

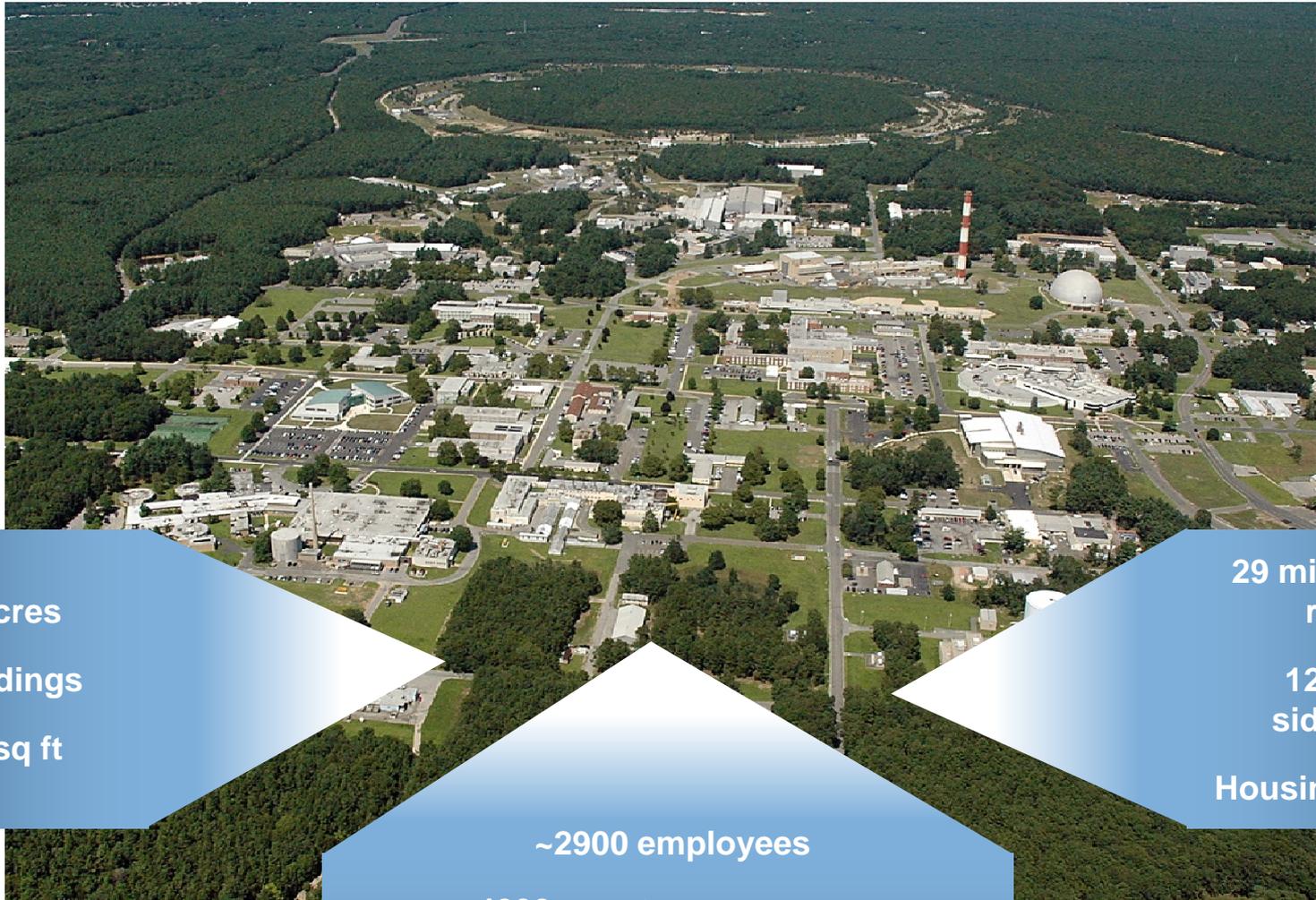
Brookhaven National Laboratory Master Planning Update

Presentation to Community Advisory Council

*Lanny Bates
June 9, 2011*



Brookhaven National Laboratory *A passion for discovery*



5321 acres

350 buildings

~3.2M sq ft

29 miles paved roads

12 miles sidewalks

Housing for ~800

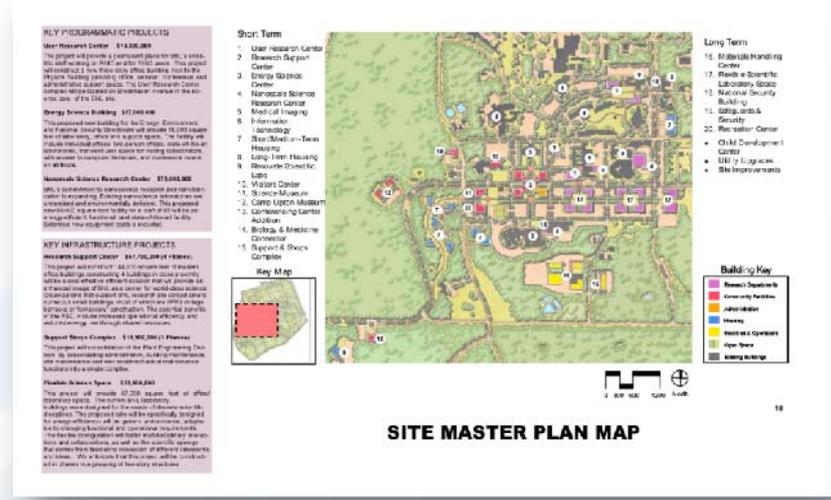
~2900 employees

>4000 guest users per year

FY 08	FY 09	FY 10	FY 11
\$532M	\$880M	\$700M	\$753M

BNL Master Plan is an evolving vision with over 10 years of maturity

- The Site Master Plan of 2000 began to create a flexible structure and framework for growth and renewal
 - Replace or renovate obsolete, inefficient, and inadequate facilities
 - Reorganize vehicular and pedestrian traffic along a “Main Street” to improve access by visitors and staff
 - Focus on redevelopment of central areas rather than site expansion



A Thoroughly Modernized BNL

The Look, Feel, and Performance of a Modern Research Laboratory

- Attractive, reliable, cost efficient, safe, secure, and sustainable campus
- World-class scientific user facilities
- State-of-the art, flexible science labs
- Fosters new ideas and initiatives
- Attracts and retains top talent
- Encourages collaboration & interaction

Driven by Mission Readiness



Challenges of Aging Infrastructure

Typical Infrastructure Issues



Roof Leaks



Deteriorated Mechanical & Electrical Systems



**Labs
Needing
Renovations**



Challenges of Aging Infrastructure

Modernization Issues

- Labs original to building construction 1950's & 60's
- Most office space original to 40's – 70's buildings
 - Roof leaks, mold, poor ventilation, wood rot
- Building elect/mech systems at end-of-life
- Do not meet requirements for 21st century labs (temperature & humidity control & cleanliness)
- Do not meet Guiding Principles for High-performance sustainable buildings
- Insufficient clean room space



Typical Science Impacts

- ELS – ISB-II occupancy delayed, stop-gap labs needed to support Plant Sciences
- GARS – Solar and energy storage programs need quality lab, high-bay and clean rooms.
- GARS – office-based programs in WWII era wood buildings (B/130,197)
- C-AD - Needs to consolidate technical spaces to improve operational efficiency



Modernization is Underway

- NSLS II is proceeding on schedule
- RSL-I is 70% complete renovating 480 and 815. CD-4 scheduled for December
- ISB-I construction initiated in August. Overall project is 28% complete in May
- RSL-II design is complete for major upgrades in 555 and 510. CD-3B completed in May with renovations to start in October
- \$18M ARRA investments in roofs, mechanical, and fire protection substantially completed in CY 2010



Infrastructure Strategic Planning – A Key Blueprint Initiative

- Modernization of the Laboratory is critical to meeting the future vision of BNL. ... Beginning in 2000, BNL developed a Master Plan ... This task will develop the implementation plan necessary to integrate and focus investment strategies and address resource issues for achieving the Master Plan. **The implementation plan will be a living document that is used as a continual planning tool.**
- Modernization of our Laboratory will ... improve our ability to respond to opportunities for growth, reduce operational and business risk, improve our ability to control the cost of doing business, and improve the quality of our work environment.

What Blueprint Success Will Achieve

The Blueprint is a plan to enable the Laboratory to reach its strategic vision and goals. If successful, in 10 years we will have:

- A Laboratory whose research and operations practices...
 - Support increased impact through science and technology (S&T) growth and evolution
 - Minimize injuries and operational incidents
- Doubled revenue, ~25% more staff during next 10 years
 - Growth in research staff supported by more efficient operations
- Laboratory infrastructure that meets 21st Century expectations
 - New facilities that support growth and attract the best and brightest science and support staff
 - Smaller, greener footprint

A broad diversified portfolio

- Enhanced basic science and accuracy
- Increased climate

Leaders and modeling Laboratory behaviors e

- Enhanced safety, accountability, teamwork, and performance management
- Alignment with strategic vision

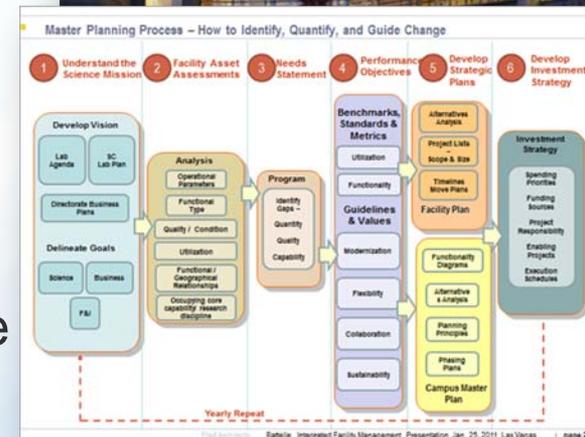
science, operations, and community relationships

Infrastructure Planning Best Practices

- BNL has leveraged the Battelle Partnership Community of Practice (COP) to implement a best practice approach to planning mission readiness
- The COP-defined “success factors”
 - Need to articulate vision
 - Need to define organizational values related to facility environment
 - Need to set responsible standards (space, operational, etc.)
 - Need to have appropriate metrics to measure against
 - Need to follow a consistent, transparent, and repeatable process
 - Need to have focused participation of Science Leadership, F&O organization, and Business Office to achieve consensus

PNNL - Value Summary – Assessment of Value Achievement

Building	MODERNIZATION					ADAPTABILITY		COLLABORATION		SUSTAINABILITY			Mission Readiness		
	Lab Quality	Lab Utilization	Work Quality	Work Satisfaction	Work Quality	Lab	Office	Events (1/1/11)	Technology	Open vs. Closed	Lab vs. Office	Energy Intensity		Water Use	User Monitoring
OTC	38%	32%	78%	68%	7	19%	3%	19%	21%	7	2%	63%	7	7	27%
BTL	22%	48%	37%	68%	7	19%	3%	19%	77%	7	5%	56%	7	7	28%
PSF	100%	100%	100%	100%	100%	100%	50%	77%	65%	100%	47%	68%	7	7	85%
J25	16%	48%	48%	85%	7	19%	3%	19%	41%	7	18%	74%	7	7	28%
NSB	-	-	100%	78%	-	20%	-	17%	7	3%	-	7	7	7	41%
ISD2	88%	88%	100%	88%	-	38%	20%	-	27%	7	3%	18%	7	7	54%
RDB	-	-	100%	78%	-	20%	-	25%	7	3%	-	7	7	7	46%
LSS	88%	88%	100%	88%	-	20%	78%	-	38%	7	88%	1%	7	7	73%



Approach

- To facilitate accomplishment, the initial step was to develop a series of “Decision Packages” analyzing a specific need or capability
- Each Decision package was reviewed with the involved internal organizations and the BNL Site Master Plan Steering Committee
- The Decision Packages provided the background analysis to develop planning around 4 “strategic themes”
 - *Getting out of the old WWII Office Buildings*
 - *Achieving Science Mission Readiness*
 - *Attracting and Accommodating our Employee/Guest/User Population*
 - *Housing Strategy*

Decision Packages	
Space Standards	Research buildings/Science
Housing	C-AD Consolidation
Child Development Expansion	Shops Relocation
Alternative Finance Office Building	Conference Space
National Security Alt Finance Building	Portal to Discovery

Getting out of the Old WWII Buildings

■ WWII Office Buildings - Summary

Building	Personnel		Current Assigned Space	
	BNL	Other	NASF	GSF
B51	10	1	3,406	12,377
B97	14		2,341	3,755
B120	57	2	9,362	13,402
B129	19		2,678	10,107
B130	45		14,674	19,649
B134	54		13,322	30,593
B179	11		2,799	15,025
B185	27		8,002	12,122
B197	83		30,424	52,029
B355	56		6,422	10,295
B460	39	2	11,513	17,672
B464		43	7,799	11,644
B493	2		2,599	6,084
Total	417	48	115,341	214,754

- Total personnel accommodated – 465
- Total area currently assigned – 115,000 sf
- Gross area of buildings so occupied – 215,000 gsf
- Gross area per occupant – 462 gsf/p – nearly twice commercial standards

Note: Charts reflect occupancy profiles as of Summer/Fall 2009 and may have changed



Getting out of the Old WWII Buildings

WWII Office Buildings - Summary

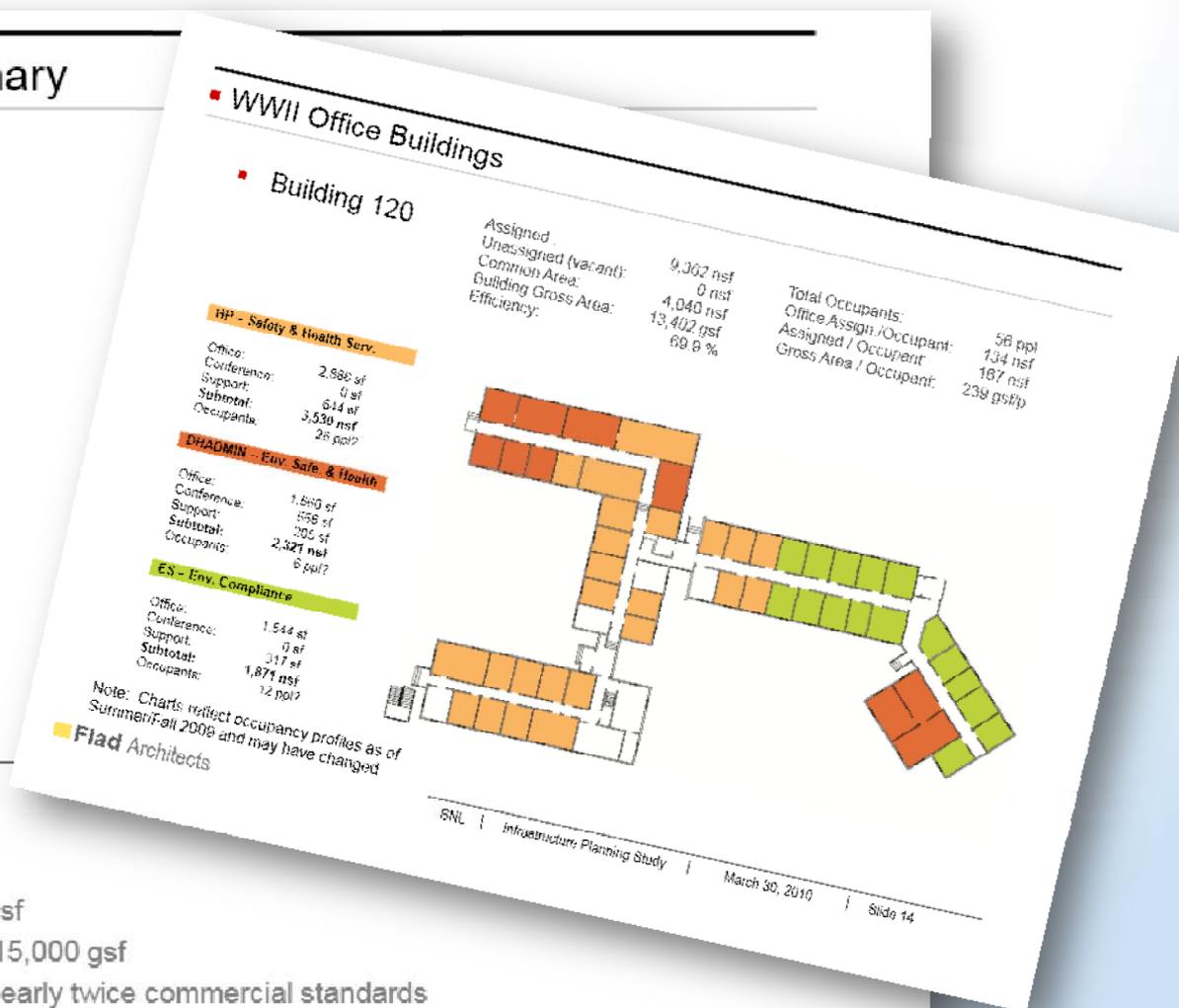
Building	Personnel	
	BNL	Other
B51	10	1
B97	14	
B120	57	2
B129	19	
B130	45	
B134	54	
B179	11	
B185	27	
B197	83	
B355	56	
B460	39	2
B464		43
B493	2	
Total	417	48

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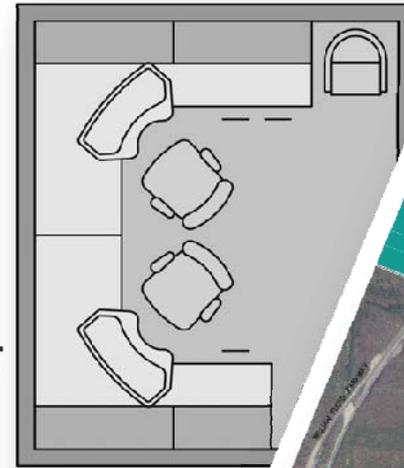
Flad Architects

BNL | Infrastructure Planning Study | March 30, 2010 | Slide 15



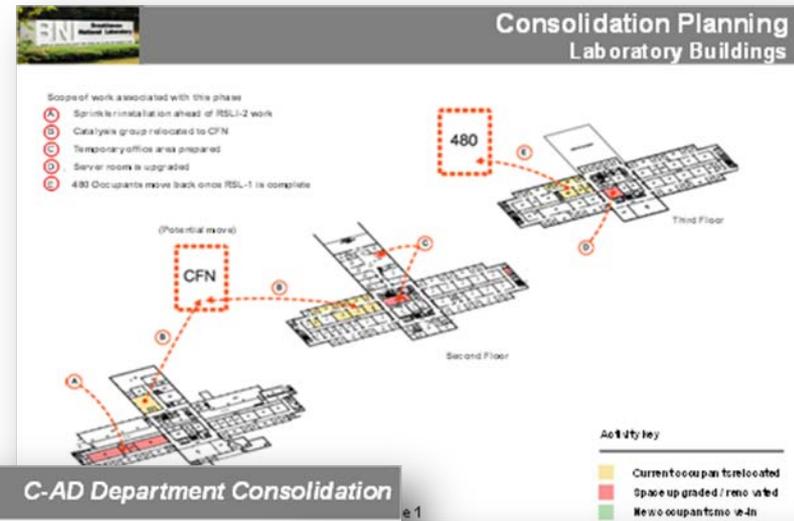
Getting out of the Old WWII Buildings - Accomplishments

- Created BNL Office Space Standards – Achieves 35% less footprint in modern flexible space
- Conceptualized a 150,000 SF replacement Admin Building
- Conceptualized a complimentary National Security Facility
- Designed a new Laboratory Entrance
- Leveraged IFM to eliminate the Shops Complex Project in SLI
- Created ISB-III as a replacement project

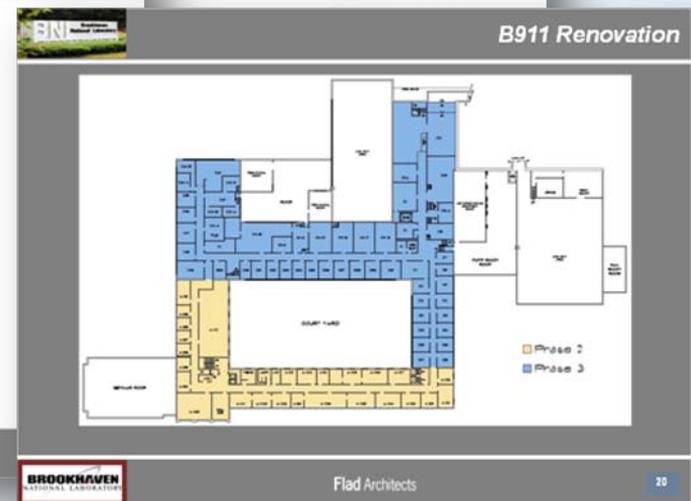
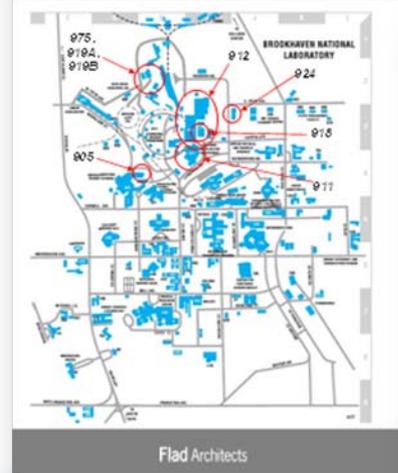


Science Mission Readiness – Early Work

- Logistical plans, relocations, and support projects for RSL-II
 - Bldg 462 Renovation/Lease
- C-AD Consolidation Options
- RSL-II Scope Development
- ISB-III Siting (Shops Consolidation)
- Building 725 (NSLS) Repurposing



C-AD Department Consolidation



Laboratory Building Survey - Scope of Work

– 12 Buildings / over 1.3 million GSF

Scope	GSF	Directorate	Name
463	113,546	ELS	Biology
480	40,786	BES	Materials Science
490	222,512	ELS/GARS	Medical Research Center
510	201,929	NPP	Physics
526	29,158	GARS	Energy Efficiency & Conservation
535	76,911	NPPS/PS	Instrumentation Division
555	151,467	BES	Chemistry
703	84,525	PS/BES	Lab/Office Building
725	155,199	PS	National Synchrotron Light Source
735	95,947	BES	Center for Functional Nano Materials
815	64,228	ELS/GARS	EENS Multiprogram Laboratory
901A	65,611	NPPS	Van De Graaff Building
	1,301,820		

Field Notes / Data by Building



Flad Architects

Date: 08 DEC 10

Facility Assessments

Building No.: 463

Molecular Biology, Computational Biology, Biology, Servers for Structural Biology; hub for other bldgs.
 Ann Amereck, Rich Sautkulis
 Built: 1950s
 Remodeled: 1965, 1970s, 1980s, 1995
 Exposed mechanical rusting; many sloped floors between additions; exposed ceilings in corridors;

Utilization:
 1 – Underutilized (green)
 2 – Appropriate (yellow)
 3 – Over-utilized (red)

Condition
 1 – Poor (red)
 2 – Average (yellow)
 3 – Excellent (green)

Identification			Room					Quality										Comments
Room No.	Name	Function	Utilization	Utilization	Suitability	Condition	Condition Ranking	Casework	Ventilation	Plumbing	Electrical	Lighting	Safety	Finishes	Hoods	BSC	Sinks	
101	Toilet room		0		+	0												
113A	Maintenance Room		+		-	-		-	-	-	-	-	-	-			1	over crowded
113B	Break Room		+		-	-												
113C	Storage		+		-	-												
114	Acid Bath	prep	-		-	-		-	-	-	-	-	-	-			2	NASTY
114A	Storage		0		-	-		-	-	-	-	-	-	-				
114B	Weigh Room		0		-	0		0	0	-	-	0	-	-				
115	Break Room		0		-	-												
115A	Storage		0		0	-		NA	0	NA	0	-	-	-				old cold room
115B	Office		-		0	-												used for storage
115C	Potting Shed		0		+	-		-	-	-	-	-	0	-			1	Scullery sink
115D	Head House		0		+	-		NA	0	-	-	0	0	-			1	
115E	Storage		+		0	-												
115F	Autoclave		+		0	-												
116	Lab		0		0	-		-	0	-	0	-	0	0	2 (4')		1	
116A	Glass wash		0		-	-		-	-	0	0	-	-	-				Autoclave, glasswasher
117	Lab		0		0	-		-	-	-	-	-	0	-	1 (4')	1	1	
118	Lab		0		0	-		-	-	0	-	-	0	-	2 (4')		2	
119	Lab	Biol	0		0	-		-	0	-	-	-	0	-	1 (4')		1	
119A	Lab	prep	0		0	0		0	0	0	0	0	0	0		1	1	crystal growth
119B	Lab		0		-	-		0	0	-	0	0	-	-	1			closet
120A	Storage		0		+	0												
120B	Storage		0		+	0												
121	Glass wash		0		-	-		-	0	0	0	0	0	-			1	bad retrofit for a GW room

Field Notes / Data by Building

Utilization:
 1 – Underutilized (green)
 2 – Appropriate (yellow)
 3 – Over-utilized (red)

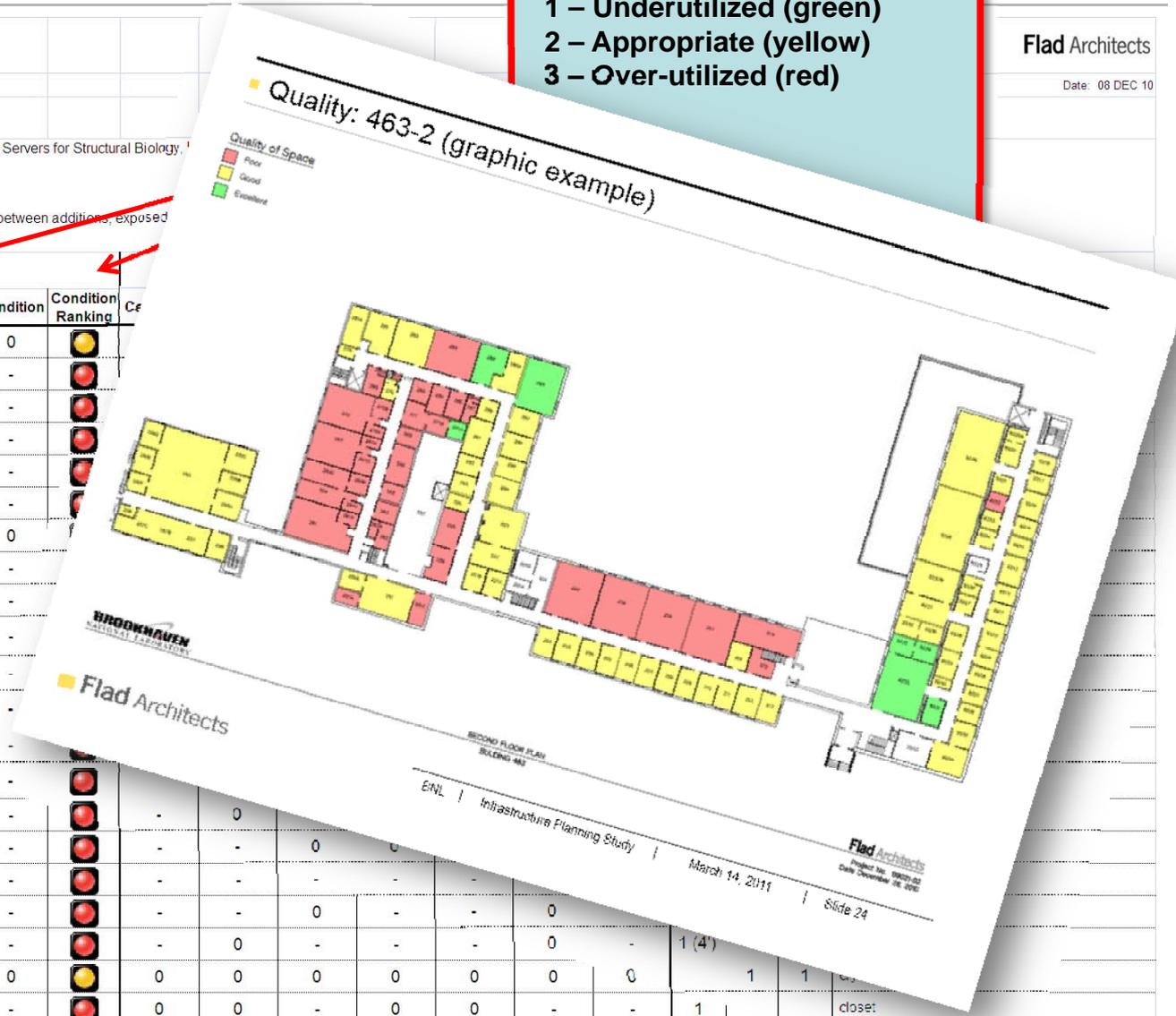
Flad Architects
 Date: 08 DEC 10



Building No.: 463

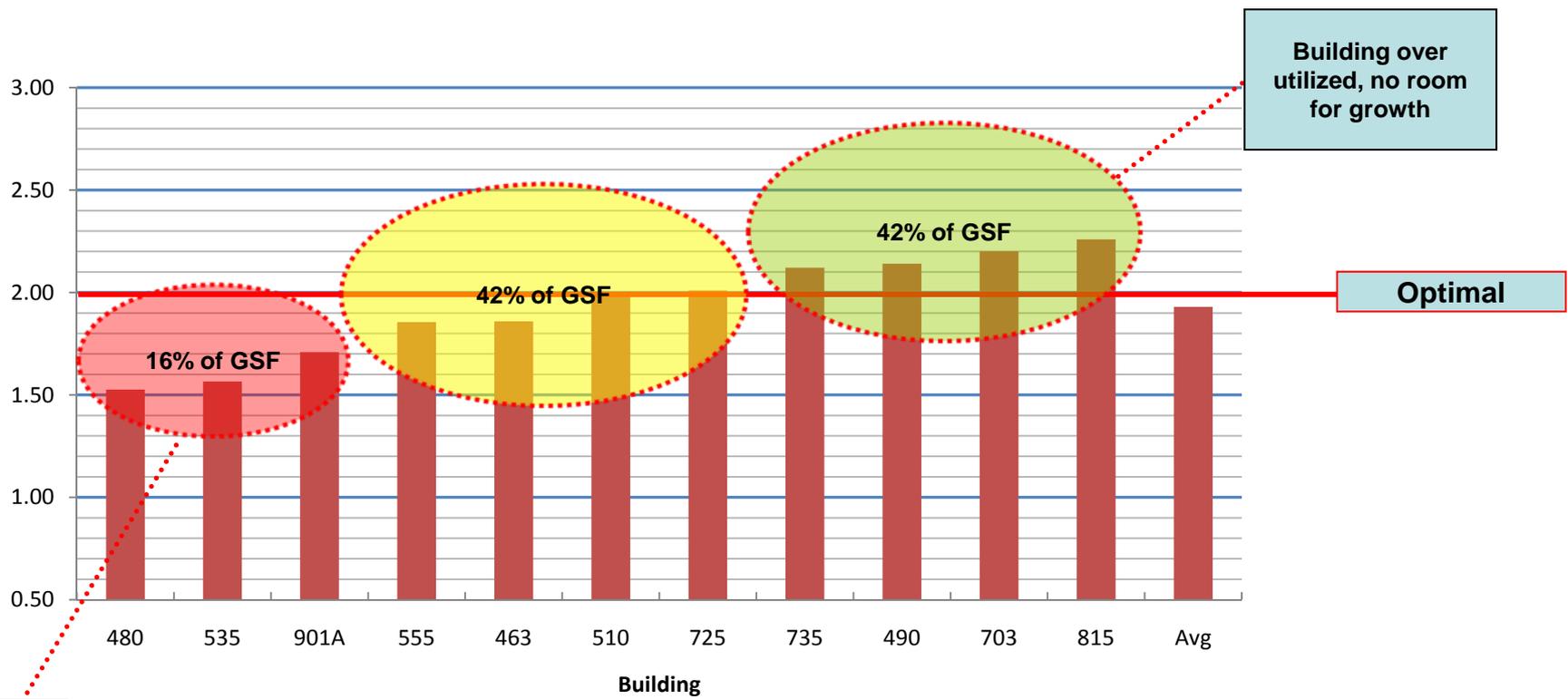
Molecular Biology, Computational Biology, Biology, Servers for Structural Biology, Ann Amereck, Rich Sautkulis
 Built: 1950s
 Remodeled: 1965, 1970s, 1980s, 1995
 Exposed mechanical rusting; many sloped floors between additions; exposed

Identification			Room				
Room No.	Name	Function	Utilization	Utilization	Suitability	Condition	Condition Ranking
101	Toilet room		0	●	+	0	●
113A	Maintenance Room		+	●	-	-	●
113B	Break Room		+	●	-	-	●
113C	Storage		+	●	-	-	●
114	Acid Bath	prep	-	●	-	-	●
114A	Storage		0	●	-	-	●
114B	Weigh Room		0	●	-	0	●
115	Break Room		0	●	-	-	●
115A	Storage		0	●	0	-	●
115B	Office		-	●	0	-	●
115C	Potting Shed		0	●	+	-	●
115D	Head House		0	●	+	-	●
115E	Storage		+	●	0	-	●
115F	Autoclave		+	●	0	-	●
116	Lab		0	●	0	-	●
116A	Glass wash		0	●	-	-	●
117	Lab		0	●	0	-	●
118	Lab		0	●	0	-	●
119	Lab	Biol	0	●	0	-	●
119A	Lab	prep	0	●	0	0	●
119B	Lab		0	●	-	-	●
120A	Storage		0	●	+	0	●
120B	Storage		0	●	+	0	●
121	Glass wash		0	●	-	-	●



Space Utilization by Building

Overall Space Utilization



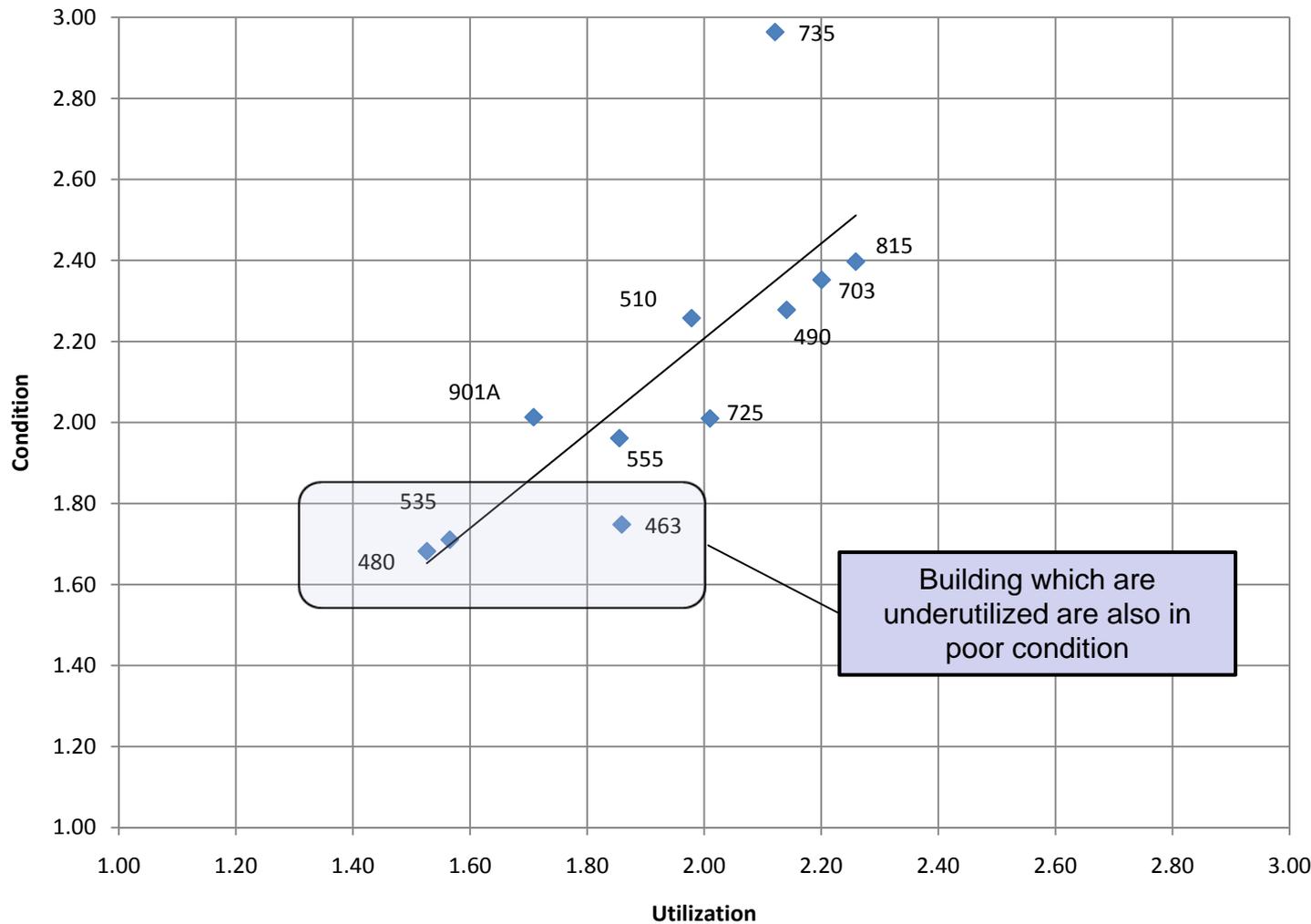
Building under utilized, look at options

Building over utilized, no room for growth

Optimal

Space Utilization by Building

Condition vs. Utilization



Building which are underutilized are also in poor condition

Science Vision Needs Identification

- Science vision project needs were determined over the course of several meetings with the science Associate Laboratory Director's
- Small projects were excluded and estimates are rough order of magnitude for planning purposes
- Projects have been prioritized to determine:
 - Fit to Brookhaven Science mission
 - Timing required for the project
 - Current definition of the project (Scope, Schedule, Cost)
 - Availability of funding

Mission Prioritization Criteria

- **Green:** ●
 - Essential to science mission readiness.
 - Capability does not exist
- **Yellow:** ●
 - Essential
 - Some capability exists
- **Red:** ●
 - Not essential to science mission
 - Capability exists
 - Mission readiness understood

Funding Prioritization Criteria

- **Green:** ●
 - Funding in place
 - Funding is consistent with timing
- **Yellow:** ●
 - Funding is projected/anticipated
 - Funding is not consistent with timing
- **Red:** ●
 - No funding identified

Timing Prioritization Criteria

- **Green:** ●
 - Urgent
 - 1 – 3 years
- **Yellow:** ●
 - Important
 - 3 – 5 years
- **Red:** ●
 - Long term
 - 5 – 10 years

Science Department Vision Needs List with Prioritization

Directorate	Name	Mission Need	Timing	Definition	Funding
GARS	Solar Energy Support Facility	🟢	🟢	🟢	🟢
E&LS	Energy and Environment	🟢	🟢	🟢	🟡
NPP	NPP Technical Facilities	🟢	🟢	🟡	🟡
GARS	AEGIS Center	🟢	🟢	🟡	🔴
GARS	Technology Transfer Outreach Facilities	🟢	🟢	🟡	🔴
GARS	Technology Transfer Engineering Facilities	🟢	🟢	🟡	🔴
BES	Complete Renovation of B-555 (Chemistry)	🟢	🟡	🟡	🔴
E&LS	Structural Biology	🟢	🟡	🟡	🔴
NPP	eRHIC	🟢	🟡	🟡	🔴
PS	LOB Construction/Fitout Projects	🟢	🔴	🟢	🔴
PS	Staff Workspace Accommodations / (725?) (2015)	🟢	🔴	🔴	🔴
NPP	Detector Development / Instrumentation	🟡	🟢	🟡	🔴
BES	Sustainable Building Performance (555)	🟡	🟢	🔴	🔴
GARS	National Security Support Facility	🟡	🟡	🟢	🔴
GARS	National Security Engineering /Tech Facilities	🟡	🟡	🟡	🔴
GARS	Detection Lab Facilities	🟡	🟡	🟡	🔴
NPP	eRHIC FEL	🟡	🟡	🔴	🔴
NPP	Accelerator Science and Technology Building (was previously noted as	🟡	🟡	🔴	🔴
NPP	Renovate Building 911	🟡	🟡	🔴	🔴
GARS	Materials in Extreme Environments	🔴	🟡	🟡	🔴

Science Department Vision Needs List with Prioritization

Directorate	Name	Mission Need	Timing	Definition	Funding	Funding Requests by Timing Need		
						1-3	3-5	Long term
GARS	Solar Energy Support Facility	●	●	●	●	\$4,950,000		
E&LS	Energy and Environment	●	●	●	●	\$78,375,000		
NPP	NPP Technical Facilities	●	●	●	●	\$35,310,000		
GARS	AEGIS Center	●	●	●	●	\$8,580,000		
GARS	Technology Transfer Outreach Facilities	●	●	●	●	\$24,131,250		
GARS	Technology Transfer Engineering Facilities	●	●	●	●	\$13,035,000		
BES	Complete Renovation of B-555 (Chemistry)	●	●	●	●		\$38,610,000	
E&LS	Structural Biology	●	●	●	●		\$1,980,000	
NPP	eRHIC	●	●	●	●		TBD	
PS	LOB Construction/Fitout Projects	●	●	●	●			\$59,400,000
PS	Staff Workspace Accommodations / (725?) (2015)	●	●	●	●			\$66,000,000
NPP	Detector Development / Instrumentation	●	●	●	●			
BES	Sustainable Building Performance (555)	●	●	●	●			
GARS	National Security Support Facility	●	●	●	●			
GARS	National Security Engineering /Tech Facilities	●	●	●	●			
GARS	Detection Lab Facilities	●	●	●	●			
NPP	eRHIC FEL	●	●	●	●			
NPP	Accelerator Science and Technology Building (was previously noted as	●	●	●	●			
NPP	Renovate Building 911	●	●	●	●			
GARS	Materials in Extreme Environments	●	●	●	●			
Request:						\$164,381,250	\$40,590,000	\$125,400,000
SLI Funding:						\$0	\$0	\$151,000,000

Funding gap due to timing of the need for projects

Science Department Vision Needs List with Prioritization

BNL SLI Profile 2011

ISB-1
2009
CD3B

RSL-2
2010
CD3B

ISB-2
2016

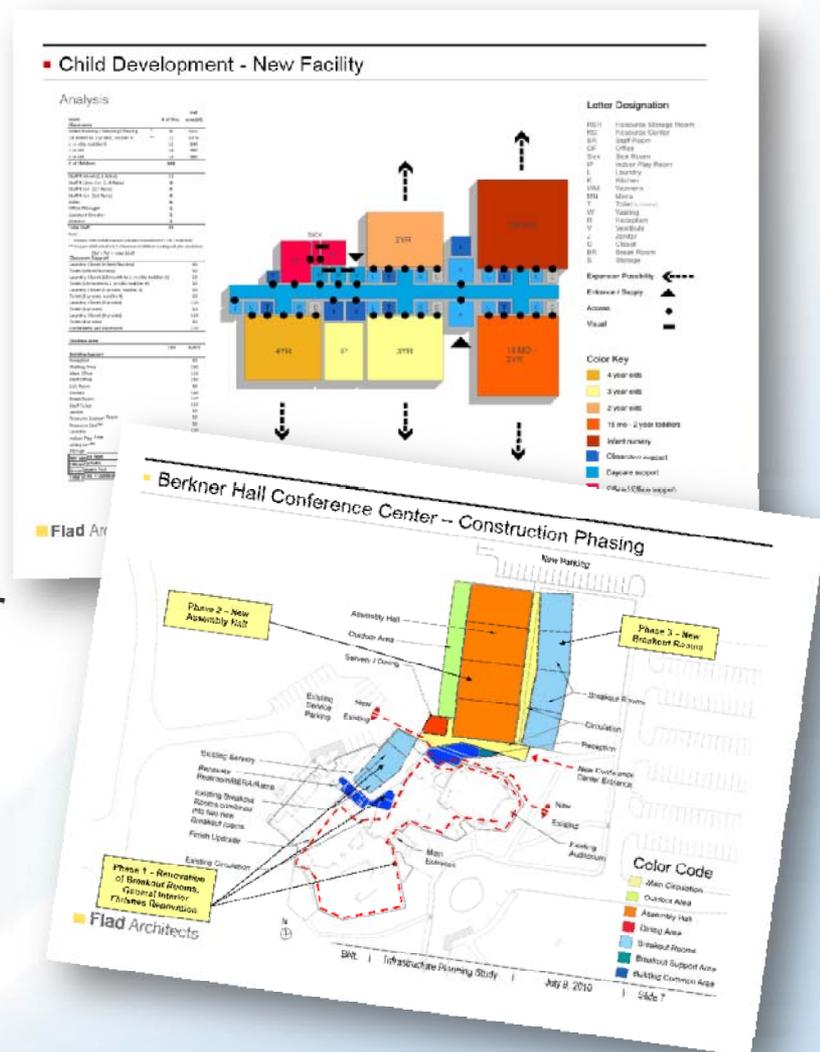
ISB-3
2019

RSL-3
2020

CCB
2020

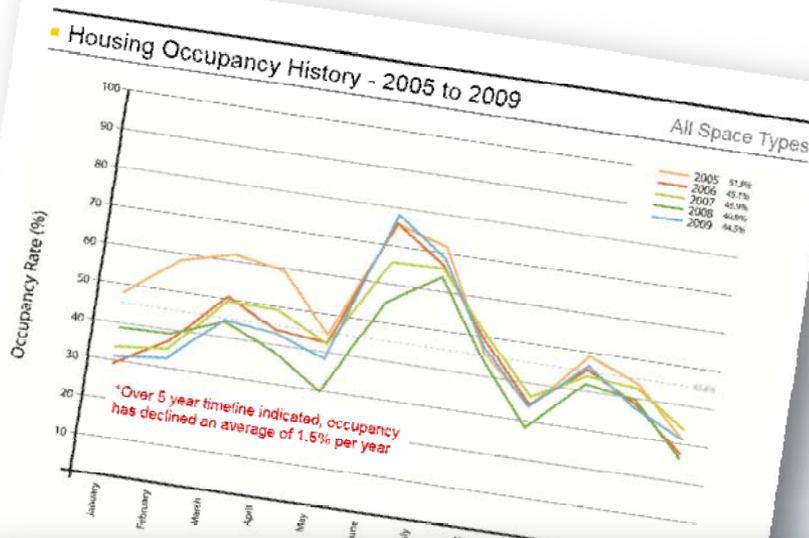
Attracting and Accommodating our Employee/Guest/User Population

- Completed a study of on-site Housing and have implemented decisions
- Evaluated and developed options for Child Care Expansion
- Recommended alternatives for improved on-site conference capability
- On-going capacity evaluations and options for central computing



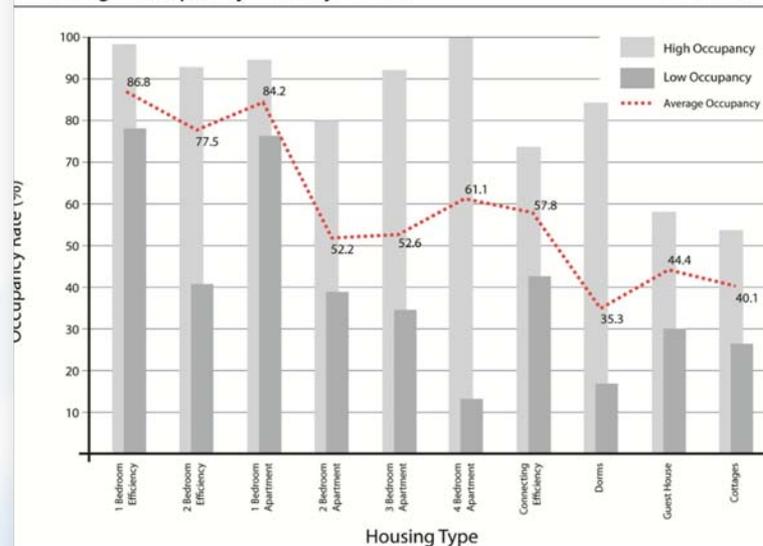
Housing Strategy – Right Size and Renew

- Occupancy rates have declined to a 60 month average of 45.6% (2005-2009)
- Units are WWII 1942-vintage barracks buildings requiring substantial investment in repairs and/or upgrades
- Water quality and fire protection are issues
- Full cost recovery operation
- Replacement of current housing inventory is not practical
- Strategy
 - Ongoing Right size of inventory
 - Extend life of remaining units as practical
 - Gradual transition to commercially available options



Housing Occupancy History - 2009

Per Housing Unit



Housing Strategy in Action

- Initial inventory reduction of 3 Apartment buildings, one Dorm, and 30 seasonal cottages – a reduction of 89 units
- Savings invested to improve condition and reconfigure to higher demand product
 - Converted Connecting Efficiencies to Two Room Efficiencies (from 14 to 7 units)
 - Completing refurbishment of 17 One Bedroom and 33 Two Bedroom Apartments
- Commercial-like reservation system employed
- Occupancies have increased ~5-20%
- A new guest house for longer term on site needs is being developed (65 rooms and \$12-15M)



60,000 SF of demolition space for SLI (\$1.7M demolition costs)



■ Non-Research Infrastructure Needs (Filtered)

Name	Mission Need	Timing	Definition	Funding	Goal	# of Goals Met	TEC
New Entrance Road	🟢	🟢	🟢	🔴	1,2,4	3	\$8,206,000
Alt. Financed Building	🟢	🟢	🟡	🔴	1,2,3	3	\$36,600,000
Child Care	🟢	🟢	🟡	🔴	1,2,3	3	\$3,921,600
Utility Infrastructure Modernization	🟢	🟡	🔴	🔴	1	1	\$55,000,000
Housing (Existing)	🟡	🟢	🟢	🟢	1,2	2	\$1,410,000
Central Computing	🟡	🔴	🟡	🟡	1,3	2	\$27,000,000
Housing (Guest House)	🟡	🔴	🟡	🔴	2	2	\$12,275,000
Conferencing	🟡	🔴	🟡	🔴	2,4	2	\$20,500,000
Shops Consolidation (Ph. 1)	🔴	🟢	🔴	🔴	1,3	1.5	\$6,600,000
Portal to Discovery	🔴	🟡	🟡	🔴	4	1.5	N/A
							\$171,512,600

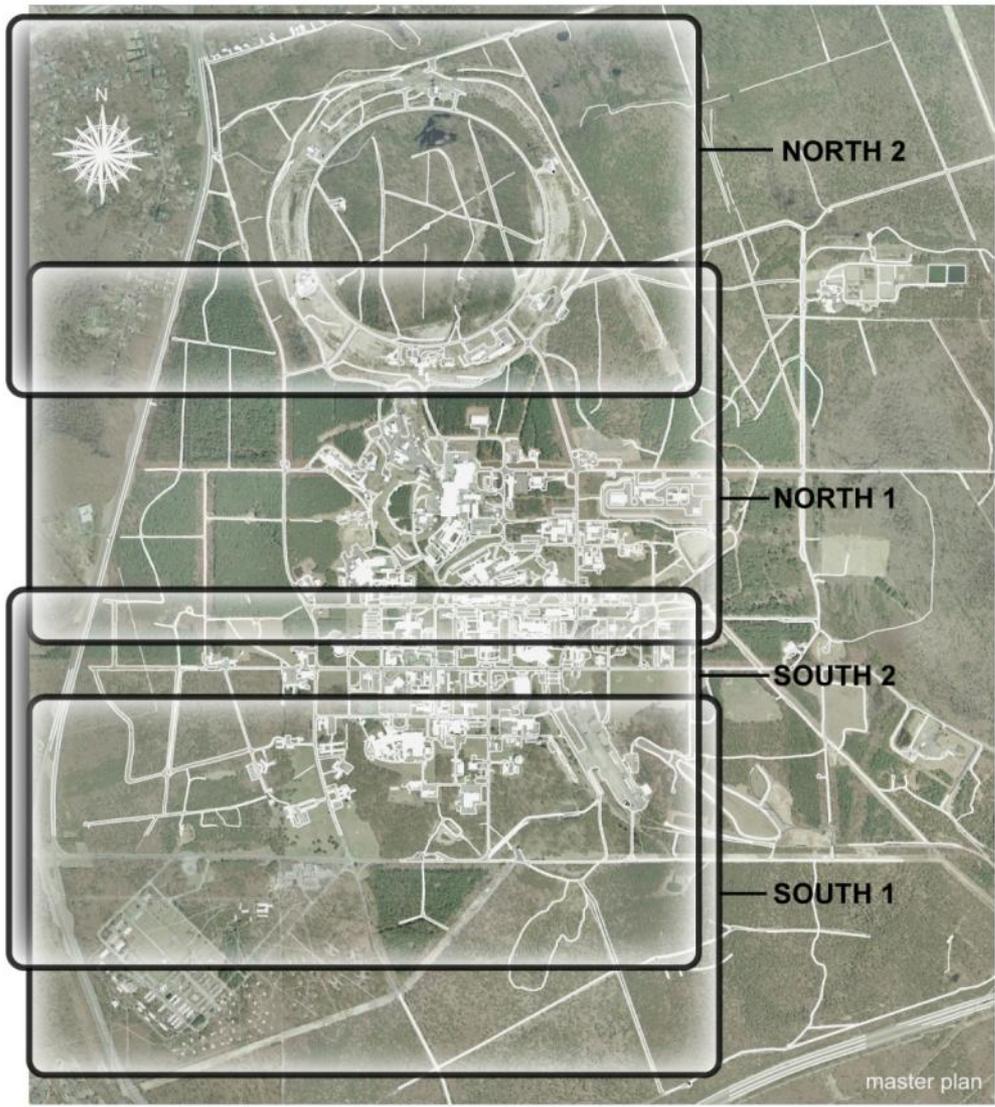
\$103,727,600

Goals

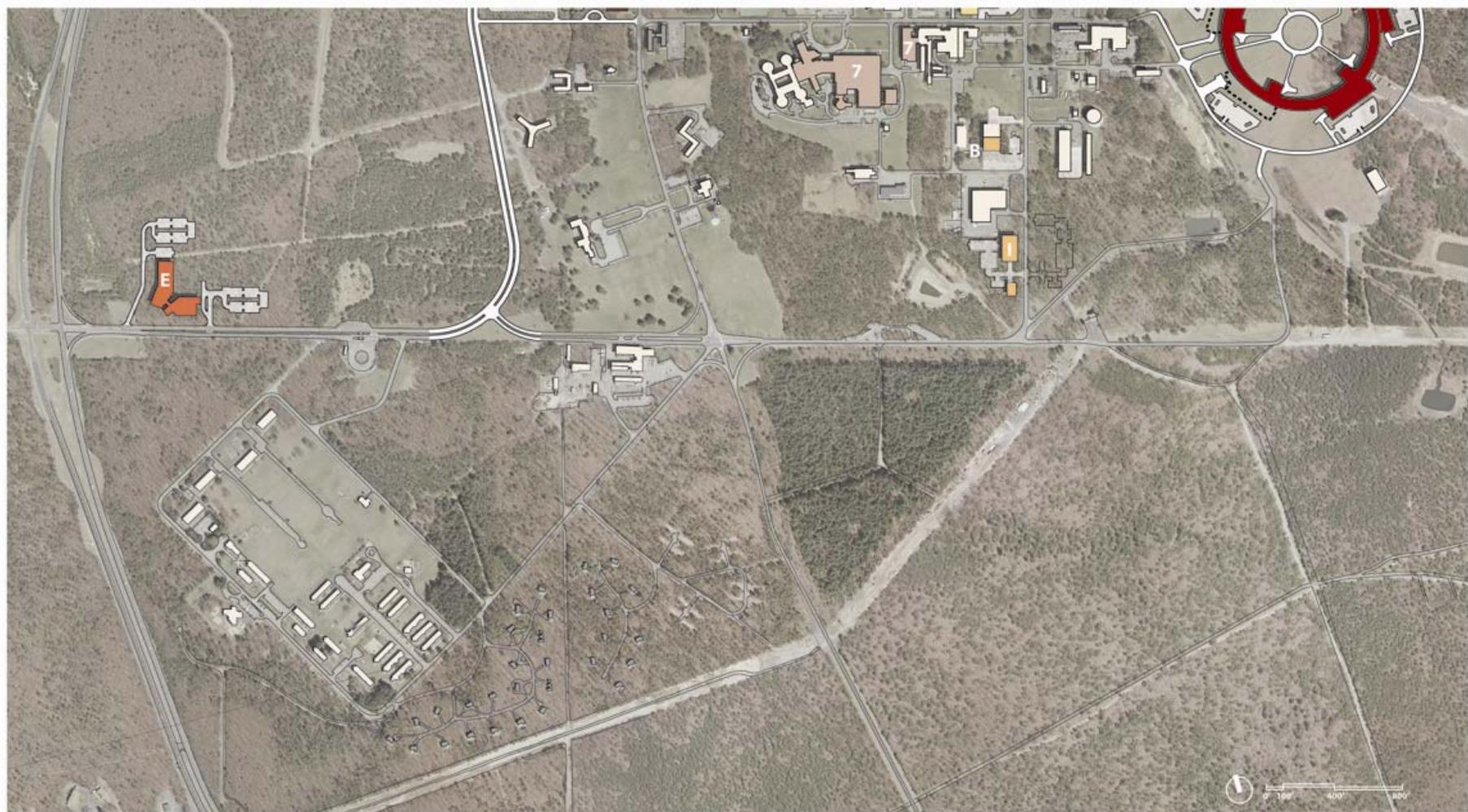
- 1. Lab modernization
- 2. Recruitment/retention
- 3. Quality of workplace
- 4. Public outreach

Green - greatest contribution
Red - least contribution

■ Master Plan Update



Site Plan – South / Housing



- 1. Interdisciplinary Science Ph I
- 2. Renovate Science Labs Ph II
- 3. Interdisciplinary Science PH II
- 4. Interdisciplinary Science PH III
- 5. Utilities Improvement Project (Not shown)
- 6. Central Computing Building
- 7. Renovate Science Labs Ph III

- A. NSLS-II
- B. Materials Handling Addn.
- C. Research Array
- D. Support Office Building
- E. Portal to Discovery
- F. eRHIC
- G. Guest Housing
- H. Conference Center
- I. Support Shops
- J. FEL Experiment Hall

- Existing Buildings
- Refurbishments - SLI/AGPP/DMR
- New Buildings - SLI
- New Buildings & Additions - IGPP
- C-AD Renovations
- New Buildings & Additions - Private Funded
- New Buildings & Additions - Program Funded
- New Buildings & Additions - Alt Finance Funded
- Buildings to be Demolished
- Future Phases

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SITE CORE 2021 - SOUTH



Site Plan - Core



- 1. Interdisciplinary Science Ph I
- 2. Renovate Science Labs Ph II
- 3. Interdisciplinary Science PH II
- 4. Interdisciplinary Science PH III

- 5. Utilities Improvement Project (Not shown)
- 6. Central Computing Building
- 7. Renovate Science Labs Ph III

- A. NSLS-II
- B. Materials Handling Addn.
- C. Research Array
- D. Support Office Building
- E. Portal to Discovery

- F. eRHIC
- G. Guest Housing
- H. Conference Center
- I. Support Shops
- J. FEL Experiment Hall

- Existing Buildings
- Refurbishments - SLI/IGPP/DMR
- New Buildings - SLI
- New Buildings & Additions - IGPP
- C-AD Renovations
- New Buildings & Additions - Private Funded
- New Buildings & Additions - Program Funded
- New Buildings & Additions - Alt Finance Funded
- Buildings to be Demolished
- Future Phases

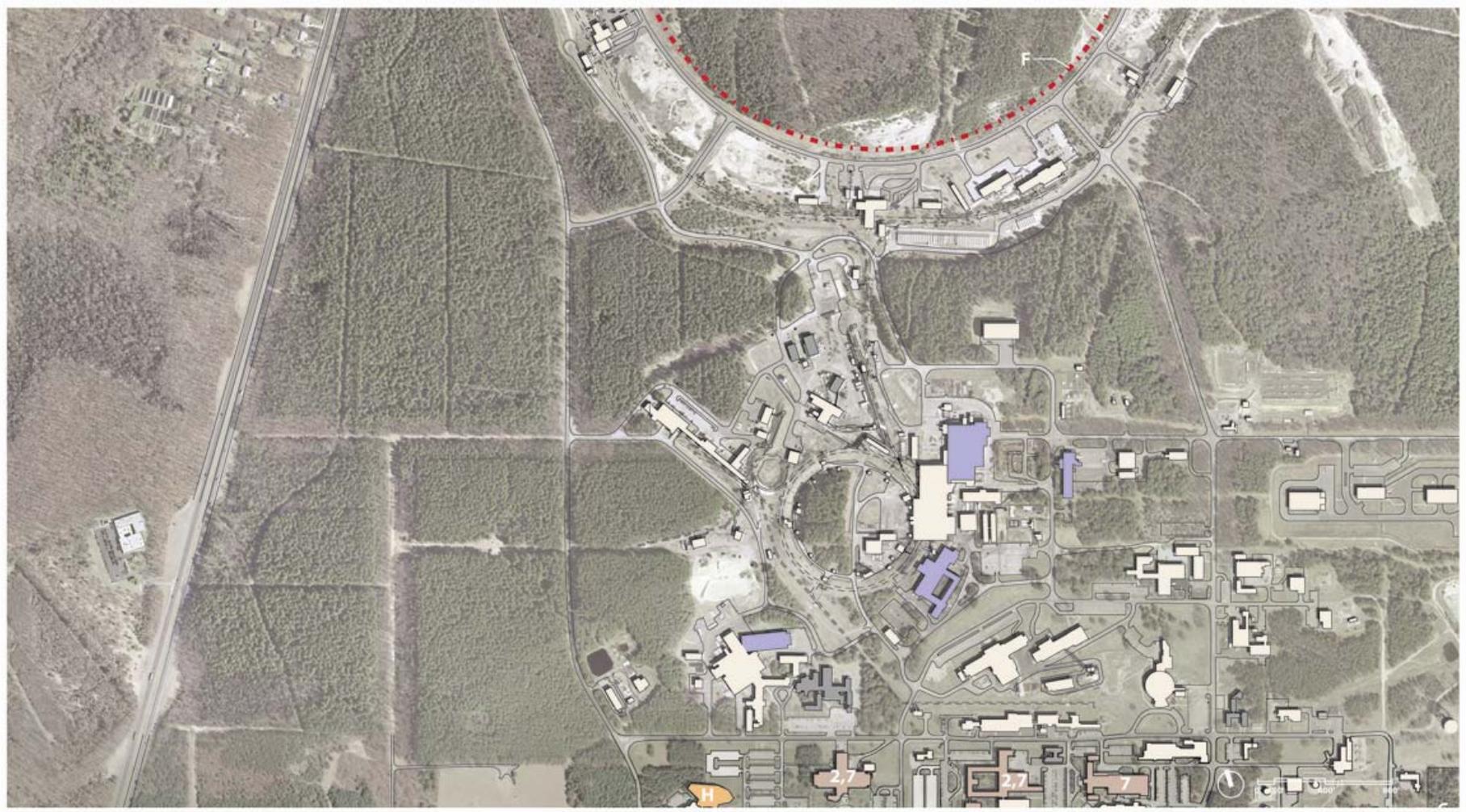
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SITE CORE 2021 - SOUTH

BROOKHAVEN
NATIONAL LABORATORY

Site Plan - North



- 1. Interdisciplinary Science Ph I
- 2. Renovate Science Labs Ph II
- 3. Interdisciplinary Science PH II
- 4. Interdisciplinary Science PH III
- 5. Utilities Improvement Project (Not shown)
- 6. Central Computing Building
- 7. Renovate Science Labs Ph III

- A. NSLS-II
- B. Materials Handling Addn.
- C. Research Array
- D. Support Office Building
- E. Portal to Discovery
- F. eRHIC
- G. Guest Housing
- H. Conference Center
- I. Support Shops
- J. FEL Experiment Hall

- Existing Buildings
- Refurbishments - SLI/IGPP/DMR
- New Buildings - SLI
- New Buildings & Additions - IGPP
- C-AD Renovations
- New Buildings & Additions - Private Funded
- New Buildings & Additions - Program Funded
- New Buildings & Additions - Alt Finance Funded
- Buildings to be Demolished
- Future Phases

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SITE CORE 2021 - NORTH



Site Plan – North / RHIC



- 1. Interdisciplinary Science Ph I
- 2. Renovate Science Labs Ph II
- 3. Interdisciplinary Science PH II
- 4. Interdisciplinary Science PH III

- 5. Utilities Improvement Project (Not shown)
- 6. Central Computing Building
- 7. Renovate Science Labs Ph III

- A. NSLS-II
- B. Materials Handling Addn.
- C. Research Array
- D. Support Office Building
- E. Portal to Discovery

- F. eRHIC
- G. Guest Housing
- H. Conference Center
- I. Support Shops
- J. FEL Experiment Hall

Existing Buildings	New Buildings & Additions - Private Funded
Refurbishments - SLI/IGPP/DMR	New Buildings & Additions - Program Funded
New Buildings - SLI	New Buildings & Additions - Alt Finance Funded
New Buildings & Additions - IGPP	Buildings to be Demolished
C-AD Renovations	Future Phases

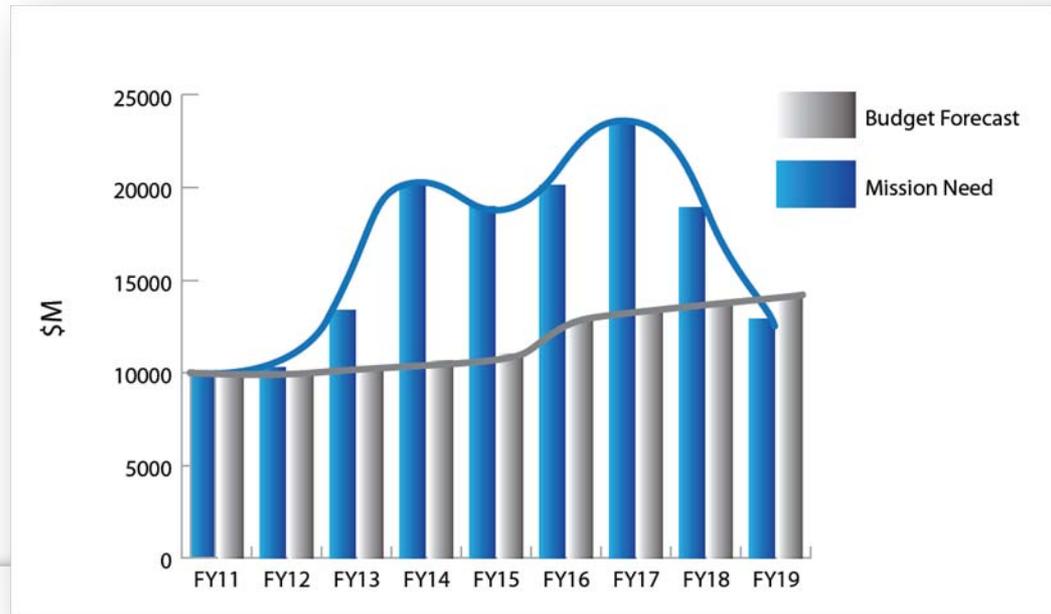
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SITE CORE 2021 - NORTH



Funding Challenges

- BNL growth during the coming SLI (HQ) funding gap, will require priority IGPP (local) investments in science infrastructure
- Limited funds availability for general infrastructure



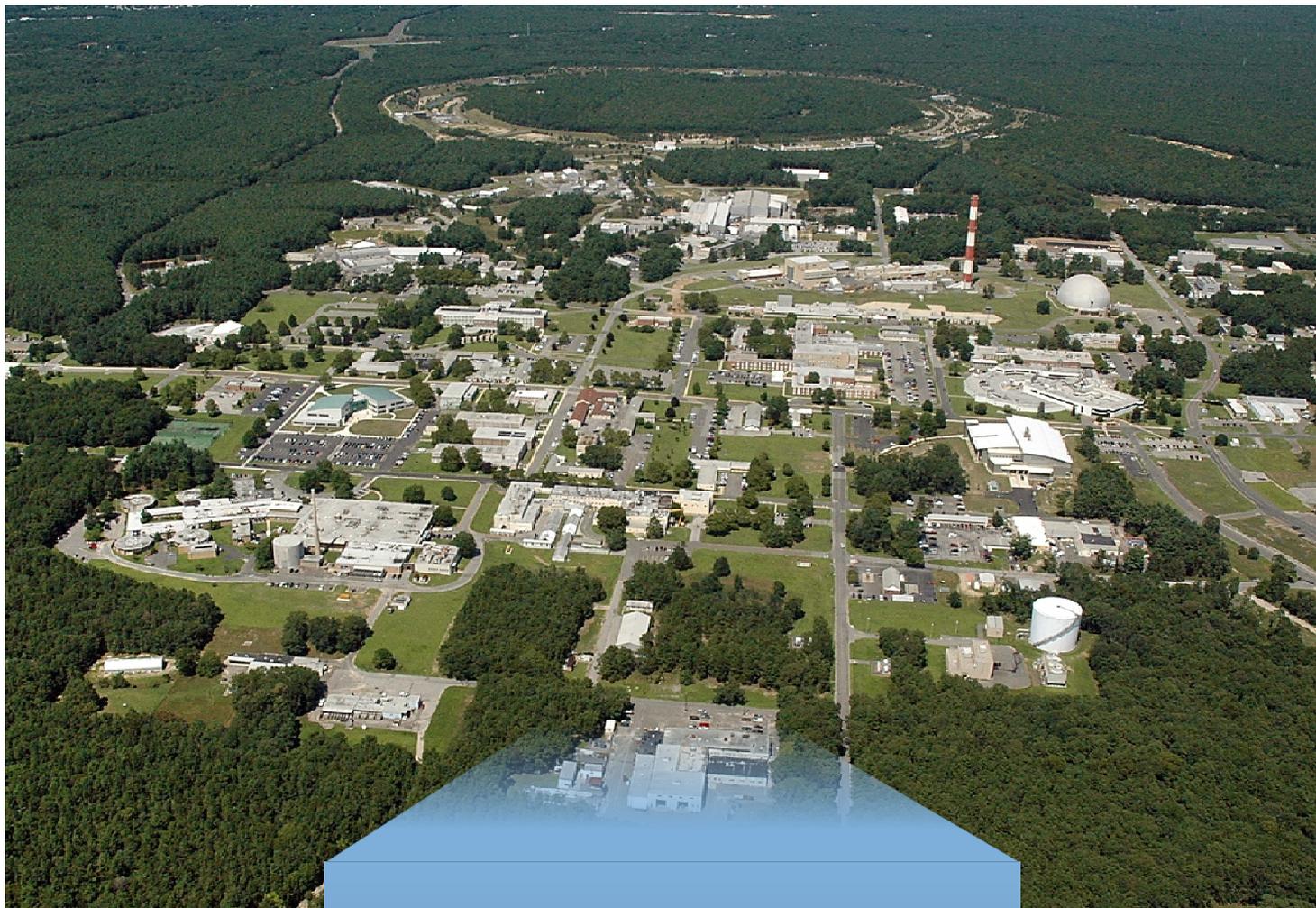
- Major science stop-gap projects

Project	Estimate \$M
• B/463 Lab/Office Renovations for Plant Science	4.0
• Convert B/462 to High-Bay Labs & Clean Room	8.5
• B/555 HVAC Improvements, East	2.1
• B/555 Renovate 2& 3 rd Floor, East	15.3
• B/911 Renovation – Phase I	8.8
• User support lab/office building	<u>9.0</u>
	46.7

Closing Thoughts

- BNL has a well established vision for future site development that will serve our science mission
- Sustainability will be integral to our site development and our operations
- Funding challenges will demand tough priority calls and innovative approaches in infrastructure management and acquisition
 - Our first priority is for science mission readiness
 - Well managed space (office and lab) utilization is critical
 - Site amenities are important to attract future scientists
 - Major office space renewal through capital investment is not likely and commercial options could fill this gap
 - Housing renewal on a large scale is not practical and a migration to commercial options over time will be facilitated

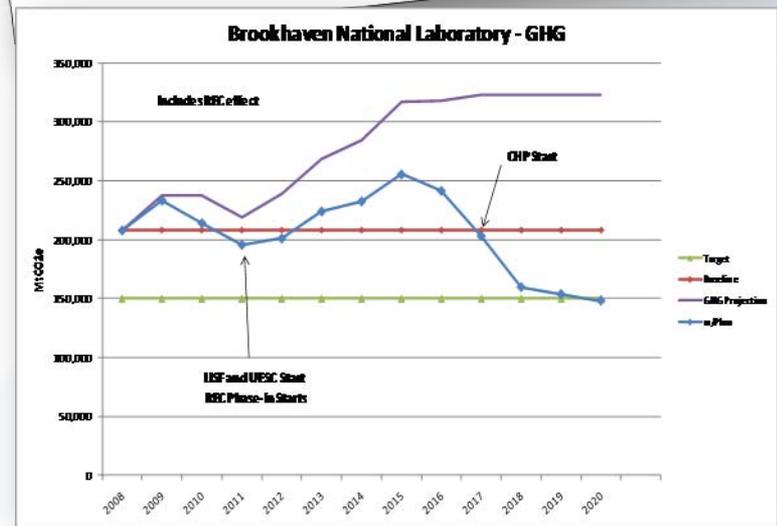
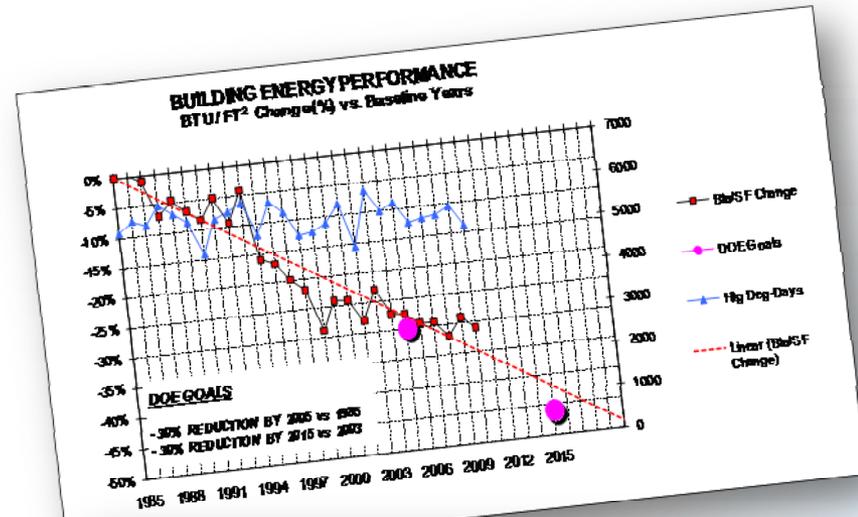
Brookhaven National Laboratory *A passion for discovery*



Questions?

Sustainability

- BNL continues to develop a multi-faceted strategy to achieve our energy, water conservation and greenhouse gas reduction (GHG) goals:
 - Utility Energy Services Contract (Phase I Initiated: lighting, energy management controls, chiller replacement. Phase II: CHP/Biomass, steam improvements, controls, energy storage)
 - Modernization of infrastructure (SLI, IGPP), replace energy inefficient buildings with LEED Gold buildings and improving and enhancing existing buildings
 - Expand existing fleet of alternate-fuel vehicle fleet (currently CNG, Biodiesel and E85)
- **Research and demonstration projects on energy technology at BNL can serve the dual goals of energy technology research and site sustainability**



Sustainability

- BNL continues to develop a multi-

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research and site sustainability

