KDHE

NEW LABORATORY
EXECUTIVE SUMMARY
21 JANUARY 2020

THE CLARK ENERSEN PARTNERS | STATE OF KANSAS

The Clark Enersen Partners

BACKGROUND AND PURPOSE

BACKGROUND

The Office of Laboratory Services at the Department of Health and Environment has supported the health and welfare of Kansas citizens for over 110 years.

DESCRIPTION

The Office of Laboratory Services or Kansas Health and Environmental Laboratories is currently housed in the former hospital on Forbes Field south of Topeka which was built around 1956.

Divided throughout former patient and operating rooms, the current facility does not provide the Kansas Health and Environmental Laboratories with the ability to streamline operations and improve efficiencies. Furthermore, the age of the facility continues to increase operational and repair costs to the state. This report is the outcome of programming services and assessment conducted to determine the need, best location and estimate of probable construction costs for a new facility.

RELEVANCE

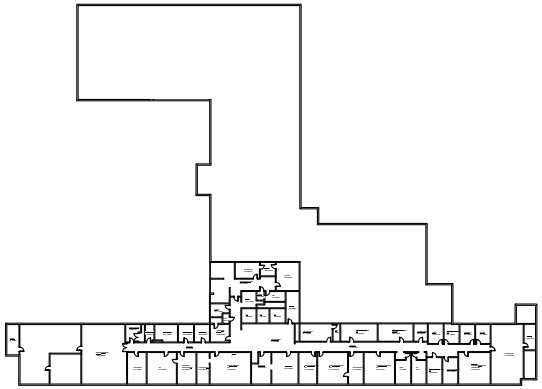
The Kansas Health and Environmental Laboratories serve the state of Kansas by conducting chemical and biological analysis of clinical specimines and environmental samples, as well as certifications and laboratory improvement surveys for regulated health, environmental, and law enforcement laboratories.

The nature of the services provided by the Office of Laboratory Services affect almost every household in Kansas by conducting tests ranging from drinking water quality to newborn screening to identifying and responding to various infectious outbreaks to ensuring that private laboratory testing is conducted to national standards.

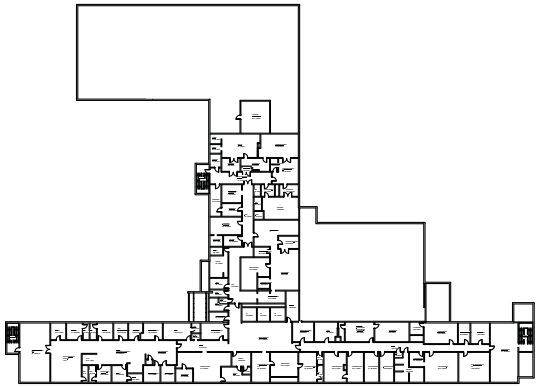
CURRENT FACILITIES

The current KDHE facility is a re-purposed hospital from the 1950s. It's not properly insulated, especially regarding windows and the exterior skin. The building itself is spatially inefficient; there are many pockets of unusable space throughout. The maintenance costs of the current KDHE facility are extensive, and the net to gross efficiency is below standard.

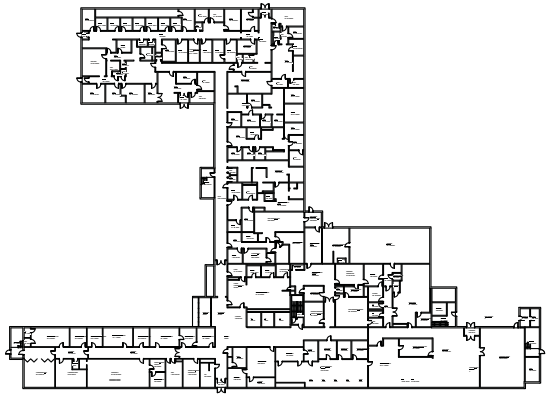
The Association of Public Health Laboratories has developed a facilities assessment report outlining the issues with the current KDHE Laboratory facilities. This report has been made public and is available on the KDHE website.



3rd Floor Plan - Existing



2nd Floor Plan - Existing



1st Floor Plan - Existing

PROPOSED SITE LOCATIONS

There were three sites proposed by the State of Kansas for re-purposing into the new KDHE Laboratory. Each site was evaluated based on a number of factors including nearby amenities, ease of access, development costs, recruitment value and proximity to other agencies.

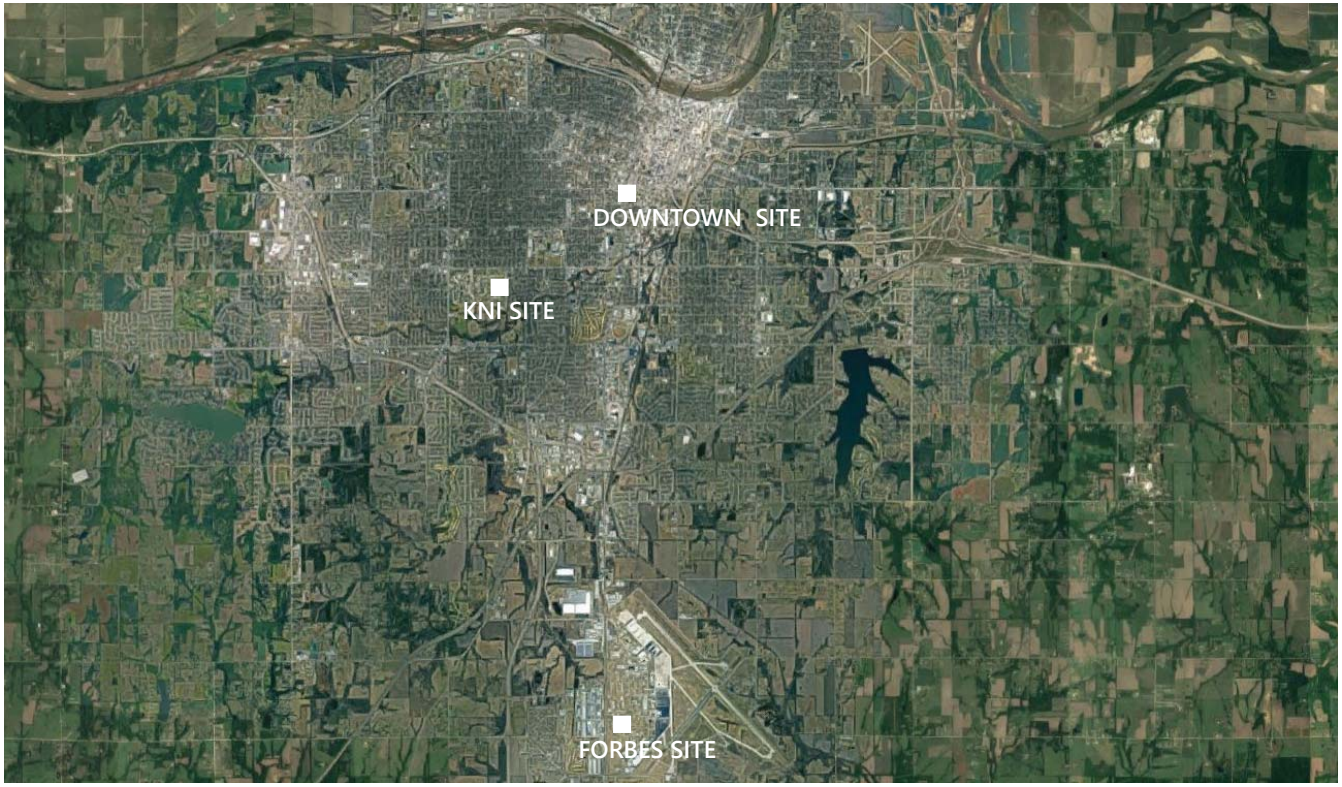
The three sites considered are:

Downtown - This site reutilizes an existing parking lot and transforms it into a public presence for the lab within footsteps of the Capitol Building.

KNI - This State owned greenfield site would provide easy access to Washburn University students who may intern at the facility.

Forbes Field - The site would be directly south of the current lab facility and tied into the existing mechanical plant.

The preference of the lab is to relocate to downtown. This opportunity works best for staff commuters, sample deliveries, proximity to other agency partners, and access to staff amenities. It was also believed that this location would provide the best opportunity for staff recruitment and retention.



DOWNTOWN SITE CONTEXT

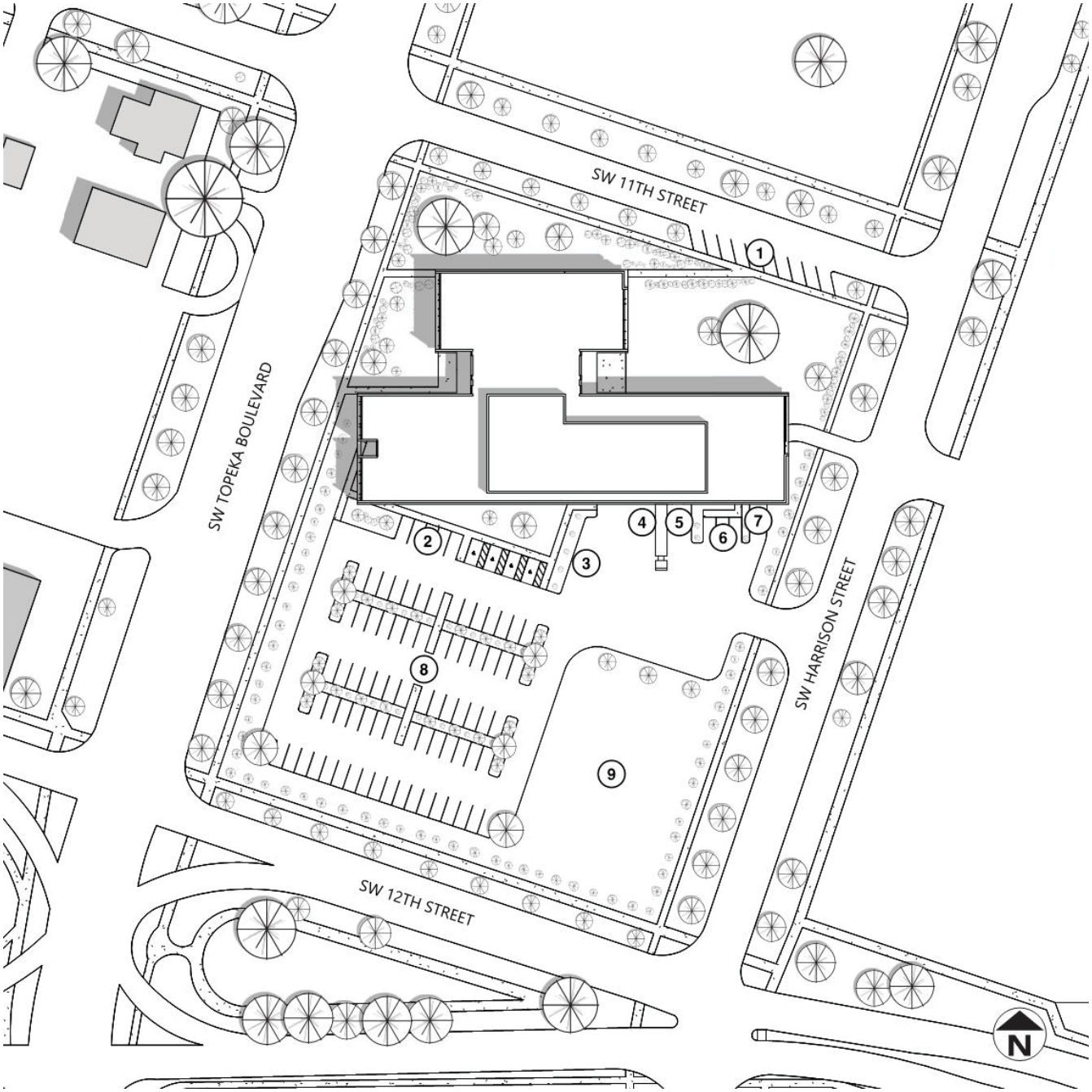
Many opportunities exist surrounding the development of the downtown site. The site plan represented on this page is indicative of that, and highlights future expansion capabilities adjacent to Lot Number 4 beyond the scope of this study. The development shown accommodates growth needs identified during the study and also takes into account enhancements of sustainable design strategies, pedestrian connections, department collaboration, service access and overall access to the building and amenities by both KDHE staff and visitors.

The building mass evolved into the final "I" study. This places offices in the small bar to the north and laboratories in the larger bar to the south. Tying the two bars together is an open zone for collaboration and vertical circulation through the building with bridges between the labs and offices.

Public access is to the north and employee access from the parking lot is to the south. A dedicated service area for shipping and receiving is also included.

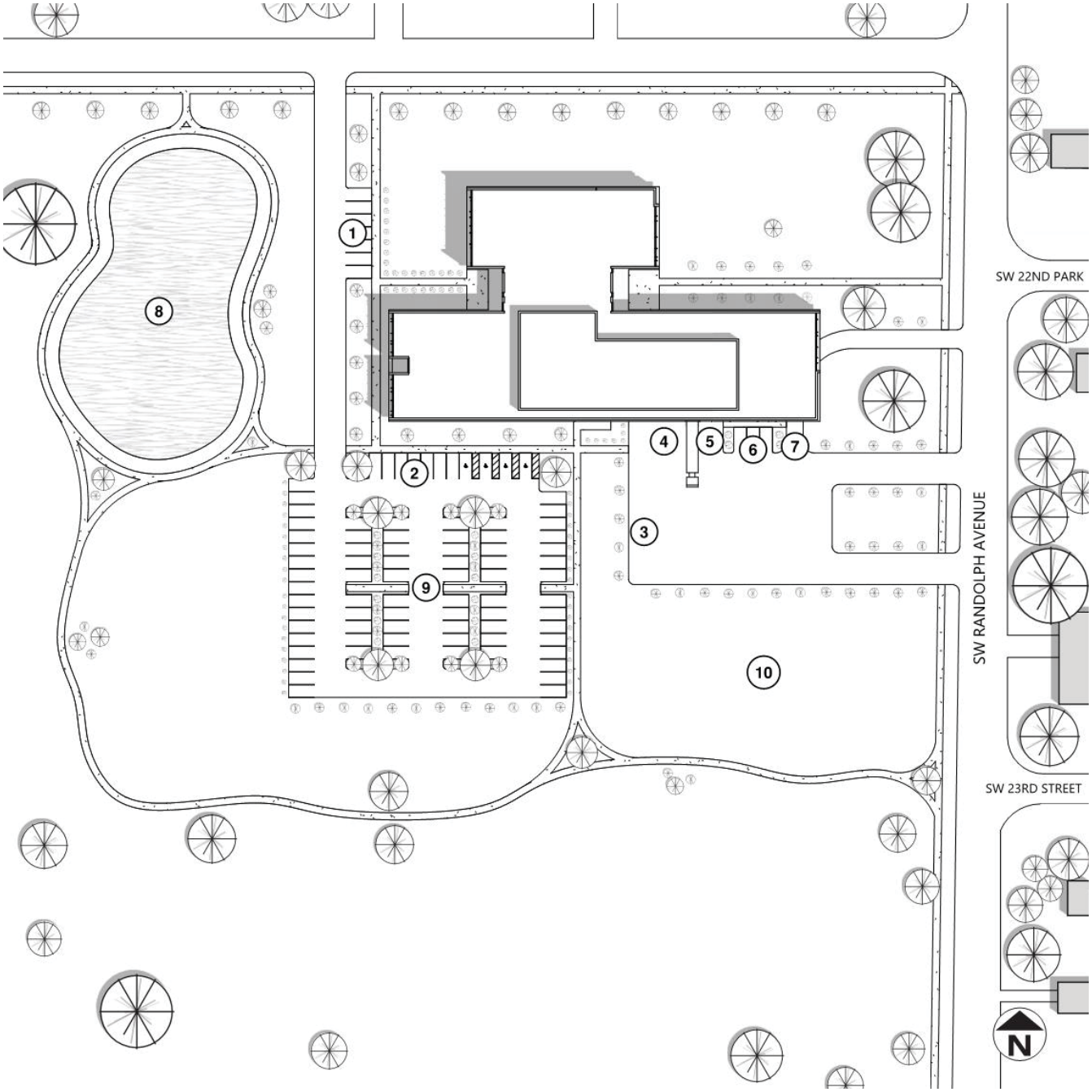
DOWNTOWN SITE PLAN

1. Public Parking
2. EV Parking
3. EPA Trailer Parking
4. Dock
5. Back-up Generator
6. Sample Drop-off Parking
7. Sample Drop-off Drive-up
8. Employee Parking
9. Bioswales



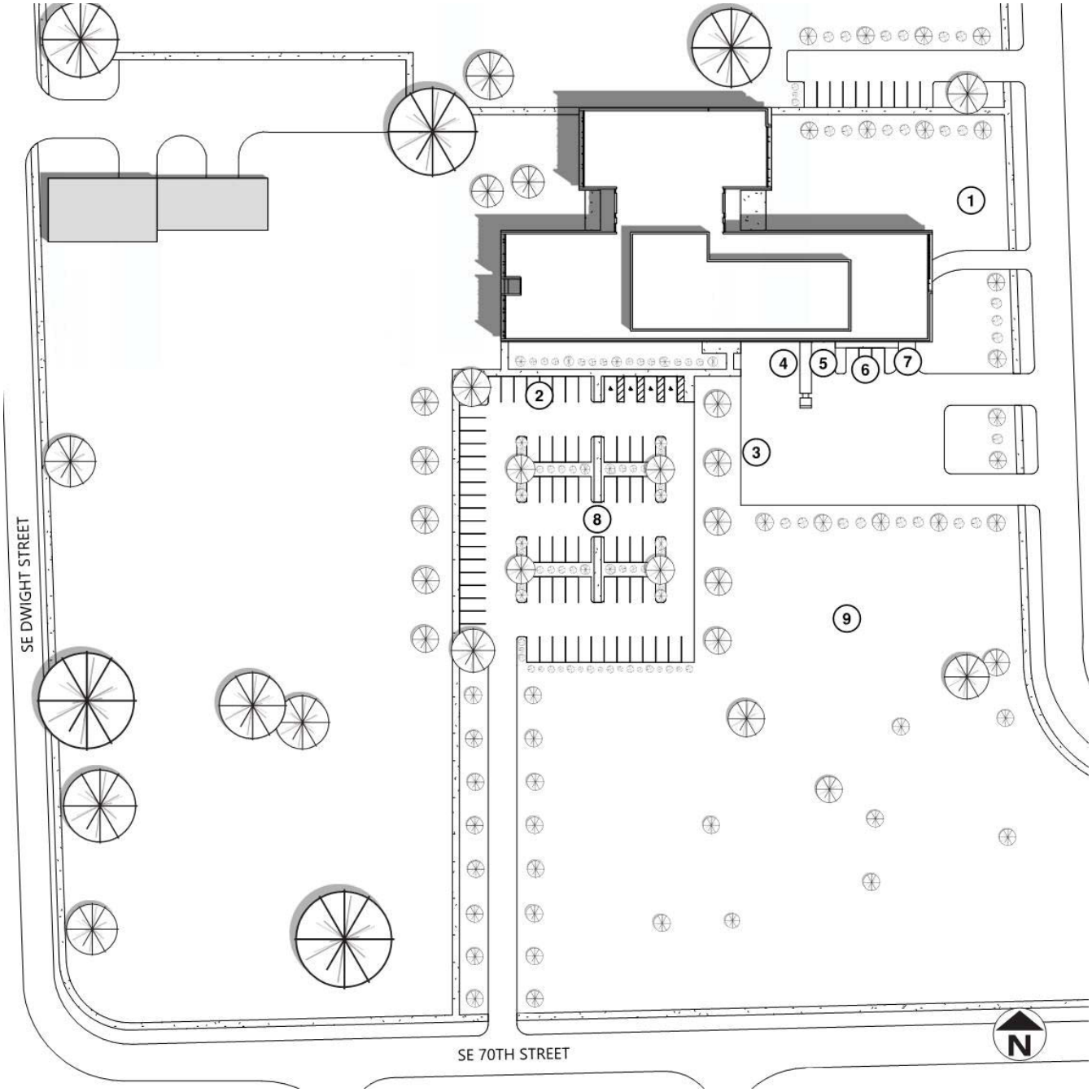
KNI SITE PLAN

1. Public Parking
2. EV Parking
3. EPA Trailer Parking
4. Dock
5. Back-up Generator
6. Sample Drop-off Parking
7. Sample Drop-off Drive-up
8. Pond
9. Employee Parking
10. Bioswales



FORBES SITE PLAN

1. Public Parking
2. EV Parking
3. EPA Trailer Parking
4. Dock
5. Back-up Generator
6. Sample Drop-off Parking
7. Sample Drop-off Drive-up
8. Employee Parking
9. Bioswales



FACILITY SPACE IMPROVEMENTS

DEPARTMENTAL NSF

In order to establish a baseline for current and future space needs for KDHE, multiple meetings were held with each department to determine what currently exists, what currently works, and what needs to improve. A first step in the process was comparing existing space utilization to current best practices.

The team spent the majority of three days observing activities within each of the lab groups. There was learning of how sample, personnel and waste flows were conducted throughout the day - time was spent looking for ways to optimize the basic function for each lab. Offices and non-lab spaces were right-sized based on current practice. The lab staff growth is projected to increase by approximately 20 over time, however with the efficiencies gained in the functional analysis of the lab, the overall NSF for the facility was reduced by 3,455 NSF and net to gross efficiency improved by over 7% for an overall new building of just over 100,000 GSF which is 20,414 GSF smaller.

Most of the efficiencies gained were due to the inefficient current layout of the lab which used to be a hospital. The lab sizes were based on existing hospital patient and ancillary spaces which are not based on a current modular approach to lab design.

Department	Current NSF	Future NSF
Receiving + Accessioning	12,531	8,730
Health Chemistry	3,808	3,267
Virology + Serology	3,985	2,178
Diagnostic Microbiology	5,703	4,464
Molecular Diagnostics	0	2,664
BSL-3	817	1,464
Organic Chemistry	6,041	5,445
Inorganic Chemistry	8,474	8,650
Offices + Shared Support	17,745	20,510
Building Support	5,369	3,645
Total	**64,473**	**61,018**

Current - 2019	Future	Difference
28,828 Lab NSF	28,133 Lab NSF	(695)
35,645 Non-Lab NSF	32,885 Non-Lab NSF	(2,760)
120,443 GSF	100,029 GSF	(20,414)
53.53% Net-to-Gross	61% Net-to-Gross	7.47%
69 Staff	85 Staff	16 Staff

ADJACENCY BUBBLE DIAGRAM

It was clear that the Health and Environment groups could remain separate with some crossover between EM, PCR, Chemical Terrorism and Health Chemistry. The layout developed utilizing this diagram as a foundational element with some minor revisions based on final input from the lab managers.

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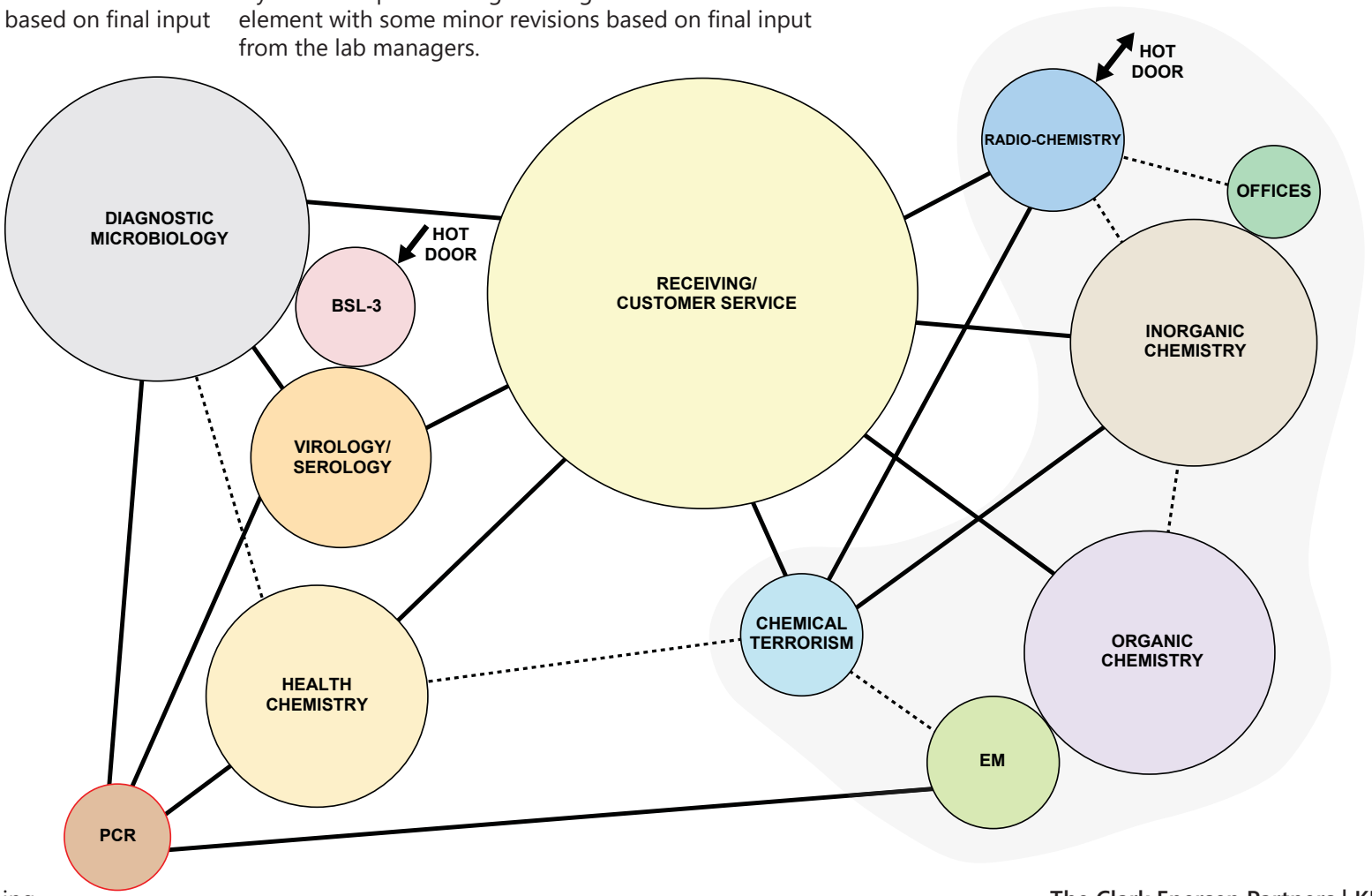
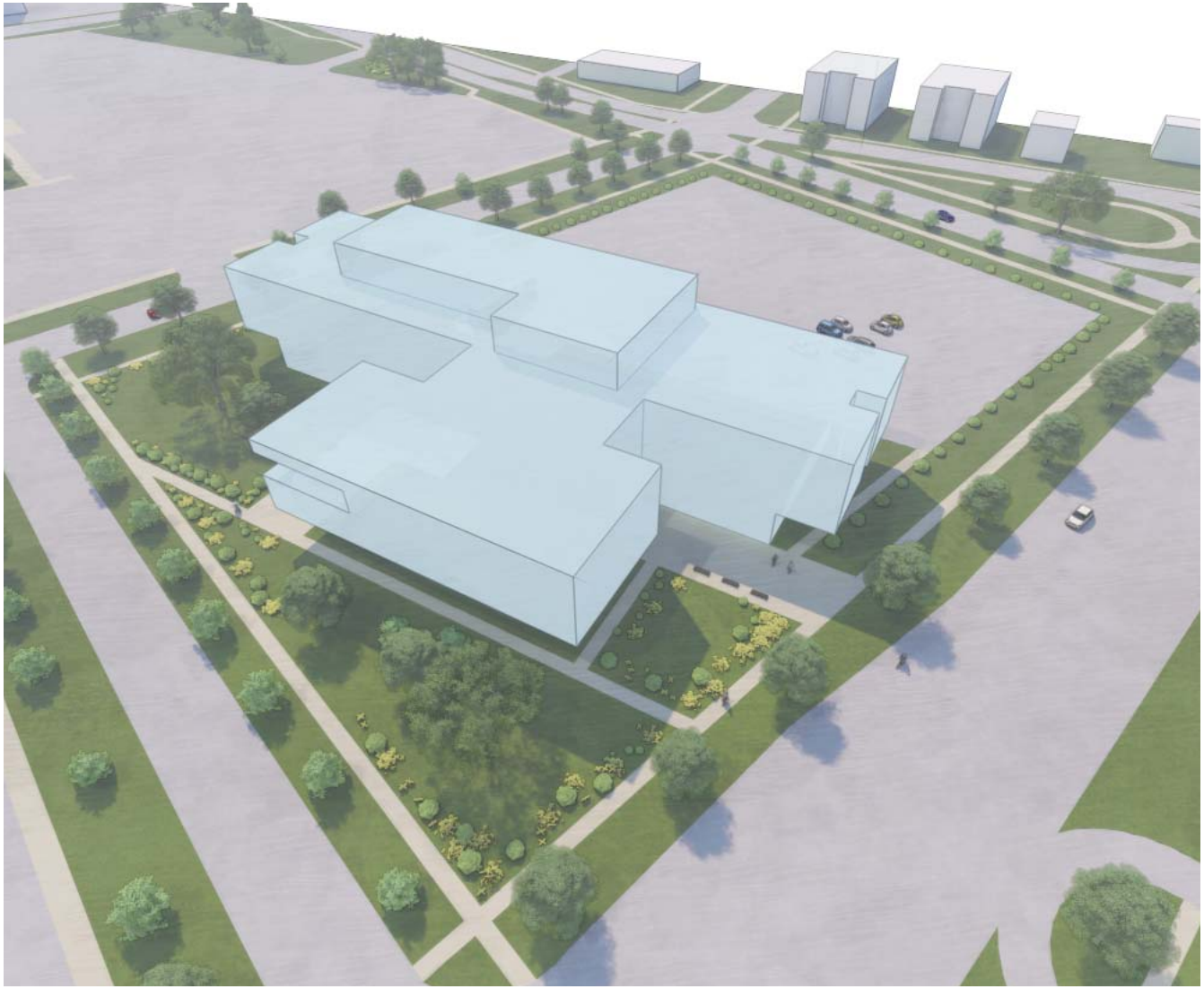


CONCEPT DESIGN

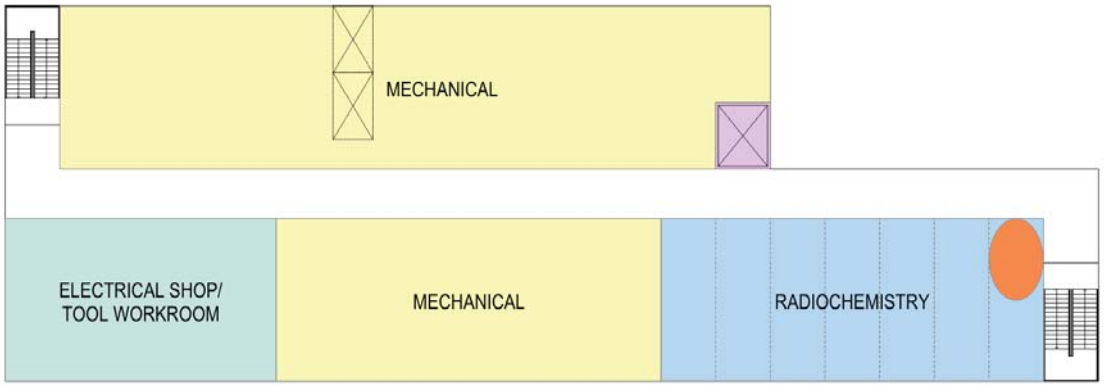
Multiple massing options for the new KDHE Laboratory were considered in order to meet the programmatic needs of flexible, efficient and modular laboratory design. The final massing study is shown and represents an "I" shaped double bar scheme with core vertical circulation and shared collaboration spaces making up the central connection element.

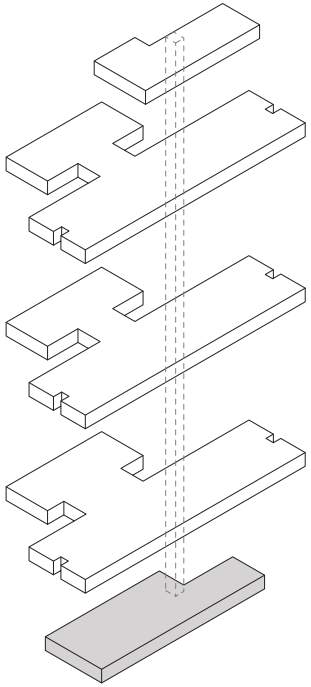
This simple form gave rise to many opportunities including modular planning for the lab space and north and south facing solar orientation, which can be controlled through proper fenestration. Dedicated lab floors act as security control, public spaces are on the first floor for access control and we are able to easily separate the mechanical and structural systems for the lab and non-lab spaces.

These massing studies also helped to identify service locations, daylighting opportunities, sustainable possibilities, site and landscaping, and connections to existing pathways.



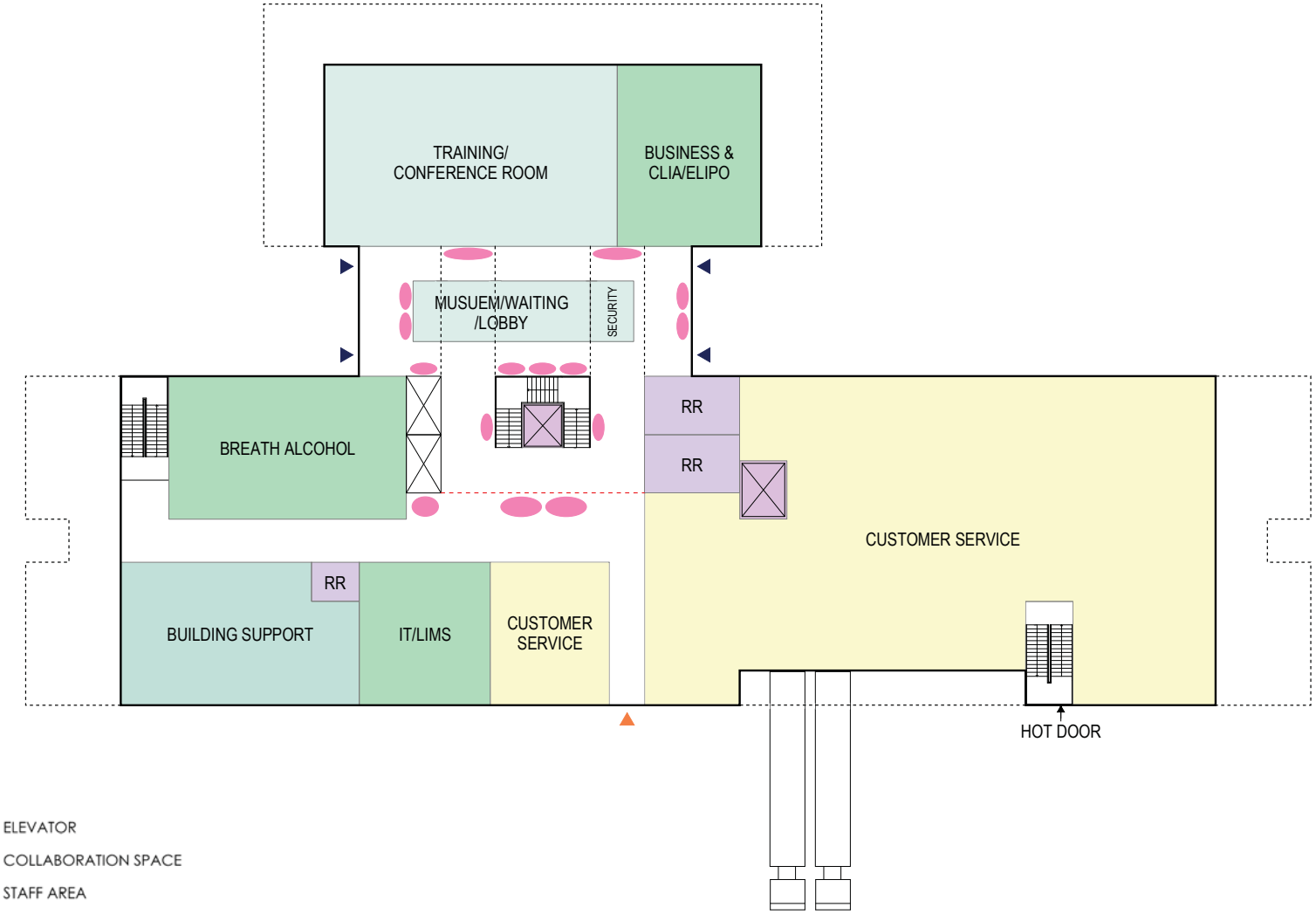
BASEMENT

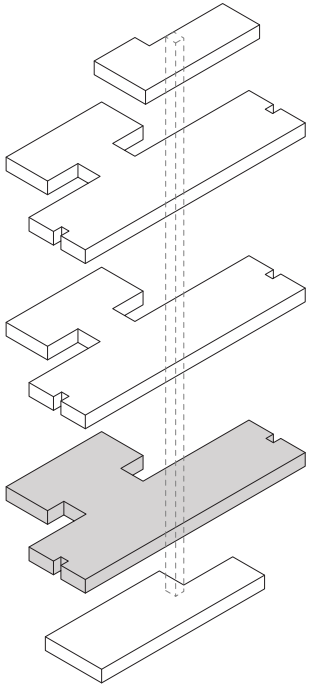




ELEVATOR
COLLABORATION SPACE
STAFF AREA
LINE OF SECURITY
PUBLIC ACCESS
EMPLOYEE ACCESS
DOCK

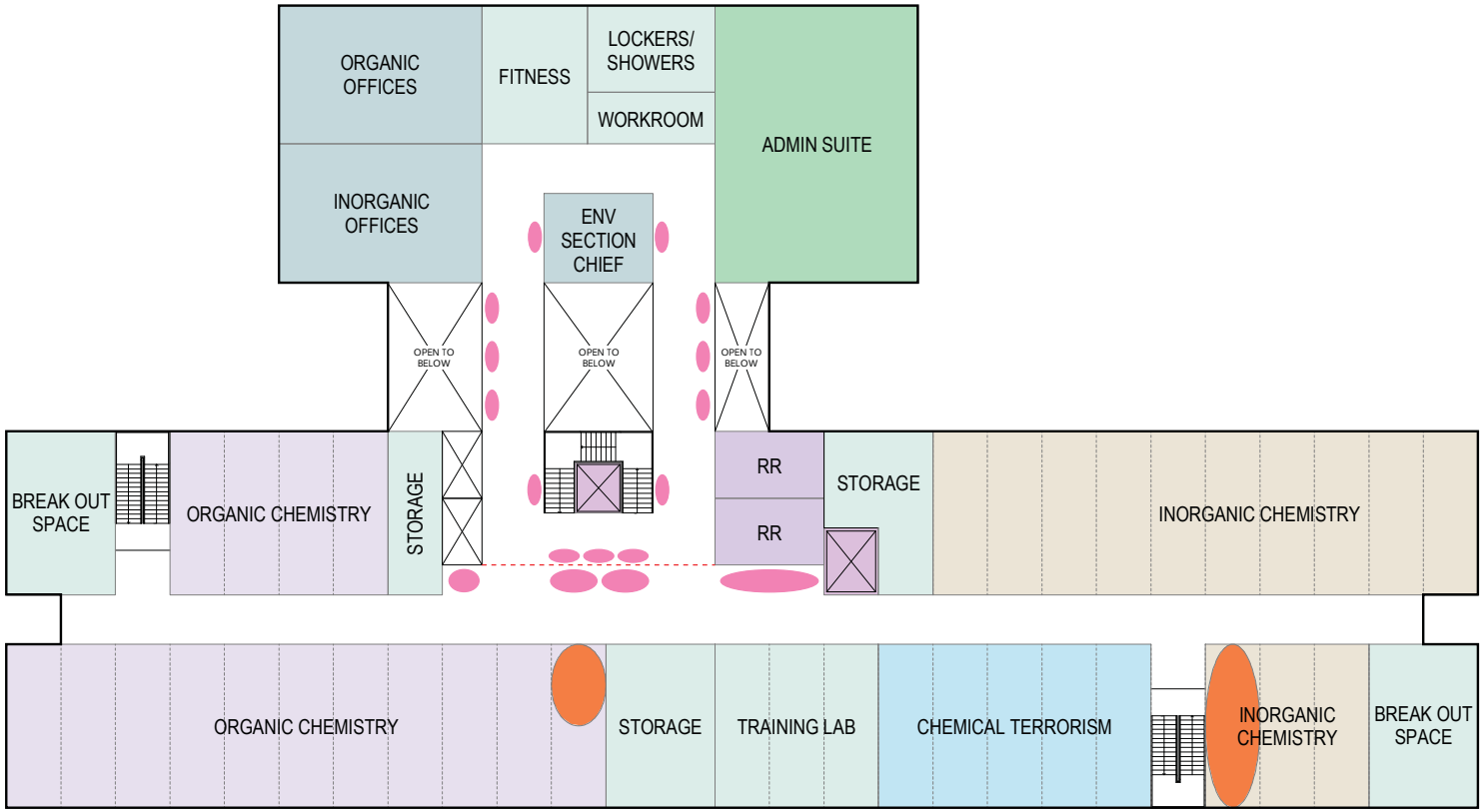
GROUND FLOOR

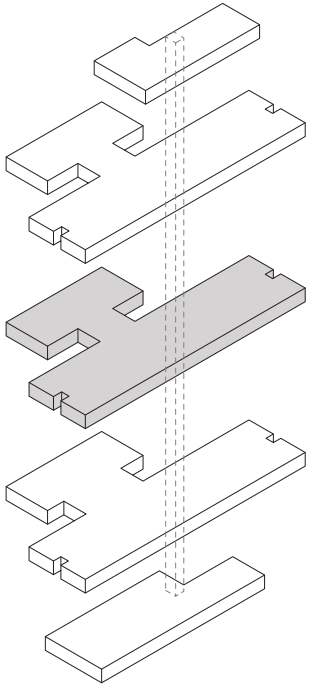




ELEVATOR
COLLABORATION SPACE
STAFF AREA
LINE OF SECURITY
PUBLIC ACCESS
EMPLOYEE ACCESS
DOCK

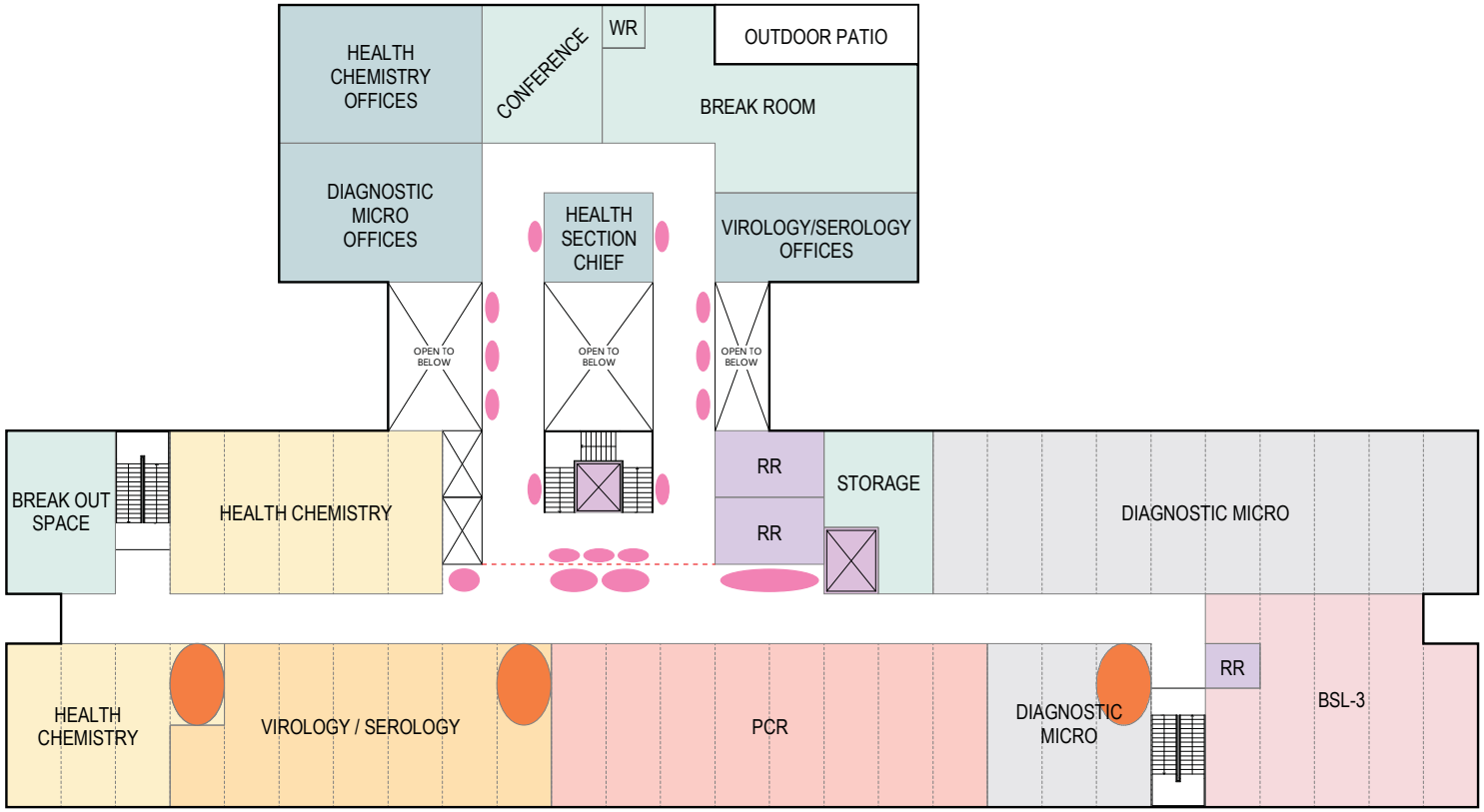
FLOOR 2

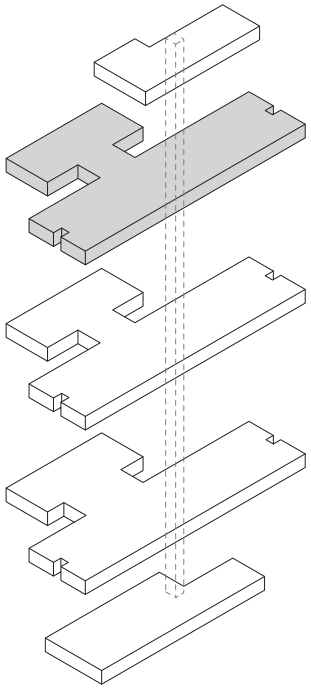




ELEVATOR
COLLABORATION SPACE
STAFF AREA
LINE OF SECURITY
PUBLIC ACCESS
EMPLOYEE ACCESS
DOCK

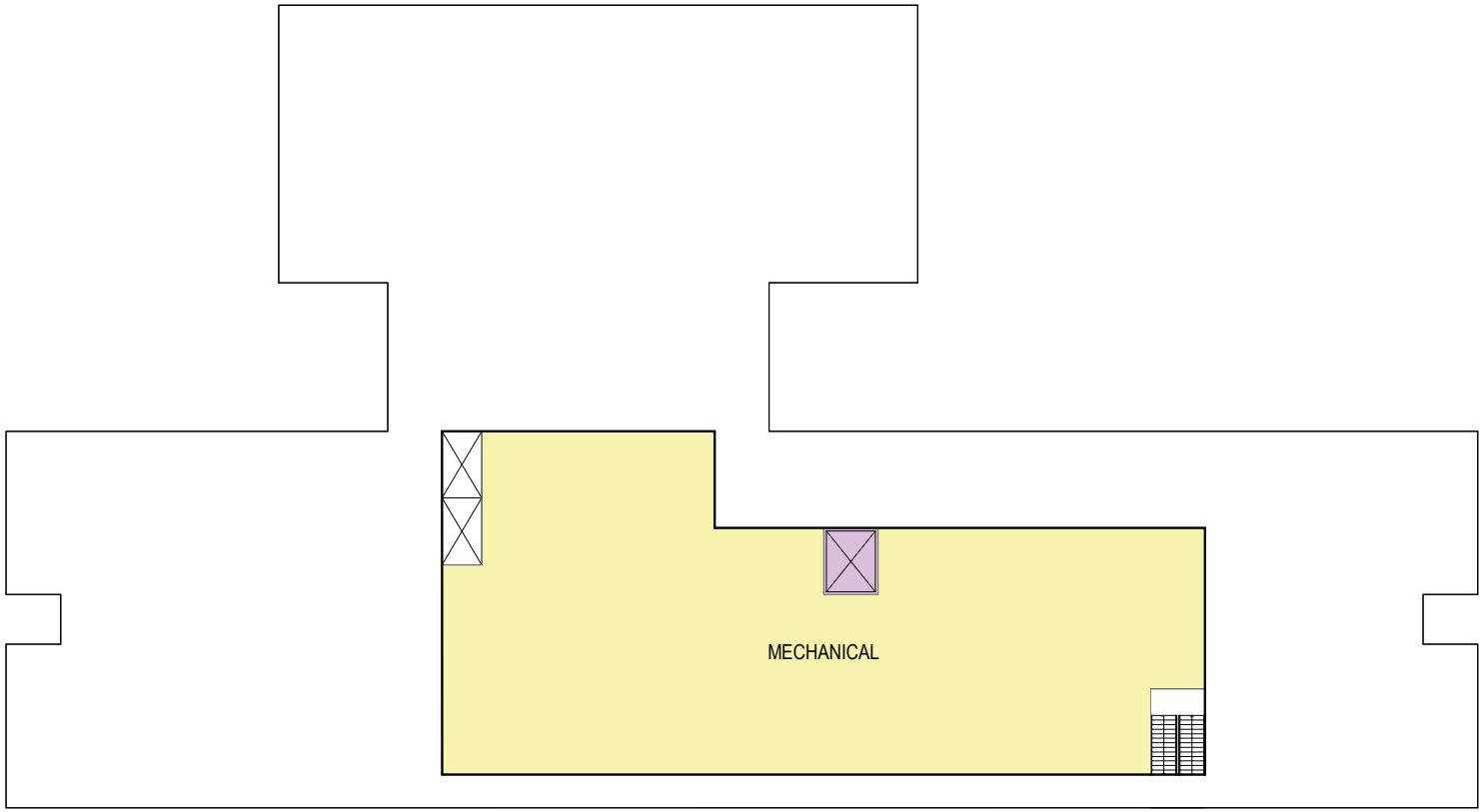
FLOOR 3

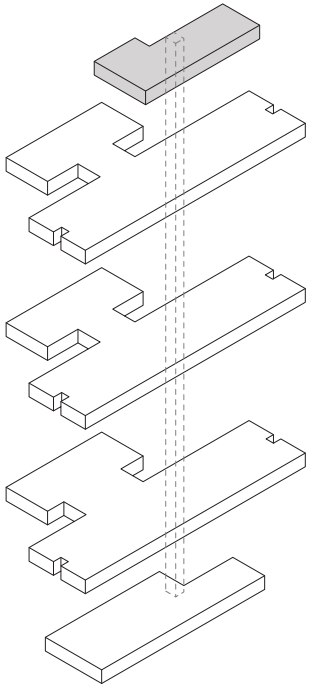




ELEVATOR
COLLABORATION SPACE
STAFF AREA
LINE OF SECURITY
PUBLIC ACCESS
EMPLOYEE ACCESS
DOCK

PENTHOUSE





ELEVATOR
COLLABORATION SPACE
STAFF AREA
LINE OF SECURITY
PUBLIC ACCESS
EMPLOYEE ACCESS
DOCK

CONCEPT IMAGERY

Views and spaces created throughout the course of concept design have been developed via digital rendering in order to visualize opportunities available in and around the project. A mix of entry sequences as well as interior and exterior amenities allow this project to fully engage the downtown area. Not only should this project provide much needed laboratory capabilities to the area, it should add to and improve upon the physical appearance of downtown Topeka.

COST MODEL

The cost model below is based on a test fit of the three sites with around 100,000 GSF of laboratory, office, shared space, building support and other miscellaneous spaces.

Site	NSF	GSF	$ / GSF	Construction Cost	Total Project Cost
DOWNTOWN SITE	61,018	100,029	$418	**$41,686,485**	**$56,276,755**
KNI SITE	61,018	100,029	$429	**$42,786,485**	**$57,761,755**
FORBES SITE	60,918	98,255	$425	**$41,592,510**	**$56,149,888**

Costs are based on anticipated project schedule

$125,000 per month escalation factor

ENERGY MODEL

This report, found in Appendix E, evaluated the current proposed design of the new KDHE facility using a total building energy modeling software package. Total building annual energy use and annual energy cost was evaluated and compared to the ASHRAE 90.1-2010 baseline according to Energy and Atmosphere – Prerequisite 2 (Minimum Energy Performance) and Credit 1 (Optimize Energy Performance) of the LEED Reference Guide for Green Building Design and Construction – Version 4.

The building's area includes laboratories, classrooms, offices, and support spaces totaling approximately 110,000 square feet. The schematic design drawings and discussions with the project team served as the basis of this modeling effort. Energy conservation measures (ECMs) have been tested in the energy model and optimized building performance solutions have been suggested based on this testing.

Based on the optimization analysis, a Proposed Case model has been developed that includes the following high performing, yet reasonably attainable, design characteristics:

- Exterior wall construction assembly: U-0.042 (R-25)
- Roof construction assembly: U-0.025 (R-40)
- 40% window-to-wall ratio, no shading
- Fenestration assembly: U-0.30,SHGC-0.40
- Lighting power density = 0.8 W/sf with continuous dimming daylighting controls
- Mechanical: Chilled water cooling system, condensing boiler, designed outdoor air quantities and airflows included in model
- Utility rates based on utility data provided by project team

With these characteristics, the Proposed Case building has an energy cost savings potential of 11.1 % compared the Baseline Case building.

Baseline Case:
Annual Estimated Energy Cost: $256,053
Site Energy Use Intensity (EUI): 123 kBTU/ft2/yr

Proposed Design:
Annual Estimated Energy Cost: $227,740
Site Energy Use Intensity (EUI): 104 kBTU/ft2/yr
% Energy Cost Savings: 11.1%
Potential LEED EAc1 Points: 3 points

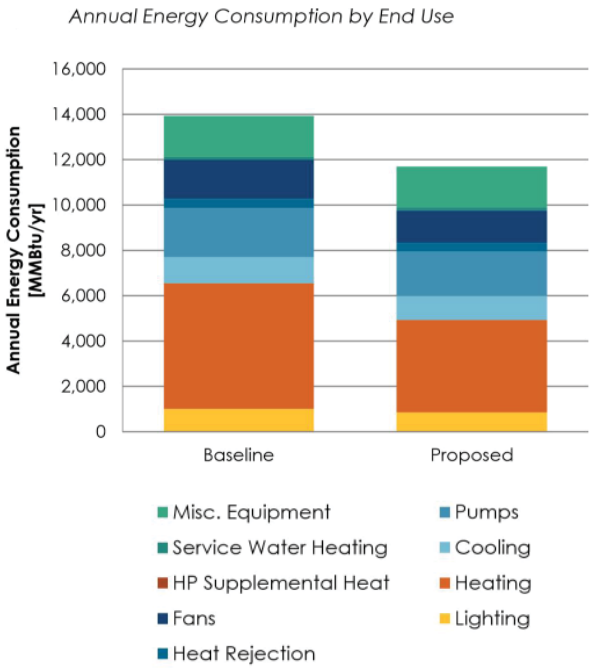
For reference, an energy model scenario using the optimal solution has been run. This model includes the following design characteristics:

- Exterior wall construction assembly: U-0.037 (R-27)
- Roof construction assembly: U-0.020 (R-50)
- 30% wall-to-wall ratio, 3' shading
- Fenestration: Assembly U-0.30, SHGC 0.40
- Lighting power density = 0.7 W/sf with continuous dimming daylighting controls

Optimal Solution Design:
Annual Estimated Energy Cost: $217,916
Site Energy Use Intensity (EUI): 99.7 kBTU/ft2/yr
% Energy Cost Savings: 14.9%
Potential LEED EAc1 Points: 5 points

Note that the energy cost savings between the Proposed Case model and Optimal Solution is about $10,000/year. Additionally, for reference and comparison, the existing building has the following performance characteristics:

Total Measured Energy Cost: $272,127
Site Energy Use Intensity (EUI): 215 kBTU/ft2/yr



While the total energy cost does not significantly change between the existing and Proposed Case building, the building's EUI (actual energy use) meaningfully reduces with the new design. This is because the heating energy use is significantly reduced in the Proposed design; however, because the current natural gas rate is fairly low, the building's utility cost total is not showing as drastic of a change.

SUSTAINABLE DESIGN

The opportunities to build a new dedicated facility for the KDHE affords the project team to consider many significant sustainable strategies to improve the overall operational costs of the new building. As a Department of Environment, there will be significant study given to achieving a sustainable building that would meet the requirements of a LEED Gold or better designation.

Some of the sustainable features that will be incorporated in this facility include the following:
- Passive Design Strategies
- Active Sustainable Design
- Renewable Energy Systems
- Building Materials and Finishes
- Native Landscaping
- Stormwater Management
- Transport Systems

SUSTAINABLE DESIGN

PASSIVE DESIGN STRATEGIES

- Solar controls – sun shading devices, low-e glazing
- Building orientation on site
- Daylight harvesting
- Natural ventilation
- High-albedo roof

RENEWABLE ENERGY SYSTEMS

- PV panels on roof and parking
- Solar water preheat
- Wind generator
- Ground source heat pumps

ACTIVE SUSTAINABLE DESIGN

- High-efficiency mechanical and electrical systems
- Energy recovery system
- Providing water-efficient plumbing fixtures to reduce building water usage by 30%
- Provide energy-recovery practices to increase energy performance by 40%
- Purchase energy efficient freezers
- Provide LED lighting throughout the facility
- Utilize task lights
- Direct/Indirect lighting
- Provide lighting controls (occupancy/ vacancy sensors)
- Grouping labs with similar functions near each other to centralize use of common lab equipment - Process cooling water for heat rejection
- Active laboratory air quality management system (Aircuity)
- Active chilled beams in the non-lab spaces
- Separate AHU for lab and non-lab
- Variable speed chillers
- VAV fume hoods with reduced face velocity
- Displacement ventilation

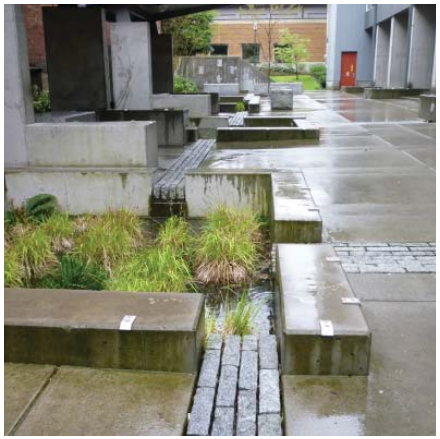
SUSTAINABLE DESIGN

BUILDING MATERIALS + FINISHES

- Utilize sustainable building elements that have a 50+ year lifespan
  - Slate
  - Terracotta
  - Stone
- Low VOC paints and finishes
- Utilize FSC certified wood that is responsibly harvested
- Recycled metal for the lab casework

NATIVE LANDSCAPING

- Water efficient landscaping
- Trees to shade parking and roofs
- Views to nature
- Public greenspace with native vegetation



STORMWATER MANAGEMENT

- Pervious pavements
- Bioswales
- Retention pond
- Stormwater collection from roofs + horizontal surfaces
- Green roof (sedum)
- Stormwater collection tank below grade

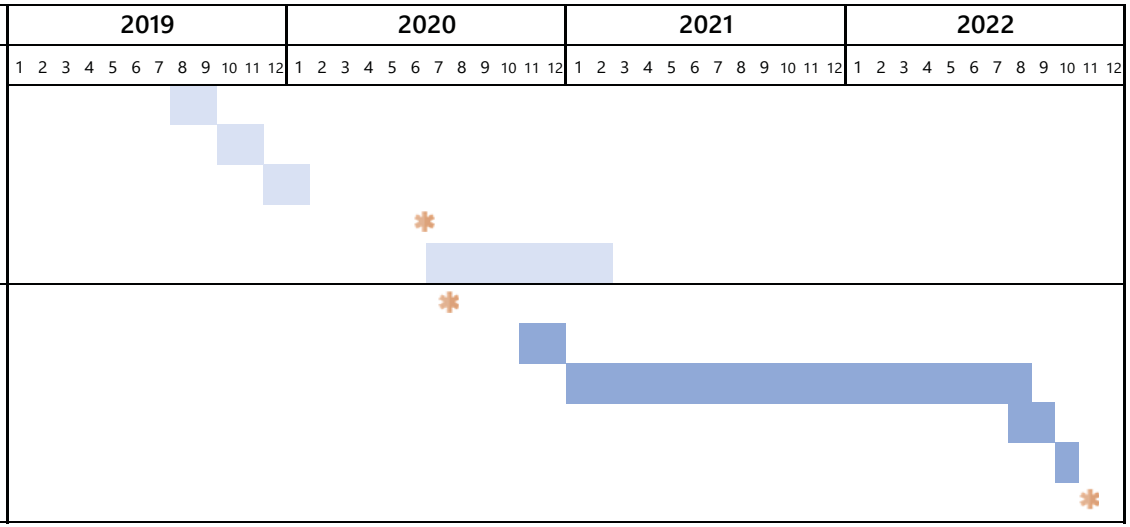
TRANSPORT SYSTEMS

- Provide bike parking spaces
- Electric vehicle charging stations
- Carpool parking
- Shower + changing facilities
- Locate on public transportation lines

PROJECT SCHEDULE

The proposed project schedule below is based on a construction start date of December 2020 and correlates to the escalation factor used in the test fit cost model.

Activity	Duration	Date
Programming	2 Mo.	8/1/19 - 10/1/19
Concept Design	2 Mo.	10/1/19 - 12/1/19
Report	1.5 Mo.	12/1/19 - 1/15/20
Notice to Proceed		7/1/2020
Design	8 Mo.	7/1/20 - 2/28/21
Construction Manager Selection		8/1/2020
GMP Development	1.5 Mo.	11/1/20 -12/15/21
Construction	20 Mo.	12/15/20 - 8/15/22
Equipment Move-In + Installation	1.5 Mo.	8/15/22 - 10/1/22
Commissioning + Certification	1 Mo.	10/1/22 - 11/1/22
Occupancy	0.5 Mo.	11/1/22 - 11/15/22



Design

Construction

KDHE

NEW LABORATORY

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