(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American statute applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American statute applies, use of foreign construction material is noncompliant with the Buy American statute.

(d) *Data*. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison ***[offeror fill-in]***			
Construction Material Description	Unit of Measure	Quantity	Price (Dollars)*
Item1			
Foreign construction material	_____	_____	_____
Domestic construction material	_____	_____	_____
Item1			
Foreign construction material	_____	_____	_____
Domestic construction material	_____	_____	_____

[* *Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued*)].

[*List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.*]

[*Include other applicable supporting information.*]

I.98 FAR 52.228-15 Performance and Payment Bonds – Construction (JUN 2020)

(a) *Definitions*. As used in this clause-

Original contract price means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) *Amount of required bonds*. Unless the resulting contract price is valued at or below the threshold specified in Federal Acquisition Regulation 28.102-1(a) on the date of award of this contract, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

(1) *Performance bonds (Standard Form 25)*. The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

(2) *Payment Bonds (Standard Form 25A)*. The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

(3) Additional bond protection.

(i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) *Furnishing executed bonds*. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) *Surety or other security for bonds*. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the *Federal Register* or may be obtained from the:

U.S. Department of the Treasury,
Financial Management,

Service Surety Bond Branch,
3700 East West Highway,
Room 6 F01,
Hyattsville, MD 20782.

Or via the internet at http://www.fms.treas.gov/c570/.

(e) *Notice of subcontractor waiver of protection* (40 U.S.C. 3133(c)). Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

I.112 FAR 52.236-4 Physical Data (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations by the Phase 1 Environmental Site Assessment, which can be found in Section J, Attachment 3, *Phase 1 Environmental Site Assessment – Advanced Manufacturing Collaborative Facility at the UofSC Aiken, U. S. Army Corps of Engineers, Savannah District, (June 2020)*.

(b) Weather conditions: Aiken, South Carolina gets 52.44 inches of precipitation per year. The US average is 39. Snowfall is 0.1 inches. The average US city gets 26 inches of snow per year. The July high is around 91 degrees. The January low is 35.

(c) Transportation facilities ____*N/A)*___

I.123 FAR 52.236-15 Schedules for Construction Contracts (APR 1984)

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the

Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

I.135 52.245-2 Government Property Installation Operation Services (APR 2012)

(a) This Government Property listed in paragraph (e) of this clause is furnished to the Contractor in an "as-is, where is" condition. The Government makes no warranty regarding the suitability for use of the Government property specified in this contract. The Contractor shall be afforded the opportunity to inspect the Government property as specified in the solicitation.

(b) The Government bears no responsibility for repair or replacement of any lost Government property. If any or all of the Government property is lost or becomes no longer usable, the Contractor shall be responsible for replacement of the property at Contractor expense. The Contractor shall have title to all replacement property and shall continue to be responsible for contract performance.

(c) Unless the Contracting Officer determines otherwise, the Government abandons all rights and title to unserviceable and scrap property resulting from contract performance. Upon notification to the Contracting Officer, the Contractor shall remove such property from the Government premises and dispose of it at Contractor expense.

(d) Except as provided in this clause, Government property furnished under this contract shall be governed by the Government Property clause of this contract.

(e) Government property provided under this clause:

I.147 DEAR 952.215-70 Key Personnel (DEC 2000)

(a) The personnel listed below or elsewhere in this contract [*see Section H clause DOE-H-2070 Key Personnel*] are considered essential to the work being performed under this contract. Before removing, replacing, or diverting any of the listed or specified personnel, the Contractor must: (1) Notify the Contracting Officer reasonably in advance; (2) submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on this contract; and (3) obtain the Contracting Officer's written approval. Notwithstanding the foregoing, if the Contractor deems

immediate removal or suspension of any member of its management team is necessary to fulfill its obligation to maintain satisfactory standards of employee competency, conduct, and integrity under the clause at 48 CFR 970.5203-3, Contractor's Organization, the Contractor may remove or suspend such person at once, although the Contractor must notify Contracting Officer prior to or concurrently with such action.

(b) The list of personnel may, with the consent of the contracting parties, be amended from time to time during the course of the contract to add or delete personnel.

I.153 DEAR 952.227-82 Rights to Proposal Data (APR 1994)

Except for technical data contained on pages ***[offeror fill-in]*** __ of the contractor's proposal dated ***[offeror fill-in]*** __ which are asserted by the contractor as being proprietary data, it is agreed that, as a condition of the award of this contract, and notwithstanding the provisions of any notice appearing on the proposal, the Government shall have the right to use, duplicate, disclose and have others do so for any purpose whatsoever, the technical data contained in the proposal upon which this contract is based.

I.154 DEAR 952.242-70 Technical Direction (DEC 2000)

(a) Performance of the work under this contract shall be subject to the technical direction of the DOE Contracting Officer's Representative (COR). The term “technical direction” is defined to include, without limitation:

(1) Providing direction to the Contractor that redirects contract effort, shift work emphasis between work areas or tasks, require pursuit of certain lines of inquiry, fill in details, or otherwise serve to accomplish the contractual Statement of Work.

(2) Providing written information to the Contractor that assists in interpreting drawings, specifications, or technical portions of the work description.

(3) Reviewing and, where required by the contract, approving, technical reports, drawings, specifications, and technical information to be delivered by the Contractor to the Government.

(b) The Contractor will receive a copy of the written COR designation from the Contracting Officer. It will specify the extent of the COR's authority to act on behalf of the Contracting Officer.

(c) Technical direction must be within the scope of work stated in the contract. The COR does not have the authority to, and may not, issue any technical direction that—

(1) Constitutes an assignment of additional work outside the Statement of Work;

(2) Constitutes a change as defined in the contract clause entitled “Changes;”

(3) In any manner causes an increase or decrease in the total estimated contract cost, the fee (if any), or the time required for contract performance;

(4) Changes any of the expressed terms, conditions or specifications of the contract; or

(5) Interferes with the Contractor's right to perform the terms and conditions of the contract.

(d) All technical direction shall be issued in writing by the COR.

(e) The Contractor must proceed promptly with the performance of technical direction duly issued by the COR in the manner prescribed by this clause and within its authority under the provisions of this clause. If, in the opinion of the Contractor, any instruction or direction by the COR falls within one of the categories defined in (c)(1) through (c)(5) of this clause, the Contractor must not proceed and must notify the Contracting Officer in writing within five (5) working days after receipt of any such instruction or direction and must request the Contracting Officer to modify the contract accordingly. Upon receiving the notification from the Contractor, the Contracting Officer must—

(1) Advise the Contractor in writing within thirty (30) days after receipt of the Contractor's letter that the technical direction is within the scope of the contract effort and does not constitute a change under the Changes clause of the contract;

(2) Advise the Contractor in writing within a reasonable time that the Government will issue a written change order; or

(3) Advise the Contractor in writing within a reasonable time not to proceed with the instruction or direction of the COR.

(f) A failure of the Contractor and Contracting Officer either to agree that the technical direction is within the scope of the contract or to agree upon the contract action to be taken with respect to the technical direction will be subject to the provisions of the clause entitled “Disputes.”

I.155 DEAR 970.5204-3 Access to and Ownership of Records (OCT 2014) (DEVIATION)

(a) *Government-owned records.* Except as provided in paragraph (b) of this clause, all records acquired or generated by the contractor in its performance of this contract, including records series described within the contract as Privacy Act systems of records, shall be the property of the Government and shall be maintained in accordance with 36 Code of Federal Regulations (CFR), Chapter XII, Subchapter B, “Records Management.” The contractor shall ensure records classified as Privacy Act system of records are maintained in accordance with FAR 52.224.2 “Privacy Act.”

(b) *Contractor-owned records.* The following records are considered the property of the contractor and are not within the scope of paragraph (a) of this clause.

(1) Employment-related records (such as worker's compensation files; employee relations records, records on salary and employee benefits; drug testing records, labor negotiation records; records on ethics, employee concerns; records generated during the course of responding to allegations of research misconduct; records generated during other employee related investigations conducted under an expectation of confidentiality; employee assistance program records; and

personnel and medical/health-related records and similar files), and non-employee patient medical/health-related records, except those records described by the contract as being operated and maintained by the Contractor in Privacy Act system of records.

(2) Confidential contractor financial information, internal corporate governance records and correspondence between the contractor and other segments of the contractor located away from the DOE facility (i.e., the contractor's corporate headquarters);

(3) Records relating to any procurement action by the contractor, except for records that under 48 CFR 970.5232-3 are described as the property of the Government; and

(4) Legal records, including legal opinions, litigation files, and documents covered by the attorney-client and attorney work product privileges; and

(c) *Contract completion or termination.* Upon contract completion or termination, the contractor shall ensure final disposition of all Government-owned records to a Federal Record Center, the National Archives and Records Administration, to a successor contractor, its designee, or other destinations, as directed by the Contracting Officer. Upon the request of the Government, the contractor shall provide either the original contractor-owned records or copies of the records identified in paragraph (b) of this clause, to DOE or its designees, including successor contractors. Upon delivery, title to such records shall vest in DOE or its designees, and such records shall be protected in accordance with applicable federal laws (including the Privacy Act) as appropriate. If the contractor chooses to provide its original contractor-owned records to the Government or its designee, the contractor shall retain future rights to access and copy such records as needed.

(d) *Inspection, copying, and audit of records.* All records acquired or generated by the Contractor under this contract in the possession of the Contractor, including those described at paragraph (b) of this clause, shall be subject to inspection, copying, and audit by the Government or its designees at all reasonable times, and the Contractor shall afford the Government or its designees reasonable facilities for such inspection, copying, and audit; provided, however, that upon request by the Contracting Officer, the Contractor shall deliver such records to a location specified by the Contracting Officer for inspection, copying, and audit. The Government or its designees shall use such records in accordance with applicable federal laws (including the Privacy Act), as appropriate.

(e) *Applicability.* This clause applies to all records created, received and maintained by the contractor without regard to the date or origination of such records including all records acquired from a predecessor contractor.

(f) *Records maintenance and retention.* Contractor shall create, maintain, safeguard, and disposition records in accordance with 36 Code of Federal Regulation (CFR) Chapter XII, Subchapter B, “Records Management” and the National Archives and Records Administration (NARA)-approved Records Disposition Schedules. Records retention standards are applicable for all classes of records, whether or not the records are owned

by the Government or the contractor. The Government may waive application of the NARA-approved Records Disposition Schedules, if, upon termination or completion of the contract, the Government exercises its right under paragraph (c) of this clause to obtain copies of records described in paragraph (b) and delivery of records described in paragraph (a) of this clause.

(g) *Subcontracts.*

(1) The contractor shall include the requirements of this clause in all subcontracts that contain the *Radiation Protection and Nuclear Criticality* clause at 952.223-72, or whenever an on-site subcontract scope of work (i) could result in potential exposure to: A) radioactive materials; B) beryllium; or C) asbestos or (ii) involves a risk associated with chronic or acute exposure to toxic chemicals or substances or other hazardous materials that can cause adverse health impacts, in accordance with 10 CFR part 851. In determining its flow-down responsibilities, the Contractor shall include the requirements of this clause in all on-site subcontracts where the scope of work is performed in: (A) Radiological Areas and/or Radioactive Materials Areas (as defined at 0 CFR 835.2); (B) areas where beryllium concentrations exceed or can reasonably be expected to exceed action levels specified in 10 CFR 850; (C) an Asbestos Regulated area (as defined at 29 CFR 1926.1101 or 29 CFR 1910.1001); or (D) a workplace where hazard prevention and abatement processes are implemented in compliance with 10 CFR 851.21 to specifically control potential exposure to toxic chemicals or substances or other hazardous materials that can cause long term health impacts.

(2) The Contractor may elect to take on the obligations of the provisions of this clause in lieu of the subcontractor, and maintain records that would otherwise be maintained by the subcontractor.

PART III – LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

SECTION J – LIST OF ATTACHMENTS

TABLE OF CONTENTS

Functional & Operational Requirements and Design Guidance for the Advanced Manufacturing Collaborative

March 31, 2021

Prepared By:
Savannah River National Laboratory
Aiken, South Carolina

Prepared for the
U.S. Department of Energy
Office of Environmental Management

Contents

ACRONYMS

AASHTO	American Association of State Highway Transportation Officials
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ATS	Acceptance Testing Specifications
CFR	Code of Federal Regulations
DCD	Design Criteria Document
DOE	Department of Energy
EIA	Electronic Industries Association
FM	Factory Mutual
GFCI	Ground Fault Circuit Interrupters
GSA	General Services Administration
HVAC	Heating, Ventilation, and Air Conditioning
IBC	International Building Code
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IESNA	Illumination Engineering Society of North America
IFC	International Fire Code
LA	Limited Area
LAN	Local Area Network
LCC	Life Cycle Cost
LED	Light Emitting Diode
LEED	Leadership in Energy & Environmental Design
M&O	Management & Operating Contractor
NACE	National Association of Corrosion Engineers
NEC	National Electric Code
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NPH	Natural Phenomena Hazard
PAS	Public Address System
PDR	Preliminary Design Requirements
PPA	Property Protection Area
PSTR	Project Subcontract Technical Representative
S&R	Shipping & Receiving
SC OSE	South Carolina – Office of State Engineer
SSC	Systems, Structures, and Components
TIA	Telephone Industries Association
UL	Underwriters Laboratories
UPC	Uniform Plumbing Code
UPS	Uninterruptible power supply
WB	Wet Bulb
WBDG	Whole Building Design Guide

1 PURPOSE

This document describes the principal functional and operating requirements for the proposed Advanced Manufacturing Collaborative (AMC) Facility to establish the basis for the conceptual, preliminary and detailed space design.

The AMC space is a project sponsored by the U.S. Department of Energy (DOE). The Office of Environmental Management (EM) has an enduring need for safer, more cost effective nuclear chemical manufacturing technology, facilities, and expertise to:

- Complete the safe cleanup of radioactive and chemical waste from Cold War activities and nuclear research
- Comply with legally enforceable environmental regulatory requirements

The AMC space replaces functions that are housed in multiple aged facilities with a new facility, geographically located to support needed collaboration. As such, it will combine the functions of widely separated office and laboratory space into a single modern and flexible location.

2 OVERVIEW

The magnitude of the EM mission is staggering; it includes managing over 1,000 metric tons of weapons-grade uranium and plutonium, over 90 million gallons of liquid waste, millions of cubic meters of contaminated soil, and billions of gallons of contaminated groundwater. Although DOE has made significant progress, the highest risk and most technically complex work lie ahead for these multi-decade nuclear chemical manufacturing challenges. The funding challenges are equally daunting. Projections of constrained funding lead to the untenable conclusion that some missions cannot predict an end date.

2.1 Mission Requirements

Research, development, adaptation and utilization of mature, cutting edge technology are needed to establish manageable mission risk profiles and successfully execute long range plans. Current DOE nuclear chemical manufacturing operations rely upon chemical processes and facilities that were designed and built over the last 65 years. Conversely, the commercial chemical and manufacturing sector currently uses a range of proven, advanced technologies which deliver significant improvements in cost, worker and process safety, product quality, environmental stewardship, and workforce training. Adoption and utilization of these technologies are needed in the nuclear chemical manufacturing mission to better manage risk, improve program performance, and reduce life cycle costs and schedule.

The AMC will involve partnership and collaboration among the Savannah River National Laboratory (SRNL), Universities, Industry, and government entities at the local, state, and federal level. Synergy among these entities will foster a greater technical impact than would be possible through individual efforts. In addition to the anticipated domestic partner relationships, where appropriate, the AMC Facility could also promote and allow for the development of international relationships to foster the exchange of chemical manufacturing knowledge and personnel. The ability of the Collaborative to provide ease of access and exchange of knowledge and innovation amongst the variety of participants will be critical to realizing the maximum benefit of enhanced knowledge and technology transfer in support of Department missions.

2.2 Program Requirements

EM needs an AMC space in partnership with SRNL that will integrate and exploit the unique attributes of national laboratories, commercial entities, and educational institutions to stimulate innovative thinking and to adapt innovative technologies to accomplish DOE missions. The AMC would consist of a state-of-the-art facility for evaluation and translation of advanced manufacturing technologies to the DOE nuclear chemical manufacturing missions. The AMC space will bring together top-level talent from the national laboratories, academia, and industry in an environment that promotes cross-discipline interactions resulting in the fertilization of novel approaches to manufacturing technology adaptations to DOE missions.

1. **The AMC shall be a shared DOE-EM asset to support a significant EM multi-site user community in environmental management and monitoring.**

   Access will be provided to scientists and engineers across and within the DOE complex. Work supports the DOE Strategic Objective to "Continue cleanup of radioactive and chemical waste resulting from the Manhattan Project and Cold War activities" and other acceptable programmatic requirements or needs.

2. **The AMC shall be a shared national resource to support a significant user community in advanced manufacturing external to EM.**

   Access will be provided to the U.S. technical and scientific community. The facility will be a state-of-the-art, unique resource, which offers capabilities desired by users external to EM that can rapidly move advanced technology from industry to high hazard, high reliability manufacturing.

3. **The AMC shall support team-based research, applied science and engineering.**

   Science and engineering functions best when supported by a design that facilitates both structured and informal interaction, flexible use of space, and sharing of resources.

4. **The AMC shall incorporate an optimal mix of open and closed laboratories and work spaces.**

   Open laboratories support team-based work. Researchers share not only the space itself but also equipment, bench space, and support staff. The open laboratory format facilitates communication between scientists and makes the lab more easily adaptable for future needs.

5. **The AMC design shall maximize flexibility.**

   Maximizing flexibility improves the ability to expand easily, to readily accommodate reconfigurations and other changes, and to permit a variety of uses.

6. **The AMC shall be designed to leverage the ubiquitous use of computing and communications technologies.**

   Virtual laboratories are becoming commonplace. Embedded computing and communications are a crucial element of research from the benchtop to virtual design and tele-robotics.

7. **The AMC shall meet sustainable laboratory design standards.**

8. **The AMC will be located at the University of South Carolina at Aiken (UofSC Aiken) to maximize collaboration between the public and private sectors.**

3 PRIMARY SPACE FUNCTIONAL DESCRIPTION

In order to meet mission and program needs, a state-of-the-art laboratory and office space is envisioned. The Functional and Operational Requirements (F&ORs) define the attributes the AMC space must have in order to meet the DOE mission need. The F&ORs consist of narrative descriptions and conceptual plans including site selection criteria that communicate the needs of the space. F&ORs were developed by a team of experts familiar with facility and commercial industry practices and the research and development (R&D) needs identified in the Mission Need Statement. The process to develop the requirements entailed data collection and validation as well as development of conceptual layouts.

Functional and operating considerations included:

- Codes and Standards
- Utility System Requirements
- Capital Equipment Needs
- Facility Relationship Lay-outs
- Conceptual Department Lay-outs
- Product Requirements
- Occupancy logistics requirements

The facility space will provide administrative, research and manufacturing space for the design and development of chemical engineering reactions, processes and materials; and the production of mechanical and electrical components. The facility includes the following critical functional spaces:

- Administration and Support
- Virtual Reality and Simulation Environments
- Computation Center
- Manufacturing Technology Environments and Stations
- Synthesis and Processing Labs
- Reaction and Electrical Engineering Areas, Scaling Test Bed Areas and Flexible High Bay
- Laboratory Support Facilities
- Training and Education Facilities
- Innovation and Incubation Areas and Office Space

3.1 Primary Space Functions

The primary functions of the AMC space are summarized in Table 1:

Table 1. Functional Descriptions

Administration and Support

Includes offices, conference rooms, restrooms, vending and break rooms, waste management facility, and printer/file/storage rooms.

Virtual Reality and Simulation Laboratories

- State-of-the Art Virtual Simulation Cave
- Semi-Immersion Virtual Reality Stations
- Individual Workstation Simulators
- Large-Area Simulation and Training Space

Computational Center w/supercomputing connectivity

- Process Modeling and Simulation—Smart Manufacturing
- Software Engineering for Process and Hardware Control
- Command and Control Capabilities—on-line access and control to Savannah River Site (SRS) Radiological Test-Bed Experiments

Synthesis and Processing

- Materials Chemistry and Processing
- Gaseous Systems and Processing
- Wasteform Development and Processing

Manufacturing Technology

- Additive Manufacturing-3D printing
- Advanced Robotics, Cobotics and Autonomous Platforms
- Advanced Material Joining and Inspection Technology
- Micro-Fabrication Technology for Principal Investigator Devices
- Non-Destructive Assay, Metrology and Evaluation

Reaction Engineering

- PI Device and System Testing and Evaluation
- Pilot Scale/Prototype Chemistry/Chemical Engineering High Bay
- External Source Effects: Microwave, Ultrasound, and Plasmas

Electrical Engineering

- Integrated Process Instrumentation, Sensors, and Controls
- Evaluation/Integration and Demonstration of Advanced Power Technologies

Support Facilities

- State-of-the Art Chemistry and Materials Characterization Laboratory
- Chemistry Preparatory Laboratories

Training and Education Facilities

- Modern Classroom, Conference Rooms and Collaborations Spaces
- Teaching/Training Laboratories
  - Advanced Manufacturing Operations and Maintenance Training

Innovation, Entrepreneurship and Incubation Laboratory for Small Business Technology Development and Demonstration

White Space (Office)

Additionally, this space is available for expansion of the office and support areas.

White Space (Manufacturing)

This space is available for expansion for the manufacturing R&D areas or for new operations

3.2 Assumptions

The following assumptions provide the framework for the AMC space functions and requirements.

3.2.1 General Space Assumptions

3.2.1.1. The AMC space will be a government-owned, management and operating (M&O) contractor-operated facility. DOE and South Carolina will provide the necessary regulatory and safety oversight.

3.2.1.2. The AMC space will be located in proximity to SRNL, on the campus of UofSC Aiken (host institution) to facilitate interaction among SRNL, Academic, and Industry staff.

3.2.1.3. Non-radiological work will be performed in the AMC space.

3.2.1.4. The AMC space will provide the capability to design, develop, test and demonstrate bench and engineering-scale chemical engineering reactions, processes and materials; and the production of mechanical and electrical components using advanced manufacturing processes and systems.

3.2.1.5. The AMC space will provide the capability to translate reactions, processes, materials and components to radioactive environments at all DOE EM sites, including the SRS.

3.2.1.6. The AMC space will be designed for the operational lifetime specified by the developer. The design lives of individual test equipment and engineering-scale demonstrations will be individually specified according to need.

3.2.1.7. The AMC space will provide the flexibility to support DOE-EM and allied missions at all DOE sites, other federal agency sites and other sites as required by DOE.

3.2.1.8. The AMC will provide an integrated operational capability for engineering-scale development and translation.

3.2.1.9. Fire protection and emergency medical response, electrical power, raw water and sanitation for the AMC space will be provided by local, community-based services because the site will be on State property.

3.2.1.10. The AMC space will be located on a single contiguous site at UofSC Aiken.

3.2.1.11. Construction guidance contained in selected Whole Building Design Guides (WBDG) for research facilities and space types: dry laboratory, wet laboratory, light industrial and office has been followed. In addition, architectural guidelines of the host institution have been followed.

3.2.2 Functional Assumptions

3.2.2.1. The AMC space will provide the following key clusters of functional activities:

- Wet Chemistry Areas.
- Engineering Fabrication Laboratory or Areas for electro-mechanical fabrication and development.
- High Bay Flexible space to support process system scale up testing and electrical component/system testing.
- Office space for approximately 120 personnel including SRNL, Academia, and Industry partners.
- Open collaborative spaces for inter-disciplinary work.
- A limited number of private conference areas and single use phone booth areas for video teleconferencing capability (VTC), etc.

3.2.2.2. AMC venues and approaches will integrate technology development and teaching.

3.2.2.3. The AMC will provide collaborative learning and research spaces which join together multiple disciplines.

3.2.2.4. The AMC will have informal interaction places where information exchange is encouraged as a daily routine.
3.2.2.5. Laboratory and office arrangements will encourage interaction between technical disciplines and organizational components.
3.2.2.6. Common/similar functions could be co-located.
3.2.2.7. Administrative areas will be shared (coffee bars/refrigerators) and quantity may vary depending on final layout of facility (i.e. # of floors, length of each floor, etc.).
3.2.2.8. Laboratory, office, and storage areas must be lockable to meet minimum requirements of government Property Protection Areas (i.e. – for protection of government property and information when the facility is unoccupied).
3.2.2.9. Space will be provided for Academic, Industry, and Business outreach presence within the facility.
3.2.2.10. Conference areas will be shared among all occupants.
3.2.2.11. Video and "Smart Board" capability will be provided in all conference areas.
3.2.2.12. A limited staging area will be provided to support catering of public events in the facility.
3.2.2.13. Printers to be in designated, shared office areas.
3.2.2.14. Records/file space to be in common shared location.
3.2.2.15. General storage areas will be shared by all building occupants.
3.2.2.16. Diskless computing environment with no Central Processing Unit in the office areas.
3.2.2.17. LEED certification at the Gold (or higher) level will be achieved.
3.2.2.18. A full cafeteria will not be provided. Proximate availability of food service options is assumed.
3.2.2.19. An auditorium will not be provided for public briefings and colloquia. Proximate auditorium access is assumed.

4 FUNCTIONAL AND OPERATIONAL REQUIREMENTS

The primary space functions of the AMC space are described in Section 3. Functional and operational requirements are described in the following tables.

Facility functions with the applicable requirements of each function are contained in Table 2. Individual requirements are listed in Table 3. Each identified requirement contains a detailed description, the basis for the requirement, the programmatic design requirement and the function that requires it. Each requirement is tied back to one of the functions listed in the function table. Also note, efforts were made to include the latest standards and codes that were applicable as of the report date, however the facility should be designed to the latest standards and codes that are applicable during the design of the facility.

4.1 Functions

Facility functions with the applicable requirements of each function are contained in Table 2. Note: Any space allocations in the tables are listed as guides for the design. Final space allocations will be determined during design. All spaces should address functional requirements as specified in the tables.

Table 2. Functions

Function Number & Name	Description	Specified by
F.1 Provide AMC Space	Provide for AMC space	R.1.1 LCC & Energy Conservation Reports R.1.2 Commissioning R.1.3 SC OSE Compliance R.1.4 Site Surveying R.1.5 No Asbestos R.1.6 Codes & Standards

Function Number & Name	Description	Specified by
F.1.1 Occupancy	Provide sufficient capacity to operate efficiently and effectively as an integrated laboratory, office, and collaborative technology development facility.	R.1.1.1 Personnel in facility R.1.1.2 Conference/specialty room space R.1.1.3 Property Protection Area criteria R.1.1.4 Up to 20 Academic, Industry, and Small Business support space R.1.1.5 Approximately 1,500 sq. ft. storage, supply R.1.1.6 Approximately 2,000 sq. ft. storage, files R.1.1.7 Up to 2500 sq. ft. for printers, Plotters, and visual arts items
F.1.2 Laboratory Space	Provide an open concept multi-function laboratory space suited to frequent adjustment to accommodate changing investigative purposes. Lab functions could be combined if the combination complies with safety, environmental and building standards. The laboratory should be capable of delivering high temperature heat to test various manufacturing processes and technologies.	R.1.2.1 Wet chemistry labs – approximately 5000 sq. ft. R.1.2.2 Engineering Fabrication labs – 5,000 – 10,000 sq. ft. R.1.2.3 High Bay Fab/Test Labs – approximately 5000 – 15,000 sq. ft. R.1.2.3.1 High Bay Grid Space R.1.2.4 Fume hood exhaust as appropriate for non-radiological wet chemistry work R.1.2.5 Liquid waste collection/drain/treatment system to dispose of liquid lab wastes.
F.1.3 Office Space	Provide office space	R.1.3.1 Up to 20 private spaces at approximately 120 square feet R.1.3.2 Open office space supporting up to 30 senior scientists R.1.3.3 Open office space supporting up to 50 technicians and junior scientists. R.1.3.4 Up to 20 private spaces for Univ/ Ind.

Function Number & Name	Description	Specified by
F.1.4 Enhanced Collaborative Space	Provide adequate VTC conference rooms, and several small "open space" conference areas to support collaborative technology development. Provide one enclosed formal conference room.	R.1.4.1 Up to six open conference areas with SmartBoard and internet capability. R.1.4.2 Up to two private areas with video teleconference, SmartBoard, internet. R 1.4.3 One formal conference room with wireless SmartBoard and internet capability
F.2 Facility Access	Provide access to facility for employees, vehicles, and Fire Protection.	R.2.1 Facility Accessibility R.2.2 Access Roads R.2.3 Main Entrance/Access Road R.2.4 Access Road AASHTO & SC OSE Compliance R.2.5 Sidewalks R. 2.6 Cypher code personnel access controls to laboratory and storage areas.
F.2.1 Provide Handicap Accessible Facility	Provide a handicap accessible facility to accommodate for employees with physical handicaps	R.2.1.1 ANSI/ICC A 117.1 Compliance R.2.1.2 SC OSE Compliance & CFR
F.2.2 Provide Parking lots	Provide parking lots for employees per host institution guidelines.	R.2.2.1 Number of Employee Parking Spaces R.2.2.2 Parking Area Requirements R.2.2.3 Pave Parking Area R.2.2.4 Dumpster/Trash Allocation

Function Number & Name	Description	Specified by
F.3 Provide Structure	Provide a structure for AMC activities following any host institution architectural guidelines.	R.3.1 Natural Phenomena Hazards (NPH) R.3.2 Occupancy Classification R.3.3 Type of Construction R.3.4 NFPA 101 R.3.5 UL & FM R.3.6 Interior Finishes-Flame Spread R.3.7 IBC 2018 R.3.8 Building Separation Distance R.3.9 Foundation R.3.10 Subsurface Testing R.3.11 Door Requirements R.3.12 Exterior Door Locks R.3.13 Roof Drainage R.3.14 Roof Access-if required R.3.15 Cool Roof Products R 3.16 Structure Height R.3.17 ASHRAE 90.1 R.3.18 LEED Certification R.3.19 Building Identification R.3.20 Interior Signs and Labeling R.3.21 Bollards R.3.22 Skylights
F.3.1 Provide Shipping & Receiving (S&R) Area	Provide an area for the receipt of AMC materials and supplies.	R.3.1.1 Fork Lift Access R.3.1.2 S&R Area Concrete Slab Strength R.3.1.3 Exterior Access to S&R Area

Function Number & Name	Description	Specified by
F.3.2 Provide Climate Control	Provide Climate Control for the HVAC in the facility.	R.3.2.1 Elevation R.3.2.2 Ventilation R.3.2.3 Indoor Design Conditions R.3.2.4 Outdoor Design Conditions R.3.2.5 HVAC Start-Up R.3.2.6 General HVAC Requirements R.3.2.7 HVAC System Filters R.3.2.8 Screens
F.3.3 Provide Floor	Provide adequate architectural floor covering appropriate for the intended uses of building spaces.	R.3.3.1 Floor Finish
F.3.4 Provide Lights	Provide lighting for both exterior and interior.	
F.3.4.1 Provide Emergency Lighting	Provide emergency lighting for facility.	R.3.4.1.1 Emergency Lighting Economic Analysis R.3.4.1.2 Emergency Lighting System
F.3.4.2 Provide Exit Marking	Provide exit marking for the facility to help employees to egress during an emergency.	R.3.4.2.1 Exit Sign-LED R.3.4.2.2 Exit Sign Test Switch
F.3.4.3 Provide Interior Lighting	Provide interior lighting for each area in the facility.	R.3.4.3.1 Interior Lighting-General Requirements.
F.3.4.4 Provide Exterior Lighting	Provide exterior lighting for the facility following any host institution guidelines.	R.3.4.4.1 Exterior Light Type R.3.4.4.2 Exterior Light Sensors R.3.4.4.3 Light Level Requirements R.3.4.4.4 Exterior Lighting Design
F.3.5 Provide Lightning Protection	Provide lightning protection for structure.	R.3.5.1 Lightning Protection R.3.5.2 Lightning Protection Compliance
F.3.6 Provide Offices	Provide suitable offices for employees to accomplish assigned/job related activities.	R.3.6.1 Occupants Offices
F.3.7.3 Provide Break Rooms	Provide adequate space and facilities for AMC personnel for storage and preparation of food	R.3.7.3.1 Provide Break Rooms

Function Number & Name	Description	Specified by
F.3.8 Provide Misc. Areas	Provide suitable space for mechanical, catering and janitorial and other miscellaneous storage.	
F.3.8.1 Provide Mechanical Room	Provide mechanical room for mechanical equipment.	R.3.8.1.1 Facility Mechanical room Design Requirements
F.3.8.2 Provide Staging area for catered events	Provide adequate space and services to support catering needs.	R.3.8.2.1 Staging area for catering
F.3.8.3 Provide Unclassified computing Router Hub Area	Provide unclassified router hubs for computers.	R.3.8.3.1 Classified and Router Hub Design Requirements.
F.3.8.4 Men's restroom	Provide Men's restrooms for employees with either joint access for visitors/guests or separate facilities.	R.3.8.4.1 Men restroom room requirements
F.3.8.5 Women's Restroom	Provide Women's restrooms for employees with either joint access for visitors/guests or separate facilities.	R.3.8.5.1 Women restroom requirements
F.3.8.6 Provide Janitorial Supply Area	Provide janitorial supply area for the custodian to store cleaning supplies.	R.3.8.6.1 Janitorial supply area requirements
F.3.8.7 Provide Electrical Room	Provide an electrical room for electrical equipment.	R.3.8.7.1 Comply with NFPA 70 and 70E R.3.8.7.2 No water in electrical rooms
F.3.9 Provide Chemical and Supply Storage	Provide chemical and supply storage for the AMC	R.3.9.1 Organic Chemical storage R.3.9.2 Acid Chemical storage R.3.9.3 Dry Chemical storage R.3.9.4 Supply Storage
F.4 Provide Utilities	Provide utilities for the facility and process equipment.	R.4.1 Corrosion Control R.4.2 General Utility Requirements R.4.3 Utility Labeling R.4.4 Underground Utility Tracing R.4.5 Utility Road Crossing
F.4.1 Provide Natural Gas	Provide natural gas for the facility	R.4.1.1 Natural Gas Design Codes and Standards R.4.1.2 Natural Gas Design Requirements

Function Number & Name	Description	Specified by
F.4.1.a Provide Compressed Gas Services	Provide compressed gas services to labs as needed.	R.4.1.a.1 Argon, Oxygen, Nitrogen, Hydrogen, P10
F.4.2 Provide Communications	Provide communications systems for the facility that will support a minimum 100G Network capability.	R.4.2.1 Communications-General Requirements R.4.2.2 Communications-Joint Use R.4.2.3 Data System Structured Cable Type R.4.2.4 Cable Run Lengths & Communication Area
F.4.2.1 Provide Unclassified LAN	Provide unclassified LAN for unclassified computers and printers.	R.4.2.1.1 Local Area Network (LAN) Requirements R.4.2.1.2 Optical Fiber Requirements
F.4.2.1.1 Provide Drops for Printers and Computers	Provide drops for printers and computer to connect to the network.	R.4.2.1.1.1 Printers & Computers
F.4.2.3 Provide Telephone	Provide telephones for the facility.	R.4.2.3.1 Telephone Distribution Cable Type R.4.2.3.2 Telephone Distribution Cable Compliance R.4.2.3.3 Telecommunications Equipment Type R.4.2.3.4 Telephone System Components Compliance R.4.2.3.5 Telephone Drop R.4.2.3.6 Telephone Routing
F.4.2.4 Provide Public Address System (PAS)	Provide public address system (PAS) integrated with the host institution announcing system for the facility to send notifications to employees.	R.4.2.4.1 PAS-General Requirements R.4.2.4.2 PAS Testing
F.4.2.5 Provide fire alarm control panel	Provide fire alarm control panel to transmit emergency communications.	R.4.2.5.1 Communicate with emergency services dispatch center.

Function Number & Name	Description	Specified by
F.4.2.6 Communicate with Energy Management System	Provide energy management system to communicate with host institution energy management system.	R.4.2.6.1 Energy Management R.4.2.6.2 Energy Management & Metering R.4.2.6.3 Energy Management System Interface
F.4.3 Provide Fire Protection	Provide Fire protection for the facility.	
F.4.3.1 Provide Fire Detection	Fire detection for the complex.	R.4.3.1.1 Fire Alarm
F.4.3.2 Provide above ground Fire Suppression system	Provide above ground fire suppression system for the facility.	R.4.3.2.1 Fire Suppression Type R.4.3.2.2 Fire Suppression Piping Requirements R.4.3.2.3 Fire Extinguishers R.4.3.2.4 Required Signs
F.4.3.3 Provide underground fire water distribution system	Provide underground fire water distribution system for the facility.	R.4.3.3.1 Service loop around facility R.4.3.3.2 Lead-in(s) R.4.3.3.3 Fire Hydrants

Function Number & Name	Description	Specified by
F.4.4 Provide Electricity	Provide electric power for the facility from the host institution electrical distribution system. Provide standby power to personnel protection systems and critical building functions. Provide independent utility power feed and high-bay drops for testbed as described in F.4.4.3 and F.4.4.4.	R.4.4.1 General Electrical Requirements R.4.4.2 Electrical System Labeling R.4.4.3 Electrical-Maintenance Considerations R.4.4.5 Electrical System Design Info and Drawings R.4.4.6 Electrical System Testing R.4.4.7 Electrical System Materials and Methods R.4.4.8 Exterior Electrical Utility Service R.4.4.9 Grounding-General Requirements R.4.4.10 Equipment Grounding R.4.4.11 Interior Electrical systems R.4.4.12 Receptacle Testing R.4.4.13 Electrical Panel Requirements R.4.4.14 Ground Fault Circuit Interrupters (GFCIs) R.4.4.15 Electrical System Design Aid R.4.4.16 Electrical Calculation Software R.4.4.17 NFPA 70 R.4.4.18 Electrical Metering
F.4.4.1 Provide Electrical Drops for Computers & Printers and equipment.	Provide electrical drops for the computer and printers and equipment in the facility.	R4.4.1.1 Provide electrical drops at computer equipment
F.4.4.2 Provide Surge Protection	Provide surge protection for the facility to protect equipment.	R.4.4.2.1 Provide Surge Protection
F.4.4.3 Provide Grounding System	Provide a grounding system that exceeds the minimum NFPA 70 grounding requirements to allow for improved safety, power quality and lightning protection. (e.g., enhanced grounding system)	R.4.4.9 Grounding General Requirements

Function Number & Name	Description	Specified by
F.4.4.4 Provide Laboratory Electrical Drops Independent from Computer & printers and equipment	Provide electrical power for laboratory setting on sourced from a different feed from utility and has independent breaker paneling	R.4.4.3.1 Provide Lab Power
F.4.4.5 Provide Utility Power for Advanced Manufacturing Standards Testbed	Provide 1 - 2MVA of power from utility feed for supporting the advanced manufacturing standards testbed	R 4.4.3.1 Provide Testbed power
F.4.4.6 Provide Domestic water	Provide domestic water for the facility.	R.4.5.1 Plant Domestic Water Requirements R.4.5.2 Domestic Water Metering
F.4.4.7 Provide Sanitary Sewer	Provide sanitary sewer for the facility.	R.4.6.1 Plant Sanitary Sewer Requirements
F. 4.4.8 Emissions monitors	Provide effluent monitoring as required by SC OSE	R.4.7.1 Air Release Stack Monitors R.4.7.2 Liquid Effluent Monitors

4.2 Requirements

Individual requirements are listed in Table 3. All submissions must comply with the prescriptive requirement and baseline performance requirements of the General Services Administration (GSA) issued PBS-P100, "Facilities Standards for the Public Buildings Service" and the State of South Carolina, Office of the State Engineer (SC OSE) requirements.

Table 3. Requirements

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.1.1 LCC & Energy Conservation Reports	A Life Cycle Cost Analysis & Energy Conservation Report shall be completed.	Required per Executive Order 13834 and SC OSE	Nil (nothing)	F.1 Provide AMC Space
R.1.2 Commissioning	Facility shall be commissioned.	Guiding Principle referenced in Executive Order 13834. LEED requirement as well Required per SC OSE 0112 (Issue 2I, July 2011).	Nil	F.1 Provide AMC Space

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.1.3 SC OSE Compliance	Potentially state owned structures are assumed to be required to meet requirements of SC OSE.	State law.	Nil	F.1 Provide AMC Space
R.1.4 Site Surveying	The site shall be surveyed in accordance with SC OSE	Required per SC OSE	Civil and Site Work	F.1 Provide AMC Space
R.1.5 No Asbestos	Materials containing asbestos shall not be used for this project.	SC OSE	Nil	F.1 Provide AMC Space
R.1.6 Codes & Standards	Codes and Standards shall be as specified in Chapter 5 of SC OSE Manual for Planning and Execution of State Permanent Improvements – part II, 2015	Required by SC OSE	Nil	F.1 Provide AMC Space
R.1.1.1 Personnel in facility	Provide space for up to 100 SRNL personnel plus estimated 20 additional Academic and Industry residents.	Co-location of technology development efforts.	Nil	F.1.1 Provide Occupancy
R.1.1.2 Conference/specialty room space	Provide space for up to 8 conference/specialty rooms for SRNL, Academia and Industry use	Co-location of technology development and meeting efforts.	Nil	F.1.1 Provide Occupancy
R.1.1.3 Offices, labs, and storage areas security.	All government property and information must be protected at the Property Protection Area level or above.	SRS M&O contract.	Nil	F.1.1 Provide Occupancy
R.1.1.4 Offices for Academia and Industry	Academia and Industry will engage in co-location and partnership with SRNL.	Collaborative work approach.	Nil	F.1.1 Provide Occupancy
R.1.1.5 Approximately 1500 sq. ft. storage, supply	All building occupants will share storage space – to include hardware, chemicals, and office supply.	Maximize shared resources.	Nil	F.1.1 Provide Occupancy
R.1.1.6 Approximately 2000 sq. ft. storage, files	Common area storage for reference materials and working files not suitable for office storage.	Maximize shared resources.	Nil	F.1.1 Provide Occupancy

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.1.1.7 Approximately 2500 sq. ft. for printers, plotters, and visual arts	Common area for output devices driven from facility network and internet	Maximize shared resources.	Nil	F.1.1 Provide Occupancy
R.1.2.1 Wet Chemistry Laboratories	Up to four Wet Chemistry Labs of approx. 1200 sq. ft. each per WBDG.	SRNL Wet Chemistry space.	Nil	F.1.2 Laboratory Space
R.1.2.2 Engineering Fabrication Laboratories	Up to five Engineering Fabrication Labs of approx. 1800 sq. ft. each per WBDG.	SRNL Engineering Lab space	Nil	F.1.2 Laboratory Space
R.1.2.3 High Bay Space	One High Bay space of approx. 5000 – 15,000 sq. ft. with a height of 100 ft. per WBDG. Including cranes and mezzanine platforms. This space should also include a high temperature heat loop capable of delivering 750˚C at 1 psig and additional electrical requirements described in R.4.4.3.1 and R.4.4.3.2.	SRNL process development and testing. Customer Requirement.	Nil	F.1.2 Laboratory Space
R.1.2.3.1 High Bay Grid Space	Within the high-bay area, approximately 1000 – 2000 sq. ft. per WBDG for electrical testing per R.4.4.3.1 and R.4.4.3.2. The space should have a barrier surrounding the perimeter such as a chain link fence.	SRNL process development and testing. Customer Requirement.	Nil	F.1.2 Laboratory Space F.4.4 Provide Electricity
R.1.2.4 Exhaust System	Fume hood exhaust system for non-radiological wet chemistry labs and snorkels for engineering fab labs.	SRNL Wet Chemistry and Engineering Fab Labs	Nil	F.1.2 Laboratory Space
R.1.2.5 Liquid waste collection	Liquid waste collection/drain/treatment system for liquid effluent management	SRNL Wet Chemistry space.	Nil	F.1.2 Laboratory Space
R.1.3.1 Private office space	Approximately 20 offices of 120 sq. ft. for Fellow Scientists per WBDG. 2400 sq. ft. total	Management and senior leadership needs.	Nil	F.1.3 Office Space

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.1.3.2 Open office space	Open office space for 30 Senior Scientists per WBDG. Total of 3000 sq. feet. Maximum use of shared shelving and work tops.	Interdisciplinary collaborative environment.	Nil	F.1.3 Office Space
R.1.3.3 Open office space	Open office space for 50 Junior Scientists and Technicians per WBDG. Total of 4200 sq. ft. Maximum use of shared shelving and work	Interdisciplinary collaborative environment.	Nil	F.1.3 Office Space
R.1.3.4 Private office space	Approximately 20 offices of 120 sq. ft. each for Academia and Industry partners. Total of 2400 sq. ft.	Co-location of SRNL, Academia, and Industry groups.	Nil	F.1.3 Office Space
R.2.1 Facility Accessibility	Fire Department vehicles shall have access to within 150 feet of all parts of the facility via an all-weather service road	Required by IFC 2012 and SC OSE.	Civil and Site Work	F.2 Facility Access
R.2.2 Access Roads	Paved all weather access roads shall be provided per host institution guidelines.	Fire department requires access to the facility in the event of an emergency.	Civil and Site Work	F.2 Facility Access
R.2.3 Main Entrance/Access Road	A paved road connecting the nearest public highway with the planned employee parking lot for the facility shall be provided per host institution guidelines.	The main access road to the main entrance of the building shall be paved per SC OSE.	Civil and Site Work	F.2 Facility Access
R.2.4 Access Road AASHTO & SC OSE Compliance	All roads, including access roads, shall comply with AASHTO GDHS-5 and SC OSE.	Required by SC OSE	Civil and Site Work	F.2 Facility Access
R.2.5 Sidewalks	Provide sidewalks in design. Sidewalks shall be rigid pavement and comply with SC OSE. At a minimum, an ANSI/ICC A117.1 walkway shall be provided from the parking lot to the facility and from the facility to adjacent facility structures of the host institution per host institution guidelines.	Compliance is required by SC OSE	Civil and Site Work	F.2 Facility Access

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R 2.6 Cypher code access	Provide cypher code system for personnel access to laboratories and storage areas	Per DOE government equipment security requirements	Civil and Site Work	F.2 Facility Access
R.2.1.1 ANSI/ICC A 117.1 Compliance	Facility shall comply with ANSI/ICC A 117.1-2003.	Required per SC OSE	Architectural	F.2.1 Provide Handicap Accessible Facility
R.2.1.2 SC OSE and CFR	Facility shall comply with SC OSE Standards and 28 CFR Part 36, Standards for Accessible Design.	Required per SC OSE	Architectural	F.2.1 Provide Handicap Accessible Facility
R.2.2.1 Number of Employee Parking Spaces	There shall be 100 general parking spaces (not including handicap).	Required Per SC OSE	Civil and Site Work	F.2.2 Provide Parking Lots
R.2.2.2 Parking Area Requirements	The parking area shall comply with SC OSE and follow any host institution guidelines.	Required by SC OSE	Civil and Site Work	F.2.2 Provide Parking Lots
R.2.2.3 Paved Parking Area	The employee parking area shall be paved per host institution guidelines.	Parking areas are typically paved on plant site. Also, helps meet requirement for surface requirements of ANS/ICC A117.1-2003 Section 302.	Civil and Site Work	F.2.2 Provide Parking Lots
R.2.2.4 Dumpster/Trash Allocation	Min of 3 Dumpsters: 1 Cardboard Recyclable and 2 standard dumpsters shall be located in the parking area on a concrete pad.	As required by host institution	Nil	F.2.2 Provide Parking Lots
R.3.1 Natural Phenomena Hazards	The SSCs shall be designed and analyzed in accordance with DOE-STD-1020-2012, IBC 2018, and AMC Building Criteria.	This requirement is determined by DOE STD-1020-2012,	Structural and Natural Phenomena	F.3 Provide Structure
R.3.2 Occupancy Classification	The occupancy classification shall be Determine thru IBC 2018 and NFPA 101.	IBC 2018, NFPA 101.	Architectural	F.3 Provide Structure

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.3 Type of Construction	The structure shall be Type I or Type II construction, to be determined during design phase.	Required by SC OSE.	Architectural	F.3 Provide Structure
R.3.4 NFPA 101	The structure shall meet the egress, construction, compartmentalization, and hazard protection requirements of NFPA 101.	Required by SC OSE.	Fire Protection	F.3 Provide Structure
R.3.5 UL & FM	Fire Rated wall, floor, ceiling, and roof assemblies shall be rated for their fire resistance by Underwriters Laboratories, Inc. (UL) or Factory Mutual (FM).	Required by SC OSE.	Fire Protection	F.3 Provide Structure
R.3.6 Interior Finishes-Flame Spread	Interior finishes shall have a UL-listed/FM-approved flame spread rating of 25 or less and a smoke developed rating of 50 or less, per American Society for Testing Materials (ASTM) E-84-2007.	Required by SC OSE.	Fire Protection	F.3 Provide Structure
R.3.7 IBC 2018	In addition to DOE-STD-1020-2012, the facility shall be designed under IBC 2018.	DOE-STD-2012 and IBC 2018.	Structural and Natural Phenomena	F.3 Provide Structure
R.3.8 Building Separation Distance	Building shall be placed such that there is adequate protection and separation from other structures. Building shall comply with NFPA 80A-2012.	Required by NFPA 80A and PFHA/FHA.	Fire Protection	F.3 Provide Structure
R.3.9 Foundation	The design of the structure's foundation shall consider soil conditions, load, settlement, and frost depth. Geotechnical investigation shall be developed in the early stage.	Required by SC OSE	Structural and Natural Phenomena	F.3 Provide Structure
R.3.10 Subsurface Testing	Soil borings shall be utilized to validate subsurface conditions for the facility site.	Required by SC OSE	Civil and Site Work	F.3 Provide Structure
R.3.11 Door Requirements	All doors shall meet the requirements in WBDG and SC OSE. Knock-down (KD) frames shall not be used.	Required by SC OSE	Architectural	F.3 Provide Structure

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.12 Exterior Door Locks	The exterior door lockable hardware shall suitable for the purpose.	Required by SC OSE	Architectural	F.3 Provide Structure
R.3.13 Roof Drainage	Roof drainage shall comply with SC OSE requirements for regional rainfall expectations.	Required by SC OSE	Structural and Natural Phenomena	F.3 Provide Structure
R.3.14 Roof Access-if required	If roof access is required (i.e. if rooftop HVAC units are used), roof access shall comply with IBC 2018 and OSHA 29 CFR 1910.27.	IBC 2018 & 29 CFR 1910.27	Structural and Natural Phenomena	F.3 Provide Structure
R.3.15 Cool Roof Products	The roof system for this facility shall comply with the definition of a "cool roof" under DOE's Cool Roof Program in the roof design and it shall be provided with a minimum R30 insulation value. The cool roof program and products can be found at the following website: http://www1.eere.energy.gov/femp/pdfs/roof.pdf .	Requirement for energy efficiency. Executive Order E.O. 13834	Structural and Natural Phenomena	F.3 Provide Structure
R.3.16 Structure Height	The maximum structure height shall be determined in the design phase but should be consistent host institution requirement.	Value Engineering	Architectural	F.3 Provide Structure
R.3.17 ASHRAE 90.1	The structure shall be designed to be 30% more efficient than the ASHRAE 90.1 base building	This building meeting ASHRAE 90.1 is a LEED requirement.	Mechanical	F.3 Provide Structure
R.3.18 LEED Certification	Buildings shall obtain LEED Gold certification, or higher.	Required by Executive Order 13834	Nil	F.3 Provide Structure

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.19 Building Identification	Building identification shall be provided on all sides of the exterior of the building. Signs shall be large enough for viewing from adjacent roads and resistant to the environment (e.g. UV radiation, thermal cycling, rain, hail, and wind). Signage shall be consistent with SRNL branding and host institution requirements	SRNL and host institution requirements.	Architectural	F.3 Provide Structure
R.3.20 Interior Signs and Labeling	Interior signs and labeling shall comply with the SC OSE and host institution requirements.	Required by SC OSE and host institution.	Architectural	F.3 Provide Structure
R.3.21 Bollards	Bollards shall be installed to protect the facility, equipment and components associated with this project in areas where vehicle damage could occur (e.g. hydrants, HVAC equipment, PIVs, Cathodic test stations, etc.). Bollards shall be provided at locations for both on- road and off-road vehicles (e.g. mowers, etc.). Bollards to be consistent with SC OSE requirements and host institution practices.	This is required to prevent damage to the facility and equipment.	Civil and Site Work	F.3 Provide Structure
R.3.22 Skylights	Skylights shall be determined in design phase. Maximum use of natural lighting is encouraged.	LEED principles.	Architectural	F.3 Provide Structure
R.3.1.1 Fork Lift Access	Provide Shipping & Receiving Area to allow a fork lift access to allow the loading and unloading of flatbed trailers and smaller box trucks. The area will also have an adjacent charging area for the forklift in the ramp	Customer Requirements	Civil and Site Work	F.3.1 Provide Shipping & Receiving (S&R) Area
R.3.1.2 S&R Area Concrete Strength	The concrete in the S&R area shall support a 4,000 lb. capacity loaded forklift as well as meet the requirements for the trucking where applicable	Customer Requirements	Civil and Site Work	F.3.1 Provide Shipping & Receiving (S&R) Area

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.1.3 Exterior Access to S&R Area	Access to the facility S&R area shall consist of an asphalt paved road designed to support loaded semi-trucks.	Customer Requirements	Civil and Site Work	F.3.1 Provide Shipping & Receiving (S&R) Area
R.3.1.4 Drainage	Provide drainage in the S&R area to prevent the accumulation of storm water in the low points of the S&R area.	The S&R area cannot collect water.	Civil and Site Work	F.3.1 Provide Shipping & Receiving (S&R) Area
R.3.2.1 Elevation	All mechanical equipment shall be capable of meeting specified performance at the host institution elevation above sea level.	Required by SC OSE	Mechanical	F.3.2 Provide Climate Control
R.3.2.2 Ventilation	Ventilation shall be provided per ASHRAE Standard	Required by SC OSE	Mechanical	F.3.2 Provide Climate Control
R.3.2.3 Indoor Design Conditions	Design temperature for heating shall be 68ºF dry bulb. Cooling is 72 ºF in lab. Cooling is 75ºF in office.	Customer Requirements and SC OSE	Mechanical	F.3.2 Provide Climate Control
R.3.2.4 Outdoor Design Conditions	Laboratory areas shall be designed with an outdoor temperature of 96ºF DB/67ºF WB in the summer and 6ºF in the winter. Design for administrative and service areas shall be in accordance with the 2.5% temperature in the current edition of the ASHRAE Handbook - Fundamentals	Required by SC OSE	Mechanical	F.3.2 Provide Climate Control
R.3.2.5 HVAC Start-Up	Manufacturer's start-up services shall be provided for all mechanical equipment. This includes testing the equipment for proper operation.	Required by SC OSE	Mechanical	F.3.2 Provide Climate Control
R.3.2.6 General HVAC Requirements	HVAC system shall meet the requirements of SC OSE	Required by SC OSE	Mechanical	F.3.2 Provide Climate Control
R.3.2.7 HVAC System Filters	Filters shall be required in all outside air and return air systems prior to air handling and/or distribution equipment	Filters help maintain acceptable indoor air quality. ASHRAE 62.1	Mechanical	F.3.2 Provide Climate Control
R.3.2.8 Screens	Bird screens shall be provided for fresh air and exhaust ducts.	Required to maintain an operational HVAC system. Refer to SC OSE.	Mechanical	F.3.2 Provide Climate Control

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.3.1 Floor Finish	Areas for general access and equipment rooms shall be non-carpeted. Areas such as office and conference room may be carpet or tile. Laboratories shall be tile or concrete as appropriate.	Required by SC OSE	Architectural	F.3.3 Provide Floor
R.3.4.1.1 Emergency Lighting Economic Analysis	An economic analysis shall be completed to determine which emergency lighting system would best serve the facility with maintenance costs included.	Required by SC OSE	Electrical	F.3.4.1 Provide Emergency Lighting
R.3.4.1.2 Emergency Lighting System Labeling	Emergency light fixtures shall be labeled in accordance with practices of the host institution guidelines.	Required by SC OSE	Electrical	F.3.4.1 Provide Emergency Lighting
R.3.4.2.1 Exit Sign-LED	Exit signs shall be illuminated with an LED source.	Required by SC OSE	Electrical	F.3.4.2 Provide Exit Marking
R.3.4.2.4 Exit Sign Test Switch	Exit Marking signs shall have a push-button test switch located on the exterior of the fixture.	Required by SC OSE	Fire Protection	F.3.4.2 Provide Exit Marking
R.3.4.3.1 Interior Lighting- General Requirements	Interior lighting shall comply with SC OSE and host institution design requirements. Maximize use of natural lighting.	Required by SC OSE	Electrical	F.3.4.3 Provide Interior Lighting
R.3.4.4.1 Exterior Light Type	LED Lighting shall be primarily used for exterior lighting and also consider host institutions guidelines.	Required by SC OSE	Electrical	F.3.4.4 Provide Exterior Lighting
R.3.4.4.2 Exterior Light Sensors	Photo sensors that acknowledge daylight shall be included on exterior lighting.	Required by SC OSE	Electrical	F.3.4.4 Provide Exterior Lighting
R.3.4.4.3 Light Level Requirements	Lights shall provide a minimum of 0.2 foot-candle illumination for building roof top and 150 feet in all directions of building and limited fence.	Required by SC OSE	Electrical	F.3.4.4 Provide Exterior Lighting

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.4.4.4 Exterior Lighting Design Method	Exterior lighting shall be designed per IESNA Lighting Handbook Reference and Application by Illuminating Engineering Society of North America (IESNA) Chapter 10 & 11 current edition.	Required by SC OSE	Electrical	F.3.4.4 Provide Exterior Lighting
R.3.5.1 Lightning Protection	Lightning protection systems shall be provided.	Required by SC OSE	Electrical	F.3.5 Provide Lightning Protection
R.3.5.2 Lightning Protection Compliance	Lightning protection systems shall comply with ANSI/NFPA 70, ANSI/NFPA 780, UL 96-2005, and UL 96A-2007. System shall have lightning arresters and surge protective devices in accordance with NFPA 70, NFPA 780 and UL listing	Required by SC OSE	Electrical	F.3.5 Provide Lightning Protection
R.3.6.1 Occupants Offices	Offices shall comply with WBDG, host institution, and SC OSE requirements.	Efficiency.	Nil	F.3.6 Provide Offices
R.3.7.3.1 Provide Break Room(s)	Provide a lunch/break room(s) or areas with a total capacity of 40 people. Lunch room(s) will include refrigerators, microwave ovens, sink and ice maker. Multiple areas may be dispersed within the facility	Shared space concept.	Nil	F.3.7.3 Provide Break Room(s)
R.3.8.1.1 Facility Mechanical Room Design Requirements	Mechanical Room(s) shall be used to house facility mechanical equipment. All mechanical rooms must be mechanically ventilated to maintain room space conditions as indicated in ASHRAE 62 and ASHRAE 15. Water lines shall not be located above motor control centers or disconnect switches and shall comply with requirements of NEC. Mechanical rooms shall have floor drains in proximity to the equipment they serve to reduce water streaks or drain lines extending into aisles.	Required by ASHRAE, GSA, and SC OSE	Nil	F.3.8.1 Provide Mechanical Room

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.8.2.1 Staging area for catering	Provide adequate space and services for catered events. Include limited amount of refrigeration and warming ovens for food service.	SRNL and host institution program needs.	Nil	F.3.8.2 Provide staging area for catered events.
R.3.8.3.1 Unclassified Router Hub Design Requirements.	Computer network connections will be provided in all offices, support areas and labs that will support a minimum of 100G Network capability. In addition to the wired access, Wireless Access Points will be located throughout the unclassified areas to provide Wi-Fi coverage for portable devices.	Required by occupants.	Nil	F.3.8.3 Provide Unclassified computing Router Hub Area
R.3.8.4.1 Men's restrooms requirement	Provide Men's restrooms in accordance with the applicable codes.	Required by IBC and UPC.	Mechanical	F.3.8.4 Men's restroom
R.3.8.5.1 Women's restrooms requirement	Provide women's restrooms in accordance with the applicable codes.	Required by IBC and UPC.	Mechanical	F.3.8.5 Women's Restroom
R.3.8.6.1 Janitorial supply area requirements	Janitorial supply area is room that is required for the custodian to take care of the facility. This room requires a hard surface floor, a mop sink at floor level, a faucet for the mop sink, chemical storage, cabinets and/or shelves, and a floor drain.	Customer requirement.	Utilities and Maintenance	F.3.8.6 Provide Janitorial supply area
R.3.8.7.1 Comply with NFPA 70E	Electrical installations shall comply with NFPA 70E, Standard for Electrical Safety in the Workplace	Required by SC OSE.	Electrical	F.3.8.7 Provide Electrical Room
R.3.8.7.2 No water in electrical rooms	No water lines are permitted in electrical rooms, except for fire sprinkler piping. Sprinkler piping lines must not be located directly above any electrical equipment.	Required by SC OSE.	Electrical	F.3.8.7 Provide Electrical Room
R.3.9.1 Organic Chemical storage	The facility will require organic chemical storage.	Required by building occupants.	Nil	F.3.9 Provide Chemical and Supply Storage
R.3.9.2 Acid Chemical storage	The facility will require acid chemical storage.	Required by building occupants.	Nil	F.3.9 Provide Chemical and Supply Storage

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.3.9.3 Dry Chemical storage	The facility will require Dry chemical storage.	Required by building occupants.	Nil	F.3.9 Provide Chemical and Supply Storage
R.3.9.4 Supply Storage	The facility will require general supply storage.	Required by building occupants.	Nil	F.3.9 Provide Chemical and Supply Storage.
R.4.1 Corrosion Control	All underground metal utility piping and components shall be cathodically protected per NACE Standard RPO-0169-96 and SC OSE.	Required per SC OSE	Civil and Site Work	F.4 Provide Utilities
R.4.2 General Utility Requirements	Plant Utility Piping buried under concrete slab shall be welded and not threaded. Unions and flanges shall be installed in utility piping systems to allow the maintenance or replacement of equipment.	Required per SC OSE	Civil and Site Work	F.4 Provide Utilities
R.4.3 Utility Labeling	Label all utilities per SC OSE and host institution requirements.	Required per SC OSE	Civil and Site Work	F.4 Provide Utilities
R.4.4 Underground Utility Tracing	All underground utility lines (metallic and non-metallic) shall be installed with a trace wire and marking tape per SC OSE	Required per SC OSE	Civil and Site Work	F.4 Provide Utilities
R.4.5 Utility Road Crossing	If it is necessary for an above ground utility to cross a road or other vehicle traffic area, the required height shall be evaluated by the contractor. The vertical Clearance shall not be less than 16.5 ft.	Required per SC OSE	Civil and Site Work	F.4 Provide Utilities
R.4.1.1 Natural Gas Design Codes and Standards	Natural gas systems shall be designed in accordance with the UPC, ASME B31.8, and NFPA 54/ANSI /AGA Z223.1.	Required per SC OSE	Civil and Site Work	F.4.1 Provide Natural Gas
R.4.1.2 Natural Gas Design Requirements	Natural gas distribution piping shall meet all requirements of SC OSE	Required per SC OSE	Civil and Site Work	F.4.1 Provide Natural Gas

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.1.3 Natural Gas Meter	Natural gas metering shall be provided at the facility gas service connection. Meters shall be provided with totalizer and report to the energy management system of the host institution if appropriate.	Required per SC OSE	Civil and Site Work	F.4.1 Provide Natural Gas
R.4.1.4 Natural Gas Regulator Station	Natural gas regulator station shall be designed and installed per SC OSE and host institution requirements.	Required per SC OSE	Civil and Site Work	F.4.1 Provide Natural Gas
R.4.1.a.1 – Argon, Oxygen, Nitrogen, P10	Provide compressed gas services to all laboratory spaces. Details to be resolved in design phase.	Required for laboratories	Mechanical	F.4.1.a – Provide Compress Gas Services
R.4.2.1 Communications-General Requirements	Communication and alarm systems shall comply with SC OSE	Required per SC OSE	Electrical	F.4.2 Provide Communications
R.4.2.2 Communications- Joint Use	Telephone circuits shall be used for other telecommunications and alarm services to the maximum extent practicable.	Required per SC OSE	Electrical	F.4.2 Provide Communications
R.4.2.3 Data System Structured Cable Type	The Data System Structured Cabling shall be an ANSI/TIA/EIA-568-B compliant system using Category 5E cable.	Requirement to be confirmed in conceptual design phase.	Electrical	F.4.2 Provide Communications
R.4.2.4 Cable Run Lengths & Comm. Area	Where any structured cabling station cable run's total length, including coming down walls and service loops, exceeds 90 meters (295 ft.), an additional communications area shall be established in that area of the building.	Requirement to be confirmed in conceptual design phase.	Electrical	F.4.2 Provide Communications

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.2.5 Communications Backboards	Backboards shall be installed on the walls in the communications area of the facility. Backboards shall be made from 3/4" AC Grade plywood. All surfaces of the plywood, including at cut outs for electrical outlets (etc.), shall be painted with fire retardant paint, electrical gray in color, before it is mounted to the wall.	Required by SC OSE	Electrical	F.4.2 Provide Communications
R.4.2.6 Communications Area	Room(s) for all communication equipment including telephone and network backboards and components shall be located in the new facility. The number of rooms shall be minimized	Required by SC OSE	Electrical	F.4.2 Provide Communications
R.4.2.1.1 Local Area Network (LAN) Requirements	Installation and performance requirements for LAN shall comply with SC OSE that will also support a minimum 100G network capability.	Required per SC OSE	Electrical	F.4.2.1 Provide Unclassified LAN
R.4.2.1.2 Optical Fiber Requirements	Installation and performance requirements for optical fiber systems shall comply with SC OSE that will also support a minimum 100G network capability.	Required per SC OSE Sections	Electrical	F.4.2.1 Provide Unclassified LAN
R.4.2.1.1.1 Printers and Computers	Provide LAN connections for both unclassified printers and computers.	The customer requires this equipment.	Architectural	F.4.2.1.1 Provide Drops for Printers and computers.
R.4.2.3.1 Telephone Distribution Cable Type	The Telephone System (Voice) Structured Cabling shall be an ANSI/TIA/EIA-568-B compliant system using Category 5E cable.	Requirement to be confirmed in conceptual design phase.	Electrical	F.4.2.3 Provide Telephone
R.4.2.3.2 Telephone Distribution Cable Compliance	Cable shall comply with Insulated Cable Engineers Association (ICEA) S-80-576 (2002).	Required by SC OSE	Electrical	F.4.2.3 Provide Telephone

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.2.3.3 Telecommunications Equipment Type	All telecommunications equipment's shall be a four- position modular, latching, plug type, jack-in flush mounting wall plate.	Required by SC OSE	Electrical	F.4.2.3 Provide Telephone
R.4.2.3.4 Telephone System Components Compliance	All telephone system components shall comply with Electronic Industries Association/Telephone Industries Association (EIA/TIA) 568.	Required by SC OSE	Electrical	F.4.2.3 Provide Telephone
R.4.2.3.5 Telephone Drop	Provide one telephone drop for facility. (Extra drops will be required for the Fire Alarm System)	Customer Requirements	Electrical	F.4.2.3 Provide Telephone
R.4.2.3.6 Telephone Routing	Telephone service to the new facility. Exterior telephone system shall comply with SC OSE and host institution system.	Required by SC OSE	Electrical	F.4.2.3 Provide Telephone
R.4.2.4.1 PAS-General Requirements	PAS shall comply with requirements of SC OSE and be compatible with host institution system.	Required by SC OSE	Electrical	F.4.2.4 Provide Public Address System (PAS)
R.4.2.4.2 PAS Testing	PAS shall be tested. Sound level shall be at least 15 dB above ambient noise level, but not exceed 90 db.	Building occupants need to be able to hear announcements, but sound level must remain below OSHA limits.	Electrical	F.4.2.4 Provide Public Address System (PAS)
R.4.2.5.1 Communicate with emergency services dispatch	Communicate with emergency services thru automatic notification of fire alarm signals.	Required by SC OSE	Fire Protection	F.4.2.5 Provide DACT on fire alarm control panel
R.4.2.6.1 Energy Management	The facility's energy management system shall be compatible with the host institution system.	Required per SC OSE	Mechanical	F.4.2.6 Communicate with Energy Management System
R.4.2.6.2 Energy Management & Metering	All meters (for electricity and natural gas) shall include provisions for monitoring by the host institution energy management system.	Required per SC OSE	Mechanical	F.4.2.6 Communicate with Energy Management System
R.4.2.6.3 Energy Management System Interface	The energy management system shall be designed and installed such that it can be operated and monitored by the host institution	Required per SC OSE	Mechanical	F.4.2.6 Communicate with Energy Management System

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.3.1.1 Fire Alarm	Facility shall be provided with a fire alarm system designed and installed in accordance with NFPA 72 and SC OSE.	Required per SC OSE	Fire Protection	F.4.3.1 Provide Fire Detection
R.4.3.2.1 Fire Suppression Type	Provided a complete automatic fire suppression system designed and installed in accordance with NFPA 13. Fire Suppression systems includes wet pipe, deluge, and/or dry pipe.	Required per SC OSE	Fire Protection	F.4.3.2 Provide Above ground fire suppression system
R.4.3.2.2 Fire Suppression Piping Requirements	Fire suppression piping shall comply with NFPA 13	Required per SC OSE	Fire Protection	F.4.3.2 Provide Above ground fire suppression system
R.4.3.2.3 Fire Extinguishers	Fire extinguishers shall be supplied throughout the facility.	Required per SC OSE	Fire Protection	F.4.3.2 Provide Above ground fire suppression system
R.4.3.2.4 Required Signs	Signage shall be as required by SC OSE and the host institution.	Required per SC OSE	Architectural	F.4.3.2 Provide Above ground fire suppression system
R.4.3.3.1 Service loop around facility	Loop configuration is required around all facilities.	Required per SC OSE	Fire Protection	F.4.3.3 Provide underground fire water distribution system
R.4.3.3.2 Lead-in(s)	Lead-in piping off the main loop shall have a lead-in PIV that is located at a minimum of 40feet from the building.	Required per SC OSE	Fire Protection	F.4.3.3 Provide underground distribution system
R.4.3.3.3 Fire Hydrants	Provide exterior fire hydrants to provide coverage to all facility location.	Required per SC OSE	Fire Protection	F.4.3.3 Provide underground distribution system
R.4.4.1 General Electrical Requirements	Electrical system shall comply with applicable codes and standards.	Required per SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.2 Electrical System Labeling	Electrical system shall be labeled per SC OSE and NFPA 70. All conduits shall be labeled per host institution practices.	Required per SC OSE	Electrical	F.4.4 Provide Electricity

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.4.3 Electrical-Maintenance Considerations	Electrical system shall be designed and installed to accommodate maintenance per SC OSE	Required per SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.5 Electrical System Design Info and Drawings	Detailed design drawings and information shall be created per Electrical SC OSE	Required per SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.6 Electrical System Testing	Electrical system shall be tested per SC OSE and International Electrical Testing Association, Inc.-Acceptance Testing Specifications (NETA-ATS).	Required per SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.7 Electrical System Materials and Methods	Electrical system shall comply with SC OSE design requirements.	Required per SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.8 Exterior Electrical Utility Service	Exterior electrical system shall comply with SC OSE requirements.	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.9 Grounding-General Requirements	Electrical system shall comply with grounding requirements in NEC and SC OSE. Additionally, the grounding system should exceed the minimum NFPA-70 grounding requirements to allow for improved safety, power quality and lightning protection. (e.g., enhanced grounding system)	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.10 Equipment Grounding	All equipment grounding shall comply with NEC and SC OSE	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.11 Interior Electrical Systems	Interior electrical system shall comply with NEC and SC OSE	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.12 Receptacle Testing	All receptacles shall be checked for correct polarity	Required by SC OSE	Electrical	F.4.4 Provide Electricity

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.4.13 Electrical Panel Requirements	All electrical panels shall comply with NEC and SC OSE requirements.	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.14 Ground Fault Circuit Interrupters (GFCIs)	GFCI receptacles shall be installed where required by NFPA 70.	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.15 Electrical System Design Aid	Contractor shall use Electrical Design aids as specified by SC OSE and host institution.	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.16 Electrical Calculation Software	Calculations shall be documented per SC OSE and host institution requirements.	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.17 NFPA 70	Installation shall comply with NFPA 70, The National Electric Code (NEC)	Required by law.	Electrical	F.4.4 Provide Electricity
R.4.4.18 Electrical Metering	Provide electrical meters at the building level for each building. Individual electrical metering shall be as required by host institution energy management practices. .	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R 4.4.19 Standby Power	Provide standby power for personnel protection systems and critical building functions (e.g. fume hood exhaust)	Required by SC OSE	Electrical	F.4.4 Provide Electricity
R.4.4.1.1 Provide electrical drops at computer equipment	Provide an electrical drop at each computer and printer	Customer Requirement	Electrical	F.4.4.1 Provide Electrical Drops for Computers and Printers & equipment
R.4.4.2.1 Provide Surge Protection	Provide surge suppression	Required by SC OSE and host institution.	Electrical	F.4.4.2 Provide Surge Protection

Requirement Number & Name	Description	Basis	Functional and System Design Requirements Category	Function Specifies
R.4.4.3.1 Provide High-bay additional power	Provide an independent electric system for high-bay. Provide 120VAC and 480VAC three phase connections on this independent electrical system.	Customer Requirement	Electrical	F.4.4.4 Provide Laboratory Electrical Drops Independent from Computer & printers and equipment
R 4.4.3.2 Provide High-bay Testbed power	Provide a utility feed and switch gear of 1-2MVA at distribution voltage for the independent electrical system in R.4.4.3.1. Customer will provide distribution transformer. Provide circuit connections for a range from 120VAC to 4160VAC	Customer Requirement	Electrical	F.4.4.5 Provide Utility Power for Advanced Manufacturing Standards Testbed
R.4.5.1 Plant Domestic Water Requirements	Domestic water shall be provided in accordance with the requirements of the Uniform Plumbing Code and NSF 61	Required by SC OSE and host institution.	Utilities	F.4.5 Provide Domestic Water
R.4.5.2 Domestic Water Metering	Domestic water meter shall be installed at the service entrance of each building. Meter shall be provided with a totalizer and report to the host institution energy management and metering system if required.	Required by SC OSE and host institution.	Utilities	F.4.5 Provide Domestic Water
R.4.6.1 Plant Sanitary Sewer Requirements	Sanitary sewer shall be designed and installed in accordance with the UPC and SC OSE.	Required by SC OSE and host institution.	Utilities	F.4.6 Provide Sanitary Sewer
R 4.7.1 Air emissions monitoring	Air Release Stack monitoring as required by state and federal law	Required by SC OSE, SCDHEC, and EPA	Utilities	F 4.7 Provide Emissions Monitoring
R 4.7.2 Liquid effluent monitoring	Liquid effluent monitoring as required by state and federal law	Required by SC OSE, SCDHEC, and EPA	Utilities	F 4.7 Provide Emissions Monitoring

4.3 Design Guidance

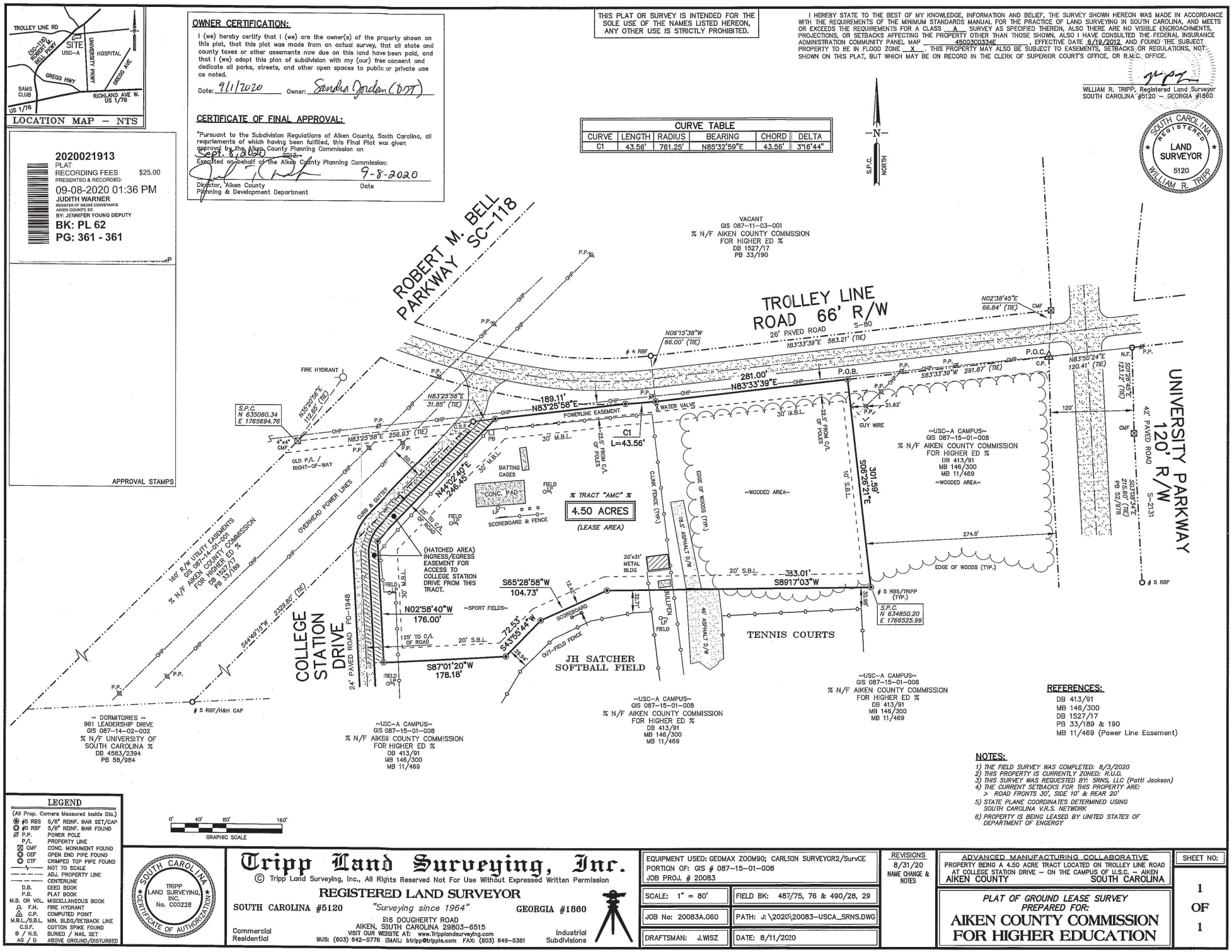
For conceptual design purposes, AMC space referenced the Design Guidance contained in selected Whole Building Design Guides for research facilities and space types: dry laboratory, wet laboratory, light industrial and office.

The WBDG is a program of the National Institute of Building Sciences. This source brings together regulatory information and market trends to provide the user with a path to the design and operation of sustainable buildings.

Individual requirements for research facilities and identified space types are available at

http://www.wbdg.org/design/.

Sustainable design and LEED certification is an assumed requirement for the AMC space. LEED stands for Leadership in Energy and Environmental Design and certification is provided through the U. S. Green Building Council. The object of attaining LEED certification is to embrace the "reduce, reuse, recycle" approach for building construction and operation to reduce the energy and water usage for the building.



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US Army Corps of Engineers®

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

ADVANCED MANUFACTURING COLLABRATIVE (AMC) FACILITY

UNIVERSITY OF SOUTH CAROLINA – AIKEN

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
June 2020

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We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in § 312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Cynthia Gose

Cynthia A. Gose

Environmental Engineer

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers, Savannah District (Corps) was contracted to perform an ASTM E1527-13, Phase I Environmental Site Assessment (ESA) of the proposed Advanced Manufacturing Collaborative (AMC) facility on the campus of the University of South Carolina - Aiken (USC-A) utilizing a ground lease arrangement at 471 University Parkway in Aiken, Aiken County, South Carolina (property).

The property is identified by the Aiken County Tax Assessment Office as a portion of property identification number 087-15-01-008, which is owned by The Aiken County Higher Education Commission. The eastern portion of the approximate 6-acre property currently consists of undeveloped, wooded land. The western portion consists of a fenced, grass-covered sports field with batting cages, nets, pitching stands, and light posts. An undeveloped access road is located between the wooded portion of the property and the fenced field portion. The property has access to natural gas and electricity provided by Dominion Energy and municipal water and sewer services.

The property is in a suburban area of Aiken and is bound on the north by Trolley Line Road, the east by undeveloped, wooded land, and further east by University Parkway. The property is bound on the southeast by a nursing building and the south by tennis courts, and further south by Scholar Loop, the USC-A supply and maintenance building, the student activities center that includes a planetarium and dining areas, and paved parking areas. The property is bound on the west by College Stations Drive, and further west by undeveloped, wooded and grass-covered land.

2.0 PURPOSE AND NEED FOR THE PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

The purpose of this Phase 1 ESA is to document the current environmental conditions of the site based primarily on any previous and current uses and activities on the property. The Phase 1 ESA should allow the Users the opportunity to qualify for landowner liability protection under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) provided certain stipulations are met. The landowner liability protections are an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser. The User must meet the protection stipulations detailed in CERCLA to qualify and meet the User Obligations contained within the ASTM E1527- 13 standard.

The need for this Phase 1 ESA is to perform all appropriate inquiries into the uses and prior ownership of the property associated with due diligence. Non-scope considerations or additional issues such as asbestos, radon, wetlands, or mold were not investigated.

2.1 Scope of the Phase 1 ESA

The scope of this Phase 1 ESA involves the following:

- Evaluate the probability of impact to surface water, groundwater, and/or soils within the property boundaries through a review of regulatory information and a reconnaissance of the property and vicinity;
- Evaluate historical land usage to identify previous conditions that could impact the environmental condition of the property;
- Conduct all appropriate inquiry as defined by ASTM E1527-13 and 40 CFR Part 312; and
- Evaluate the potential for on-site and off-site contamination; and, provide a professional opinion regarding the potential for environmental impact at the site and a list of Recognized Environmental Conditions (RECs).

The Phase I ESA is in general conformance with the scope and limitations of ASTM E1527-13 and U.S. Environmental Protection Agency (EPA) Standards and Practices for All Appropriate Inquiries (40 CFR §312.20) and was conducted under the supervision or responsible charge of an individual that qualifies as an environmental professional, as defined in 40 CFR §312.10.

This Phase 1 ESA incorporates guidance detailed in the American Society for Testing and Materials (ASTM) International guidelines *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process E1527-13* (ASTM International, 2013). The following information was used: review of available documents from federal, state, and local sources; interview persons knowledgeable about the property; and a historical aerial photograph review.

2.2 ASTM Definitions

ASTM E1527-13 defines a "recognized environmental condition (REC)" as "the presence or likely presence of any hazardous substances or petroleum products in, on or at a property: 1) due to release to the environment, 2) under conditions indicative of a release to the environment; or 3) under conditions that pose a material threat of a future release to the environment." For the purposes of this practice, “migrate" and

“migration” refer to the movement of hazardous substances or petroleum products in any form including solid and liquid at the surface or subsurface and vapor in the subsurface.

ASTM E1527-13 defines a “business environmental risk” (BER) as "a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice". "Other Environmental Considerations" is used to discuss BERs and environmental concerns outside of the ASTM E1527-13 requirements (radon, asbestos, lead, wetlands, etc.). Site condition limitations, if encountered, are detailed in Section 7.1 Methodology and Limiting Conditions.

ASTM E1527-13 defines a “de minimis condition” as a condition that generally does not represent a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. De minimis conditions are not recognized environmental conditions nor controlled recognized environmental conditions.

ASTM E1527-13 defines a " controlled recognized environmental condition (CREC)" as a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (i.e., property use restrictions, activity and use limitations, institutional controls, or engineering controls). A condition identified as a controlled recognized environmental condition does not imply that the Environmental Professional has evaluated or confirmed the adequacy, implementation or continued effectiveness of the required control that has been, or is intended to be, implemented.

ASTM E1527-13 defines a " historical recognized environmental condition (HREC)" as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (i.e., property use restrictions, activity and use limitations, institutional controls, or engineering controls). Before calling the past release a historical recognized

environmental condition, the Environmental Professional must determine whether the past release is a recognized environmental condition at the time the Phase I ESA is conducted (for example, if there has been a change in the regulatory criteria).

2.3 Limitations

This Phase 1 ESA involved a review of regulatory and historical information of the property and contiguous properties in general accordance with the ASTM standard and EPA regulation referenced herein. No non-scope considerations or additional issues such as asbestos, radon, wetlands, or mold were investigated, unless otherwise described in Section 8.0 of this report.

The conclusions and/or recommendations presented within this report are based upon a level of investigation consistent with the standard of care and skill exercised by members of the same profession currently practicing in the same locality under similar conditions. The intent of this assessment is to identify the potential for recognized environmental conditions in connection with the property; however, no ESA can completely eliminate uncertainty regarding the potential for recognized environmental conditions in connection with the property. The findings of this Phase 1 ESA are not intended to serve as an audit for health and safety compliance issues pertaining to improvements or activities at the property. The Corps is not liable for the discovery or elimination of hazards that may potentially cause damage, accidents, or injury.

Observations, conclusions and/or recommendations pertaining to environmental conditions at the property are necessarily limited to conditions observed, and or materials reviewed at the time this study was undertaken. It was not the purpose of this study to determine the actual presence, degree, or extent of contamination, if any, at this property. This could require additional exploratory work, including sampling and laboratory analysis.

2.4 Data Gaps

Historical data gaps were identified during the historical research of the property. Use of the property was generally documented back to 1962. Historical information including Sanborn Fire Insurance maps were not available and aerial photographs were missing for various time periods. However, based on other research and historical information gathered, these historical data gaps do not impact the ability to render a professional opinion regarding the property. No other data gaps were identified.

2.5 Limiting Conditions/Deviations

ASTM E1527-13 requires that the Environmental Professional identify limiting conditions, deletions, and deviations from the ASTM E1527-13 standard, if any, including client-imposed constraints. A site inspection was scheduled for 17 Jul 2020 with the conditions that a mask would be worn and social distancing of 6 feet be maintained if interaction was required. Mr. Brian Enter, Facilities Director at USC – Aiken, was informed via phone call of arrival and presence on the proposed project property while the inspection was conducted.

3.0 PROPERTY DESCRIPTION

3.1 Property Location and Legal Description

Table 1: Project Location and Legal Description

Site Name	Proposed Advanced Manufacturing Collaborative (AMC) Facility
Property Address	471 University Parkway
Property City, State	Aiken, South Carolina
Property County	Aiken County
Number of Parcels	One
Property ID Number(s)	087-15-01-008
Property Size	6 Acres
Property Owner of Record	The Aiken County Higher Education Commission
Property Legal Description	None listed

3.2 Physical Setting and Hydrology

Table 2: USGS Topographic Map and Physical Settings

USGS Topographic Map	
Quad Designation	Graniteville, South Carolina
Date	Dated 1964, Photo revised 1980
Property Settings	
Average Property Elevation (in ft.)	400 Feet
General Sloping Direction	West toward a tributary of Bridge Creek
Bodies of Water	None
General Directions of Surface Flow	West toward a tributary of Bridge Creek
Presumed Direction of Groundwater Flow	West toward a tributary of Bridge Creek
Geologic Province	Sandhills
Up gradient Property Direction	East

*Regional influences may have an impact on groundwater flow. The actual groundwater flow direction cannot be determined without site-specific information obtained through the gaging of groundwater monitoring wells.

3.3 Current Use and Description of the Site

The property is in an area that can generally be described as suburban. It is the part of the campus of USC-A. There are offices for Economic Development, Home Medical Equipment, Nurse Practitioners, and a computer learning center. There are local businesses including the USC-A bookstore, consignment shop, and coffee shops. The Aiken Regional Medical Center is a half mile to the south east, with many medical offices and commercial businesses further south. The surrounding community has been growing continuously since the 1980s, and commercial properties have also been increasing over time.

4.0 USER PROVIDED INFORMATION

The ASTM standard includes disclosure and obligations of the User to help the Environmental Professional identify the potential for RECs associated with the site.

4.1 Title Information

The Corps was not provided with title information by the User. If this information is provided following issuance of this report and information contained therein materially changes the outcome of this report, an addendum to this report will be issued.

4.2 Environmental Liens or Activity and Use Limitations

The Corps found no information on environmental liens or activity and use limitations in the Aiken County Tax Records. The State of South Carolina has no statute imposing a super priority lien for clean-up of hazardous waste.

4.3 Specialized Knowledge

The User does not possess specialized knowledge of the property.

4.4 Commonly Known or Reasonably Ascertainable Information

The User is not aware of commonly known environmental concerns related to the property.

4.5 Valuation Reduction for Environmental Issues

No information pertaining to the valuation reduction for environmental issues was provided. The appraisal value is the same as the fair market value. This property would be leased, not sold.

4.6 Owner, Property Manager, and Occupant Information

The property owner is the Aiken County Commission for Higher Education, and that the property manager was Mr. Brian Enter, Facilities Director, USC-A.

4.7 Degree of Obviousness

The User is not aware of obvious indicators that point to the presence or likely presence of contamination at the property.

5.0 RECORDS REVIEW

A regulatory records search of ASTM standard and supplemental databases was conducted for the property and is included in Appendix A which includes additional details about the regulatory databases that were reviewed.

The ASTM standard specifies an approximate minimum search distance from the property for each database. Pursuant to ASTM, the approximate minimum search distance may be reduced for each standard environmental record except for Federal NPL site list, and Federal RCRA TSD list. According to ASTM, government information obtained from nongovernmental sources may be considered current if the source updates the information at least every 90 days or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public. The following table indicates the standard environmental record sources and the approximate minimum search distances for each record.

Table 3: ASTM Standard Minimum Search Distance

Standard Environmental Record Sources	Approximate Minimum Search Distance Per ASTM (miles)	Property	Off-Site Properties
Federal NPL	1.0	No	0
Federal Delisted NPL	0.5	No	0
Federal CERCLIS	0.5	No	0
Federal CERCLIS NFRAP	0.5	No	0
Federal RCRA CORRACTS	1.0	No	0
Federal RCRA non-CORRACTS TSD	0.5	No	0
Federal RCRA Generators	Subject Site and Adjoining Properties	No	1
Federal IC/EC	Subject Site Only	No	0
Federal ERNS	Subject Site Only	No	0
State and Tribal Hazardous Waste Sites (NPL Equivalent)	1.0	No	0
State and Tribal Hazardous Waste Sites (CERCLIS Equivalent)	0.5	No	1
State and Tribal Landfill and/or solid waste disposal sites	0.5	No	0
State and Tribal Leaking Tanks	0.5	No	0
State and Tribal Registered UST and AST	Subject Site and Adjoining Properties	No	2
State and Tribal IC/EC	Subject Site Only	No	0
State and Tribal Voluntary Cleanup (VCP)	0.5	No	0

Based on our knowledge of the property and the surrounding area, attempts to verify and interpret this data is made with due diligence, and cannot guarantee the accuracy of the record(s) search beyond that of information provided by the regulatory report(s), and no warranty regarding the accuracy of the database report information included within the regulatory report(s).

The regulatory record search was performed by VERAcheck, Inc. The Corps did not reduce the minimum ASTM search distances stipulated in the standard.

5.1 Federal ASTM Databases

VERAcheck includes all Federal databases reviewed as listed on page 9 of Appendix A and definitions are on page 56. The VERAcheck report identified several listings from these databases for the AMC Facility. They are shown in their report on the maps on page 10 and 11. Kent's Corner gas station is listed for their UST which is not considered a REC for the property and is the closest to the property.

5.2 State ASTM Databases

5.2.1 State Hazardous Waste Sites (SHWS) Inventory

State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not be already listed on the federal CERCLIS database.
There was one known site with a leaking underground storage tank within the ½ mile radius, and 2 reported spills. There are 4 brown fields listed and 16 leaking underground storage tanks in unknown locations. There are also several operating permits listed with locations listed as 'unknown'.

5.2.2 Registered Underground Storage Tank (UST) List

The Registered UST List inventories underground storage tanks registered with the state. This list does not identify USTs that have not been registered or are exempt, such as home heating oil tanks and other unregulated tanks. The property was not identified on the UST database.

One off-site property within the minimum search distance was reported:
Kent's Corner, 301 Robert M Bell Parkway - Located approximately 330 feet northwest and topographically cross-gradient to the property. This facility is documented as currently utilizing one 20,000-gallon UST of multiple petroleum products, and one 4,000-gallon diesel UST. This facility is also documented as having one 1,000-gallon UST of E85A that is in extended out-of-use status. Releases are not listed in association with this facility. Based on the distance and topographic position of this facility relative to the property, not considered to represent a REC of the property.

5.3 Additional Non-ASTM State Databases

Neither the property nor properties within the designated search radii were identified on the state databases researched for this assessment.

5.4 Regulatory Review Summary

A regulatory database search report was provided, researching a series of Federal, State, Local, and other databases for facilities and properties that are located within specified minimum search distances from the property. The report did not identify the property on the databases researched. The report identified several off-site properties within the minimum ASTM search distances. USC-Aiken was identified, however, the actual location is elsewhere on campus, not on the proposed property site, nor is it within the ASTM search radius. Based on review of available public records, they are not RECs for the property.

6.0 HISTORICAL USE INFORMATION

6.1 Aerial Photograph Review

Aerial photographs reviewed of the property and immediately surrounding properties for evidence of former usage which may indicate potential environmental issues. The aerial photographs were obtained from VERAcheck, Inc. The aerial photographs reviewed were dated 1962, 1971, 1981, 1994, 2006 and 2017. Aerial photographs dated prior to 1962 were not available for review. The review is dependent on the quality and scale of the photographs. The following is a description of relevant information from the aerial photographs:

Table 4: Aerial Photograph Review

Year(s)	Property	Adjoining Properties	REC (yes or no)
1962	Undeveloped, wooded land	Undeveloped, wooded land. Trolley Line Road is depicted to the north of the property.	No
1971	Undeveloped, wooded land	Undeveloped, wooded land. Development associated with USC-Aiken depicted further to the south.	No
1981	Eastern portion of the property is depicted as undeveloped, wooded land. Western portion of the property is depicted as a cleared, vacant field.	Undeveloped, wooded land and cleared land. Additional development associated with USC-A depicted further to the south.	No
1994	Eastern portion of the property is depicted as undeveloped, wooded land. Western portion of the property appears to be used as part of the adjoining softball field. Existing batting cages and pitching stands appear to be depicted in the northwestern portion of the property.	North- Trolley Line Road and cleared land. East- Undeveloped, wooded land South- Softball field and tennis courts. West- College Station Drive and cleared land	No
2006 to 2017	Consistent with the previous aerial photographs	The existing nursing building is depicted on the southeastern adjacent property. Other adjoining properties appear to be consistent with the previous aerial photographs. Existing Kent's Corner is depicted further to the northwest of the property. Increased development is depicted in the surrounding areas.	No

6.2 Property Tax Files

Property tax files may include records of past ownership, appraisals, maps, sketches, photos or other information kept by the local jurisdiction for property tax assessment purposes. According to the Aiken County tax assessor's on-line information, the property is owned by The Aiken County Higher Education Commission. The property is listed as a 6-acre portion of a parcel with an identification number of 087-15-01-008. Improvements are not listed in association with this parcel.

6.3 Recorded Land Title Records

Recorded land title records may include leases, land contracts, and authorized user lists recorded by the local jurisdiction. Land title records may provide only a list of the names of previous owners and may be of limited use; however, they may provide useful information about uses or occupancy of the property when employed in combination with other sources. The Corps was not provided with Land Title Records.

6.4 Historical USGS Topographic Maps

Topographic maps are produced by the United States Geological Survey (USGS) for various time periods. The Corps reviewed a historical topographic map of the Graniteville, South Carolina quadrangle, dated 1964 and photo revised in 1980. Trolley Line Road is depicted to the north and College Station Drive to the west of the property. A USC-Aiken supply and maintenance building is located in near the existing tennis court facilities on the southern adjacent property. Structures are not depicted on other adjacent properties.

6.5 Historical Research

One of the ASTM standard historic sources to be reviewed for previous property uses is tenant history. The purpose is to identify past occupants of the property and adjacent properties. VERAcheck, Inc. completed a historical research dated 1994, 1997, 1999, 2001, 2008, 2005, 2007, 2009, 2011, 2013, 2015, 2017, and 2019. The following is a description of relevant information:

Table 5: Historical Research of Property

Year(s)	Property	Adjoining Properties	REC (yes or no)
1994	No commercial listings	No commercial listings	No
1997	No commercial listings	Listing associated with USC-Aiken	No
1999	No commercial listings	Residences, Medical listings, commercial businesses, and listings associated with USC-A	No
2001	Economic Development, Library, Planetarium and USC-A	Surrounding properties consistent with the previous listings	No
2008	Theater added	Residences, Medical offices and commercial businesses	No
2005	Apartments added	Surrounding properties consistent with the previous listings	No
2007-2019	Additional businesses listed.	Surrounding properties consistent with the previous listings, continue to grow	No

6.7 Zoning/Land Use Records

The term zoning/land use records refers to records of the local government indicating the uses permitted by the government in particular zones within its jurisdictions. According to the Aiken County Assessment Office, the property parcel is classified as government property and is listed as commercial land use.

6.8 Other Historical Sources

Other credible historical sources may be reviewed to identify past uses of the property. These sources may include websites, county or state road maps, historical society documents, or local library information. The Aiken County Environmental Health Department does not maintain files pertaining to the property.

6.9 Previous Reports

The Corps has not been provided with environmental or engineering assessment reports for the property completed by others, nor has The Corps completed similar studies or prior assessments of the property.

6.10 Historical Use Summary

According to historical research, it appears that the property historically consisted of undeveloped, wooded land from at least 1964 until the late 1970s when the western portion of the property was cleared and converted to a sports field for use by USC-A. The eastern portion of the property has remained undeveloped and wooded. Historical records prior to 1964 were not located for the site.

Our review of historical information for adjoining or nearby properties identified the area as originally undeveloped, wooded land that transitioned to commercial and academic institutional use over time. It appears that development associated with the USC-A campus began in the late 1960s or early 1970s. It appears that commercial businesses and medical offices began to be constructed in the 1970s and 1980s. Obvious indications of RECs were not identified in the historical data review.

7.0 SITE AND AREA RECONNAISSANCE

7.1 Site Features

The eastern portion of the property currently consists of undeveloped, wooded land. The western portion of the property consists of a fenced, grass- covered sports field.

The property is bound on the north by Trolley Line Road. The property is bound on the east by undeveloped, wooded land. The property is bound on the southeast by a nursing building. The property is bound on the south by tennis courts, and further south by Scholar Loop, USC-Aiken supply and maintenance building, the student activities center, and paved parking areas. The property is bound on the west by College Stations Drive (see figures 1-4).

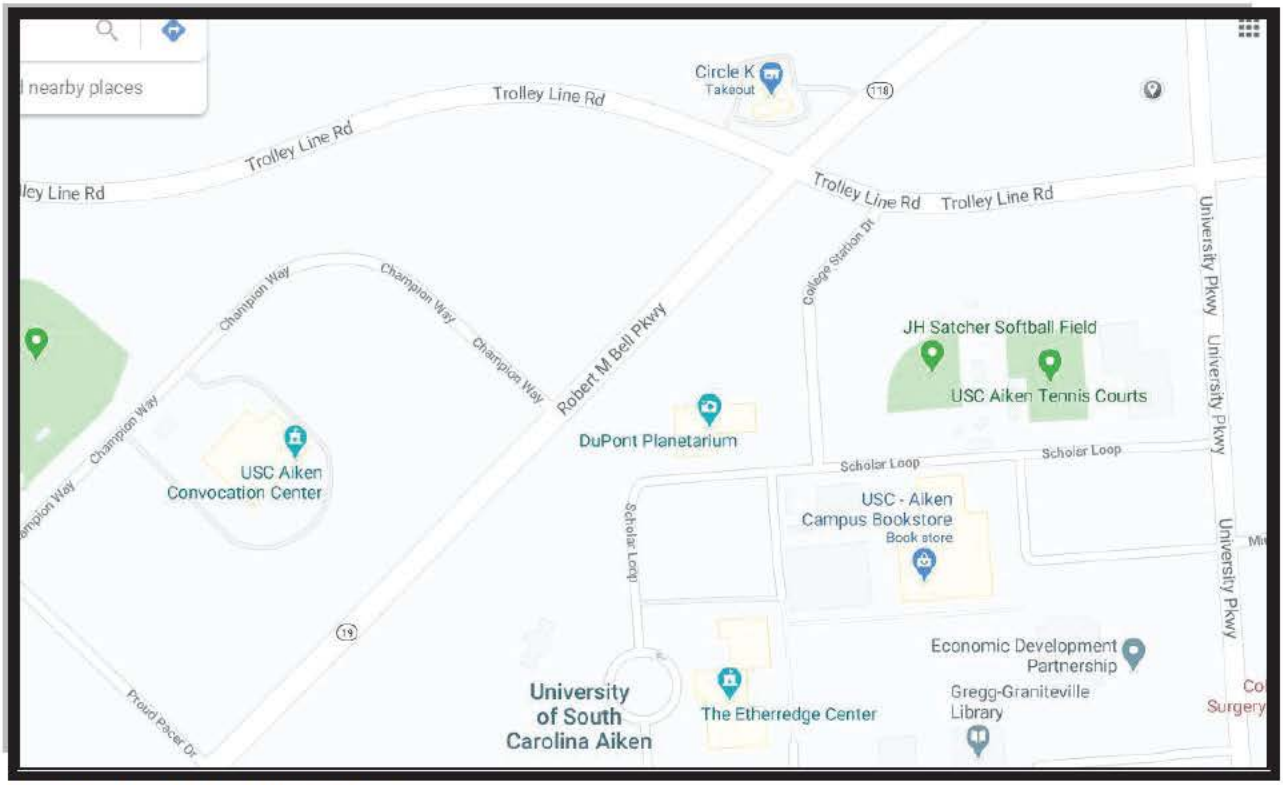

Figure 1: USC-Aiken Map

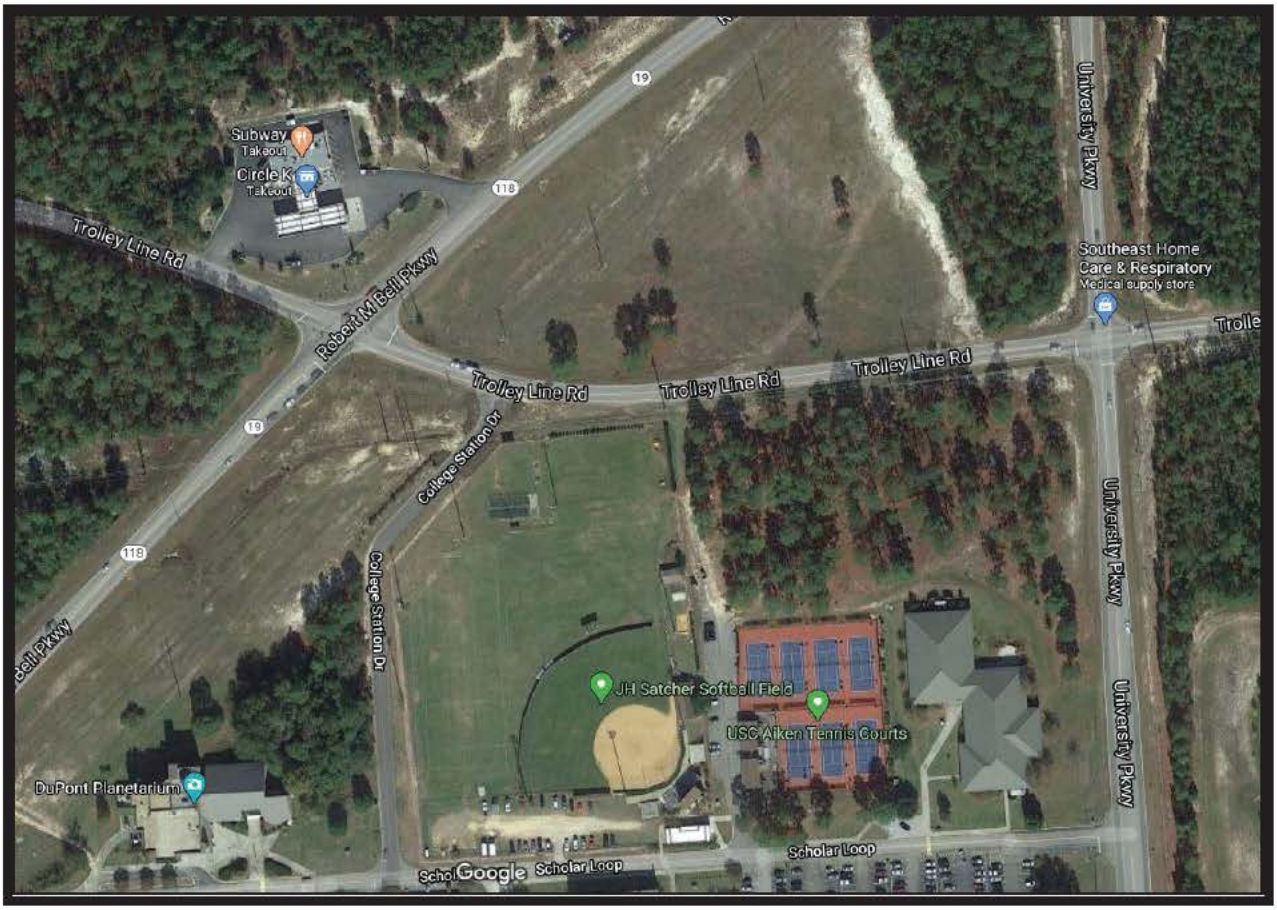

Figure 2: USC – Aiken Satellite Map

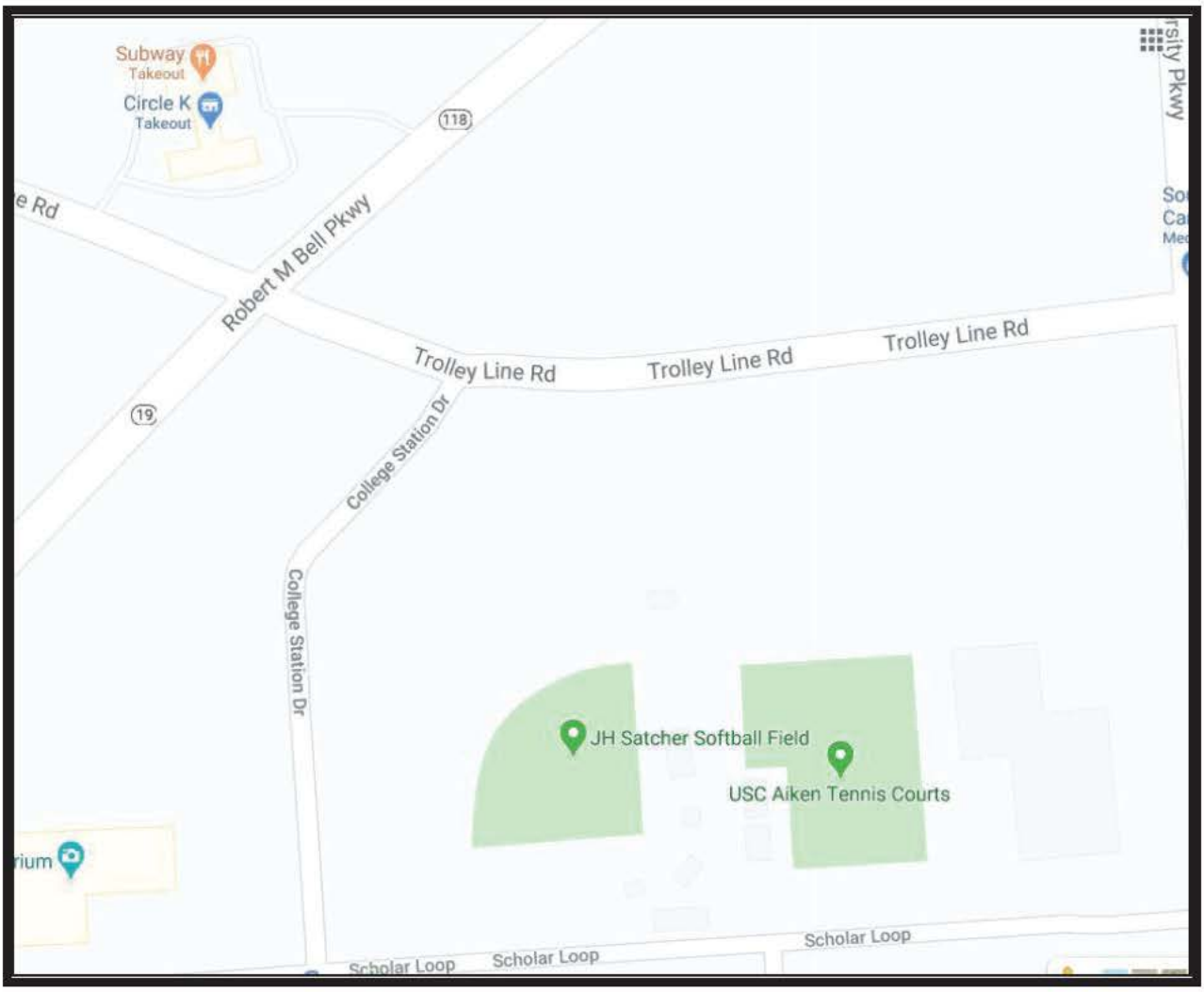

Figure 3: Close-Up of USC-Aiken Softball Field and Tennis Courts

Figure 4: Satellite of North of Softball Field - Proposed Project Site between scoreboards

7.2 Adjoining and Nearby Properties

Table 6: Adjoining and Nearby Properties of the AMC Facility

Direction	Description	Gradient Direction
North	Trolley Line Road Further northwest- Kent's Corner Further north- Vacant, grass-covered field	Cross-gradient
East	Undeveloped, wooded land Further east- University Parkway Southeast- Nursing building	Up-gradient
South	Softball field and tennis courts Further south- Scholar Loop, the USC-Aiken supply and maintenance building, the student activities center that includes a planetarium and dining areas, and paved parking areas Southwest- College Stations Drive Further southwest- Ruth Patrick Science Education Center	Cross-gradient
West	College Station Drive Further west- Undeveloped, wooded and grass-covered land	Down-gradient

7.3 Features of Interest

Table 7: Features of Interest for a Phase 1 ESA

Features	Found on Site	Not Found on Site
Underground or aboveground storage tanks		X
Strong, pungent or noxious odors		X
Surface waters		X
Standing pools of liquid likely containing petroleum or hazardous substances		X
Containers of petroleum or hazardous substances greater than five gallons		X
Containers of petroleum or hazardous substances < or = five gallons		X
Unidentified opened or damaged containers of hazardous substances or petroleum products		X
Known or suspect PCB-containing equipment (excluding light ballasts)		X
Stains or corrosion to floors, walls or ceilings		X
Floor drains and sump pumps		X
Pits, ponds or lagoons		X
Stained soil or pavement		X
Stressed vegetation		X
Solid waste mounds or non-natural fill materials		X
Wastewater discharges into drains, ditches or streams		X
Groundwater wells including potable, monitoring, dry, irrigation, injections and/or abandoned		X
Septic systems or cesspools		X
Elevators		X
Dry cleaning		X
Onsite emergency electrical generators		X
Specialized industrial equipment (paint booths, bag houses, etc.) on-site		X
Hydraulic lifts		X
Oil-water separators		X
Compressors		X
Grease traps		X

7.4 Site Inspection Methodology

Ms. Cynthia Gose, Environmental Engineer with the Corps, conducted a field inspection on 17 Jul 2020, starting about noon after contacting Mr. Brian Enter via telephone (due to COVID-19 limitations of physical contact). The temperature was approximately 90 degrees and the sky was overcast. The property was walked around the inside of the fenced perimeter, the field between the two scoreboards where the proposed project would be located, around the maintenance storage area, and outside the fenced perimeter. Photos are in Appendix C, and describe where they were taken and what they are showing. Appendix E is the IPaC report from a website the U.S. Fish and Wildlife maintains to determine if there are protected or Threatened and Endangered species. None were present during the inspection.

This site reconnaissance confirmed that there were no indication of RECs on the project site.

Pictures show the Circle K is located to the northwest of the intersection of College Station Drive and Trolley Line Road, where a former UST/LUST is listed in the VERAcheck Report. The gas station is approximately 330 feet away from the proposed project site, outside the ASTM search radius minimum distance.

7.5 Summary

According to the records review of adjoining and nearby properties, the property does not have any features that would be identified as a REC.

8.0 ADDITIONAL SERVICES

ASTM guidelines identify non-scope issues, which are beyond the scope of this practice. Non-scope issues have the potential to be business environmental risks. Some of these non-scope issues include; asbestos-containing building materials, radon, lead-based paint, lead in drinking water, wetlands, and mold.

9.0 INTERVIEWS

Mr. Enter, the Facilities Director for USC-A was contacted via telephone and completed the owner survey. According to Mr. Enter, the property was purchased from Graniteville Company, a South Carolina Corporation on October 20, 1970. Mr. Enter indicated that the subject property is part of a larger parcel, identified as Aiken County parcel identification number 087-015-01-008, and that the subject property has historically consisted of undeveloped, wooded land.

According to Mr. Enter, the property contains a natural gas pipeline maintained by Dominion Energy, but that it is not currently connected to public utilities. Mr. Enter indicated that he is not aware of 1) environmental concerns associated with the property; 2) pending, past, or threatened administrative litigation, or administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the property; or 3) government notices regarding any possible violation of environmental laws or possible liability related to hazardous substances or petroleum products.

10.0 FINDINGS AND CONCLUSIONS

Based on the records search, it appears that the property historically consisted of undeveloped, wooded land from at least 1964 until the late 1970s when the western portion of the property was cleared and converted to a sports field for use by USC-Aiken. The eastern portion of the property has remained undeveloped and wooded. Historical records prior to 1964 were not reasonably ascertainable for the site. The review of historical information for adjoining or nearby properties identified the area as originally undeveloped, wooded land that transitioned to commercial and academic institutional use over time.

Development associated with the USC-A campus began in the vicinity of the property in the late 1960s or early 1970s. It appears that commercial businesses and medical offices began to be constructed in the vicinity of the property in the 1970s and 1980s. Obvious indications of RECs were not identified in the historical data review.

A regulatory database search report was provided researching a series of Federal, State, Local, and other databases for facilities and properties that are located within specified minimum search distances from the property. The report did not identify the property on the databases researched. The report identified several off-site properties within the minimum ASTM search distances. USC-Aiken was identified, however, the actual location is elsewhere on campus, not on the proposed property site, nor is it within the ASTM search radius. Based on the review of available public records and/or interviews with USC – Aiken, Facilities Director, none of the listings are believed to represent a REC for the property.

11.0 REFERENCES

Aiken County Tax Assessment and GIS websites, accessed on 22 & 23 June 2020, and on 27 July 2020.

ASTM E1527-13. Standard Practice for Environmental Site Assessment, Phase I Environmental Site Assessment (2013).

Property owner survey, completed via teleconference with Mr. Brian Enter, dated 23 June 2020.

U.S. Fish & Wildlife Service: IPaC Report run 27 Jul 2020.

VERAcheck, Inc. Report dated June 2020.

ENVIRONMENTAL RECORDS SEARCH

40 CFR 312.26 Compliant; Reviews of Federal, State, Tribal, and local government records.

471 University Parkway, Aiken, SC 29801

Aiken County
Parcel ID: 087 15 01 003
Project Number: C187888

Prepared for:
US Army Corps of Engineers-SD

Attn:
Cynthia A Gose

6/5/2020

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Table of Contents

SUBJECT SITE INFORMATION			
Address City Present Tenant	471 UNIVERSITY PKWY # 11 AIKEN, SC 29801-6389 CHAMBERLAIN KENDRIA L nurses-practitioners/ 1 yrs in business	County	AIKEN
Address City Present Tenant	471 UNIVERSITY PKWY # 111 AIKEN, SC 29801-6389 ECONOMIC DEVELOPMENT economic development agencies/ 8 yrs in business; federal government contractors/ 7 yrs in business	County	AIKEN
Address City Present Tenant	**471 UNIVERSITY PKWY** AIKEN, SC 29801-6389 ABBI'S COFFEE MILL & ROASTERY restaurants/ 7 yrs in business DU PONT PLANETARIUM planetariums/ 15+ yrs in business; educational programs/ 2 yrs in business; non-profit organizations/ 1 yrs in business ELLISON ANNE nonclassified establishments/ 2 yrs in business **ETHERREDGE CENTER** theatres-live/ 15+ yrs in business KITCHINGS KATHY M nurses-practitioners/ 2 yrs in business MCGRATH COMPUTER LEARNING CTR education centers/ 1 yrs in business STARBUCKS coffee shops/ 2 yrs in business; coffee & tea/ 2 yrs in business; cafes/ 2 yrs in business UNIVERSITY OF SC AIKEN schools-universities & colleges academic/ 15+ yrs in business; federal government contractors/ 9 yrs in business; college admissions counselors/ 1 yrs in business USC AIKEN CONTINUING EDUCATION educational programs/ 3 yrs in business USCA BOOKSTORE book dealers-retail/ 10 yrs in business	County	AIKEN

HISTORICAL RESEARCH

The purpose of this Historical Research is to establish prior land use by identifying the present and historical occupants (be it the owner or lessee) of the **subject sites, 471 UNIVERSITY PKWY # 11, 471 UNIVERSITY PKWY # 111, 471 UNIVERSITY PKWY, INCLUDING ALL SUITE NUMBERS and the 4 neighboring odd addresses.**

Occupant History *COMMERCIAL LISTING ONLY*		
2019	309 UNIVERSITY PKWY	HOME MEDICAL 599920 - HOME HEALTH & HEALTH CARE EQUIPMENT/ 4 yrs in business; 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 14 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 13 yrs in business; 516920 - OXYGEN (WHLS)/ 13 yrs in business
	471 UNIVERSITY PKWY # 11	**CHAMBERLAIN KENDRIA L 804907 - NURSES-PRACTITIONERS/ 1 yrs in business**
	471 UNIVERSITY PKWY # 111	**ECONOMIC DEVELOPMENT 874875 - ECONOMIC DEVELOPMENT AGENCIES/ 8 yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 7 yrs in business**
	471 UNIVERSITY PKWY	**ABBI'S COFFEE MILL & ROASTERY 581208 - RESTAURANTS/ 6 yrs in business**
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM 841204 - PLANETARIUMS/ 15+ yrs in business; 821108 - EDUCATIONAL PROGRAMS/ 2 yrs in business; 839998 - NON-PROFIT ORGANIZATIONS/ 1 yrs in business**
	471 UNIVERSITY PKWY	**ELLISON ANNE 999977 - NONCLASSIFIED ESTABLISHMENTS/ 2 yrs in business**
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER 792207 - THEATRES-LIVE/ 15+ yrs in business**
	471 UNIVERSITY PKWY	**KITCHINGS KATHY M 804907 - NURSES-PRACTITIONERS/ 2 yrs in business**
	471 UNIVERSITY PKWY	**MCGRATH COMPUTER LEARNING CTR 829972 - EDUCATION CENTERS/ 1 yrs in business**

Occupant History
COMMERCIAL LISTING ONLY

	471 UNIVERSITY PKWY	**STARBUCKS** 581228 - COFFEE SHOPS/ 2 yrs in business; 549915 - COFFEE & TEA/ 2 yrs in business; 581214 - CAFES/ 2 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SC AIKEN** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 9 yrs in business; 829989 - COLLEGE ADMISSIONS COUNSELORS/ 1 yrs in business
	471 UNIVERSITY PKWY	**USC AIKEN CONTINUING EDUCATION** 821108 - EDUCATIONAL PROGRAMS/ 3 yrs in business
	471 UNIVERSITY PKWY	**USCA BOOKSTORE** 594201 - BOOK DEALERS-RETAIL/ 10 yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 15+ yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 9 yrs in business
	1583 UNIVERSITY PKWY	A TO Z SELF STORAGE 422503 - STORAGE-HOUSEHOLD & COMMERCIAL/ 15+ yrs in business
2017	171 UNIVERSITY PKWY	ATM 602103 - AUTOMATED TELLER MACHINES/ 5 yrs in business
	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 12 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 11 yrs in business; 516920 - OXYGEN (WHLS)/ 11 yrs in business; 599922 - ARTIFICIAL LIMBS/ 11 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**ECONOMIC DEVELOPMENT** 874875 - ECONOMIC DEVELOPMENT AGENCIES/ 6 yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 5 yrs in business
	471 UNIVERSITY PKWY	**ABBI'S COFFEE MILL & ROASTERY** 581208 - RESTAURANTS/ 4 yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841204 - PLANETARIUMS/ 13 yrs in business
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER** 792207 - THEATRES-LIVE/ 15+ yrs in business
	471 UNIVERSITY PKWY	**SMALL BUSINESS DEVELOPMENT CTR** 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 15+ yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SC AIKEN** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 7 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SOUTH CAROLINA** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 6 yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 5 yrs in business
	471 UNIVERSITY PKWY	**USC AIKEN CONTINUING EDUCATION** 821108 - EDUCATIONAL PROGRAMS/ 1 yrs in business; 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 1 yrs in business
	471 UNIVERSITY PKWY	**USCA BOOKSTORE** 594201 - BOOK DEALERS-RETAIL/ 8 yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 15+ yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 7 yrs in business
	1583 UNIVERSITY PKWY	A TO Z SELF STORAGE 422503 - STORAGE-HOUSEHOLD & COMMERCIAL/ 13 yrs in business
2015	171 UNIVERSITY PKWY	ATM 602103 - AUTOMATED TELLER MACHINES/ 3 yrs in business
	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 10 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 9 yrs in business; 516920 - OXYGEN (WHLS)/ 9 yrs in business; 599922 - ARTIFICIAL LIMBS/ 9 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**ECONOMIC DEVELOPMENT** 874875 - ECONOMIC DEVELOPMENT AGENCIES/ 4 yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 3 yrs in business
	471 UNIVERSITY PKWY	**AIKEN BRANDON T** 804918 - PHYSICAL THERAPISTS/ 6 yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841204 - PLANETARIUMS/ 11 yrs in business

Occupant History
COMMERCIAL LISTING ONLY

	471 UNIVERSITY PKWY	**ETHERREDGE CENTER** 792207 - THEATRES-LIVE/ 15+ yrs in business
	471 UNIVERSITY PKWY	**SMALL BUSINESS DEVELOPMENT CTR** 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 14 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SC AIKEN** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 5 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SOUTH CAROLINA** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 4 yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 3 yrs in business
	471 UNIVERSITY PKWY	**USCA BOOKSTORE** 594201 - BOOK DEALERS-RETAIL/ 6 yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 15+ yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 5 yrs in business
	1583 UNIVERSITY PKWY	A TO Z SELF STORAGE 422503 - STORAGE-HOUSEHOLD & COMMERCIAL/ 11 yrs in business
2013	171 UNIVERSITY PKWY	ATM 602103 - AUTOMATED TELLER MACHINES/ 1 yrs in business
	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 8 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 7 yrs in business; 516920 - OXYGEN (WHLS)/ 7 yrs in business; 599922 - ARTIFICIAL LIMBS/ 7 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY # 9	**SMALL BUSINESS DEVELOPMENT CTR** 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 12 yrs in business
	471 UNIVERSITY PKWY	**AIKEN BRANDON T** 804918 - PHYSICAL THERAPISTS/ 4 yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841204 - PLANETARIUMS/ 9 yrs in business
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER** 792207 - THEATRES-LIVE/ 15+ yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SC AIKEN** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 3 yrs in business
	471 UNIVERSITY PKWY	**USCA BOOKSTORE** 594201 - BOOK DEALERS-RETAIL/ 4 yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 15+ yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 3 yrs in business
	1583 UNIVERSITY PKWY	A TO Z SELF STORAGE 422503 - STORAGE-HOUSEHOLD & COMMERCIAL/ 9 yrs in business
2011	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 6 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 5 yrs in business; 516920 - OXYGEN (WHLS)/ 5 yrs in business; 599922 - ARTIFICIAL LIMBS/ 5 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY # 9	**SMALL BUSINESS DEVELOPMENT CTR** 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 10 yrs in business
	471 UNIVERSITY PKWY	**AIKEN BRANDON T** 804918 - PHYSICAL THERAPISTS/ 2 yrs in business
	471 UNIVERSITY PKWY	**ARA SVC** 581212 - CATERERS/ 15+ yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841204 - PLANETARIUMS/ 7 yrs in business
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER** 792207 - THEATRES-LIVE/ 15+ yrs in business
	471 UNIVERSITY PKWY	**GREGG GRANITEVILLE LIBRARY** 823109 - LIBRARIES-INSTITUTIONAL/ 14 yrs in business

Occupant History
COMMERCIAL LISTING ONLY

	471 UNIVERSITY PKWY	**UNIVERSITY OF SC AIKEN** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business; 999966 - FEDERAL GOVERNMENT CONTRACTORS/ 1 yrs in business
	471 UNIVERSITY PKWY	**USCA BOOKSTORE** 594201 - BOOK DEALERS-RETAIL/ 2 yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 15+ yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 1 yrs in business
	1583 UNIVERSITY PKWY	A TO Z SELF STORAGE 422503 - STORAGE-HOUSEHOLD & COMMERCIAL/ 7 yrs in business
2009	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 4 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 3 yrs in business; 516920 - OXYGEN (WHLS)/ 3 yrs in business; 599922 - ARTIFICIAL LIMBS/ 3 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY # 9	**SMALL BUSINESS DEVELOPMENT CTR** 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 8 yrs in business
	471 UNIVERSITY PKWY	**ARA SVC** 581212 - CATERERS/ 15+ yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841204 - PLANETARIUMS/ 5 yrs in business; 841201 - MUSEUMS/ 13 yrs in business
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER** 792207 - THEATRES-LIVE/ 13 yrs in business
	471 UNIVERSITY PKWY	**GREGG GRANITEVILLE LIBRARY** 823109 - LIBRARIES-INSTITUTIONAL/ 12 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SC-AIKEN** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 13 yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 6 yrs in business
	1583 UNIVERSITY PKWY	A TO Z SELF STORAGE 422503 - STORAGE-HOUSEHOLD & COMMERCIAL/ 5 yrs in business
2007	309 UNIVERSITY PKWY	HOME MEDICAL INC 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 2 yrs in business; 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 1 yrs in business; 516920 - OXYGEN (WHLS)/ 1 yrs in business; 599922 - ARTIFICIAL LIMBS/ 1 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY # 9	**SMALL BUSINESS DEVELOPMENT CTR** 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 6 yrs in business
	471 UNIVERSITY PKWY	**ARA SVC** 581212 - CATERERS/ 15+ yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841204 - PLANETARIUMS/ 3 yrs in business; 841201 - MUSEUMS/ 11 yrs in business
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER** 792207 - THEATRES-LIVE/ 11 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SOUTH CAROLINA** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business
	895 UNIVERSITY PKWY	R E PHELON CO INC 336398 - ALUMINUM DIE CASTINGS (MFRS)/ 15+ yrs in business; 336501 - FOUNDRIES-ALUMINUM BRASS BRONZE (MFRS)/ 15+ yrs in business; 349903 - METAL GOODS-MANUFACTURERS/ 15+ yrs in business; 369498 - ELEC EQUIP-INTERNAL COMB ENGINES (MFRS)/ 15+ yrs in business
	1573 UNIVERSITY PKWY	UPSCALE RESALE 593204 - CONSIGNMENT SHOPS/ 11 yrs in business; 562101 - WOMEN'S APPAREL-RETAIL/ 4 yrs in business
2005	199 UNIVERSITY PKWY	DONNA'S BED & BREAKFAST 701107 - BED & BREAKFAST ACCOMMODATIONS/ 2 yrs in business; 701101 - HOTELS & MOTELS/ 1 yrs in business

Occupant History

COMMERCIAL LISTING ONLY

	309 UNIVERSITY PKWY	HOME MEDICAL 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 3 yrs in business; 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 5 yrs in business; 516920 - OXYGEN (WHLS)/ 5 yrs in business; 599922 - ARTIFICIAL LIMBS/ 2 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY # 9	**SMALL BUSINESS DEVELOPMENT CTR 874201 - BUSINESS MANAGEMENT CONSULTANTS/ 4 yrs in business**
	471 UNIVERSITY PKWY	**ARA SVC 581212 - CATERERS/ 15+ yrs in business**
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM 841201 - MUSEUMS/ 9 yrs in business; 841204 - PLANETARIUMS/ 1 yrs in business**
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER 792207 - THEATRES-LIVE/ 9 yrs in business**
	471 UNIVERSITY PKWY	**GREGG GRANITEVILLE LIBRARY 823109 - LIBRARIES-INSTITUTIONAL/ 8 yrs in business**
	471 UNIVERSITY PKWY	**PACER DOWN APARTMENTS 651303 - APARTMENTS/ 15+ yrs in business**
	471 UNIVERSITY PKWY	**UNIVERSITY OF SOUTH CAROLINA 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business**
	895 UNIVERSITY PKWY	R E PHELON CO 336398 - ALUMINUM DIE CASTINGS (MFRS)/ 15+ yrs in business; 336501 - FOUNDRIES-ALUMINUM BRASS BRONZE (MFRS)/ 15+ yrs in business; 349903 - METAL GOODS-MANUFACTURERS/ 15+ yrs in business; 369498 - ELEC EQUIP-INTERNAL COMB ENGINES (MFRS)/ 15+ yrs in business
	1569 UNIVERSITY PKWY	AIKEN MILL SVC 349903 - METAL GOODS-MANUFACTURERS/ 9 yrs in business; 171114 - MECHANICAL CONTRACTORS/ 15+ yrs in business
2003	151 UNIVERSITY PKWY	HOME MEDICAL 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 10 yrs in business; 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 15+ yrs in business; 516920 - OXYGEN (WHLS)/ 10 yrs in business; 599922 - ARTIFICIAL LIMBS/ 7 yrs in business
	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 3 yrs in business; 516920 - OXYGEN (WHLS)/ 3 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY	**AIKEN COUNTY ECONOMIC DEV 961103 - COUNTY GOVERNMENT-ECONOMIC PROGRAM ADM/ 14 yrs in business**
	471 UNIVERSITY PKWY	**ARAMARK 581212 - CATERERS/ 14 yrs in business**
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM 841201 - MUSEUMS/ 7 yrs in business**
	471 UNIVERSITY PKWY	**ETHERREDGE CENTER 792207 - THEATRES-LIVE/ 7 yrs in business**
	471 UNIVERSITY PKWY	**GREGG GRANITEVILLE LIBRARY 823109 - LIBRARIES-INSTITUTIONAL/ 6 yrs in business**
	471 UNIVERSITY PKWY	**PACER DOWN APARTMENTS 651303 - APARTMENTS/ 15+ yrs in business**
	471 UNIVERSITY PKWY	**UNIVERSITY OF SOUTH CAROLINA 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 15+ yrs in business**
	785 UNIVERSITY PKWY	SPRINGSIDE APARTMENTS 651303 - APARTMENTS/ 15+ yrs in business
	895 UNIVERSITY PKWY	R E PHELON CO 336398 - ALUMINUM DIE CASTINGS (MFRS)/ 15+ yrs in business; 336501 - FOUNDRIES-ALUMINUM BRASS BRONZE (MFRS)/ 15+ yrs in business; 349903 - METAL GOODS-MANUFACTURERS/ 15+ yrs in business; 369498 - ELEC EQUIP-INTERNAL COMB ENGINES (MFRS)/ 15+ yrs in business
2001	151 UNIVERSITY PKWY	HOME MEDICAL 504704 - PHYSICIANS & SURGEONS EQUIP & SUPLS-WHLS/ 9 yrs in business; 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 10+ yrs in business; 516920 - OXYGEN (WHLS)/ 9 yrs in business; 599922 - ARTIFICIAL LIMBS/ 6 yrs in business
	309 UNIVERSITY PKWY	HOME MEDICAL 504712 - HOSPITAL EQUIPMENT & SUPPLIES (WHLS)/ 2 yrs in business; 516920 - OXYGEN (WHLS)/ 2 yrs in business
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**

Occupant History
COMMERCIAL LISTING ONLY

	471 UNIVERSITY PKWY	**AIKEN COUNTY ECONOMIC DEV** 961103 - COUNTY GOVERNMENT-ECONOMIC PROGRAM ADM/ 10+ yrs in business
	471 UNIVERSITY PKWY	**ARA SVC** 581212 - CATERERS/ 10+ yrs in business
	471 UNIVERSITY PKWY	**DU PONT PLANETARIUM** 841201 - MUSEUMS/ 6 yrs in business
	471 UNIVERSITY PKWY	**GREGG GRANITEVILLE LIBRARY** 823109 - LIBRARIES-INSTITUTIONAL/ 5 yrs in business
	471 UNIVERSITY PKWY	**UNIVERSITY OF SOUTH CAROLINA** 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC/ 10+ yrs in business
	785 UNIVERSITY PKWY	SPRINGSIDE APARTMENTS 651303 - APARTMENTS/ 10+ yrs in business
	895 UNIVERSITY PKWY	R E PHELON CO 336398 - ALUMINUM DIE CASTINGS (MFRS)/ 10+ yrs in business; 336501 - FOUNDRIES-ALUMINUM BRASS BRONZE (MFRS)/ 10+ yrs in business; 349903 - METAL GOODS-MANUFACTURERS/ 10+ yrs in business; 369498 - ELEC EQUIP-INTERNAL COMB ENGINES (MFRS)/ 10+ yrs in business
1999	171 UNIVERSITY PKWY	AIKEN COUNTY ECONOMIC DEV 961103 - COUNTY GOVERNMENT-ECONOMIC PROGRAM ADM
	171 UNIVERSITY PKWY	ARAMARK 581212 - CATERERS
	171 UNIVERSITY PKWY	DU PONT PLANETARIUM 841201 - MUSEUMS
	171 UNIVERSITY PKWY	ETHERREDGE CENTER 792207 - THEATRES-LIVE; 593222 - THRIFT SHOPS
	171 UNIVERSITY PKWY	UNIVERSITY OF SOUTH CAROLINA 822101 - SCHOOLS-UNIVERSITIES & COLLEGES ACADEMIC
	375 UNIVERSITY PKWY	SPRINGSIDE APARTMENTS 651303 - APARTMENTS
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY	**No commercial listings**
	525 UNIVERSITY PKWY	UNIVERSITY PARKWAY APARTMENTS 651303 - APARTMENTS
	545 UNIVERSITY PKWY	AIKEN MILL SVC 349903 - METAL GOODS-MANUFACTURERS; 171114 - MECHANICAL CONTRACTORS
	895 UNIVERSITY PKWY	R E PHELON CO 369498 - ELEC EQUIP-INTERNAL COMB ENGINES (MFRS); 336398 - ALUMINUM DIE CASTINGS (MFRS); 336501 - FOUNDRIES-ALUMINUM BRASS BRONZE (MFRS); 349903 - METAL GOODS-MANUFACTURERS
1997	123 UNIVERSITY PKWY	OXFORD HOUSE AIKEN 8093 - SPECIALTY OUTPATIENT FACILITIES, NOT ELSEWHERE CLASSIFIED
	171 UNIVERSITY PKWY NW	ECONOMIC DEVELOPMENT PARTNERSHIP
	171 UNIVERSITY PKWY NW	UNIVERSITY OF SOUTH CAROLINA-AIKEN SECURITY-NI 8221 - COLLEGES, UNIVERSITIES, AND PROFESSIONAL SCHOOLS
	375 UNIVERSITY PKWY	HE XIANG CAN
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY	**No commercial listings**
	895 UNIVERSITY PKWY	PHELON R E COMPANY
1994		
	471 UNIVERSITY PKWY # 11	**No commercial listings**
	471 UNIVERSITY PKWY # 111	**No commercial listings**
	471 UNIVERSITY PKWY	**No commercial listings**

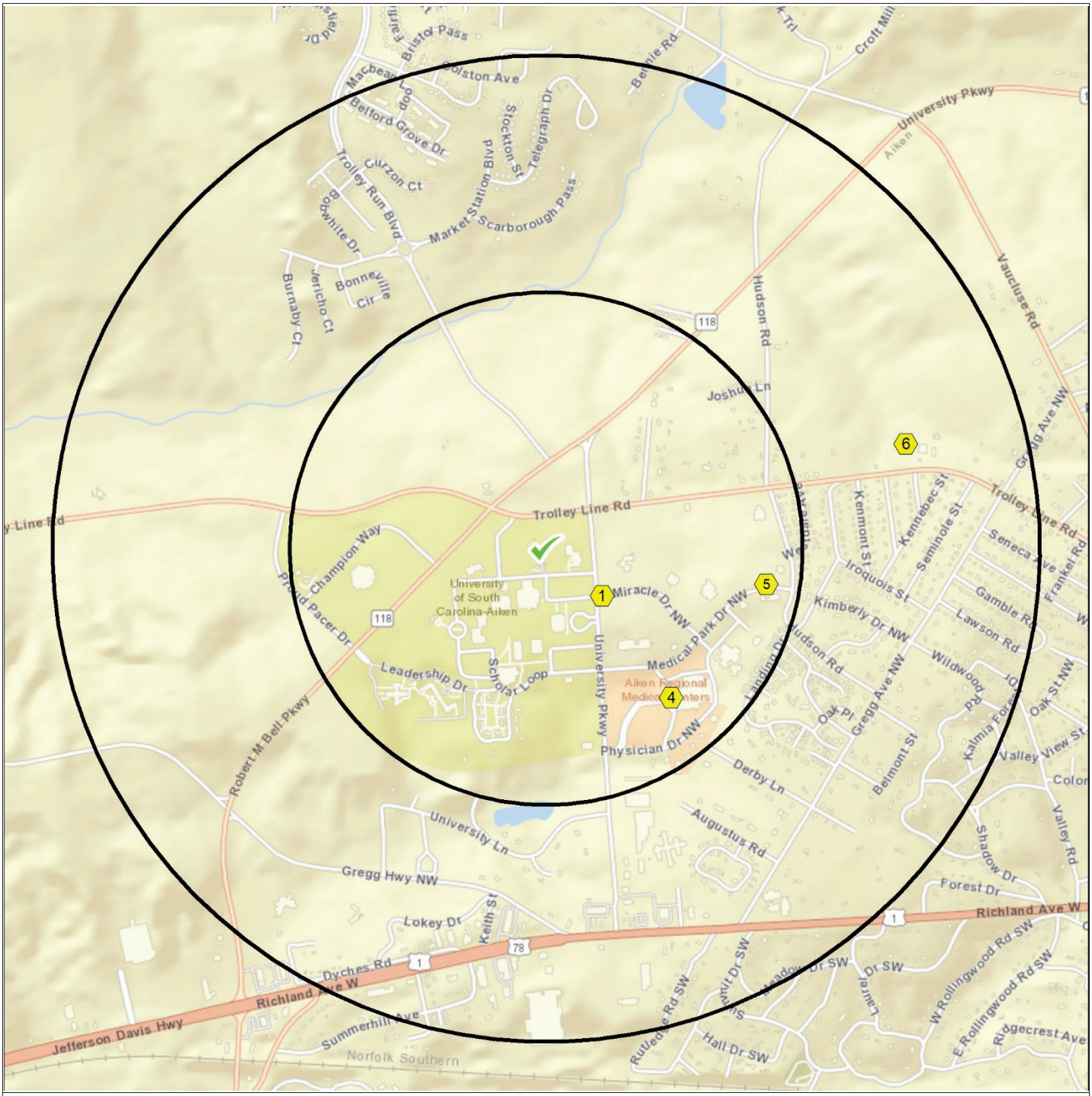
SUBJECT SITE INFORMATION			
Address	471 University Parkway		
City	Aiken		
State	SC	Latitude	33.57567
Zip	29801	Longitude	-81.76724

Regulatory Records Research Findings Summary

The purpose of this Regulatory Records Research is to establish potential environmental issues at the subject site and adjacent properties in accordance with the active ASTM Standard E-1527-13 records review requirements and 40 CFR 312.26 Compliance; Reviews of Federal, State, Tribal, and local government records.

FINDINGS

Environmental Concerns	Search Dist	Site	<1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	unknown	Total
Fed. National Priority List	1 mile							0
Fed. National Priority List Polygons	1 mile							0
Fed. SEMS CERCLA	1/2 mile						4	4
Fed. Uranium Mill Tailing Remedial Action	1/2 mile							0
Fed. National Mines Database	1/2 mile							0
Fed. Indian Country LUST	1/2 mile							0
Fed. Emergency Response Notification Sys	1/2 mile				2			2
Fed. HMIRS Pipeline	1/8 mile							0
Fed. HMIRS Transport Incidents	1/8 mile							0
Fed. Clandestine Drug Labs	1/2 mile							0
Fed. Brownfields	1/2 mile							0
Fed. Indian Country FE&C	1/2 mile							0
Fed. NAMSEI	1/2 mile							0
Fed. ICIS FE&C	1/2 mile							0
Fed. Hazardous Waste Compliance Docket	1/2 mile							0
Fed. RCRA Violators	1/2 mile							0
Fed. RCRA Institutional/Engineering Controls	1/2 mile							0
SC. Brownfields	1/2 mile						4	4
SC. Drycleaning Facility Restoration Trust Fund	1/2 mile							0
SC. Leaking Underground Storage Tanks	1/2 mile	1			1		16	18
SC. Registry of Conditional Remedies	1/2 mile							0
SC. Spills	1/2 mile				2			2
SC. Solid Waste	1 mile					1		1
SC. Spills from Unregulated Sources	1/2 mile							0
Concern Sites		1	0	0	2	1	24	28
Operating Permits								
Fed. HMIRS Transport Permits	1/8 mile							0
Fed. NRC Reactors and Storage	1/4 mile							0
Fed. NRC License Permits	1/4 mile							0
Fed. TSCA CDR-IUR	1/4 mile							0
Fed. PCB Waste Handlers Comm Displ Permits NLU	1/4 mile							0
Fed. PCB Waste Handlers Comm Storage Permits NLU	1/4 mile							0
Fed. PCB Notice of Activity	1/4 mile							0
Fed. PCB Registrations	1/4 mile						3	3
Fed. Toxic Release Inventory	1/4 mile							0
Fed. TSCA PPIS	1/4 mile						4	4
Fed. Indian Country UST	1/4 mile							0
Fed. ICIS NPDES	1/4 mile							0
Fed. Indian Country NPDES	1/4 mile							0
Fed. Indian Country AFS	1/4 mile							0
Fed. ICIS AFS	1/4 mile	1					7	8
Fed. RCRA Permits	1/4 mile							0
Fed. Facility Registry System	1/4 mile			1				1
Fed. Active Reg Pesticide Producing Facilities	1/4 mile							0
SC. Dry Cleaners City Directory Listings	1/4 mile						2	2
SC. Gas Stations City Directory Listings	1/4 mile			1			3	4
SC. Underground Storage Tanks	1/4 mile	1		1			3	5
Permit Sites		1	0	2	0	0	22	27
Total Sites		**1**	**0**	**2**	**2**	**1**	**46**	**52**



Buffers: 1/2 & 1 mile Scale: One Inch = 1610 Feet

✓ Subject Site

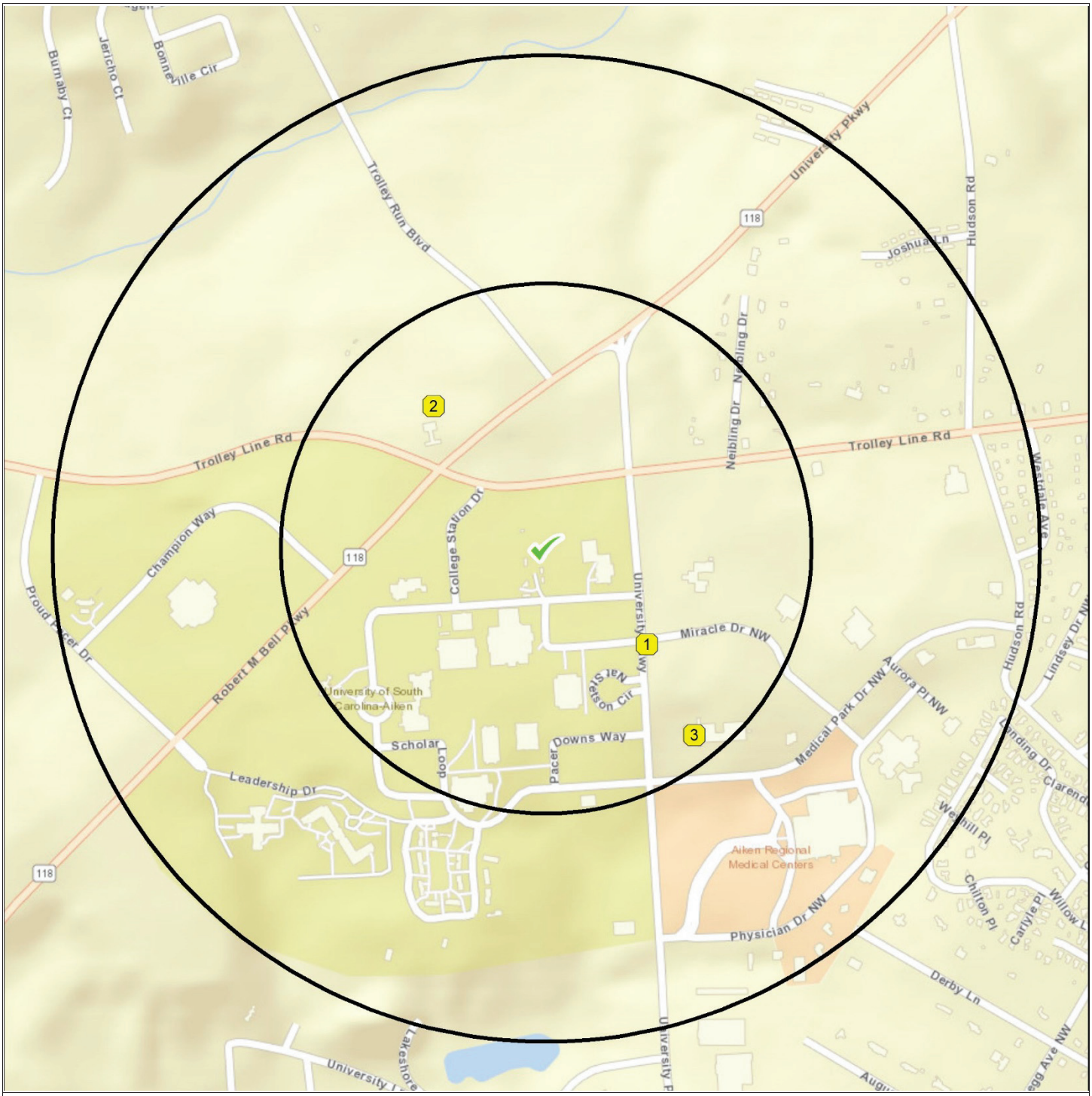
⬡ Concerns Site

⬠ National Priority List Site

American Indian Lands

Sites with Records of Concern within the Research Area

N



Buffers: 1/4 and 1/2 mile Scale: One Inch = 840 Feet

✔ Subject Site

Permits Site

American Indian Lands

Sites with Permit Records within the Research Area

N

Zoom Radius: 1/8 mile Scale: One Inch = 260 Feet ✔ Subject Site

Aerial Image Date: 10/31/2017

N

Zoom Radius: 1/8 mile Scale: One Inch = 260 Feet ✔ Subject Site

Aerial Image Date: 10/13/2006

N

Zoom Radius: 1/8 mile Scale: One Inch = 260 Feet ✔ Subject Site

Aerial Image Date: 2/1/1994

N

Zoom Radius: 1/8 mile Scale: One Inch = 260 Feet ✔ Subject Site

Aerial Image Date: 3/10/1981

N

Zoom Radius: 1/8 mile Scale: One Inch = 260 Feet ✔ Subject Site

Aerial Image Date: 12/22/1971

N

Zoom Radius: 1/8 mile Scale: One Inch = 260 Feet ✔ Subject Site

Aerial Image Date: 3/23/1962

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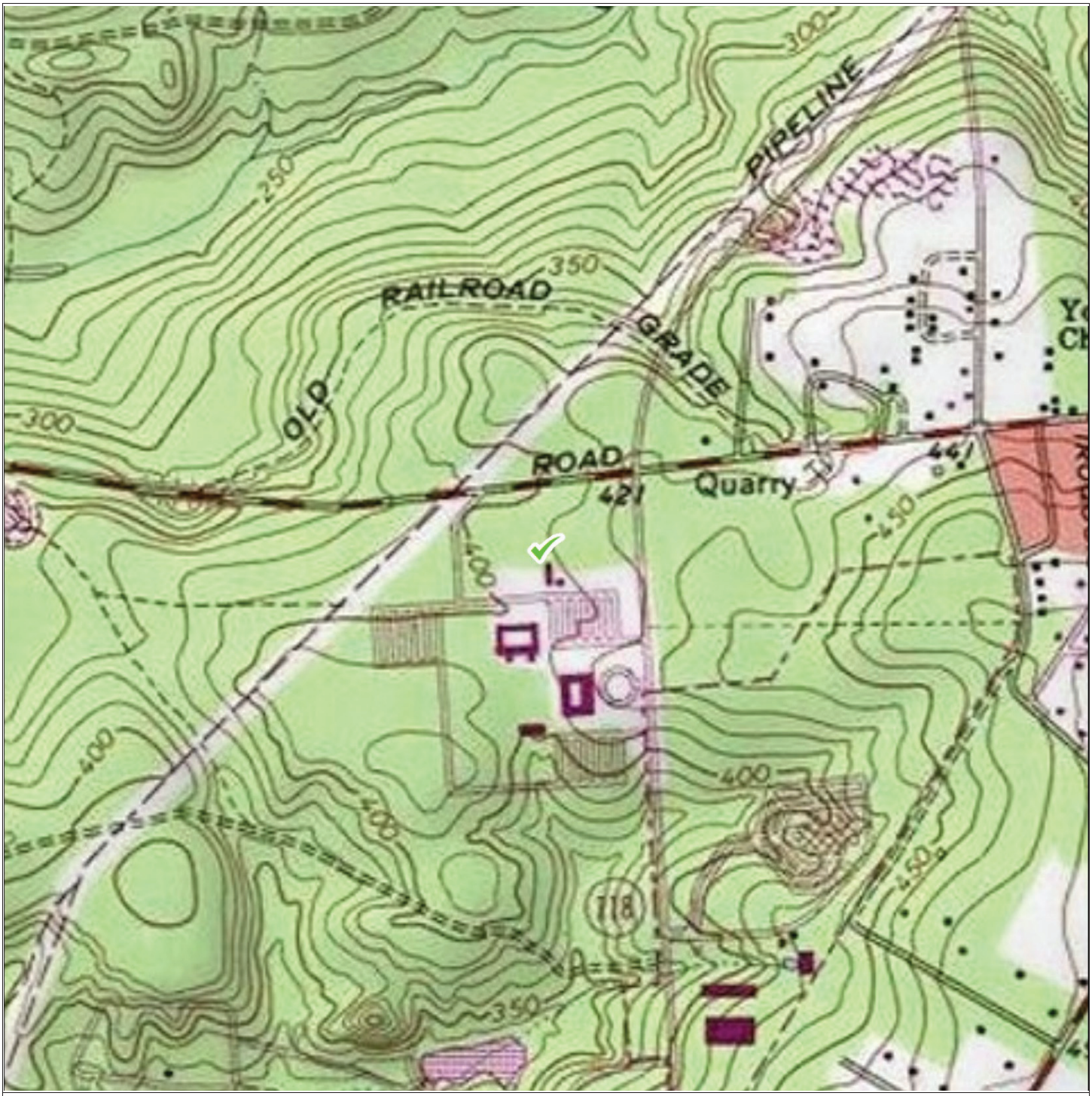

Zoom Radius: 1/2 mile Scale: One Inch = 840 Feet ✔ Subject Site

Topographic Map

N

Zoom Radius: 1/2 mile Scale: One Inch = 840 Feet ✔ Subject Site

Historical Topographic Map Image

Map Name: Graniteville, Graniteville. Current as of: 1980.

Map ID: SC_Graniteville_261065_1964_24000.tif, SC_Graniteville_261064_1964_24000.tif

N

Zoom Radius: 1/2 mile Scale: One Inch = 840 Feet ✔ Subject Site

Historical Topographic Map Image

Map Name: Graniteville. Current as of: 1971.

Map ID: SC_Graniteville_261062_1971_24000.tif

N