Madison Area Consolidation and Facility Modernization Plan

U.S. Geological Survey: National Wildlife Health Center – Madison, WI

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Figure 1: Business Interiors; (Adobe Stock Photo; 2012)

Credit: Photo on Cover: USGS National Wildlife Health Center, Madison, WI. (USGS NWHC)

Figure 2: Research Lab (Adobe Stock Photo, 2014)

Figure 3: Student Lab; (Adobe Stock Photo; 2014)

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The team of CTA and Page / SST planners were contracted to review and validate the National Wildlife Health Center 2011 consolidation and facility modernization plan. The team engaged in five separate tasks in order to provide findings and recommendations for implementing a Consolidation and Facility Modernization plan. Tasks included: 1) Reviewing NWHC Mission and Program Requirements; 2) Reviewing and validating the 2011 Consolidation and Modernization Master Plan; 3) Developing short term plans for NWHC campus and building improvements; 4) Developing a long term plan for modernization and consolidation of NWHC and other identified DOI agencies; and 5) Develop a Business Case Analysis to validate short term and long term improvement plans.

The modernization plan that has been prepared as a part of this contract includes two options: 1) Consolidation with other area Department of Interior agencies, and modernization of facilities; 2) No consolidation only modernization of the current NWHC facilities. Total space square footages for both the National Wildlife Health Center as well as proposed collocating agencies were reviewed and adjusted for current best practices for both office and research space. Final cost analyses were prepared for the implementation of both consolidation and non-consolidation options.

NWHC History

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The National Wildlife Health Center (NWHC) was founded in 1975 to consolidate U.S. Fish and Wildlife expertise into a single program designed to provide the technical assistance necessary to identify, control, and prevent wildlife losses from diseases as well as conduct research to understand the impact of diseases on wildlife populations, and devise methods to more effectively manage these disease threats. The impetus behind the creation of the NWHC was, in part, a consequence of the catastrophic loss of tens of thousands of waterfowl as a result of an outbreak of duck plague at the Lake Andes National Wildlife Refuge in South Dakota.

Background

The current USGS facility funding outlook has extended the time line for executing the preferred improvement option (Option C: All New Construction) recommended in the 2011 Master Plan. The current budgetary outlook, along with the urgency of addressing critical NWHC facility issues, has resulted in a need to revise and prioritize the components of the 2011 Master Plan along with considering alternative options and a new time line for accomplishing the Master Plan. (USGS, 2014)

As a result of the budgetary shortfall, and the critical facility issues at the NWHC campus, the consulting team of CTA and Page/SST Planners were contracted to review the 2011 Master Plan and validate the program needs of the NWHC and other identified Madison based DOI agencies that have been proposed to consolidate onto the NWHC campus. The consulting team engaged in the following tasks as a part of addressing the critical NWHC facility needs as defined by the 2011 Master Plan:

- Review mission/ program requirements for NWHC and all proposed DOI collocating agencies.

- Review and validate the 2011 Conceptual Master Plan - final concept submittal (build all new buildings)

- Develop a short term (1-10 year) for NWHC campus and building improvements to sustain the mission essential components of the NWHC.

- Develop a long-term Modernization and Consolidation Master Plan that is consistent with USGS program, mission and facility requirements for the NWHC and the other DOI agencies from the greater Madison area proposed to collocate on the NWHC campus.

- Develop a Business Case Analysis based on the long term Modernization and Consolidation Master Plan

Existing Conditions

The existing NWHC campus was completed in 1986. At that time it housed a program consisting of 51 staff members and had an annual budget of $1.4M. Its mission focused primarily on diseases of migratory birds and other trust species of the U.S. Fish and Wildlife Service.

As of 2010 the NWHC campus was supporting a budget of $10.0M and had a staff of more than 130 people consisting of 86 federal employees and over 50 contractors, students, visiting and emeritus scientists, and volunteers. By 2010 the NWHC's mission also included supporting all Department of Interiors (DOI) agencies and an increasing number of state agencies. It also had developed significant collaborations with the Centers for

Figure 4: Current Lab Space, NWHC (CTA 2015)

Disease Control and Prevention, the Departments of Agriculture, Homeland Security, and numerous academic institutions. (Strang, 2011)

A review of the staffing levels during the planning team's validation process in 2015, revealed that the NWHC staff has continued to maintain the 2010 employee counts. Staff counts as of 2015 are at 125 employees. According to staffing plan, the NWHC is projected to grow 9% by 2030 to a total staff count of 139 employees.

The 2011 Master Plan assessed the current research lab and office space as follows:

> *"To be able to perform its mission quickly, safely, and efficiently the NWHC needs to have adequate space and high quality facilities and equipment. Unfortunately these are all currently lacking." (Strang, 2011)*

At the time of the 2011 Master Planning process, the NWHC facility was under-going extensive work on the campus to upgrade mechanical system components; As Strang stated, " the mechanical system design itself was not changed to be consistent with industry standards for efficiency. Likewise, from a research standpoint, the 30 year old facility has seen little in the way of lab equipment replacement, leaving much of the equipment dated and in questionable condition." CTA's review of the campus noted, little in the way of campus facility improvements have been completed since the 2011 Master Plan.

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The NWHC is responsible for investigating known and emerging wildlife diseases and responding to wildlife mortality outbreaks throughout the United States. The NWHC is designated as a USGS "mission essential" facility and is classified as a Level 3 Security Facility under the Department of Justice Standards for Federal Facilities.

The campus is generally described as:

“The campus itself is contained on a 24 acre site, located on the west side of Madison. The campus holds two buildings, referred to by the users as the Main Building (MB), and the Tight Isolation Building (TIB).
The Main Building, which is the larger of the two, was built in the 1960’s and retrofitted to its current use in the 1980’s. It contains the primary necropsy suite, four diagnostic laboratories, offices, and administrative functions. It also contains shared core functions which provide science support to both buildings. Housed in the main building basement is the disease investigations group. This group is made up of parasitology, virology, and microbiology. These laboratories operate at Biosafety Level 3 (BSL3). These laboratories quickly and accurately identify pathogens in tissue samples and carcasses received from around the United States. Over 3,000 carcasses/tissue samples are processed each year and over 105,000 cases, most consisting of multiple submissions, have been processed since 1975.

The TIB is located approximately 150’ from the main building. Even though the buildings are physically separated, there isn’t a complete separation of functions, and some researchers work in both buildings. The TIB contains five research laboratories and an animal isolation wing (AIW) which includes 24 animal holding rooms (AHRs), a necropsy room, and one laboratory.

The following research labs are contained in the Tight Isolation Building: virology, microbiology, prion and chemistry laboratories, an animal isolation wing (AIW) with a necropsy room, and 22 ABSL3 experimental animal rooms. The AIW also contains an ABSL3 (enhanced) laboratory, and 2 ABSL3 (enhanced) animal rooms designed for working with diseases requiring additional containment (i.e., highly pathogenic avian influenza). According to Strang in 2011; all laboratories and animal rooms in the TIB were designed to Biosafety Level 3 (BSL-3) containment standards. (Strang, 2011) Review of these same facilities and the results from the Risk Assessment performed as a part of the 2015 validation project further indicates significant deficiencies have further degrade the facilities making the ability of the labs to adhere to the BSL3 containment standards questionable.
Various species of small to medium sized birds and mammals are housed

in the 24 animal rooms. Some of the diseases being studied in the TIB include West Nile virus, chronic wasting disease, sylvatic plague, avian botulism and avian influenza.

Wildlife diseases being studied at the NWHC include:

- Chronic Wasting Disease (CWD)
- West Nile Virus (WNV)
- Highly Pathogenic Avian Influenza (HPAI)
- Avian Botulism
- Newcastle Disease
- White Nose Syndrome
- Sylvatic plague
- Salmonellosis
- Avian Cholera

A number of other structures also exist on the site. These include a 2,000 SF maintenance garage, a small exterior freezer located outside the Diagnostic Necropsy, an array of solar voltaic panels located behind the parking area and a modular trailer used for employee offices.
The modular trailer facility was located to the property in the 2000's as a means of accommodating the additional staff and researchers. There are currently 24 office cubicles in this trailer.

Mission and Vision

National Wildlife Health Center (NWHC)

As a part of the consulting team's efforts to understand the recommendations from the 2011 Master Plan, the team conducted a three day site visit, meeting with individual research teams, facility managers, and the leadership team for the NWHC and the leadership of the Wisconsin Water Science Center (Water Science). During the three day visit the consultants conducted group interviews and a visual inspection of the existing NWHC facilities, and the Water Science facilities in order to understand the existing opportunities and constraints of the facilities that each agency is currently working.

Part of the interview process included confirming the mission of the National Wildlife Health Center. That mission as described in the 2011 plan is described more fully as:

Figure 5: Example Research Activity (USGS, 2014)

> *"The emerging wildlife diseases have become a high-priority concern in the United States and the world. In addition to their harmful effects on natural wildlife populations and ecosystems, there is the potential for the spread of zoonotic diseases to humans, and for causing economic losses associated with livestock morbidity and mortality. The NWHC is responsible for providing research and for investigating and responding to known and emerging wildlife diseases and wildlife mortality outbreaks throughout the United States."* (Strang, 2011)

The planning teams investigation, interviews and document review confirmed the NWHC mission is consistent with what Strang reported in the 2011 Master Plan. In summary, the science conducted at the NWHC on wildlife diseases that carry potential negative impacts on wildlife and that are potentially transferable to human populations in the U.S. and the world supports the need for the classification of the facility as "Mission Essential". This designation is re-iterated by the facility's classification as a Level 3 Security Facility under the Department of Justice Standards for Federal Facilities. With this designation;

> *"The NWHC is required to maintain a high security biomedical facility operating under criteria established by the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) for Biological Safety Level 3 (BSL-3) containment." (Christopher Brand, 2011)*

These special designations allow the NWHC to receive and work with "select" disease agents, and to Import/Export and Transport specified infectious agents of concern to the agricultural industry. In the event of wildlife disease emergencies within the United States, the NWHC also supports the Department of Interior responsibilities under the Department of Homeland Security's National Response Plan -Emergency Support Function 11.

Co-Location

Part of the planning team's efforts included considering the consolidation of other Department of Interior agencies in the Madison area to the NWHC site. In order to effectively understand the proposed collocation agencies; the design team conducted on site or telephone interviews with each agency and reviewed their program missions.

Seven other Department of Interior agencies within the Madison area are proposed to be consolidated onto the NWHC campus as a part of this project. These agencies and the total number of current employees are listed below:

- WiWSC - Wisconsin Water Science Center (136 people)
- FWS – Fish and Wildlife Service (5)
- NGP – National Geospatial Program (8)
- EPN – Enterprise Publishing Network (4)
- NSP – National Spatial Data Infrastructure Partnership Office (1)
- USGS OMS – Office of Management Services (1)
- GLO – Geography Liaison Office (1)

Wisconsin Water Sciences Center (WiWSC)

As the Wisconsin Water Science Center (WiWSC) is by far the largest of the other DOI agency's proposed to consolidate onto the NWHC campus, the planning team toured the Water Science facilities and conducted user interviews in order to fully appreciate the user needs. The WiWSC mission as summarized in the 2011 Master Plan has not changed. It is summarized from the plan:

"The USGS Wisconsin Water Science Center (WiWSC) is responsible for collecting, analyzing, and distributing information about Wisconsin's water resources. It investigates surface-water runoff, studies lake ecosystem dynamics, researches non-point pollution, and measures groundwater quantity and quality. Information that the WiWSC provides allows local, state, and federal agencies the means to best manage their water resources. Within the WiWSC the Mercury Studies team analyzes water samples and provides expert assistance to state and federal agencies in understanding mercury in our environment." (Strang, 2011)

Existing Conditions at WiWSC

The WiWSC has continued to lease 24,500 sq. ft. of office and lab space in a corporate office park located in the community of Middleton, WI. The facilities are relatively new and in good condition. The majority of the space is being used for office functions, but a water quality testing lab and a mercury lab are also on the premises. During the 2011-2012 time frame of the Master Plan, the Water Science Center was undergoing construction of a 5,000 SF addition project. This project increased their facility from its' original 19,000 square feet to the current 24,500 sq. ft. that the program currently occupies. The WiWSC also leases warehouse and "ware yard" space for its field research vehicles and equipment. These are also in good condition. The WiWSC has been leasing these facilities in five year increments. Currently the WiWSC facilities are reaching the end of their five year lease period and are in need of re-signing their lease contract for an additional 5-year lease or finding different accommodations to house their programs. In summary, the WiWSC office and lab accommodations are adequate for their work. Motivation for consolidating to the NWHC site includes:

- Ability to take advantage of lower lease rates in a USGS-owned facility
- Opportunities to improve operational efficiencies by sharing the cost of core services and functions
- Possibility of scientific collaboration and collegiality with other USGS organizations.

Other organizations (FWS, NGP, EPN, NSP, OMS, GLO)

Just as was noted in the 2011 master plan, the 20-odd members of the other small USGS organizations currently within the Madison area all lease the space they occupy. Their needs are primarily limited to space for office functions. With the exceptions of needing some additional storage and warehouse facilities required for boats and vehicles. Like WiWSC, they would be able to take advantage of lower lease rates, operational efficiencies, and scientific collaboration. (Strang, 2011)

2011 Master Plan Validation

Review the Final Concept (Build All New Buildings - Option 3)

The 2011 Master Plan recommended the following gross square footages for space:

• Office/Admin	63,597 GSF
• BSL2 Labs	4,309
• BSL3 Labs	50,438
• ABSL3 AHRs	23,600
• BSL3-Ag Labs/AHRs	18,893
• AHR Support Services	9,007
• Bio-Support Services	4,018
TOTAL	173,862 GSF
• + Warehouses/garages	15,470 GSF

Table 1: 2011 Space Needs (Strang, 2011)

These final square foot totals shown in the 2011 Master Plan were based on work sessions held with the end user groups. The CTA team conducted similar space planning sessions with the end users to confirm the need for the total square footage listed in the 2011 Master Plan. Throughout the course of the user group interviews, and as a result of the planning teams site visit, it was determined that the potential for the greatest amount of square footage reduction was found to be in the area of office space. The observations made during the site visit identified that the current office space was in-efficient and that new design standards and design trends

in office space could reduce the overall space allocation by upwards of 20,000 sq. feet in total.

In the same vein the lab space identified in the 2011 Master Plan was found to be over-sized and an additional 14,000 sq. ft. of lab space could be removed from the space program. A side by side comparison of the existing space on the NWHC campus, along with the proposed square footages from the 2011 Master Plan and the new 2015 square footages for the lab, office, and warehouse program can be found in Table 2. Full itemized detail of the summary information is located in Appendix A at the end of this document.

Further review and program interviews identified that the 15,000 square feet of warehouse space identified in the 2011 Master Plan would be inadequate with the increase in the number of vehicles, boats, and field equipment to be found within the NWHC, the WiWSC, and the other DOI agencies. The total warehouse square footage for the overall consolidation program was increased from the 15,000 square foot identified in the 2011 Master Plan to a total of 20,230.00 sq. feet. The comparative summary between the 2011 Master Plan, each agency's existing square footage and the projected future square footage needs is shown in table 2 on page 22.

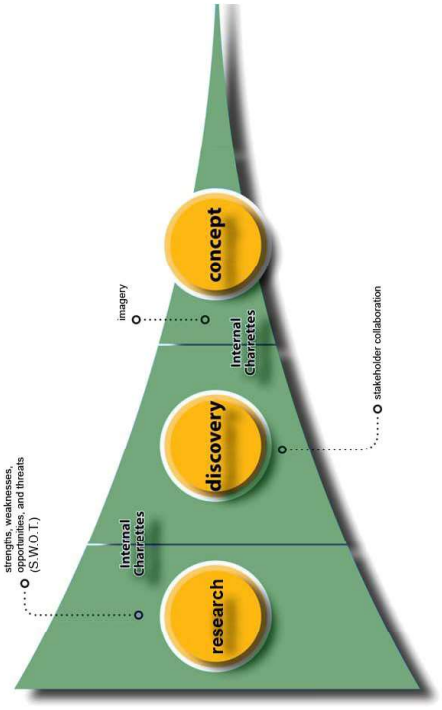

Figure 6: Planning Process Diagram; (CTA, 2015)

In the course of developing the 2011 Master Plan three op-

Description	2011 Master Plan Square Footages	Existing Square Feet per measured floor plans	Future projected Gross Square Feet (2030)
Office and Administration Space			
NWHC and Co locator Office space	63,597.00		
NWHC office (only)space		10,087.65	*13,136.84*
Water Science Office Square Footage		10,100.00	14,552.63
Fish and Wildlife Services – Private Lands		488	1,138.16
Support Team		400	894.74
National Geospatial, Enterprise Publishing, Scientific Information, and Education Office		1,040.00	1,263.16
USGS Management Services		120	157.89
Subtotal		***12,148.00***	***18,006.58***
NWHC Shared Space		***14,860.87***	***14,051.32***
Subtotal Office and Shared Space		***27,008.87***	***31,143.42***
Lab Space			
NWHC Labs	110,265.00	22,607.97	90,694.00
Water Science Labs		4,468.00	5,581.82
Subtotal			***96,276.05***
Warehouse Space			
NWHC	15,470.00	2,200.00	3,600.00
Water Science		5,000.00	12,880.00
FWS Private Lands		5,000.00	3,750.00
Subtotal		***12,200.00***	***20,230.00***
Total Square Footage	***189,332.00***	***105,903.10***	***161,700.79***

Table 2: Space Needs Summary, (CTA, 2015)

tions and their accompanying business case analyses were developed for meeting the programmatic needs of the NWHC and the other agencies moving to the site. The task of this planning team was to validate the preferred Option Three from the 2011 Master Plan. Consolidation within New Buildings option along with the associated 2011 Business Case Analysis is included in this report as a point of reference in order to fully realize the validity of the final recommendation of implementing the recommended complete demolition of existing facilities and complete new build from the 2011 Master Plan.

Option Three - Consolidation within All New Buildings

In summary Option Three looked at the viability of constructing entirely new facilities and demolishing the Main Building and Tight Isolation Building. The construction illustrated in the 2011 Master Plan Option Three involves phased construction. The 2011 proposal was that a new building would be constructed while operations in the two existing buildings continued.

> *"Upon completion of the new building, NWHC staff, along with the other agencies, would move into the building. The two existing buildings would then be razed, and the vacated space would be used for parking and for warehouse functions"* (Strang, 2011). See Strang Option Three in Appendix B

The review of the space needs and the downsizing of the lab and office facilities as illustrated in Table Two does not negate the new construction option constructing entirely new facilities and demolish the existing buildings on the NWHC site. The planning team has reviewed the list of Pros and Cons identified with Option Three in the 2011 Master Plan. This planning team supports the concept of the all new construction approach, with a smaller foot print. A list of the positive attributes based on a revised building and site plan include:

- Meets the current and twenty year space and programmatic needs of the NWHC, as well as those of the other agencies moving to the site.

- Compact design would maximize opportunities for collaboration.
- Allows for full use of modern building technologies, resulting in maximum space and energy efficiencies.
- Building entirely new structures would be less disruptive for the current occupants
- Best able to maximize the desired programmatic adjacencies since the design would not be limited by current building conditions.
- A newer building will be more attractive in a second use scenario if USGS elected to sell the property.

The USGS should recognize however that there are some drawbacks to a complete rebuild when it comes to:

- Initial up front dollars invested will be higher (due to limited phasing of construction.)
- Cost of construction would be distributed over a relatively short time period (4-5 years).

Short Term (1-10 year) Plan for the NWHC Campus

Campus and building improvements to sustain the mission essential components of the NWHC

User Goals

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"All USGS entities seek to acquire adequately sized, high quality, functional and flexible facilities which are prepared to meet the users' needs for the next 30 years."
Taken from the NWHC 2011 Master Plan - User Goals; Strang 2011)

As a part of the plan review and validation project, the CTA team was asked to develop a short term plan for the NWHC campus to address the deficiencies currently inhibiting the day to day operations of the facility. The planning team assessed the current operations and existing conditions at the NWHC campus based upon the current accepted containment planning principles for laboratories and animal facilities including:

- Code requirements

- Space and adjacency requirements
- Testing compliance statements
- Security provisions

At the time of completion of the 2011 Master Plan, the following conditions were identified in both the TIB and the Main building. In 2011, the authors of the master plan recommended that on-going repairs and upkeep of the facilities could change the condition of a system from poor to good. (Strang, 2011)

- Overly crowded laboratories with limited lineal bench space
- Use of older, primary containment biological safety cabinets
- Use of old and inefficient incubators
- Autoclaves with flange barriers on the wrong side
- Old autoclaves (need replacement)
- Casework surfaces made of plastic laminates with exposed, chipped surfaces
- Surfaces with peeling paint, holes, unsealed penetrations and cracking walls
- Door/ window seals and frames that are cracking (unsealed and non-impermeable)
- Lack of consolidated freezer space
- Improper air conditioning in existing freezer room
- No formal system-based decontamination strategy, including methods to decontaminate duct work.
- Lack of procedural space supporting animal rooms
- Avian Flu animal work inside non-BSL3AG space (this work will be required to be performed in ABSL3-Ag space in the future)
- Use of contained animal rooms for general storage (Strang, 2011)

Deferred Maintenance and Renovation Projects

Some five years since the 2011 Master Plan the CTA team noted similar deficiencies as the list that was prepared in 2011 (shown previously). In some instances the systems and conditions of the infrastructure and equipment have further degraded. Repeated condition assessments have identified lists of items for repair or replacement, and go so far as to categorize these lists in order of priority. NWHC leadership annually prepares a capital improvement plan and budget. Even with this proactive plan to repair systems and facilities in order to maintain operational status these efforts provide only short term fixes and focus only on the necessary operations. Table 2 in this report identifies the maintenance projects that are in need of being completed and an approximate time line for completing these improvements. Completion of these projects brings only slight modification to the buildings on campus and brings them only up to a current operational status without consideration for future needs or the meeting of the current biosafety standards.
Likewise, the extensive amount of renovation to the existing facilities in order to bring them up to an operational stage let alone to meet the requirements of the mission critical and biosafety level 3 status creates a cost prohibitive scenario for USGS. The costs associated with these deferred maintenance and renovation projects are considered sunk costs in the scenario of building new facilities for this research campus. In other words, the dollars spent over the next three to five years will never be recouped or fully realizes as all modifications will be demolished or removed in order to address the future programmatic needs of the NWHC.

Overall, the facilities remain outdated, inefficient, and in need of significant replacement and repair. It is the opinion of the planning team that the mission and function of the facility along with the interests of the Department of Interior would be better served with a complete replacement of all buildings on the NWHC Campus.

Other systems and methodologies within the facilities that impact the workflow of the research and the reliability of the research outcomes include both technical and functional requirements of both the animal facilities and the research labs. In general all research facilities have technical and functional requirements that should be met on a day to day basis. What follows are the summary of these requirements for both the animal and the lab facilities.

Technical & Functional Requirements Update: *Animal Facilities*

Alignment of space types with Risk Assessments: Facility space should more accurately align with risk assessments associated with the agents being handled. Ideally a new facility would have an appropriate mix of ABSL2 and 3 labs as well as enhancements to both ABSL2 and 3 as required per risk assessment. Some segregated ABSL3-AG space (specific agents to be identified) and grouped/segregated BSL3 Select Agent space will also be required. Enhancements will include:

1) Directional airflow for both BSL2 and 3 labs,
2) Central forced air mechanical systems with HEPA exhaust,
3) Room decontamination capabilities, shower-out for BSL3, and

Figure 7: Existing Autoclave at the NWHC; (CTA, 2105)

4) Effluent waste treatment equipment.

Proper design of animal housing: Animal holding suites shall be appropriately designed to comply with guidelines for proper housing of a variety of species, typically small and medium sized animals, however there may also be a requirement for larger animal housing. Housing for specific larger animals that may require pens (such as goats, deer, elk, and moose up to 2000 lbs.) will be provided on an as needed basis with final determination to be made during detailed programming. Animal suites also need access to appropriately fitted-up procedure rooms that are linked to groups of holding rooms that staff can work with the animals inside the facility. A "bio-bubble" system for animal containment housing should also be considered for operational efficiency.

Remediation for ineffective control of temperature and humidity: Facility users require zoned controls to more accurately maintain environments appropriate for research and diagnostic testing protocols. The current situation does not permit adjustments room-by-room and consequently tailored research or diagnostic testing activities are severely limited.

Improved materials and waste stream flow: Both lab and animal facilities need an improved flow for incoming materials and out-going waste stream. There needs to be efficient access to loading, staging, corridors/ elevators and storage spaces to enable lean operations (minimizing unnecessary steps). Specific decisions about how waste will be handled will be made during detailed programming, with a preliminary decision that a digester of sufficient capacity will be included in the new facility. The existing incinerator will likely be taken off-line by the time of the new facility and will no longer provide a method for waste disposal. Use of ventilated cages and automatic-watering systems should also be considered as part of a lean operational strategy.

Safety and operational efficiency: The new facilities will need to be designed to maintain safety first and also be operationally efficient. Investigation into mechanical systems that enable appropriate airflow rates (to

maintain containment and directional airflow/pressure differentials) but that doesn't waste resources will be required. This is essential for both first costs and life cycle cost control over the next 20 years.

Easy access to new mechanical systems: Access will be required to equipment, ducts, valves and filters. It is imperative that mechanical staff has easy access to these systems without risk or danger. All access points that require adjustments or repairs (especially valve, switches, filters, etc.) shall be outside lab or animal holding rooms. Enclosed roof top mechanical penthouse for fan and filter housings, interstitial floor, deep ceilings with catwalks for access to ducts, corridors with ceiling access to pipes and systems outside of containment labs are all options to be evaluated.

Redundancy (and interconnection) of local and central building systems is important to maintaining on-going operations 24 x 7. Electrical standby generation is needed for all mission-critical equipment (items such as ventilation for animal cages, freezers and cold rooms for samples, power for selected biosafety cabinets). The need for redundant generators is critical in facilities of this nature; should one generator fail to start in a power outage. Redundancy in the waste stream decontamination process is also recommended. If possible the animal facility and the lab facility decontamination systems should be interconnected to support each other's liquid waste streams should one system fail. Decontamination using local portable VHP systems should be integrated into overall building-wide engineering systems so that rooms can be sealed and ventilated before and after the decontamination process systematically. Finally, duplicate glassware washing and drying, and sterilizing equipment should be considered to minimize downtime.

Pleasant work environment that considers ergonomics (especially for repetitive tasks), adjustable furniture (both sitting and standing height), break rooms and interaction areas outside of containment but inside secure perimeter of the facility, access to office space outside of the lab or animal suites, and natural light to as many rooms and corridors as possible. It is also important to provide natural landscaping with regional plantings on the site and around the buildings.

Technical & Functional Requirements Update: *Lab Facility*

Alignment of space types with Risk Assessments: Types of spaces should more accurately align with risk assessments associated with the agents being handled. Ideally a new facility would have an appropriate mix of BSL2 and 3 labs as well as enhancements to both BSL2 and 3 as required per risk assessment. Some segregated BSL3-Enhanced space (specific agents to be identified) and grouped/segregated BSL3 Select Agent space will also be required. Enhancements that are required to meet the outcomes of the Risk Assessment include:

1) directional airflow for both BSL2 and 3 labs,
2) central forced air mechanical systems with HEPA exhaust,
3) room decontamination capabilities, shower-out for BSL3, and
4) effluent waste treatment equipment.

Figure 8: Existing NWHC Research Lab, (CTA, 2015)

More flexible lab space and expansion of diagnostic capabilities: Consider combining assets in both facilities that can support both the lab and animal protocols. In particular necropsy suites, shipping and receiving, waste handling and disposal and records/ archive were mentioned. The goal is make a more efficient building in terms of support facilities so that more of the focus can be on providing a greater percentage of flexible lab space that will be available during surge periods (if there is an

animal disease outbreak for example). The main goal is to expand applied research and to better enable and expand diagnostic capabilities associated with infectious diseases within safe and modern/flexible labs.

Lean work flow: Need specialized labs such as PCR (traditional & real-time), Necropsy, Gown-in/Gown-out, Materials & Waste flow and access to storage and samples are to be designed with efficiency of work flow in mind. Easy access to office space (without long walk times) is also important. Ability to supervise work and to see operations in progress (windows into labs from corridors for example) is to be considered. Specialized support areas that need efficient access to labs are: Freezer and incubator rooms, loading dock with cylinders, materials staging and centralized storage, glassware & media prep, and laundry. Necropsy should be designed to have close access to x-ray, histology, parasitology, microscopy, and controlled environment waste storage. These are all examples of spaces that can impact orderly (lean) workflow that need user input during the design process.

More storage space: The proper functioning of the research and diagnostic testing labs requires the following storage facilities: Bulk chemical storage (especially for chemicals like formalin), Reference library for sample archive, Field gear and supplies/kits, Frozen samples- Walk in freezers, individual chromatography freezers and Liquid Nitrogen supplied freezers (-80C).

Better infrastructure: Mechanical systems need to be accessible in the winter months especially for adjustments to fans or for filter changes. Building management systems

Figure 9: NWHC Lab and Researcher (CTA, 2015)

need to monitor all critical systems and be able to alert appropriate staff after hours or on weekends if there is a failure. Improved IT/AV, telephone (to communicate with medical response teams and high speed internet are all needed to communicate effectively between animals rooms, labs, and offices.

Compliance with Select Agent and other rules: Select agent labs should be organized into a secure group of spaces for better monitoring and control. The spaces are to be designed to comply with the DHHS Select Agent rules. The new facilities shall also be designed to comply with NAHLN guidelines. The facility shall also comply with the requirements of a DOI "Mission Critical Facility" (per the directive provided to the team by USGS leadership after the meetings). These requirements include a CDC certified BSL3 lab and the ability for the USGS to be a DOI principal planner in coordinating the response to an outbreak of a highly contagious disease involving wildlife.

Robust equipment power and services: New labs need to have sufficient power (110, 208/220V) and sufficient numbers of individual circuits and amps per circuit (20 A and higher) to support an array of domestic and foreign equipment. The labs will also need access to natural gas and RO/DI water (with polishers at point of use). If vacuum or compressed air is needed options to deliver these services locally (rather than central systems) should be considered.

Collaboration spaces: The new building should enable science to be "on display" and also enable collegial interaction. The ability to accommodate the media/press, important visitors and educational tour groups is critical to public outreach objectives. The building should have IT/AV enabled meeting rooms and conference areas (sizes to be determined). A training lab that can be used for multiple functions (equipment & procedures training, staff protocol meetings or as a surge lab) would be an important function to include in the new building.

Pleasant work environment that considers ergonomics (especially for repetitive tasks), adjustable lab furniture (both sitting and standing height), kitchenette/break rooms, access to office space outside of the labs (but nearby), and natural light to as many rooms and corridors as possible. The lab staff mentioned a bike parking area and a dedicated smoking area outside of the building. A local area that also displays the work being performed as well as the history of the facility should be included in the design. Opportunities to display science should be considered.

With proposed consolidation of other Department of Interior agencies onto the NWHC campus, technical and functional considerations of these programs must also be made. Consolidation of facilities that results in further inefficiencies or jeopardizes the agencies current workflow will be unacceptable outcomes of the proposed consolidation. The second largest agency to occupy the NWHC campus will be the Wisconsin Water Science Center, and CIDA lab and offices. The CTA team conducted on site interviews with the user group and toured facilities noting the existing conditions and current needs.

Technical & Functional Requirements Update: WiWSC and CIDA- Lab & Office Facility

Improved lab space: Mercury lab (6-8 staff) has grown in terms of staff and tasks performed and needs additional lab space that is properly designed (chemical intensive environment) and has appropriate ventilation and utilities. This lab is not a biologically hazardous lab and does not require BSL2 or 3 capabilities. The labs use chemicals that are hazardous (such as hydrofluoric acid) and need to be designed according to all applicable safety codes and guidelines.

Additional support space: Mercury lab also has a series of small support labs that need to be properly sized for equipment and work flow relative to the main lab. The support rooms include prep lab, instrument room, and sample receiving room need items such as sinks, fume hoods, gas, air and vacuum, specialized power, durable finishes and proper ventilation, lighting and temperature and humidity control. While not bio-hazardous (not BSL2 or 3) the labs use chemicals that are hazardous (such as hydrofluoric acid) and need to be designed according to all applicable safety codes and guidelines accordingly.

Field lab, office and storage: WiWSC has substantial interior and exterior field lab, office and storage requirements. On a nearby site (walking distance from the WiWSC building) there is a second facility that has 700 nsf wet lab with adjoining 1325 nsf of office space. There is also a high-bay interior storage facility with loading dock access, a vehicle maintenance area and a shop. Nearby there is an outdoor staging area for numerous vehicles, boats and portable kits as well as a shed building with an interior mezzanine. This entire area may be lost when the lease renewal comes up in the near future. Ideally this lab, office and field staging/storage capability can be retained in the vicinity of the main WiWSC facility.

WiWSC required lab areas: The total lab area required by the WiWSC program is currently estimated to be approximately 6,822 GSF including the following labs: Mercury Lab, Mercury Lab Prep Area, Mercury Instru-

ment Room, Mercury Sample Receiving and Water Quality Lab/Sample Prep

CIDA (Center for Integrated Data Analysis) has grown to about 40 people and their office space requirements are addressed in this master plan update. CIDA also has significant data, IT and AV requirements associated with their operations. In addition there is office space for the Wisconsin Internet Mapping Group that also has dedicated IT/AV requirements.

Access to natural light: The labs and office spaces would benefit from access to natural light. None of the procedures in the labs require complete darkness or light-tight conditions.

USGS DM Totals by Site / WONUM

Site:	Site Name			
NWHC	NATIONAL WILDLIFE HEALTH CENTER			
Location:	**1STFLRMECHRM**	**MAIN BUILDING - BASEMENT/ 1ST FLOOR - MECHANICAL RM**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438558	INSULATE STEAM LINES IN MAIN BUILDING	WAPPR	DMCR	$15,000
			Sub Total By Location	**$15,000**
			Work Order Count 1	
Location:	**2NDFLOOROTHER**	**MAIN BUILDING - 2ND FLOOR - OTHERS**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438510	MAIN BUILDING DUMBWAITER ROOM REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$6,750
			Sub Total By Location	**$6,750**
			Work Order Count 1	
Location:	**CORR 181**	**MAIN BUILDING - CORRIDOR 181**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428068	MAIN BUILDING CORRIDOR M181 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLCORING	WAPPR	DMCR	$4,625
2438507	MAIN BUILDING LAB CORRIDOR 181 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$6,750
			Sub Total By Location	**$11,375**
			Work Order Count 2	
Location:	**CORR 183**	**MAIN BUILDING - CORRIDOR 183**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428075	MAIN BUILDING RM M184 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$4,625
2428073	MAIN BUILDING CORRIDOR M183 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLCORING	WAPPR	DMCR	$4,625
2438508	MAIN BUILDING LAB CORRIDOR 183 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$6,750
			Sub Total By Location	**$16,000**
			Work Order Count 3	
Location:	**CORR 186**	**MAIN BUILDING - CORRIDOR 186**		

Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428074	MAIN BUILDING CORRIDOR M186 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLCORING	WAPPR	DMCR	$4,625
2438509	MAIN BUILDING LAB CORRIDOR 185 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$6,750
			Sub Total By Location	**$11,375**
			Work Order Count	2

Location: FUELTANK1 NWHC - FUEL TANK #1

Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438553	REPLACE UNDERGRCUND FUEL STORAGE TANK FOR MAIN BUILDING	WAPPR	DMCR	$50,000
			Sub Total By Location	**$50,000**
			Work Order Count	1

Location: FUELTANK2 NWHC - FUEL TANK #2

Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438554	REPLACE UNDERGROUND FUEL STORAGE TANK FOR TIGHT ISOLATION BUILDING	WAPPR	DMCR	$50,000
			Sub Total By Location	**$50,000**
			Work Order Count	1

Location: MAIN NWHC - MAIN BUILDING

Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
1924964	Replace Irefficient Chiller in Main Building with Energy Efficient Chiller	BMSAPPR	DMFP	$658,400
2438557	REPLACE STEAM BOILER IN MAIN BUILDING	BMSAPPR	DMFP	$324,000
2036695	Help move furniture for floor cleaning	INPRG		$0
1957022	Parking Lot Pavement & Service Road Overlays & Island Rehab	WAPPR	DMFP	$142,200
1957018	Rehab Main Building for ADA	WAPPR	DMFP	$199,800
1930363	Pave Gravel Service Road	WAPPR	DMFP	$87,500
1928497	Replace Main Building Cooling Tower	WAPPR	DMFP	$238,600
			Sub Total By Location	**$1,650,500**
			Work Order Count	10

Location: RESEARCHBLD NWHC - TIGHT ISOLATION

Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438551	RENOVATE ANIMAL SUPPORT AREA AND REPLACE EQUIPMENT IN THE CAGE WASH ROOM	BMSAPPR	DMFP	$477,000
2438513	REPAIR LAB CEILINGS IN BOTH BUILDINGS WITH FIBER REINFORCED PLASTIC PANELS	BMSAPPR	DMFP	$612,000
1930364	Replace Inefficient Chillers in Tight Isolation Building	BMSAPPR	DMFP	$1,260,000
2436807	REPLACE FLOORING IN LABORATORY AREAS	BMSAPPR	DMFP	$477,000

2438012	TIB LAB 4 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$15,120
			Sub Total By Location	**$25,480**
			Work Order Count **2**	

Location:	**RESEARCHLABCHEM**	**RESEARCH BLD - LABORATORIES - CHEMISTRY**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438013	TIB CHEMISTRY LAB REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$17,550
2428058	TIB CHEMISTRY LAB REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$12,025
			Sub Total By Location	**$29,575**
			Work Order Count **2**	

Location:	**RESEARCHRMA-04**	**RESEARCH BLD - CAGE WASH RM A-04**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438548	REPLACE CAGE WASHER	WAPPR	DMCR	$125,000
2438550	REPLACE GLASSWARE WASHER	WAPPR	DMCR	$48,000
			Sub Total By Location	**$173,000**
			Work Order Count **2**	

Location:	**RM 142**	**MAIN BUILDING - VIROLOGY RM 142**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428060	MAIN BUILDING LAB M142 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$18,500
2438505	MAIN BUILDING VIROLOGY LAB REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$27,000
			Sub Total By Location	**$45,500**
			Work Order Count **2**	

Location:	**RM 144**	**MAIN BUILDING - HISTOLOGY RM 144**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428061	MAIN BUILDING LAB M144 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$8,795
2438504	MAIN BUILDING MOLECULAR LAB REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$12,875
			Sub Total By Location	**$21,670**
			Work Order Count **2**	

Location:	**RM 149**	**MAIN BUILDING - MICRO RM 149**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428062	MAIN BUILDING LAB M149 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$13,875

2428049	REPLACE WASTE WATER TREATMENT SYSTEM FOR THE TIGHT ISOLATION BUILDING	BMSAPPR	DMFP	$1,440,000
2438555	REPLACE UNDERGROUND FUEL STORAGE TANK FOR TIGHT ISOLATION BUILDING	WAPPR	DMFP	$0
1957025	REHABILITATE TIB LOCKER ROOMS	WAPPR	DMFP	$224.000
			Sub Total By Location	**$4,490,000**
			Work Order Count **8**	

Location: RESEARCHCOR51 — **RESEARCH BLD - CORRIDOR 51**

Work Orcer #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428059	TIB LAB CORRIDOR 51 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLCORING	WAPPR	DMCR	$14,800
			Sub Total By Location	**$14,800**
			Work Order Count **1**	

Location: RESEARCHLAB1 — **RESEARCH BLD - LABORATORIES - LAB 1**

Work Orcer #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438010	TIB LAB 1 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$15,120
			Sub Total By Location	**$15,120**
			Work Order Count **1**	

Location: RESEARCHLAB2 — **RESEARCH BLD - LABORATORIES - LAB 2**

Work Orcer #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438007	TIB LAB 2 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$15,120
2428055	TIB LAB 2 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$10,360
			Sub Total By Location	**$25,480**
			Work Order Count **2**	

Location: RESEARCHLAB3 — **RESEARCH BLD - LABORATORIES - LAB 3**

Work Orcer #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428056	TIB LAB 3 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$10,360
2438011	TIB LAB 3 REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$15,120
			Sub Total By Location	**$25,480**
			Work Order Count **2**	

Location: RESEARCHLAB4 — **RESEARCH BLD - LABORATORIES - LAB 4**

Work Orcer #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428057	TIB LAB 4 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$10,360

2438503	MAIN BUILDING MICROBIOLOGY LAB REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$20,250
			Sub Total By Location	**$34,125**
			Work Order Court **2**	

Location:	**RM 152**	**MAIN BUILDING - PARISITOLOGY RM 152**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438014	MAIN BUILDING PARASITOLOGY LAB REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$15,120
2428064	MAIN BUILDING LAB M152 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$10,360
			Sub Total By Location	**$25,480**
			Work Order Court **2**	

Location:	**RM 16**	**MAIN BUILDING - NECROPSY RM 16**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438511	MAIN BUILDING NECROPSY SUITE REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$45,305
2428067	MAIN BUILDING LAB M16 REMOVE OLD AND DAMAGED EPOXY FLOORING REPLACE WITH NEW POURED EPOXY FLOORING	WAPPR	DMCR	$45,305
			Sub Total By Location	**$90,610**
			Work Order Court **2**	

Location:	**RM 188**	**MAIN BUILDING - INCUBATOR RM 188**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2428065	MAIN BUILDING LAB M188 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$3,700
2438506	MAIN BUILDING INCUBATOR ROOM REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$3,700
			Sub Total By Location	**$7,400**
			Work Order Court **2**	

Location:	**RM 20**	**MAIN BUILDING - WET LAB RM 20**		
Work Order #	Description	Status	Sub Work Type	Deficiency Cost Estimate
2438512	MAIN BUILDING NECROPSY WET LAB REPAIR LAB CEILING WITH FIBER REINFORCED PLASTIC PANELS	WAPPR	DMCR	$6,750
2428066	MAIN BUILDING LAB M20 REMOVE SHEET VINYL FLOOR REPLACE WITH POURED EPOXY FLOORING	WAPPR	DMCR	$4,500
			Sub Total By Location	**$11,250**
			Work Order Court **2**	
			Sub Total By Site	**$6,845,970**

Table 3: Deferred Maintenance Schedule (NWHC, 2015)

Risk Assessment

The 2011 Master Plan recommended that the NWHC prepare a thorough Risk Assessment of the current facilities on the campus. At the onset of the 2015 update, the CTA team requested the NWHC leadership follow this recommendation and prepare this risk assessment in order for the CTA team to have a complete understanding of the biological agents being used at the facility as well as the biosafety levels that were needed for the lab and animal spaces. The outcomes of the risk assessment are included in summary here. The full risk assessment can be found in Appendix C.

Based on the risk assessment, the program requirements for the space list was updated and organized by biosafety category (Biosafety Levels 2, 3, 3-Enhanced and 3-Agriculture). Furthermore, specific requirements, some of which are optional per the current edition of the Biosafety in Microbiological and Biomedical Laboratories (BMBL), are recommended as follows:

Biosafety Level 2 (BSL2) facilities shall employ an optional but recommended feature outlined in the current edition of the Biosafety in Microbiological and Biomedical Laboratories (BMBL). While there is no specific requirement for a ducted air ventilation system, the planning team recommends that all new BSL2 labs shall be provided with directional airflow using a ducted mechanical air distribution system. Lab air shall flow in an inward direction without recirculation to spaces outside the laboratory. While windows

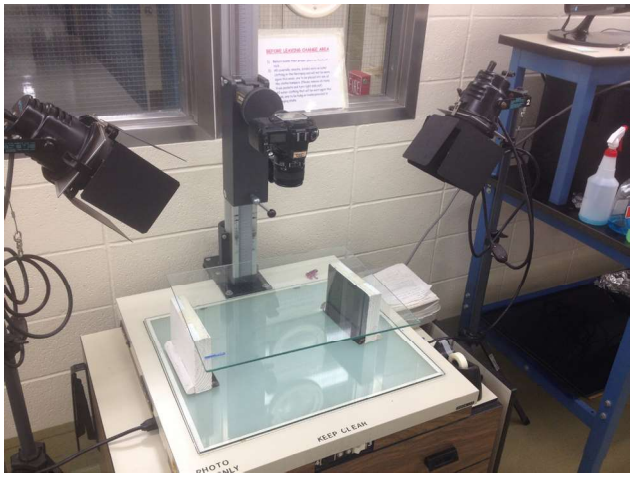

Figure 10: Photo Equipment; NWHC; (CTA, 2015)

fitted with screens that open to the exterior are permitted, the planning team recommends that all windows are fixed shut. A method of decontaminating all wastes shall be available. Exact numbers and locations of required decontamination and sterilization autoclaves shall be determined during detailed programming.

Animal Biosafety Level 2 (ABSL2) space shall comply with the ventilation requirements of the Guide for Care and Use of Animals and with the requirements of the BMBL current edition. A ducted ventilation air system for exhaust air is required and is also recommended for supply air to achieve proper air differential controls as well as to facilitate temperature and humidity monitoring and control throughout the facility. Airflow shall always be inward relative to hallways and inward relative to spaces outside the facility. Discharge air shall not be recirculated back to any parts of the facility.

Biosafety Level 3 (BSL3) space shall comply with the baseline requirements as listed in the BMBL current edition. Similar to BSL2, the Level 3 facilities shall be designed with a ducted mechanical system such that directional airflow can be maintained by drawing air from "clean" areas towards potentially contaminated areas in such a way as to prevent reversal of airflow under a failure condition. All exhaust air must be dispersed away from the building and none of it can be re-circulated to any other area in the building. All windows shall be sealed. As in BSL2, a method of decontaminating all wastes shall be available. Based on user requirements there will be additional pass-thru autoclaves required for the facility depending on how the final workflow is developed during detailed programming (i.e. the number of individual BSL3 suites).

Animal Biosafety Level 3 (ABSL3) space shall comply with the ventilation requirements of the Guide for Care and Use of Animals and with the requirements of the BMBL current edition. A ducted ventilation air system for exhaust air is required and is also recommended for supply air to achieve proper air differential controls as well as to manage temperature and hu-

midity throughout the facility. Airflow shall always be inward relative to hallways and inward relative to spaces outside the facility. The mechanical system shall be designed to prevent reversal of airflow under a failure condition. Discharge air shall not be recirculated back to any parts of the facility.

FIgure 11: NWHC Necropsy Lab (CTA, 2013)

Biosafety Level 3 with Enhancements (BSL3-E) and Animal Biosafety Level 3 (ABSL3-E) is particularly important for handling specific agents identified in the risk assessment. The team recommends the following enhancements: anteroom with dress-in, dress-out, shower out sequence, space for decontaminating large equipment and for the storage of clean equipment, gas tight isolation dampers or other technologies for facilitating laboratory isolation and decontamination, HEPA filtration of lab supply and exhaust air with sufficient space for HEPA filter replacement such as bag-in/bag-out with appropriate decontamination procedures, lab effluent decontamination with sufficient capacity or redundancy to prevent backup or overflow, and advanced access control devices such as biometrics (this will be state of the art by the time the building is constructed). See also Additional Enhancements for Agricultural Agent Permitting in the following section.

Biosafety Level 3 and Animal Biosafety Level 3 plus Additional Enhancements for Agricultural Agent Permitting is based on specific risk assess-

ments when high-risk organisms that are typically studied in large animals are permitted to be studied in small animals in BSL3-E or ABSL3-E when the research is done in primary containment devices. While pressure decay testing is not required for the rooms (since all work conducted with infectious materials is inside other primary containment devices and the room is a secondary containment barrier), it is required that all exhaust duct work prior to the HEPA exhaust filter. Additional enhancements are detailed in Appendix D of the BMBL 5th Edition.

Biosafety Level 3 Agriculture (BSL3-AG) and Animal Biosafety Level 3 Agriculture (ABSL3-AG) requires the facility to serve as the primary containment barrier in order to protect the worker but also has a great emphasis on protecting the environment from the escape of any hazardous agents. A complete listing of specifics can be found in both the BMBL 5th Edition and the current USDA ARS manual. It is important to note that BSL3-Ag/ABSL3-Ag facilities are designed with features ordinarily associated with BSL4 facilities as enhancements. Recommended characteristics include HEPA filtered supply and exhaust air with redundant supply and exhaust air fans, and a liquid effluent collection and decontamination system with double pipe and leak alarms. Tunnels or other access capabilities to inspect the plumbing/piping systems are required. In addition, as with BSL4 labs, a pressure decay test for duct work, doors with compressible gaskets, walls, floors and ceilings so that rooms can be certified as airtight is required. Also note that any Class III Biological Safety Cabinets shall have double filtered HEPA exhaust before discharge to the outside. Protection of the environment against accidental release of an agent is critically essential.

Long Term Modernization and Consolidation Master Plan

Consistent with USGS program, mission and facility requirements for NWHC and the other DOI agencies.

In the course of developing the update to the 2011 Master Plan multiple programming options for building and site configurations were considered with two options being fully developed for meeting the programmatic needs of the NWHC and the other DOI agencies moving to the site. The final two building and site options, along with pros and cons of each follow in this chapter. A breakdown of estimated project costs, along with anticipated schedules, has been developed for each of the options. Estimated project costs and construction sequencing schedules are included in the project cost and schedules section of this report.

The Site

The 24-acre USGS NWHC site is conveniently located on the west side of Madison in a residential and light commercial area. Good access is available to nearby state highway 12/14. The site is bordered by Hwy 12/14 to the north, baseball diamonds on Forward Drive to the west, Schroeder Road to the south, and three-story apartment buildings to the east.

Currently the site can only be accessed from Schroeder Road, where a gate limits access to daytime hours. However, an easement exists which would allow the installation of a second access drive from the west off of Forward Drive. The site can best be described as gently rolling, with a combination of woodlands and prairie. Five buildings are currently on the site, the Main Building (33,000 SF), the TIB (29,000 SF), a modular office building (1,900 SF), a maintenance garage (2,000 SF), and a small freezer building (200 SF). The buildings are located north of the center of the site and are well-screened by trees on the west, south, and east sides of the site. Trees and a berm partially hide the site from Hwy. 12/14 to the north. There are currently 98 parking stalls.

Adequate room is available on the site to accommodate the additional buildings and parking that the existing and new tenants will require if thoughtful construction sequencing is followed. In contrast to the 2011 plan, the site development concepts prepared as a part of this report utilize parts of the site where existing construction has taken place, in an attempt to minimize the amount of site development work required for the new construction.

Site Needs Analysis

With the exception of providing additional warehouse space very few changes to the site program were identified. The site development program continues to include:

- Provide parking for 275 cars
- Provide 20,000 SF of paved surface (ware yards) for exterior storage of vehicles, trailers and equipment.
- Provide handicap accessible parking and routes to the buildings
- Meet site security requirements of Department of Justice (DOJ) Level 3.
- Provide for safe and convenient car and truck circulation.
- Maintain visual screening of the site from neighboring properties.

- Maintain prairie and wetlands green space
- Provide a means of detaining storm water on the site
- Improve access to the site by adding an additional access road to the west
- Maintain site utilities to the existing buildings during any construction

Conceptual Site Design Recommendations

Based on the site program, the team prepared two conceptual design and phasing plans discussed in this chapter. The two options illustrated in figures 12 and 13. The planning team identified the following opportunities (pros) and constraints (cons) for these concepts.

Pros-

- Meets the current and long term space and programmatic needs of the NWHC, as well as those of the other agencies moving to the site.
- Compact design of labs would maximize opportunities for collaboration.
- Allows for full use of modern building technologies, resulting in maximum space and energy efficiencies.
- Construction phasing and schedule will be less disruptive for the current occupants.
- Best able to maximize the desired programmatic adjacencies since the design would not be limited by current building conditions.
- Would likely be the most aesthetically pleasing since the new design would be more cohesive.
- Parking could be divided into two or more smaller lots, which would be more aesthetically pleasing than a single large lot.
- A newer building would be more attractive in a second use scenario if USGS elected to sell the property.

Cons-

- Slightly more expensive than working with remodeling existing buildings. Though operating costs should be slightly lower.
- Does not allow for sustainability in terms of re-using the existing buildings.
- Cost of construction would be distributed over a relatively short time period.

Relocation Options

The planning team also considered the implications of relocating the entire NWHC campus to an alternative site. Several options were identified and would include:

- USGS to seek a third party developer to identify alternate property, purchase and build new facilities for NWHC and all Madison area DOI agencies. USGS would engage in a lease to own arrangement with the third party developer.
- USGS to partner with the National Park Service and locate new NWHC facilities on the 400 + acres of NPS property located south of Madison, WI.
- USGS to seek partnerships with institutions of higher education to share in resources for research and housing of NWHC research labs and offices. At the time of this report, it's this third option that seems the most viable. It is our understanding that USGS officials are currently in talks with both Colorado State University as well as University of Wisconsin to partner with the NWHC to build the needed facilities on either campus.

When one considers a complete relocation, additional costs are associated with each of these scenarios not accounted for in the initial cost estimates illustrated as a part of the construction scenario. Such additional costs would include:

- land costs
- additional infrastructure costs and
- lease costs

There are also advantages to the third party developer arrangement as well as the higher education partnership arrangement that require further study and investigation. These advantages include:

- Shortened construction time
- Smaller to no up front dollars spent on construction- (dependent on the negotiated agreement.)
- Becomes an annual operating budget item rather than a capital expenditure.
- In the case of a partnership with a institution of higher learning it becomes an opportunity to broaden both the university's and the NWHC's research capability.

Conceptual Building Design Recommendations

In the course of developing the update to the 2011 Master Plan, the planning team reviewed the preferred option from the 2011 Master Plan, validated the space needs of the NWHC and the proposed collocates. The result of this validation process reduced the overall square footage needed. As such, the planning team prepared two alternatives to the new office and lab building based on current standards and practices for research labs and office space. The conceptual floor plans are illustrated in figures 14 thru 18 in this chapter. Great care and consideration was given to the technical and functional needs of the new buildings with acute attention being paid to the integration of research practices, adjacencies between labs and office space and the overall design of the buildings mechanical systems. The two options were developed to meet the updated programmatic needs of the NWHC and the other agencies moving to the site. Preliminary floor plans with and without collocation are presented as a part of this chapter

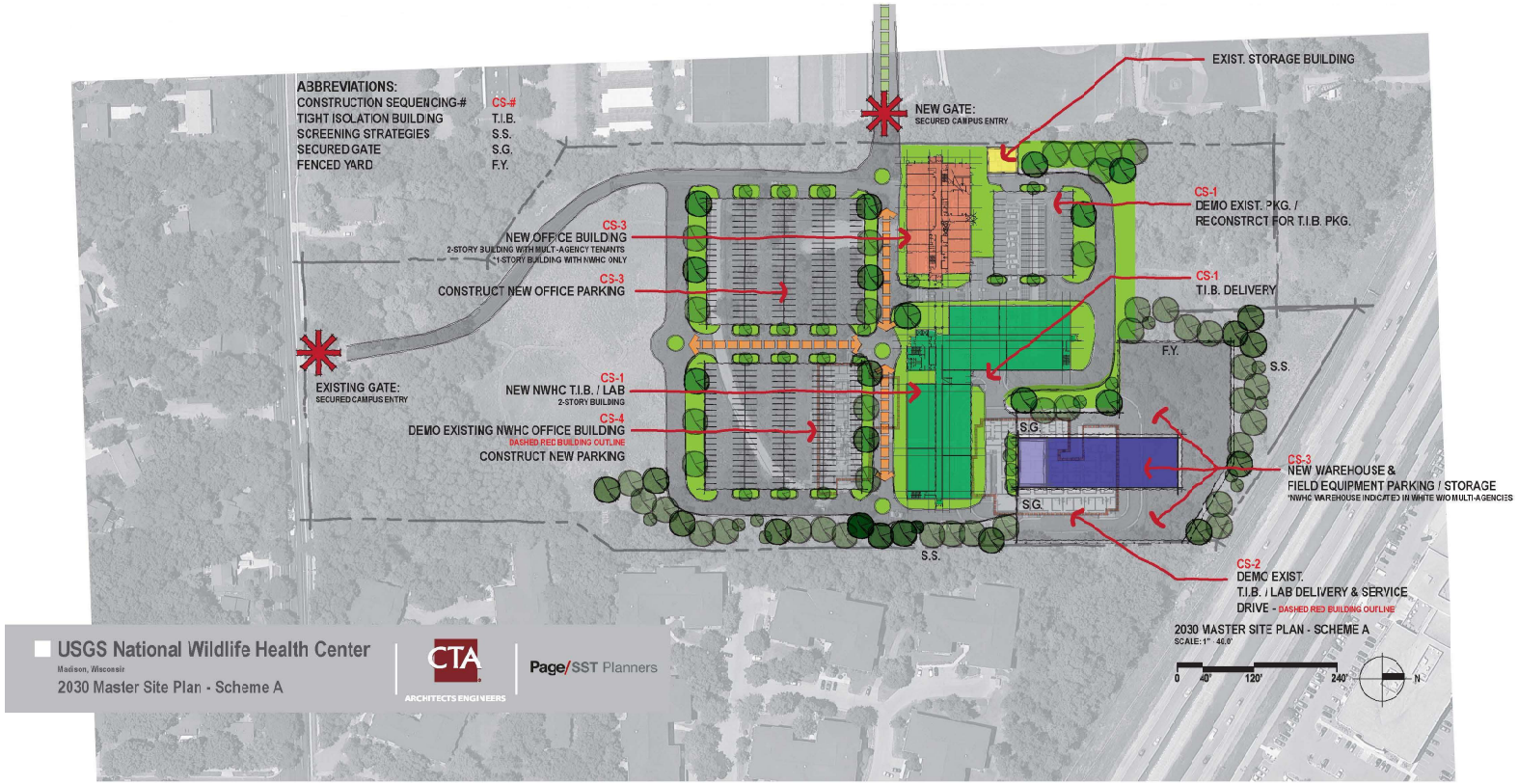

Figure 12: USGS National Wildlife Health Center 2030 Master Plan Scheme A, (CTA, 2015)

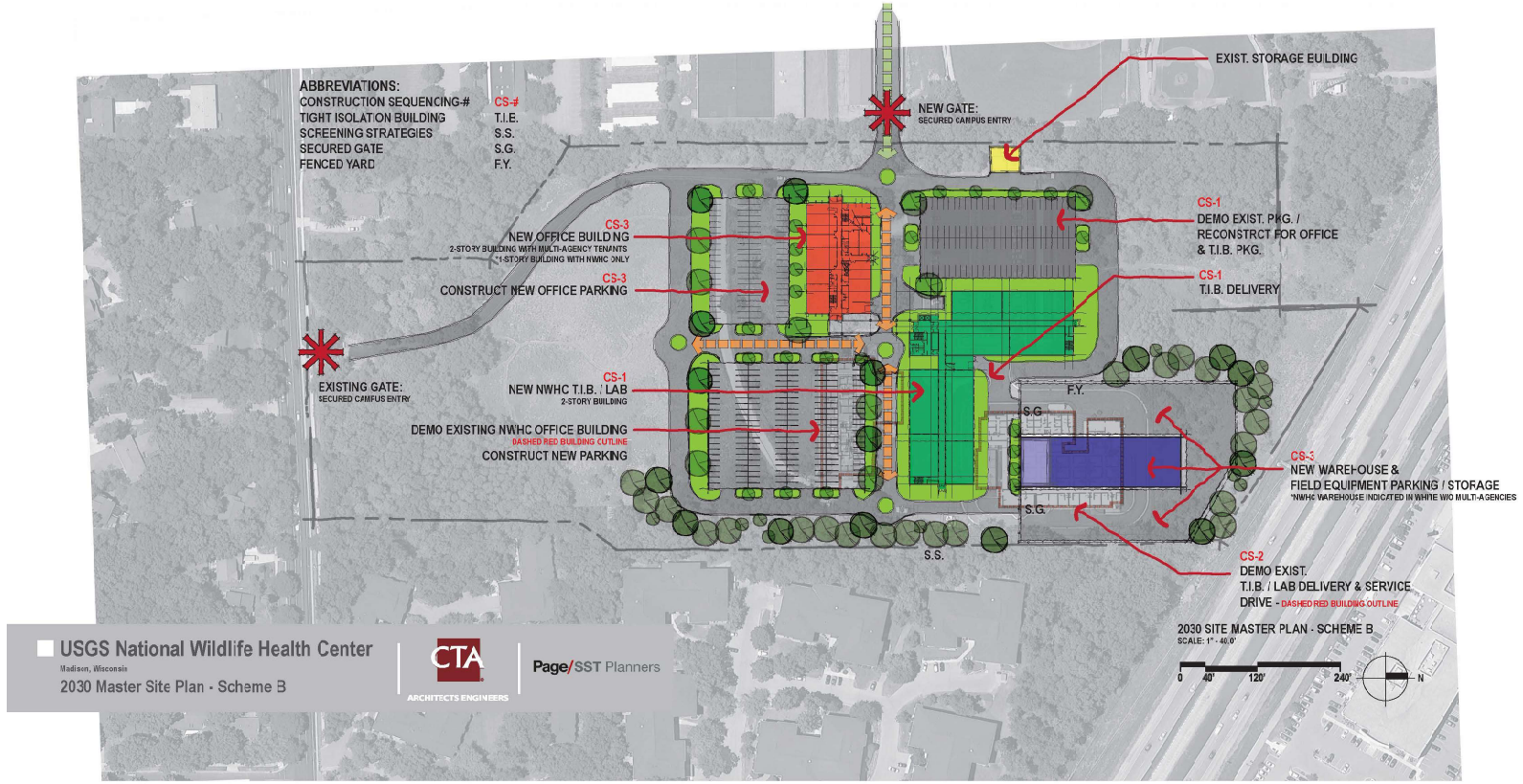

Figure 13: USGS National Wildlife Health Center 2030 Master Plan Scheme B, (CTA, 2015)

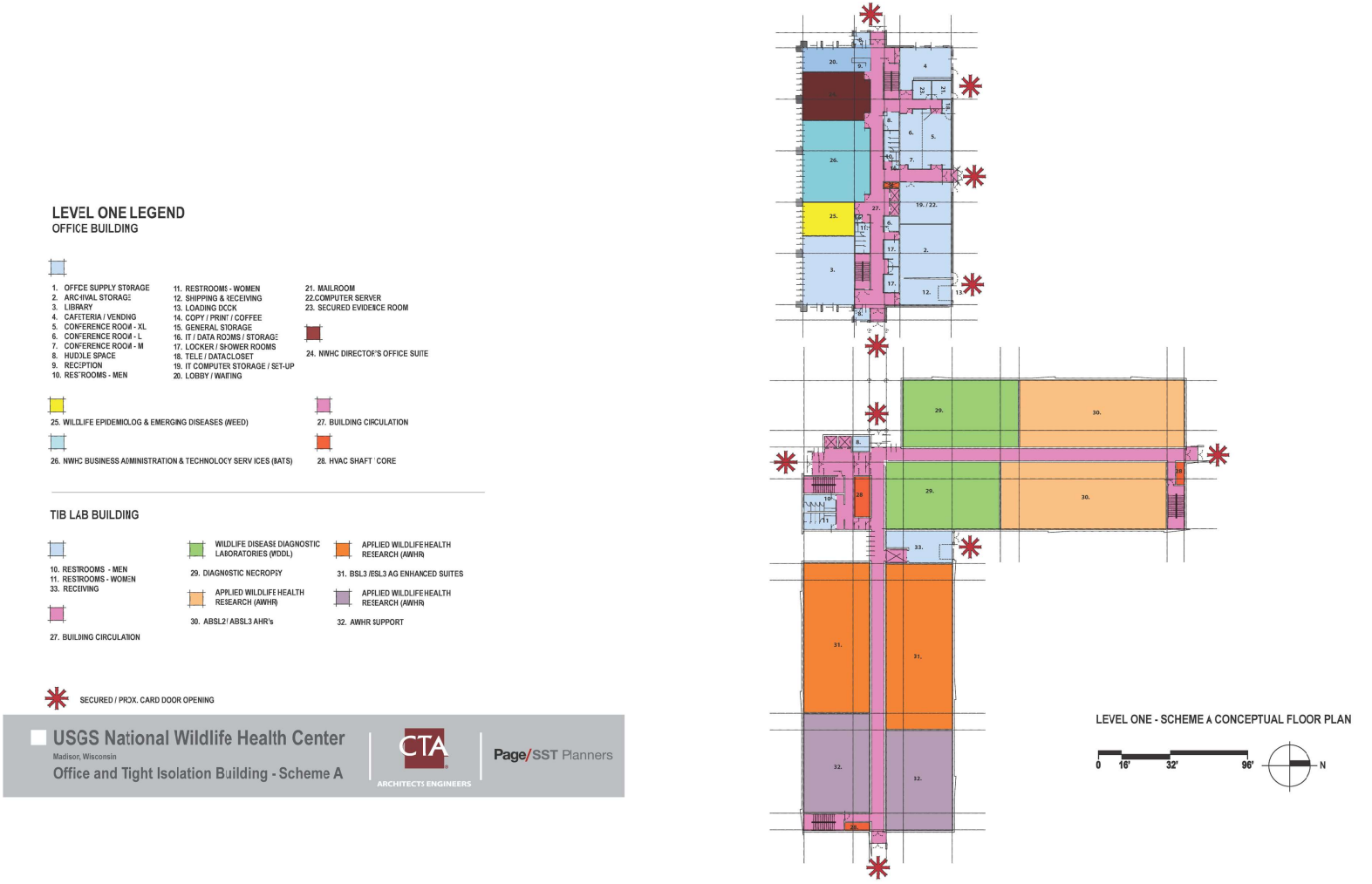

Figure 14: USGS National Wildlife Health Center Office / TIB Scheme A; (CTA, 2015)

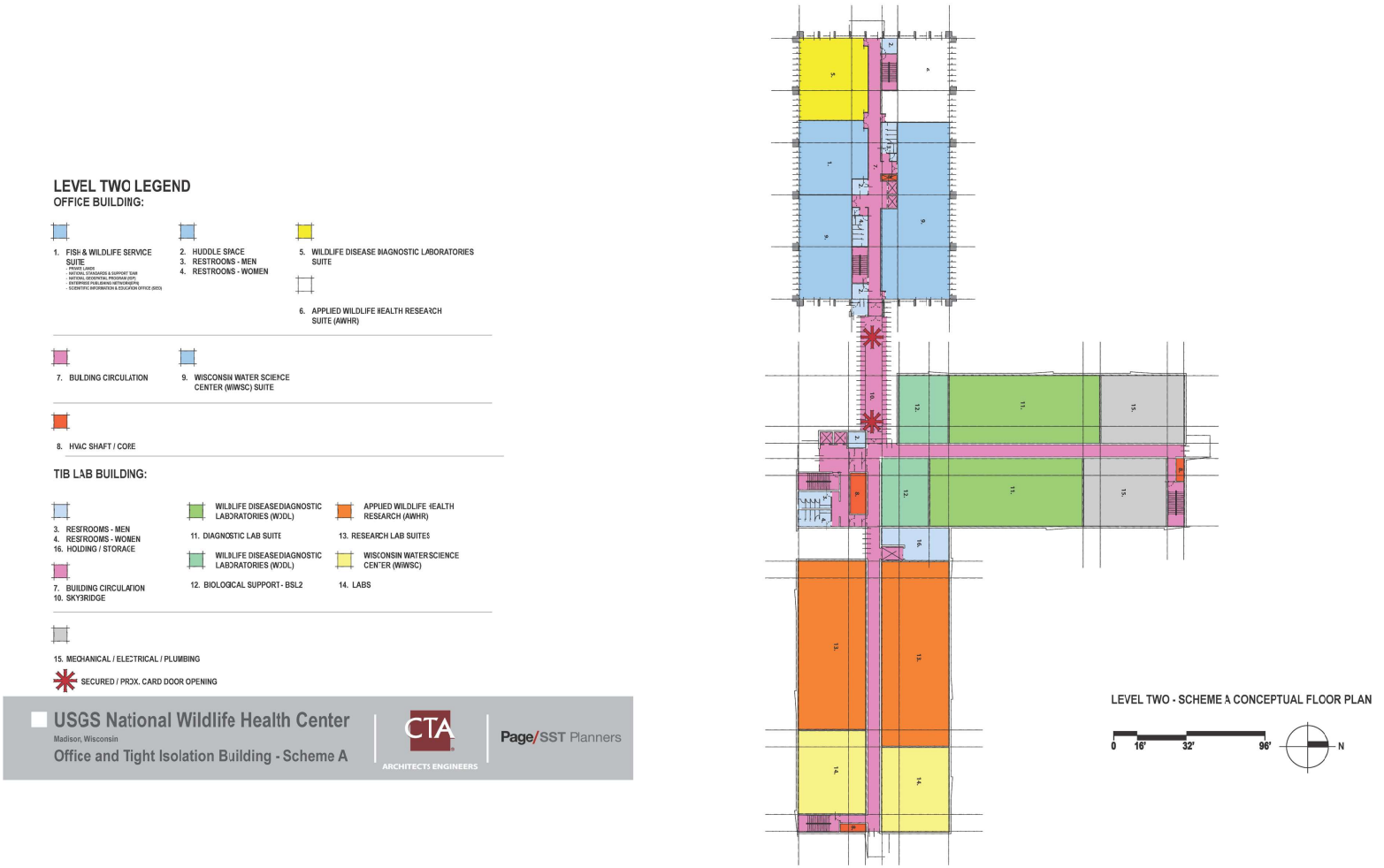

Figure 15: USGS National Wildlife Health Center Office / TIB Scheme A; (CTA, 2015)

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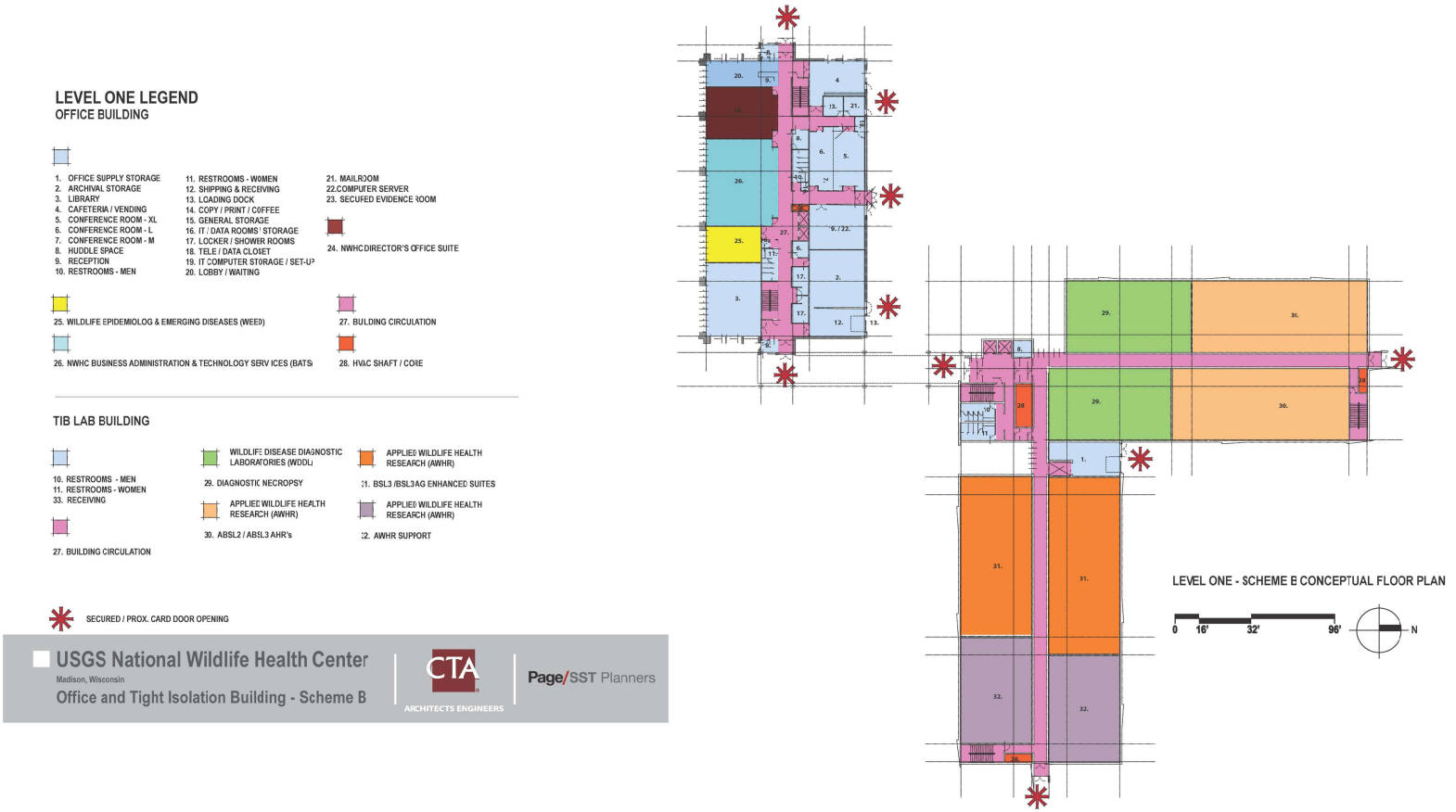

Figure 16: USGS National Wildlife Health Center Office / TIB Scheme B; (CTA, 2015)

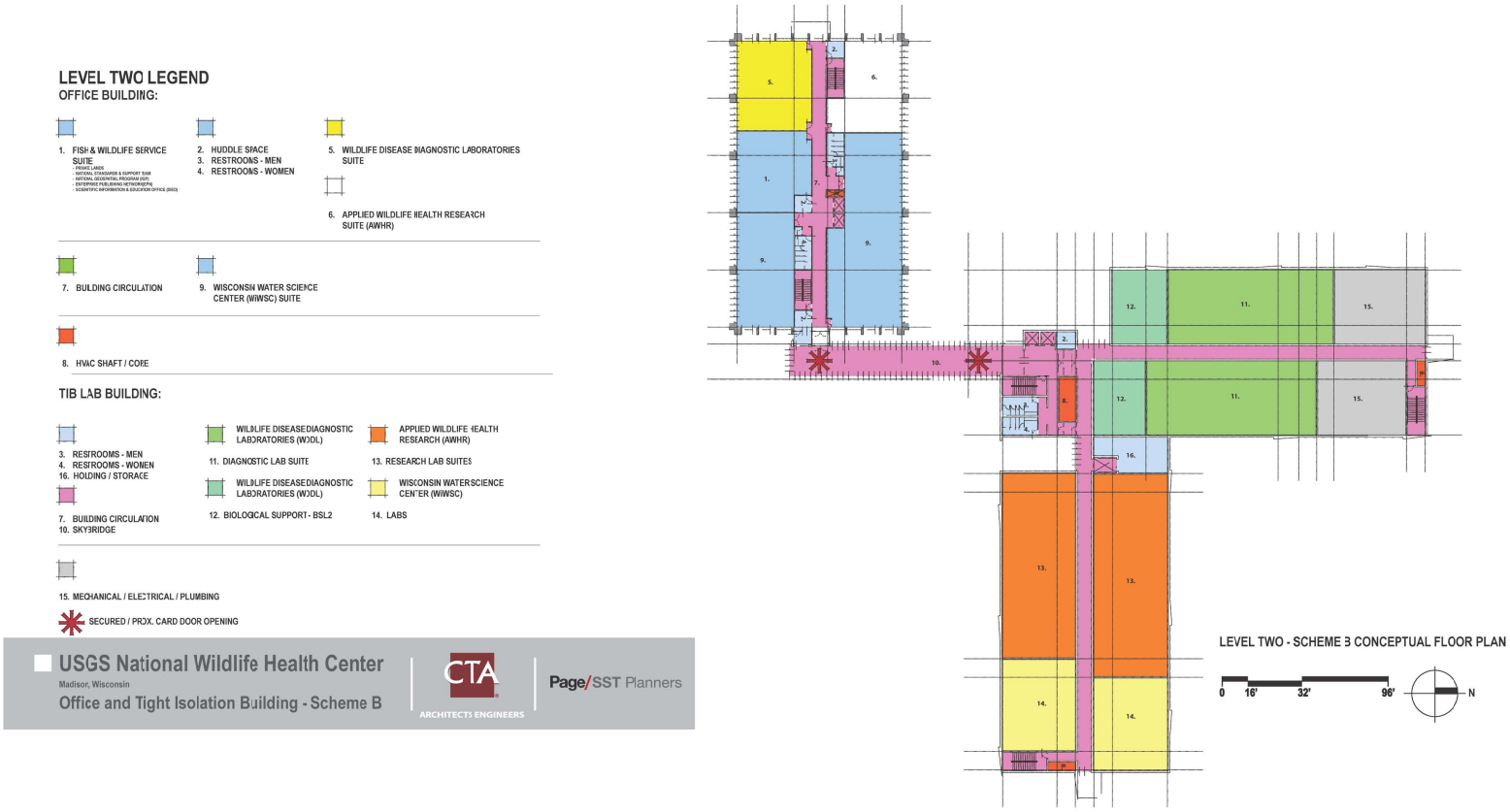

Figure 17: USGS National Wildlife Health Center Office / TIB Scheme B; (CTA, 2015)

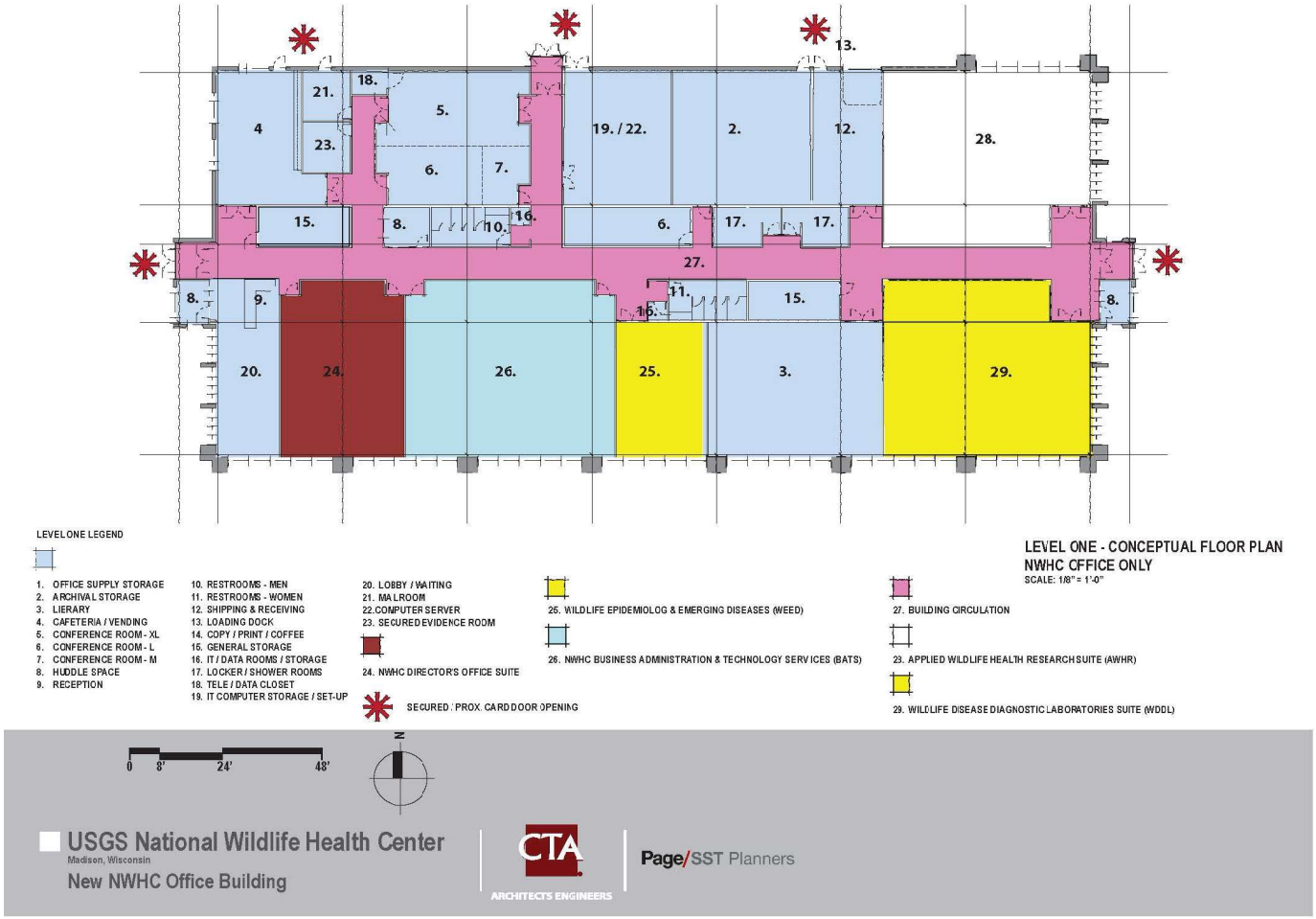

Figure 18: USGS National Wildlife Health Center Only Office Building; (CTA, 2015)

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