Mobile Lab Trailer Procurement Specification

Prepared by:

Tracy Spooner, Project Manager

Washington River Protection Solutions, LLC

August 2015

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
AWG	American Wire Gauge
BISCI	Building Industry Consulting Services International, Inc.
CFR	Code of Federal Regulations
COR	Code of Record
DOE	U.S. Department of Energy
EMT	Electrical Metallic Tubing
GFCI	Ground Fault Circuit Interrupter
HLAN	Hanford Local Area Network
HVAC	Heating Ventilation and Air Conditioning
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IMC	International Mechanical Code
LED	Light Emitting Diode
MC	Metal Clad
MSL	Master Submittal Log
NEC	National Electric Code
NEMA	National Equipment Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Standards
PVC	Polyvinyl Chloride
SDS	Safety Data Sheet
SEI	Safety Equipment Institute, Inc.
SOW	Statement of Work
TIA	Telecommunications Industry Associate
TOC	Tank Operations Contract
UPC	Uniform Plumbing Code
VOC	Volatile Organic Compound
WAC	Washington Administrative Code
WSEC	Washington State Energy Code

1.0 SCOPE

This Specification provides the required provisions to procure a mobile lab trailer that provide laboratory space for performing SUMMA analysis.

2.0 APPLICABLE DOCUMENTS

The following documents, of the exact issue shown, form a part of the basis of design to the extent specified in the applicable sections of this document and establish the Code of Record (COR). In the event of a conflict between documents referenced herein and the requirements of this specification, the requirements of this specification shall take precedence over requirements in documents listed in Table 2-1 and Table 2-2 only when the specification requirements are more stringent or conservative.

2.1 Government Documents

The documents listed in Table 2-1 comprise the Government Documents portion of the COR including applicable federal and state specifications, standards, regulations, contract requirements, drawings and other publications.

Table 2-1. Government Documents

Document Number	Document Title
DOE G 414.1-3	"Suspect/Counterfeit Items Guild for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1B, Quality Assurance," DOE, Washington, D.C.
DOE-STD-1066-99	"Fire Protection Design Criteria," DOE, Washington, D.C.
DOE-STD-1088-95	"Fire Protection for Relocatable Structures," DOE, Washington, D.C.
ENS-ENG-IP-05, R0	"ORP Fire Protection Program," DOE Office of River Protection, Richland, Washington
HNF-36174	"DOE Fire Protection Handbook – Hanford Chapter,"
WAC 51-11C (WSEC)	"Washington State Energy Code" (WSEC), Washington Administrative Code (WAC), as amended
WAC 51-50	"State Building Code Adoption and Amendment of the 2012 Edition of the International Building Code," WAC as amended
WAC 51-52	"State Building Code Adoption and Amendment of the 2012 Edition of the International Mechanical Code," WAC, as amended
WAC 296-150F	"Factory-Built Housing and Commercial Structures," WAC, as amended

2.2 Non-Government Documents

The documents listed in Table 2-2 comprise the Non-Government Documents portion of the COR including applicable Tank Operations Contract (TOC) documents, national codes and standards, and commercial data.

Table 2-2. Non-Government Documents

Document Number	Document Title
ANSI C37 Series	"Circuit Breakers, Switchgears, Substations, and Fuses"

Document Number	Document Title
ANSI TIA 568-C.0	"Commercial Building Telecommunications Cabling Standard," Telecommunications Industry Associate, Arlington, Virginia
ANSI/IEEE 141	Institute of Electrical and Electronics Engineers (IEEE) Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book)
ANSI/IEEE 242	IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (IEEE Buff Book)
ANSI/IEEE 399	Recommended Practice for Power Systems Analysis (IEEE Brown Book)
ANSI/IEEE 902	IEEE Guild for Maintenance, Operations, and Safety of Industrial and Commercial Power Systems (IEEE Yellow Book)
ANSI/IEEE 1015	IEEE Recommended Practice for Applying Low Voltage Circuit Breakers Used in Industrial and Commercial Power Systems (IEEE Blue Book)
ANSI/IESNA RP-7	"Recommended Practice for Lighting Industrial Facilities," Illuminating engineering Society of North America, New York, New York
ASCE/SEI 7-10	"Minimum Design Loads for Buildings and Other Structures," American Society of Civil Engineers (ASCE), Reston, Virginia
ASHRAE Handbook – Fundamentals, 2013	"Fundamentals," American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), Atlanta, Georgia
ASHRAE Handbook – HVAC Systems and Equipment, 2012	"HVAC Systems and Equipment," ASHRAE, Atlanta, Georgia
BISCI, 13th Edition	"Telecommunication Distribution Methods Manual," Building Industry Consulting Services International, Inc. (BICSI), Tampa, Florida
IBC®	"International Building Code®" (IBC), International Code Council, Washington, D.C.
IEEE 142	"IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems," IEEE, New York, New York
IEEE C2	"National Electrical Safety Code," IEEE, New York, New York
IESNA Lighting Handbook, 10th Edition	"The IESNA Lighting Handbook," IESNA, New York, New York
IMC®	"International Mechanical Code®" (IMC), International Code Council, Washington, D.C.
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Max)
NEMA PB-1	Panel Boards
NFPA 45®	"Standard on Fire Protection for Laboratories Using Chemicals," National Fire Protection Association (NFPA), Quincy, Massachusetts
NFPA 70®	"National Electrical Code®" (NEC®), NFPA, Quincy, Massachusetts

Document Number	Document Title
NFPA 70E®	"Standard for Electrical Safety in the Workplace," NFPA, Quincy, Massachusetts
NFPA 101®	"Code for Safety to Life from Fire in Buildings and Structures," NFPA, Quincy, Massachusetts
NFPA 225®	"Model Manufactured Home Installation Standard," NFPA, Quincy, Massachusetts
TFC-BSM_IRM_DC-C-07	Vendor Processes
TFC-ENG-DESIGN-D-29	Guidance for Inclusion of Human Factors in Design
TFC-ENG-STD-01	Human Factors in Design
TFC-ENG-STD-06	Design Loads for Tank Farms Facilities
TFC-ENG-STD-07	Ventilation System Design Standard
TFC-ENG-STD-31	Electrical Distribution Studies
TFC-ENG-STD-41	Electrical Installations
TFC-ESHQ-FP-STD-02	Fire Protection Design Criteria

3.0 TECHNICAL REQUIREMENTS

3.1 Item Definition

The Subcontractor shall design, procure, and install all components associated with the following scope of work except as specifically identified in this Specification or in the Statement of Work (SOW).

3.1.1 Item Diagram

A sketch of the proposed lab trailer layout is provided as an attachment to the SOW.

3.1.2 Interface Definition

The lab trailer shall have the following interfaces:

A. Provisions for connection to onsite electrical power at 240 Volt and grounding in the field.

B. Provisions for connection to Hanford Local Area Network (HLAN) in the field.

C. Provisions for connection to the proximity door security system in the field.

3.1.3 Pollution Prevention and Waste Minimization

A. Products procured such as adhesives, sealants, paints, carpet and furnishings shall have low pollutant emissions (low Volatile Organic Compounds [VOCs]).

B. When available, materials, equipment and furnishings procured shall be made in the U.S.A.

C. When available, materials procured shall have a recycled content of 20% or more.

D. No products shall be asbestos containing materials.

3.2 Characteristics / Design Parameters

The mobile lab trailer shall meet the Washington State Gold Insignia standards. The mobile lab shall be designed and fabricated in conformance with the best industry practices using new and first quality materials and shall meet Chapter 296-150F WAC and the latest requirements of the Washington State Energy Code, and each trailer section tagged with the WA State Gold Insignia.

Hanford specific design loads can be found in TFC-ENG-STD-06, *Design Loads for Tank Farm Facilities.*

3.2.1 General Characteristics

A. The trailer shall be comprised of two (2) sections, single-story, and approximately 1,440 square feet.

1. Each section shall have a nominal dimension of 12 feet wide by 60 feet long, with an overall facility footprint of 24 feet by 60 feet.

B. The trailer shall have an interior height from finished floor to the bottom of the ceiling of nine (9) feet.

3.2.2 Architectural

A. Roofing material shall meet the DOE “cool roof” requirements.

B. Siding shall be minimum 22 gauge, R-Panel metal siding.

1. Color is to be determined based on product sample submittal.

C. Skirting material shall match the metal siding. Skirting material shall be shipped loose for installation by others.

D. Subfloor material shall be a minimum of 1-1/8 inch plywood decking.

E. Ceilings shall be two (2) foot by four (4) foot acoustic ceiling tile.

1. Acoustic ceiling tiles to meet BioPreferred® requirements, 37% minimum biobased content.

F. All interior walls shall have 3/8 inch plywood backing from floor to ceiling.

G. All interior walls to be vinyl wrapped gypsum board and have a NFPA 101® Class A (0-25) flame spread rating.

H. Interior columns shall be constructed to allow installation of recessed electrical on both north and south sides of the column.

I. Flooring shall be Armstrong, MEDINTECH homogeneous vinyl sheet flooring with heat-welded seams.

1. Color is to be determined based on product sample submittal.

2. Flooring adhesive shall be Armstrong, S-240 High Performance Epoxy Flooring Adhesive or approved equal.

J. Wall base shall be six (6) inch welded resilient base, with pre-formed outside corners.

1. Color is to be determined based on product sample submittal.

2. Wall base adhesive shall be Armstrong, S-725 Wall Base Adhesive or approved equal.

3. Heat weld resilient base to flooring.

3.2.3 Doors

A. Single and double doors shall be hollow metal doors with half glass and metal frame.

1. Doors shall have a minimum width of 36 inches and 48 inches in accordance with layout attached to the SOW.

2. Doors shall have a kick plate and kick stand. The height of the pre-engineered platform shall be taken into account for the mounting height and location of the kick stand.

3. Door shall be Von Duprin 99-series crash bar assembly with E996L trim, grade 1 Schlage ND53-LD lockset, and finish US26D.

4. Color of doors is to be determined.

B. Doors shall have Corbin Russwin DC3210-M54-689 door closures.

3.2.4 Windows

A. Windows shall be five (5) feet wide by three (3) feet tall, double pane, fixed, Low-E coating, and argon filled.

1. Windows shall have one (1) inch aluminum blinds, interior mount.

2. Bottom of window shall be a minimum of 42 inches above finished floor.

3. Window shall be wood wrapped, with mitered joints.

a. Color to be determined based on product sample submittal.

3.2.5 Electrical

A. There shall be no shared neutrals (Edison circuits).

B. Main panel located as shown on the lab trailer layout attached to the SOW.

1. The main panel shall have a lockable feed for the subpanel.

2. Panel shall have a main breaker.

3. Main distribution shall be designed for 120/240 Volt, single phase underground service.

4. Install one (1) 2 inch EMT conduits from the bottom of the panel to six (6) inches below the trailer vapor barrier. Place conduit in corner opposite subpanel. Cap for future use.

5. Install two (2) each 1-1/2 inch EMT conduits from the bottom of the panel to six (6) inches below the trailer vapor barrier. Place in center and corner closest to subpanel. Cap for future use.

C. Subpanel shall be 120/240 Volt, 20 space, single-phase, 100 amp main breaker panel with 20 single-pole circuit breakers. All wiring by others.

1. Install two (2) each 1-1/2 inch EMT conduits from the bottom of the panel to six (6) inches below the trailer vapor barrier. Place conduits in opposite corners. Cap for future use.

2. Install ten (10) each 3/4 inch EMT conduits from the top of the panel to a sub 90-degrees above the ceiling. Cap for future use.

D. J-boxes labeled TBD on the layout attached to the SOW shall consist of a four (4) inch square by 2-1/8 inch deep, metal box with single gang mud ring and blank cover at mounting height shown on the layout with 3/4 inch EMT conduit from the box to above the ceiling with a stub 90-degrees above the ceiling. Cap for future use. All wiring by others.

E. All receptacles, lights and HVAC shall be fed from the main panel. TBD J-box and subpanel wiring by others.

F. There shall be no more than eight (8) duplex receptacles per circuit.

G. Switches and receptacles shall be specification/commercial grade, 20 amp, 120 volt, white, Decora style with white covers unless otherwise specified in this Specification or the SOW.

H. Flood light receptacles shall be recessed single receptacles with “in use” weatherproof cover.

I. Public Announcement (PA) locations shall consist of flush mount, 2-gang box with weatherproof cover at mounting height shown on the layout attached to the SOW with 1/2 inch EMT conduit from the box to above the ceiling inside the trailer. Cap for future use.

J. Cross connections between trailer sections shall be hard wired. The Subcontractor shall provide material required for the cross connections and all wiring shall be clearly identified and labeled.

K. All switches, receptacles, ports, panels, disconnects, etc. shall be labeled with P-Touch labeling system and indicating circuit number.

3.2.6 Low Voltage

A. All network cabling shall be Cat5E.

B. Communication board shall be four (4) foot by six (6) foot fire-rated plywood backer board for mounting the communication and proximity door security system equipment.

1. The fire-rating stamp must be visible, the board shall not be painted.

C. Install one (1) two (2) inch PVC conduit with end bell on both ends from above the ceiling to overlapping the top of the communication board by six (6) inches, and within three (3) inches of either side of the communication board.

D. Install one (1) two (2) inch PVC conduit overlapping the bottom of the communication board by six (6) inches, and within three (3) inches of either side of the communication board through the floor to beneath the trailer extending 12 inches below the vapor barrier.

E. Each network access point shall consist of the following:

1. One (1) white, single gang cover plate with two (2) jacks.

2. One (1) cable per jack.

3. Jacks shall be white, two each per plate.

4. Each jack shall be labeled in consecutive order: 1, 2, 3, 4, etc.

3.2.7 Lighting

A. All interior lighting shall be on its own circuit.

B. All exterior lighting shall be on its own circuit.

C. Interior light fixtures shall be two (2) foot by four (4) foot specification/commercial grade, dimmable, LED troffers with maintenance disconnect.

1. Each fixture shall have a minimum of two (2) wire supports on opposite corners from the fixture to permanent building structure.

D. All exterior lights shall be controlled by one (1) single photocell that extends above the roof line and shall be facing north.

E. Porch lights shall be RAB Lighting #ENTRA12N, 120 volt, without photocell or Company approved equal.

F. Flood lights shall be RAB Lighting #FXLEC105TN, 105W LED, cord and plug, without photocell, with Trunnion mount and arm or Company approved equal.

3.2.8 Proximity Door Security System

A. Each entry shall have a single-gang, recessed box with blank weatherproof cover mounted 48 inches above finished floor.

1. Belden No. 6343PC cable, 4-pair shielded 18 gauge to be installed from each entry box to electrical/communication room with an additional ten (10) feet of cable coiled in the ceiling above the communication board.

B. On the interior of each entry shall be one (1) single-gang, flush mount box with blank aluminum cover.

1. Box to be installed at approximately the same height as the crash bar on the hinge side of the door.

2. 3-conductor 12 gauge MC cable shall be installed from each box to the electrical/communication room with an additional ten (10) feet of cable coiled in the ceiling above the communication board.

3.2.9 HVAC

A. HVAC unit(s) shall be wall mounted to the facility.

B. Supply and return air lines shall be fully ducted.

C. HVAC unit(s) shall have a fusible disconnect switch with an externally operable handle on the exterior of the facility in close proximity to the HVAC unit(s).

1. Disconnect switch to be mounted +24 inches above finished floor.

D. Thermostat to be mounted at +60 inches above finished floor.

3.3 Design and Construction

A. General Construction: Fabricate the mobile lab trailer in accordance with WAC 296-150F, WAC 51-50, WAC 51-11C, WAC 51-52, IBC, NFPA 101, and NFPA 225.

B. Structural: Structural design criteria can be found in TFC-ENG-STD-06, *Design Loads for Tank Farm Facilities*; ASCE/SEI 7-10; and the IBC.

C. Fire Protection: Fire protection requirements can be found in DOE-STD-1066-99, *Fire Protection Design Criteria*; DOE-STD-1088-95, *Fire Protection for Relocatable Structures*; ENS-ENG-IP-05, *ORP Fire Protection Program*; HNF-36174, *DOE Fire Protection Handbook – Hanford Chapter*; NFPA 45®; and TFC-ESHQ-FP-STD-02, *Fire Protection Design Criteria.*

D. Architectural

1. The occupancy category of the mobile lab trailer is Group F-1 (as defined in the IBC) due to the presence of laboratory space and equipment.

E. Electrical

1. The electrical system for this mobile lab trailer shall meet the requirements of the following codes, standards and procedures:

    a. ANSI C37 Series
    b. ANSI/IEEE 141
    c. ANSI/IEEE 242
    d. ANSI/IEEE 399
    e. ANSI/IEEE 902
    f. ANSI/IEEE 1015
    g. IEEE 142
    h. IEEE C2
    i. NEMA 250
    j. NEMA PB-1
    k. NFPA 70®
    l. NFPA 70E®
    m. TFC-ENG-STD-31, *Electrical Distribution Studies*
    n. TFC-ENG-STD-41, *Electrical Installations*

2. There shall be no shared neutrals (Edison circuits).

3. Electrical systems shall be wired in metal conduit, flexible metal conduit, or electrical metallic tubing.

4. Electrical services shall be 120/240VAC, single-phase.

5. The conductors shall be copper for all sizes of wire and cable unless specifically designated otherwise in this Specification or the SOW.

6. Power wiring for 120/240V single-phase systems shall have the color coded insulation or markings indicated below:

    a. Hot 1 = Black
    b. Hot 2 = Brown
    c. Neutral = White or Gray
    d. Ground = Green
    e. Isolated Ground = Green or Yellow.

F. Lighting: The lighting system for this mobile lab trailer shall meet the requirements of ANSI/IESNA RP-7 and IESNA Lighting Handbook.

G. HVAC

1. The HVAC system for this mobile lab trailer shall meet the requirements of the IMC, ASHRAE Handbook - Fundamentals, ASHRAE Handbook - HVAC Systems and Equipment, and TFC-ENG-STD-07, *Ventilation System Design Standard.*

2. HVAC design indoor and outdoor temperature requirements shall be as follows:

    a. Outdoor summer temperature: 115°F.
    b. Outdoor winter temperature: -25°F.
    c. Indoor summer temperature: 68°F to 78°F.
    d. Indoor winter temperature: 68°F.

3. Heat loads to consider:

    a. Personal Computers, 4 total: 2,050 BTUh each
    b. Computer Monitor, 8 total: 820 BTUh each
    c. Oven, 2 total: 6,700 BTUh each
    d. GC, 2 total: 6,830 BTUh each
    e. GC/MS, 2 total: 11,130 BTUh each
    f. Auto Sampler, 2 total: 11,000 BTUh each
    g. Personnel, 6 FTEs: 450 BTUh each

H. Communications (Phone and HLAN)

1. The communication systems for the mobile lab trailer shall meet the requirements of ANSI/TIA 568-C.0 and BICSI Telecommunications Distribution Methods Manual.

3.3.2 Parts/Materials/Processes

All materials shall be new and as called out in this Specification or the SOW. Substitute materials shall be allowed only if approved in advance by the Company. The Subcontractor shall have the responsibility for providing proof of equivalency. The Subcontractor shall maintain redlined drawings to track approved substitutions requiring design changes.

The Subcontractor shall not use suspect or counterfeit parts and shall verify and document compliance with this requirement suing the DOE suspect/counterfeit items list and DOE G 414.1-3.

3.3.3 Identification and Marking

Each trailer section shall be labeled on the frame with the serial number.

3.3.4 Nameplate

The trailer shall be provided with a Manufacturer's Certification Nameplate and the Washington State Labor and Industry Gold Insignia attached and clearly visible on the exterior of the trailer.

3.3.5 Warranty Information

A. Provide twenty-year warranty for the roof.

B. Provide five-year warranty against defects in material and workmanship. Should a product fail the Subcontractor shall repair, replace with new product, replace with equivalent product, or provide a full refund for the product.

C. The Subcontractor shall provide the Company with copies of all warranty information prior to shipping.

3.3.6 Human Factors Engineering

Human factors shall be in accordance with TFC-ENG-STD-01, *Human Factors in Design* and TFC-ENG-DESIGN-D-29, *Guidance for Inclusion of Human Factors in Design.*

3.3.7 Qualification

Qualifications are defined in the SOW, Section 12.0, *Qualifications.*

3.3.8 Document Submittal (Vendor Information)

Required submittals are summarized below and are listed in detail on the Master Submittal List (MSL). The MSL identifies the minimum submittals required by this Specification and the SOW.

A. See TFC-BSM_IRM_CD-C-07, *Vendor Processes* and the SOW for submittal procedures.

B. Design Media Package: Submit electronic copy of design media package including, but not limited to:

1. Title Page
2. Architectural
3. Structural
4. Sections
5. Details
6. Exterior Elevations
7. Electrical/HLAN
8. Panelboard Schedules
9. Reflected Ceiling Plan
10. Mechanical (HVAC)

C. Calculations and other data (structural, electrical, lighting levels, etc.) necessary to clearly describe design, materials, sizes, layouts and assembly instructions.

D. Washington State Labor and Industry approved drawing package.

E. Catalog Data: Legible manufacturer's data sheets on each product, material or piece of equipment to be used, including, preparation instructions, recommendations, storage and handing requirements and recommendations, as well as installation methods. Additional information to include Safety Data Sheet (SDS), shelf life, and temperature range of storage or application.

F. Product Samples: Submit product samples for siding, skirting (if different from siding), flooring, cove base, window casings, and blinds.

G. Gold Seal Insignia: Submit proof of compliance with WAC-150F and the Gold Seal Insignia.

H. Nonconformances:

1. Submit a written request to the Company for any proposed technical changes, exceptions, and/or deviations to this Specification or other Subcontract documents. Do not implement proposed changes, exceptions, or deviations until the Company provides written approval.

2. Conflicts: Notify the Company as soon as possible in the event of conflicts among the Specification, drawings, and/or the manufacturer's recommended processes or instructions.

I. Operations and Maintenance Manuals.

J. Material Book: Submit one hard copy and one electronic copy of all materials used in the creation of the facility including catalog sheets, SDSs, photographs of samples, etc. in an organized and logical manner.

B. As-Built Drawings and Calculations Package: Incorporate red-line markups and submit complete set of design drawings and calculations after installation of the facility. Include native electronic file with as-built set of drawings.

4.0 QUALITY ASSURANCE REQUIREMENTS

The Subcontractor shall follow standard commercial quality practices unless otherwise specified in this Specification or the SOW.

4.1 Acceptance Criteria

Acceptance criteria is defined in the SOW, Section 5.0, *Acceptance Criteria.*

4.2 Verification

Inspections shall be performed in accordance with the SOW, Section 8.0, *Verification/Hold Points*.

4.3 Inspections and Tests

Inspections shall be performed in accordance with the SOW, Section 8.0, *Verification/Hold Points.*