



FESS Engineering Departments

Russ Alber, FESS Engineering and Al Schmitt, FESS Facility Management
4TH Annual All Engineers Retreat
February 20, 2018

MISSION

Fermilab's Facilities Engineering Services Section (FESS) builds and maintains mission-critical infrastructure and services from which high-energy physics research can be safely accomplished without interruption.

FESS has two engineering departments:

- FESS Engineering (FESS E) -
 - presented by Russ Alber, FESS E Department Head
- FESS Facility Management (FESS FM) -
 - presented by Al Schmitt, FESS FM Department Head

FESS Engineering

FESS Engineering

MISSION

Provide facilities and infrastructure that meet the initial requirements of the physics community, incorporate flexibility to adapt to changing Laboratory programs, maximize uptime, are economical to construct, operate and maintain, are environmentally responsible, and provide for human comfort and a creative workplace atmosphere.

FESS E employs 16 licensed architects and engineers in all the classical disciplines:

- Civil
- Mechanical
- Structural
- Electrical
- Architectural
- Environmental

FESS Engineering

Last year FESS Engineering managed \$250M in projects

Line-item Projects

- IERC \$86M
- UUP \$36M
- Mu2e \$42M Conventional Construction
- LBNF/DUNE and PIP-II

GPP Projects \$75M

- Sitewide DWS – new domestic water line down Discovery Road
- Computer Room Upgrades → Sitewide VOIP
- C0 Detector Hall – new morgue
- WH Renovation – WH13 and Ground Floor renovations
- ICB Addition – New Industrial Building Addition
- SBN Program – Complete

Operating Tasks

- \$2M in miscellaneous projects – various tasks for D/S/C's

FESS Engineering – 1980's

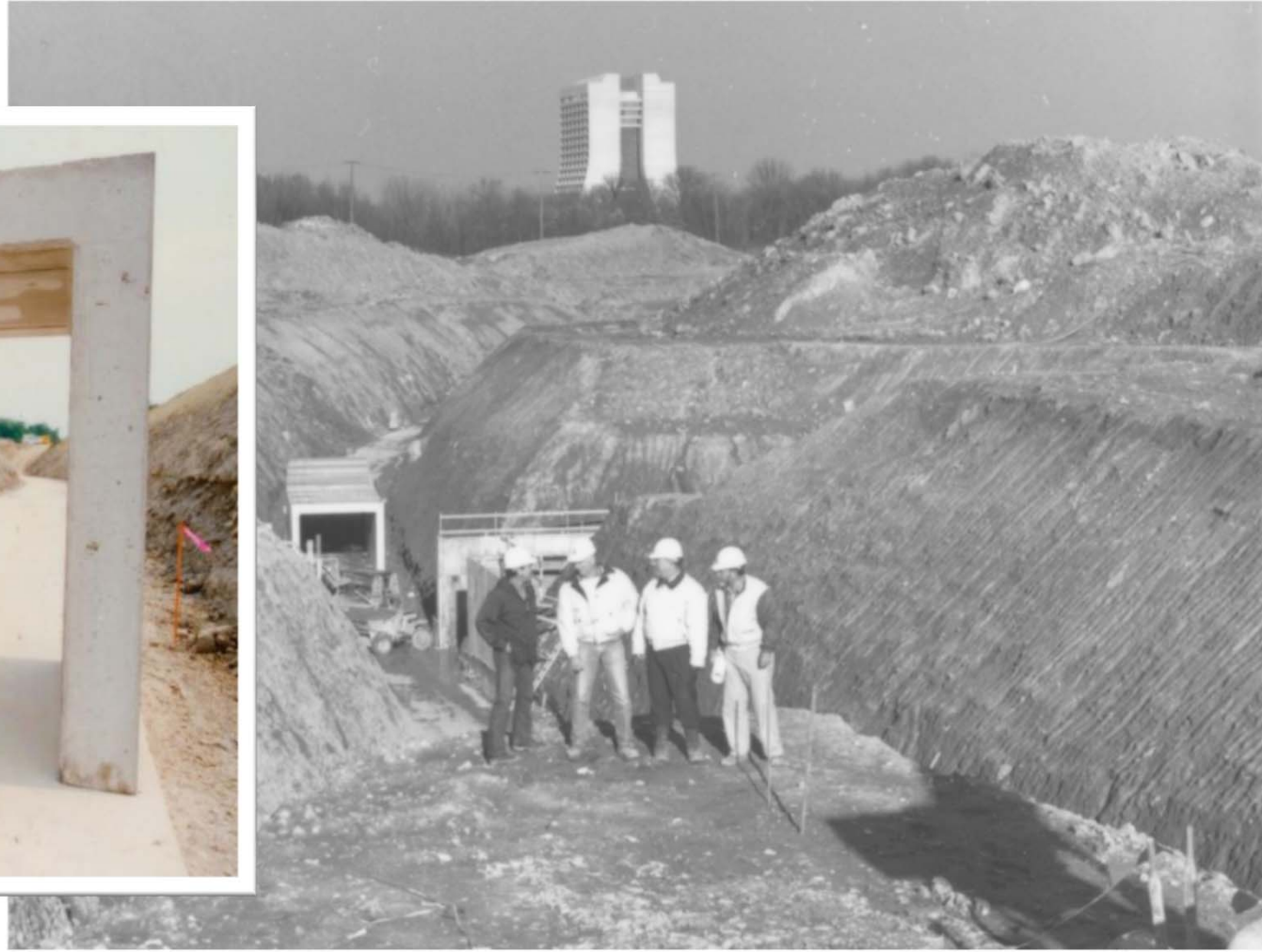
FESS Engineering (FESS E) evolved out of the TEV1 and TEV2 upgrades in the early 80's

- CDF, D-0, Anti-Proton, Fixed Target buildings, etc.



FESS Engineering – 1990's

Main Injector Construction –
Ron Foutch, PE



FESS Engineering – 2000's

NuMI and NOvA Construction

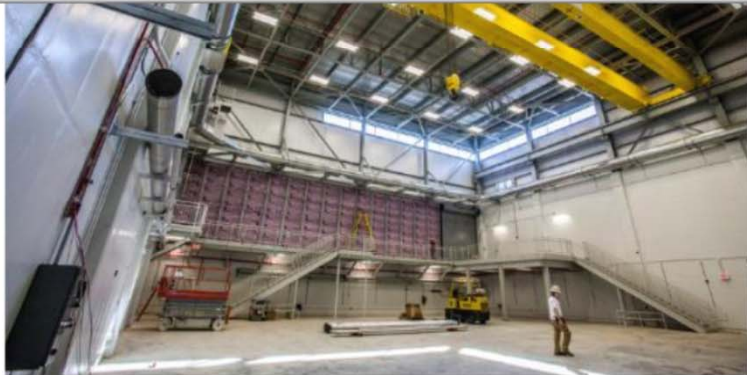


FESS Engineering – 2010's

IARC Construction



FESS Engineering – 2010's Muon Campus Construction



FESS Engineering – 2010's

Utilities Upgrade Project



FESS Engineering – Future

Integrated Engineering Research Center (IERC)

- \$86M TPC, CD-1 approved in April 2017 – starting Preliminary Design
- State-of-the-art laboratory, high bay, clean room, and technical spaces
- World-class modernized facilities and infrastructure for R&D and construction of particle physics detectors
- Integrates subset of Fermilab engineering resources scattered across the laboratory
- 18 Science Points of Contact (SPOCs) from across the lab helping to refine IERC science requirements

IERC Highlights:

- 3-stories
- Direct physical connections to Wilson Hall
- Collaboration spaces to reestablish vital interconnects between international science community and Fermilab engineering



FESS Engineering – Future

IERC Connections to Fermilab Science Programs

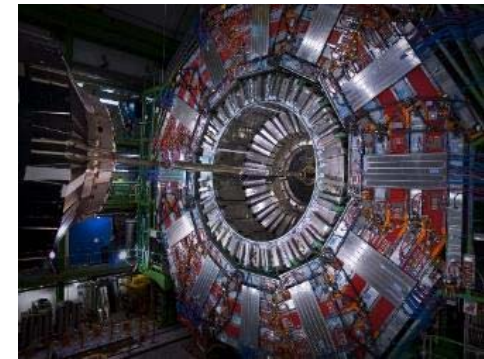
LBNF/DUNE:

- Critical element to support Fermilab’s role as host laboratory
- Provides space for significantly increased collaboration required by LBNF/DUNE



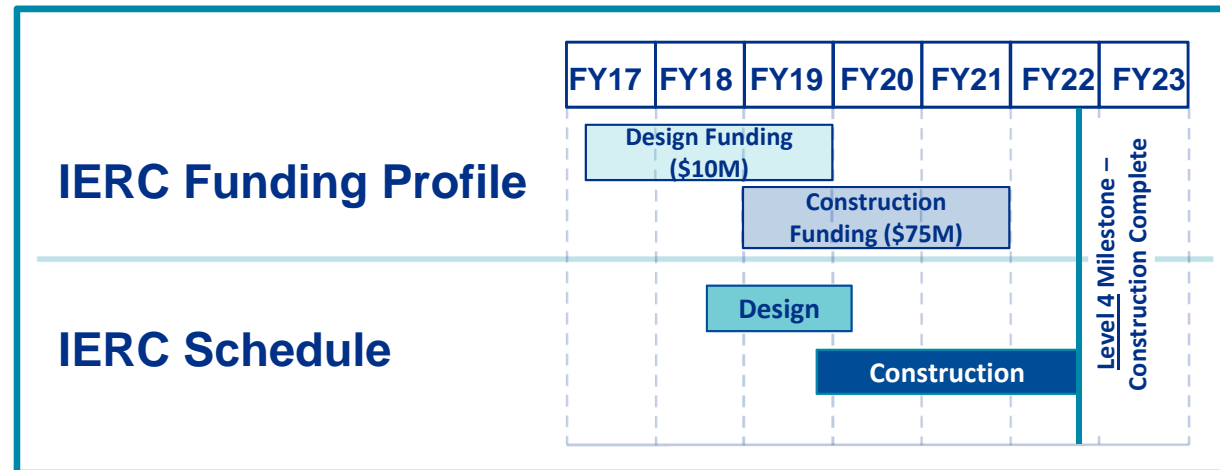
High Luminosity LHC (HL-LHC):

- Design and engineering technical space
- Lab space for assembly, testing, and integration of HL-LHC CMS detector components



Quantum Information Science (QIS):

- Ultimate home for the Fermilab Quantum Science Center
- Space for collaboration, interaction, and algorithm development
- Lab space for cryogenic detector R&D and superconducting detector development



FESS Engineering – Initiatives

Modifying Conventional Facilities –

including building structures (roofs, walls/partitions, roads/walks, elevators, cranes), utilities, or any impact to exiting/accessibility and changes in usage is required to be reviewed by FESS with the FESS Design Review application:

<http://fess-ogfp.fnal.gov:8095/FDRF/faces/searchDp18Forms.xhtml>

FESS Engineering – Initiatives

Fermilab Facilities Manual

- 1000 Policy and Administration
Departmental Policies
- 2000 Planning
Master Planning and Conceptual Design
- 3000 Design
Permits, Guides, Standards, Building Permits
- 4000 Construction
Permits and Inspections
- 5000 Transition to Operations
Transition execution and Occupancy Permit
- 6000 Operations and Maintenance
O&M practices and Centralized Facility Management
- 7000 Demolition/Decommissioning/Repurposing
Standard Specifications



FESS Facility Management

FESS Facility Management

Facility Management is the department within FESS responsible for the operation and maintenance of non-science infrastructure at Fermilab.

MISSION

Provide our customers with deliberate and timely response to infrastructure inspection, maintenance and repair needs that are within our core services and capacity in a way that is respectful, efficient and effective.

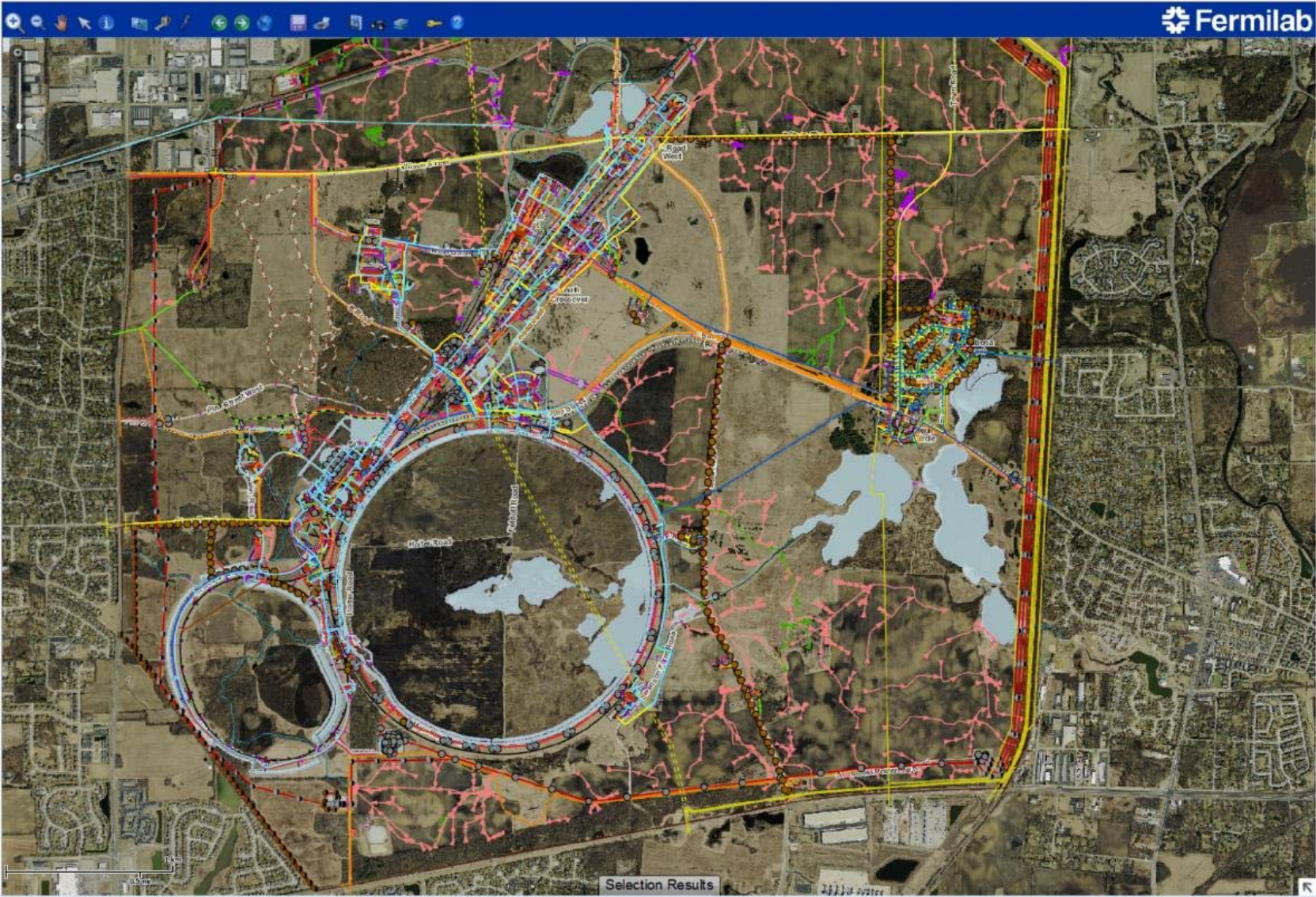
FESS Facility Management

Non programmatic infrastructure managed by FESS FM includes:

- Utilities
 - Electrical distribution
 - Industrial cooling water (ICW)
 - Surface Water
 - Low conductivity water(LCW) regeneration
 - Natural gas
 - Domestic water
 - Sanitary sewer
 - Central Utility Building systems

FESS Facility Management

GIS of Site Utilities



FESS Facility Management

Non programmatic Infrastructure managed by FESS FM includes (cont.):

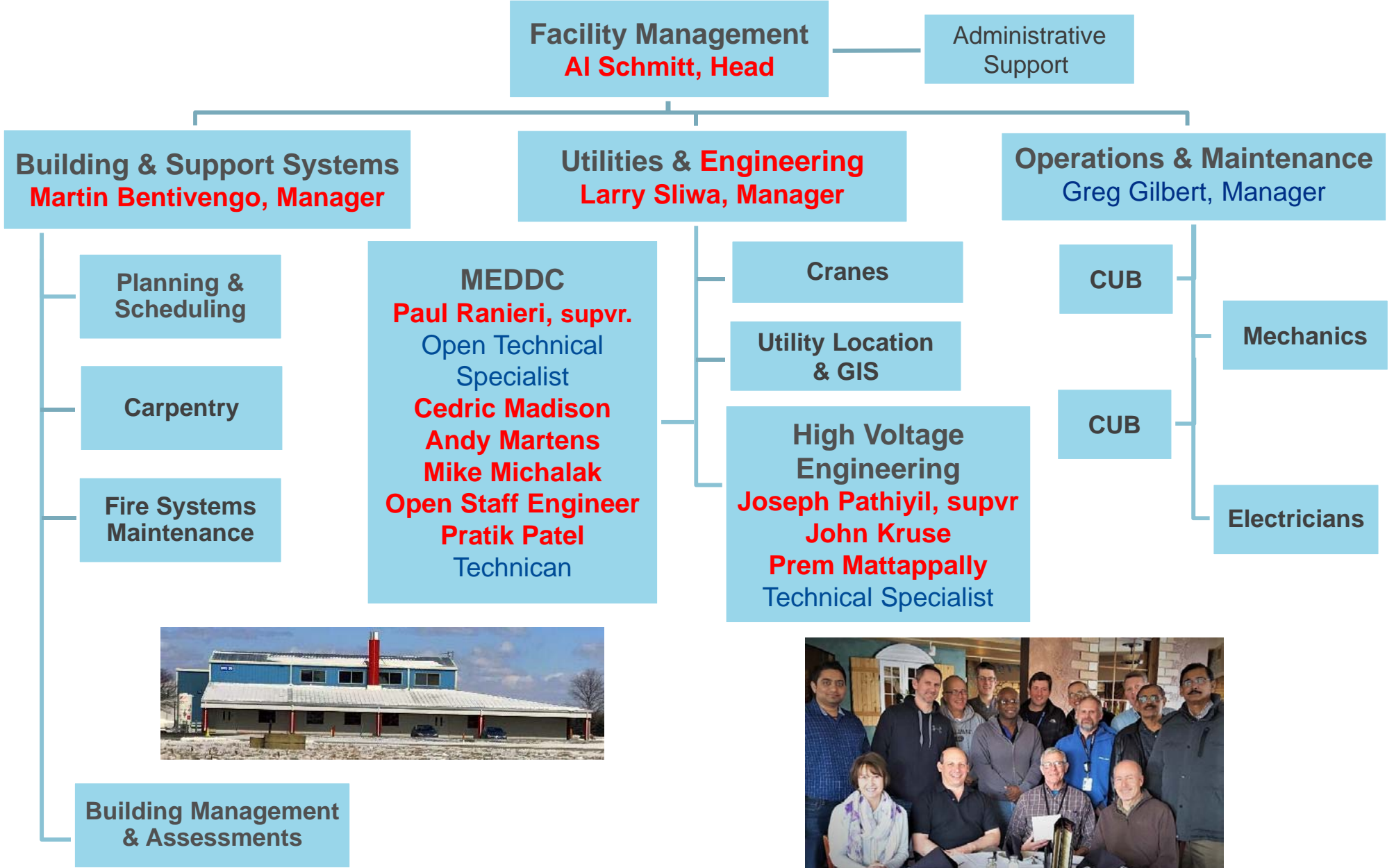
- Building Infrastructure and Systems
 - HVAC
 - Lighting
 - Electrical distribution
 - Plumbing distribution
 - Sprinkler systems
 - Ground water sump pumping / related systems
 - Building automation
 - Fire alarm systems
 - Roof inspections and repair services
 - Overhead door inspections and repair services
 - Elevator inspection and repairs
 - Crane inspections, repairs and upgrades

Staffed 24 x 7 x 365

FESS Facility Management - Staff

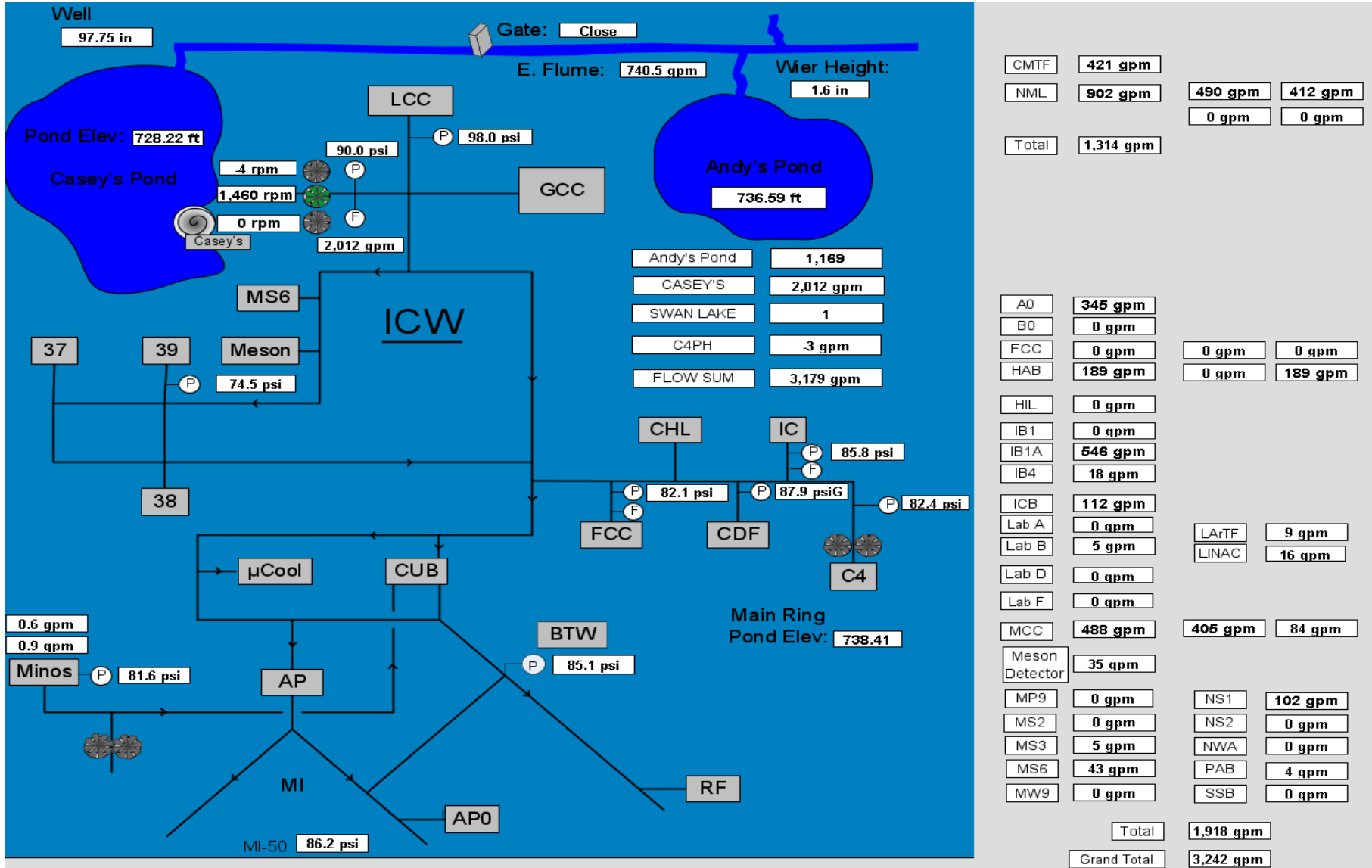
- 12 Engineers
- 1 Operations manager
- 5 Maintenance/technical supervisors
- 25 Shop personnel
 - 12 Maintenance Mechanics
 - 11 Maintenance Electricians
 - 2 T&M HVAC Personnel
 - Duty Mechanic and Duty Electricians cover off-shift hours
- 7 Technicians
- 1 Construction specialist
- 2 Carpenters
- 2 Building management service specialists
- 1 Interior designer
- 5 Scheduler-Planners
- 5 Admin support assistants
- 1 JULIE coordinator
- 1 Functional analyst

FESS Facility Management - Engineers



FESS Facility Management – Recent Projects

ICW Metering



FESS Facility Management – Recent Projects

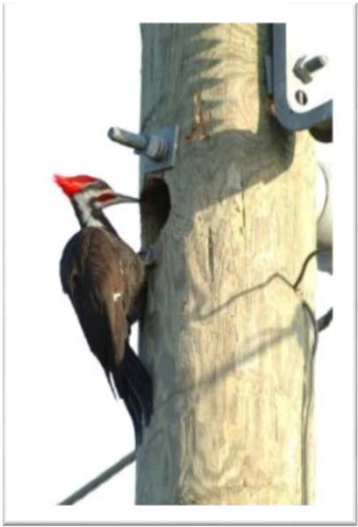
Wilson Hall DDC Upgrades

- Convert old pneumatic valve actuators to electromechanical
- Convert old pneumatic damper actuators to electromechanical
- Upgrade old controls from the basement NC-17
- Upgrade old controls from the Mezzanine NC-7



FESS Facility Management – Recent Projects

Fermilab FM High Voltage Utility Pole Inspection Program



FESS Facility Management – Recent Projects

MI-52 Sump Pump Discharge



FESS Facility Management – Recent Projects

MI-62 Spray Header Repair



FESS Facility Management – Recent Projects

HDPE ICW Failures



FESS Facility Management – Recent Projects

Large DWS Leak @ MW9 (Under building structure)



FESS Facility Management – Initiatives

Centralized Facility Management PILOT–

- One year
- 3 participants
 - ESHQ
 - WDRS
 - Neutrino Division
- Advisory group providing feedback on program development
- *Service Level Agreement* will define responsibilities

Next steps -

- Continue regular Advisory Group Meetings
- Finalize Service Level Agreement document(s)
- Fund/Implement FY18 EOL workplan
- Look-ahead to full program roll-out

FESS - Conclusion

FESS is responsible for designing, constructing and maintaining conventional facilities (buildings, utilities and infrastructure) across our 6,800 acre site.

FESS assures integration of conventional facilities with the labs programmatic requirements and integrates the lab's many stand-alone campuses into a robust conventional facility and infrastructure system.