NSLS-II Comprehensive Design Review

CF Requirements and Interfaces

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Assistant Director for Design Conventional Facilities

September 11, 2007

Outline

- CF Technical Performance Goals
- Utilities Requirements
- Building Program Requirements
- Environmental Requirements
- BNL Interfaces
- Information Tracking
- Scope Discussion

CF Requirements Development

- Performance parameters developed in design charrettes with A/E and ASD and XFD groups
- Parameters are reviewed by NSLS II Management team and advisory committees
- Development included benchmarking study of other light source facilities
- Currently in process of formalizing documentation of parameters and implementing configuration control
- Parameters affecting conventional facilities are documented in A/E design reports (Title I 90% is latest), parameter matrix and project wide requirements documents (Global requirements)

CF Technical Performance Goals

- Structurally stable facility with low vibration (<25nm)
- Tunnel design that provides required shielding and accessibility
- Temp. stability of +/- 0.1 deg C tunnel; +/- 1.0 F Experimental Floor
- Utility services & expansion capability to support full beamline build-out
  - Power & Cooling water for 60 beamlines
- Facility layout enabling future long beamlines
- Experimental Floor noise level < NC 60 (or most quiet light source facility reasonably possible)
- Design for LEED Certification to meet sustainability requirements (level of implementation being discussed with DOE)

Utility Requirements

- Electrical Power
  - 20MW substation and feeder
  - Total Load at 3.0GeV is ~15.3MW
  - 2 Emergency Gen's planned and 30 kVa UPS at Control Room
- Chilled Water
  - Estimated cooling load of 2400 ton capacity increase planned for Central Plant
- Process Cooling Water
  - 2700 ton Cooling tower planned. (may be reduced due to ASD magnet redesign)
- Steam
  - Estimated steam load 17,000 lbs/hr peak

Building Program Requirements

- Ring Tunnel
  - 40,284 gross square feet
  - Lattice 792.45m circumference
  - 12’-6” (3.136m)width x 9’-0” (2.75m) height
  - Floor Elevation 71’-4” (+1’-4” above Experimental Hall – 40 cm)
- Experimental Hall
  - 148,176 gross square feet
  - 70’-0” Clear span. Inside spacing 21’-0” outside spacing 25’-0”
  - Floor Elevation 70’-0”
- Booster
  - Lattice 157m circumference
  - 11’-5” (3.45m) x 9’-0” (2.75m) height
  - Floor Elevation 71’-4”

Environmental Requirements

- Ring Tunnel
  - Temperature 78º (25.5ºC) ± 0.18ºF
  - Humidity control 30% winter 50% summer
- Experimental Hall
  - Temperature 75º (23.8ºC) ± 1.00ºF
  - Humidity control 30% winter 50% summer
- Booster
  - Temperature 78º (25.5ºC) ± 1.8ºF
  - Humidity control 30% winter 50% summer

BNL Interfaces

- Accelerator Group
  - Formal Weekly meetings
  - As required to resolve issues
- Experimental Group
  - Formal Bi-weekly meetings
  - As required to resolve issues
- Plant Engineering
  - Will conduct formal weekly meetings
  - As required to resolve issues
- Safety & Health, Radiation Shielding, and IT group etc.
  - As required to resolve issues

Information tracking

- Tracking document
  - to capture and track comments and recommendations by various external and internal committees, reviews and workshops such as:
    - Conventional Facilities Advisory Committee, Accelerator Systems Advisory Committee, Experimental Facilities Advisory Committee, Project Advisory Committee
  - The items will be tracked until closure as they are incorporated in the HDR design or dispositioned

NSLS II Tracking document

Latest Revision: 07-Sep-07

Item	Date Rec.	Reference	150	Author	Action	Action by	Date Required	BNL Comments	HDR Comments	Follow up Comments, Disposition, Resolution	Status	Date
1	10-Oct-06	Comment	The ASA committee is concerned of the booster hanging from the ceiling above the storage ring. Their concern is installation and servicing of the beamline front end when everything is in place. The Booster will also be it's own zone.	ASA	HDR			Booster has been relocated to the inside of the ring		HDR have incorporated booster on their documents	Closed	11/1/2006
2	10-Oct-06	Comment	The ASA committee has a strong preference for a crane and removable roof with the booster supported on the inner wall of the storage ring tunnel.	ASA	BNL			A crane and removable roof has been eliminated due to cost and constructability issues.		HDR have been instructed not to include a crane in their design documents	Closed	11/1/2006
3	10-Oct-06	Comment	The ASA committee recommends implementing a staged beneficial occupancy of the building infrastructure in order to squeeze installation time.	ASA	BNL / HDR	Jamison / Fallier		A staged beneficial occupancy will be initiated. HDR to follow up with construction documentation			Open	

Information tracking continued

- Parameter Matrix
  - preliminary document
  - to capture and track specific design parameters for conventional facilities
  - presently being used to identify conflicts and or missing parameters

Parameter matrix

	Project Total	Ring Tunnel	First Floor Service Building	Second Floor Service Building	Linac/Klystrom	Booster	Booster Service Building
Architectural/Structural							
Gross square feet	248,600	40,284	53,640 for all five	N/A	6,520	7,938	9,306
Design Live Load		250 psf	150 psf	150 psf	250 psf	250 psf	125 psf
Floor elevation		71'-4" (+1'-4")	71'-4" (+1'-4")	83'-7" (+13'-7")	71'-4" (+1'-4")	71'-4" (+1'-4")	71'-4" (+1'-4")
Dimension		Varies 12'-6" wide x 9'-0" high	81'-8" x 69'-4"	81'-8" x 69'-4"	157'-0" x 48'-9" ±	Radius 73'-4 1/4"	111'-1" x 40'-8" ±
radius to inside face of concrete wall		HDR 408'-10" NSLSII 405'-6"	N/A	N/A	N/A	N/A	N/A

- Requirements Specification & Interfaces document
  - to capture and track interfaces

Information tracking continued

- Record of Discussion
  - Documents discussions related to design
    - Minutes of meetings & tele conferences
    - Captured and tracked on the tracking spread sheet

ROD Number 17

Brookhaven National Laboratory
Upton, New York

NSLS-II Title I Design

Client Project: 05-CH-108-0
HDR Project: 030-55381-002

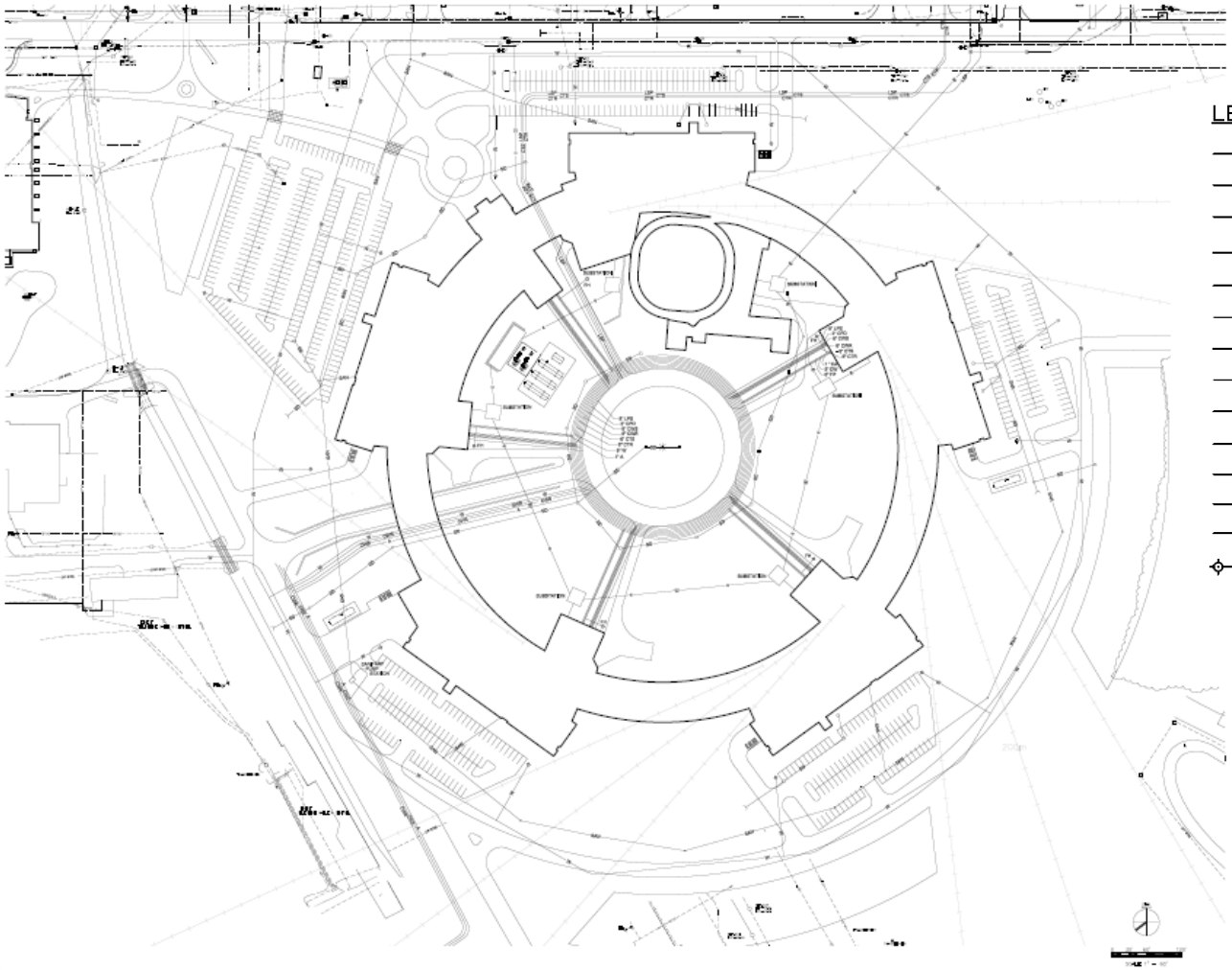
Recorded By: Jamison, M
Location: BNL B/817
Date / Time: 5/17/2007 1:00 PM
Type: Meeting
Purpose: Lattice Definition

Participants:				
Dyling, O	BNL	Fallier, M	BNL
Johnson, E	BNL	Ozaki, S	BNL
Guarino, T	HDR	Jamison, M	HDR
Kasman, T	HDR	Soueid, A	HDR
Tran, N	HDR	Walker, A	HDR

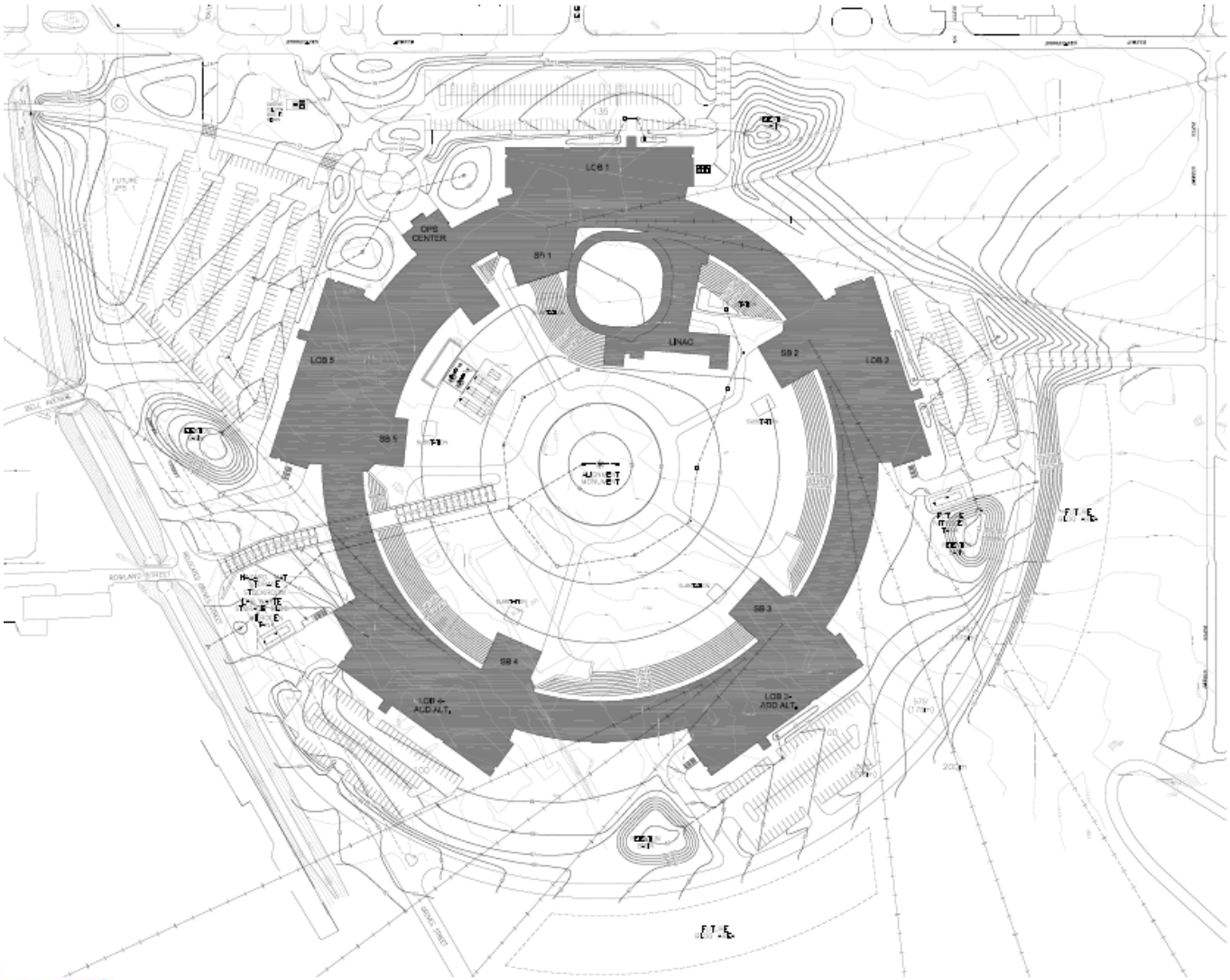
Item	Disc	Type	Date Due	Owner	Item Description	SOW	SCH	COST
17 . 1	L	DIS		Johnson, E	Discussion of lattice: RF sections will be in cells 22 & 24 (superperiods 11 & 12) Super-long Straights will be in cells 7,17,27 (SP 4,9,14) if they are used. Injection will be at cell 30 (SP 15) Erik reviewed the logic behind the lattice layout for the education of the design team.			

Existing Site

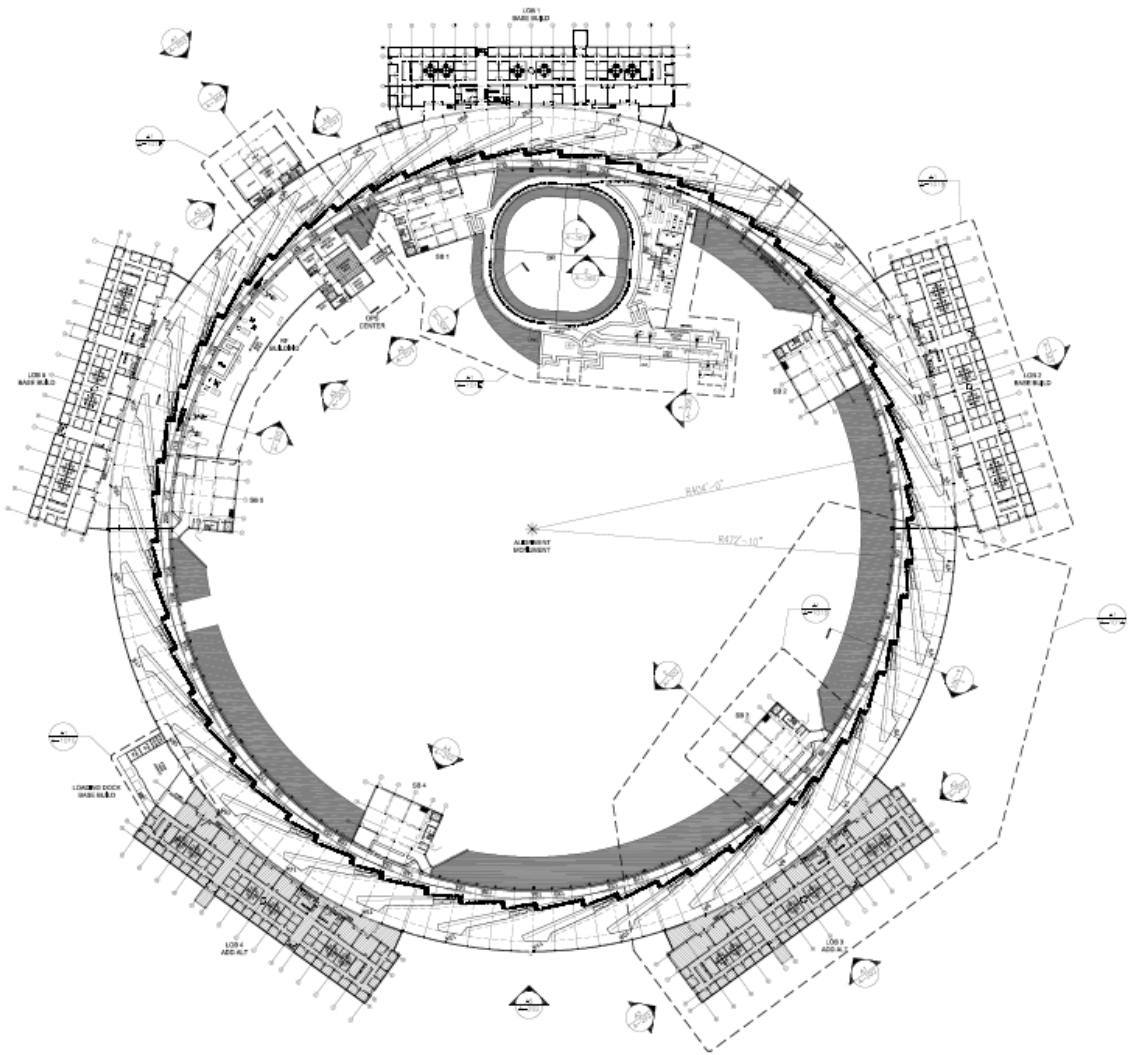
Site Utilities Plan



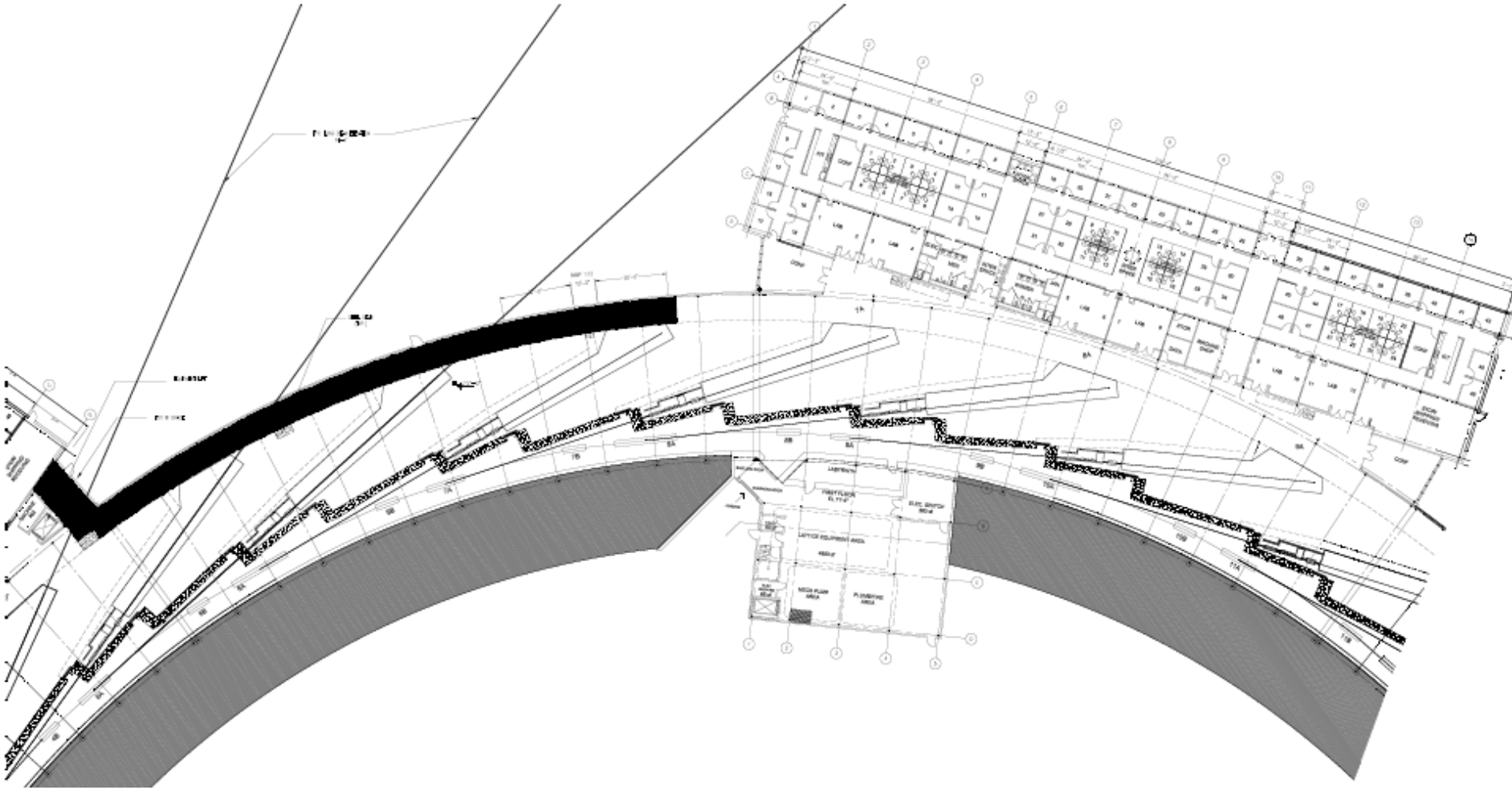
Grading Plan



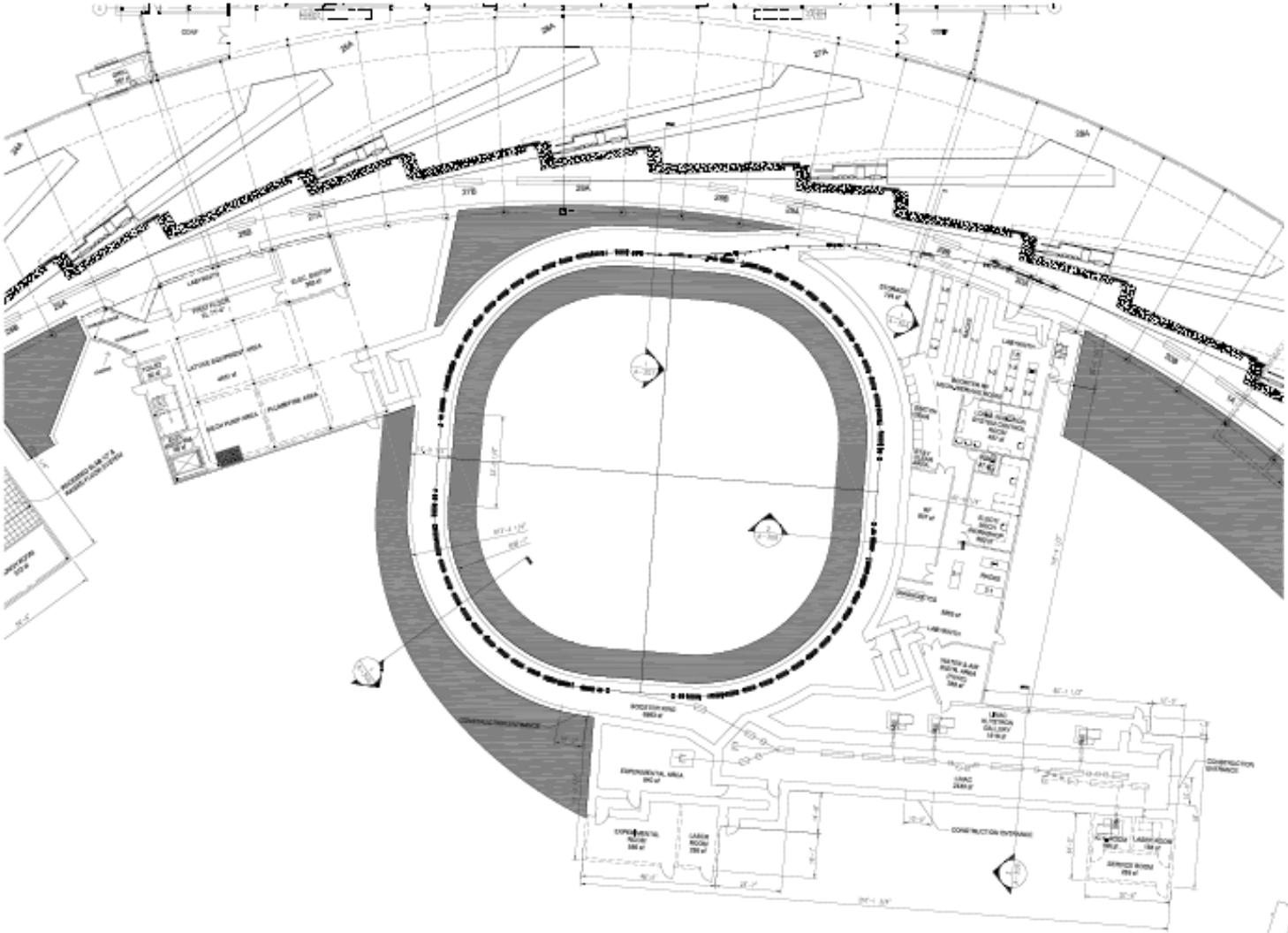
Overall First Floor Plan



Service Building and Long Beam Line

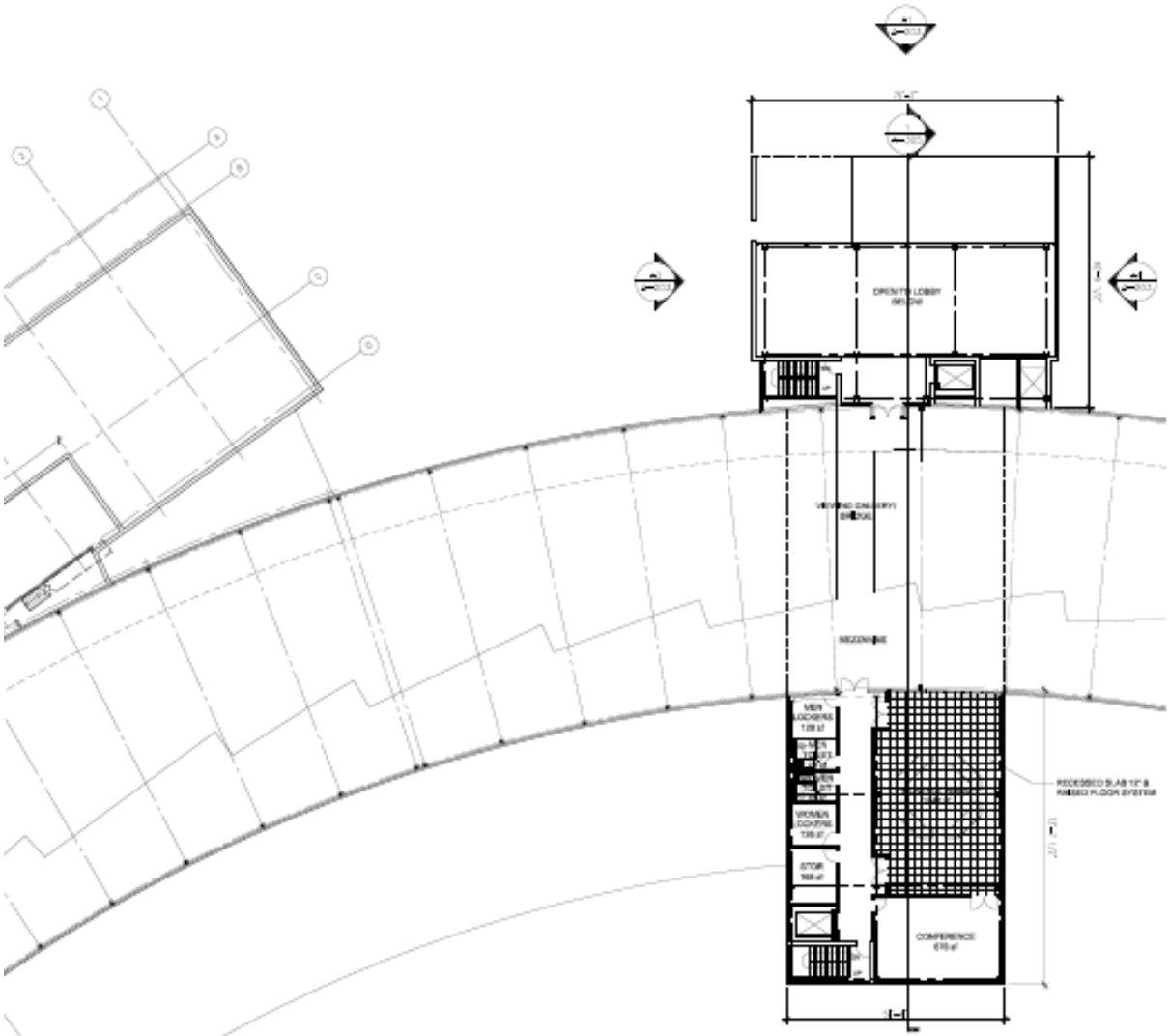


Booster Ring

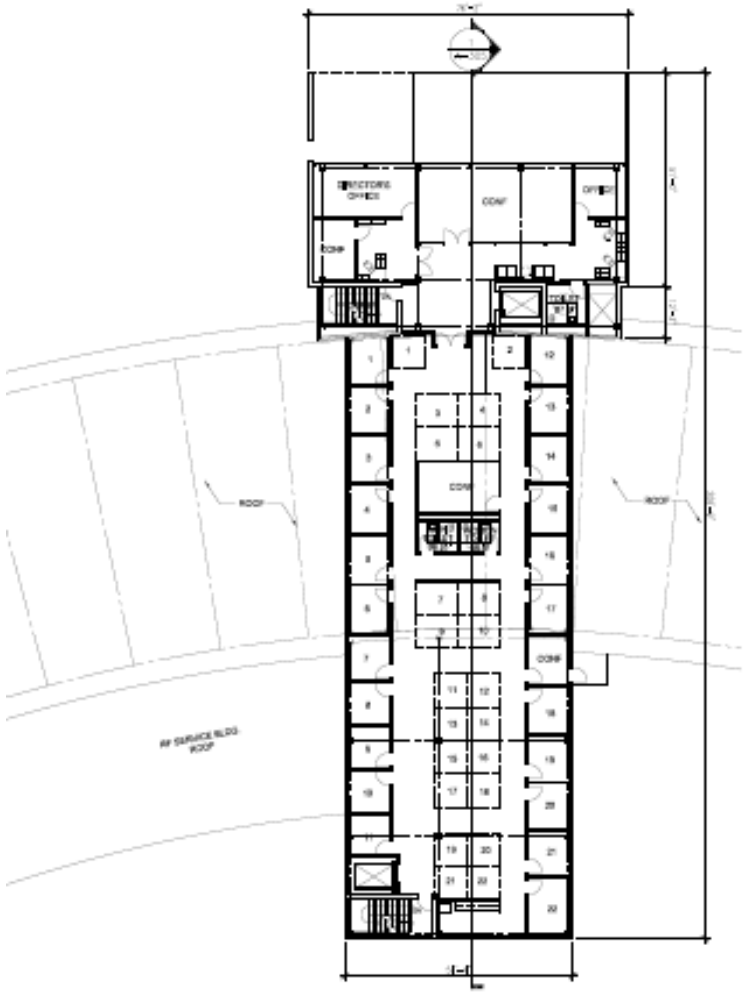


Ops. Center & RF Building

Operation Center Second Floor



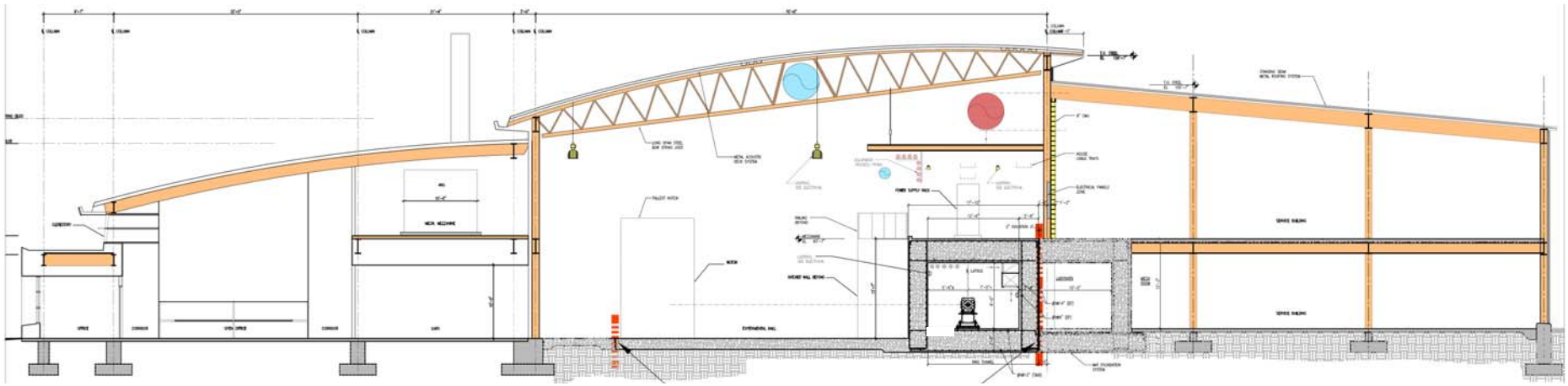
Operation Center Third Floor (Alt.)



Main Loading Dock

A1 MAIN LOADING DOCK - FIRST FLOOR PLAN

Building Section LOB/Ring Bldg/Service Bldg.



Typical Section Ring Building