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# *Institute Honors and Awards* **Fellowship**



THE AMERICAN  
INSTITUTE  
OF ARCHITECTS

## **2017 AIA Fellowship**

Nominee     Leslie Gartner  
Organization     WSP USA Corp  
Location     Atlanta, GA  
Chapter     AIA Atlanta

### Category of Nomination

Category Two - Practice (Technical Advancement)

### Summary Statement

Leslie Gartner designs high containment laboratories that focus on the science of discovery. As a global expert he is evolving BSL4 containment design worldwide that is functional, meets stringent technical requirements and inspires innovative science.

### Education

University of Manitoba, Winnipeg Manitoba Canada - 6 years (1977 - 1980 & 1981 - 1984)

#### Degrees Received

- Masters of Architecture (MArch) 1984
- Bachelors of Environmental Studies (BES) 1980

Licensed in: Georgia, Texas, Alabama, Louisiana, South Carolina, North Carolina, Maryland, Virginia, New York, Montana, Wyoming, Utah, Minnesota, North Dakota, Illinois, Kansas, Ohio, Iowa, Michigan.

Canada: RAIC - Manitoba, British Columbia

United Kingdom: RIBA

### Employment

WSP USA Corp (formerly Smith Carter) / Atlanta GA: 2.5 years - January 2014 - current  
Smith Carter USA LLC / Atlanta GA: 13.5 years - Sept 2000 - January 2014  
Smith Carter Architects and Engineers / Winnipeg MB Canada: 13.5 years - Feb 1987 - Sept 2000  
IKOY Partnership / Winnipeg MB Canada: 3 years - May 1984 - Feb 1987



October 6, 2016

Mary Katherine Lanzillotta, FAIA  
Chair, Jury of Fellows  
The American Institute of Architects  
1735 New York Avenue, NW  
Washington, DC 20006-5292

Subject: Sponsor Letter for Leslie Gartner, AIA

Dear Ms. Lanzillotta and Members of the Jury,

It is a great pleasure and an honor to submit this letter of sponsorship and nomination for Leslie Gartner, AIA for elevation to the College of Fellows. I have had the opportunity and pleasure to know and work closely with Leslie over the past fifteen years on many of the most challenging architectural projects one can find. Leslie and I first worked together on the design of the Emerging Infectious Diseases Laboratory for the US CDC in Atlanta. He moved his family from Canada to the US to help develop this critical facility for our nation and the world. This first-of-its-kind project was a success and has been recognized both in the technical and architectural communities. I have continued working closely with Leslie over the years.

During this time I have witnessed Leslie's consistent efforts to achieve success for the client; creating unique environments that allow the containment and safe handling of extremely hazardous materials. His attention to detail, intellectual curiosity, drive and vision have resulted in his pioneering the development of new models of bio-containment, improving both the delivery process and performance of the facilities.

The process of designing and constructing high-containment facilities, with their highly exacting standards and performance requirements is very unique. Leslie has developed and documented new methods for management of this highly complex and technically challenging work. His influence in the design and management of many of the world's most complex research facilities for institutions such as Health Canada, the US Centers for Disease Control, the National Institutes for Health and numerous U.S. and international research institutions has created environments to enable scientists to battle important infectious diseases.

Most importantly, Leslie has made continuous efforts to disseminate this knowledge to the architectural profession, engineers, contractors and owners through teaching, writing and speaking. Over the past decade I have witnessed Leslie's record of accomplishments and influence in the design and management of these facilities and know that he has had a far-reaching and long-lasting impact on the architectural and the world health communities. Leslie truly exemplifies the highest ideals of our profession, and I enthusiastically recommend and endorse his elevation to the AIA College of Fellows, an honor he richly deserves.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jonathan Crane'.

Jonathan Crane, FAIA

*Senior Vice President, Director Translational Health Sciences*  
HDR Architecture, Inc.

*Leslie Gartner designs high containment laboratories that focus on the science of discovery. As a global expert he has evolved BSL-4 containment design worldwide that is functional, meets stringent technical requirements and inspires innovative science.*

## URGENT AND COMPELLING NEED

Infectious Diseases continue their negative impact on people worldwide. Passion for science and solutions has been evident in Leslie Gartner's career, beginning in 1989 with the design for the first High Containment BSL-4 lab for Canada and continuing today with work that spans the globe. In 2002 his team was selected to design the Rocky Mountain Laboratories Integrated Research Facility under a United States government procurement of "Urgent and Compelling Need", highlighting the essential nature of these facilities. The principles of science and health protection have been central to Leslie's design of BSL-4 facilities for the Centers for Disease Control and Protection, the National Institutes of Health, the Department of Homeland Security, and the Department of Defense in every region of the U.S. demonstrating the national impact his work has had. His expertise has gained him international recognition as evidenced by his continued leadership in the field and the design of these unique facilities in countries such as Canada, United Kingdom, Ireland, Saudi Arabia and India.

## EVOLUTION OF BSL-4

Leslie has been at the forefront of innovation and advancement of BSL-4 design to allow work on the deadliest diseases. Each design is built upon strengths from previous projects and enhanced with innovations to address new objectives and missions. Leslie evolved BSL-4 design to address 3 key aspects, which are driven by the requirement to incorporate new advances in scientific discovery:

- Designing facilities to be able to take on advancing missions of BSL-4 facilities allowing them to diversify from purely diagnostic (what agent is the cause) to basic research (understanding the agent) to developing a facility to create vaccines and therapies and allowing the testing and evaluation in a safe and approved way to verify they work.
- Incorporating innovations in how the laboratories are planned to provide flexibility for the scientific objectives, developing new technical solutions to accommodate novel equipment and procedures and new overall facility designs to accommodate changing management and operational models.
- Continuously integrating lessons learned from previous facilities and then incorporating tested and proven methods, which have evolved the quality of space, function and system characteristics of new facilities.

The result is that Leslie has designed a class of facilities that are unique for each specific client, specific to their mission, and successfully incorporate new innovations, while ensuring the stringent technical criteria is maintained.

## DISSEMINATION OF KNOWLEDGE

Leslie developed containment documents and presented them to contractors to facilitate their understanding of the principles of the design, and the key critical components criteria and acceptance tests. The documents developed focused on BSL-4 lab design from an overall perspective to many specific topics ranging from life safety, containment barriers, imaging equipment, to quality of life for all occupants. These presentations were developed into Separate Containment Handbooks to disseminate containment to new staff to foster their development and complemented with an intentionally open studio to create an active mentoring and learning environment.

Leslie is an active member of the American Biosafety Association and many other national and international agencies. He gives presentations and workshops to advance knowledge of biosafety and containment design. These educational seminars are attended by architects and engineers and provides a collaborative forum for the architectural profession to learn, discuss and enhance our collective knowledge regarding containment design.

Leslie's dedicated focus on BSL-4 containment design has enabled him to have a positive national and international impact on architecture and health.

## 2.1 SIGNIFICANT WORK

### High Containment Design – BSL-4 (Biosafety Level 4)

BSL-4 laboratories are a unique type of facility and to appreciate the design of BSL-4 facilities, the following overview is provided to support Leslie's accomplishments.

BSL-4 laboratories provide an environment that is safe for our communities and safe for scientists to understand the most dangerous diseases in the world and develop vaccines and therapeutics to combat them. A BSL-4 laboratory is required for working with the world's most dangerous or exotic agents that pose a high risk of life-threatening disease and for which there is no known vaccination or treatment (i.e., Ebola). The BSL-4 laboratory is a highly specialized environment that requires attention to detail and must be designed to promote safe procedures, a secure work environment and maintain Life Safety code compliance for its occupants.

#### QUALITY OF WORK ENVIRONMENT

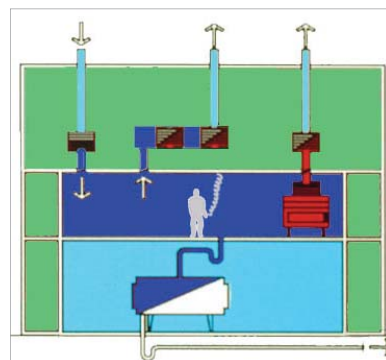
While providing a safe working environment for research, the facility needs to provide an inspiring workspace to attract and retain key scientists. Acoustic control and natural light are challenges to incorporate. Utilizing internal atrium and common areas provide a visual openness and a collaborative area to advance scientific discussion.



#### CONTAINMENT BARRIER SYSTEM

The containment barrier is required to provide a gas tight barrier between each independent zone. The "box-in-a-box" principle is used to ensure the pressure between the containment zones are not influenced by exterior influences of wind and temperature on pressure. The principal of "pressure differentials" between the containment zones is employed to create an airlock entry and directional airflow for zones from the chemical shower to laboratories.

The containment zones are "pressure decay tested" to ensure the gas tight integrity of the containment barrier has been achieved. The containment barrier is covered with a special epoxy coating sealing the penetrations to the barrier construction. This test provides a constructability standard of acceptance for BSL-4 facilities.

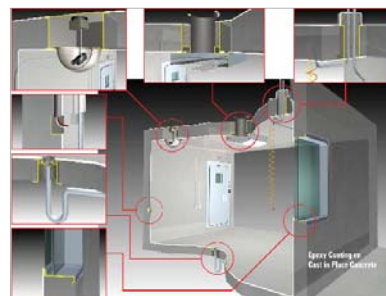


Box-in-box

#### CONTAINMENT BARRIER COMPONENTS

Personnel and materials is required to pass through the containment barrier. The key components are designed and tested to maintain the containment barrier's integrity. Components of containment barriers include:

- Air Pressure Resistant Doors
- Air Pressure Resistant Windows
- Pass-through autoclaves and dunk tanks allow for the safe removal of material
- Supply and exhaust air is HEPA filtered
- Liquid effluent is collected/treated in the biowaste system
- Lab services, water, CO2 gas, and liquid nitrogen
- Electrical and data outlets: normal power, emergency power and UPS and light fixtures



Containment Barrier

#### BIO-SECURITY

Security of the high containment facilities address protection of the facility and its occupants as well as protection or integrity of the agents maintained. The bio-security program includes security management, security plan development, risk analysis and countermeasure, which includes physical security solutions.

- Physical security employs a layered approach to control access to and from the facility.
- Access control to prevent agents from unauthorized removal.



Iris Scanner



## 2.1 SIGNIFICANT WORK: BSL-4 CONTAINMENT DESIGN

**Canadian Science Centre for Human and Animal Health, Winnipeg, Canada** (see exhibit)

Role: Design Architect; BSL-4, BSL-3 and BSL-2 Lab Planning + Design for Health Canada component; and Biocontainment Specialist

Completion: 1997

The 315,000 sf facility contains research facilities for animal and human health, consists of BSL-2/3, and BSL-4 laboratories. Leslie was a lead member of the design team responsible for concept design, design development and construction documents.

- First new High Containment laboratory in the world designed and built in 20 years
- It established a reference center for new facilities considered by other countries
- First to combine human and animal health high containment in one facility

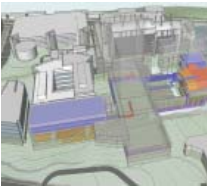
**CDC Building 18 – Emerging Infectious Diseases Laboratory, Atlanta, GA** (see exhibit)

Role: Principal/Project Manager for Containment; Architect of Record for High Containment; and Lead Lab Planning + Design for BSL-4 and BSL-3 Containment

Completion: 2008

The 390,000 sf Emerging Infectious Diseases Laboratory supports the critical work of the Department of Health and Human Services to protect the nation from infectious disease and to contribute to global scientific knowledge and advancement as the world reference center. As the high containment consultant, Leslie was responsible for the design, documentation and construction administration services of the high containment portions (BSL-4 and BSL-3) located in Building 18.

- 2006 R&D Magazine “Lab of the Year” and Special Mention

**CDC Building 25 – High Containment Lab, Atlanta, GA**

Role: Project Director, Lead Lab Planning + Design for BSL-4 and BSL-3 Containment

Completion: Phase 1 Study Completed in 2016; Phase 2 Study is Ongoing

The Building 25 Project Development Study (PDS) has been undertaken to accommodate growth in current CDC infectious disease laboratory programs, accommodate growth in laboratory support functions such as vivarium space, meet needs for new types of laboratory core space in response to changing technology and assure continuity of CDC high containment laboratory capacity when the current high containment laboratories in Building 18 must be deactivated for planned renovations at the end of their engineering service life cycle between 2020 and 2025. As the high containment consultant, Leslie was/is responsible for the programming and concepts for the BSL-4 and BSL-3 portions of the building.

**NIH Integrated Research Facility – Rocky Mountain Laboratories, Hamilton, MT** (see exhibit)

Role: Project Director/Project Manager, Architect of Record and Lead Lab Planning + Design for BSL-4 and BSL-3 Containment

Completion: 2008

The Integrated Research Facility (IRF) is the first high containment lab designed primarily for research. It complements the National Institutes of Health's program and supports national research on the top priority agents for biodefense. The facility is a strategic component for the NIH Intramural Biodefense Agenda as it includes BSL-4, BSL-3 and BSL-2 containment laboratories designed specifically for research. The highly secure enhanced containment capacity enables research teams to study pathogens defined as Category A, B, or C agents by the Centers for Disease Control and Prevention (CDC). As the lead for the project team, Leslie was responsible for the overall design, including the high containment components of the project.

**NIH Integrated Research Facility, Fort Detrick, MD** (see exhibit)

Role: Project Director/Project Manager, Architect of Record and Lead Planning + Design for BSL-4 and BSL-3 Containment

Completion: 2012

The new National Institute of Health, Integrated Research Facility (NIAID) integrated containment defense facility is the first new High Containment building to be constructed at the new National Interagency Biodefense Campus at Fort Detrick. The 140,000 sf facility includes a large BSL-4 contiguous lab area of 24,000 sf. As the lead for the project team, Leslie was responsible for the overall design, including the high containment components of the project.

## 2.1 SIGNIFICANT WORK: BSL-4 CONTAINMENT DESIGN

**NBACC – National Biothreat Analysis & Countermeasures Center, Frederick, MD**

Role: High Containment Specialist

Completion: 2004

The mission of the National Biological Weapons Analysis Center in the Department of Homeland Security is to address relevant medical scientific issues, to include BW threat and risk assessments and to determine which countermeasures require priority research and development. This facility includes BSL-4 and BSL-3 laboratories and will provide for aerosol challenges of non-clinical models and aerosol characterization. As the lead responsible for high containment, Leslie led the development of concepts for the feasibility and concepts design of the facility.

**U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), Ft. Detrick, MD** (see exhibit)

Role: Project Director/Project Manager, Architect of Record for High Containment; and Lead Lab Planning + Design for BSL-4 Containment

Completion: January 2017

The new USAMRIID will replace the existing outdated and crowded USAMRIID facilities, providing a new 930,000 gsf containment facility including state-of-the-art BSL-4 and BSL-3 biocontainment laboratory space, animal facilities, and administrative offices, as well as operational and administrative support facilities. As the lead responsible for high containment, Leslie led the design and continues to provide support during the final completion of the construction and the start up phase.

- 2007 AIA New Jersey, Merit Award for Design Excellence: - Unbuilt Category, USAMRIID - National Interagency Biodefense Campus

*"Smith Carter is one of the top 5% of firms I have worked with. They think ahead and consider everything of importance. Plus, they are absolutely great people to work with!"*

- David Giles, Department of Defense, Health Facility Planning Agency

**UTMB Shope BSL-4 Laboratory Facility, Galveston, TX** (see exhibit)

Role: Biocontainment Specialist

Completion: 2004

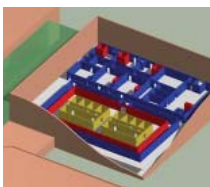
The Shope Laboratory consists of a BSL-4 containment laboratory housing the Department of Pathology and the World Health Organization's Collaborating Center for Tropical Diseases. This new facility has 12,000 sf of laboratory research space that can operate at BSL-3 Enhanced and BSL-4.

**Boston University Medical Center – National Emerging Infectious Diseases Laboratory, Boston, MA** (see exhibit)

Role: Principal/Project Manager for Containment, Architect of Record for High Containment, and Biocontainment Specialist

Completion: 2011

One of two national biocontainment laboratories funded by the National Institute of Allergy and Infectious Disease (NIAID), clinical and translational research at the facility is focused on biological agents in BSL-4, BSL-3, and BSL-2 laboratories. Specialty core laboratories such as contained imaging suites, Cryo EM, Aerobiology and Insectaries enhance the research capacity of this national biocontainment facility.

**Advanced Research Center, Texas Tech University, Lubbock, TX**

Role: Project Architect

Completion: Concept Design - 2003

Development of a feasibility study to provide high containment laboratories (BSL-4 and BSL-3) for counter-measures research. The facility will be capable of testing and validating new sensor technology, live sensor data generation, test newly synthesized non-woven fabrics, and evaluate new building designs prior to implementation.

## 2.1 SIGNIFICANT WORK: BSL-4 CONTAINMENT DESIGN

**Western National Center for Bio-defense and Emerging Diseases – UC Davis National Biocontainment Lab, Davis, CA**

Role: Project Manager, Lead Lab Planning + Design for BSL-4 Containment

Completion: Concept design - 2003

This 300,000 gsf, \$165,000,000 infectious disease biomedical research containment facility is part of NIAID's national network for conducting research on select agents to develop vaccines and therapeutics.

**University Illinois Champagne National Biocontainment Lab, Champagne, IL**

Role: Biocontainment Specialist

Completion: Concept design - 2003

This \$212,000,000 National Biocontainment Laboratory in the heart of the Illinois Medical District enables leading scientists from Chicago and the nation to develop more effective treatments for the emerging threats. It is to enhance the capabilities of emergency response teams throughout the Midwest to act promptly and efficiently.

**National Institute of Virology Microbiological Maximum Containment Laboratory, Pune, India**  
(see exhibit)

Role: Project Director, Architect of Record, and Lead Lab Planning + Design for BSL-4 Containment

Completion: 2012

The facility, certified in December 2012, is India's first BSL-4 containment laboratory and Asia's first to meet international standards. The facility includes two separate BSL-4 suites and a BSL-4 isolation unit to provide support at the highest level of containment for patient and/or staff monitoring. As the lead BSL-4 consultant, Leslie traveled frequently to India to meet and discuss the project with NIV and contractors, as well as hosted a contingent from India in the U.S., to visit facilities to provide a benchmark for this facility.

**Plowright and Biological Resources Facility, Pirbright, England, UK** (see exhibit)

Role: Project Director, Architect of Record, and Lead Lab Planning + Design for BSL-4 Containment

Completion: Plowright 2015; BRF in design

The Plowright building is part of the initial Site Redevelopment Programme for Pirbright, which is comprised of site and infrastructure work, a new security strategy, demolition and renovation of existing buildings and chiefly a new 14,000 CL4 laboratory facility. The Biological Resources Facility (BRF) includes facilities at CL4 (both ACDP4 and SAPO4) and CL3 to support research into domestic livestock and poultry diseases. As the lead for the project team, he was responsible for the overall design, including the high containment components of the project.

**Defense Science & Technology Lab High Containment Facility, Porton Down, England, UK**

Role: Biocontainment Specialist

Completion: 2012

Defense Science and Technology Laboratory (DSTL) is the center of scientific and engineering excellence for the UK Ministry of Defense (MOD) and home to one of the largest groups of scientists and engineers in the UK public service. Part of DSTL's role is to conduct safe research on pathogens. To facilitate this capability, a high containment facility exists at Building 459, Porton Down. Building 459 effluent treatment system had suffered extensive chloride induced corrosion and was in need of replacement. Building 459 has a number of laboratories designed to ACDP3/4 standards.

**Health Protection Agency (PHE) BSL-4 and BIG Facility, Harlow, England, UK**

Role: Lead Lab Planning + Design for BSL-4 Containment

Completion: Concepts complete 2012.

A £90,000,000 BSL-4 research facility to replace aging facilities at Porton Down. The new high containment facility will be constructed to International BSL-4 standards and consist of microbiological research labs to BSL-4 standards and high containment BIG (in vivo) facilities.

## 2.1 SIGNIFICANT WORK: BSL-4 CONTAINMENT DESIGN

**National Biocontainment Animal Facility, Manhattan, KS**

Role: Biocontainment Specialist

Completion: 2019

A high containment facility, dedicated to research and diagnostics for foreign animal diseases. It is a replacement for the current operations at Plum Island and includes a BSL-4 laboratory for large animals. As the biocontainment specialist Leslie provided Peer Review for the client (DHS) for the BSL-4 components and worked with the contractor to provide lessons learned for constructing a high containment facility.

**Center for Veterinarian Research Lab - Leixlip, Ireland**

Role: Architect of Record, Lab Planning + Design

Completion: 2017

This facility serves as the central reference laboratory for the surveillance of animal diseases for Ireland's Department of Agriculture, Food and the Marine (DAFM). The project focus was to bring the high containment portion, a 492 sm (5,292 sf) CL-4 (BSL-4) cabinet laboratory into operation. The project consists of two parts: the first was the development of a list of containment envelope recommendations required for the laboratory to achieve internationally recognized leak tightness mandates (AS/NZ 2243.3-2010). ?????

**National Health Laboratory, Riyadh Kingdom of Saudi Arabia**

Role: Principal in Charge, Architect of Record and Lead for Planning + Design

Completion: 2012

The project design phase included the review of the National Health Laboratory which is currently under construction in Riyadh, for the inclusion of BSL-3 labs and BSL-4 labs for diagnostics and research for human pathogens in Saudi Arabia. The mandate of the facility is to provide a national laboratory for diagnostics and research on infectious diseases. It is to include BSL-2, BSL-3 and BSL-4 labs and a vivarium to allow work on emerging infectious diseases affecting people within the country.

**Center for Cellular and Molecular Biology National Biocontainment Facility, Hyderabad, India**

Role: Principal in Charge, Architect of Record and Lead for Planning + Design

Completion: Design Complete in 2012

As a second high containment facility for India, the project includes BSL-4 laboratories that can function as BSL-3 and as BSL-4 to provide enhanced capabilities for India to address highly infectious diseases. As the lead for the project, Leslie led the team to develop the concepts and led the presentation of the project to India government officials.

**Research Institute for Veterinary Medicine, Utrecht, The Netherlands**

Role: Peer Review – Biocontainment Specialist

Completion: 2015

The project is establishing a center within the Netherlands for high containment research and diagnostics. As a first for them, they engaged us to provide design guidance to the in-country team. As the lead for the project, Leslie provided containment planning direction to RIVM and their consultants and coordinated the engineering input from his team.



## 2.1 SIGNIFICANT WORK: DIAGNOSTIC AND RESEARCH CONTAINMENT DESIGN

**NIH B33 Avian Research Facility, Bethesda, MD**

Role: Principal-In-Charge of Containment and Biocontainment Specialist

Completion: 2007

Design and planning for enhanced BSL-3 laboratories. The laboratories in this 150,000 sf facility are used for development of new diagnostics techniques, and investigation into vaccines and therapeutics for the treatment and prevention of naturally occurring diseases as well as potential biological threats.

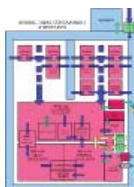
- 2006 AIA Potomac Valley Design Citation Award

**CDC Building 401 Vector-Borne Infectious Disease Lab, Fort Collins, CO**

Role: Principal-In-Charge, Architect of Record and Lead Lab Planner

Completion: 2010

The project fit-out the fourth floor of the Division of Vector-Borne Infectious Diseases (DVBID) consists of 14,000 sf of BSL-2/3 laboratory space, lab support spaces and office administrative spaces. A 7,000 sf mezzanine constructed to house an animal incinerator, as well as mechanical, plumbing and electrical equipment is included in the fit-out. The project received LEED Gold certification.

**Kansas State Food Safety & Security Research Facility, Manhattan, KS**

Role: Programmer and Concept Designer

Completion: Concept design - 2002

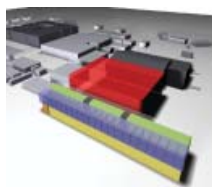
Concept design for a unique containment facility. It has a dual role of testing and tracking biological agents through the meat packaging process as well as provide a learning platform for KSU students. This facility with the proposed levels of containment will support USDA and DHS, and will act as a center of first response to a real or perceived threat from a foreign exotic disease.

**University of Tennessee Health Science Center Regional Biocontainment Lab, Memphis, TN**

Role: Project Director and Biocontainment Specialist

Completion: 2009

The 25,000 sf Regional Biocontainment Laboratory facility funded by NIAID includes an ABSL-3 vivarium with imaging and aerobiology for vaccine research, BSL-2/3 labs, high throughput screening. It is used by the University of Tennessee, the National Institutes of Health and private sector partners for basic and translational research.

**Duke University Regional Biocontainment Lab, NC**

Role: Lab Planner

Concept Design Completion: 2003

A Regional Biocontainment Lab, as part of the NIH NIAID program to create a laboratory network to research select agents. The BSL-3 lab facility was incorporated into the campus vernacular and maintains the required federal security measures.

**Tulane University Regional Biocontainment Lab, Covington, LA**

Role: High Containment Specialist

Completion: 2010

Conceptual development, detailing and documentation of the Aerobiology Laboratory for this BSL-3 bio-containment, vivarium and laboratory for the National Institutes of Health. The laboratory includes custom glove box cabinets and transport modules, integrated into the containment architecture that allows the TNPRC the ability to run aerosol challenges protocols in conjunction with their biodefense research.

## 2.1 SIGNIFICANT WORK: DIAGNOSTIC AND RESEARCH CONTAINMENT DESIGN

**Thompson BSL-3 Lab Upgrade, Jackson, MS**

Role: Principal in Charge

Completion: 2015

Retained to provide remedial design and construction supervision to foster certification of the BSL-3 laboratories within the facility. The BSL-3 component of the facility constitutes 25,000 gsf, enhancements include a cabinet lab, HEPA filtration and an effluent treatment plant. Work included BMS upgrades, power supply upgrades, coatings and envelope upgrades as well as HVAC system tuning.

**DHS / USDA Plum Island Animal Disease Center Large Animal Facility, Plum Island, NY**

Role: Project Director, Architect of Record and Lead Laboratory Planner

Completion: 2012

The Department of Homeland Security inherited aging infrastructure to house USDA focused BSL-3Ag research on exotic animal diseases. Prior to making any architectural or engineering changes, a study was conducted to determine how to best extend the useful life of the buildings. The result was a \$25 million upgrade focused on building a new large animal facility, renovating other BSL-3 containment space, enhance operational flexibility, and upgrade the building systems most in need.

**University of Saskatchewan InterVac, Saskatoon SK, Canada**

Role: Biocontainment Specialist

Completion: 2011

International Vaccine Center (InterVac) provides research capability, especially large animal research space, for animal and human diseases on current and emerging infectious diseases. As specialist laboratory consultant, Leslie was responsible for the initial scientific functional program development and a space and technical program.

**University of Georgia Animal Health Research Center, Athens, GA**

Role: Architect of Record for Containment and Biocontainment Specialist.

Completion: 2008

Total renovation of a facility that failed to meet USDA and BMBL containment barrier criteria for BSL-3 labs and animal facilities. New concepts and technical solutions were developed to bridge cracks and containment barrier failures due to the highly defective structural system in the existing building. The final facility included BSL-3 labs and vivarium spaces primarily for large animals - cows, horses, pigs, and sheep and for small animals including avian and rodent species for study of BSL-3 infectious agents.

**Minnesota Department of Health / Agriculture BSL-3 Avian Influenza Research Lab, St Paul, MN**

Role: Project Director, Architect of Record and Biocontainment Specialist

Completion: 2007

A collaboration of Minnesota Department of Agriculture and University of Minnesota led to an opportunity to secure a significant research grant for Avian Influenza Virus. The facility needed to create more flexible BSL-3 labs and construct a BSL-3 laboratory to complement the BSL-2. The project was fast tracked from concept to construction in eight months.

**Agency for Plant and Animal Health, Weybridge, England UK**

Role: Biocontainment Specialist

Completion: 2016

Responsible for supporting the evaluation of the complete research campus for its long term use. New facilities were identified to remove containment facilities from newly identified flood plains. Upgrades to existing infrastructure in BMS, electrical, water and steam were developed and the next phase of design is underway.

## 2.1 SIGNIFICANT WORK: DIAGNOSTIC AND RESEARCH CONTAINMENT DESIGN

**Loma Plata Hospital BSL-3 Hanta Virus Lab, Loma Plata, Paraguay**

Role: Lead Lab Planner

Design Completion: 2003

Responsible for designing and coordinating the consultant team to design a BSL-3 laboratory in collaboration with the Canadian Science Centre for Human and Animal Health, Concordia College of Alberta, and Loma Plata Hospital. The laboratory consists of a BSL-3 suite for diagnosis and research specific to the Hantavirus.

**Human and Animal Health Containment Laboratory, Bishkek, Kyrgyz**

Role: Project Director, Architect of Record and Biocontainment Specialist

Design Completion: 2011

The Biocontainment Lab in the Kyrgyz Republic designed to enhance biosecurity, biosafety and biocontainment capabilities and to serve as a central repository for the consolidation of dangerous pathogens from several existing vulnerable facilities and to conduct human and animal health diagnostics in a secure and safe manner. Leslie provided expertise in laboratory planning and led the design team to meet several design goals, including creating a headquarters facility with the only BSL-3 Lab in the Republic.

**SAGARPA BSL-3 Ag Facility, Tecamac, Mexico**

Role: Project Director, Architect of Record

Design Completion: 2011

BSL-3AG areas include animal holding, procedure areas and necropsy as well as laboratory space. Support functions include loading storage and other supporting areas. Building support areas include electrical and mechanical service areas.

**SAGARPA BSL-3 Avian Influenza Lab, Palo Alto, Mexico**

Role: Project Director, Architect of Record

Design Completion: 2011

CPA is a joint U.S./Mexico commission, connected to SAGARPA and focused upon the eradication of Foot-and-Mouth disease and other exotic animal diseases such as Avian Influenza, Newcastle disease, Vesicular Stomatitis, Venezuelan Equine Encephalitis and Classical Swine Fever. The new 30,000 sf facility is a combination of renovation work to utilize existing structures on SAGARPA's Palo Alto campus for supporting functions and new construction to provide BSL-3 space.

**University of Tuskegee Veterinarian School of Medicine and Allied Health, Tuskegee, AL**

Role: Project Director, Lead Lab Planning + Design

Completion: Concept Design - 2010

Conceptual Programming Phase Services of the Tuskegee University School of Veterinary Medicine encompasses the conceptual programming of the Small and Large Animal Teaching Hospital, its teaching and diagnostic laboratories, and the associated Common Support program elements.

**Meril Colbert Research Center Expansion (B33), Colbert, GA**

Role: Project Director, Architect of Record

Completion: 2011

The project provides a 1,300 sf expansion of Building 33 of the Colbert campus of Meril Limited, an international manufacturer of pharmaceuticals for animal care.

## 2.1 SIGNIFICANT WORK: DIAGNOSTIC AND RESEARCH CONTAINMENT DESIGN

**Georgia Tech Marcus Nanotechnology, Atlanta, GA**

Role: Principal-In-Charge, Architect of Record

Completion: 2014

The Marcus Nanotechnology Building located on the Georgia Institute of Technology campus currently houses up to 30,000 sf of cleanroom space and a laboratory wing with three floors each having 10,000 sf of useable laboratory space. This project consisted of design and construction of build out for Bio-Nano and Physical-Nano labs on levels 2, 3 and 4 of lab wing and an extensive Microscopy suite. The program houses open and individual lab spaces, faculty offices and graduate student offices, and collaboration areas.

**Georgia Tech Boggs Building Laboratory Upgrades, Atlanta, GA**

Role: Principal-In-Charge, Architect of Record

Completion: 2014

Several separate renovations to various areas of the building to accommodate incoming professors and researchers. The projects included developing a building standards for laboratory casework design to maintain a consistent approach throughout the building phases.

**Georgia Gwinnett College Allied Health Facility, Duluth, GA**

Role: Architect of Record, Facility Lab Design

Completion: 2014

The 90,000 sf Allied Health Building for Georgia Gwinnett College in Lawrenceville, GA includes Physics, Biology, and Chemistry teaching laboratories in addition to 6,000 sf of nursing instruction space. The project supports the college's rapidly growing campus and instruction in Science, Technology, Engineering and Math (STEM) disciplines.

**Augusta University Cancer Research Center, Augusta, GA**

Role: Principal-In-Charge, Architect of Record

Completion: Design complete 2016 / Construction to be complete in 2018

This project for the Board of Regents of the University System of Georgia is the first phase of a large development for a new Comprehensive Cancer Center at Augusta University. The \$42.5 million Cancer Research Building creates 80,562 gsf of research and support labs for thirty Principal Investigators including a vivarium and animal imaging. The Cancer Center accommodates the majority of all Augusta University Cancer programs under one roof and combines scientific research with patient driven clinical cancer care.

**Emory University Sanford S. Atwood Chemistry Center, Atlanta, GA**

Role: Lead Lab Planning Team

Completion: 2015

The renovation and addition to the Atwood Chemistry Center at Emory University includes a 5-story 62,000 sf addition, as well as 13,000 sf of renovated space in the existing 1970's era center. Leslie led the design team in developing the planning and design of the laboratory areas.



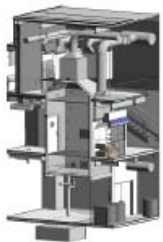
## 2.1 SIGNIFICANT WORK: BIOLOGICAL AND CHEMICAL CONTAINMENT FACILITIES

**Individual Protection Ensemble (IPE) Mannequin, Dugway Proving Ground, UT** (see exhibit)

Role: Project Director, Architect of Record, and Lead Lab Planning + Design

Completion: 2009

The purpose of this program is to design, fabricate, and validate a system to test the efficacy of military clothing and to evaluate real-time IPE performance against live Chemical Warfare Agents (CWA). A free-standing, self-balancing robot was developed simultaneously to simulate warfighter activities, body temperature, perspiration and components of respiration, while the exposure chamber provides a platform within which IPE testing can be conducted in a CWA environment using the IPE Mannequin. The chamber is simulates exterior conditions the warfighter may face, i.e., wind, temperature, humidity in a variety of climates (arid to tropical), and provides testing of the mannequin using a variety of chemical agents and concentrations under varying wind speeds and directions and in different temperatures.

**Non Traditional Agent Test System High Containment Facility, ECBC Aberdeen Proving Ground, MD**

Role: Project Director, Architect of Record, and Lead Lab Planning + Design Completion: 2015

The 19,000 sf High Containment Facility (HCF) is designed to provide safe containment and engineering control for toxic challenge materials and non-traditional chemical agents. It consists of a Primary Containment Module to test solid, liquid and gas form molecules, as well as a Tertiary Containment Model to simulate potential agents that the warfighter might experience in the field.

**Defense Advanced Research Projects Agency Testbeds for Immune Building Systems Experimentation, Arlington, VA**

Role: Lead Design and Lab Planner

Completion: 2002

In a collaborative group led by the Johns Hopkins University Applied Physics Laboratory, Leslie designed a testbed to assess the effectiveness of building strategies to counter the effects of biologics, chemicals and toxins to create an immune building. This program will provide the experimental data and systems engineering required to design, develop, implement, test, optimize and demonstrate complete systems architectures to achieve the DARPA goals: to protect the human inhabitants, to restore the building functionality after an incident, and to preserve forensic evidence.

**Johns Hopkins University - Integrated Chemical/Biological Aerosol Laboratory, Laurel, MD**

Role: Project Director, Architect of Record and Laboratory Planner

Completion: 2008

The Integrated Chemical/Biological Aerosol Laboratory includes three aerosol suites, an immune building laboratory and associated support areas. The facilities support the National Security Technology Department's mission to enhance national security through science and technology. Facilities include a custom 800 ft<sup>3</sup> environmental chamber for aerosol testing, a 780 ft<sup>3</sup> chamber blind testing aerosol laboratory to independently test biological and chemical sensor equipment, and a 3,672 ft<sup>3</sup> chamber for evaluating larger systems for containment, decontamination, and particle and vapor propagation experiments.

**Johns Hopkins University Applied Physics Laboratory - NSTD Laboratory, Laurel, MD**

Role: Project Director, Architect of Record and Laboratory Planner

Completion: 2008

The specialty lab area includes 3 aerosol chambers (one designed as a cold room) and one aerosol immune building suite, a mass spec lab, a chemical sensor lab, and BSL-2 microbiology labs. The specialty lab area is utilized to develop and test sensors and products with real live/simulated agents.



### NASA Mars Sample Receiving Facility Feasibility Study, White Sands, NM

Role: Architect and Containment Specialist

Completion: 2001 - Feasibility Study

A NASA probe will return to earth, bringing with it rocks and soil samples that it will have collected on the surface of the planet Mars. At that time, NASA will require a contained laboratory facility within which to deposit these samples. The concept developed would see the Planetary Receiving Facility (PRF) consists of remodeling an existing White Sands building, the Data Interface Facility (DIF) and construction of a new three-level addition. The PRF consists of 7,680 sf of BSL-4 laboratory space and 45,600 sf of non-containment support spaces. The feasibility study identified a completely new facility could be constructed for \$33,400,000 in lieu of a combination of new/modified space.

## 2.1 SIGNIFICANT WORK: CONTAINMENT CONSULTING



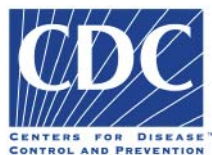
### NIH Biocontainment Guidelines for BSL-4 and BSL-3 - 2006

Role: Architect and Biocontainment Specialist for High Containment

Completion: 2006

Following the successful completion of NIH's 3 Intramural High Containment Facilities (RML, IRF at Ft Detrick, and B33) we utilized the design principles, in collaboration with NIH, to document and develop Chapter 6 Biocontainment Guidelines of rBSL-4 and BSL-3 in their Design Policies and Guidelines Manual. The architectural component includes establishing the containment barrier design, directional airflow, protocol development and specific architectural components critical for containment research including special coatings, air pressure resistant doors and windows, hardware, laboratory equipment and fittings, and casework.

A supplement was added in 2008 establishing guidelines specific to imaging component design within containment facilities and included in the NIH Design Requirements Manual for Biomedical Laboratories and Animal Research Facilities, 2008 ed.



### CDC Space Planning Guidelines for High Containment and Vivarium - 2015

Role: Architect and Biocontainment Specialist for High Containment

Completion: 2015

As part of developing the concepts for CDC's future high containment facilities, Leslie and his team provided the Guidelines for BSL-4. The guidelines include an overview of BSL-4 Suit Laboratories, containment airflow strategies, and schematics of BSL-4 labs and its associated engineering support space. The guidelines establish a standard for functional elements, such as body and chemical showers, egress and exit procedures, finishes and containment barrier testing criteria. Ancillary components including decontamination procedures, emergency power, security, air distribution strategies are included. The intent is to provide a guide for future designers of containment labs for the CDC.



### DoD Defense Threat Reduction Agency - Advisory and Assistance Support 2010 - 2020

Role: Principal-In-Charge

Completion: Ongoing

Leslie leads a team of architects and engineers to provide Advisory and Assistance Support to the Cooperative Threat Reduction Support Center (CTSC) team. The project is to provide A&AS to the DTRA in regards to its cooperative threat reduction (CTR) initiatives to ensure the reduction of both nuclear and biological threats and materials. Leslie's responsibility is to lead the engineering team. Specifically, we advise DTRA and its collaborators on the planning and design of laboratories that are used for diagnosis and storage of extremely dangerous pathogens. Services (A&AS) to the Cooperative Threat Reduction program.

## 2.1 SIGNIFICANT WORK: DISSEMINATION OF KNOWLEDGE

### Driving the Evolution of Containment

The evolution of the containment lab mission, its increase in size and complexity of scientific capability has required innovations to be applied. The innovations have been engaged in the following three areas:

- Create new laboratory planning and design options to accommodate program flexibility and scientific objectives
- Adjust management and operational models to balance the scientific, biosafety and O&M objectives and control to ensure safe and operationally sound facilities
- Drive novel technical solutions to accommodate new equipment, flexibility and economical solutions



University of Texas Medical Branch, Galveston Level 4 Laboratory, TX



Center for Disease Control, Building 18, Atlanta, GA



Integrated Research Facility, Rocky Mountain Laboratories, MT



Integrated Research Facility, National Institutes of Health, Ft. Detrick, MD



U.S. Army Medical Research Institute for Infectious Diseases, Ft. Detrick, MD

INNOVATIONS ■ Program ■ Technical ■ Management

#### Small lab (cost control)

Capable to operate at BSL-3 or BSL-4

Integrate into open campus

#### Multiple BSL-4 lab types

Flexible animal rooms (BSL-4 – BSL-3Ag)

Low spray chemical nozzles  
Integrated services chases

#### Research specific high containment

Flexibility of animal rooms

Biometrics in BSL-4  
Client in multiple locations

Parametric cost modelling

#### Class III cabinet to support suit lab Imaging in high containment

Mixed waste disposal solution  
Through wall tissue

#### Integrated aerosol challenges Animal transport systems

Hybrid containment barrier  
Stainless steel fumigation chambers

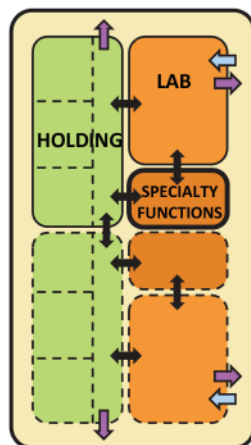
Multiple agency client with large management team

**DIAGNOSTIC:** The earliest facilities designed for high containment were generally small or individual laboratories with diagnostics as the primary purpose (i.e., Canadian Science Center, CDC).

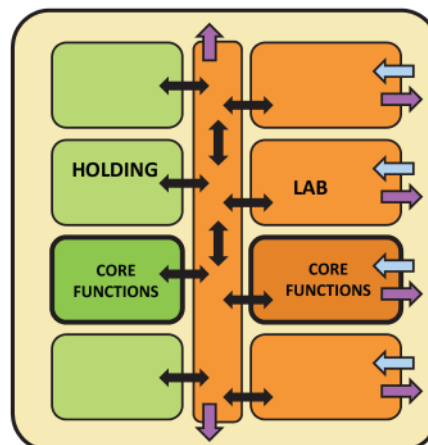
**RESEARCH:** Laboratories evolved to include the ability to discover and understand the pathogenesis of the agents, which required a considerably more open and flexible approach.

**CLINICAL:** Understanding the agent, has led to development of vaccines and therapeutics. This has increased the need for specialized imaging and research equipment being located in containment, resulting in new technical and operational challenges.

**TESTING & EVALUATION:** The need to test the vaccines in a safe and approved way has led to new models that increase the flexibility or use within the space.



Research & Diagnostics Model



Translational Research Model

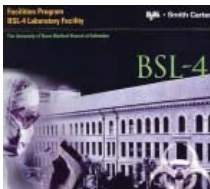
## 2.1 SIGNIFICANT WORK: DISSEMINATION OF KNOWLEDGE



## TEACHING AND EDUCATION; CONTAINMENT KNOWLEDGE TRANSFER TO INTERNAL TEAM

The following in-house training sessions were developed to advance the knowledge of high containment of our staff.

- Evolution of Containment
- Animal Facility Design Booklet
- Contractor Lessons Learned
- Management for Complex Projects with Complex Teams for Complex Clients
- WSP / Smith Carter Lab Intro Guide 2008 - 2016
- Science Know + Tell: WSP / Smith Carter Internal Team Development / Presentations
  1. BSL-4 Suit Lab
  2. BSL-4 Cabinet Lab
  3. BSL-3 Lab
  4. BSL-3Ag Lab
  5. BSL-2 and Academic Labs
  6. Imaging in Containment
  7. Containment Equipment



## PRESENTATIONS AND LECTURES

## ABSA American Biosafety Association

- Getting the best out of design, presented with Scott Stirton, New Orleans, LA, 2001
- Impact of Advanced Research Technologies for Biodefense Research on Biocontainment Facility Design, presented with Jon Crane, Randy Kray, San Antonio, TX, 2004
- Acceptable Air Leakage Criteria for Biocontainment Barriers, presented with Randy Kray, Boston, MA, 2006
- BSL-4 Suit Lab Fire & Lifesafety Risk Analysis, Boston, MA, 2006
- Steel Containment BSL-3Ag Barrier – Fast Construction, Controlled Cost, Measurable Quality, presented with Luis Linares, Nashville 2007
- Integrated Research Facility, Ft. Detrick MD, presented with Frank Kutlak, James Lawler, Daniel Lamb, Reno, NV, 2008
- Supporting Biosecurity in Central Asia, Kyrgyz Republic, presented with Global Partnership, Reno, NV, 2008
- High Containment Support Design From Loading Docks to Labs, presented with Alan Gnani, 2009
- National Health Lab, Kingdom of Saudi Arabia, San Diego, CA, 2014
- Containment Isolation Wards for Patients with Highly Infectious Patients, Grapevine, TX, 2016

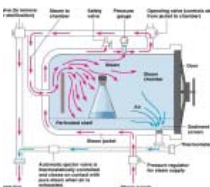


## Asia Pacific Biosafety Association

- Do you need a BSL-3 Laboratory?, presented with Paul Huntley, Singapore, 2007
- BSL-3 Laboratory Development, presented with Luis Linares, Singapore, 2007

## International Federation of Biosafety Associations

- Global Biosafety and Biosecurity: Taking Action





## 2.1 SIGNIFICANT WORK: DISSEMINATION OF KNOWLEDGE



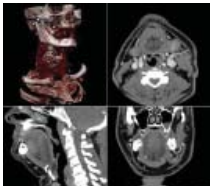
## PRESENTATIONS AND LECTURES (CONT'D)

## CDC Symposium

- Security Issues Related to High Containment Facilities, Atlanta, GA, 2004
- Advanced Technologies in Animal Research, Atlanta, GA, 2006

## Eagleson Colloquium

- High Containment Labs Project Management, Freeport ME, 2003
- Biocontainment Facility Security, Freeport ME, 2003



## Tradelines – International Conference on Biocontainment

- Project Delivery Strategies for BSL-4 Facilities, presented with Scott Stirton, San Antonio TX, 2002
- How Certification Requirement Impact Design and Construction Details and Commissioning, presented with Dr Michael Mispagel, Jeffrey Schramm, Grayson Gurley, Phoenix AZ, 2005
- Successful Strategies for On-Time Validation and Certification of Biocontainment Facilities, presented with Lee Thompson, Randy Kray, Phoenix AZ, 2006

## Labs 21 / I2SL: International Institute for Sustainable Laboratories

- Evolving Design Issues in a Biocontainment Facility, Denver, CO, 2003
- Impact of Biosecurity on Biocontainment, St Louis, MO, 2004
- CDC B401 Fort Collins – Sustainable Design Strategy, Indianapolis, IN, 2009



## Lab Design

- Biosafety Tips – Design Perspective for BSL-3, presented with Joe Phillips, San Diego, CA, 2004
- WSP Science + Technology Design, Atlanta, GA, 2015

## AALAS

- Advanced Imaging Technologies in Biodefense Animal Research, presented with Randy Kray, St Louis, MO, 200



## AIHCE

- Design Issues in a Biocontainment Facility, Dallas, TX, 2003

## Filovirus Scientific Conference

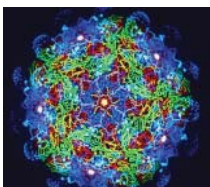
- Imaging Technologies Impact in Biodefense Research Facilities

## Erinha Speiz Switzerland

- BSL-4 Cost Global Analysis, 2014

## International Veterinary Biosafety Workshop

- Imaging in Containment, Pirbright England UK, 2014
- Containment Coatings, Pirbright England UK, 2014



## 2.2 SIGNIFICANT AWARDS, HONORS AND RECOGNITION

Due to the secure nature of High Containment facilities, the high containment components of these facilities are not able to be submitted for awards. The buildings overall can be submitted for awards in specialized categories.



### Honors and Awards

AIA Potomac Valley, Maryland, Design Citation Award, National Institutes of Health, Biomedical Building 33 Complex, 2006

AIA New Jersey, Merit Award for Design Excellence: - Unbuilt Category, USAMRIID - National Interagency Biodefense Campus, 2007

R&D Magazine, Special Mention, Lab of the Year Awards – CDC Building 18 Emerging Infectious Diseases Laboratory, 2006



## 2.3 ARTICLES AND CO-AUTHORED PRESENTATIONS

**Anthology of Biosafety VIII: Evolving Issues in Containment**

- Editor: Jonathan Y Richmond, PhD, published by ABSA, Mundelein, IL 2005  
Chapter 5: Animal Room Design Issues in High Containment

**ABSA American Biosafety Association**

- Issues in the Design of a Comprehensive Bio-Containment Facility, presented by Jon Crane, Ross Ferries in San Antonio, TX, 2004
- Containment Barrier Coatings – The Integrated System of Structure, Surface and Skin, presented by Ed Martin, Heather Gartner in Vancouver, Canada, 2005
- Containment Animal Facilities – Design and Operational Issues, presented by Jon Crane, Randy Kray in Vancouver, Canada, 2005
- Special Coatings Inside Containment Labs – Testing, Application and Validation, presented by Heather Gartner in Denver, 2010
- Protocol Mapping for Containment Suites – Chiapas Mexico, presented by Rainey Hufstetler in Orlando, FL, 2012

**European Biosafety Association**

- Emerging Bio-containment Issues in the U.S., presented by Scott Stirton, Prague Czech, 2004
- Safe work practices involving Research Animals in Biocontainment Facility Design, presented by Jon Crane, Scott Stirton, Barcelona, Spain, 2005

**CDC Symposium**

- Core Issues in Retrofitting an Existing Facility, Atlanta, GA, 2008
- Management Challenges for Safe Operation of BSL-3/ABSL-3 Facilities, Atlanta, GA, 2010
- Biosafety Management – Planning for the Future by Learning from the Past, Atlanta, GA, 2016

**Eagleson Colloquium**

- Large Animal Facilities “The Macro/Micro Isolator”, presented by Scott Stirton, Freeport ME, 2003
- High Containment Laboratory and Public Delivery Processes, presented by Randy Kray, Freeport ME, 2005

**Tradelines – International Conference on Biocontainment**

- How to Turn Obsolete Research Space Into a State-of-the-art Biocontainment Facility, presented by Al Miller, Jon Crane and Scott Stirton, 2003
- Operation and Maintenance for Biocontainment Facilities, presented by Daniel Smith, 2007
- Building System control features for reduced airflow, containment flexibility and lower operating costs, presented by Gordon Handziuk, 2015

**Labs 21 / I2SL: International Institute for Sustainable Laboratories**

- 2010: Do Less With More Get More – Building High-Containment Labs in Challenging Economies

**Urban Land Institute**

- 2010: SC3 Sustainability is Good for Business

## LIST OF EXHIBITS



01 Canadian Science Centre for Human and Animal Health  
Winnipeg, Manitoba, Canada



06 UTMB Shope BSL-4 Laboratory Facility  
Galveston, Texas, U.S.



02 CDC Building 18 - Emerging Infectious Diseases Laboratory  
Atlanta, Georgia, U.S.  
(Photographer: Balthazar Korab)



07 Boston University Medical Center - National Emerging Infectious Disease Laboratory  
Boston, Massachusetts, U.S.  
(Photographer: Don Hamerman)



03 NIH Integrated Research Facility - Rocky Mountain Laboratories  
Hamilton, Montana, U.S.  
(Photographer: Paul Hultberg)



08 National Institute of Virology Microbiological Maximum Containment Laboratory  
Pune, India



04 NIH Integrated Research Facility  
Fort Detrick, Maryland, U.S.  
(Photographer: Paul Hultberg)



09 Pirbright Institute - Plowright Biological Resources Facility  
Pirbright, England, UK  
(Photographer: Commission Air)



05 U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)  
Fort Detrick, Maryland, U.S.



10 Individual Protection Ensemble (IPE) Mannequin  
Dugway Proving Ground, Utah, U.S.



# 01 CANADIAN SCIENCE CENTRE FOR HUMAN AND ANIMAL HEALTH

## PROJECT LOCATION

Winnipeg, Manitoba, Canada

## CLIENT

University of Manitoba Health and Science Center, Faculty of Medicine

## ARCHITECTURE FIRM OF RECORD

Smith Carter / Dunlop Farrow

## DESIGN FIRM

Smith Carter / Dunlop Farrow

## COMPLETION DATE

1997

## ROLE OF NOMINEE

Design Architect for overall building design

BSL-4, BSL-3 and BSL-2 lab planning + design for Health Canada component

Biocontainment Specialist

## DESCRIPTION

The Canadian Science Center for Human and Animal Health is the first and only facility in the world where human and animal virus research is conducted under one roof. It is also one of only a few facilities worldwide where research is conducted at BSL-4. The 315,000 sf facility contains research facilities for animal and human health, consists of BSL-2, BSL-3, and BSL-4 laboratories. The high containment labs have a low tolerance to deflection resulting in the foundations being embedded into the second level of bedrock 30 meters below the soil to provide maximum stability.

## CHALLENGE AND RESULT

The design mandate was to design one facility for two agencies that had separate and complementary missions. Diagnostics and research on highly infectious diseases. Additionally, no BSL-4 facility had been constructed for 20 years, requiring a new set of principles to be applied to this type of facility.

To accentuate the scientific house for the two agencies, the building is designed as a systematic arrangement of the modular lab elements in a juxtaposed position to the non-scientific functions connected by a scientific walk. The scientific walk creates a spine that visibly connects and is positioned to create interaction among scientists to foster an environment for exchange of knowledge between scientists working for both agencies.

As this was the first BSL-4 facility in Canada, a world reference process was conducted to determine best containment



design practices, which resulted in establishing containment design and biocontainment design principles that have established this facility as a world benchmark for high containment facilities.

The high containment lab walls, floors, ceilings are designed as a box-within-a-box with minimum thermal stress, multi-layered epoxy liner sealed specially formed and cured concrete providing maximum seal integrity.

“Your head “mind” needs to get into containment.”

- Jim Orzechowski, CEO,  
Smith Carter, 1990

## DECLARATION OF RESPONSIBILITY

I have personal knowledge of the nominee's responsibility for the exhibit listed above. That responsibility included:

- ☒ Largely responsible for design
- ☒ Project under direction of nominee
- ☐ Nominee's firm executed project
- ☐ Other: explain

Daniel Smith, AIA — Vice President Lab Planning & Design, WSP | PB



# 01 CANADIAN SCIENCE CENTRE FOR HUMAN AND ANIMAL HEALTH





## 02 CDC BUILDING 18 – EMERGING INFECTIOUS DISEASES LABORATORY

*“Leslie is the global expert on high containment ...”*

- Stephen C. Milby, RA, Centers for Disease Control and Prevention



### PROJECT LOCATION

Atlanta, Georgia, U.S.

### CLIENT

Centers for Disease Control and Prevention

### ARCHITECTURE FIRM OF RECORD

CUH2A Prime / Smith Carter: High Containment

### DESIGN FIRM

CUH2A Prime / Smith Carter: High Containment

### COMPLETION DATE

2008

### ROLE OF NOMINEE

- Principal/Project Manager for Containment
- Architect of Record for High Containment
- Lead Lab Planning + Design for BSL-4 and BSL-3E Containment

### AWARDS / PUBLICATIONS

2006 R&D Magazine “Lab of the Year” and Special Mention

### DECLARATION OF RESPONSIBILITY

I have personal knowledge of the nominee's responsibility for the exhibit listed above. That responsibility included:

- ☒ Largely responsible for design  
☒ Project under direction of nominee  
☐ Nominee's firm executed project  
☐ Other: explain

Jennifer Bracewell, PMP, Liaison Officer

### DESCRIPTION

This BSL-4 laboratory facility is located at the home of the Centers for Disease Control and Prevention in Atlanta, Georgia, co-locating formerly disparate groups into one cohesive unit, creating a foundation for scientific collaboration and inspiration. The 390,000 sf Emerging Infectious Diseases Laboratory supports the critical work of the Department of Health and Human Services to protect the nation from infectious disease and to contribute to global scientific knowledge and advancement as the world reference center.

### CHALLENGE AND RESULT

As the high containment consultant, Leslie was responsible for the design, documentation and construction administration services of the high containment portions (BSL-4 and BSL-3 enhanced) located in Building 18. An accelerated design and construction schedule enabled construction to commence one year after programming started, providing a challenge to maintain a high quality BSL-4 laboratories that would be capable of handling life-threatening and exotic pathogens for which there are no treatments or vaccines.

Building on a depth of past laboratory design experience, we conceived, tested and implemented several design and technical innovations to maximize scientific program efficiency during the design and construction. The project provided the opportunity to apply several new technologies and many original integrated design and engineering

features, on an accelerated schedule to keep pace with program needs.

The result, the premier biocontainment facility of its kind in the world today, has guided the design of future laboratories around the world. These included planning innovations, such as flexible animal holding, multiple combinations of BSL-3/4 modules, and shared specimen support space.

Technical innovations include the use of optical scanners with suits, integrated lightweight air pressure resistant doors, mist spray chemical shower nozzles, integrated service delivery chases, effluent treatment integral with autoclaves, a scuba compressor breathing air backup system and visual display messaging boards.

02 CDC BUILDING 18 – EMERGING INFECTIOUS DISEASES LABORATORY





## 03 NIH INTEGRATED RESEARCH FACILITY – ROCKY MOUNTAIN LABORATORIES

*“Smith Carter is unique in their ability to deal effectively with all groups involved in a complex project like ours – architects, engineers, scientists, end-users, etc. This ability makes them a valuable asset to any highly complex project.”*

- Jell Welter, Higgins



### PROJECT LOCATION

Hamilton, Montana, U.S.

### CLIENT

National Institutes of Health

### ARCHITECTURE FIRM OF RECORD

Joint Venture: CUH2A Smith Carter

### DESIGN FIRM

Joint Venture: CUH2A Smith Carter

### COMPLETION DATE

2008

### ROLE OF NOMINEE

- Project Director / Project Manager
- Architect of Record
- Lab Planning + Design for BSL-4 Containment

### DESCRIPTION

The Integrated Research Facility (IRF) is the first high containment lab designed primarily for research. It complements the National Institutes of Health program and supports national research on the top priority agents for biodefense. The facility is a strategic component for the NIH Intramural Biodefense Agenda as it includes BSL-4, BSL-3 and BSL-2 containment laboratories designed specifically for research. The highly secure enhanced containment capacity enables research teams to study pathogens defined as Category A, B or C agents by the Centers for Disease Control and Prevention (CDC).

### CHALLENGE AND RESULT

As part of the evolution of high containment labs as diagnostic facilities to research facilities, we developed new planning models based on the concepts of dynamic interdisciplinary research teams, containment core support services, and the new FDA Two Animal Rule as new drivers in containment facility planning specific to the biodefense research agenda. The result provides greatly enhanced flexibility in laboratory programming, increased utilization and adaptability of animal modeling capability, and more efficient staffing models to support the high containment research program.

Building a high containment lab in a small town required a unique approach to visual integration while maintaining the security requirements. The result is a design that exposes the lower containment areas and

offices to the community with large glazed areas to express openness and centralizing the larger, non-transparent high containment components internally to provide a secure area, with the result of a facility integrated into the community as well as the research campus. The three-story research laboratory includes 34,600 sf of area dedicated to research which includes a 16,000 gsf high containment floor of BSL-4 labs, BSL-3 labs, BSL-4 animal holding rooms, as well as insectary, aerobiology suites, and a future imaging suite which are separated by an internal two-story atrium from the BSL-2 labs and administration training facilities creating an internal focus for scientific and staff interactions.

### DECLARATION OF RESPONSIBILITY

I have personal knowledge of the nominee's responsibility for the exhibit listed above. That responsibility included:

- ☒ Largely responsible for design
- ☒ Project under direction of nominee
- ☐ Nominee's firm executed project
- ☐ Other, explain: \_\_\_\_\_

\_\_\_\_\_  
Frank Kutlak, Architect/Project Officer

03 NIH INTEGRATED RESEARCH FACILITY – ROCKY MOUNTAIN LABORATORIES



## 04 NIH INTEGRATED RESEARCH FACILITY

*"This project was one of the toughest jobs I have been involved with and one of the toughest clients to work for. Smith Carter is the best at laboratory work because that is what they do. They are more capable and more experienced than others and are not distracted by other types of work."*

- Frank Kutlak, National Institutes of Health



### PROJECT LOCATION

Frederick, Maryland, U.S.

### CLIENT

National Institutes of Health

### ARCHITECTURE FIRM OF RECORD

Joint Venture: CUH2A Smith Carter

### DESIGN FIRM

Joint Venture: CUH2A Smith Carter

### COMPLETION DATE

2012

### ROLE OF NOMINEE

- Project Director / Project Manager
- Architect of Record
- Lab Planning + Design for BSL-4 Containment

### DESCRIPTION

The new National Institute of Health, Integrated Research Facility (IRF) containment defense facility is the first new High Containment building to be constructed at the new National Interagency Biodefense Campus (NIBC) at Fort Detrick. The 140,000 sf facility includes a large BSL-4 contiguous lab area of 24,000 nsf. The IRF's mission is to provide a clinical approach to research to advance the development of vaccines and therapeutic drugs and to provide support for triage and diagnostic to U.S. hospitals for recognizing highly infectious diseases.

To facilitate this, the facility features highly specialized multiple imaging modalities including MRI, CT-SPECT, CP-PET and X-Ray, within the BSL-4 high containment setting. This is the first biocontainment laboratory in the world that fully integrates advanced medical equipment, clinical support infrastructure, and whole animal imaging in a BSL-4 environment.

within containment and be imaged by equipment outside of containment. Lead and RF shielding designs were integrated into the containment barrier. Additionally the waste contained radionuclides, which required unique equipment and containment vessels to be developed to contain the mixed waste liquids.

As the first building on the NIBC campus, the building occupied a key position on the central green in development. A three-story glass atrium serves as an end focal point for the green and an entry point for all staff and guests, creating an openness to the campus to foster collaboration amongst the agencies.

### CHALLENGE AND RESULT

The key challenge for this project was to provide the first fully integrated advanced medical equipment, clinical support infrastructure, and whole animal imaging core in a BSL-4 environment, within a biocontainment facility model—while addressing conflicts between the stringent biosafety requirements of containment barrier design and environmental needs of the finely calibrated scientific equipment. The resulting design requiring re-engineering imaging equipment with specialty tubes to allow subjects to remain

### DECLARATION OF RESPONSIBILITY

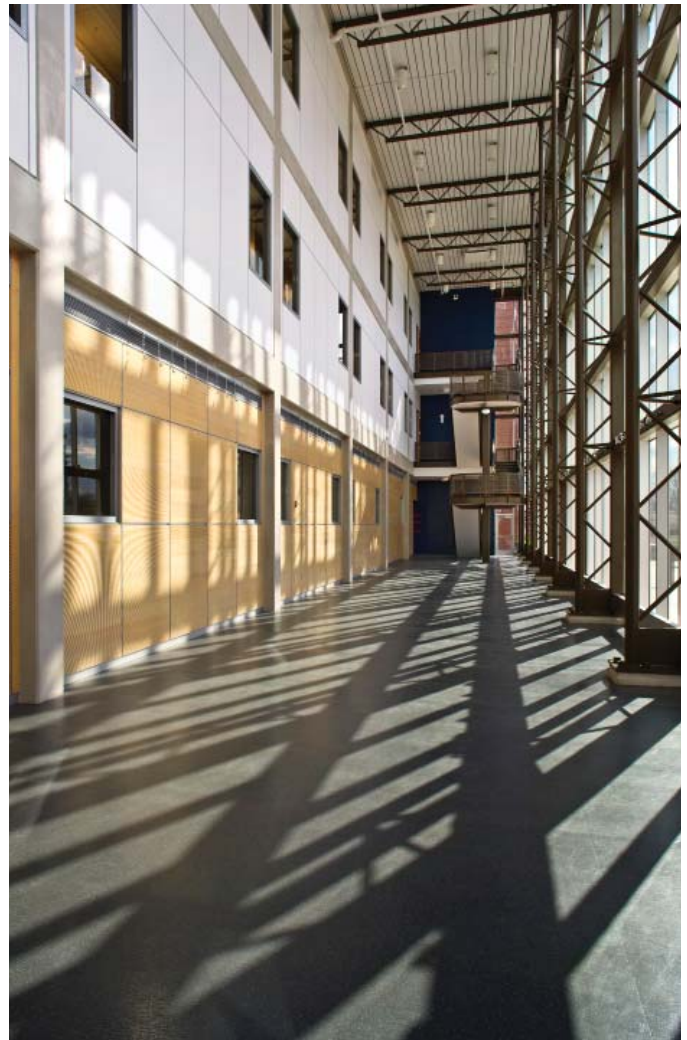
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☐ Nominee's firm executed project  
☐ Other, explain.

Frank Kutlak, Architect/Project Officer



# 04 NIH INTEGRATED RESEARCH FACILITY



## 05 U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES (USAMRIID)

*"Smith Carter stands head and shoulders above the rest of the competition in terms of professionalism. Their quality of work exceeds expectations and provides great value for the money spent. They were always two steps ahead and anticipated and responded to client concerns on the spot."*

- Thomas Kenney, Department of Defense, U.S. Army Corp of Engineers



### PROJECT LOCATION

Frederick, Maryland, U.S.

### CLIENT

U.S. Army Corps of Engineers, U.S.  
Biological Defense Research Program

### ARCHITECTURE FIRM OF RECORD

Joint Venture: CUH2A Smith Carter

### DESIGN FIRM

Joint Venture: CUH2A Smith Carter

### COMPLETION DATE

January 2017

### ROLE OF NOMINEE

- Project Director / Project Manager
- Architect of Record
- Lab Planning + Design for BSL-4 Containment & Imaging

### AWARDS / PUBLICATIONS

New Jersey AIA Award

### DESCRIPTION

The new USAMRIID will replace the outdated and crowded existing USAMRIID facilities, providing a new 930,000 gsf containment facility including state-of-the-art BSL-4 and BSL-3 biocontainment laboratory space, animal facilities, and administrative offices, as well as operational and administrative support facilities. Smith Carter's team provided architectural and engineering design services for a new replacement facility for the high containment laboratories (BSL-4, BSL-3 Enhanced Imaging and Aerobiology), clinic, and logistics areas providing planning, architectural and mechanical engineering services.

The project includes new biomedical research and vivarium facilities, housing spaces for BSL-2/3/4 Research, BSL-2/3/4 Repository, BSL-2/3/4 Transgenics, Emergents BSL-4's, BSL-3/4 Aerobiology, Pathogenesis, Vaccine Research, Diagnostics, Host Responses, Special BSL-4 In-patient Triage Suite, Therapeutics, Advanced Imaging, Bioinformatics, Genomics, Proteomics, Biopharmaceutical Development, Animal ABSL-2/3/4 Animal Research and Animal Holding for various species including non-human primates and administrative and support space. Support facilities include medical gas utilities, conventional utilities, effluent steam sterilization, fire protection, and information systems.

### CHALLENGE AND RESULT

The projects includes the largest BSL-4 facility in the world. The resulting design included four suites, each divisible into a

lab component and an animal containment component. This allows for minimal operational obstructions to work in research and developing science; however provided significant challenges to the systems operations to ensure a safe and biosecure lab. The mandate of the facility also includes the first testing and evaluation capability at BSL-4, which required certain areas to be installed with additional electronic monitoring and lead shielding.

The size of the facility allowed research into new techniques for containment and resulted in prefabricated chemical shower systems, complete with chemical dispersion, HEPA filtration and breathing air pre-installed to provide a high quality installation. Construction phase services in addition to shop drawing review and approval, technical assistance, and commissioning, included full time on-site personnel to provide daily interaction with the construction team.

The process working with DoD, provided challenges to coordination, as four agencies were involved and at one point 24 managers, which were frequently rotated through their system. Teaming sessions were regularly conducted as well as exploratory trips to other containment facilities to ensure common understanding, awareness and that a collective decision was made on design. This resulted in solutions that continue to be endorsed fully by all agencies.

### DECLARATION OF RESPONSIBILITY

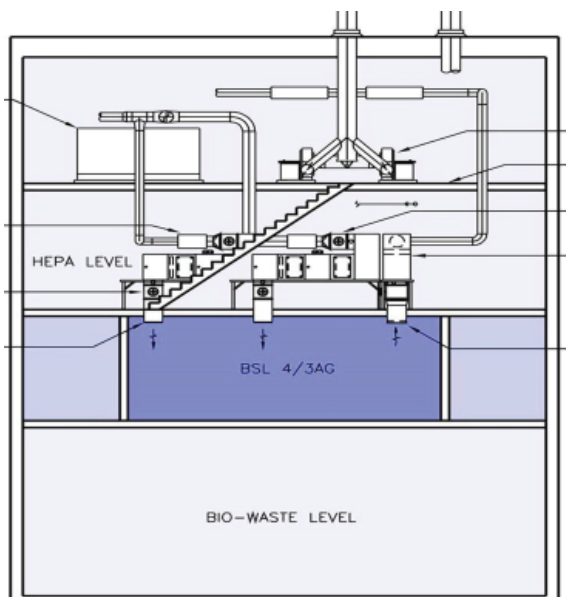
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David Giles, Department of Defense



## 05 U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES (USAMRIID)



## 06 UTMB SHOPE BSL-4 LABORATORY FACILITY



### PROJECT LOCATION

Galveston, Texas, U.S.

### CLIENT

University of Texas Medical Branch  
Galveston

### ARCHITECTURE FIRM OF RECORD

Joint Venture: B2HK Prime / Smith Carter:  
High Containment

### DESIGN FIRM

Joint Venture: B2HK Prime / Smith Carter:  
High Containment

### COMPLETION DATE

2004

### ROLE OF NOMINEE

- Biocontainment Specialist

### DESCRIPTION

The Shope Laboratory consists of a BSL-4 containment laboratory housing the Department of Pathology and the World Health Organization's Collaborating Center for Tropical Diseases. It provides much needed research space to develop therapies, vaccines and diagnostic tests for naturally occurring emerging diseases such as SARS, West Nile encephalitis, and avian influenza, as well as for microbes that might be employed in conflict. This new facility has 12,000 sf of laboratory research space that can adjust operate at BSL-3 Enhanced and BSL-4. The building program calls for a research laboratory and associated support spaces to house equipment, virus collections storage, specialized fumigation equipment and chemical shower rooms for people and equipment as they move in and out of the lab.

### CHALLENGE AND RESULT

The Shope Lab is the first BSL-4 lab to be designed and constructed on an academic campus. A major challenge was to ensure successful integration of the new highly secure lab with the existing historically designated building, dating to 1881. Traditional security devices had to be re-developed to allow the facility to be integrated into the campus, resulting in a hardened exterior skin and a structure designed for progressive collapse and explosive charges.

In addition, and paramount, the building must be safe, secure, and able to withstand the high-force winds in this coastal hurricane zone. Developing this top-level containment laboratory

demands that "safety first" is the top priority both for lab workers and the neighboring community. No compromises are acceptable. The hardened structure has since weathered a direct strike in 2012 from hurricane Ike, a Category 2 hurricane. The facility was fully decontaminated, powered down for four hours and restarted without a single system failure.

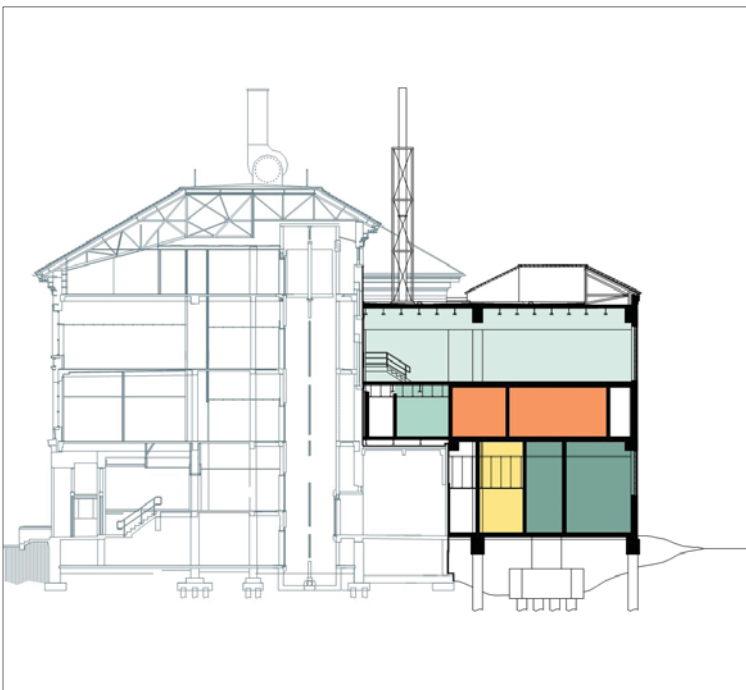
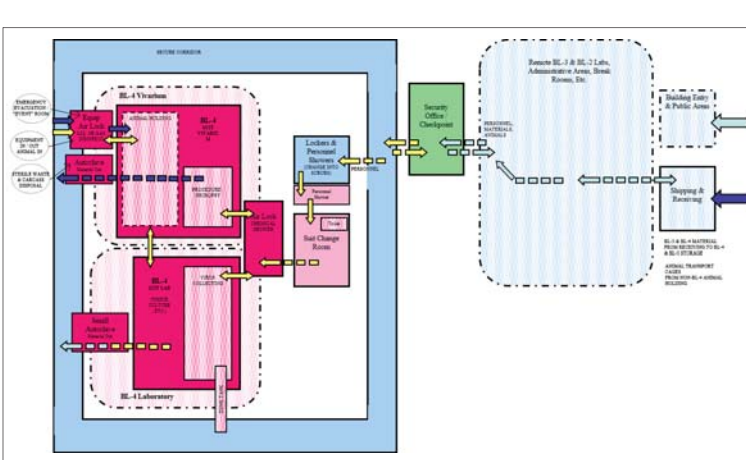
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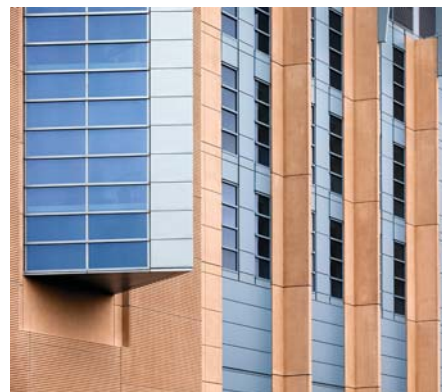
Daniel Smith, AIA — Vice President Lab  
Planning & Design, WSP | PB





# 07 BOSTON UNIVERSITY MEDICAL CENTER – NATIONAL EMERGING INFECTIOUS DISEASE LABORATORY

*“Threading the NEIDL - Inside a BSL-4” on Vimeo, February 8, 2013*  
<https://vimeo.com/59246199>



## PROJECT LOCATION

Boston, Massachusetts, U.S.

## CLIENT

Boston University

## ARCHITECTURE FIRM OF RECORD

Joint Venture: CUH2A Smith Carter

## DESIGN FIRM

Joint Venture: CUH2A Smith Carter

## COMPLETION DATE

2011

## ROLE OF NOMINEE

- Principle/Project Manager for Containment
- Architect of Record for High Containment
- Biocontainment Specialist

## AWARDS / PUBLICATIONS

Threading the NEIDL – Inside a BSL-4 (on Vimeo)

## DESCRIPTION

As an important link in the nation's biodefense efforts, the National Emerging Infectious Diseases Laboratory supports the research and development for countermeasures against hazardous biological agents. One of two national biocontainment laboratories funded by the National Institute of Allergy and Infectious Disease (NIAID), clinical and translational research at the facility is focused on biological agents in BSL-4, BSL-3, and BSL-2 laboratories. Specialty core laboratories such as contained imaging suites, Cryo EM, Aerobiology and Insectaries enhance the research capacity of this national biocontainment facility.

## CHALLENGE AND RESULT

To provide a collaborative academic environment supporting a federal agency mission, the containment design is based upon a central laboratory model surrounded by specialized functions including aerobiology suites, BSL-4 advanced imaging, biomolecule production and specimen processing

capabilities. These specialized cores are a first in the containment environment, accommodate the latest in scientific equipment and leverage the advancement of infectious disease vaccines, therapeutic development and diagnostics research. The innovative design supports the facility's mission to establish a research facility with the highest attention to community and laboratory safety and security.

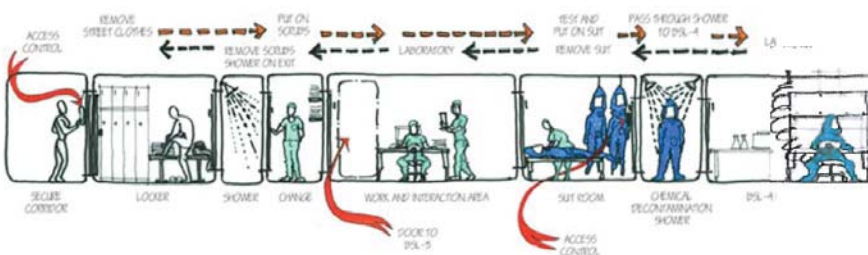
We developed innovative engineering and design solutions which enable several independent research programs to function effectively within the 190,000 gsf facility. A key innovation was pioneering the development of a new mist suppression system following ground-breaking quantified analysis of fire hazards and risk in high containment laboratories. The team's research allowed the introduction and regulatory acceptance of the system instead of a traditional sprinkler system, reducing the risk of equipment damage, biohazard and loading of effluent decontamination systems.

## DECLARATION OF RESPONSIBILITY

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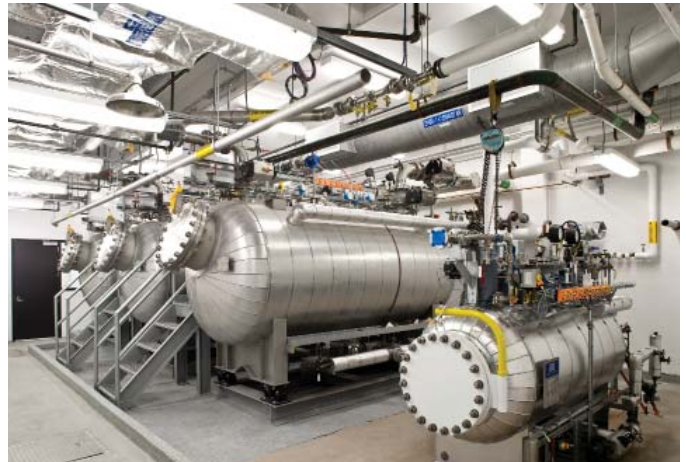
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☐ Other: explain

Daniel Smith, AIA — Vice President Lab Planning & Design, WSP | PB





07 BOSTON UNIVERSITY MEDICAL CENTER –  
NATIONAL EMERGING INFECTIOUS DISEASE  
LABORATORY





# 08 NATIONAL INSTITUTE OF VIROLOGY MICROBIOLOGICAL MAXIMUM CONTAINMENT LABORATORY

Why do you need a BSL-4 Lab?

*"In order to improve the health and economics of the citizens of our nation, we need to take control of the health issues we face at the highest level."*  
– Dr Mourya NIV Director of Research 2007

India is home to many high containment pathogens.

## PROJECT LOCATION

Pune, India

## CLIENT

National Institute of Virology

## ARCHITECTURE FIRM OF RECORD

Smith Carter

## DESIGN FIRM

Smith Carter

## COMPLETION DATE

2012

## ROLE OF NOMINEE

- Project Director
- Architect of Record
- Lead Lab Planning + Design for BSL-4 Containment

## DECLARATION OF RESPONSIBILITY

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Daniel Smith, AIA — Vice President Lab Planning & Design, WSP |PB

## DESCRIPTION

The facility, certified in December, 2012, is India's first BSL-4 containment laboratory and Asia's first to meet international standards. The focus of the facility is for research and diagnostics on highly contagious human pathogenic biological agents. The facility includes two separate BSL-4 suites and a BSL-4 Isolation Unit to provide support at the highest level of containment for patient and/or staff monitoring. It also features a reference stock vault, an aerobiology lab with a Class III cabinet and two separate animal suites. The animal suites have access to a common necropsy room, fumigation rooms and redundant large rack size autoclaves for procedures and decontamination. BSL-2 and BSL-3 containment laboratories, cage washing, animal quarantine suites, gamma cell and administrative are included in the facility to support the BSL-4 scientific agenda.

## CHALLENGES AND RESULTS

The project was delivered as a Design-Build with Klenzaid as the prime contractor. Smith Carter was responsible for the containment design and for providing the laboratory planning, building organization and architectural and MEP systems engineering design for this BSL-4 biomedical facility.

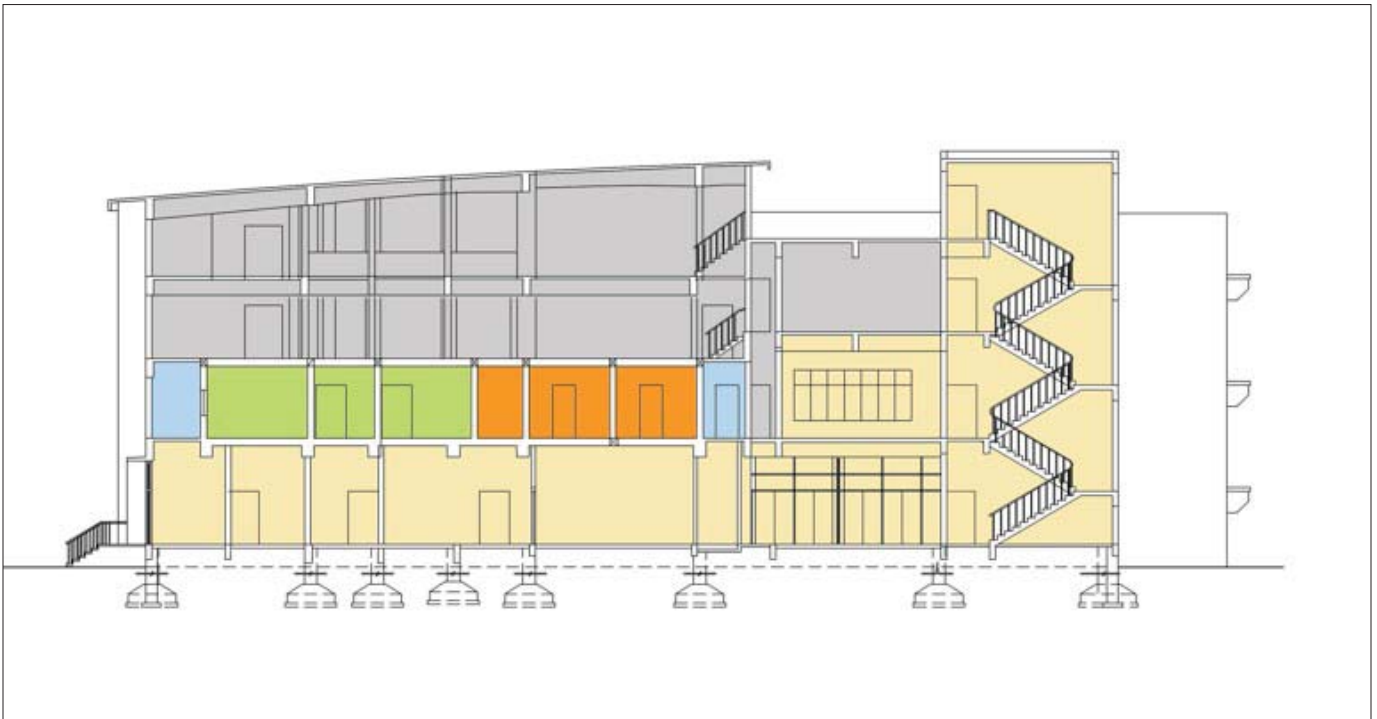
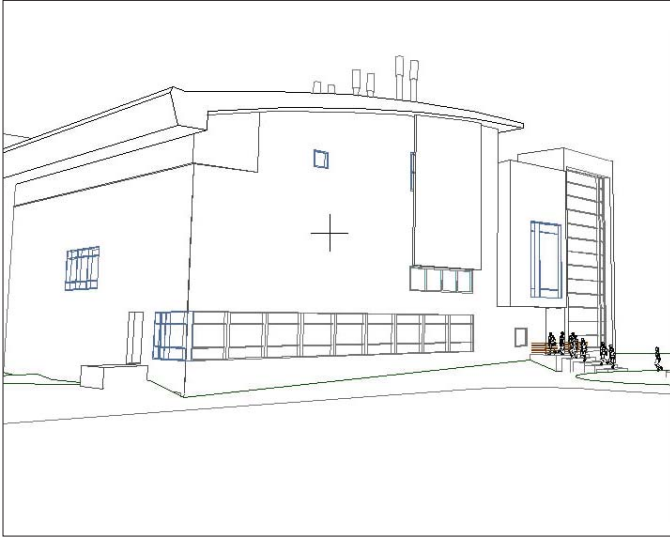
The most difficult challenge was to ensure the lab was constructed to meet U.S. and International Standards, as CDC and NIH personnel from the U.S. would be working



in the lab collaboratively with NIV. Concrete construction techniques are generally not of the quality required for a containment lab. Special concrete installers and plants that construct high quality bridges were engaged to construct the containment barriers. Additionally, local environmental challenges such as rain and humidity required specialized concrete to which will be adapted for strength and shrinkage. We developed a mock-up and testing methodology that was supported by a key person from our office on site during the construction. Engineering systems such as emergency and UPS power, redundant HVAC fans with HEPA filters, breathing air, chemical shower and biowaste batch treatment plant are located above and below the containment labs to ensure containment and continuity of operations. Perimeter security features and monitoring have been incorporated to ensure this facility meets international standards; while incorporating local building regulations.

The result is a BSL-4 facility that meets international standards and is actively improving the health of the nation of India as their science matures collaborating with CDC and NIH.

08 NATIONAL INSTITUTE OF VIROLOGY  
MICROBIOLOGICAL MAXIMUM CONTAINMENT  
LABORATORY



## 09 PIRBRIGHT INSTITUTE – PLOWRIGHT & BIOLOGICAL RESOURCES FACILITY

*“Smith Carter’s technical expertise was the reason we hired the firm. They know how to get the work done and can identify the most important 10% of the issues and focus on solving those effectively.”*

– Uwe Mueller-Doblies, Institute of Animal Health, UK



### PROJECT LOCATION

Pirbright, United Kingdom

### CLIENT

The Pirbright Institute

### ARCHITECTURE FIRM OF RECORD

Smith Carter

### DESIGN FIRM

Smith Carter

### COMPLETION DATE

Plowright 2015; BRF in design

### ROLE OF NOMINEE

- Project Director
- Architect of Record
- Lead Lab Planning + Design for BSL-4 Containment

### AWARDS / PUBLICATIONS

Plowright: 2015 R&D Magazine “Lab of the Year” Finalist and Special Mention

### DESCRIPTION

The Plowright building is part of the initial Site Redevelopment Programme for Pirbright, which is comprised of site and infrastructure work, a new security strategy, demolition and renovation of existing buildings and chiefly a new 14,000 CL4 laboratory facility. This new facility provides laboratory space for scientists that work mainly on animal diseases affecting livestock and on diseases affecting wildlife and zoonotics affecting both humans and animals.

The Biological Resources Facility (BRF) is part of The Pirbright Institute’s Phase 2 campus redevelopment to provide a state-of-the-art institute for fundamental and applied research on some of the most devastating viruses of farmed animals.

The Biological Resources Facility includes facilities at CL4 (both ACDP4 and SAPO4) and CL3 to support research into domestic livestock and poultry diseases. The BRF is an 8,000 sm facility that is located adjacent to existing research laboratories for collaborative work.

### CHALLENGE AND RESULT

The BRF includes a High Containment area, which includes an ACDP4 Suite Lab for work on zoonotics, which is the first suit lab in the UK. As a result, a collaborative process was established with the institute, outside scientific and biosafety experts and our design team. This resulted in applying world standards and best practices to develop a UK specific approach to Level 4 suit lab work that meets both the UK regulations and International Standards.

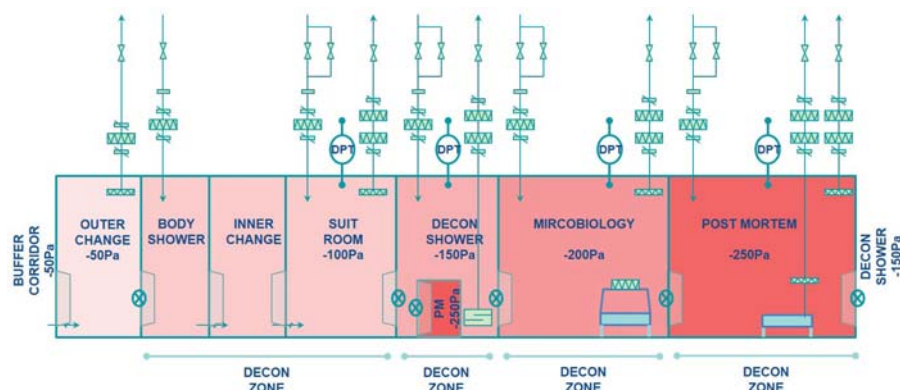
The challenge was to design a facility that incorporates guidance from a number of domestic and international agencies, including the Advisory Committee on Dangerous Pathogens (ACDP) and the Department for the Environment, Food and Rural Affairs (Defra) for work with high hazard pathogens, as they license the facility for operation. Compliance with Home Office legislation, The Animals [Scientific Procedures] Act 1986 Amended 2012 and Part 7 of the Anti-Terrorism, Crime and Security Act will also be provided.

### DECLARATION OF RESPONSIBILITY

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Daniel Smith, AIA — Vice President Lab Planning & Design, WSP | PB





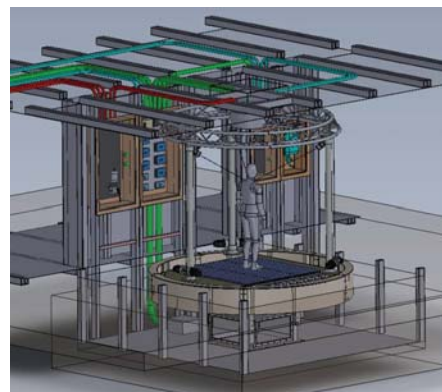
## 09 PIRBRIGHT INSTITUTE - BIOLOGICAL RESOURCES FACILITY



# 10 INDIVIDUAL PROTECTION ENSEMBLE (IPE) MANNEQUIN SYSTEM

*Video: DARPA's Updated Humanoid Hits the Treadmill, Climbs Stairs, Does Push-Ups And otherwise terrifies us*

By Clay Dillow April 12, 2012  
<https://youtu.be/aaqCmX5dMYHg>



## PROJECT LOCATION

Dugway Proving Ground, Utah, U.S.

## CLIENT

U.S. Army RDECOM Acquisition Center

## ARCHITECTURE FIRM OF RECORD

Joint Venture: CUH2A Smith Carter

## DESIGN FIRM

Joint Venture: CUH2A Smith Carter

## COMPLETION DATE

2009

## ROLE OF NOMINEE

- Project Director
- Architect of Record
- Containment Specialist

## DESCRIPTION

The purpose of this program is to design, fabricate, and validate a system to test the efficacy of military clothing and to evaluate real-time IPE performance against live Chemical Warfare Agents (CWA). A free-standing, self-balancing robot was developed simultaneously to simulate warfighter activities, body temperature, perspiration and components of respiration, while the exposure chamber provides a platform within which IPE testing can be conducted in a CWA environment using the IPE Mannequin. The chamber is required to simulate exterior conditions the warfighter may face, ie: wind, temperature, humidity in a variety of climates (arid to tropical), and provide testing of the mannequin using a variety of chemical agents and concentrations under varying wind speeds and directions and in different temperatures.

## CHALLENGE AND RESULT

The most significant challenge was to develop a safe environment to conduct the tests using live chemical agents. The resultant design is a wind tunnel in containment. The complete system, including the air fans, were placed inside a double wall welded stainless steel containment barrier. Sensors for chemical tracing were developed and located on the mannequin to understand the level of chemical exposure, inside the chamber to monitor the mixture, inside the double wall containment barrier to monitor for any escaped gas and inside the building to

notify the base emergency unit if any chemicals are detected outside the double wall containment barrier.

A unique challenge to a project of this type is the team that needs to be assembled to ensure success. A Systems Engineering group was engaged (Midwest Research Institute) to manage the team and provide DoD with some 32 reports each month and develop the sensors, a Robot Engineering company (Boston Dynamics) was responsible for developing the robot who in turn engaged a company from Seattle (Measurement Tech NW) for robotic physio monitoring. Smith Carter was responsible for the architectural and mechanical design of the test chamber. Six separate design focus streams were established to provide continuous engagement with consultants of such unique capabilities.

## DECLARATION OF RESPONSIBILITY

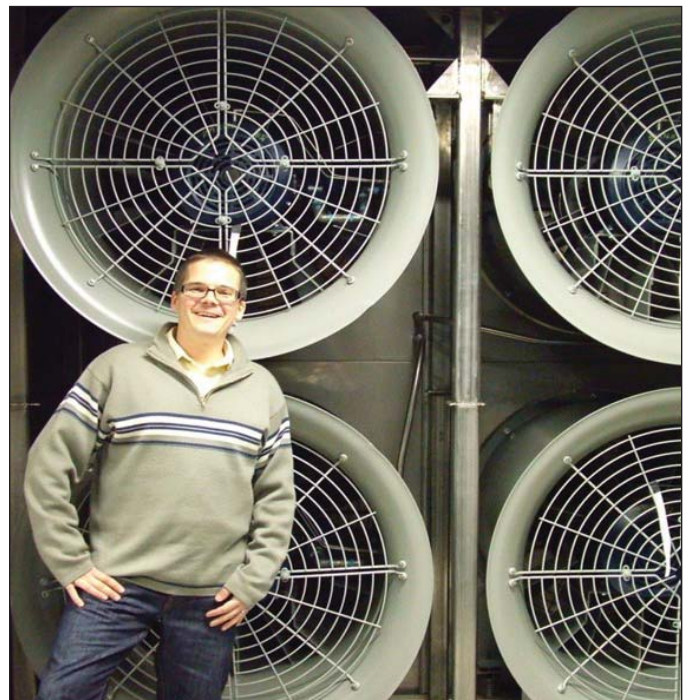
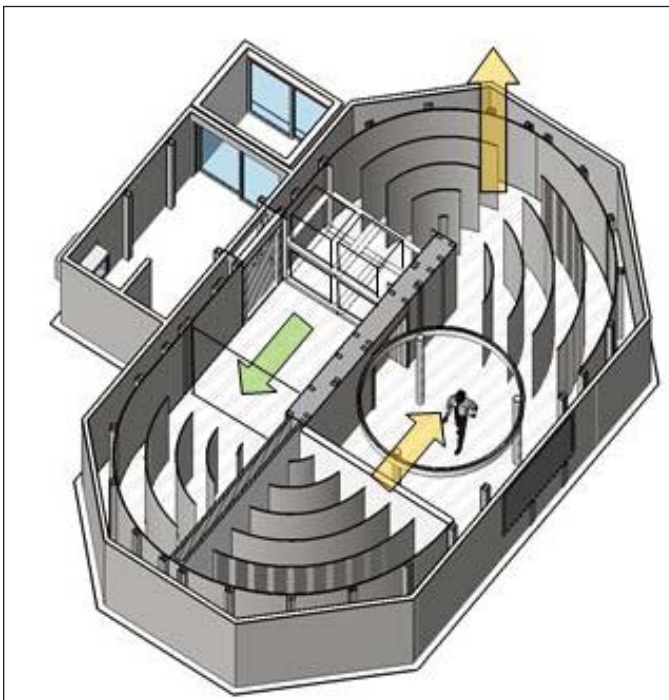
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Daniel Smith, AIA — Vice President Lab  
Planning & Design, WSP | PB



## 10 INDIVIDUAL PROTECTION ENSEMBLE (IPE) MANNEQUIN SYSTEM



PEMS High Containment Chamber - Wind Flow