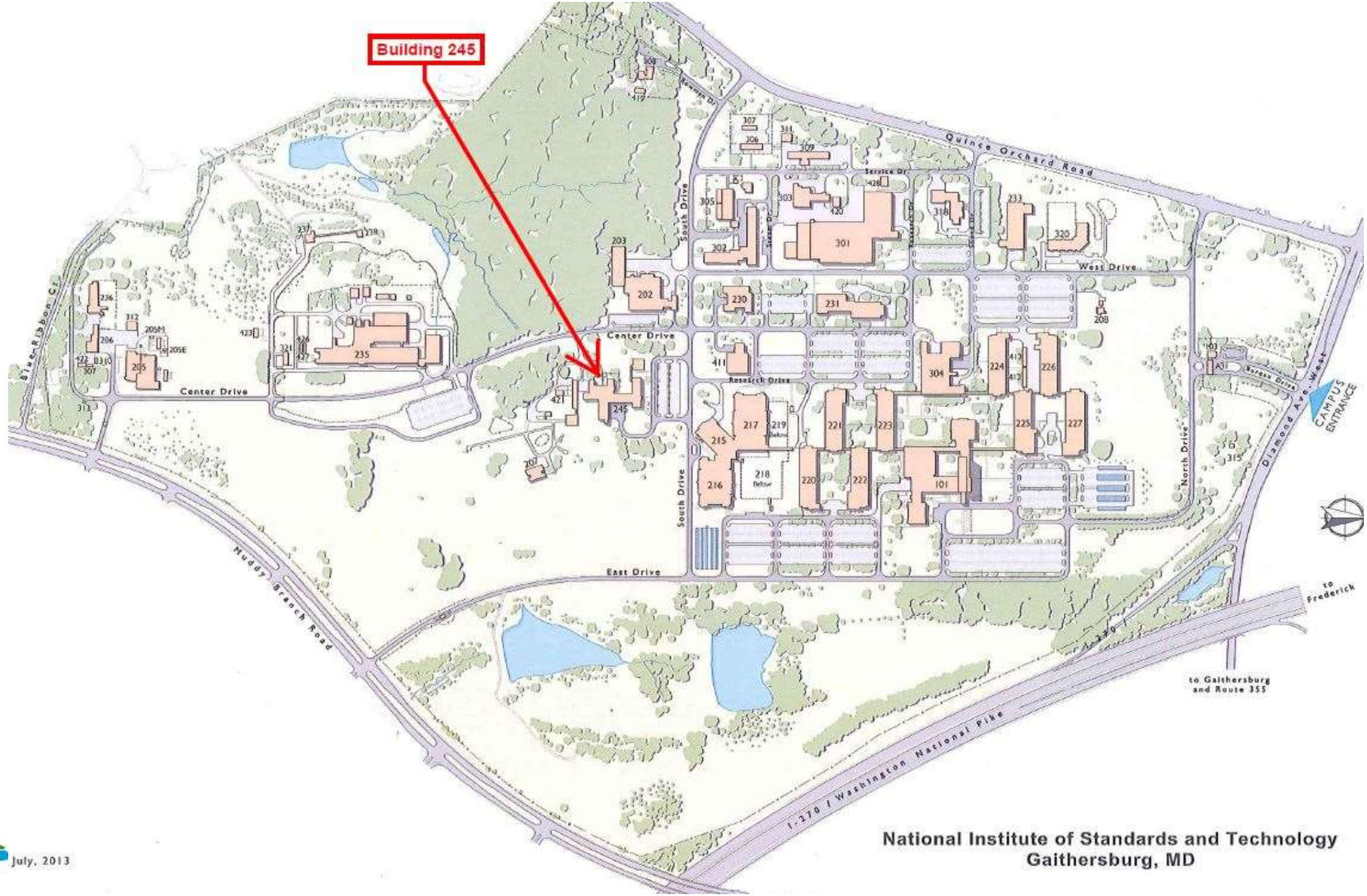
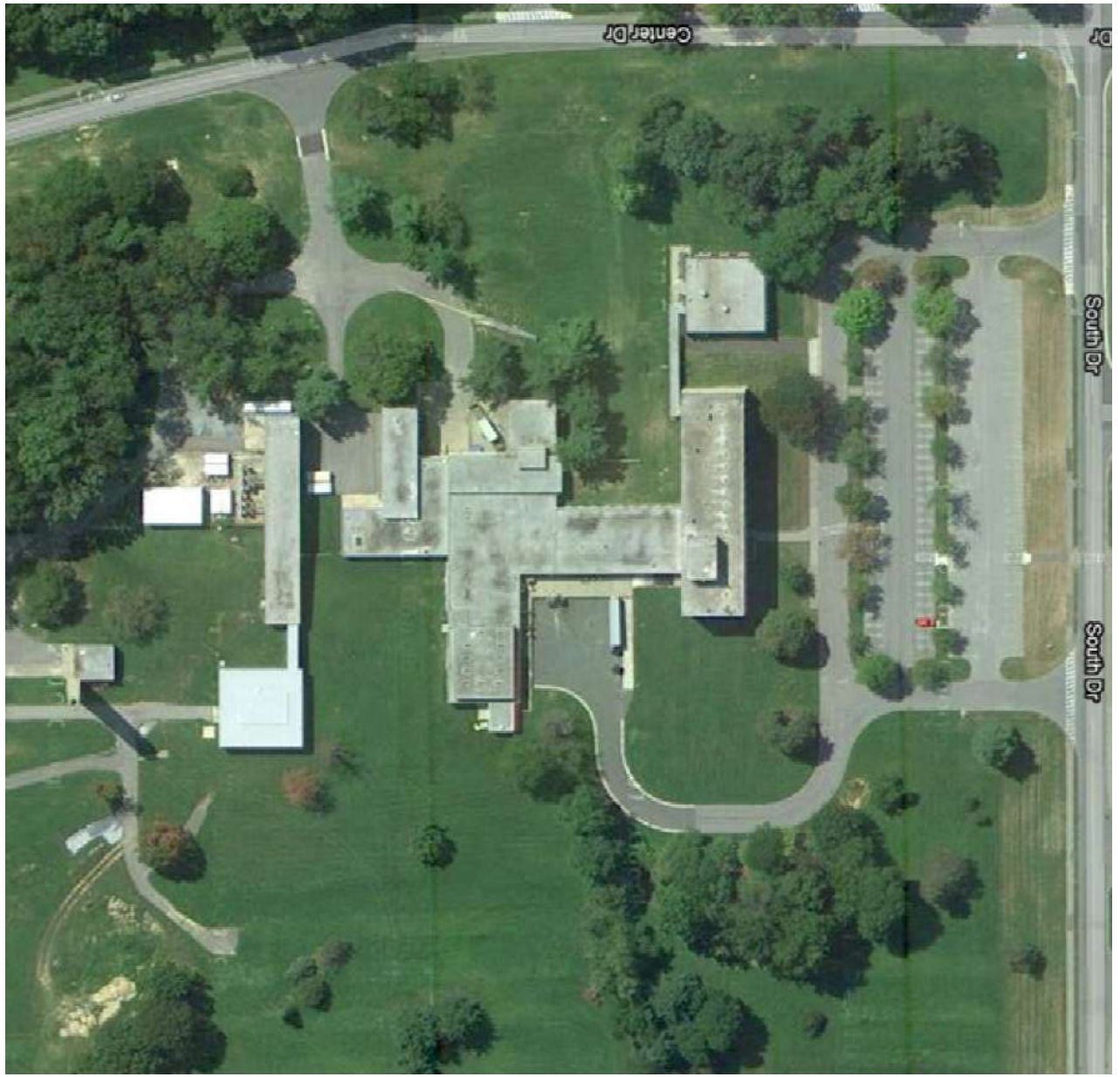


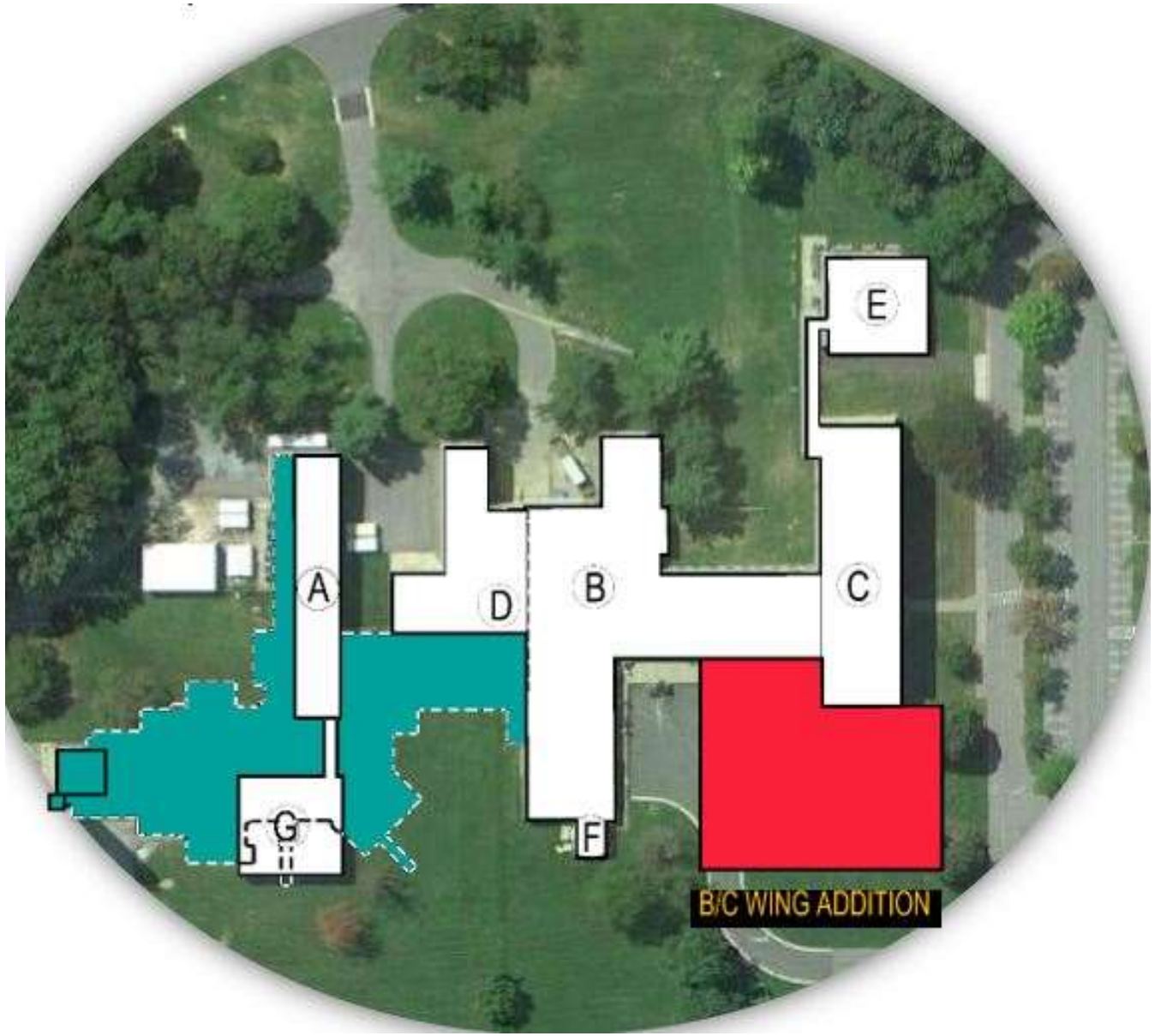
PML July, 2013

National Institute of Standards and Technology
Gaithersburg, MD

Ionizing Radiation Metrology at NIST

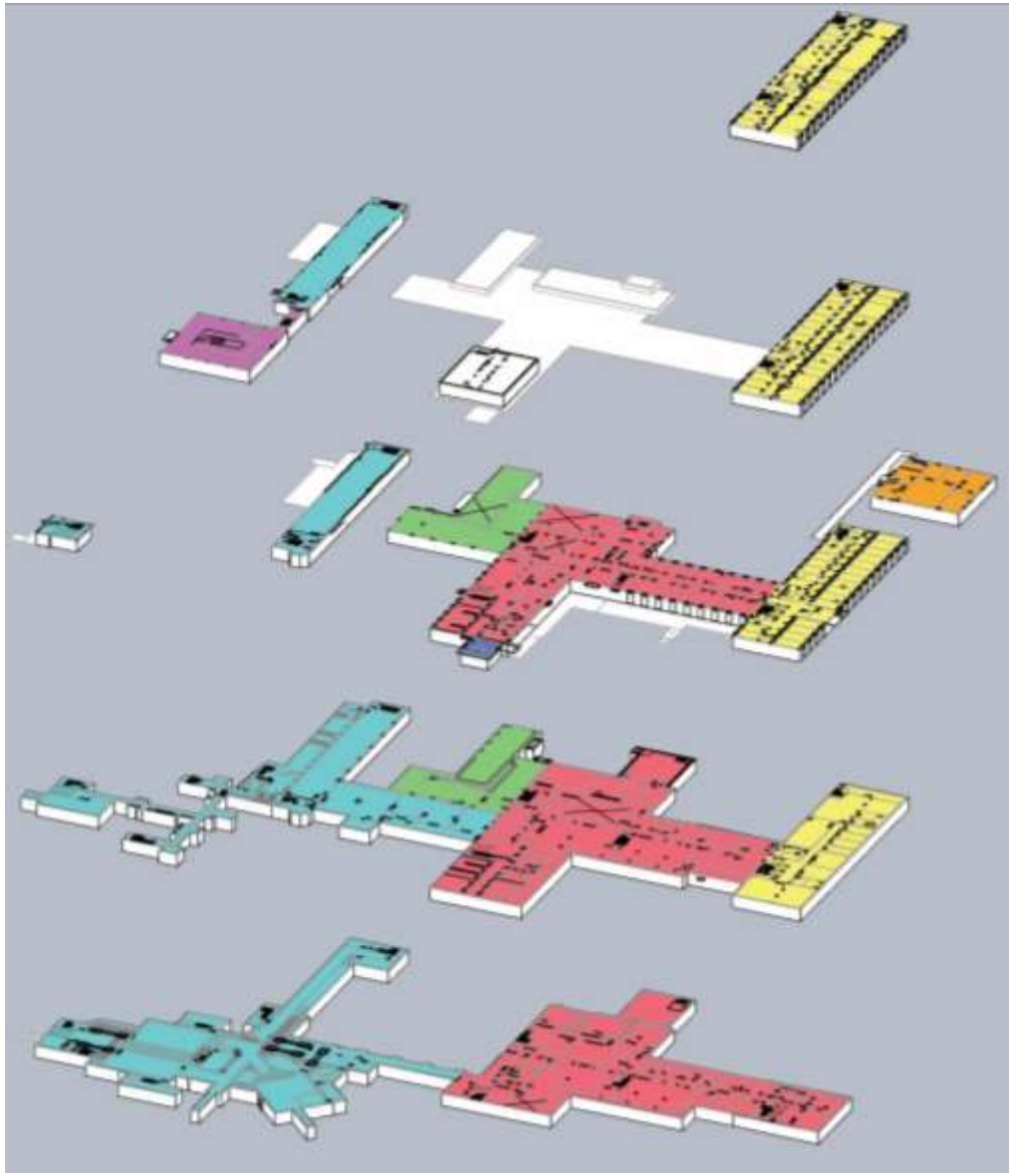


Ionizing Radiation Metrology at NIST



Building 245 Today

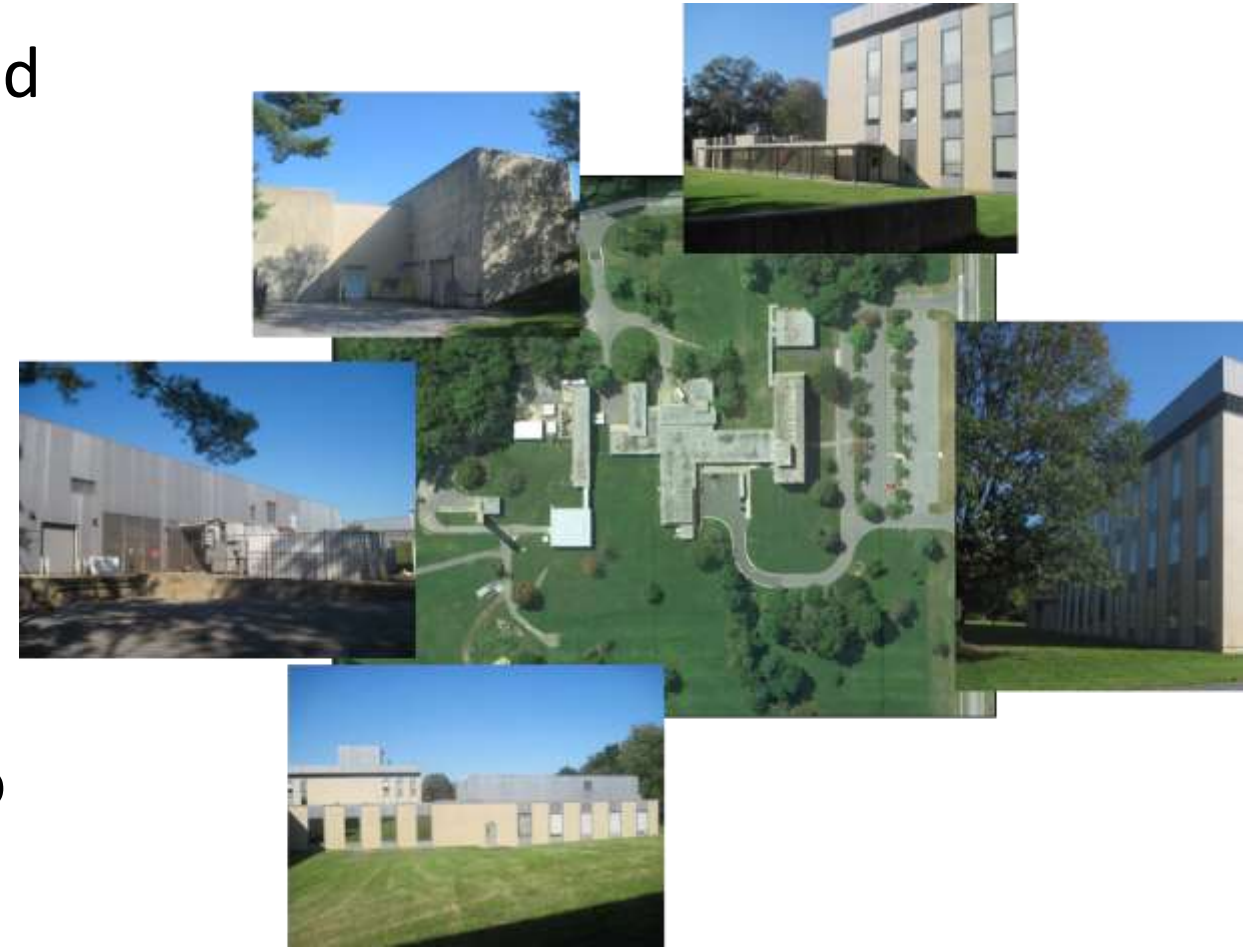
- Completed in 1964
- 208,000 gross square feet; 95,200 net square feet
- 5 occupied floor levels & 7 wings
- Purpose built for radiation physics research and measurements:
  - >Half of facility is underground
  - Heavily shielded concrete walls up to 10 feet thick
  - Built with pre-WWII materials: pre-fallout low background levels of radiation that cannot be replicated (concrete & steel shield walls)



Project Drivers

Primary Programmatic Drivers

- From NRC Panel Report FY **1998**: "programs still suffer from the deterioration in physical plant described in the panel's previous report"
- Work conducted within Building 245 in support of the NIST mission including internal and external requirements and customers (Mission/Program)
- Current and future capability requirements
- Condition of Building 245 and ability to adequately house the Program

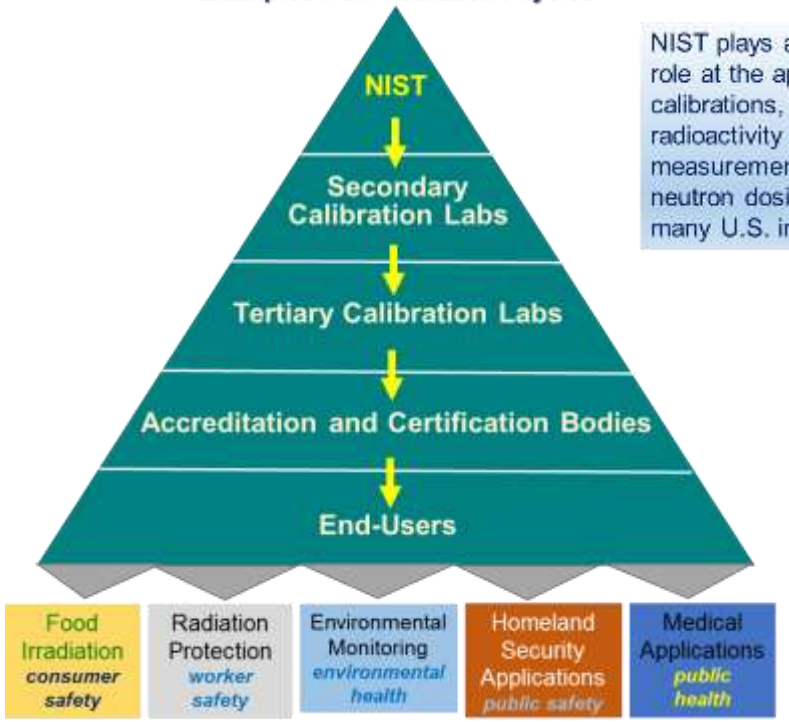


Mission Needs Gap

- Research compromised due to facility *condition*
  - Measurements for new and emerging radionuclides
  - Dosimetry standards for evolving technologies (high dose rate brachytherapy).
  - Continued capability for calibrations (e.g., increasing need in air kerma calibrations)
  - Mission critical precision measurements on material and devices with environmental sensitivity (e.g., optics and space instruments)
- Research compromised due to inadequate or inappropriate *space*
  - High-dose and high-dose-rate dosimetry (for medical device sterilization, polymer processing, food irradiation, blood irradiation)
  - Test methods and standards validation (for radiation detectors and x-ray screening instruments)
  - Standards in medical imaging (nuclear medicine, PET-MRI, *in-vivo* dosimetry, radiolabeled biomarkers)
  - New beamline facility and improvements to the SURF NASA Spectrometer Calibration Facility to meet increasing demands

Work performed in Building 245 has critical impact on multiple sectors of the economy

Examples from Radiation Physics



NIST plays a critical role at the apex of calibrations, radioactivity and dose measurements, and neutron dosimetry for many U.S. industries

Directly Supports

- 38.9 million annual mammography procedures (U.S.)
- 81.2 million annual CT procedures (U.S.)
- A $2 billion brachytherapy (cancer radiation therapy) market (U.S.)
- A $152.3 million global radiation detection, monitoring and safety market (U.S. - 40% market share)
- Irradiation of 120,000 tons of food annually (U.S.)
- Development of 276 Radioactivity Standard Reference Materials (SRMs), 47 % sold to customers outside of the U.S.

Technologies Relying on Traceability to NIST

- Mammography
- External beam therapies (cancer treatment)
- Internal radiation therapies
- PET/CT scans
- Dental and medical x-rays
- Medical fluoroscopy
- Cardio stress tests
- Metabolic studies (gallbladder, kidney, intestines)
- Medical device sterilization
- Innovative public health tec

Initial Risk Review Results

- **Risks of *not* proceeding with the Modernization**
  - Inability to provide calibration services
  - Inability to develop test methods and validation of standards for radiation detection equipment as required by the Department of Homeland Security (Safe Port Act)
  - Increased sample degradation/contamination and research inefficiencies
  - Inability to provide mandated measurement and calibration services to NASA, NOAA and other Federal Agencies
  - Potential failure of building equipment/systems
  - Potential radiation exposure to staff due to overcrowding and lack of appropriate space within radiochemistry labs & cleanrooms
- **Risks inherent to the Modernization**
  - Project funding not made available in coordination with the project plan (resolved in FY16)
  - Potential disruption to the research program

Facility Deficiency Summary
(2016 FCI rating= 35.5, DM=$69M)

Summer/Fall 2017 - Basement excavation for B/C Wing Addition

Summer/Fall 2017 - Basement excavation for B/C wing addition

Summer/Fall 2018 – Structure of B/C Wing addition taking shape

Spring/Summer 2019 – Nearing completion of B/C wing addition

Summer/Fall 2019 – Conceptual Rendering at Completion

Building 245 Renovation Status

Contract Actions – Ongoing and Pending

Task Name	Start	Finish
B245 SATOCC	Fri 9/30/16	Thu 9/30/21
TO16-600 - B/C Wing Addition	Fri 9/30/16	Tue 3/19/19
PCAS - OKKS	Fri 9/30/16	Mon 10/2/17
Construction Management Services for TO16-600 Acquisition	Mon 11/28/16	Mon 3/27/17
Construction Management Services for TO16-600	Tue 3/28/17	Tue 3/19/19
Construction Management Services SATOC Acquisition	Mon 11/7/16	Mon 9/25/17
Construction Management Services SATOC	Tue 9/26/17	Thu 9/30/21

Fitout Contracts

- IT
- Telephones
- OU Equipment
- Security

Building 245 Modernization Program Status

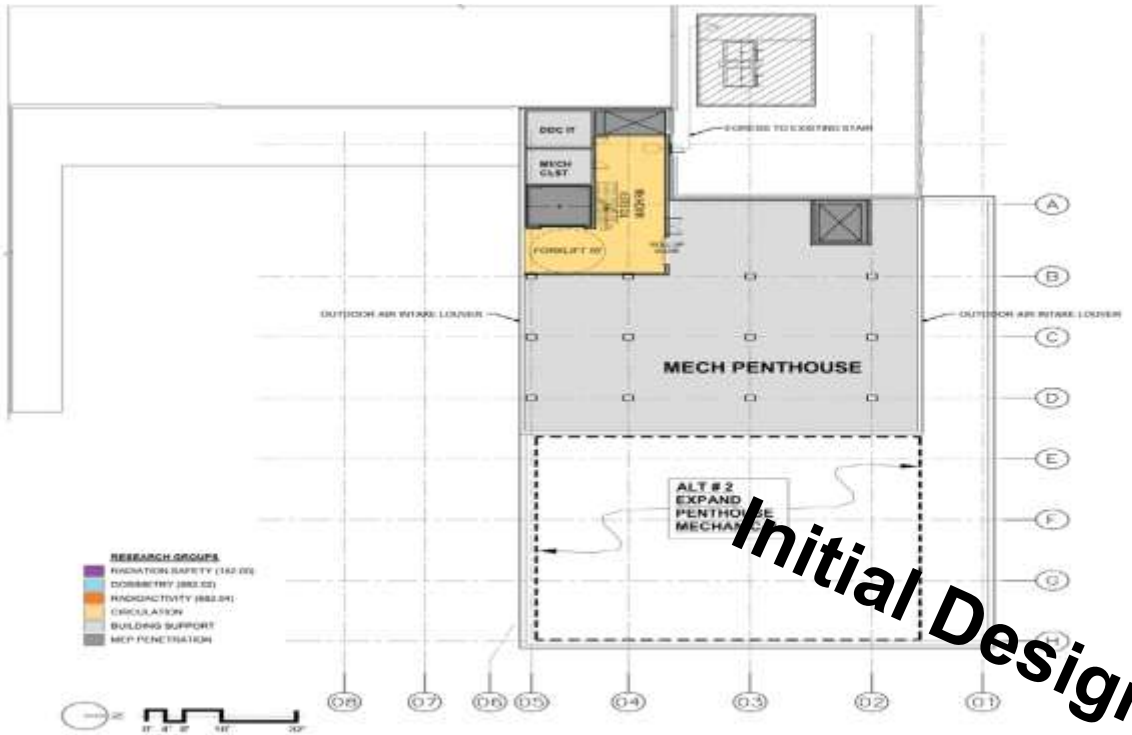
Initial Funding $60 M (awarded 30 Sept 2016)

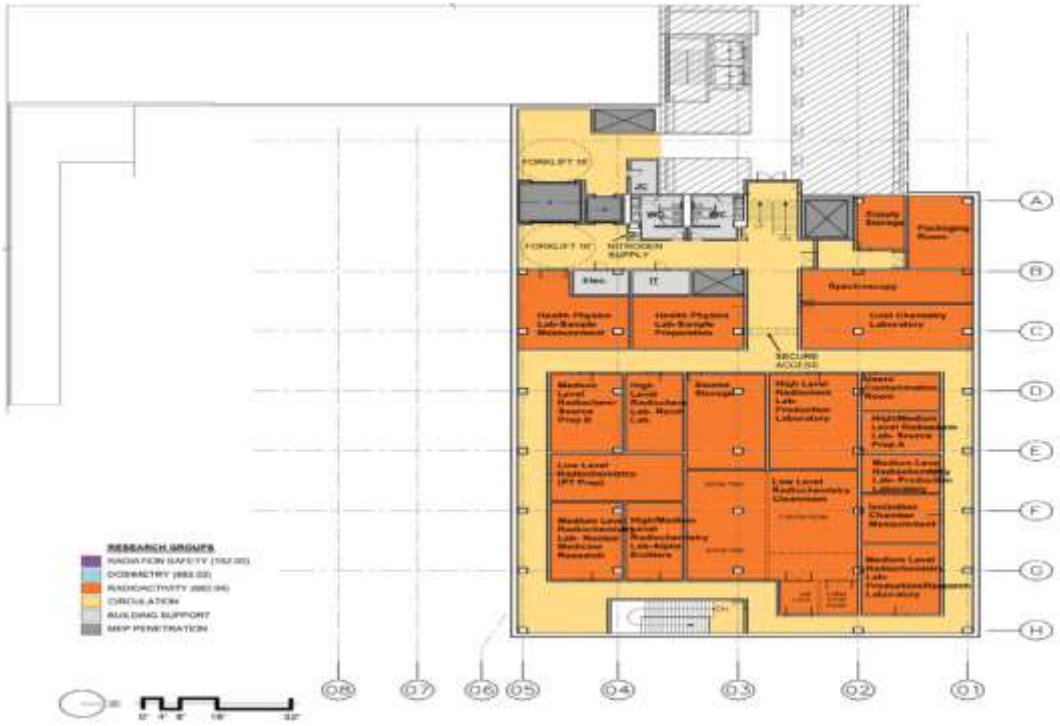
HENSEL PHELPS
Plan. Build. Manage.

90 Day Milestones	
~~Start Pre-Concept Design (10%)~~	~~21 Nov 2016~~
~~Continuing Res. Approved (cont. with FY16 budget)~~	~~9 Dec 2016~~
~~Round 2 Design Interviews~~	~~12-14 Dec 2016~~
~~Conference Trailer Onsite~~	~~Mid-Jan 2017~~
~~Site survey complete (incl. core drilling)~~	~~31 Jan 2017~~
~~Submit Pre-Concept Design~~	~~21 Feb 2017~~
~~Temp. power electrical duct-bank to trailer~~	~~Jan-Feb 2017~~
~~Pre-Concept Design Conference~~	~~~15 Mar 17~~
Groundbreaking Ceremony	TBD (Spring)
Building Outage (Electrical)	28 Apr – 1 May
Construction set-up	~1 May 2017

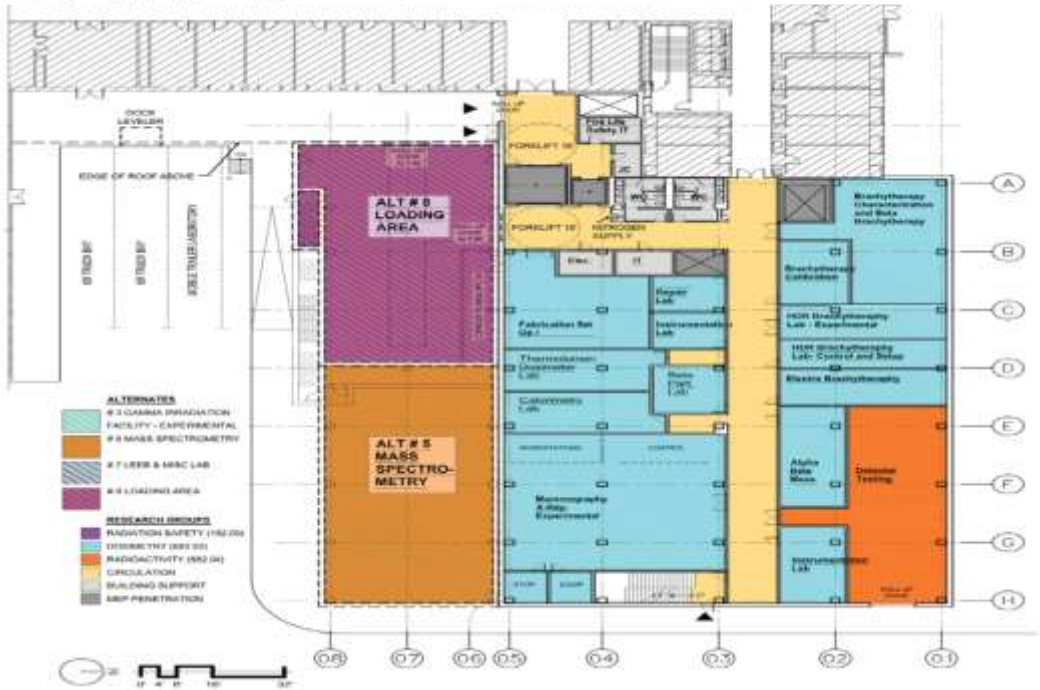
Upcoming Design Activities	
~~Round 1 User Group Interviews~~	~~21/22 Nov and 29/30 Nov~~
~~Round 2 User Group Interviews~~	~~12-14 Dec~~
~~Round 3 User Group Interviews~~	~~10-12 Jan~~
~~Submit Pre-Concept Design~~	~~21 Feb~~
~~NIST Review/Comment~~	~~21 Feb – 8 Mar~~
~~GRSD review~~	~~8 Mar~~
Pre-Concept Design Conference	DONE 22-23 Mar

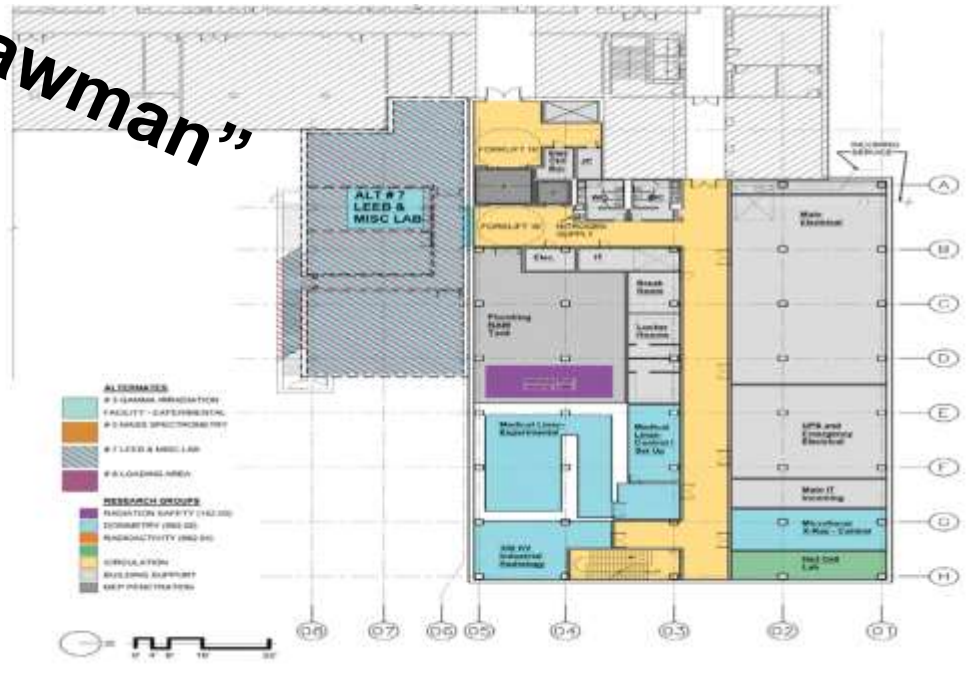
PML





Initial Design "Strawman"





Building 245 Modernization User Meetings

Agenda for Tenant Program Verification Meeting Cycle 3 (example):

- Items distributed in advance for review and comment:
  - Revised building drawings
  - Updated lab layout plans with power/data/equipment locations
  - Room Data Sheets with changes from RFP tracked
- Sequence of Activities for each lab space:
  - Discussions of lab plans to confirm layout
  - Confirm specific fume hood requirements (as applicable)
  - Confirm chemicals + quantities to be used
  - Confirm finishes (floors/walls/ceilings)
  - Summary of any outstanding items to be completed in preparation for final sign-off at pre-Design Conference

		12:30pm - 6pm						
		RadioChemistry - Continued						
682.04	A.5.2		Cold Chemistry Laboratory (adjacent to radiochemistry)	NEW-682.04-1		Dr. Michael Unterweger	Jerome La Rosa	Brian Zimmerman, Denis Bergeron, Svetlana Nour, Jacqueline Mann, Jerome La Rosa
682.04			Spectroscopy	C109/E108		Dr. Michael Unterwegger	Brian Zimmerman	Jerry Larosa, Ron Colle, Liz Laureano-Perez, Amanda Forster, Brian Zimmerman, Jeff Cessna, Jeff Cessna
682.04	A.5.8		Source Storage	NEW-682.04-4		Dr. Michael Unterweger	Lizbeth Laureano-Perez	Liz Laureano-Perez, , Jeffrey Cessna, Jacqueline Mann
682.04	A.5.3.5		High/Medium Level Radiochemistry Lab-Alpha Emitters	B157		Dr. Michael Unterweger	Lizbeth Laureano-Perez	Jacqueline Mann, Lizbeth Laureano-Perez, Ronald Colle
682.04	A.5.3.8		Medium Level Radiochemistry- Source Preparation B	B046		Dr. Michael Unterweger	Lizbeth Laureano-Perez	Jerry Larosa, Liz Laureano-Perez, Larry Lucas, Leticia Pibida
682.04	A.5.3.3		High Level Radiochemistry Lab- Research Laboratory	E105		Dr. Michael Unterweger	Jeffrey Cessna	Jerome La Rosa, Jeffrey Cessna, Ryan Fitzgerald
682.04	A.5.3.9		Medium Level Radiochemistry Lab-Nuclear Medicine Research	E106		Dr. Michael Unterweger	Jeffrey Cessna	Jerome La Rosa, Jeffrey Cessna, Ryan Fitzgerald

Building 245 Modernization Program Status: