Iowa State University
College of Veterinary Medicine

Veterinary Diagnostic Laboratory
Planning Verification Study

Prepared by:
RDG Planning & Design and SRG Partnership

With:
Iowa State University - Veterinary Diagnostic Laboratory
Iowa State University - Facilities Planning & Management

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EXECUTIVE SUMMARY

The Iowa State University Veterinary Diagnostic Laboratory (VDL) is a component of the Iowa State University College of Veterinary Medicine (CVM), and combined with the Food Supply Veterinary Medicine section, Veterinary Extension, and Veterinary Field Services, forms the department of Veterinary Diagnostic and Production Animal Medicine (VDPAM) at Iowa State University. As the only full service and fully accredited veterinary diagnostic laboratory in the state of Iowa, the ISU Veterinary Diagnostic Laboratory serves to protect animal and human health and advance Iowa's $32.5 billion dollar animal agricultural industry by providing timely, high quality, comprehensive veterinary diagnostic services; teaching veterinary students, graduate students, future diagnosticians, and veterinary practitioners; and conducting applied research to advance diagnostic and production animal medicine.

The ISU VDL's 25 faculty and 130 technical staff process 80,000 – 100,000 diagnostic case submissions and conduct more than 1,000,000 – 1,500,000 diagnostic assays each year for livestock producers.

The Veterinary Diagnostic Laboratory is housed in the College of Veterinary Medicine building with some research activities located at the Veterinary Medicine Research Institute (VMRI). The overall footprint and infrastructure of the VDL has not been substantially expanded or updated since the College of Veterinary Medicine building was completed and initially occupied by the laboratory's 11 faculty and 20 staff in 1976.

The VDL currently occupies about 64,000 net square feet; minimal expansion has occurred to accommodate the growth in caseload and staffing over the last 40 years. Space quality and quantity are serious concerns. Building infrastructure systems are outdated and inadequate; severe overcrowding, biosafety, and biocontainment are all critical issues that need to be addressed. The space in VMRI is functionally obsolete, inefficient, and unsuitable for modern research. The VDL is a concentration point for receiving and handling a broad spectrum of biological specimens from clinically ill animals whose cause of illness is unknown. Many pathogens and toxins that cause ill health or death of animals can also cause disease in humans. Thus, protecting the health of the employees and students (e.g., biosafety) that work at the VDL is of utmost concern as is the importance for containing such disease causing agents from escaping the laboratory (biocontainment).

The current program space has been aggregated within the existing building as best possible within the constraints of the building, but results in a maze of ill-configured rooms that hinder workflow and create inefficiencies. Many building systems are deficient or inadequate for the needs of a contemporary laboratory environment and much of the space receives no natural light. The American Association of Veterinary Laboratory Diagnosticians (AAVLD) is the national accrediting body and has repeatedly cited facility deficiencies in program square footage, biocontainment, biosecurity and other technical issues that cannot be resolved in the existing building. Failing to address these basic veterinary diagnostic laboratory facility infrastructure needs could result in the ISU VDL losing its AAVLD Accreditation. If the ISU VDL lost its accreditation, the primary impact would be that the VDL would lose its status as Tier I Lab in the National Animal Health Laboratory Network (NAHLN), and would not be recognized or authorized to conduct testing that has official, regulatory, or program disease consequence. Such official, regulatory, or program disease diagnostic services provided by the VDL are a foundational element in supporting Iowa Animal Agriculture's ability to sell animals and animal products (meat, milk, and eggs) into the global marketplace.

A Needs Assessment Study was conducted in 2012 to analyze and assess the programmatic space and facility needs for the ISU Veterinary Diagnostic Laboratory. The University hired the team of RDG Planning & Design and SRG Partnership in 2014 to further this process with a more detailed planning study. These needs were assessed through on-site observations, peer institution site visits, departmental interviews and committee review sessions.

The 2014 study confirmed programmatic space needs and identified key issues with space quality, biocontainment, biosecurity, and process flow. The study indicated a need for an approximately 150,000 gross square foot building and recommended a new, stand-alone diagnostic laboratory.

A new veterinary diagnostic facility was identified as the next capital building priority for Iowa State University, at an estimated cost of $124M. In 2018, the State of Iowa Legislature appropriated $63.5M for a new VDL. Along with private and university funds, a total project budget of $75M was established.

The purpose of this planning verification study was to confirm programmatic space requirements for the VDL, determine the potential scope of a $75M project, evaluate prospective sites for a new facility, and factor in additional project components such as the pathological incinerator and the heating and cooling plant.

The study confirmed the recommendation for a new, stand-alone facility on the College of Veterinary Medicine complex. The full program identified a need for a 139,270 gross square foot VDL building supported by an 8,000 gross square foot heating and cooling plant at a cost of $126M.

A $75M, budget-based facility was developed as an outcome of this study. This concept recommends building the core infrastructure required to support a new, stand-alone VDL, incorporating the primary front-end diagnostic laboratory functions. All of the case receiving and much of the initial assessment and sample processing will occur in the new building. This option provides the best blend of making significant strides toward addressing the VDL's most significant biocontainment and biosafety concerns while maintaining a functional working veterinary diagnostic laboratory. This recommendation also outlines a clear way forward for the eventual completion of a facility that will accommodate the entire Iowa State University Veterinary Diagnostic Laboratory operation.

The projected timeframe for a $75M facility anticipates completion in 2023.

PARTICIPANTS

Iowa State University

Administrative Committee

Rodger Main	Veterinary Diagnostic Laboratory
Kelly Boesenberg-Smith	Veterinary Diagnostic Laboratory
Dan Grooms	College of Veterinary Medicine
Pat Halbur	Veterinary Diagnostic & Production Animal Medicine
Renee Knosby	College of Veterinary Medicine
Brian Adams	College of Veterinary Medicine
Dan Sloan	Facilities Planning & Management
David Blum	Facilities Planning & Management
Margie Tabor	Facilities Planning & Management
Scott Ayres	Facilities Planning & Management

Veterinary Diagnostic Laboratory User Groups

Molecular & Viral Diagnostics (Molecular, HATS, Virology)

Phil Gauger	MVHS
Karen Harmon	MVHS
Amy Chriswell	MVHS
Jess Miller	MVHS
Haiyan Huang	MVHS
Allison Kolker	MVHS

Bacteriology

Orhan Sahin	Bacteriology
Nubia Macedo	Bacteriology
Danielle Kenne	Bacteriology
Angela Johnson	Bacteriology
Curt Thompson	Bacteriology

Serology

Dave Baum	Serology
Sheila Norris	Serology

Histology & Pathology

Eric Burrough	Pathology
Jerry Snyder	Pathology
Jenny Groeltz-Thrush	Histology

Mailroom/ Sample Receiving & Materials Receiving

Katie Woodard	Mailroom/ Sample Receiving
Wendy Stensland	Mailroom/ Sample Receiving
Brian Adams	College of Veterinary Medicine

Research

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Jianqiang Zhang	MVHS
Luis Gimenez-Lirola	Serology
Alejandro Larios	Pathology
Karen Harmon	MVHS
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Kent Schwartz	Pathology
Drew Magstadt	Pathology
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Dave Baum	Serology
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Environmental Health & Safety and Incinerator

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Brian Adams	College of Veterinary Medicine
Pat Halbur	Veterinary Diagnostic & Production Animal Medicine

Analytical Chemistry

Viet Dang	Analytical Chemistry
Renee Novak	Analytical Chemistry
Dwayne Schrunk	Analytical Chemistry
Scott Radke	Analytical Chemistry

Central Lab Services

Brian Adams	College of Veterinary Medicine
David Frisk	Bacteriology
Danielle Kenne	Bacteriology
Karen Harmon	MVHS
Katie Woodard	Mailroom/ Sample Receiving
Orhan Sahin	Bacteriology
Scott Radke	Analytical Chemistry
John Beary	VDL Facilities
Dave Baum	Serology
Jianqiang Zhang	MVHS

Administration, Information Technology, and Quality Assurance

Randy Berghefer	Information Technology
Kelly Boesenberg-Smith	Quality Assurance
Jennifer Holdredge	Administration

Iowa State University Other Stakeholders

Cathy Brown	Facilities Planning & Management
Mark Huss	Facilities Planning & Management
Brandi Latterell	Facilities Planning & Management
Chris Strawhacker	Facilities Planning & Management
Clay Miller	Environmental Health & Safety

Consultant Team

Joe Lang	RDG Planning & Design
Tim Evans	SRG Partnership
Nick Schulz	RDG Planning & Design
Matt Coen	RDG Planning & Design
Gary Cooper	Alvine Engineering
Dennis Sieh	Building Cost Consultants

Other Consultants

Jerod Gross	Snyder & Associates
Spencer Wignall	Snyder & Associates
Cris Traywick	APC Products, Inc.

STATEMENT OF INTENT

In 2018, the University engaged RDG Planning & Design and SRG Partnership to update the previous planning studies and verify the outcomes.

The intent of this Planning Verification Study is to refine the facility program space summary, develop concept options, develop construction cost estimates, and establish the feasibility for a future capital project for the Veterinary Diagnostic Laboratory, using the previous studies as the basis for information. The content of this Planning Verification Study should be reviewed in association with previous studies as this report highlighted changes from the prior reports and supplements, rather than replaces, the previous studies.

In concert with CVM and VDL leadership, Snyder and Associates, Environmental Health and Safety, and Facilities Planning and Management (FP&M), the study also investigated additional planning issues related to site, infrastructure, and the incinerator.

2018 Planning Verification Study goals and objectives:

Program

- Review and update the Veterinary Diagnostic Lab Planning Study completed in 2014
- Publish a revised program statement in preparation for a Design Build delivery process
- Evaluate addition/renovation scenario versus new stand-alone facility
- Review and refine the list of VDL units/sections through a series of meetings with VDL, FP&M, and unit/section leaders
- Confirm all units are listed, modifying as needed to represent any organizational changes
- List existing space allocation by unit, room number, square footage, and function
- Identify existing space allocation by unit on floor plans
- List each functional space within the unit and the associated future programmatic area
- Summarize space by unit/section

Development Options

- Describe functional adjacency requirements among units and with other college entities, students, visitors, etc., to identify which groups need to be co-located/adjacent to each other
- Identify programmatic priorities for the new VDL by unit
- Determine appropriate net-to-gross percentage to be used to develop overall building massing
- Develop stacking diagrams/overall massing for potential new building footprint
- Develop a solution, utilizing the $75M in available funding that accommodates future building expandability
- Develop opinions of probable cost

Site and Infrastructure

- Identify replacement, location, regulatory, and operational guidelines related to the incinerator
- Identify requirements and relationship of new heating and cooling plant to new VDL facility
- Develop site-related programmatic requirements
- Develop site selection criteria and associated parameters

OUTLINE OF THE PROCESS

Work Plan Schedule – 2018 Veterinary Diagnostic Lab Planning Study

October 2018

- Program Kick-off meeting - Review of project scope, process & schedule
- Site Selection Kick-off meeting – Review of potential sites
- Incinerator Kick-off meeting – Review of existing processes
- Workshop #1 - Review of spatial adjacencies & relationships; program priorities

November 2018

- Utilities meeting – Review project utility requirements
- Site Review meetings #1 & 2 – Review project scope and tour existing facilities
- Incinerator meeting – Tour and review of existing incinerators spaces and processes
- Workshop #2 - Space summary validation

December 2018

- Administrative Group Update Meeting
- Planning Committee Review of Draft Report

January 2019

- Planning Committee Review of Final Report
- ISU Administrative Review of Final Report

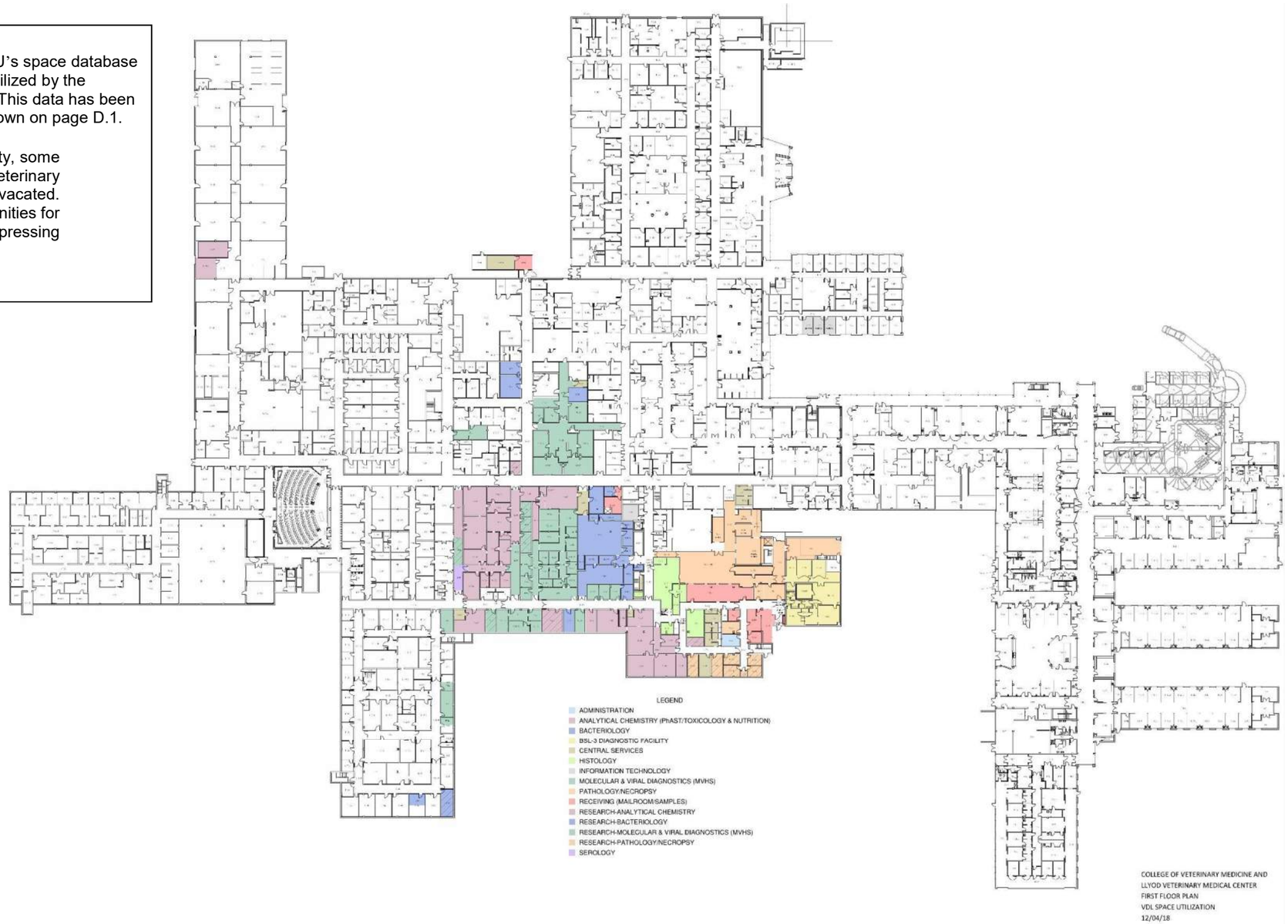
February 2019

- Final Report Published

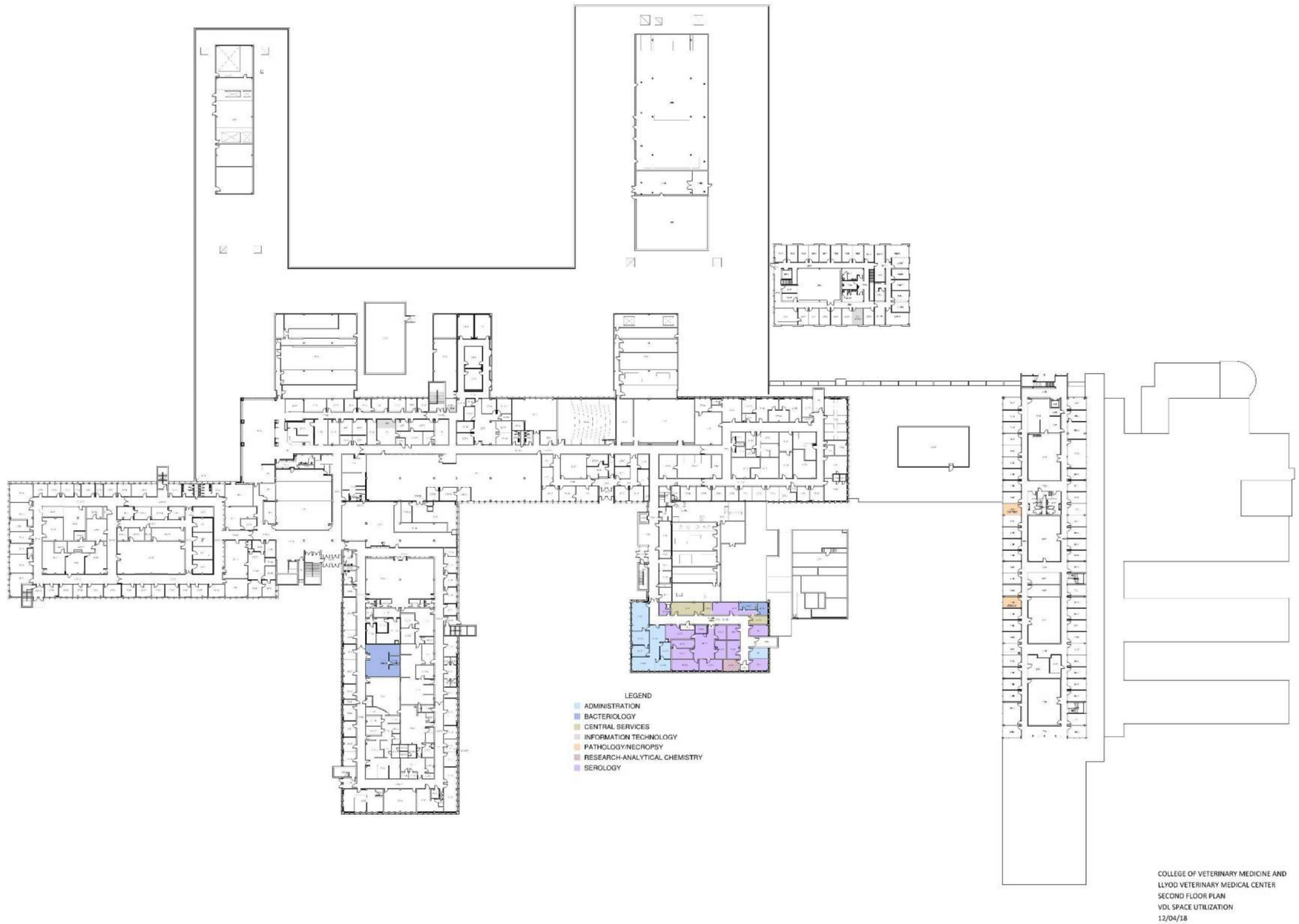
LEVEL 1 - OVERALL COLLEGE OF VETERINARY MEDICINE – EXISTING VETERINARY DIAGNOSTIC LAB USAGE AS OF 12/04/2018

The following drawings correspond to ISU's space database and visually represent the space being utilized by the Veterinary Diagnostic Laboratory (VDL). This data has been included in the Space Summary table shown on page D.1.

Following the construction of a new facility, some space currently occupied by the Veterinary Diagnostic Laboratory (VDL) will be vacated. These vacated areas will provide opportunities for the college to meet their most pressing programmatic space needs.

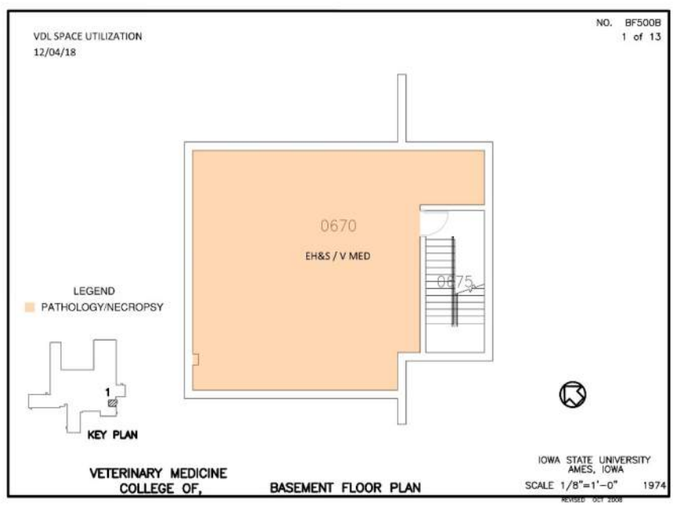


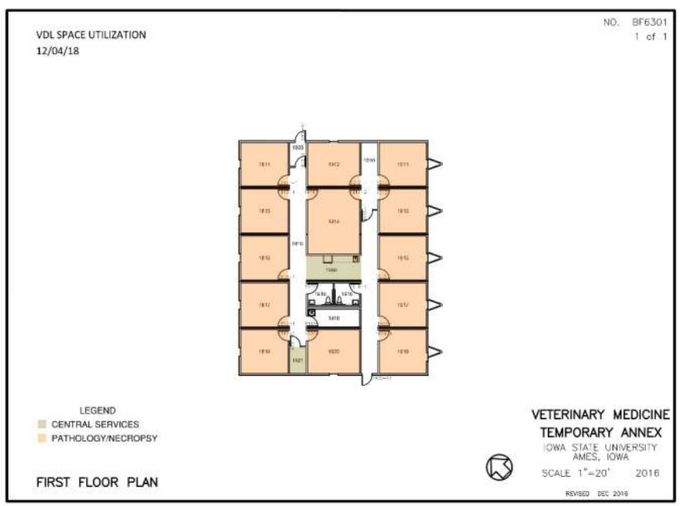
LEVEL 2 - OVERALL COLLEGE OF VETERINARY MEDICINE – EXISTING VETERINARY DIAGNOSTIC LAB USAGE
AS OF 12/04/2018

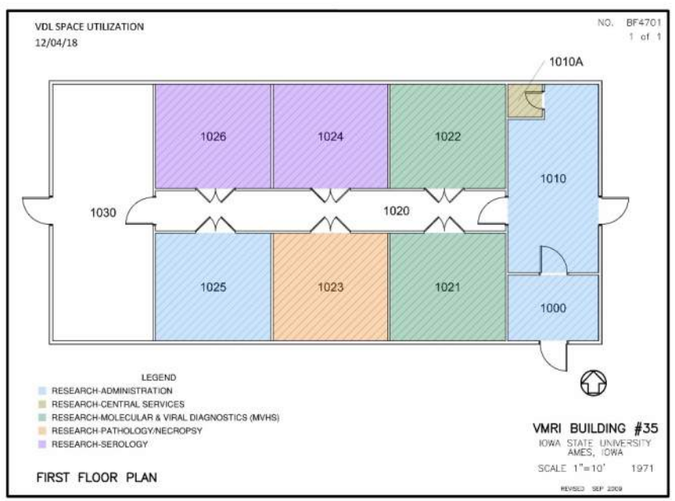


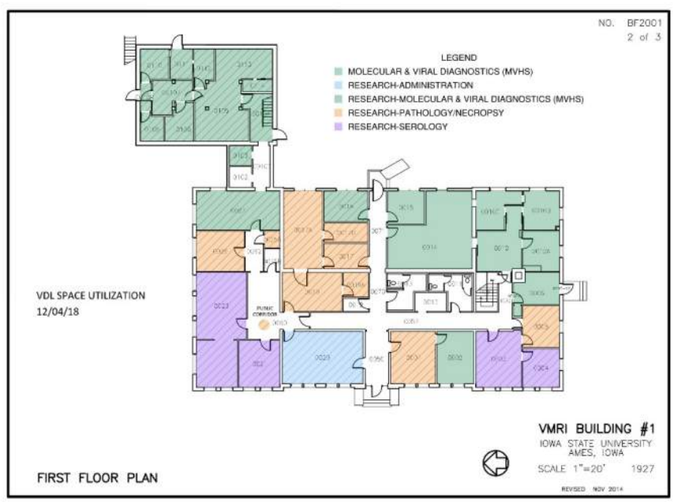
ANCILLARY SPACES - COLLEGE OF VETERINARY MEDICINE – EXISTING VETERINARY DIAGNOSTIC LAB USAGE

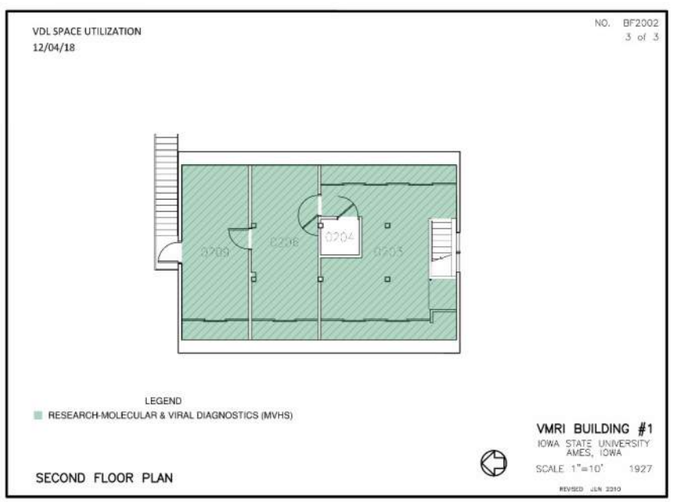
AS OF 12/04/2018

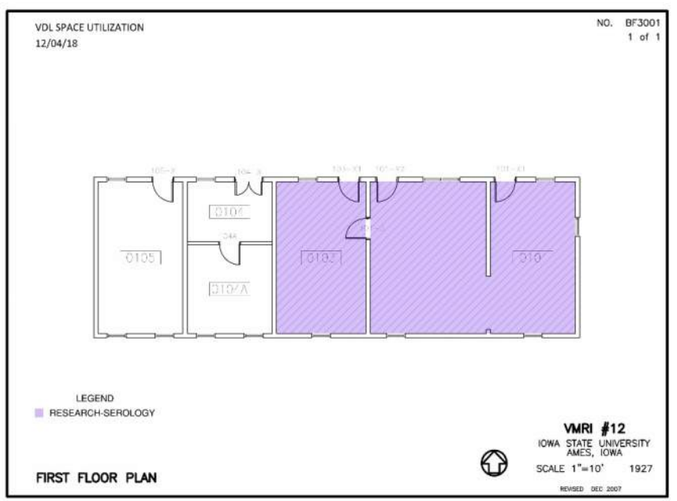












FACILITY SUMMARY

The table below represents the history of needs assessments and planning studies focused on the programmatic space needs for the VDL, comparing occupied space to future programmatic space needs.

					Current Study		
Space Type*	2012 Occupied NSF	2013 Needs Assessment NSF	2014 Occupied NSF	2014 Planning Study NSF	2018 Occupied NSF	2018 Full Program	2018 Budget Based
Common Space			-	4,726	-	5,270	2,820
Administration	3,591	5,770	2,979	1,886	1,983	2,300	300
Information Technology	816	1,056	810	1,068	995	1,056	-
Bacteriology	5,546	6,892	6,009	6,595	6,196	6,465	6,465
Serology	3,000	4,075	3,017	4,415	3,275	4,445	-
PhAST	7,672	8,553	6,155	7,137	10,233		
Toxicology and Nutrition	4,021	5,277	4,089	5,350	-		
Pathology/Necropsy	8,017	12,565	7,942	12,130	9,844	14,126	14,126
BSL-3 Diagnostic Facility	3,484	6,220	3,244	2,184	2,586	2,684	-
Molecular & Viral Diagnostics	6,403	11,400	12,338	11,535	11,460	12,803	-
Histology	1,334	3,973	1,643	2,692	1,692	3,333	3,333
Research	9,229	18,857	9,377	14,598	11,004	15,198	5,000
Shared Lab Functions	731	1,218	1,311	645	2,746	795	795
Materials Receiving and Handling	-	-	-	3,998	-	3,998	3,998
Mailroom and Sample Receiving	664	3,000	663	4,167	2,316	4,167	4,167
Dirty Corridor	-	6,337	-	-	-		
Analytical Chemistry	-	-	-	-	-	10,300	-
Building Support	-	-	-	-	-	800	800
Total Net Square Feet (NSF)	54,508	95,193	59,577	83,126	64,330	87,740	41,804
NSF/GSF Ratio		55%		55%		63%	57%
Total Gross Square Feet (GSF)		**173,078**		**151,138**		**139,270**	**73,340**

The program breakdown above is for the VDL program spaces only. An 8,000 GSF heating and cooling plant is needed to support the new building. Total project GSF including the heating and cooling plant as follows:
2018 Full Building Program total with Plant = 147,270 gsf
2018 Budget Based Program total with Plant= 81,340 gsf

PROGRAM SPACE ANALYSIS SUMMARY

Over a two-month period, the data from the 2014 Planning Study was carefully analyzed and compared to the current programmatic needs for the VDL and the ISU space inventory data base. The following is a list of several operational and programming changes that were identified through this verification study:

- Operational efficiencies implemented after the 2014 study instituted significant changes to processes and overall process flow, impacting the amount of space allocated to the materials and sample receiving, processing, handling and storage.
- Staffing levels have increased to support and maintain the VDL's quality assurance and client services as caseloads continue to increase.
- On-going and anticipated replacement of existing instrumentation needs to be accommodated; additional square footage will be needed to support robotic instrumentation.
- The area allocated to common space was expanded to incorporate institutional guidelines for shared spaces like lactation facilities and gender-neutral restrooms, as well as collaboration areas designed to facilitate informal interaction between faculty, staff and students.

- The need for appropriately sized offices for pathology faculty and an increase in staff resulted in the addition of a modular building, which increased the overall VDL space by 3,000 net square feet.
- PhAST and Toxicology & Nutrition sections have been combined and are now identified as Analytical Chemistry.

Shared building functions have been grouped for programming purposes, they are described as:

- Materials Receiving and Handling: receiving and loading dock areas, central lab supply room, archival records storage, as well as waste disposal and chemical/storage dispensing.
- Mailroom and Sample Receiving: all case entries, which includes the submission, sample receiving, processing and storage areas, as well as a work room.
- Common space: break rooms, a central reception area, seminar and conference rooms, and locker areas.

*A complete description of all functions included in each Space Type above can be found in the Appendix. Additional space-related information available in the Appendix include a detailed program summary of functional spaces by unit. Existing space allocation and usage is also documented.

Incinerator

A comprehensive study was conducted in 2011, evaluating the short- and long-term viability and reliability of the existing pathological incinerator located at the College of Veterinary Medicine. The incinerator is a critical component for the disposal of pathological waste for the university as well as the community. It is operated by Environmental Health and Safety and maintained by Facilities Planning and Management. The findings indicate the incinerator has surpassed its useful economic life.

Currently, the pathological waste stream is separated into rendered waste and incinerated waste. The current regulatory trends predict increased restrictions and limitations for rendered waste. Rendering is anticipated to eventually be phased out all together as a waste disposal method, therefore, the quantity of waste requiring incineration is expected to more than double over the next twenty years.

The 2011 study examined long term solutions regarding pathological waste streams. A long-term alternative is required to properly manage future pathological waste streams. Both qualitative and quantitative analyses show a new incinerator is the preferred long-term strategy. These findings have been incorporated into the planning for a new VDL facility.

Based on the preferred location for the new VDL building, the new incinerator stack will be in the flight path of the Ames Municipal Airport. Incinerator stack height and plume feasibility study exhibits have been submitted to the FAA for consideration and comment. The City of Ames will provide a final recommendation after considering the FAA comments. If the preferred site is not acceptable, alternate sites have been identified and will be further explored.

Site

Site program requirements necessary to support a new stand-alone Veterinary Diagnostic Laboratory building were established during this effort. Some of the requirements identified are listed below:

- Separate dock entries for necropsy and sample and parcel receiving and processing
- Efficient vehicular access, parking and circulation for clients, deliveries, and staff
- FAA comments and recommendations on new incinerator site. DNR permits the new incinerator.
- VDL siting compatible with future growth of College of Veterinary Medicine and VMRI
- Heating and cooling plant requirements to supply the new VDL building and provide expansion capability to support future development on the western portion of the College of Veterinary Medicine campus.

Heating and Cooling Plant

The existing energy plant located at the northeast corner of the existing College of Veterinary Medicine campus does not have the capacity to serve a new VDL building. Therefore, a dedicated heating and cooling plant will be constructed to serve the VDL building. Along with the heating and cooling plant; new site utility infrastructure, storm, sanitary sewers, domestic water, natural gas, high voltage electrical, fiber optics, and thermal energy distribution systems will be provided. The final location of the new heating and cooling plant will be sited to allow for future expansion to serve the expansion needs of the VDL facility. Redundancy will be considered for water and electrical utilities. Generators will also be provided for support of emergency functions.

SUMMARY OF DEVELOPMENT OPTIONS

This study investigated three development options to meet the programmatic space needs of the Veterinary Diagnostic Laboratory, revisiting the findings and recommendations from the 2014 study and factoring in the recent funding for a $75M VDL project.

In addition to addressing the key issues identified in the previous studies, careful study was undertaken to address the following considerations while developing these options:

- Facilitate sequence and adjacency of laboratory processes
- Optimize sample receiving and process flow
- Minimize disruption to laboratory functions
- Maintain and improve biosafety and biocontainment requirements
- Confirm current and projected space needs
- Address core lab programmatic space needs
- Clarify infrastructure requirements

Each development option recognized the need for additional space. The need for additional space is extensive; as there is no surge space available. A project that involves only the renovation of existing space is not feasible. Options varied from addition/renovation to a stand-alone facility.

Addition / Renovation Concept

During the 2014 Study, addition/renovation concepts that utilized and expanded existing space were developed. These options anticipated phased construction and renovation, which exacerbated several critical issues: the ability to address biocontainment separation from the other CVM areas in the existing complex would be difficult, effective and efficient operational continuity would be compromised, and the overall project schedule would be extended significantly. An addition/renovation option would make it very difficult for the VDL to provide continuous, timely services to its clients without major disruption. Additionally, the overall benefit to meeting long-term space needs for the College by vacating and reallocating existing VDL space would be substantially reduced. It is noted that this verification study confirms the inadequacies of the addition/renovation concept as related to key issues per the 2014 study; see table A on page E17 of the 2014 study. These constraints and concerns were re-evaluated during this verification effort, and the determination was made that the best long-term option remains a new, stand-alone facility.

New Building Concept – Full Building Program

- **87,740 net square feet (139,270 gross square feet)**

The concept for a new building to accommodate the Veterinary Diagnostic Laboratory develops an entirely new facility focused on the optimal process flow, ideal functional relationships, appropriate biocontainment and biosafety, and current and projected space requirements. This building would be located on the CVM campus, allowing access and collaboration with other units, but would not be physically attached to the existing building. This option would house all the VDL functions, including the incinerator, and minimize both the disruption to operations during construction and the overall project timeline.

New Building Concept – Budget Based Program

- **41,804 net square feet (73,340 gross square feet)**

A concept for a new building based on a project budget of $75M has been developed to accommodate the availability of funding now, and over time. In this option, the project program has been carefully considered to create a solution that would define a project scope and accommodate the VDL's operations in the short-term and in the future. This solution completes essential sample receiving and processing functions supporting a new, stand-alone VDL. Many of the existing diagnostic testing services, research, administration and lab support functions will remain in their existing locations and be deferred to a future phase. The Budget Based Program will include VDL building central services, the incinerator complex, and the heating and cooling plant required for the new facility. The initial project would be designed and constructed to accommodate a future addition for the remaining program functions.

This approach follows the progression of the diagnostic process and provides VDL faculty, staff, and students the resources necessary to accomplish much of their day-to-day work within the building in which they are housed. All of the case receiving (e.g., whole animals, gross tissues, and a vast myriad of ante-mortem, environmental, and feed samples) and much of the initial assessment and sample processing will be in the new stand-alone VDL Building, isolating many of the most potential sources of contamination from the Veterinary Medicine building complex and loading areas.

Processed samples requiring molecular, classical virology, serologic, or analytical chemistry-based testing, representing approximately 80% of all the testing completed and impacting more than 85% of all cases processed at the VDL, would then be transferred in secondary containment to the existing Veterinary Medicine Building for testing and further analysis. While the substantial movement of samples multiple times each day from the new VDL Building to the existing Veterinary Medicine Building each day is far less than optimal, all such movements would be unidirectional, limiting bio-contamination and bio-safety concerns.

In phased options, full programmatic space needs are not realized until all phases are completed. Notably, a phased solution improves, but does not fully satisfy bio-containment and bio-safety concerns in the existing building, previously identified as key issues. It is recommended that efforts be made to complete the second phase as soon as possible to address these concerns. In addition, no funding of renovation of existing VDL space has been included in the initial phase of in this scenario. Substantial challenges related to biosafety, biocontainment and lack of sufficient space would remain with the New Building Concept-Budget Based Program option.

CONCEPT STATEMENT – NEW VDL BUILDING

The concept for a new building to accommodate the Veterinary Diagnostic Laboratory provides a new stand-alone facility located on the College of Veterinary Medicine complex. The location of the building will maintain access to and facilitate collaborative efforts with other CVM units. The following concept diagrams were developed to test the full program and functional adjacency requirements, through phased implementation. Two- and three-story design options were considered. A strong preference for a two-story building was established based on work flow functionality required between floors.

Three test-fit scenarios were developed in consideration of the following:

- Ability to phase construction
- Ability to accommodate various possible site constraints depending on final site selection
- Consideration of relative travel distances between the new VDL and existing CVM buildings
- Optimal, efficient and flexible laboratory design
- Creation of amenity spaces
- Improved access to daylighting and views

The following is an outline of the potential organization of programmatic spaces:

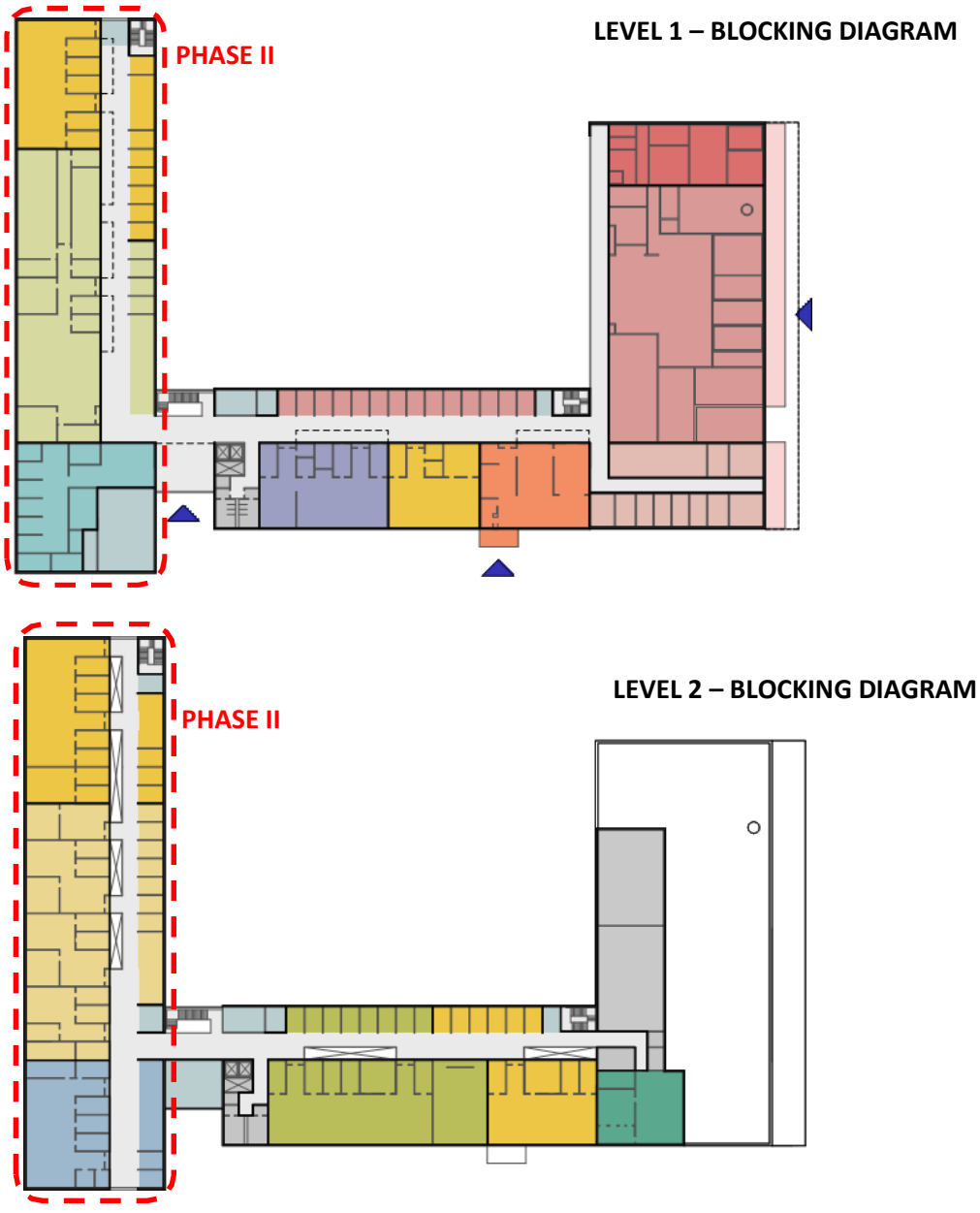
Level 1

- Public access to Administration and Common Space meeting areas.
- Appropriate separation of laboratories and sample areas to control public access.
- Necropsy receiving, materials receiving, and waste disposal areas are isolated from public areas, visually screened, and away from other CVM receiving functions.
- Co-locate the VDL Necropsy/Pathology, Sample Receiving, Material Receiving, and Incinerator areas to optimize the critical sample flow and receiving functions. At-grade loading dock access is achievable to all these areas.
- The BSL-3 space is located adjacent to the incinerator and necropsy receiving / waste disposal functions to create efficiency and ensure bio-security when handling infectious material and waste.
- Sample Receiving, Necropsy, and Pathology/Necropsy are located at Level 1 for efficient sample flow between these three sections.
- Building corridors are shared use circulation routes used for both sample and personnel movement and comprise part of a biosafety level 2 environment; open containers of food or drink are prohibited.

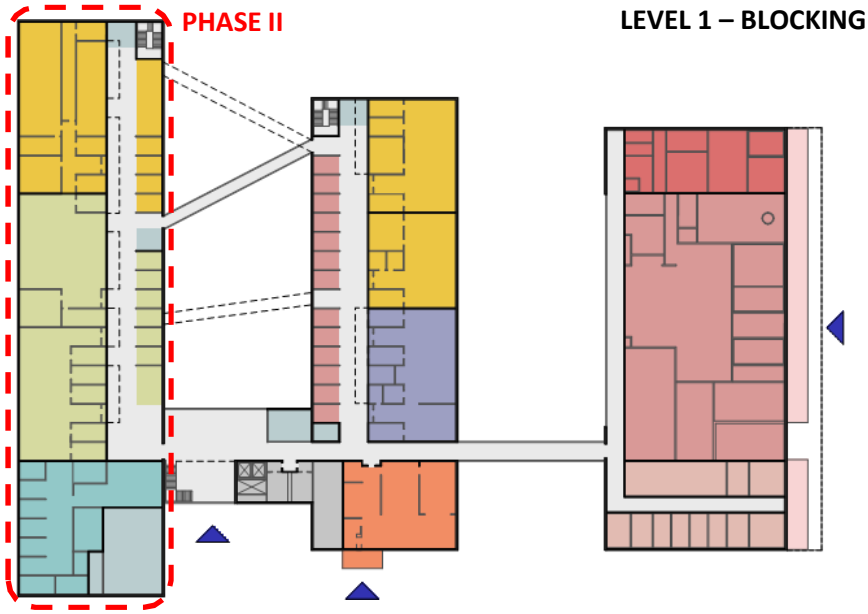
Level 2

- Analytical Chemistry and shared research space are located on Level 2 to balance the floor areas for efficient stacking.
- Floor plans suggest wide circulation spaces with penetrations of the second level to daylight the space below from skylights or clerestories above and provide better connectivity within the facility. Exterior windows provide daylighting and view to all major interior spaces.
- Integration of mechanical spaces within the second floor is suggested to improve access to mechanical equipment and reduce the need for rooftop penthouses.
- Wide corridors, interior glazing at laboratory walls, and a potential viewing gallery into the necropsy suite could facilitate building tours, improving biosafety for visitors while minimizing disruption to building occupants and day-to-day work activities.

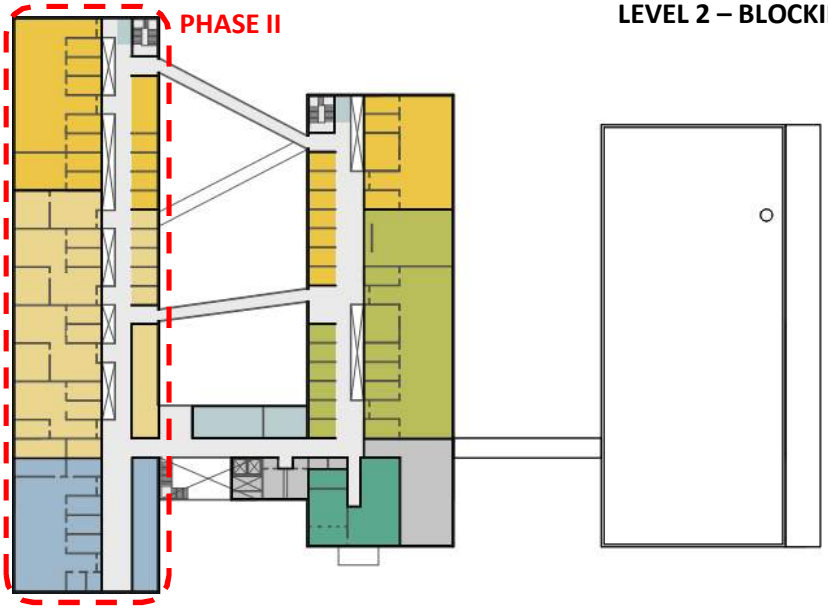
NEW BUILDING FULL BUILDING PROGRAM – TEST FIT #1



NEW BUILDING FULL BUILDING PROGRAM – TEST FIT #2



LEVEL 1 – BLOCKING DIAGRAM



LEVEL 2 – BLOCKING DIAGRAM

RESEARCH
MOLECULAR & VIRAL DIAG
SEROLOGY
HISTOLOGY
ANALYTICAL CHEMISTRY
BACTERIOLOGY
ADMINISTRATION
SHARED LAB FUNCTIONS
SAMPLE RECEIVING
BSL-3 DIAGNOSTIC FAC
PATHOLOGY
MAT REC & HANDLING
NECROPSY DOCK
COMMON SPACE
BUILDING SUPPORT
CIRCULATION
ENTRY

NEW BUILDING FULL BUILDING PROGRAM – TEST FIT #3

LEVEL 1 – BLOCKING DIAGRAM

LEVEL 2 – BLOCKING DIAGRAM

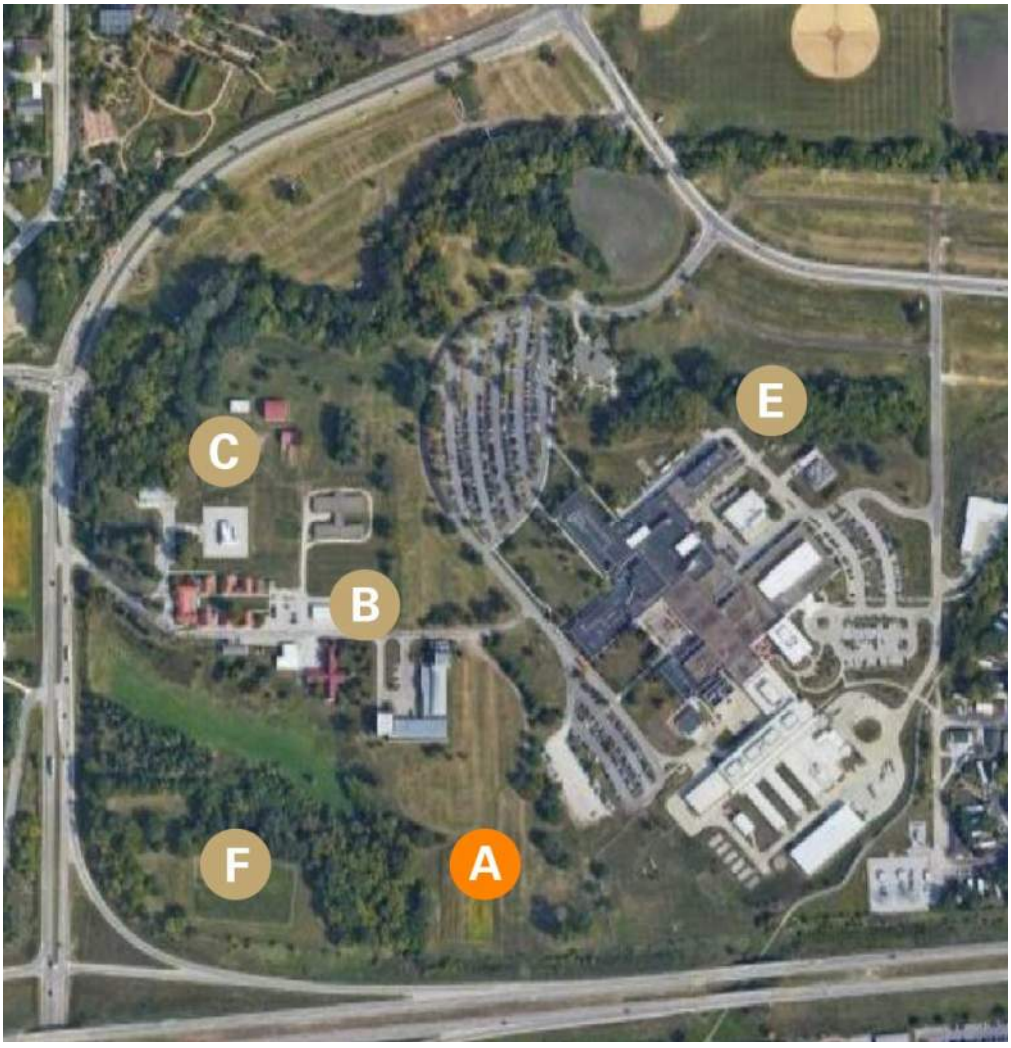
RESEARCH
MOLECULAR & VIRAL DIAG
SEROLOGY
HISTOLOGY
ANALYTICAL CHEMISTRY
BACTERIOLOGY
ADMINISTRATION
SHARED LAB FUNCTIONS
SAMPLE RECEIVING
BSL-3 DIAGNOSTIC FAC
PATHOLOGY
MAT REC & HANDLING
NECROPSY DOCK
COMMON SPACE
BUILDING SUPPORT
CIRCULATION
ENTRY

POTENTIAL VDL SITE LOCATIONS

Site Considerations:

The 2014 VDL study conducted a preliminary analysis of five sites on the College of Veterinary Medicine complex considering access from Highway 30 to the necropsy facilities, access to the EH&S managed incineration facility, utility infrastructure, previously identified building sizes and environmental constraints.

A matrix of evaluation criteria (table A) was developed based on the site program, to thoroughly review the sites identified in 2014. Criteria were selected to evaluate impacts to current and future land use on the College of Veterinary Medicine campus, access and circulation, and VDL infrastructure needs.



Site Key:

Preferred location of proposed New Building at the College of Veterinary Medicine complex

Additional Sites evaluated for new VDL Building at the College of Veterinary Medicine Complex

VDL Site Evaluation Criteria - February 20, 2019

	Evaluation Criteria	Considerations	Site A	Site B/C	Site E	Site F
Campus Planning	Adjacency to existing Vet Med	Pedestrian and material access to and from existing Vet Med building	+ Good access to existing	+ Good access to existing	o Increased distance; impact to material/sample transport	- Increased distance; impact to material/sample transport
	Parking/Access Drive	Access to existing parking	+ Use lot 96	+ Reallocate portion of lot 93	- New lot required ($432K)	- New lot required ($432K)
	Current land use	Existing structures or program space are compatible	+ Site is available and compatible	- Conflicts with existing LAR facilities; requires relocation of current operations[1]	o Work through grass parking	+ Site is available and compatible
	Future land use	Land is available for future/compatible development	+ Site is available and compatible; potential LIDIF expansion	o Compatible with future VMRI redevelopment	+ No planned land use change	+ No planned land use change
	Visibility	Access to public Vet Med entries; potential traffic congestion	+ Highly visible from Hwy 30	+ Visible from Christensen Dr.	+/- Visible from South 16th Street, Christensen Dr. and Riverside Dr.; becomes front door for CVM	+ Highly visible from Hwy 30 and University Blvd.
	Visitor access to the complex	Access to public Vet Med entries; potential traffic congestion	+ Access from Christensen Dr.	+ Access from Christensen Dr.	- Road realignment/ modifications required; Access from Christensen Dr. and Riverside Dr. ($135K)	- New road development required ($270K)
Infrastructure	Utilities and site improvements	Utilities required for each site along with topography and site preparation	o $4.8M	o $4.6M	+ $5.5M[2]	FF $6.5M[3]
	Incinerator Stack	Location of site in relation to the flight path	- In line with flight path	- In line with flight path; farther away than Site A	+ Out of flight path	+ Out of flight path
	Heating & Cooling Plant	Location of plant in proximity to proposed site; expansion capabilities for greater VMRI area	+ Plant can be centrally located for VDL + greater VMRI area	+ Plant can be centrally located for VDL + greater VMRI area	- Additional plant required for future development in the greater VMRI area	- Plant can be centrally located for VDL + greater VMRI area; increased infrastructure costs

FF (Fatal Flaw) = substantial cost and/or program implications

[1] estimated cost of LAR facilities replacement = ~$6 million

[2] includes cost of parking and road improvements

[3] includes cost of parking and road improvements

Site A-1 similar to site A

PREFERRED SITE

Through this evaluation, Site A was identified as the preferred site for a new VDL facility. This site, located in close proximity to the existing VDL facility in the College of Veterinary Medicine building, provides the best access for faculty, students and staff, especially if this project is implemented using a phased approach. The ability to utilize existing parking and the visibility off Christensen Drive make this location ideal for visitors. The location on the Vet Med Campus will provide a central location for the required heating and cooling plant and is compatible with land use in this area. A significant concern with sites A, B and C is related to the flight path of the Ames Municipal Airport. Restrictions related to building height, stack height, and plume heights were identified and outlined during the site evaluation process.

Site A was submitted to the FAA and is anticipated to be the site for the new VDL pending favorable FAA review. Information from Snyder and Associates, containing additional details on the site evaluation, incinerator siting, utilities, and heating and cooling plant can be found in the Appendix.

COST AND SCHEDULE SUMMARY

The estimated project costs developed for each option include design and construction, fixed and moveable equipment, utility extensions, and project contingency costs in project 2022 dollars, which is the projected midpoint of construction.

COST SUMMARY

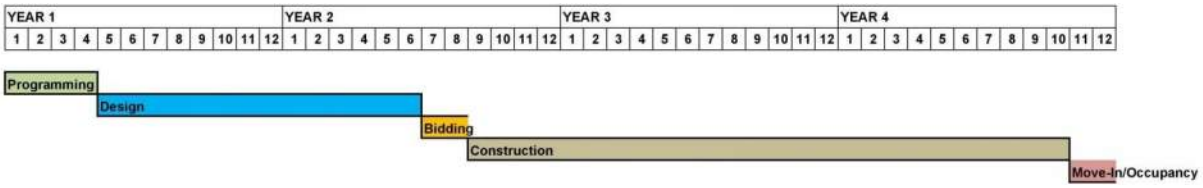
	Full Building Program	Budget Based Program
2022 Adjusted Costs		
Net Building Area (NSF)	87,740	41,804
Gross Building Area (GSF)	**139,270**	**73,340**
Construction $/GSF	*555*	*555*
Construction Cost		
Building Construction (GSF x Construction $/GSF)	**77,232,000**	**40,671,000**
Heating & Cooling Plant Equipment and Construction	5,613,000	3,680,000
Incinerator Equipment (enclosure incl in const cost)	1,809,000	1,809,000
Site Development/Utilities	6,351,000	6,351,000
Design Build Professional Fees	5,352,000	2,927,000
Design Build Contract	**96,358,000**	**55,438,000**
Construction Cost Outside of DB Contract	3,860,000	2,172,000
Construction Contingency	4,833,000	2,787,000
Construction Total	**105,051,000**	**60,396,000**
Total Construction Cost $/GSF	*746*	*817*
Non-Construction Costs		
Furniture	3,633,000	2,090,000
Instructional Technology	819,000	471,000
Air Quality Emissions	250,000	250,000
Equipment	4,681,000	4,681,000
Other Project Costs	11,691,000	7,138,000
Non-Construction Costs Total	**21,073,000**	**14,630,000**
Total Project Cost	**126,124,000**	**75,026,000**
Total Project Cost $/GSF	*906*	*1,023*

Notes:

1. The Gross Building Area (GSF) above is for the VDL program spaces only. An 8,000 GSF heating and cooling plant is needed to support the new building. Total project GSF including the heating and cooling plant as follows:
   2018 Full Building Program total with Plant = 147,270 gsf
   2018 Budget Based Program total with Plant = 81,340 gsf
2. Non-Construction Costs-Equipment; Costs include stand-alone lab equipment. Lab sections in the budget based program have the greatest equipment need in a new facility. Lab equipment needs identified by VDL.
3. Non-Construction Costs-Instructional Technology; Costs includes purchase and installation of media equipment. Examples: projectors, displays/monitors, Audio Visual equipment.
4. Non-Construction Costs-Air Quality Emissions; ISU operates under a Title V Operating Permit issued by the Iowa DNR. Air quality modeling is required any time ISU adds a permitted emission unit. The VDL project will require installation of several emission units that likely will require construction permits. These will include the incinerator, a large diesel generator, and gas-fired boilers. Other campus emissions units may also need modifications to allow installation of the new emissions units. ISU will need to modify the ISU Title V Operating Permit to incorporate the equipment installed as part of the VDL project or any existing equipment modified to ensure compliance. Costs for Air Quality Emissions will to be similar in both a budget based program and full building program.

5. Non-Construction Costs-Other Project Costs; Professional Services, Pre-Design Services, Bridging Consultant Services, Stipends for unsuccessful shortlisted Design-Build proposals , Geo-technical Services, Testing Services, Building and Mechanical Commissioning Services, FP&M management, EH&S services, advertising, printing, builder's risk premiums, moving services.

SCHEDULE SUMMARY



Planning Study Space Category Definitions

Common Space
- Break Rooms, Building Reception Area, Seminar Room, Conference Room, Locker Areas

Administration
- Director's Office, Staff Offices, Conference Room, Work Room, Reception Area, Records Storage, QA Offices, Reference Storage, Training Conference Room

Information Technology
- Offices, Workstations, Open Conference Space, Work/Storage Room, Server Room

Bacteriology
- Open Lab, Sub Labs, Clinical Microbiology Lab, Offices

Serology
- Open Lab, Sub Labs, Offices

Pathology/Necropsy
- Necropsy Lab, Photo Room, Lockers/Showers/Boots, Incoming/Outgoing Cold Storage, Animal Holding, Sample Receiving, Student Rooms, Storage, Offices
- Incinerator - Space for a new incinerator and its associated material handling and storage are included in the space program and space diagrams within this report as part of the Pathology/Necropsy section. Costs related to the incinerator are also identified.

BSL-3 Diagnostic Facility
- Contamination Areas, Clean/Dirty Changing Areas, Lab Space, Necropsy, Cold Storage, Waste Neutralization

Molecular & Viral Diagnostics
- Sample Receiving, PCR Suites, Sequencing, Lab Suites, Offices

Histology
- Open Lab, Offices

Research
- Labs, Research Offices

Shared Lab Functions (Central Kitchen)
- Media Prep, Central Glass Wash

Materials Receiving
- Central Lab Supply, Archival Records Storage, Waste Disposal, Chemical Storage/Dispensing, Receiving Areas, Storage Areas, Covered Dock Areas

Mailroom and Sample Receiving
- Case Entry, Work Room, Submission Areas, Sample Receiving Area, Molecular & Viral Diagnostics Sample Processing, Molecular Sample Storage

Planning Study Space Category Definitions (Continued)

Analytical Chemistry
Since the 2014 Planning Study, the PhAST and Toxicology & Nutrition sections have been combined.

- Open Lab, Sub Labs, Offices, Equipment Repair, Records Storage
- Tech Area, Wet Chemistry Lab, Sample Receiving, Instrument Rooms, Cold Storage, Sample Processing, Storage, Offices
- Break Rooms, Building Reception Area, Seminar Room, Conference Room, Locker Areas

Building Support

- Custodial Workroom, Janitorial Closet, Filter Storage, Waste Recycling Room, Recycling Room

Iowa State University
Veterinary Diagnostic Laboratory
1/10/2019

	Full Building Program				Budget Based Program				
	Quantity	NSF/Unit	NSF	Total NSF	Quantity	NSF/Unit	NSF	Total NSF	Remarks
Common Space				**5,270**				**2,820**	-
Break Room and Vending	2	400	800		2	400	800		percent of total staffing
Reception Area	1	500	500			500	-		
Seminar Room	1	1,600	1,600			1,600	-		
Seminar Storage Room	1	200	200			200	-		
Catering Staging	1	150	150			150	-		Adjacent exterior grill area
Conference Room	2	375	750		2	375	750		For diagnostic lab use
Lactation Room	1	40	40		1	40	40		
Collaboration Spaces	4	150	600		4	150	600		1 to 2 per floor in Phase 1
Gender-Neutral Restroom	2	80	160		2	80	160		
Locker Area	118	4	470		118	4	470		
Administration				**2,300**				**300**	-
Director of Operations	1	180	180			180	-		
Admin Specialist	1	120	120			120	-		
Director Conference Room	1	150	150			150	-		
Staff	6	48	288			48	-		
Copy/Work Room/Mail Room	1	150	150			150	-		
Waiting Area	1	100	100			100	-		Waiting for 4
General Storage	1	200	200			200	-		
Records Storage	1	250	250			250	-		
Quality Assurance Director	1	120	120			120	-		
QA Administrative Assistant	3	48	144			48	-		
Client Services	2	150	300		2	150	300		
Administrative Assistant	1	48	48			48	-		
Reference Device Storage	1	100	100			100	-		
Training Conference Room	1	150	150			150	-		
Information Technology				**1,056**				-	-
IT Manager	1	120	120			120	-		
Desktop Support	1	48	48			48	-		
Network Administrator	1	120	120			120	-		
Programmer	3	48	144			48	-		
Hoteling	3	48	144			48	-		
Open Conference Space	1	150	150			150	-		
Work Room/Storage	1	240	240			240	-		
Server Room	1	90	90			90	-		
Bacteriology				**6,465**				**6,465**	-
Open Lab / Sample Receiving	1	3,000	3,000		1	3,000	3,000		Account for increased automation
Sub Lab									
Regulated Testing: Salmonella/Poultry	1	210	210		1	210	210		
Egg Washing and Processing	1	650	650		1	650	650		
Freezer Farm	1	210	210		1	210	210		
Media Prep	1	150	150		1	150	150		
Media QC	1	100	100		1	100	100		
Media Storage	1	150	150		1	150	150		Moved to Shared Lab Functions
Bio-secure and Biosafety Lab									
Swine Mycoplasma	1	420	420		1	420	420		
Mycology/Microscopy	1	150	150		1	150	150		Mycotic / Reagent Prep and Dark field microscope
Clinical Microbiology Teaching Lab	1	900	900		1	900	900		Currently in the Field Services Building/Hoteling workstation included
Office									
Section Leader Office	1	150	150		1	150	150		
Future Faculty Position	1	150	150		1	150	150		
Supervisor Office	3	75	225		3	75	225		shared
			-				-		
Serology				**4,445**				-	-
Open Lab	1	2,500	2,500			2,500	-		Need capacity to grow if disease eradication program emerges
ELISA robot space									
Technicians									Accommodate future growth as well as surge
Sub lab									
Live Antigen Lab	1	420	420			420	-		
Microscopy	1	120	120			120	-		Shared with Virology/ability to darken room
Cell Culture	1	420	420			420	-		Shared with Virology. Liquid Nitrogen. Biosafety Cabinet
Freezer Farm	1	240	240			240	-		Sample storage
Walk in Cooler	1	120	120			120	-		Kit storage
Office			-				-		
Section Manager	1	150	150			150	-		
Faculty	1	150	150			150	-		
Reporting/Clerical	3	75	225			75	-		Integrated with Technician Office Space
Storage Room	1	100	100			100	-		Could be located in another part of the building.

Analytical Chemistry				**10,300**				-	-
Sample Receiving	1	325	325			325	-		Consolidated from previous Tox/Nutrition and PhAST
Entry Vestibule / Storage	1	173	173			173	-		
Wet Chemistry Lab / Extraction	1	1,853	1,853			1,853	-		
Feed Lab / Grinding	1	273	273			273	-		
Toxin Extraction	1	210	210			210	-		
Residue Extraction	1	210	210			210	-		
Residue Analysis	1	210	210			210	-		
Freezers/Ref/Shared Equipment	1	505	505			505	-		
Acid Digestion	1	173	173			173	-		
Analytical Balance / Drug Room	1	240	240			240	-		
Organic Instrument Room	1	1,506	1,506			1,506	-		
Inorganic Instrument Room	1	900	900			900	-		
Equipment Galley	1	490	490			490	-		
Cylinder Storage / Exchange	1	173	173			173	-		
Wet Chemistry Research Lab	1	495	495			495	-		
Radio-Immuno-Assay Lab	1	495	495			495	-		
Instrument Repair	1	173	173			173	-		
Clean Chemical Storage	1	173	173			173	-		
Waste Chemical Storage	1	173	173			173	-		
Office									
Faculty Office	3	150	450			150	-		
Shared Staff Office	6	150	900			150	-		
Shared Office Work Area	1	200	200			200	-		
Pathology/Necropsy				**14,126**				**14,126**	-
Necropsy Lab	1	2,800	2,800		1	2,800	2,800		
Tech Workspace	4	48	192		4	48	192		
Band saw			-				-		Included in Necropsy Lab
Freezer Farm	1	168	168		1	168	168		
Bio-Containment Area	1	120	120		1	120	120		Includes Biosafety cabinet
Photo room	1	80	80		1	80	80		
Lockers/Showers/Toilet Room	2	630	1,260		2	630	1,260		25 lockers in each room
Boot room	1	250	250		1	250	250		
Laundry	1	288	288		1	288	288		2 washers + 2 dryers
Incoming Cooler	1	420	420		1	420	420		
Incoming Receiving	1	300	300		1	300	300		Direct access from dock to Necropsy Lab
Outgoing Rendering Cooler	1	200	200		1	200	200		
Outgoing Incinerator Cooler	1	300	300		1	300	300		
Incinerator	1	1,500	1,500		1	1,500	1,500		
Animal Holding	1	500	500		1	500	500		Includes Euthanasia
Enclosed Truck Dock	1	750	750		1	750	750		
Live Animal Unloading	1	750	750		1	750	750		offload live animals directly to holding
Sample Receiving/Pass Thru	1	100	100		1	100	100		Include specimen storage freezers/refrigerators
Students Rounds Room	1	400	400		1	400	400		
Specimen Review	1	580	580		1	580	580		
Teaching Specimen Storage	1	150	150		1	150	150		
Office			-				-		
Supervisor	1	120	120		1	120	120		
Pathology/Faculty	12	180	2,160		12	180	2,160		
Poultry Pathology	2	150	300		2	150	300		
Resident	6	48	288		6	48	288		
Technician	1	150	150		1	150	150		
			-				-		
BSL-3 Diagnostic Facility				**2,684**				-	-
Anteroom	1	150	150			150	-		
Decontamination	1	100	100			100	-		
Incoming Sterilization	1	80	80			80	-		
Clean Change Room	1	120	120			120	-		
Shower	1	64	64			64	-		
Dirty Change Room	1	64	64			64	-		
Shared Access Vestibule	1	120	120			120	-		
BSL-3 Microbiology Lab	1	420	420			420	-		
BSL-3 Necropsy	1	476	476			476	-		
BSL-3 Cooler	1	190	190			190	-		
BSL-3 Holding / Euthanasia	1	500	500			**500**	-		
Liquid Waste Neutralization	1	400	400			400	-		verify SF allowance heat system

Molecular & Viral Diagnostics				**12,803**				-	-
Virus Isolation	1	420	420			420	-		
Faculty	5	150	750			150	-		
Growth Faculty	1	150	150			150	-		
Supervisor	3	120	360			120	-		
Technician	25	36	900			36	-		
Clerical/Case Coordination	3	75	225			75	-		
Bioinformatics	6	48	288			48	-		
Conference Room	1	150	150			150	-		
Next-Gen Sample Receiving	1	383	383			383	-		
Next-Gen Amplification / PCR	1	630	630			630	-		
Next Gen Extraction	1	420	420			420	-		
Next Gen Pooling & Plating	1	220	220			220	-		
Next Gen Clean Room	1	220	220			220	-		
Next Gen Suite Internal Circulation	1	352	352			352	-		
Freezer / Refrigerator / Equipment	1	630	630			630	-		
Real-Time Suite 1 Sample Receiving	1	383	383			383	-		
Real-Time Suite 1 Amplification / PCR	1	630	630			630	-		
Real-Time Suite 1 Extraction	1	420	420			420	-		
Real-Time Suite 1 Pooling & Plating	1	220	220			220	-		
Real-Time Suite 1 Clean Room	1	220	220			220	-		
Real-Time Suite 1 Internal Circulation	1	352	352			352	-		
Real-Time Suite 2 Sample Receiving	1	383	383			383	-		
Real-Time Suite 2 Amplification / PCR	1	660	660			660	-		
Real-Time Suite 2 Extraction	1	420	420			420	-		
Real-Time Suite 2 Pooling & Plating	1	220	220			220	-		
Real-Time Suite 2 Clean Room	1	220	220			220	-		
Real-Time Suite 2 Internal Circulation	1	352	352			352	-		
Research Suite Sample Receiving	1	383	383			383	-		
Research Suite Amplification / PCR	1	630	630			630	-		
Research Suite Extraction	1	420	420			420	-		
Research Suite Pooling & Plating	1	220	220			220	-		
Research Suite Clean Room	1	220	220			220	-		
Research Suite Internal Circulation	1	352	352			352	-		
Histology				**3,333**				**3,333**	-
Open Lab	1	1	1,600		1	1	1,600		
Sample Staging	1	190	190		1	190	190		Entrance alcove to Open Lab
Grossing Stations	1	635	635		1	635	635		4 Trim Stations Required
Slide Staging	1	120	120		1	120	120		
Archival Slide/Block Storage	1	200	200		1	200	200		Slides and paraffin blocks
Waste accumulation area	1	80	80		1	80	80		Include flammable storage
Chemical Storage	1	100	100		1	100	100		
General Storage	1	150	150		1	150	150		
Offices									
Faculty									No faculty
Lab Supervisor	1	75	75		1	75	75		
Lab Manager	1	75	75		1	75	75		
Technicians	3	36	108		3	36	108		
			-				-		
Research				**15,198**				**5,000**	-
Lab Environment	36	250	4,000			250	-		
Research Offices									
Lab Manager	6	120	720			120	-		.5 Lab Manager per Faculty
Post Doc	12	75	900			75	-		1 Post Docs per Faculty
Graduate	36	48	1,728			48	-		3 Graduate Students per Faculty
Faculty	12	150	1,800			150	-		
Visiting Scholars	3	150	450			150	-		
Collaboration Space	4	150	600			150	-		
Flex Lab / Lab Support	1	5,000	5,000		**1**	**5,000**	**5,000**		
Shared Lab Functions				**795**				**795**	-
Central Glass Wash and Autoclave	1	645	645		1	645	645		21.5' x 30'
Media Storage	1	150	150		1	150	150		Moved from Bacteriology
Materials Receiving and Handling				**3,998**				**3,998**	-
Central Lab Supplies	1	1,400	1,400		1	1,400	1,400		Based upon Cornell University ADHC
Archival Records Storage	1	200	200		1	200	200		Past year storage. 5 years off site
Waste Disposal Autoclave	1	240	240		1	240	240		14' x 17'
Recycling Holding	1	400	400		1	400	400		20' x 20'
Recycling Holding Vestibule	1	60	60		1	60	60		
Cylinder Storage	1	150	150		1	150	150		
Chemical Storage/Dispensing	1	220	220		1	220	220		
Central Laundry	1	288	288		1	288	288		Separate necropsy laundry facilities
Clean Receiving Room	1	400	400		1	400	400		
Shipping/Receiving Office	1	240	240		1	240	240		
Custodial Storage	1	200	200		1	200	200		
General Building Storage	1	200	200		1	200	200		
Covered Sample Receiving Dock			-				-		
Covered Materials Receiving and Shipping Dock			-				-		Raised dock, (2) 25-30 CY trash dumpsters

Mailroom and Sample Receiving				**4,167**				**4,167**	-
Case Entry	8	36	288		8	36	288		
Copy/Work Room	1	80	80		1	80	80		
Sample Receiving Vestibule and Night Drop off	1	100	100		1	100	100		
Afterhours Sample Drop off	1	15	15		1	15	15		
Submission Receiving Lobby	1	200	200		1	200	200		
Submission Office	1	150	150		1	150	150		
Sample Receiving			-				-		
Sample Splitting	6	75	450		6	75	450		6LF for each work station
Sample Receipt and Inventory	15	75	1,125		15	75	1,125		6LF for each workstation
Biosafety Cabinets	8	64	512		8	64	512		
Molecular Diagnostics/HATS Sample Processing Room			-				-		Must be a very "cleanable" space
Recirculating Bio Cabinet	4	64	256		4	64	256		
Vented Bio Cabinet	2	64	128		2	64	128		
HATS Recirculating Bio Cabinet	2	64	128		2	64	128		
Biosafety Hoods	5	64	320		5	64	320		
Hats Biosafety Hood	1	65	65		1	65	65		
Equipment and Layout Counter	1	200	200		1	200	200		25 LF of stainless or similar counter/tables
Molecular Sample Storage									
-20 Freezers	4	25	100		4	25	100		
Refrigerator	1	25	25		1	25	25		
HATS Freezer	1	25	25		1	25	25		
Building Support				**800**				**800**	-
Custodial Workroom	2	120	240		2	120	240		
Janitor Closet	2	120	240		2	120	240		
Filter Storage	1	100	100		1	100	100		
Waste Recycling Room	1	120	120		1	120	120		
Recycling Room	1	100	100		1	100	100		
Total			87,740	**87,740**			41,804	41,804	
Efficiency				63%				57%	
Gross Square Feet				**139,270**				**73,340**	

	NSF	GSF
Full Building Program	87,740	139,270
Budget Based Program	41,804	73,340
% of Full Building Program in Budget Based	48%	53%

The program breakdown above is for the VDL program spaces only. An 8,000 GSF heating and cooling plant is needed to support the new building. Total project GSF including the heating and cooling plant as follows:
2018 Full Program total with Plant = 147,270 gsf
2018 Budget Based Program total with Plant = 81,340 gsf

Memorandum

To: Dave Blum **Date:** 11/16/2018

From: Jerod Gross

CC: Spencer Wignall

RE: Matrix and Site Comparison

Memorandum Includes:

1. Site Needs Report
2. Site Specific Observations (dis/advantage list)
3. Exhibits
    A. Available Parking for Site 1
    B. Available Parking for Site A
    C. Available Parking for Site B/C
    D. Available Parking for Site C
    E. Available Parking for Site E
    F. Site Delivery and Parking Requirements
    G. FAA: Feasibility Study

Site Needs

General

This project is a site planning study with the goal of selecting a site for the new Veterinary Diagnostic Laboratory (VDL) at the College of Veterinary Medicine (CVM). Aspects of the sites will be evaluated in a matrix format. The matrix will identify benefits and challenges with relative values identified. The initial sites included sites A, B, C, D, E, and 1 as shown in the 2014 study. Aspects for consideration include: site circulation, incinerator, parking, utilities and permitting. For reasons contained within this report and briefly addressed in the executive summary the final sites included in the Site Specific Observations (pages F.15-F.19) and the VDL Site Evaluation Criteria Matrix (Page E.8) are sites: A, A-1, B-C, E, F, and 1.

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Site Circulation

Pedestrian Traffic
Existing pedestrian traffic currently consists of:

- to the site from parking lots,
- students walking to campus that live in the modular home park east of CVM and
- Bike commuters from granular trail on the abandoned railway's right of way.

The presence of a new building on the CVM campus will increase the site's overall pedestrian traffic with the addition of the following trip generators:

- Faculty and Staff to and from meetings
- Student to and from classes
- Student employees to and from work
- All users from VDL to Vet Med café
- From VDL to library
- Students biking and walking to and from trailer court
- Bike commuters from granular trail on the right of way of abandoned railway
  Pedestrian access should be considered for students that live in the modular home park east of CVM.

Parking
There are approximately 175 staff, students and technicians that will use VDL. There is no planned growth in full time employees (FTE). See Exhibit A-E the appendix for potential parking layouts in relation to Sites A, B, C, E and 1.

Parking needs at the new VDL site were determined to be:

- 10 client spots
- 2 courier stalls
- 4-5 vendor parking (high turn-over rate)
- 1 stall used for service vehicles (EH&S) for incinerator
- 1 parking stall for VDL vehicle
- Required ADA accessible parking stalls

The parking area requirements for this request can be seen in Exhibit F in the Appendix. It was also stated that the public and client associated stalls should be separate from the delivery areas for the building should be screened from the necropsy loading docks.

Additional considerations were stated in relation to pedestrian movements and required infrastructure from parking to the building. No specific requests have been made except that the walking time between buildings and parking not exceed campus wide norms. The required staff parking will need to be provided through reallocation of existing lots or construction of new parking to maintain walking distances that are consistent with campus norms.

Existing Loading Docks

- The existing loading dock servicing the incinerator is sloped towards building. A storm drain is located at the base of the building and occasionally requires maintenance. The storm intake is serviced by a lift station to the campus storm sewer system.
- Truck washout consists of an area bordered by a concrete lip separating the washout sanitary sewer drain and adjacent site storm sewer area drains. It was indicated that concrete lip offers sufficient containment and separation of systems.
- Animal walk up ramp connects to incinerator/rendering dock.
- Existing pavement area and site features make efficient turning movements for tractor/livestock trailers difficult.
- Trucks and trailers unloaded via a scissor lift, wheeled carts and hoist/trolley. Occasionally, wheeled carts are overloaded.
- Traffic arm remains open to lower parking area leading to VDL walk in receiving and gate to VDL and incinerator/rendering overhead door and dock currently remains controlled to the public via a vehicle gate.
- Vehicles using incinerator and rendering loading dock consist of semi-trailers at infrequent intervals, straight trucks at moderate intervals, livestock trucks at moderate/frequent intervals, pickup trucks at frequent intervals, dump trucks at frequent intervals.
- The current incinerator and rendering dock is screened from view due to building configuration.
- There is a pedestrian and livestock ramp to the incinerator and rendering dock.
- The VDL dock was built after the incinerator and rendering dock and is used to drop off incoming samples. Overhead door is an at-grade entrance and a sidewalk connects parking area to building entrance. Neither of the entrances are covered or screened.
- VDL dock has stainless steel for ease of cleaning.
- Potential biosecurity/contamination risks were acknowledged from crossing wheel paths and staff/vendor traffic.
- Minimal way finding and directional signage on site.

New Loading Docks

- The design vehicle for the loading dock areas is a full sized tractor trailer (WB-67).
- Additional vehicle types that will be in the loading area include: vans, trucks, cars, dump trucks, box trucks, semi-trucks, livestock trailers
- A preference for covered dock areas was noted. Consideration should be given to wheel paths and turning movements of largest design vehicle.
- An entrance capable of accepting large animals via walk-in entrance is required.

- It is preferred to have improved drainage at new VDL dock. Considerations for a 4 foot variable grade truck entrance or adjustable scissor lift.
- The necropsy dock areas will have multiple hoist rail/trolley systems for moving carcasses in and out of the facility.
- Truck cleaning capabilities should be maintained as existing (interior to building) or upgraded depending on future bio-security programming accommodations (added capability of cleaning exterior of trucks parked at loading dock).
- It is desired for the new building to also have a hoist and trolley for unloading.
- Regarding dock area separation from other departments, additional considerations are needed for value added bio-security options in relation to parking area and internal corridors.
- Bio-security can be increased via tire wash station, which would require additional site area and utilities at proposed sites. Additional site considerations should be made for operation and traffic flow/turning movements.
- It is not desired to store bulk material at in the dock area and should be considered in the building program as a central storage lab.
- There is a desire to provide screening of site for rendering/incinerator deliveries.
- Improved wayfinding and directional signage is desired.

Heating and Cooling Plant

- Overhead door for single unit truck deliveries of chemicals and supplies.

Incinerator

General

EH&S is the licensed operator of the existing incinerator. The existing location requires delivery to and from both incinerator/rendering and VDL. Of the estimated $75 million project budget, $10 million is currently anticipated for a new incinerator. EH&S currently maintains operations, scheduling and maintaining air quality permit. It is anticipated that 90% of current users would use the new incinerator, including the VDL, Laboratory Animal Resources, BSL3, Veterinary Anatomy, state and local law enforcement, University departments, VMRI, Animal Science, Ames Animal Shelter, Veterinary Clinical Sciences, Meat Laboratory, Veterinary Diagnostic & Production Animal Med, livestock producers, and others. The future height and size of new incinerator is dependent on the operation schedule. There are concerns with fumes from the existing incinerator which currently burns weekly on Tuesdays. In addition to FAA stack height clearances and air quality, thermal plume needs to be considered for approaching aircraft. Bio-security needs should be addressed in site circulation considerations for incinerator and VDL access.

Existing Incinerator

The existing incinerator burns at 7 million BTU and is serviced via 3.5” forced (interruptible) gas via regulator. The rate of allowable disposal is 1,080 lbs/hr. The incinerator has two chambers (primary and secondary), residence time is ¼ sec with the primary chamber being air controlled. Current incinerator configuration causes clogging of the firing system. The existing ash removal system is a manual process requiring the incinerator to be room temperature prior to cleaning. This system means the operations of the facility are non-continuous.

The average volume of weekly ash generation is approximately two 55-gallon drums per week. Incinerator ash is currently taken off site in 55 gallon drums and stored at EH&S Services Building. This management practice is not preferred. Empty drums are stored on the loading dock and take up potentially valuable space. EH&S delivers 30 filled drums at a time to Boone county landfill. Incinerated material consists of: radiological combustibles, seed/grain, animal products, bedding material, expired medicine and state supplied material (contraband, judge ordered evidence, etc.)

Incinerator schedule: Incinerator runs on Tuesday each week, then as needed, and continues until all available material has been processed. The incinerator is shut off and starts to cool. Once incinerator is at room temperature (typically Monday) crews go into and manually remove ash build up.

Stack consist of two sections. The larger diameter bottom is original to the incinerator. Smaller diameter stack was added later to accommodate hazardous waste incineration (program eliminated from available services). Temperature recorded at 700^{o} F at top of stack. Physical height of the stack consists of the building and stack. The Effective height of the stack consist of the stack and the thermal mass/lift/plume height. Gaseous odors build up in ash due to existing system configuration and performance. Odors can be extruded at advent of second burn. The odor can be sensed by building users when high pressure systems cause down draft effect and odor infiltrates into building via air intake manifolds during down drafts.

New Incinerator

The following specifications have been shared either by reference from previous reports or as new considerations to aid in site evaluations. Previous report indicated minimum throughput of 1,100 lbs/hr. This rate needs to be evaluated and an alternate rate will need to be determined if reported rate did not account for a continuous ash removal system. EH&S reported a recommendation for a 2 sec residence, whereas previous reported recommendation is a 1 sec residence time. Continuous ash removal was highly desired by EH&S and would change operation and management procedure to continuous incineration operation. It was noted that a continuous operation neutralizes odorous gases more effectively.

If a continuous ash removal system were implemented, then it is anticipated this change may decrease the required storage area and there would be a need for a review of full time employee workflow. An auger system could pull ash from bottom of incinerator to ash management area. It was indicated the current system of 55 gal drums for ash storage is inefficient and takes up space. Auger system will incorporate a quenching system and would allow for disposal via roll off dumpster or 55 gal drums. Additional coordination with Boone County landfill for potential change in ash disposal is needed.

Additionally, if a continuous ash removal system were implemented the user would need to determine the type of gas service preferred. There are two gas service types: interruptible service and firm service. The current incinerator runs on interruptible service. If a continuous ash removal system and continuous incinerator operation are used, there is potential for downtime in the current “interruptible gas service.”

It was also recognized that if "firm gas" was used fuel costs could be 30% higher. If interruptible gas service was used, a contingency plan would be required for down time. It was noted that there is no desire for an underground fuel storage tank. Fuel trailers were noted as an acceptable alternative as part of redundancy plan, but are understood as intermittent availability. It was also noted that additional considerations to cooler sizing is intrinsically linked to this line of investigation.

The new stack height and location will be reviewed by the FAA as part of an FAA review of construction proposals impacting the Ames Municipal Airport. Currently, ISU holds an Iowa DNR administered EPA Title V air quality permit and will obtain the permit for a new incinerator. A relationship was identified between the need to achieve FAA and EPA approval and to also achieve performance goals. Striking this balance was identified as meeting regulation requirements while still effectively elevating the site of exhaust from a continuous operations without odor infiltration into the building/campus. City of Ames approval may also be required as part of the permitting process.

Exhibit G of the appendix shows the anticipated FAA physical height requirements for site A. It was also noted that the stack height of 70 feet above FFE. The anticipated efflux velocity of the effluent is 13.3ft/s and at a temperature of 1500^{o}F. These parameters were modeled using Mitre Corp.'s Exhaust Plume Analyzer and yielded the following characteristics as shown in Table 1

Probability of server turbulence to a light-sport aircraft	~ Begin Vertical Height (Feet)	~ End Vertical Height (Feet)	~ Begin Horizontal Distance (Feet)	~ End Horizontal Distance (Feet)
10^{-5}	100	110	0	60
10^{-6}	100	120	0	60
10^{-7}	100	165	0	60

Table 1: Plume dimensions and probability of turbulence to light-sport aircraft.

Utilities

Heating and Cooling Plant

The existing heating and cooling plant servicing the CVM services approximately 600,000 SF and consists of four (4) boilers with one (1) boiler's worth of redundancy and four (4) chillers with one (1) chiller's worth of redundancy. This system is comfortably at capacity and any expansion of the existing plant would not be cost beneficial. The proposed plant for the new VDL building when fully built out should consist of three (3) chillers and three (3) boilers for 100% capacity and redundancy for west CVM demand. The land demands of this new plant area have been approximated at 8,000 SF. The capacity of the energy plant is desired to be 2/3 of the existing plant. It was noted that while a tower unit could supply the new VDL building, a new heating and cooling plant would increase energy efficiency for this, and future projects at CVM.

The location of a future heating and cooling plant should consider existing CVM campus buildings including those which are currently serviced with heating and cooling needs by alternative/individual sources.

Most notably LIDIF heating and cooling is currently served as one to one within the building envelope. It is preferred that the location of the plant be centrally located to serve future development on the west CVM campus areas, including a potential expansion of LIDIF. The heating and cooling plant may be remote to VDL if its location is poised for growth with the recognition that additional piping and some larger distribution equipment would be required. Furthermore, if full build out presented excessive capital costs, the possibility of removable walls for future expansion with dynamic features with "plug in space" for future growth may be considered.

The proposed heating and cooling plant must be hot water type and not steam. Local boilers at building site may be used for steam and sanitation. It is preferred that the new plant be equipped with looped electrical service with a generator large enough to accommodate an emergency shutdown. Boilers and cooling towers will also require construction permits under the ISU Title V Air Permit.

Domestic Water

- The Existing VDL is serviced by a domestic water line that is looped at CVM. It is yet to be determined if the future VDL will require a looped service for redundancy. Ultimate loading requirements have not been determined to date. See the site evaluation criteria on page E.8 for site by site comparison.

Sanitary Sewer

- It is desired to establish a sanitary sewer connection that will not require a new City of Ames sanitary sewer permit and sampling requirements.
- Anticipate routing to manhole SA1D15 that presents opportunity for gravity line out of a basement level, but would require addition of new sampling manhole with access improvements and specific sampling procedure for a deep manhole.
- Sanitary connection must be upstream of existing or new City of Ames sampling location.
- SA5D15 & SA12F16 manholes are the existing sampling locations.
- New sampling manholes may be required.
- Heating and cooling plant will contribute appreciable volume of discharge to dilute building site effluent.
- Heating and cooling plant sanitary must be a gravity sewer that may be pressurized due to plant equipment.
- It is understood that sampling manholes must be straight through manholes with only one pipe entering and one pipe exiting.

Storm Sewer

- Storm water should produce no net gain in runoff on the south side (i.e. Storm system at SE corner of CVM campus is at capacity). North side runoff will convey to Worrell Creek. Storm water management plan will be required. Disturbed existing storm structures and disturbed area shall retain or detain site runoff at a client designated rate.

Electrical

- Substation located at the southeast corner of CVM has capacity (6 megawatts) for new VDL. The farther the site is from the substation, the more costly. VDL will require a generator.
- The building will require a designated electrical service from substation with switch gear and transformer (anticipate 15KV transformer).
- Building switch gear may be on top of electrical vault (S&C or PMH switch gear may be used).
- Adjacent heating and cooling plant will also require a designated electrical service from the substation with independent switch gear and transformer.
- Looped redundant service is currently provided to the existing VDL site and is preferred for the new site.
- Radial service is acceptable but would have to be designated by client.
- Pipe raceway sized for full sized 150,000SF building would be included in this project.
- Future service lines and equipment for full size build out may be omitted from this project.
- Heating and cooling plant
    - Will require 10-12 KV and separate switch gear and transformer.
    - It is preferred the new heating and cooling plant be equipped with a looped electrical service and a generators for plant should be sized to accommodate an emergency shut down.
    - Can be sized with 2-3 chilling towers which needs to be determined.

Gas

- Three separate services and regulators will be required for the site serving (building, incinerator, and heating and cooling plant).
- Natural gas is provided by Alliant Energy. In the past ten years, Alliant Energy has implemented a shut-down only once, from 9am, January 29 to 9am, January 31 (48 hours.) ISU shut down the incinerator and resumed operations three days later. The disruption was minimal.

Communications

- Site A & B-C would connect directly to the node room with in CVM and to Research Park node room with ~2500LF of cable ran from the site under Hwy 30 to tie-in at Research Park.
- Looped 24 strand line in two 4-inch conduits.
- Site E would be serviced through the existing node room and would not require a communications connection to the Research Park.

Permitting

- The new incinerator will require a construction permit and operating permit from the DNR, zoning permission from the City of Ames, and coordination with the Ames Airport after FAA feasibility studies are completed.
- Emergency generators greater than 400BHP require construction permits under ISU's Title V Air Permit.
- Permitting the specific air emission equipment is required prior to construction.
- Equipment and activities regulated under the Clean Air Act will be included in the ISU Title V operating permit administered by EH&S to comply with air quality regulations.
- Sanitary Sewer Permit if sanitary connection is not routed to existing sampling manhole
- DOT ROW permit if utility work is with in DOT ROW.
- NPDES Permit (Storm Water) is needed.

Site Specific Observations

Site A

Advantages

- Only potential demolition and replacement is to existing dockyard fence (as needed).
- Existing parking for FTE available via Lot 96.
- LIDIF adjacency and site allowance acceptable for project feasibility without concern of limiting future expansion of either VDL or LIDIF facilities.
- Potential for pedestrian access from modular homes along existing granular trail. Current concern with pedestrians walking and biking up Christensen Drive.
- Site close to existing facility with potential for pedestrian thoroughfare to existing facility.
- Provides high visibility front doors from Hwy 30 and Christensen Drive. Back door shared with LIDIF and Northwest corner of site.

Disadvantages

- Site is located in south half of CVM campus site. Required heating and cooling plant could be located adjacent to building or more centrally located. Placement may result in potential additional capital costs if located centrally to campus.
- Existing storm sewer system at southwest corner of Lloyd Vet Med Center is at capacity and alternative storm routing would be required. Requires no net increase in runoff.
- Proposed site closest to Ames Municipal Airport. Additional review required to determine feasibility.
- Concern of flight path to Runway 13 of Ames Municipal Airport. Runway is on prevailing winds path and could see heavy landing traffic with proposed building squared with center of runway.
- Construction phasing may present site restrictions and detailed staging plans should be considered. In particular cranes for construction will require FAA approval.
- Depending on basement elevation sanitary sewer toward SA1D15 manhole may require a lift station. Depth of gravity system (15'-20') increases cost.

Site A-1

Advantages

- Considerations were made of shifting Site A west of the center of Runway 13 flight path.
- Potential for incinerator stack to be at western edge of FAA approach zone.
- Topographic features (i.e. existing ravine and drainage way may present opportunity for architectural relief on the site and opens southwest corner of site to project parking and storm requirements. Other site access and utility demands anticipated to be similar to Site A +/- the respective distance to this alternative site.
- Site shares similar site visibility (i.e. front door/back door circumstance with Site A).
- Site fits within available space.
- Only potential demolition and replacement is to existing pasture fence (as needed).
- Existing parking for FTE available via Lot 96.
- LIDIF adjacency and site allowance acceptable for project feasibility without concern of limiting future expansion of either VDL or LIDIF facilities.

- Potential for pedestrian access from trailer court along existing abandoned UPRR right of way. Current concern with pedestrians walking and biking up Christensen Drive.
- Site close to existing facility with potential for pedestrian though fair to existing facility.
- Provides high visibility front doors from Hwy 30 and Christensen Drive. Back door shared with LIDIF and Northwest corner of sit.
- Site is located in south half of campus site. Required heating and cooling plant could be located adjacent to building or more centrally located. Results in potential additional capital costs if located centrally to campus.

Disadvantages

- Site A-1 carries the same disadvantages as Site A.
- Site access off of University Boulevard will require additional study and review by City of Ames.
- Site is located in the south half of CVM campus. Required heating and cooling plant could be located adjacent to building or more centrally located. Results in a potential for additional capital costs if located centrally to campus.
- Construction phasing may present site restrictions and detailed staging plans should be considered.
- Sanitary sewer toward Worrell Creek would potentially require a lift station.

Site B-C

Advantages

- It was determined that Site B does not have the required open space to accommodate the site massing needed, so sites B and C have been combined.
- Parking for Site B-C is available in both lot 96 and lot 93.
- VMRI #29 is a Laboratory Animal Resource (LAR) facility, partially occupied by the VDL and other off-site department. The demolition of VMRI #29 is viable.
- Site demands would not require relocation of the BSL3 structure.
- Potential for future VMRI building in Site B-C.
- Site offers visible front door to Christensen Drive with potential back door to tree line. Buffer and hill separating site and University Boulevard.
- Potential to increase existing storm detention pond serving Lot 96. Site is close to existing city sanitary trunk line at Worrell Creek.
- Site access is available from Christensen Drive.
- Site is centrally located with potential to strategically place heating and cooling plant.
- Site is close to existing sanitary sampling location with acceptable fall for a gravity sanitary sewer.

Disadvantages

- Site demands require demolition and relocation of VMRI #29.
- Site allowances and facility replacement costs should be considered if demolition to VMRI #4, 9, 29 and or 36 are needed. Further review between FP&M and the college is required.
- Increased pedestrian movements across Christensen Drive may warrant traffic calming measures.
- Construction phasing may present site restrictions and detailed staging plans should be considered.

Site D

- Site not considered for full review due to Lot 96 Expansion and loss of available space.

Site E

Advantages

- Potential development of building using existing hillside with an at-grade entrance on north side of existing Veterinary Medicine building. This site could include a delivery/service entrance that would be back of house and would be accessed S. Riverside Drive and the existing service drive to the Vet Med Power Plant.
- No concern noted between described proximity between existing College of Vet Med complex and proposed VDL site E when above described service entrance is utilized. Front of house would be serviced off of one of two existing entrances. (i.e. Christensen Dr., S. Riverside Dr. or both).
- May become the front door to CVM and could be used to improve campus identity.
- Only original site considered with feasible placement of incinerator outside of FAA approach zone (i.e. within the 150-foot horizontal surface).
- Topographic relief available on-site may offer potential fill material.
- Construction phasing and site lay down areas are not anticipated to be a limiting factor.
- Communication lines would only connect directly to node room in existing building and would be routed through the building in existing cable raceway.
- Potential cost savings if existing building utility equipment is at-grade with rest of college.
- Use of hillside may produce advantage of incinerator ash collection in properly screen from the front.

Disadvantages

- Site currently exists within flood prone area and substantial amounts of fill (7') would be required for this site.
- Existing topographic relief between existing campus and proposed site exists, which presents a challenge for pedestrians.
- May introduce campus character challenge to CVM and may increase way finding challenge to other departments at CVM.
- Significant way finding effort would be needed.
- Site not preferred for west heating and cooling plant placement and would require higher capital cost to construct with a new centrally located plant.
- Expansion to existing heating and cooling plant not financially viable alternative.
- Site would require FTE parking review with a potential for the construction of additional parking lot required.
- If split level design with at-grade entrance chosen, significant pedestrian routing would be required between existing Vet Med campus and proposed future VDL.
- Existing lot used for event (football) parking. Stated the project would dictate but consideration for offset to parking would need to be vetted between ISU as a whole.
- If incinerator were placed at-grade with the rest of Vet Med Campus, ash removal could be at-grade on the buildings at the north, east or west side.
- If incinerator is at lower level (i.e. close to existing field parking elevation incinerator stack height would be lower. Closer to existing Vet Med Campus) this was noted as not preferred from an odor/air quality control stand point.
- Will require sanitary sewer force main to SA12F16.
- The proximity to the daycare center was noted and would require considerations.

Site F

Advantages

- Site provides opportunity to position incinerator stack outside of FAA approach zone.
- Site offers topographical relief and potential cut/fill material.
- If a heating and cooling plant is located north of site at top of hill it will not limit future campus expansion.
- Site F is not as remote or challenging as Site E in terms of heating and cooling plant positioning when future growth is the highest goal.
- Site is highly visible with a clear front and back door.
- Construction phasing and site lay down areas are not anticipated to be a limiting factor.

Disadvantages

- Site is isolated from existing utilities.
- Site may require access via service drive off of University Boulevard. Proximity to HWY 30 off ramp presents a significant challenge.
- Site may require intersection reconstruction to accommodate necessary turning movements. Intersection and access drive improvements requires additional study.
- Site has high visibility from University Boulevard off ramp.
- Forced sanitary sewer service would be required as a connection to City sewer to west along University Boulevard would require new sanitary permit and additional monitoring.
- If new heating and cooling plant is installed to service this site, it will come with higher infrastructure costs due to adjacent existing infrastructure that may limit routing or additional challenges.
- Building could also be serviced with individual heating and cooling facilities.
- DOT permit may be required for domestic water connection next to University Boulevard.
- Additional FTE parking would be required.

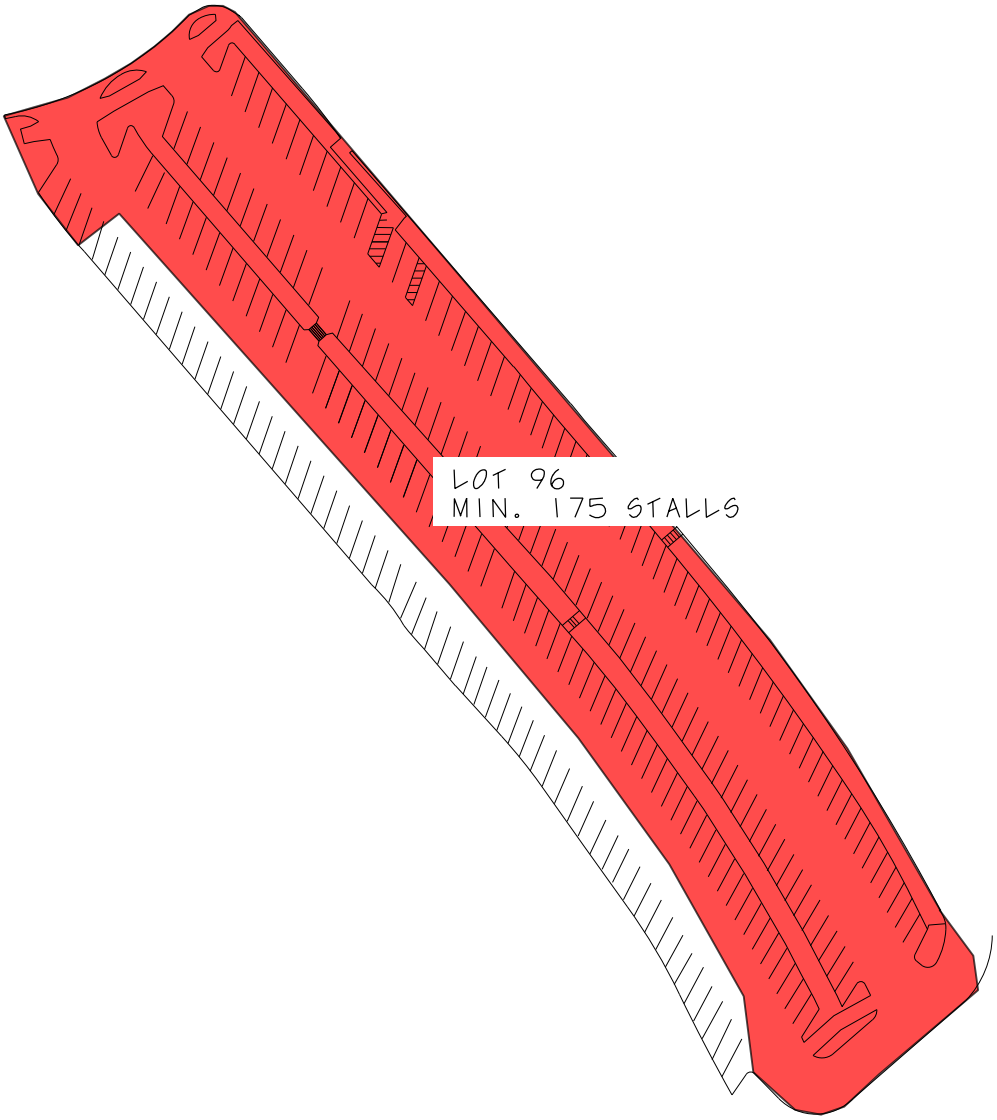
Site 1

Advantages

- Site parking and proximity to existing program areas and VDL/Vet Med campus would remain directly linked.

Disadvantages

- It was noted that Site 1 has limited space for development with much of the expansion demand required within existing facilities.
- Site presents limited financial incentive to route utilities through the existing building. An in-depth review would be required to quantify these connections which is beyond the scope of this site evaluation.
- Expanded site would still require western heating and cooling plant and as previously noted expansion of existing plant infrastructure is not financially viable.
- Construction phasing could present a challenge as existing departments would be required to adjust to shrinking and relocation throughout construction.
- Site limits future growth opportunities due to physical constraints.
- Site would be challenged to provide required hardscape features.



SNYDER & ASSOCIATES

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Exhibit A - Parking For Site 1 in Lot 96

ISU VDL Site Evaluations | Ames, IA| 11/15/2018

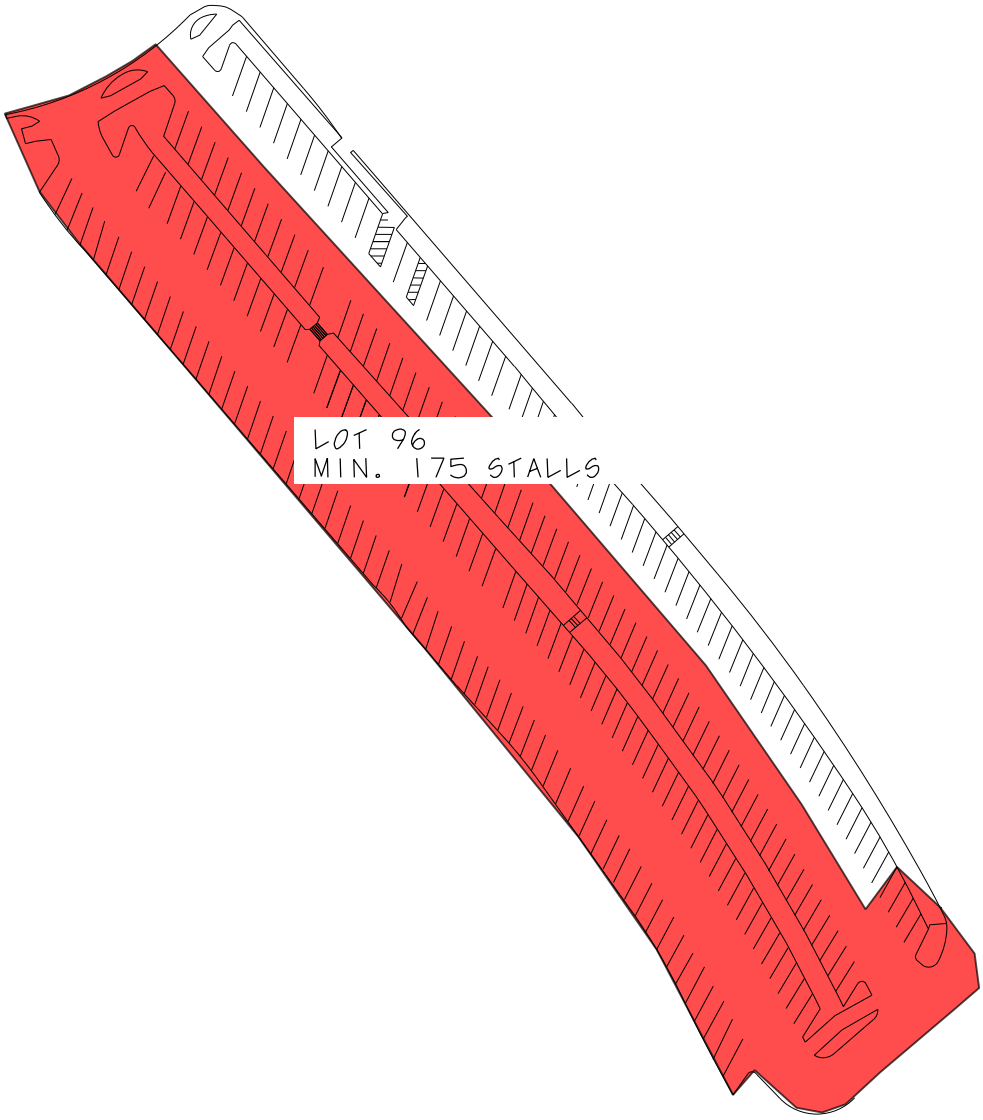

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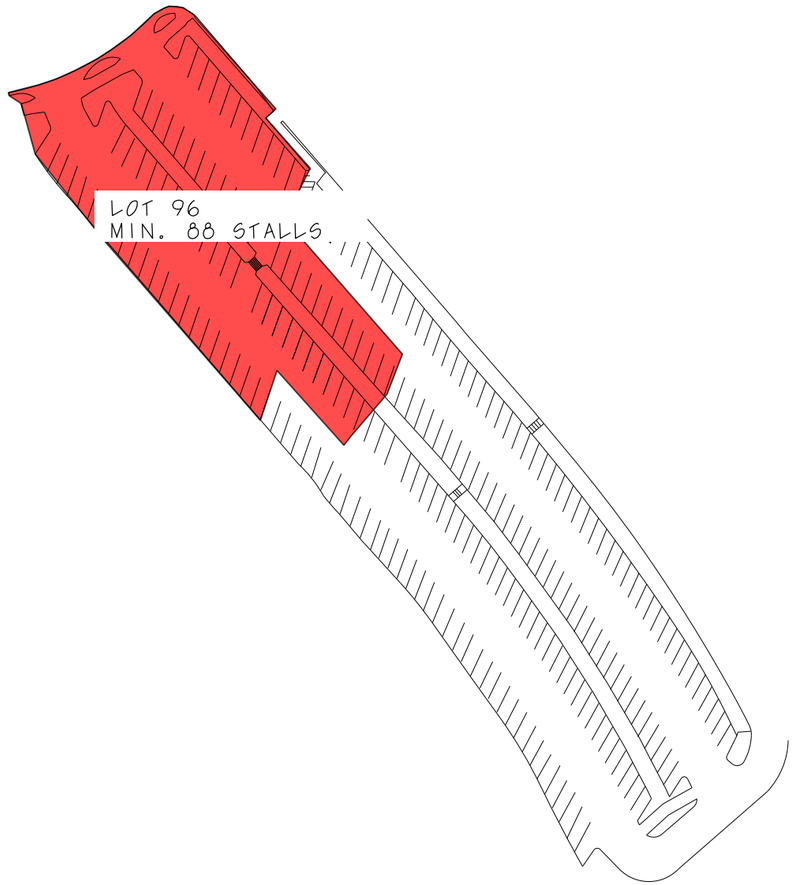
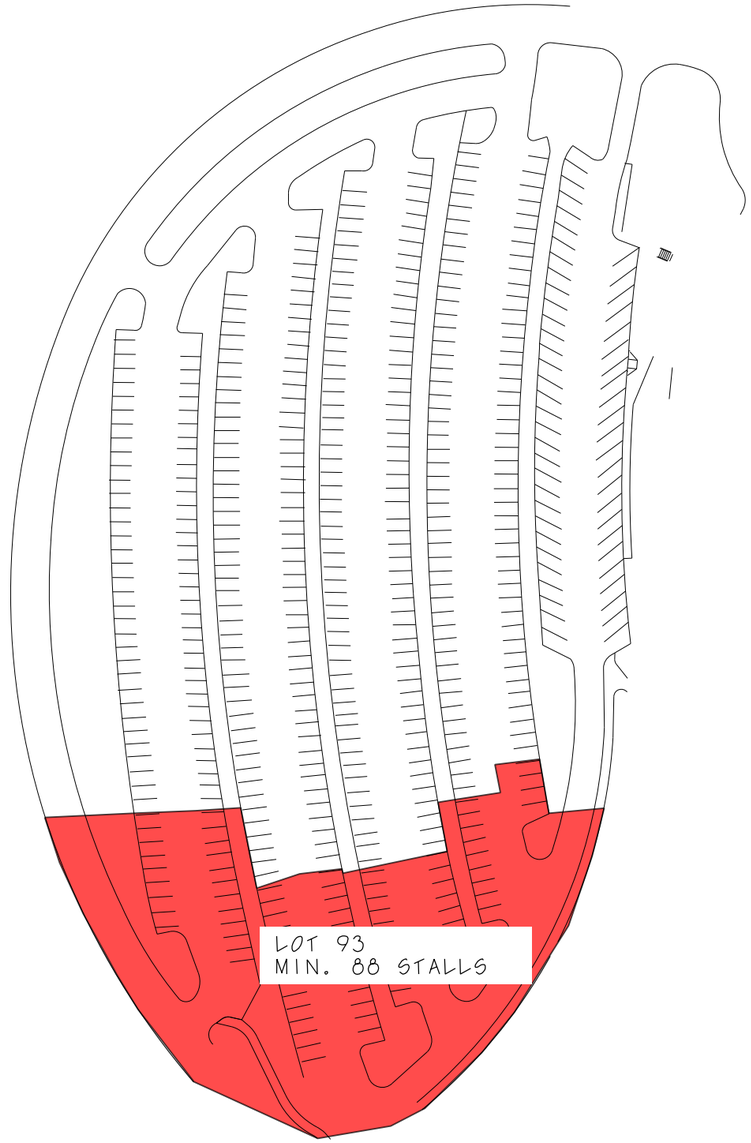
Exhibit B - Parking For Site A in Lot 96

ISU VDL Site Evaluations | Ames, IA| 11/15/2018





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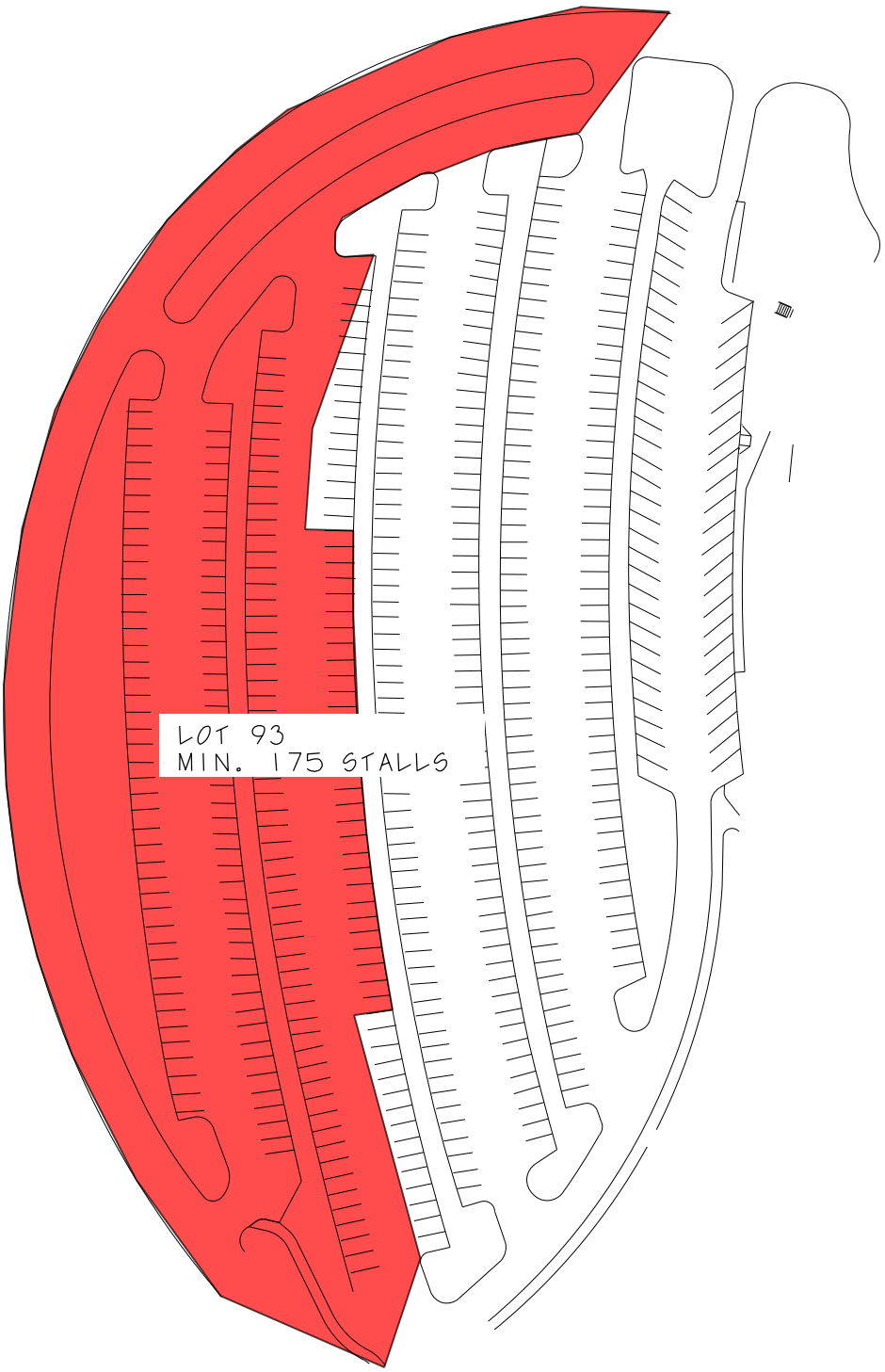
ISU VDL Site Evaluations

Exhibit C - Parking For Site B/C in Lot 93 and Lot 96

Ames, IA

11/15/2018



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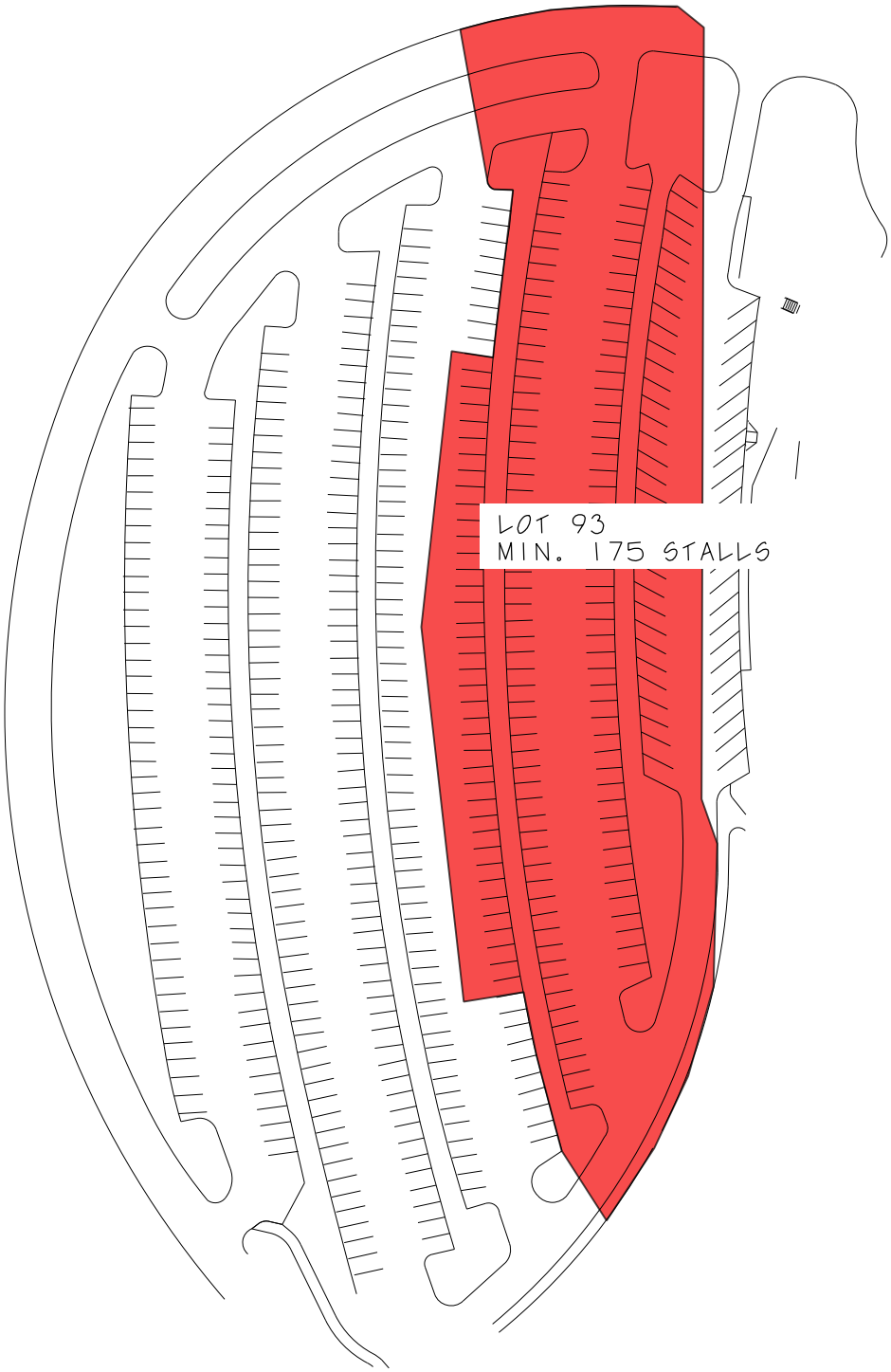
Exhbit D - Parking For Site C in Lot 93

ISU VDL Site Evaluations | Ames, IA| 11/15/2018



SNYDER & ASSOCIATES

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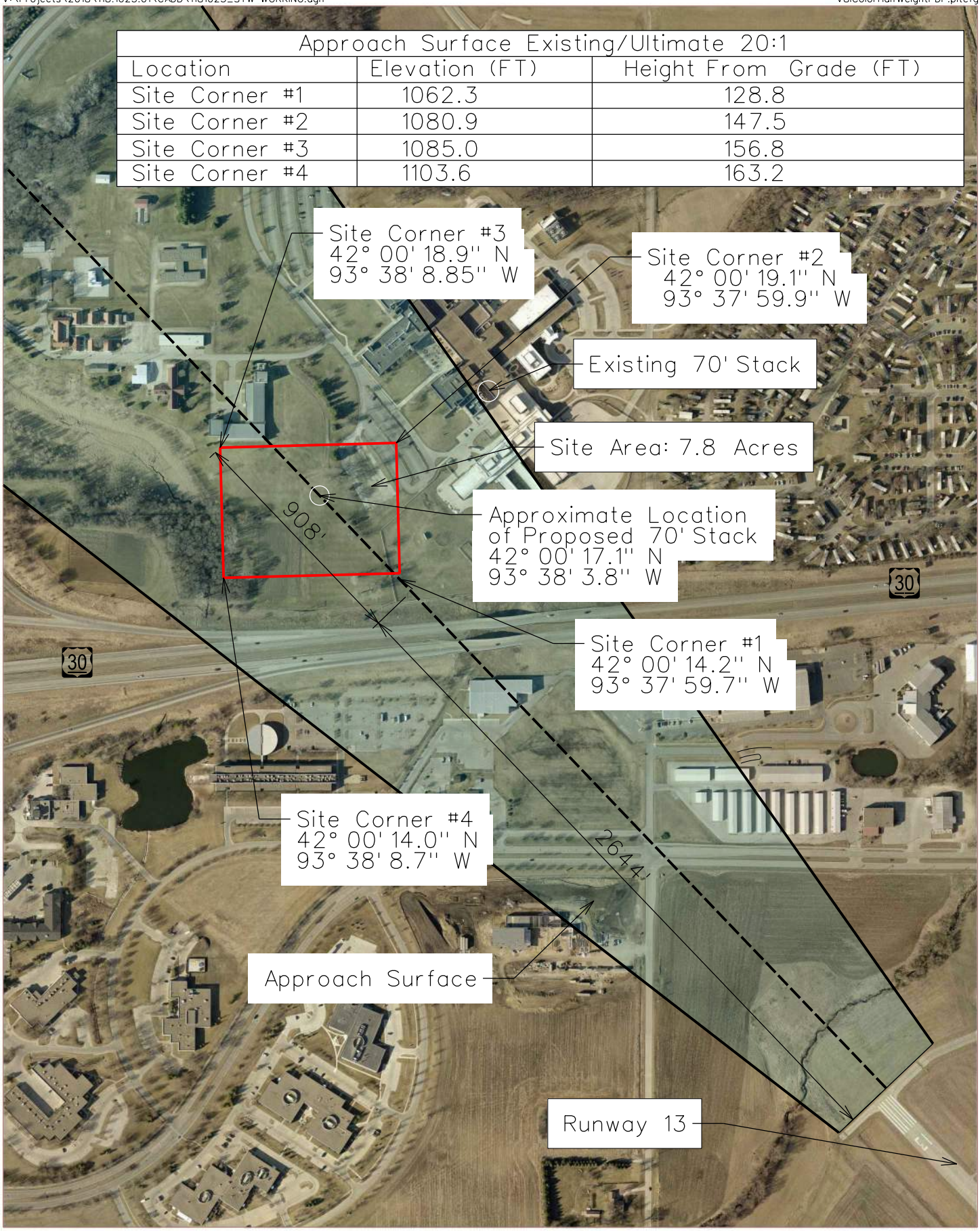
Exhibit E - Parking For Site E in Lot 93

ISU VDL Site Evaluations | Ames, IA| 11/15/2018

Approach Surface Existing/Ultimate 20:1		
Location	Elevation (FT)	Height From Grade (FT)
Site Corner #1	1062.3	128.8
Site Corner #2	1080.9	147.5
Site Corner #3	1085.0	156.8
Site Corner #4	1103.6	163.2



SNYDER & ASSOCIATES

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Exhibit G - FAA: Feasibility Study

ISU-VDL | Ames, IA | 11/30/2018