APS Vibration Monitoring Plans

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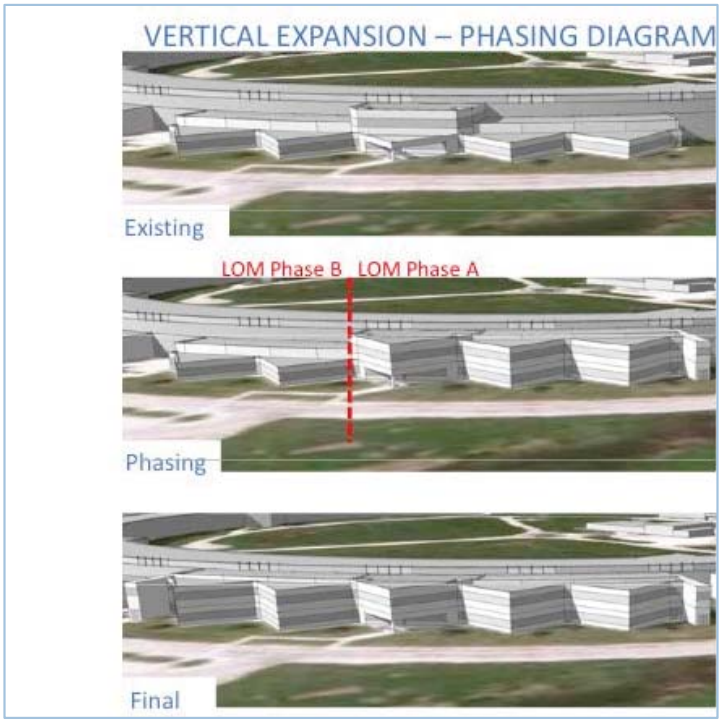
APS/Users Monthly Operations Meeting

May 30, 2012

Upcoming construction at the APS

- Expansion of 400A
- APCF
- LOM Expansions
- Beamline construction

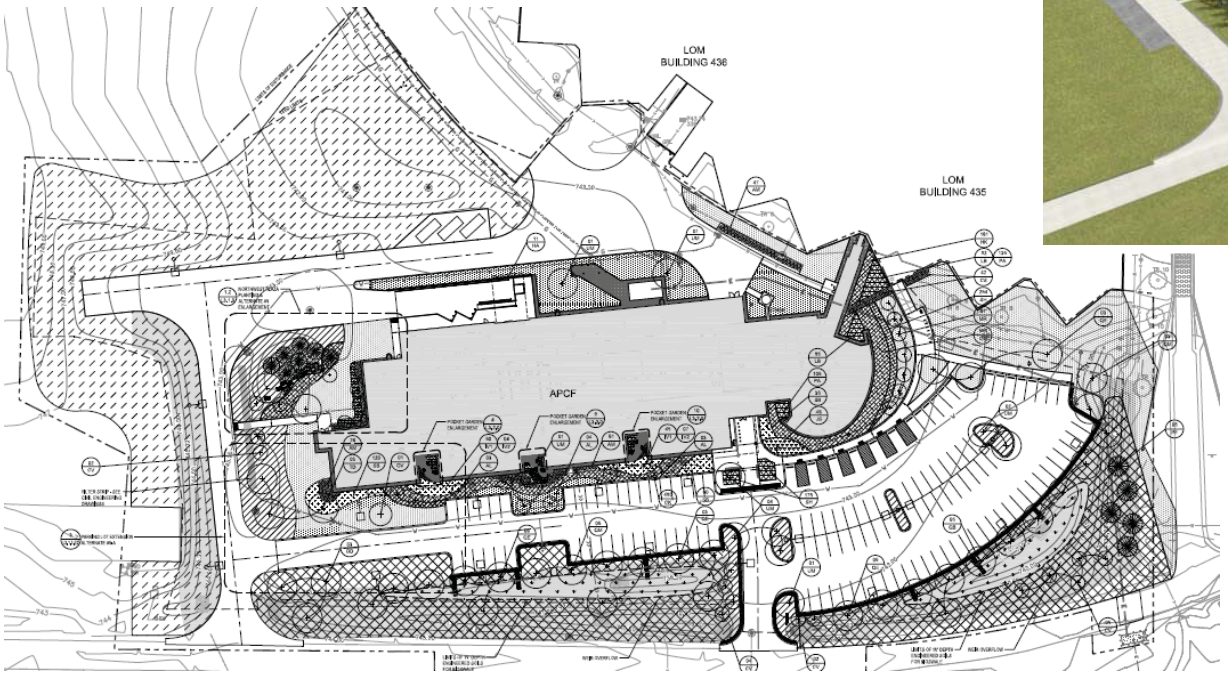


Next Big Construction Project: Advance Protein Crystallization Facility (APCF)

The APCF will be a state-of-the-art highly automated laboratory for production and characterization of proteins and protein crystals in order to take full advantage of Argonne/APS's capabilities for determining the three-dimensional structures of proteins and characterization of their functions.

APCF Location

APCF will be adjoining 435



APCF Schedule

- Ground breaking August 30, 2011
- Final general contractor proposals being evaluated
- Start of main building construction expected early August 2012
- Slated to open in late 2013/ early 2014

Construction Equipment to Be Evaluated

Request for Proposal:

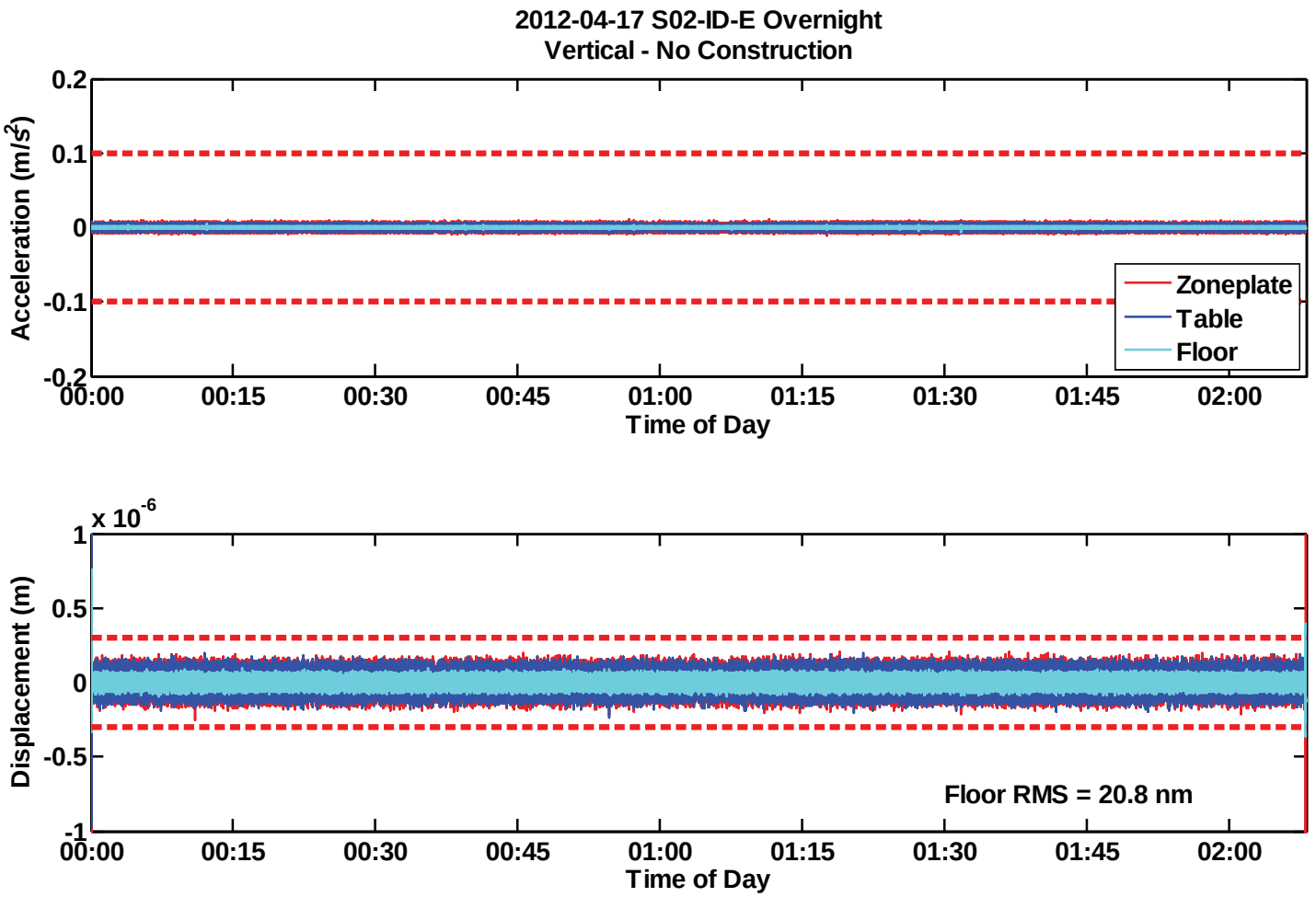
- Each piece of construction equipment that may generate excessive vibrations must be surveyed and tested prior to its use to assess its potential impact on the APS and CNM.
- The equipment test will require the contractor to mobilize critical equipment on-site in advance of its intended use and operate the equipment for approximately 2 hours on an APS “Study Day”.
- While the equipment is in operation, Argonne will evaluate the equipment’s impact on existing facility operations.
- Construction activities with equipment that impacts data taking will be coordinated with the shutdown schedule.
- During scheduled APS operational shutdowns the restrictions on vibration producing equipment may be waived.

Vibration Monitoring System

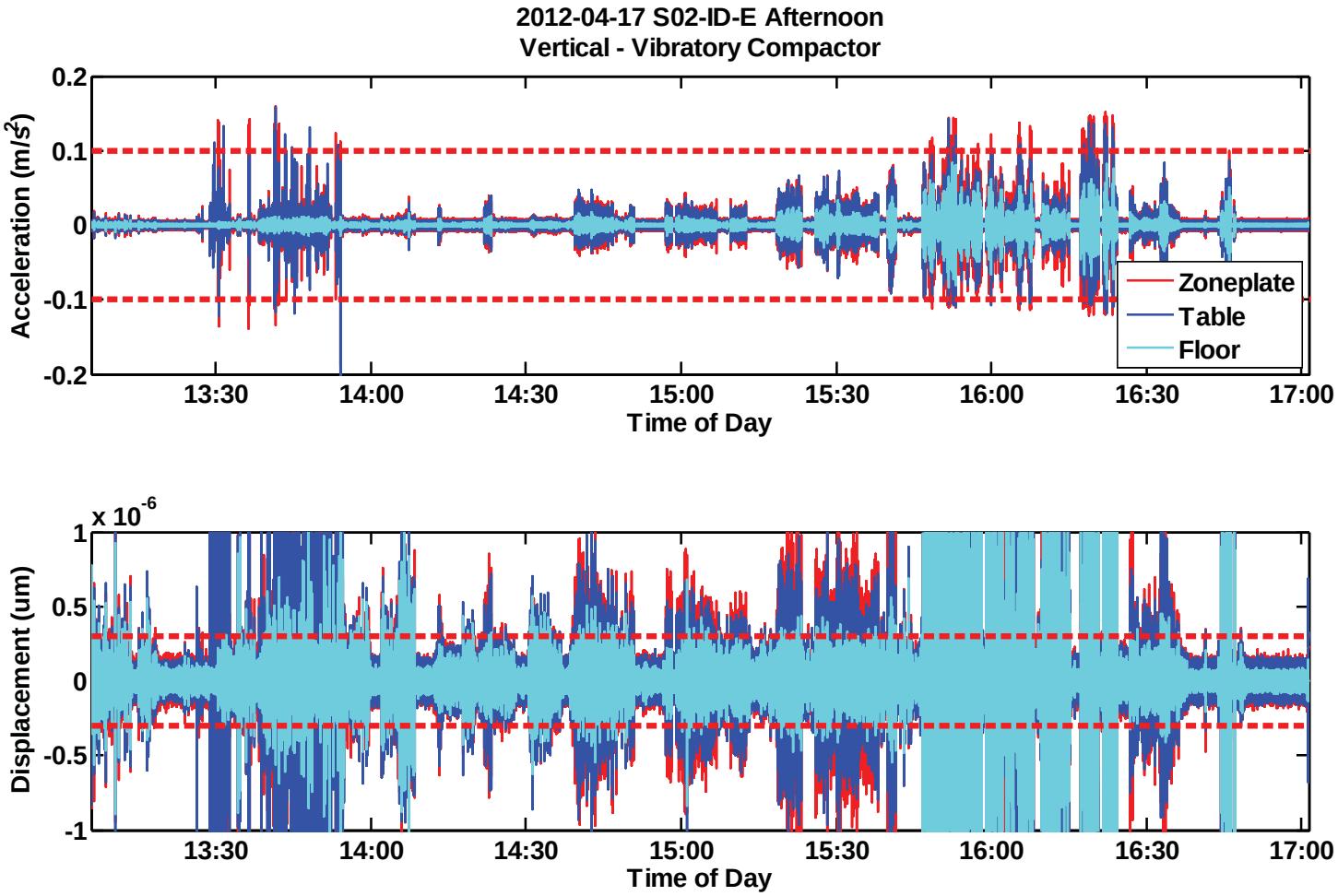
Our long term goal is to:

- Detect disruptive vibration around the storage ring experimental floor
- Provide as many accelerometer stations as needed, consistent with available funds
- Measure ground motion in three independent directions
- Utilize data from: ground motion, e-beam motion, and beamline x-ray motion
- Data will be analyzed to produce an alarm in the control room
- Pre-alarm and post-alarm data will be available for review
- Post processing of data can be done to determine vibration source
- Implementation in three phases:
  - Qualification – single sensor station, measure equipment signatures pre-construction
  - Phase I – four stations close to the APCF construction site
  - Phase II – and additional 13 stations distributed around the ring

Baseline Floor Motion at S02-ID-E

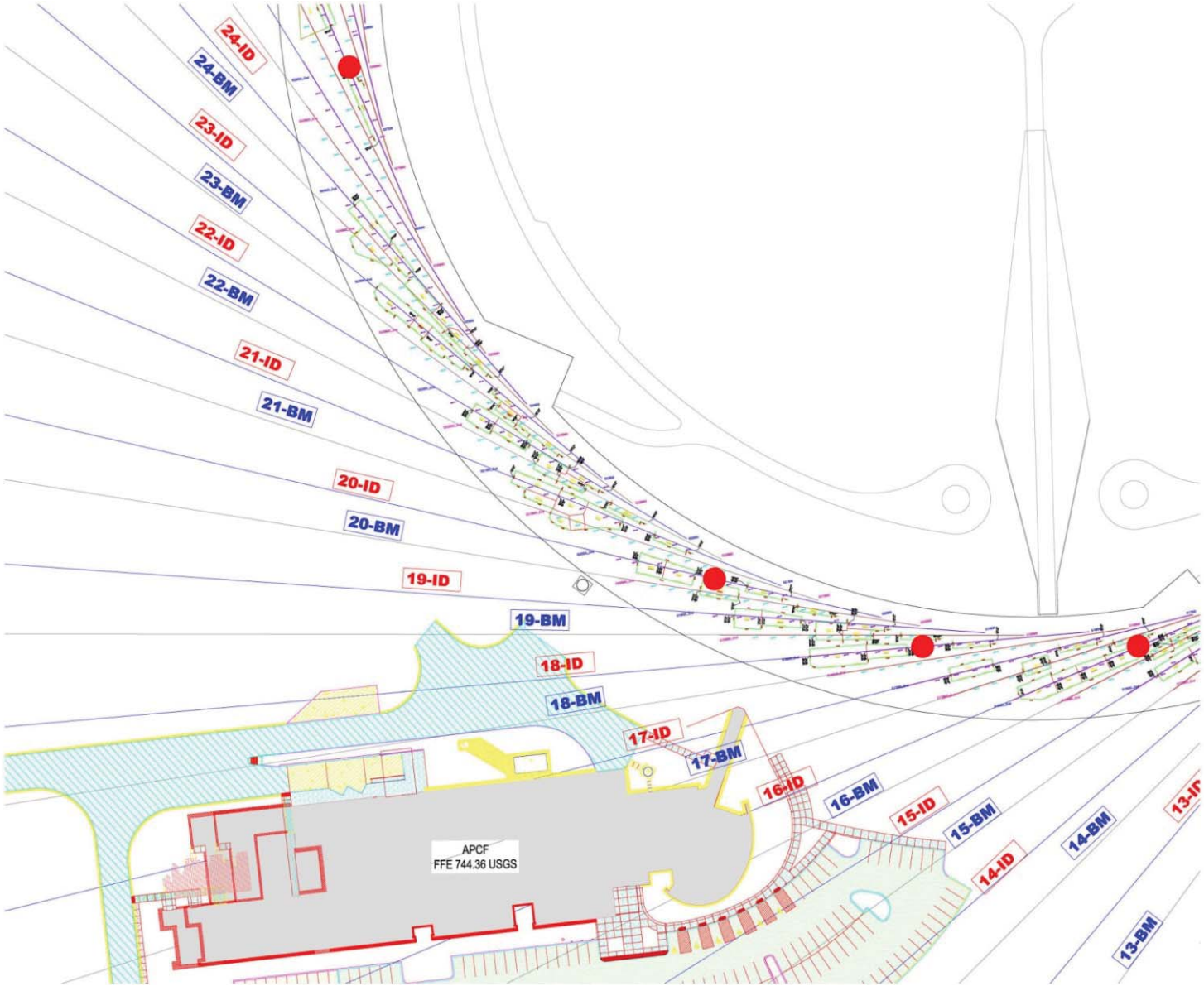


Floor motion w/compaction at S02



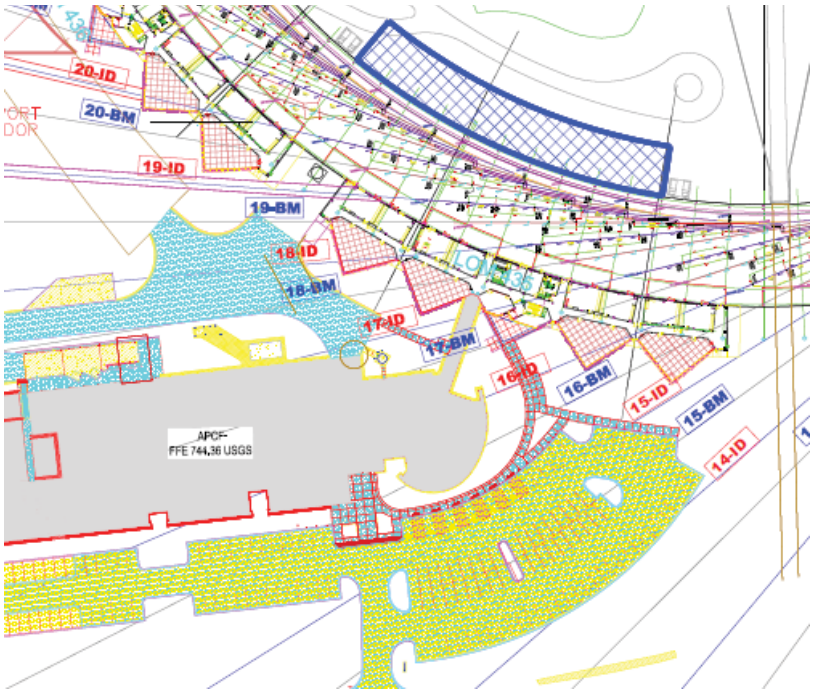
Proposed Phase I Monitoring Locations

- S16ID
- S18ID
- S20ID
- S26ID



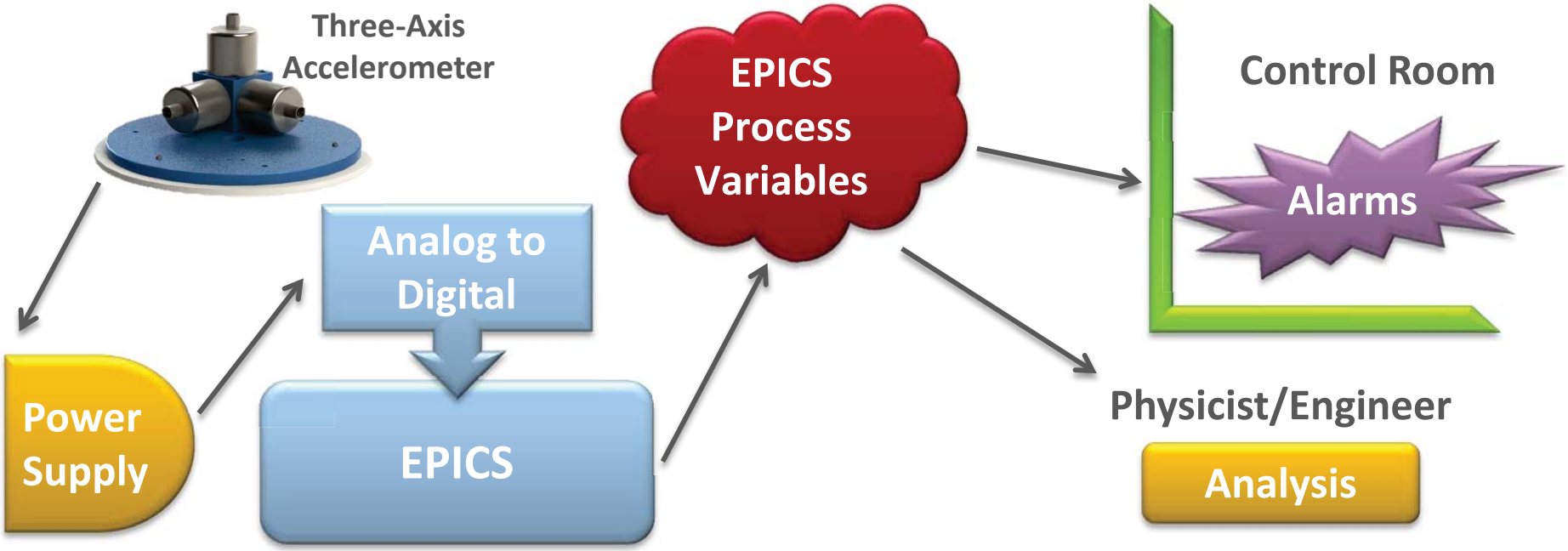
Monitoring Locations

- Implement in stages
  - Concentrate on sectors near APCF initially
  - Expand when system architecture has been proven
- Install near the ID Beamline 45 m mark
  - Mid-beamline
  - Generally clear
  - Variations from sector to sector will not unduly complicate analysis
- Utilize existing power outlets and cable trays where feasible
- Generally every other sector
- Skip EAA and open sectors (for now)



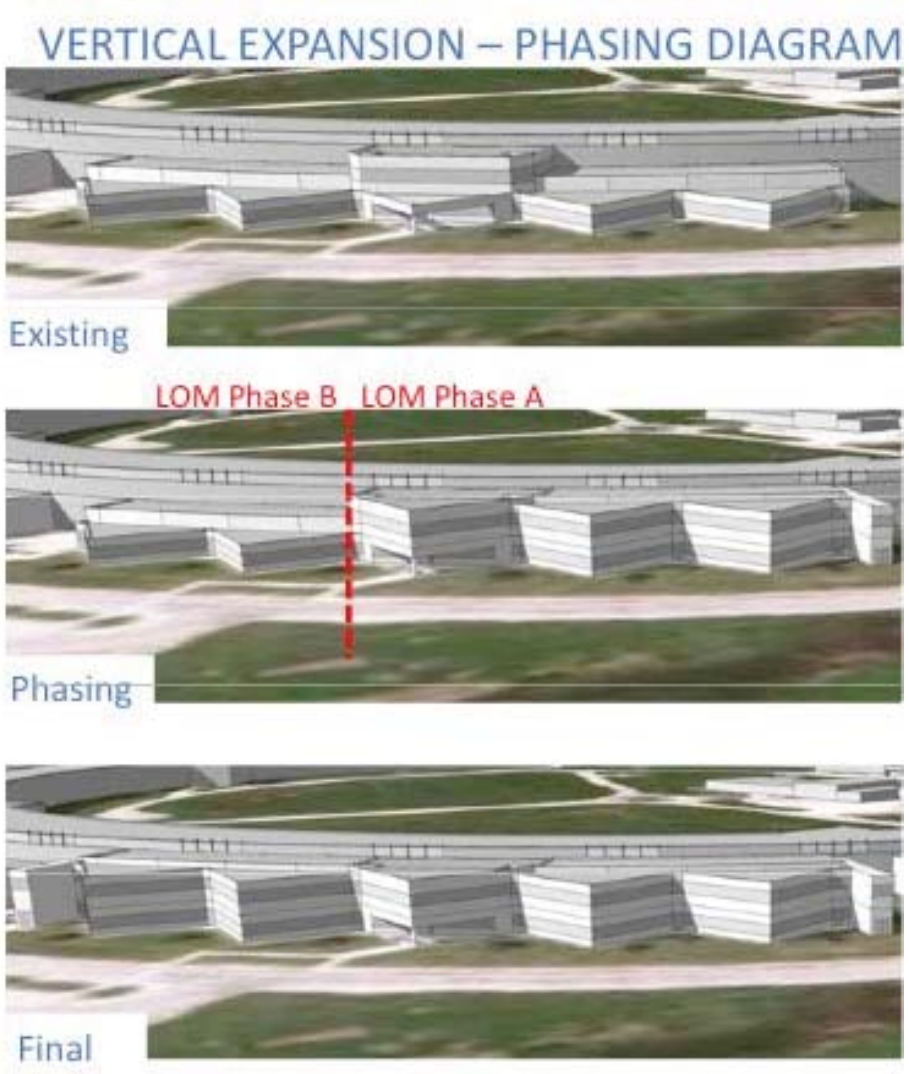
System Architecture

- The accelerometer data are:
  - Acquired by a computer and data acquisition setup running an EPICS IOC. This produces both…
    - A local data store and
    - EPICS PVs, which can be used to…
  - Create alarms for the accelerator operators and/or
  - Be archived for later analysis.



Early Planning for LOM Expansion

- Planning feasibility of adding second floor to office areas of LOMs to provide more user and beamline staff space starting in FY2013
- Likely first LOM to be expanded would be 437 (unoccupied), construction in second part of FY2013



Communication

- Web page of known activities: http://www.aps.anl.gov/Construction/
- Utilize meetings (APS/Users Monthly Operations Meeting) to get word out
- E-mail notification
- User Contacts: Floor Coordinator… Julie Cross, Mark Beno, Stefan Vogt