

**D&D Best Practices
Demolition of a Research Facility
Building 431**

**William L. Collins, P.E.
SAT Project Manager
Lawrence Livermore National Laboratory**

**EFCOG – Infrastructure Management Working Group
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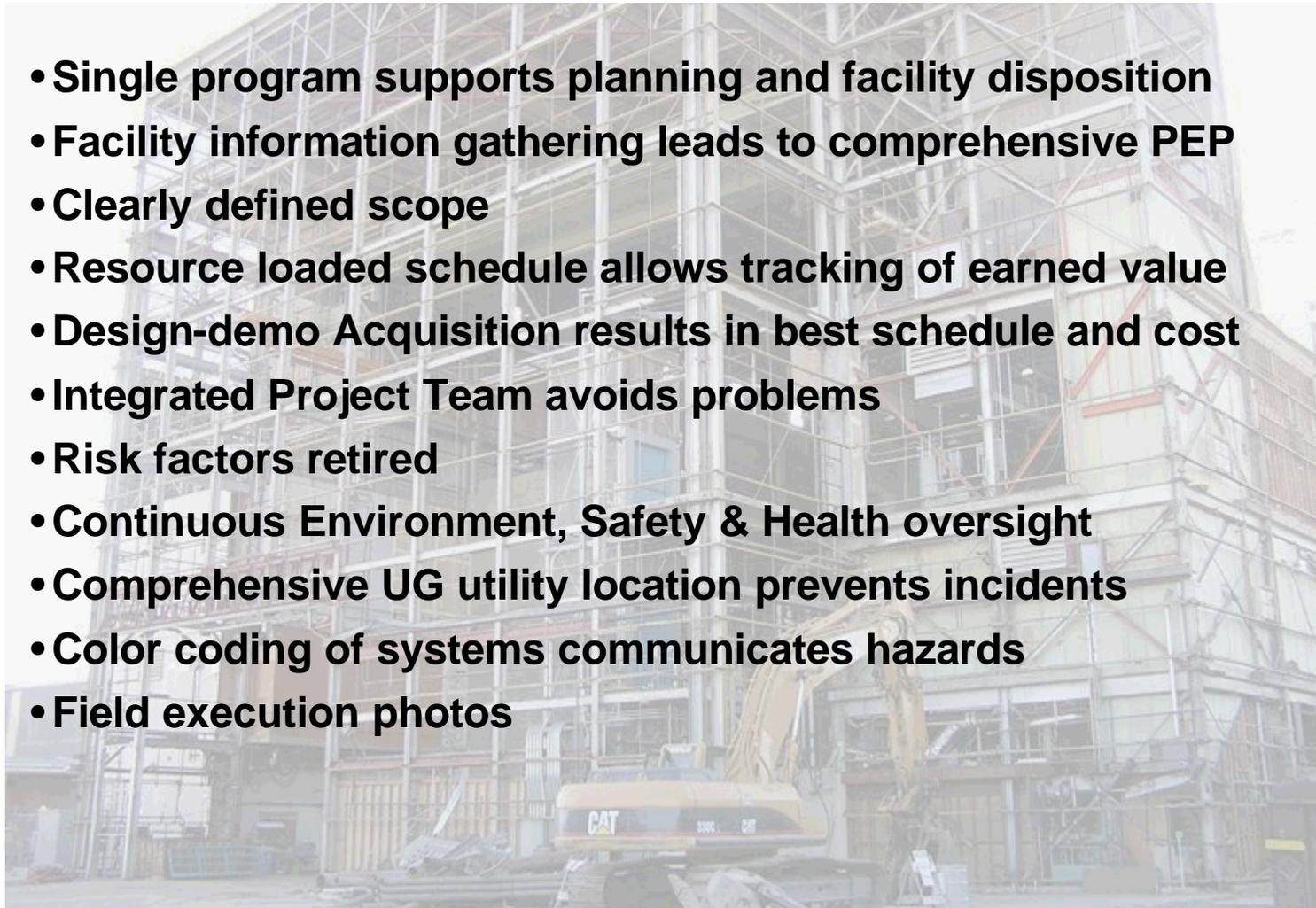
UCRL-PROC-215810

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Overview of best practices



- **Single program supports planning and facility disposition**
- **Facility information gathering leads to comprehensive PEP**
- **Clearly defined scope**
- **Resource loaded schedule allows tracking of earned value**
- **Design-demo Acquisition results in best schedule and cost**
- **Integrated Project Team avoids problems**
- **Risk factors retired**
- **Continuous Environment, Safety & Health oversight**
- **Comprehensive UG utility location prevents incidents**
- **Color coding of systems communicates hazards**
- **Field execution photos**



Facility disposition supports strategic objectives

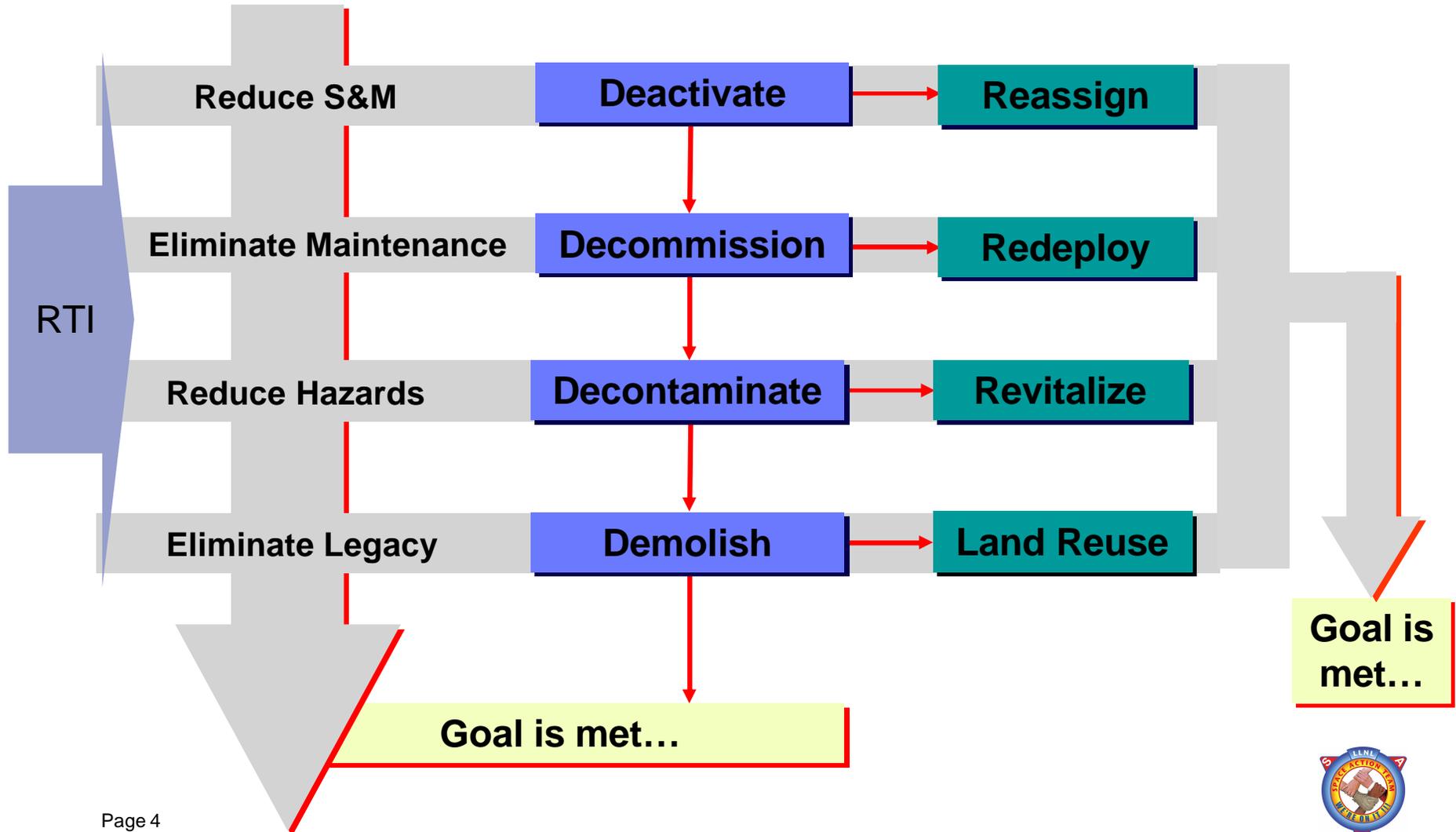


One Integrated Program for both Institutional S&M and D&D

1. **Provide facility management for buildings that are surplus or excess to Program needs.**
 - **Manage the process to transition facilities from an operating condition into an inactive status**
2. **Plan and execute facility disposition in support of strategic objectives.**
 - **The Space Action Team (SAT) is an integrated multi-disciplinary, multi-directorate, cross-trained team with diverse talents and skills dedicated to execute facility projects**
3. **This approach increases flexibility and value**
 - **Supports programs through relief of unneeded facilities**
 - **Provides flexibility in establishing project priorities**
 - **Utilizes S&M as a precursor to disposition**
 - **Establishes a balance to optimize utilization of surplus facilities**



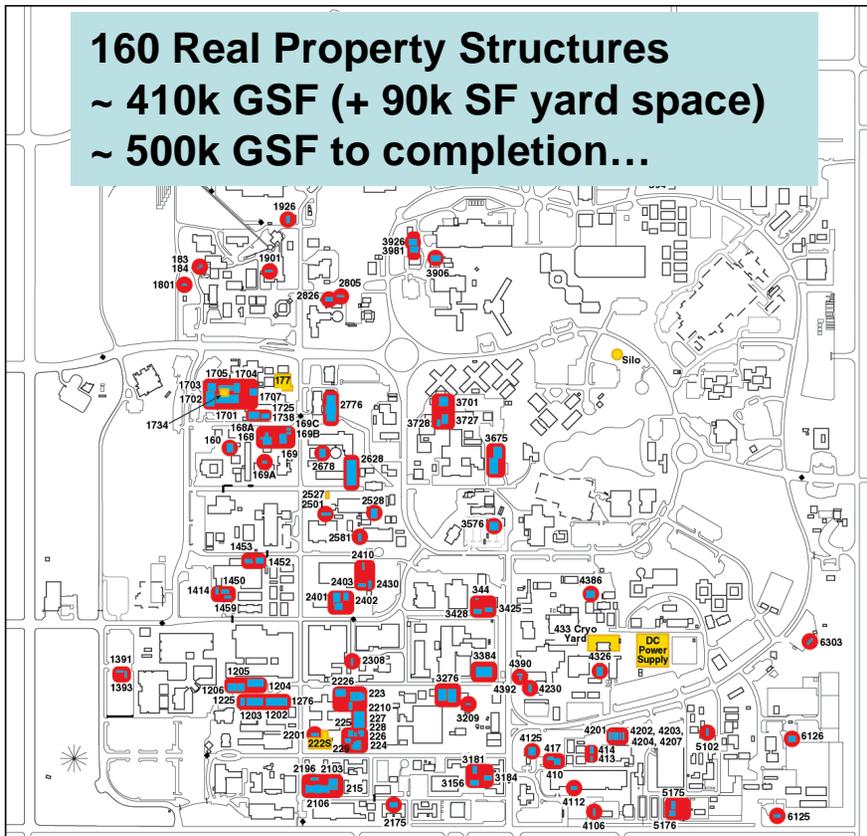
The Laboratory's flexible approach to manage its disposition program begins with the end in mind



Stabilizing & Removing Excess/Surplus Facilities is a Key Element to Strategic Facility Planning



160 Real Property Structures
 ~ 410k GSF (+ 90k SF yard space)
 ~ 500k GSF to completion...



● Facilities demolished/removed FY94—01 ■ Facilities for demo in FY02

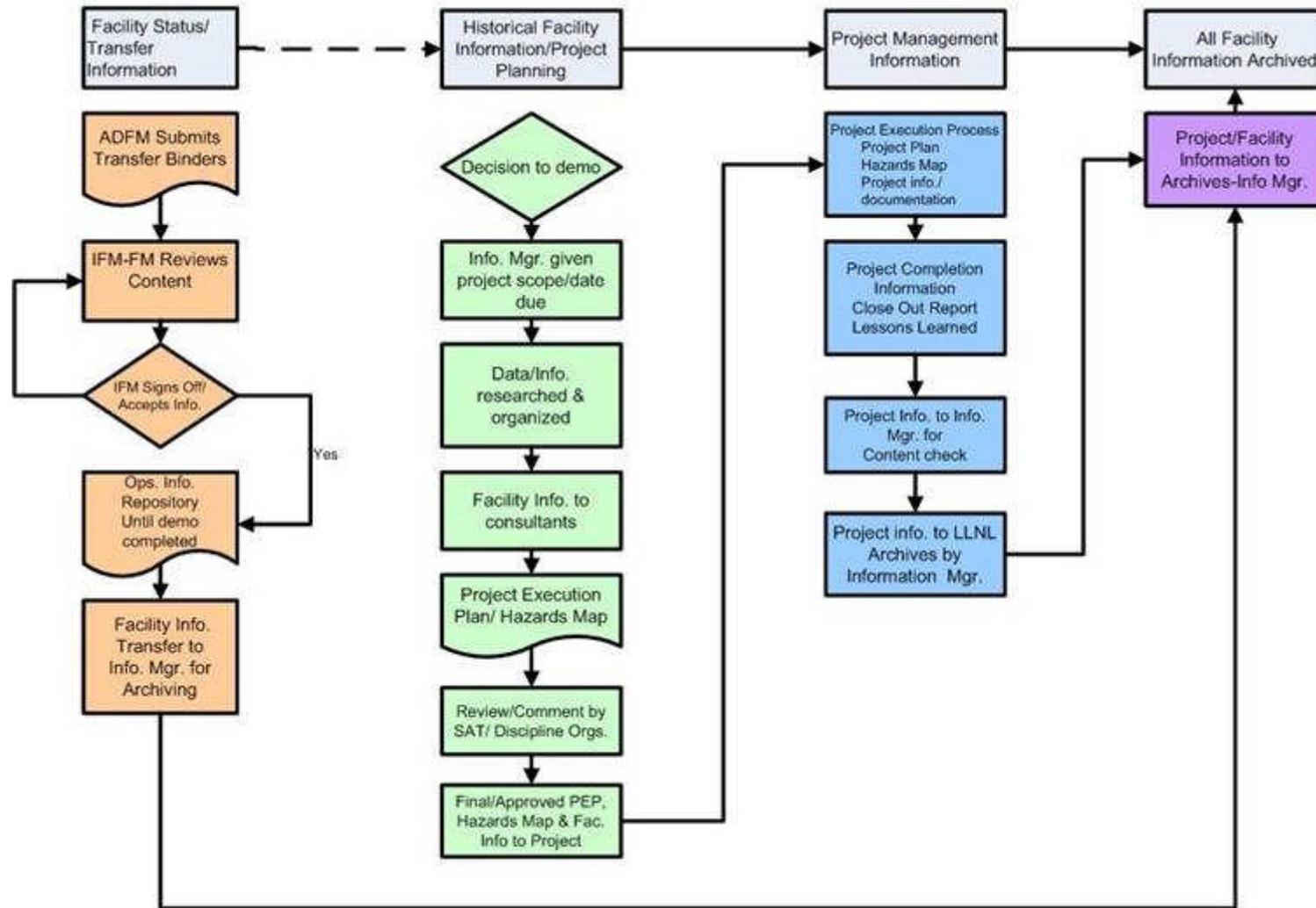
Institution “owns” 50 buildings,
 ~800k SF excess/re-assignable space.

- Single program responsibility supports “Dual Purpose” planning
- Provides a framework for decision making and priority setting
- Supports “End Point Planning” starting at initiation of transfer
- B431 is a good example of this efficiency

Recycle stats:
 Concrete – 22,000 Tons
 Metal – 2,400 Tons
 Freon – 1,300 lbs
 Wood – 180 CY



Facility information process for D&D



Historical Search Table of Contents



Facility

- Master Equipment List (MEL)
- Phone and networks
- Asbestos
- High pressure data base
- Key plans
- Facility number changes
- Maintenance backlog
- Deficiencies
- Facility photos
- Historical Site Maps
- FIMS

General

- Personal Interviews
- E-mails
- IAs and ORs
- Sunflower Report
- Archives
- Security
- Store Room
- Financial Records

Environmental & Hazards

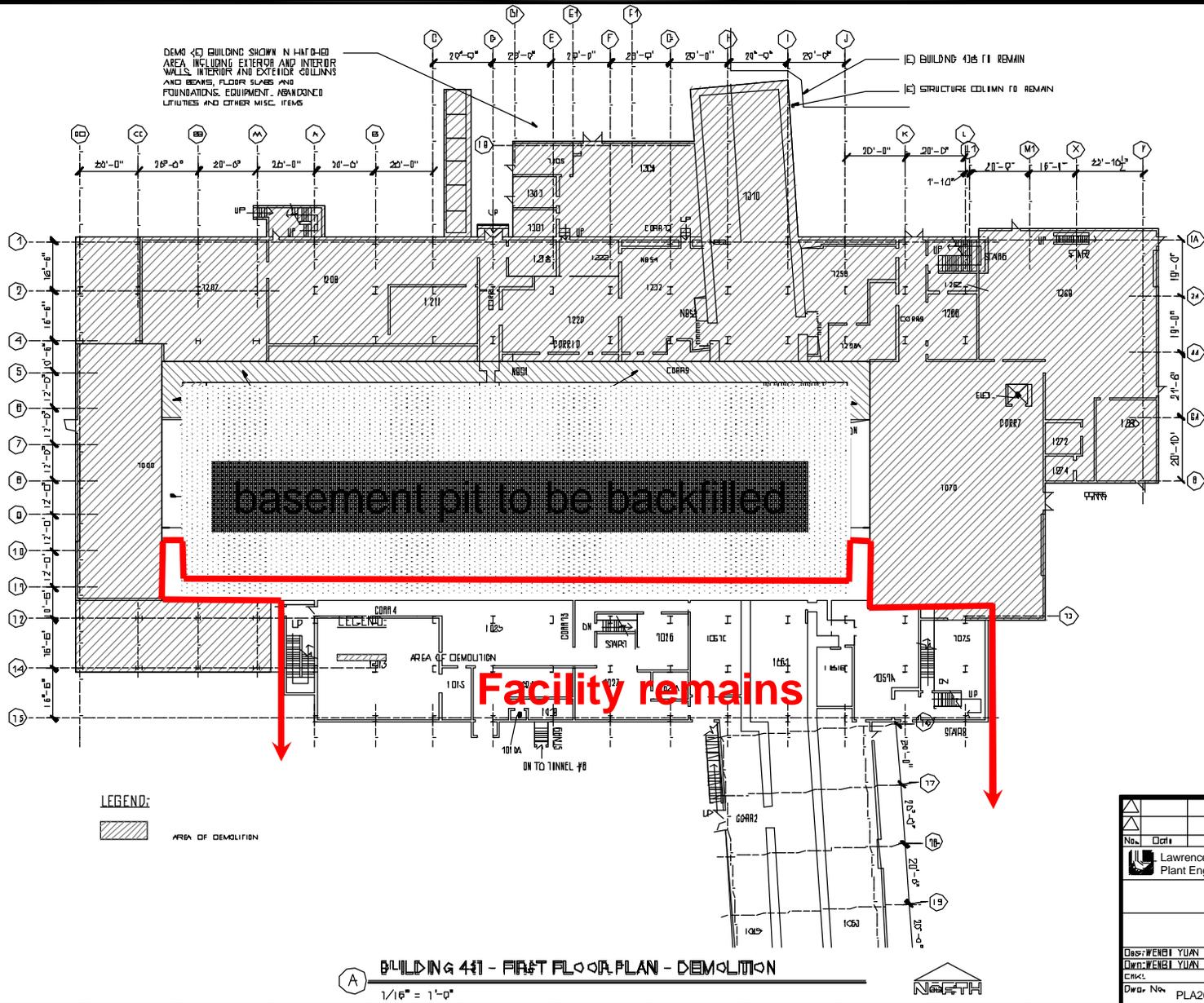
- Drain Reports
- EPD file review
- Chem track
- Spill Reports
- Environmental Permits
- SWPPP
- Retention Tank Reports
- Waste Records
- NEPA/NHPA
- Screening report/H.A.R.
- Facility Haz. Class
- H. C. Team facility files
- Fire Dept. files
- RAD Survey 10 CFR 835
- HEPA filter data base

The facility status and historical data supports a successful PEP and is archived with a project closeout report.





2003 7 25



No.	Date	Revision	Drawn	Checked	By	Scale
1						
Lawrence Livermore National Laboratory Plant Engineering, Livermore, CA 94550						
BUILDING 431 DEMOLITION						
FIRST FLOOR DEMOLITION PLAN						
Des:	WENGLI YUAN	07/31/03	Scale:			
Drawn:	WENGLI YUAN	09/13/03	Permit:			
Check:			Scale:			
Draw No:	PLA2003-0431-0003D	Sheet No:	A-1			



Scope of work



- Isolation and reroute of utilities to minimize neighborhood impact
 - Temporary re-routing of 13.8 KV circuit and removal inside pit
 - Replace transformer and re-route main feeders to ETA
 - Reroute elec circuits and piping feeding nearby buildings
- Remove concrete shield block (35T) Depleted Uranium target wall
- Abate Asbestos Containing Material (e.g., exterior siding, flooring, lead paint, thermal system insulation, etc.)
- Remove and dispose of interior and exterior equipment
- Demolish steel structure – 100' hibay roof, 50T crane, 4 story structure
- Demolish North concrete shield wall and foundation to grade level
- Backfill pit
- Rebuild and weatherproof South roof and siding

Alternatives evaluated and various reviews conducted throughout the life of a project.





Management systems, controls and planning



- Once Authorized, the Integrated Project Team plans, manages and controls the project using a tailored approach of DOE Order 413.3 and the Project Management Manual, DOE M413.3-1.
- The LLNL Space Action Team has management responsibility for the day-to-day work execution
- Implementing documents
 - NNSA FIRP⁽¹⁾ Program Execution Plan
 - LLNL FIRP Program Management Plan
 - LLNL ISMS Implementation Plan
 - Building 431 Project Execution Plan
- Special project reviews
 - Independent Project Review at Critical Decision 0
 - External Independent Review at Critical Decision 1/2/3
 - Value Engineering “Red Team” led by a certified Project Management Professional (PMP)
- Resource loaded schedule used to track work scheduled and performed, and compared to actual costs to establish monthly earned value
- Monthly schedule and cost performance is tracked at Division Level (WBS Level 2) and reported externally to NNSA at Level 1
- NNSA Livermore Site Office (LSO) oversight

CD - 0 Mission Need – Plan & Prep
CD - 1 Alternative Selection – “DEMOLITION”
CD - 2 Performance Baseline - “TPC \$12M, Completion Nov. 2006”
CD - 3 Begin Field Demolition Activities
CD - 4 Project Completion and Closeout

Good communication eliminates surprises.



Project performance reporting



Building 431									
Data Thru	ACWP (\$k)	BCWS (\$k)	BCWP (\$k)	CV (\$k)	CV (%)	CPI	SV (\$k)	SV (%)	SPI
7/30/2005	3,812	3,821	3,830	18	0.48%	1.005	9	0.25%	1.002
6/25/2005	3,218	3,183	3,284	66	2.01%	1.020	101	3.18%	1.032

Project Start: 8/4/03	Project End: 7/21/06
Act. Proj. Start: 8/4/03	Act. Proj. End:
Authorized Funding to Date (\$k):	\$ 8256
Project Budget w/ Contingency (\$k):	\$ 12038
Project Budget w/o Contingency (\$k):	\$ 9361
Estimate to Complete (ETC) (\$k):	\$ 5531
Remaining Budget (\$k):	\$ 8226
Variance at Completion (\$k):	\$ 2695
Contingency Budget (\$k):	\$ 2677
Contingency Remaining (\$k):	\$ 2677

Cost Variance Detail:	1.00
Cost variance satisfactory. Value represents slightly lower than expected costs for preparation and procurement activities.	
Cost Variance Recovery Plan:	
None required.	
Schedule Variance Detail:	1.00
Schedule variance satisfactory. Two week late finish of utility deactivation and late start of demolition contractor offset by CES sampling approximately \$80k ahead of plan.	

Schedule Variance Recovery Plan:
None required.

- Highlights and Lowlights**
- ⊔ LO/GSE utility deactivation contractor substantially complete at 96%; life safety systems and punchlist remaining in Aug and temp power removal in Sep.
 - ⊔ ETA major electrical outage for refeed of power successfully completed; ETA equipment back on-line.
 - ⊔ Continued site support activities: sampling of concrete for recycle and oil for waste disposal.
 - ⊔ Completed review of demolition subcontract (Evans Brothers Inc.) submittals; resubmit some items in response to comments.
 - ⊔ Abatement/Demo NTP granted July 21; EBI/Bayview mobilized July 28 and began abatement preparations.
 - ⊔ Abatement activities were started in July on removal of Galbestos siding. [Abatement Start Milestone]
 - ⊔ Two transforms with PCB oil need processed as hazardous waste; other oil needs pumped by approved waste hauler.
 - ⊔ Superblock security camera installation complete and cameras deactivated and removed from B431.
 - ⊔ NNSA granted approval for 48 property items to be disposed by the demo subcontractor; tags have been removed.
 - ⊔ Specs and procurement package for roof/wall restoration being delayed to review high construction estimate and evaluate alternate go-forward plan; no impact on critical path.
 - ⊔ Perspective of Roof Restoration completed.
 - ⊔ B431 SCR (describing two segments) has been signed by the AB group and PAT ADFM, then submitted to LSO for formal review.
 - ⊔ Developed Critical Lift Plan for removal of Depleted Uranium Shield Block. Final approval expected in September to execute work.

Safety Minute

- ⊔ Deactivation of all mechanical and electrical systems complete (except Life Safety) in preparation for demo.
- ⊔ Some final color coding still needs worked by H&ST and Construction Inspector.

Key Milestones

Utility Deactivation Start	Jan-05	P
Award Demolition Contract Start	May-05	P
Abatement Start	Jul-05	P
Demolition Start	Sep-05	
CD-4 Project Complete	Nov-06	

Several reports help monitor performance.



Acquisition Strategy



- Finalized after CD-0 and submitted per DOE M 413.3-1
- Combination of LLNL staff and competitive fixed-price procurements awarded by the University of California. Assumptions:
 - LLNL staff handles prep work, sampling, hazardous waste disposal, ES&H oversight and PM
 - LLNL Labor-only contractor (Davis-Bacon) performs utility isolation and re-routing
 - Design-demolition (“Design / Unbuild”) subcontract awarded hazards abatement, demolition, backfill, and site grading. Experience & safety record essential.
 - Design-build subcontract will be awarded for weatherproofing and repair/rebuild of the remaining roofing and siding.
- Detailed design-demolition specifications and detailed utility deactivation drawings and procedures prepared
- Design-demo subcontract strategy resulted in several different demolition approaches
 - Best value bid uses method not originally considered
 - Recycle value \$250k and 85% of materials
- Best value evaluation: license & certifications, security, vibration, traffic, recycle, schedule, safety history (ERR & TRR), shield wall demo, similar projects, references and price.

Design-demo process results in best schedule and cost.



Integrated project team (IPT) involvement



- **ETA-II, a non-nuclear facility, remains operational and continues experiments**
- **Computations server facility and archive records management facility B439**
- **High voltage routing through existing building**
- **Machine shop services facility B432**
- **Operational Security Plan due to the proximity to security area**
 - **Vehicle and personnel access**
 - **Staging of material and equipment**
 - **Restrictions on crane size, placement, accessibility and relocation**
 - **Security related work stoppages may impact the project**
- **ES&H Teams**
- **Representative personnel are on the project review team**

IPT participation avoids problems during execution.



Risk and Contingency Management



- Risk Management Plan developed, risk assessment completed and a risk mitigation strategy prepared.
- The activities with the highest risks are Electrical & Mechanical Isolation, shield wall removal and Renovation.
- The high risk factors include:
 - Encountering stored energy
 - ETA II sensitivity to vibration
 - Difficulty with demolition of the shield wall due to its size
 - Schedule uncertainty due to uniqueness of shield wall demo, potential weather delays, impacts to nearby operational facilities, ETA operational status

Plan updated as risk factors retired.



Environmental, Safety and Health



- Environmental, Safety and Health incorporated into the planning
- Historical operational background reviews and surveys to determine likely hazards and contamination levels
- NEPA review performed and the project granted a categorical exclusion
- NHPA review performed and the building determined to be of no historical significance to the State of California.
- Confirmatory sampling performed for ACM in order to better bound the scope of abatement
- Integrated Safety Management System – DOE Seven Guiding Principles and Five Core Functions
 - Integrated Worksheet (IWS) defining scope, hazards, controls, training and authorizing the work
 - Subcontractor Site specific Health & Safety Plan and Corporate Injury & Illness Prevention Program

Continuous safety oversight and managed review of concerns.

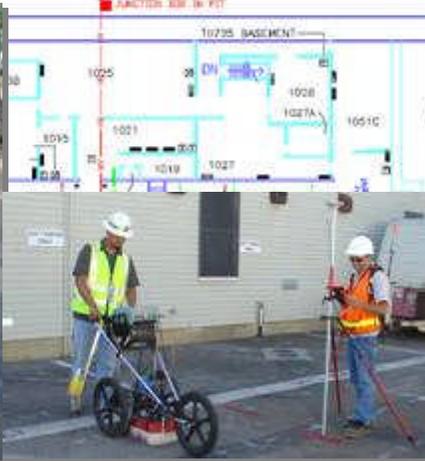


Utility safety is best served by integrating historical information and active measurements

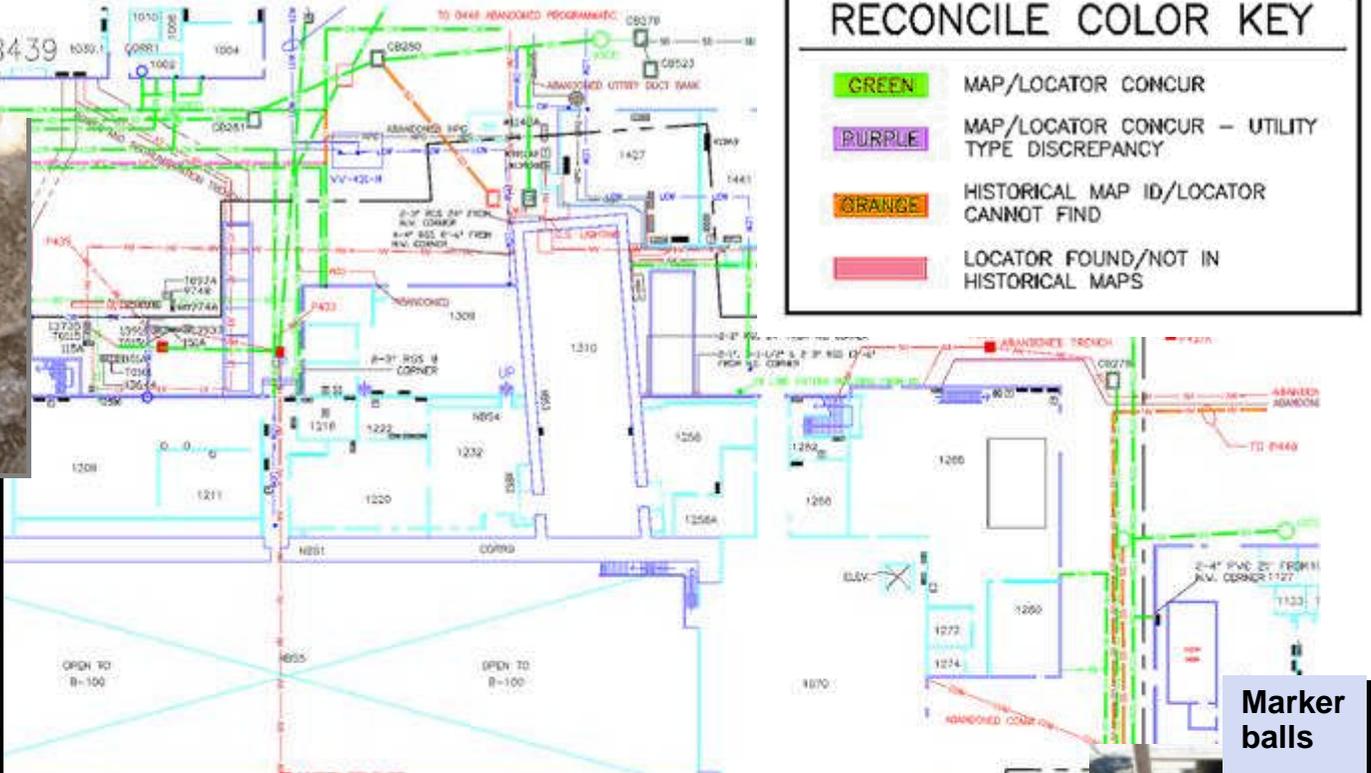
Nondestructive excavation



GPR/GPS and Acoustic Listening Device



Radio frequency device traces line



RECONCILE COLOR KEY	
GREEN	MAP/LOCATOR CONCUR
PURPLE	MAP/LOCATOR CONCUR - UTILITY TYPE DISCREPANCY
ORANGE	HISTORICAL MAP ID/LOCATOR CANNOT FIND
PINK	LOCATOR FOUND/NOT IN HISTORICAL MAPS

Marker balls



Color Coding Best Practice



Problem: Decommissioning systems containing stored energy or contaminants is a communication challenge. Tracking materials from sample through resolution, protective of workers and the environment requires constant verification and documentation to properly control through release.

Solution: SAT uses a color code to identify the status of all Structures, Sub-systems, and Components (SSCs) during decommissioning through disposition.

Red: Known hazard exists on or inside a SSC.

Yellow: SSCs denoting caution.

Blue: Controlled disposal to the Municipal Landfill

Green: Free release - no issue.

Black: Editorials and instructions



Field Execution



- **Completed**
 - Deactivation and reroute of utilities
 - Interior abatement
 - Demolition of 8,000 SF



Field Execution



Field Execution



- Working
 - Abatement/removal of Galbestos siding
 - Structural demo
 - Specs for Restoration design-build



Restoration planning for Design-build



D&D best practices



- Single program supports S&M and D&D
- Resourced schedule tracks performance
- Design-demo acquisition achieved best schedule/ cost
- Integrated Project Team eliminates surprises
- Environment, Safety & Health team participation
- Comprehensive UG utility location - ZERO hits
- Color coding of systems clearly communicates hazards

Embracing best practices sustains team performance and achieves mission success.

