

UTEB  
E2  
ABB

ESB

FLC

ITE

HBL

UNIVERSITY OF CONNECTICUT  
SCHOOL OF ENGINEERING  
**MASTER PLAN**

January 11, 2019

**FINAL DRAFT REPORT**

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## WORKING GROUP

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# 1. EXECUTIVE SUMMARY

## Context

The University of Connecticut began as an agricultural school in 1881, training students in mechanical arts and technology with an emphasis on agricultural science. The school evolved over the next 35 years, offering a four-year degree program in mechanical engineering and expanding to include civil and electrical engineering by 1935. Today, the School of Engineering offers undergraduate degrees in 12 engineering fields and Masters and Ph.D. degrees in nine engineering fields through its seven departments in Biomedical Engineering, Chemical & Biomolecular Engineering, Civil & Environmental Engineering, Computer Science & Engineering, Electrical & Computer Engineering, Materials Science & Engineering, and Mechanical Engineering. Since its inception, the School of Engineering has continued to provide innovative cutting-edge research and education supported by public and private funding. The Next Generation Connecticut STEM initiative has inaugurated a significant wave of growth at the University of Connecticut School of Engineering which must be supported by adequate teaching and research space now and in the future.

## Process

The participants of the Working Group, the key individuals involved in developing the report, are representatives from the University of Connecticut School of Engineering, University Planning, Design and Construction, and Payette (an architectural firm located in Boston, Massachusetts). Using the framework of the 2015 Campus Master Plan, the Working Group developed a list of objectives to guide this Master Plan's growth yet allow for strategic realignment to suit funding and departmental priority shifts:

- Determine if the School of Engineering footprint is currently sufficient or deficient
- Forecast faculty growth and projected student enrollment over the next five to seven years
- Determine the assignable square feet (ASF) required for the future population growth based on the University planning metrics
- Offer implementation opportunities to accommodate the projected growth

## Adequacy of Existing Facilities to Meet Present Programmatic Need

To understand the spatial autonomy of each building, the Consultant Team reviewed the existing floor plans, calculated the amount of assignable square feet per building (usable assignable space) by department and space type. After reviewing all of the collected data and visiting each building, the team determined the School of Engineering space currently accommodates today's needs with no vacancy.

It was noted by the team that the Longley and Depot D Buildings are in poor condition and require either extensive renovation or replacement. The exterior envelopes of Longley and Depot D are showing signs of age and distress, the building systems are at the end of their life cycle and the space type adjacencies are inefficient because the spaces were filled based on vacancy, not strategic planning. If these buildings are removed from the space inventory, the School of Engineering would require an additional 39,762 ASF to meet the present need.

## Growth of Faculty and Students

Faculty and student projections are based on enrollment history and predicted growth due to emerging trends. The faculty is anticipated to increase by six to seven members per year over the next five years, for a total of 33 additional faculty members by 2023. The School of Engineering is anticipated to grow by 420 graduate students and 720 undergraduate students to a total enrollment of 5,178 students by 2023. Administrative staff positions will grow incrementally to support the increase in academic and research population.

## Growth to Accommodate Future Population

At the end of the Fall 2018 semester, there will be no available space in the School of Engineering. To accommodate the projected growth and requested space needs, the Working Group anticipates that

**by 2023 the School of Engineering will require 324,920 total assignable square feet for research laboratories, core laboratories, teaching space, office space, student space, general support, and strategic vacancy space—54,865 ASF more than the 270,055 ASF currently existing today, which includes Longley and Depot D. If Longley and Depot D are removed from the inventory, the need would grow from 54,865 ASF to 94,627 ASF.**

## Options

There are multiple options to meet the School of Engineering projected space needs.

The following are opportunities within existing spaces:

- Recapture the vacated space in the Engineering II and Arthur B. Bronwell Hall after the Materials Science and Engineering teaching laboratories are relocated to Science 1 in 2022 and the CLAS Biology laboratories are relocated to Gant in 2023, respectively (+7,431 ASF).
- Reconfigure space in the Information Technologies Engineering Building and Babbidge Library sub-basement to increase usable square footage in line with the Master Plan's metrics (+6,700 ASF).
- Capture the unallocated space in the proposed Science 1 Building design and reassign the space to the School of Engineering Mechanical Engineering department (+12,000 ASF).

The following are opportunities within new construction:

- Strategically-place additions on Engineering II, United Technologies Engineering Building, and/or Center for Clean Energy & Engineering building.
- Replace the Longley Building and Depot D.

It should be noted that Longley is a major research center for the School of Engineering and industry partners and that Longley and Depot D are in very poor condition. Both require significant renovation or replacement.

## Planning Assumptions for Projected Growth

Population Types	2023 Total Projected	2018 Total Existing	Projected Growth Delta
Faculty lines	221	188	+33 *
Graduate enrollment	1,178	758	+420
Undergraduate enrollment	4,000	3,280	+720
Research group size	PI+5	PI+4	+1

Table 1.1: Projected faculty and student population growth

\* Faculty projected growth: (24) research faculty and (9) teaching faculty

## Space Needs: Projected Growth and Strategic Vacancy Only

Space Types	2023 Total Projected ASF	2018 Total Existing ASF	Projected Growth Delta ASF
Research Labs (with Support)	135,328	118,328	+17,000
Core Labs	23,673	20,173	+3,500
Teaching Space (with Support)	50,109	39,609	+10,500
Office Space (with Support)	81,793	68,928	+12,865
Student Space	17,479	12,479	+5,000
General Support	10,538	10,538	0
Strategic Vacancy	6,000	0	+6,000
<b>Total ASF Space Needs</b>	<b>324,920</b>	<b>270,055</b>	<b>+54,865</b>

Table 1.2: Space needs by space type with the Longley and Depot D buildings remaining as is

## Space Needs: Projected Growth, Strategic Vacancy and Replacement of Longley and Depot D

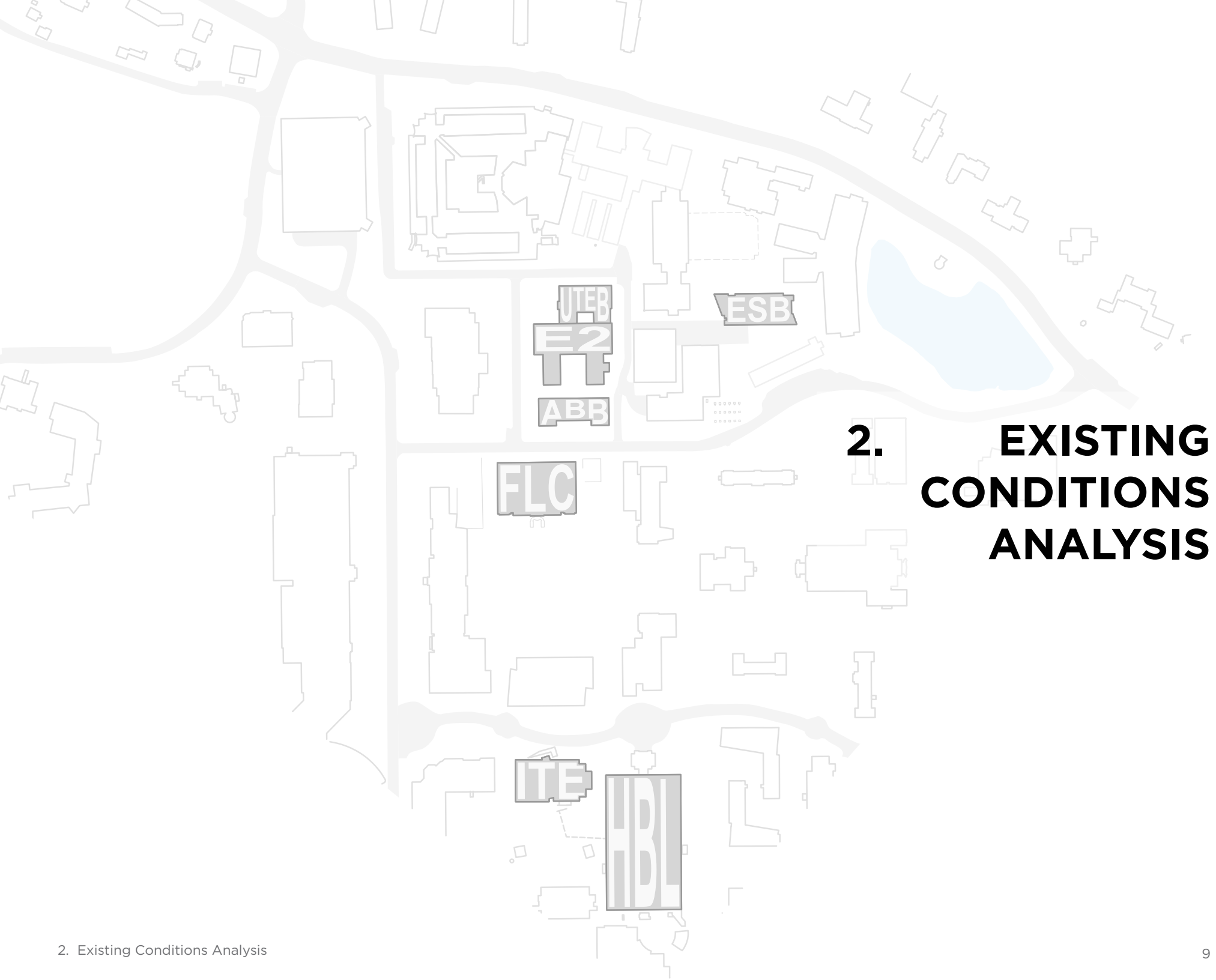
Space Needs	2023 Total Projected ASF	2018 Total Existing ASF	Delta ASF
<b>Total Projected Growth and Strategic Vacancy ASF</b>	<b>324,920</b>	<b>270,055</b>	<b>+54,865</b>
Replacement of Longley and Depot D	+1,982	-37,780	+39,762
<b>Total ASF Space Needs</b>	<b>326,902 (with Longley and Depot D replaced)</b>	<b>232,275 (without Longley and Depot D)</b>	<b>+94,627</b>

Projected Growth and Strategic Vacancy Only

Longley and Depot D are replaced using metrics

Table 1.3: Summary of space needs including projected growth, strategic vacancy, and replacement of the Longley and Depot D buildings





## 2.1 Building Summary

The School of Engineering consists of seven departments and multiple research centers occupying space in three buildings on the Depot Campus dedicated to research facilities and student clubs and seven academic buildings on the Storrs Campus with a cumulative total of 270,055 assignable square feet.

### Depot Campus

- Center for Clean Energy & Engineering (C2E2)
- Depot D (DD)
- Longley Building (LONG)

### Storrs Campus

- Arthur B. Bronwell Hall (ABB)
- Engineering II (E2)
- Engineering & Science Building (ESB)
- Franklin L. Castleman Building (FLC)
- Homer Babbidge Library (HBL)
- Information Technologies Engineering (ITE)
- United Technologies Engineering Building (UTEB)

### Departments:

- Biomedical Engineering (BME)
- Chemical & Biomolecular Engineering (CBE)
- Civil & Environmental Engineering (CEE), which includes the Environmental Engineering program
- Computer Science & Engineering (CSE)
- Electrical & Computer Engineering (ECE)
- Mechanical Engineering (ME), which includes the Management & Engineering for Manufacturing (MEM) program
- Materials Science & Engineering (MSE), not included in this study with the exception of space in C2E2 and ESB

### Centers and Programs:

- Center for Career Development
- Center for Clean Energy Engineering (C2E2)
- Connecticut Transportation Institute (CTI)

### Engineering Diversity & Outreach Center (EDOC)

### Engineering Technical Services (ETS)

### Offices:

- Booth Engineering Center of Advanced Technology (BECAT), included in CSE and ECE
- Continuing and Distance Engineering Education (CDEE)
- Deanery
- Undergraduate Office

## **Total:**

**270,055 Assignable Square Feet occupied by the School of Engineering (2018)**

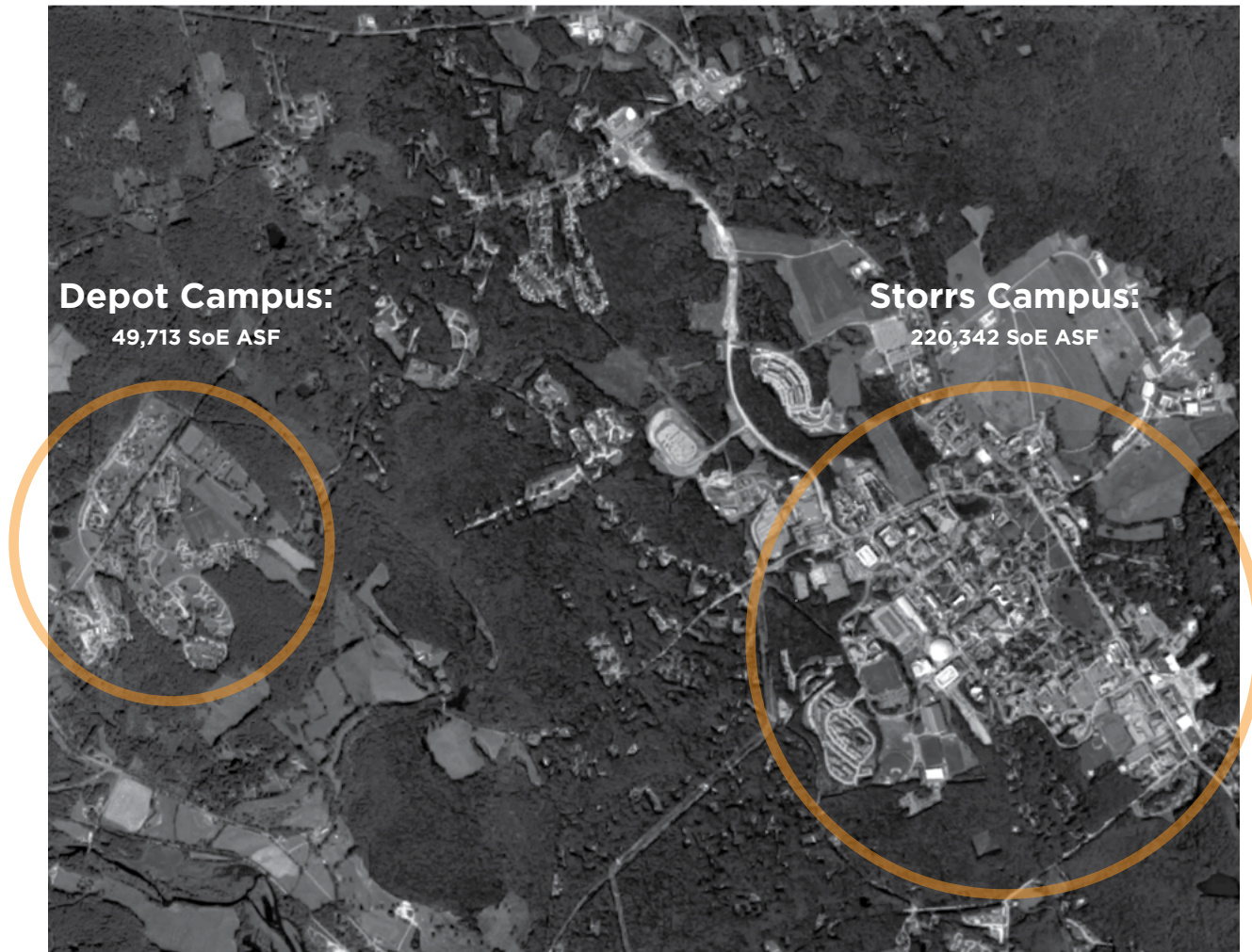


Figure 2.1: University of Connecticut Campuses located in Mansfield, CT (source: Google Maps)



### Departmental Area by Building (ASF)

Departments	Depot Campus			Storrs Campus							Total
	C2E2	DD	LONG	ABB	E2	ESB	FLC	HBL	ITE	UTEB	
BME	0	0	0	14,759	138	7,092	787	129	0	0	<b>22,905</b>
CBE	3,483	0	0	1,252	11,221	5,097	0	0	0	10,324	<b>31,377</b>
CEE	0	1,129	623	2,909	140	1,446	23,976	0	0	0	<b>30,223</b>
CSE	0	0	0	0	156	208	0	4,368	22,924	0	<b>27,656</b>
ECE	993	0	2,448	1,461	224	5,015	0	7,712	25,382	0	<b>43,235</b>
ME & MEM	2,933	4,302	2,006	516	18,264	10,843	3,368	0	0	12,555	<b>54,787</b>
MSE & C2E2 *	4,524	0	0	0	0	4,289	0	0	0	0	<b>8,813</b>
CTI	0	1,285	17,135	0	0	0	0	0	0	0	<b>18,420</b>
SoE Administration **	0	0	8,852	64	6,823	0	10,232	1,539	2,778	2,351	<b>32,639</b>
Total	11,933	6,716	31,064	20,961	36,966	33,990	38,363	13,748	51,084	25,230	<b>270,055</b>

Table 2.1: Existing (2018) department area per building

\* MSE space in C2E2 to remain

\*\* School of Engineering Administration includes EDOC, ETS, CDEE, Deanery and Undergraduate Office

### Building Area by Space Type (ASF)

Space Types	Depot Campus			Storrs Campus							Total
	C2E2	DD	LONG	ABB	E2	ESB	FLC	HBL	ITE	UTEB	
Research Labs	4,374	0	14,844	8,174	12,647	31,311	6,123	10,494	17,856	12,505	<b>118,328</b>
Core Labs	4,257	0	0	0	2,798	0	8,522	0	2,245	2,351	<b>20,173</b>
Teaching Space	0	0	0	7,956	9,710	0	12,827	0	9,116	0	<b>39,609</b>
Office	3,302	0	6,122	4,767	11,240	2,099	10,345	2,770	18,223	10,060	<b>68,928</b>
Student Spaces ***	0	5,431	1,246	0	420	580	546	298	3,644	314	<b>12,479</b>
General Support ****	0	1,285	8,852	64	151	0	0	186	0	0	<b>10,538</b>
Total	11,933	6,716	31,064	20,961	36,966	33,990	38,363	13,748	51,084	25,230	<b>270,055</b>

Table 2.2: Existing (2018) School of Engineering-assigned space type area per building

\*\*\* Student spaces include gathering, study and club space

\*\*\*\* General Support includes all School of Engineering-assigned building support space, such as general storage



## 2.2 Space Conditions

The School of Engineering led a tour of each building to provide the Consultant Team with a general understanding of their function, condition attributes and challenges.

The buildings were categorized into three groups:

### Good Condition (110,755 ASF)

No significant infrastructure upgrades are forecasted, but there will be minor modifications to customize laboratories for future faculty.

- Center for Clean Energy & Engineering (C2E2, 2002)
- Engineering & Science Building (ESB, 2017)
- Homer Babbidge Library (HBL, 1978 & 2002)
- Information Technologies Engineering (ITE, 2003)

### Fair Condition (121,520 ASF)

Four buildings are in fair condition; the building systems are approaching the end of their service life, and the buildings require major renovation.

- Arthur B. Bronwell Hall (ABB, 1968)
- Engineering II (E2, 1959)
- Franklin L. Castleman Building (FLC, 1939 & 1995)
- United Technologies Engineering Building (UTEB, 1987)

### Unacceptable Condition (37,780 ASF)

Two buildings are in very poor condition and require extensive renovation or replacement. The buildings were part of the Mansfield Training School and do not have the level of infrastructure required to support research or their current space types. Due to the age and types of construction, their exterior envelopes are showing signs of age and distress, and their mechanical systems are beyond their useful life expectancy. The buildings are close to being uninhabitable.

- Depot D (DD)
- Longley Building (LONG, 1951)



Figure 2.2: Longley Building uninhabitable space



Figure 2.3: Depot D exterior

## 2.3 Space Observations

The following additional observations and recommendations were discussed as part of the Master Plan:

- The School of Engineering's "front door" is unclear.
- There is a need to provide flexible, adaptable student spaces to encourage collaboration, strengthen community and celebrate diversity.
- Incremental renovations over time have led to a poor organization of departmental and space type adjacencies within the buildings.
- Many of the existing research buildings have long, double loaded corridors; there is an opportunity to increase views into lab space and install multi-media displays to highlight past and current projects.



Figure 2.4: Lack of informal student gathering space



Figure 2.5: Typical corridor



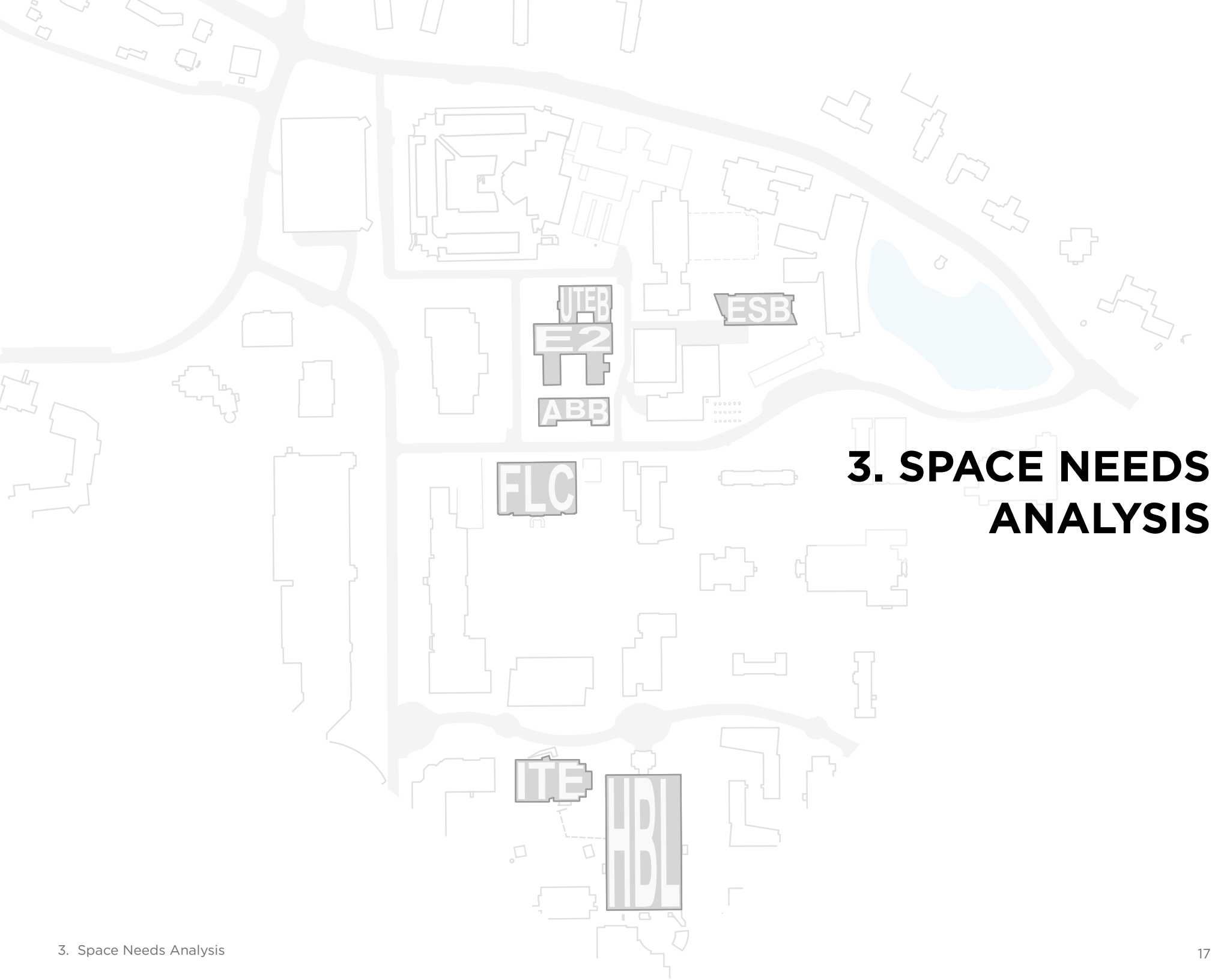
Figure 2.6: Instructional laboratory



Figure 2.7: High technology laboratory on the Depot Campus







### 3. SPACE NEEDS ANALYSIS

## 3.1 Methodology

The School of Engineering Master Plan is a dynamic five year planning document to provide a framework to guide aspirational growth and development.

The Consultant Team created a space inventory of each building broken down by area, space type and department.

After the Working Group understood the qualitative and quantitative presence of the School of Engineering and the existing number of faculty, staff and students enrolled in the undergraduate and graduate programs were confirmed by the School of Engineering, the Working Group established a few baseline assumptions:

- This Master Plan's timeline spans from the fall of 2017 semester to the end of the 2023 spring semester.
- There are currently 188 faculty members of the School of Engineering:
  - 28 teaching faculty
  - 160 research faculty
- The current graduate student enrollment is 758 with 538 students involved in research.
- The current total undergraduate enrollment is 3,280.
- The School of Engineering backfill projects are assumed to have been completed by the Fall 2018.
- MSE research space (2,123 ASF high bay) in C2E2 will remain.
- The Innovation Partnership Building is not referenced in this report.

### Definitions

**ASF:** Assignable Square Feet – Area assigned to, or available for assignment to, an occupant or specific use

**GSF:** Gross Square Feet – Total area of a building including walls, mechanical rooms, corridors and stairs

**ASF/GSF Ratio:** Building efficiency as a percentage of space within a building that is assignable

**Research Station:** An area within a lab assigned to a graduate student or research assistant

**PI:** Principal Investigator - Research faculty member

**PI + #:** The average number of graduate and undergraduate students assigned per PI

**FTE:** Full-Time Equivalent (for office occupants)

### Space Type Metrics

Space Type	ASF per FTE	Office Type/ Comments
<b>Research Labs:</b>		
Computational (Office type space)	60	Research station
Wet (Bench type space)	160	Research station
Hybrid (Instrumentation focused)	180	Research station
<b>Offices:</b>		
Department Chair/ Director	150	Private office
Faculty (Teaching and Research)	120	Private office
Research Scientist	120	Private office
Lab Manager	120	Private office
Visiting/Adjunct Faculty	80	Private or shared office
Admin Staff (senior)	100	Private office
Admin Staff	80	Open workstation
Post Doc	80	Shared office or open workstation
Graduate Student w/ research space	30-35	Open workstation (included in research lab metric)
Graduate Student w/o research space	35	Hoteling workstation (1 per 10 students)
Undergraduate Student (admin work)	20	Open workstation for payroll positions
Conference Space	20	Allocation per FTE
Office Service (file, copy, storage)	10% additional	10% of total office + conference space

Table 3.1: Space type metrics

Note: UConn guideline metrics with refined research types are in line with national space standards

## 3.2 Faculty and Student Populations

The projections of future growth were discussed in depth by the Working Group. The School of Engineering reviewed three different hiring proposals: aggressive, medium and slow. Based on past trends and known upcoming faculty recruitment, the medium growth model was identified to estimate the needs of the School with the exception of CSE and ME, which utilize an aggressive growth model. By 2023, the faculty size is projected to increase by 18%:

- (9) New Teaching Faculty
- (24) New Research Faculty

The graduate student count is anticipated to rise to a total of 1,178, of which 828 are expected to require research space. Undergraduate student enrollment is projected to total 4,000. Administrative staff positions grow incrementally to support the increase in academic and research population.

Space need projections for 2023 are calculated based on future growth numbers. The assignable square feet required to support the 2023 projected faculty, staff and student growth is determined by multiplying the number of people by the space type metrics.

If the School of Engineering grows as forecasted in the Master Plan, the impact on the University's ability to provide housing, dining, parking and centrally scheduled classes must be considered.

The following tables provide a summary of the projections.

**Faculty Lines**

Departments	Current Faculty (2018)			Projected Faculty (2023)			Total Growth (2023)	
	Teaching	Research	Total	Teaching	Research	Total	Total	%
BME	5	11	16	6	11	17	1	6%
CBE	3	19	22	4	19	23	1	5%
CEE	4	28	32	4	30	34	2	6%
CSE	6	30	36	11	38	49	13	36%
ECE	0	30	30	1	32	33	3	10%
ME & MEM	10	26	36	11	33	44	8	22%
C2E2	0	2	2	0	3	3	1	50%
CTI	0	14	14	0	18	18	4	29%
<b>Total</b>	<b>28</b>	<b>160</b>	<b>188</b>	<b>37</b>	<b>184</b>	<b>221</b>	<b>33</b>	<b>18%</b>

↑ Growth: 33 faculty (+18%) ↑

Table 3.2: (Data source: School of Engineering)

**Graduate Student Enrollment**

Current Enrollment (2018)			Projected Enrollment (2023)		
Enrolled	Group Size	In Labs	Enrolled	Group Size	In Labs
758	PI+4	538	1,178	PI+5	828
↑ Growth: 420 (+55%) ↑					

Table 3.3

**Undergraduate Student Enrollment**

Current Enrollment (2018)	Projected Enrollment (2023)
3,280	4,000
↑ Growth: 720 (+20%) ↑	

Table 3.4

(Data source for Tables 3.3 and 3.4: 2/21/18 School of Engineering-provided actual enrollment numbers. Reviewed by the Provost and School of Engineering Dean, March 2018.)



### 3.3 Space Type Projections

The following pages are a breakdown of each space type; including a description, existing space inventory, metrics used and projected growth. The metrics associated with the different space types are in line with national space standards as well as those at peer universities and form the basis for projections of future need. See *Section 5.3 Space Needs Analysis* for prototypical room diagrams.

#### Research Labs

In order to develop a more accurate assessment of research space needs, three different lab types were defined, each with a different space metric; each metric aligns with other State Universities:

- **Computational:** Office type space, small desktop set-ups (**60 ASF per research station**)
- **Wet Bench:** Lab space with central workbenches and perimeter support benches, storage and equipment (**160 ASF per research station**)
- **Hybrid:** Large equipment set-ups and work bench (**180 ASF per research station**)

In addition to allocations for the wet bench and hybrid lab types, which include dedicated lab space and write-up areas for graduate student researchers, **an additional 25% is added to account for shared instrumentation support and other research service functions.**

Currently, the average number of graduate students assigned to a Principal Investigator is four (PI+4). The projected space metrics will be PI+5. See *Tables 3.5 and 3.6.*



Figure 3.1: Computational lab example at Columbia University (source: Payette)



Figure 3.2: Wet lab example at the National University of Ireland Galway (source: Payette)



Figure 3.3: Hybrid lab example (source: Payette)



Figure 3.4: Graduate student write-up space example at National University of Ireland Galway (source: Payette)



### Research Lab Type Distribution

Departments	2018 Existing Lab Type Distribution				2023 Projected Lab Growth			2023 Total Projected Labs
	Comp.	Wet	Hybrid	Total	Comp.	Wet	Hybrid	
BME	3	7	1	<b>11</b>	0	0	0	<b>11</b>
CBE	3	14	2	<b>19</b>	0	0	0	<b>19</b>
CEE	5	18	5	<b>28</b>	2	0	0	<b>30</b>
CSE	29	0	1	<b>30</b>	6	0	2	<b>38</b>
ECE	8	5	17	<b>30</b>	1	0	1	<b>32</b>
ME & MEM	8	10	8	<b>26</b>	3	2	2	<b>33</b>
C2E2	0	0	2	<b>2</b>	0	0	1	<b>3</b>
CTI	1	1	12	<b>14</b>	1	0	3	<b>18</b>
<b>Total</b>	<b>57</b>	<b>55</b>	<b>48</b>	<b>160</b>	<b>13</b>	<b>2</b>	<b>9</b>	<b>184</b>

Table 3.5: Existing and projected research lab type distribution per department

Note: The projected research laboratory types include both lab and write-up office space.

### Space Needs Analysis: Research Labs

Research Lab Space Type (including Grad Write-Up Space & Research Support)	2018 # of Research Labs	2018 Total Existing ASF	2023 PI+5 ASF Metric (+25% Lab Support)	2023 # of New Research Labs	2023 Projected Growth ASF with Support	2023 Subtotal Projected ASF	Removal of Longley ASF	Replacement of Longley ASF with Support	2023 Total Projected Growth ASF
Computational	57	25,938	300 (375)	13	4,875	<b>30,813</b>	-621	375	<b>30,567</b>
Wet	55	50,879	800 (1,000)	2	2,000	<b>52,879</b>	-616	1,000	<b>53,263</b>
Hybrid/Equipment	48	41,511	900 (1,125)	9	10,125	<b>51,636</b>	-13,607	15,750	<b>53,779</b>
<b>Total ASF</b>	<b>160</b>	<b>118,328</b>		<b>24</b>	<b>17,000</b>	<b>135,328</b>	<b>-14,844</b>	<b>17,125</b>	<b>137,609</b>

Table 3.6: Existing and projected space needs for research labs

Notes: The PI+5 metrics will apply only to Growth; the existing labs are to remain PI+4.

If the existing Research Lab space is adjusted to the PI+5 metrics, an additional 12,047 ASF is needed.

The 2023 Total Projected Growth ASF includes replacing the Longley and Depot D assignable square footage; there is no research lab space in Depot D.

## Core Labs

Core labs are defined as facilities that are shared by multiple departments, or specialty spaces that provide a unique resource.

The projection of future needs includes a high bay space and a lab for a future research initiative. Both labs are envisioned as flexible open work areas with available electrical, data and gas utility infrastructure for connections to individual equipment items. The future high bay lab would be similar to the existing high bay space in C2E2. Both would provide a specialty capability with high end instrumentation that would be too expensive for individual researchers to purchase and maintain.

### Space Needs Analysis: Core Labs

Core Lab (Building)	Department Assigned to	2018 Total Existing ASF	2023 Projected Growth ASF	2023 Total Projected ASF
High Bay Lab (C2E2)	Multiple (C2E2)	4,257	0	<b>4,257</b>
Structures High Bay Lab (FLC)	CEE	2,712	0	<b>2,712</b>
Machine Shop (E2)	ME	872	0	<b>872</b>
Computer Labs (E2 & ITE)	Deanery	4,171	0	<b>4,171</b>
Foundation in Engineering (UTEB)	Deanery	2,351	0	<b>2,351</b>
Machine Shop (FLC)	ETS	5,810	0	<b>5,810</b>
High Bay Lab	Unassigned		1,500	<b>1,500</b>
Core Lab	Unassigned		2,000	<b>2,000</b>
<b>Total ASF</b>		<b>20,173</b>	<b>3,500</b>	<b>23,673</b>

Table 3.7: Existing and projected space needs for core labs



Figure 3.5: Existing C2E2 high bay core lab



Figure 3.6: Core lab example at Cornell University (source: Payette)

Teaching Space

Teaching laboratories, senior design and underclassmen project spaces are included in the Teaching Space program type.

In order to accommodate the anticipated increase in undergraduate students, one additional teaching laboratory of each type will be required.

In addition, project space for underclassmen has been provided. This includes open build areas with work benches along with adjoining rooms for supplies and secure storage. The existing available project space can only accommodate seniors.

Space Needs Analysis: Teaching Space

Teaching Space Type (including Support)	2018 Total Existing ASF	2023 Projected Growth ASF	2023 Total Projected ASF	Notes
Computational Teaching Lab	8,313	1,500	9,813	New lab: 50 seats
Wet Teaching Lab	9,684	1,500	11,184	New lab: 30 seats
Hybrid/Equipment Teaching Lab	11,581	1,500	13,081	New lab: 30 seats
Senior Design Space	10,031	2,000	12,031	
Underclassmen Student Project Space	0	4,000	4,000	4 at 1,000 ASF
Total ASF	39,609	10,500	50,109	

Table 3.8: Existing and projected space needs for teaching space



Figure 3.7: Wet teaching lab example at Northeastern University (source: Payette)



Figure 3.8: Undergraduate student project space example at Cornell University (source: Payette)

## Office Space

Office space includes all faculty and staff offices, hoteling space for graduate students without research space (Master of Engineering, or MENG, students), conference rooms and office service (file, copy and storage space). Write-up areas for graduate students are included in research lab space calculations.

Acknowledging that existing office layouts and assignments are unlikely to change significantly in the near-term, the existing (2018) office area will be used as the starting point to which future growth will be added incrementally.

The undergraduate student allocation is for workstation space for undergraduates with payroll positions working in offices.

Projected needs for future office space are based on the metrics outlined in *Table 3.1: Space Type Metrics*.



Figure 3.9: Office example at Princeton University (source: Payette)



Figure 3.10: Conference space example (source: Payette)

### Space Needs Analysis: Office Space

Office Space Type	2018 # of People	2018 Total Existing ASF	2023 ASF Metric	2023 Population Growth	2023 Projected Growth ASF	2023 Subtotal Projected ASF	Removal of Longley ASF	Replacement of Longley ASF	2023 Total Projected ASF
Faculty (Research and Teaching)	188	29,231	120	33	3,960	<b>33,191</b>	Incl. in staff	1,760	<b>34,951</b>
Department Chair/Director (included in Faculty)	Incl. in faculty (8)	Incl. in faculty	150 (120 + 30)	Incl. in faculty (8)	240 (8 x 30)	<b>240</b>	Incl. in staff	0	<b>240</b>
Research Scientists and Lab Managers	2	Incl. in staff	120	2	240	<b>240</b>	Incl. in staff	0	<b>240</b>
Visiting/Adjunct Faculty	8	Incl. in faculty	80	0	0	<b>Incl. in faculty</b>	0	0	<b>Incl. in faculty</b>
Admin Staff (senior)	52	Incl. in staff	100	9	900	<b>900</b>	Incl. in staff	1,300	<b>2,200</b>
Admin Staff	59	24,608	80	10	800	<b>25,408</b>	-5,386	1,120	<b>21,142</b>
Post Doc	24	1,437	80	13	1,040	<b>2,477</b>	0	0	<b>2,477</b>
Graduate Student w/o research space (hoteling)*		0	35	(35 stations)	1,225	<b>1,225</b>	0	0	<b>1,225</b>
Undergraduate Student (admin work)	50	Incl. in staff	20	(10 stations)	200	<b>200</b>	0	0	<b>200</b>
Conference Space		8,007	20	(67 FTE)	1,340	<b>9,347</b>	0	840	<b>10,187</b>
TA student office hour space		0	350	(5 rooms)	1,750	<b>1,750</b>	0	0	<b>1,750</b>
Office Service (file, copy, storage)		5,645	+10%		1,170	<b>6,815</b>	-736	802	<b>6,881</b>
<b>Total ASF</b>	<b>383</b>	<b>68,928</b>		<b>67</b>	<b>12,865</b>	<b>81,793</b>	<b>-6,122</b>	<b>5,822</b>	<b>81,493</b>

Table 3.9: Existing and projected space needs for office space

\*Graduate student hoteling space calculated as 35 ASF per student, one for every ten students.

Note: The 2023 Total Projected Growth ASF includes replacing the Longley and Depot D assignable square footage; there is no office space in Depot D.



## Student Space

Student spaces focus on undergraduate needs and include gathering/break space, study rooms and student club work space. In order to accommodate the projected rise in undergraduate student enrollment, increases are identified for each of these spaces.

**Space Needs Analysis: Student Space**

Student Space Type	2018 Total Existing ASF	2023 ASF Metric	2023 # of New Spaces	2023 Projected Growth ASF	2023 Subtotal Projected ASF	Removal of Longley & Depot D ASF	Replacement of Longley & Depot D ASF	2023 Total Projected ASF
Study Rooms	2,156	400	2	800	<b>2,956</b>	-623	623	<b>2,956</b>
SoE Club Project Space	6,055	1,000	2	2,000	<b>8,055</b>	-6,055	6,055	<b>8,055</b>
SoE Club Office Space	0	100	2	200	<b>200</b>	0	0	<b>200</b>
Break Space	4,268	500	2	1,000	<b>5,268</b>	0	0	<b>5,268</b>
Computer/Work Space	Included in study rooms	500	2	1,000	<b>1,000</b>	0	0	<b>1,000</b>
<b>Total ASF</b>	<b>12,479</b>		<b>10</b>	<b>5,000</b>	<b>17,479</b>	<b>-6,678</b>	<b>6,678</b>	<b>17,479</b>

Table 3.10: Existing and projected space needs for student space

Note: New student space needs determined with input from the Working Group

Note: The 2023 Total Projected Growth ASF includes replacing the Longley and Depot D assignable square footage.



Figure 3.11: Informal break space example at University of Massachusetts, Amherst (source: Payette)



Figure 3.12: Student club space example (source: Payette)

General Support

General Support includes all non-department assigned building support space, including:

- ETS general storage space
- CTI storage in Depot D
- Server storage closet in Engineering II

No additional support space has been added in the future projections with the assumption that current service facilities will be able to accommodate future activity.

Space Needs Analysis: General Support						
Space Category	2018 Total Existing ASF	2023 New ASF	2023 Subtotal Projected ASF	Removal of Longley & Depot D ASF	Replacement of Longley & Depot D ASF	2023 Total Projected ASF
General Support	10,538	0	10,538 (No Change)	-10,137	10,137	10,538 (No Change)

Table 3.11: Existing and projected space needs for general support

Note: The 2023 Total Projected Growth ASF includes replacing the Longley and Depot D assignable square footage.

# Strategic Vacancy

The Dean of the School of Engineering requested Strategic Vacancy space to be able to respond to requests for short-term laboratory swing space.

Examples of uses for strategic vacancy include:

- Accommodation of research grant and industry sponsored research initiatives;
- Readily available space to house newly recruited faculty researchers or allow for episodic growth of junior faculty;
- Temporary relocation space for current researchers to enable updates and renovations to existing labs.

Space Needs Analysis: Strategic Vacancy

Space Category	2018 Total Existing ASF	2023 New ASF	2023 Total Projected ASF	Notes
Strategic Vacancy	0	6,000	6,000	+ 4-5% of all research space

Table 3.12: Projected space needs for strategic vacancy



Figure 3.13: UConn National Institute for Undersea Vehicle Technology (source: UConn Innovation Portal)



### 3.4 Total Space Needs

The following are the space needs for the School of Engineering:

- **Projected Growth and Strategic Vacancy:**  
The projected space to support the growth for the School of Engineering over the next five years is 48,865 ASF. With an additional 6,000 ASF of enabling Strategic Vacancy laboratory swing space, the total is 54,865 ASF.
- **Replacement of Longley and Depot D:**  
A total of 37,780 ASF of occupied space in the Longley and Depot D buildings is in poor condition; both buildings are in need of extensive renovation or replacement. If replaced, utilizing the proposed PI+5 metrics, the area would increase by an additional 1,982 ASF to a total of 39,762 ASF.

**Space Needs:  
Projected Growth and Strategic Vacancy Only**

Space Types	2018 Total Existing ASF	2023 Total Projected ASF	Delta ASF
Research Labs (with Support)*	118,328	135,328	+17,000
Core Labs	20,173	23,673	+3,500
Teaching Space (with Support)	39,609	50,109	+10,500
Office Space (with Support)**	68,928	81,793	+12,865
Student Space	12,479	17,479	+5,000
General Support	10,538	10,538	0
Strategic Vacancy***	0	6,000	+6,000
<b>Total ASF Space Needs</b>	<b>270,055</b>	<b>324,920</b>	<b>+54,865</b>

Table 3.13: Space needs by space type

\* If existing research space is calculated based on the PI+5 group size metric, an additional 12,000 ASF is needed.

\*\* No adjustments to office ASF for existing faculty; incremental growth only

\*\*\* Total Projected ASF can be adjusted by eliminating or reducing the Strategic Vacancy ASF

**Space Needs:  
Replacement of  
Longley and Depot D**

2018 Total Existing ASF	2023 Total Projected ASF
-14,844	+17,125
0	0
0	0
-6,122	+5,822
-6,677	+6,677
-10,137	+10,137
0	0
<b>-37,780 (without Longley and Depot D)</b>	<b>+39,762 (with Longley and Depot D replaced)</b>

Table 3.14: Space needs for the replacement of Longley and Depot D

**Space Needs:  
Projected Growth, Strategic Vacancy  
and Replacement of Longley and Depot D**

Space Needs	2018 Total Existing ASF	2023 Total Projected ASF	Delta ASF
Total Projected Growth and Strategic Vacancy ASF	270,055	324,920	+54,865
Replacement of Longley and Depot D	-37,780	1,982	+39,762
<b>Total ASF Space Needs</b>	<b>232,275 (without Longley and Depot D)</b>	<b>326,902 (with Longley and Depot D replaced)</b>	<b>+94,627</b>

Table 3.15: Summary of space needs including projected growth, strategic vacancy, and demolition and replacement of the Longley and Depot D buildings





# 4. OPPORTUNITIES

## 4.1 Organization

The majority of the School of Engineering's space is located within a series of buildings (UTEB, E2, ABB and FLC) located adjacent to each other on the Storrs Campus. Within these buildings is the School of Engineering Administration and almost all of the School's student project space and core labs. Coincidentally, these buildings are in the same physical condition (fair condition), offering opportunities for quantitative and qualitative improvements.

The remaining School of Engineering buildings (ESB, ITE and HBL) are contemporary laboratories and, therefore, do not offer the same development opportunities. Due to these factors, this Master Plan recommends focusing near-term improvements on UTEB, E2, and ABB.

The Depot D building is currently used for student clubs and storage; these spaces should be relocated to the Storrs Campus. The Longley Building is occupied primarily by the Connecticut Transportation Institute (CTI); due to its large parking demand and vast number of municipal visitors, CTI would ideally remain on the Depot Campus.

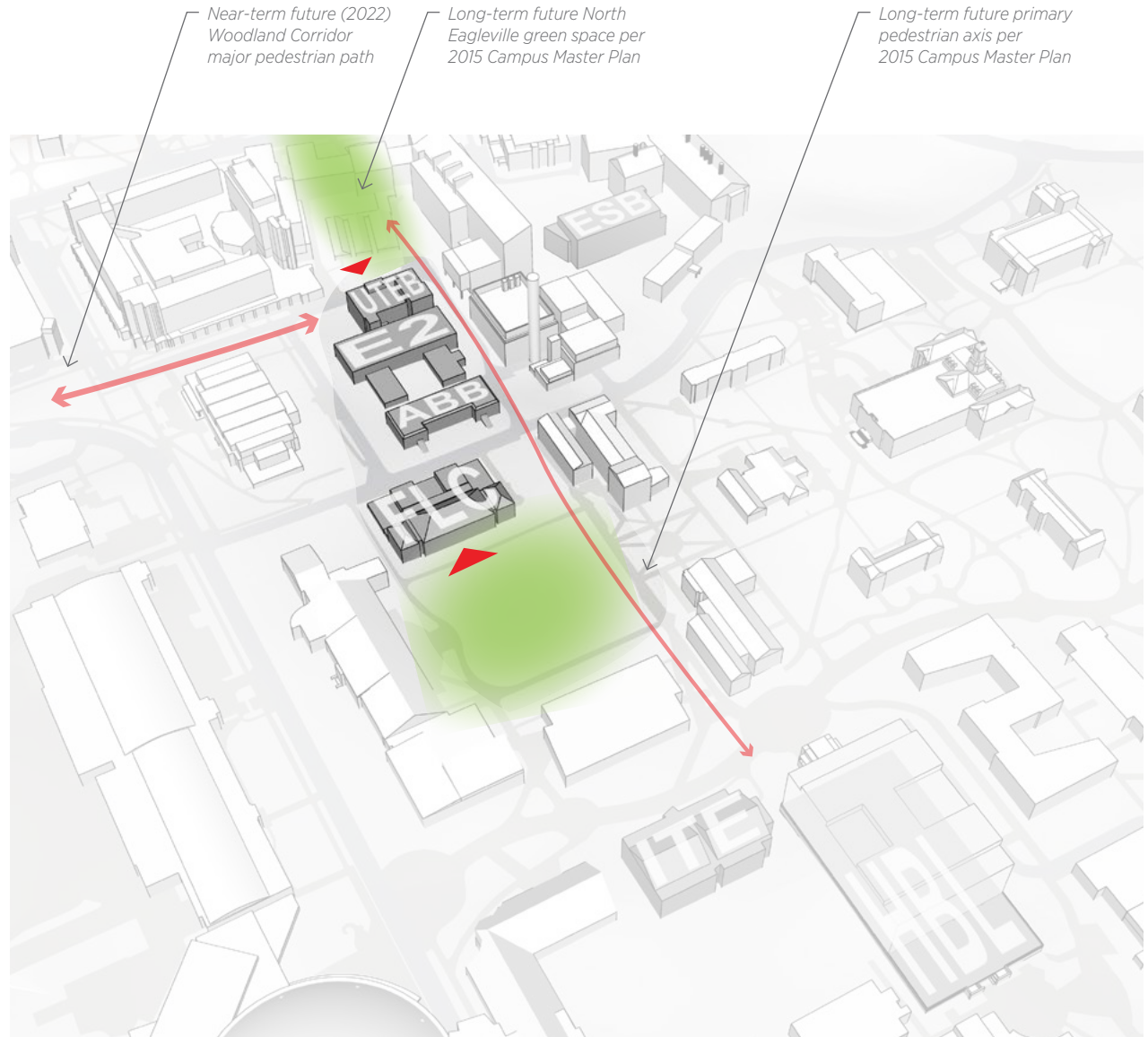


Figure 4.1: Conceptual aerial view of the School of Engineering Storrs Campus buildings facing north

## 4.2 Space Opportunities

The projected growth space needs for the School of Engineering can be met by recapturing vacant space in the Arthur B. Bronwell Hall (ABB) and Engineering II (E2) buildings at the completion of the Gant renovation project in 2023 and Science 1 building in 2022, reorganizing space in the Information Technologies Engineering Building (ITE) and the sub-basement of Babbidge Library (HBL) and capturing unallocated space in Science 1.

With the exception of CTI space, replacing the Longley Building and Depot D ASF would require additions to existing buildings on the Storrs Campus.

The following goals have driven the recommended opportunities:

- Clearly establish FLC as the School's "front door" by collocating the Office of the Dean administrative offices, Engineering Financial Services and Continuing and Distance Engineering Education (CDEE) while increasing their visibility
- Refocus buildings on a specific department where appropriate
- Create continuous zones of similar space types for flexible expansion (e.g. placing labs adjacent to each other without any other space type interrupting them)
- Utilize buildings to their highest and best use
- Celebrate science on display

The following is a list of potential options to meet the 2023 School of Engineering Projected Growth and Strategic Vacancy space needs. The total space identified exceeds the need, providing some flexibility in choosing which opportunities to implement.

### Opportunities within Existing Buildings: *With Existing Longley & Without Depot D*

Opportunities	Available ASF	Projected ASF	Delta ASF	Notes
<b>Total ASF</b>	<b>270,055</b> (2018 Existing)	<b>324,920</b>	<b>+54,865</b>	Projected ASF is Projected Growth and Strategic Vacancy space need
Recapture ABB CLAS Biology Space	+4,403			Gant North completion in 2023 or Gant West in 2021
Recapture E2 MSE Teaching Lab Space	+3,028			Science 1 completion in 2022
Reconfigure ITE	+2,800			Can occur anytime (efficiency increase, not space addition)
Reconfigure HBL	+3,900			Can occur anytime (2,900 ASF from efficiency increase)
Recapture Longley TIP space	+2,748			Relocate to IPB
Capture Science 1 unallocated space for Mechanical Engineering department	+12,000			Not entire ME department, Science 1 completion in 2022
<b>Total Adjusted ASF (with Opportunities)</b>	<b>298,934</b>	<b>324,920</b>	<b>+25,986</b>	
Vacate Depot D	-6,716			Relocate student clubs and storage to Storrs Campus
<b>Total Adjusted ASF (without Depot D)</b>	<b>292,218</b>	<b>324,920</b>	<b>+32,702</b>	<b>32,702 ASF needed beyond all opportunities in existing buildings, including replacing Depot D</b>

Table 4.1: Opportunities to address the projected growth and strategic vacancy space needs within existing School of Engineering buildings assuming the Longley Building is to remain as is and the Depot D building is vacated

### Opportunities with New Construction: *With Existing Longley & Without Depot D*

Opportunities	Available ASF	Projected ASF	Delta ASF	Notes
<b>Total Adjusted ASF (with all opportunities in existing buildings and without Depot D)</b>	<b>292,218</b>	<b>324,920</b>	<b>+32,702</b>	
E2 Addition	+21,620			
UTEB Addition	+21,800			
C2E2 Addition	+1,880			
<b>Total Adjusted ASF (with Opportunities)</b>	<b>337,518</b>	<b>324,920</b>	<b>-12,598</b>	<b>12,598 ASF surplus beyond space needs for flexibility in opportunity options and implementation</b>

Table 4.2: Opportunities to address the remaining projected growth and strategic vacancy space needs with new construction assuming the Longley Building is to remain as is and the Depot D building is vacated

The following are opportunities for 45,300 ASF of new construction additions to School of Engineering-occupied buildings:

E2	ASF Add*
Wings Demolition	-6,980
Large Addition	+28,600
Net ASF	+21,620

Table 4.3: E2 possible opportunity area tabulation with a large addition  
 \* All numbers are approximate.

UTEB	ASF Add*
Addition	+21,800
Net ASF	+21,800

Table 4.4: UTEB possible opportunity area tabulation  
 \* All numbers are approximate.

C2E2	ASF Add*
Addition	+1,880
Net ASF	+1,880

Table 4.5: C2E2 possible opportunity area tabulation  
 \* All numbers are approximate.



Figure 4.2: Aerial view of the proposed addition to E2



Figure 4.3: Aerial view of the proposed addition to UTEB



Figure 4.4: Site diagram of the proposed addition to C2E2



### Opportunities within Existing Buildings: *Without Longley & Depot D*

Opportunities	Available ASF	Projected ASF	Delta ASF	Notes
<b>Total ASF</b>	<b>270,055</b> (2018 Existing)	<b>324,920</b>	<b>+54,865</b>	Projected ASF is Projected Growth and Strategic Vacancy space need
Recapture ABB CLAS Biology Space	+4,403			Gant North completion in 2023 or Gant West in 2021
Recapture E2 MSE Teaching Lab Space	+3,028			Science 1 completion in 2022
Reconfigure ITE	+2,800			Can occur anytime (efficiency increase, not space addition)
Reconfigure HBL	+3,900			Can occur anytime (2,900 ASF from efficiency increase)
Recapture Longley TIP space	+2,748			Relocate to IPB
Capture Science 1 unallocated space for Mechanical Engineering department	+12,000			Not entire ME department, Science 1 completion in 2022
<b>Total Adjusted ASF (with Opportunities)</b>	<b>298,934</b>	<b>324,920</b>	<b>+25,986</b>	
Vacate Depot D	-6,716			Relocate student clubs and storage to Storrs Campus
<b>Total Adjusted ASF (without Depot D)</b>	<b>292,218</b>	<b>324,920</b>	<b>+32,702</b>	
Demolish Longley	-31,064	+1,982		1,982 ASF additional space needed to replace Longley at idealized PI+5
<b>Total Adjusted ASF (with all opportunities in existing buildings)</b>	<b>261,154</b> (without Longley and Depot D)	<b>326,902</b> (with Longley and Depot D replaced)	<b>+65,748</b>	<b>65,748 ASF needed beyond all opportunities in existing buildings, including replacing Longley and Depot D</b>

Table 4.6: Opportunities to address the projected growth space needs within existing School of Engineering buildings assuming the Longley Building is demolished and the Depot D building is vacated

### Opportunities with New Construction: *Without Longley & Depot D*

Opportunities	Available ASF	Projected ASF	Delta ASF	Notes
<b>Total Adjusted ASF (with all opportunities in existing buildings and without Depot D and Longley)</b>	<b>261,154</b>	<b>326,902</b>	<b>+65,748</b>	Longley existing ASF has been removed from the available ASF
E2 Addition	+21,620			
UTEB Addition	+21,800			
C2E2 Addition	+1,880			
<b>Total Adjusted ASF (with Opportunities)</b>	<b>306,454</b>	<b>326,902</b>	<b>+20,448</b>	<b>20,448 ASF deficit without replacing the Longley Building</b>

Table 4.7: Opportunities to address the remaining projected growth and strategic vacancy space needs with new construction assuming the Longley Building is demolished and the Depot D building is vacated

## 4.3 Conclusion

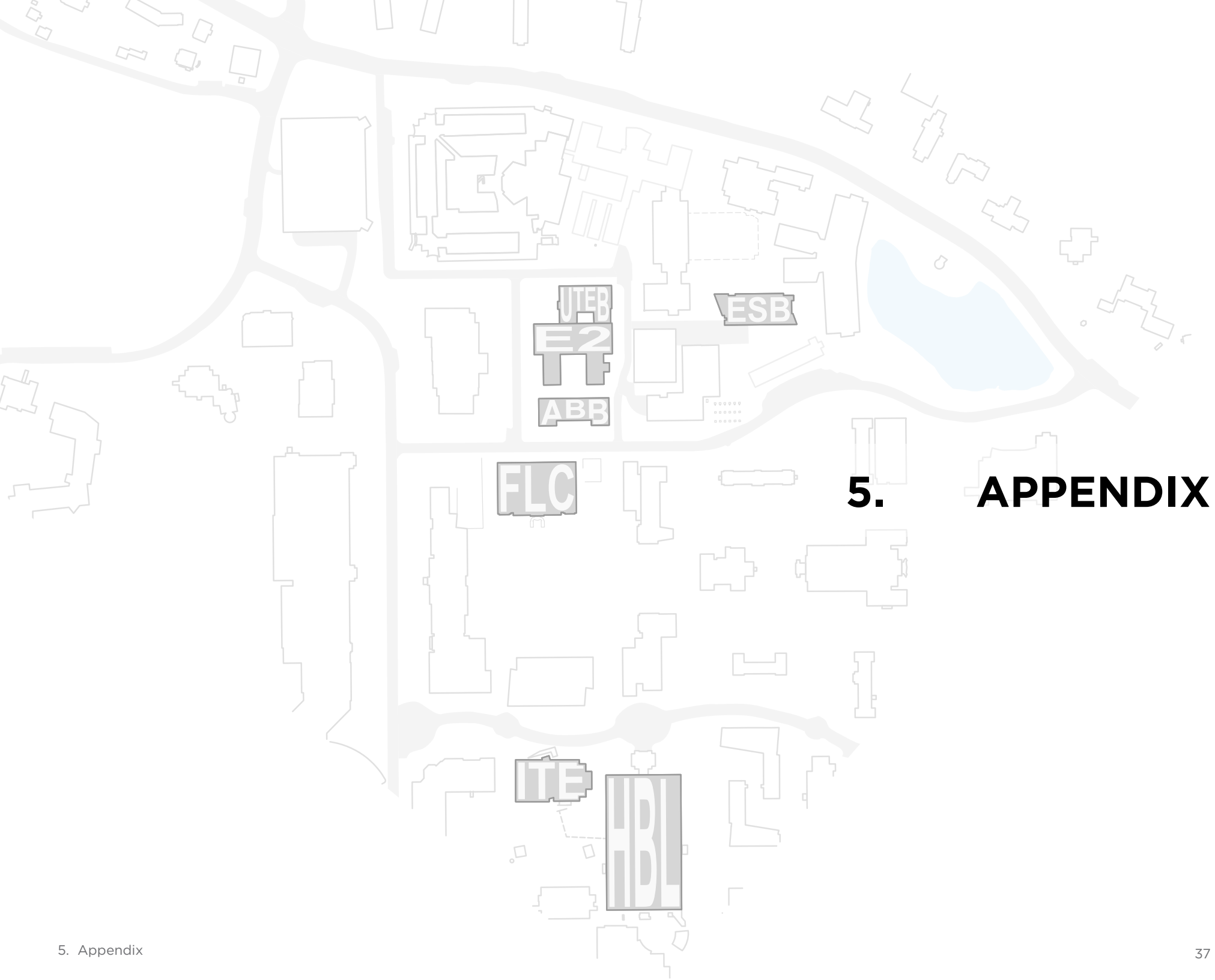
The School of Engineering is projected to grow **by 33 new faculty, 420 graduate students, and 720 undergraduate students**. The School faces two space need issues: the quantity of space needed per growth projections and the quality of the existing Longley and Depot D buildings. If the School grows per the Master Plan projections, **54,865 ASF is needed to meet this growth. Ideally, Longley and Depot D are replaced, adding a need for 39,762 ASF, for a grand total space need for the School of Engineering of 94,627 ASF.**

There are opportunities in existing School of Engineering-occupied buildings to increase efficiency and add space, but this will not satisfy the total projected space needs; additional new space as new construction is required.

The projected growth, strategic vacancy, and replacement of Depot D space needs can be met with opportunities in existing buildings and strategically-placed new construction additions on E2, UTEB, and C2E2. If all opportunities in the Master Plan are implemented, there will be a surplus of space as compared to the 2023 needs, offering flexibility in opportunity options and implementation. However, if existing space in the Longley Building and Depot D are removed from the School of Engineering footprint and not replaced, the opportunities noted within this Master Plan (utilizing existing space and new construction) will not meet the projected 2023 needs.







## 5. APPENDIX

5.1 Site Analysis



Figure 5.1: Aerial photo of Depot Campus  
(base image source: Google Maps)



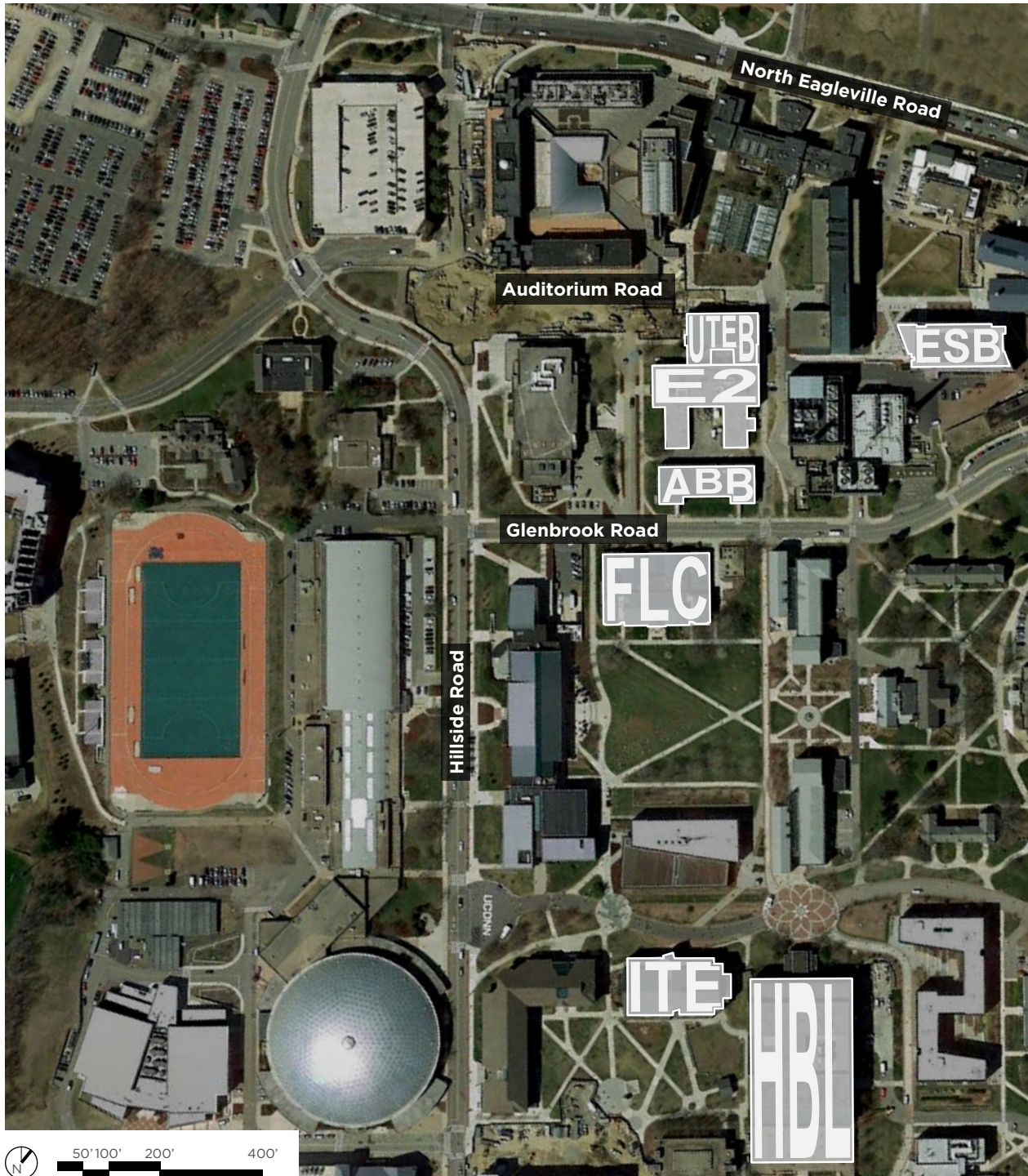


Figure 5.2: Aerial photo of Storrs Campus  
(base image source: Google Maps)

# Campus Circulation: Vehicular

The following site diagrams illustrate the current circulation patterns around the School of Engineering buildings, noting future changes suggested by the 2015 Campus Master Plan.

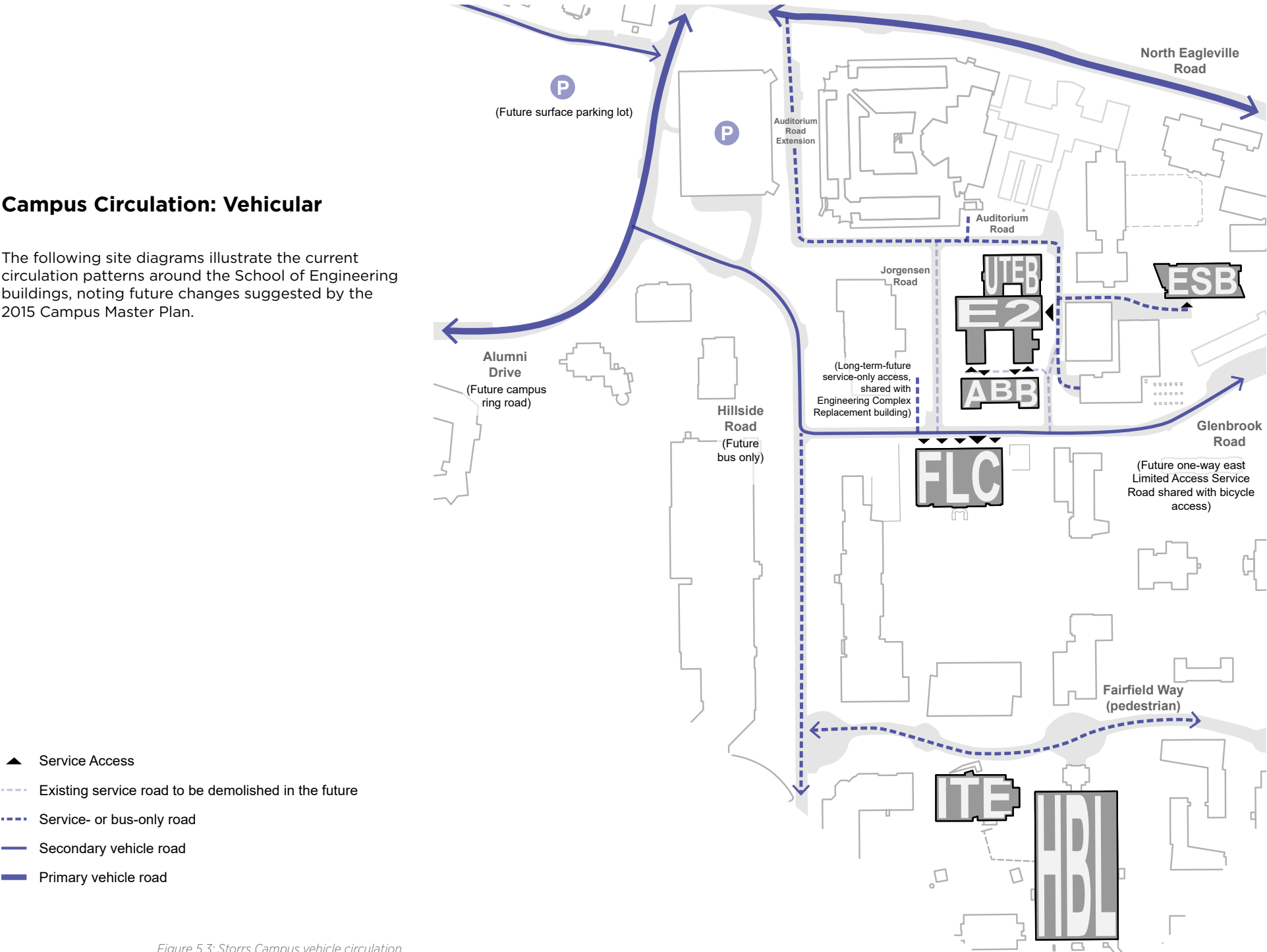


Figure 5.3: Storrs Campus vehicle circulation

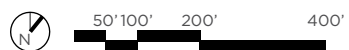


## Campus Circulation: Pedestrian

The future north-south pedestrian landscape axis is envisioned to connect to a potential green space on North Eagleville Road.

- Landscaped courtyard
- Landscaped circulation axis
- ▲ Pedestrian entry
- Tertiary pedestrian path
- Secondary pedestrian path
- Primary pedestrian path

Figure 5.4: Storrs Campus pedestrian circulation



# 5.2 Existing Conditions Analysis

## School of Engineering Building Space Inventories

### Arthur B. Bronwell Hall (ABB)

- Research Labs
- Core Labs
- Teaching Space
- Office Space
- Student Space
- General Support
- Classrooms

2018 Existing ASF

Level	All	SoE-Only
3	9,610	9,610
2	9,095	9,095
1	8,202	2,256
	26,907	20,961

Space Type	All	SoE-Only
Research Labs	8,992	8,174
Core Labs	0	0
Teaching Space	11,987	7,956
Office Space	5,189	4,767
Student Space	0	0
General Support	738	64
	26,907	20,961

Department	All	%
BME	14,759	55%
CBE	1,252	5%
CEE	2,909	11%
CSE	0	0
ECE	1,461	5%
ME & MEM	516	2%
MSE & C2E2	0	0
CTI	0	0
SoE Administration	64	0
Unassigned	0	0
Other	5,946	22%
	26,907	100%

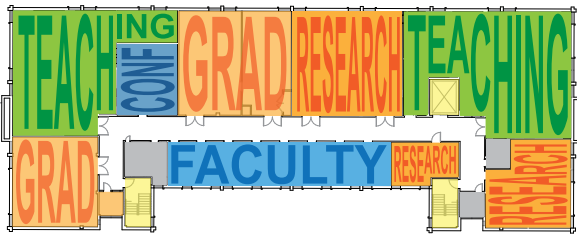


Figure 5.7: Existing Level 3 plan diagram

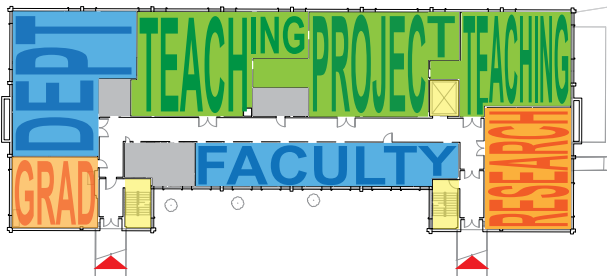


Figure 5.6: Existing Level 2 plan diagram

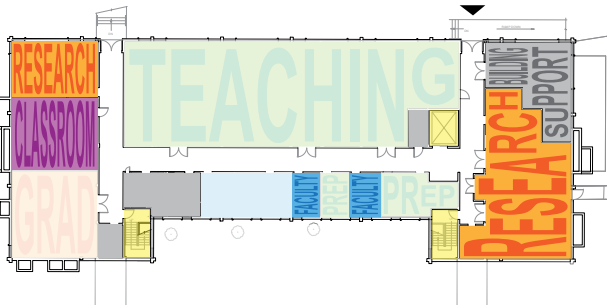
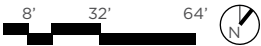


Figure 5.5: Existing Level 1 plan diagram

Tables 5.1-3: ABB 2018 existing ASF inventory





Engineering II (E2)

2018 Existing ASF

Level	All	SoE-Only
3	12,069	8,550
2	11,992	11,992
1	17,838	16,424
	41,899	39,966

Space Type	All	SoE-Only
Research Labs	12,647	12,647
Core Labs	2,798	2,798
Teaching Space	12,738	9,710
Office Space	11,240	11,240
Student Space	420	420
General Support	2,056	151
	41,899	36,966

Department	All	%
BME	138	0
CBE	11,221	27%
CEE	140	0
CSE	156	0
ECE	224	1%
ME & MEM	18,264	44%
MSE & C2E2	0	0
CTI	0	0
SoE Administration	6,823	16%
Unassigned	3,028	7%
Other	1,905	5%
	41,899	100%

Tables 5.4-6: E2 2018 existing ASF inventory

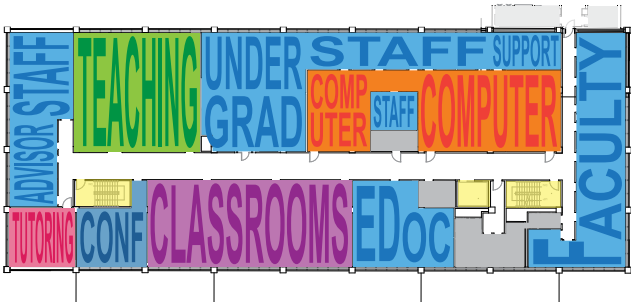


Figure 5.10: Existing Level 3 plan diagram

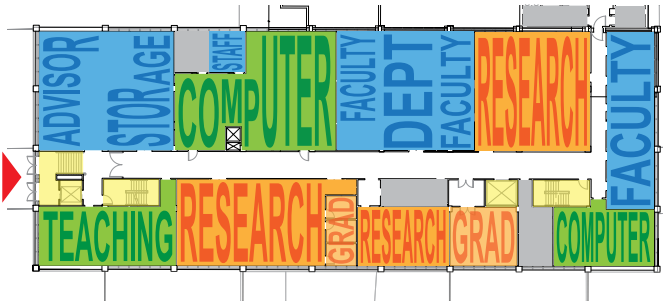


Figure 5.9: Existing Level 2 plan diagram

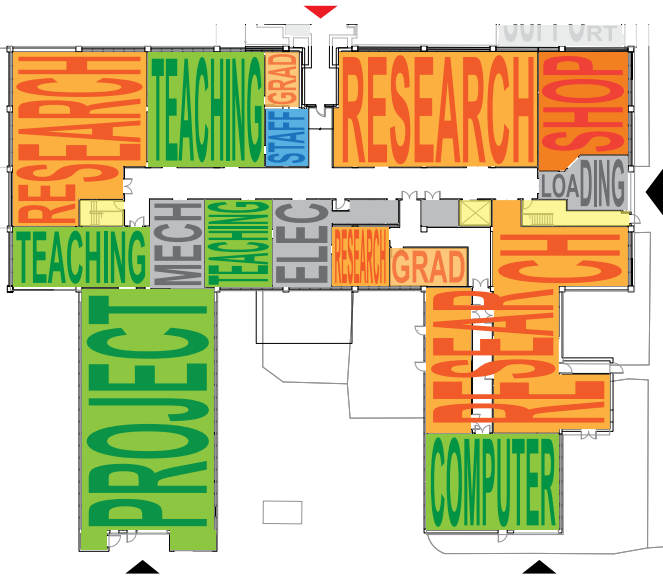


Figure 5.8: Existing Level 1 plan diagram





United Technologies Engineering Building (UTEB)

2018 Existing ASF

Level	All	SoE-Only
5	2,338	2,190
4	6,827	6,827
3	6,432	6,432
2	6,597	6,597
1	5,829	3,185
	28,022	25,230

Space Type	All	SoE-Only
Research Labs	12,505	12,505
Core Labs	2,351	2,351
Teaching Space	0	0
Office Space	10,060	10,060
Student Space	314	314
General Support	2,642	0
	28,022	25,230

Department	All	%
BME	0	0
CBE	10,324	37%
CEE	0	0
CSE	0	0
ECE	0	0
ME & MEM	12,555	45%
MSE & C2E2	0	0
CTI	0	0
SoE Administration	2,351	8%
Unassigned	0	0
Other	2,642	9%
	28,022	100%

Tables 5.7-9: UTEB 2018 existing ASF inventory

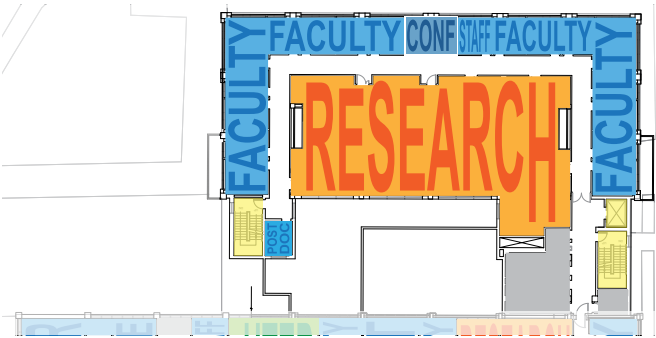


Figure 5.12: Existing Level 2 plan diagram

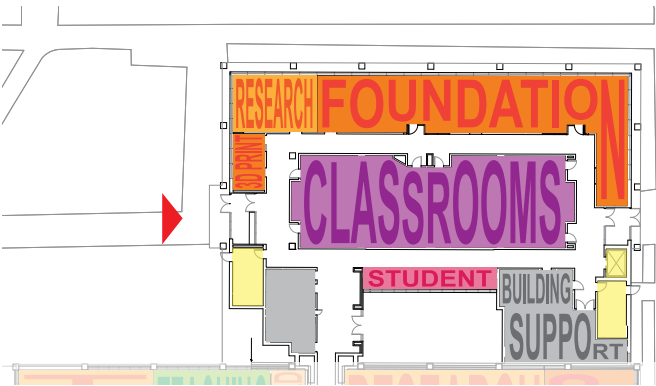


Figure 5.11: Existing Level 1 plan diagram

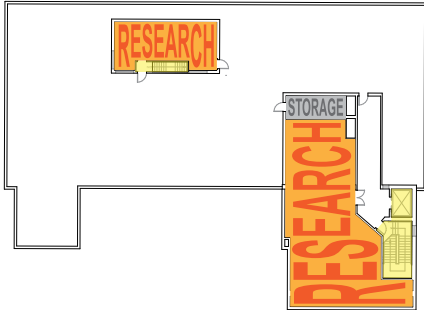


Figure 5.15: Existing Level 5 plan diagram



Figure 5.14: Existing Level 4 plan diagram

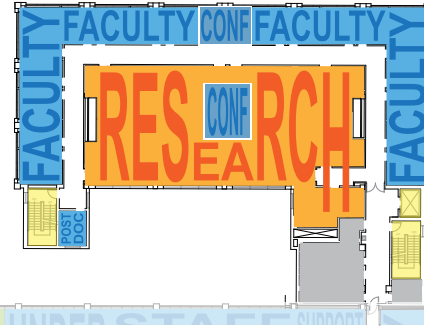
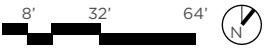


Figure 5.13: Existing Level 3 plan diagram



Franklin L. Castleman Building (FLC)

2018 Existing ASF

Level	All	SoE-Only
3	7,079	7,079
2	11,551	8,010
1	23,274	23,274
	41,904	38,363

Space Type	All	SoE-Only
Research Labs	6,123	6,123
Core Labs	8,522	8,522
Teaching Space	12,827	12,827
Office Space	10,345	10,345
Student Space	546	546
General Support	3,541	0
	41,904	38,363

Department	All	%
BME	787	2%
CBE	0	0
CEE	23,976	57%
CSE	0	0
ECE	0	0
ME & MEM	3,368	8%
MSE & C2E2	0	0
CTI	0	0
SoE Administration	10,232	25%
Unassigned	0	0
Other	3,541	8%
	41,904	100%

Tables 5.10-12: FLC 2018 existing ASF inventory

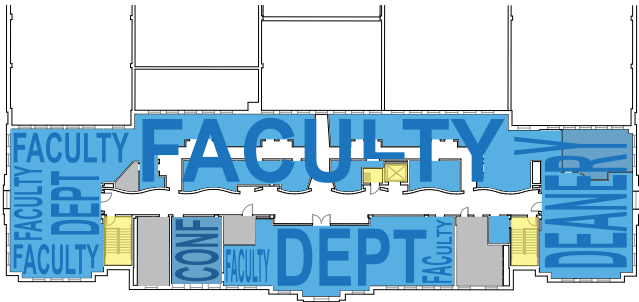


Figure 5.18: Existing Level 3 plan diagram

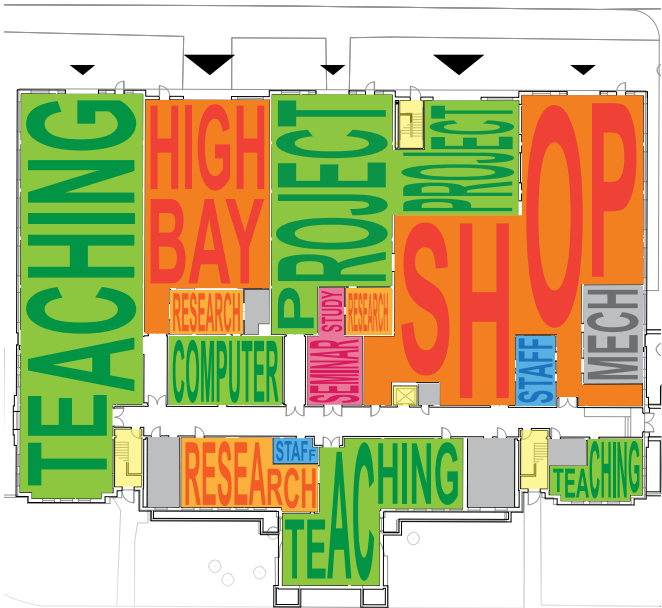
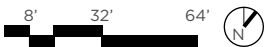


Figure 5.16: Existing Level 1 plan diagram



Figure 5.17: Existing Level 2 plan diagram



## Information Technologies Engineering (ITE)

## 2018 Existing ASF

Level	All	SoE-Only
4	11,746	11,746
3	12,463	11,264
2	11,700	11,700
1	14,154	6,862
0	11,268	9,512
	61,330	51,084

Space Type	All	SoE-Only
Research Labs	17,856	17,856
Core Labs	2,245	2,245
Teaching Space	9,116	9,116
Office Space	18,223	18,223
Student Space	3,643	3,644
General Support	10,246	0
	61,330	51,084

Department	All	%
BME	0	0
CBE	0	0
CEE	0	0
CSE	22,924	37%
ECE	25,382	41%
ME & MEM	0	0
MSE & C2E2	0	0
CTI	0	0
SoE Administration	2,778	5%
Unassigned	0	0
Other	10,246	17%
	<b>61,330</b>	<b>100%</b>

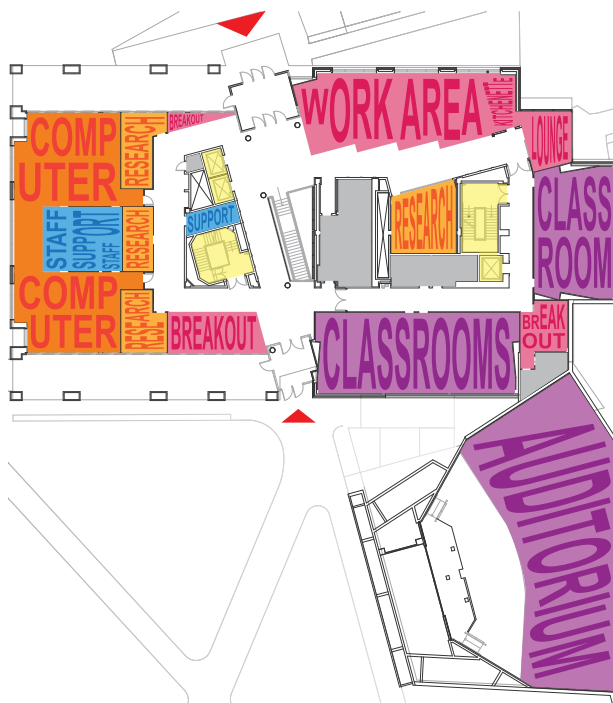


Figure 5.20: Existing Level 1 plan diagram

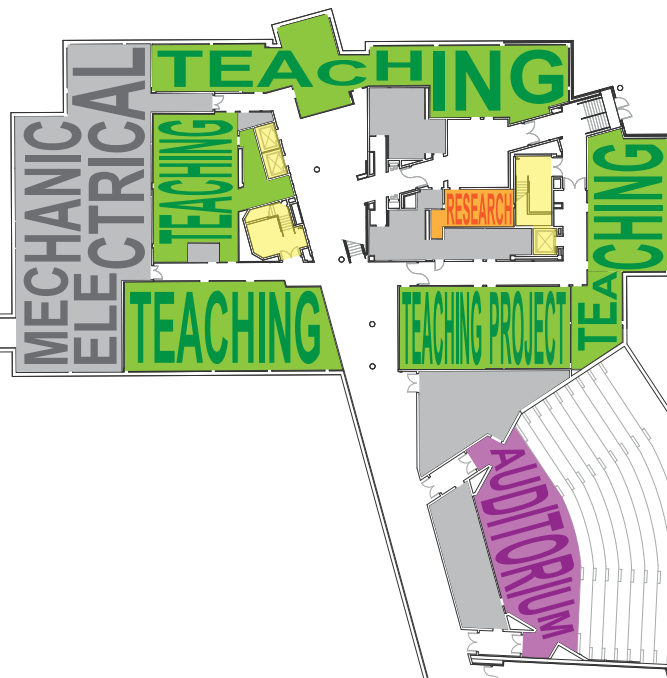


Figure 5.19: Existing Level 0 plan diagram

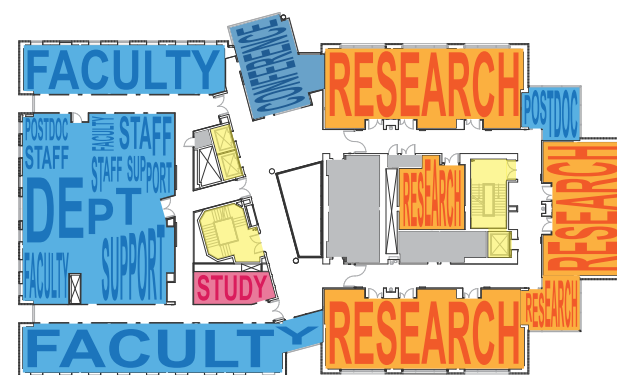


Figure 5.23: Existing Level 4 plan diagram

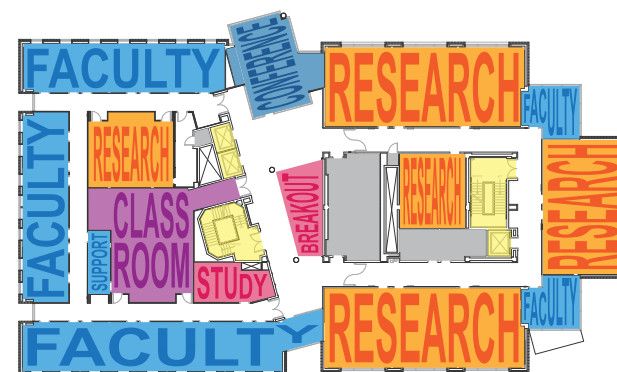


Figure 5.22: Existing Level 3 plan diagram

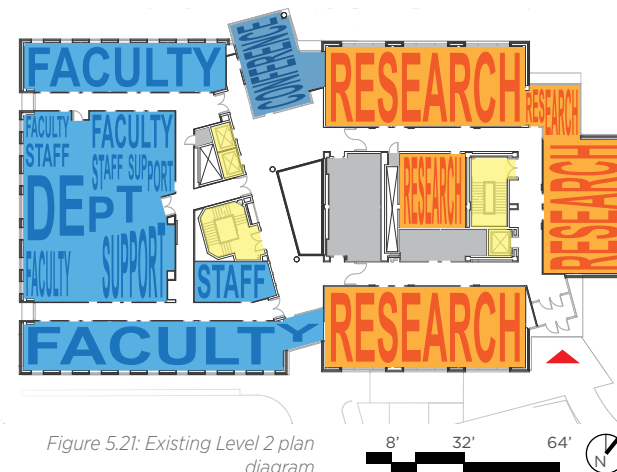


Figure 5.21: Existing Level 2 plan diagram

Homer Babbidge Library (HBL)

2018 Existing ASF

Level	All	SoE-Only
A	34,469	13,748
	34,469	13,748
Space Type	All	SoE-Only
Research Labs	10,494	10,494
Core Labs	0	0
Teaching Space	0	0
Office Space	8,338	2,770
Student Space	446	298
General Support	15,265	186
	34,469	13,748
Department	All	%
BME	129	0
CBE	0	0
CEE	0	0
CSE	4,368	13%
ECE	7,712	22%
ME & MEM	0	0
MSE & C2E2	0	0
CTI	0	0
SoE Administration	1,539	5%
Unassigned	0	0
Other	20,721	60%
	34,469	100%

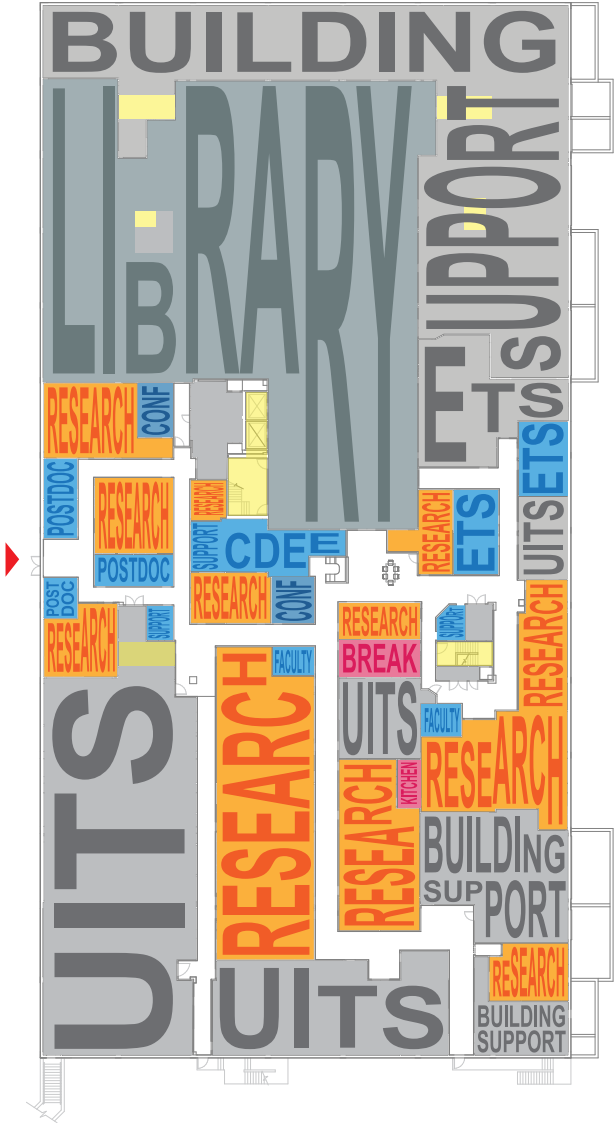


Figure 5.24: Existing Level A plan diagram

Tables 5.16-18: HBL 2018 existing ASF inventory

2018 Existing ASF

Level	All	SoE-Only
5	12,421	12,421
4	12,349	12,349
1	10,512	9,221
	35,282	33,990

Space Type	All	SoE-Only
Research Labs	31,311	31,311
Core Labs	0	0
Teaching Space	0	0
Office Space	2,099	2,099
Student Space	1,873	580
General Support	0	0
	35,282	33,990

Department	All	%
BME	7,092	20%
CBE	5,097	14%
CEE	1,446	4%
CSE	208	1%
ECE	5,015	14%
ME & MEM	10,843	30%
MSE & C2E2	4,289	12%
CTI	0	0
SoE Administration	0	0
Unassigned	0	0
Other	1,292	4%
	35,282	100%



Figure 5.27: Existing Level 5 plan diagram



Figure 5.26: Existing Level 4 plan diagram

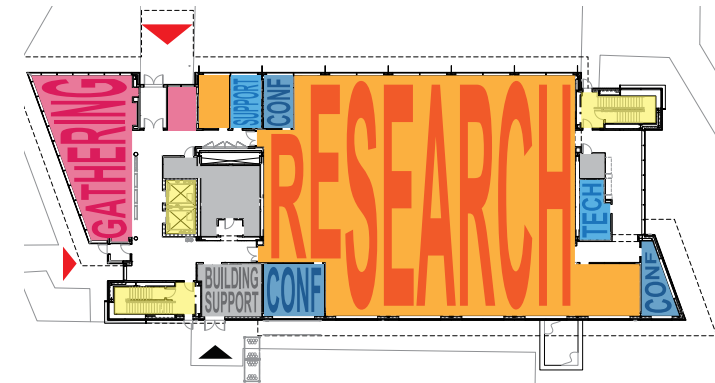


Figure 5.25: Existing Level 1 plan diagram

2018 Existing ASF

Level	All	SoE-Only
1	11,933	11,933
	11,933	11,933
Space Type	All	SoE-Only
Research Labs	4,374	4,374
Core Labs	4,257	4,257
Teaching Space	0	0
Office Space	3,302	3,302
Student Space	0	0
General Support	0	0
	11,933	11,933
Department	All	%
BME	0	0
CBE	3,483	29%
CEE	0	0
CSE	0	0
ECE	993	8%
ME & MEM	2,933	25%
MSE & C2E2	4,524	38%
CTI	0	0
SoE Administration	0	0
Unassigned	0	0
Other	0	0
	11,933	100%

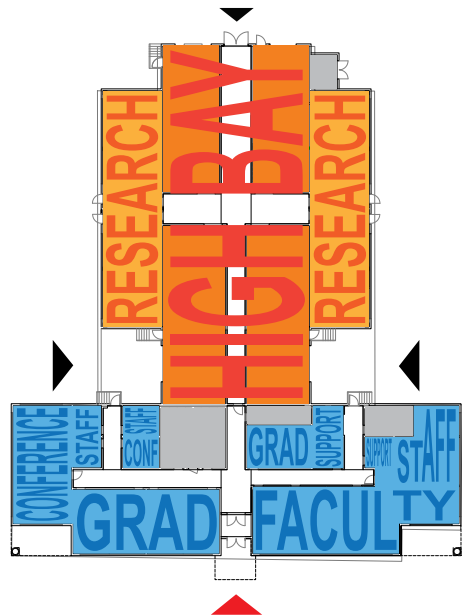


Figure 5.28: Existing Level 1 plan diagram



Longley Building (LONG)

2018 Existing ASF

Level	All	SoE-Only
2	6,907	5,259
1	26,905	25,804
	33,812	31,064

Space Type	All	SoE-Only
Research Labs	16,381	14,844
Core Labs	0	0
Teaching Space	0	0
Office Space	7,315	6,122
Student Space	1,246	1,246
General Support	8,871	8,852
	33,812	31,064

Department	All	%
BME	0	0
CBE	0	0
CEE	623	2%
CSE	0	0
ECE	2,448	7%
ME & MEM	2,006	6%
MSE & C2E2	0	0
CTI	17,135	51%
SoE Administration	8,852	26%
Unassigned	0	0
Other	2,748	8%
	33,812	100%

Tables 5.25-27: LONG 2018 existing ASF inventory



Figure 5.29: Existing Level 1 plan diagram

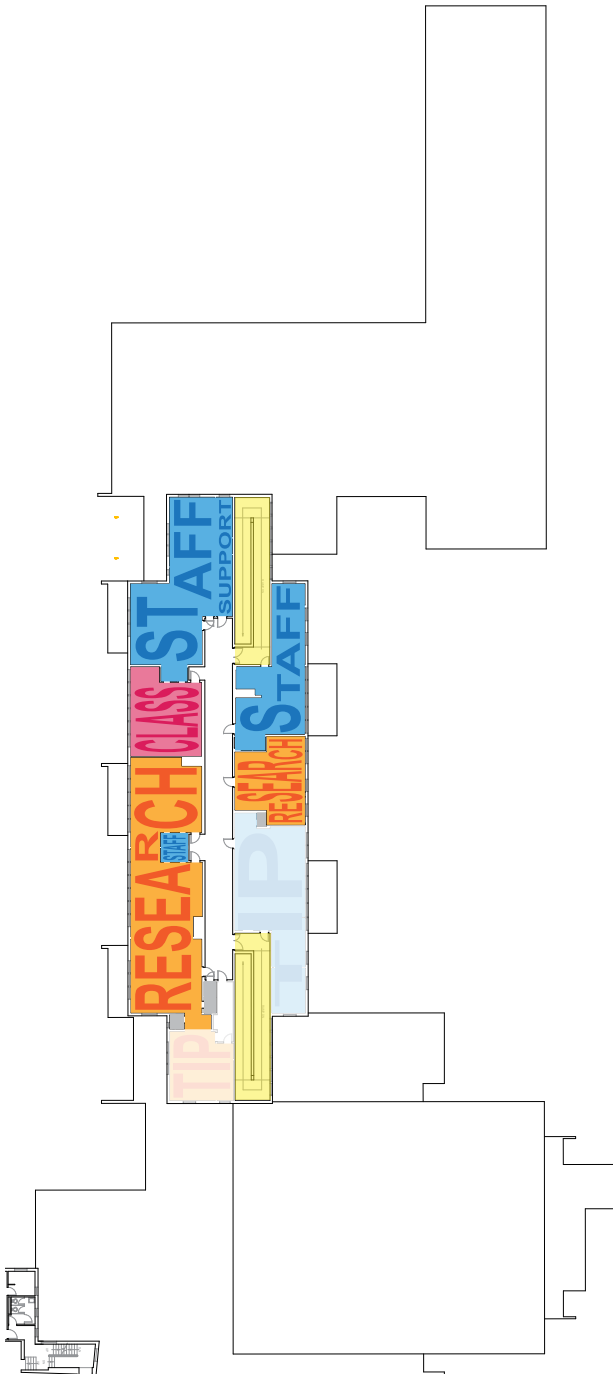


Figure 5.30: Existing Level 2 plan diagram



Depot D (DD)

2018 Existing ASF

Level	All	SoE-Only
1	8,505	6,716
	8,505	6,716
Space Type	All	SoE-Only
Research Labs	0	0
Core Labs	0	0
Teaching Space	0	0
Office Space	0	0
Student Space	5,431	5,431
General Support	3,074	1,285
	8,505	6,716
Department	All	%
BME	0	0
CBE	0	0
CEE	1,129	13%
CSE	0	0
ECE	0	0
ME & MEM	4,302	51%
MSE & C2E2	0	0
CTI	1,285	15%
SoE Administration	0	0
Unassigned	0	0
Other	1,789	21%
	8,505	100%

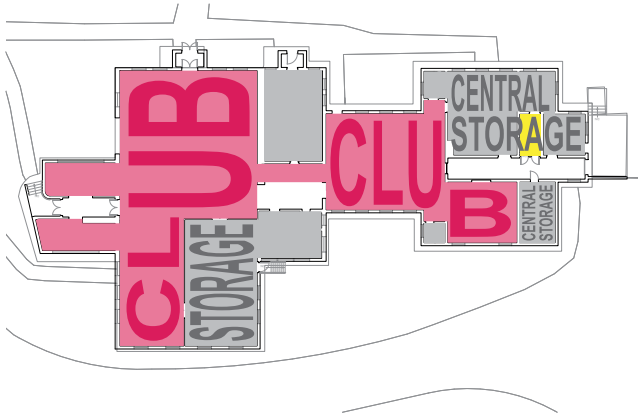


Figure 5.31: Existing Level 1 plan diagram



## School of Engineering Research Centers

The majority of the School of Engineering research centers are located on the Depot Campus. The Connecticut Transportation Institute (CTI) and the Center for Clean Energy & Engineering (C2E2) are the largest centers on the Campus. CTI works with the Connecticut Department of Transportation in multidisciplinary research, education and promoting transportation safety. C2E2 is a multidisciplinary center developing clean, efficient energy systems.

The Storrs Campus has primarily department-assigned research centers; the Booth Engineering Center for Advanced Technology (BECAT) is located in the sub-basement of Babbidge Library, and the Synchrony Financial Center of Excellence in Cybersecurity is located in the Information Technologies Engineering Building.

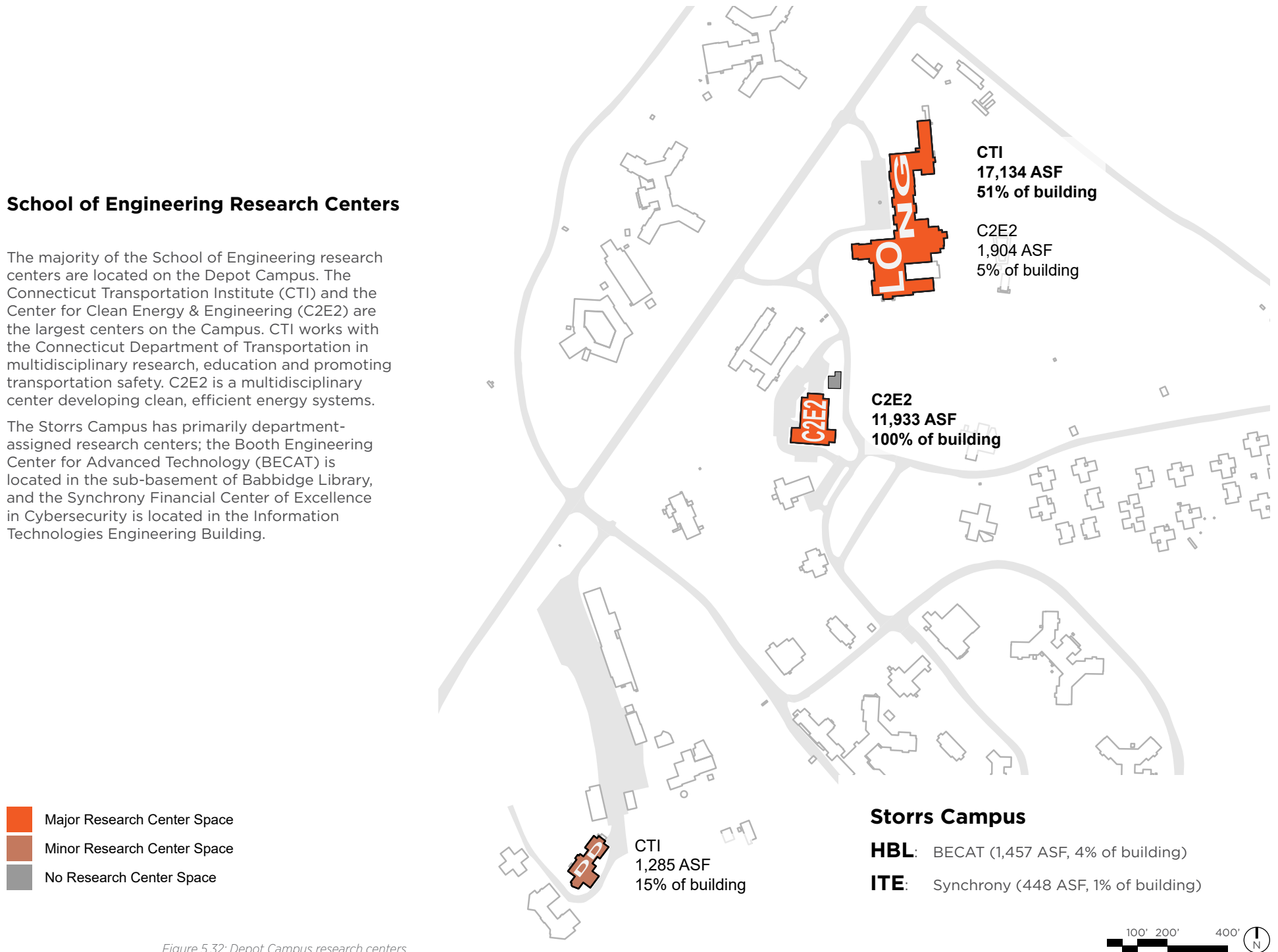
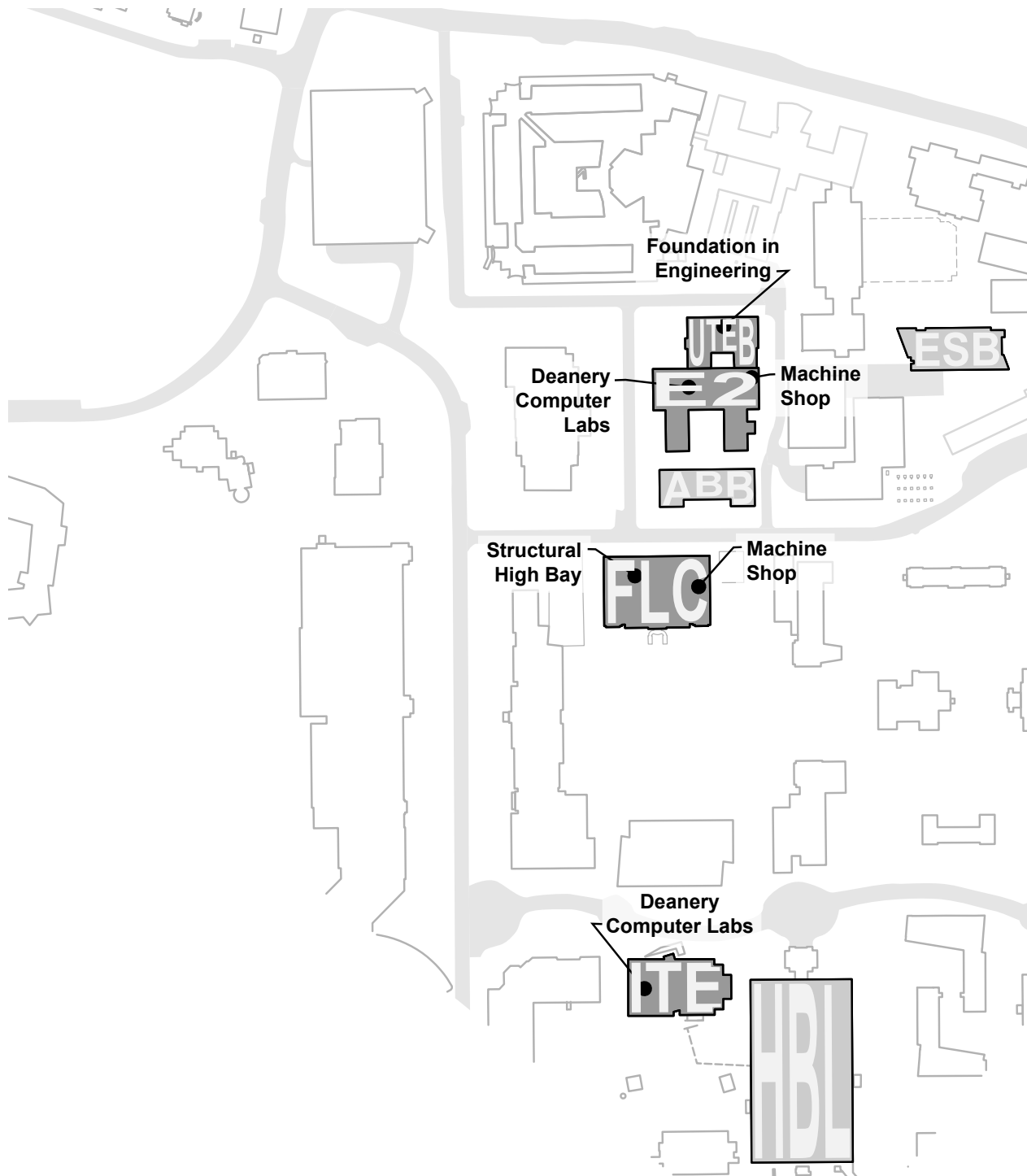


Figure 5.32: Depot Campus research centers



## School of Engineering Core Labs

Core labs are defined as facilities that are shared by multiple departments, or specialty spaces that provide a unique resource. These include the Deanery-managed computer labs and Foundation in Engineering lab space and department-assigned high bay lab and machine shop spaces.

Figure 5.33: Storrs Campus core labs

Registrar Classrooms

Centrally scheduled classrooms located within the School of Engineering buildings are typically scheduled for School of Engineering courses. In UTEB, every course scheduled in its classrooms is for School of Engineering students.

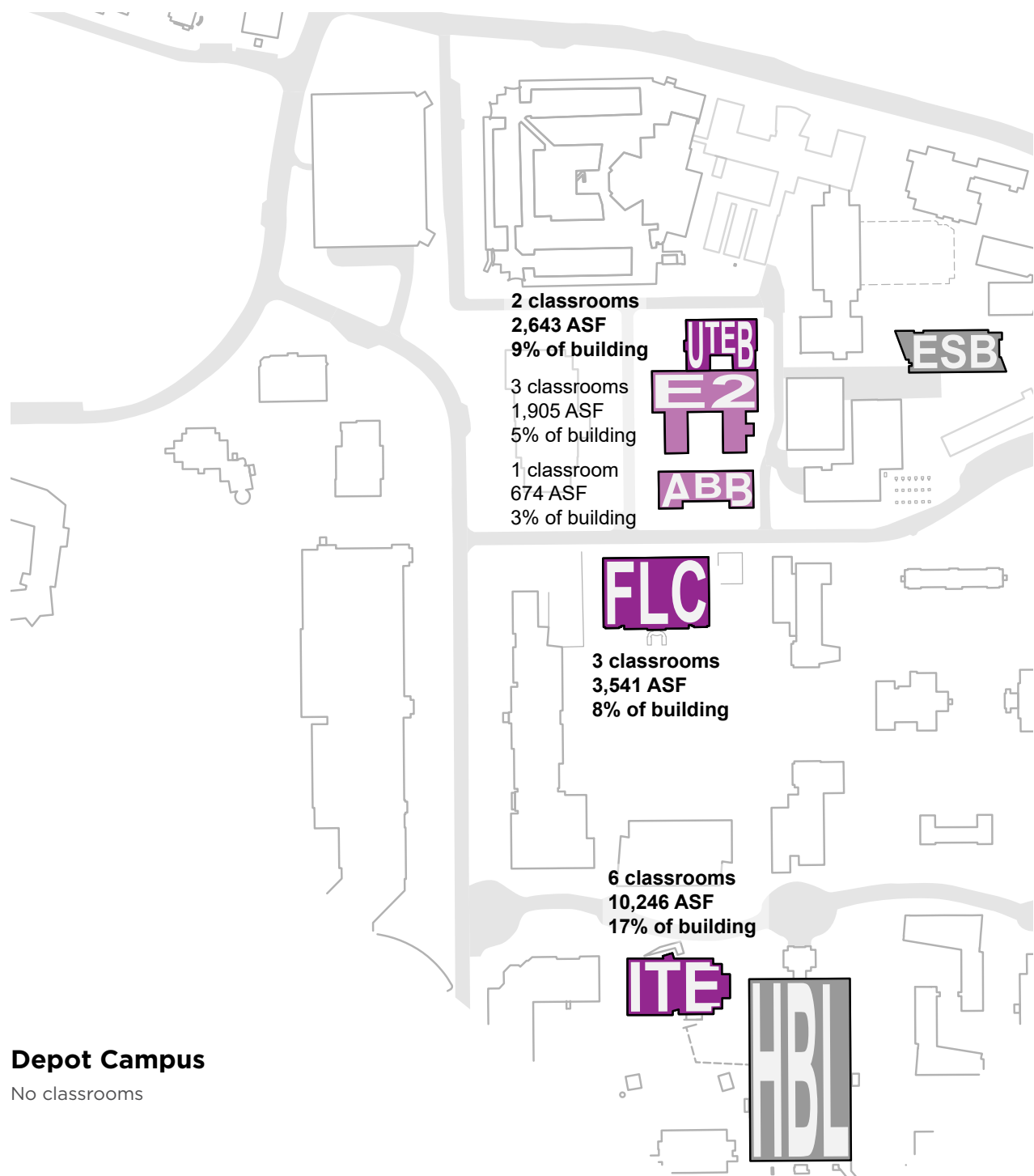
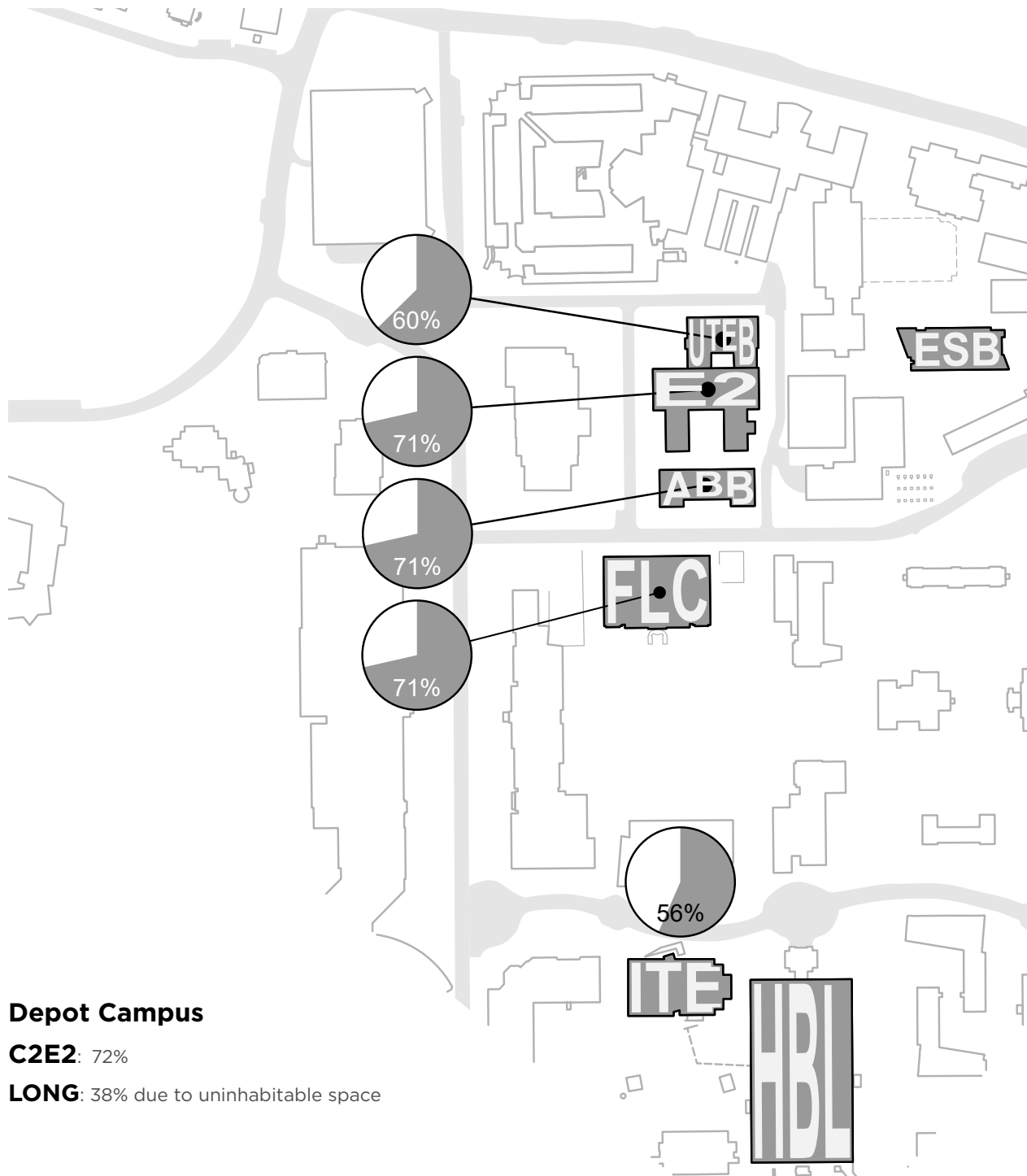


Figure 5.34: Storrs Campus Registrar classrooms



### School of Engineering Building Assignable-to-Gross Efficiency

Building assignable-to-gross efficiency measures the usable (assignable) floor area, as opposed to non-assignable (gross) area.

E2, ABB and FLC are organized along a central double-loaded corridor with offices on one side and laboratories on the opposite side producing maximum efficiency.

On the Depot Campus, the Longley Building is encumbered by a large percentage of the building being uninhabitable; this reduces the usable assignable area significantly. C2E2 is highly efficient, utilizing a double-loaded corridor organization and exterior mechanical systems. There is insufficient data for Depot D on the Depot Campus.

As the School of Engineering is a partial-occupant of ESB and HBL, their efficiencies are not shown.

Figure 5.35: Storrs Campus building efficiency

# 5.3 Space Needs Analysis

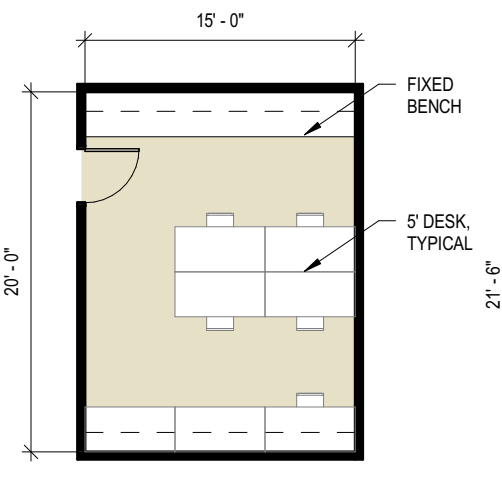


Figure 5.36: Computational lab module for PI+5  
(60 ASF per lab workstation: lab and write-up)  
(Total computational lab ASF per PI: 300 ASF)

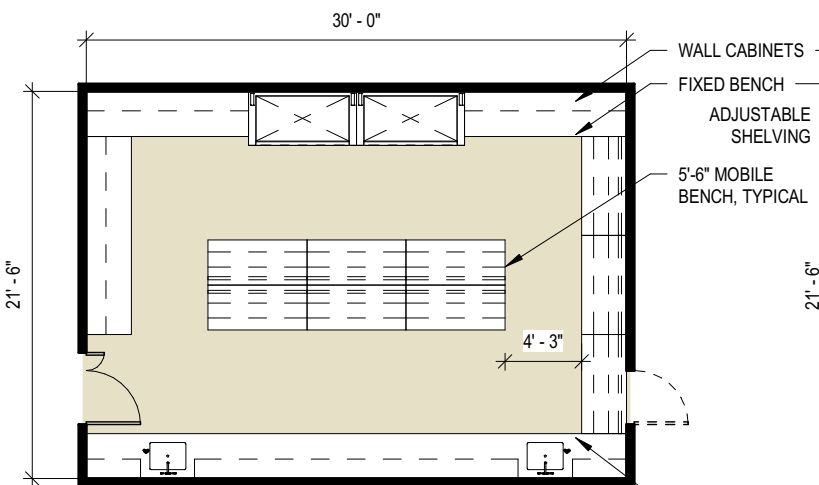


Figure 5.37: Wet lab module for PI+5 research group size  
(160 ASF per lab workstation: 130 lab + 30 write-up ASF)  
(Total wet lab ASF per PI: 800 ASF)

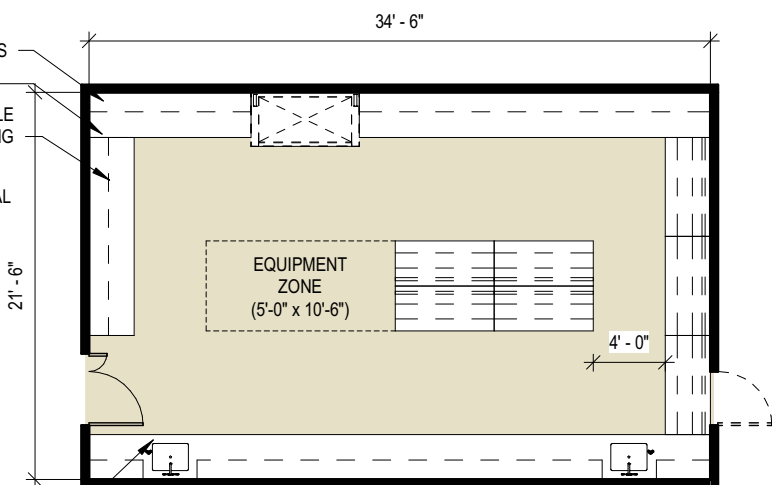


Figure 5.39: Hybrid lab module for PI+5 research group size  
(180 ASF per lab workstation: 150 lab + 30 write-up ASF)  
(Total hybrid lab ASF per PI: 900 ASF)

+

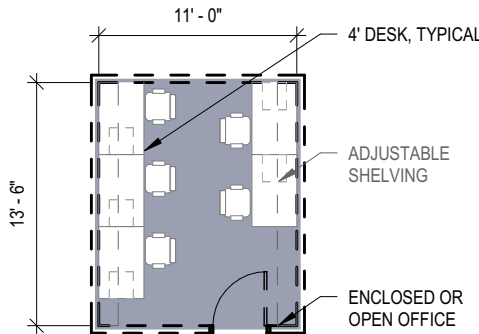


Figure 5.38: Grad student write-up space for PI+5 research group size  
(160 ASF per lab workstation: 130 lab + 30 write-up ASF)

No separate graduate student write-up space  
is provided for computational labs.

+

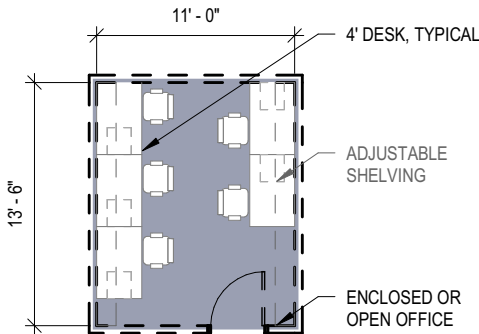


Figure 5.40: Grad student write-up space for PI+5 research group size  
(180 ASF per lab workstation: 150 lab + 30 write-up ASF)

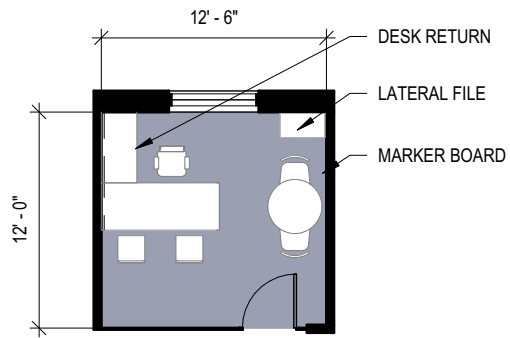


Figure 5.41: Department Chair and Director office module (150 ASF/FTE)

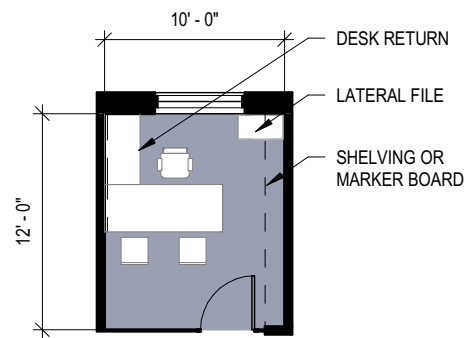


Figure 5.42: Research and Teaching Faculty office module (120 ASF/FTE)

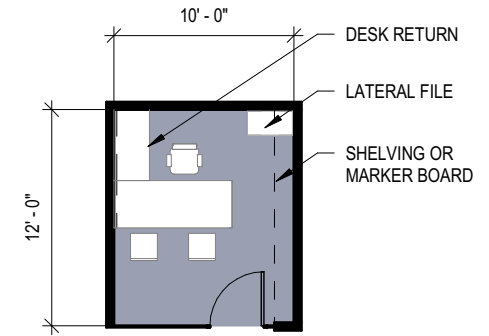


Figure 5.43: Research Scientist and Lab Manager office module (120 ASF/FTE)

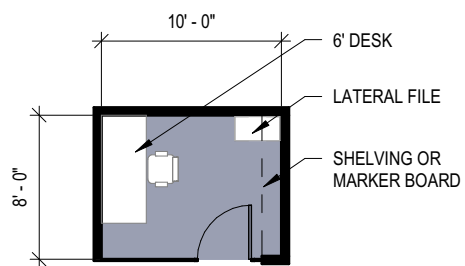


Figure 5.44: Visiting and Adjunct Faculty office module (80 ASF/FTE)

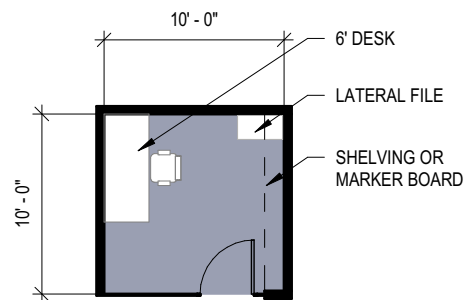


Figure 5.45: Senior Staff office module (100 ASF/FTE)

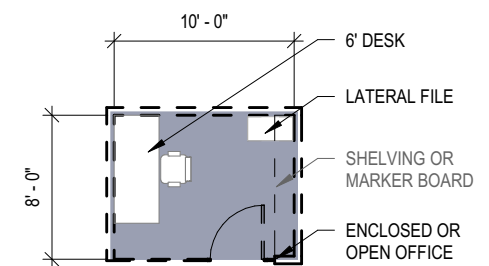


Figure 5.46: General Staff office module (80 ASF/FTE)



# 5.4 Opportunities by Building

The following pages are a breakdown of observations and opportunities for each building. The opportunities provide options to meet the projected space needs.

## Arthur B. Bronwell Hall (ABB)

Storrs Campus



Figure 5.47: View of ABB from Glenbrook Road (source: UConn Maps)

Opportunity	Area Add
CLAS Laboratories recaptured	+4,403
Net SoE ASF change	+4,403

Table 5.31: ABB possible opportunity area tabulation

## Observations & Opportunities

### Organization

- ABB will remain focused on biomedical engineering and CEE computation laboratories.
- In 2023, the College of Liberal Arts and Sciences Biology laboratories located on the first floor of ABB are planned to move into the newly-renovated Gant Science Complex (+4,403 ASF).
- The plan-north lab zone would benefit from a reorganization. A clean plan organization increases optimization, grouping similar space types for modularization and flexible expansion. This will also remove non-lab space from the lab zone that underutilizes the building, such as conference or graduate student write-up space.

### Offices

- The building has the physical capacity for 26 offices if the office zone is renovated to leave all existing offices as is, bisect all double-wide offices and remove all non-office space types. This will support the forecasted BME faculty and nine CEE faculty.

### Summary

With all of the possible opportunities at ABB, an additional 4,403 ASF could be added to the School of Engineering, satisfying BME growth and providing space for another department, such as CEE.

## Engineering II (E2)

Storrs Campus



Figure 5.48: View of E2 from Jorgenson Road

### Observations & Opportunities

#### Organization

- Ideally, E2 will be refocused on chemical and biomolecular engineering. The ME Department also has a large amount of space in E2, but given its connection to UTEB it is appropriate to remain interdisciplinary.
- Reassign the MSE teaching labs in E2 to the School of Engineering in 2022 at the completion of the Science 1 Building (3,028 ASF).
- The building would benefit from a reorganization to create better efficiency and utilization of the existing spaces.

#### Building Opportunities

- The Undergraduate Office is located on the second floor; the building is tasked with creating a welcoming experience for prospective students.

#### Core Labs

- Per Group discussion, it is desired to relocate the machine shop currently in E2 to FLC, combining it with the larger core machine shop.

#### Offices

- E2 currently has 19 faculty offices, short of the future CBE need (23 faculty). The need can be met either with a minor renovation or reassigning faculty into advisor offices.

#### Student Space

- Currently underutilized, the east wing high bay space with an overhead door would be better suited as student project space. Infilling the existing corridor could create a large flexible open space (+440 ASF).

### Courtyard Infill

The existing open courtyard between the two E2 wings provides an infill opportunity, possibly for flexible high bay Strategic Vacancy space. Its central location lends itself to being a shared resource. This addition could create 4,100 ASF.

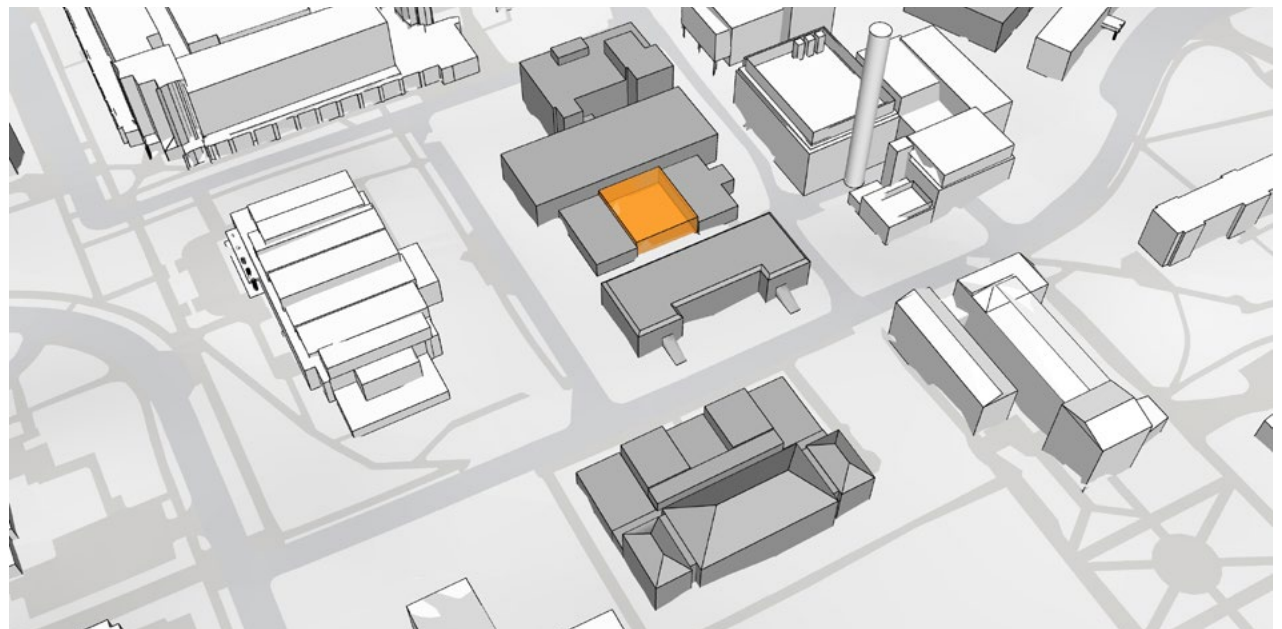
### Summary 1 (Courtyard Infill)

With all of the possible opportunities at E2, an additional 7,568 ASF could be available to the School of Engineering.

Opportunity	Available	Area Add*
Capture MSE teaching labs	+3,028	
Plan-east wing renovation		+440
Courtyard infill		+4,100
Net SoE ASF change	+3,028	+4,540

Table 5.32: E2 possible opportunity area tabulation with a courtyard infill

\* All numbers are approximate.



Existing School of Engineering Building Proposed Addition

Figure 5.49: Aerial view of the proposed courtyard infill to E2

Large Addition

Both existing wings provide high bay space; if removed, the open area offers an opportunity to create a large addition. A three-story plus penthouse addition could add 28,600 ASF.

Summary 2 (Large Addition)

With all of the possible opportunities at E2, an additional 24,648 ASF could be available to the School of Engineering.

Opportunity	Available	Area Add*
Capture MSE teaching labs	+3,028	
Wings Demolition		-6,980
Large Addition		+28,600
Net SoE ASF change	+3,028	+21,620

Table 5.33: E2 possible opportunity area tabulation with a large addition  
\* All numbers are approximate.

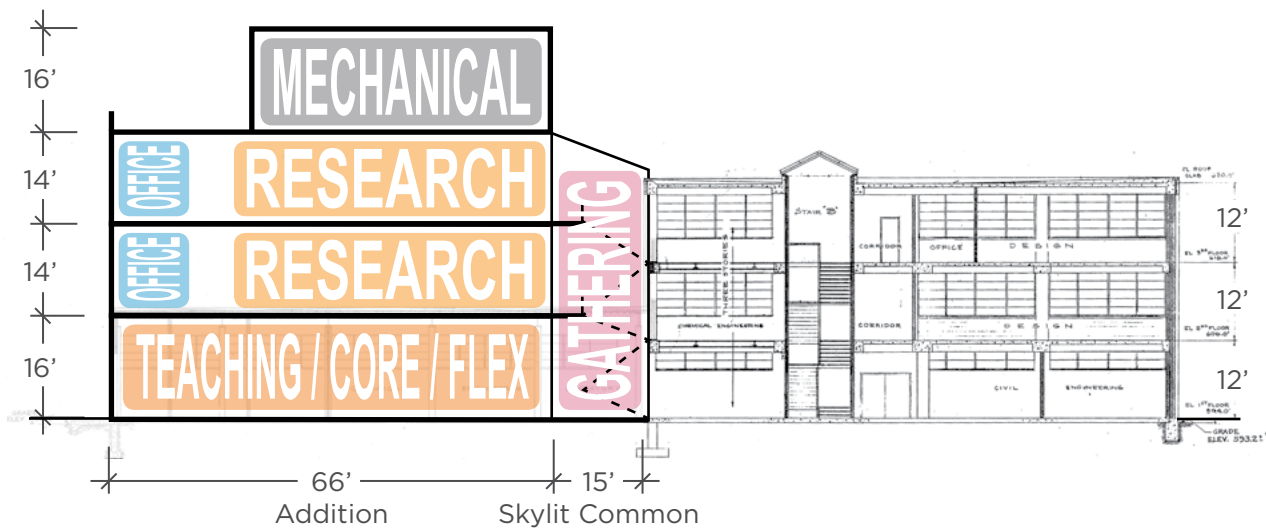


Figure 5.50: Section view of proposed addition



Figure 5.51: Aerial view of the proposed addition to E2

# United Technologies Engineering Building (UTEB)

Storrs Campus



Figure 5.52: View of UTEB from service road

## Observations & Opportunities

### Organization

- Ideally, UTEB will be refocused on mechanical engineering. The CBE Department also has a large amount of space in UTEB, but given its connection to E2, it is appropriate to remain interdisciplinary.

### Research Labs

- Grad student write-up and conference space within the inner lab zone is recommended to move to the office perimeter. This will give daylight to this office space and use the lab zone to its highest and best use: research lab space.

### Offices

- UTEB has the physical capacity for 46 offices if the Level 3 double-wide faculty offices are bisected to match Levels 2 and 3. This will satisfy the future ME forecasted growth of 44 faculty.

### Addition

- An addition could be located at the northwest corner and could add 20,500 ASF. In addition, the existing courtyard could be enclosed to create a skylit student gathering space, adding 1,300 ASF for a total of 21,800 ASF.

### Summary

With all of the possible opportunities at UTEB, an additional 21,800 ASF could be added to the School of Engineering. This will satisfy the ME and CBE growth, provide student space and could allow for ECE growth space not able to fit in ITE and HBL.



Figure 5.53: Aerial view of the proposed addition to UTEB

Opportunity	Area Add*
Addition	+21,800
Net SoE ASF change	+21,800

Table 5.34: UTEB possible opportunity area tabulation

\* All numbers are approximate.

## Franklin L. Castleman Building (FLC)

Storrs Campus



Figure 5.54: View of FLC from the quad

### Observations & Opportunities

#### Organization

- Ideally, FLC will remain focused on the Office of the Dean administrative offices and civil and environmental engineering. As all CEE research, teaching and office space (both currently and with future growth) will not fit in the existing FLC building, Bronwell Hall is recommended as a secondary building for CEE, namely the CEE grad student write-up, office and research space.
- The Engineering Financial Services is ideally located adjacent to the Office of the Dean administrative offices.

#### Building Opportunities

- Future development beyond the existing building is not possible due to site constraints.
- As the home of the Deanery, FLC is tasked with creating a welcoming experience for prospective students.

#### Office

- There are currently 28 occupied offices within the building; it cannot support the future projected growth forecasted for the CEE department. Additional faculty offices are recommended to be located in ABB.
- The graduate student space on Level 2 is recommended to move to ABB to allow for Deanery administrative office space expansion.

#### Summary

Opportunities in FLC will not satisfy all of the CEE growth space, needing to overflow into another School of Engineering building, such as ABB.



## Information Technologies Engineering Building (ITE)

Storrs Campus



Figure 5.55: View of ITE from Fairfield Way (source: UConn ETS)

### Observations & Opportunities

#### Organization

- ITE will likely remain focused on computer science and electrical engineering. The growth space need of CSE and ECE exceeds the capacity of ITE.

#### Research Labs

- An analysis of existing lab workstation counts suggests most labs are underutilized; by increasing station density, it may be possible to gain a theoretically available 2,800 ASF.
- The existing labs are underutilized with computational laboratories and graduate write-up spaces; these spaces are recommended to be relocated to HBL.

#### Office

- The current configuration of faculty offices cannot meet the future need of CSE and ECE (total projected growth of 82 combined). With only 61 existing faculty offices, future faculty will likely need to be located in another building. Staff and office support space are recommended to be assessed.
- Per School of Engineering feedback, the CSE department office is in need of expansion.

#### Summary

With all of the possible opportunities in ITE, an additional 2,800 ASF could be added to the School of Engineering. This will not satisfy the CSE and ECE expected growth requirements.

Opportunity	Available*	Area Add*
Efficiency increase	+2,800	
Net SoE ASF change	+2,800	0

Table 5.35: ITE possible opportunity area tabulation

\* All numbers are approximate.



# Homer Babbidge Library (HBL)

Storrs Campus



Figure 5.56: View of HBL from Fairfield Way (source: John Phelan)

## Observations & Opportunities

### Organization

- Ideally, HBL will be refocused on computer science and electrical engineering.
- It is desired to move ETS out of HBL and consolidate the group in E2 (970 ASF relocated).
- It is desired to move CDEE to FLC (570 ASF relocated).

### Building Opportunities

- With ETS and CDEE ideally moving out of HBL, there is an opportunity to reorganize the floor plan to increase usable square feet and provide spaces in line with the Master Plan’s metrics (+3,900 ASF).

### Summary

With all of the possible opportunities at HBL, an additional 3,900 ASF could be added to the School of Engineering. This will not satisfy the CSE or ECE forecasted growth.



Figure 5.57: Possible more efficient program zone (orange) layout

Opportunity	Available*	Area Add*
Corridor layout		+1,000
Efficiency increase	+2,900	
Net SoE ASF change	+2,900	+1,000

Table 5.36: HBL possible opportunity area tabulation

\* All numbers are approximate.

## Engineering & Science Building (ESB)

Storrs Campus



*Figure 5.58: View of ESB from the quad (source: UConn R. O'Neill Lab)*

### Observations & Opportunities

#### Organization

- ESB is an interdisciplinary building.

#### Summary

ESB will likely continue to be fit-out for future hires. This report does not recommend any changes be made to this building. The unassigned labs could satisfy the growth for BME, CBE and ECE.

# Center for Clean Energy & Engineering (C2E2)

Depot Campus



Figure 5.59: View of C2E2 from the parking lot

## Observations & Opportunities

### Organization

- C2E2 will remain focused on the C2E2 research center.

### Building Opportunities

- The building is currently 72% assignable-to-gross area efficient, unlikely to become more efficient with any renovation. The building is very efficient and well-organized.
- The building is landlocked by the building’s gas storage to the northeast, Weaver Road to the east and parking lot aisle to the south. The building could be extended north.

### Addition

- The existing high bay lab zone could be extended north. At 75% efficient, +1,880 ASF could be added.

### Summary

With all of the possible opportunities at C2E2, an additional 1,880 ASF could be added to the School of Engineering. This will satisfy the C2E2 growth.



Figure 5.60: Site diagram showing possible addition to C2E2

Opportunity	Area Add*
Addition	+1,880
Net SoE ASF change	+1,880

Table 5.37: C2E2 possible opportunity area tabulation

\* All numbers are approximate.

## Longley Building (LONG)

Depot Campus



Figure 5.61: View of Longley from the parking lot

### Observations & Opportunities

#### Organization

- If possible, the Technology Innovation Program (TIP) space could be consolidated in its two primary locations (Advanced Technology Laboratory and the Cell and Genome Sciences Building), and the space be recaptured to the School of Engineering (2,748 ASF).

#### Building Opportunities

- Any renovations will require the building be brought up to the current building code. A 2013 study suggested the cost to renovate the building too costly due to existing mold, asbestos, building systems, envelope, restroom and egress issues. The building does not have an elevator and is not fire-proofed.

#### Replacement

- Longley is recommended to be replaced. Idealized at a PI+5 research group for all current occupants, a replacement building would be 31,064 ASF. Further study will need to take place.

#### Summary

It is not recommended to renovate the Longley Building, ideally replacing it and designing it specifically for CTI.

Opportunity	Area Add
TIP space recaptured	+2,748
Net SoE ASF change	+2,748

Table 5.38: Longley possible opportunity area tabulation

## Depot D (DD)

Depot Campus



Figure 5.62: View of Depot D main entrance

### Observations & Opportunities

#### Building Opportunities

- Due to the physical condition of the existing building and its remoteness, it is not recommended to divert funding to renovate the building for the School of Engineering student clubs and storage.

#### Summary

Depot D's space is recommended to be relocated to the Storrs Campus (6,716 ASF).

**PAYETTE**

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