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APS Renewal – Infrastructure

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Infrastructure

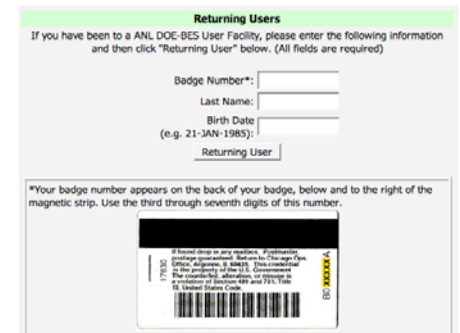
- Candidate projects
- Short term and long term
- Business Software
- IT Infrastructure
 - Networks, servers etc
- Conventional Facilities
 - Construction



Information Systems Infrastructure Renewal

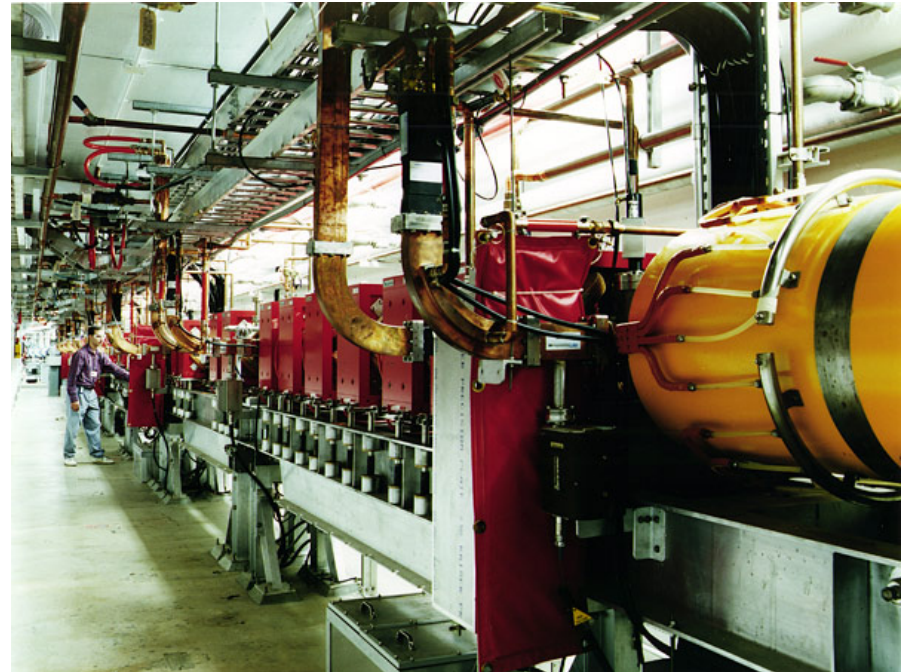
- Update user-facing applications such as GUP, ESAF, Registration, Publications, Beamline Scheduling, Proposal Review systems, etc.
 - Overhaul data model on server side
 - Put new interface onto applications
 - Implement modern programming models and languages
 - Easier to maintain and secure
- Acquire and implement Service Oriented Architecture (SOA) technology
 - Applications would be exposed as services
 - SOA is technology most computing groups want
 - Some components would be open-source, others commercial.
- Replace CAD management tool.

APS Facility Core Courses:	
Course	Name
APS 101	Advanced Photon Source User Orientation (5 year retraining)
ESH 100U	Argonne National Laboratory User Facility Orientation (one time course)
ESH 223	Cybersecurity Annual Education and Awareness (1 year retraining)
ESH 377	Electrical Safety Awareness Training (2 year retraining)
ESH 738	GERT: General Employee Radiation Training (2 year retraining)



Upgrades to Accelerator IT Infrastructure

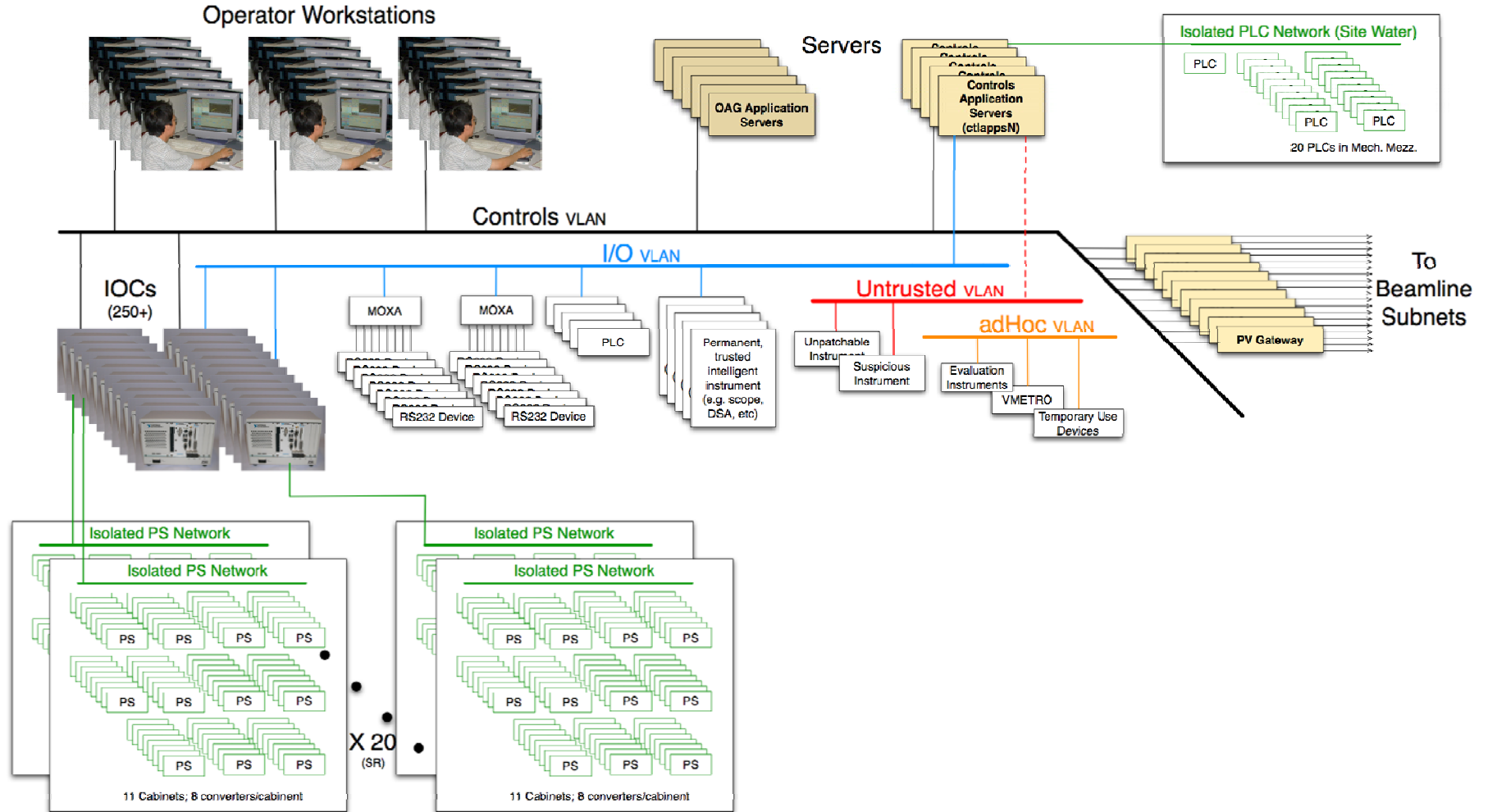
- New network design required to support the latest equipment.
- Original IOC's are large VME crates with each IOC requiring a single Fast Ethernet connection to two network switches.
- IOC's today can be as small a single module or ebrick.
- Additional network ports and switches will be needed to support the many new Network Attached Devices that are being proposed.
- Additional switches require installation of new fiber uplinks and copper cabling to the IOC's
- Gigabit Ethernet would be available after the upgrade.



Upgrades to Accelerator Control System

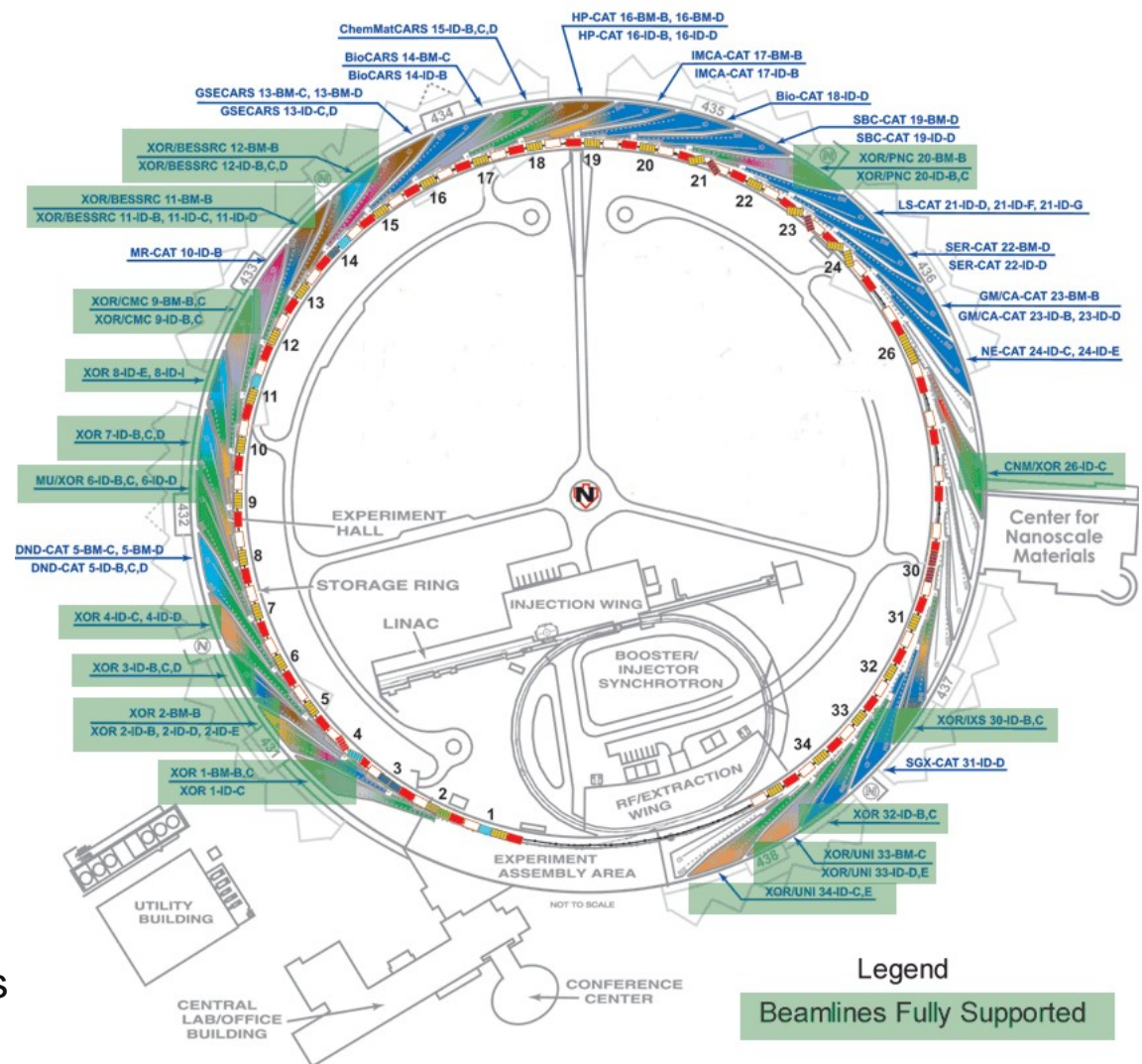
APS Accelerator Control Network Infrastructure

-- Functional View --



Upgrade to XOR Beamline Computing and Networks

- Since 2004, the number of XOR beamlines has grown from 4 to 16.
- Many beamlines, old and new, plan to add stations, upgrade detectors, and/or increase scanning rates.
- The additional beamlines and increased data rates at many beamlines are pushing existing networks and servers to their limit, resulting in poor performance, slow data transfers.
- Additional file/storage servers needed to handle the additional load.
- 10GB/sec backbone network is needed to allow file/data servers move data faster.



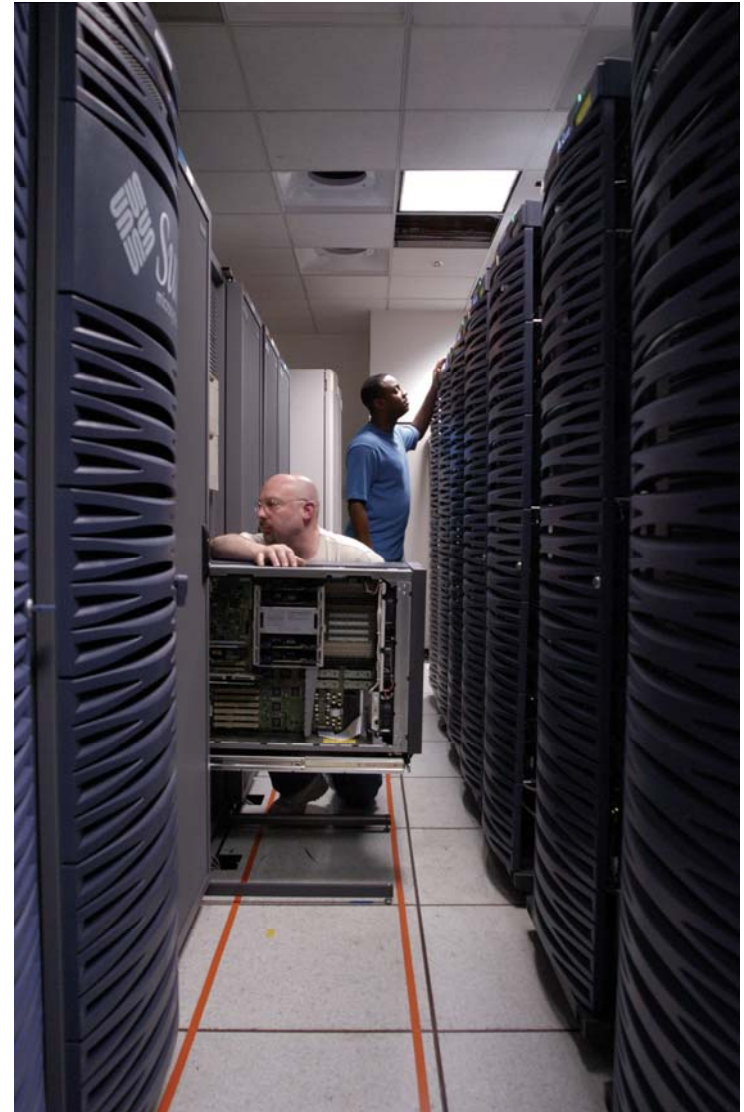
Upgrade to Beamline Computing and Networks

- Upgrade XOR Servers
 - Beamline servers provide critical services
 - Servers supporting half of XOR sectors and are 5 years old and not meeting performance requirements of multiple beamlines. Disk arrays have failed several times in the past year.
- Add additional nodes and disk storage to HPC cluster.
- Add 2-stage backup capability to the XOR backup server.
- Upgrade XOR network to accommodate high speed data transfers
- Existing switches that are not capable of 10 GigE will be replaced by HP switches which are 1/3 to 1/2 the price of Cisco switches.

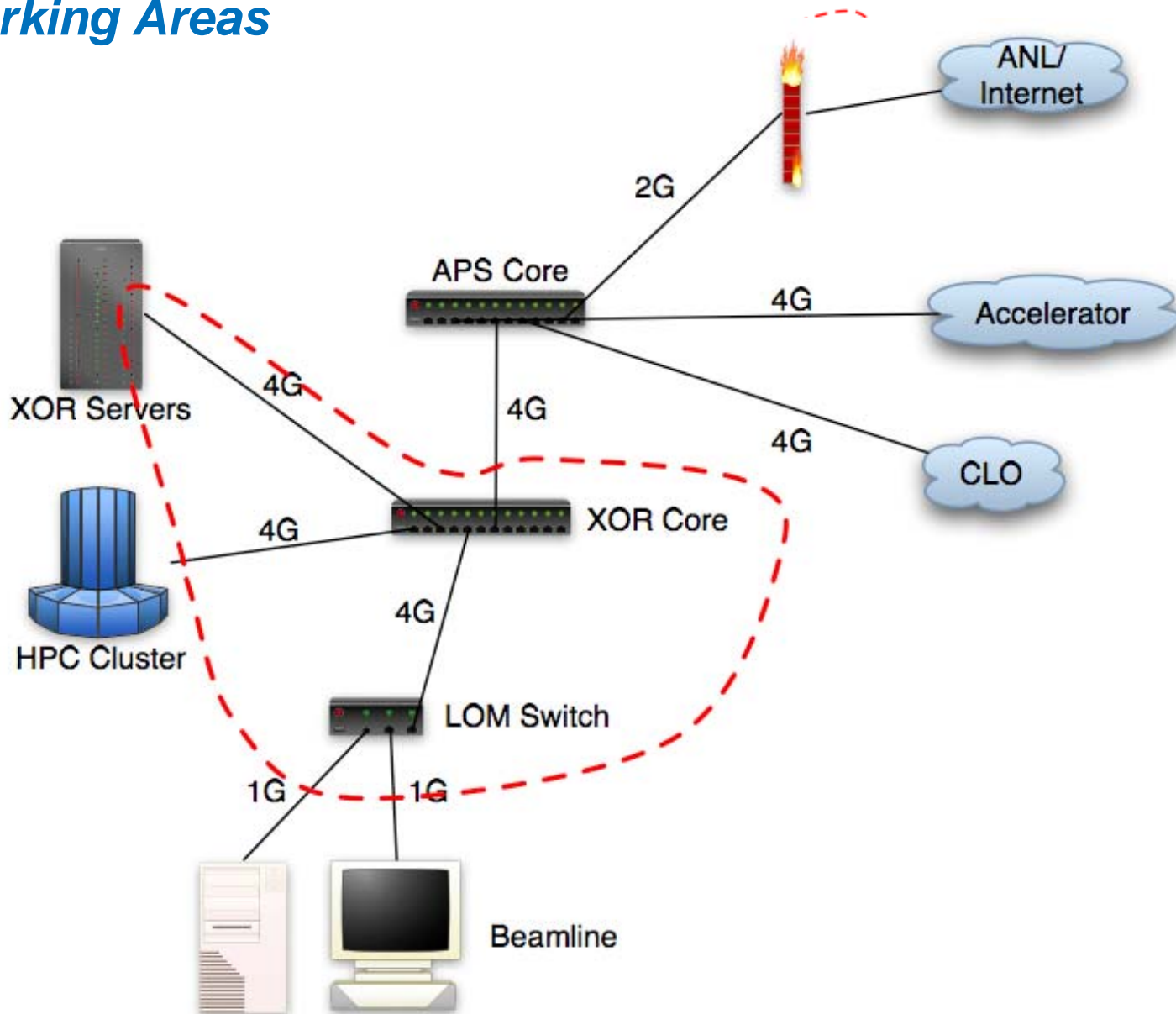


Upgrades to APS Central Computing and Networks

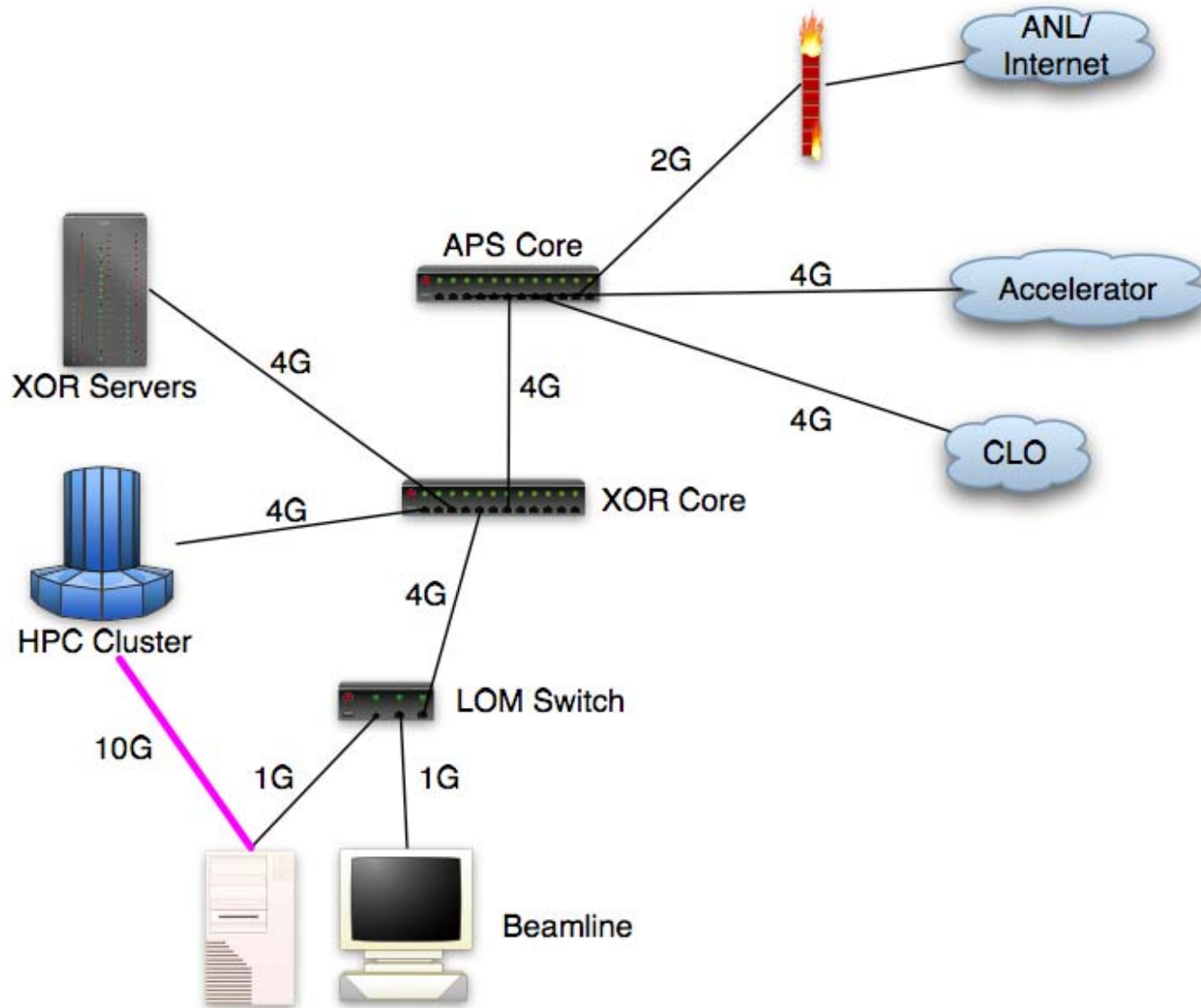
- Upgrade APS Tier 2 firewalls to 10 GigE. Improves network performance between the APS, Argonne, and the Internet for everyone at the APS, but especially for all beamlines.
- Upgrade core networking to 10 GigE. This will improve overall network performance for data transfers and server access between the beam lines, APS, Argonne, and the Internet.
- Upgrade standalone servers. A number of servers are over 5 years old and near the end of their useful life.
 - Vendors either will not offer maintenance or sharply increase price for maintenance.



Networking Areas



Networking - ad-hoc



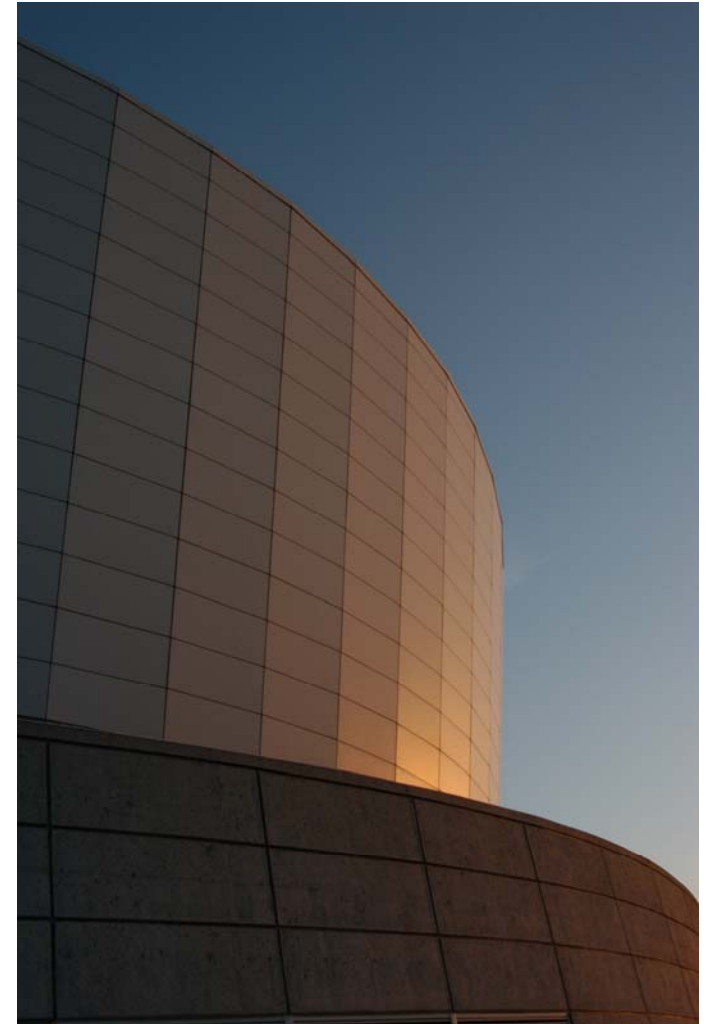
Conventional Facilities Projects

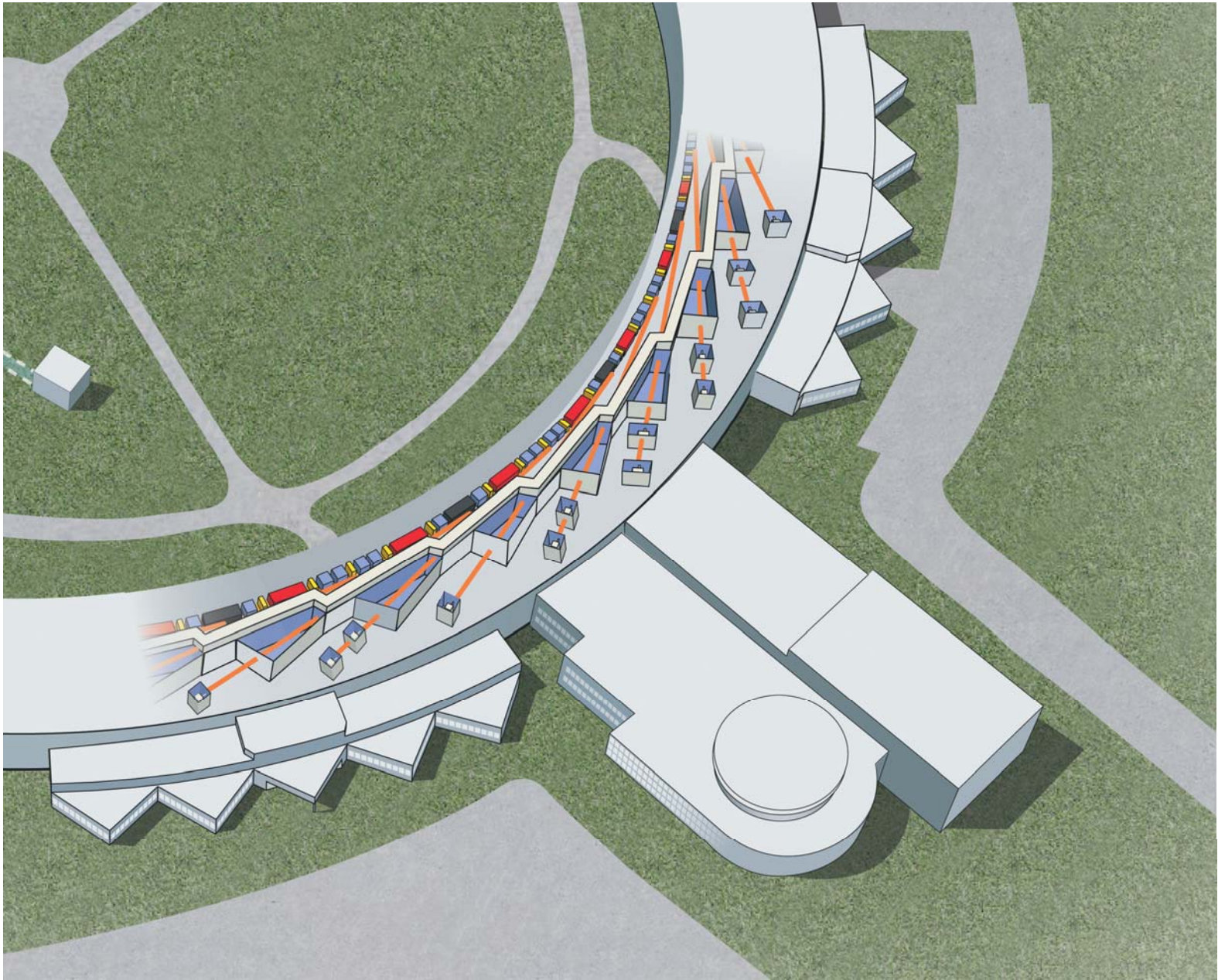
- Computer Room Extension
 - Nominal doubling of computer room space
 - Space, power and cooling are all issues in the current computer room

- LOM 437 build out

- New Storage Facility

- LOM expansion

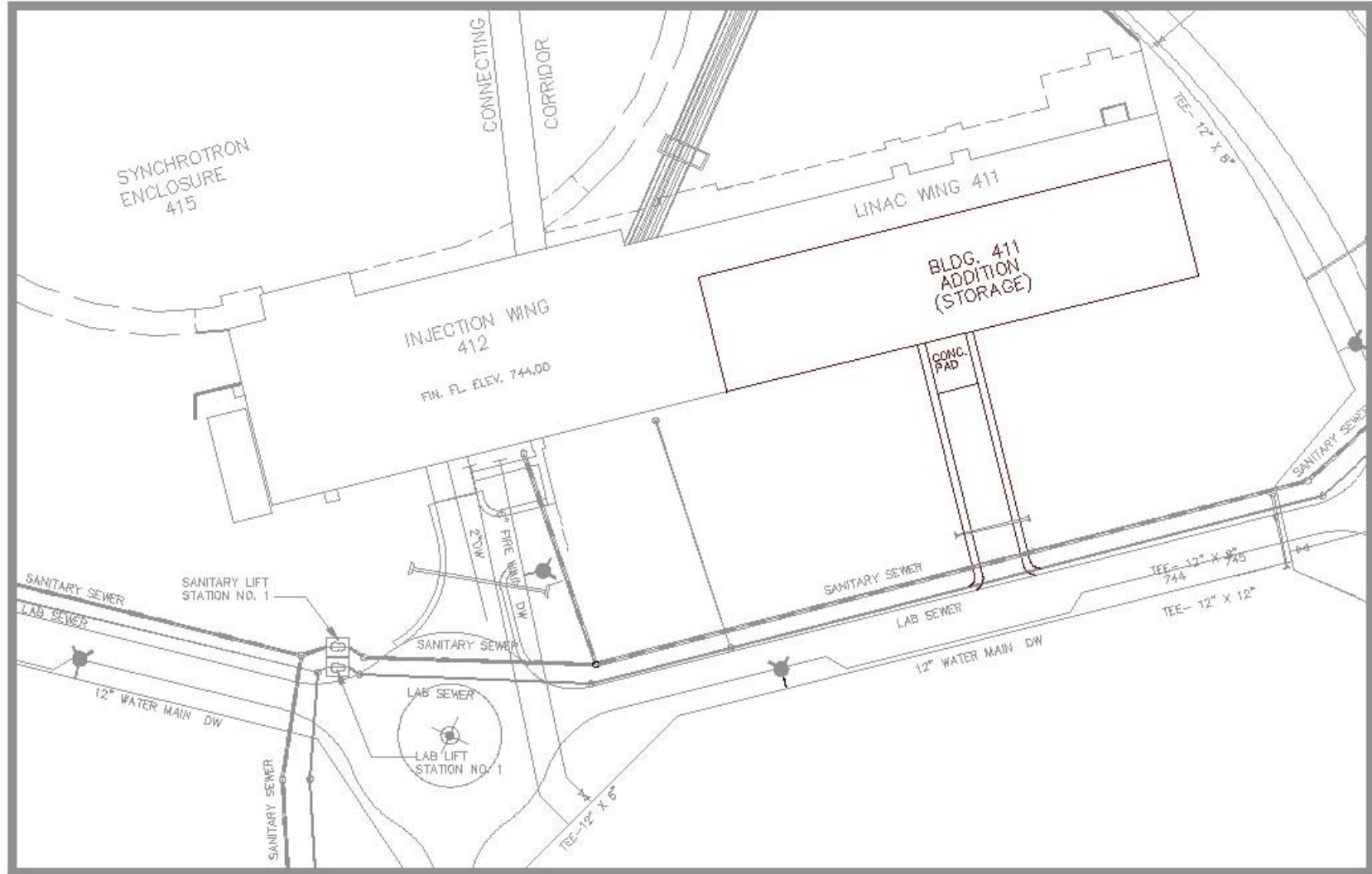




Additional Storage

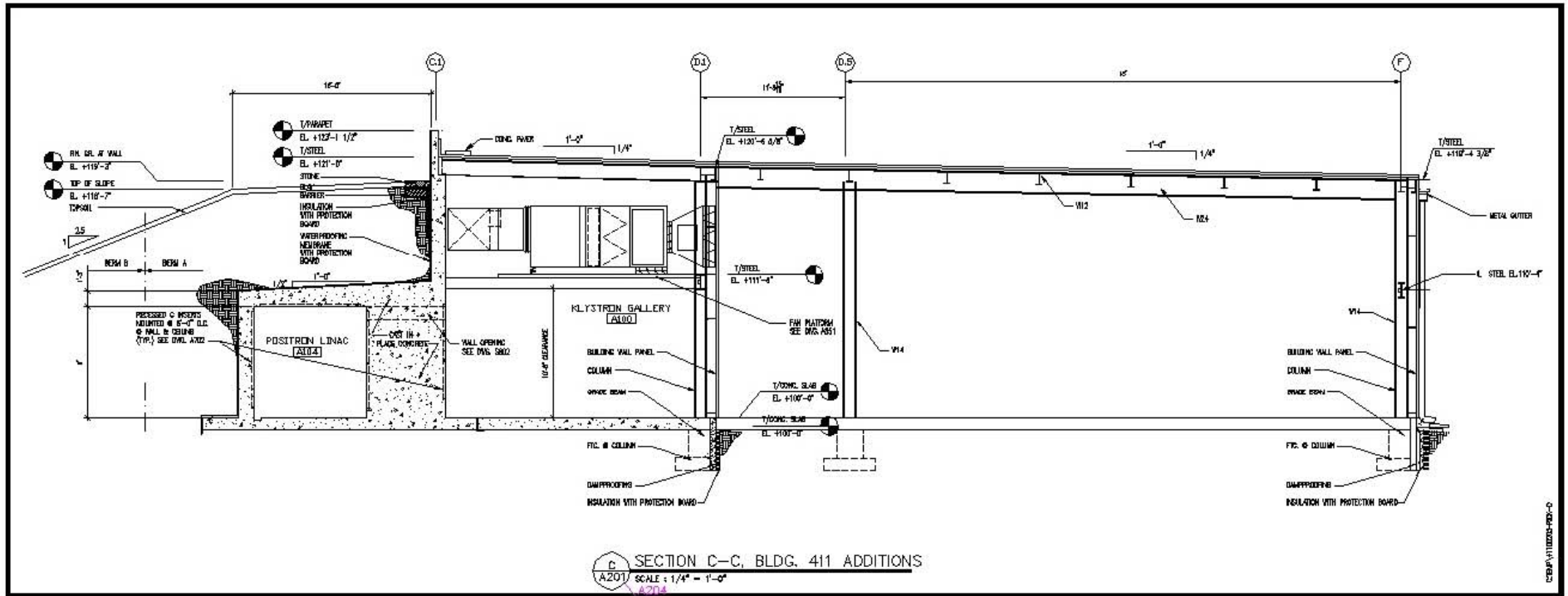
- New Storage Space is needed due to the decreasing amount of storage space in the Experiment Hall as new beams lines are added.
- Would provide 12,000 square feet of additional storage space for the APS Facility
- Possible locations,
 - Infield (best)
 - South of building 450

APS Storage Facility



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APS Storage Facility



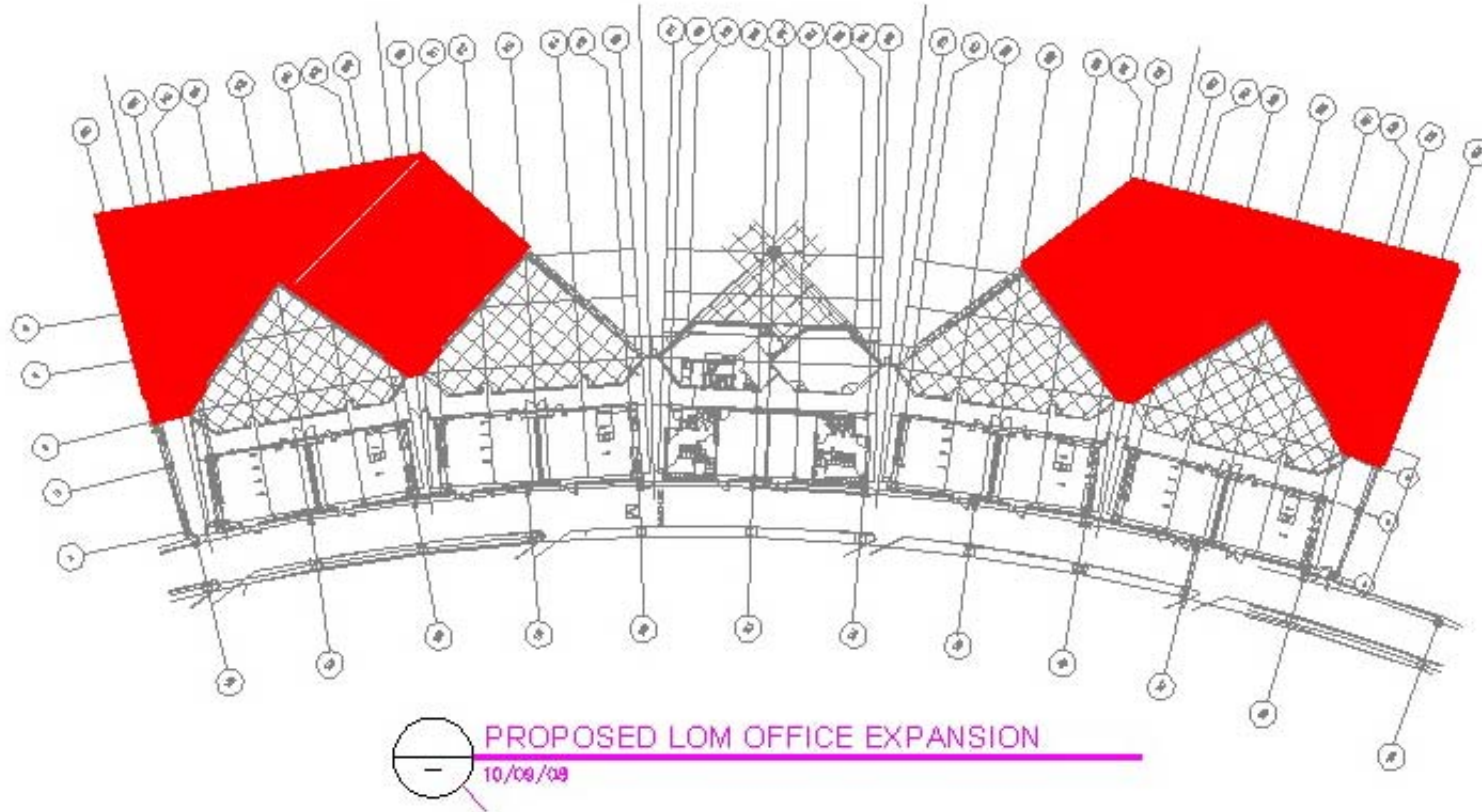
LOM Extension

- Existing LOM buildings have ~8000ft² office space
- Building “up” is impractical and not cost effective
- Extension would give additional 8000 to 14000 ft², depending on available space
- Retains external look and style of original
- Approximately \$3M to \$5M per LOM
- For 8 LOMs cost is \$24M to \$40M
- Parking space an issue



LOM Expansion

One possible concept



Infrastructure Summary

- Numerous opportunities
- Some focus more directly on science
- Others less visible but important for the facility
- Business software
- IT infrastructure throughout facility
- Several construction projects
- Not glamorous, but part of providing a world class facility

