

FORUM F
"Mixing Bowls" for Science and Engineering:
Recipes and Ingredients For Inspiring Interdisciplinary
Learning and Discovery Environments

Presented By:

Craig S. Spangler, AIA
BALLINGER

Dr. Can Korman
GEORGE WASHINGTON UNIVERSITY

Rob W. Voss, AIA LEED BD +C
BALLINGER

Tradeline
Boston, MA
October 18-19, 2015

Presenters



Craig S. Spangler, AIA
Principal

B A L L I N G E R
Architects + Engineers



Dr. Can Korman
Associate Dean of Research and Graduate Studies, Professor
School of Engineering and Applied Sciences



Rob W. Voss, AIA LEED BD+C
Associate Principal

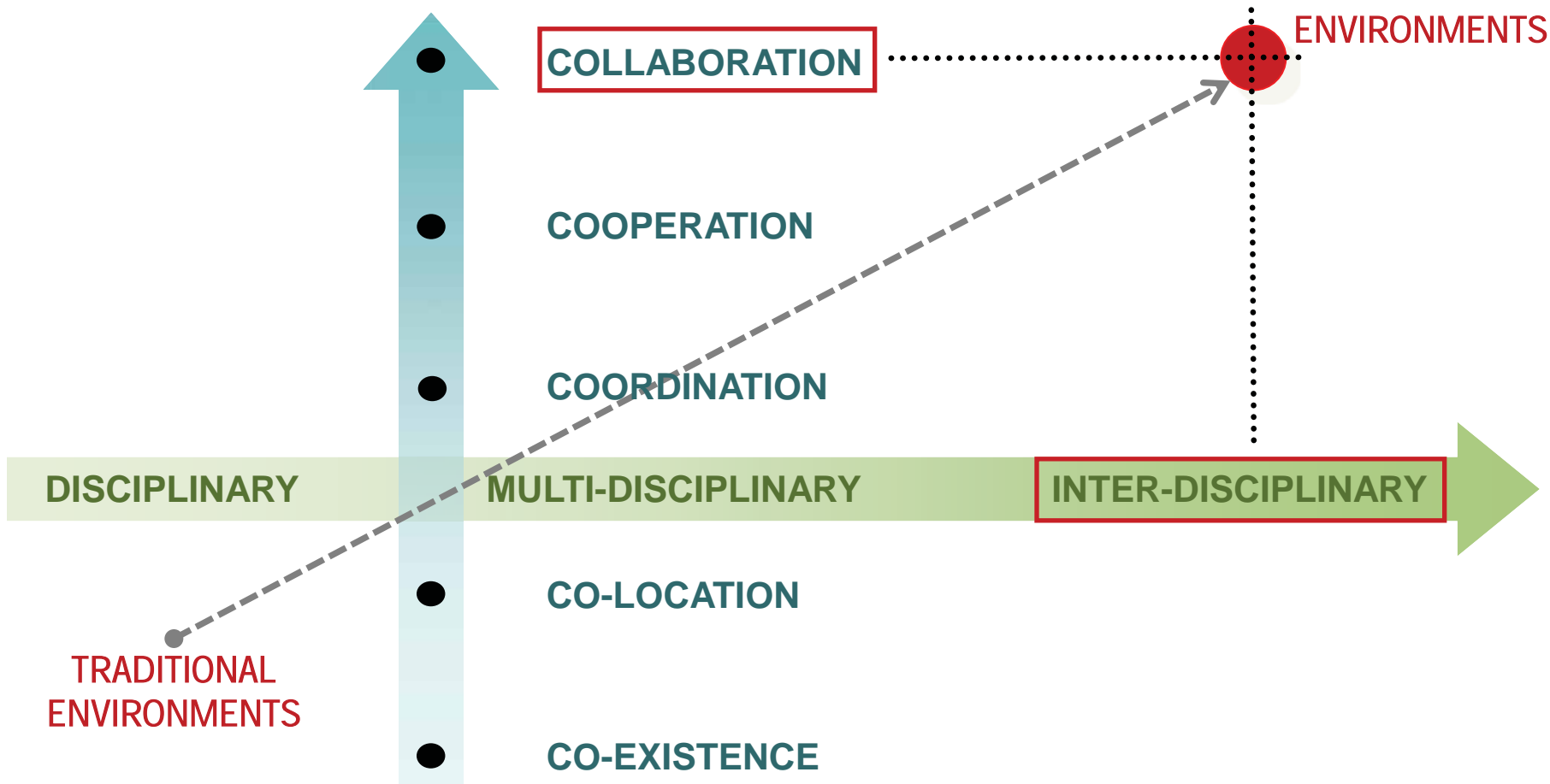
B A L L I N G E R
Architects + Engineers

The Menu

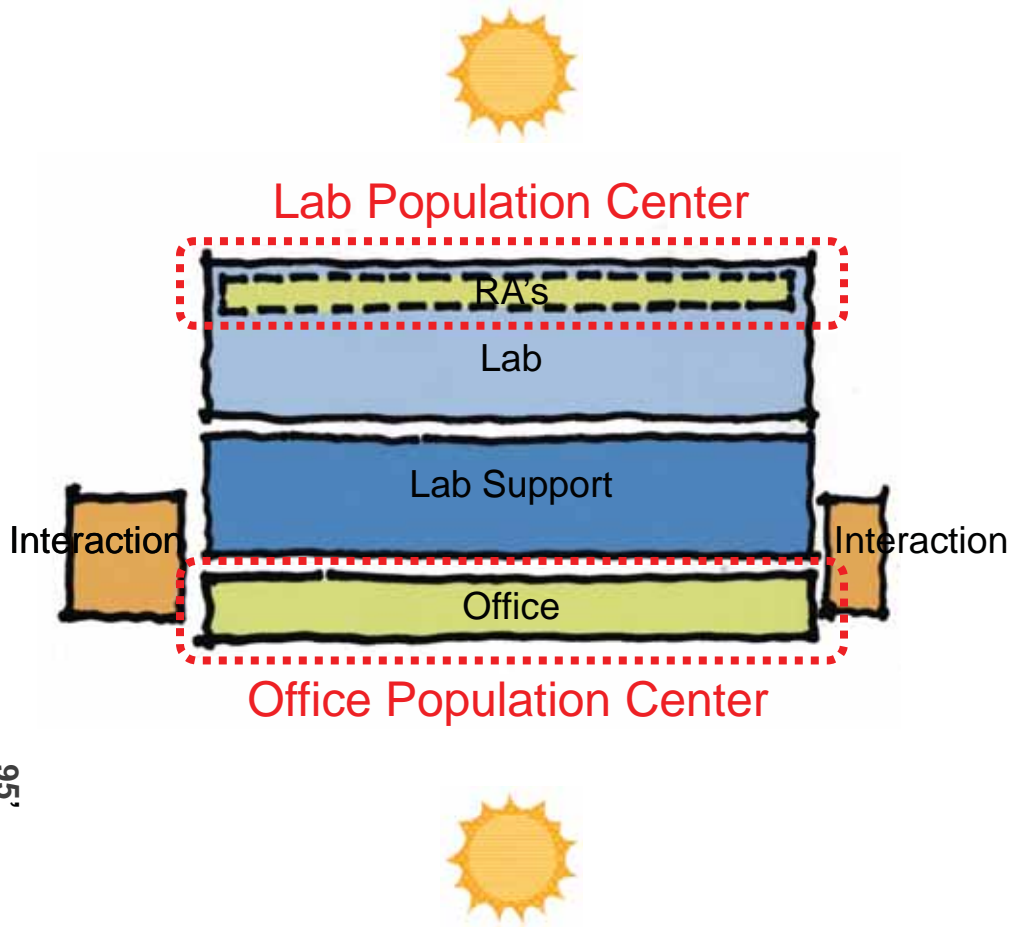
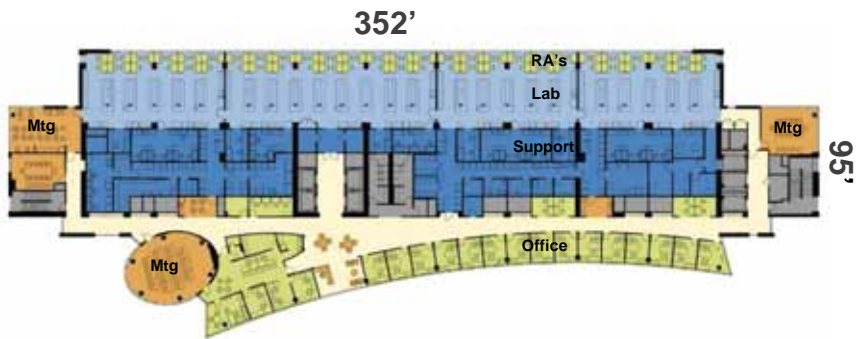
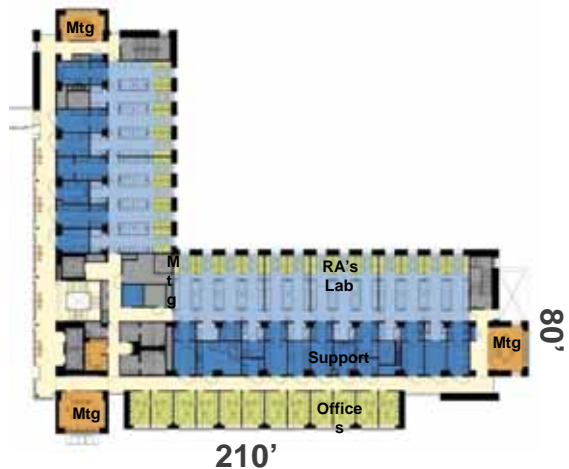


- **Mixing Bowls:** *Framing Convergent Environments*
- **Recipes:** *Varying the Ingredients*
 - Three Projects
- **The Entrée:** *GW Science and Engineering Hall*
 - *Mes En Place: The Ingredients*
 - *Preparing the Meal: Design Overview*
 - *How Does it Taste?: The First Year (Almost)*
- **Dessert:** *Summary*
- **Doggie Bag:** *The Tradeline Three & Dialogue*

Mixing Bowls



Traditional Layered Environments



Mixing Bowls: Convergent Environments

Facebook Headquarters
Frank Gehry

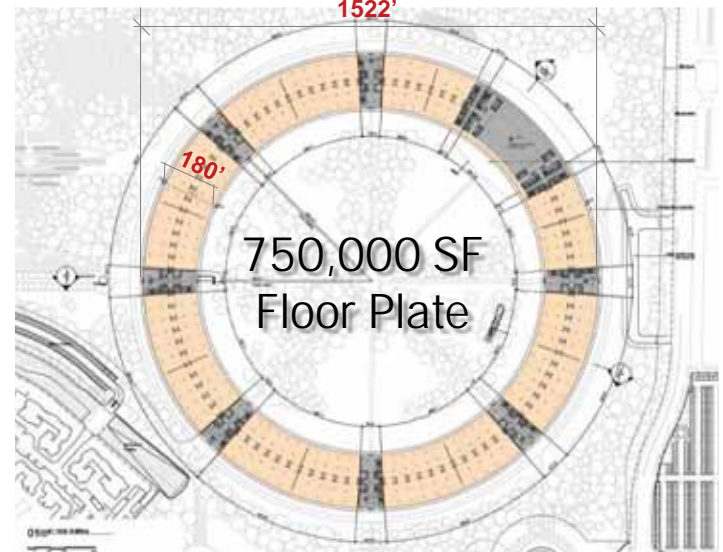


335,000 SF Floor Plate

280'

1200'

Apple Headquarters
Foster + Partners



1522'

180'

750,000 SF
Floor Plate

Mixing Bowls

CONVERGENCE

Science	Engineering
Teaching	Research
Wet Labs	Dry Labs
Laboratory	Social Space
Public	Private
Owned	Shared



Mixing Bowls

RECIPES



University of Wisconsin
Wisconsin Institutes for Discovery



Rutgers University
IFNH



University of Maryland
A. James Clark Hall

ENTREE



George Washington University
Science & Engineering Hall

Twin Institutes
One Private / One Public
Town Center

Institute for Food Nutrition &
Health

Engineering Teaching
Bioengineering Department
Bioengineering Institute
Central Animal Facility

9 Science & Engineering
Departments

330,000 GSF
54% Net/Gross

80,000 GSF
65% Net/Gross

184,000 GSF
55% Net/Gross

496,230 GSF S/E Program
750,000 GSF Total Building
60% Net/Gross

2010

2015

2017

2014

\$175 M (Construction)
\$531 / SF

\$37 M (Construction)
\$463 / SF

\$120 M (Construction)
\$652 / SF

\$264 M (Construction)
\$ 528 / SF

Institute

Institute

Departments / Institute

Departments

Recipes: Varying The Ingredients



PROCESS



PROGRAM



PLANNING



DESIGN



BOUNDARIES



CODE



COST

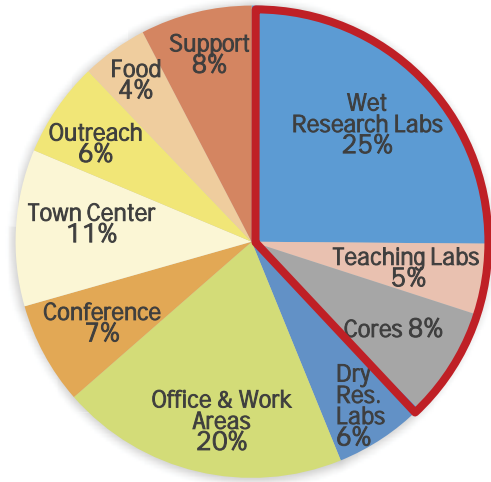
University of Wisconsin - Madison: Wisconsin Institutes for Discovery



WISCONSIN
UNIVERSITY OF WISCONSIN - MADISON

R & D Magazine's Lab of the Year
2010 | \$175M | 330,000 GSF | \$531 / SF

WID: Program & Process



38%
Wet
Capable



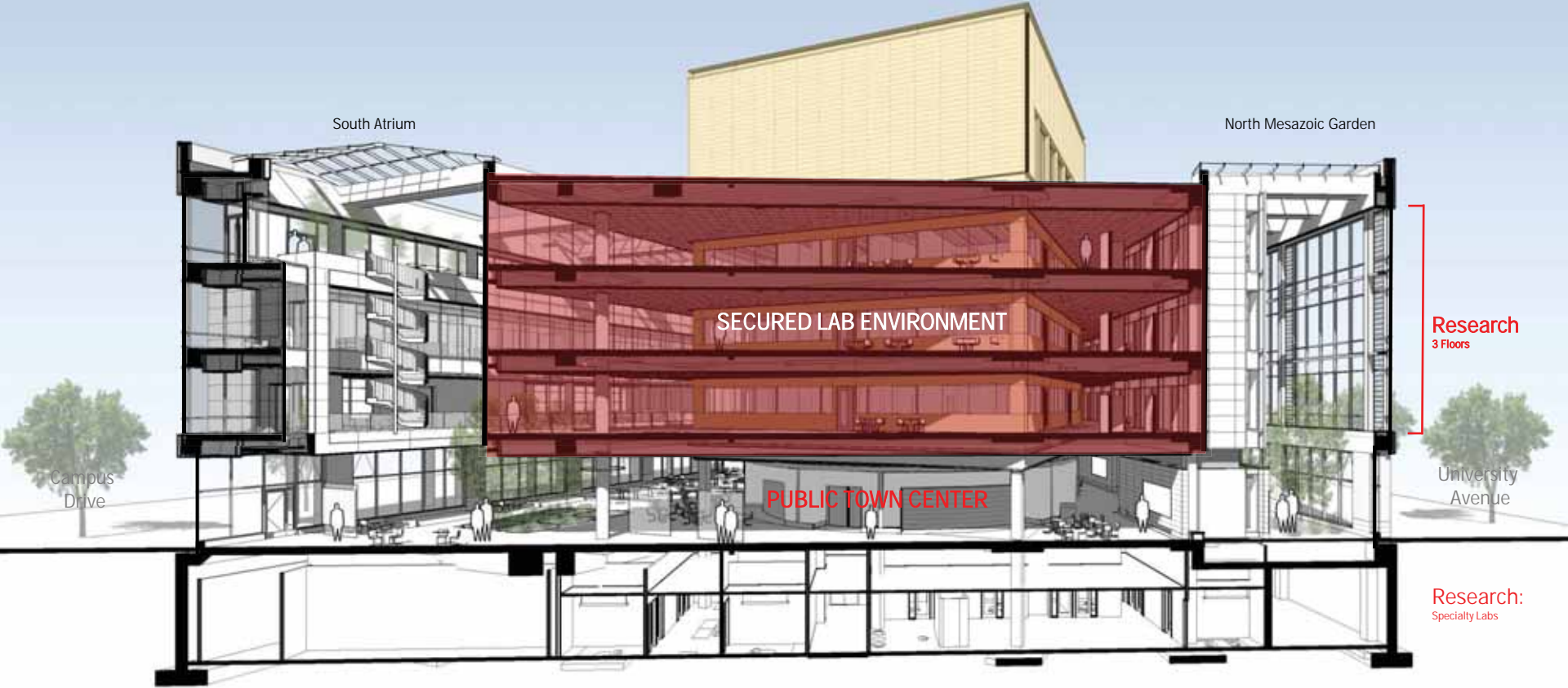
PROGRAM



179,000 ASF / 330,000 GSF
54% Net / Gross

PROCESS

WID: Section



South Atrium

North Mesozoic Garden

SECURED LAB ENVIRONMENT

PUBLIC TOWN CENTER

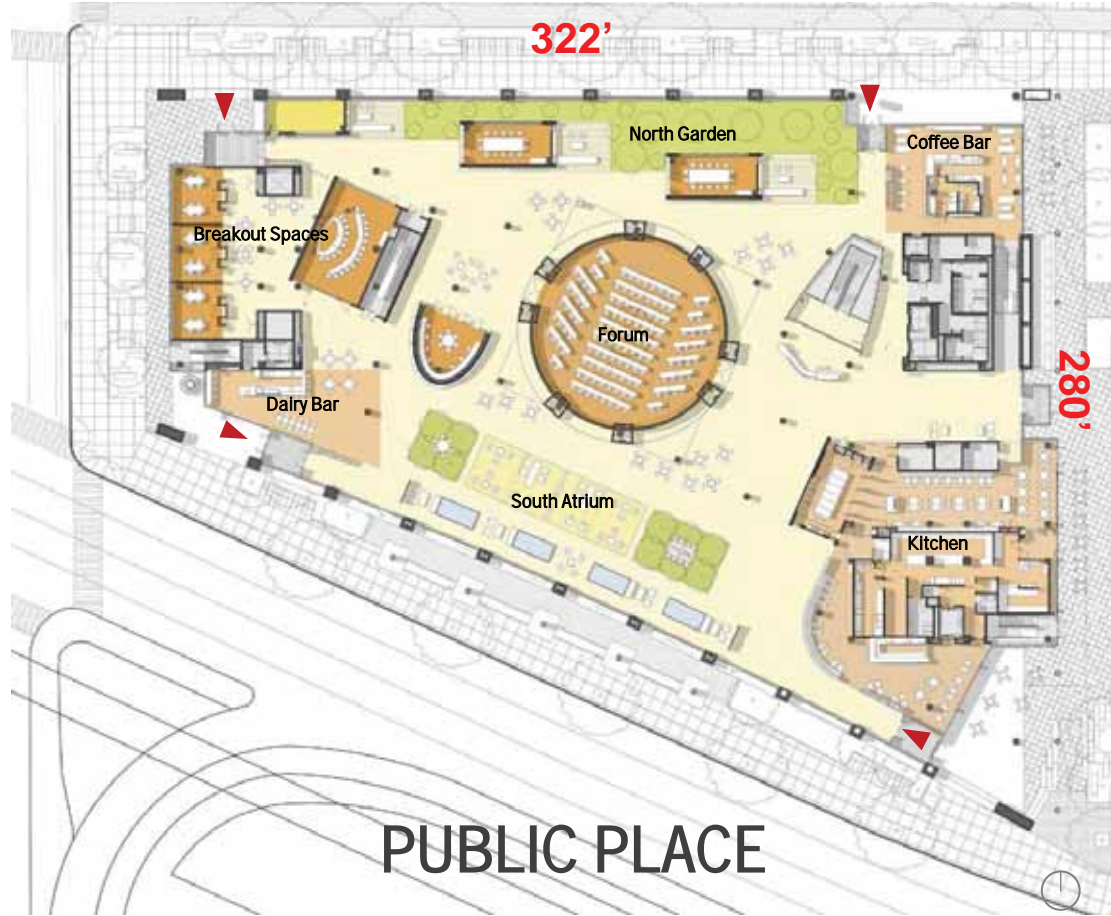
Research
3 Floors

Research:
Specialty Labs

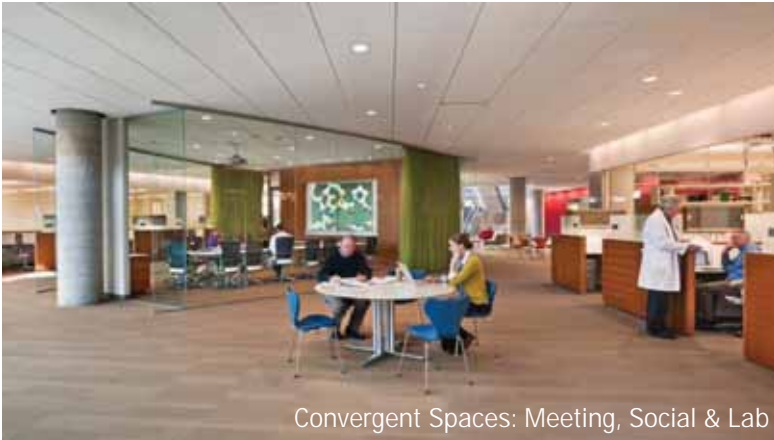
Campus
Drive

University
Avenue

WID: First Floor Town Center



WID: Typical Research Floor

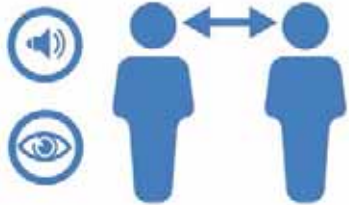


- Support
- Lab
- Offices & RA's
- Shared



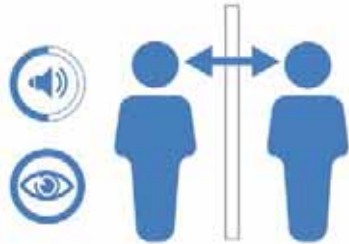
Space Types & Boundaries

OPEN



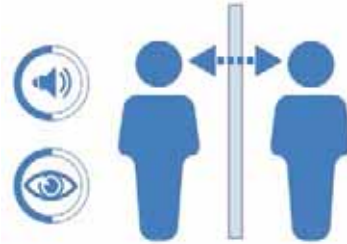
\$0 / SF

TRANSPARENT



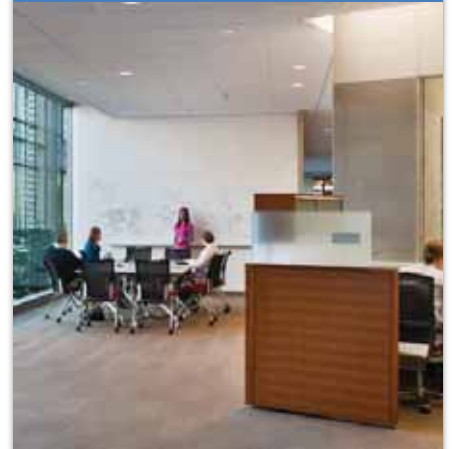
\$65-75 / SF

TRANSLUCENT



\$65-75 / SF

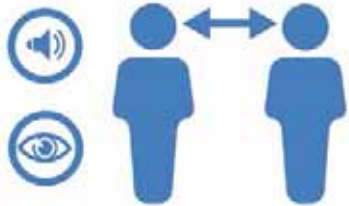
SOLID



\$10 / SF

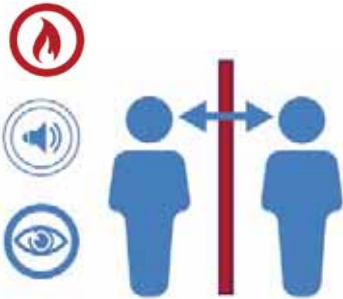
Space Types & Boundaries

OPEN



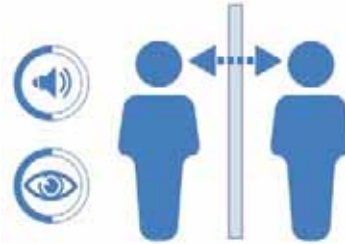
\$0 / SF

TRANSPARENT



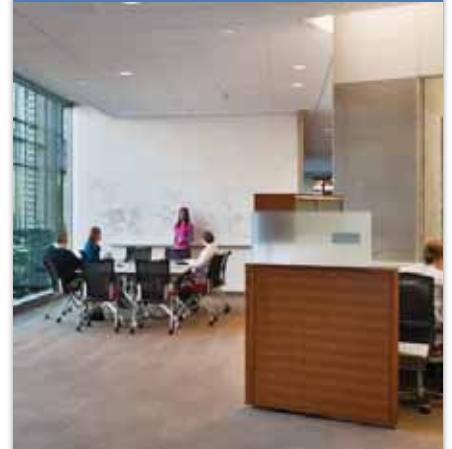
\$180 / SF

TRANSLUCENT



\$65-75 / SF

SOLID



\$10 / SF

WID: Space Types at Typical Lab Floor

Plan Perspective



322'





280'

Boundary Diagram

WID: Space Types at Typical Lab Floor

Plan Perspective

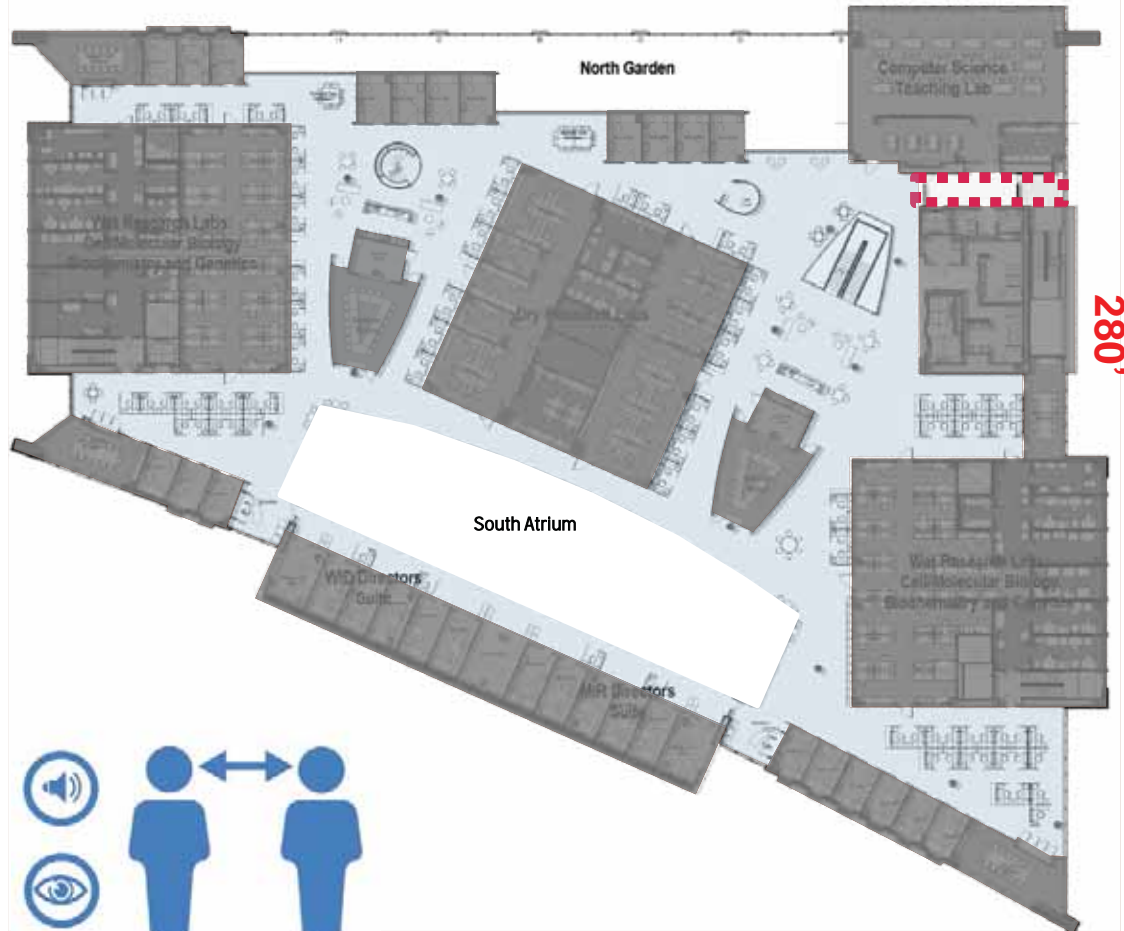


-  Insecure Public Space
-  Secure Open Spaces

1%
40%



322'






Boundary Diagram

WID: Space Types at Typical Lab Floor

322'

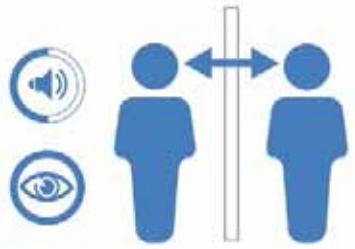
Plan Perspective



-  Insecure Public Space 1%
-  Secure Open Spaces 40%
-  Transparent Connected Spaces 30%



280'







Boundary Diagram

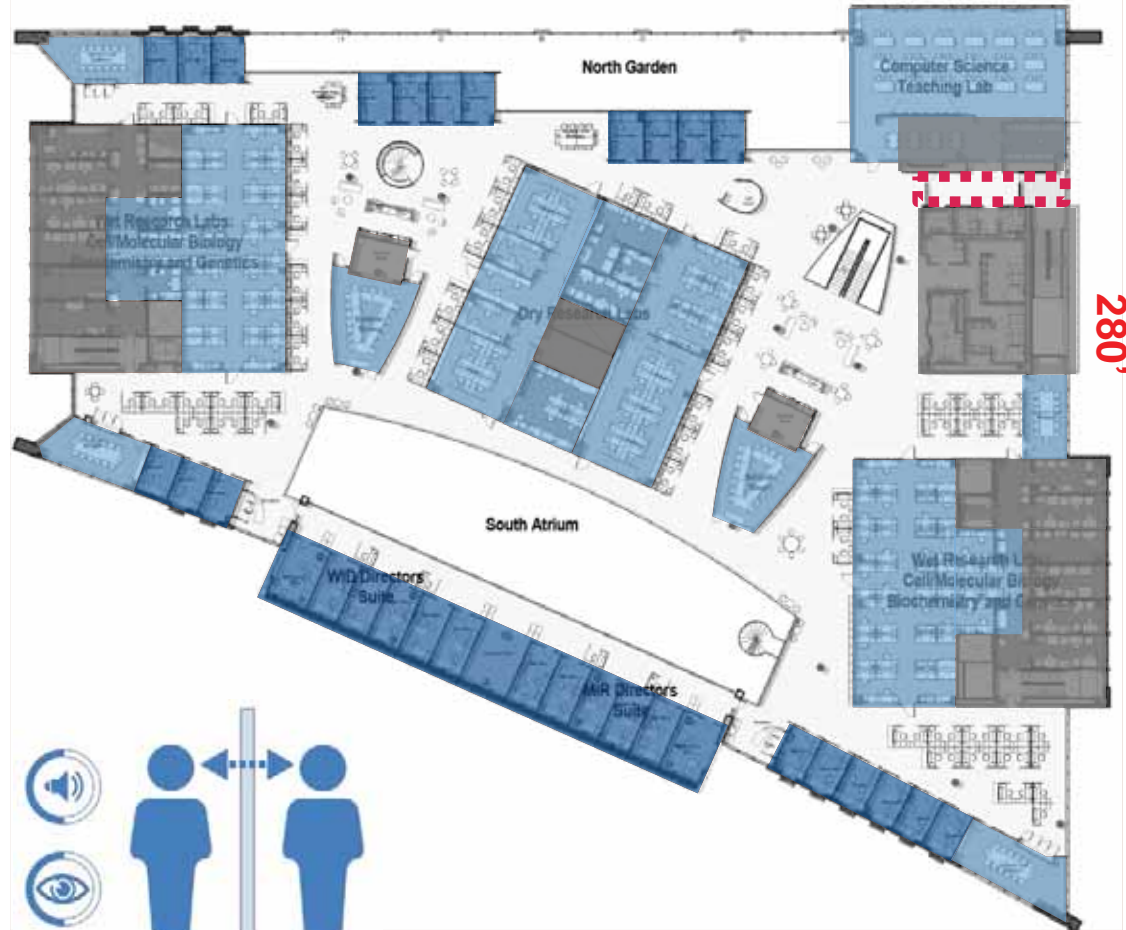
WID: Space Types at Typical Lab Floor

322'

Plan Perspective



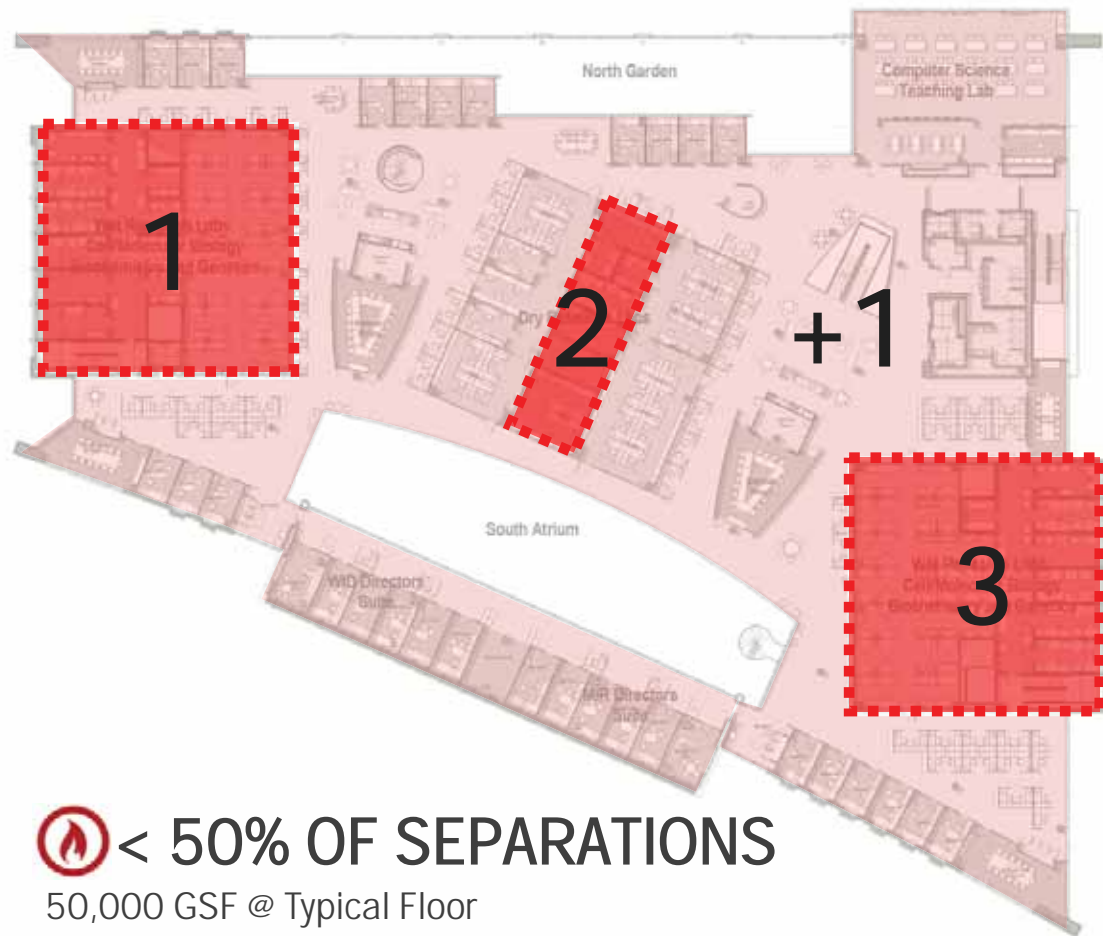
	Unsecure Public Space	1%
	Secure Open Spaces	40%
	Transparent Connected Spaces	30%
	Translucent Connected Spaces	11%



Boundary Diagram

WID: Code & Cost

- Code Boundaries Required
 - Quantity of Wet Capable Research = 38%
- Code Boundaries = Transparent 🔥
- Code Boundary Functions
 - Materials Management
 - Identity
 - Acoustics
 - Security



 < 50% OF SEPARATIONS

50,000 GSF @ Typical Floor
38% Wet Capable

Boundary Diagram



IFNH: Mission



Cell Biologist



Plant Biologist



Nutritionist



Food Scientist



Psychologist



Kinesiologist



Sociologist



Media Expert



Film Maker



Urban Planner



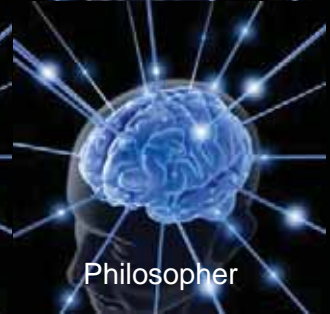
Policy Expert



Teacher



Anthropologist



Philosopher

IFNH: Program

Goal:

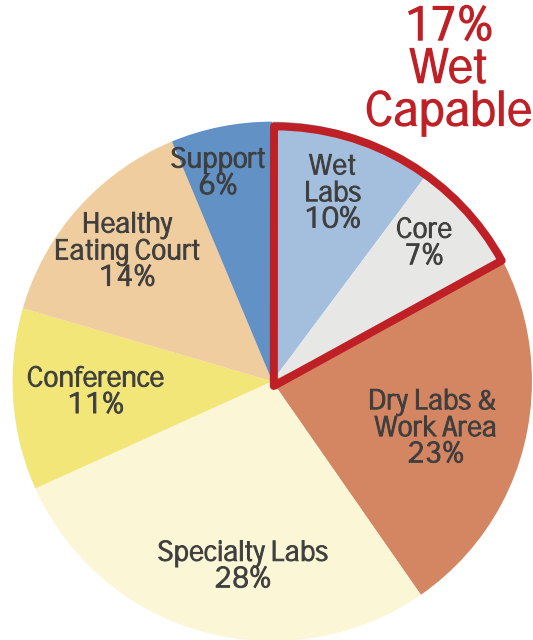
- Prevent Childhood Obesity to Reduce Risk of Chronic Adult Diseases

Mission:

- New Jersey as the "Healthy State" A Model for the Nation
- Organizational Hub for Convergent Research in Nutrition & Health

Core Values

- Convergence
- Community Responsibility
- Collective Success



52,000 ASF / 80,000 GSF
65% Net / Gross

IFNH: Section

Work Area /
Wet Labs

Human
Performance
Lab & Clinic

Children's
Nutrition
Pre-School

Hearth

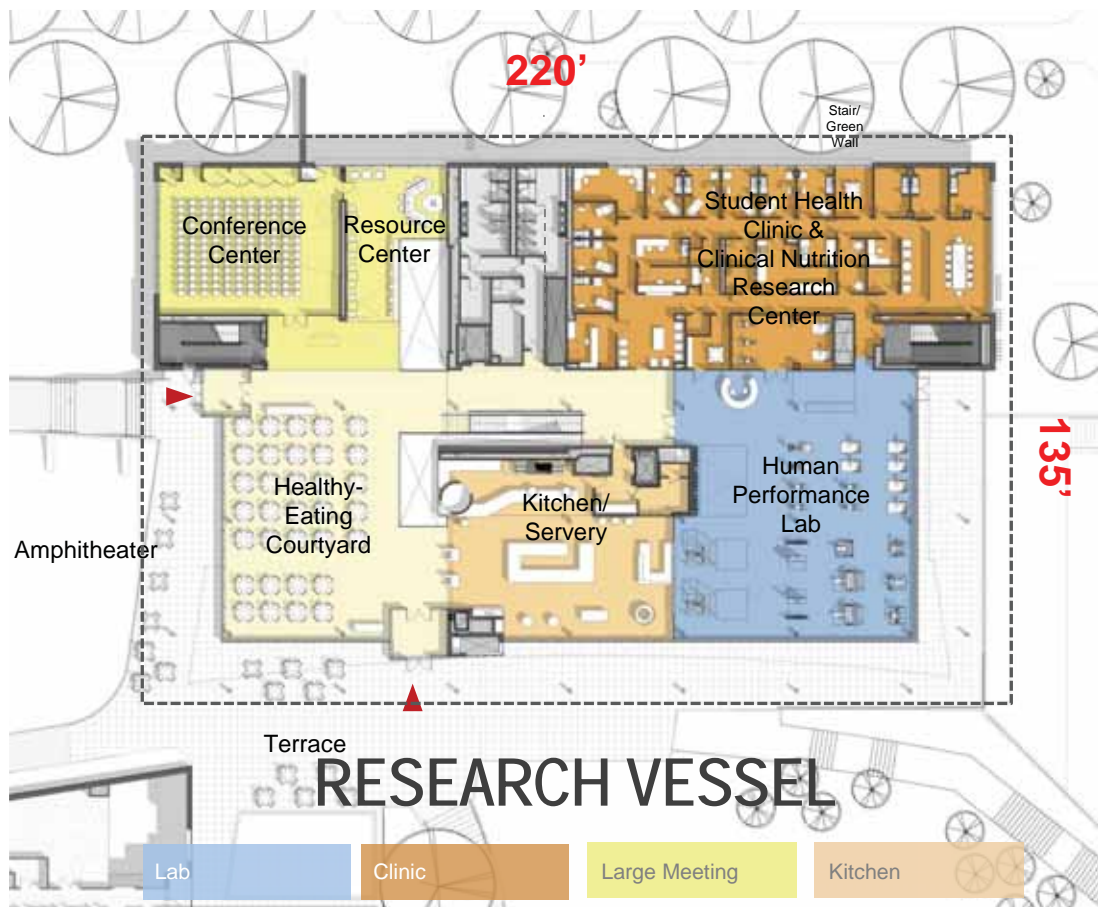
Metabolomics
Core

Work Area /
Conference Center

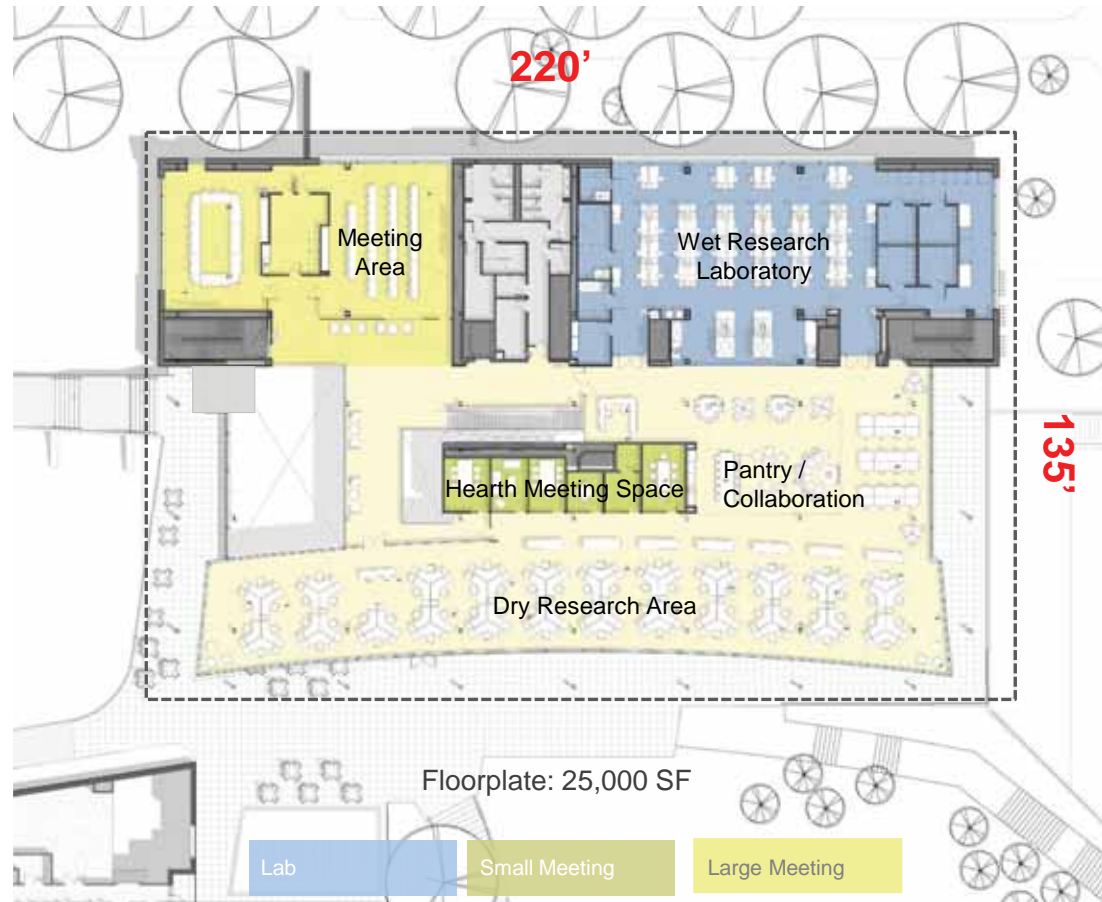
Healthy Eating
Courtyard & Conference



IFNH: Main Floor



IFNH: Upper Floor









IFNH: Space Types at Typical Lab Floor

Plan Perspective



Boundary Diagram

	Unsecure Public Space	10%
	Secure Open Spaces	40%
	Transparent Connected Spaces	33%
	Translucent Connected Spaces	0%
	"Dark Matter"	17%
	Important Connections	
	Views	

FEWER BOUNDARIES

IFNH: Code and Cost

- Code Boundaries Not Required
 - Quantity of Wet Capable Research = 17%
- Boundary Functions
 - Identity
 - Acoustics
 - Security



**NO REQUIRED CODE
BOUNDARIES**

25,000 GSF @ Typical Floor
17% Wet Capable

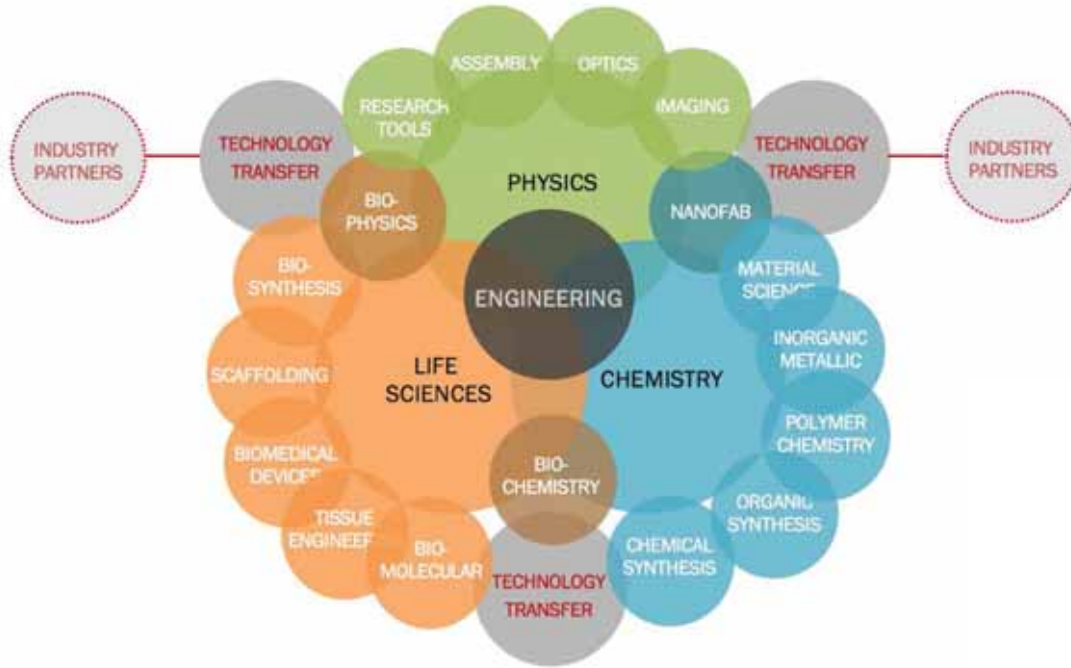
Boundary Diagram

University of Maryland: A. James Clark Hall

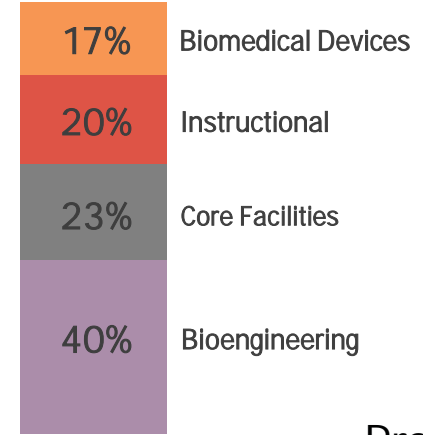


2017 | \$120M | 184,000 GSF | \$652 / SF

AJCH: Goals & Program



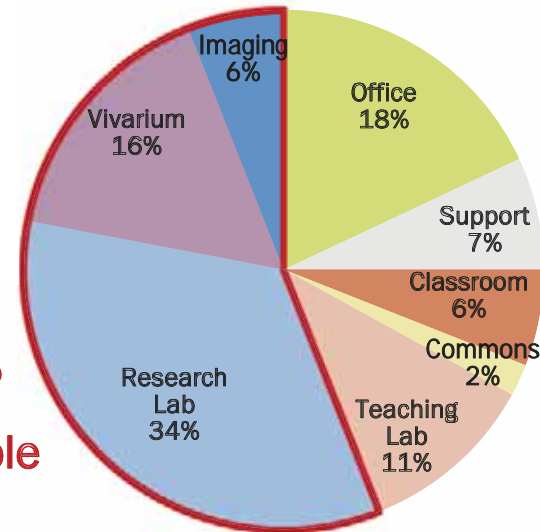
101,000 ASF / 184,000 GSF
55% Net / Gross



Program

Space Type

**56%
Wet
Capable**



AJCH East – West Section



95'-0"

+ 25'-0" PH

+ 16'-0" 6

+ 16'-0" 5

+ 16'-0" 4

+ 16'-0" 3

+ 16'-0" 2

MEP Penthouse

Vivarium

Research Labs

Research Labs

Research Labs

Forum

Innovation Lab

Offices

Offices

Offices

Vivarium

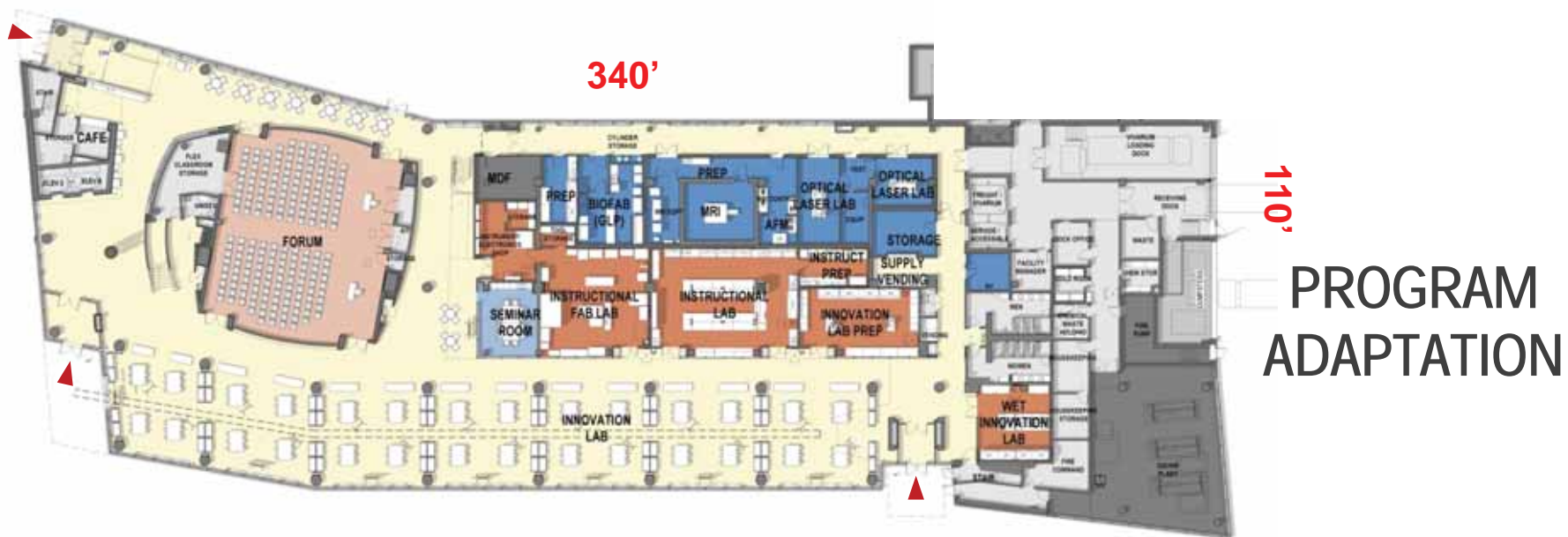
Robert E. Fischell Institute
for Biomedical Devices

Fischell Department
of Bioengineering

Instructional Space

Paint
Branch
Drive

AJCH: Ground Floor



AJCH: Typical Research Floor: Floors 3-5

Support

Lab

Offices

RA's

Shared



Typical Research Floor: 3-5 | 27,000 SF








AJCH: Space Types at Typical lab Γ

Plan Perspective—



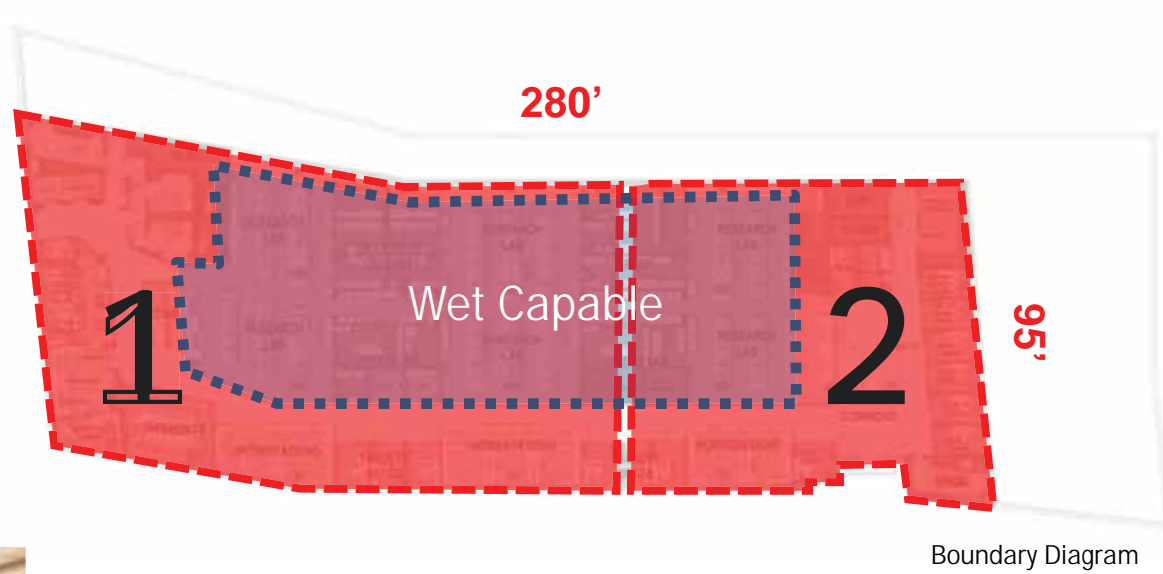
Boundary Diagram

	Unsecure Public Space	5%
	Secure Open Spaces	20%
	Transparent Connected Spaces	36%
	Translucent Connected Spaces	8%
	"Dark Matter"	31%
	Important Connections	
	Views	

PATTERN OF OPEN & SOLID

AJCH: Code and Cost

- Code Boundaries Required
 - Quantity of Wet Capable Research = 56%
- Code Boundaries = Solid
 - Code Boundary Contained Within Support Zone
- Code Boundary Functions
 - Materials Management



NO FIRE RATED GLASS

27,000 GSF @ Typical Floor
56% Wet Capable

The Entrée – George Washington University | Science & Engineering Hall



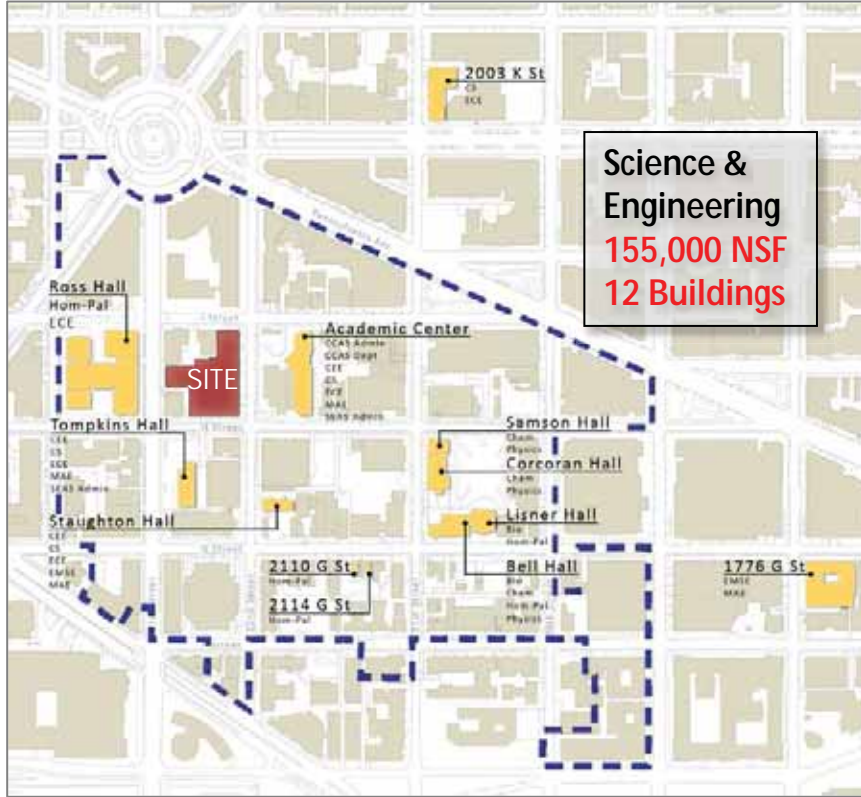


SEH: Context

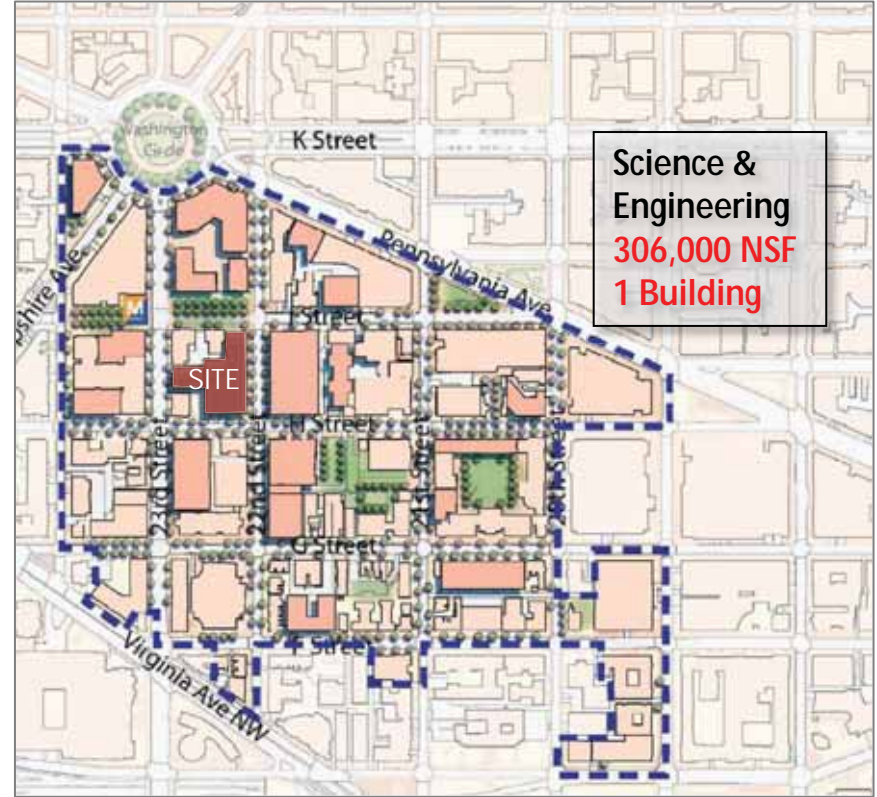
- 20,000 Students w/ Law, Medicine, Liberal Arts Focus
- Commitment to Urban Research Institution: 1980's
- Long History of Training Scientists / Engineers
- 2006: New Science & Engineering Focus
- Mid 2000's: New Leadership
 - President
 - Provost
 - VP for Research
 - Engineering Dean
- Top Tier Faculty Recruitment Investment Strategy
- Productivity Gains Limited Due to Old Facilities



SEH: Context



Previous Plan



Master Plan

SEH: Goals

CAMPUS WIDE IMPACT

Catalytic Effect

- Site Location: HUB
- Urban Sustainability
- Enhance Overall Reputation of GW



COLLABORATIVE/ INTERDISCIPLINARY

Faculty & Students

- Interaction
- No Barriers
- Open Character / “On Display”



ENGAGED LEARNING PARADIGM

New Direction

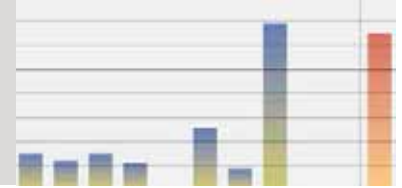
- Integrate Research w/Teaching
- Learning Commons
- Public Outreach



MEASURABLE OUTCOMES

Metrics Of Success

- Enhance GW Reputation
- Research Revenue
- Building Performance
- Cost / Delivery

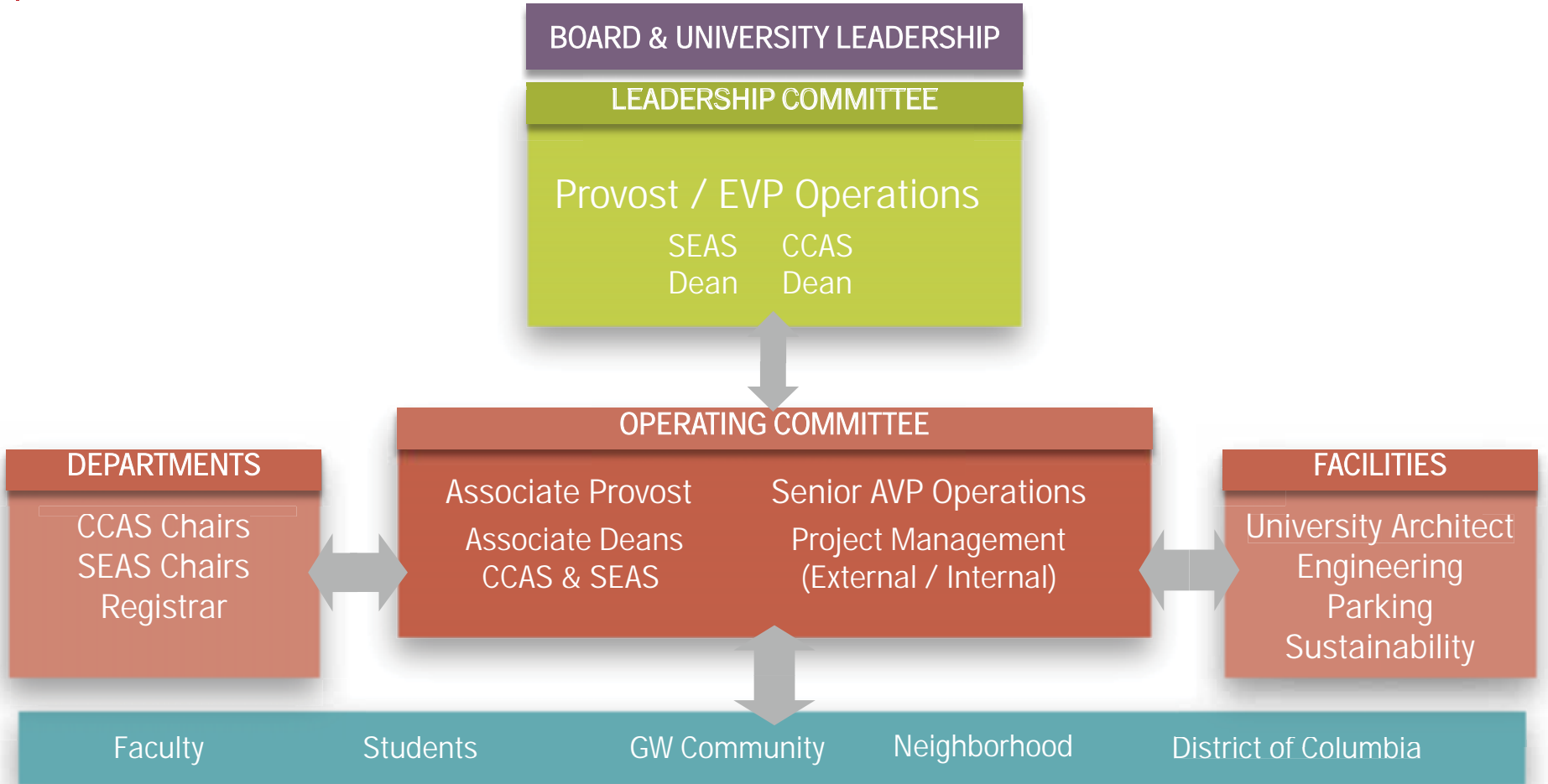


50 / 100 YEAR BUILDING

Space & Systems

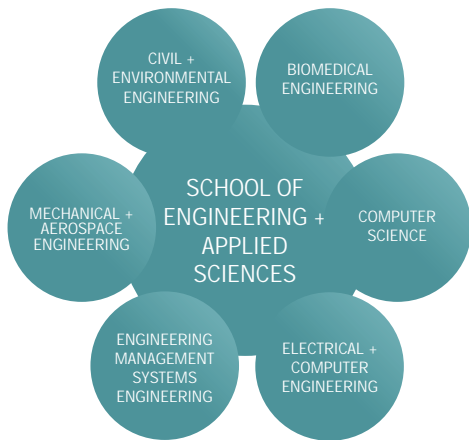


SEH: Cultural Management

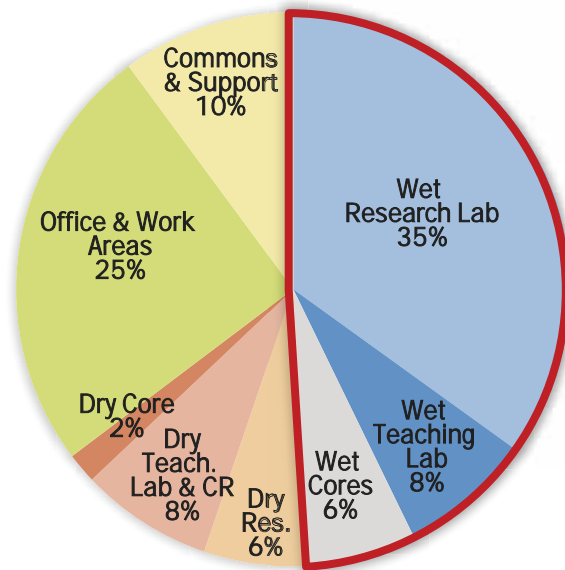
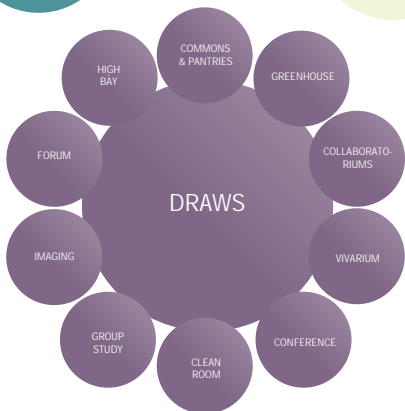
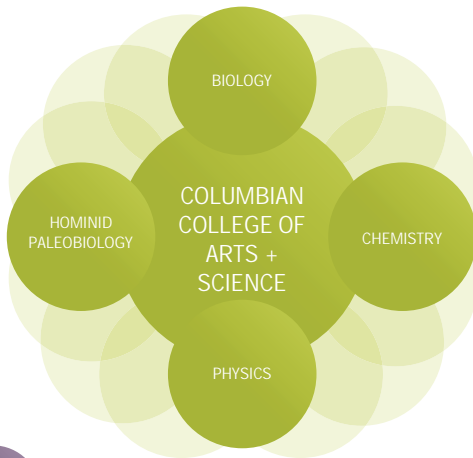


SEH: Program

ALL DEPARTMENTS



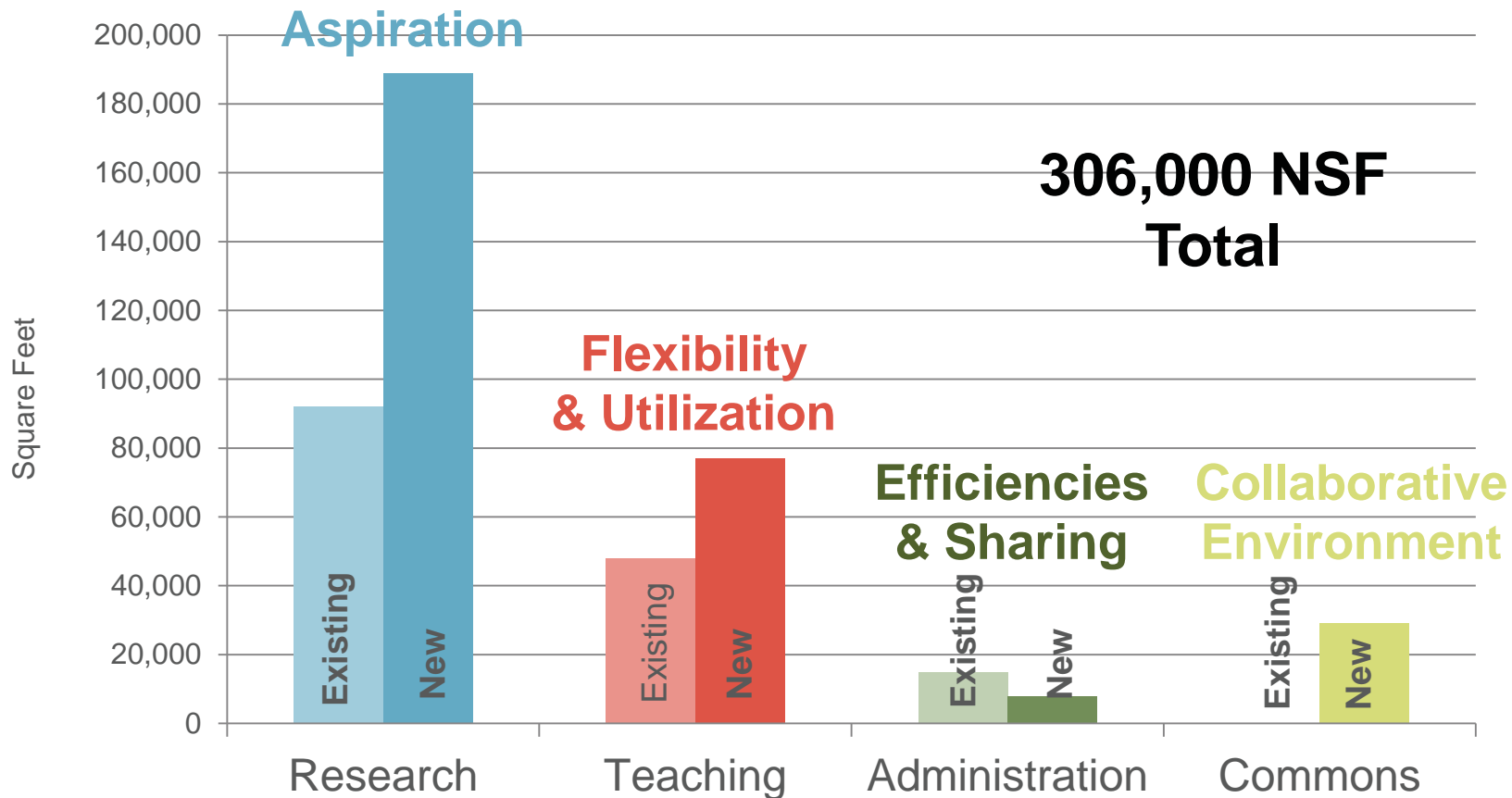
4 OF 54 DEPARTMENTS & PROGRAMS



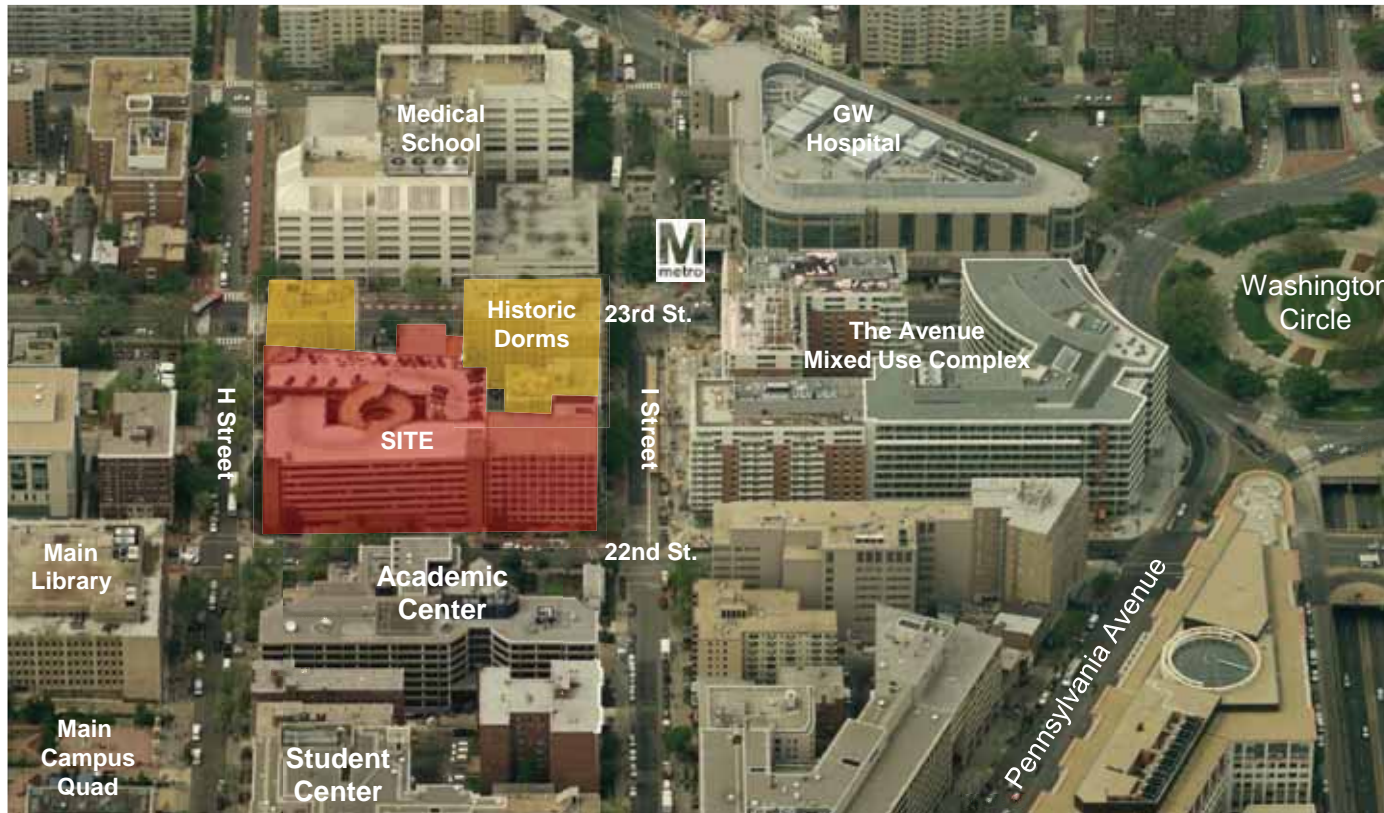
**49%
Wet
Capable**

306,000 ASF / 496,230 GSF
60% Net / Gross
Total Building 750,000 GSF

SEH: Program



SEH: Public Place



Existing Site



Mixed Use Complex: Retail / Office / Residential



Active Street Environment



Washington Circle & 23rd Streets: Major L'Enfant Avenues

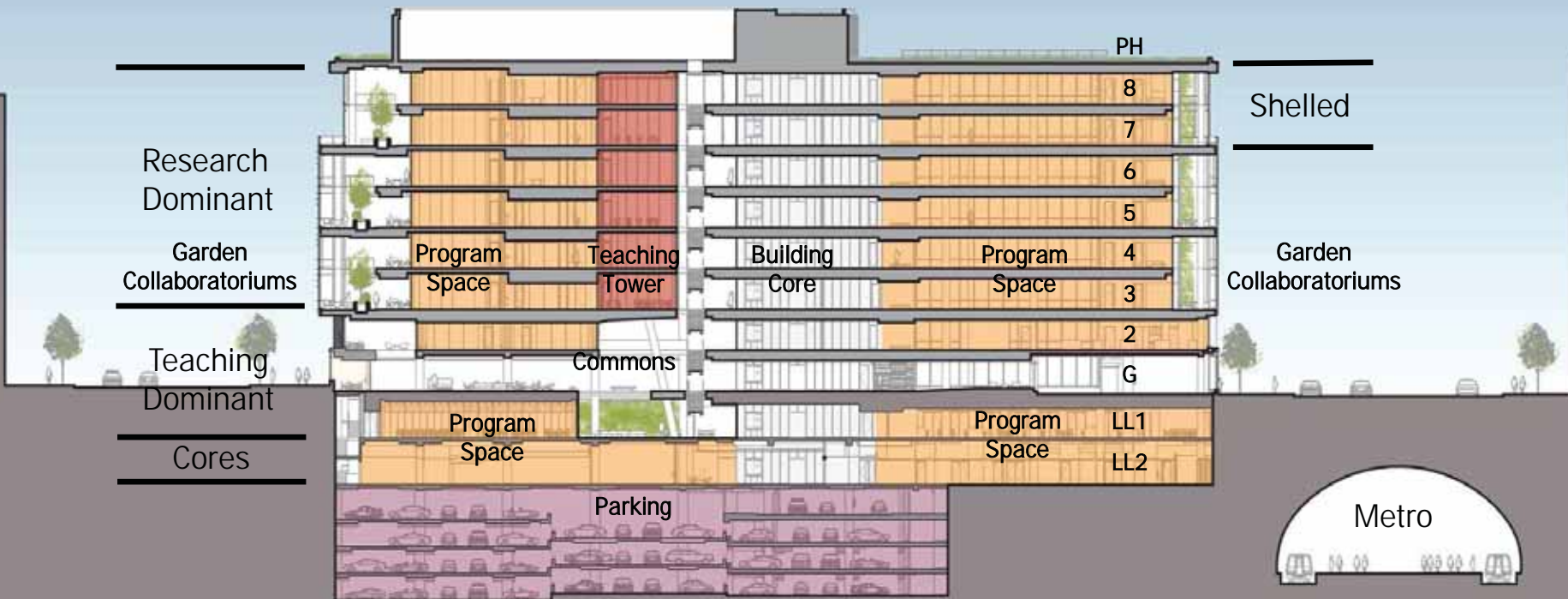
The Avenue

SEH: Section

H Street

SEH

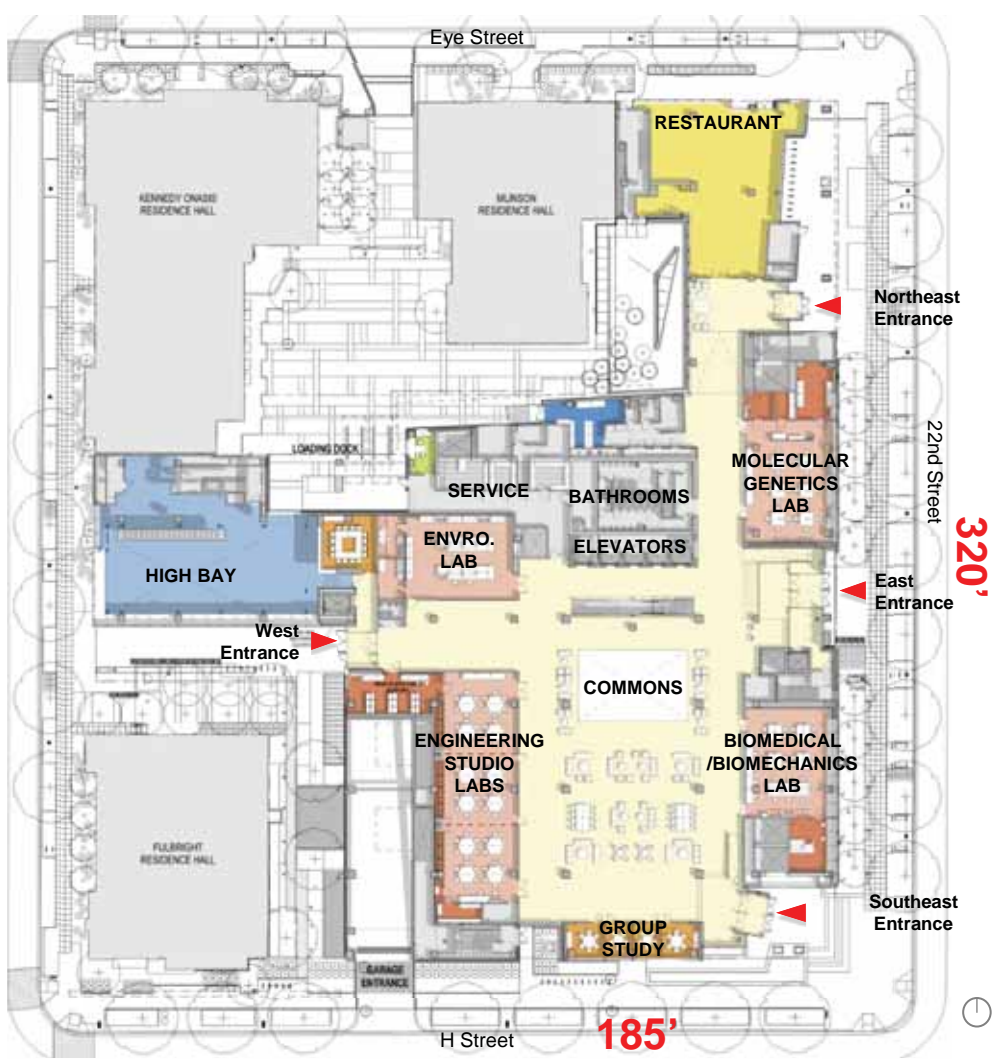
I Street



SEH: Ground Floor



Full Block Building | 22nd Street Facade





SEH: Ground Floor



Study/Social Space Adjacent to Teaching Labs

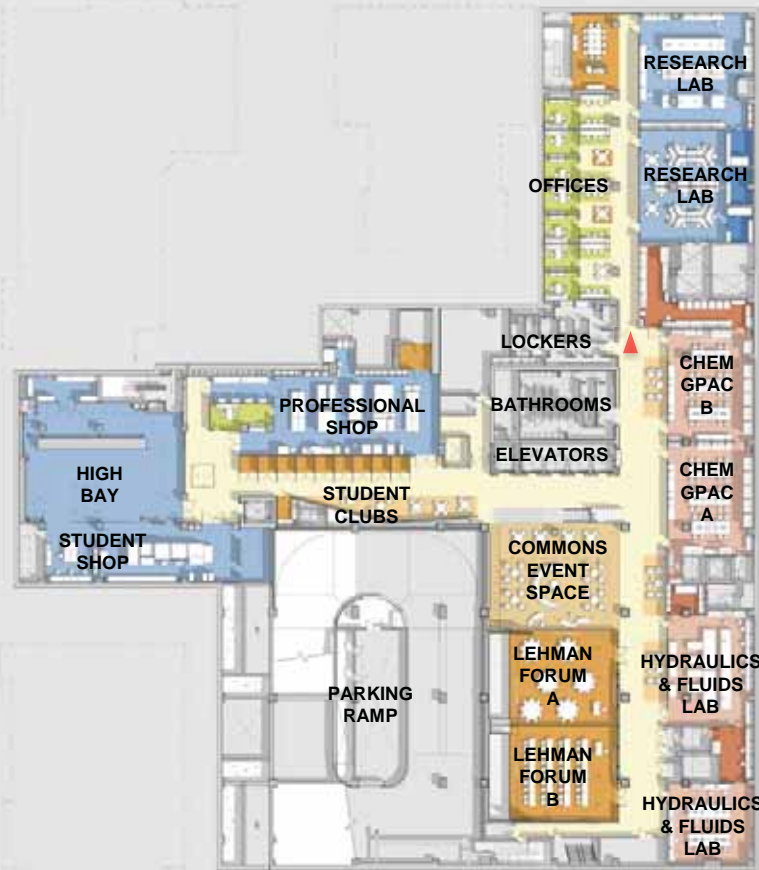


Studio Lab



Vertical Connections

SEH: Lower Level 1



320'

185'



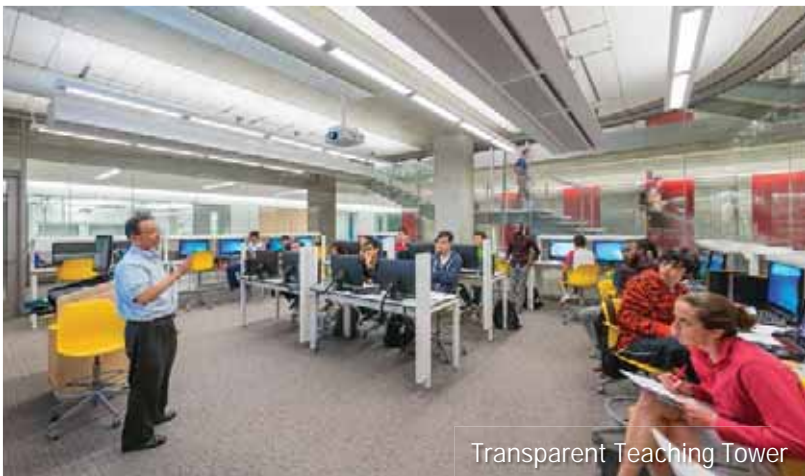
SEH: Lower Level 1



SEH: Levels 4-8



SEH: Levels 4-8



SEH: Levels 4-8



SEH: Levels 4-8



SEH: South Garden Collaboratorium



Exterior View



Night Beacon



Variety of Social Spaces External to Lab



Neighborhood Integration

SEH: West Garden Collaboratorium



Collaboratorium



High Bay



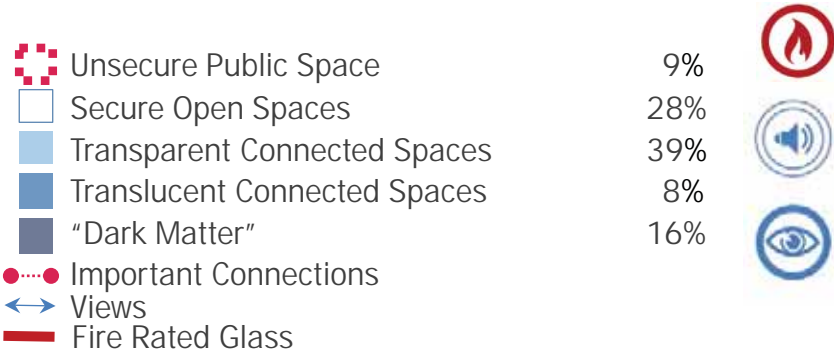
Engagement With Community

SEH: North Garden Collaboratorium



SEH: Space Types at Typical Lab Floor

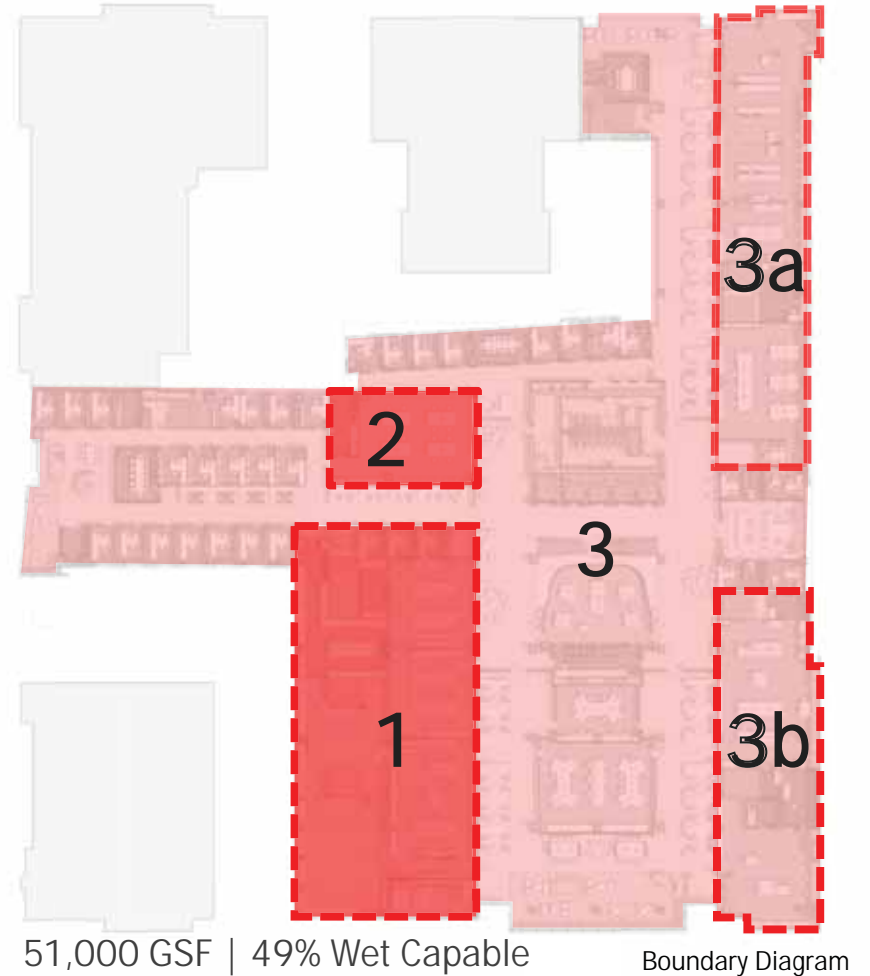
Plan Perspective



SEH: Code and Cost

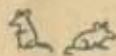
- Code Boundaries Required
 - Quantity of Wet Capable Research – 49%
 - Variance based on NFPA 45
- Code Boundaries = Transparent 🔥
- Code Boundary Functions Maximized
 - Materials Management
 - Identity
 - Acoustics
 - Security

🔥 < 30% OF SEPARATIONS





by
HILARY B. PRICE



SEH: Campus Mixing Bowl



SEH: Openness & Transparency



Storefront Teaching Lab



Teaching Tower



Open Workstations



Laboratory & Social Environments

SEH: Mixing Bowl Operations & Management





Dessert: Openness & Transparency



vs.



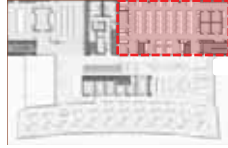
Dessert: Wet Capable Program



TRADITIONAL



WISCONSIN



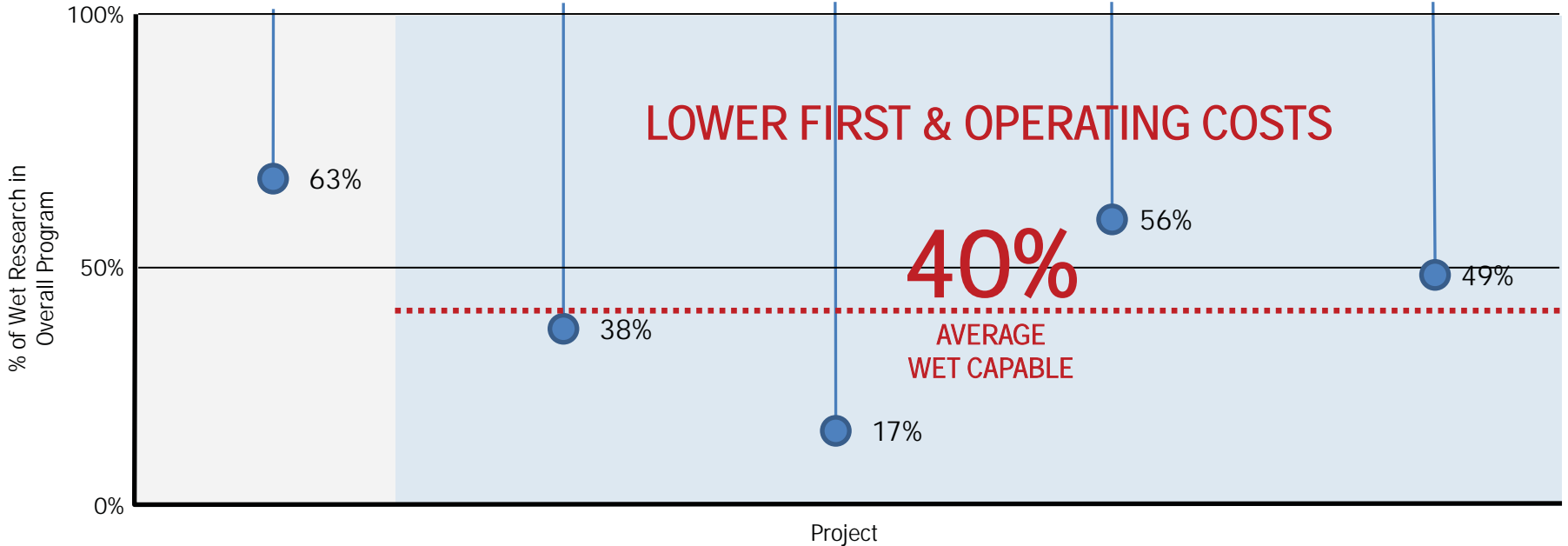
RUTGERS



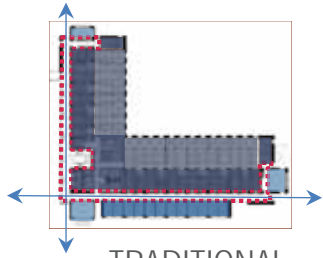
MARYLAND



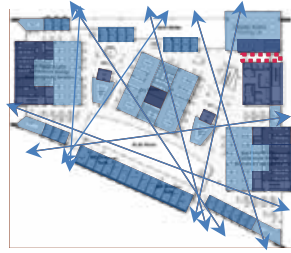
GEORGE WASHINGTON



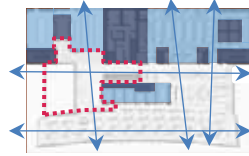
Dessert: Area of Space Types



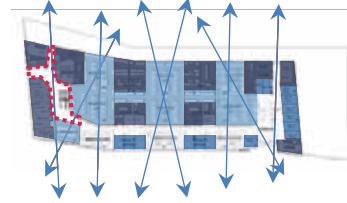
TRADITIONAL



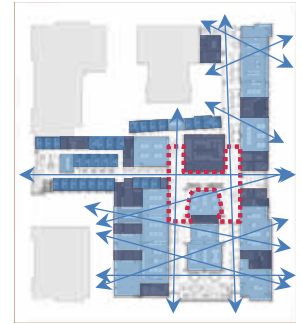
WISCONSIN



RUTGERS



MARYLAND



GEORGE WASHINGTON



Open

18%

41%

50%

25%

37%



Transparent

2%

30%

33%

36%

39%



Translucent

12%

11%

0%

8%

8%



Solid

68%

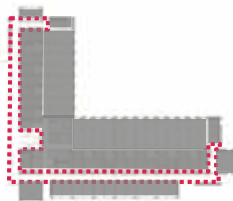
18%

17%

31%

16%

Dessert: Open Space



TRADITIONAL



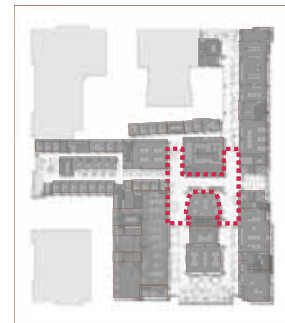
WISCONSIN



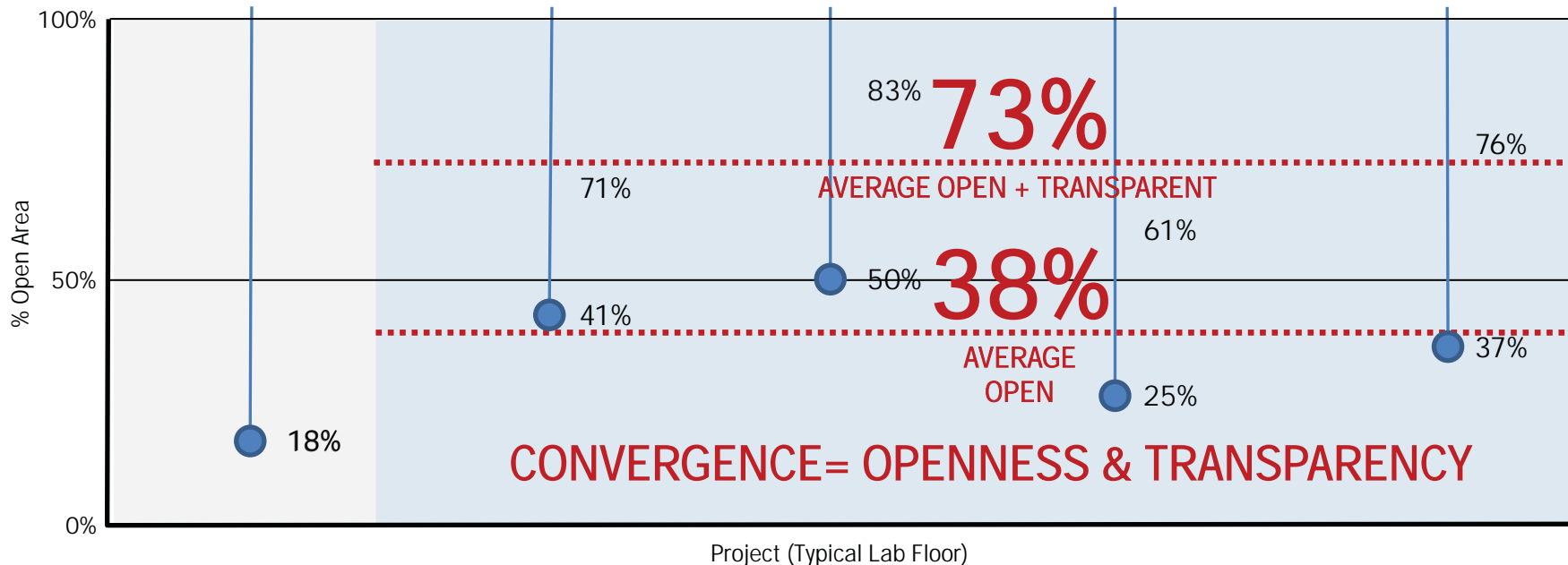
RUTGERS



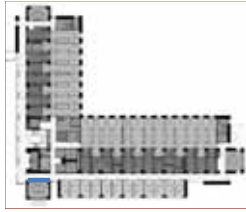
MARYLAND



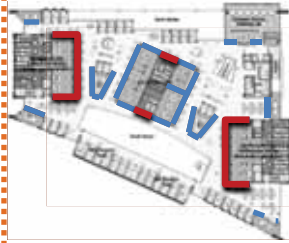
GEORGE WASHINGTON



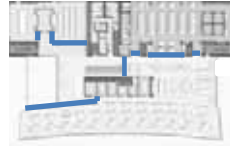
Dessert: Glass Boundary Walls



TRADITIONAL



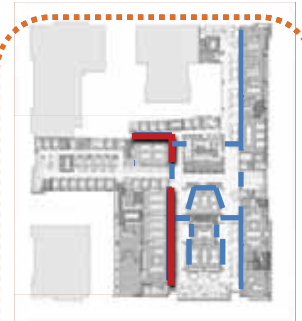
WISCONSIN



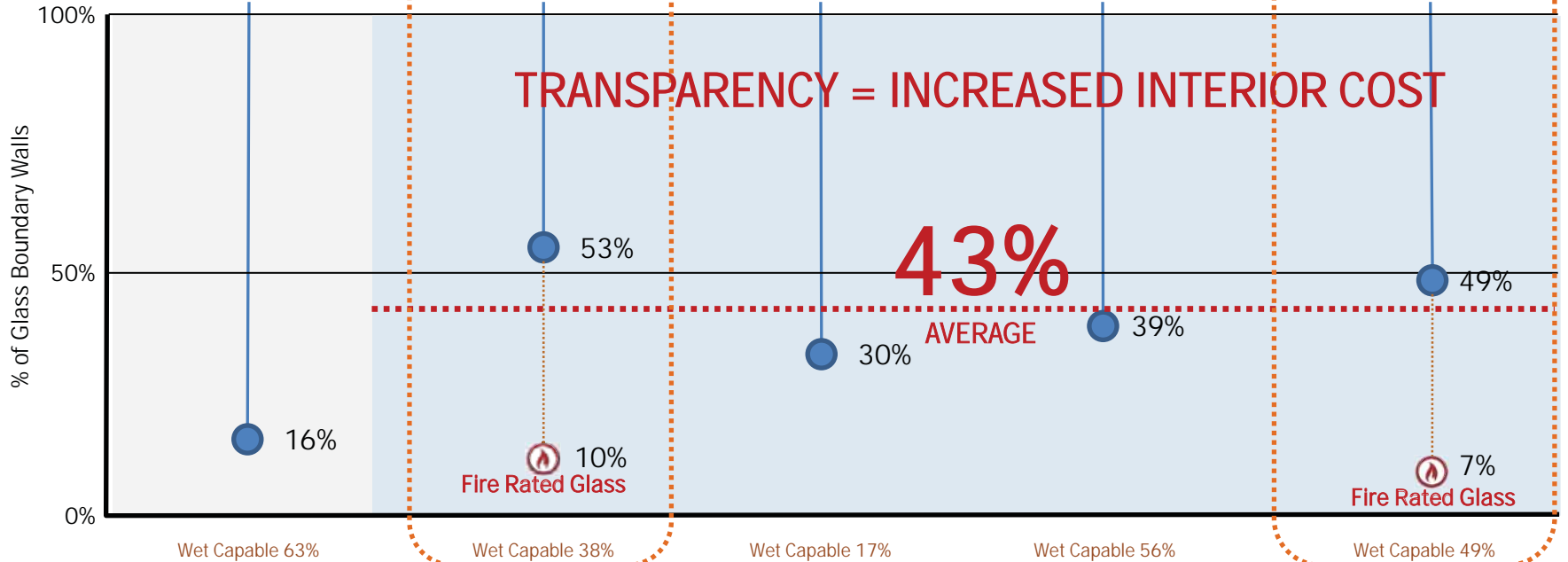
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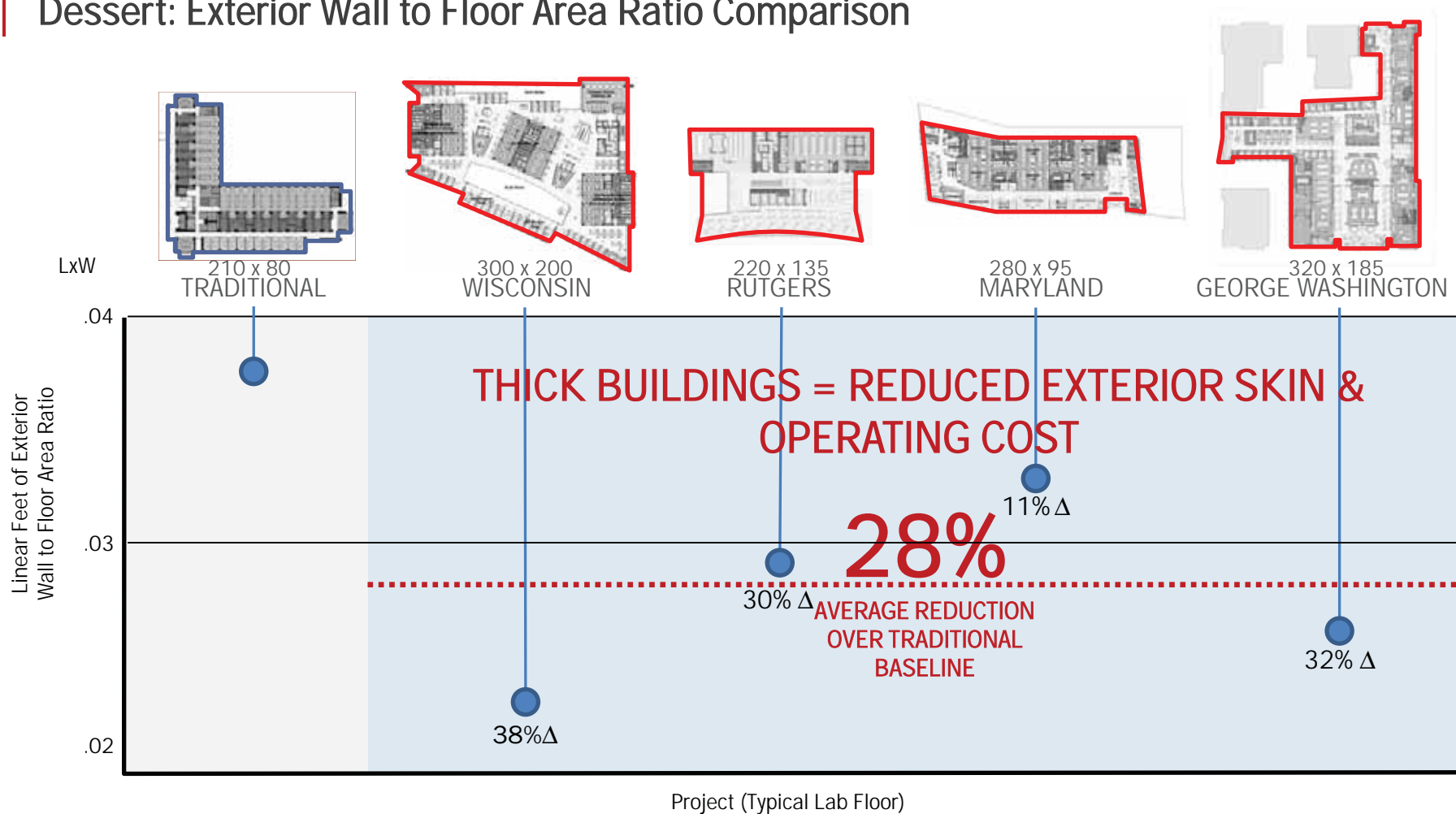
MARYLAND



GEORGE WASHINGTON



Dessert: Exterior Wall to Floor Area Ratio Comparison



Doggie Bag



- 1 **Mixing Bowls Challenge Cultural Norms:**
Benchmark & Educate
- 2 **Minimization of Boundaries Enhances Convergence:**
Early & Often Management of Code & Cost
- 3 **Traditional Plan Dimensions Do Not Apply:**
Don't Be Afraid of the Thick Building

Mixing Bowls

University of Wisconsin
Wisconsin Institutes for Discovery



Floorplate
50,000 GSF

Rutgers University
IFNH



Floorplate
25,000 GSF

University of Maryland
A. James Clark Hall



Floorplate
27,000 GSF

George Washington University
Science & Engineering Hall



Floorplate
51,000 GSF

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