

NSS construction works and Installation model

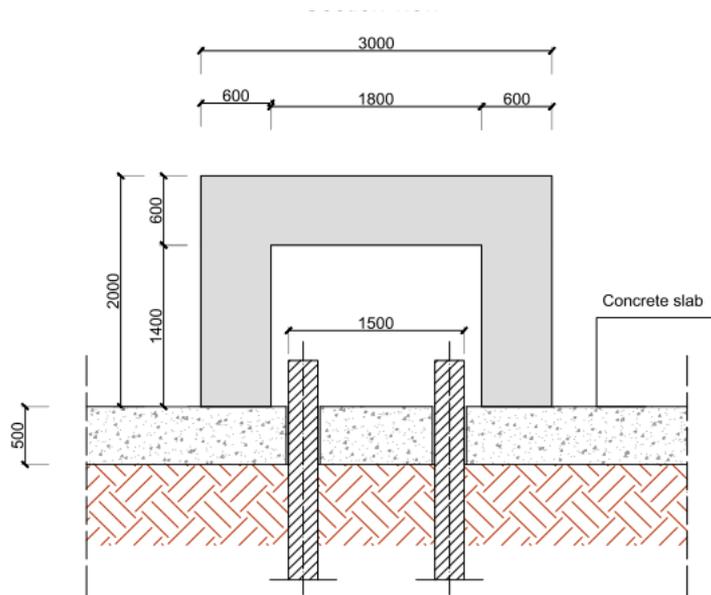
Antonio Bianchi
NSS Installation coordinator
Clara Lopez
Instrument Integration

www.europeanspallationsource.se

14th February 2018

NSS construction works: E02 load test

Preliminary shielding design

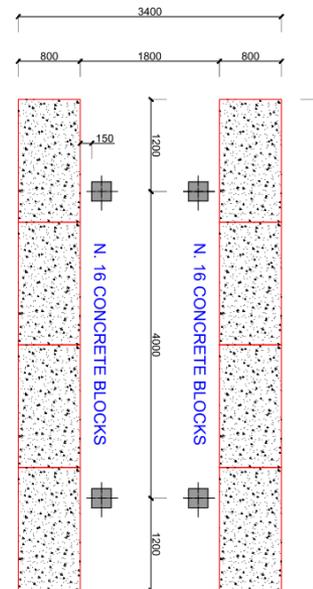


SHIELDING AREA	3,48 m ²
WEIGHT	8.352 Kg/m
<hr/>	
TOTAL WEIGHT	8.352 Kg/m
LOAD FROM EACH SIDE	4.176 Kg/m
SPECIFIC LOAD	4.176 Kg / (100 X 60) = 0,70 kg/cm ²



Shielding "simulation" (concrete blocks)

Plan view



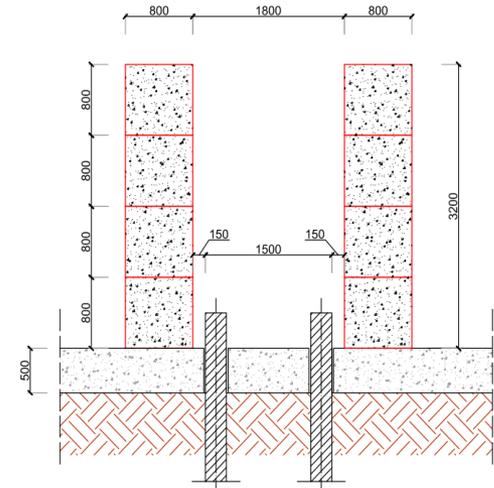
AREA (EACH SIDE)

WEIGHT

TOTAL WEIGHT

SPECIFIC LOAD

Section view



2,56 m²

6.144 Kg/m

6.144 Kg/m

6.144 Kg / (100X 80) = 0,77 kg/cm²



E02 load test location

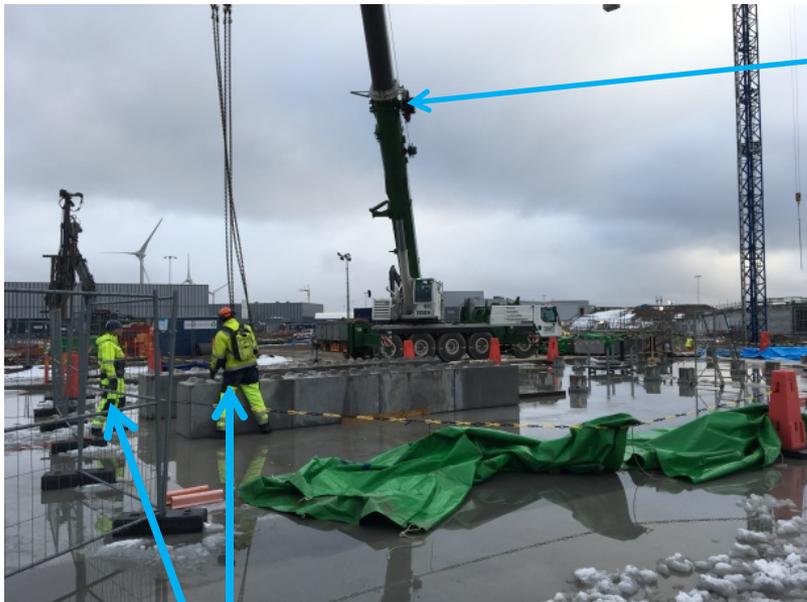


W7



**TEST LOCATION
(E02.2)**

E02 load test – on going work

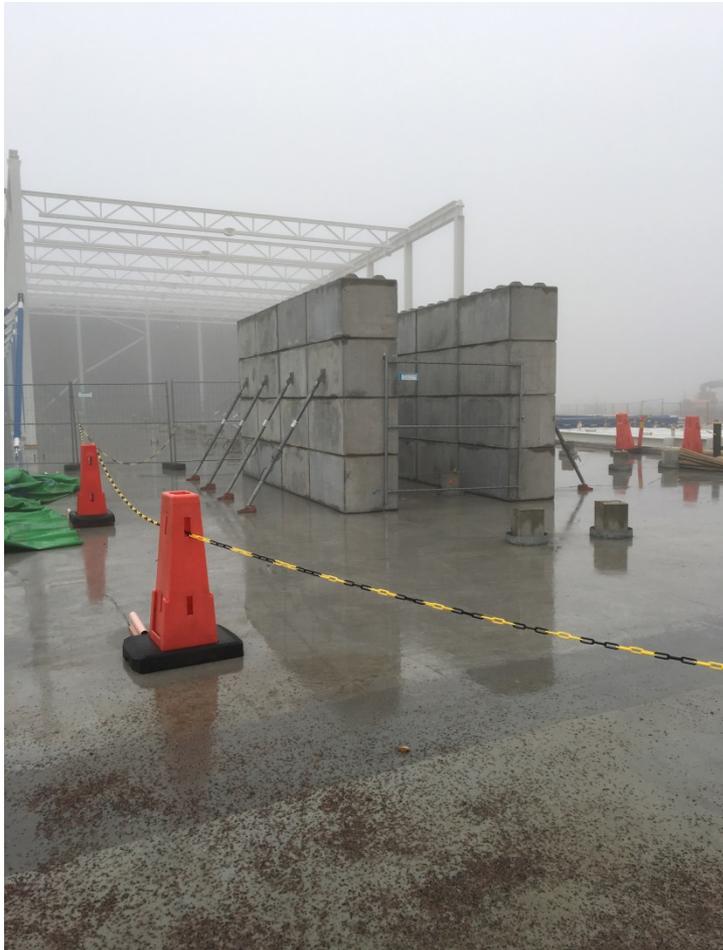


**BMS – MOBILE CRANE
AND CRANE DRIVER**



SKANSKA PERSONNELL

E02 load test – Final Configuration

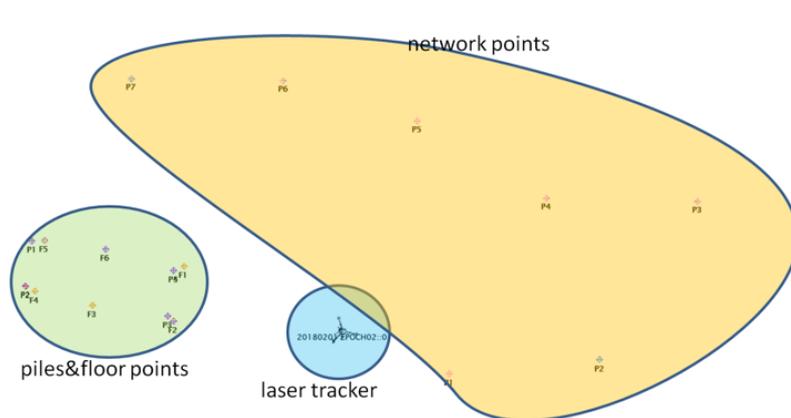


**SURVEYING STILL ON-GOING (ESS
METROLOGY GROUP)**

E02 slab and piles deflection

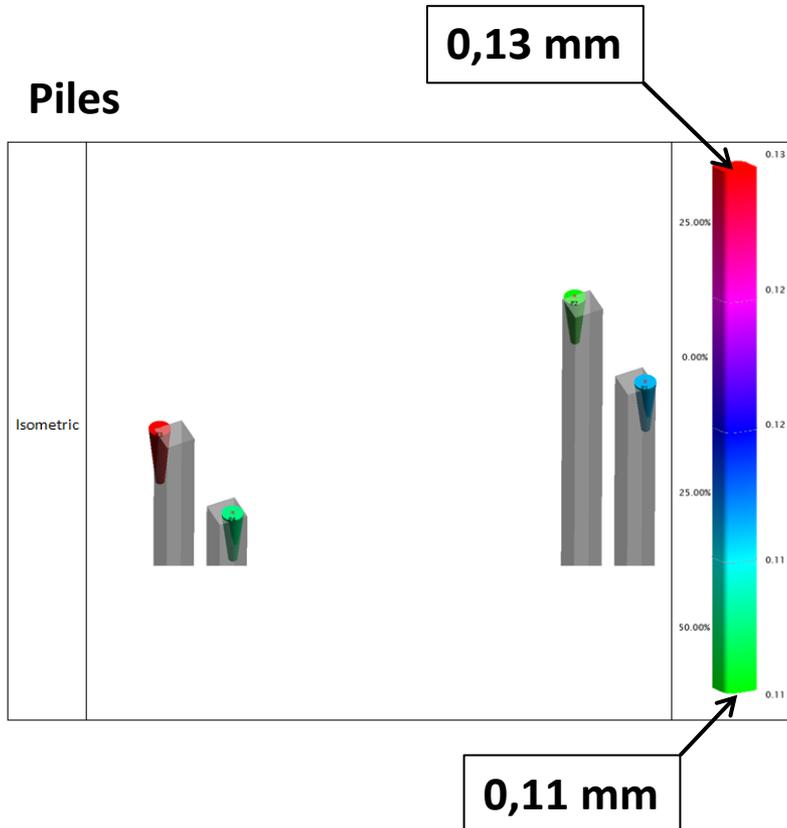
ESS-0237432

Date	Epoch	Comments
11/01/2018	0	Initial Measurement – No load
26/01/2018	1	15 days after loading
01/02/2018	2	21 days after loading

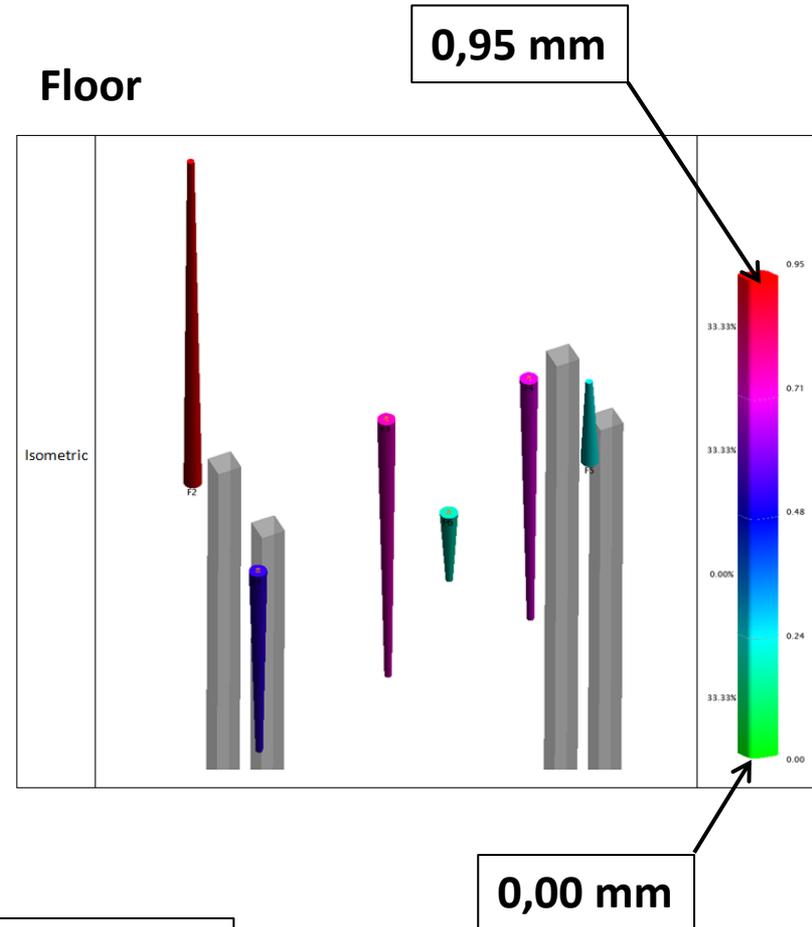


Load test results (1 Epoch)

Piles



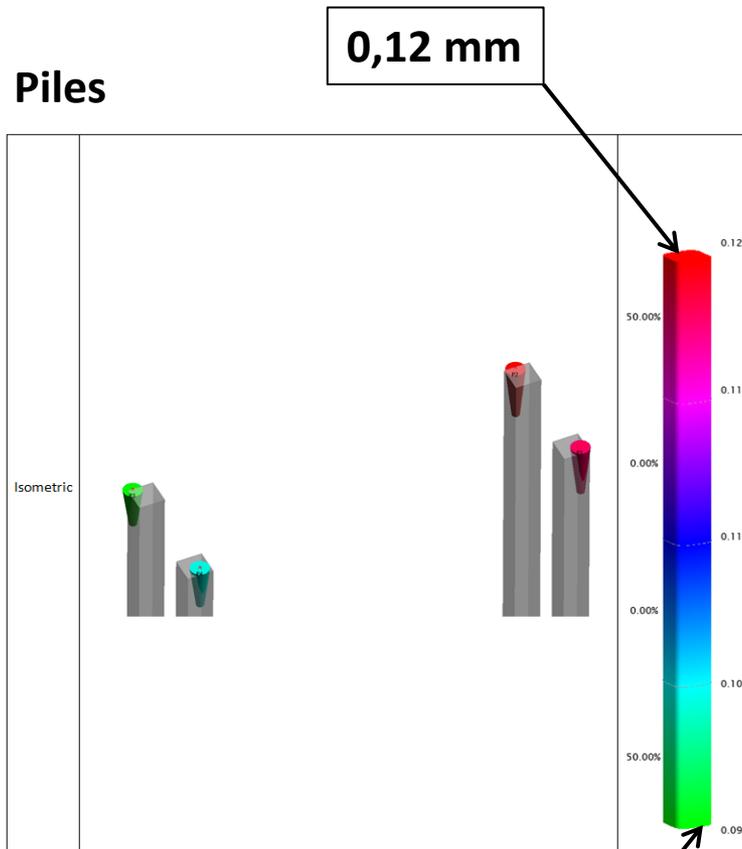
Floor



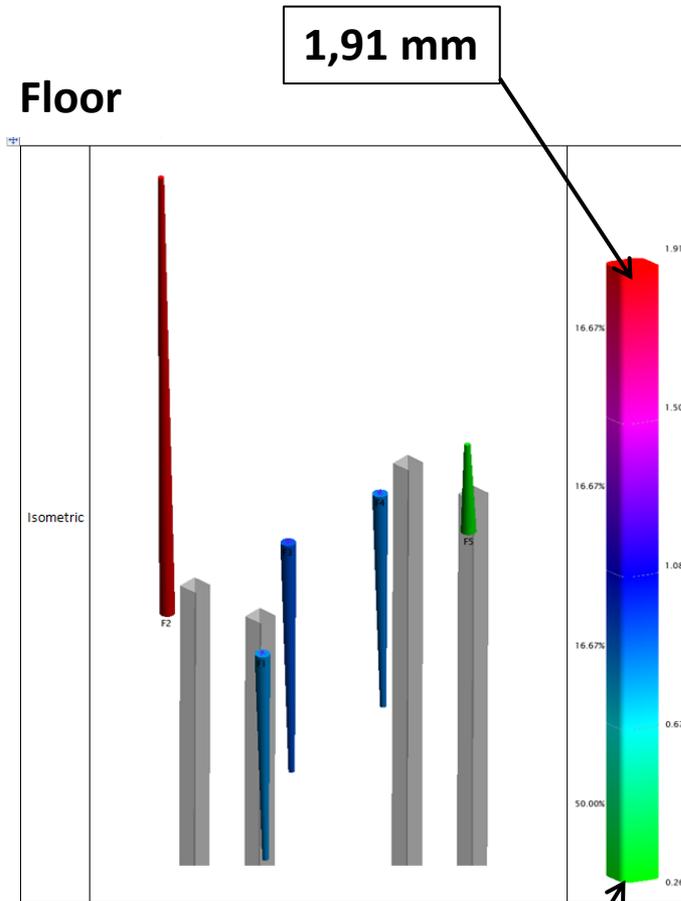
15 days after loading

Load test results (2 Epoch)

Piles



Floor



0,09 mm

21 days after loading

0,26 mm

Installation Model

Ready,...

Delivery process
from partner

ACCESS at
ESS

Installation

Partner site

Integrated
components

Integrated plan
ESS/Instruments

Logistics -
Transportation

Field installation
Packages (FIP)

ESS site

Logistics at ESS

Instrument team
area

Resources

Regulatory
requirements

Planning coordination -
work order

Steady...., go!

Integrated plan

Infr. & Utilities

Teams in place

FIP & components

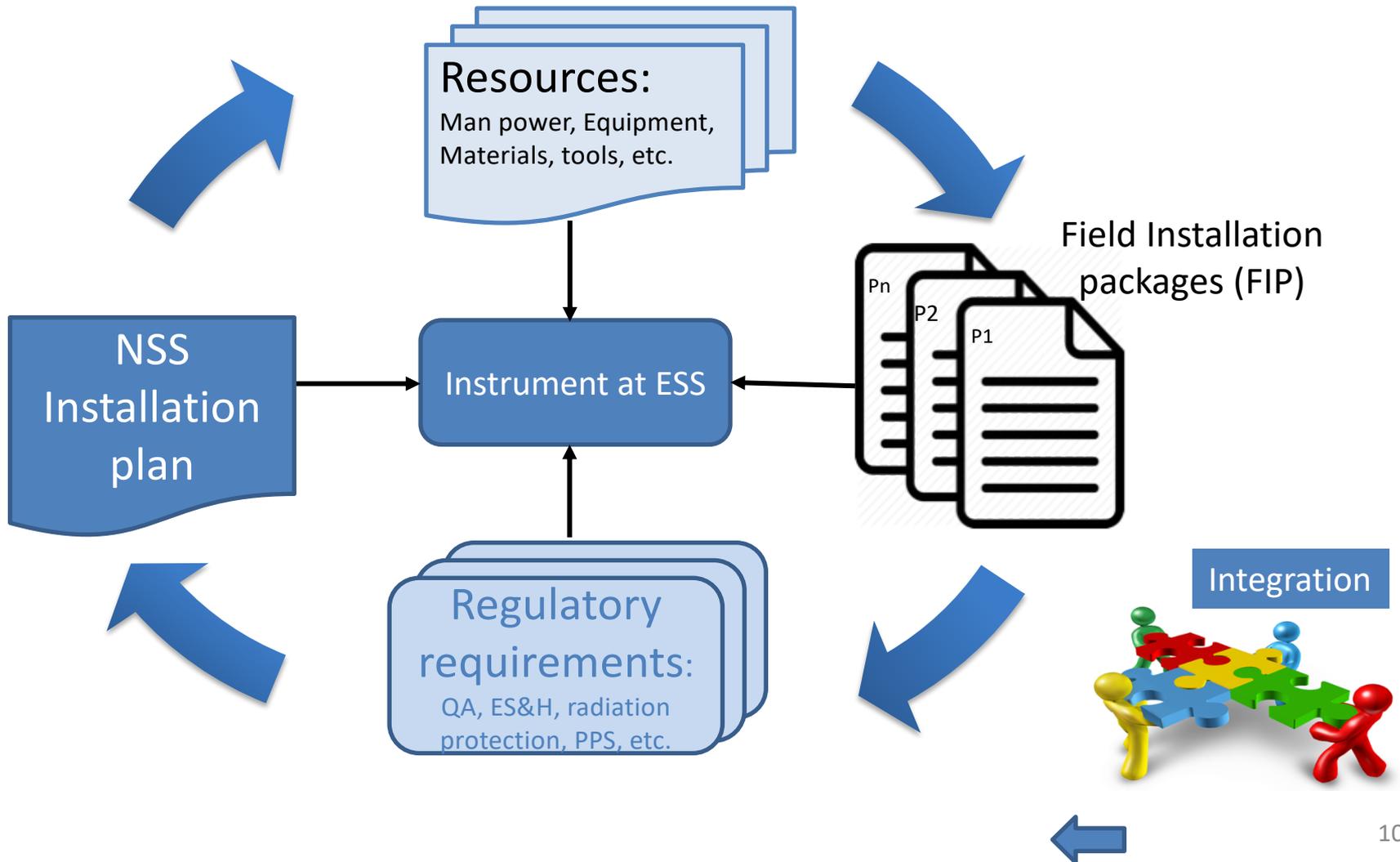
Areas prepared

Installation and SAT (if
apply)

As Built drawings



Objectives of Installation planning phase



Integrated components

- Assembled components at Partner site
- FAT Factory acceptance test
- CE Marking documentation
- Packing list
- Manuals for components
- Documentation related: Drawings, models, datasheet for materials, etc.



Logistics at Partner site

- Transport preparation
- Packing list: ID, list, weight, description, etc.
- Logistic procedure: ESS & partner
- Regulations
- Site inspection at arrival



Field installation Packages

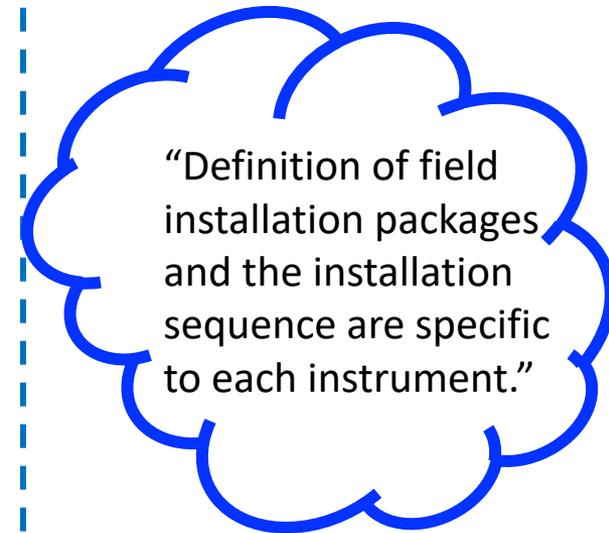
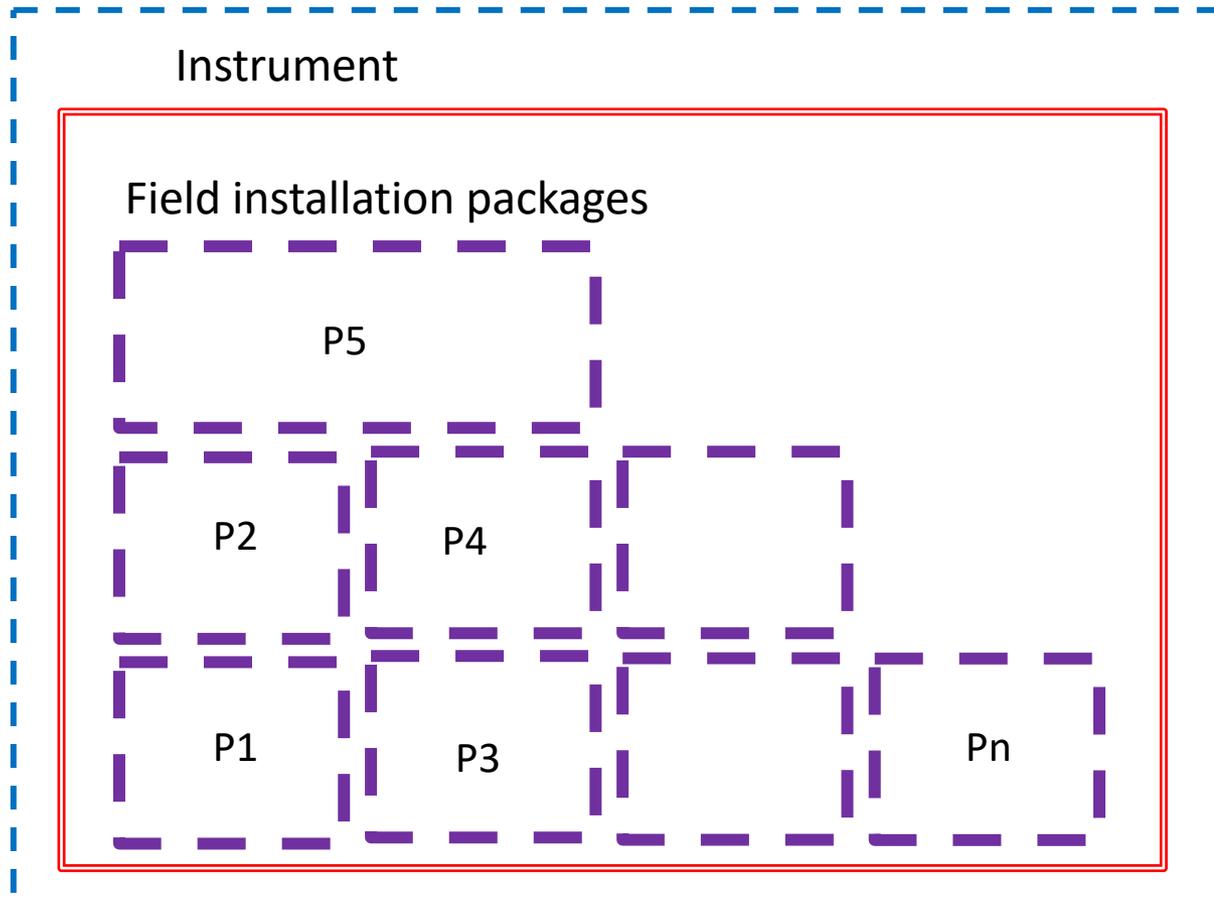
To facilitate management of installation an instrument will be divided into a set of *field installation packages*. These will be chosen to be of manageable size and defined by the sequence of engineering work and the assembly process. The FIPs will be prepared in an organized way to deliver the scope of work needed for the process of installation required at ESS by the partner and ESS installation teams.

This process is aligned with the detailed design phase, manufacturing process, installation, QA & safety requirements, and specific constraints and requirements specific to the relevant installation areas.



Field installation packages

Envelope space in instrument halls

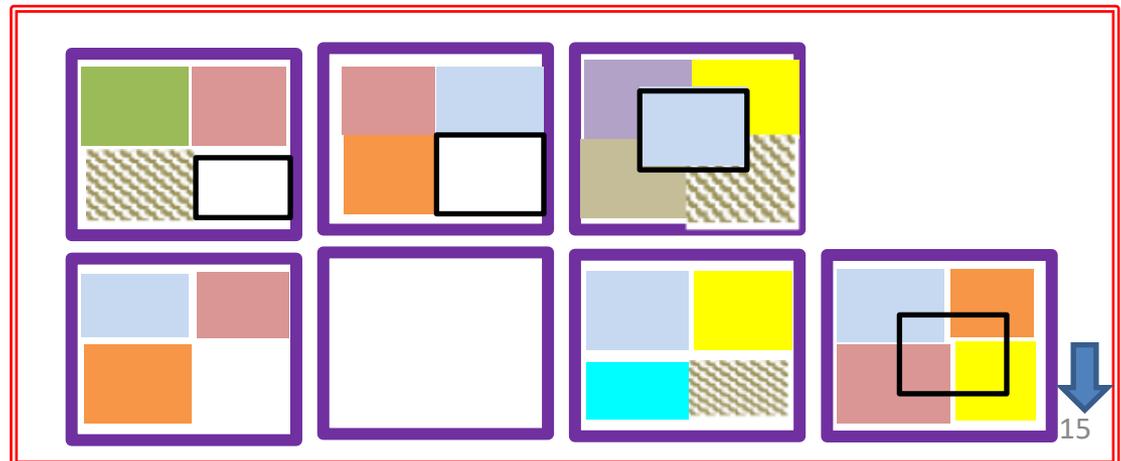
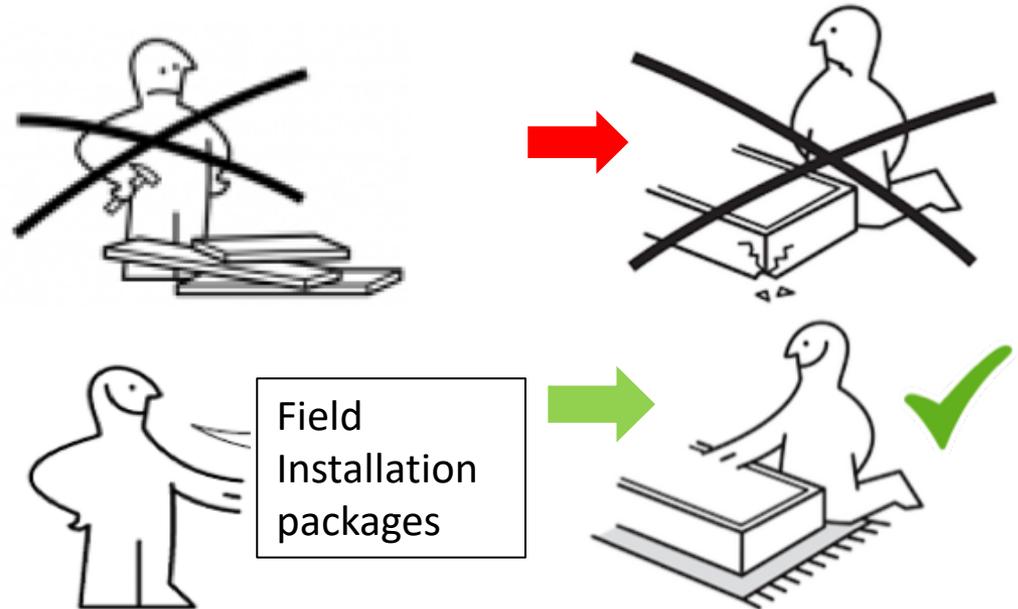
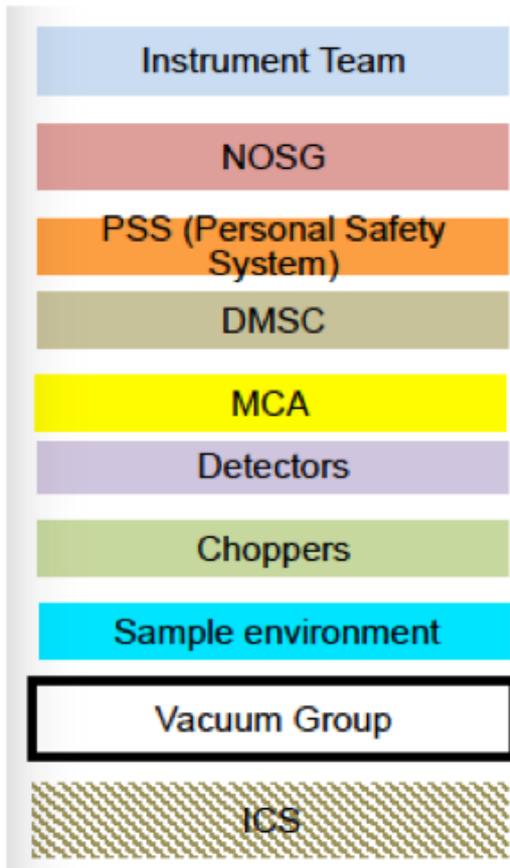


“Definition of field installation packages and the installation sequence are specific to each instrument.”



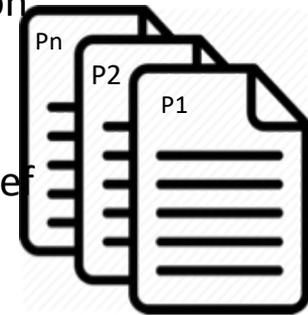
Field installation packages

Instrument Work packages



Field installation package document P1, P2,, Pn

- Package ID. (logistic operations)
- Work description: Scope of work
- Schedule: time and man power estimation
- Site preparation needed for field installation package (grouting, mounting supports, alignment plates, etc.)
- Pre assembly activities for field installation packages
- List of Drawings /Mounting instructions/Figures/ Electrical schemes/reference documents P&ID's/specifications, 3d scans, photo archives, etc.
- Particular considerations: access permits, regulatory requirements, risks, safety, temporary provisions, special limitations or recommendations for lifting equipment, subcontractors, vendors support, etc.
- List of equipment, tools, consumables and materials
- Location identification at site (bunker-hall-sectors)
- Boundaries: dimensions LxWxH and mass
- Utilities distribution preassembly needs: fluids, power, data, signals, etc. Check lists
- Scaffolding, cranes and construction equipment requirements
- Critical interface verification
- Test validation to perform at site: ref document

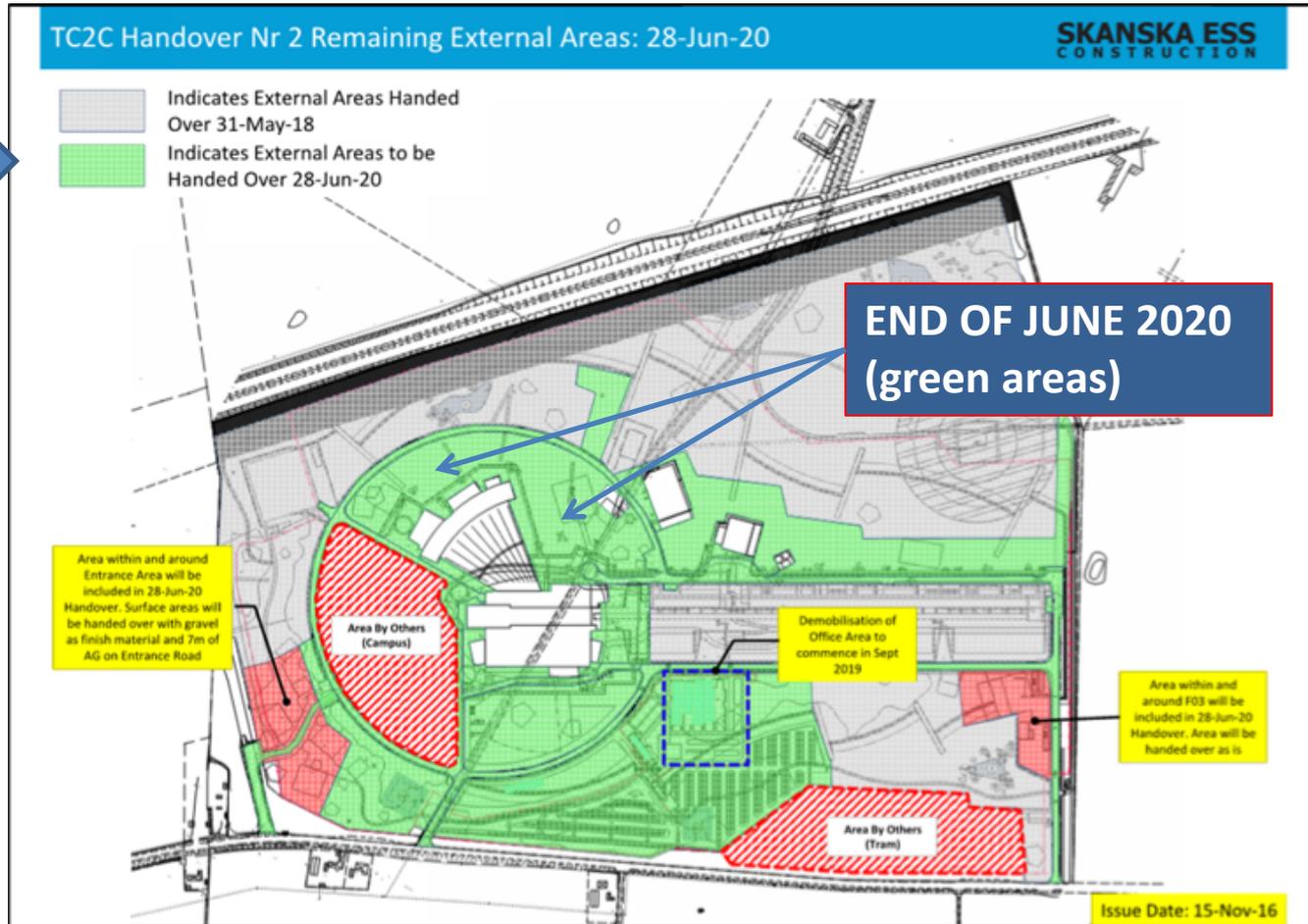


Logistics at ESS - Available space

- Unpacking
- Preassembly
- Final adjustments
- Reworks
- Visit workshops if is needed- Support functions
- Pre-installation checks



Logistic: handover of externals areas



Site aerial view – Main site entrance



External storage area (E buildings)

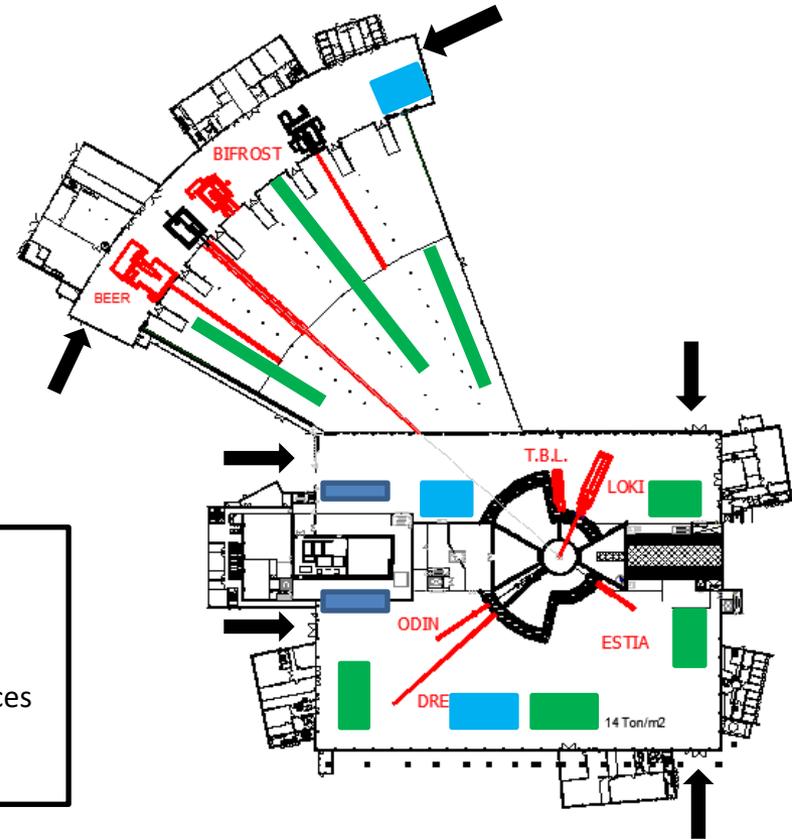
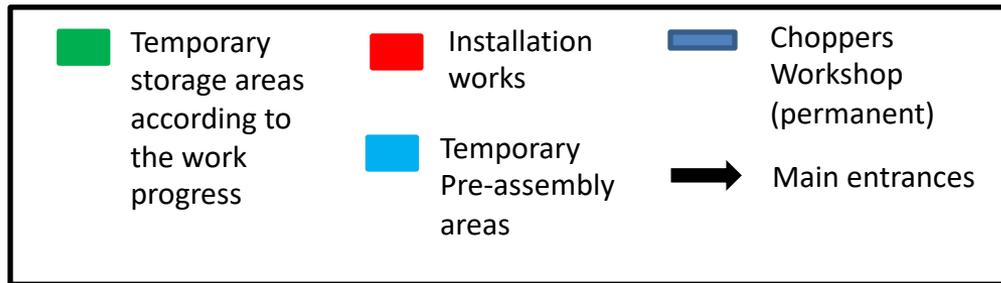


Instruments team storage area from middle 2019
1000 m² (on-going discussion with Skanska)



Logistics and storage areas inside the building

- Storage coordination
- Transportation
- Site inspection – Instrument team and Tech groups
- Regulations



- Storage areas will follow the integrated installation plan and the work-progress.



Instrument teams areas

- Provisional offices for teams
- Container space
- Instrument equipment location
- Lockers



Resources Equipment

- Instrument teams
- Technical groups
- Cranes
- Forklifts & Hand truck
- Fences
- Scaffolding
- Special equipment
- Tools workshop
- Ladders
- Consumables, materials, etc.

Previously
identified in Field
installation
Packages FIP



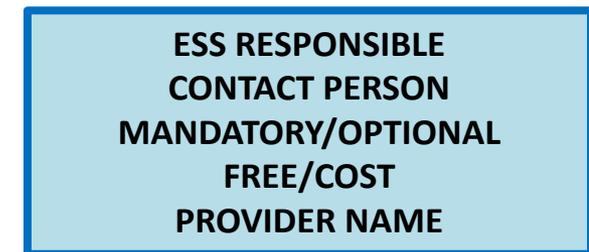
ESS Support function

SUPPORT FUNCTIONS (to be extended)

- Scaffolding
- Laydown Areas
- Crane drivers
- Logistics/Transport
- Heavy lifting
- Temporary Power Fluids
- Concrete drilling
- Survey/Alignment
- General support (washing/cleaning)
- Office support
- PPE and general consumables
- Safety fencing
- Workers cabin
- Waste management



FOR EACH OF THE SUPPORT FUNCTION



Framework agreements

Project	WP	Proc ID	In-kind ID	Name	Description	Total Value	Specification/SoW Responsible and Status	Procurement Requisition Number / Status	Procurement Start	Contract Signature	First Deliveries	Installation Start	Comments	Impact	Priority	Prioritization	Status / Action
ISC				Framework Agreement Piping and Cooling	Piping and Cooling Services / Works / Materials for all projects and In-kind Duration: 5 year	15 000 000,00 EUR	Leading: Piero Valente P. Officer: Luis Ortega Status: Initial discussions, procurement involved	REQ #: no Status: n/a	2017/9	2017/12	2017/2	2017/2	Replacing ACCSYS procurement IDs 11.16.1, 11.16.5 and 11.16.6	2	A	1	
ISC				Framework Agreement Electrical Installation & Cables	Electrical Installation & Cables Services / Works / Materials for all projects and In-kind Duration: years	15 000 000,00 EUR	Leading: Leif Steffensen (Evangelia Vaena) P. Officer: Luis Ortega Status: Initial discussions, procurement involved	REQ #: no Status: n/a	2017/9	2017/12	2017/2	2017/2	Replacing ACCSYS procurement for Klystron Gallery electrical infrastructure and cables	2	A	2	
ISC				Framework Agreement Manufacturing Services	Roster of companies providing multi-disciplinary manufacturing services for all projects and In-kind Duration: 5 years	1 000 000,00 EUR	Leading: Benjamin Davidge P. Officer: Luis Ortega Status: Initial discussions, procurement involved	REQ #: 20002251 Status: Approved	2017/9	2017/11	2017/12	n/a	Dynamic Purchasing System - Ongoing open call for 5 years	3	A	3	
ISC				Framework Agreement Training Services	Safety courses needed for performing work at ESS construction site for all projects and In-kind	200 000,00 EUR	Leading: Bertil Winér P. Officer: Luis Ortega Status: Procurement supporting development of SoW	REQ #: 20003010 Status: Approved	2017/9	2017/12	2017/12	n/a		2	A	3	

PIPING & COOLING

ELECTRICAL INSTALLATION

TRAINING

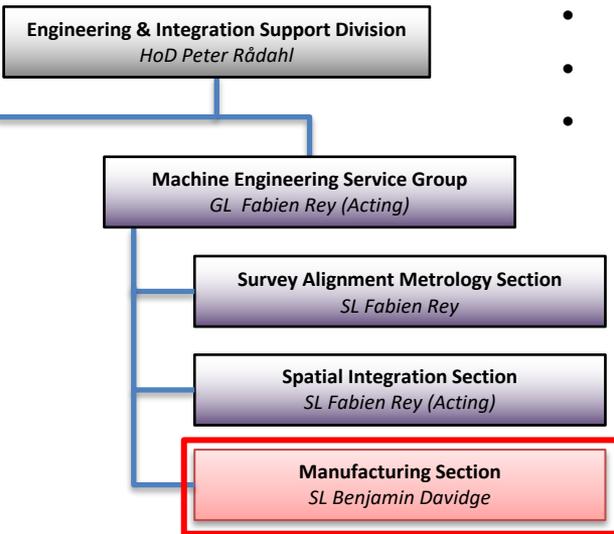
Framework agreements

INSTALLATION RESOURCES

LIFTING & HANDLING

ISC				Framework Agreement Installation Resources	Resources to support installation work (technicians and supervisors) for all projects and in-kind	TBD	Leading: Lelf Steffensen P. Officer: ? Status: SoW to be developed	REQ #: no Status: n/a	2017/9	2018/1	2018/1	n/a			2	A	4
ISC				Framework Agreement Lifting and Handling	Lifting and handling services at the construction site for all projects and in-kind	TBD	Leading: Lelf Steffensen P. Officer: ? Status: SoW to be developed	REQ #: no Status: n/a	2017/9	2017/12	2017/12	n/a			2	A	5
ISC				Framework Agreement Pre-assembly and Assembly	Multidisciplinary system assembly and pre-assembly services for all projects and in-kind	TBD	Leading: ? P. Officer: ? Status: ?	REQ #: no Status: n/a	2018/1	2018/5	2018/5	n/a			3	A	1
ISC				Framework Agreement Supply of Gas for Installation	Gases for welding, testing... for all projects and in-kind	TBD	Leading: ? P. Officer: ? Status: ?	REQ #: no Status: n/a	2018/1	2018/5	2018/5	n/a			3	A	2
ISC				Framework Service Agreement for Temporary Storage Solutions	Temporary Tents at the construction site	TBD	Leading: ? P. Officer: ? Status: ?	REQ #: no Status: n/a	2018/1	2018/5	2018/5	n/a			3	B	1
ISC				Framework Agreement for Industrial Cleaning	Industrial cleaning services for the construction site	TBD	Leading: ? P. Officer: ? Status: ?	REQ #: no Status: n/a	2017/9	2017/12	2017/12	n/a			2	A	6
ISC				Framework Agreement Small Works	Construction, reconstruction and related works for ESS buildings	TBD	Leading: ? P. Officer: ? Status: ?	REQ #: no Status: n/a	2018/5	2018/9	2018/9	n/a			3	B	2
ISC				Framework Agreement Drilling and related works	Drilling and related works	TBD	Leading: ? P. Officer: ? Status: ?	REQ #: no Status: n/a	2018/1	2018/5	2018/5	n/a			3	B	1

Manufacturing Section – Temporary Technical Center



- Formal establishment of new **Manufacturing Section** in August 2017
- Section is part of new Machine Engineering Service Group within E&IS Division
- Appointment of Benjamin Davidge as Section Leader in October 2017

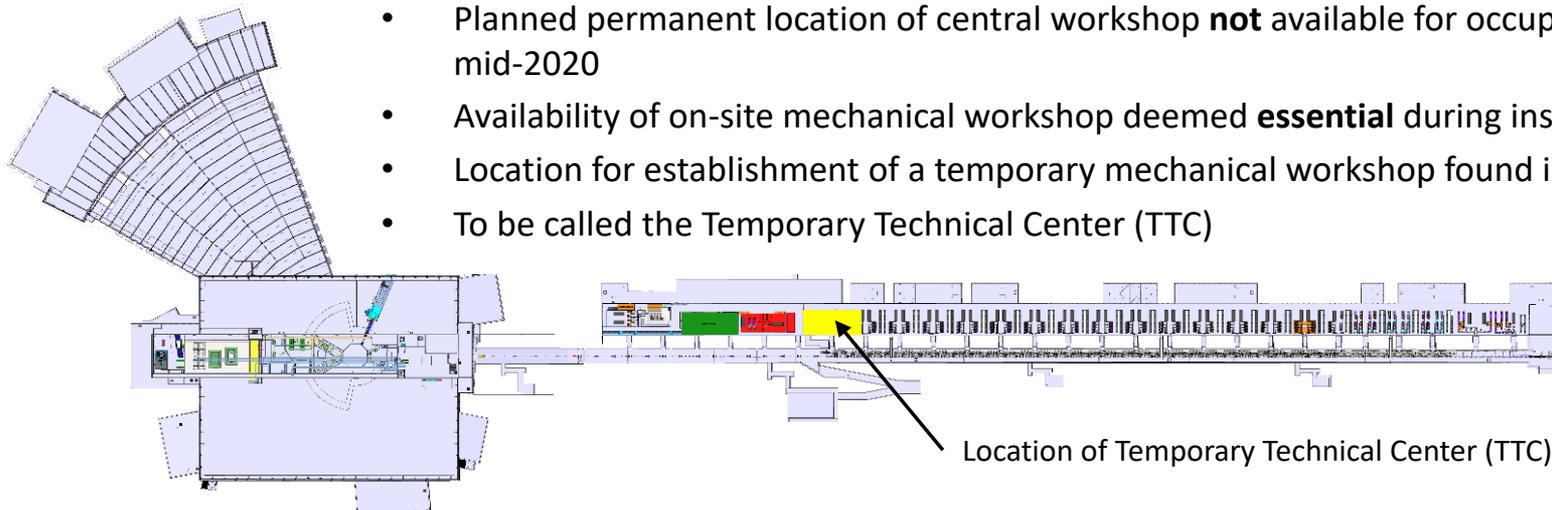
Section Mandate:

“Provide support for all mechanical disciplines of manufacturing to ESS as necessary to support installation, commissioning & operation of the facility.”

Delivered through:

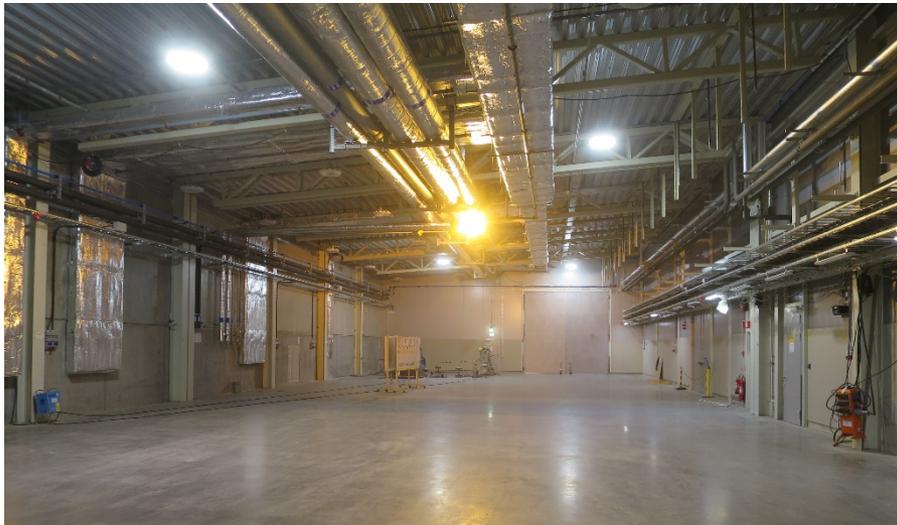
- Coordination of a central mechanical workshop
- Extensive network of external vendors
- Experienced staff

- Planned permanent location of central workshop **not** available for occupancy until earliest mid-2020
- Availability of on-site mechanical workshop deemed **essential** during installation phase
- Location for establishment of a temporary mechanical workshop found in **Gallery building**
- To be called the Temporary Technical Center (TTC)

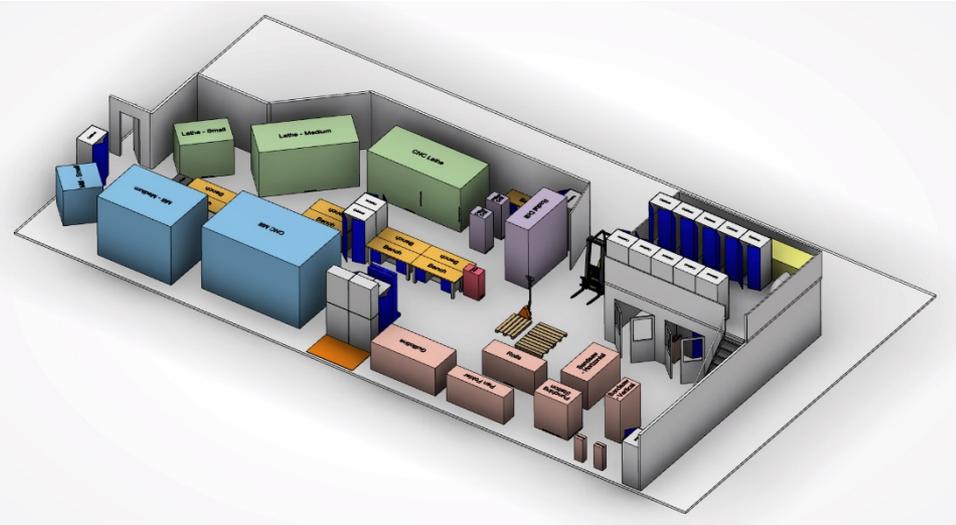


Manufacturing Section – Temporary Technical Center

- ~300 m² TTC floor area
- Preparation of space starting end of March 2018
- Machinery and equipment purchasing underway
- Machinery for machining, material cutting, basic sheet metal/fabrication, welding
- Limited assembly space – No overhead crane



Location as at Dec-2017



Proposed layout realized mid-2019

- Dedicated Manufacturing Section technicians only – **Not open access**
- First technician recruitment almost complete, plans for **3 full-time technicians available by mid-2019**

Please visit the **Manufacturing Section** page on **confluence** for more information and latest updates

<https://confluence.ess.lu.se/display/EIS/Manufacturing+Section>



Regulatory Requirements

- Certifications – External
- Risk assessments
- Permits and authorizations
- ESS training- ESS Safety code
- QA requirements
- Site Access teams – forms and formalities
- Emergency procedures
- Personal protective equipment PPE
- Monitoring and compliances
- Handling waste
- Safety training, matrix,
- Electrical safety
- Crane operator
- Swedish regulation for work environment

Main ESS installation documents

Below are summarised relevant documents about installation in the ESS facility:

ESS-0147103	General Information
ESS-0147089	ESS Guidelines For Accessing And Performing Work On Site
ESS-0012721	ESS Rules for Electrical Safety
ESS-0147093	Fire Safety Plan
ESS-0147094	Responsibility of Electrical Safety Permanent ESS Electrical System
ESS-0147099	Emergency notice. Safety plan
ESS-0147100	Safety Training Matrix for Installation Activities on Site
ESS-0147101	ESS Site Logistics



Reference provisions from Swedish work environment Authority:

- building-and-civil-engineering-work-provisions-afs1999-3;
- scaffolding-provisions-afs2013-04;
- use-of-lifting-devices-and-lifting-accessories-provisions-afs2006-6;
- who-is-responsible-for-what-within-building-and-construction-adi704-eng;

Web site

<https://www.av.se/en/work-environment-work-and-inspections/publications/foreskrifter/>



Who is responsible for what within building and construction?



“Good planning and design lead to a safer construction site with reduced risk of ill health and accidents, more effective production, and increased profitability”.
(Swedish Work Environment Authority)



Installation Safety matrix

Safety Training Matrix

■ Trainings provided by ESS-Skanska on site
■ Training provided by external companies

Training Purpose	HS site Induction	Site orientation training at gate	Safe lifting (slinging/rigging)	Hot work training	Fall protection and rescue training (with harness)	Electrical Safety instructions, (ESA 14 -, (EN 50110 certificate)	Electrical Safety Training, (How to apply ESA-14 on site)	MEWP (Scissor lift, Skylift, Boom lift)	First Aid course including Electrical Injuries	Forklift truck training	Crane operator training for specific crane	Training and medical examination
Estimated cost (SEK)/person	-	-	2000	3200	2200	6000	-	2500	7000/gr.	3600	3200	4000
Access to site	X											
Work on site (general)	X								X*			
Access to site with vehicle/transport		X										
Performing hot work	X			X								
Performing lifting and coupling work	X		X									
Work on site (Accessing energised areas, performing electrical work)	X								X**			
Accessing energised areas, performing electrical works	X					X***	X****		X			
Working on MEWP	X				X			X				
Operating forklift	X									X		
Operating cranes	X		X								X	
Working with epoxy or other allergenic chemical												X
VALIDITY of courses (duration)	-	-	 (Swedish certificate)	 5 years (Nordic certificate)	 (Swedish certificate)	3 years	3years	5 years (ISO 18878 certificate)	3 years	Swedish BYN or TYA validation	Swedish BYN or TYA validation	 Swedish certificate 5 years
	60-90 min	30 min	0.5 day	1 day	0.5 day	2 day	0.5 day	1 day	0.5 day	1 day per course or few hours if validation in-house		



Safety training programs

Safety courses are currently under development.

- [ATEX \(basic\)](#)
- [Crane Operator](#)
- [ESA-14 \(Advanced\)](#)
- [ESA-14 \(Basic\)](#)
- [First Aid: Basic \(incl. electrical injuries\)](#)
- [Hot work](#)
- [Radiation training for personnel working on TS2](#)
- [Use of epoxy](#)



[Safety Training Website](#) under development (on Confluence):

<https://confluence.ess.lu.se/display/ESH/Safety+Training+Program>

(Responsible: Lars Aprin (EH&S Division))



Mandatory PPE on Construction Site

GENERAL RULE

Helmet as in picture

Safety glasses

Reflective clothing
class 2 (chest)

Safety gloves

Long sleeve trousers

Safety shoes

Exceptions from the
general rule must
be agreed with SEC



Blue – site operative
White - supervisor

Green – OHS personnel
Red - visitor



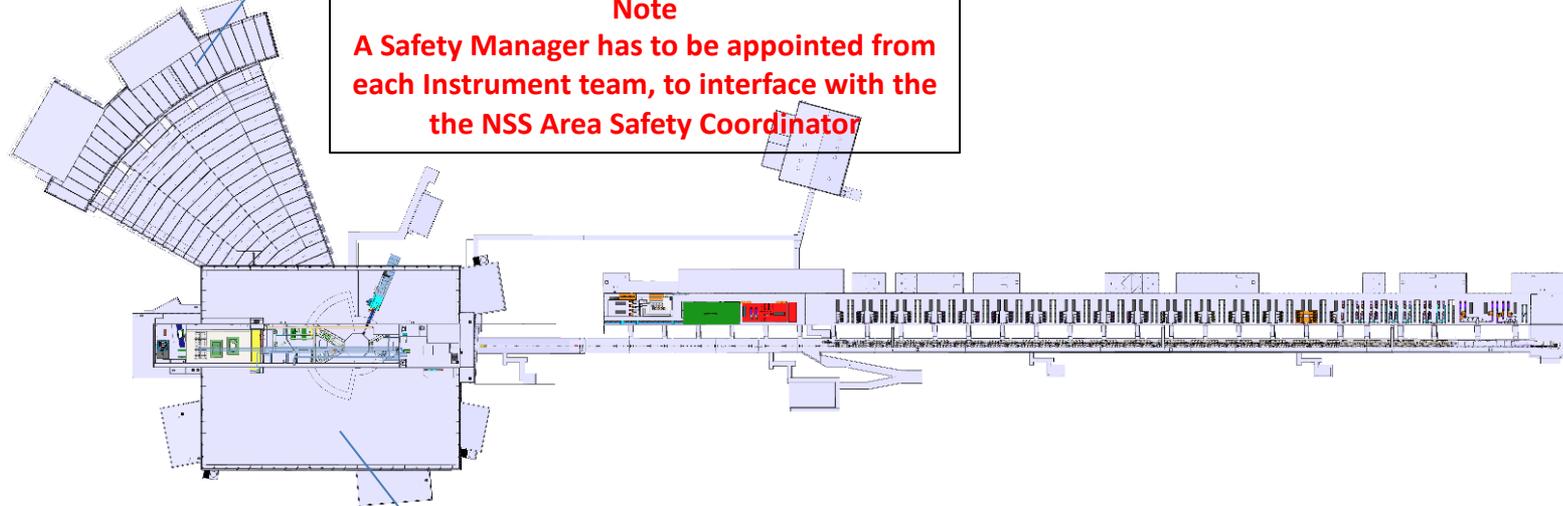
Installation safety: NSS Area Safety Coordinator

Site Responsible BAS-U (construction safety)

Up to the end of
SKANSKA
construction works

NSS Area safety coordinator (E buildings)

Note
A Safety Manager has to be appointed from
each Instrument team, to interface with the
the NSS Area Safety Coordinator



NSS Area safety coordinator (D buildings)



An “**Electrical contractor**” is a person who has been authorized by **The Swedish National Electrical Safety Board** to perform electrical installation work within the scope of The Act on Electrical Contractors (SFS [1990:806](#)).

- To get authorization as “**Electrical Contractor**” you need qualification e.g. right education and experience to work with electrical installations in Sweden (High or Low Voltage)
- “**Electrical contractor**” may perform electrical installation work relating to the execution, alteration or repair of electrical installations and installations of electrical devices, where such a voltage, current or frequency that can be dangerous to persons or property.



Electrical safety: Need of Authorization and Authorization types

An authorization is needed to:

- perform fixed connection/disconnection of devices to and from an electrical installation that could be dangerous to people or property.

An authorization is not needed to:

- perform electrical installations for machinery and vehicles such as cars & aircrafts are excluded from the electrical installation regulations.
- perform electrical installations and works within machinery considered as a non-fixed electrical installation.

There are 2 types of authorization

General authorization- High and Low Voltage (AB)

Can perform all types of electrical installation work

General authorization – Low Voltage (ABL)

Can perform all types of electrical installation work on facilities for nominal voltage up to 1 000 Volt AC or 1500 Volt DC.



Electrical safety: In-Kind Contributors



- An Electrical contractor with qualifications from an EES country other than Sweden may temporarily perform electrical installation work.
- Must submit an application to get a temporary authorization.



1 (4)

Company registration

What type of company registration is to be completed?

- New company registration Change previously registered data

The personal data supplied in connection with registration is processed in accordance with the Swedish Personal Data Act (1998:204). More information can be found on the National Electrical Safety Board website, www.elsakerhetsverket.se.

Electrical installation companies carrying out work on third-party systems must be registered with the National Electrical Safety Board. To be able to register, the following requirements must be met:

- **The electrical installation company is active**
A company counts as active if it has a F-tax certificate, is VAT registered or pays employer contributions.
- **There is at least one electrical contractor responsible for compliance at the company**
Electrical contractor/s responsible for compliance are to be stated in the company's self-audit scheme. They must also be registered in the National Electrical Safety Board register of companies, for which the electrical contractor must give their permission. This is done by submitting the "Consent of electrical contractor" form that shall also be included in the company registration. The electrical contractor's authorisation must cover the activity types to which the registration refers.

1. Company data

The following company is to be registered in the National Electrical Safety Board's register of companies

Company name		Company registration number
Address	Postcode	City
Country		
Type of company	Web site	

2. Additional details to be completed by companies outside of Sweden

NB! National ID number is mandatory.

National ID number	Swedish ID number (optional)	VAT number (optional)
Is the company's work in Sweden temporary? "Temporary" refers to individual projects for a limited period		
<input type="checkbox"/> Yes, end date for the work (YY/MM/DD): <input type="text"/>		
<input type="checkbox"/> No		

If yes, the company can be registered as a temporary service provider. The company must have access to an electrical contractor with relevant professional qualifications in an EU/EEA country as required in section 22 of the Swedish Electrical Safety Act. Otherwise the company's electrical contractor responsible for compliance must be authorised in Sweden.

Provide the addresses where the company will be operating in Sweden

Address	Postcode	City



Application

Prepare following before register starts

1. Self-audit scheme shall be handed over to ESH&Q when registration starts.
2. In-Kind Contributors need to have an authorization (Certificate) in the home-country in EU. (AB or ABL)
3. The work shall be performed temporary in Sweden and during a limited time period.

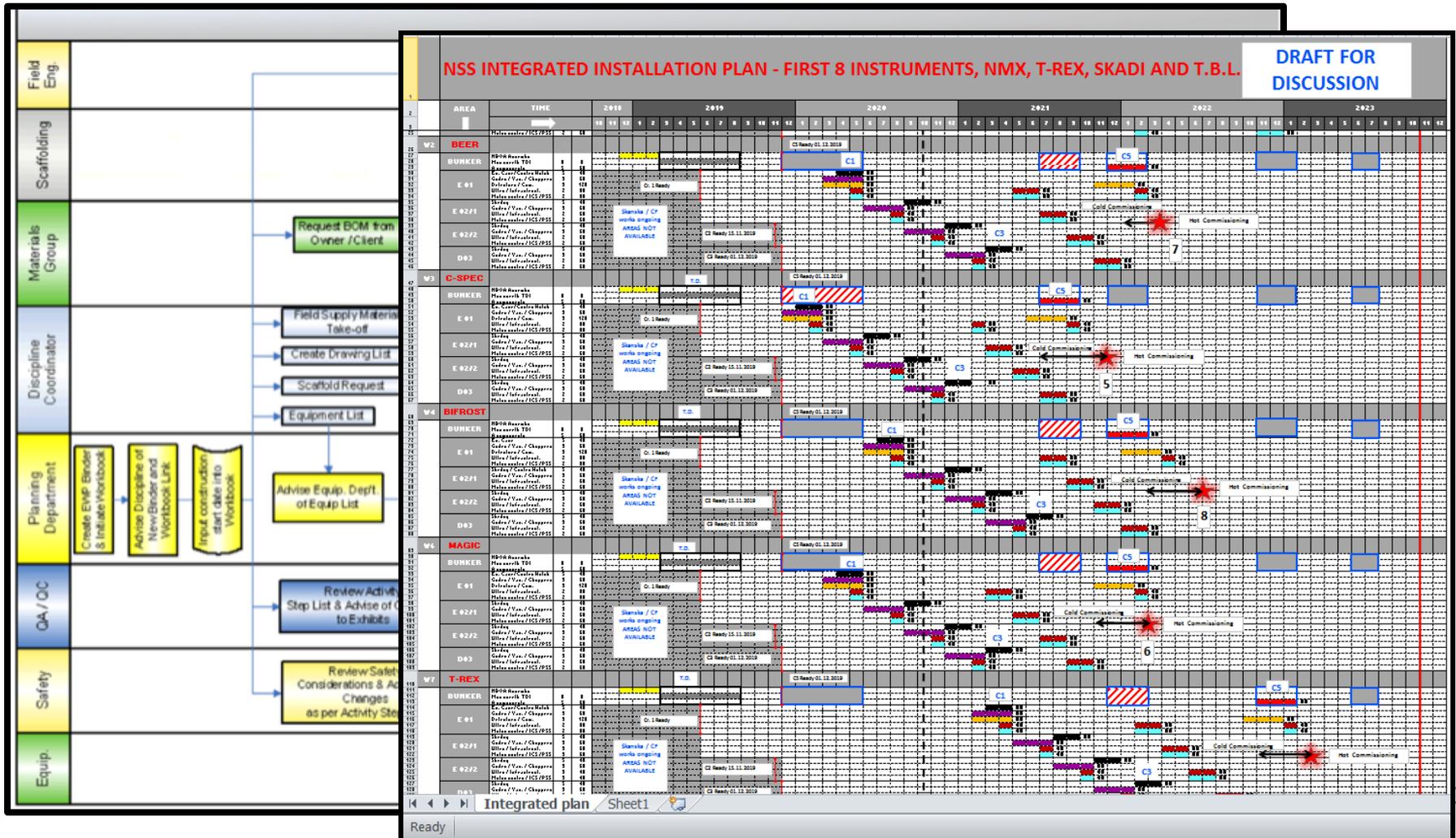
More information:

<http://www.elsakerhetsverket.se/en/electrical-installation-companies/register-your-company/>



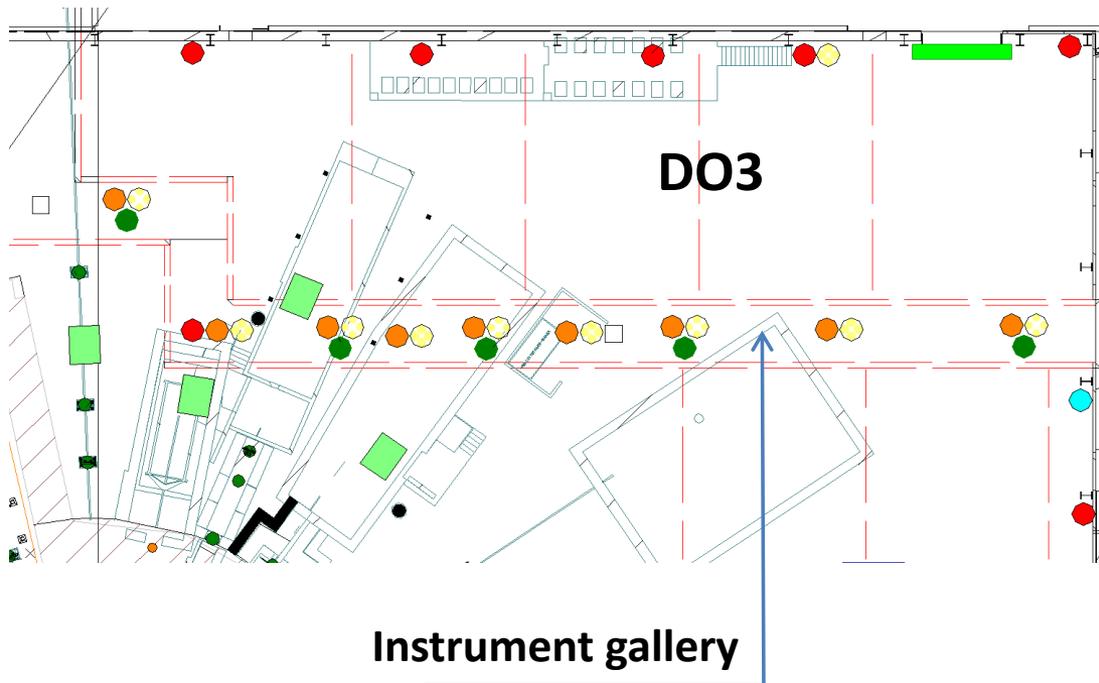
Integrated plan

Master plan schedule and Work process at site installation



Infrastructure and utilities

- According to the Instrument Installation package and the integrated project schedule, NSS will ensure all the required connection points for utilities distribution (fluids, power, data, signals, etc.) are in place.



Power ;
 Cooling water;
 Compressed air;
 Vacuum pumps;
 Data;
;



Teams in place

Coordination :

- Technical groups
- Instrument crew
- ESS installation crew
- ESS Equipment/tools
- Configuration – Bunker preparation/mobile cranes, etc.



What is needed?

- Planning NSS/Instruments
- Field Installation Packages (FIP) – start !
- Definition of resources
- Responsible /Team/clear communication
- Definition of equipment and tools



Questions?



Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

TIME TO PLAN!

A hand is shown holding a black marker, with the number 18 circled in red on the calendar grid.