

NIST Facilities Overview

Mr. Skip Vaughn, Director, OFPM & Chief Facilities Management Officer

Facilities Overview



Credit: Google Maps

Gaithersburg, MD



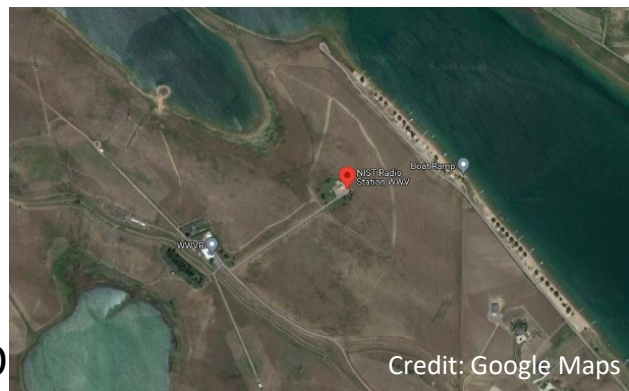
Credit: NIST

Boulder, CO



Credit: Google Maps

Kauai, HI



Credit: Google Maps

Ft. Collins, CO

- Over 1,200 acres across 4 sites
- 97 buildings & structures totaling over 4.6 Million Gross Square Feet

Facilities Overview - Gaithersburg



Credit: Google Maps

- 1.** Original buildings built 1962-1966; 26 of the current buildings are original
- 2.** 579 acres with 62 buildings and structures totaling almost 3.7 million GSF
- 3.** Nearly 798,000 GSF of new facilities built in the last 20 years (22%)
- 4.** Added to the National Register of Historic Places as a Historic District in 2021

Facilities Overview - Boulder



1. Original buildings built 1951-1957; over 300,000 GSF of the current buildings are original

2. 206 acres with 28 buildings and structures totaling over 916,000 GSF

3. Over 404,000,000 GSF of new facilities built in the last 20 years (44%)

4. Building 1 (Wings 1-4 portion); Determined eligible for the National Register of Historic Places

Facilities Overview – Radio Stations



Kauai, HI

Credit: NIST

1. Kauai, HI: WWVH
Located on the Barking Sands
Pacific Missile Range Facility

2. 31 acres with 2 buildings and
structures totaling nearly 5,000 GSF

3. Fort Collins, CO: WWVB

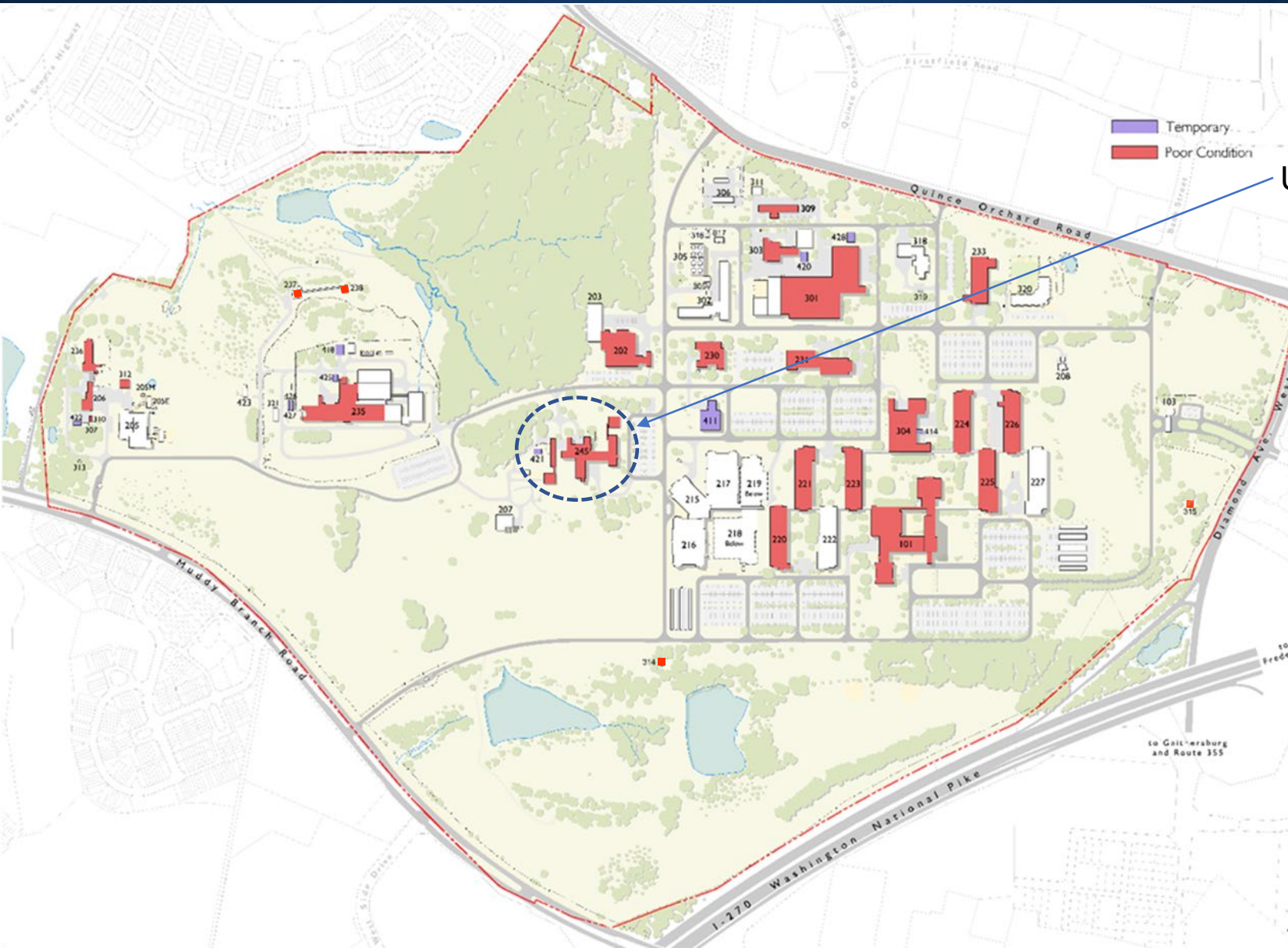
4. 390 acres with 5 buildings and
structures totaling nearly 14,000
GSF



Ft. Collins, CO

Credit: NIST

Facilities Condition & History



Under Renovation

OCT 2021 Facilities Condition Report:

74% of facilities are in Poor to Critical Condition (by SF area)

66% of research facilities are in Poor to Critical Condition (by SF area)

Facilities Condition & History

Under Renovation, Complete Spring 2023

Renovation Funded, Start 6 months after Wing 5 completion

OCT 2021 Facilities Condition Report:

61% of facilities are in Poor to Critical Condition (by SF area)

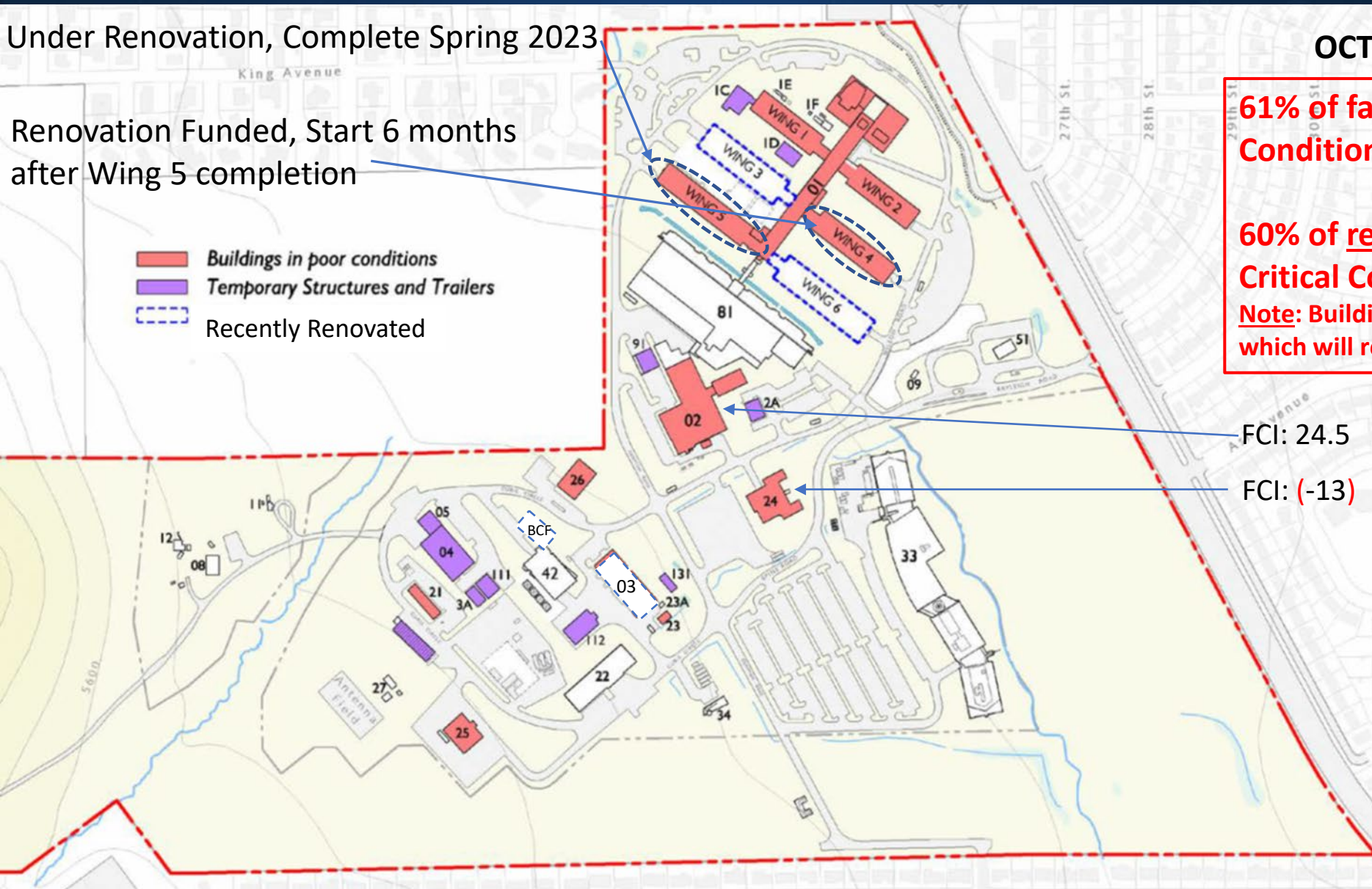
60% of research facilities are in Poor to Critical Condition (by total building area)

Note: Building 1 is counted as a whole & not by parts which will reduce this value.

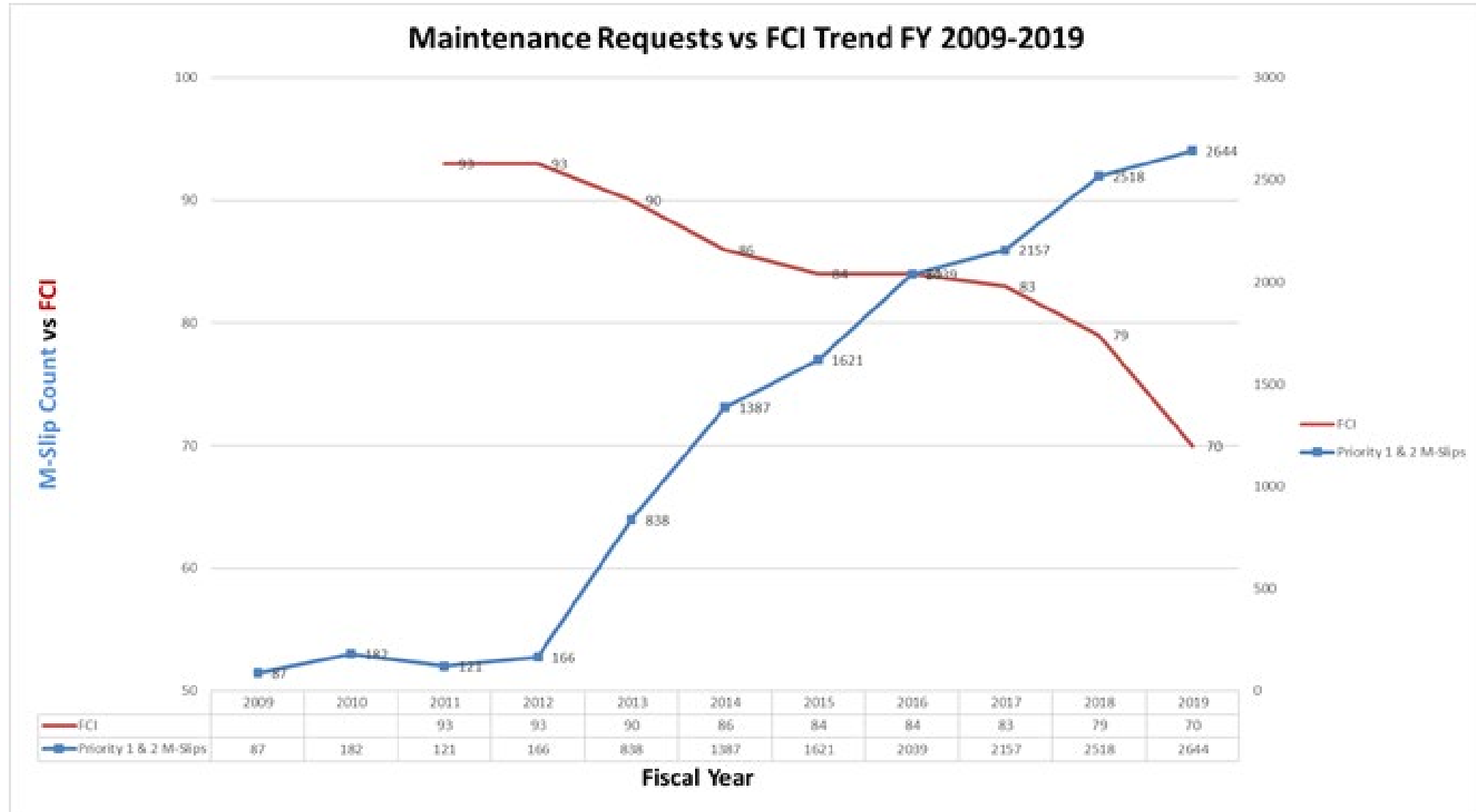
- Buildings in poor conditions
- Temporary Structures and Trailers
- Recently Renovated

FCI: 24.5

FCI: (-13)



Facilities Operations & Maintenance



Facilities Conditions Creating Safety Issues

Facilities Conditions – Central Utility Plants



Boulder

- New CUP built in 2006 & expanded in 2011 is undersized to meet campus chilled water requirements, does not account for master plan increased requirements.
- Emergency Power Back-Up: Only for chillers. Current generator needs replacement.
- Chillers need replacement; \$18M estimate for each.
- Boilers: 3 new boilers installed in 2012 with 1 more needed in next 5 years.
- Cooling Tower Capacity Upgrades: In progress
- \$13.6M deferred maintenance backlog does not account for all work required.

Gaithersburg

- Summer 2020 catastrophic failure of steam strainer; complete piping systems replacement required.
- Major Electric components need replacement
- Numerous components need replacement
- Central Command Center for campus utility systems
- Modernization Program required
- Life Safety Requirements project recently awarded
- Boiler Replacement award late FY22
- \$15.4M deferred maintenance backlog does not account for all work required



Mission Impacts due to Facilities Conditions NIST

Impact Examples: (G) CUP Steam Strainer

Date: AUG 30, 2020

Cause: Porosity & lack of tensile strength in cast iron, corrosion due to age

Damage: 4" steam line, fitting, insulation, hangers, lights & platform

Impact: Lab program delayed deliverable to DOD, DHS & others. Forensic investigation identified need to replace entire steam system piping in this facility which will have numerous future impacts to researchers.



Credit: NIST



Credit: NIST



Credit: NIST

Facilities Conditions – Underground Utilities **NIST**

Gaithersburg

- Electrical:
 - System beyond useful life
 - Structural failures
 - Lack of capacity for expansion
 - Chilled Water:
 - Recurring breaks & Valve failures
 - Potable Water:
 - Recurring breaks & Valve failures
- Steam:
 - 50,000-70,000 gallons per day loss in system
 - Defective prior replacement work, exacerbating problems
 - All Systems:
 - Lack of redundancy
 - Lack of capacity for master plans



Facilities Conditions – Building Utilities



Boulder

- Electrical:
 - Circuit Breaker replacement program
 - Power survey needed
 - Medium Voltage System survey needed
- Chilled Water:
 - Decouple from CUP Program
- Building 2: Major mechanical system revisions
- Building 25: Utilities Modernization

Gaithersburg

- Electrical:
 - MV Gear Replacements
 - HV Gear testing
 - Short Circuit & Arc Flash Studies
- Chilled Water:
 - Current system only for building systems, not research equipment
- Potable Water:
 - Replace lines in service entry at all original buildings
- HVAC: AHU Replacements & System replacements



Credit: NIST

From: Bowers, Charles E. (Fed)
Sent: Wednesday, February 2, 2022 1:52 PM
To: 235sponsors; Building 235 Staff
Cc: ccsponsors
Subject: Emergency Outage for Domestic Water to Bldg 235 B-Wing.

OFPM has secured domestic water to B-Wing of building 235 to repair a water main break. This affects restrooms, lab hot & cold water, and heating systems. All pure steam systems were also secured since they require make-up water to keep the system on-line. We will flush all lines in the building today once the service is restored. You should check your areas that use these building systems to ensure no issues. If you have any concerns or questions, you may call the Service Desk on extension 6928.

If you need any safety assistance ahead of or during the outage, please contact OSHE at x5375 Option 3 or your OU/Division Safety Representative.

Other issues can be reported to OFPM through the service desk at x6928 or through the [Facilities Service Portal](#) to submit an [M-Slip](#) for maintenance issues or to create a new reimbursable [Work Order](#) (NIST-260).

Mission Impacts due to Facilities Conditions **NIST**

Impact Examples: Building 101 Water Leaks

Date: Ongoing; photos from DEC 2021

Cause: Failing heating water risers and dielectric fittings for floors 2-11, failed mechanical piping fittings for 1st Floor Human Resources spaces

Damage: 2-5 floods annually in tower, 1-2 floods annually on 1st floor

Impact: Office spaces unavailable for use in NIST headquarters building & disruptions to daily functions as well as remediation expenses.



Mission Impacts due to Facilities Conditions **NIST**

Impact Examples: Building 301 Mold Incident

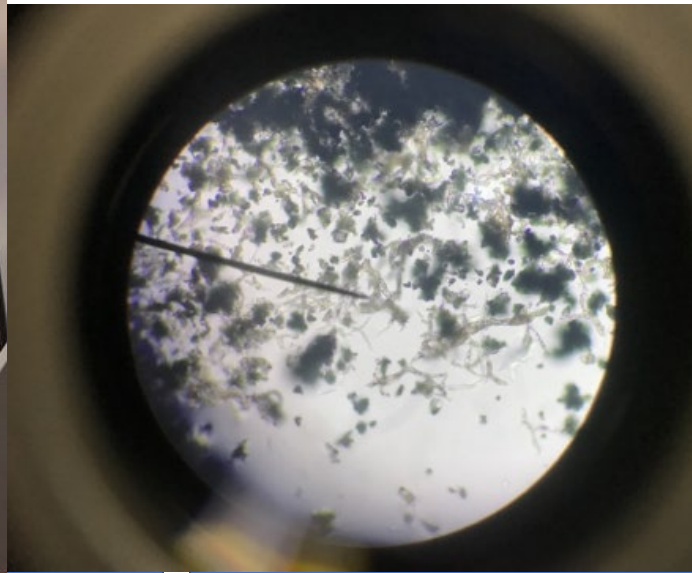
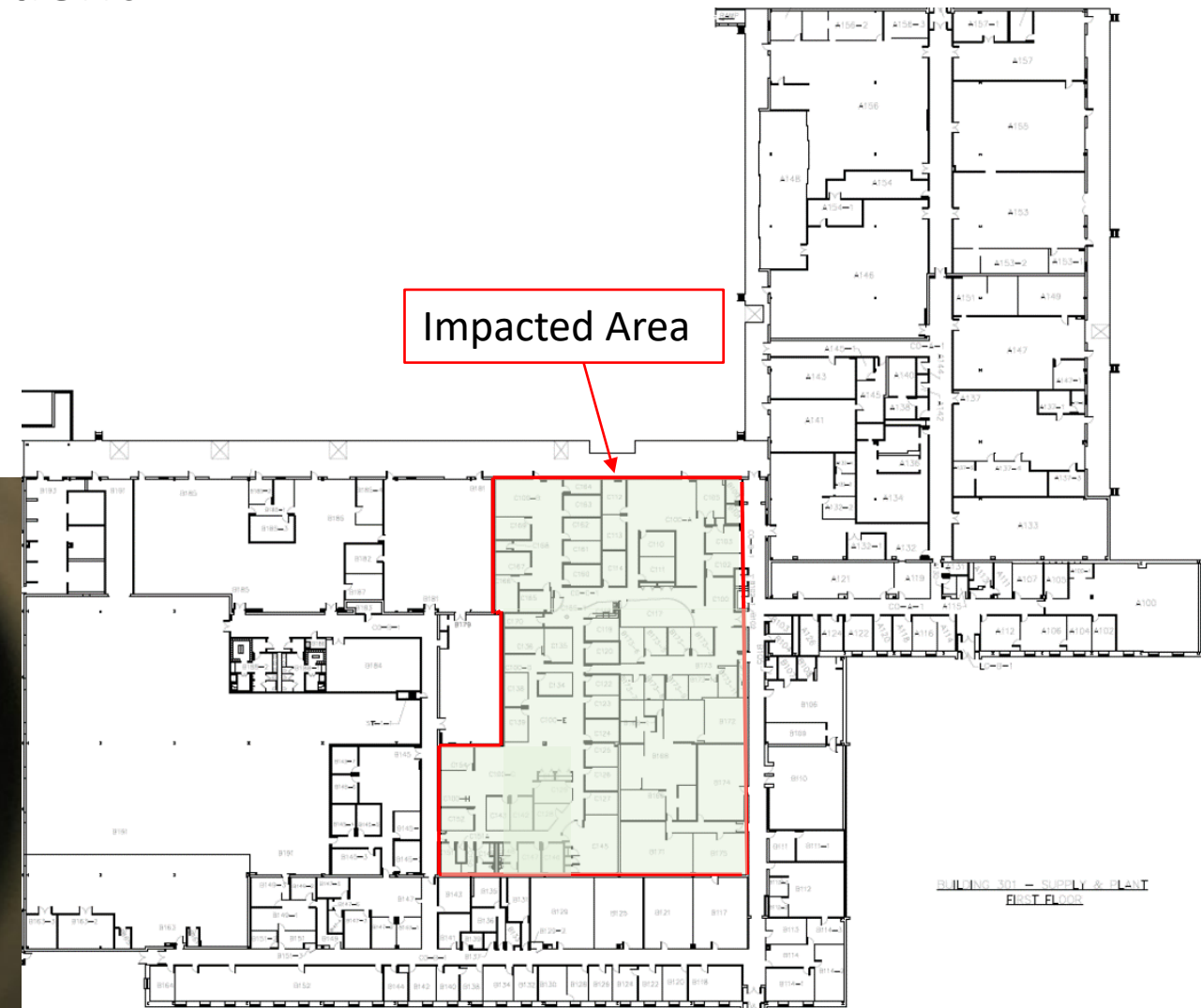
Date: Fall 2018: Evacuation notice on OCT 12, 2018

Cause: Leaking HVAC system, piping in overhead

Damage: Required complete remediation of impacted area

Impact: Nearly 80 staff received evacuation notice. Almost 3 years to move back into space. >\$6M in direct costs.

Impacted Area



Facilities Conditions - Safety

Both Campuses:

- Notification Systems
- Roof Railings

Gaithersburg:

- Arch Beam Cranes
- Fire Alarm Panel Replacements

Boulder:

- Fitness Center Courtyard Structural Repairs



Major building issues that can only be addressed via Major Renovations:

1. Lack of environmental controls (facades, windows, insulation, walls & ceiling construction, HVAC customization to meet lab needs)
2. Electrical wiring & panel replacements
3. Plumbing & mechanical piping system replacements
4. Sprinkler systems

Mission Impacts due to Facilities Conditions **NIST**

Impact Examples: (G) Electrical Substation

Arc Flash

Date: May 17 & June 13, 2018

Cause: Lack of preventive maintenance

Damage: 2 switchgear cubicles destroyed

Impact: Power bumps across the Gaithersburg campus with unknown impacts to research projects or equipment.

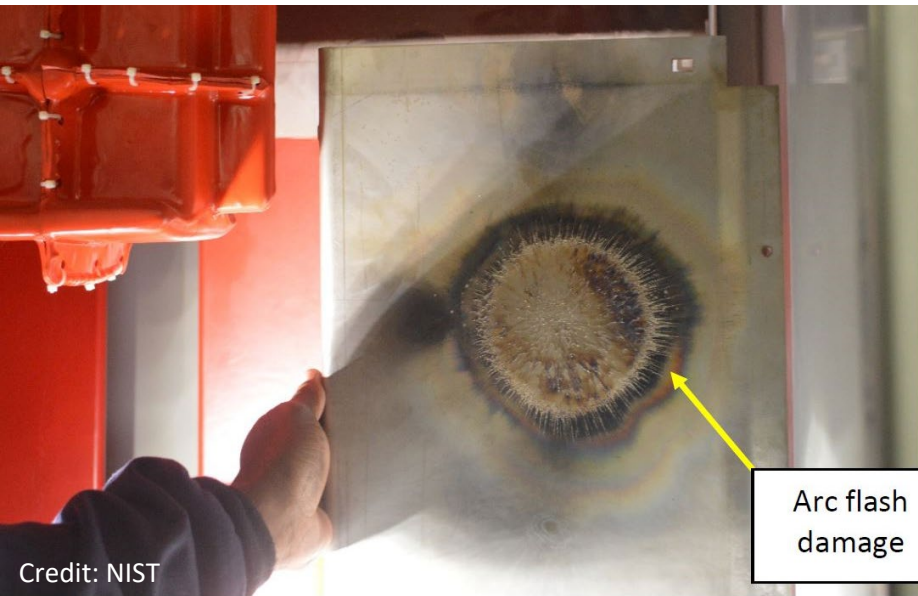


Figure 6: Arc flash evidence on the inner side of the inner panel.