

# HEX Beamline Satellite Building

## Final Design Review Presentation

Brian M. McCaffrey  
Chief Engineer & Manager of Facilities Engineering Group  
Modernization Project Office  
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# Scope

- Design and construction of a 3,850 square foot building external to the NSLS-II storage ring building which will house the HEX beamline end station and ancillary equipment.
- Design to be similar to HXN satellite building & concrete hutch, with variations in:
  - Dimensions of the concrete hutch (increased)
  - Number hutch labyrinths (decreased)
  - Temperature control requirements (decreased)
  - Vibration requirements (decreased)
  - Air distribution system (simplified)
- Design incorporated lessons-learned from HXN and SIX Satellite Buildings
- Construction will be coordinated with HEX beamline and beamline infrastructure

# Final Design

## Structural / Architectural

- 0.7-meter thick upstream and side concrete walls for the hutch
- 1.0-meter thick downstream concrete wall for the hutch
- 0.6-meter thick concrete roof for the hutch
- Internal dimensions: 18.8 m x 5.3 m (61'-9" x 17'-6")
- 11 wall labyrinths
- 6 floor trenches
- Satellite building structure – similar to HXN building

# Final Design

## Mechanical

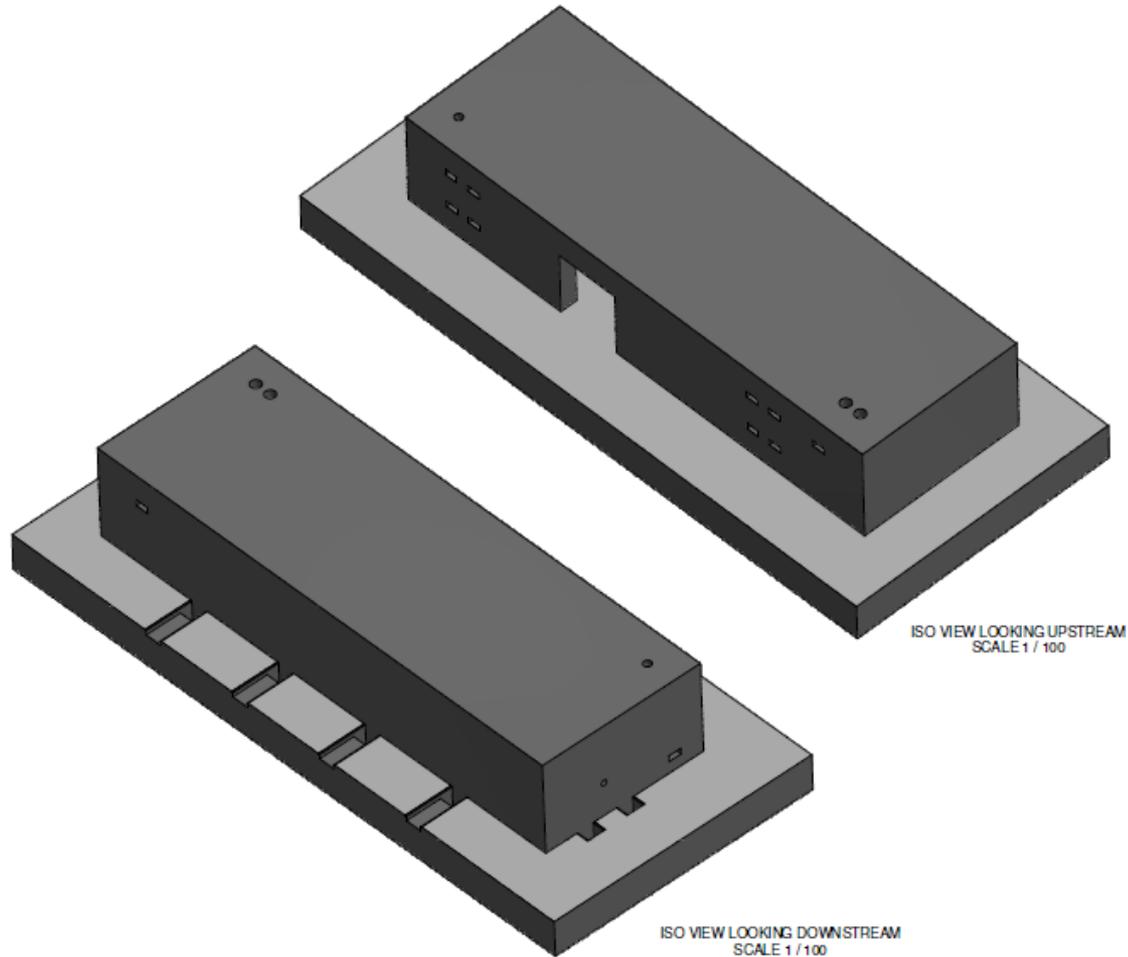
- Temperature stability
  - +/- 0.5 °C over 2-hour period within the hutch
  - +/- 1.0 °C over 24-hour period within the satellite building
- Heat loads
  - 6 people outside of hutch – 70 W (sensible) and 30 W (latent) per person
  - Electrical equipment inside of hutch – 5 kW
  - Electrical equipment outside of hutch – computer equipment, lighting
    - Server racks to be water-cooled
- Air distribution
  - Two fabric air ducts within the hutch – more uniform distribution
  - Ductwork / diffuser grilles within the satellite building
  - Dedicated air handler for the satellite building / hutch
- Exhaust system
  - 800 cfm – provision for gases

# Final Design

## Electrical

- Three (3) 225 A, 208 / 120 V, 3 Ph, 60 Hz power panels
  - Lighting
  - Power
  - Controls
- Luminaires
- Power receptacles
- Access Controls / Card Readers
- Grounding and bonding
- Lightning protection
  
- The electrical services from the power panels to the scientific equipment will be installed by BNL electricians and is included in the electrical utilities WBS

# Final Design – Hutch - Isometric View



# Final Design - Rendering



# Cost

Activity	As of Preliminary Design Review 26-Apr-2018*	As of Final Design Review 1-Apr-2019*	Variance
Design	360,136	332,774	27,362
Construction Contract	4,190,364**	4,227,560	(37,196)
Construction Contingency	208,837	148,182	60,655
Oversight / Commissioning	790,192	788,421	1,771
Oversight / Commissioning Contingency	59,783	59,599	184
TOTAL	5,609,312	5,556,536	52,776

\* All costs are burdened

\*\* Estimated at 60% design

# Schedule Milestones

Activity	Baseline	Estimate / Actual
Design Start	01-Nov-17	01-Nov-17 (A)
Final Design Complete	4-Sep-18	31-Aug-18 (A)
Construction Contract Award	10-Dec-18	12-Dec-18 (A)
Construction Start	5-Apr-19	1-Apr-19 (A)
Construction Finish	15-Jul-20	05-Feb-20 (E)
Construction Punchlist & Close-out Finish	16-Nov-20	11-Mar-20 (E)

# Summary

- Project milestones have been on-time or early
- Projecting substantial completion of construction 5 months early
- Project costs are currently under-budget
- Although we have favorable cost performance to-date, the contingency on the project was reduced and is less than reasonable to manage construction risks
- Cost reductions could be further realized if: 1) change orders are within contingency and 2) with less oversight labor due to early construction completion