept on the crane and be made available for inspection by the NASA Inspector or the Safety and Facility Assurance Office Representative upon request. The Safety and Facility Assurance Office shall be notified prior to any mobile/truck mounted crane being brought onto LaRC, at 864-5594 or 864-7233.

The Contracting Officer may inspect at any time, any or all of the Contractor-furnished lifting devices used on-site. If any of the devices do not meet the above requirements, they will be barred from further use until all necessary repairs have been made and they have been reinspected.

Where cranes and derricks are used in or around high-voltage substations, overhead lines, or exposed energized parts, the operations and equipment shall be in accordance with OSHA Subpart N, Paragraph 1926.550, "Cranes and Derricks."

All lifting equipment shall be effectively grounded when being moved or operated in proximity to energized lines or equipment. Consideration shall also be given to grounding the load, particularly if insulated lifting straps are in use.

Lifting equipment shall be operated with a dedicated observer to warn the equipment operator of potentially hazardous situations and/or movements.

### 1.15.3 Guidelines for Proper Use of A-Frame Type Lifting Devices

A-frames shall be positioned directly over the object to be lifted with the lifting line vertical, the hoist-to-object attachment vertical, or the sling vertical.

Lifts shall be performed through the center of gravity of the object to be lifted or lateral movement restraints shall be imposed to maintain the lifting line vertical.

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If the lifted object is to be transported by the A-frame, the center of gravity of the object shall be as low as practical and lateral restraints imposed to maintain the lifting line vertical during transport.

At no time during the use of A-frames shall the lifting line be allowed to get outside of the A-frame base dimensions.

- o A-frames shall be marked with their load capacity rating.
- o A-frames shall be constrained to a 2.5 to 1 height-to-base ratio, to allow the lifting line to be approximately 11 degrees from vertical before an unsafe condition could occur.
- o A-frame base support devices shall be provided for A-frames with wheels, to preclude overturn due to the loss of a wheel when lifting its rated load.

### 1.15.4 Certification of Qualified Operators of Government Owned Lifting Equipment

Prior to using Government owned lifting equipment, all qualified operators shall be certified in accordance with Langley Procedures and Guidelines, LAPG 1740.6, Chapter 8 (Hardware Handler). The Contractor shall submit a list of qualified operators as defined in this section to the Safety and Facility Assurance Office (SFAO) by calling 864-1168 or 864-7233 to be scheduled for NASA safety training and examination in the use of lifting equipment.

Following the 2-hour training session and successful completion of a written exam, the qualified operators shall be scheduled for a visual and hearing acuity examination by the Contractor, and checked out on the specific equipment to be used, by a NASA Facility Safety Head or designee.

#### Certification Letter for Operators of Government Owned Lifting Equipment

The Contractor shall provide a certification letter to the Contracting Officer stating; (1) the names of the qualified operators, (2) the date of their NASA safety training, and (3) confirmation of their passing the written examination, visual and hearing acuity examination, and having been checked-out on the specific equipment. This letter shall be submitted to the Contracting Officer prior to on-site lifting operations.

### 1.16 ACCIDENTS AND SAFETY RELATED INCIDENTS

#### 1.16.1 Emergency Response and First Aid Facilities

Contractor employees working onsite may use the Occupational Medical Center for emergency first aid. This facility is located in Building 1149 at 10 West Taylor Street. The telephone number is 864-3196.

To facilitate the rapid notification of emergency responders in the event of a fire, injury or other hazardous conditions, it is recommended the Contractor have a telephone available at the job site.

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Emergency response may be obtained by dialing 911 from any Center telephone or by dialing 864-2222 from cellular telephones.

The Contractor shall assure that its personnel are aware of these emergency first aid and emergency response services and shall post the above information conspicuously at the job site.

Accidents shall be reported to the Safety and Facility Assurance Office at 864-7233 as soon as possible. A written report of the accident shall be filed with the Safety and Facility Assurance Office within 3 working days after the accident.

### 1.16.2 Accident Reporting

All near miss/close call accidents occurring on the Center involving NASA property or equipment, shall immediately be reported to the Safety and Facility Assurance Office at 864-7233.

A near miss/close call accident is defined as a work-related accident that could have caused an injury or property/equipment damage.

### 1.17 DISPOSAL OF HAZARDOUS WASTE MATERIAL

Disposal of hazardous waste shall be conducted in accordance with Resource Conservation Recovery Act (RCRA) and Federal regulations, State regulations (9 VAC-20-60), and LAPG 8800.1, Chapter 5 (Environmental Program Manual). The Government will be responsible for disposal of all hazardous/regulated waste. Any waste generated by the Contractor at the construction site shall be reported to the Contracting Officer to determine if the waste is regulated or hazardous. The Contractor shall not generate hazardous/regulated waste until it has received written approval and been informed of all applicable regulations concerning the waste generated, by the Environmental Management Office (EMO). The Contractor will be audited by the Environmental Management Office to assure that all RCRA regulations and proper hazardous waste practices are being followed. Contractor shall take appropriate actions to assure compliance with all Hazardous Waste regulations. The Contracting Officer shall be advised of all waste disposal practices at the construction site and will be the liaison between EMO and the Contractor. The Contractor shall remove all mercury containing devices (such as switches, relays, gauges, used fluorescent light bulbs, and ballasts) from any electrical/mechanical equipment prior to transporting off LaRC property. The Contractor shall place used fluorescent tubes in boxes for pickup. EMO will provide labeled containers for accumulation and pickup of devices.

Disposal of hazardous waste into the storm or sanitary sewer is prohibited at all times. Disposal of non-hazardous wastes into sewer systems is authorized only after approval by the Contracting Officer. A permit issued by EMO is required before these waste practices can be permitted. The permit form is Attachment 2, Sewer Disposal Permit, to this section.

### 1.18 PERSONAL PROTECTIVE EQUIPMENT

Protective equipment, including personal protective equipment for eyes,

## UPGRADE TO HIRF AND SAFETI LABS

face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in accordance with OSHA 29 CFR Part 1926, Safety and Health Regulations for Construction, Subpart E, Personal Protective and Life Saving Equipment, wherever it is necessary by reason of hazards, processes, environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

### 1.19 SIGNS, SIGNALS AND BARRICADES

#### 1.19.1 Accident Prevention Signs

Contractor shall place signs at locations where hazards exist, as described below. These signs shall be visible at all times when work is being performed and shall be removed or covered promptly when the hazard(s) no longer exists. (OSHA 29 CFR Part 1926.200)

Danger signs shall be used where an immediate hazard exists. Caution signs shall be used to warn against potential hazards or to caution against unsafe practices.

Safety instruction signs shall be used to identify safety requirements relating to the work (e.g., Hard Hats Area, Eye and Hearing Protection Required). Contractor shall post construction areas with legible traffic signs at points of hazard. All traffic control signs or devices used for protection of construction workers shall conform to AASHTO D-MUTCD-3, Manual for Uniform Traffic Control Devices.

#### 1.19.2 Signaling

When operations are such that signs, signals, and barricades do not provide the necessary protection on or adjacent to a roadway, flagmen or another appropriate traffic control shall be provided. Signaling directions by flagmen shall conform to AASHTO D-MUTCD-3, Manual for Uniform Traffic Control Devices.

#### 1.19.3 Barricades

Barricades shall be used to deter the passage of persons or vehicles from a hazard, such as openings in walls, floors and roof edges. Barricades shall conform to the portions of AASHTO D-MUTCD-3, Manual for Uniform Traffic Control Devices, relating to barricades. (OSHA 29 CFR Part 1926.202)

### 1.20 HAND AND POWER TOOLS

All hand and power tools and similar equipment shall be maintained in a safe condition. When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use. (OSHA 29 CFR Part 1926.300)

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise

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create a hazard. Guarding shall meet the requirements as set forth in ASME B15.1, Safety Standard for Mechanical Power Transmission.

1.21 SCAFFOLDING

All scaffolding activities shall be in accordance with OSHA 29 CFR Part 1926.451.

1.21.1 Aerial Lifts

Aerial lifts acquired for use on or after January 22, 1973 shall be designed and constructed in accordance with the applicable requirements of the American National Standards, ANSI/SIA A92.2-2002, for "Vehicle Mounted Elevating and Rotating Work Platforms." Aerial lifts acquired before January 22, 1973 which do not meet the requirements of ANSI/SIA A92.2-2002, may not be used, unless they have been modified to conform to the applicable design and construction requirements of ANSI/SIA A92.2-2002. A fall arrest system shall be used in accordance with OSHA 29 CFR Part 1910.66(j).

All aerial lifts shall be in accordance with OSHA 29 CFR Part 1926.453.

1.22 STEEL ERECTION

All steel erection activities shall be in accordance with OSHA 29 CFR Part 1926.750 through 1926.752.

1.23 CONCRETE AND MASONRY CONSTRUCTION

All concrete and masonry construction shall be in accordance with OSHA 29 CFR Part 1926 Subpart Q.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

## UPGRADE TO HIRF AND SAFETI LABS

### Safety Program Guide Items That Must Be Addressed (Unless Totally Inapplicable) On All Safety Plans

Contract Identification - Job title and contract number and a brief summary and scope of the work. The safety representative shall be identified.

Policy - Provide Company's safety policy statement with the plan. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Goals and Objectives - Describe specific goals and objectives to be met. Describe the contractor's approach (including milestone schedule) to achieve and maintain level 5 of the NASA Performance Evaluation Profile in all areas. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Management Leadership - Describe management's procedures for implementing its commitment to safety and health through visible management activities and initiatives including a commitment to the exercise of management control to ensure work place safety and health. Describe processes and procedures for making this visible in all contract and subcontract activities and products. Include a statement from the project manager or designated safety official indicating that the plan will be implemented as approved and that the project manager will take personal responsibility for its implementation. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Employee Involvement - Describe procedures to promote and implement employee (e.g., non-supervisory) involvement in safety and health program development, implementation, and decision-making. Describe the scope and breadth of employee participation to be achieved so that approximate safety and health risk areas of the contract are equitably represented. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Assignment of Responsibility - Describe line and staff responsibilities for safety and health program implementation. Identify any other personnel or organization that provides safety services or exercises any form of control or assurance in these areas. State the means of communication and interface concerning related issues used by line, staff, and others (such as documentation, concurrence requirements, committee structure, sharing of the work site with NASA and other contractors, or other special responsibilities and support). As a minimum, the contractor will identify the following, as required per Appendix H of NPG 8715.3, "NASA Safety Manual":

- a. Safety Representative - Identify by title the individual who will be responsible for the contractor's adherence to Center-wide safety, health, environmental and fire protection concerns and goals, and who will participate in meetings and other activities related to the Center's safety and Health program.
- b. Company Physician - The contractor shall identify their company physician, including name, address and telephone number.

Notice of Violations - The prime contractor shall respond to any Notice of Violation (NOV) issued to them or their subcontractors within 3 working days

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from issuance. This response shall be provided to the issuer of the NOV.

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## UPGRADE TO HIRF AND SAFETI LABS

Accountability - Describe procedures for ensuring that management and employees will be held accountable for implementing their tasks in a safe and healthful manner. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Voluntary Protection Program (VPP) - The contractor shall explain its approach to comply with the elements of the VPP while working on LaRC, which is a designated VPP Star site. This approach shall include, but is not limited to logs, records, minutes, procedures, checklists, statistics, reports, analyses, notes, or other written or electronic documentation that contains in whole or in part any subject matter pertinent to safety, health, environmental protection, or emergency preparedness. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Workplace Analysis - Describe the method by which hazards, within the contractor's workplace, shall be systematically identified. The identified method shall explain the information collection process through a combination of survey analyses, inspections of the workplace, investigations of mishaps and close calls, and the collection and trend analysis of safety and health data such as: records of occupational injuries and illnesses; reports of spills and inadvertent releases to the environment, facility related incidents, employee reports of hazards. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Hazard Identification - Describe the procedures and techniques to be used to compile an inventory of hazards associated with the work to be performed on the contract. This inventory of hazards shall address the work specified in the contract, as well as, operations and work environments, which are performed in the vicinity or in close proximity to contract operations.

(Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Employee Reports of Hazards - Identification of methods to encourage employee reports of hazardous conditions (e.g., close calls) and analyze/abate hazards. The contractor shall describe steps it will take to create reprisal-free employee reporting with emphasis on management support for employees and describe methods to be used to incorporate employee insights into hazard abatement and motivation/awareness activities. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Inspections - The contract shall include requirements for assignments, procedures and frequency for regular inspections and evaluation of work areas for hazards and accountability for implementation of corrective measures. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Accident Reporting - All serious accidents shall be reported (as soon as possible) to the Safety and Facility Assurance Office at 864-7233. A written report of the accident shall be filed with the Safety and Facility Assurance Office within 3 working days after the accident. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Recordkeeping - The Contractor shall maintain the appropriate records concerning accidents and injuries, in accordance with OSHA 29 CFR 1904.

UPGRADE TO HIRF AND SAFETY LABS

(Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

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## UPGRADE TO HIRF AND SAFETI LABS

Mishap Investigation - Identification of methods to assure the reporting and investigation of mishaps including corrective actions implemented to prevent recurrence. The contractor shall describe the methods to be used to report and investigate mishaps on NASA property and on contractor or third party property. The contractor shall discuss its procedures for immediate notification requirements for fires, hazardous materials spills and releases and other emergencies. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Hazard Prevention and Control - Describe approach to identify, control and/or eliminate hazards in the work place. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Hazardous Operations - Identify hazardous operations to be performed and written procedures developed to ensure the safety and health of employees while performing them. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Flammable Liquid Storage Containers - Flammable liquids shall only be stored in "approved" flammable liquid safety cans that have self-closing spouts.

NASA LaRC Lockout/Tagout System - All contractors/subcontractors shall comply with the NASA LaRC Lockout/Tagout system when performing work on-site, as described in LAPG 1910.10, "Safety Clearance Procedures (Lockout/Tagout). Under no circumstances shall a NASA LaRC Lockout/Tagout device be violated.

Safety Regulations - In addition to OSHA and Federal Regulations, the Contractor shall adhere to all applicable State, Local and Langley Research Center Safety Regulations. (Required per Appendix H of NPG 8715.3, "NASA Safety Manual.")

Confined Space Entry - Confined spaces shall not be entered until a Confined Space Entry Permit has been obtained. The Contractor shall have personnel trained in confined space entry, shall provide the permit and conduct initial and hourly readings as required by OSHA 29 CFR 1910.146.

Crane Certification - All mobile/truck-mounted cranes shall have a current "Annual Certification of Load Test". The Certification shall be kept on the crane and be made available for inspection by the NASA Inspector or the Safety and Facility Assurance Office Representative upon request. The Safety and Facility Assurance Office shall be notified immediately when any mobile/truck mounted crane is brought onto the Center, at 864-5594 or 864-7233.

Scaffolding - When scaffolding is required, it shall be designed, constructed and assembled in accordance with OSHA 29 CFR 1926.450 through 454.

Excavations and Trenching - Surface penetrations of 6 inches or more require a "Digging Permit" and shall follow all applicable standards under OSHA 1926.650-652.

Material Safety Data Sheets (MSDS) - A MSDS shall be available for each chemical, oil, lubricant, solvent, etc., used on the job-site. (Required per

UPGRADE TO HIRF AND SAFETY LABS

Appendix H of NPG 8715.3, "NASA Safety Manual.")

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Fall Protection - When fall protection is required, the Contractor shall comply with OSHA 29 CFR 1926.500 through 1926.503, which defines the types of fall protection devices and systems. Personnel shall use a full body harness with shock absorbing lanyard.

Extension Cords and Ground Fault Protection - All extension cords shall be the three wire grounded type and be in good working order (No broken or missing pins). Extension cords or other temporary wiring shall be protected by a Ground Fault Interrupt (GFI) device.

Subcontractor Compliance - All subcontractors shall comply with the Prime Contractor's Safety Plan.

Safety Meetings - The Contractor shall hold weekly safety meetings.

Hazardous Communications Program - The Contractor shall furnish a copy of his hazardous communications program as defined in CFR 29 Part 1910.1200.

Floors, Openings, Etc. - Unprotected openings in walls, floors or roof edges shall be guarded using standard handrails, barricades, or equivalent protection.

Steel Erection - When steel erection is required, it shall be performed in accordance with OSHA 29 CFR 1926.750 through 1926.752.

Personal Protective Equipment - When required, the appropriate PPE shall be used in accordance with OSHA 29 CFR 1926 Subpart E.

Hot Work Permit - Hot Work will not be permitted until a Hot Work Permit has been issued by the Fire Department, approved and posted. Deviations or waivers from this and must be presented to the LaRC Fire Chief, in writing, for review and consideration. Only the LaRC Fire Chief can grant deviation or waiver approval.

Appendix H, NPG 8715.3, "NASA Safety Manual" may be viewed at:  
[http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal\\_ID=N\\_PG\\_8715\\_0003\\_&page\\_name=AppendixH](http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal_ID=N_PG_8715_0003_&page_name=AppendixH)

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SEWER DISPOSAL PERMIT

PART ONE (TO BE COMPLETED BY REQUESTOR)

1. Name of material\_\_\_\_\_
2. Quantity\_\_\_\_\_
3. Date(s) of proposed disposal\_\_\_\_\_
4. Analytical Data: MSDS\_\_\_ Laboratory Analysis\_\_\_ Attached\_\_\_ (Check at least one)
5. Sanitary Sewer\_\_\_\_\_ Storm Sewer\_\_\_\_\_
6. Signature of Requestor\_\_\_\_\_
7. Organization\_\_\_\_\_
8. Date\_\_\_\_\_

PART TWO (TO BE COMPLETED BY THE ENVIRONMENTAL MANAGEMENT OFFICE)

Authorization for disposal of the material described above is granted. Any deviation invalidates this permit.

\_\_\_\_\_  
Environmental Management Office

\_\_\_\_\_  
Date

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SECTION 01330

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SECTION 01330

SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

This section defines and explains the general submittal requirements applicable to all submittals under this contract. Specific submittals required are set forth by the various administrative or technical sections of this specification, the contract drawings, or other portions of this contract. Accordingly, the Contractor shall make timely and complete submittals as required by all applicable contract provisions.

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 SUBMITTAL PREPARATION AND CONTENT

1.2.1 Technical Submittals

All technical submittals, for action of the Contracting Officer, shall be submitted on the Langley Technical Submittal Form (see Attachment 1). The actual transmittal form for this project will be transmitted to the Contractor at the time of Notice to Proceed.

The technical submittal form shall serve as the Contractor's cover sheet and also the Government's approval/review sheet back to the Contractor.

The Contractor shall submit one technical submittal form cover sheet for each package of submittals.

Technical submittals shall be grouped by specification section, limited to eight (8) submittals per cover sheet from one specific specification section.

The Contractor shall complete the item number, specification section and paragraph number, SD number and description for each item submitted.

The Contractor shall note any specification deviation included in the submittal package.

1.2.2 General

All submittals shall be in the English language.

Submittals become the property of the Government. The Government reserves the right to duplicate, use, and disclose, in any manner and for any purpose, shop drawings delivered under this contract. Wording such as

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"Confidential", "Do not reproduce", and similar statements shall not be included on the submittals. Submittals that prohibit duplication will be returned to the Contractor for correction and resubmitting. Refer to FAR 52.236-1, Performance of Work by the Contractor, for additional information.

The Contractor shall specifically point out variations of submittal items from contract requirements in transmittal letters. Failure to point out deviations may result in the Contracting Officer requiring rejection and removal of such work at no additional cost to the Government.

The Contractor shall allow 30 calendar days for review of submittals. If the Contractor deems a submittal critical or urgent (e.g., to order long lead-time items; enter into firm subcontracts or supplier purchase orders), it shall so state on the letter or form transmitting such submittal and shall indicate its priority for the items submitted.

The Contracting Officer will, after receipt of submittals, return one copy to the Contractor marked "Reviewed", "Approved," "Approved with corrections as noted," "Reviewed with corrections as noted," or "Returned for corrections," which shall be interpreted as follows:

Submittals marked "Reviewed" authorize the Contractor to proceed with the work covered by such submittals.

Submittals marked "Approved" authorize the Contractor to proceed with the work covered by such submittals.

Submittals marked "Approved with corrections as noted" or "Reviewed with corrections as noted," authorize the Contractor to proceed with the work covered by such submittals in accordance with the corrections indicated thereon. The Contractor shall make the corrections to the submittals and resubmit them to the Contracting Officer within fifteen calendar days after receipt of the marked submittals.

Submittals marked "Returned for correction" require the Contractor to make the necessary corrections and revisions to the submittals and to resubmit them for approval by the Contracting Officer.

Where the submittal is for Information, the Government may indicate recommended corrections, or take no action, at its discretion. The Contractor may proceed with the work without response from the Government.

Government review or approval does not relieve the Contractor of responsibility for the accuracy and correctness of submittal data furnished or for compliance of the submittal's subject items with all applicable contract requirements.

Where review of the submittals is indicated, the Contracting Officer will notify the Contractor of any recommended corrections within 30 calendar days after receipt. If the Government takes no action within 30 calendar days, the Contractor may assume Government acceptance and proceed with the work.

Where Approval of submittals concerning materials, drawings, or other

submittals is required prior to work execution, the Contractor shall not proceed with the affected work until such approval is received from the Contracting Officer. Government action will be taken within 30 calendar days.

Partial Submittals will not be accepted for expediency of the contract's completion.

#### 1.2.3 Calculations, Drawings, Data, and Other Contractor Submittals

The Contractor shall collect the required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Marking of each copy of product data submitted shall be identical.

##### 1.2.3.1 Calculations and Drawings

As required by these specifications, the Contractor shall prepare all calculations and/or drawings to fabricate, assemble and install all parts of the work, in such detail that will enable the Contracting Officer to understand and check conformity with the contract specifications.

The Contractor shall collect copies of the calculations and computations in booklet form, arranged to show electrical, mechanical, and structural/architectural divisions.

When action on submittals is taken by the Contracting Officer, each copy of drawings/calculations will be identified as having received such action by being so stamped and dated. The Contractor shall make any corrections required by the Contracting Officer. If the Contractor considers any correction indicated to constitute a change to the contractual requirements, the Contractor shall promptly notify the Contracting Officer and shall not proceed with the work covered thereby until directed to do so. The approval of the drawings by the Contracting Officer shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. The Contractor shall be responsible for the dimensions and design of adequate connections, and details, and satisfactory construction of all work.

The drawings shall be made by using the AutoCAD drafting program and be of such quality of workmanship to permit the making of legible reproductions and revisions without impairing their usefulness. Drafting standards employed shall permit reducing the drawing to a 35mm negative from which a full size enlarged print can be reproduced without loss of resolution of the information contained thereon.

The drawings shall be submitted on white bond paper, not less than 8½ by 11 inches in size, not larger than 22 by 34 inches in size, except for full size patterns or templates.

Shop drawings shall be prepared in accurate size, with scale indicated, except where other form is required. A responsible representative of the Contractor shall sign all drawings.

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Design, Furnish, and Install contract drawings shall be on 22-inch x 34-inch white bond paper with standard Langley Research Center title blocks. The Contracting Officer shall furnish the title blocks in the form of AutoCAD files.

Drawing reproducibles shall be suitable for microfilming and reproduction and shall be of a quality to produce clear, distinct lines and letters. Drawings shall have dark lines on a white background.

Copies of each drawing shall have the following information clearly marked thereon:

- a. The job name, which shall be the general title of the contract drawings.
- b. The date of the drawings and revisions.
- c. Name of Contractor.
- d. Name of Subcontractor and/or manufacturer.
- e. The name of the item, material, or equipment detailed thereon.
- f. The number of the submittal (e.g., first submittal) in a uniform location adjacent to the title block.

The Contractor shall submit drawings in a sequence that will permit the work to proceed in an orderly manner consistent with the sequence of events as scheduled on the Contractor's scheduling technique required by this contract.

### 1.2.4 Submittal Descriptions (SD)

Submittal Description (SD): These are drawings, diagrams, layouts, schematics, catalog cuts, descriptive literature, illustrations, schedules, performance and test data, and similar materials to be furnished by the Contractor explaining in detail specific equipment and portions of the contractually required work.

The following items are descriptions of data to be submitted for the project. The requirements to actually furnish the applicable items will be called out in each specification section.

#### SD-01 Data

##### General:

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

##### Manufacturer's Catalog Data:

Data composed of catalog cuts, brochures, circulars, specifications and product data, and printed information in sufficient detail and scope to

## UPGRADE TO HIRF AND SAFETI LABS

verify compliance with requirements of the contract documents.

### Manufacturer's Standard Color Charts:

Printed illustrations displaying choices of color and finish for a material or product.

### Design Data:

Design calculations, mix design analyses, or other data pertaining to a part of the work.

### Recertification Status Sheets:

Tabular summary of component data including: end connections, manufacturer, description, material, installation date, allowable working pressure, and code compliance.

### SD-04 Drawings

Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, detail of fabrications, layout of particular elements, connections, and other relational aspects of the work. Drawings may include the types of graphically depicted information discussed below.

Original shop drawings including Elementary Diagrams and Schematics shall be created using the current or immediately previous release of AutoCAD.

The drawings shall be coordinated with the wiring diagrams of the equipment furnished under sections of Division 16. Prior to final payment on this contract, the original tracings of the submitted shop drawings, including electronic files in AutoCAD format, shall be forwarded to Langley Research Center for retention.

### Connection Diagrams

Connection diagrams shall indicate the relations and connections of devices and apparatus. They shall show the general physical layout of all controls, the interconnection of one system, or portion of system, with another, and all internal tubing, wiring, and other devices.

### Control Diagrams

Control diagrams shall show the physical and functional relationship of equipment. Electrical diagrams shall show size, type, and capacity of the systems. Pneumatic diagrams shall be furnished where air or gas systems are used.

### Elementary Diagrams

Elementary diagrams shall indicate, in straight-line form, without regard for physical relationship, all supporting systems and elements

of equipment and associated apparatus.

#### Interconnection Diagrams

Interconnection diagrams shall indicate, to scale, interface between associated units of equipment and between equipment and systems.

#### Schematics

Schematic drawings shall depict the functional flow of systems and their interfaces with facilities and other systems. Functional and physical interfaces shall be indicated. Schematics need not be to scale. Schematics may be structural, mechanical, electrical, or a combination of these.

#### Fabrication/Erection/Installation Drawings

Fabrication, erection, installation, and checkout drawings and specifications shall indicate equipment arrangement, with elevations, sections, and enlarged details. Details shall indicate proper methods of fabrication, construction, and installation.

#### As-Built Contract Drawings

The As-built Contract Drawings shall provide current factual information including deviations from, and amendments to the drawings and changes in the work, concealed and visible.

The As-built Contract Drawings shall accurately reflect the current configuration of the design and construction, and shall be red-lined concurrently with any changes being made. The Contractor shall implement an established drawing control process to ensure that design changes are communicated to construction personnel and to the Government for approval in a timely manner.

The As-Built Contract Drawings shall be maintained at the construction site, and shall be available for inspection any time by the Contracting Officer. The Contractor shall submit one (1) copy of these marked up drawings to the Contracting Officer at the end of the contract period for Government review and approval prior to final payment and acceptance of the contract. These drawings shall be stamped "AS-BUILT CONDITIONS" on each sheet or page, dated, and signed by the Contractor.

#### Pressure Systems Drawings:

Pressure systems drawings shall be an isometric depiction of the pressure piping system as installed. The drawing shall include all system components, each uniquely numbered, including supports and all other specific elements that represent the as-built configuration. Component numbering shall be continuous throughout the system.

#### SD-06 Instructions

Preprinted material describing installation of a product, system, or

material, including special notices and material safety data sheets, if any, concerning impedances, hazards, and safety precautions.

SD-08 Statements

A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other subcontractor, to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications, or other verification of quality. This shall include plans or other documentation to ensure compliance with local, state, and federal safety laws and regulations.

SD-09 Reports

General:

Reports of inspections and/or laboratory tests, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

Test Reports:

A report signed by an authorized official of a testing laboratory that a material, product, or system identical to the material, product, or system to be provided has been tested in accordance with requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within 3 years of the date of award of this contract.

Factory Test Report:

A written report which includes the findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for this project before it is shipped to the job site. The report must be signed by an authorized official of the manufacturer or an independent testing laboratory and must state the test results. The report shall also indicate whether the material, product, or system has passed or failed the test. These reports shall be subject to approval of the Contracting Officer, unless otherwise specified herein, before delivery of the materials or equipment. This approval shall not relieve the Contractor of the obligation to meet all the requirements of the contract.

Field Test Report:

A written report which includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report shall be signed by an authorized official of a testing laboratory or agency, must state the test results, and indicate whether

the material, product, or system has passed or failed the test.

SD-13 Certificates

Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system or material meets specified requirements. The statements must be dated after award of contract, name the project, and list the specific requirements.

SD-14 Samples

General:

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

Color Selection Sample:

Samples of the available choice of colors, textures, and finishes of a product or material, presented over a substrates identical in texture to that proposed for the work.

Sample Panels:

An assembly constructed at the project site, in a location acceptable to the Contracting Officer, using materials and methods to be employed in the work; completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the Contracting Officer.

Sample Installation:

A portion of an assembly or material constructed where directed and, if approved, retained as a part of the work.

SD-18 Records

Documentation required for contract administration.

SD-19 Operation and Maintenance Manuals (O&M)

The technical specifications identify requirements for operation, maintenance instructions, and parts, and describe specific testing requirements for certain items of equipment and/or systems. Where such requirements exist, the Contractor shall furnish commercially available standard operation and maintenance data, including operating instructions, maintenance instructions and parts listings. Testing procedures shall be furnished as required to demonstrate full compliance with the technical provisions. Detailed requirements for these items follow.

Information required for the preparation of Operation and Maintenance Manuals (O&M) may be furnished in the form of manufacturers' standard

## UPGRADE TO HIRF AND SAFETI LABS

brochures, schematics, and other printed instructions. Data shall include as a minimum the following items:

Recommended procedures and frequencies for preventive maintenance, inspection, adjustment, lubrication, and cleaning.

Special tools and equipment required for testing and maintenance.

Parts lists reflecting the true manufacturer's name, part number, and nomenclature.

Recommended spares by part number and nomenclature and spare stocking levels.

Integrated mechanical and electrical system schematics and diagrams to permit operation and troubleshooting after acceptance of the system.

Troubleshooting, checkout, repair, and replacement procurement procedures.

Operating instructions including start-up and shutdown procedures.

Safety considerations including load limits, speed, temperature, and pressure

Four copies of the above data shall be submitted 30 calendar days prior to onsite delivery, and shall be updated and submitted for final approval not later than 30 calendar days prior to contract completion. Test data shall be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear and legible. Pages for vendor data and/or the manuals shall be bound in three-ring, loose leaf binders and have 3/8-inch holes. Data shall be organized by separate index and tabbed sheets. Caution and warning indications shall be clear and well labeled.

### 1.3 MARKING

Marking shall be provided for each submittal to identify it by contract number, transmittal date, Contractor's, Subcontractor's, and supplier's name, address(es) and telephone number(s), submittal name, specification section and paragraph reference, drawing reference, and similar information to distinguish it from other submittals and to identify its contractual requirement source(s).

### 1.4 SAMPLES

As required by the various sections of these specifications, the Contractor shall furnish samples. Materials or equipment requiring sample approval shall not be delivered to the site or used in the work until approved in writing by the Contracting Officer.

Samples shall conform to requirements listed below:

Samples shall be marked to show the name of the material, trade name of

## UPGRADE TO HIRF AND SAFETI LABS

manufacturer, place of origin, contract number, name and location of the project where the material represented by the sample is to be used, and the name of the contractor submitting the sample.

Samples shall be accompanied by a letter to the Contracting Officer. This letter shall be addressed as stated in the paragraph entitled, "Addressing Correspondence" of Section 01011 and shall include descriptive literature, and reference the provisions of the specification or drawings requiring use of the material.

Samples not subjected to destructive tests may be retained until completion of the work, but thereafter will be returned to the Contractor if it so requests in writing, at its own expense. If no request for return of samples is made prior to contract completion, the samples shall become the property of the Government.

Samples shall be physically identical with the proposed material or product to be incorporated in the work, fully fabricated and finished in the specified manner, and full scale. Where variations in color, finish, pattern, or texture are inherent in the material or product represented by the sample, multiple units of the sample, showing the near-limits of the variations and the "average" of the whole range (not less than 3 units), shall be submitted. Each unit shall be marked to describe its relation to the range of the variation. Where samples are specified for selection of color, finish, pattern, or texture, the full set of available choices shall be submitted for the material or product specified. Sizes and quantities of samples shall represent their respective standard unit.

Before submitting samples, the Contractor shall assure that the materials or equipment will be available in quantities required for the project. Any proposed change or substitution shall be resubmitted and approved prior to use in the project.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. The Contractor shall replace such materials or equipment to meet contract requirements.

### 1.5 SUBMITTAL REQUIREMENTS

The following submittal summary chart itemizes the general and specific submittal requirements under this contract. The following letter codes designate the Government addressee(s) and Mail Stop(s):

- A - Contract Administrator, Mail Stop 126
- B - Contracting Officer Technical Representative, (COTR), Mail Stop 465
- C - Safety and Facility Assurance Office, Mail Stop 429
- D - Construction Services Unit, Mail Stop 428
- E - Accounts Payable and Employee Services Branch, Mail Stop 175

UPGRADE TO HIRF AND SAFETI LABS

F - Environmental Management Office, Mail Stop 418

The number following the letter code, as shown in the submittal summary chart, specifies the number of copies to be provided, (e.g., B-6). The required number of all submittals shall be delivered prepaid to Langley Research Center, Hampton, Virginia 23681-0001 addressed to the appropriate recipient and Mail Stop number as shown above.

UPGRADE TO HIRF AND SAFETI LABS

SUBMITTAL SUMMARY

<u>TITLE</u>	<u>FIRST SUBMITTAL</u>	<u>UPDATE</u>	<u>LTR CODE AND DISTRIBUTION</u>	<u>GOVERNMENT ACTION</u>	<u>SECTION</u>
SD-01, Data					
Mix Designs (Contractor and Job)	**	---	B-6	Approval	09901
Equipment and Performance Data	**	---	B-6	Approval	08160
Design Analysis and Calculations	30 Days Before Installation	---	B-6	Approval	08160
Manufacturer's Catalog Data	30 Days Before Installation	---	B-6	Approval	08331,08710 09901,13999
SD-04, Drawings					
Control Diagrams	30 Days Before Installation	---	B-6	Approval	08160
Schematics	30 Days Before Installation	---	B-6	Approval	08160
Fabrication/ Installation Drawings	30 Days Prior to Installation	---	B-6	Approval	05120,05510 08100,08160 08331,13999
As-Built Contract Drawings	Prior to Contract Completion	---	B-1	Approval	01011
SD-06, Instructions					
Manufacturer's Instructions	**	---	B-6	Review	08160,08710 13999
SD-08, Statements					
Material and Equipment Substitutions	Before Field Use	---	B-6	Approval	01011

UPGRADE TO HIRF AND SAFETI LABS

SUBMITTAL SUMMARY

<u>TITLE</u>	<u>FIRST SUBMITTAL</u>	<u>UPDATE</u>	<u>LTR CODE AND DISTRIBUTION</u>	<u>GOVERNMENT ACTION</u>	<u>SECTION</u>
Application for Making Connection to Utilities	**	---	B-5, C-1	Approval	01011
Safety Plan	Prior to Award	---	A-3	Approval	01060,02225
Application for Work on Energized Electrical Circuits Below 600 Volts	Prior to Work Start	---	B-6	Approval	01060
Electrical Safety Workers' Qualifications	Prior to Work Start	---	B-5, C-1	Approval	01060
Application for Making Connection to Government Electrical Utilities	**	---	B-5, C-1	Approval	01011,01060
Power Outage Requests	7 Days Before Desired Outage	---	D-2	Approval	01060
Utility Outage Requests	7 Days Before Desired Outage	---	D-2	Approval	01011,02225
Plumbing Worker's Qualifications	Prior to Site Work	---	B-1, C-1	Approval	01011
Electrical Worker's Qualifications	Prior to Site Work	---	B-1, C-1	Approval	01011
Mechanical Worker's Qualifications	Prior to Site Work	---	B-1, C-1	Approval	01011
RF Testing Agency's Credentials	30 Days Prior to Site Work	---	B-6	Approval	08160,13999

UPGRADE TO HIRF AND SAFETI LABS

SUBMITTAL SUMMARY

<u>TITLE</u>	<u>FIRST SUBMITTAL</u>	<u>UPDATE</u>	<u>LTR CODE AND DISTRIBUTION</u>	<u>GOVERNMENT ACTION</u>	<u>SECTION</u>
RF Shielding Contractor's Qualifications	30 Days Prior to Site Work	---	B-6	Approval	08160,13999
List of Riggers	14 Days Before Lifting Ops.	---	B-2, C-1	Approval	01060
Demolition Plan	30 Days Prior to Site Work	---	B-2, C-1	Approval	02225
Installation Procedures	30 Days Prior to Site Work	---	B-2, C-1	Approval	13999
Welding Procedure Specifications (WPS)	15*	---	B-2	Approval	05055,05140 05510
Certified Welder Performance Qualification (WPQ)	15 Days Before Welding Work	---	B-2	Approval	05055,05120 05140,05510
Certified Procedure Qualification Records (PQR)	30 Days Before First Use	---	B-2	Approval	05055,05140 05510
SD-09, Reports					
Test Reports	10 Days After Test Completion	---	B-6	Review	0505508160 13999,16145
Test Plans	15 Days Prior to Test	---	B-6	Review	08160,13999
SD-13, Certificates					
Certificates of	30 Days	---	B-6	Review	05120,08100

UPGRADE TO HIRF AND SAFETI LABS

SUBMITTAL SUMMARY

<u>TITLE</u>	<u>FIRST SUBMITTAL</u>	<u>UPDATE</u>	<u>LTR CODE AND DISTRIBUTION</u>	<u>GOVERNMENT ACTION</u>	<u>SECTION</u>
Compliance	Before Installation				08710
SD-14, Samples					
Standard Color Charts	30 Days Before Use	---	B-2	Approval	09901
SD-18, Records					
Invoices	Monthly	---	E-2	Approval	01011
Contractor Release Form	At Contract Completion	---	E-1	Review	01011
Price Breakdown for Modification Proposals	14 Days After Change or Proposal Request	---	A-2	Approval	01011
Price Breakdown for Progress Payments	10*	---	A-6	Approval	01011
Order Status Reports	**	---	B-3	Information	01011
Schedule of Construction	30*	---	A-1, B-5	Approval	01011
Monthly Progress Schedules	30* 15th Day of Each Month		A-1, B-5	Review	01011
Monthly Technical Progress Narratives	30* 15th Day of Each Month		A-1, B-5	Review	01011
Certified Payrolls	Weekly	---	D-2	Review	01011
Record of Existing Conditions	Before Site Work	---	B-6	Approval	02225
SD-19, Operation	30 Days	30 Days	B-4	Review	01011,08160

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SUBMITTAL SUMMARY

<u>TITLE</u>	<u>FIRST</u> <u>SUBMITTAL</u>	<u>UPDATE</u>	<u>LTR CODE AND</u> <u>DISTRIBUTION</u>	<u>GOVERNMENT</u> <u>ACTION</u>	<u>SECTION</u>
and Maintenance Manuals	Prior to Onsite Const.	Prior to Contract Completion			08331,13999

NOTE: Submittal Summary requirements are listed in Calendar Days.

\* Calendar days after date of receipt of Notice to Proceed

\*\* As required by specifying section with updates when significant changes occur

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

# Technical Submittal Form

Date Received:

TO:

FROM:

Distribution:

Contract No.:

Title:

**TO BE COMPLETED BY CONTRACTOR**

Submittal

New

Previous

Submittal Number:

Previous Submittal Number:

Item #	Specification Section Para No./Dwg. No.	SD No.	Description of Material (Include Type, Model No., Catalog No., Mfg., Etc.)	Action Code	Initials

Contractor Representative:

Signature:

Date:

Government Action Codes:    A-Approved;                      AC-Approved with corrections as noted;    RE-Reviewed  
    R-Returned for corrections;                      RC-Reviewed with corrections as noted;

**FOR GOVERNMENT USE ONLY**

To Reviewer:

M/S:

To Reviewer:

From Reviewer:

Date:

Date:

Comments

Reviewer:

Signature:

Date:

Approval (*Name and Title*):

Signature:

Date:

UPGRADE TO HIRF AND SAFETI LABS

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES

-- End of Section Table of Contents --

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES

Reference publications are cited in other sections of the specifications along with identification of their sponsoring organizations. The addresses of the sponsoring organizations are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

ALUMINUM ASSOCIATION (AA)

900 19th Street N.W.  
Washington, DC 20006  
Ph: 202-862-5700  
Fax: 202-862-5164  
Internet: [www.aluminum.org](http://www.aluminum.org)

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

444 N. Capital St., NW, Suite 249  
Washington, DC 20001  
Ph: 800-231-3475 or 202-624-5800  
Fax: 800-525-5562 or 202-624-5806  
Internet: [www.aashto.org](http://www.aashto.org)

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

One East Wacker Dr., Suite 3100  
Chicago, IL 60601-2001  
Ph: 312-670-2400  
Publications: 800-644-2400  
Fax: 312-670-2400  
Internet: <http://www.aiscweb.com>

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

11 West 42nd St  
New York, NY 10036  
Ph: 212-642-4900  
Fax: 212-302-1286  
Internet: <http://www.ansi.org/>

AMERICAN WELDING SOCIETY (AWS)

550 N.W. LeJeune Road

UPGRADE TO HIRF AND SAFETY LABS

Miami, FL 33126  
Ph: 800-443-9353  
Fax: 305-443-7559  
Internet: [www.amweld.org](http://www.amweld.org)

ASME INTERNATIONAL (ASME)

Three Park Avenue  
New York, NY 10016-5990  
Ph: 212-591-7722  
Fax: 212-591-7674  
Internet: [www.asme.org](http://www.asme.org)

ASTM INTERNATIONAL (ASTM)

100 Barr Harbor Drive  
West Conshohocken, PA 19428-2959  
Ph: 610-832-9500  
Fax: 610-832-9555  
Internet: [www.astm.org](http://www.astm.org)

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

355 Lexington Ave.  
New York, NY 10017-6603  
Ph: 212-297-2100  
Fax: 212-370-9047  
Internet: [www.buildershardware.com](http://www.buildershardware.com)

DOOR AND HARDWARE INSTITUTE (DHI)

14170 Newbrook Dr.  
Chantilly, VA 20151-2232  
Ph: 703-222-2010  
Fax: 703-222-2410  
Internet: [www.dhi.org](http://www.dhi.org)  
E-mail: [techdept@dhi.org](mailto:techdept@dhi.org)

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

445 Hoes Ln, P. O. Box 1331  
Piscataway, NJ 08855-1331  
Ph: 732-981-0060 OR 800-701-4333  
Fax: 732-981-9667  
Internet: <http://www.standards.ieee.org>  
E-mail: [customer.service@ieee.org](mailto:customer.service@ieee.org)

LANGLEY RESEARCH CENTER (LaRC)

100 Nasa Road  
Hampton, VA 23681-2199  
Ph: 757-864-1000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

UPGRADE TO HIRF AND SAFETI LABS

Publication(s) Available From  
Superintendent of Documents  
U.S. Government Printing Office  
Washington, DC 20402  
Ph: 202-783-3238

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

1300 N. 17th St., Suite 1847  
Rosslyn, VA 22209  
Ph: 703-841-3200  
Fax: 202-841-3300  
Internet: <http://www.nema.org/>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

One Batterymarch Park  
P.O. Box 9101  
Quincy, MA 02269-9101  
Ph: 800-344-3555  
Fax: 800-593-6372  
Internet: <http://www.nfpa.org>

STEEL DOOR INSTITUTE (SDI)

30200 Detroit Rd.  
Cleveland, OH 44145-1967  
Ph: 216-899-0010  
Fax: 216-892-1404

UNDERWRITERS LABORATORIES (UL)

333 Pfingsten Rd.  
Northbrook, IL 60062-2096  
Ph: 847-272-8800  
Fax: 847-272-8129  
Internet: <http://www.ul.com/>  
Order from:  
Global Engineering Documents  
15 Inverness Way East  
Englewood, CO 80112-5776  
Ph: 800-569-7128  
Fax: 303-397-7945  
Internet: <http://global.ihs.com>  
E-mail: [global@ihs.com](mailto:global@ihs.com)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

General Services Administration  
1800 F Street, NW  
Washington, DC 20405  
PH: 202-501-0705  
Order from:

UPGRADE TO HIRF AND SAFETI LABS

General Services Administration  
Federal Supply Service Bureau  
1941 Jefferson Davis Highway  
Arlington, VA 22202  
PH: 703-605-5400  
Internet: <http://www.fss.gsa.gov/pub/fed-specs.cfm>

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

700 Pennsylvania Avenue, N.W.  
Washington, D.C. 20408  
Phone: 866-325-7208  
Internet: <http://www.archives.gov>  
Order documents from:  
Superintendent of Documents  
U.S. Government Printing Office  
732 North Capitol Street, NW  
Washington, DC 20401  
Mailstop: SDE  
Ph: 866-512-1800 or 202-512-1800  
Fax: 202-512-2250  
Internet: <http://www.gpo.gov>  
E-mail: [gpoaccess@gpo.gov](mailto:gpoaccess@gpo.gov)

VIRGINIA ADMINISTRATIVE CODE (VAC)

910 Capitol St. Fl 2  
Richmond, VA  
Ph: 804-786-3591

-- End of Section --

UPGRADE TO HIRF AND SAFETI LABS

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DIVISION 02 - SITE WORK

SECTION 02225

BUILDING DEMOLITION

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- 1.2 SUBMITTALS
- 1.3 OCCUPANCY OF STRUCTURES TO BE DEMOLISHED
- 1.4 DISCONNECTING UTILITIES
- 1.5 PRECAUTIONS AGAINST MOVEMENT
- 1.6 CONSTRUCTION EQUIPMENT LIST
- 1.7 DEMOLITION PLAN
- 1.8 SAFETY PLAN
- 1.9 EXISTING CONDITIONS

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

- 3.1 BUILDINGS
- 3.2 DISPOSAL OF REMOVED MATERIALS
  - 3.2.1 General
  - 3.2.2 Removal From Government Property

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SECTION 02225

BUILDING DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

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

29 CFR 1926 (2001) Safety and Health Regulations for Construction

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-08 Statements

Contractor shall submit a detailed Demolition Plan of the work procedures and safety precautions to be used prior to the beginning of work.

A Safety Plan shall be submitted prior to the beginning of work.

Contractor shall submit Utility Outage Request in accordance with the paragraph entitled, "Disconnecting Utilities," of this section.

SD-18 Records

Contractor shall record Existing Conditions prior to starting work in accordance with the paragraph entitled, "Existing Conditions," of this section.

1.3 OCCUPANCY OF STRUCTURES TO BE DEMOLISHED

Government will not vacate buildings and other structures in area of demolition prior to the start of the work under this Contract.

1.4 DISCONNECTING UTILITIES

Existing utilities serving facilities occupied and used by the Government shall not be interrupted except when approved in writing and then only after temporary utility services have been provided and approved.

1.5 PRECAUTIONS AGAINST MOVEMENT

## UPGRADE TO HIRF AND SAFETI LABS

Shoring and bracing or other support shall be provided as necessary to prevent movement, settlement, or collapse of a structure to be demolished and of facilities to remain that are adjacent to a structure to be demolished.

### 1.6 CONSTRUCTION EQUIPMENT LIST

A Construction Equipment List of all major equipment to be used in this section shall be submitted to the Contracting Officer prior to construction.

### 1.7 DEMOLITION PLAN

Contractor shall prepare and submit a detailed Demolition Plan of the work procedures to the Contracting Officer at least 10 days prior to the commencement of any demolition work. The plan shall be according to OSHA regulations 29 CFR 1926, Subpart T.

### 1.8 SAFETY PLAN

Contractor shall submit a Safety Plan in accordance with Section 01060, "General Safety Requirements."

### 1.9 EXISTING CONDITIONS

Existing Conditions shall be recorded by the Contractor, in the presence of the Contracting Officer, showing the condition of structures and other facilities adjacent to areas of alteration or removal. Such record shall contain the elevation of the top of foundation walls, the location and extent of cracks and other damage, and description of surface conditions that exist prior to the start of work. Copies of the record shall be submitted and the stated conditions before starting work shall be verified.

Submit utility interruption request in accordance with paragraph entitled, "Disconnecting Utilities," of this section.

## PART 2 PRODUCTS (Not Applicable)

## PART 3 EXECUTION

### 3.1 BUILDINGS

Demolition shall proceed in a systematic manner from the top of the structure to the ground.

### 3.2 DISPOSAL OF REMOVED MATERIALS

#### 3.2.1 General

Contractor shall remove debris, rubbish, and other materials resulting from demolition operations. Removed materials shall not be stored on the project site nor sold on Government property.

#### 3.2.2 Removal From Government Property

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Waste materials, including excavated material classified as unsatisfactory soil material, trash, and debris, shall be removed from Government property and legally disposed of by the Contractor.

-- End of Section --

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DIVISION 05 - METALS

SECTION 05055

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  - 1.4.2 Specific Qualifications for all Welding
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    - 1.5.1.1 Materials For Which No Preheat is Required By Code
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PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

- 3.1 CONSTRUCTION
  - 3.1.1 Structural Components Having Thicknesses of 1/8-Inch or Greater
  - 3.1.2 Structural Components Having Thicknesses of Less Than 1/8-Inch
- 3.2 INSPECTION/NON DESTRUCTIVE EXAMINATION (NDE)
  - 3.2.1 Inspection Requirements
    - 3.2.1.1 Structural Components Having Thicknesses of 1/8-Inch or Greater
    - 3.2.1.2 Full Penetration Welds
    - 3.2.1.3 Statically Loaded Structures
    - 3.2.1.4 All Other Welds
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  - 3.2.2 Additional Requirements for Radiographic Inspection
  - 3.2.3 Unacceptable Welds
  - 3.2.4 Final Weld Acceptance

UPGRADE TO HIRF AND SAFETY LABS

3.2.5 Inspectors Qualifications

3.2.5.1 Structural Components Having Thicknesses of 1/8-Inch or Greater

3.2.5.2 Structural Components Having Thicknesses of Less Than 1/8-Inch

3.2.6 Inspection Procedures

3.3 PROTECTION OF ADJACENT MATERIALS

-- End of Section Table of Contents --

SECTION 05055

STRUCTURAL STEEL WELDING

PART 1 GENERAL

1.1 SUMMARY

This specification contains the minimum requirements for qualifying welding procedures, welders, and welding operators and for effecting and inspecting weld joints, in mechanical fabrications of carbon steel, low alloy steel, extra-high-strength quenched and tempered, low alloy steels, and austenitic stainless steel materials.

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN WELDING SOCIETY (AWS)

ANSI/AWS D1.1 (2002) Structural Welding Code - Steel

ANSI/AWS D1.3 (1998) Structural Welding Code - Sheet Steel

1.3 SUBMITTALS

The Contractor shall submit the following qualification documentation in sufficient detail to show full compliance with applicable, national consensus code(s).

SD-08 Statements

Within fifteen calendar days after date of receipt of Notice to Proceed, the Contractor shall submit the following items for approval:

- o Welding Procedure Specifications (WPS), two copies
- o Certified Procedure Qualification Records (PQR), two copies
- o Certified Welder Performance Qualifications (WPQ), two copies

The Contractor shall not weld on project material until these qualification documents have been approved.

SD-09 Inspection Reports

The Contractor shall submit all records of non-destructive examination, including radiographic film, to the Contracting

## UPGRADE TO HIRF AND SAFETI LABS

Officer for approval. The Contractor shall submit these records within 7 days of the examination, for Government retention.

### 1.4 QUALIFICATIONS

#### 1.4.1 General Qualifications

The Contractor shall qualify the welding procedures and welders by the tests prescribed in the applicable code or specification, notwithstanding the fact that the code or specification may allow pre-qualified procedures.

#### 1.4.2 Specific Qualifications for all Welding

##### 1.4.2.1 Structural Components Having Thicknesses of 1/8-Inch or Greater

##### 1.4.2.2 Weld Procedure Test Requirements

The Contractor shall qualify all weld procedures in accordance with ANSI/AWS D1.1 and conduct the following tests satisfying the listed test requirements.

The Contractor shall conduct bend tests and reduced-section tension tests in accordance with ANSI/AWS D1.1 Code. These tests shall satisfy the acceptance criteria of the ANSI/AWS D1.1 Code for complete joint penetration groove welds.

##### 1.4.2.3 Structural Components Having Thicknesses of Less Than 1/8-Inch

The qualification documents (WPS, PQR, and WPQ) shall be in accordance with the ANSI/AWS D1.3, Structural Welding Code, Sheet Steel.

### 1.5 ENVIRONMENTAL AND HEAT CONTROLS

#### 1.5.1 Preheat

##### 1.5.1.1 Materials For Which No Preheat is Required By Code

The Contractor shall not weld when rain or snow is falling on the surfaces of the parts in the area to be welded, or when these parts are wet. When adverse conditions exist, the welder and work area shall be properly shielded and the material to be welded shall be above 50 degrees F. When the material is below 50 degrees F and/or the thickness is in excess of one inch, the Contractor shall heat the joint to a temperature that is warm to the hand, approximately 100 degrees F.

The Contractor shall preheat all joints displaying moisture until the moisture is evaporated.

##### 1.5.1.2 Materials For Which Preheat is Required By Code

The Contractor shall preheat the material to be welded to the temperature specified in the applicable code.

##### 1.5.1.3 Interpass Temperature

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The Contractor shall not allow the interpass temperature to fall below the preheat temperature. The interpass temperature may be monitored directly adjacent to the weld joint. The Contractor shall not allow the maximum interpass temperature to exceed the code-specified temperature limits.

1.5.1.4 Post Weld Heat Treatment

The Contractor shall heat treat weldments as required by the applicable NASA approved, code qualified/certified welding documentation, WPS and PQR.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CONSTRUCTION

3.1.1 Structural Components Having Thicknesses of 1/8-Inch or Greater

The Contractor shall follow the construction procedures specified in the ANSI/AWS D1.1 Code.

3.1.2 Structural Components Having Thicknesses of Less Than 1/8-Inch

The Contractor shall follow the construction procedures specified in the ANSI/AWS D1.3 Code.

3.2 INSPECTION/NON DESTRUCTIVE EXAMINATION (NDE)

3.2.1 Inspection Requirements

3.2.1.1 Structural Components Having Thicknesses of 1/8-Inch or Greater

3.2.1.2 Full Penetration Welds

3.2.1.3 Statically Loaded Structures

The Contractor shall 100 percent radiographically inspect all full penetration welds. These welds shall satisfy the acceptance criteria of ANSI/AWS D1.1, section on Statically Loaded Structures.

3.2.1.4 All Other Welds

3.2.1.5 Statically Loaded Structures

The Contractor shall 100 percent visually inspect the final weld configuration of all welds. These welds shall satisfy the acceptance criteria of ANSI/AWS D1.1, section on Statically Loaded Structures.

3.2.1.6 Structural Components Having Thicknesses of Less Than 1/8-Inch

The Contractor shall 100 percent visually inspect all welds. These welds shall satisfy the acceptance criteria of ANSI/AWS D1.3.

3.2.2 Additional Requirements for Radiographic Inspection

When radiographic inspection is required, the Contractor shall assign each qualified welder an identification symbol. The Contractor shall mark each weld or adjacent area, with the low stress identification symbol of the welder. In lieu of marking, appropriate documentation shall be filed, which includes the information required in Items A through F below.

Each radiograph shall, as a minimum, have the following additional information permanently included in the image:

- A - (Unique) LaRC Weld No. (including repair cycle no.)
- B - LaRC Drawing No.
- C - LaRC View No.
- D - Welder I.D., Stamp No. or Identification Symbol
- E - Date
- F - LaRC Contract No.

Where radiographic inspection is not practical, the Contractor shall perform magnetic particle inspection of the root pass and the final weld configuration.

The Contracting Officer will perform final interpretation of all radiographs of welded joints.

The Contractor shall submit all accepted radiographs and interpretation reports to the Contracting Officer for retention.

3.2.3 Unacceptable Welds

The Contractor shall repair and reinspect all unacceptable welds at no additional cost to the Government.

3.2.4 Final Weld Acceptance

Final acceptance of all welded/brazed joints will be by the Contracting Officer.

Prior to the Contracting Officer's inspection, and prior to painting, all slag, scale and spatter shall be removed from all welds. The procedure employed shall not produce notches in either the weld metal or adjacent base metal.

After weld joints have been satisfactorily completed by the Contractor and accepted by the Contracting Officer, the Contractor shall clean the joint area to a bright, unpitted, and unscarred surface. The base metal and weld thicknesses shall not be reduced below applicable code allowable limits. The surface shall then be protected in accordance with the applicable contract documents in accordance with Section 09901 or the specific surface

finish requirement.

3.2.5 Inspectors Qualifications

3.2.5.1 Structural Components Having Thicknesses of 1/8-Inch or Greater

The Contractor shall use AWS certified welding inspectors to perform visual inspections.

The Contractor shall use certified inspectors to perform radiographic, magnetic particle and dye penetrant inspections. These inspectors shall be qualified in accordance with ANSI/AWS D1.1.

3.2.5.2 Structural Components Having Thicknesses of Less Than 1/8-Inch

The Contractor shall use AWS certified welding inspectors (CWI) to perform visual inspections.

3.2.6 Inspection Procedures

The Contractor shall use the procedures specified in ANSI/AWS D1.1 in performing radiographic, magnetic particle and dye penetrant inspections.

3.3 PROTECTION OF ADJACENT MATERIALS

The Contractor shall sufficiently protect machinery, materials, floor, and all surfaces adjacent to the welding/brazing operations, to prevent any damage from these operations.

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SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY (Not Applicable)

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC M016	(1989; 9th Ed) Manual of Steel Construction
AISC M013	(1983; 8th Ed) Detailing for Steel Construction
AISC M014	(1984; 1st Ed) Engineering for Steel Construction a Source Book on Connections
AISC S303	(2000) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.22.1	(1975; R 1998) Plain Washers
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 108	(1999) Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
ASTM A 153	(2001) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2002) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 325	(2002) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 36	(2001) Standard Specification for Carbon Structural Steel

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ASTM A 500	(2001) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 53	(2002) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM B 633	(1998) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
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CORPS OF ENGINEERS (COE)

COE CRD-C 621	(1988) Nonshrink Grout
---------------	------------------------

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 25	(1997) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)
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1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-04 Drawings

Fabrication Drawings for the following items shall be in accordance with AISC M016, AISC M013 and AISC M014. Drawings shall show standard welding symbols in accordance with AWS A2.4.

Structural Steel  
Accessories

Installation Drawings for Structural Steel Units shall indicate the members and connection areas not to be painted, and sequence of erection. Shoring and temporary bracing shall be designed and sealed by a registered professional engineer and provided for record purposes.

SD-08 Statements

See SD-08 Statements, Paragraph 1.3 Submittals, of Section 05055 for "Welding Documentation Requirements".

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### SD-13 Certificates

Certificates of Compliance shall be submitted for the following items showing conformance with the referenced standards contained in this section.

Structural Steel  
Bolts, Nuts and Washers  
Shop Painting Materials  
Nonshrink Grout

#### 1.4 QUALIFICATION FOR STRUCTURAL STEEL CONSTRUCTION

Structural steel fabrication and erection shall be performed by organizations experienced in structural steel work of equivalent magnitude.

#### 1.5 QUALIFICATION FOR WELDING CONSTRUCTION

See Paragraph 1.4, "Qualifications", of 05055, "Structural Steel Welding", for the applicable welding qualification requirements for the project construction.

#### 1.6 FABRICATION REQUIREMENTS

Unless otherwise indicated, AISC M016 and AISC S303 shall govern all work.

Design of members and connections for any portion of the structure not indicated shall be completed by the fabricator and indicated on fabrication drawings.

Substitution of sections or modification of details, or both, and the reasons for the action shall be submitted with the fabrication drawings for approval.

Structural weldments shall be fabricated and assembled in the shop to the greatest extent possible. Parts not assembled in the shop shall be secured by bolts for shipment.

Shop splices of members between field splices will be permitted only where indicated. Splices not indicated must be approved. Field splices in compound joints will not be permitted.

##### 1.6.1 Tolerances

Tolerances in fabrication and erection shall be in accordance with AISC S302.

##### 1.6.2 Connections

One-sided or other types of eccentric connections will not be permitted, unless indicated in detail and approved by the Contracting Officer.

Shop connections shall be welded unless otherwise indicated.

Field connections shall be bolted, except where welded connections are

indicated, as follows:

High-strength threaded fasteners shall be used for bolted connections, except where otherwise specified.

Low carbon steel threaded fasteners may be used only for bolted connections of secondary members to primary members (such as, purlins, girts, and other framing members carrying only nominal stresses) and for temporary bracing to facilitate erection.

High-strength bolting shall conform to AISC M016 and shall be friction-type connections as modified by the bonding and grounding requirements.

Holes shall be cut, drilled, or punched at right angles to the surface of the metal and shall not be made or enlarged by burning. Holes in base or bearing plates shall be drilled. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling or reaming operation shall be removed with a tool making a 1/16-inch bevel.

Bolts shall be inserted into holes without damaging thread. Bolt heads shall be protected from damage during driving. Bolt heads and nuts shall rest squarely against the metal. Where bolts are to be used on beveled surfaces having slopes greater than 1 in 20 with a plane normal to the bolt axis, beveled washers shall be provided to give full bearing to the head or nut.

Low carbon steel threaded fasteners shall be of length that will extend through, but not more than 1/4 inch beyond, the nuts. Bolt heads and nuts shall be drawn tight against the work with a suitable wrench not less than 15 inches long. Bolt heads shall be tapped with a hammer while the nut is being tightened. Nuts shall be locked after tightening. Where self-locking nuts are not furnished, bolt threads shall be upset.

#### 1.6.3 Bearing Plates and Angles

Bearing plates and angles shall be provided under beams, girders, and trusses resting on slabs.

#### 1.7 DRAINAGE HOLES

Adequate drainage holes shall be drilled to eliminate water traps. The hole diameter shall be 1/2-inch and location shall be shown on the detail drawings. The hole size and location shall not affect structural integrity.

### PART 2 PRODUCTS

#### 2.1 STRUCTURAL STEEL

##### 2.1.1 Carbon Grade Steel

Carbon grade steel shall meet the minimum requirements of the ASTM A 36 specification.

#### 2.2 STRUCTURAL TUBING

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Structural tubing shall meet the minimum requirements of the ASTM A 500, Grade B specification.

### 2.3 STEEL PIPE

Steel pipe shall meet the minimum requirements of the ASTM A 53, Type E, Grade B specification.

### 2.4 LOW-CARBON STEEL THREADED FASTENERS

Bolts and nuts shall meet the minimum requirements of the ASTM A 307, Grade A, specification.

Round washers shall meet the minimum requirements of the ANSI B18.22.1, Type B, specification.

### 2.5 HIGH-STRENGTH THREADED FASTENERS

High-strength bolts, nuts and washers shall meet the minimum requirements of the ASTM A 325 specification.

### 2.6 WEDGE-TYPE EXPANSION ANCHORS

Wedge type expansion anchors shall be externally threaded stud-type anchors with spring steel wedges. Stud material shall meet the chemical requirements of ASTM A 108 and the minimum mechanical requirements of ASTM A 307.

Nuts shall meet the requirements of ASTM A 307.

Studs, nuts, and washers shall be hot dipped galvanized in accordance with ASTM A 153 Class C or clear chromate treated in accordance with the requirements of ASTM B 633, Type III, Class SC1 for mild service (Note: formerly Federal Specification QQ-Z-325C, Type II, Class 3).

### 2.7 PROTECTIVE COATING

Steelwork shall be shop primed with red oxide primer in accordance with SSPC Paint 25.

### 2.8 BEDDING MATERIALS

#### 2.8.1 Shrink-Resistant Grout

Shrink-resistant, ferrous aggregate grouting shall be a premixed and packaged compound and the grout shall meet the minimum requirements of the COE CRD-C 621 specification.

#### 2.8.2 Mixing Water

Water shall be potable.

## PART 3 EXECUTION

3.1 GENERAL

Erection of structural steel shall be in accordance with AISC M016, with modifications and additional requirements as specified herein.

3.2 ERECTING EQUIPMENT

Equipment shall be suitable and safe for workers. Falsework shall be maintained in a safe and stable condition until the steel structure is fully self-supporting.

3.3 WEDGE-TYPE EXPANSION ANCHORS

Expansion anchors shall be installed per manufacturer's instructions.

3.4 SETTING BEARING PLATES

Loose and attached bearing plates and angles for beams and similar structural members shall be aligned with wedges or shims and shall be bedded with damp-pack bedding. Installation of bearing plates and angles shall be as follows:

Concrete bearing surfaces shall be cleaned free of laitance, dirt, oil, grease, and other foreign material. Concrete surfaces shall be roughened, but not enough to interfere with placing bedding. The bottom surface of bearing plates and angles shall be cleaned free of dirt, oil, grease, and other foreign materials.

Space between top of bearing surface and bottom of bearing plate or angle shall be approximately  $1/24$  of the width of the bearing plate or angle, but not less than  $1/2$  inch for bearing plates or angles that are less than 12 inches wide. Bearing plate or angle shall be supported and aligned on steel wedges or shims.

Bedding shall be a mix composed of the specified shrinkage-resistant grout and enough water to provide a flowable mixture without segregation or bleeding.

Forms shall be provided to retain bedding until sufficiently hard to support itself.

3.5 FIELD ASSEMBLY

Structural steel frames shall be assembled to lines and elevations indicated. Various members forming parts of a completed frame or structure after being assembled shall be aligned and adjusted before being fastened. Fastening of splices of compression members shall be done after abutting surfaces have been brought completely into contact. Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before members are assembled.

Splices will be permitted only where indicated. Erection bolts used in welded construction shall be removed and the holes shall be filled with

plug welds.

Bracing, adequacy of temporary connections and supports, alignment, and removal of paint on surfaces adjacent to field welds shall be as specified in AISC M016.

Welding for re-drilling will not be permitted. Holes shall not be enlarged more than 1/16-inch larger than the specified hole size without approval of the Contracting Officer.

### 3.6 GAS CUTTING

Use of a gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

### 3.7 TOUCHUP PAINTING

After erection of structural steel, the Contractor shall touch up bolt heads and nuts, field welds, and abrasions in the shop coat. Touchup and repair shall be accomplished as soon as possible after the damage or installation has occurred.

### 3.8 INSPECTION AND ACCEPTANCE PROVISIONS

#### 3.8.1 Inspection and Tests

Inspection by the Government will include proper preparation, size, gaging location, and acceptability of welds; identification marking; and calibration of wrenches for high-strength bolts.

#### 3.8.2 Inspection of Welding

See Paragraph entitled "Inspection and Nondestructive Examination" of Section 05055 for the applicable examination requirements.

#### 3.8.3 Inspection of High-Strength Bolted Connections

Inspection of high-strength bolted connections shall be performed in accordance with AISC M016.

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SECTION 05140

WELDING ALUMINUM CONSTRUCTION

PART 1 GENERAL

This specification contains the minimum requirements for qualifying welding procedures, welders, and welding operators for making and inspecting welds in structural fabrications of weldable aluminum materials.

1.1 Summary

The following classifications shall be used to establish levels of fabrication.

1.1.1 Class A Fabrication

Complete penetration weld joints only. Applicable to those welds where failure would cause a loss of the system and/or be hazard to personnel. Welds which are highly stressed (dynamic and cyclic loading) and characterized as a single point of failure with no redundancy for the redistribution of stress into another member.

1.1.2 Class B Fabrication

Complete and partial penetration groove weld joints and fillet weld joints. Applicable to those welds where failure would reduce the overall efficiency of the system but loss of system or hazard to personnel would not be experienced.

1.1.3 Class C Fabrication

Complete and partial penetration groove weld joints and fillet weld joints. Applicable to those welds where failure would not affect the efficiency of the system nor create hazard to personnel. Welds for connections of secondary members not subject to dynamic action and low stressed miscellaneous applications.

1.1.4 Class D Fabrication

Plug and slot weld joints may be used for subcritical construction joints, if the joints meet all the applicable Sections 2, design and fabrication requirements of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

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ASTM E 165 (2002) Standard Test Method for Liquid Penetrant Examination

AMERICAN WELDING SOCIETY (AWS)

ANSI/AWS D1.2 (1997) Structural Welding Code - Aluminum

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-08 Statements

Within fifteen days after receipt of Notice to Proceed, the Contractor shall submit for approval to the Contracting Officer the following items:

Certified Welding Procedure Specifications (WPS), two copies

Certified Procedure Qualification Records (PQR), two copies

Fifteen calendar days prior to any employee welding on project material, the Contractor shall submit for approval to the Contracting Officer the following items:

Certified Welder Performance Qualifications (WPQ), two copies

1.4 QUALIFICATIONS

1.4.1 General

The organization performing this work shall be certified in any one or more of the three (3) AISC (American Institute of Steel Construction) Quality Certification Program Categories, Category I - Conventional Steel Structures, Category II - Complex Steel Building Structures, and/or Category - III Major Steel Bridges.

1.4.2 Welding Documentation

No pre-qualified welding procedures are allowed. The Contractor shall qualify the welding procedures, welders and welder operators by tests prescribed in the Section 5 of the ANSI/AWS D1.2 Structural Welding Code, Aluminum.

1.5 HEAT INPUT REQUIREMENTS

1.5.1 Preheat

Welding shall not be done at ambient temperature below 32 degrees F or when the surfaces are wet or exposed to rain, snow, or high wind. The temperature of the metals in the area where the welding is to be done shall

be not less than 50 degrees F. When the ambient conditions are such that the normal temperature of the base metal is below 50 degrees F, the area surrounding the joint shall be preheated to provide a base metal temperature of 100 degrees for a distance of at least 3 inches in all directions from the joint to be welded.

#### 1.5.2 Interpass

In a multipass weld, the interpass temperature is the temperature of the weld metal before the next pass is started.

#### 1.5.3 Postweld

Weldments shall not be given a postweld heat treatment unless noted in the applicable NASA approved, Code qualified/certified welding documentation, WPS, PQR, and WPQ.

### PART 2 PRODUCTS (Not Applicable)

### PART 3 EXECUTION

#### 3.1 CONSTRUCTION

##### 3.1.1 Class A Fabrication

Complete penetration groove weld joints shall be used where possible. The weldment shall be fabricated in accordance with the requirements of the applicable section, Section 9 or 10 of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

##### 3.1.2 Class B Fabrication

The weldment shall be fabricated in accordance with the requirements of applicable section, Section 8 or 10 of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

##### 3.1.3 Class C Fabrication

The weldment shall be fabricated in accordance with the requirements of Section 11 of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

##### 3.1.4 Class D Fabrication

The welding of plugs and slot joints shall meet the minimum applicable requirements of Section 2 of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

#### 3.2 INSPECTION/NONDESTRUCTIVE EXAMINATION (NDE)

##### 3.2.1 General

Fabrication/Erection inspection shall be performed as necessary prior to assembly, during assembly, during welding, and after welding to ensure that materials and workmanship meet the minimum requirements of the contract

documents.

The final acceptance of all welded joints shall be by the Contracting Officer.

Unacceptable welds shall be immediately repaired and made ready for Government reinspection at no additional cost to the Government.

After weld joints have been satisfactorily completed by the Contractor and accepted by the Contracting Officer, the joint area shall be cleaned to a bright, unpitted, and unscarred surface and then protected in accordance with the applicable contract documents.

### 3.2.2 Methods of NDE

The examination/inspection of structural aluminum weldments shall be performed in accordance with the applicable section of the ANSI/AWS D1.2, Structural Welding Code, Aluminum, and as follows:

#### 3.2.2.1 Visual Inspection (VT)

Visual inspection for cracks and other discontinuities shall be aided by a magnifying lens of 10X power wherever required to discern indications or defects otherwise not clear. Size and contour of welds shall be measured with suitable gages.

#### 3.2.2.2 Liquid Penetrant Inspection (PT)

Liquid penetrant inspection of welds shall be performed in accordance with the requirements of the ASTM E 165 standard.

#### 3.2.2.3 Radiographic Inspection (RT)

Radiographic inspection of welds shall be performed in accordance with the requirements of Section 6.10, Radiographic Procedure, of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

#### 3.2.2.4 Ultrasonic Inspection (UT)

When ultrasonic testing is required by the contract documents, the extent of testing, the procedure, and the acceptance criteria shall be specified therein.

### 3.2.3 Levels of Examination

#### 3.2.3.1 Level I Examination

Level I examination shall require 100 percent visual inspection (VT), and 100 percent radiographic inspection (RT) where practical. Where RT is not practical, liquid penetrant inspection (PT) of the root pass and the final surface of each weld joint shall be performed.

Where applicable, each radiograph shall, as a minimum, have the following additional information permanently included in the image:

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A - Agency Weld No. (including repair cycle no.)

B - Agency Drawing No.

C - Agency View No.

D - Agency Contract No.

Final interpretation and acceptance of all radiographs of welded joints will be by the Contracting Officer.

3.2.3.2 Level II Examination

Level II examination shall require 100 percent visual inspection (VT), and liquid penetrant inspection (PT) of the final surface of each weld joint.

3.2.3.3 Level III Examination

Level III examination shall require 100 percent visual inspection (VT) of each weld joint.

3.2.4 Acceptance Requirements

3.2.4.1 Class A Fabrication

Class A fabrication shall receive a Level I examination. The weldments shall meet the minimum acceptance requirements of Section 3, "Workmanship", and Section 9 or 10, as applicable, of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

3.2.4.2 Class B Fabrication

Class B fabrication shall receive a Level II examination. The weldments shall meet the minimum acceptance requirements of Section 3, "Workmanship", and Section 8 or 10, as applicable, of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

3.2.4.3 Class C & D Fabrication

Class C & D fabrication shall receive a Level III examination. The weldments shall meet the minimum acceptance requirements of Section 3, "Workmanship", and Section 11 of the ANSI/AWS D1.2, Structural Welding Code, Aluminum.

3.3 PROTECTION OF ADJACENT MATERIALS

The Contractor shall sufficiently protect machinery, materials, and floor adjacent to the welding/brazing operations to prevent any damage from these operations.

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SECTION 05510

METAL STAIRS

PART 1 GENERAL

1.1 SUMMARY (Not Applicable)

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 108	(1999) Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
ASTM A 153	(2001) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283	(2000) Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A 307	(2002) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 36	(2001) Standard Specification for Carbon Structural Steel
ASTM A 366	(1999) Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
ASTM A 500	(2001) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 512	(1996; R 2001) Standard Specification for Cold-Drawn Butt-weld Carbon Steel Mechanical Tubing
ASTM A 53	(2002) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 569	(1998) Standard Specification for Steel,

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Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality

ASTM A 653 (2002) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process

ASTM B 633 (1998) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (2002) Structural Welding Code - Steel

CODE OF FEDERAL REGULATIONS (CFR)

CFR 29 Part 1910 (1974) Occupational Safety and Health Standards

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 11 (1995) Red Iron Oxide, Zinc Chromate, Raw Linseed Oil and Alkyd Primer

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-04 Drawings

Fabrication Drawings for the following items shall be in accordance with the paragraph entitled, "General Fabrication," of this section.

Metal Stairs

Installation Drawings shall include the following information:

Plans and elevations at not less than 1 inch to 1 foot scale.

Details of sections and connections at not less than 3 inches to 1 foot scale.

SD-08 Statements

See SD-08, Statements, under the paragraph entitled, "Submittals" of Section 05055 for welding documentation requirements.

1.4 QUALIFICATIONS FOR WELDING

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See paragraph entitled "Structural Projects" of Section 05055 for the applicable welding qualification requirements.

### PART 2 PRODUCTS

#### 2.1 GENERAL REQUIREMENTS

Items shall be preassembled in the shop to the greatest extent possible. Units shall be disassembled only to the extent necessary for shipping and handling. Units shall be clearly marked for reassembly and coordinated installation.

For the fabrication of work exposed to view, only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness, shall be used. Blemishes shall be removed by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes, including zinc coatings.

#### 2.2 STRUCTURAL STEEL PLATES AND SHAPES

Structural plates and shapes shall meet the minimum requirements of the ASTM A 36 specification, unless otherwise noted in this contract.

Steel plates to be bent or cold-formed shall meet the minimum requirements of the ASTM A 283, Grade C, specification, unless otherwise noted in this contract.

#### 2.3 SHEET STEEL AND STRIPS (COMMERCIAL QUALITY)

Hot-rolled, pickled and oiled, carbon steel sheets and strips shall meet the minimum requirements of the ASTM A 569 specification.

Cold-rolled carbon steel sheets shall meet the minimum requirements of the ASTM A 366 specification.

Galvanized carbon steel sheets shall meet the minimum requirements of the ASTM A 653 specification with Coating Designation of G90.

#### 2.4 STRUCTURAL STEEL TUBING

Hot-formed, welded or seamless structural tubing shall meet the minimum requirements of the ASTM A 500, Grade B specification.

Cold-drawn, butt-welded and stress-relieved steel tubing shall meet the minimum requirements of the ASTM A 512 specification.

#### 2.5 STEEL PIPE

Steel pipe, Schedule 40, shall meet the minimum requirements of the ASTM A 53, welded Type E, Grade B specification, unless otherwise indicated or specified.

#### 2.6 FABRICATION, GENERAL

## UPGRADE TO HIRF AND SAFETI LABS

The Contractor shall use materials of size and thicknesses indicated or, if not indicated, of required size and thickness to produce adequate strength and durability in finished product for intended use. Materials shall be worked to dimensions indicated on approved detail drawings, using proven details of fabrication and support. Type of materials indicated or specified shall be used for the various components of work.

Exposed work shall be formed true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be eased to a radius of approximately 1/32 inch, unless otherwise indicated. Metal corners shall be bent to smallest radius possible without causing grain separation or otherwise impairing the work.

Corners and seams shall be welded continuously and meet the minimum requirements of the paragraph entitled "Weld Profiles" of the AWS D1.1 code. Exposed welds shall be ground smooth and flush to match and blend with adjoining surfaces.

Exposed connections shall be formed with hairline joints that are flush and smooth, using concealed fasteners wherever possible.

Anchorage of the type indicated shall be provided and coordinated with the supporting structure. Anchoring devices shall be fabricated and spaced as indicated and as required to provide adequate support for the intended use of the work.

### 2.7 PROTECTIVE COATING

Steelwork shall be shop primed with red oxide primer in accordance with SSPC Paint 11.

### 2.8 STEEL STAIRS

#### 2.8.1 General

Welding shall be used for joining pieces together, unless otherwise indicated or specified. Units shall be fabricated so that bolts and other fastenings do not appear on finish surfaces. Joints shall be made true and tight, and connections between parts shall be lightproof tight. Continuous welds shall be ground smooth where exposed.

Stair units shall be constructed to sizes and arrangements indicated. Framing, hangers, columns, struts, clips, brackets, bearing plates, and other components shall be provided as required for the support of stairs and platforms.

#### 2.8.2 Stair Framing

Stringers of structural steel channels shall be fabricated as indicated. Closures for exposed ends of strings shall be provided.

Platforms of structural steel channel headers and miscellaneous framing members shall be constructed as indicated. Headers shall be welded to stringers and newels. Framing members shall be welded to stringers and

headers.

### 2.8.3 Stair Railings and Handrails

Railings shall meet the minimum requirements of the CFR 29 Part 1910, Section 23 specification.

Posts, rails, and corners shall be joined by one of the following methods:

Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth, butt railing splices, reinforced by a tight fitting interior sleeve not less than 6 inches long

The pipe shall meet the minimum requirements of the ASTM A 53, Type S, Grade B specification.

### 2.8.4 Kickplates

Kickplates shall be provided between railing posts where indicated, and shall consist of 1/8-inch steel flat bars not less than 6 inches high. Kickplates shall be secured as indicated.

### 2.9 WEDGE-TYPE EXPANSION ANCHORS

Wedge type expansion anchors shall be externally threaded stud-type anchors with spring steel wedges. Stud material shall meet the chemical requirements of ASTM A 108 and the minimum mechanical requirements of ASTM A 307.

Nuts shall meet the requirements of ASTM A 307.

Studs, nuts, and washers shall be hot dipped galvanized in accordance with ASTM A 153 Class C or clear chromate treated in accordance with the requirements of ASTM B 633, Type III, Class SC1 for mild service (Note: formerly Federal Specification QQ-Z-325C, Type II, Class 3).

## PART 3 EXECUTION

### 3.1 STAIR RAILINGS AND HANDRAILS

Railings shall be adjusted prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Posts shall be spaced not more than 8 feet on center. Posts shall be plumbed in each direction. Posts and rail ends shall be secured to building construction as follows:

Posts shall be anchored to steel by welding.

### 3.2 WEDGE-TYPE EXPANSION ANCHORS

Expansion anchors shall be installed per manufacturer's instructions.

### 3.3 TOUCHUP PAINTING

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Immediately after installation, field welds, bolted connections, and abraded areas of the shop paint shall be cleaned, and exposed areas shall be painted with the paint used for shop painting. Paint shall be applied by brush or spray to provide a minimum dry-film thickness of [2 mils].

-- End of Section --

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SECTION 08100

METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2002) Structural Welding Code - Steel

DOOR AND HARDWARE INSTITUTE (DHI)

DHI A115.1 (1990) Preparation for Mortise Locks for 1-3/8 Inch 35 millimeter and 1-3/4 Inch 44 millimeter Doors

DHI A115.2 (1988) Door and Frame Preparation for Bored or Cylindrical Locks for 1-3/8 Inch 35 millimeter and 1-3/4 Inch 44 millimeter Doors

DHI A115.4 (1994) Standard Steel Door and Frame Preparation for Lever Extension Flush Bolts

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Standard for Fire Doors and Fire Windows

STEEL DOOR INSTITUTE (SDI)

SDI 100 (1991) Standard Steel Doors and Frames

SDI 105 (1991) Erection Instructions for Steel Frames

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-04 Drawings

Installation Drawings for the following items shall be in accordance with the paragraph entitled, "Installation," of this

section.

Steel Doors  
Frames

### 1.3 DELIVERY, HANDLING, AND STORAGE

Doors, frames, and accessories shall be protected from damage during handling, transportation, and at the job site. Materials shall be stored at the site, under cover, and on wood blocking or suitable floors.

## PART 2 PRODUCTS

### 2.1 GENERAL

Doors, frames, and accessories shall conform to SDI 100 and the requirements specified herein.

Welding shall be in accordance with the recommended practice of the Structural Welding Code, Sections 1 through 6, AWS D1.1/D1.1M and as specified by the producer of the metal being welded. Welds behind finished surfaces shall cause no distortion or discoloration on the exposed side.

#### 2.1.1 Steel Doors

Doors shall be heavy duty, 1-3/4-inch, 18-gage, full flush or seamless hollow steel construction, electrolytic zinc-coated with honeycomb core reinforcement.

#### 2.1.2 Frames

Interior frames shall be 16-gage knocked down, field assembled type.

### 2.2 FINISH HARDWARE PREPARATIONS AND LOCATIONS

Preparation for hardware shall be in accordance with DHI A115.1, DHI A115.2, and DHI A115.4, as applicable.

Frames shall be punched to receive molded-rubber door silencers. Single door frames shall be punched for three silencers in the lock side jamb. Double door frames shall be punched for one silencer in each leaf of the frame head. Lock strikes shall be set out to provide clearance for the silencer.

Hardware locations shall comply with SDI 100, Table V, except when template dimensions and multiple-item installations require an alternative location.

Reinforcement for finished hardware shall meet or exceed the requirements of SDI 100, Table IV.

### 2.3 FINISHING

Doors and frames shall be primed and finished in accordance with SDI 100.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Door Clearance

Clearances shall be those specified in SDI 100.

Clearances for fire-rated doors shall be as specified in NFPA 80.

3.1.2 Frame Installation and Tolerances

Frames shall be installed in accordance with SDI 105.

Fire-rated frames shall be installed in accordance with NFPA 80.

Frames shall be installed within the following tolerances:

Deviation in location from that indicated on the drawings	Plus or minus 1/4 inch
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Deviation from plumb or horizontal:

In 8 feet	Not more than 1/16 inch
-----------	-------------------------

In 12 feet	Not more than 1/8 inch
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3.1.3 Finish-Hardware Installation

Hardware shall be installed and adjusted in accordance with the hardware manufacturer's printed directions.

After the installation is completed, hardware shall be adjusted and lubricated to ensure proper performance.

3.1.4 Final Adjustment

Before final acceptance, finish hardware shall be checked and readjusted as required to ensure proper operation of the finish hardware.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08160

RADIO FREQUENCY SHIELDED PNEUMATIC SLIDING DOOR

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  - 3.2.1 Operational Testing
  - 3.2.2 Shielding Effectiveness Testing

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SECTION 08160

RADIO FREQUENCY SHIELDED PNEUMATIC SLIDING DOOR

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE-299 (1997) Standard for Measuring the Effectiveness of the Electromagnetic Shielding Enclosure

1.2 GENERAL REQUIREMENTS

Provide a new EMI/RFI shielding sliding pocket door in existing reverberation chamber.

Manufacturer's instructions shall be submitted to the Contracting Officer for the shielding door indicated, and the recommended installation method and sequence.

1.3 PERFORMANCE REQUIREMENTS

Design Analysis and Calculations shall meet design specifications as required by referenced standards within this section.

Equipment and Performance data for Radio Frequency Shielded Pneumatic Sliding Door Assemblies and Hardware and Accessories shall meet design specifications as required by referenced standards within this section.

The shielding of the door and existing chamber shall provide the following degree of attenuation:

Magnetic Field Requirement: 10KHz to 1MHz, shielding effectiveness of 100dB

Electric Field Requirement: 10KHz to 100MHz, shielding effectiveness of 120dB

Plane Wave Requirement: 100MHz to 40GHz, shielding effectiveness of 120dB

Doors shall be pneumatically operated with pushbutton controls for fully automatic operation. The controls shall be located inside the HIRF Test Chamber (144A), and remote indication shall be provided in the Control Room

(144E) and the Amplifier Room (144D).

The nominal size of the opening for the door shall be 20' wide by 9'-6" high. The threshold of the door shall be flush with interior ground plane of the chamber and provide for smooth access across the threshold when the door is open.

#### 1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

##### SD-01 Data

Equipment and Performance Data for the following items shall be in accordance with the requirements stated in the paragraph entitled, "Performance Requirements," of this section.

Radio Frequency Shielded Sliding Door Assemblies  
Hardware and Accessories

Design Analysis and Calculations shall be submitted in accordance with paragraph entitled, "Performance Requirements," of this section.

##### SD-04 Drawings

The following drawings shall be submitted in accordance with paragraph entitled, "Drawings," of this section.

Fabrication Drawings  
Installation Drawings

The following shall be submitted for pneumatic door operating units and controls:

Control Diagrams  
Schematics  
Wiring Diagrams

##### SD-06 Instructions

Manufacturer's Instructions for new equipment shall be submitted in accordance with paragraph entitled, "General Requirements", of this section.

##### SD-08 Statements

The Qualifications of the RF Shielding Contractor shall be submitted for approval.

The Credentials of the third party RF Testing Agency shall be submitted for approval.

SD-09 Reports

Test Plans shall be submitted prior to all specified field and acceptance testing. Test Plans shall include an outline of the test procedures to be performed, the pass/fail requirements, and the test equipment to be used.

Test Reports for door performance as installed shall be submitted for Shielding Sliding Door in accordance with the paragraph entitled, "Testing", of this section.

SD-19 Operation and Maintenance Manuals (O&M)

Operation and Maintenance Manuals for sliding door assemblies shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this section.

1.5 DRAWINGS

Fabrication Drawings shall include framing member details, welding details, and finish and painting details for door assemblies.

Installation Drawings shall include type and location of hardware, framing details, and rough opening dimensions and details for door systems.

1.6 OPERATION AND MAINTENANCE

Contractor shall submit 4 copies of the Operation and Maintenance Manuals for sliding door assemblies. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

Operation and Maintenance Manuals shall be consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Test data shall be legible and of good quality. Light-sensitive reproduction techniques are acceptable, provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals shall have 3/8-inch holes and be bound in 3-ring, loose-leaf binders. Data shall be organized by separate index and tabbed sheets, in a loose-leaf binder. Binder shall lie flat with printed sheets that are easy to read. Caution and warning indications shall be clearly labeled.

Contractor shall provide classroom and field instruction in operation and maintenance of systems equipment where required by the technical provisions. These instructional services shall be conducted using the manufacturer's factory trained personnel or qualified representatives. Contracting Officer shall be given 7 days written notice of scheduled instructional services.

PART 2 PRODUCTS

2.1 MATERIALS

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All materials used in the door construction, including all accessories, shall be new and undamaged. Installation and use shall be in a manner that normal wear and tear do not affect the specified shielding effectiveness.

### 2.2 CONSTRUCTION

The door shall use all welded construction. It shall be constructed from low carbon, hot rolled structural steel. The door frame shall consist of structural steel tube with a pure tin coating and it shall be welded in place. The door pocket shall be equipped with bolt-on access panels for access to pneumatic controls for maintenance and repair. The door shall be constructed such that when it is closed, a rubber bladder inside of the door will be inflated to force the metal surfaces of the door and frame together to give a tight, RF seal on the inner and outer faces of the door. The operation of the door shall be fully automatic and controlled by a push button from inside HIRF Chamber A (144A). Pneumatic actuators shall provide the opening and closing force for the door.

The door controls shall be equipped with emergency systems to allow the opening of the door manually from inside the Test Chamber in the event pneumatic operating systems are shut down. The door controls shall include safety interlocks for RF amplifier shut down in the event the door RF seal is lost during testing in the chamber. The pocket sliding door shall also be equipped with an air filled safety edge bumper on its leading edge. This safety edge bumper shall detect any obstruction in the path of the sliding door and automatically retract the door if an obstruction is contacted.

Remote indication of the door state shall be provided in the Control Room (144E) and Amplifier Room (144D) by using visual indicators similar to those used for the other existing RF shielding doors at the HIRF facility.

The door control system shall include a pneumatically activated switch that is fully compatible with existing system components for the Interlock System located in the Control Room (144E). The Control System shall monitor inflation pressure and the door seal and provide for the connection to the existing Safety Interlock System enabling an automatic shutdown of amplifier power during testing if proper inflation pressure and door seal are lost.

All modifications to the existing RF shielded HIRF facility shall be performed by a contractor regularly engaged and highly experienced in the fabrication and installation of RF shielded facilities of the type and performance level as those required to be constructed by these specifications.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Prepare openings prior to door installation in accordance with drawings. Install doors in accordance with manufacturer's directions and as shown on drawings.

3.2 ACCEPTANCE TESTING

3.2.1 Operational Testing

The pneumatic sliding door shall be tested in the presence of a representative of the door manufacturer and the Contracting Officer. Testing shall consist of 10 complete opening and closing cycles and demonstrate all modes of operation. On the fifth and tenth cycles, the seals shall be checked for wear and leakage. Switches shall function properly, and operation of doors shall be smooth.

3.2.2 Shielding Effectiveness Testing

Prior to making any physical modifications to the RF reverberation chambers, a baseline shielding effectiveness test shall be performed. The data obtained from this testing shall be compared to the test data obtained after the construction is complete and shall serve as a baseline for final acceptance test which shall be performed following completion of construction.

The shielding enclosure shall be tested and performance verified in accordance with IEEE-299 and NSA 65-6.

The testing shall be provided by the Contractor and performed by an independent third party testing agency regularly engaged and highly experienced in this type of testing. A Test Plan shall be submitted prior to testing. A full test report shall be provided. The test report shall document all equipment used for testing, the testing procedures, test criteria, and test results. The test report shall signed by the testing official.

Final acceptance of the shielding enclosure is based on the test report and to the satisfactory achievement of the requirements stated in the Performance Requirements.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08331

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3.3.1 Maintenance and Adjustment

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SECTION 08331

OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

ASME INTERNATIONAL (ASME)

ASME B29.1M (1993) Precision Power Transmission Roller Chains, Attachments, and Sprockets

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M (2001a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 27/A 27M (2000) Standard Specification for Steel Castings, Carbon, for General Application

ASTM A 307 (2002) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

ASTM A 36/A 36M (2001) Standard Specification for Carbon Structural Steel

ASTM A 446/A 446M (1993) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

ASTM A 48 (2000; R 2001) Standard Specification for Gray Iron Castings

ASTM A 525 (1993) Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

ASTM A 526/A 526M (1990) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality

ASTM A 53 (2002) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated

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Welded and Seamless

ASTM A 780 (2001) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM D 2000 (2001) Standard Classification System for Rubber Products in Automotive Applications

NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

NEMA MG 1 (2002) Motors and Generators

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 6 (1993) Enclosures for Industrial Control and Systems

NEMA ST 1 (1988; R 1997) Specialty Transformers (Except General Purpose Type)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS FF-B-171 (Rev A; Am 1) Bearings, Ball, Annular (General Purpose)

FS TT-C-490 (Rev C; Am 2) Cleaning Methods for Ferrous Surfaces and Pretreatments for Organic Coatings

1.2 PERFORMANCE REQUIREMENTS

1.2.1 Wind Loading

Doors shall be designed and reinforced to withstand a wind loading pressure of at least 34 pounds per square foot with a maximum deflection of 1/120 of the opening width.

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Manufacturer's Catalog Data for the following items shall be submitted listing all accessories including supports, locks and latches, and weatherstripping.

Overhead Coiling Doors  
Hardware  
Counterbalancing Mechanism

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Electric Door Operators

SD-04 Drawings

Fabrication Drawings shall show complete assembly with hardware and framing details for the following items:

Overhead Coiling Doors  
Counterbalancing Mechanism  
Electric Door Operators

Installation Drawings shall be submitted in accordance with paragraph entitled, "Overhead Coiling Door Assemblies," of this section.

SD-19 Operation and Maintenance Manuals

Operation and Maintenance Manuals for Overhead Coiling Door Assemblies shall be submitted.

1.4 FIELD MEASUREMENTS

Field measurements shall be taken prior to preparation of drawings and fabrication.

1.5 WARRANTY

Contractor shall furnish a written warranty guaranteeing that the helical spring and counterbalance mechanism are free from defects in material and workmanship and that they will remain so for not less than 3 years after completion of the project and final acceptance by the Contracting Officer.

Contractor shall warrant that upon notification by the Government, the Contractor will immediately make good any defects in material, workmanship, and door operation within the same time period covered by the guarantee, at no cost to the Government.

1.6 OVERHEAD COILING DOOR ASSEMBLIES

Installation Drawings for overhead coiling door assemblies shall show rough frame opening dimensions, hardware and anchor locations, and counterbalancing mechanism and door operator details.

Contractor shall submit 4 copies of the Operation and Maintenance Manuals 30 days prior to testing the Overhead Coiling Door Assemblies. Data shall be updated and resubmitted for final approval no later than 30 days prior to contract completion.

Operation and maintenance manuals shall be consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Test data shall be legible and of good quality.

PART 2 PRODUCTS

2.1 OVERHEAD COILING DOORS

2.1.1 Curtain Construction

Curtains shall be fabricated from steel sheets conforming to ASTM A 446/A 446M, Grade A, or to ASTM A 526/A 526M, with the additional requirement of a minimum yield point of 33,000 psi. Sheets shall be galvanized in accordance with ASTM A 525, G90.

Doors shall be fabricated from interlocking cold-rolled slats, with section profiles as specified, designed to withstand the specified wind loading. Slats shall be continuous without splices for the width of the door.

2.1.2 Curtain Bottom Bar

Curtain bottom bars shall be pairs of angles not less than 2.0 by 2.0 inches by 0.188 inch. Angles shall be steel conforming to ASTM A 36/A 36M.

Angles and fasteners shall be galvanized in accordance with ASTM A 525, G90. Welds and abrasions shall be coated with paint conforming to ASTM A 780.

2.1.3 Wind Locks

Wind locks shall be cast steel conforming to ASTM A 27/A 27M, Grade B. Locks shall be galvanized in accordance with ASTM A 525, G90, and secured to the curtain slats. A wind lock shall be provided on every other curtain slat.

2.1.4 Weatherstripping

Weatherstripping for door heads shall be 1/8-inch thick sheet natural rubber or neoprene rubber air baffles secured to the insides of hoods with galvanized-steel fasteners through continuous galvanized-steel pressure bars at least 5/8-inch wide and 1/8-inch thick.

Weatherstripping for door-jamb guides shall be 1/8-inch thick strip natural rubber or neoprene rubber secured to the exterior sides of jamb guides with galvanized-steel fasteners through continuous galvanized-steel pressure bars at least 5/8-inch wide and 1/8-inch thick.

Bottom astragals shall be 1/8-inch thick sheet natural rubber or neoprene rubber secured to the bottom bars.

Weatherstripping and astragals shall be natural rubber or neoprene rubber conforming to ASTM D 2000.

2.2 HARDWARE

2.2.1 Curtain Jamb Guides

Curtain jamb guides shall be fabricated from a combination of steel angles of sufficient size to retain the curtain against the specified wind loadings. Guides shall be fabricated from rolled structural-quality

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carbon-steel angles conforming to ASTM A 36/A 36M. Guide assembly shall be galvanized in accordance with ASTM A 525, G90. Bolt holes shall be slotted for track adjustment. Welds and abrasions shall be coated with paint conforming to ASTM A 780.

### 2.2.2 Equipment Supports

Door-operating equipment supports shall be fabricated from steel shapes and plates conforming to ASTM A 36/A 36M, galvanized in accordance with ASTM A 525, G90. Shapes and plates shall be sized in accordance with the manufacturer's standard practices for the size, weight, and type of door installation.

### 2.2.3 Threaded Fasteners

Threaded fasteners shall consist of unfinished low-carbon steel bolts and nuts conforming to ASTM A 307, Grade A, galvanized per ASTM A 153/A 153M, Table 1.

### 2.2.4 Locks and Latches

Locking assembly shall consist of a keyed cylinder lock, a spring-loaded dead bolt, a chrome operating handle, a cam plate, and lock bars with adjustable guides to engage through slots in the track.

Doors shall have seven-pin tumbler locks with temporary construction cores which shall be removed when directed by the Contracting Officer. Security cores will be installed by the Government prior to acceptance of the work.

## 2.3 COUNTERBALANCING MECHANISM

Doors shall be counterbalanced by an adjustable, steel, helical torsion spring mounted around a steel shaft in a spring barrel and connected to the door curtain with the required barrel rings.

### 2.3.1 Brackets

Mounting brackets shall be the manufacturer's standard with one located at each end of the counterbalance barrel. Brackets shall be gray cast iron conforming to ASTM A 48.

### 2.3.2 Hoods

Hoods shall be fabricated from steel sheets conforming to ASTM A 446/A 446M, Grade A, or to ASTM A 526/A 526M, with the additional requirement of a minimum yield strength of 33,000 psi. Sheets shall be galvanized in accordance with ASTM A 525, G90. Material shall have an uncoated thickness of not less than 0.0299 inch. Hoods shall be reinforced to prevent hood deflection.

Hoods shall be built for mounting on the building exterior as indicated on the drawings.

### 2.3.3 Counterbalance Barrels

Counterbalance-barrel components shall be as follows:

Spring barrels shall be hot-formed structural-quality carbon-steel, welded or seamless pipe conforming to ASTM A 53, Type E or S, Grade A, with the steel yield point and design stresses conforming to ASTM A 36/A 36M. Pipe shall be of sufficient diameter and wall thickness to limit deflection to a maximum of 1/360 of the span. Barrels shall be hot-dip galvanized, inside and outside, in conformance with ASTM A 525, G90.

Counterbalance springs shall be oil-tempered helical steel springs designed with a safety factor of not less than 4. Springs shall be sized to counterbalance the weight of the curtain at any point of its travel, and shall be capable of being adjusted to counterbalance not less than 125 percent of the normal curtain load. Spring adjustment shall be arranged in such a way that the curtain need not be raised or lowered to secure the adjustment.

Counterbalance shafts shall be case-hardened steel of the proper size to hold the fixed ends of the spring and carry the torsional load of the spring.

Barrel plugs shall be fabricated from cast steel machined to fit the ends of the barrel. Plugs shall secure the ends of the spring to the barrel and the shaft. Plugs shall be galvanized in conformance with ASTM A 525, G90.

Barrel rings shall be fabricated from malleable iron of the proper involute shape to coil the curtain in a uniformly increasing diameter.

Shaft bearings shall be factory-sealed ball bearings conforming to FS FF-B-171 and of the proper size for load and shaft diameters.

#### 2.4 ELECTRIC DOOR OPERATORS

Electrical wiring shall conform to the applicable requirements of Section 16145, "Standard Wiring Systems."

Door operator controls shall conform to the applicable requirements of Section 16286, "Overcurrent Protective Devices."

Electric door-operator assemblies shall be the sizes and capacities recommended and provided by the door manufacturer for specified doors. Assemblies shall be complete with electric motors and factory-prewired motor controls, gear reduction units, solenoid-operated brakes, clutches, remote-control stations, manual or automatic control devices, and control of stations and accessories as required for proper operation of the doors.

Operators shall be so designed that motors may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operators.

A manual operator of crank-gear or chain-gear mechanisms with a release clutch shall be provided to permit manual operation of doors in case of

power failure. Emergency manual operator shall be so arranged that it may be put into and out of operation from floor level, and its use shall not affect the adjustment of the limit switches. An electrical or mechanical device shall be provided which will automatically disconnect the motor from the operating mechanism when the emergency manual operating mechanism is engaged.

#### 2.4.1 Door-Operator Types

Door operators shall be wall-mounted units or counterbalancing bracket-mounted units consisting of an electric motor, a worm-gear drive from the motor to the reduction gear box, a chain or worm-gear drive from the reduction gear box to the gear wheel mounted on the counterbalance shaft, and a quick-clutch disconnect release for manual operation. Motor, clutch, and drive assembly shall be the horsepower rating and design determined by the door manufacturer for the size of the door and as specified.

Door operator shall be built for exterior exposure.

#### 2.4.2 Motors

Motors shall be the high-starting-torque, reversible, constant-duty electrical type with overload protection. Motors shall be of sufficient torque and horsepower to move the door in either direction from any position and produce a door-travel speed of not less than 8 nor more than 12 inches per second without exceeding the horsepower rating.

Motors shall conform to NEMA MG 1 and to the requirements specified.

Fractional horsepower motors up to 1/2 horsepower shall be single-phase, 115-volt, 60-hertz, or 115/230-volt, 60-hertz. A dual voltage rating may be provided at the option of the Contractor.

Motors 1/2 horsepower and larger shall be three-phase, 230/460-volt, 60-hertz.

Motor frame sizes shall conform to NEMA MG 1.

Motor enclosures shall be open drip-proof and shall be certified for continuous operation at full nameplate power output in an ambient temperature of 104 degrees F.

#### 2.4.3 Motor Bearings

Bearings shall be bronze-sleeve or heavy-duty ball or roller antifriction type with full provisions for the type of thrust imposed by the specific duty load.

Bearings in motors less than 1/2 horsepower shall be prelubricated and factory sealed.

Motors coupled to worm-gear reduction units shall be equipped with either ball or roller bearings.

Bearings in motors 1/2 horsepower or larger shall be equipped with lubrication service fittings. Lubrication fittings shall be fitted with color-coded plastic or metal dust caps.

In any motor, bearings that are lubricated at the factory for extended duty periods shall not need to be lubricated for a given number of operating hours. An appropriate tag or label on the motor shall display this information.

#### 2.4.4 Motor Starters, Controls, and Enclosures

Each door motor shall have a factory-wired, unfused, disconnect switch; a reversing, across-the-line magnetic starter with thermal overload protection; 120-volt operating coils with a control transformer limit switch; and a safety interlock assembled in a NEMA ICS 6 type enclosure as specified herein.

Adjustable switches, electrically interlocked with the motor controls and set to stop the door automatically at the fully open and fully closed position, shall be provided.

#### 2.4.5 Control Enclosures

Control enclosures shall conform to NEMA ICS 6 for general purpose NEMA Type 1.

#### 2.4.6 Transformer

Starters with 230/460 to 115 volt control transformers with two primary and one secondary fuse shall be provided when it is required to reduce the voltage on control circuits to 120 volts or less. Transformers shall conform to NEMA ST 1.

#### 2.4.7 Safety-Edge Device

Each door shall be provided with a pneumatic safety device extending the full width of the door and located within a U-section neoprene or rubber astragal mounted on the bottom rail of the bottom door section. Device shall immediately stop and reverse the door upon contact with an obstruction in the door opening during downward travel and shall cause the door to return to full-open position. Safety device shall not be a substitute for a limit switch.

Safety device shall be connected to the control circuit through a retracting safety cord and reel.

#### 2.4.8 Remote-Control Stations

Interior remote-control stations shall be full-guarded, momentary-contact three-button, heavy-duty, surface-mounted NEMA ICS 6 type enclosures as specified. Buttons shall be marked "OPEN," "CLOSE," and "STOP." The "CLOSE" button shall be the type requiring a constant pressure to maintain the closing motion of the door. When the door is in motion and the "STOP"

button is pressed, the door shall stop instantly and remain in the stopped position; from the stopped position, the door may then be operated in either direction.

#### 2.4.9 Speed-Reduction Units

Speed-reduction units shall consist of hardened-steel worm and bronze worm gear assemblies running in oil or grease and encased in a sealed casing, coupled to the motor through a flexible coupling. Drive shafts shall rotate on ball- or roller-bearing assemblies that are integral with the unit.

Minimum ratings of speed reduction units shall be in accordance with AGMA provisions for class of service.

Worm gears shall be ground to provide accurate thread form; all other types of gearing shall have machined teeth. All gears shall be surface hardened.

Bearings shall be the antifriction type equipped with oil seals.

#### 2.4.10 Chain Drives

Roller chains shall be power-transmission series steel roller type conforming to ASME B29.1M, with a minimum safety factor of 10 times the design load.

Roller-chain side bars, rollers, pins, and bushings shall be heat-treated or otherwise hardened.

Chain sprockets shall be high-carbon steel with machine-cut hardened teeth, finished bore and keyseat, and hollow-head setscrews.

#### 2.4.11 Brakes

Brakes shall be internally expanding 360-degree shoe brakes or shoe and drum brakes, solenoid-operated and electrically interlocked to the control circuit to set automatically when power is interrupted.

#### 2.4.12 Clutches

Clutches shall be the 4-inch diameter, multiple face, externally adjustable friction type or adjustable centrifugal type.

### 2.5 SURFACE FINISHING

Zinc-coated steel materials shall be chemically cleaned, rinsed, given a zinc-phosphate conversion coating, rinsed with cold water, and then sealed with a chromic-acid rinse in accordance with FS TT-C-490, Method III, Type I. Minimum weight of the pretreatment coating shall be not less than 150 milligrams per square foot.

Pretreated zinc-coated steel sheets shall be given the manufacturer's standard prime coat and an enamel finish coat applied to the exterior face after forming.

PART 3 EXECUTION

3.1 GENERAL

Doors, tracks, and operating equipment shall be installed complete with specified preparatory framing, jamb and head mold stops, anchors, inserts, hangers, and equipment supports in accordance with approved drawings, manufacturer's printed instructions, and as specified.

Door guide-track assembly shall be fastened to steel or wood framing with 1/2-inch galvanized machine bolts or lag screws, not more than 24 inches on center, and erected plumb and true to a vertical alignment with not more than 1/8 inch deviation in 20 feet.

3.2 STEEL FRAMING

Steel framing at jambs and heads of door openings shall be plumb, true, and securely anchored in place. Vertical members shall be plumb, with a deviation of not more than 1/16 inch in 20 feet. Inside faces of steel jambs shall extend to the ceiling or to the minimum headroom height of the door.

3.3 ACCEPTANCE PROVISIONS

After installation, doors, track, and operating equipment will be examined and tested by the Government for general operation, for operation against the specified wind pressure, and for resistance to weather.

Doors that fail the required tests shall be adjusted and retested. Doors that have been adjusted and which fail subsequent tests shall be removed and replaced with new doors. New doors shall be tested and adjusted at no additional cost to the Government.

3.3.1 Maintenance and Adjustment

In not less than 60 nor more than 90 calendar days after final acceptance of the work, the Contractor shall examine, lubricate, test and re-adjust the doors to ensure proper operation.

-- End of Section --

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SECTION 08710

DOOR HARDWARE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

ALUMINUM ASSOCIATION (AA)

AA 45 (2003) Designation System for Aluminum Finishes

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1 (2000) Butts and Hinges

BHMA A156.16 (2002) Auxiliary Hardware

BHMA A156.18 (2000) Materials and Finishes

BHMA A156.2 (1996) Bored and Preassembled Locks and Latches

BHMA A156.5 (2001) Auxiliary Locks & Associated Products

STEEL DOOR INSTITUTE (SDI)

SDI 100 (1991) Standard Steel Doors and Frames

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Manufacturer's Catalog Data shall be submitted for the following items:

- Fasteners
- Hinges
- Locksets
- Door Stops

SD-06 Instructions

## UPGRADE TO HIRF AND SAFETI LABS

Manufacturer's Instructions shall be provided by the Contractor in accordance with paragraph entitled, "General," of this section.

### SD-13 Certificates

Certificates shall be submitted for the following items showing conformance with the referenced standards included in this section.

Fasteners  
Hinges  
Locksets

### 1.3 GENERAL

A Finish Schedule shall include a Hardware Schedule indicating the door and frame location, type, size, swing, bevel, material, hardware type by Builders' Hardware Manufacturers Association (BHMA) numbers, and the respective manufacturer's type, name, number, finish, and design. Material, Equipment and Fixture Lists shall be provided prior to the hardware schedule, showing a list of the proposed Finish Hardware by manufacturer, type, name, series, material and finish.

Manufacturer's Instructions for finish hardware shall indicate the manufacturer's recommended method and sequence of installation.

## PART 2 PRODUCTS

### 2.1 FASTENERS

Fasteners of the proper type, size, quantity, and finish for each hardware item shall be provided. All visible fasteners shall be phillips-head, bronze or stainless steel finished to match specified hardware.

### 2.2 HINGES

Hinges shall be full mortise, heavy weight, anti-friction bearing, button tip, template type conforming to BHMA A156.1, Grade 2. Size shall be 4-1/2 by 4-1/2 inches.

### 2.3 LOCKSETS

#### 2.3.1 General

Cylinder bored locksets and latchsets shall conform to BHMA A156.2, plain design and wrought trim. Locksets and latchsets shall have lever style design for disability compliance.

Locksets and latchsets shall have standardized fronts, cases, and strikes so that varying functions will be interchangeable and will require only one mortise for their installation. Locks and latches shall have beveled bronze fronts, bronze bolts and strikes, brass hubs, and cases with specified finish. Locks shall have cylinders conforming to BHMA A156.5.

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Locksets and lock cylinders shall be master keyed to the key system established for the installation.

2.3.2 Cylinder Bored Locksets

Heavy duty usage cylinder bored locksets and latchsets shall be Series 4000, Grade 1.

2.4 MISCELLANEOUS AND SHELF HARDWARE

2.4.1 General

Miscellaneous hardware shall conform to BHMA A156.16, except as noted, and shall match or have the same finish as lockset finish.

2.4.2 Door Stops

Door stops and bumpers shall conform to BHMA A156.16.

Wall mounted stops shall be Type L02061 (4 inches flexible projection) Type L02101 (wall bumper). Where impossible to install wall mounted stops, floor mounted stops, Type L02141 (dome type) or Type L02161 (dome type for door with thresholds) shall be provided.

2.4.3 Door Silencers

Door silencers shall be Type L03011 for metal frames and Type L03021 for wood frames.

2.5 FINISHES

Hardware shall receive the following finish(es) conforming to BHMA A156.18, as follows:

Hinges, locksets and latchsets	Satin chromium plated on brass or bronze, BHMA Code 626
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Aluminum hardware items shall be anodized to an Architectural Class II natural finish not less than 0.4-mil thick conforming to AA 45 (designation AA M21 C22 A31).

PART 3 EXECUTION

3.1 GENERAL

Hardware shall be installed and adjusted in accordance with the hardware manufacturer's printed instructions and to template dimensions.

Temporary-construction cores shall be furnished, installed, and maintained in locks during construction and removed when directed.

3.2 HARDWARE LOCATION

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Hardware shall be located in accordance with SDI 100, Table V, except when template dimensions and multiple-item installations require alternate locations.

3.3 HARDWARE SCHEDULE

All locksets and lock cylinders shall be masterkeyed to Langley Research Center's established Best Lock Co. Universal masterkey system.

Hardware Set No. 1

1-1/2 Pair Hinges	A8112 4 1/2" x 4 1/2" x 626
1 Each Lockset	Series 4000, Grade 1, F81, keyed from outside, button on inside
1 Door Silencers	as specified
1 Door Stop	as specified

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SECTION 09250

GYPSUM BOARD

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM C 36	(2001) Gypsum Wallboard
ASTM C 475	(2002) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 514	(2001) Standard Specification for Nails for the Application of Gypsum Board
ASTM C 645	(2000) Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Applications of Gypsum Board

1.2 SUBMITTALS (Not Applicable)

PART 2 PRODUCTS

2.1 GYPSUM WALLBOARD

Regular Gypsum Wallboard shall be in accordance with ASTM C 36 and shall be 5/8-inch thick with tapered edges.

2.2 METAL FRAMING MATERIALS

2.2.1 Studs

Studs and floor and ceiling runners shall be electrogalvanized, cold-rolled steel conforming to ASTM C 645.

Metal studs shall be formed, zinc-coated sections of channel-shape, of 0.0209 inch minimum thickness, and of widths indicated on the drawings. The stud flanges that come in contact with gypsum wallboard shall be a minimum of 1-1/4 inch wide, with a 1/4-inch stiffening lip with turned or folded edges. Holes shall be regularly punched in studs to facilitate installation of electrical wiring, conduit, or horizontal bracing.

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Floor and ceiling runners shall be not less than .0179-inch thick steel before galvanizing, with 1-1/4-inch flanges, sized to nest with steel stud.

### 2.3 JOINT MATERIALS

Joint Tape shall be plain or perforated material conforming to ASTM C 475, Type II, Styles 1 and 2.

Joint Compound shall be an adhesive conforming to ASTM C 475, Type I.

### 2.4 METAL FASTENERS

#### 2.4.1 Gypsum Fasteners

Nails shall be steel, diamond point, with mechanically deformed shank, and shall conform to ASTM C 514.

Screws shall be steel, self-tapping drywall type, with bugle head self-drilling point. The length shall be as recommended by the drywall manufacturer for the type of system being installed.

### 2.5 METAL ACCESSORIES AND METAL TRIM

Corner beads shall be 0.012 inch minimum thickness, hot-dip galvanized steel, with 1-1/4-by 1-1/4-inch flanges and a 1/8-inch beaded corner.

Corner beads shall be formed to an angle of 90 degrees and shall be either zinc-coated steel not lighter than .012-inch before coating with wings not less than 7/8-inch wide and perforated for nails and cement treatment; or they shall be formed of zinc-coated steel or protected aluminum with legs approximately 3/4-inch wide and cemented under pressure with a rubber-base Adhesive to tough-paper jointing-tape wings not less than 1-inch wide.

Casing trim shall be 0.0158-inch nominal thickness, hot-dip galvanized steel channel, depth as required for wallboard, with attached tape flange.

## PART 3 EXECUTION

### 3.1 WALL INSTALLATION

Tracks shall be furnished in the longest practical lengths with butt joints between lengths and attached to concrete slabs with concrete stud nails at 24 inch on center.

Steel studs shall be size indicated, spaced as shown.

Studs shall be positioned plumb in ceiling and floor tracks and attached with at least one self-tapping screw on each side of the stud ends. Studs shall be installed in continuous lengths with no splicing.

Head and jamb framing at door openings shall consist of a tube made up of one runner channel and one stud. Tubes at door jambs shall extend the full height of the partition and shall be fastened together with screws at minimum of 24 inch center-to-center each flange. The tube over the door

head shall be fastened together with a minimum of three screws for each flange.

### 3.2 JOINTS

The number of end joints shall be minimized. Edges of boards shall be butted together but shall not be forced.

Joints shall be staggered and not aligned with the edge of an opening nor positioned so that the corners of four boards will meet at a common point.

All abutting ends or edge joints shall occur over solid bearing joists and shall be fitted neatly and accurately. Wallboard shall be supported as recommended by the manufacturer, with additional framing at all cutouts and openings.

Joints between wallboard panels and joints at metal trim shall be reinforced with joint tape and embedding-type joint compound and concealed with at least two applications of finishing compound in accordance with the printed instructions of the manufacturer of the gypsum wallboard. Screw depressions shall be filled with at least three coats of joint compound. Flanges at corner beads, edge trim, and control joints shall be concealed with at least two applications of joint compound, feathered and sanded smooth.

The finished wallboard application shall be plumb and true, with all joints aligned to within a 1/16-inch tolerance and with all surfaces shimmed and aligned to a plane and even surface having a maximum variation of 1/8 inch in 8 feet.

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SECTION 09901

ARCHITECTURAL PAINTING

PART 1 GENERAL

1.1 SUMMARY

This section covers general architectural painting for normal facility painting of buildings and their structures. This section does not cover specifications for painting of industrial or research structural steel which may be subject to a variety of environmental or special conditions.

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Mix Designs shall be submitted for each type of Paint and Coating System in accordance with the paragraph entitled, "Mixing and Application," of this section.

Manufacturer's Catalog Data shall be submitted for the following items. Data shall include detailed analysis of each coating material required, with constituents measured as percentages of the total weight of coating.

Pigmented Sealer  
Enamel Undercoat  
Acrylic Latex  
Fast Dry Metal Primer  
Alkyd Enamel

SD-14 Samples

Manufacturer's Standard Color Charts shall be submitted showing manufacturer's recommended finish colors. Three color chips of each color and gloss scheduled shall also be submitted.

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered in their original, unbroken containers bearing the manufacturer's name and product identification. Containers breached by rough handling shall be removed from the site, together with their contents.

Paint materials, thinners, and cleaners shall be stored in tightly closed containers in a covered, well-ventilated area where they will not be

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exposed to excessive heat, sparks, flame, or direct sunlight. Water-based materials shall be protected against freezing.

1.4 PROTECTION AND SAFETY REQUIREMENTS

The Contractor shall remove and reinstall or provide acceptable protection for hardware, accessories, lighting and electrical components, factory-finished materials, plumbing fixtures and fittings, and any other materials that may become splattered or damaged by the painting work. "WET PAINT" signs shall be posted by the Contractor to indicate newly painted surfaces.

The Contractor shall be fully responsible for having its equipment comply with current OSHA regulations (29 CFR 1926 Subparts E & I and 29 CFR 1910 Subpart I) and in supervising its personnel in the safe operation of the equipment. Workmen shall wear the proper type of eye protection, face masks, respirators, gloves, and other safety-related equipment as required by the product being applied.

The Contractor shall take precautions to prevent fire, explosion, and other damage that could be caused by its materials, equipment, and work.

Rags, paint, and solvents shall be stored in closed metal containers when not in use.

Ladders, stages, scaffolds, and platforms shall be in a safe condition, with adequate strength to support the maximum allowable workload. This type of equipment shall comply with current OSHA regulations (29 CFR 1926, Subpart L & X and 29 CFR 1910 Subparts D & F).

Adequate ventilation shall be provided for interior or confined spaces during application and drying of coatings to prevent concentration of vapors.

1.5 CONTRACTOR PERSONNEL QUALIFICATION

The personnel assigned to the work shall be certified by the Contractor to be experienced in the successful application of paints and coatings similar to those specified.

PART 2 PRODUCTS

2.1 GENERAL

The following are suggested paint manufacturers and their products. Other paint manufacturers' products of equal quality will be considered when submitted and approved by the Contracting Officer.

<u>COATING</u>	<u>PITTSBURGH</u>	<u>SHERWIN WILLIAMS</u>	<u>ICI GLIDDEN/DEVOE</u>
Fast dry metal primer	6-205	E41N1	4100-7100

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<u>COATING</u>	<u>PITTSBURGH</u>	<u>SHERWIN WILLIAMS</u>	<u>ICI GLIDDEN/DEVOE</u>
Pigmented sealer	6-2	B28W200	1000-1200
Acrylic latex, flat	70 line	B36W100	2200-Series
Acrylic latex semi gloss	5-510	A-26	1416-Series
Acrylic latex, gloss	78 line	A-100A8	2406-Series
Alkyd enamel semi gloss	6-90	B34W200	1516-Series
Alkyd enamel gloss	23-49	B35W200	4308-Series

PART 3 EXECUTION

3.1 GENERAL

The manufacturer's recommendations for surface preparation, thinning, mixing, handling, and applying his/her product shall be considered a part of this specification.

3.2 SURFACE PREPARATION

3.2.1 General

Surfaces shall be clean, dry, and free from contaminants and foreign matter. Mildew and chalking shall be removed and the surface thoroughly sterilized. Chipped, peeling, or blistered paint shall be removed and the surface spot primed. Hard glossy surfaces shall be dulled and roughened to ensure proper adhesion.

3.2.2 Ferrous Metal

Surfaces shall be free from dirt, oil, grease, wax, and other contaminants. Heavy rust and loose mill scale shall be removed by hand, power tool, or blast cleaning. All new piping shall be blast cleaned to an SSPL-SP10 condition and primed prior to fabrication.

3.2.3 Wood

Surfaces shall be clean, dry, smooth, and free from oil, grease, and dirt. Knots shall be sealed with a mixture of equal parts of shellac and alcohol. Nail holes, cracks, and other defects shall be filled with plastic wood or putty. Concealed surfaces shall be back-primed before installation.

3.2.4 Plaster and Drywall

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Surfaces shall be clean and dry. Cracks and other surface imperfections shall be filled with spackling compound and sanded smooth.

### 3.3 MIXING AND APPLICATION

#### 3.3.1 General

No paints or coatings shall be applied when the temperature or humidity is outside the limits recommended by the manufacturer.

Paints and coatings shall be applied by brush or roller.

Contractor shall select the appropriate method with considerations to safety, working space, property protection and performance.

Each coat of material applied shall be free from runs, sags, bubbles, foreign contaminants, variations in color, gloss, and texture, dry overspray, brush and roller marks, holidays (missed areas), or other evidence of poor application.

Paints and coatings shall be thoroughly worked into corners and crevices.

Newly painted surfaces shall be adequately protected from damage.

#### 3.3.2 Procedures

Coatings shall be applied as follows:

- a. Material shall be thoroughly stirred to produce a uniform mixture.
- b. Material shall be thinned for workability and improved spray characteristics, but only according to the manufacturer's instructions.
- c. Each coat shall be applied uniformly at the minimum wet-film thickness specified by the manufacturer.
- d. Special attention shall be given when coating sharp edges, corners, and crevices to ensure complete coverage.
- e. Finish coats shall show good hiding characteristics and uniform appearance.

NOTE: Spot-painting to correct damaged surfaces will be allowed only when touchup area blends into the surrounding finish. Otherwise, the entire area shall be recoated. Touchup shall be accomplished using the same method of application as was used to apply the original material.

### 3.4 ACCEPTANCE PROVISIONS

#### 3.4.1 Inspection

The Contractor shall provide qualified personnel for inspection of the work

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to ensure that the requirements of this section have been fulfilled.

3.4.2 Cleanup

The Contractor shall be responsible for removal of paint or coating splatter and spills from floors, adjacent walls, hardware, and other finished surfaces.

The Contractor shall leave the work area clean and free from rubbish and accumulated material left from its work.

3.5 PAINT SCHEDULE

The number of coats specified is a minimum to ensure acceptable paint finishes of uniform color, texture and finish; free from cloudy or mottled appearances in surface; and evident thickness of coatings. The final application shall be so complete that the addition of another coat of paint would not increase the masking characteristics.

<u>SURFACE</u>	<u>PRIMER*</u>	<u>INTERMEDIATE</u>	<u>FINISH**</u>	<u>SHEEN &amp; COLOR</u>
Interior drywall	Pigmented sealer	--	Acrylic latex flat	To match existing adjacent surfaces
Miscellaneous ferrous steel, metal doors & frames	Fast dry primer	--	Alkyd enamel	To match existing adjacent surfaces
Interior wood	Water-base enamel undercoat	--	Alkyd enamel or acrylic latex	To match existing adjacent surfaces

\*Shop primed structures shall be spot primed and finished coated only.

\*\*Contractor shall submit manufacturers' standard color charts (SD-14) for color selection.

Prime coat for concrete floor shall be reduced 25 percent with specified thinner or as recommended by manufacturer.

-- End of Section --

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SECTION 13999

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SECTION 13999

SHIELDING ENCLOSURE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE-299 (1997) IEEE Standard for Measuring the Effectiveness of the Electromagnetic Shielding Enclosure

MILITARY SPECIFICATIONS AND STANDARDS (MIL)

MIL-STD-220 (2000) Method of Insertion Loss Measurement

RADIO TECHNICAL COMMISSION FOR AERONAUTICS (RTCA)

RTCA-DO-160D (1997) Environmental Conditions and Test Procedures for Airborne Equipment

UNDERWRITERS LABORATORIES (UL)

UL-1283 (1998-ED4) Electromagnetic Interference Filters

1.2 GENERAL REQUIREMENTS

Provide a new EMI/RFI shielded enclosure to surround the existing VEL cockpit. Nominal dimensions are 19'-6"L x 18'W x 12'H.

Manufacturer's Instructions shall be submitted to the Contracting Officer for the Shielding Enclosure, indicating the recommended installation methods and sequence.

1.3 DESIGN CRITERIA

The shielding effectiveness or attenuation shall be 100+ dB from 10kHz to 10GHz when tested in accordance with IEEE-299. The shielded enclosure shall meet the requirements for certification under RTCA-DO-160D.

This level of performance shall be for the complete enclosure and shall

apply to all accessories specified with the enclosure.

#### 1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

##### SD-01 Data

Manufacturer's Catalog Data shall be submitted for the following items:

- Shielding Enclosures
- Enclosure Doors
- Light Fixtures and Switches
- Connector Panels
- Signal and Power Line Filters
- Waveguide for Vents
- Accessories

##### SD-04 Drawings

Fabrication and Installation Drawings shall be submitted for the following items:

- Shielding Enclosures
- Enclosure Doors
- Access Panels
- Light Fixtures
- Connector Panels
- Waveguide for Vents
- Filter Panels
- Accessories

##### SD-06 Instructions

Manufacturer's Instructions shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

##### SD-08 Statements

The Qualifications of the RF Shielding Contractor shall be submitted for approval.

The Credentials of the third party RF testing agency shall be submitted for approval.

##### SD-09 Reports

Test Plans shall be submitted prior to all specified field and acceptance testing. Test Plans shall include an outline of the test procedures to be performed, the pass/fail requirements, and the test equipment to be used.

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Test Reports for shielding performance as-constructed shall be submitted for Shielding Enclosures in accordance the paragraph entitled, "Field Testing," of this section.

### SD-19 Operation and Maintenance Manuals (O&M)

Operation and Maintenance Manuals for VEL Shielding Enclosure Assemblies shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this section.

## PART 2 PRODUCTS

### 2.1 MATERIALS

All materials used in the enclosure, including all accessories, shall be new and undamaged. Installation and use shall be in a manner that normal wear and tear does not affect the specified shielding effectiveness.

### 2.2 CONSTRUCTION

The shielded enclosure shall be of the prefabricated modular type and shall be fully capable of being assembled and disassembled without any welding or cutting. The enclosure shall consist of shielded modular panel sections that are assembled with a clamping system into a self-supporting room structure.

#### 2.2.1 Shielded Panels

The shielded panels shall be composed of sheets of 28-gauge galvanized steel laminated to 3/4 inch, exterior grade plywood board and/or high density particle board core. The panels shall be immune to moisture induced warping.

The walls, floor and ceiling shall be constructed of these panels.

#### 2.2.2 Clamping System

The shielded panels shall be joined together with a structural clamping system that is designed to clamp the edges of the panels and provide continuous, uniform and constant pressure contact against the shielding elements of the panels. The clamping devices shall be zinc-plated and joined together with zinc-plated hardware.

The enclosure walls shall be self-supporting from floor to ceiling with no bracing against the parent room. The enclosure ceiling shall be supported by the enclosure walls. Hangers from the parent structure will not be permitted.

#### 2.2.3 Doors

The shielded enclosure shall be equipped with three doors as shown on the contract drawings.

The shielded doors shall have a minimum clear opening 32 inches by 80 inches.

The doors shall be equipped with a recessed contact mechanism with enclosed beryllium contact fingers. The contact mechanism shall be located on the periphery of the doors. The contact mechanism shall be mechanically attached to allow field repair or replacement.

The doors shall be equipped with a manual 2 point latching mechanism to provide positive closure and ensure equal compression of the contact mechanism and maintain the shielding integrity of the enclosure.

The bearing surfaces, rollers and door cams shall be case hardened steel.

#### 2.2.4 Floor

The Contractor shall prepare the parent building floor by ensuring that the floor is level and free of any sharp protruding objects. The Contractor shall provide a vapor barrier and dielectric underlayment to be placed under the shielding enclosure.

The floor shall be made level to 1/8 inch over 10 feet. If necessary, the Contractor shall provide exterior grade plywood of appropriate thickness to meet the leveling requirements.

A dielectric underlayment consisting of an 1/8 inch polypropylene sheet shall be placed over the leveling plywood or existing concrete floor. A 6-mil dielectric vapor barrier shall be placed over the dielectric underlayment. The shielding enclosure shall be placed on top of the vapor barrier.

Any fasteners used on the bottom of the shielding enclosure shall be counter-sunk to prevent puncture of the dielectric and vapor barrier and allow for flooring installation.

The floor inside the shielding enclosure shall be covered with vinyl tiles. The floor shall be capable of supporting a total floor load of 1,000 lbs. per sq. ft.

### 2.3 ACCESSORIES

The shielded enclosure shall be equipped with features to accommodate existing air ducts, cockpit simulator power and control lines, and cockpit display monitors.

#### 2.3.1 Air Duct Shield Penetration Vents

The shielded enclosure shall be fitted with shielded penetration wave guide vents to accommodate the routing of HVAC ductwork to and from the cockpit simulator. The shield penetration vents shall be sized and constructed to accommodate indicated air flows at a maximum total increased air pressure drop in each duct of .01 inch water column, and shall maintain the shielding effectiveness of the enclosure. The penetration vents shall be constructed of filter media and dielectric connectors as required to

maintain the specified shielding effectiveness of the enclosure. Penetration vents shall be Lindgren's EMI/RFI Shielded Waveguide Air Vents, or equal.

2.3.2 Grounding

The shielding enclosure shall be grounded to the parent building at a single point.

The shielding enclosure shall be fitted with a 1/4 inch diameter grounding stud of solid brass. The earth stud shall extend far enough inside and outside of the shielding enclosure to allow for the installation of ground leads. The grounding stud shall be provided with washers and nuts.

Before ground cable and power installation, the Contractor shall perform an isolation pre-test to verify at least 10K ohms resistance between the shielding enclosure and the parent building ground.

2.3.3 Filters

There are numerous signal and power lines that connect the existing cockpit simulator to laboratory. These lines shall be filtered and connectors shall be provided in order to maintain the connections after installation of the shielding enclosure around the cockpit simulator.

The shielding enclosure shall be fitted with a shielded filter panel for mounting all existing signal and power line filters. The panel shall be mounted on the shielded enclosure and connectors for the signals shall be provided for access into the shielded enclosure.

2.3.3.1 Power Line Filters

Power line filters shall be provided for existing AC and DC power lines to the cockpit simulator. All power line filters shall meet the design requirements of UL-1283 and shall be tested for insertion loss according to MIL-STD-220. The required power line filters are as follows:

<u>POWER LINE TYPE</u>	<u>QTY</u>	<u>INSERTION LOSS</u>	<u>FREQUENCY RANGE</u>
28 VDC, 30A	20	100 dB	14 kHz - 10 GHz
5 VAC, 400Hz, 20A	18	100 dB	14 kHz - 10 GHz

2.3.3.2 Signal Line Filters

Signal line filters shall be provided for existing instrumentation and control lines to the cockpit simulator. All signal line filters shall meet the design requirements of UL-1283 and shall be tested in accordance with IEEE-299. The required signal line filters are as follows:

<u>SIGNAL LINE TYPE</u>	<u>QTY</u>	<u>INSERTION LOSS</u>	<u>FREQUENCY RANGE</u>
ARINC 429 (+/-5V, 100kbps)	13	100 dB	1.5 MHz - 18 GHz

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Instrument Signals 38 100 dB 14 kHz - 10 GHz  
(0-10VDC and 0-28VDC)

### 2.3.4 Connector Panels

The shielding enclosure shall be equipped with minimum three removable connector panels. Minimum panel size shall be 2' x 2' (length and width). The first panel will allow for the installation of future connectors for lines entering the shielding enclosure. The second panel will be equipped with 6 VGA standard connectors for connecting the cockpit monitors. The panel shall be removable and a spare blank panel shall be provided for use when the cockpit monitors are not being used. The third panel shall be provided and sized to accommodate all existing power and signal cables connected to existing cockpit devices.

### 2.3.5 Ceiling Access Panels

The shielding enclosure shall be equipped with two removable access panels located on the ceiling of the shielding enclosure above the existing cockpit monitors. The Contractor shall field verify the dimensions of cockpit monitors to ensure adequate clearance for removal of the monitors through the ceiling. The access opening shall be sized to allow for any necessary rigging of the monitors from above. The access panels shall be bolted.

### 2.3.6 Lighting

The shielding enclosure shall be equipped with 4 incandescent light fixtures to provide a minimum average illumination of 20 footcandles for the walkway around the simulator.

## PART 3 EXECUTION

### 3.1 ASSEMBLY AND ERECTION

Assembly and erection shall be on a prepared sub-floor in accordance with the manufacturer's instructions and the Part 2.2.4 "Floor", of this section of the specification.

The VEL cockpit is a Government research apparatus and the Contractor shall take precautions to ensure that it is not damaged during the course of the work. Installation of the shielding enclosure will likely require that the Contractor slightly move the VEL cockpit away from the adjoining wall and/or temporarily support it off the floor to accommodate installation of the modular shield panels. The Contractor shall carefully coordinate these activities with the Contracting Officer and submit a detailed work plan for Installation Procedures as specified in Part 1.4, "Submittals", of this section of the specifications.

The shielding enclosure for the VEL cockpit shall be fabricated and installed by a contractor regularly engaged and highly experienced in the fabrication and installation of RF shielded enclosures of the type and level of performance as those required to be constructed by these

specifications.

### 3.2 FIELD TESTING

The shielding enclosure shall be tested and performance verified in accordance with IEEE-299.

The specified level of performance shall be for the complete enclosure and shall apply to all accessories specified with the enclosure.

The testing shall be provided by the Contractor and performed by an independent third party testing agency regularly engaged and highly experienced in this type of testing. A Test Plan shall be submitted prior to testing. A full test report shall be provided. The test report shall document all equipment used for testing, the testing procedures, test criteria, and test results. The test report shall signed by the testing official.

Final acceptance by the Contracting Officer of the shielding enclosure is based on the field test report and the satisfactory performance of the shielding enclosure as specified in Part 1.3, Design Criteria.

-- End of Section --

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SECTION 16003

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SECTION 16003

GENERAL ELECTRICAL PROVISIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2002) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA Z 535.1 (1998) Safety Color Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1910 Occupational Safety and Health Standards

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS W-J-800 (Rev F) Junction Box: Extension, Junction Box; Cover, Junction Box (Steel, Cadmium, or Zinc-Coated)

UNDERWRITERS LABORATORIES (UL)

UL-05 (1997) Electrical Construction Materials Directory

1.2 SUBMITTALS (Not Applicable)

1.3 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

It is the intent of these specifications and the contract drawings to provide a complete and workable facility.

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Design drawings are diagrammatic and do not show all offsets, bends, elbows, or other specific elements that may be required for proper installation of the work. Such work shall be verified at the site. Additional bends and offsets, and conduit as required by vertical and horizontal equipment locations or other job conditions, shall be provided to complete the work at no additional cost to the Government.

Except where shown in dimensional detail, the locations of switches, receptacles, lights, motors, outlets, and other equipment shown on plans are approximate. Such items shall be placed to eliminate interference with ducts, piping, and equipment. Exact locations shall be determined in the field. Door swings shall be verified to ensure that light switches are properly located.

Equipment sizes indicated are minimum. Before installing any wire or conduit, the Contractor shall obtain the exact equipment requirements and shall install wire, conduit, disconnect switches, motor starters, heaters, circuit breakers, and other items of the correct size for the equipment actually installed. Wire and conduit sizes shown on the drawings shall be taken as a minimum and shall not be reduced without written approval.

### 1.4 CODES AND STANDARDS

Equipment design, fabrication, testing, performance, and installation shall, unless shown or specified otherwise, comply with the applicable requirements of NFPA 70 and IEEE C2.

### 1.5 COORDINATION

Installation of the electrical work shall be coordinated with the work of other trades.

### 1.6 APPROVAL REQUIREMENTS

Where materials and equipment are specified to conform to the standards of the Underwriters Laboratories (UL), Inc., the label of, or listing with re-examination, in UL-05 will be acceptable as sufficient evidence that the items conform to the requirements.

Where materials or equipment are specified to be constructed or tested in accordance with the standards of NEMA, ANSI, ASTM, or other recognized standards, a manufacturer's certificate of compliance indicating complete compliance of each item with the applicable NEMA, ANSI, ASTM, or other commercial standards specified will be acceptable as proof of compliance.

### 1.7 PREVENTION OF CORROSION

Metallic materials shall be protected against corrosion. Equipment enclosures shall be given a rust-inhibiting treatment and the standard finish by the manufacture. Aluminum shall not be used in contact with earth or concrete. Dissimilar metals in contact shall be protected by Contracting Officer approved fittings, barrier material, and treatment. Ferrous metals such as anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and

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miscellaneous parts not of corrosion-resistant steel or nonferrous materials shall be hot-dip galvanized in accordance with ASTM A 123/A 123M for exterior locations and cadmium-plated in conformance with FS W-J-800 for interior locations.

### PART 2 PRODUCTS

#### 2.1 IDENTIFICATION PLATES

Identification plates shall be 3-layer white-black-white, engraved to show black letters on a white background. Letters shall be uppercase. Identification plates 1-1/2 inches high and smaller shall be 1/16-inch thick with engraved lettering 1/8-inch high. Identification plates larger than 1-1/2 inches high shall be 1/8-inch thick with engraved lettering not less than 3/16-inch high. Identification plates having edges of 1-1/2 inches high and larger shall be beveled.

#### 2.2 WARNING SIGNS

Each item of electrical equipment operating at 480 volts and above shall be provided with conspicuously located warning signs conforming to the requirements of Occupational Safety and Health Agency (OSHA) standards, 29 CFR Part 1910.145.

Any equipment with externally powered wiring shall be marked with a laminated plastic nameplate having 3/16-inch high white letters on a red background as follows:

DANGER - EXTERNAL VOLTAGE SOURCE

Safety color coding for identification of warning signs shall conform to NEMA Z 535.1.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Installation shall be accomplished by workers skilled in this type of work. Installation shall be made so that there is no degradation of the designed fire ratings of walls, partitions, ceilings, and floors. Except as otherwise indicated, emergency switches and alarms shall be installed in conspicuous locations.

#### 3.2 PAINTING APPLICATION

Exposed conduit, supports, fittings, cabinets, junction boxes, conduit bodies, pull boxes and racks, if not factory painted or galvanized, shall be thoroughly cleaned and shall be painted with one coat of corrosion inhibiting metal primer and two coats of enamel paint. Paint color shall match the existing finishes of the surrounding equipment or wall in the work area. Paint materials shall be approved by the Contracting Officer.

#### 3.3 IDENTIFICATION PLATE INSTALLATION

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Identification plates shall be fastened by means of corrosion-resistant steel or nonferrous metal screws. Hand lettering, marking, or embossed self-adhesive tapes are not acceptable.

### 3.4 CUTTING AND PATCHING

Contractor shall install its work in such a manner and at such time as will require a minimum of cutting and patching on the building structure.

Holes in or through existing masonry walls and floors in exposed locations shall be drilled and smoothed by sanding. Use of a jackhammer will be permitted only where specifically approved.

### 3.5 DAMAGE TO WORK

Required repairs and replacement of damaged work shall be done as directed by and subject to the approval of the Contracting Officer, and at no additional cost to the Government.

### 3.6 CLEANING

Exposed surfaces of wireways, conduit systems, and equipment that have become covered with dirt, plaster, or other material during handling and construction shall be thoroughly cleaned before such surfaces are prepared for final finish or painting or are enclosed within the building structure.

Before final acceptance, electrical equipment, including lighting fixtures and glass, shall be clean and free from dirt, grease, and fingermarks.

### 3.7 FIELD TESTING AND TEST EQUIPMENT

All field testing specified in Division 16 electrical specification shall be made with test equipment specially designed and calibrated for this purpose. Test equipment used shall be calibrated and certified by the Contracting Officer approved testing laboratory. Date of last calibration and certification shall not be more than 90 days old at the time of field testing.

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DIVISION 16 - ELECTRICAL

SECTION 16145

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UPGRADE TO HIRF AND SAFETI LABS

SECTION 16145

STANDARD WIRING SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C80.3 (1994) Electrical Metallic Tubing - Zinc-Coated

ASTM INTERNATIONAL (ASTM)

ASTM D 2301 (1999) Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA FB 1 (2001) Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

NEMA PR 4 (1983; R 1989) Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type for Industrial Use

NEMA WD 1 (2000) General Requirements for Wiring Devices

NEMA WD 6 (2002) Wiring Devices - Dimensional Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1 (2000) UL Standard for Safety - Flexible Metal Conduit

UL 1581 (2001) UL Standard for Safety - Reference Standard for Electrical Wires, Cables, and Flexible Cords

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UL 20	(2002) UL Standard for Safety General-Use Snap Switches
UL 486C	(2000) UL Standard for Safety Splicing Wire Connectors
UL 514A	(1996; 9th Ed) UL Standard for Safety - Metallic Outlet Boxes
UL 514B	(1997; R 2002) UL Standard for Safety Fittings for Conduit and Outlet Boxes
UL 797	(2002) UL Standard for Safety - Electrical Metallic Tubing

1.2 GENERAL REQUIREMENTS

Section 16003, "General Electrical Provisions," applies to work specified in this section.

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-09 Reports

Test Reports shall be submitted for standard wiring systems in accordance with the paragraph entitled, "Field Testing," of this section.

PART 2 PRODUCTS

2.1 CONDUIT, RACEWAYS AND FITTINGS

Conduit shall be 1/2-inch diameter minimum, except where specifically shown smaller on the contract drawings, and except for exposed switch leg runs.

Conduit, connectors, and fittings shall be approved for the installation of electrical conductors.

2.1.1 Electrical Metallic Tubing (EMT)

EMT shall be rigid metallic conduit of the thinwall type in straight lengths, elbows, or bends and shall conform to ANSI C80.3 and the requirements of UL 797.

Couplings and connectors shall be hex-nut expansion-gland type, zinc or cadmium-plated. Crimp, spring, or setscrew type fittings are not acceptable. Where EMT enters outlet boxes, cabinets, or other enclosures, connectors shall be the insulated-throat type, with a locknut. Fittings shall meet the requirements of NEMA FB 1.

### 2.1.2 Flexible Metallic Conduit

Flexible metallic conduit shall meet the requirements of UL 1.

Fittings for flexible metallic conduit shall meet the requirements of UL 514B, Type I box connector, electrical, Type III coupling, electrical conduit, flexible steel, or Type IV adapter, electrical conduit.

## 2.2 WIRE AND CABLE

Insulated current-carrying wire and grounding conductors shall be copper and shall conform to NFPA 70 and UL 1581. Wire bundles with cable ties shall be secured to the enclosure with sheet-metal screws. Self-sticking adhesive attachments are not acceptable.

### 2.2.1 Building Wire

Building wire for use in conduits, raceways, and wireways shall be single-conductor, 600-volt, heat- and moisture-resistant insulated wire suitable for use in wet or dry locations.

Conductors AWG No. 10 and smaller shall be solid round copper wire. Conductors AWG No. 8 and larger shall be standard concentric stranded copper wire. Conductors shall be not less than AWG No. 12, except that AWG No. 14 shall be stranded copper wire and shall be used for control wiring.

Building wire shall be Type THHN with insulation of PVC and nylon jacket, with a minimum temperature rating of 90 degrees C.

### 2.2.2 Splices and Connectors

Splices in building wire AWG No. 8 and smaller and multiple conductor cables shall be made with insulated spring connectors to ensure a satisfactory mechanical and electrical joint.

Splices in building wire AWG No. 6 and larger and single-conductor cables shall be made with indenter crimp-type connectors and compression tools or with bolted clamp-type connectors to ensure a satisfactory mechanical and electrical joint.

Joints shall be wrapped with an insulating tape that has an insulation and temperature rating equivalent to that of the conductor. Splices in rubber-insulated neoprene-jacketed wire and cables shall be watertight.

Vinyl-plastic electrical insulating tape shall meet the requirements of ASTM D 2301. Where pressure-sensitive tape is used, the surface shall be cleaned free of dust, sand, or other foreign material and a primer recommended by the tape manufacturer shall be applied prior to taping.

Solid wiring shall be terminated with terminal blocks specifically designed for solid wire. Crimp type shall not be used on solid wire for termination.

Stranded wire shall use crimp type lugs for termination on terminal blocks.

## 2.3 FLUSH WIRING DEVICES

### 2.3.1 Wall Switches

Snap switches installed for the control of incandescent and fluorescent lighting fixtures shall be heavy-duty, general-purpose, noninterchangeable flush devices conforming to UL 20 and NEMA WD 1, as indicated.

Snap switches shall be toggle type, two-position devices rated 20 amperes at 277 volts, 60 hertz, ac only, meeting the requirements of UL 20.

All snap switches shall be made by the same manufacturer.

Where two or more snap switches are to be installed at the same location, they shall be mounted in one-piece ganged switch boxes, with a gang cover plate.

### 2.3.2 Receptacles

Receptacles shall be 20-ampere, 125-volt ac, 2-pole, 3-wire, duplex grounded, conforming to NEMA PR 4, NEMA WD 1 and to the 5-20R configuration in NEMA WD 6.

Bodies of 20-ampere receptacles shall be phenolic compound supported by a mounting yoke having plaster ears. Contact arrangement shall be such that contact is made on two sides of an inserted blade. Each receptacle shall be side-wired with two screws per terminal, shall be provided with a third grounding pole, and shall be capable of receiving 2-wire, 3-pole parallel-blade caps. Third grounding pole shall be connected to a metal mounting yoke and shall be provided with a green-colored screw for grounding.

Receptacles shall meet the requirements for retention of plugs, overload, temperature, and assembly security in accordance with NEMA WD 1.

### 2.3.3 Device Plates

Wall plates for flush snap switches and receptacles shall be the appropriate type and size and shall match the wiring devices for which they are intended. Dimensions for openings in wall plates shall be in accordance with NEMA WD 1.

Wall plates for flush snap switches and receptacles shall be corrosion-resistant steel not less than 0.040-inch thick, with beveled edges and a brushed satin finish. Mounting screws shall be corrosion-resistant steel with oval countersunk heads finished to match the plate.

## 2.4 BOXES AND FITTINGS

Boxes shall have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70 and UL 514A. Boxes that are exposed to the weather or that are in normally wet locations

shall be cast-metal with threaded hubs. Surface-mounted boxes on interior walls shall be cast-metal. Boxes in other areas shall be cadmium-plated or zinc-coated sheet metal.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Power, lighting, control emergency light and power, and special-service systems and all related components shall be installed in accordance with NFPA 70, and shall be enclosed in separate conduit or separate conduit systems.

Any run of EMT (Electrical Metallic Tubing) or rigid conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall contain not more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting. All conduits installed in or behind walls shall run vertically up to the ceiling space before running horizontally to another outlet. Field bends shall be made in accordance with the manufacturer's recommendations, which normally require use of a one-size-larger bender than would be required for uncoated conduit. Installed conduit and fittings shall be free of dirt and trash and shall not be deformed or crushed. Empty conduit shall have a pull rope installed.

Conduit shall be installed with a minimum of 3 inches of free air space separation from mechanical piping.

Conduit in finished areas shall be installed concealed. Conduit passing through masonry or concrete walls shall be installed in sleeves.

Conduit shall be securely clamped and supported at least every 10 feet vertically and 8 feet horizontally. Galvanized pipe straps shall be fastened to structure with bolts, screws, and anchors. Wooden masonry plugs shall not be used.

Conduit and boxes shall not be supported from T-bar ceiling wires.

All recessed outlet boxes in non-combustible walls or ceilings shall be installed flush, such that the outlet box is set back less than 1/16-inch or protrudes less than 1/16 inch from the face of the ceiling or wall.

Conduit connections to boxes and fittings shall be supported not more than 36 inches from the connection point. Conduit bends shall be supported not more than 36 inches from each change in direction. Conduit shall be installed in neat symmetrical lines parallel to the centerlines of the building construction and the building outline. Multiple runs shall be parallel and grouped whenever possible on common supports.

Conduit and raceway runs concealed in or behind walls, above ceilings, or exposed on walls and ceilings 5 feet or more above finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).

Ends of conduit extending from the interior to the exterior of the building

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and portions of interior conduit exposed to widely varying temperatures shall be sealed to prevent the passage of air within the conduit. Conduit shall be sloped to drain and shall be provided with drainage fittings at the lower end of the run. Curved portion of conduit bends shall not be visible above the finished floor. Underground service entrance and feeder conduit entering or leaving the building above the ground floor shall be terminated in a pull box.

Expansion fittings with flexible ground strap shall be provided in conduit runs crossing building expansion joints.

Exposed ends of conduit without conductors shall be sealed with watertight caps or plugs.

Bushings shall be provided on the open ends of conduit containing conductors. Insulated bushings shall be provided for conduits containing conductors AWG No. 4 or larger with an insulating ring an integral part of the bushing.

Flexible metallic conduit shall be used to connect recessed fixtures from outlet boxes in ceilings, metallic transformers, and other approved assemblies. Sections of flexible steel conduit shall be not more than 6 feet long and shall be installed only in exposed or accessible locations. Interior surfaces of conduit shall be free from burrs and sharp edges which might cause abrasion of wire and cable coverings. Ends of flexible steel conduit shall be provided with grounding bushings and approved fittings.

Bonding wires shall be used in flexible conduit for all circuits. Flexible conduit shall not be considered a ground conductor.

Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit in a manner that will not impair the function of the equipment.

Wire or cable shall not be installed in conduit until the conduit system is completed; the inner surfaces of conduit shall be clean and dry.

A nylon pull rope with a tensile strength not less than 130 pounds shall be installed in empty conduit.

### 3.1.1 Installation of EMT

EMT shall be cut square and reamed to remove burrs and rough surfaces.

Field-made bends and offsets shall be avoided where possible but, where necessary, shall be made with a hickey or conduit-bending machine. Changes in direction of runs shall be made with symmetrical bends or metal fittings.

### 3.1.2 Installation of Flexible Metallic Conduit

Flexible metallic conduit shall be installed only in exposed, accessible locations in accordance with NFPA 70. A grounding green conductor shall be installed in all runs. Connections to motors and vibrating equipment shall be made with flexible metallic conduit.

3.2 INSTALLATION OF WIRING

Raceways shall be completely installed, with interiors protected from the weather, before proceeding with the installation of wires and cables. Conductors of special-service systems and emergency light and power systems shall not occupy the same enclosure with light and power conductors or the same enclosure with each other. Conductors shall be continuous with splices and connections made in outlet, junction, or pull boxes only. All control wiring shall be continuous between components and/or terminal boards.

Phase conductors and the neutral conductor of each branch or feeder circuit shall be contained in a single enclosure or paralleled in separate enclosures to avoid overheating the raceway by electromagnetic induction. Conductors and conduit in parallel shall be the same length and size, shall have conductors of the same type of insulation, shall be terminated at both ends in a manner to ensure equal division of the total current among conductors, and shall have a separate neutral conductor in each conduit.

Sharing of a common neutral between single phase circuits, connected to different phases, shall not be permitted.

Conductors installed in heavy-wall rigid steel conduit and EMT shall have allowable current-carrying capacity and ampere ratings in accordance with NFPA 70. Larger-sized conductors shall be used to compensate for derating factors when more than three current-carrying conductors are installed in raceways and when conductors are installed in wet locations.

Conductors 600 volts and below shall be color coded in accordance with the following:

<u>CONDUCTOR</u>	<u>120/208</u> <u>COLOR</u>	<u>480/277</u> <u>COLOR</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White/Gray
Equipment Grounds	Green	Green

Conductors up to and including AWG No. 6 shall be manufactured with colored insulating materials. Conductors larger than AWG No. 6 shall have ends identified with colored plastic tape in outlet, pull, or junction boxes. Control circuit conductors shall be identified at each connection point.

Connectors and splices shall conform to UL 486C and shall be made in approved enclosures utilizing solderless pressure connectors and adequate insulation with vinyl-plastic electrical insulating tape. Conductors and materials used in a splice, tap, or connection shall be thoroughly cleaned prior to makeup to ensure good electrical and mechanical connections.

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Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made and at the equipment terminal of each conductor. Terminal and conductor identification shall match that shown on approved shop drawings. Hand lettering or marking is not acceptable. Control-circuit terminals of equipment shall be properly identified by color-coded insulated conductors, number-coded plastic self-sticking printed markers, or permanently attached metal-foil markers. Cable fittings shall conform to UL 514B; insulating tape shall conform to ASTM D 2301.

Where several feeders pass through a common pullbox, the feeders shall be tagged to clearly indicate the electrical characteristics, circuit number, and panel designation.

Grounding shall be provided in accordance with NFPA 70. Noncurrent-carrying parts of electrical equipment shall be bonded and grounded together.

### 3.3 WIRING DEVICES

#### 3.3.1 Wall Switches and Receptacles

Wall switches and receptacles shall be installed so that when device plates are applied, the plates will be aligned vertically to within 1/16 inch.

Ground terminal of each flush-mounted receptacle shall be bonded to the outlet box with an approved green bonding jumper.

#### 3.3.2 Device Plates

Device plates for switches that are not within sight of the loads controlled shall be suitably engraved with a description of the loads.

Device plates and receptacle cover plates for receptacles other than 15-ampere, 125-volt, single-phase, duplex, convenience outlets shall be suitably engraved, showing the circuit number, voltage, frequency, phasing, and amperage available at the receptacle; for example: RP1-12, 208 VOLTS, 60 HERTZ, 3-PHASE, 30 AMPERES. If engraving is not practical, an engraved laminated phenolic identification plate may be applied.

Device plates shall be identified on the inside by circuit number and panelboard.

### 3.4 BOXES AND FITTINGS

Pullboxes shall be furnished and installed where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right-angle bends shall have a pullbox installed at a convenient intermediate location.

Boxes and enclosures shall be securely mounted to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

Bonding jumpers shall be used around concentric or eccentric knockouts.

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Approximate mounting height of wall-mounted outlet and switch boxes, measured between the bottom of the box and the finished floor, shall be as follows:

<u>LOCATION</u>	<u>MOUNTING HEIGHT</u>
Receptacles	18 inches
Switches for light control	48 inches
Thermostats	66 inches

3.5 IDENTIFICATION PLATES

Red identification plates reading CAUTION: 480/277 VOLTS shall be provided in switch and outlet boxes containing 277- or 480-volt circuits. An identification plate marked DANGER: 480 VOLTS shall be provided on the outside of 480-volt enclosures. Identification plate shall use white lettering on a red laminated plastic.

Any equipment with externally powered wiring shall be marked with a laminated plaster nameplate having 3/16-inch high white letters on a red background as follows:

DANGER - EXTERNAL VOLTAGE SOURCE

3.6 FIELD TESTING

Test reports shall be submitted in accordance with referenced standards in this section.

After completion of the installation and splicing, and prior to energizing the conductors, wire and cable shall be given continuity and insulation tests as herein specified before the conductors are energized.

Necessary test equipment, labor, and personnel shall be provided by the Contractor to perform the tests, as herein specified. Continuity tests shall be conducted using a dc device with bell or buzzer.

Wire and cable in each voltage classification shall be completely isolated from all extraneous electrical connections at cable terminations and joints. Substation and switchboard feeder breakers, disconnects in combination motor starters, circuit breakers in panel boards, and other disconnecting devices shall be used to isolate the circuits under test.

Insulation tests on circuits rated 480-volts and less shall be conducted using a 1,000-volt insulation-resistance test set. Readings shall be taken every minute until three equal and consecutive readings are obtained. Resistance between phase conductors and between phase conductors and ground shall be not less than 25 megohms.

Phase-rotation tests shall be conducted on all three-phase circuits using a phase-rotation indicating instrument. Phase rotation of electrical

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connections to connected equipment shall be clockwise, facing the source.

Final acceptance will depend upon the successful performance of wire and cable under test. No conductor shall be energized until the installation is approved by the Contracting Officer.

-- End of Section --