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SECTOR INTERFACES DOCUMENT

FOR THE

HIGH-ENERGY ENGINEERING X-RAY (HEX) BEAMLINE

AT SECTOR 27-ID AT NSLS-II

MARCH 18, 2019

NSLSII-27ID-PLN-002

REVISION 2

SECTOR ASSIGNMENT DOCUMENT

FOR THE

HEX BEAMLINE AT SECTOR 27-ID AT NSLS-II

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3/20/2019

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(Approval on behalf of Light Source Safety and Operations Council [LSSOC])

By approving this plan I acknowledge the requirements set forth herein and agree with its implementation.

REVISION HISTORY

REVISION	DESCRIPTION	LIST OF REVIEWERS	DATE
1	First Issue.	See page ii	Oct 2017
2	Second Issue; addition of floor plan drawings. Minor changes to remove duplicated utilities specifications (these are specified elsewhere).	See page ii	Mar 2019

ACRONYMS

ADXD	Angle Dispersive X-ray Diffraction
EDXD	Energy Dispersive X-ray Diffraction
ESR	Experiment Safety Review
FOE	First Optics Enclosure
HEX	High-energy Engineering X-rayID Insertion Device
LN2	Liquid Nitrogen
NEC	National Electrical Code
NSLS-II	National Synchrotron Light Source II
PDF	Pair Distribution Function
PPS	Personnel Protection System
SAF	Safety Approval Form
SBMS	Standards Based Management Scheme
SCW	Superconducting Wiggler

If you have any questions or feedback regarding this document, please click this link.

1 SUMMARY

This document summarizes and formalizes the assignment of space for the HEX beamline in NSLS-II Sector 27-ID. Only activities and infrastructure described and approved below are permitted. When approved, this provides authorization for the beamline to use resources, and to occupy and use space, as indicated. No installation of enclosures, furniture, control or computing areas, or sample preparation spaces are permitted unless described below and approved. The use of spaces proposed here shall comply with all NSLS-II, SBMS and other BNL requirements.

General Information	
Sector Information	27-ID
Name of Beamline	High energy Engineering X-ray (HEX)
Floor space amendment at 27-ID defined in Appendix B of this document.	Minor changes requested to standard sector walkway layout on experimental floor. Standard egress routes are not impeded. Some floor space at 26-BM may be assigned to 27-ID Users. This will require separate approval when hutches D or E are fitted out. See Figure 2.
Floor area usage other than for office type equipment (seating/desk area)	None. Satellite building may house the following; • Beamline operator consoles. • Sample preparation benches. • Mechanical technician workbench. • Gas bottle storage and cabinets. • Space may be used for experimental equipment storage. See Figure 3, for floor diagram
Number of Hutches	6
27-ID-A: FOE	In mature phase, will contain hard x-ray optics including Laue monochromators, vertical focusing mirror, as well as filters, diagnostics and safety components. White beam and primary bremsstrahlung will not be stopped in the FOE. Initial project scope assumes full design, but only partial fit-out of this hutch.
27-ID-B: End Station	Future expansion to be used for ADXD (PDF) studies. Designed to be operated independently using branch-line shutter and side diffracting Laue monochromator from the SCW inboard beamlet (crosses over the other two branches). PPS and utilities will not be implemented in the initial scope. Approved experiment instruments: Experiment instrumentation undefined; ESR not approved.
27-ID-C: Optics Station	Secondary optics station on the HEX white beam lines. Primary components include masks and collimators.
27-ID-D: End Station	Future experimental hutch designed for EDXD experiments (white beam from the outboard beamlet of the SCW). PPS and utilities will not be implemented in the initial scope. Central branch shielded transport pipe passes through this hutch. Approved experiment instruments: Experiment instrumentation undefined; ESR not approved.

27-ID-E: End Station	Future experimental hutch designed for ADXD and EDXD experiments (white and monochromatic beam). This will most likely be a workhorse station fitted with a robot. PPS and utilities to be included in the initial scope. The downstream end of the hutch will be fitted with a shutter to prevent beam propagation to the satellite building stations. Approved experiment instruments: Experiment instrumentation undefined; ESR not approved.
27-ID-F: End Station (in satellite building)	A large and flexible experimental hutch designed to support the requirements of ADXD, EDXD and Imaging experiments (white and monochromatic beam). This station will cater for a wide range of possible experimental setups, some with long set-up times or requiring large equipment with complex exhaust or utility requirements. Fitted with utilities and PPS within the initial scope. Once the E-station is fitted out, either endstation E or F may be operated at any one time. Approved experiment instrumentation: Defined and will be approved within the Instrument Readiness Review.
Source and Front End Information	
Source Device	Superconducting Wiggler (SCW70)
Front End	As defined in: NSLSII-27ID-RSI-001.
Egress Information	
Egress from Hutch Roof	Hutches B/C/D/E egress via bridge to FOE. FOE egress onto SR tunnel roof. Hutch F will not have roof access (except under permit).
Floor Egress	Standard: 4’ wide duck-under route unrestricted and unchanged from standard layout (between A and B hutches) and between the E-hutch and the bypass corridor and within the satellite building upstream of the F-hutch.
Facility walkway	The impacts on the facility walkway will be minimal, very similar to HXN, with a double door, roller door and window adjacent to the walkway, a local raising of the corridor roof, and the beam transport pipe over the walkway at the bottom of the ramp to the bypass corridor. See figures 1,2,3.
Special radiation Shielding Requirements	High energies in all hutches require special attention, an experienced hutch vendor will be contracted. Satellite building hutches are constructed from concrete (thickness 1m on downstream wall, 0.7m for side and upstream walls, 0.6m roof). Additional shielding needed at the downstream wall for beam stops.
Utilities	
Electrical Power	Electrical power distribution includes 120V and 208V (single phase) and 208V (three phase) with 100A service for experimental floor, and 100A service for satellite building. All distribution meets NEC and BNL SBMS requirements.

DI water	De-ionized (process) water distribution not to exceed 15 gpm (57 l/min) (standard maximum) at usual specified temperature and pressure).
Chilled water	Chilled water at 12C (53F) at usual standard pressure, not to exceed 24 l/min (6 gpm) distributed to all equipment racks and some (future) items of end station equipment such as furnaces, compressors, etc.
Compressed air	Facility compressed gas (compressed air) is provided at usual specified pressure and flow rate. Compressed air for the satellite building shall be taken from the high capacity header adjacent to the outer columns.
Compressed Nitrogen gas	Compressed nitrogen gas at usual pressure and flow rate.
LN2	Liquid nitrogen distribution from the local interface point on the SR tunnel roof with valved tap-off point for possible future use with pumped liquid nitrogen cooled heat exchangers (cryocoolers) and experimental hutches B/D/E/F. Peak flow rate of not to exceed 150 l/hour (40 gals/hr) with a supply pressure of 0.2 –0.3 MPa (30–45 psi). All stations containing LN2 pipework will be fitted with approved oxygen depletion sensors and alarms.
Special gases	Special gases (toxic / flammable) may be required (mature scope), in very small quantities and will be subject to safety review before installation.
Gas extraction system	Gas extraction from hutches B/C/D/E will occur through the phoenix valve above column 12 (exhausting via Service Building 1). The gas extraction from hutch F (satellite building) will ideally occur through the same phoenix valve, since this effectively uses the additional extraction capacity of the Service Building 1 system, rather than the Service building 2 system which is loaded by PDF/XPD beamline; this requires a longer length (~40m) of extraction pipe).
Smoke detectors	To be fitted as required (hutches and racks).
Vibration / thermal / noise impacts on adjacent beamlines	None. No compressors, rotary pumps (except temporary use of roughing carts and leak detectors). Impact due to cryocooler (pump has speed control) is assumed to be negligible. Cryogenic sample environments do not use compressors (piped LN2, or LHe from dewars). Any additional equipment such as a large volume press, will require hydraulics, vibration study to be performed and approved prior to construction.
Experiment instruments & safety envelope	Safety envelope for 27-ID includes components installed in the FOE and 27-ID-F, as well as the connecting sections of white beam transport pipe and other components, will be subject to Instrument Readiness Review. Experimental activities controlled through hazard assessment and authorized through Experiment Safety Review (ESR) approval process together with Safety Approval Form (SAF). Additional instrumentation in any hutch will require further analysis and review.

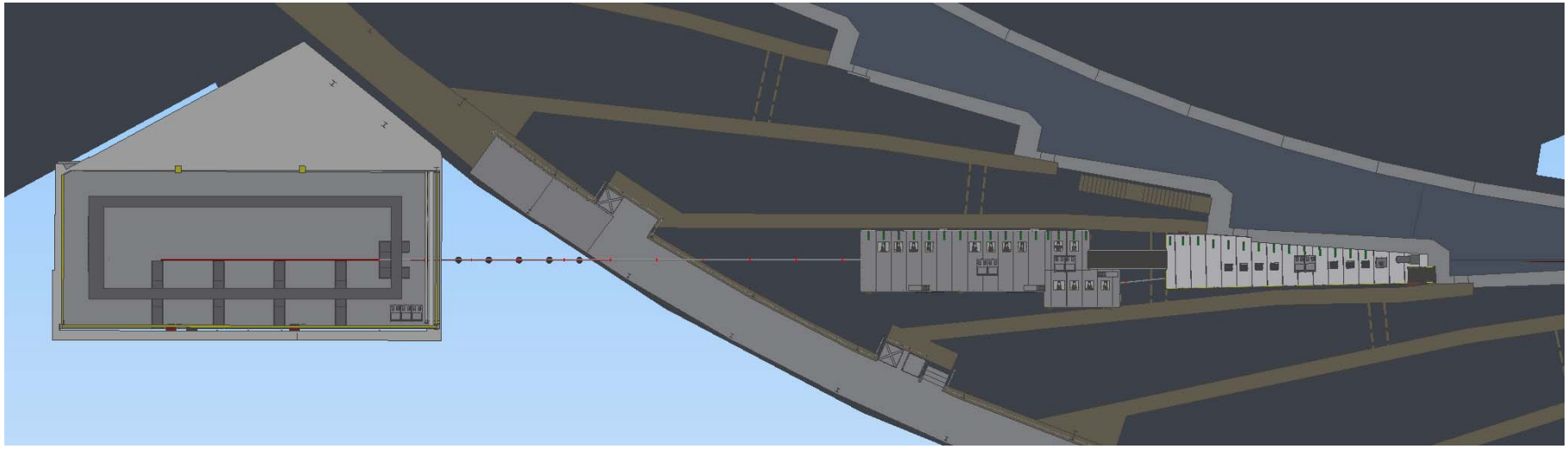

Figure 1: **HEX Beamline Layout**

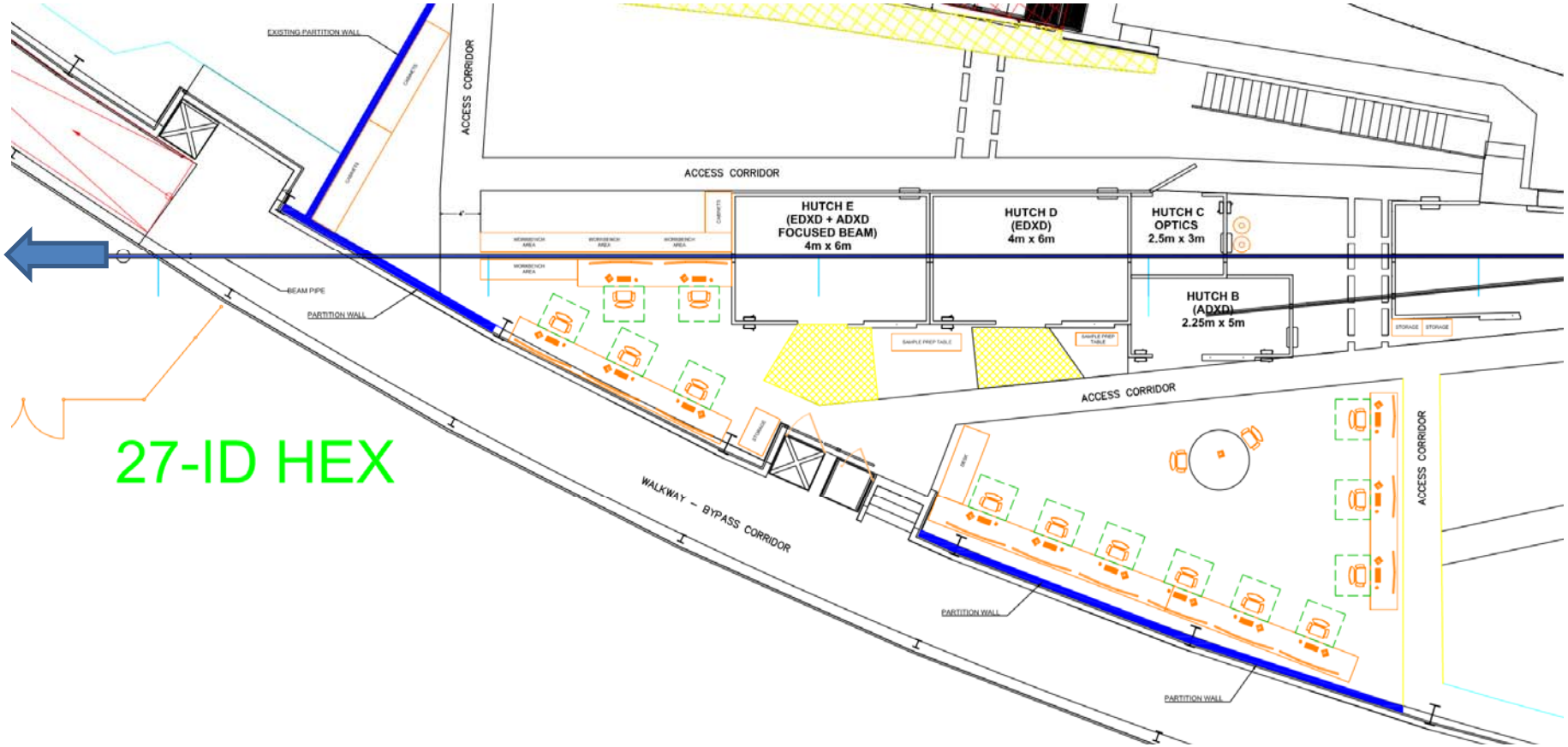

Figure 2: **HEX Beamline User Area Layout on the Experimental Floor**

The seating area for HEX needs to accommodate up to three separate User groups simultaneously, in the mature stage. This will be accomplished by taking a small part of the adjacent (26-BM) floor area. Access routes are unimpeded by these changes. The user space layout is provided for planning purposes only, and the fit-out will not occur until hutches D, or E are fitted out, and SPMC & LSSOC approval is obtained.

Figure 3: **Layout of the User Area for the Satellite Building**