

Bunker Project

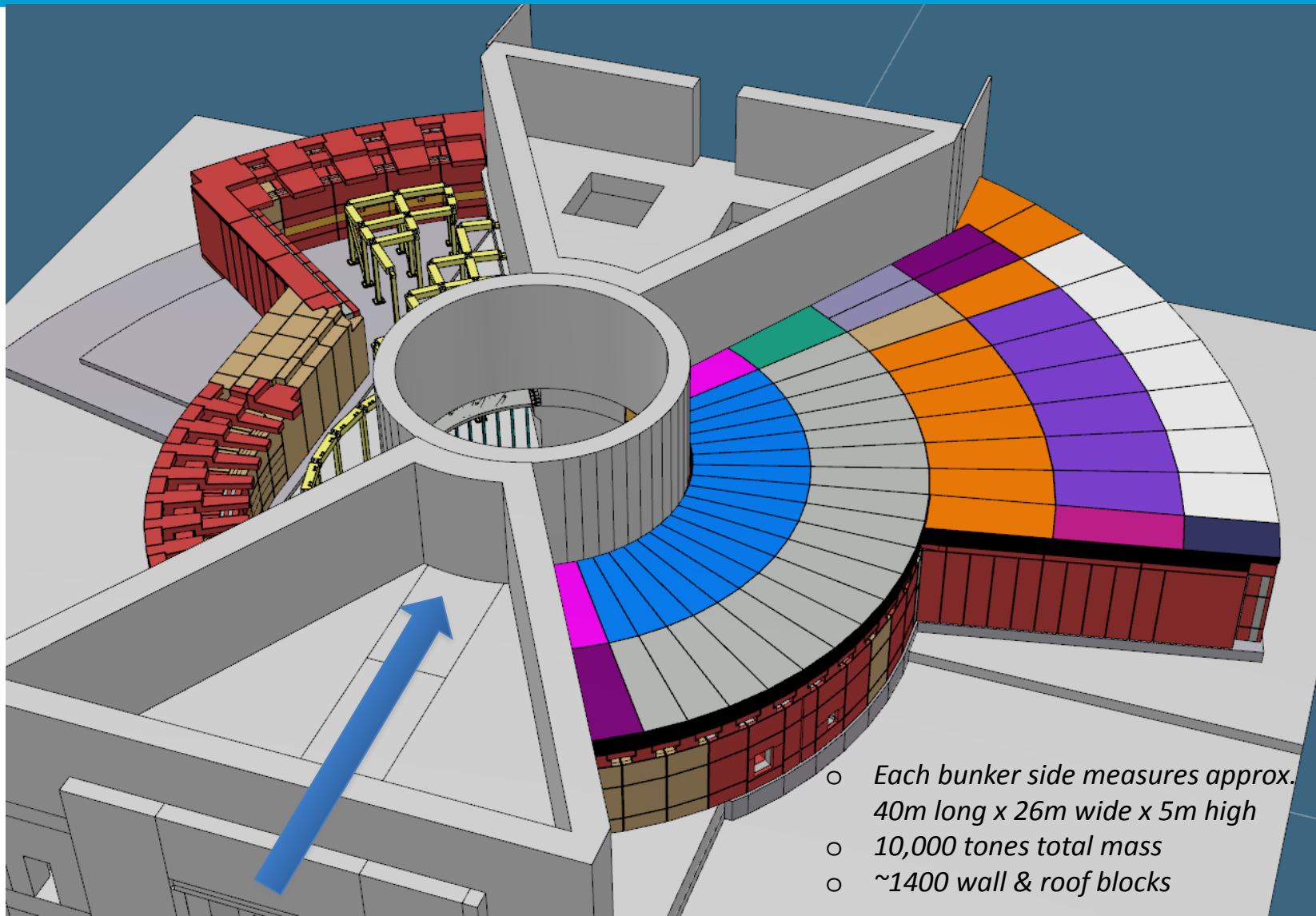
Managing Interfaces

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www.europeanspallationsource.se

13 June 2017

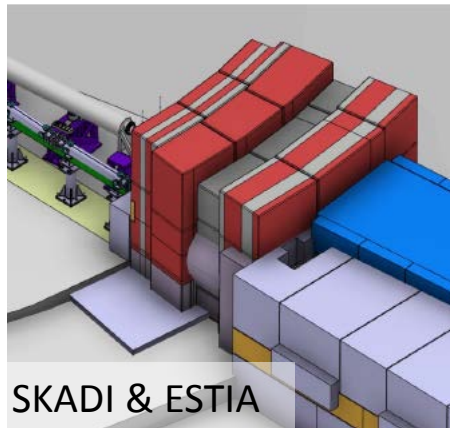
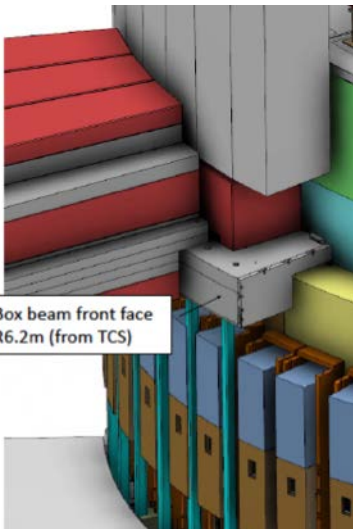
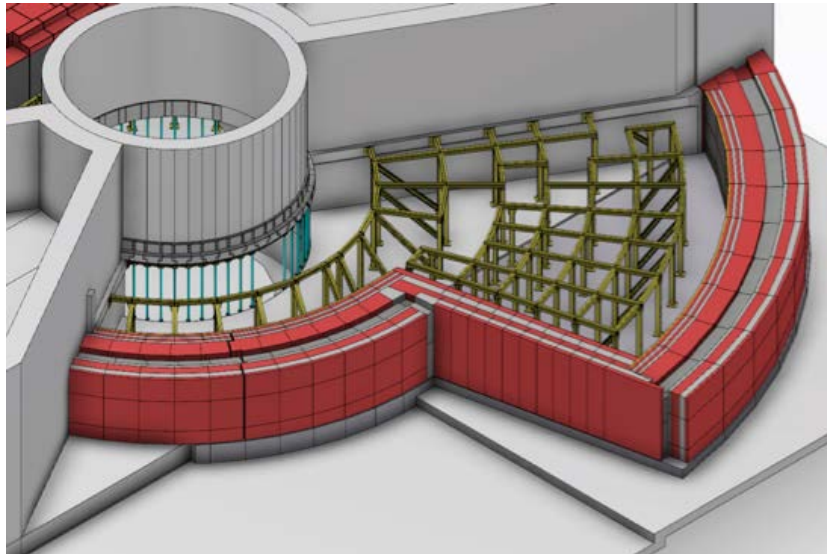
Bunker overview



- Each bunker side measures approx. 40m long x 26m wide x 5m high
- 10,000 tones total mass
- ~1400 wall & roof blocks

The neutron guide Bunker:

Key milestones

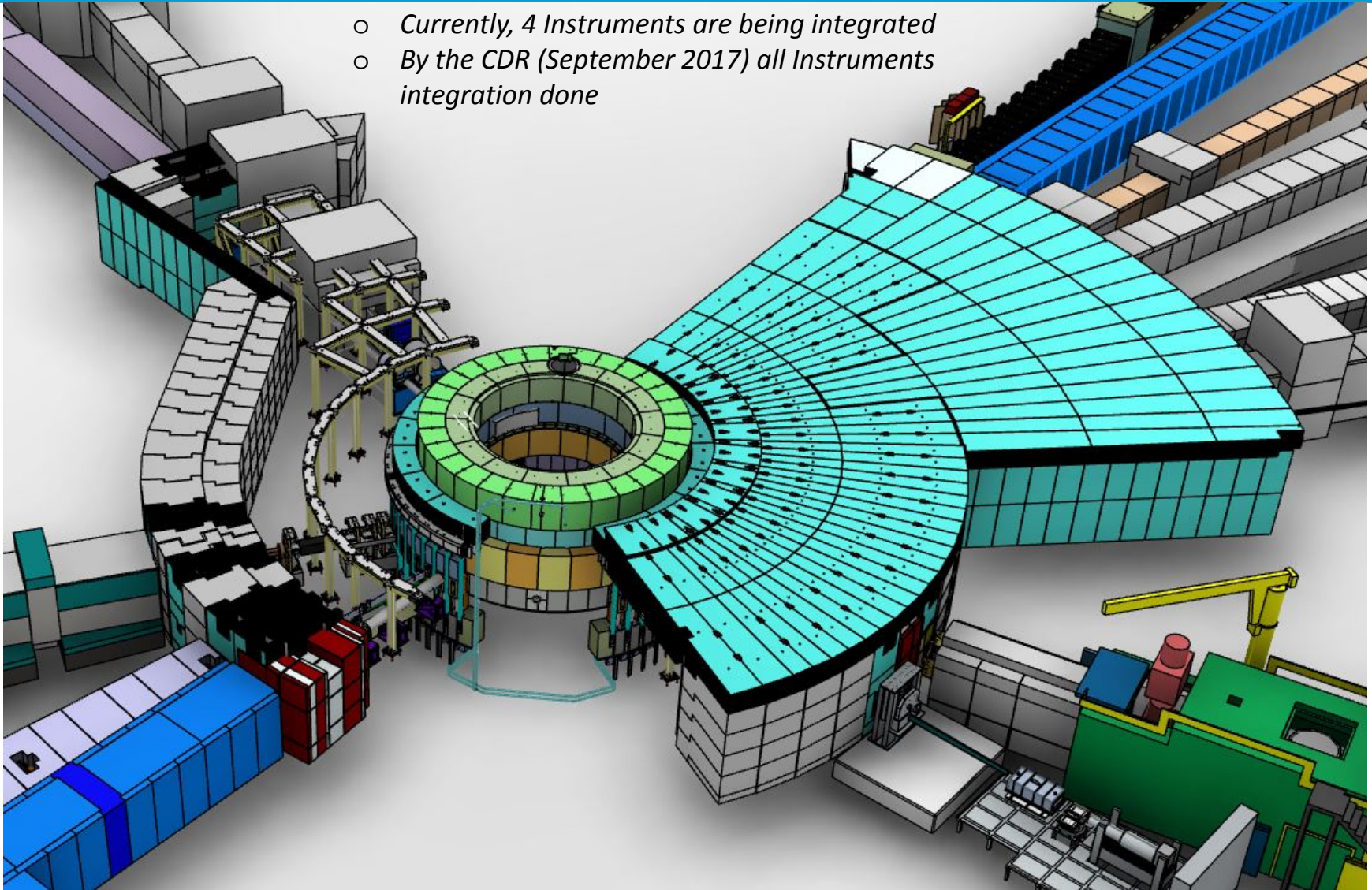


- Project start (Manager: Sara G-N) - June 2015
- Initial costing (14.6 M€) - Aug 2015
- Neutronics calculations 1st report - April 2016
- Full time manager (Zvonko Lazic) - June 2016
- Revised costing (18.0 M€) - Sep 2016
- Bunker concept Design Review - 4-5 Oct 2016
- Preliminary Design Review - 15-16 Dec 2016
- Internal Design/Cost Review - 26-27 June 2017
- Critical Design Review - 13-15 Sept 2017
- Start Manufacturing (Contract) - Jan 2018
- First delivery to site (R6 frame) - Oct 2018
- Start Installation - Jan 2019
- Installation Complete (ready for BOT) - Oct 2020

- Bunker design & installation is self managed by NSS.
- Bunker manufacturing could be self managed or Turn-key (In-Kind involvement is still possible)

Bunker and Instruments - overview

- *Currently, 4 Instruments are being integrated*
- *By the CDR (September 2017) all Instruments integration done*



Integration & Communication

- The Bunker is designed 'in house' at ESS.
- All initial Instruments are designed at collaborating facilities as 'in kind' contributions.
 - *Ensuring that interfaces between the Bunker, the surrounding structure (CF) and instruments are kept up to date and clear, is the most important task. And most complicated.*
- Due to dispersion of system owners, we are centralizing the communication network to ensure right information is passed to the right person.
- [Confluence page](https://confluence.esss.lu.se/pages/viewpage.action?spaceKey=SPD&title=Bunker+feed-trough+for+neutron+guides) is set up to collate and share data relating to the Bunker-Instrument integration (<https://confluence.esss.lu.se/pages/viewpage.action?spaceKey=SPD&title=Bunker+feed-trough+for+neutron+guides>) .
- Instrument teams are asked to direct enquiries to appropriate contact (below).
 - *Instruments Integration - Gabor.Laszlo@esss.se*
 - *Bunker – Instrument integration - Sebastian.Lyrbo@esss.se*

Way of working

- The Bunker project use Catia V6
 - Instrument projects work in many different tools -> integration of models can be tricky
 - All models have to be referenced to TCS (Target Coordination System)
 - Every model from Instruments needs to be checked versus Catia V6 by NSS engineers
 - When design changes happen, they are communicated to Instrument teams directly, who are asked to update their models accordingly.
 - Sometimes the “translation” between tools doesn’t work well – additional work needed (between Bunker team and Instruments) to align. *Iterations & communication key!*
-
- *Instruments Integration* - Gabor.Laszlo@esss.se
 - *Bunker – Instrument integration* - Sebastian.Lyrbo@esss.se

- Instruments pass the top assembly to our Instrument Integration engineer, Gabor (preferred) or to the Bunker integration engineer, Sebastian.
- These are assembled with corresponding interfacing wall segment (the blue ESS number in the Confluence page table).
- These numbers also carry the drawing depicting each Instrument' penetration/interface with the wall.
- As designs mature, models and drawings are updated and the change is communicated.

Pages / Instrument Projects / Common Info Repository

Bunker feed-trough for neutron guides

Created by Gabor Laszlo, last modified by Artur Glavic on Jun 07, 2017 08:07

[Generic bunker feed-trough](#)

You can find additional comments and explanations regarding the feed-trough here:

[Issues, questions from partners](#)(DREAM and MAGIC had questions)

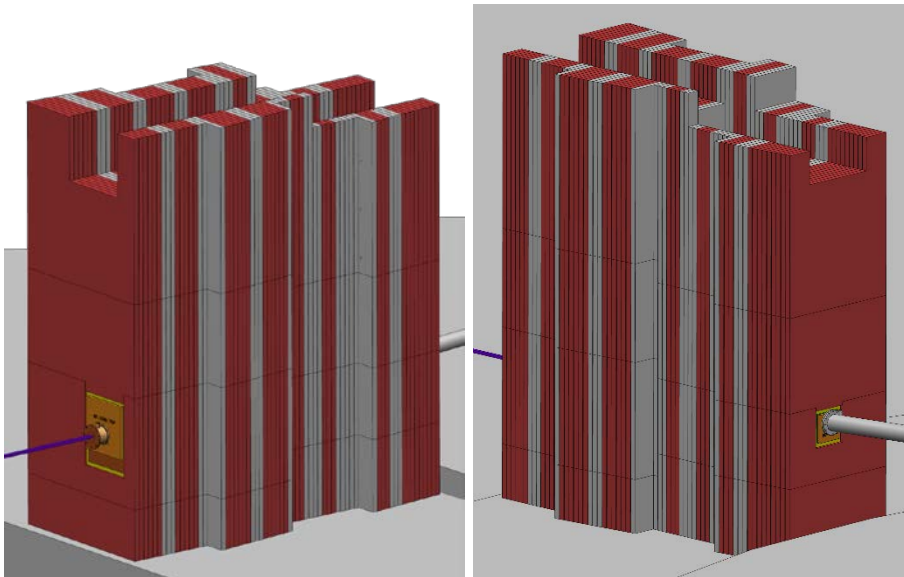
Feed-trough data received from IKC (Updated 2017-02-14, Daniel Lundgren)

Instrument, Section	3D/2D (yes or no)	Updated Bunker Assembly ESS-0047079 (yes or no)	Comments	Internal Support (yes/no)
DREAM, S3	yes/no	yes ESS-0092639	<p>The DREAM-insert axis system is not in correct position. It is 137mm above TCS. Bunker wall updated according to 3D which means that probably the penetration will have to be lowered by 137mm.</p> <p>170306: Wall section updated with adjusted DREAM axis system.</p>	
LOKI, N7	yes/yes	yes ESS-0092641	<p>Bunker Assembly updated according to ESS-0063919 <i>Loki guide concept</i>. This 3D does not correspond to the LOKI assembly ESS-0020385. ESS-0020385 to be removed from EPL.</p> <p>LOKI updated according to 2D</p> <p>170306: ESS-0020385 removed from LOKI assy. Drawing updated according to 3D. Lengths 700 was 650, 570 was 520.</p> <p>170418: 3D updated with new wall concept. ESS-0104613 replaces ESS-0092538. Drawing updated according to 3D.</p> <p>170523: New layout of the wall lamination based on Neutronics analysis. Steel plates are added for guide insert support. 3D and 2D updated.</p>	yes

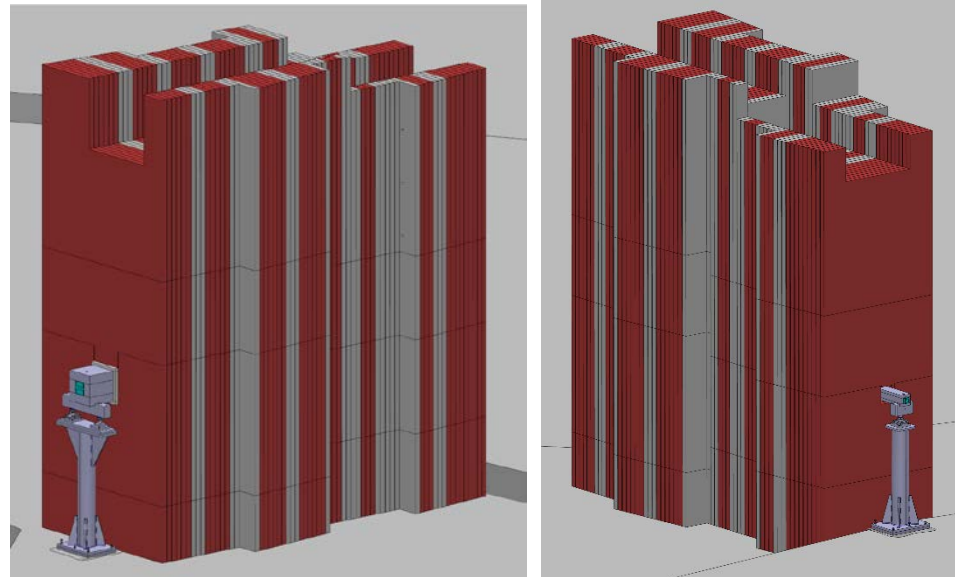
Details - R15 Wall (short wall)

RED = PolyB4C, Grey = shielding steel

N7 wall segment - **LOKI** Feedthrough
Internal support from wall



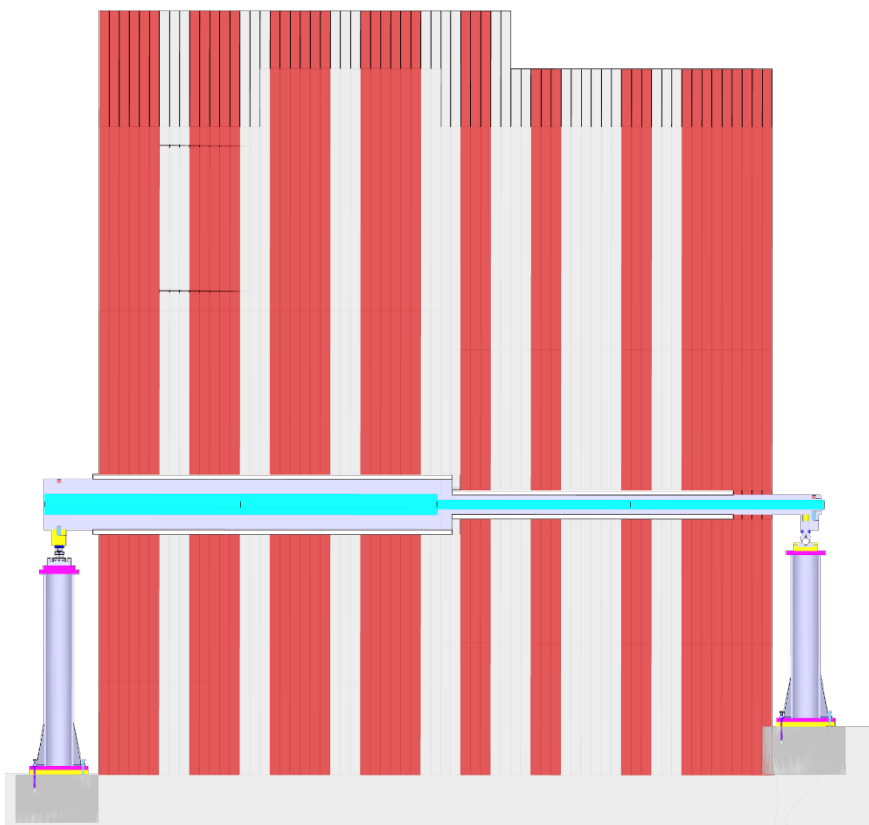
E3 wall segment - **SKADI** Feedthrough
External support from slab



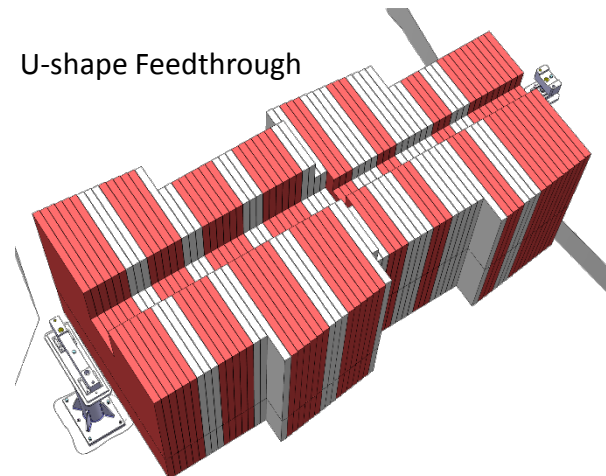
R15 Wall – E3 SKADI segment (extra-wall support)

E3 wall segment - SKADI Feedthrough

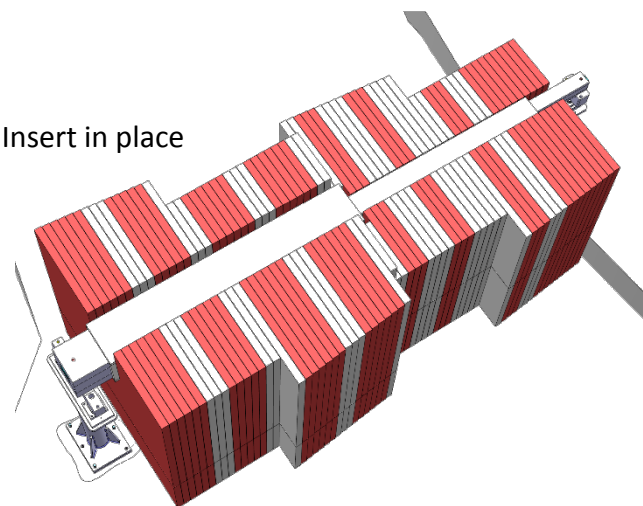
- has external support and adjusting features of the guide insert



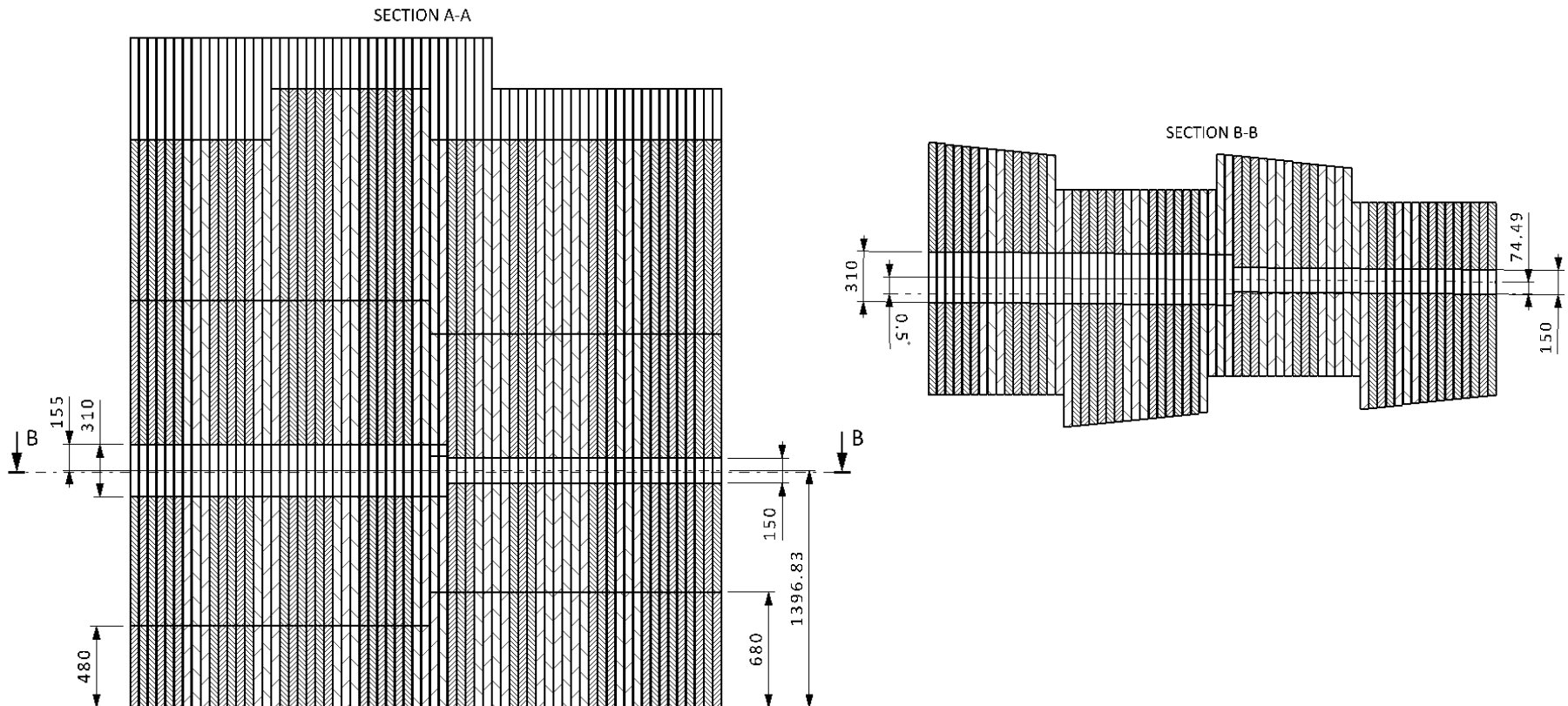
U-shape Feedthrough



Insert in place



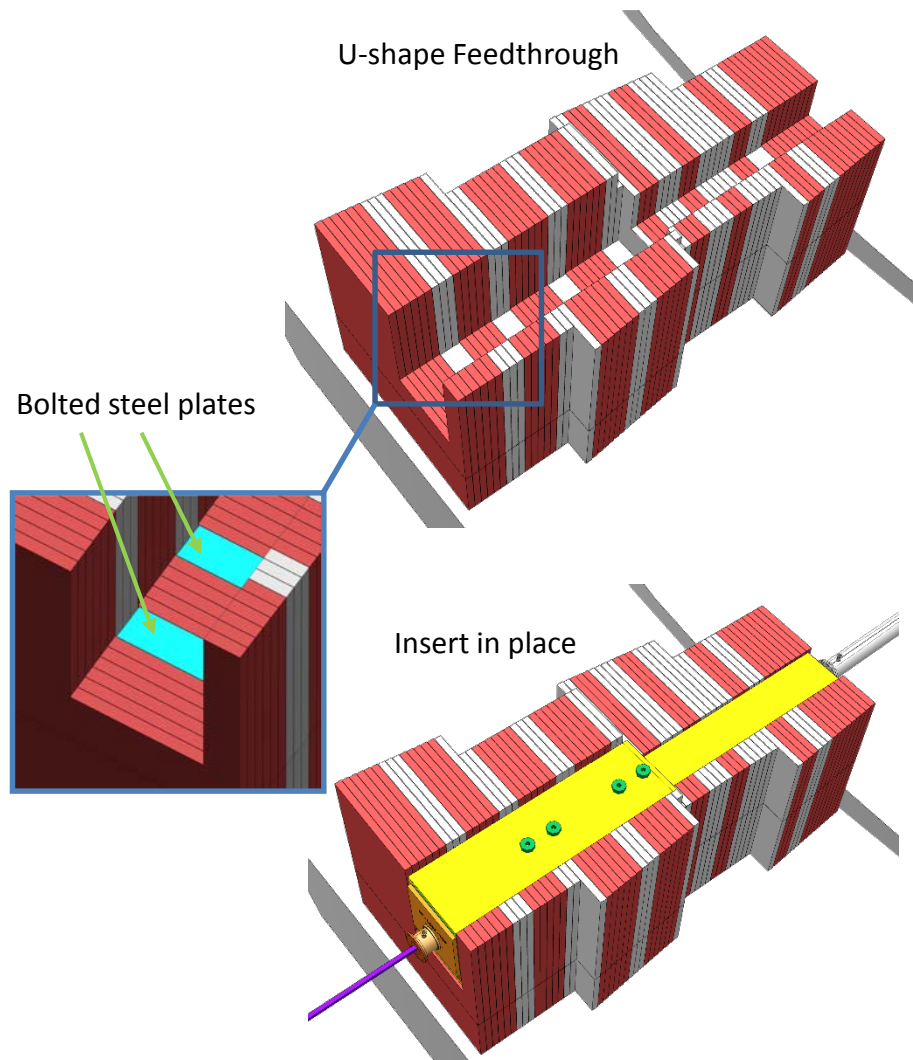
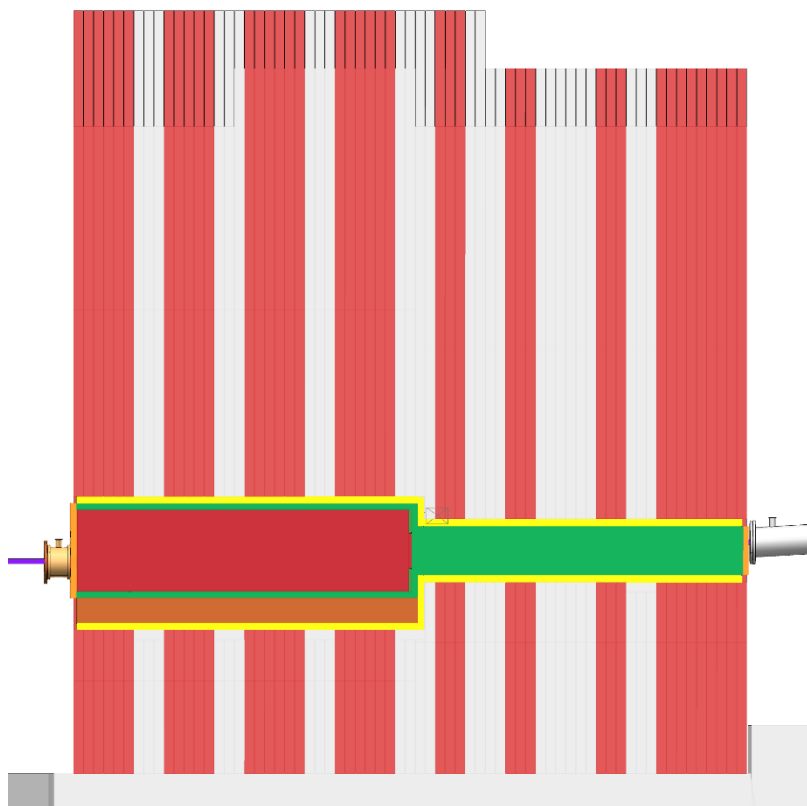
R15 Wall – E3 SKADI segment



R15 Wall – N7 LOKI segment (intra-wall support)

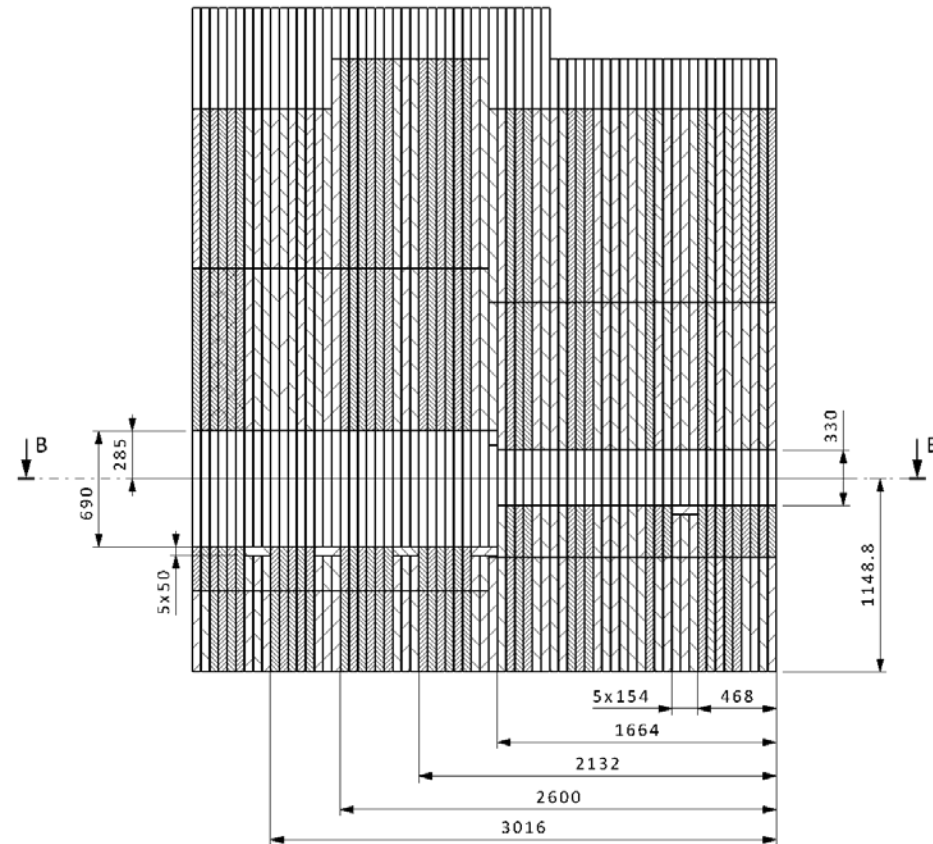
N7 wall segment - LOKI Feedthrough

- support and adjustments for guide insert within the wall
- bunker wall provides 50mm steel plates bolted into the steel laminate structure

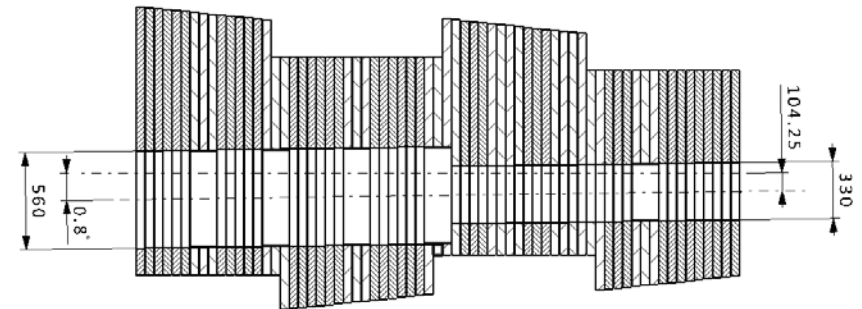


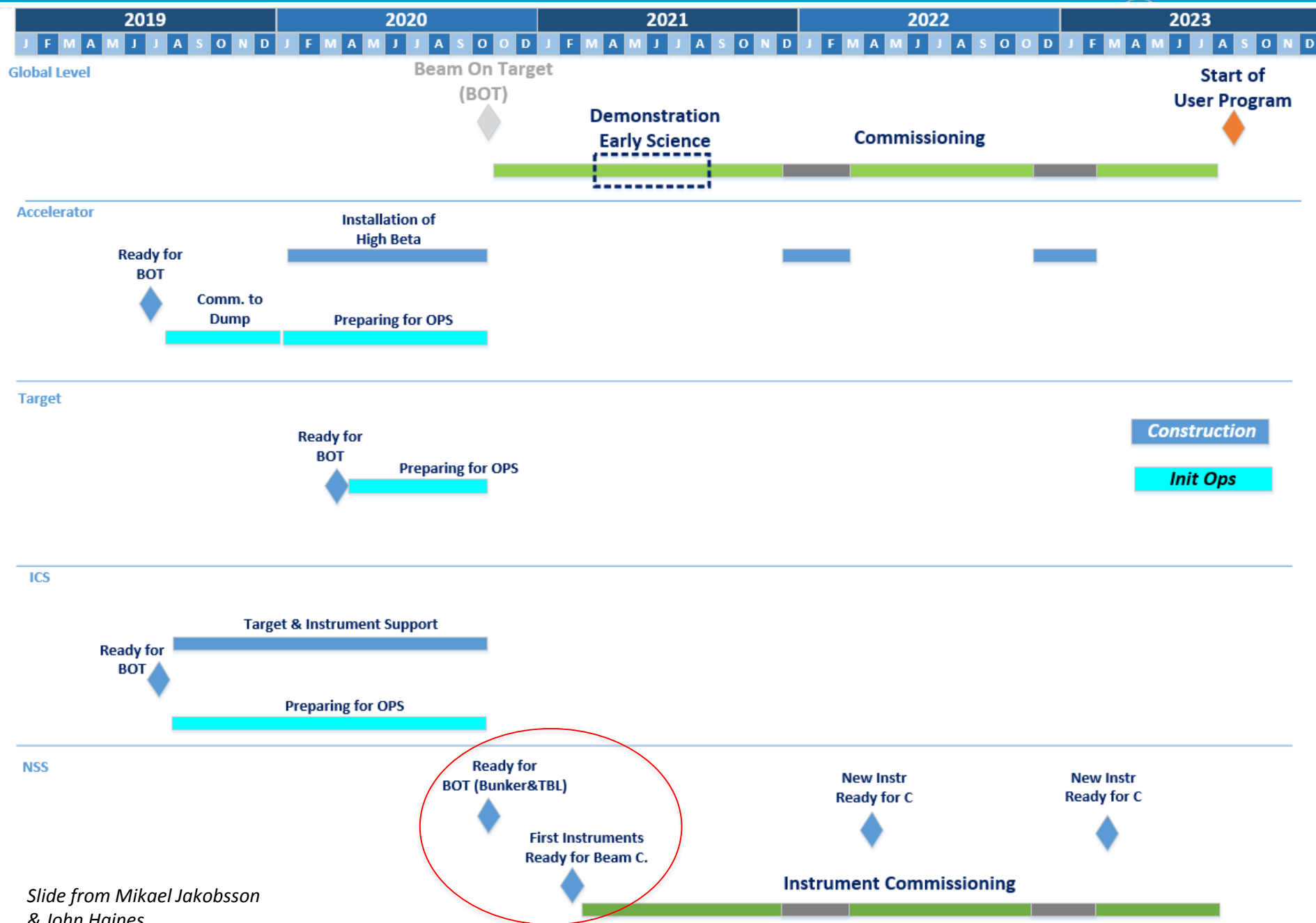
R15 Wall – N7 LOKI segment

SECTION A-A



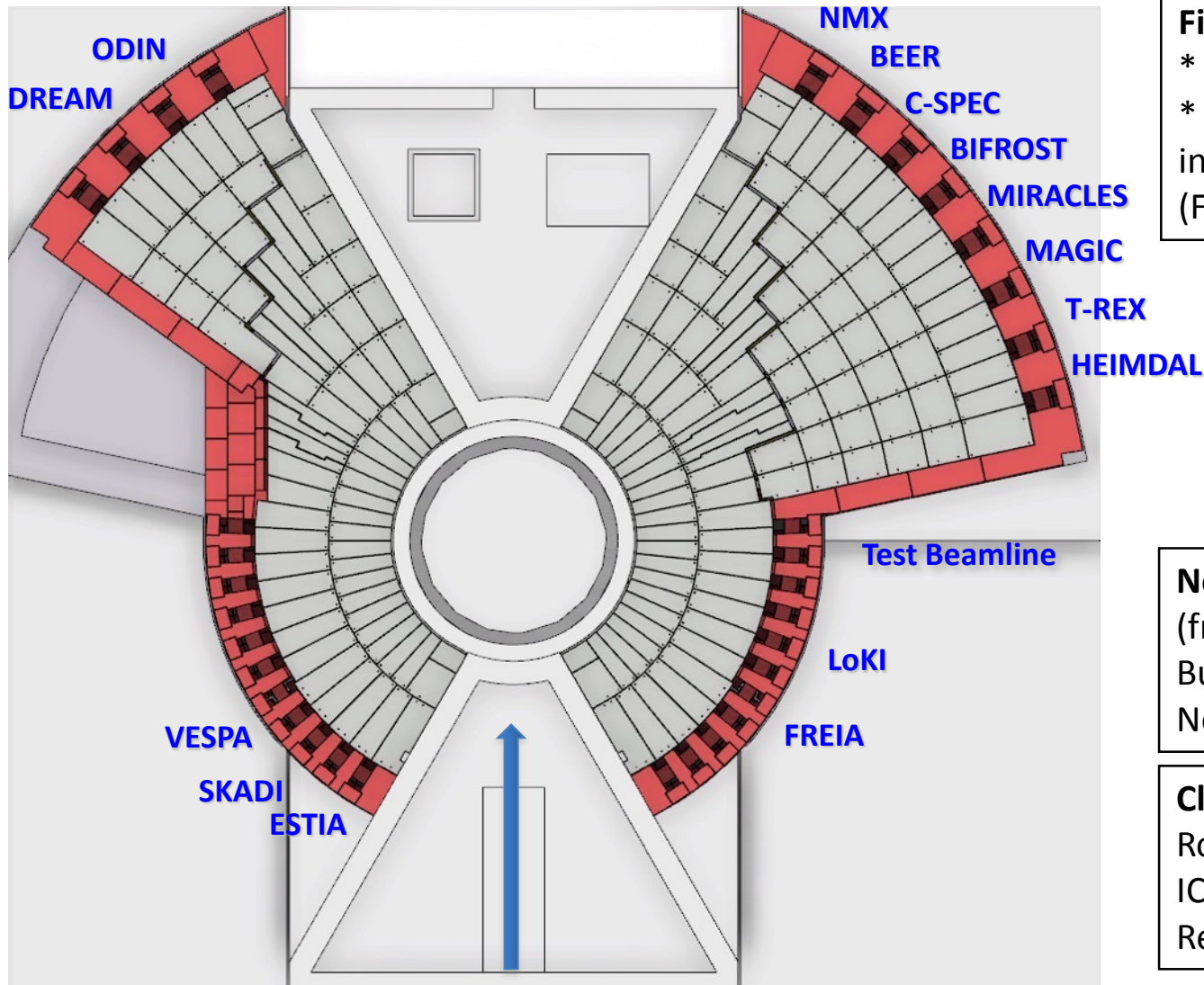
SECTION B-B





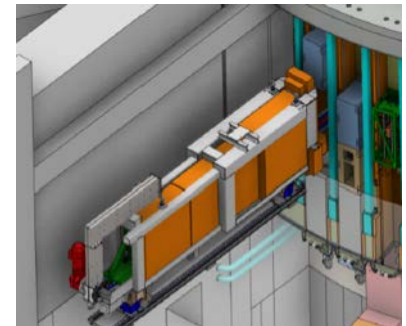
Slide from Mikael Jakobsson
& John Haines

Preparing for BOT and first BOI: In Bunker activities



First installations in Bunker:

- * R6 structure (Jan 2019)
- * Neutron Beam Optics in monolith & light shutters (Feb – Sept 2019)



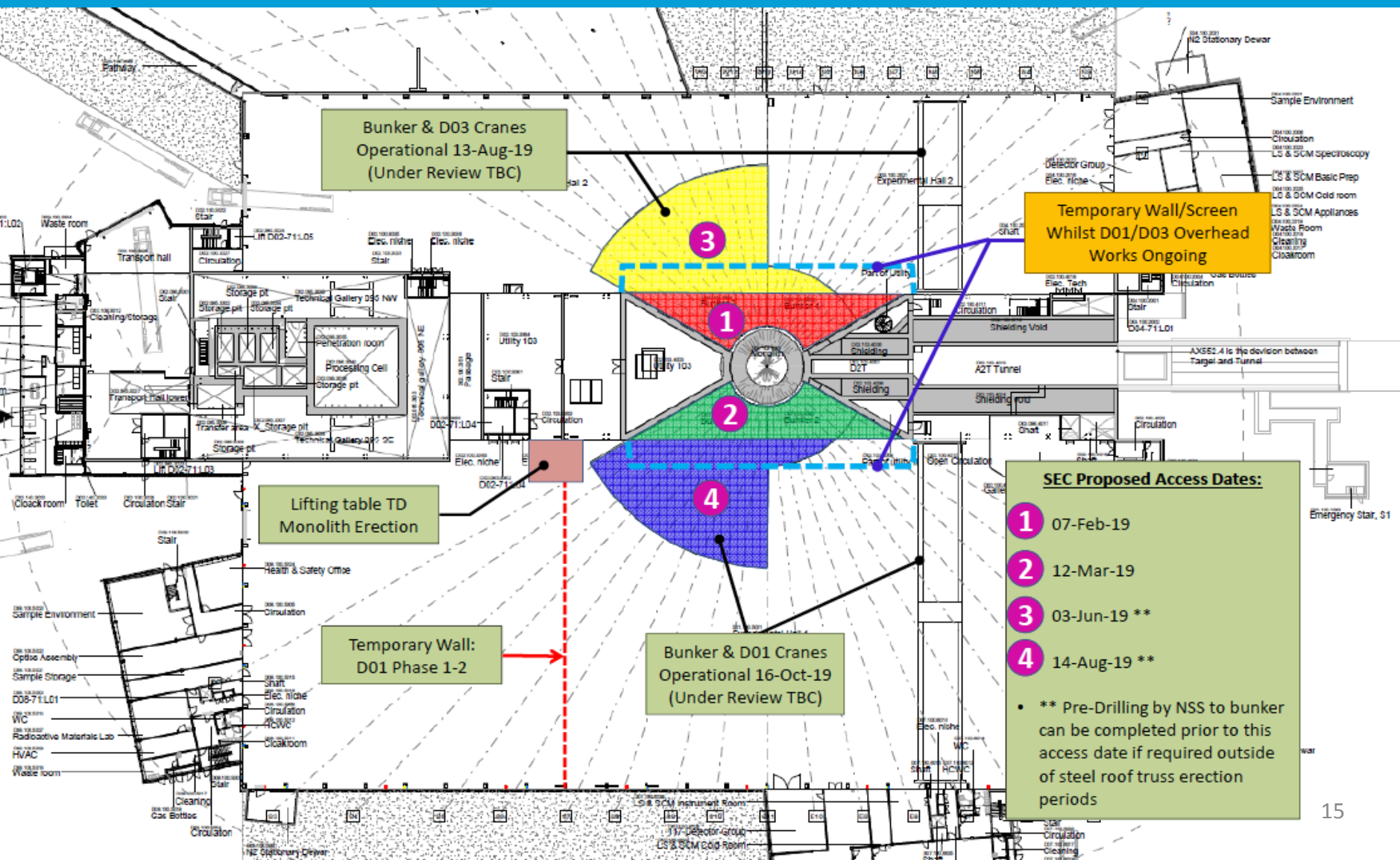
Next installations in Bunker:

(from Nov 2019 – May 2020)
Bunker Optics for first 4 – 8
Neutron Beam Instruments

Closing the Bunker:

Roof compl. Jun – Aug 2020
ICS final inst. & test Sept 2020
Ready for BOT Oct 2020

Access dates to Bunker areas -> Driving the Installation planning



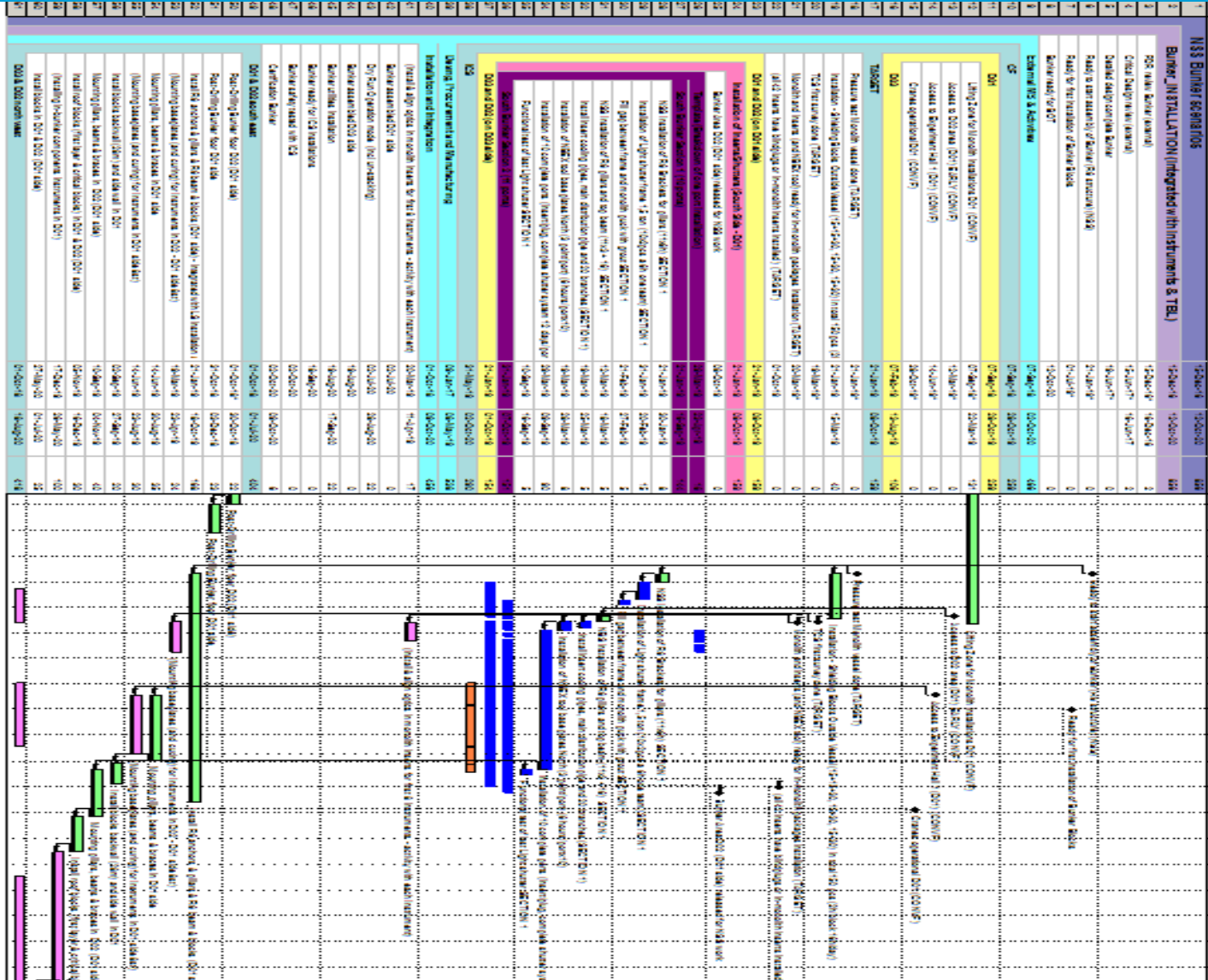
Schedule (D01 side only)

BLUE = Target
PINK = Instruments

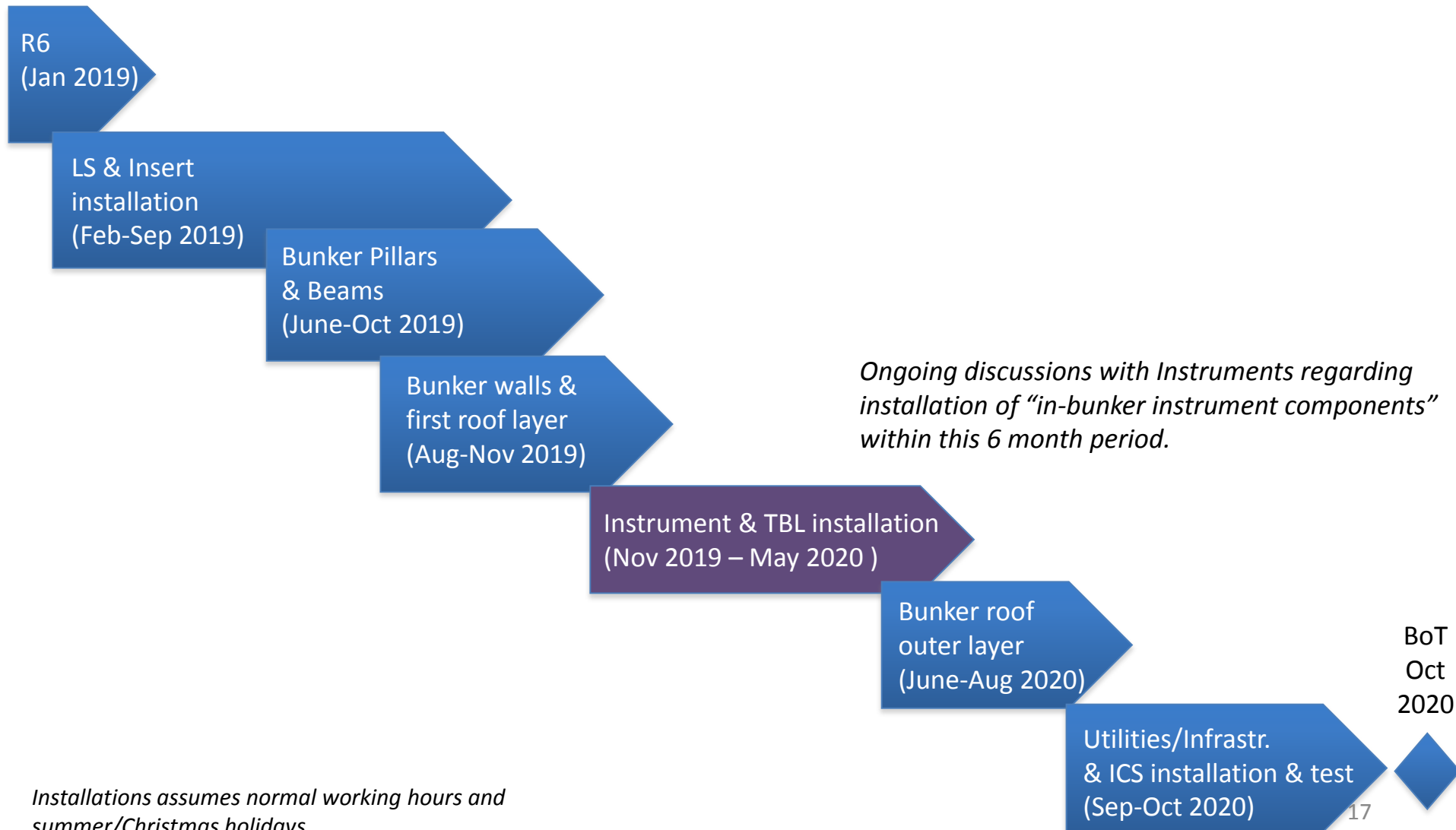
ORANGE = ICS
GREEN = Bunker



█ Primary Baseline
█ Actual Work
█ Remaining Work
█ Critical Remaining ...



High level schedule



Internal* NBI Installation Schedule (> TG4)

DRAFT FOR DISCUSSION

(derived from V3.3, 10th June 2017)

* BOT still under discussion
with ESS-ERIC Council

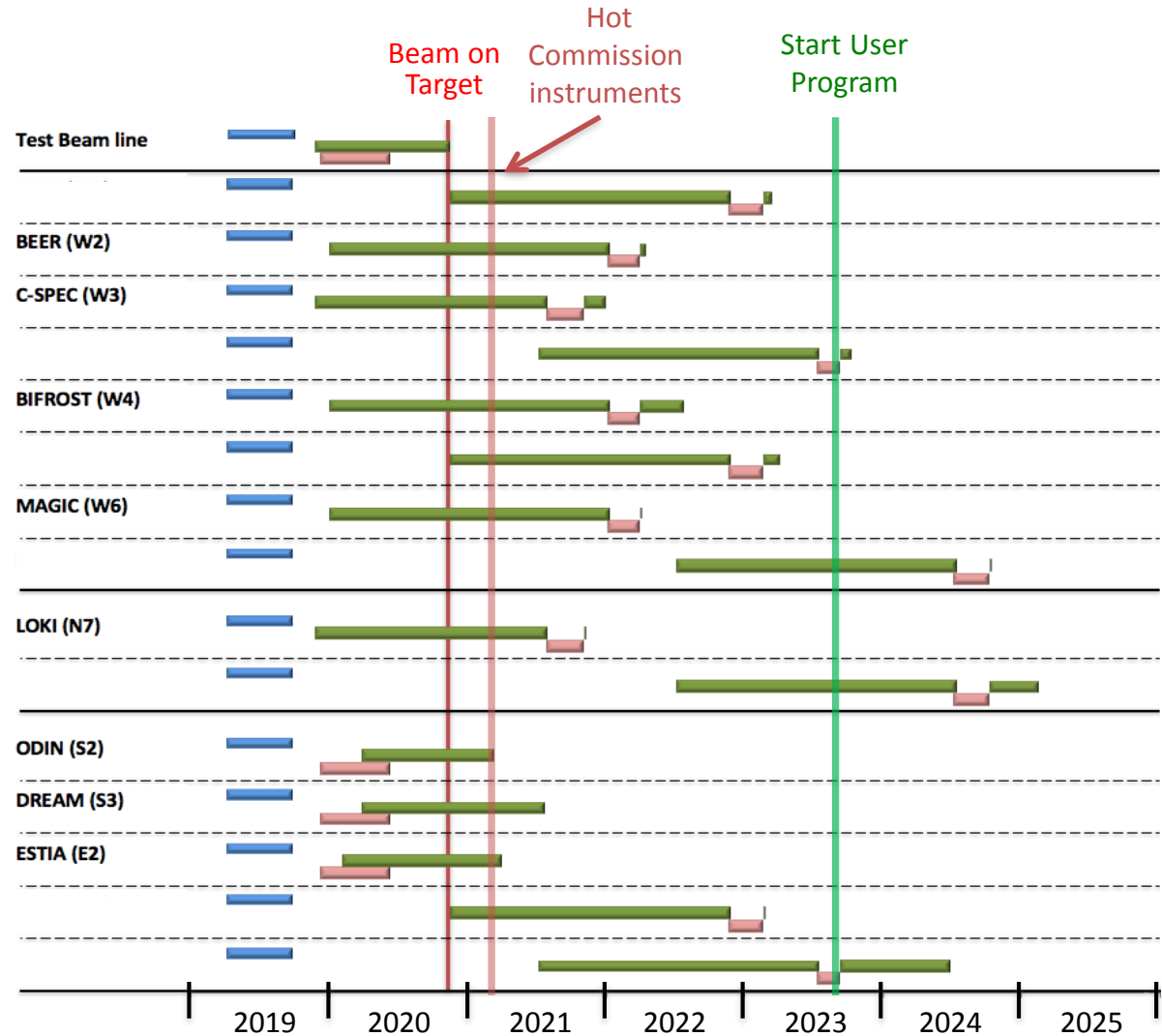
NOTES:

- Plan aligned with access dates to D & E buildings
- Installation & Integration (TG4) + Hot Commissioning (TG5) for first 8 NBIs aligned with draft BOI plan
(schedule match typically within 1 month)
- Alignment with TG5 for NBI 9-15 not yet complete
- On-site Resource plan under development

In monolith complete

In bunker complete

Out of bunker



Summary

- Communicate - discuss mutual progress frequently
 - communicate,
 - communicate,
- Utilize open database for ESS models access/sharing;
- Frequently check that work is up-to-date; continue checking for new clashes as the designs mature;
- Complex installation schedule
 - Driven by area access dates
 - High degree of parallel work
- Instrument installations in Bunker area to be integrated with ESS schedule (longer shutdowns)