"ENGINEERING SERVICES FOR PREPARATION, PROCUREMENT AND SUPERVISION OF RAIL BALTICA CONTROL-COMMAND AND SIGNALLING SUBSYSTEM DEPLOYMENT"

(PROCUREMENT IDENTIFICATION NO RBR 2020/18)

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1. GENERAL

1.1. Rail Baltica project

Rail Baltica is a joint project of three EU Member States – Estonia, Latvia and Lithuania – and concerns the developing of a fast conventional double-track 1435 mm gauge electrified and ERTMS equipped railway line with overall length of 870 km on the route from Tallinn through Pärnu (EE), Riga (LV), Panevėžys (LT), Kaunas (LT) to the Lithuania/Poland state border (including a Kaunas – Vilnius spur) with a design speed of 249km/h.

Railway line for both passenger and freight transport shall be interoperable with the TEN-T Network in the rest of Europe and competitive in terms of quality with other modes of transport in the region.

Rail Baltica is to become a part of the EU TEN-T North Sea – Baltic Core Network Corridor, which links Europe's largest ports of Rotterdam, Hamburg and Antwerp – through the Netherlands, Belgium, Germany and Poland – with the three Baltic States, further connecting to Finland via the Gulf of Finland short sea shipping connections with a future fixed link possibility between Tallinn and Helsinki. Further northbound extension of this corridor shall pave the way for future connectivity also with the emerging Arctic corridor, especially in light of the lucrative prospects of the alternative Northern Circle maritime route development between Europe and Asia. Furthermore, the North Sea – Baltic Corridor crosses with the Baltic-Adriatic Corridor in Warsaw, paving the way for new supply chain development between the Baltic and Adriatic seas, connecting the Baltics with the hitherto inadequately accessible Southern European markets.

The Contracting authority RB Rail AS (RBR) was established by the Republics of Estonia, Latvia and Lithuania, via state-owned holding companies, to coordinate the Rail Baltica project. The figure 1 below illustrates current shareholders and structure of the Rail Baltica project in Estonia, Latvia and Lithuania.

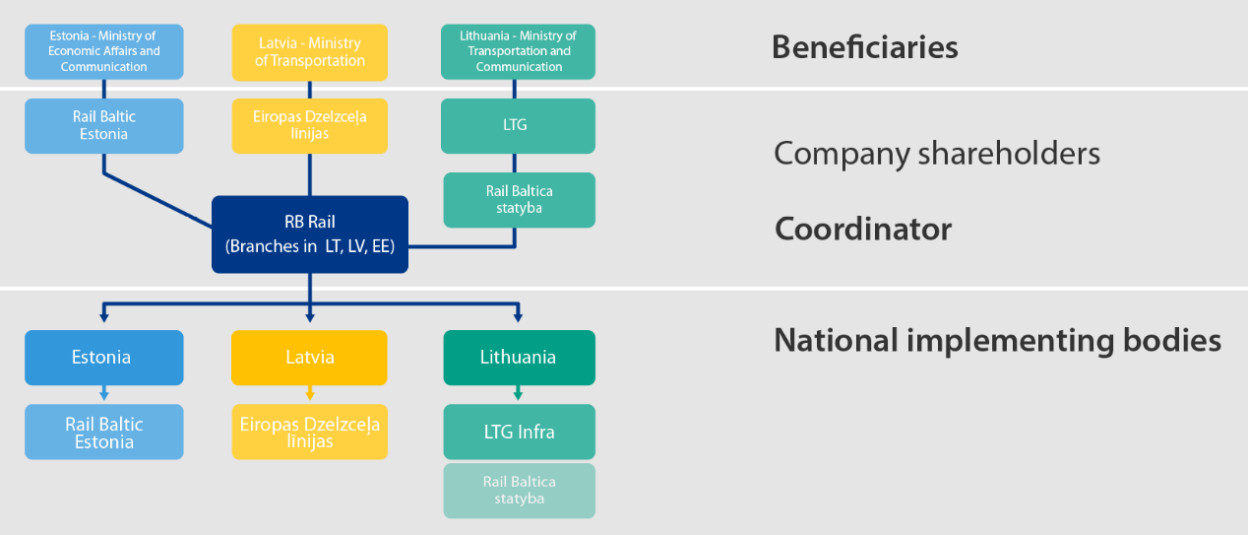

Figure 1. The shareholders structure

The organisational structure of the Contracting authority RBR is provided in the Figure 2 below. RBR departments which are identified as the main contributors to input/output processes of CCS Engineer to be involved from Employers side are highlighted with yellow.

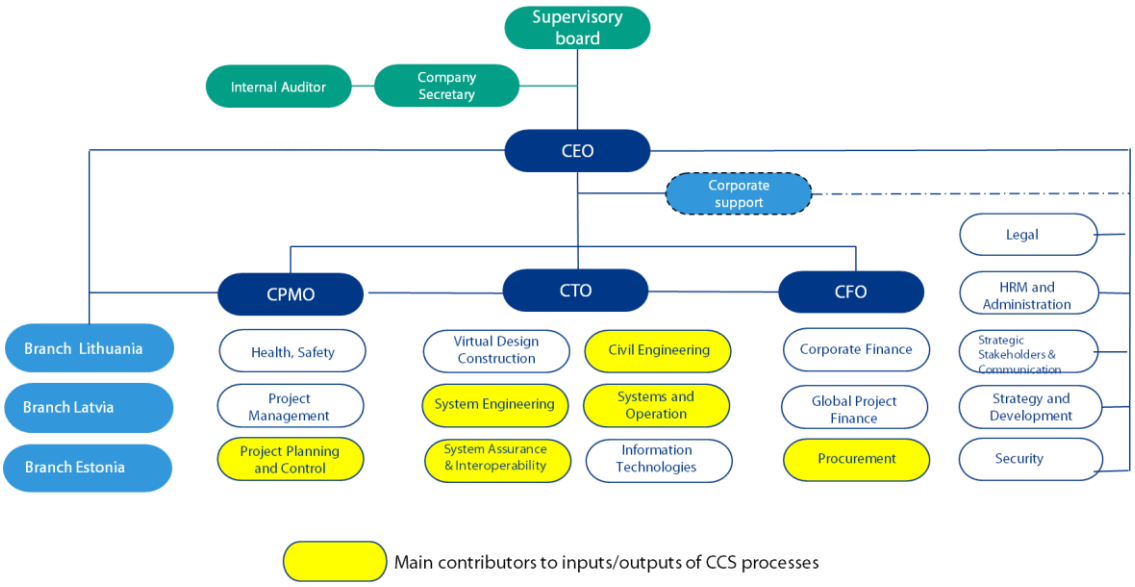

Figure 2. The organisational structure of RB Rail AS

1.2. Abbreviations and terms

All abbreviations, designations, definitions and terms defined in the applicable laws, legislation, regulations, directives, TSIs, standards, rules, Design Guidelines, other guidelines and documents of RB Rail are used in this Scope of Service without modifications if not defined otherwise further. In this document where the context admits, the following words shall have the meaning assigned to them hereafter:

Table 1. Abbreviations and definitions

Denomination	*Abbreviation*	*Definition*
Accelerated Life Test	ALT	A process of testing a product by subjecting it to stress conditions over its normal condition to force the failure to occur in a short amount time to predict reliability in normal conditions.
Affected parties		State institutions, local government bodies, public and/or private enterprises, legal or private entities (persons) representing the owners and/or managers of the assets (networks and/or objects of power supply, gas, oil, water, drainage etc.) that are linked to the designed layout of Rail Baltica railway line and shall be considered.
Agreement		means the Form of Agreement together with the Client/Consultant Model Services Agreement (General Conditions and Particular Conditions), Appendix 1 [Scope of Services], Appendix 2 [Form of the Notice to Commence], Appendix 3 [Remuneration and Payment, and Payment Forms], Appendix 4 [Agreement Administration Forms], Appendix 5 [Rules of Adjudication], Appendix 6 [Procurement Documents], Appendix 7 [Site Security and Security Clearance requirements], Appendix 8 [Checks and Audits],

		Appendix 9 [Form of the Performance Security], Appendix 10 [Supplier's Declaration], as well as any future amendments / addendums to such documents.
Artificial Intelligence	AI	A field of computer science that aims to transform data into information automatically that enables fast decisions based on human machine interface and machine to machine autonomous decision and action.
Assessment Body	AsBo	An independent party appointed to assess the safety risk process applied during a project – determining compliance with the Regulation No. 402/2013 with the final output being the production of a Safety Assessment Report
Asset Management	AM	A process that aims to achieve and keep the physical asset high performance based on the ISO 55001 standards element such as Context of the organization, Leadership, Planning, Support, Operation and Performance evaluation. In addition to the ISO 55001, it is also important to consider the European Federation of National Maintenance Societies Book of knowledge and the Global Forum on Maintenance & Asset Management Asset management landscape as reference of good practices.
Asset Management System	AMS	A software cloud database that enables different users to manage their activities related to asset management, based on ISO 55001 standards principles, to support the achievement and sustain the physical asset's high performance.
Asset Information Management	AIM	-
Automated train operation	ATO	
Automatic Train Protection	ATP	-
Authorization of placement in service	APIS	-
Base transceiver station	BTS	
Beneficiary	BEN	Rail Baltica Global project Beneficiaries are Ministry of Economic Affairs and Communications of the Republic of Estonia, Ministry of Transport of the Republic of Latvia, Ministry of Transport and Communications of the Republic of Lithuania
BIM Execution Plan	BEP	A formal document that defines how the project will be executed, monitored, controlled and approved with regard to BIM. A BEP is developed at initiation of each project phase and subsequently updated to provide important information/data management plans and assignment of roles and responsibilities for model

		creation and data integration throughout the project.
Block section	-	Section of railway line between two ETCS stop marker boards.
Building Information Management	BIM	Set of technologies, processes and policies enabling multiple stakeholders to collaboratively design, construct and operate a facility in virtual space.
Capital Expenditures	CAPEX	
CCS Deployment	-	Full realisation of Rail Baltica CCS subsystems covering necessary studies, Concept Design preparation, generic and specific design preparation, construction works, testing, commissioning, defect notification period covering the opening of railway operations on Rail Baltica line.
CCS Deployment Management Plan	-	A formal, approved document that defines how CCS Deployment is executed, monitored and controlled to achieve the main targets for CCS subsystem. This document shall be used as a reference throughout the CCS Deployment process to ensure that the management of CCS Deployment is carried out consistently and in line with the main targets.
CCS Deployment process	-	All activities required for successful introduction of Rail Baltica CCS subsystems according to objective and targets set by the Employer and covering all necessary studies, Concept Design preparation, generic and specific design preparation, works, testing, commissioning, defect notification period covering the opening of railway operations on Rail Baltica line.
CCS Deployment Programme	-	Part of Rail Baltica Master Programme related to CCS Deployment.
CCS Deployment Risk Management	-	Systematic process of identifying, analysing, and responding to CCS Deployment risks.
CCS Detailed Technical Design	CCS DTD	A final stage of the CCS subsystem design process in accordance with Country's construction legislation and it gives right to start CCS construction works. A final stage of the CCS subsystem design process in accordance with Country's construction legislation and it gives right to start CCS construction works.
CCS Engineer	-	Agreement party providing to the Employer the CCS Engineering services for preparation, procurement and supervision of Rail Baltica Control-Command and Signalling subsystem deployment.
CCS Engineering services	-	The scope of CCS Engineering services and the Agreement covers complete CCS Deployment

		service provision till the end of defect notification period as described in present Scope of service.
CCS Strategy study	-	Study on Rail Baltica CCS subsystems procurement and deployment strategy, performed by Ramboll Danmark A/S and commissioned on 21.12.2020 by RB Rail AS.
CCS Technical Working Group	CCS TWG	*Ad hoc* working group established and managed by RB Rail AS, consisting of Rail Baltica Global Project implementing parties and stakeholders involved in CCS Deployment process. CCS TWG is the platform for the exchange of information and opinions on CCS Deployment process to ensure an efficient feedback mechanism and promote cooperation during the CCS Deployment process.
Commencement Date	CD	Effective Date.
Common Data Environment	CDE	-
Concept Design	-	Rail Baltica railway CCS subsystems design, prepared by CCS Engineer during Preparatory phase and defining CCS subsystems architecture and components in details in vendor neutral level for CCS subsystems design and Works implementation procurement.
Condition Based Monitoring	CBM	A technique, which consist of measuring "at predetermined intervals" the characteristics and parameters of the physical actual state of an item.
Conformity Assessment Body	CAB	A body that performs one or several elements of conformity assessment (Assessment Body, Notified Body, National Safety Authority).
Corrective Maintenance	CM	Act to restore equipment or component function after it fails.
CCS Contractor	-	Any contractor to be engaged by the Client (or other stakeholders involved in CCS Deployment process, as the case may be) for performance of any part of the Works, and identified by the Client as the "Contractor".
Contracting Scheme Agreement	CSA	Agreement on the Contracting Scheme for the Rail Baltic / Rail Baltica between RB Rail AS, Ministry of Economic Affairs and Communications of the Republic of Estonia, Ministry of Transport of the Republic of Latvia, Ministry of Transport and Communications of the Republic of Lithuania, Estonian Technical Regulatory Authority, Rail Baltic Estonia OÜ, Eiropas dzelceļa līnijas SIA, Lietuvos Geležinkeliai AB, Rail Baltica Statyba AB, concluded on 30 September 2016.
Control-Command and Signalling	CCS	Control-Command and Signalling according to the Technical Specifications for Interoperability TSI CCS and EN 50129 standard.
Control-Command and Signalling subsystems	CCS subsystems	CCS subsystems being deployed for entire Rail Baltica Global project covers the following key components:

		• Interlocking System; • Radio Communication System; • ETCS Trackside System; • Traffic Management System; • Transmission/ Communication & Power Supply System; • Ancillary; and other supporting Systems.
Country	-	Any and all of the following countries (as the context requires): Republic of Latvia; Republic of Estonia; Republic of Lithuania as described in this Scope of Services.
Critical Path Method	CPM	-
Critical Items Action Report	CIAR	-
Centralised Traffic Control	CTC	
Cyber Security	-	A practice of defending computers, servers, mobile devices, electronic systems, networks and data from malicious attacks. It's also known as information, communication, signalling system security and electronic information security.
Degraded Operation Mode		Operation in a restricted manner due to the failure of one or more CCS subsystems components. Some safety critical actions are carried out by railway personnel.
Design Failure Mode and Effect Analysis	DFMEA	A qualitative reliability engineering method applied during the design phase that aims to analyse the equipment failure modes, the causes triggered by design error and consequence, including the risk assessment and proposed mitigation.
Design Guidelines	DG	Set of predefined and standardized technically and economically justified engineering and design solutions for Rail Baltica to be applied at design, construction and operation phases of the Rail Baltica Global Project. Design Guidelines are mandatory for all stakeholders involved in design and construction of the Rail Baltica Global Project.
Defect Notification Period	DNP	As to be defined in the Works Contract.
Detailed Technical Design	DTD	Final stage of the design process in accordance with Country's construction legislation and it gives right to start construction works. For Estonia, Detailed Technical Design corresponds to Operational Building Design documentation ("Tööprojekt" in Estonian); For Latvia, Detailed Technical Design corresponds to Building design ("Būvprojekts" in Latvian); For Lithuania, Detailed Technical Design corresponds to work's design ("Darbo projektas" in Lithuanian).

Distribution System Operator for Electrical Energy	DSO	Legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the electricity distribution system in a given area and, where applicable, its interconnections with other systems and for ensuring the long term ability of the system to meet reasonable demands for the distribution of electricity (Directive 2007/72/EC).
Electromagnetic Compatibility	EMC	-
Emergency Operation Mode		Operation in a restricted manner due to the failure of one or more systems of CCS subsystems, e.g. interlocking, TMS, etc. All safety critical actions are typically carried out by railway personnel.
Employer	RBR	RB Rail AS
ENE		Rail Baltica railway energy subsystem, covering extended energy term (as defined in ENE TSI), High Voltage Feeding Lines, other facilities falling under scope of Rail Baltica Global Project implementation and related to the feeding/control of traction facilities.
ENE Engineer	-	ENE Engineer is responsible for delivery of ENE Engineering services for deployment of Rail Baltica ENE subsystem.
European Court of Auditors	ECA	A one of the seven institutions of the European Union and it is in charge of improvement of EU financial management.
European Railway Traffic Management System	ERTMS	-
European Train Control System	ETCS	-
ETCS stop marker board	-	A coloured and reflecting panel which is installed along the track at each end of block section.
Experts		Specialists appointed by CCS Engineer for CCS Engineering service delivery.
Failure Mode and Effect Analysis	FMEA	FMEA is a qualitative reliability engineering method applied during the design phase that aims to analyse the equipment failure modes, the causes triggered by degradation during operation and consequence, including the risk assessment and proposed mitigation.
Fault Tree Analysis	FTA	A qualitative deductive risk analysis method that quantifies the probability or frequency of a top event occurrence considering the combination of basic event occurrence based on logic gates rules.
First Article Inspection	FAI	-
Factory Acceptance Test	FAT	According to FIDIC "Conditions of Contract for Plant & Design-Build, 2nd edition 2017 ("FIDIC Yellow Book").

Failure Reporting, Analysis, and Corrective Action System	FRACAS	A database system that captures the equipment and component failures information such as failure date, type of failures, cause, consequence, root cause of failure, corrective action, responsibility and status. The FRACAS can be integrated into the AMS and CMMS.
Functional Safety Analysis	FSA	A qualitative risk analysis method that analyses the system functional failures, causes, and consequences, including risk assessment and mitigation actions. In addition, based on FSA results, the functional and technical safety requirements are defined to demonstrate the achievement of the safety goal. Finally, the functional and technical safety configurations are defined.
Future Railway Mobile Communication System	FRMCS	Is designed to be the successor to GSM-R, as a cooperative effort across different railway stakeholders and standards organisations. It is also as a key enabler for railway digitalisation.
Generic Design		General Rail Baltica railway CCS subsystem design, part of CCS DTD, prepared by Contractor(-s) during Works implementation process, and defining CCS subsystem architecture and components in details in vendor neutral level.
GIS use cases		GIS use cases that are expected but not limited to: • Mapping and Visualization • Data Management • Field Mobility • Monitoring • Decision Support • Constituent Engagement • Sharing & Collaboration
Hazard rate	HR	Rate of occurrence of a hazard. During qualitative risk analysis the hazard rate is considered constant, but in real life it is not necessary to happen. The hazard rate may increase on time. Therefore, it is necessary to implement Preventive Maintenance to mitigate the risk.
High Accelerate Life Test	HALT	The process of testing a product by subjecting it to extremely high stress conditions over its normal condition to force the failure to occur in a short amount of time to enhance product reliability and robustness.
High Accelerated Stress Screening	HASS	The process of testing a product by subjecting it to high stress conditions over its normal condition during manufacturing to detect failures caused by the manufacturing process.
Human Reliability Analysis	HRA	A different qualitative and semi-quantitative reliability engineering methods applied to predict the human error probability considering the effect of the performance shape factors and mitigate the

		effect of human error during human activities. Not all HRA methods enable the prediction of human error probability and consider the performance shape factor.
Global System for Mobile Communication-Railway	GSM-R	-
Implementing Body	IB	Entities designated by national beneficiaries in each country to implement the Rail Baltica project: OÜ Rail Baltic Estonia, SIA „Eiropas dzelzceļa līnijas“ and AB „LTG Infra.
Information and Communications Technology	ICT	-
Innovation and Networks Executive Agency	INEA	An executive agency established by the European Commission and is in charge of all open TEN-T projects.
International Project Management Association	IPMA	-
Independent Safety Assessor	ISA	An independent party appointed to evaluate and provide judgement that specified aspects of the safety management process have been adequately undertaken and/or specific requirements with regard to the system or part of the system are fulfilled in accordance with EN 50126, EN 50128, EN 50129.
Lead-Experts		Key specialists appointed by CCS Engineer for CCS Engineering service delivery.
Local Facilities	-	Geographically limited parts of railway infrastructure with extended structural or functional elements (terminals, service facilities, roads, major crossings and bridges etc.) which are related or needed to ensure a safe and smooth operation of the railway. Examples: 1) a passenger terminal, 2) a freight terminal, 3) a rolling stock facility, 4) infrastructure maintenance facility, 5) Control centre.
Local Legislation	-	Legislation applicable in the particular Country.
Life Cycle Cost	LCC	A process of compiling all costs that the owner or producer of an asset will incur over its lifespan including the acquisition, operation, maintenance, and decommissioning costs. The LCC must be part of the RAM analysis to predict the proper effect of system configuration, maintenance, and spare parts on LCC related to RAMS performance.
Lifetime Data Analysis	LDA	Reliability Engineering method based on statistic principles applied to define the best probability density function that fits in set of field data (failure time or repair time), estimate the probability density function parameters, and finally predict

		the reliability, failure rate and other indexes for specific time.
Multi Criteria Analysis	MCA	Analysis to compare and assess alternative proposals where objectives are diverse and where the potential beneficial and adverse effects have implications in different areas and/or communities or beneficiaries.
Notified Body	NoBo	Is an organisation designated by an EU country to assess the conformity of certain products before being placed on the market.
National Safety Authority	NSA	National safety authority of respective Country, which authorises placing Interoperable subsystems into service.
Normal Operation Mode		Operation in a day by day manner when all CCS subsystems are functioning and carry out safety critical actions as required.
Non-Destructive Testing	NDT	NDT are maintenance techniques, part of condition-based maintenance, which consist of measuring, observing or testing the relevant characteristics of an item.
Non-traction power supply		Non-traction power supply system is a part of Rail Baltica Railway System. CCS Engineer is responsible for the development of NTPS system.
Operation Control Canter	OCC	
Overhead Contact System	OCS	-
Operation & Maintenance	O&M	-
Operational Expenses	OPEX	
Operational Plan	OP	Comprehensive set of documents defining all long term operational principles of the Rail Baltica railway line on the wider corridor of Warsaw – Helsinki and describing the future structure of train traffic and operational processes on Rail Baltica railway line, outlining railway capacity, establishing operational requirements with regard to the infrastructure and rolling stock and outlining the related effort for maintenance of the infrastructure and rolling stock. Operational Plan defines also the infrastructure parameters on Rail Baltica railway line, covering speed limitations, track layouts of the stations, main line and facilities, type of turnouts, main infrastructure objects. Timetable and travel times defined in the OP are the ones of the essential targets to be complied with during Rail Baltica Global project implementation. OP is being updated on a regular basis throughout the progress of Rail Baltica Global project.
Organizational Breakdown Structure	OBS	-
Partial Acceptance Test	PAT	-

Polskie Koleje Państwowe - Polskie Linie Kolejowe	PKP-PLK	Railway Infrastructure Manager in Poland.
Post Installation Check Out	PICO	Installation work Acceptance.
Power Supply Connection Point	PS Connection Point	In the context of CCS Engineering services, a structural point within Rail Baltica Non-traction power supply system where Non-traction power supply consumers are connected to an external power supply network or to the Traction Power Supply System.
Preventive Maintenance	PM	Action to restore equipment or component function before it fails.
Preliminary Design	PD	Completed pre-design stage in accordance with Country's national construction legislation and approved at the State level.
Preliminary Hazard Analysis	PHA	Qualitative deductive risk analysis that aims to identify the system, subsystem hazard, perform risk assessment and propose risk mitigation actions.
Process Failure Mode and Effect Analysis	PFMEA	PFMEA is a qualitative reliability engineering method applied during the design phase that aims to analyse the equipment failure modes, the causes triggered by manufacturing/montage error and consequence including the risk assessment and proposed mitigation.
Prognostic Health Management	PHM	Act to predict the equipment or component RUL and SoH based on predictive maintenance P data information.
Project Management Body of Knowledge	PMBOK	-
Project Manager		Persons in overall charge of the planning and execution of CCS Engineering service delivery project from Employers' side and from CCS Engineers' side.
Project Management Office	PMO	The organization/management structure established by CCS Engineer responsible for defining and managing the CCS Deployment governance process, procedures, templates, sharing of resources, methodologies, tools and techniques, supporting. applying project management principles set out by PMI (Project Management Institute) or similar organisations and facilitating CCS Deployment process.
Radio Coverage Simulation Software Tool	-	Digital software tool for radio coverage and interference simulation proposed by the CCS Engineer for the CCS Engineering service procurement process.
Rail Baltica Global Project	-	All the activities undertaken by the Rail Baltica railway implementing parties in order to build, put in operation and commercialize the Rail Baltica railway and related railway infrastructure in

		accordance with the agreed route, technical parameters and time schedule.
Rail Baltica Master Programme	-	Rail Baltica Global project implementation integrated schedule regularly updated by the Employer.
Rail Baltica railway	-	A new fast conventional double track electrified European standard gauge (1435 mm) railway line on the route from Tallinn through Pärnu – Riga - Panevėžys - Kaunas to Lithuanian - Polish border, with a connection line between Kaunas and Vilnius.
Rail Baltica Track Layout	-	Layout developed as a part of Operational Plan and updated regularly as Rail Baltica Global project progresses.
Railway Communication Systems	-	Set of communication systems delivering communications to CCS subsystem and other subsystems or users, for railway operation functions and administrative support functions.
Railway Infrastructure	-	Has the meaning in the Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (recast), as well includes freight and passenger terminals and infrastructure and rolling stock maintenance facilities and the ground underneath them and the airspace above them to the extent that the national legislation permits the ownership of the ground and the airspace.
Reliability, Availability, Maintainability	RAM	According to the EN 50126 standard.
RAM analysis		Reliability engineering method applied to predict system, subsystem, equipment and component operational availability, reliability, expected number of failures, expected number of preventive maintenances, LCC and define the most critical equipment. The RAM analysis is based on reliability diagram block system configuration and Monte Carlo simulation. Such method is used as input data such as probability density functions parameters, Preventive maintenance task schedule, Preventive maintenance task duration, spare part and cost related to spare parts and maintenance.
Reliability, Availability, Maintainability and Safety	RAMS	According to the EN 50126 standard.
Reliability Centred Maintenance	RCM	A qualitative reliability engineering method that aims to define the different maintenance tasks, types of maintenance and frequency of such maintenance tasks on time. The RCM considers the FMEA template as input information. Each maintenance task is defined based on FMEA equipment/component failure mode and cause.

Renewable Energy	-	According to Directive (EU) 2018/2001, renewable energy refers to energy from renewable non-fossil sources, namely wind, solar (both solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogas.
Risk Management	-	A systematic application of management policies, procedures and practices to the tasks of analysing, evaluating and controlling risk.
SCADA	-	Supervisory Control and Data Acquisition system applied to non-traction Rail Baltica Global Project related facilities.
Energy Control-Command System	ECCS	System for remote monitoring and control of Rail Baltica Global Traction Electrification System.
Scope of Services	-	This document with all its Annexes.
Service Deliverable	-	Tangible Service result with the defined content, subject to the completion of a Service milestone and approval.
Service Package	-	Part of the Services with the defined scope and subject to the completion of a Service milestone and approval by the Employer.
Services	-	Services implemented by the CCS Engineer in accordance with the Agreement.
Service Section	-	A part of Rail Baltica railway infrastructure identified for convenient managing of the CCS Deployment process.
Safety Integrity Level	SIL	The level of safety integrity (I to IV) of the Safety Instrumented Function (sensor, control, and Final Element) or Electric or Electronic device function. Each SIL is associated with the probability of failure on demand or hazard rate.
Safety Integrity Level Analysis	SIL Analysis	Is an inductive qualitative or semi-quantitative risk analysis method to define the SIL level for an Electric or Electronic device function or a specific Safety Instrumented Function.
Site Acceptance Test	SAT	According to FIDIC "Conditions of Contract for Plant & Design-Build, 2nd edition 2017 ("FIDIC Yellow Book").
Shadow Operator	SO	The Shadow Operator is a Consultant contracted by RB Rail AS that provides its Operation and Maintenance (O&M) experience and expertise in the railway industry to support the Rail Baltica project in representing the future O&M companies during the design and construction phases. Shadow Operator is currently under tendering process by RB Rail AS
Spare Part Strategy	-	It is the short, medium and long-term time spare part level definition for different LRUs to ensure that right spare part and resources are at the right place at the right time.

State of Health	SoH	The percentage of health presented by an equipment when operating under operational stress level higher than designed.
Subsystem	-	Structural or functional part of the rail system as defined in Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union (recast).
Supplier	-	An individual or a legal person, a group or association of such persons in any combination thereof which offers to perform works or supply products or provide services accordingly.
System		System related to specific subsystem, e.g. Systems of CCS subsystem
System Acceptance Test	SAT	According to V&V.
System Integration Test	SIT	According to V&V.
System Failure Mode and Effect analysis	SFMEA	SFMEA is a qualitative reliability engineering method applied during concept and/or design phase that aims to analyse the systems interfaces influence in one each other systems considering function failures, causes and consequence, including risk assessment and proposed mitigation.
Technical building/Technical premise	-	Building or technical room in a building dedicated to any railway system.
Technical Integration	-	Technical integration consist in systematic identification of relevant technical and operational interfaces, initiation, development and management of interface specifications, supervision of integration of functional and technical designs, supervision of verification and validation activities, supervision of resolution of interfaces by Contractors, and supervision of test scenarios and sequences to be performed as part of test sessions.
Technical Supervision	-	Services implemented by the CCS Engineer in accordance with national construction legislation of the Country concerned: - *Ehitusjärelevalve* (in accordance with Estonian construction legislation); - *Būvuzraudzība* (in accordance with Latvian construction legislation); - *Techninė priežiūra* (in accordance with Lithuanian construction legislation).
Technical Reference Group	TRG	Coordination and alignment body for the implementation of the technical substance of Rail Baltica Global project with the ultimate aim to ensure interoperability within the project and alignment between the parties involved in Rail Baltica Global project implementation. One of the

		responsibilities of the TRG is to manage the change processes of the Design Guidelines. The TRG consists of members from each of the Baltic States appointed by the Beneficiary as well as the representatives of the technical team of RB Rail AS.
Testing and commissioning	T&C	Testing and commissioning of completed Works.
Technical Specifications for Interoperability	TSI	The Technical Specifications for Interoperability as defined in Directive (EU) 2016/797 defining the technical and operational standards which must be met by each subsystem or part of subsystem in order to meet the essential requirements and ensure the interoperability of the railway system of the European Union.
Traffic Management System	TMS	-
Transmission System Operator for electrical energy	TSO	
Work Breakdown Structure	WBS	A deliverable-oriented breakdown of a project into smaller components.
Verification & Validation	V&V	Processes according to EN50126 standard: Verification is a process checking, whether it is possible to move to the next phase in the V-model; Validation is a process checking, whether physical system behaves as specified, i.e. horizontal tests and checks in the V-model.
Works	-	All and any permanent and temporary works required for implementation of the CCS Deployment as defined in the Works Contract.
Works Contract		A contract (or several contracts, as the case may be) concluded between the Client (or other stakeholders involved in CCS Deployment process acting as employers under respective contracts, as the case may be) and the Contractor for performance of Works (or any part of them as the case may be) and identified by the Employer as "Works Contract".

1.3. Document references

CCS Engineer shall fully take into account, inter alia, the following documents in the provision of the Services stated in Table 2.

Table 2. Main documents to be considered

Ref. Nr.	*Title of document*	*Availability / Web link*
[1]	Design Guidelines, including Final Study Report	Annex 1 to this Scope of Service
[2]	Operational Plan (including Annexes and updated Track layout)	Annex 4 to this Scope of Service, publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/

[3]	Contracting Scheme Agreement	Relevant extract to be provided after signature of the Agreement
[4]	Rail Baltica Cost-Benefit Analysis, 2017	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/
[5]	CCS Strategy study (Rail Baltica control-command and signalling (CCS) subsystems procurement and deployment strategy)	Annex 2 to this Scope of Service (Final Report & Presentation)
[6]	Zero Environmental Impact during O&M phase Strategy (ZEIS)	To be provided after signature of the Agreement
[7]	ENE Strategy study (Rail Baltica energy subsystem procurement and deployment strategy)	To be provided after signature of the Agreement
[8]	ENE Engineering services – Appendix 1 Scope of Services	Annex 3 to this Scope of Service
[9]	Climate change study (Study on climate change impact assessment for the design, construction, maintenance and operation of Rail Baltica railway)	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/
[10]	Rail Baltica EMC study	To be provided after signature of the Agreement
[11]	Master designs and Detailed designs of Rail Baltica Local Facilities.	To be provided after signature of the Agreement
[12]	Master designs and Detailed designs of Rail Baltica Main line Design sections.	To be provided after signature of the Agreement
[13]	Rail Baltica Global Project risk management plan	To be provided after signature of the Agreement
[14}	Rail Baltica Operational Concept (developed by Shadow Operator)	To be provided during the course of the Services
[15]	Rail Baltica Railway cyber-security strategy	To be provided during the course of the Services
[16]	Riga Node Operation Optimisation study	To be provided after signature of the Agreement
[17]	Kaunas station, 1435/1520 Operation expertise	To be provided during the course of the Services

1.4. Standard references

The CCS Engineer shall fully take into account the following standards stated in Table 3 in the provision of the Services, the in-force standards shall be applied:

Table 3. Main standards to be considered

Document Number	Document Title
Directive (EU) 2016/797 (Interoperability directive)	Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union
Directive (EU) 2016/798 (Safety Directive)	Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety

Regulation No. 402/2013 (CSM RA)	Commission implementing regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment.
Regulation No. 215/1136	Amending implementation Regulation (EU) 402/2013
Regulation No.216/919 (TSI CCS)	Commission Regulation (EU) 2016/919 of 27 May 2016 on the technical specification for interoperability relating to the 'control-command and signalling' subsystems of the rail system in the European Union
EN 50126:2017	Railway Applications – The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) Part 1 – Basic Requirements and Generic Process Part 2: Guide to the application of the EN 50126-1 for safety
EN 50128:2011	Railway Applications – Communication, Signalling and Processing Systems – Software for Railway Control and Protection Systems
EN 50129:2018	Railway Applications – Communication, Signalling and Processing Systems – Safety Related Electronic Systems for Signalling
IEC 61508	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems (all series parts)
ISO 12207	Systems and software engineering – Software life cycle processes
ISO 10007	Quality management systems -- Guidelines for configuration management
IEC 62443	Security for Industrial Automation and Control Systems
ISO 55001	Standard provides an overview of asset management and asset management systems.

1.5. Legal references

The CCS Engineer shall follow EU directives and regulations, all Country's construction and other national legislation, EU standards, Country-specific legislation/standards/rules and other legal acts applicable for the provision of the Services.

2. GENERAL SCOPE

2.1. General

2.1.1. The Employer is appointed as a central purchasing body for procurement of studies, design and construction works for CCS Deployment in Rail Baltica Global project in Estonia, Latvia and Lithuania.

2.1.2. The Employer is appointed to conclude contracts and supervise the execution of the concluded contracts on behalf of Rail Baltica Global project Beneficiaries and Implementing Bodies for the full scope of CCS subsystem.

2.1.3. The CCS Engineer shall verify at any opportunity that the implementation of the CCS subsystems is in full compliance with the eligibility conditions edited by INEA. During any auditing or claim processes from INEA, ECA or any other entitled authority, the CCS Engineer shall provide technical assistance to the Employer in the preparation of any supporting argumentation or by producing and assembling required documentation.

2.1.4. As part of the scope of the Services, the Employer delegates and the CCS Engineer undertakes full responsibility of the management of Rail Baltica Global project CCS Deployment as described in Chapter 2.8, except for the procedural organisation of public procurements and concluding contracts with the Contractors.

2.1.5. The CCS Engineering services that the CCS Engineer shall undertake and complete are aimed to:

2.1.5.1. Implement all tasks assigned to Project Management Office for CCS Deployment process;

2.1.5.2. Develop technical solutions and Concept Designs for all Systems of the CCS subsystem with a vendor neutral perspective;

2.1.5.3. Manage the CCS Deployment by ensuring the proper quality control, application of the best engineering practices, transparent procurement and efficient supervision with the aim to achieve the most optimum solution for Rail Baltica CCS subsystem from targeted RAMS performance and LCC perspective.

2.1.5.4. Develop and provide to Employer studies, drawings, manuals for definition of functionalities, architecture and performances of all Systems of CCS subsystem (including the future management of the built infrastructure) for procurement of CCS detailed design and construction works;

2.1.5.5. Elaborate requirement specifications (incl. technical, functional, operational, RAMS, etc. requirements) for all Systems of CCS subsystem;

2.1.5.6. Lead the Technical integration of all Systems of CCS subsystem with the following systems:

- Track and Civil works (INF TSI domain),
- Energy subsystem (ENE TSI domain),
- People with disabilities and reduced mobility (PRM TSI domain),
- Operation and Traffic Management (OPE TSI domain),
- Telematics application for passenger services (TAP TSI domain),
- Telematics application for freight services (TAF TSI domain),
- Rolling stock,
- ICT systems used for administrative management by Infrastructure Manager and Railway Undertakings.
- 1520 mm CCS and ICT where 1520 mm infrastructure is crossed at grade by Rail Baltica 1435 mm tracks (refer to Chapter 2.2.4),

- Public and private telecommunication systems, interfaced with Rail Baltica or implemented in Rail Baltica premises or right of way,
- Any system or subsystem related to railway and people safety,
- Any system or subsystem related to security and defence.
- Any system or subsystem related to Local facilities operation (Mechanical, Electrical, Plumbing, etc.)

2.1.5.7. Develop radio coverage design by means of radio cellular network planning and signal propagation software tool;

2.1.5.8. Perform all responsibilities of the FIDIC engineer during the implementation of Works Contract providing technical supervision of design, construction, system integration, testing and commissioning, putting in operation and Defect Notification Period.

2.1.6. Technical integration role of CCS Engineer shall cover all Rail Baltica Global scope, including Local Facilities.

2.1.7. Another essential objective of the CCS Engineer is to ensure the management of CCS Deployment process in order to deploy Rail Baltica CCS subsystem that is interoperable across the Baltic States (including Poland) and in full compliance with EU regulations and Rail Baltica Design Guidelines.

2.1.8. The CCS Engineer shall reach main targets specified for CCS subsystem and elaborate state-of-the-art technical solutions for optimum operability of the Rail Baltica railway and reaching all the following goals which will be detailed during CCS Deployment:

2.1.8.1. Single design concept across 3 Baltic states resulting in scale and maintenance economies, limited number of interfaces,
2.1.8.2. Sustainability and Life-Cycle Cost requirements,
2.1.8.3. "State-of-the-art and further" by early adopting the latest evolutions of CCS standardization and initiatives (game changers from Shift2Rail and industry innovations (FRMCS, ATO functionalities, etc.),
2.1.8.4. Integration with 1520 mm railways and common traffic management for intermodal operations in 1435/1520 mm freight yards,
2.1.8.5. Concentration of railway systems equipment in predefined land plot reservation areas for railway systems,
2.1.8.6. Zero copper cables on open line,
2.1.8.7. Usage of local renewable power supply.

2.1.9. During the provision of the Services, the CCS Engineer shall endeavour to deliver to the Employer CCS subsystem with the minimal environmental impact.

2.1.10. The CCS Engineer shall implement Rail Baltica CCS subsystem in compliance with essential requirements of the Annex III of Directive (EU) 2016/797 on the interoperability:

2.1.10.1. Safety,
2.1.10.2. Reliability, availability and maintainability,
2.1.10.3. Health,
2.1.10.4. Environmental protection,
2.1.10.5. Technical compatibility,
2.1.10.6. Accessibility.

2.1.11. The CCS Engineer is responsible for the early reallocation of his resources and adaptive planning of the Services in relation to the status / changes of Rail Baltica Master Programme.

2.1.12. The CCS Engineer shall provide the Services during spread of COVID-19 disease or any other biological hazard in accordance with the Agreement only under absolute safety and health conditions by respecting the governments of the relevant Countries mandatory safety and health requirements and/or best practices into European Union.

2.2. Geographical scope

2.2.1. Geographical scope includes all Systems of CCS subsystem for Rail Baltica Global Project infrastructure in Estonia, Latvia and Lithuania, plus the interface with Poland with PKP-PLK. The geographical scope is defined as a whole Rail Baltica Global project and any changes within this geographical scope and within Global project will not be considered as a justification of any variations.

2.2.2. The most up to date version of Track layout annexed to Operational Plan[2] indicates the present status of Global Project geographical scope and is regularly updated according to the actual progress of the design.

2.2.3. For the avoidance of doubt, the geographical scope includes Rail Baltica main line including all Local Facilities of Rail Baltica Global Project:

2.2.3.1. Passenger stations and stopping points (international and regional)
2.2.3.2. freight/intermodal terminal,
2.2.3.3. freight yard,
2.2.3.4. rolling stock maintenance facility,
2.2.3.5. infrastructure maintenance facility,
2.2.3.6. military facility.

2.2.4. In addition, the geographical scope includes all 1520 mm infrastructure which is crossed at grade by Rail Baltica 1435 mm tracks, including notably all 1520 mm Interlocking, Signalling, Train Protection, TMS and ICT systems at locations where 1435 mm and 1520 mm gauge tracks shall cross each other at one level[1] (Kaunas, Palemonas, Vilnius, Muuga, Salaspils, etc.) and where 1520 mm shall be implemented as gauntlet track (Kaunas tunnel).

2.2.5. The CCS Engineer shall specify all Systems of CCS subsystem and ensure Engineer duties for Rail Baltica main line, all Local Facilities mentioned in Chapter 2.2.3, all 1520 mm infrastructure mentioned in Chapter 2.2.4 and all interfaces between these systems.

2.2.6. Optional scope: As part of potential variations of the Agreement, the CCS Engineer could be invited to deliver services regarding the following scope:

2.2.6.1. Development of Concept Design, Functional and Technical specifications for introduction of ERTMS on 1520 mm railway networks in Estonia, Latvia and Lithuania, including specifications for rolling stock onboard equipment;
2.2.6.2. Elaboration of strategy for dynamic testing phases, coordination of dynamic tests;
2.2.6.3. Any other optional 1435 mm scope related to CCS subsystems implementation for Rail Baltica railway, which is not included in the Global Project;
2.2.6.4. Any other additional 1520 mm railway section which shall be interfaced with CCS subsystems implementation for Rail Baltica railway;
2.2.6.5. Sketch Design and Technical Design for Technical buildings/technical premises.

2.3. System scope:

2.3.1. In general, the scope of the CCS Engineering services includes all the necessary railway Systems and their interfaces which are needed for Rail Baltica Global Project operation and maintenance, except:

2.3.1.1. ENE subsystem scope, as defined in [8],
2.3.1.2. Mechanical, Electrical, Plumbing (MEP) scope of Local Facilities,

[1] Crossing of 1435 mm and 1520 mm gauge tracks at one level is implemented by means of specific gauge crossings

2.3.1.3. ICT systems used for administrative management by Infrastructure Manager and Railway Undertakings.

2.3.2. CCS Engineer's scope includes all systems defined in:

2.3.2.1. TSI CCS, and following Rail Baltica Design Guidelines:

2.3.2.2. RBDG-MAN-020-0101 Railway Energy: Part 3 Non- traction power supply (in annex 1);

2.3.2.3. RBDG-MAN-021-0101 Railway Energy: Part 4 Electromagnetic compatibility (excluding ENE subsystem) (in annex 1);

2.3.2.4. RBDG-MAN-022-0102 Railway Control-Command Signalling system (in annex 1);

2.3.2.5. RBDG-MAN-023-0101 Railway telecommunications system(in annex 1);

2.3.2.6. RBDG-MAN-024-0101 Railway SCADA (excluding SCADA for ENE subsystem) (in annex 1);

2.3.2.7. RBDG-MAN-012-0105 General requirements : Cableways (its Chapter 10 in annex 1);

to be deployed for entire Rail Baltica Global project.

2.3.3. Hierarchy of CCS subsystems which is used in this document is provided in Table 4.:

Table 4. Hierarchy of railway subsystems

Level	Description
Level 0	Railway system
Level 1	Subsystem (INF, ENE, CCS, Rolling stock)
Level 2	System related to a specific subsystem, e.g. System of CCS subsystem
Level 3	Part of a specific System
Level 4	Component of a specific Part of a System

2.3.4. The indicative CCS subsystem breakdown structure is provided in the Figure 3.

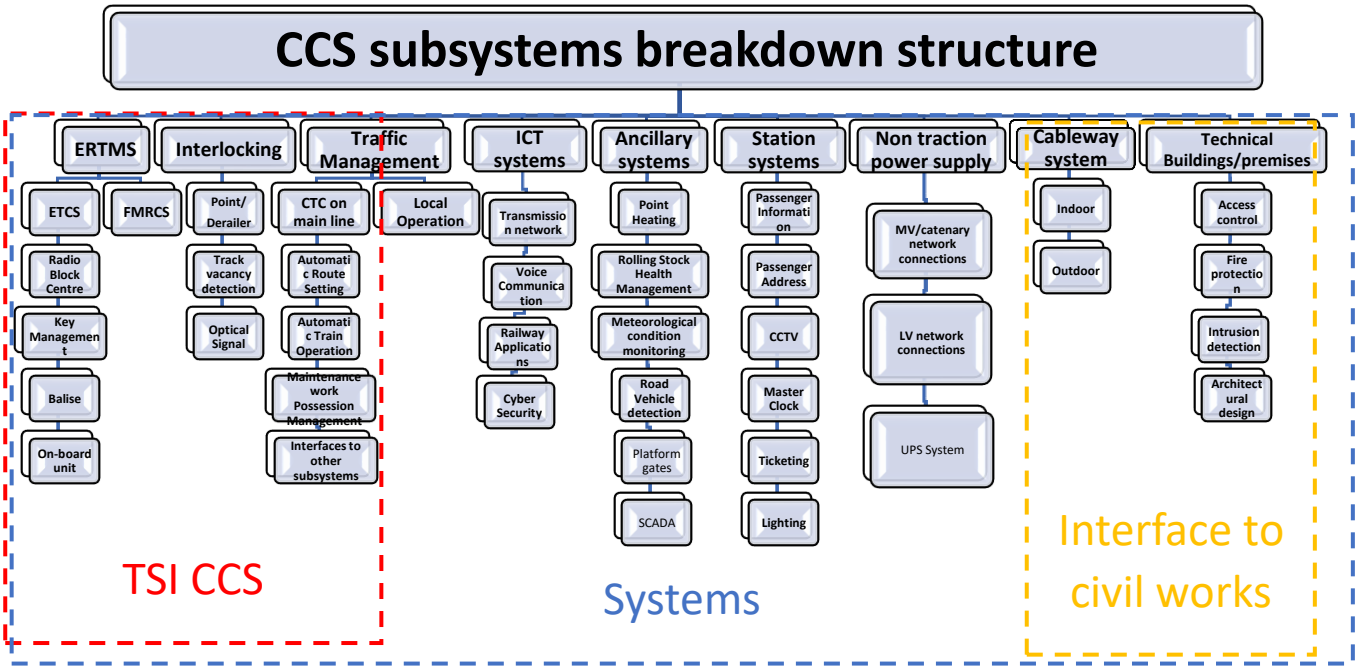

Figure 3. System scope breakdown structures

2.3.5. The Scope breakdown structure depicted above is indicative and shall be reviewed and improved by CCS Engineer during CCS Deployment preparation phase.

2.3.6. The principal features of the main Systems (non-limitative list) are provided below:

2.3.6.1. ERTMS including ETCS Level 2 without track side signalling, FMRCS and ATO as per TSI CCS revision expected in 2022,

2.3.6.2. Interlocking based on EULYNX specifications baseline 3 or 4,

2.3.6.3. Traffic Management based on Traffic Management Evolution (TD2.9) for Centralised Traffic Control on Rail Baltica main line as well Local Control for traffic control in Local Facilities outside Rail Baltica main line,

2.3.6.4. ICT systems: fixed transmission networks, voice communication, railway operation communication applications, Cyber Security purposed for railway operation needs except ICT used for administrative management by Infrastructure Manager and Railway Undertakings,

2.3.6.5. Ancillary systems: turnout predictive monitoring, point heating, rolling stock health management, meteorological condition monitoring, flood monitoring, road vehicle detection, platform gates, SCADA, structures' monitoring, broken rail detection, rail temperature monitoring, maintenance work monitoring and track possession, etc.,

2.3.6.6. Station equipment on international and regional stations: PIS, Passenger Address, CCTV, Master Clock, ticketing system, Lighting, etc,

2.3.6.7. Non traction power supply of all Systems of CCS subsystem,

2.3.6.8. Cableway system for all systems of CCS subsystem,

2.3.6.9. Technical Buildings/premises for all systems of CCS subsystem.

2.3.7. CCS Engineer's scope includes design and specification of interfaces with adjacent infrastructures and elaboration of functional and technical solutions for their deployment:

2.3.7.1. Interfaces with existing 1520 mm railway infrastructure systems and necessary modifications of 1520 mm systems at 1520/1435 mm intersections and 1520/1435 mm gauntleted track sections. These interfaces are present at Kaunas station, Kaunas tunnel, Palemonas station, Vilnius station, intermodal terminals in Kaunas, Vilnius, Salaspils, Muuga, Rolling Stock Maintenance and Infrastructure Maintenance Facilities, and possibly other locations,

2.3.7.2. Interfaces with power supply infrastructures of TSO and DSO,

2.3.7.3. Other utilities infrastructure objects identified during Service provision and impacting the solutions to be considered for CCS Deployment (for example: high voltage line crossing or parallel to the railway infrastructure, 1520 mm railway, airport, industrial plant or similar, utilities, which are source of specific requirements for the CCS subsystem design).

2.3.8. Service scope covers also the analysis and the supply of technical solutions regarding all aspect of electrical and electromagnetic compatibility (EMC) inside the CCS subsystem and between the CCS subsystem and all surrounding or interfaced systems or infrastructure, whomever being the owners.

2.4. Scope of CCS Deployment process

2.4.1. Services to be provided by the CCS Engineer shall cover all phases of CCS Deployment. In this document they are divided into two phases:

2.4.1.1. Preparatory phase;

2.4.1.2. Works implementation phase.

2.5. Scope of CCS Deployment management

For provision of the Services the CCS Engineer shall establish the Program Management Office (Chapter 3) responsible for defining and managing the program-related governance process, procedures, templates, etc. supporting individual program management teams by handling administrative functions centrally or providing dedicated assistance to the Employer.

2.6. Expert technical assistance

2.6.1. The CCS Engineer shall ensure technical expertise for all Systems of CCS subsystem throughout the full CCS Deployment Process, provide technical assistance as described in Chapter 2.3 and cover the following fields of technical expertise:

- 2.6.1.1. Interface with ENE subsystem,
- 2.6.1.2. Interface with INF subsystem (in particularly with turnouts),
- 2.6.1.3. Interface with CCS on-board subsystem,
- 2.6.1.4. Interfaces between 1435 and 1520-mm railways,
- 2.6.1.5. Electromagnetic Compatibility of all Systems of CCS subsystem,
- 2.6.1.6. RAMS for all Systems of CCS subsystem,
- 2.6.1.7. Software development for all Systems of CCS subsystem,
- 2.6.1.8. Contributing to putting all Systems of CCS subsystem into operation,
- 2.6.1.9. Operation and maintenance of all Systems of CCS subsystem.

2.6.2. The CCS Engineer shall provide technical support to the Employer as part of the implementation of Common Safety Methods (CSM) and safety techniques in compliance with requirements and standards applicable for CCS subsystem development and Deployment.

2.7. Language

2.7.1. In provision of the CCS Engineer services working language with the Employer is English.

2.7.2. The CCS Engineer is responsible for the provision of the Services in Country's local language, in particular:

- 2.7.2.1. Review of documents which are only available in Country`s local language,
- 2.7.2.2. Review of design documents which are only available in Country's local language,
- 2.7.2.3. Communication with local stakeholders, (local language if necessary),
- 2.7.2.4. Provision of necessary data for local stakeholders (local language if necessary).

2.7.3. The CCS Engineer shall ensure the communication and provision of documents in English and if required/requested, in Country's local language.

2.7.4. Non-exhaustive list of documents which shall be provided by the CCS Engineer and translated into Country's local language includes:

- 2.7.4.1. Presentations to local stakeholders (if required by stakeholders),
- 2.7.4.2. Applications for receiving Technical conditions from Affected parties,
- 2.7.4.3. Concept Design (if specific part is required).

2.8. Main responsibilities

Main responsibilities have been indicated in Table 5 below and is a subject to change during elaboration of CCS Deployment strategy and CCS Management plan.

Table 5. Main responsibilities table

Activity	Employer	CCS Engineer	Shadow operator	ENE Engineer	CCS Works Contractor(-s)	CAB`s
Preparatory phase						
Consolidate the Employer's expectations and requirements	C+A	R				
Rail Baltica Operational Concept	C+A	C	R			
Concept Design	A	R		C		I+C
Requirements specifications for CCS subsystems	A	R		C		A
Architectural design for technical buildings	A	R		C		
Requirements management, technical integration management and technical interface management, incl. all railway systems requirements during Design phase;	A	R				
RAMS program development	C+A	R				
Operation and Maintenance Plan development for all systems of CCS subsystem	A	R	C			
Prepare Works procurement functional and technical specification	A	R				I+C
Manage Works procurement	R	C				
Works implementation phase						
CCS subsystems implementation project management (PMO) including Works contract management	I+A	R			I+C	I
Configuration management	I	A+C			R	
Systems integration	A	A+C			R	I
Design and construction of all systems of CCS subsystem	A	A+C		C	R	A
Testing, commissioning and putting in operation of all systems of CCS subsystem	A	A+C	C	C	R	A
Conformity assessment of Works Specifications (NoBo & AsBo)	A	I+C			C+R[2]	R
RAMS program implementation and deliverables	A	A+C			R	I

[2] Contractor is responsible to procure AsBo services related to its scope of delivery.

Operation and Maintenance program development and implementation	A	A+C	C		R	
Requirement Management of all Systems of CCS subsystem	A	R			C+R	I
Defects resolution during DNP	I	A+ C			R	

R: Responsible for producing process outputs

A: Approves process outputs

C: Contributes to production of process outputs

I: Informed of content of process outputs

3. PROJECT MANAGEMENT OFFICE

3.1. General

3.1.1. The role of the Project Management Office to be established by the CCS Engineer is to manage the CCS Engineering services and CCS Deployment with the following:

3.1.1.1. Definition the CCS Deployment management processes and procedures that will be followed by the CCS Engineer and CCS Contractor(-s),

3.1.1.2. Creation and management of the CCS Deployment Programme according to AACE3 standards,

3.1.1.3. For the provision of the Services, the CCS Engineer shall establish at least one permanent office in Riga, and other offices in Vilnius (or Kaunas) and Tallinn. In main office in Riga there shall be a meeting room allowing meetings with the Employer (min. 15 persons),

3.1.1.4. Required on-site offices including all the office equipment necessary for the CCS Engineer during the supervision of construction, installation works, testing and commissioning and Defect Notification Period shall be provided free of charge by the CCS Contractor(-s), following the schedule of the CCS Deployment,

3.1.1.5. Definition of the quality standards for CCS Deployment of all Systems, parts and components CCS subsystem,

3.1.1.6. Resource management across CCS Deployment,

3.1.1.7. Documents and configuration management (knowledge management),

3.1.1.8. Centralized support for managing changes and tracking risks and issues,

3.1.1.9. Contract management of Works contract,

3.1.1.10. Management support for personnel and other resources, contracts and procurements, and legislative issues,

3.1.1.11. Providing necessary expert and administrative resources.

3.1.2. The CCS Engineer shall employ the best industry practice of applying project management principles set out by PMI (Project Management Institute[4]), Prince[5] or similar organisations.

3.1.3. The CCS Engineer shall prepare and maintain the CCS Deployment Management Plan covering at least the following parts:

3.1.3.1. CCS Deployment Programme,
3.1.3.2. Scope management,
3.1.3.3. Schedule management,
3.1.3.4. Quality assurance management,
3.1.3.5. Stakeholder management,
3.1.3.6. Documentation management,
3.1.3.7. Resource management,
3.1.3.8. Communication management,
3.1.3.9. CCS Deployment Risk management,
3.1.3.10. Cost management,
3.1.3.11. Change management,

[3] Association for the Advancement of Cost Engineering - https://web.aacei.org/.

[4] Project Management Institute - https://www.pmi.org/.

[5] Prince2 project management: https://www.axelos.com/best-practice-solutions/prince2

3.1.3.12. Asset management,
3.1.3.13. Audit management.

3.1.4. The CCS Engineer shall review the CCS Deployment Management Plan and update it monthly (related parts) as a result of Rail Baltica Global project development (including CCS Deployment) by taking all necessary factors (including external factors related to economic situation, market trends etc.).

3.2. CCS Deployment Programme incl. Scope and Schedule management

3.2.1. The CCS Engineer shall prepare the CCS Deployment Management Plan in accordance with Project management Body of Knowledge[6], or other equivalent / similar requirements. CCS Deployment Management Plan shall describe how CCS Deployment will be executed, monitored, controlled and reported on a regular basis.

3.2.2. The CCS Deployment Management Plan draft version shall be submitted as a part of Inception Report. Minimal content of the CCS Deployment Management Plan is as follows.

3.2.2.1. Management Plan structure;
3.2.2.2. Organizational Breakdown Structure (OBS) and organizational chart together with a statement of duties and responsibilities, which shall demonstrate how the CCS Engineer will comply with responsibilities under the Agreement and how the OBS is interrelated to the work breakdown structure of the CCS Deployment Programme;
3.2.2.3. The CCS Engineer shall define a template for Critical Items Action Report (CIAR) in the CCS Deployment Management Plan;
3.2.2.4. Milestones of Services to be provided by the CCS Engineer;
3.2.2.5. Works implementation activities with clear and logical predecessors and successors;
3.2.2.6. Preparatory phase milestones;
3.2.2.7. Works implementation milestones;
3.2.2.8. Milestones of all CCS Deployment contracts;
3.2.2.9. Key CCS Deployment deadlines;
3.2.2.10. Key Rail Baltica Master Programme deadlines;
3.2.2.11. The Activity IDs shall be presented by the CCS Engineer in the CCS Deployment Management Plan and organized according to the agreed Work Breakdown Structure (WBS). Activity ID shall be unique for the overall Agreement duration, i.e. no activity ID number shall be re-used;
3.2.2.12. The programme percent complete type shall be set to physical % complete. The method of measurement of physical percent complete shall be proposed by the CCS Engineer in the CCS Deployment Management Plan;
3.2.2.13. The CCS Engineer shall resource load the CCS Deployment Programme (Prices, Labour, etc.) and submit for acceptance within the CCS Deployment Management Plan;
3.2.2.14. The CCS Engineer shall submit the method for resource loading of the programme and the maintenance of the resource loading.

3.2.3. The CCS Engineer shall control and manage the future CCS Contractor(-s). The CCS Engineer shall develop requirements to the CCS Contractor(-s) regarding the CCS Deployment Programme consisting of but not limited to:

3.2.3.1. Review monthly reports;
3.2.3.2. Review critical paths;
3.2.3.3. Reports;
3.2.3.4. Cumulative S curves;
3.2.3.5. Histograms;
3.2.3.6. Labour histograms;

[6] https://www.pmi.org/pmbok-guide-standards

3.2.3.7. Review of the quality of the schedule according to 14-point DCMA[7] guidelines;
3.2.3.8. Compliance to the technical specification, local laws, 14-point DCMA guidelines;
3.2.3.9. Risks and Opportunities in the CCS Contractors schedules;
3.2.3.10. Review CCS Contractors schedule variations, delay analysis, claims;
3.2.3.11. Resource loading;
3.2.3.12. Other relevant requirements.

3.2.4. The CCS Engineer shall be responsible for creating and timely updating of the CCS Deployment Programme which shall be aligned with Rail Baltica Master Programme.

3.2.5. The level of detail of the CCS Deployment Programme shall be sufficient to ensure the implementation of the CCS Deployment Management Plan prepared by the CCS Engineer.

3.2.6. The CCS Engineer shall provide clear procedures indicating how to implement all aspects of the CCS Deployment Programme Control requirements in the CCS Deployment Management Plan which will be submitted for approval by the Employer.

3.2.7. CCS Deployment Programme planning and Scheduling

3.2.7.1. Programme – CPM[8] Planning and Scheduling

a. The CCS Engineer shall develop, maintain and submit the CCS Deployment Programme using Oracle Primavera P6 software in the Employer's P6 cloud environment. The CCS Deployment Programme shall be created, maintained and updated exclusively in P6 cloud environment. Access shall be provided by the Employer, but the CCS Engineer shall be responsible for acquiring a Primavera P6 licence. The CCS Engineer shall work in P6 cloud environment according to the Employer's Project Control plan which shall be agreed and communicated with the CCS Engineer during Inception phase.

b. The Oracle Primavera P6 settings shall be in accordance with the Employer's requirements, which enables easy and efficient control of the progress and changes in the Programme.

c. The CCS Deployment Programme shall be in logic linked Critical Path Method (CPM) network format showing the critical paths per each Mandatory Milestone and the overall critical path of CCS Deployment.

d. The CCS Deployment Programme shall follow and be developed taking in consideration the highest industry standards of scheduling, including:

I. 14-point DCMA guidelines;

II. AACE International Recommended Practices[9];

III. "Planning, Scheduling, Monitoring and Control Guide (2015)" published by the Association for Project Management – APM.

e. All Planning and Scheduling submissions made by the CCS Engineer shall be in both Electronic PDF document and Electronic soft copy (P6 file, .xer) (e.g. compatible with the Employer's CPM software) formats.

f. All the CCS Deployment Programme submissions made by the CCS Engineer shall be clearly titled (e.g. Baseline Programme, Monthly Programme, What-if Programme),

[7] 14-point DCMA[7] guidelines https://www.gao.gov/assets/690/687052.pdf

[8] Critical Path Method. https://www.projectmanager.com/critical-path-method

[9] https://web.aacei.org/resources/publications/recommended-practices

numbered (e.g. Period 00, 01, 02, …), revision coded (e.g. Rev 00, 01, 02, …) and dated (DDMMYYYY).

g. The level of detail shall correspond to AACE International Level 4 (detailed level; programme) or equivalent.

h. It is required that all activities have an original baseline and reporting period programme (monthly programme) to show variance against previous versions.

i. For the purposes of reporting, Programmes shall not be baselined or re-baselined without an agreement of the Employer.

3.2.7.2. Programme representation

Every CCS Deployment Programme shall be submitted for review of the accuracy and shall include a special document - Narrative which shall include following items, but not limited to:

a. Summary Description of the CCS Engineer's Execution Plan;

b. Format of activity descriptions including any abbreviations used;

c. Staffing plan consisting of a histogram indicating total manpower required per reporting period, inclusive of subcontractors;

d. The activity calendars used, particularly non-standard work patterns;

e. Holidays, weather windows and other non-work periods;

f. Description of the critical path(s) for each contractual date;

g. Description of the near critical path(s) (these activities being defined as a total float in the of 0 to 15 calendar days);

h. Listing of key interfaces with the Employer / Affected Parties / Other Consultants working alongside with the CCS Engineer or others and the dates those interfaces are planned to occur;

i. Details of any significant changes including revisions to the critical path since previous Approved or Submitted CCS Deployment Programme;

j. Impact on Progress;

k. Details of Changes to Key Dates, Milestones, and Associated float and time risk allowances;

l. List of Implemented Changes or Variations;

m. List of Predicted / potential Changes or Variations;

n. Any delay mitigation measures incorporated;

o. Assumptions and Constraints.

3.2.7.3. Programme calendars

a. All Calendars shall be set in calendar days. For level 3 and 4 Programmes, activities shall not exceed 20 calendar days without prior approval from the Employer.

b. All calendars must be presented in a table format, and clearly identify all the constraints and assumptions.

3.2.7.4. CCS Deployment Programme loading

a. The CCS Engineer shall resource load the CCS Deployment Programme (Prices, Labour, etc.). submitted for acceptance within the CCS Deployment Management Plan and

submit the method for resource loading of the programme and the maintenance of the resource loading.

b. This will facilitate the assessment of progress, cost and performance. Once this Programme is approved, it will be known as the Approved CCS Deployment Programme.

c. The Approved CCS Deployment Programme and subsequent Revised CCS Deployment Programmes including resource loaded activities shall be organized and grouped by Employer's Work and Cost Breakdown structure and cost codes.

3.2.7.5. **Programme hierarchy**

a. The CCS Engineer's Programme will form an integral part of the overall Rail Baltica Master Programme and Reporting structure.

b. The CCS Engineer shall provide the hierarchy of Programmes as follows and provide with P6 version and an Electronic PDF version at the Progress Meeting. Critical Path Method Tool:

I. Level 1: Summary Programme – 1-2 Page(s) Summary;

II. Level 4: Programme – Resourced Loaded, Logic Linked, CPM Network, updated with Progress and under review and approved variations orders.

3.2.8. The CCS Engineer shall coordinate with the Employer the format of the CCS Deployment Programme (including structuring and coding of sub-activities).

3.2.9. The CCS Engineer shall adapt its Service implementation programme, organization and resources according to the development and status of Rail Baltica Global Project implementation (including Rail Baltica Master Programme).

3.2.10. The CCS Engineer shall consider that Rail Baltica railway construction strategy is under development and therefore the structure of work packages for construction / integration works and testing could be different from the current structure of design packages.

3.3. Quality assurance management

3.3.1. The CCS Engineer is responsible for the quality assurance management throughout CCS Deployment process with the aim to ensure the main targets of CCS subsystem.

3.3.2. The CCS Engineer shall include in quality assurance management at least the following:

3.3.2.1. Personnel organization, resources and means;
3.3.2.2. Management system and responsibility;
3.3.2.3. Requirement management;
3.3.2.4. Control organization and procedures;
3.3.2.5. Works management procedures;
3.3.2.6. Quality audits.

3.4. Stakeholder management

3.4.1. The CCS Engineer shall be fully responsible for the stakeholder management process, by at least ensuring the following:

3.4.1.1. Maintenance of an up to date stakeholder structure;
3.4.1.2. Stakeholder interests, responsibilities and involvement in CCS Deployment process;
3.4.1.3. Early engagement with stakeholders;

3.4.1.4. Communication and coordination of related activities with stakeholders in local language in at least B2 level[10];
3.4.1.5. Necessary alignment and approval to be obtained from the stakeholders;
3.4.1.6. Provision of necessary analysis and data at the request[11] of stakeholders;
3.4.1.7. Coordination of stakeholder management with the Employer;
3.4.1.8. Informing the Employer on the status of the CCS Engineer activities with stakeholders.

3.4.2. The CCS Engineer shall be responsible for coordination of activities with the stakeholders and management of following list[12] of stakeholders to be considered by the CCS Engineer:

Table 6. List of stakeholders

	Stakeholder group	Stakeholders
a.	Rail Baltica Global Project implementers[13]	IBs, BENs, RBR
b.	National Safety Authorities	EE, LV, LT
c.	Conformity Assessment Bodies	NoBo, AsBo
d.	Other	Other Contractors and service providers for Rail Baltica global project
e.	Affected parties	As defined in "Abbreviations and definitions" table
f.	Existing infrastructure managers of 1520mm gauge railway networks	EE, LV, LT
g.	Future infrastructure manager	EE, LV, LT
h.	Construction authorities	EE, LV, LT
i.	Distribution System Operator for Electrical Energy	EE, LV, LT
j.	Other identified stakeholders directly linked to CCS Deployment	To be updated during CCS Deployment

3.4.3. The Employer shall provide necessary support for the CCS Engineer regarding the communication with the necessary stakeholders. However, the CCS Engineer holds full responsibility for the stakeholder management process.

3.4.4. The CCS Engineer shall cooperate also with the stakeholders of Rail Baltica Global project that are not directly linked with CCS Deployment.

[10] Based on Common European Framework of Reference for Languages. Available here: http://europass.cedefop.europa.eu/resources/european-language-levels-cefr.

[11] Any request of a stakeholder shall be coordinated with the Employer.

[12] The list of stakeholders is to be updated throughout CCS Deployment process.

[13] The Employer remains responsible for the communication and coordination process with indicated Rail Baltica Global Project implementers.

3.5. Documentation management

3.5.1. The CCS Engineer shall be responsible for establishment of document management ensuring the effective document (including any other data) flow throughout CCS Deployment.

3.5.2. The CCS Engineer shall seek for the possibility to sign the documents by using e-signature systems, available in Baltic states.

3.5.3. The CCS Engineer shall agree with the Employer on the approach to use the Employer's Common Data Environment (CDE) for project documentation using Bentley ProjectWise Connect Edition.

3.5.4. All the data about the deliveries must be stored in CDE. The Employer is the owner of this platform – Bentley ProjectWise Connect Edition. The CDE must be considered as the single source of truth.

3.5.5. All the data is stored within a data source and access to this data shall be granted as required and requested by the Employer. A separate process must be established how the access rights are granted to CCS Contractor(-s).

3.5.6. It is required that all of the technical documentation about the project during the Design, Construction stage and taking over stage must be stored in the repository and all of the up-to-date information is stored in this data repository. The information uploaded to the Employers CDE shall be done using the system/prepared tools/forms. All the data required by the national legislation must be included, organized and must be digitally signed by the responsible Party.

3.5.7. In order to access the information, the CCS Engineer shall allocate financial and human resources. The financial resources in order to access the platform, must include personal user license for each user accessing the system. The number of users which the CCS Engineer shall allocate is not defined, however it shall ensure that the information flow is realized in a timely manner and the information is updated on regular basis as stipulated in the Agreement and its annexes. The exact list of all named users using and accessing the platform shall be agreed with the Employer directly.

3.5.8. Indicative[14] license costs for accessing the Employers CDE are as follows:

3.5.8.1. VISA license cost for ProjectWise CONNECT Edition ~1000 EUR/user/year;

3.5.8.2. PASSPORT license cost for ProjectWise CONNECT Edition ~300 EUR/user/year.

3.5.9. All users who must access the platform shall undergo a security background check and receive a security clearance. The security clearance must be granted by the Security Risk Manager of the Employer or by equivalent instance/person from the Employer's side. All information must be treated as minimum as Limited Access Information.

3.5.10. Any violation and security threat and breach shall be immediately reported to Security Risk Manager of the Employer or to equivalent instance/person from the Employer's side.

3.5.11. The CCS Engineer's human resources and experts shall be trained to use the platform for the specific tasks. The training materials in written or video format will be prepared and delivered to the CCS Engineer by the Employer prior to the granting an access. Any additional training required to be performed for the CCS Engineer employees is the responsibility of the CCS Engineer.

3.5.12. The exact workflows and responsible persons shall be defined during the Inception phase of the Agreement. The definition of the workflows is a collaborative work between the Employer and the CCS Engineer. As minimum, but not limited to, those shall include:

[14] The license cost has indicative nature and exact prices shall be quoted from the vendor

3.5.12.1. Any information management according to respective Country's laws, legislation and rules;
3.5.12.2. Any deliverables information exchange using the Employer's ProjectWise CDE platform and Deliverables Management services;
3.5.12.3. Requests for information (RFI) exchange using the Employer's ProjectWise CDE platform and Deliverables Management services;
3.5.12.4. General and Agreement Communication exchange using the Employer's ProjectWise CDE platform and Deliverables Management services.

3.5.13. The CCS Engineer is responsible for ensuring that its sub-contractors are able to use the CDE platform and are trained to do it. The CCS Engineer remains responsible for any information uploaded/downloaded or any actions performed by its sub-contractor within the CDE platform.

3.5.14. As a part of documentation management system, the CCS Engineer shall be responsible for preparation and managing of minutes of the meetings for every meeting.

3.6. Application of BIM, AIM and GIS

3.6.1. All requirements towards BIM implementation are included in the Design Guidelines [1] and are integral part of all design deliverables and later will be applied during construction and operational phases. All design deliverables shall include BIM models and other supporting data.

3.6.2. Depending on the design stage of the project the Level of Geometry and Level of Information for the design deliverables varies from generally adopted BIM LoG and LoI 200 to 400 levels. Detailed LoG and LoI tables for each stage of the project are described in "Building Information Management (BIM) Employer's Information Requirements" RBDG-MAN-030 document (its Chapters 4., 11. in annexes 1).

3.6.3. GIS platform for accessing the design and asset information is used by the Employer. If necessary and for the benefit of both parties to better organize and carry out the tasks and works, the Employer can grant access rights to the GIS for the CCS Engineer. The details of the tasks carried out and prepared within the GIS system shall be separately agreed.

3.6.4. The general requirements and recommendations towards the most used software solutions from the Employer are the following:

3.6.4.1. CDE (Data, model and drawing management) – ProjectWise CONNECT Edition from Bentley Systems (mandatory to be used);

3.6.4.2. Project Control, Planning, Scheduling and Risk management – Primavera P6 from Oracle (mandatory to be used);

3.6.4.3. Geographic Information System (GIS) – ArcGIS Enterprise from ESRI;

3.6.4.4. Asset Register (AR) – ArcGIS Enterprise from ESRI AR is part of the Asset Information Management (AIM) system to be implemented by Infrastructure Manager;

3.6.4.5. CAD design (*.dwg) – Trueview (viewer), AutoCAD and CIVIL 3D (latest versions) from Autodesk;

3.6.4.6. CAD design (*.dgn) – Bentley View CONNECT Edition (viewer), MicroStation CONNECT Edition from Bentley Systems;

3.6.4.7. BIM Model viewers and authoring software

a. IFC – Solibri Anywhere, Trimble Connect, Navisworks Manage (also for *.nwd and *.nwc), Bentley View CONNECT Edition (also for *.imodel), BIM Collab ZOOM;

b. Native – depending on the software solution used to create the models.

- *.rvt – Revit (different versions) from Autodesk;
- *.dgn – various Bentley Systems products (different versions);

- *.db1 – Tekla Structures (different versions) from Trimble;
- *.ndw – Allplan (different versions) from Nemetschek;
- *.mur – CivilEstudio (37.9 or superior).

3.6.4.8. Text, spreadsheet, presentation, simple schedule, email creators/editors – Microsoft 365 Suite.

3.6.5. The exact specific model types and file formats are specified in the each of the contract's BIM Execution Plans (BEP) agreed with each of the designers, but the requirements are set out in the "Building Information Management (BIM) Employer's Information Requirements" RBDG-MAN-030 document and in the "BIM Manual" RBDG-MAN-033 document.

3.6.6. Dedicated BIM review meetings with the CCS Engineer and the CCS Contractor(-s) shall be organized monthly or the schedule can be agreed separately with the Employer.

3.7. Resource management

3.7.1. The CCS Engineer shall ensure enough resources with necessary facilities, equipment and tools for the provision of the Services.

3.7.2. Resource management plan elaborated by the CCS Engineer shall include the organizational breakdown structure (OBS) together with statements of duties and responsibilities of each role, which shall demonstrate how the CCS Engineer would allocate all the responsibilities for the Service provision and how the OBS is interrelated to the work breakdown structure of the services.

3.7.3. Human resource management plan shall include:

3.7.3.1. Roles and Responsibilities;

3.7.3.2. Project Organization Charts;

3.7.3.3. Mobilization plan for Preparatory phase;

3.7.3.4. Mobilization plan for Works implementation phase;

3.7.3.5. Staffing Management Plan (incl. workload);

3.7.3.6. Plan for staff acquisition;

3.7.3.7. Resource calendars;

3.7.3.8. Staff release plan;

3.7.3.9. Staff training needs.

3.7.4. Works implementation phase timesheet management process aim is to ensure clear reporting and respective remuneration to the CCS Engineer.

3.7.5. Timesheets and mobilisation plan shall be submitted monthly till every months 5th day and shall contain:

3.7.5.1. Experts name;

3.7.5.2. Experts position;

3.7.5.3. Experts daily rates;

3.7.5.4. Actual working days;

3.7.5.5. Detailed report and tasks description provided in reporting period for each day, including expert's geographical location;

3.7.5.6. Respective Service package activity;

3.7.5.7. Estimated days to complete Service packages activity;

3.7.5.8. Respective months planned working days in updated mobilization plan;

3.7.5.9. Respective months planned working days in initial mobilization plan that was submitted by the CCS Engineer in the procurement;

3.7.5.10. Planned and actual working day comparison chart between procurement and updated mobilization plan and justification if deviations have been occurred;

3.7.5.11. Planned tasks and working days for next month and forecast of expert's workload for next 12 months.

3.7.6. Employer shall review timesheet and provide comments (Employer can require any additional supporting information to be included in timesheets) or acceptance within 5 working days.

3.7.7. The Employer can reject timesheets:

3.7.7.1. If it does not contain the requested information;

3.7.7.2. If it contains tasks that in the Employer`s opinion does not reflect correct actual working days spent;

3.7.7.3. Tasks description is not well justified;

3.7.7.4. Indicated tasks are not related to respective service package activity;

3.7.7.5. For other justified reasons.

3.7.8. If the Employer provides comments to timesheets, the CCS Engineer within 5 working days must make adjustments, and/or provide additional explanations, information, or evidence confirming the information provided in timesheets. If requested information will not be provided within set time period, the Employer will accept only those parts of services, where no comments were provided.

3.8. Communication management

3.8.1. The CCS Engineer shall develop and maintain communication strategy with at least covering the following parts:

3.8.1.1. Communication parties / stakeholders involved;

3.8.1.2. Communication frequency;

3.8.1.3. Description/Purpose of communication;

3.8.1.4. Means of communication.

3.8.2. While maintaining the communication requirements set in the Agreement, the CCS Engineer shall agree with the Employer on written communication means and format regarding the provision of the Service.

3.8.3. The CCS Engineer shall agree with the stakeholders on written communication means and format.

3.9. CCS Deployment Risk Management

3.9.1. The CCS Engineer shall establish governance around the process for management of risks to CCS Deployment that shall be aligned with the Employer and shall be in accordance with up to date version of the Rail Baltica Global project risk management plan [13]. The CCS Engineer shall utilise agreed with the Employer risk management processes, procedures, organization, tools and systems to proactively manage risks that have the potential to impact the CCS Deployment process and the Rail Baltica Global project implementation. Risk information, including identified risks, assessment, treatment plans and post treatment analysis shall be developed and continuously updated in Oracle Primavera Cloud risk system environment for the Rail Baltica Global project. The CCS Engineer shall plan in advance all its activities necessary to carry

out the full scope of the Services in due time and in the agreed quality by considering the all relevant risks and providing risk response plans to reduce their adverse influence on costs and time schedule and mitigate any identified supply chain risks. Such risk response plans shall be developed and approved for all risks.

3.9.2. CCS Engineer's responsibility regarding risk management shall cover its obligations related activities under this section (including but not limited to risk governance, risk identification, preparation of Project Risk Management Plan, Project Risk register, risk and response activities status reports on implementation of mitigation measures attributable to the CCS Engineer, etc.)[15] and risks that are attributable and are in control of the CCS Engineer.

3.9.3. To minimise, manage and mitigate risk event occurrence and/or the impact of risks upon the project implementation in relation with CCS subsystems deployment, the CCS Engineer shall develop and implement a full risk management approach, including, inter alia, risk response plans for all relevant risks. Such risk management approach shall include, as a minimum, the following to be addressed:

3.9.3.1. Delays, inactivity, procrastination of the stakeholders in regard to their involvement in the CCS Deployment process;
3.9.3.2. Territorial, environmental restrictions to plan necessary land plots for the CCS subsystem facilities;
3.9.3.3. Interface risk of the CCS services with other construction activities scope implemented by third parties;
3.9.3.4. Interface risk of land acquisition, Environmental impact assessment and other important activities;
3.9.3.5. Delayed Works during construction;
3.9.3.6. Poor collaboration with CCS Contractor(-s) and coordination of other subsystem design and construction works (INF, ENE…);
3.9.3.7. Changes in Operational Plan requirements;
3.9.3.8. Changes in applicable laws and regulations;
3.9.3.9. Potential claims and litigation by third parties;
3.9.3.10. Changes in the Rail Baltica Master Programme;
3.9.3.11. Non-performance of CCS Contractor(-s);
3.9.3.12. Potential conflict of interest cases;
3.9.3.13. Governmental preventive measures due to global pandemic;
3.9.3.14. Impact of delayed deliverable on subsequent Services.

3.9.4. The goal of risk management by the CCS Engineer is to ensure that CCS Deployment achieves established project objectives and stakeholder expectations in terms of:

3.9.4.1. Keep within agreed budget;
3.9.4.2. Achieve the required completion dates;
3.9.4.3. Achieve the required performance.

3.9.5. The CCS Engineer shall develop and maintain Project Risk Management Plan that covers practices and procedures how the project team will implement risk management that is integrated with overall Project Management Plan to ensure that project objectives are achieved throughout the life cycle of the project. Risk Management plan shall at least cover the following parts:

3.9.5.1. Risk planning;
3.9.5.2. Risk identification;
3.9.5.3. Risk assessment / prioritisation;
3.9.5.4. Qualitative and quantitative risk analysis;
3.9.5.5. Response planning;

[15] Definitions are used according Rail Baltica Global project risk management plan [13]

3.9.5.6. Proposals for risk management and mitigation measures;
3.9.5.7. Risk monitoring and control;
3.9.5.8. Risk reporting.

3.9.6. CCS Deployment Risk Planning

Risk planning activities set the foundation for CCS Deployment risk management objectives and plan necessary effort to prepare for risk assessment, treatment and risk control, and set criteria to determine whether the initiative is successful. During the risk planning phase, the CCS engineer shall define how risks are addressed and managed and how it will be incorporated with the overall CCS Deployment Management Plan. Risk planning shall take into consideration the following:

a. RBGP Risk management guidelines (including tolerance level for risk);

b. Resources allocation (key roles and responsibilities, staffing, budgets);

c. Reporting and communication;

d. Developing a risk matrix and assigning risk ratings to identify risks. The risk matrix should define risk ratings based on probability and impact by considering RBGP risk tolerance and threshold levels

3.9.7. CCS Deployment Risk identification

Risk identification is the identification of all foreseeable risks that could either negatively or positively affect the CCS Deployment process according to agreed risk classification, description of risk cause, event and consequences. The CCS Engineer shall acquire input from all Rail Baltica Global project stakeholders. These risks shall be captured by the CCS Engineer in Project BIM

, that is stored in Oracle Primavera Cloud risk environment for RBGP. Potential contributors to risk identification shall include:

a. Project team members;

b. Subject matter professionals;

c. Customers (internal and external);

d. End users;

e. Organisation management and leadership.

3.9.8. CCS Deployment Risk assessment

The CCS Engineer shall assess and prioritise every risk by determining its probability and impact according to established probability and impact categories and threshold levels. For all project risks, the CCS Engineer shall undertake both - Qualitative assessment, and run Quantitative risk analysis in Oracle Primavera risk system.

3.9.9. CCS Deployment Risk Response Planning

3.9.9.1. The CCS Engineer shall have an overarching mitigation strategy, and detailed response actions including start and finish dates, and Response Action Owners for each risk. These response actions should be specific, 'time bound' and appropriately allocated. Risk response is an active process that will involve developing options, selecting strategies, agreeing on action plan for approval and employing selected response strategies for either threats or opportunities. As a result, appropriate ways to mitigate project risks are identified, and responsible persons appointed. The intent is to reduce threat impacts or enhance opportunity realizations should either occur.

3.9.9.2. For RBGP following risk response strategies shall be considered:

a. Risk mitigation;
b. Risk avoidance;
c. Risk transfer;

d. Risk acceptance;
e. Risk sharing;
f. Risk contingency.

3.9.10. CCS Deployment Risk monitoring and control

3.9.10.1. The final step of risk management is monitoring and control. This step tracks potential risks, oversee the implementation of risk plans, and evaluate the effectiveness of risk management procedures. Monitoring and control occur throughout the project lifecycle and feedback back into overall risk management process and planning.

3.9.10.2. The CCS Engineer shall monthly update the Risk Register and provide necessary risk response plans with current status.

3.10. Cost management

3.10.1. Throughout the progress of Rail Baltica Global project development (including CCS Deployment) the CCS Engineer shall prepare and maintain the cost estimates for CCS Deployment (including Works contract). Cost estimates updates shall include:

3.10.1.1. Global Project CAPEX, with breakdown per country and per CCS subsystem;
3.10.1.2. CAPEX and OPEX per line-km, per station, per open line section and per CCS subsystem element;
3.10.1.3. Indication of all assumptions, indexes and unit prices taken as a basis for cost estimation.

3.10.2. The CCS Engineer shall update cost estimates quarterly by taking all factors impacting the costs for CCS Deployment, such as: Rail Baltica Global project development updates, economic situation in the region, market trends, etc.

3.10.3. The CCS Engineer shall provide cost forecast for the CCS Engineering services and CCS Works monthly, for next 12 months.

3.11. Change management

3.11.1. The CCS Engineer shall develop and maintain change management process and plan by involving the Employer for decision making.

3.11.2. The CCS Engineer shall document proposed scope, timeline and cost change of the project. Change management request shall at least contain:

3.11.2.1. Detailed description of the proposed change and reasons for it;
3.11.2.2. Detailed description of how the proposed change or variation is to be affected, including activities and anticipated durations for any resulting design changes to be undertaken by the Employer, additional or revised contents, amended key dates or relevant information;
3.11.2.3. Detailed description of impact on Rail Baltica Master Programme.

3.12. Asset Management

3.12.1. CCS Engineer shall develop and set up CCS subsystem equipment's data with all relevant RAMS performance and maintenance information about equipment, which is necessary input for the CCS subsystems Asset Management.

3.12.2. The CCS Asset Management shall be carried out by the Asset Management System to enable fast and integrated information that enables faster decisions.

3.12.3. The CCS Engineer needs to consider future integration with the input data into the Asset Management System. The minimum requirements for the AMS are the following:

3.12.3.1. CCS subsystems and equipment KPI monitoring;

3.12.3.2. Services performance KPI Monitoring;

3.12.3.3. Critical equipment parameters online monitoring including the possibility of additional prognostic health management and AI interface and integration;

3.12.3.4. Preventive Maintenance and Inspection schedule with calendar visualization and reports;

3.12.3.5. Maintenance work order management with calendar visualization and reports;

3.12.3.6. Spare part management and report;

3.12.3.7. FRACAS with standardized failure modes, cause and detection based on FMEA developed during design phase;

3.12.3.8. Risk report with graph visualization;

3.12.3.9. Automatic KPI prediction such as operational reliability, availability and maintainability based on FRACAS database;

3.12.3.10. Root cause analysis based on 5 whys and/or qualitative Fault Tree analysis;

3.12.3.11. GIS and/or Digital Twins;

3.12.3.12. Asset Data Register;

3.12.3.13. Safety Critical Element management;

3.12.3.14. Team routine management.

3.12.4. CCS Engineer shall synchronize AMS requirement development with ENE Engineer to have same approach for Rail Baltica Global project.

3.13. Audit Management Plan

3.13.1. CCS Engineer shall establish audit management plan for audit of CCS Contractor(-s) at least for the following activities:

3.13.1.1. Quality audit;

3.13.1.2. Design review audit;

3.13.1.3. RAM and Safety audit in cooperation with the AsBo assigned for the task[16];

3.13.1.4. Interoperability audits in collaboration with NoBo;

3.13.1.5. Software audit;

3.13.1.6. Configuration audit;

3.13.2. All mentioned audits must be conducted at regular intervals during CCS Deployment phases. It must be defined in audit management plan.

3.14. Reporting

[16] AsBo tasked for assessment of the signalling subsystems including ERTMS, interlocking, TMS, ancillary systems and their integration must be appointed by the CCS supplier.

3.14.1. The CCS Engineer shall prepare monthly CCS Deployment Report. The structure and content of the CCS Deployment Report shall be proposed by the CCS Engineer in the CCS Deployment Management Plan and agreed with the Employer.

3.14.2. Based on CCS Deployment phase, the CCS Engineer shall propose and update structure and content of the CCS Deployment Report according to the updated status of CCS Deployment phase. As minimum content of the CCS Deployment Report shall consist of the following parts:

3.14.2.1. CCS Deployment Programme;
3.14.2.2. CCS Deployment progress;
3.14.2.3. Cost management;
3.14.2.4. Resource management;
3.14.2.5. Risk management;
3.14.2.6. Communication;

3.14.3. At each Monthly Progress Meeting, the CCS Engineer shall submit a revised CCS Deployment Programme for approval of the accuracy of the Progress Information, showing the progress, remaining duration, actuals, physical percentage complete and planned completion dates and submit it to the Employer for acceptance.

3.14.4. CCS Deployment progress reporting structure:

Table 7. Progress reporting structure

No.	Section	Content
1.	Summary Programme	The CCS Engineer shall provide a Summary Programme, which is submitted for approval by the CCS Engineer at the Progress Meeting. The Summary Programme is used as the basis for developing and reporting to management and key stakeholders from initiation to completion. The Summary Programme is developed in time-scaled format with typically not more than 100 activities and contained on 1-2 sheets. The Summary Programme highlights the Critical Path, major milestone events and interface events important to the overall Rail Baltica Master Programme delivery. Summary Programme activities must be related to the CCS Engineer's Programme activities in a rolled-up way or using level of effort activities.
2.	Updated Programme	Updated Programme must include and cover, but not limited to, all activities and dates as follows: a) All dates for the Contractual milestones and key dates, deadlines (including intermediate terms) and commencement, completion and handover milestones. b) All dates when the CCS Engineer plans to submit any particular deliverables. c) All dates when the CCS Engineer plans to submit planning and technical studies. d) All durations and dates for any particular items of Equipment with long lead times. g) All the dates when any input information to be provided by the Employer or third parties will be required by the CCS Engineer. h) Details of any consents permits and licenses development, preparation, submission and approvals allowing enough time for each stage of the process and also allowances for resubmission. i) Details of any 3rd Party interfaces and/or documents preparation, submission and approvals allowing enough time for each stage of the process and also allowances for resubmission. j) The CCS Engineer shall describe in the Programme submissions details of any measures to be taken to minimize the effect of the CCS Engineer's operations on the

		public including as a minimum (where applicable): cleanliness of adjacent areas, intended working hours, safety risk assessments. k) Any other milestones and/or activities provided by the Employer. l) Activity durations must not exceed 40 calendar days, with exception of long lead items. p) Clear details on Handover processes and timeframes. q) Clear identification of any of the Employer's obligation. r) Details of how and where CCS Engineer's work deliverables will feed into as input data / input information. If any logic changes are required to be made to the programme, a Request for Approval shall be submitted by the CCS Engineer requesting the change and the justification for the Request. In line with good practice, a log shall be submitted with the updated programme each period outlining any logic changes agreed. The log should record the predecessor and successor activities before and after the change as well as any changes to log.
3.	Programme Performance Report	The CCS Engineer within monthly CCS Deployment Report shall produce a Programme Performance Report for review by the Employer which shows cumulative and period movement data. Any areas which show significant variance between cost and value shall be investigated, explained and mitigation measures identified if applicable.
4.	Critical Items Action Report (CIAR)	The CCS Engineer shall maintain a Critical Items Action Report (CIAR) which will be maintained in conjunction with the Early Warning System[17]. A critical item is defined as any item that has caused or is likely to cause an impact to a key or contractual milestone or to overall Agreement completion. It should be noted that not every delay result in an impact to a key date or milestone and therefore not every delay counts as a critical item. The intent is that the CIAR becomes a working dynamic document, not a voluminous punch list for the Agreement. It should rarely contain more than 15-20 items. Significant critical items should have an accompanying entry in the CCS Deployment Programme. The main task of the CIAR is the analysis of the Programme to determine which items are critical or potentially critical. The CIAR shall be reviewed on Progress Meetings to discuss the corrective actions or alternatives to eliminate the programme impact of the critical items. The CCS Engineer shall nominate a CIAR coordinator from within his team. The CIAR coordinator shall be responsible for development, maintenance and production of the CIAR.
5.	Coordination Report	The CCS Engineer shall produce a monthly report showing the Authorities and Affected Parties contacted, their feedback, actions taken, future needed actions and documents exchange between the parties. Detailed format of the report will be agreed within the Inception Report.
6.	Open Items Report	The CCS Engineer shall produce a monthly report showing all the items raised during meetings, Request for Information (RFI), Project Change Requests (PCR), List of sent out / received notices and List of open claims / variations submitted during the period and previous periods which have not received resolution to the date. The report shall show also all the decisions taken at working level meetings and open items from those meetings (Meeting Items). The report will be accompanied with RFI, PCR, Meeting Items, List of sent out / received notices, List of open claims / variations and Open Items

[17] Early Warning System - the early warning process is a mechanism for both parties to identify potential problems to the project. https://gmhplanning.co.uk/nec-guidance-notes/nec3-ecc-clause-16-early-warnings/

		tracker which displays all the history of items raised and decisions taken. Detailed format of the report and the tracker will be agreed within the Inception Report.

3.15. Meetings

3.15.1. The CCS Engineer shall organise regular monthly[18] progress meetings with the Employer and/or other related stakeholders. The structure, content and agenda of the progress meetings shall be aligned between the CCS Engineer and the Employer in advance. 5 (five) calendar days before every progress meeting the CCS Engineer shall provide the CCS Deployment Report for the Employer review.

3.15.2. The CCS Engineer shall prepare and participate in the meetings according to the CCS Deployment Management Plan as well as in *ad hoc* meetings which shall be organised as needed. The minimal amount of the meetings to be considered is proposed below.

Table 8. Meetings

Title	Responsible party organising the meeting	Scheduling	Participating parties (from both parties of the Agreement)
Kick-off meeting	Employer	1 week after CD of the Agreement	CCS Engineer and Employer project management team
Inception meeting	CCS Engineer	1 month after CD of the Agreement and provision of Inception Report	CCS Engineer and Employer project management team and necessary experts
Progress meetings	CCS Engineer	Every 1 month following the Inception meeting	CCS Engineer and Employer project management team and necessary experts
CCS Technical Working Group meetings	Employer	Depending on the progress (preliminary every quarter)	Employer will appoint representatives according internal rules and invite necessary CCS Engineer experts. Employer shall inform CCS Engineer minimum 1 week ahead. Project managers or deputies of Employer and CCS Engineer shall take part in all meetings TWG meetings
BIM collaboration meetings	CCS Engineer	Every month or schedule can be agreed separately with the Employer	CCS Engineer specialists (if required), representatives of Employer (if required) and Affected party authorized representatives (if required)

[18] Based on CCS Deployment progress the CCS Engineer may agree with the Employer to extend the reporting periods.

RAMS Meeting	CCS Engineer	Every month or schedule can be agreed separately with the Employer	CCS Engineer RAM and Safety specialists (if required), representatives of Employer (if required) and Affected party authorized representatives (if required)
Local Facilities and Rail Batica main line design review meetings	Employer	Twice a month or schedule can be agreed separately with the Employer)	CCS Engineer specialists (if required), representatives of Employer (if required) and Affected party authorized representatives (if required)
Implementing Body and Beneficiary management meetings	Employer	When needed (approximately on quarterly basis)	Employer and CCS Engineer project managers or deputies shall take part in all IBs and BENs management meetings
Meeting with any stakeholder group	CCS Engineer	When needed	CCS Engineer, Employer's related stakeholder's representatives
Risk management/ review meeting	Employer	When needed	CCS Engineer, Employer's representatives

4. PREPARATORY PHASE

4.1. General

4.1.1. During this phase, the CCS Engineer shall analyse the status of the existing design requirements, outcomes of ongoing design works and perform all necessary technical and economic studies necessary to prepare all the technical documents for elaboration of Concept Designs for all Systems of CCS subsystem and technical specifications required for procurement of the Works. The CCS Engineer shall deliver an optimal level of detail of the abovementioned documents ***keeping neutral position regarding commercial technologies and products, in order to warranty a free competition between suppliers for the procurement of the Works.***

4.1.2. Main objective of the CCS Engineer during this phase is elaboration of a comprehensive and reliable procurement documentation which will allow minimize the level of uncertainties and risks perceived from Works procurement tenderers, in order to ensure that the Employer receives the most comprehensive technical and financial proposals.

4.1.3. During the Preparatory phase, all architectural and technical choices made by the CCS Engineer shall be justified by the research, calculations, and analysis of the optimum LCC and minimal direct and indirect environmental impact of the CCS subsystem.

4.1.4. Specific deliverables described in detail below shall be considered as minimal and may be supplemented, improved and reorganised as far as necessary by the CCS Engineer to fulfil his overall responsibility and to reach the assigned objectives.

4.1.5. Preparatory phase consists of the following Service Packages to be provided by the CCS Engineer within indicated deadlines and deliverables:

Table 9. Service Packages in Preparatory phase.

Preparatory phase – Service Packages	**Milestones (after CD)**	**Deadlines[19] (after CD)**	**Deliverables[20]**
PrepPhase SP-1. Inception			
Inception report	**1 month**	**3 months**	**Report**
Draft CCS Deployment Management Plan	**1 month**		**Draft report**
Draft LCC / MCA / Environmental impact Plan	**1 months**		**Report**
CCS Engineer Mobilization plan	**1 month**		**Report**
CCS Deployment Management Plan	**3 months**		**Report**
PrepPhase SP-2. Initial data review			
Initial data collection list	**2 weeks**	**2 months**	**List**
Initial data (Including DG, Rail Baltica main line design, Local Facility design, Employers design concepts) review	**2 months**		**Report**

[19] Milestones are the time when the indicated documents shall be approved by Employer. Deadlines indicated are contractual – it is recommended to submit draft deliverables one week beforehand, in order to have first feedback on deliverable from the Employer.

[20] Full content deliverables shall be considered for the review by the Employer.

PrepPhase SP-3. CCS Concept Design preparation			
System engineering plan	**1 month**	**11 months**	**Report**
Concept Design structure	**1 month**		**Report**
Review of the draft Rail Baltica Operational Concept provided by Shadow Operator	**5 months**		**Draft report**
Draft Concept Designs incl. LCC / MCA / Environmental impact report and draft CCS subsystems requirements specifications	**5 months**		**Draft report**
Review and finalisation of the Rail Baltica Operational Concept provided by Shadow Operator	**7 months**		**Report**
Proposal for civil works provisions for CCS subsystem in DTD and preparation of updates for DG	**8 months**		**Report**
TSI CCS Concept Design and TSI CCS requirements specifications for submission for approval by the EU Agency for Railways	**9 months**		**Report**
All Concept Designs incl. LCC / MCA / Environmental impact report and RAMS analysis	**10 months**		**Report**
Requirements specifications for all systems of CCS subsystem according to scope definition in Chapter 2	**11 months**		**Report**
PrepPhase SP-4. Radio coverage Concept Design			
Collection of input data and assumptions	**1 month**	**8 months**	**List**
Approach on Radio coverage Concept Design	**2 months**		**Presentation**
Draft radio coverage Concept Design report	**4 months**		**Draft Report**
Final radio coverage Concept Design report	**8 months**		**Report**
PrepPhase SP-5. CCS Deployment Strategy preparation			
Supplier market research	**2 months**	**11 months**	**Report**
CCS subsystem procurement strategy	**3 months**		**Report**
CCS Deployment Strategy Draft	**4 months**		**Report**
CCS Deployment Strategy including technical agreements	**10 months**		**Report**
Verification and Validation plan	**11 months**		**Report**

Elaboration of cost estimates for all systems of CCS subsystem and its deployment based on SP-3, SP-4, SP-5	**11 months**		**Report incl. Cost Breakdown structure**
PrepPhase SP-6. Assistance to procurement*			
Draft technical part for the Regulations of the first stage of Works procurement	**4 months**	**11 months**	**Report**
Draft technical part for the Regulations of the second stage of Works procurement	**7 months**		**Report**
Recommendations/review of Works Contract	**8 months**		**Report**
Draft Technical Specifications for Works Contract	**9 months**		**Report**
Technical Specifications for Works Contract	**11 months**		**Report**
Support for supplier market consultation	**N/A***	**N/A***	**N/A***
Assistance in Works procurement process	**N/A***	**N/A***	**N/A***

** – deadlines to be agreed with the Employer depending on the Works procurement process*

4.2. PrepPhase SP-1. Inception

4.2.1. The Inception Report shall include:

4.2.1.1. Detailed presentation of the organization of the CCS Engineer during the Preparatory phase (organization chart, expert roles and responsibilities, and processes),

4.2.1.2. Detailed CCS Engineer Mobilization plan for the Preparatory phase, including date of establishing of the permanent office in Riga, schedule of presence of involved experts in the Baltic states, proposed schedule of the meetings, etc,

4.2.1.3. Overview of the organization of the CCS Engineer during the Works implementation phase (organization chart, roles and processes),

4.2.1.4. Overview of the CCS Engineer Mobilization plan for the Works implementation phase,

4.2.1.5. Description of organisation of implementation of the tasks included in the Preparatory phase, and detailed schedule,

4.2.1.6. Organisation setup for stakeholder's management and technical interface management, including understanding of specific aspects for Estonia, Latvia and Lithuania and for interface with Poland,

4.2.1.7. The CCS Engineering Deployment project management plan as described in Chapter 3,

4.2.1.8. The CCS Engineer can propose to the Employer for approval different deliverable split, without financial impact and respecting at least main milestones:

a. Rail Baltica Operational Concept [14] provided by Shadow Operator - 7 months from CD,

b. Final radio coverage Concept Design report including radio coverage simulation - 8 months from CD,

c. Technical Specifications for Works Contract - 11 months from CD.

4.2.1.9. Any other information relevant for the performance of the Agreement.

4.3. PrepPhase SP-2. Initial data review

4.3.1. Considering the documents identified in Table 10 below, the CCS Engineer shall prepare and deliver to the Employer a list of additional data which would be necessary to achieve the Services planned as part of the Preparatory phase. The Employer will deliver the necessary data in his possession to the CCS Engineer and will initiate all necessary contacts with stakeholders (refer to Chapter 3, Stakeholder management) in order CCS Engineer could collect data from the stakeholders.

4.3.2. The CCS Engineer is responsible for the proper data collection from the stakeholders and shall ensure sufficiency and consistency of the collected data.

4.3.3. The CCS Engineer shall collect and review all necessary information, studies, concepts and civil works designs in order to get full understanding of the Service delivery details and complexity.

4.3.4. As part of initial data, the CCS Engineer shall consider the reference documents and previous studies listed in the following Table and perform a thorough analysis of their content. Findings, comments and professional opinions shall be summarised in a report, with clear hierarchization of the findings by their level of criticality for the Project implementation.

Table 10. Preliminary list of the initial data to be reviewed.

No.	Title	Specific requirements for CCS Engineer in relation to the initial data
a.	Design Guidelines [1]	To perform a thorough review of the **Design Guidelines** and deliver a review report detailing findings and recommendations in relation to CCS Deployment. Proposed changes will be submitted to the Technical Reference Group before launching Works procurement process.
b.	Designs [12]	**The CCS Engineer shall review the available designs by reviewing the Preliminary Designs, Spatial Planning documents and current status of deliverables by engaging with the designers responsible for the Detailed Technical Design.** The CCS Engineer shall directly engage with the Rail Baltica main line designers in charge of design of infrastructure, stations, freight terminals and any other facilities to assess the status of their respective design documentation regarding track layout, turnout locations, length of station tracks and provisions made for CCS subsystems, notably landplot reservations, cableways, power supply... Specific attention shall be made to railway structures and structures over the railways (overpasses, ecoducts, tunnels, screening structure for protection of radionavigation equipment), interfaces with bridges and viaducts, and station areas and buildings. The scope of design of Rail Baltica main line sections (Detailed Technical Design) includes design of railway systems at conceptual level only, which include all necessary physical provisions for further implementation of CCS subsystem elements, as well as design of necessary interfaces. The CCS Engineer shall perform a thorough review of the status of designs and for every Rail Baltica main line design

		deliverables and prepare a review report detailing his findings and recommendations for every design section. Priority shall be given to the most advanced design sections, and to the ones for which urgent input is needed. Proposed changes will be assessed by the Employer, relevant designers and stakeholders. List of main line DTDs currently includes but not limited to: in Estonia: • DTD DS1 for section Rapla-Pärnu • DTD DS2 for section Tallinn-Rapla • DTD DS3 for section Pärnu-EE/LV border in Latvia: • DTD DS1 for section mainline through Riga • DTD DS2 for section Vangaži-Salaspils-Misa • DTD DS3 for section EE/LV border-Vangaži • DTD DS4 for section Misa-LV/LT border in Lithuania: • DTD DS1 for section Ramygala-Kaunas; • DTD DS2 for section LV/LT border-Ramygala; • DTD DS3 for section Kaunas-LT/PL border[21]; • DTD DS4 for section Kaunas- Vilnius[22].
c.	**Operational Plan (including Annexes and updated Track layout)** [2]	The CCS Engineer shall perform a thorough review of the **Operational Plan** (OP) and deliver a review report detailing his findings and recommendations. OP defines the future railway operation transport plan, and therefore includes the planned typology of rolling stock (type of trainsets, locomotives, train composition, tonnage etc.) as well as the timetable at different time horizons. Updated information on OP status will be delivered by the Employer and the Shadow Operator after signature of the Agreement. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
d.	**Riga Node Operation Optimisation study** [16]	The CCS Engineer shall perform a thorough review of the **Riga Node Operation Optimisation study** which provides an updated timetable for regional services in Latvia. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.

[21] Design of the section is not yet started; documents will be relevant only for CCS-Engineers review and approval in works implementation phase

e.	**Kaunas station, 1435/1520 Operation expertise** [17]	The CCS Engineer shall perform a thorough review of the **Kaunas station, 1435/1520 Operation expertise** which provides an updated timetable for regional services in Kaunas area, provides changes in track layouts and information on operation of locations with 1435/1520 interactions. **The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.**
f.	**Cost Benefit Analysis** [4]	The CCS Engineer shall perform a thorough review of the **Cost Benefit Analysis** and deliver a review report detailing his findings and recommendations. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer. The Global Project Cost Benefit Analysis is planned to be updated in 2022 after transport demand study to be completed in 2021.
g.	**Zero Impact Strategy** [6]	The CCS Engineer shall perform a thorough review of the **Zero Environmental Impact during O&M phase Strategy study** (ZEIS) and deliver a review report detailing his findings and recommendations. ZEIS defines recommendations regarding the impact of railway operation and maintenance phase, transport plan and roadmap for an environmental optimised design. As energy use for train traction is identified as major impact, the recommendations regarding CCS subsystem, in particular TMS, are of highest importance for the definition of ATO functionalities linked to energy consumption. Energy use by the CCS subsystem and by the technical building is also considered as significant, thus ZEIS recommendations shall be considered in the CCS subsystem design. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations, assumptions, guidelines or requirements to the Employer. The CCS Engineer recommendations and proposals will be basis for the future updates of the ZEIS, and for its practical implementation.
h.	**CCS Strategy study** [5]	The CCS Engineer shall perform a thorough review of the **CCS procurement and deployment strategy study** and deliver a review report detailing his findings and recommendations. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, provide additional justifications, information, hypothesis validations or assumptions to the Employer.

i.	**Climate Change study [9]**	The CCS Engineer shall perform a thorough review of the **Climate Change study** and deliver a review report detailing his findings and recommendations. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
j.	**Planning and deployment strategy**	The CCS Engineer shall perform a thorough review of the **Planning and deployment strategy** and available Planning documents (Global Project Gantt chart, CCS schedule and CCS strategy Work Package 7) and deliver a review report detailing his findings and recommendations. The CCS Engineer shall assess the suitability of this information for the purpose of his tasks, and if necessary, require additional information, hypothesis validations or assumptions to the Employer.
k.	**Cost estimates**	The CCS Engineer shall perform a thorough review of the available cost estimates documents and deliver a review report updating the cost estimates according to his results of SP-3, SP-4 and SP-5.
l.	**Implementing Bodies prepared MD and DTD of Rail Baltica Local Facilities [11]**	The CCS Engineer shall engage with the IB designers in charge of design of infrastructure, stations, freight terminals and any other facilities to assess the status of their respective design documentation regarding track layout, turnout locations, length of station tracks and provisions made for CCS subsystems: landplot reservations, cableways, technical rooms, ICT systems, ancillary systems, etc. Specific attention shall be made to railway structures and structures over the railways (overpasses, ecoducts, tunnels, requirements and screening structures for protection of radionavigation equipment), interfaces with bridges and viaducts, and station areas and buildings. The CCS Engineer shall perform a thorough review of the status of designs and for every IB design deliverables and prepare a review report detailing his findings and recommendations for every design section. Priority shall be given to the most advanced design sections, sections which are the part of Rail Baltica main line and to the ones for which urgent input is needed. Proposed changes will be assessed by the Employer, relevant designers and stakeholders. Design sections which are part of Rail Baltica main line currently include, but not limited to: In Estonia: • DTD for Ülemiste passenger terminal building and related civil structures • DTD for Ülemiste rolling stock maintenance depot • DTD for Pärnu passenger terminal building and related civil structures In Latvia:

		• DTD of the railway line section including Riga International Airport station terminal (LV); • DTD of the railway line section including Riga Central station terminal (LV); In Lithuania: • Kaunas Airport station[23] • Kaunas Central station[23] • Vilnius passenger station including terminal facilities[23] Design of Local Facilities: In Estonia: • DTD for Muuga TEN-T Port freight terminal • Tallin infrastructure maintenance facility[22] • Rapla station maintenance point[23] • Pärnu infrastructure maintenance facility[23] • Pärnu freight terminal[23] In Latvia: • Skulte infrastructure maintenance facility[23] • Skulte freight terminal[23] • Salaspils intermodal terminal • Iecava infrastructure maintenance facility[23] • Ādaži military facility[23] • Jaunmārupe rolling stock maintenance facility[23] In Lithuania: • Panevežys infrastructure maintenance facility[23] • Panevežys freight terminal • Panevežys military facility[23] • Jonava freight yard[23] • Kaunas infrastructure maintenance facility • Karmelava freight station[23] • Jonava military facility[23]
m.	**Other Studies / reports / concepts/ relevant data review**	Review and update of concept on land plot reservation for railway systems, Review and update of concept on block section locations, Review and update of concept on cableway system design, Any other relevant internally and externally prepared studies and documents that would be available at the time of the Initial data review.

4.3.5. The CCS Engineer shall prepare review reports separately for every document reviewed by the CCS Engineer as a part of the Service. The structure of a separate review report shall be agreed with the Employer. Review report shall cover the clear statement of the CCS Engineer regarding

[22] Design of the section is not yet started; documents will be relevant only for CCS-Engineers review and approval in works implementation phase

the acceptance / rejection / recommendations of a document provided for the review to the CCS Engineer.

4.4. PrepPhase SP-3. CCS Concept Design preparation

4.4.1. Rail Baltica Operational Concept

4.4.1.1. Operational concept [14] for Rail Baltica main line and all Local Facilities is prepared by Shadow Operator under a separate contract.

4.4.1.2. Based on RB rule book and working manuals for railway staff, Operational Concept shall capture all scenarios to be covered by the sub-systems forming the CCS system and/or in the Operational Rules under normal, degraded and emergency conditions.

4.4.1.3. It will deliver a set of CCS project outcomes that should be mapped by CCS Engineer to the CCS Subsystem concept designs and requirements specifications and avoid over-specification.

4.4.1.4. The operational concept shall consider all types of trains and stations of origin and destination for international passenger, regional passenger and freight traffic according to the timetable provided in Operational plan [2] and Riga Node Operation Optimisation Study and Kaunas station, 1435/1520 Operation expertise.

4.4.1.5. Shadow Operator shall elaborate Rail Baltica Operational Concept for:

a. Starting, executing and ending of train and shunting movements on the Rail Baltica main line under ETCS supervision.
b. Starting, executing and ending of train and shunting movements in Local Facilities outside of Rail Baltica main line, in particularly in:
   I. freight/intermodal terminal
   II. freight yard
   III. rolling stock maintenance facility
   IV. infrastructure maintenance facility
   V. military facility
c. Transitions between Rail Baltica main line and Local Facilities outside of Rail Baltica main line and vice versa including operations on exchange tracks under responsibility of Centralised Traffic Control for Rail Baltica main line and Local Control (LC) for traffic control in Local Facilities.

4.4.1.6. As part of the Rail Baltica Operational Concept, Shadow Operator shall perform following tasks:

a. Propose a set of ETCS National values which shall be the part of ERTMS concept,
b. Elaborate a route list for all origin, intermediate and destination stations,
c. Elaborate a route suitability concept,
d. Elaborate a track conditions concept,
e. Elaborate a static speed restriction concept,
f. Elaborate an operational mode profile concept,
g. Elaborate ETCS, interlocking, and Traffic Management functions for main line and local operations (e.g. depot control panel) to be supported by the each particular system of CCS subsystem, e.g. overlap functionality, train splitting/joining functionality, reversing train on open line, setting routes under conditions, etc.

4.4.1.7. Shadow Operator shall elaborate the abovementioned Rail Baltica Operational Concept for Normal, Degraded and Emergency Operation Modes.

4.4.1.8. For Degraded and Emergency Operation Modes in particular following situations (including software faults) shall be considered and respective functionality of corresponding systems of CCS subsystem included in technical specifications:

a. Failure of ETCS incl. software critical faults;
b. Failure of Interlocking incl. software critical faults;
c. Failure of track clearance detection (axle counter (-s));
d. Failure of FRMCS radio coverage;
e. Failure of transmission network;
f. Failure of uninterrupted power supply;
g. Failure of CTC/LC;
h. Failure of Catenary/Traction Power system;
i. Failure of Track/Turnouts.

4.4.1.9. CCS Engineer shall provide a system Failure Mode Analysis (FMA) for main functions of the systems defined in a)-h) which shall be used to elaborate solutions for Degraded and Emergency Operation Modes.

4.4.1.10. CCS Engineer shall review the draft Rail Baltica Operational Concept which will be provided by Shadow Operator not later than 4 Months after CD.

4.4.1.11. CCS Engineer shall check technical feasibility of Operational Concept with regards to all systems of CCS subsystem and, in a cooperative manner with Shadow Operator, challenge the operational concept from cost-benefit perspective.

4.4.1.12. CCS Engineer shall in particularly check feasibility and backwards-compatibility of CCS subsystem for Rail Baltica for interoperable cross-border operations with PKP-PLK railway network in Poland.

4.4.1.13. CCS Engineer shall elaborate a signalling solution and, if required from the safety point of view, an ATP solution for each type of local facilities (outside of Rail Baltica main line). The abovementioned signalling and ATP solutions shall be interoperable (it could be as well ETCS, if it could be an alternative from cost-benefit perspective) and avoid national specific systems as much as possible.

4.4.2. Concept Design

4.4.2.1. Definition and objectives

a. The present chapter describes the Employer's requirements and processes for elaboration of the Concept Design. The CCS Engineer may amend the processes only when Employer's requirements are still met or exceeded. All amendments shall be described in the methodology to be delivered as part of the Inception report.

b. CCS Engineer shall elaborate Concept Designs for all Systems of CCS subsystem described in Chapter 2.3 according to the CCS subsystem breakdown structure.

c. Concept Designs shall provide technical solutions for the introduction of the Operational Concept described in Chapter 4.4.1 and the main targets and goals of the Rail Baltica CCS subsystem set in Chapter 2 design as well as reviewing decisions made by RB Rail and Designers for track design parameters (e.g. overlap lengths), land plot reservations, cableway system and ETCS parameters.

d. The Concept Design shall be defined at the optimum level of details to prepare the specifications for the Works contract procurement. The Concept Design shall keep as open as possible the competition between tenderers for Works Contract, in particular regarding suppliers' own technologies, under the necessary requirements to define the optimal type of CCS subsystem for Rail Baltica.

e. The Concept Design for each System of CCS subsystem shall:

I. Define the optimal configuration of each System of CCS subsystem, including basic subsystem architecture, equipment location diagrams, dimensioning of equipment, interfaces with neighbouring subsystems, etc,

II. Ensure full interoperability to TSI CCS. In this aim, the Concept Design will be subject of review and approval of the Employer's contracted NoBo and European Union Agency for Railways,

III. Ensure achievement of RAMS targets,

IV. Deliver solutions optimized for LCC,

V. Minimise the Environmental Impact of the CCS subsystem and of the entire railway operation during O&M phase,

VI. Deliver all necessary supporting documents to demonstrate that Concept Design fulfils its objective, including benchmarking reports, technical analysis, schematics, drawings, evidence of compliance to interoperability requirements calculation notes, bill of quantities, LCC analysis, MCA, EIA, Radio coverage reports, RAMS calculations.

f. The Concept Design, following approval by the Employer, shall be the basis of the CCS subsystem technical specifications for the Works procurement.

4.4.3. Concept Design for ERTMS

4.4.3.1. Concept Design for ERTMS shall be in line with elaborated Rail Baltica Operational Concept and provide mapping of functional requirements across all Systems (including ETCS on-board), parts and components of CCS subsystem, describing the architecture of the entire ERTMS and providing requirements on dimensioning of the ERTMS components.

4.4.3.2. CCS Engineer shall describe all interfaces with all other Systems of CCS subsystem and external subsystems as INF, ENE and civil structures which shall be respected during the procurement and indicate the interface standards which shall be provided by CCS Contractor(-s).

4.4.3.3. CCS Engineer shall review and consolidate the set of ETCS National values proposed by Shadow Operator as part of a Rail Baltica Operational Concept.

4.4.3.4. CCS Engineer shall elaborate schematic diagrams for preliminary equipment location on typical operational points: on open line, in stations (at least in a stopping point, all 7 international stations, typical passing loop with 2 sidings, the main freight intermodal terminal in each country).

4.4.3.5. CCS Engineer shall elaborate schematic diagrams for preliminary equipment location in Local Facilities, in particularly, for a typical:

a. freight/intermodal terminal
b. freight yard
c. rolling stock maintenance facility
d. infrastructure maintenance facility
e. military facility

4.4.3.6. CCS Engineer shall elaborate specific solutions incl. schematic diagrams for transitions between Rail Baltica main line under ETCS supervision and Local Facility areas not equipped with ETCS at least for following cases: transition on the access to Rolling stock depots, transition on the access to Infrastructure Maintenance Facilities, transition at LT/Poland border.

4.4.3.7. CCS Engineer shall reflect the outcomes of the radio coverage design in the FRMCS concept, describe proposed architecture of the core network, BTS system and provide requirements on dimensioning of the components.

4.4.3.8. CCS Engineer shall prepare ERTMS Concept Design and requirements specifications for submission to the European Union Agency for Railways for review and approval.

4.4.4. Concept Design for Interlocking

4.4.4.1. Concept Design for Interlocking shall be in line with elaborated Rail Baltica Operational Concept and provide mapping of functional requirements across all Systems, parts and components of CCS subsystem, describe the architecture of the entire Interlocking system and provide requirements on dimensioning of the interlocking components.

4.4.4.2. CCS Engineer shall describe all interfaces with other Systems of CCS subsystem (if any, but in particularly with ETCS Level 2 and Level 1, TMS, Ancillary systems, neighbouring interlocking) and external subsystems as INF, ENE and civil structures, which shall be respected during the procurement and indicate the interface standards which shall be provided by CCS Contractor(-s).

4.4.4.3. CCS Engineer shall elaborate schematic diagrams for preliminary equipment location on typical operational points: on open line, in stations (at least in a stopping point, all 7 international stations, typical passing loop with 2 sidings, the main freight intermodal terminal in each country).

4.4.4.4. CCS Engineer shall elaborate schematic diagrams for preliminary equipment location in Local Facilities, in particularly, for a typical:

a. freight/intermodal terminal
b. freight yard
c. rolling stock maintenance facility
d. infrastructure maintenance facility
e. military facility

4.4.4.5. CCS Engineer shall elaborate specific solutions incl. schematic diagrams for transitions between Rail Baltica main line under ETCS supervision and Local Facilities which could be not equipped with ETCS and remain under Local Control for at least following cases: transition on the open line, transition in station with only arrival/departure tracks equipped with ETCS.

4.4.4.6. CCS Engineer shall review technical specifications for consolidated procurement of turnout solution and update it according to the results of Concept Design for Interlocking.

4.4.5. Concept Design for Traffic management

4.4.5.1. Concept Design for Traffic management shall be in line with elaborated Rail Baltica Operational Concept and provide mapping of functional requirements across all systems, parts and components of CCS subsystem, describe the architecture of the entire Traffic management system for Centralised Traffic Control and local operations incl. requirements on dimensioning of the control centres and system for carrying out Normal, Degraded and Emergency Operation Modes.

4.4.5.2. CCS Engineer shall describe all interfaces with other systems of CCS subsystem and external subsystems as INF, ENE, which shall be respected during the procurement and indicate the interface standards which shall be provided by CCS Contractor(-s).

4.4.5.3. CCS Engineer shall elaborate schematic diagrams for physical distribution and authority management of CTC and Local Control for Rail Baltica main line and Local Facilities.

4.4.5.4. CCS Engineer shall define the functionalities linked to optimisation of traction energy consumption on the Rail Baltica infrastructure (notably eco-driving functionalities). This include analysis of existing or planned solutions, recommendations of relevant solutions and definition of functionalities and requirements. The definition of the solutions shall be coordinated with the ENE Engineer and Contractor, as well as with the Shadow Operator. The CCS Engineer shall consider European Union regulatory framework, as well as standards and good practices. The CCS Engineer shall define the requirements which shall be exported to the rolling stock and to Railway Undertakings for optimisation of traction energy consumption.

4.4.6. Concept Design for Information and Communications Technology system

4.4.6.1. Concept Design shall be elaborated in line with Rail Baltica Operational Concept and reflect the general architecture of backbone telecommunication networks for the needs of all Systems of CCS subsystem, ENE subsystem and public mobile services for the passengers of the Rail Baltica line.

4.4.6.2. Concept Design shall provide functional requirements for all ICT applications required for railway operations all provisions for connection of others ICT on the backbone network and FRMCS, for Infrastructure Managers and railway undertaking parties.

4.4.6.3. Concept Design shall provide requirements on dimensioning of the components of all parts of ICT system.

4.4.6.4. CCS Engineer shall elaborate schematic diagrams for preliminary equipment location on open line and in stations aligned with cableway system and landplot reservations.

4.4.6.5. CCS Engineer shall elaborate an ICT system Cyber Security concept which shall respect special requirements of all CCS subsystems and be aligned with the overall security concept of Rail Baltica defined in Rail Baltica Railway cyber-security strategy [15]. Study defines a number recommendations and guidelines for the development and implementation of a structured Cyber security strategy for the Rail Baltica railway ICT infrastructure with some emphasis on the identification of most critical assets of railway ICT infrastructure, Information systems, railway ICT services. The study also shall deliver ICT and Operational technologies (OT) architecture model, cyber security governance, resilience solutions, guidelines etc. CCS Engineer shall review study and elaborate CCS subsystem Concept Design according defined Rail Baltica Railway security strategy.

4.4.6.6. Elaboration of Cyber Security concept shall include following activities, but shall be not limited to it:

a. Development of the Rail Baltica CCS subsystem safety management requirements;

b. Development the Rail Baltica CCS subsystem information technology security management requirements;

c. Definition of the risks classified as intolerable which must be eliminated at the design or construction stage. The impact reduction measures are to be developed for intolerable risks;

d. Identification of critical nodes of CCS subsystem technological equipment/devices and services important to the functioning of the critical infrastructure which it is necessary to apply standard and additional physical security measures;

4.4.7. Concept Design for SCADA system

4.4.7.1. The main objective of SCADA system is to provide efficient remote monitoring and control functionality to be applied to the corresponding system in order to support and ensure required functionality and operation.

4.4.7.2. CCS Engineer shall elaborate a concept for SCADA system(-s) which shall cover all systems of CCS subsystem, INF subsystem and MEP equipment in stations. Scada for ENE subsystem is not part of CCS Engineer's scope.

4.4.7.3. Before starting the development of Concept Design for SCADA system, CCS Engineer shall propose for the approval of the Employer the above-mentioned concept including proposed structure, scope and key functional configuration for SCADA system.

4.4.7.4. CCS Engineer shall propose the up to date / practically proven technologies and solutions for SCADA system implementation.

4.4.7.5. The following aspects shall be considered by CCS Engineer for the preparation of Concept Design for SCADA system:

a. RAMS requirements,
b. LCC optimised solutions,
c. Applicable modes of operation,
d. Efficient energy control and utilisation of renewable energy sources,
e. Unified technical solutions for SCADA system parts and scaling possibilities.

4.4.7.6. As a part of Concept Design for SCADA system CCS Engineer shall provide the following information:

a. Structural scheme for SCADA system covering all systems of CCS subsystem, INF subsystem and MEP equipment in stations showing clearly separate parts (distinguished by different functionality, RAMS requirements),
b. Structural scheme of centralised control centre(s) covering communication, power supply parts,
c. Proposed locations of SCADA system parts along the railway line with the proposed reservation areas,
d. Functional hardware requirements and main technical specifications for all SCADA system parts,
e. Functional software requirements and main technical specifications for all SCADA system parts,
f. Human machine interface requirements, space reservation needs,
g. Monitoring (detection) systems for Rail Baltica railway infrastructure objects,
h. Any other information identified as necessary to be provided as a part of SCADA system Concept Design for the CCS Deployment,
i. SCADA system safety and security requirements,
j. Any other systems falling out of scope of railway traffic management & control and ECCS.

4.4.8. Concept Design for Ancillary systems

4.4.8.1. Concept Design shall be in line with elaborated Rail Baltica Operational Concept and provide mapping of functional requirements across all systems, parts and components

of CCS subsystem, describe the architecture of each ancillary system and provide requirements on dimensioning of the system.

4.4.8.2. CCS Engineer shall describe all interfaces with other systems of CCS subsystem, ENE subsystem and INF subsystem which shall be respected during the procurement and indicate the interface standards which shall be provided by CCS Contractor(-s).

4.4.8.3. CCS Engineer shall elaborate schematic diagrams for preliminary equipment locations.

4.4.9. Concept Design for Station systems

4.4.9.1. Station systems include station and platform equipment for passengers on international and regional stations: PIS, Passenger Address, CCTV, Master Clock, ticketing system, etc.

4.4.9.2. Concept Design shall describe the architecture of each system, providing mapping of functional requirements across all systems, parts and components, and provide requirements on dimensioning of each systems.

4.4.9.3. CCS Engineer shall describe all interfaces with other systems of CCS subsystem, ENE subsystem and INF subsystem, which shall be respected during the procurement and indicate the interface standards which shall be provided by CCS Contractor(-s).

4.4.9.4. CCS Engineer shall elaborate schematic diagrams for preliminary equipment location in stopping point (platforms are located on the main line), typical passing loop (platforms are located between main line and siding, platforms are located on sidings) and 3 large stations.

4.4.9.5. CCS Engineer shall elaborate a concept solution for platform gates

4.4.9.6. CCS Engineer shall elaborate schematic diagrams for equipment location in technical rooms of station buildings and outdoor shelters.

4.4.10. Concept Design for Non traction power supply

4.4.10.1. Concept Design shall describe the architecture, schematic drawings (major feeding diagrams) of each railway system components and provide requirements on dimensioning of the equipment.

4.4.10.2. CCS Engineer shall describe all interfaces with other railway system components, which shall be respected during the procurement and indicate the interface standards which shall be provided by CCS Contractor(-s).

4.4.10.3. CCS Engineer shall elaborate schematic diagrams for preliminary equipment locations.

4.4.10.4. CCS Engineer shall elaborate Power demarcation implied boundaries.

4.4.10.5. CCS Engineer shall provide calculation of power consumption (included current capacity check, steady state voltage check, short circuit rating check).

4.4.10.6. CCS Engineer shall provide MV/LV main Power cable technical specifications included rating input data:

a. Ambient Temperature

b. Ground Temperature

c. Soil thermal resistivity

d. Conductor temperature under normal conditions

e. Conductor Temperature under fault conditions

f. Minimal voltage drop settings at normal and degraded mode

4.4.10.7. CCS Engineer shall propose Concept for local Renewable23 energy solutions, prepare conceptual solution for renewable energy power sources at Block Section locations, evaluate different types of local renewable energy sources.

4.4.10.8. CCS Engineer shall investigate and develop Point heating technical solutions proposed benchmarking for concept technical solutions (for instance: solution with heating elements vs induction heating technology) with MCA. It should be proposed technical solutions in order to increase power consumption efficiency with intelligent monitoring system, proposed technical solution for regenerative braking energy usage. Deliver solutions optimized for LCC. The following technical parameters shall be defined:

a. Heating capacity (w/m) per meter;

b. Stock rail length needed to be heated;

c. Tongue length needed to be heated.

4.4.10.9. CCS Engineer shall prepare the analysis of different solutions for the feeding of all non-traction power supply consumers at least covering the following primary electricity feeding sources: DSO, OCS, local renewable electricity sources, other (such as regenerative braking energy). The analysis shall cover MCA approach to compare different feeding options for the purpose to identify the conditions what option is the most economically advantageous for a particular case. RAMS requirements shall be considered for all feeding options. LCC aspect shall be used for the above-mentioned analysis.

4.4.10.10. CCS Engineer shall be responsible for the analysis and development of the most optimum solution for connection of non-traction power supply consumers at every PS Connection Point to the corresponding DSO networks.

4.4.10.11. CCS Engineer shall be responsible for the provision of necessary data, application and receiving of technical conditions for every PS Connection Point from the corresponding DSO. All technical conditions shall be considered in Concept Design.

4.4.10.12. CCS Engineer shall prepare the solutions covering the implementation of technical conditions for every PS Connection point provided by the corresponding party responsible for the supplying of electricity to the PS Connection Point and obtain the approval from this party.

4.4.10.13. CCS Engineer shall investigate and propose solutions for the utilisation of regenerated energy produced during the braking process of the trains.

4.4.10.14. CCS Engineer shall assist with development of remote railway energy management system.

4.4.10.15. CCS Engineer shall analyse and propose the CCS subsystem Earthing & Bonding concept covering the delivery of the corresponding reports:

a. CCS subsystem Earthing & Bonding concept: its interfaces with other railway systems (including ENE and INF) and of relevant standards, the CCS Engineer shall deliver the requirements on Earthing & Bonding of CCS Subsystem to ENE Engineer which will integrate these requirements in to the overall Earthing & Bonding concept for Rail Baltica infrastructure.

[23] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC

b. CCS Earthing & Bonding concept shall identify the necessary provisions which will enable, during normal or under fault operation, keeping touch potential for human beings under normative limits, protect low voltage equipment from damages, and facilitate reaching Electro Magnetic Compatibility of the RB Railway system. Normal or Fault operation shall consider train operation conditions, short circuit conditions, lightning conditions.

c. CCS Earthing & Bonding concept shall provide architecture of the system, typical connection arrangements.

d. CCS Earthing & Bonding concept shall define Interface technical arrangements between CCS subsystem and other systems (including ENE and INF). Recommendations/requirement for interface solution between contractors must be proposed. The corresponding results shall be coordinated and agreed with ENE Engineer.

a. CCS Earthing & Bonding concept shall be part of the CCS Concept Design. Recommendations for changing or supplementing Design Guidelines shall be part of the DG update proposal report.

4.4.10.16. CCS Engineer shall define requirements for EMC Management and Control Plan.

4.4.10.17. The CCS Engineer`s scope includes Electromagnetic study compatibility analysis and identification of all possible technical interfaces with other systems. CCS Engineer shall establish guideline/strategy for CCS Contractor(-s), implement EMC Management process (based on RBR technical interface management system) and provide clear recommendations for every interfaced element (shall be part of the corresponding report). Analysis at detailed level and design of solutions for electric, magnetic fields and/or galvanic coupling studies in the context of reaching EMC is within the scope of the CCS Contractor(-s).

4.4.11. Concept Design for Cableway system

4.4.11.1. Concept Design for Cableway sylstem shall include update of the current RBDG-MAN-012-0105 General requirements (its Chapter 10 of annex 1): Cableways with the purpose to align it with the Concept Designs of all systems of CCS subsystem and ENE subsystem (provided by ENE Engineer).

4.4.11.2. CCS Engineer shall update/elaborate schematic diagrams for cableways in typical equipment locations, at least at open line, at block section location, in stopping point, typical passing loop with two sidings, railway overpass, ecoduct, culvert, etc.

4.4.11.3. CCS Engineer shall elaborate practical recommendations on implementation of adjustments of cableway system resulting from CCS subsystem Concept Designs under design contracts performed by DTD designers, CCS- and ENE Works Contractor(-s).

4.4.11.4. CCS Engineer shall review technical specifications for consolidated procurement of cableway system components and update it according to the results of Concept Design for Cableway systems.

4.4.12. Concept Design for Technical buildings/technical premises

4.4.12.1. Concept Design for technical buildings shall describe dimensions of the proposed technical buildings and its inner layout with preliminary locations of equipment for all systems, parts and components of CCS subsystem, and other subsystems if relevant and in case if shall be foreseen as well, necessary rooms for respective maintenance purposes for reasonable location of proposed equipment, to maintain and do repair works (in addition to locations of Infrastructure Maintenance facilities, refer to Table 10., No. I) if such will be necessary in:

a. Equipment location – technical buildings,

b. Local Facilities– technical premises,

c. Regional stations – Technical buildings or Technical premises,

d. Operation control centres,

4.4.12.2. During Concept design preparation CCS engineer is responsible for:

a. Evaluation of most appropriate (technical-economical based) energy source for building to achieving zero environmental impact.

b. Assessment of new building location to ensure conformity with existing municipality special plans.

c. Proposal of most appropriate (technical-economical based) materials for building construction to achieve zero environmental impact.

4.4.12.3. Sketch Design and Technical Design for Technical buildings/technical premises (optional scope):

a. The Employer may request the CCS Engineer to prepare sketch designs or Detailed Technical Designs of part or totality of technical buildings and technical premises. This shall be managed as an optional scope, subject to amendment to the Agreement.

b. The architecture principles of the technical buildings and technical premises shall fulfil architectural requirements from Rail Baltica, Architectural Design Guidelines and requirements defined in Zero Environmental Impact strategy,

c. Conceptual design must foresee in conceptual level (Diagrammatic or schematic model elements; conceptual and/or schematic layout/flow diagram) necessary infrastructure (roads, electricity, water and sewage supply, HVAC, and connections to city infrastructure if necessary. and take into according local national norms

4.4.13. **Design Guidelines changes**

4.4.13.1. The CCS Engineer shall deliver a DG amendment report on Concept Design approval stage in order to:

a. Improve consistency between DG documents,

b. Implement CCS Engineer proposed solution(s) improving Systems requirements defined in DG;

c. Develop technical requirements, conditions and interface with external utilities;

4.4.13.2. The CCS Engineer shall propose civil works provisions required for deployment of CCS subsystem (cableways, landplot reservations, etc.) which shall be incorporated in Design Guidelines.

4.4.14. **Cost estimates for CCS Deployment / Life Cycle Cost analysis / Environmental impact analysis / Multi Criteria Analysis**

4.4.14.1. The CCS Engineer shall demonstrate that the deployment of recommended concept of each CCS subsystem will deliver the most economically optimized solution with the most limited environmental impact for the railway operation needs. This is of highest importance due to the scale of Rail Baltica CCS subsystem deployment, the public financing and the long lifetime of its components. Therefore, the CCS Engineer shall develop the following tools:

a. Cost estimates: the CCS Engineer shall develop bill of quantities, unit prices, Cost estimates tables for CAPEX and OPEX for CCS Deployment and O&M phase. Attention is drawn on the necessity to estimate the cost of each System.

b. LCC analysis: this method of economic analysis shall aggregate all the necessary elements of cost of each CCS Systems: CAPEX, OPEX, dismantlement, disposal/recycling and replacement/renewal values. Level of detailisation shall allow to provide clear comparisons between options.

c. Environmental impact analysis: the CCS Engineer shall analyse the internal and external environmental impacts of design, production, transport, installation, O&M, decommissioning and disposal/recycling of every configuration, components or subsystems.

d. Multicriteria Analysis: The CCS Engineer shall deliver MCA incl. all required parameters and weighting system. MCA shall be prepared for each subsystem and consider at least following parameters: detailed LCC (CAPEX, OPEX, lifetime of components etc.) and environmental impact of each CCS subsystems.

4.4.15. **Review and approval of Draft Concept Design**

The CCS Engineer shall submit the Draft Concept Design for review and approval by the Employer. The CCS Engineer shall prepare and present the Draft Concept Design to the involved stakeholders (TWG etc.). Following collection of the opinions of relevant Employer 's experts and of the stakeholders, the Employer will take decision regarding the report status, and the approval of the recommended CCS subsystem Draft Concept Design.

4.4.16. **RAMS Program**

4.4.16.1. To achieve the RAMS requirement that are verified and validated by implementing all RAMS methods throughout the asset life cycle, it is necessary to implement the RAMS program in different CCS Engineer organizations levels.

4.4.16.2. The RAMS Program encompasses the success element factors such as:

a. RAMS culture,

b. RAMS leadership,

c. RAMS organizational structure,

d. RAMS resources,

e. RAMS management process.

4.4.16.3. The effectiveness of the RAMS Management process depends on the effectiveness of the other RAMS program success factor listed above. The RAMS Management Process encompasses the RAMS plan, RAMS implementation, RAMS control and RAMS improvement applied to RAMS activities.

4.4.16.4. The RAMS program needs to be in line with organization strategy that will be the input to define the RAMS strategic objective, RAMS success factors and RAMS requirement.

4.4.16.5. Concerning the RAMS implementation, that encompasses RAMS requirement and RAMS methods, the obligatoriness Directives, Regulations and Standards are the following:

a. The Directives (EU) 2016/797 and Regulation (EU) 2013/402,

b. The standards are EN50126-1, EN50128 and EN50129,

c. Design Guidelines.

4.4.16.6. Whenever necessary, another standards and guidelines concerning RAMS topics can also be used to guarantee the effectiveness of the RAMS requirement achievement and RAMS program implementation.

4.4.16.7. The CCS Engineer is contributing to the achievement of the RAMS program along with other stakeholders, RB Rail AS and CCS Contractor(-s) in particular. The tasks of the CCS Engineer are developed in Chapter 4.4.17 and Chapter 4.4.18 below.

4.4.17. Safety activities

4.4.17.1. The CCS Engineer shall assist the Employer in establishing the conditions for the most efficient Safety management process as part of RAMS program implementation for the development and Deployment of the CCS subsystem, in line with provisions set as part of European directives, CSM regulations and EN 50126, EN 50128 and EN 50129 standards.

4.4.17.2. The CCS Engineer shall identify and provide recommendations on where the CCS Engineer and/or the Employer shall be involved during the CCS subsystem development/deployment stages, when such steps serve the demonstration of CCS subsystem/components safety. The CCS Engineer shall review existing documentation released by RB Rail AS defined in table 10 in Chapter 4.3.

4.4.17.3. The CCS Engineer shall propose modifications, developments, and adaptations after review of this set of safety documentation in accordance with the Concept Design and concept of operation proposed for CCS subsystems.

4.4.17.4. The CCS Engineer shall adapt his analysis and adapt recommendations concerning the selected CCS procurement strategy and the resulting CCS Contractor(-s) and stakeholders mapping. The CCS Engineer shall identify all duties related to Safety management and recommend organisation, and assignment of responsibilities to each party.

4.4.17.5. Based on the Preliminary System Hazard Analysis provided by the Employer, the CCS Engineer shall conduct hazard workshops developing the CCS Preliminary Hazard Analysis and proposing adaptation of safety targets and requirements accordingly. Such development shall be conducted with consideration of the technical solution proposed by the CCS Engineer. The outcome of this activity shall be presented as part of a CCS Safety analysis report including full traceability of the workshops and meetings conducted along development.

4.4.17.6. The CCS Engineer shall ensure that resulting safety targets, safety policies, and Safety management processes are based on safety methods such as:

a. Preliminary Hazard analysis,
b. Functional Safety analysis,
c. SIL analysis,
d. FTA analysis,
e. ETA analysis,
f. FMEA.

4.4.17.7. Safety requirements shall be included as part of the Technical Specifications prepared for the selection of the CCS Contractor(-s).

4.4.18. RAM activities

4.4.18.1. The CCS Engineer shall assist the Employer for establishing the conditions for most efficient RAM Management Process as part of RAMS program implementation for

development and deployment of the CCS subsystem, in line with provisions set as part of EN 50126 standards.

4.4.18.2. The CCS Engineer shall identify and provide recommendations for such steps where the CCS Engineer and/or the Employer shall be involved during the CCS Deployment stages, serving the demonstration of CCS subsystem/components assurance.

4.4.18.3. The CCS Engineer shall review existing documentation released by RB Rail defined in table 10 in Chapter 4.3.

4.4.18.4. The CCS Engineer shall propose modifications, developments, and adaptations after review of this set of RAM documentation in accordance with the Concept Design and concept of operation proposed for CCS subsystems.

4.4.18.5. The CCS Engineer shall adapt his analysis and recommendations according to the selected CCS procurement strategy and the resulting CCS Contractors and Stakeholders mapping. The CCS Engineer shall identify all duties related to RAM management and recommend organisation, and assignment of responsibilities to each party.

4.4.18.6. Based on the Preliminary System RAM Analysis provided by the Employer, the CCS Engineer shall develop the CCS RAM Analysis and propose adaptation of RAM targets and RAM qualitative and quantitative requirements accordingly for CCS subsystems. Such development shall be conducted with consideration of the technical solution proposed by the CCS Engineer. Outcome of this activity shall be presented as part of a CCS RAM analysis report.

4.4.18.7. The CCS Engineer shall ensure that resulting RAM targets and RAM Management Process are based on RAM methods such as:

a. Lifetime Data Analysis;

b. RAM and LCC Analysis;

c. SFMEA;

4.4.18.8. RAM requirements are established as part of the Technical Specification prepared for the selection of the CCS Contractor(-s).

4.4.18.9. As part of RAM management process, the requirements for Spare Part Strategy shall be defined.

4.4.18.10. The CCS Engineer shall implement the RAM and LCC analysis and LDA according to the RAM plan.

4.4.18.11. In the case of new equipment such as FRMCS or equipment /component operating in new or extremely stress conditions, implementation of the ALT, HALT, HASS and reliability growth need to be required as part of CCS supplier procurement specification.

4.4.18.12. Relevant requirements for development of RAM activities by CCS suppliers must be defined based on state-of-the-art methodologies applied to critical systems/components:

a. ALT/HALT/HASS/RG

b. SFMEA/DFMEA/PFMEA/FMEA;

c. HRA

d. RCM

e. FRACAS

4.4.18.13. The CCS Engineer shall require CCS supplier to propose the best maintenance program considering the state of art of PHM and AI.

4.5. PrepPhase SP-4. Radio coverage Concept Design

4.5.1. The CCS Engineer shall elaborate a radio coverage Concept Design using the specialized software tool according to his proposal.

4.5.2. Radio coverage Concept Design shall be based on the railway alignment, local topography, rolling stock operation parameters and consider location of BTS at land plot reservations. The software tool shall use the most up to date propagation maps with all local geographical conditions.

4.5.3. Radio coverage Concept Design shall provide a feasible solution of the FRMCS radio network and describe its main parameters such as architecture of the FRMCS network, location of core network elements and BTSs, height and output power of antennas, energy consumption and source of power supply at each BTS location for the procurement documentation of the Works Contract.

4.5.4. Radio coverage Concept Design shall include technical drawings of proposed types of radio towers and site area. Loading of the proposed types of radio towers shall allow to use these as well for public mobile services for the passengers of the Rail Baltica.

4.5.5. Radio coverage Concept Design shall include performance targets and description of related Nominal, Degraded and Emergency Operation Modes.

4.5.6. Radio coverage Concept Design shall provide a reliable basis for the elaboration of proposals by Works procurement tenderers.

4.5.7. Process for modelling shall be described in dedicated modelling plan defining objectives, methods and tools, steps, input data and hypothesis, reference standards, and reporting, as necessary. The modelling tool shall be proven in use for large scale radio project with guaranteed outputs against relevant standards.

4.5.8. The radio coverage model shall take into account at least the following:

4.5.8.1. Typical timetable of train services and other operational parameters,

4.5.8.2. Railway alignment and track layout,

4.5.8.3. Track sections speeds,

4.5.8.4. Climatic conditions,

4.5.8.5. Land plot reservations,

4.5.8.6. Radio spectrum considerations (interference with public spectrum, interference in border areas, interference with GSM-R spectrum in Lithuania).

4.6. PrepPhase SP-5. CCS Deployment Strategy preparation

4.6.1. CCS procurement strategy

4.6.1.1. CCS Engineer shall review and analyse all justifications related to Deployment strategies proposed in the CCS Strategy study.

4.6.1.2. CCS Engineer shall recommend a most suitable solution for a Design and Built Works Contract(-s). Supporting argumentation and justifications shall be provided.

4.6.2. Supplier market research

CCS Engineer shall review the supplier market research provided as part of CCS Strategy study and update it as far as it is required for recommending the CCS Deployment strategy for Rail Baltica.

4.6.3. Preparation of technical Agreements with main stakeholders

4.6.3.1. Interface agreements with 1520 mm railway

The CCS Engineer shall assist the Employer in the discussions and the preparation of the technical conditions and draft agreements with 1520 mm railway Infrastructure Managers, for locations with gauge crossing at gauntleted track, but also for locations where both infrastructure are parallel (maintenance organisation, EMC effects). Draft interface agreements shall include technical, legal, operational and maintenance conditions. The CCS Engineer shall lead the negotiation phase with the 1520 mm railway Infrastructure Managers on behalf of the Employer until signature of the interface agreements.

4.6.3.2. Interface agreements with PKP-PLK

The CCS Engineer shall assist the designers and the Employer in the discussions and the preparation of the technical conditions and draft agreements with PKP-PLK (Polish railway Infrastructure Manager), for interface at LT-PL border. Draft interface agreement shall include technical, legal, operational and maintenance conditions. The CCS Engineer shall lead the negotiation phase with PKP-PLK on behalf of the Employer until signature of the interface agreement.

4.6.3.3. Connection agreements with DSO

Following the validation of Concept Design for Non traction power supply recommended configuration, the CCS Engineer shall prepare the draft agreement with DSO for connection conditions of every Systems equipment locations to the grid. Draft agreement shall include technical, legal, operational and maintenance conditions. The CCS Engineer shall lead the negotiation phase with the DSO on behalf of the Employer until signature of the connection agreements.

4.6.3.4. Interface agreements with DSO

The CCS Engineer shall assist the Employer in the discussions and the preparation of the technical conditions and draft agreements with DSO for interface with crossing or parallel electric line. Draft agreement shall include technical, legal, operational and maintenance conditions. The CCS Engineer shall lead the negotiation phase with the DSO on behalf of the Employer until signature of the interface agreements

4.6.4. Review and finalisation of Procurement strategy for Works Contract

4.6.4.1. As reference solution, the CCS Engineer shall consider that the implementation of CCS subsystem will be procured as a single Design and Built contract, for the entire geographical scope of Rail Baltica Global Project. This reference solution was justified by the implementation of Rail Baltica as a greenfield project, by the criticality of CCS subsystem for Interoperability and by the economy of scale it delivers both in CAPEX and OPEX. Procurement of CCS subsystem as a single Design and Built Contract is stipulated in the Contracting Scheme [3], Clause 4, however CCS Strategy study [5] recommends procurement in 4 Lots, where each Lot covers specific Systems for entire Rail Baltica line.

4.6.4.2. The CCS Engineer shall analyse single Design and Build Contract (including equipment delivery, testing and commissioning) for whole Rail Baltica railway CCS subsystem as preferred solution covering at least:

a. Market research on similar scope of CCS subsystem Deployment, including consultation meetings with suppliers,

b. Critical review of possible procurement strategies

c. CCS Deployment Risk analysis,

d. Economic analysis,

e. Market competition analysis.

4.6.5. Requirements Management

4.6.5.1. The CCS Engineer shall be responsible for the incorporation of the requirements of all Systems of CCS subsystem in a single Requirements Management tool. The specific Requirements Management tool to be used shall be proposed in a technical proposal. Alternatively, the Employer could provide its own Requirements Management tool to be used by the CCS Engineer.

4.6.5.2. CCS Engineer's tasks are as follows:

a. Establish CCS Contractor(-s) Requirements;

b. Populate requirements on all Systems of CCS subsystem in a requirements database during preparatory phase for CCS procurement purpose and later supervise CCS development and deployment works performed by CCS Contractor(-s) as well as entire Verification & Validation process.

c. Specify requirements on Requirements Management for CCS Contractor(-s) which shall be included in the procurement documentation.

4.6.6. Requirements on System Integration

4.6.6.1. CCS Engineer shall define requirements on System Integration for all CCS subsystems including trackside and onboard equipment of rolling stock as well as integration with ENE subsystem and INF subsystem (in particularly turnouts).

4.6.6.2. CCS Engineer shall include requirements on alignment of system integration activities with Rail Baltica Master Programme schedule, in particularly in terms of different design/construction/putting in operation phases of Rail Baltica main line and Local Facilities.

4.6.6.3. CCS Engineer shall coordinate integration of all systems of CCS subsystem with abovementioned subsystems in all project phases: requirements specification, procurement, design, construction, testing and commissioning and putting in operation.

4.6.7. Requirements on Software Management

CCS Engineer shall define requirements on software development and establish Software Management plan guidance for the CCS Contractor(-s).

4.6.8. Requirements on System Engineering

CCS Engineer shall define and set up high level guidelines requirements for engineering development and establish Engineering Management plan guidance for the CCS Contractor(-s).

4.6.9. Requirements on Configuration Management (Software and Hardware)

CCS Engineer shall define requirements to enable traceability of any changes of software/hardware items for the CCS Contractor(-s), and provide evidence how safety requirements have been captured and controlled by proposing baseline, procedures and identify configuration items.

4.6.10. Requirements on Operation and Maintenance

CCS Engineer shall define requirements on O&M and related activities for each System of CCS subsystems which shall be fulfilled by the CCS Contractor(-s). It has to integrate with the Rail Baltica joint Asset register and existing O&M plans which are to be developed by the Shadow Operator.

4.6.11. Training strategy and planning

CCS Engineer shall define requirements on planning and conducting of training of Employer's staff by CCS Contractor(-s).

4.6.12. Requirements on Design Gate Review

The CCS Engineer shall define requirements on gate review procedure for engineering deliverables of each CCS subsystem including criteria to facilitate acceptance process for at least following Design stages:

a. Generic Product Design,
b. Generic Application Design,
c. Specific Application Design,
d. Master Design,
e. Detailed Technical Design.

4.6.12. Verification and Validation

4.6.12.1. Verification and Validation Plan

a. The CCS Engineer shall prepare a V&V plan presenting the generic strategy for the V&V of the CCS subsystem, including:

I. Description of required V&V process according to best railway industry practice, for all tests stages according to the CCS design documentation hierarchy and the CCS systems architecture, and guaranteeing the control of the production / construction quality and compliance to the Employers requirements,

II. Required involvement of CCS Contractor(-s) and stakeholders along the CCS V&V cycle,

III. Strategy for test at interfaces,

IV. Strategy for products and Systems testing and acceptance,

V. Strategy for products and systems certification,

VI. Detailed plan for System static, dynamic testing, offline in laboratory testing and on site testing,

VII. Detailed plan for System operation testing,

VIII. Requirement management supporting evidence of compliance,

IX. Configuration management,

X. List and scope of V&V deliverables to be produced on the course of the CCS Deployment, by CCS Contractors, Suppliers and stakeholders involved in CCS delivery,

XI. Safety V&V test for hardware & software and safety V&V integration test.

b. b. The CCS Engineer shall develop the set of V&V requirements to be specified as part of the CCS Works procurement. The set of requirements shall reflect the elements established as part of the V&V plan and identify further the expected duties of the CCS Contractor(-s) as part of the V&V activities.

4.6.13. Requirements on Independent Assessment services

The CCS Engineer shall define the scope of AsBo/ISA services to be provided by CCS Contractor(-s) including technical scope, required competences and accreditations, schedule and set of deliverables, interfaces to other conformity assessment bodies.

4.7. PrepPhase SP-6. Assistance to procurement

4.7.1. Preparation of Technical Specifications

4.7.1.1. The CCS Engineer shall prepare full Technical Specification for Works Contract procurement for all systems of CCS subsystem, on the basis of the approved Concept Design and of the approved Procurement strategy for Works Contract.

4.7.1.2. The Technical Specifications shall be clear and unambiguous. All the requirements in the specifications shall be structured in order to be easily implemented in the Employer requirements management system.

4.7.1.3. Functional requirements regarding operation and maintenance of CCS subsystem, necessary functionalities including the interworking with interfaces subsystem shall be described.

4.7.1.4. Non-functional requirements should be also addressed. Each specification shall include a range of sections, in particular:

a. Requirements for design,
b. Functions and performance to be achieved, including RAMS objectives,
c. Material and workmanship requirements,
d. Operations requirements,
e. Monitoring and Control requirements,
f. Normal and Reserve modes,
g. Presentation of Concept Design and flexibility left to the tenderers,
h. Maintenance requirements,
i. EMC,
j. RAMS,
k. Construction and installation works,
l. Testing and commission operations,
m. Software quality,
n. Requirement management,
o. Quality management,
p. Configuration management plan,
q. Architectural design of building according high energy efficiency standards.

4.7.1.5. A set of interface specifications shall also be produced for every interface case, describing respective responsibilities of the CCS Contractor(-s) in terms of scope, design, procurement, installation, testing and commissioning (e.g. between CCS and civil works).

4.7.1.6. Operation and Maintenance specifications shall be prepared to define general rules and requirements for the CCS subsystem.

4.7.1.7. The CCS Engineer shall review the existing BIM processes, documents and use cases in RB Rail AS. The CCS Engineer shall then prepare the Technical Specification for BIM application and the required attribute information for "CCS Detailed Technical Design" which shall be included in the BIM Models. The required geometrical and attribute information shall serve the purpose for the design, construction and maintenance of the CCS subsystems. All the prepared documents, tables and lists shall be agreed with the Employer and implemented by "CCS Detailed Technical Design" Works contractor.

4.7.1.8. DG BIM relevant documents and developed processes must be used as basis for the preparation of the Technical Specification for "CCS Detailed Technical Design".

4.7.1.9. The Technical Specification as minimum, but not limited to, must include the following:

a. Detailed BIM use cases and application,

b. Detailed LOD definition tables (LoG and LoI) for the design, construction and maintenance phases,

c. Detailed data and asset codification tables,

d. Model, drawing and data native and exchange formats,

e. Asset Management and Asset Register strategy,

f. The Asset Data Dictionary Definition Document (AD4) documents shall be prepared as additional information to Object attribute (LoI) matrix,

g. Roles and responsibilities of the involved parties of the project,

h. Data exchange and sharing strategy.

4.7.1.10. The CCS Engineer shall review the existing GIS system implementation and use cases in RB Rail and prepare the Technical Specification for the GIS use cases during the design, construction and maintenance phases of the project. The Technical Specification as minimum, but not limited to, shall include:

a. GIS use cases during the design stage of the CCS subsystems,

b. GIS use cases during the construction stage of the CCS subsystems,

c. Data representation and data visualizations using GIS system during the design and construction stages,

d. Construction work status and progress representation using GIS system.

4.7.2. Assistance to Works' Contract preparation

The CCS Engineer shall assist the Employer's staff for the preparation of the Works' Contract template to be included as part of the Works' Contract procurement documentation. Taking into account that Works' contract will be based on "Conditions of Contract for Plant & Design-Build, edition, 2019 Contract Conditions for Design and Built (Yellow Book), the CCS Engineer shall be actively involved in the preparation of the following documents:

a. Particular Conditions,

b. Payment Conditions,

c. Performance Warranty, Retention Bond,

d. Insurance requirements,

e. Other contract related appendixes to the Works Contract.

4.7.3. Assistance during Works contract procurement process

4.7.3.1. The CCS Engineer before the announcement of the Works Contract procurement shall provide assistance in the organisation of market consultations.

4.7.3.2. The CCS Engineer shall provide at least following recommendations as set of requirements for the Works Contract procurement:

a. Technical qualification requirements,

b. Legal qualification requirements,

c. Proposals evaluation methodology and criteria (weighting factors).

4.7.3.3. These requirements shall be delivered in full respect of EU and national public procurement legislation.

4.7.3.4. The CCS Engineer shall provide at least following assistance during ongoing Works Contract procurement procedure:

a. Providing assistance in preparation of the answers to received questions during procurement process,

b. Providing assistance in the supplier meetings,

c. Providing assistance in the negotiation process,

d. Providing assistance in evaluation of the applications and proposals and providing recommendations,

e. Providing and assistance in procurement claims resolution process,

f. CCS Engineer shall provide assistance in to procure particular technology separately during Preparatory Phase defined in CCS Strategy study [5]

4.7.3.5. CCS Engineer shall provide assistance during evaluation of Tenderers proposals in other procurements related to CCS subsystem and CCS subsystem components, namely:

a. Turnout solution (in relation to point machine, locking and sensor system, point heating system, predictive maintenance system);

b. Multiducts, ducts, manholes and on-surface cable channels;

c. Any other procurements covering the scope of CCS subsystem which is defined in the Chapter 2.3 System scope and would not be included in the scope of CCS Contractor(-s).

5. WORKS IMPLEMENTATION PHASE

5.1. General

5.1.1. During the Works implementation phase, the CCS Engineer shall fulfil the entire role and duties of the Engineer, as defined by the Works contract (e.g, FIDIC "Conditions of Contract for Plant & Design-Build, 2nd edition 2019 ("FIDIC Yellow Book") the Particular Conditions of the Works contract, all annexes to the Works contract, and by the present Agreement.

5.1.2. The CCS Engineer shall verify at any opportunity that the Works implementation of the CCS subsystem is in full compliance with the eligibility conditions edited by INEA. During any auditing or claim processes from INEA, ECA or any other entitled authority, the CCS Engineer shall provide technical assistance to the Employer in the preparation of any supporting argumentation or by producing and assembling required documentation.

5.1.3. In particular, the duties of the CCS Engineer include:

5.1.3.1. The management of the Works Contract,

5.1.3.2. The Project Management Office as described in Chapter 3,

5.1.3.3. The review and approval of the CCS Contractors documents for further approval by Employer,

5.1.3.4. The supervision of the Design,

5.1.3.5. The supervision of the manufacturing, the delivery and installation of the of equipment, as well as the supervision of all construction works,

5.1.3.6. The supervision of the testing and commissioning operation, including Tests on Completion,

5.1.3.7. The issuance of the Taking-Over Certificates,

5.1.3.8. The supervision of the Defect Notification Period,

5.1.3.9. The issuance of the Performance Certificates,

5.1.3.10. All measures needed until Works Contract closure.

5.2. Works implementation phase is structured with the following Service Packages:

Table 11. Works implementation phase Service Packages

Works implementation phase Service Package[24]	Milestones	Completion condition
Supervision of Generic design phase	According to CCS Deployment Management Plan	Approved Generic Product Design, Generic Application Design,
Supervision of specific design phases	According to CCS Deployment Management Plan	Specific Application Design Detailed Technical Design documents

[24] Minimum mobilization requirements on Works implementation phase services set out in Annex No 4 to the Invitation.

Design supervision for Service section 2.1. – 2.11	According to CCS Deployment Management Plan	Approved Service Section CCS Detailed Technical Design documents
Manufacturing, equipment deliveries, construction and installation works supervision for Service section 2.1. – 2.11	According to CCS Deployment Management Plan	Approved Tests on Completion & Approved As-Built Detailed Technical Design documents & Taking-Over Certificate issued for Service section
Defect Notification Period supervision for Service section 2.1. – 2.11	According to CCS Deployment Management Plan	Performance Certificate issued

5.3. Management of the Works Contract

5.3.1. The CCS Engineer shall organize, perform, and complete all assignments on behalf of the Employer, as well as advise the Employer on all technical, administrative, and finance management aspects related to implementation of the Works Contract.

5.3.2. The CCS Engineer shall ensure continuous exchange of information with the Employer concerning prompt performance of the Works.

5.3.3. The CCS Engineer shall review the CCS Contractor(-s) Payment Plan, considering:

5.3.3.1. Compliance with Works Contract, Master Programme and objectives,

5.3.3.2. Compliance with applicable rules related to Asset Management, taxes and accountancy,

5.3.3.3. Breakdown in Permanent and Temporary Works,

5.3.3.4. Reasonable cashflow for the Employer and CCS Contractor(-s) during whole execution of the Works contract,

5.3.3.5. The approval of the CCS Contractor(-s) Payment Plan requires prior approval by the Employer.

5.3.4. The CCS Engineer shall accept and review the CCS Contractor(-s) Applications for payment certificates and related invoices (invoice formats and content shall also be approved by the Employer).

5.3.5. The CCS Engineer shall manage variations and claims in accordance with the provisions of the Works Contract deemed necessary and/or unavoidable and corresponding to the CCS Contractor(-s) proposals. This include the review of technical, financial and implementation aspects of the variations or claims by the CCS Engineer, and production of corresponding assessment reports.

5.3.6. The CCS Engineer shall advise and consult on any complaints from stakeholders or third parties, or issues relating to the contract that arise during performance of the works, as well as identifying of prospective delays and prevention of complaint whenever feasible.

5.3.7. The CCS Engineer shall issue all necessary Instructions, Notices and Determinations necessary to the proper execution of the Works contract, according highest professional standards and on a timely manner.

5.3.8. The structure and content of every deliverable for Works implementation phase Service Package shall be agreed with the Employer before provision of a deliverable.

5.3.9. The CCS Engineer shall advise the Employer on all aspects of technical, administrative, and financial management aspects related to complete execution of the Works Contract.

5.4. Project Management Office for Works implementation phase

5.4.1. The CCS Engineer shall provide Project Management Office services as described in Chapter 3, including organization and chairing of monthly progress meetings attended by the Employer, CCS Contractor(-s), Project Manager and other stakeholders, and preparation and distribution of the minutes of meetings.

5.4.2. The CCS Engineer shall prepare and deliver to the Employer the "CCS Engineer Monthly progress report" integrating information from CCS Contractor(-s) progress report together with the related Review/Approval statuses of Contractors documents and of supervision activities.

5.4.3. The CCS Engineer shall review and approve CCS Contractor(-s) work programmes and monthly progress reports to ensure conformity of the Works and Sections thereof with the Rail Baltica Master Programme and CCS Deployment programme and ultimately, the completion of the Works in accordance with the Works Contract.

5.5. Review and approval of the CCS Contractor(-s) documents

5.5.1. The CCS Engineer shall ensure that all notices issued by the CCS Contractor(-s) and "Contractors Documents" are verified and confirmed professionally and in a timely manner for the purpose to ensure performance of the Works in accordance with the CCS Deployment Programme.

5.5.2. The CCS Engineer shall in particular review, amongst others, the following CCS Contractors documents:

- 5.5.2.1. Project management documentation (as described in Chapter 3),
- 5.5.2.2. Performance Security documents,
- 5.5.2.3. Environmental plan,
- 5.5.2.4. Documentation plan,
- 5.5.2.5. Insurance certificates.
- 5.5.2.6. Documents linked to Contractors personnel: qualification, medical certificates, professional certificates, work permits etc.,
- 5.5.2.7. Documents linked to Contractors subcontractors,
- 5.5.2.8. Health and Safety plans.

5.5.3. Examination of the Contractors quality control documents and procedures to ensure that they comply with requirements of the Works Contract.

5.5.4. The CCS Engineer shall ensure that the Contractors insurance documents, Subcontractors' documents, Performance Security documents, and any required documents or certificates remain adequate and valid to cover the Contractor's liabilities at all stages. Follow-up table shall be prepared and kept updated.

5.6. Technical compliance management

5.6.1. The CCS Engineer shall develop and maintain technical compliance management process in order to ensure that the CCS subsystem is in compliance with all mandatory standards, regulations, Employer's requirements and other related requirements.

5.6.2. The CCS Engineer shall use requirement management system to ensure Technical compliance management, including ensuring full traceability of the Employer's requirements. The CCS Engineer shall be responsible for supporting Employer for the communication with the CAB`s involved in the Rail Baltica Global project implementation, appointed at Country's level, or contracted by the Employer. The purpose of this communication is to support Employer to demonstrate the compliance of CCS subsystem with all mandatory, interoperability, safety and any other specific national legislative requirements of the Country.

5.6.3. The CCS Engineer shall be responsible for supporting Employer in provision of information to CAB`s regarding any CCS Deployment activity, covering design, construction and testing, delivery of documentation, approval status etc. Such information must be part of the progress report to be delivered by the CCS Engineer.

5.6.4. The CCS Engineer's review shall be independent from the CAB`s review. The CCS Engineer shall not oversee the delivery of and shall not endorse the CAB`s review results.

5.7. Interface Management

5.7.1. The CCS Engineer shall be responsible for all interface management according TSI (including technical, legal, administrative, Rail Baltica progress related, etc.) management related to the CCS Deployment.

5.7.2. The CCS Engineer shall be responsible for management of all the CCS Deployment Programme interfaces with Rail Baltica Master Programme.

5.7.3. The CCS Engineer shall be responsible for management of all technical interfaces, in particular:

5.7.3.1. ENE subsystem (for the entire deployment process, including planning, design, installation, testing, operation),

5.7.3.2. INF subsystem (for the entire deployment process, including planning, design, construction, testing, operation),

5.7.3.3. Signalling, interlocking and ATP systems of 1520 mm railways at one level crossings of 1435 and 1520 networks for flank protection purposes,

5.7.3.4. Rolling Stock subsystem interface for design, testing and operation,

5.7.3.5. Other utilities affected,

5.7.3.6. Other interfaces with CCS subsystem identified during Service provision.

5.7.4. Assist CCS Contractor in the development of interface specifications, establishing Interface cards for each particular interface, liaising with suppliers and monitoring implementation until resolution of interface case.

5.8. Supervision of the Design

5.8.1. The CCS Engineer shall ensure that the Design documentation issued by the CCS Contractor(-s) are in conformity with Employer's requirements, Technical Specifications and other annexes to the Works Contract, with quality and quantities requirements of Works Contract, with European and local regulations and standards. The conformity of the Design shall be verified and confirmed professionally and in a timely manner for the purpose to ensure performance of the Works in accordance with the Programme.

5.8.2. The scope of the CCS Engineer services related to all design activities shall include review and approval of all CCS Contractor(-s) design documentation for each of the following design stages:

5.8.2.1. Generic Product Design and Generic Application Design: includes all technical specifications, conceptual or typical solution, design, architecture principles, general schematic etc. applicable to the CCS subsystem in general, but not linked to a particular site or section,
5.8.2.2. Specific Application Design of each Rail Baltica main line design section and each Local Facility,
5.8.2.3. CCS Detailed Technical Design (DTD) of each Rail Baltica main line design section and each Local Facility.
5.8.2.4. Operation & Maintenance manuals,
5.8.2.5. As built Detailed Technical Design of every section (As Built).

5.8.3. The scope of the CCS Engineer services related to all design activities shall include review and approval of all Rail Baltica designers and IB designers documentation which covers any system of CCS subsystem for Rail Baltica mainline, stations and terminals and Local Facilities, according to requirements on CCS subsystem and CCS Engineer's experience and best practises in similar railway infrastructure. The review process shall include consolidation of findings and comments in the report document and participation in Rail Baltica main line and Local Facilities design review meetings.

5.8.4. Detailed Technical Design

5.8.4.1. The CCS Engineer shall be aware that meaning of the term "Master Design" is different in each of three countries:

a. In terms of Lithuania construction legislation, Master Design corresponds to Principal Design Documentation ("Techninis projektas" in Lithuanian) together with all requirements specified in DTD technical specifications;

b. In terms of Latvia construction legislation, Master Design ("Būvprojekta pamatrisinājumi" in Latvian) is not applicable in Country's construction legislation, however required by RBR as separate stage during provision of the Design Services to align Global project solutions and at the early level of Detailed technical design preparation together with all requirements specified in DTD Technical Specification;

c. In terms of Estonia construction legislation, Master Design corresponds to Principal Design Documentation ("Põhiprojekt" in Estonian) together with all requirements specified in DTD Technical Specification.

5.8.4.2. The CCS Engineer shall be aware that meaning of the term "CCS Detailed Technical Design" is similar in the three Baltic states, as it is the final stage of the design process in accordance with relevant Country's construction legislation and it gives right to start construction works. Denomination in each of three countries is as follows:

a. For Estonia, Detailed Technical Design corresponds to Operational Building Design documentation ("Tööprojekt" in Estonian);
b. For Latvia, Detailed Technical Design corresponds to Building design ("Būvprojekts" in Latvian);
c. For Lithuania, Detailed Technical Design corresponds to work's design ("Darbo projektas" in Lithuanian).

5.8.4.3. Design review shall include (but is not limited) to following tasks:

a. Review and approval of the CCS Contractor(-s) documents to determine their compliance with requirements of the Employer, relevant standards Directives and Regulations. The CCS Engineer shall bring to the immediate attention of the Employer any changes in the design or in respect to technical issues, which potentially may lead to time and cost overruns, or otherwise have a significant impact on the project. The authorization of the Employer is not required before

the approval of the CCS Contractor(-s) documents by the CCS Engineer, however the Employer shall be kept informed in detailed and timely way of all issues. If deemed necessary, the Employer reserve the right to block approval of any CCS Contractor(-s) documents. Full content of the deliverables of the Generic Design shall be subject to joint consolidated review by the Employer and the CCS Engineer.

b. Review and approval of the CCS Contractor(-s) Operation & Maintenance manuals for CCS subsystem, according CCS Engineer experience of best practise in similar railway infrastructure. The review process shall include consolidation of opinion of relevant stakeholders (Employer, Shadow Operator, Infrastructure Manager etc.).
c. Verification of "as built drawings", and delivery of all reports, records, certificates and addenda prepared by the CCS Contractor(-s) upon completion of the works to the Employer.

5.8.5. Compliance with BIM and Asset Information policies

5.8.5.1. The CCS Engineer shall carry out the review of the BIM deliverables of the CCS DTD. For this task the CCS Engineer shall allocate the appropriate knowledgeable experts. All BIM models shall contain attribute data embedded within the models (LoI) and appropriate geometry for the stage and shall follow the DG and specifically "Building Information Management (BIM) Employer's Information Requirements" RBDG-MAN-030 document, RBDG-TPL-016 Codification Tables, RBDG-TPL-019 BIM Objects Attributes Matrix.xlsx.

5.8.5.2. As minimum, but not limited to, the CCS Engineer shall review and check the following deliverables according to the requirements of DG from CCS DTD:

a. Inception report (including the BIM Execution plan, TIDPs/MIDPs, mock-up models, Object attribute (LoI) matrix, object LoG matrix),
b. Site investigation reports including Laser scanning and Geotechnical BIM models (if any additional is being prepared),
c. All design BIM and 3D models for all stages of the "CCS Detailed Technical Design" (CCS DTD),
d. BIM models in native file formats,
e. BIM models (including attribute information) in exchange file formats,
f. QEX and QTO and their compliance with information in the BIM models,
g. Clash check reports,
h. BIM QA/QC reports,
i. 4D (construction scheduling) simulations,
j. Codification tables,
k. BIM objects attribute matrix,
l. BIM delivery reports,
m. 2D drawing and 3D/BIM (geometry compliance) check,
n. 2D drawing and BIM information compliance check.

5.8.5.3. The review of BIM models also includes the attribute review according to the requirements set out in the DG and in the technical specification for the CCS DTD.

5.8.5.4. All the discovered issues shall be reported to the Employer and to CCS Contractor(-s) preparing CCS DTD. The CCS Contractor(-s) shall amend and correct the design according to the remarks and comments and the CCS Engineer shall verify the solutions in BIM environment.

5.8.5.5. The CCS Engineer shall review, verify and approve the information within the Asset Register system according to the agreed requirements with the CCS Contractor(-s).

5.8.5.6. All design information from CCS DTD, DTD, IB projects of the mainline, stations and terminals of the project including the BIM models, drawings and data shall be made

available for the CCS Engineer for review. The CCS Engineer shall be able and have the knowledge, hardware and software capability to review all the models, drawings and other data.

5.8.5.7. General approach for design deliverables are:

a. For BIM models – IFC 2x3 (IFC4), XML and native file formats,
b. For 3D models – DWG/DGN and native file formats,
c. For drawings – DWG/DGN and PDF file formats,
d. For text documents – docx and PDF file formats,
e. For spreadsheet type documents – xlsx and PDF file formats,
f. For scheduling and planning documents – xer and PDF file formats,
g. For PointClouds – LAS/LAZ/XYZ/PTS/PTX/E57/RCP file formats.

5.9. Supervision of manufacturing and delivery of the equipment, supervision of construction and installation works

5.9.1. The manufacturing of any equipment shall be initiated by the CCS Contractor(-s) only once all the design documents related to this equipment are approved. Serial manufacturing of any equipment shall be initiated by the CCS Contractor(-s) only once the corresponding Factory Acceptance Tests[25] are passed. During manufacturing phase, the CCS Engineer shall:

5.9.1.1. Monitor the progress of the manufacturing and assess the compliance with the Programme,

5.9.1.2. Report any risk related to the manufacturing and take necessary actions to mitigate these risks.

5.9.2. The CCS Engineer shall consider in his proposal that costs related to attendance to Factory Acceptance tests, except if FAT are taking place in Baltic states, are covered by CCS Contractor(-s). These costs include transportation and accommodation costs, necessary testing equipment, and on-site offices. However, Per Diem or other salary element linked to travel conditions for CCS Engineer's employees according the relevant legislation will remain borne by the CCS Engineer.

5.9.3. The CCS engineer shall consider in his proposal that costs related to establishment, operation, supplies, furniture, maintenance and dismantlement of construction site offices for CCS Engineer will be provided by CCS Contractor(-s). Generally, it means that in all construction site offices adequate dedicated space and equipment will be available free of charge for the CCS Engineer.

5.9.4. The schedule of the deliveries of the equipment in the CCS Contractor(-s) warehouse or on site shall be monitored by the CCS Engineer:

5.9.4.1. Following invitation from the Contractor's or on his initiative, the CCS Engineer shall perform and inspection of the delivered equipment, their compliance with the approved design documents and with the deliverable bills,

5.9.4.2. The CCS Engineer shall inspect the equipment storage site, assess its conditions and report any deficiency or risk,

5.9.4.3. Prepare a delivery report stating type and quantities of equipment's delivered, and all necessary remarks and reserves,

5.9.4.4. In the case the delivered documents are subject to payment, review and approve the related documents.

5.9.5. The supervision of construction and installation works by the CCS Engineer shall allow to warranty high level of quality and timely completion of the Works. During this phase, the CCS Engineer is responsible for:

[25] The CCS Engineer shall allocate FAT`s travel costs in Works contractor`s agreement.

5.9.5.1. Detect any defect or inconsistencies between ongoing work and design documentation,

5.9.5.2. Follow relevant regulation for Construction supervision (in Latvian: *būvuzraudzība*; in Lithuanian: *techninė priežiūra*; in Estonian: *ehitusjärelevalve*) as defined in applicable laws of the Country, and in the Agreement, also ensuring required certified experts according to Country legislation,

5.9.5.3. Verifying and approving that CCS Contractors construction site offices are in conformity with the Works Contract requirements,

5.9.5.4. Monitoring and evaluating volume of the Works performed by the CCS Contractor(-s), including accurate record of the actual progress of the Works compared to the theoretical progress mentioned in Works implementation programme. The monitored Works shall be splatted in the following categories:

a. Permanent Works,
b. Non-permanent Works,
c. Covered works (also known as hidden Works),

5.9.5.5. Organisation of weekly site meetings with the CCS Contractor(-s), and reparation and distribution of the corresponding minutes,

5.9.5.6. Daily supervision of the activities of the CCS Contractor(-s) on the works sites ensuring that all the construction and installation works, methods and technology comply with the approved Design, with the Technical Specifications and other annexes to the Works contract, with quality and quantities requirements of Works Contract, with European and local regulations and standards and with the Programme,

5.9.5.7. Monitoring the effective availability of CCS Contractor(-s) resources toward approved Programme,

5.9.5.8. Monitoring the CCS Contractor(-s) record keeping (daily reports, site diaries etc.), examining accuracy of these records. Preparing Engineer's weekly report of CCS Contractor(-s) activities progress,

5.9.5.9. Examine construction methods, review test documentation and perform site inspection to assess compliance with the requirements,

5.9.5.10. Coordinate with the CCS Contractor(-s) scope, equipment, configurations and locations of tests which shall be carried out,

5.9.5.11. Require appropriate examinations and tests, which haven't been carried out by CCS Contractors,

5.9.5.12. Monitor the quantities implemented on site during construction and installation against CCS Contractors records of construction Works. Verification of correctness of such documents is necessary to prepare taking-over and asset management,

5.9.5.13. Inspect sample materials and testing of manufactured products to establish compliance thereof with required certificates and guarantees. Perform routine inspections, examination and testing of materials and workmanship on the site. Perform inspection of plants and materials to be supplied under the Works Contract at their manufacturing facilities to determine their compliance with requirements of the Beneficiary and documents of the CCS Contractor(-s),

5.9.5.14. Covered works: the Covered works (mast foundations, pipes, manholes and cable trenches, earthing & bonding systems, technical building foundations etc.) shall be supervised on an exhaustive manner and their compliance with the approved drawings and standards shall be confirmed, prior the covering or backfilling of such equipment.

Compliance report with georeferenced pictures and/or video shall be prepared by the CCS Engineer.

5.9.6. The CCS Engineer shall ensure supervision of training of CCS subsystem operation and maintenance staff to warranty their adequacy with the CCS subsystem actual O&M conditions. The CCS Engineer shall perform prior approval of training manuals and course supports.

5.9.7. The CCS Engineer shall ensure supervision of the testing and commissioning operation, including Tests on Completion.

5.9.8. The CCS Engineer shall ensure that the testing and commissioning activities, at any stage of the CCS subsystem implementation and for any scope of test, are consistent and exhaustive with the Technical Specifications and other annexes to the Works Contract, with quality and quantities requirements of Works Contract, and with European standards and legislation. In this regard, the CCS Engineer shall:

5.9.8.1. Cover testing at factory and at building sites, witnessing and reporting on Factory Acceptance Tests, auditing production processes in factory ascertaining the quality of the delivered components, reviewing and witnessing site static and dynamic tests and System integration tests,

5.9.8.2. During the Generic Design stage, establish with the CCS Contractor(-s) the list of type components which shall pass Factory Acceptance Testing subject to the CCS Engineer's and Employer's approval before their deployment on Rail Baltica,

5.9.8.3. For all test stages, review all testing and commissioning plans and procedures submitted by the CCS Contractor(-s), provide relevant comments, request correction or supplementation when required,

5.9.8.4. In case of not satisfying testing and commissioning documentation, send appropriate instruction to the CCS Contractor(-s) to remedy to the defects in the documentation, and to reschedule the corresponding testing and commissioning operations,

5.9.8.5. Establish a test supervision plan and supervise the testing and commissioning operations as performed by the CCS Contractor(-s) by providing appropriate Experts attendance. Provide any comments or instruction to the CCS Contractor(-s) during the testing and commissioning operations,

5.9.8.6. Deliver CCS Engineer test supervision reports following supervision of testing and commissioning operations, including observations noted during supervision and providing status on acceptability of the tests results after review of the CCS Contractor(-s) test reports,

5.9.8.7. In the case of Tests on Completion of a Works section, provide statements about the status of the tests (Passed or Failed), covering all stages related to the Works section acceptance, operational and technical restrictions, recommendations for tests after completion and conditions in order to proceed to following steps shall be summarized as part of the related taking-over certificate,

5.9.8.8. As part of the railway systems dynamic tests, contribute to the CCS Contractor(-s) in preparation and execution of the dynamic tests, including:

a. Definition of the CCS operational scenario and test runs,
b. Coordination of the test train set-up for the CCS subsystem of the test equipment,
c. Contribution to specific safety analysis,
d. Definition of organization and procedures,
e. Witnessing and reporting on test execution on-board.

5.9.8.9. The CCS Engineer shall participate and contribute to the organisation of the test train set-up in the frame of the dynamic test stage. This contribution shall consist in all activities

foreseen for the CCS Engineer as part of development and deployment of the CCS systems,

5.9.8.10. Liaise and coordinate with Conformity Assessment Bodies in activities related to interoperability and safety certifications.

5.9.9. The CCS Engineer is responsible for health and safety management assurance throughout CCS Works implementation phase by:

5.9.9.1. Performing inspections and audits confirming that local Health and Safety standards are respected and implemented on the work sites,

5.9.9.2. Inspecting and assessing that Health and Safety standards are respected during the testing and commissioning operations on works sites.

5.9.10. The CCS Engineer shall develop in health and safety management approach according Rail Baltica Health & Safety policy including at least the following:

5.9.10.1. Personnel organization, resources during CCS Works implementation phase,

5.9.10.2. Health and safety policy that includes organisation`s intention and focus in health and safety;

5.9.10.3. Processes covering Plan, Do, Check, Act approach including as a minimum but not limited to:

a. Risk assessments for all activities carried out within scope of agreement,

b. Safe systems of work covering mitigation measures for all related risks,

c. Certified in experienced for risk awareness and risk mitigation measures,

d. Provision of safe working environment including working tools and equipment, safety equipment and personal protective equipment,

e. Carrying out safety observations covering all significant risk inclusive activities within scope of agreement at the frequency based on risk. Recording safety observations,

f. Report for accident, incident, near-miss and safety concern reporting and investigation process,

g. Develop and ensure health and safety risk mitigation plan for risks recognized at safety observations and accidents, incidents, near-misses and safety concerns reported and investigated. Report status of health and safety risk mitigation plan to client upon client`s request,

h. Ensure Employers provided legitimate health and safety guidelines and requirements are implemented and complied with at all times.

i. Participate in Employers organized Health and Safety meeting.

5.10. RAMS activities

The CCS Engineer shall ensure CCS Contractor(-s) demonstrate the RAMS program implementation according to the definition in Chapter 4.4.16.

5.10.1. Safety activities

5.10.1.1. During Works implementation phase, the CCS Engineer shall supervise timely delivery of the CCS Contractor(-s) supplier safety documentation, review and trace compliance against Employer's requirements, and coordinate as necessary with interfaced subsystems and stakeholders.

5.10.1.2. At the acceptance stage and at the take-over stage, the CCS Engineer shall review safety cases and independent assessment reports as delivered by the CCS supplier in order to confirm their consistency against the status of the Project delivery. CCS Engineer confirming consistency shall relate to verification of system version, system configuration, closure of requirements, management of requirements towards external stakeholders, relevance of safety related application conditions, and of related independent assessment reports.

5.10.1.3. The CCS Engineer shall contribute to an independent assessment performed by AsBo at system safe integration stages.

5.10.1.4. The CCS Engineer shall ensure that the resulting safety targets, safety policies, and Safety management processes are based on safety methods such as:

a. Preliminary Hazard analysis,
b. Functional Safety analysis,
c. SIL analysis,
d. FTA analysis,
e. ETA analysis,
f. FMEA.

5.10.2. RAM activities

5.10.2.1. During Works implementation phase, the CCS Engineer shall supervise timely delivery of the CCS supplier RAM documentation, review and trace compliance against Employers requirements, and coordinate as necessary with interfaced subsystems and stakeholders.

5.10.2.2. At acceptance stage and at taking-over stage, the CCS Engineer shall review the definition of the RAM demonstration phase as proposed by the CCS Contractor(-s), and in coordination with the RB Rail and the Infrastructure Manager.

5.10.2.3. The CCS Engineer shall ensure that CCS Contractor(-s) demonstrate the assurance of the resulting RAM target for equipment and component level based on field data or ALT as well as RAM Management Process based on EN 50126 standard, RBR Design Guidelines and RAM methods such as:

g. Lifetime Data Analysis,
h. RAM and LCC Analysis,
i. ALT/HALT/HASS/RG,
j. SFMEA/DFMEA/PFMEA/FMEA,
k. HRA,
l. RCM,
m. FRACAS,
n. Spare Part Strategy,
o. RAM requirements established as part of the Technical Specification prepared for the selection of the CCS Contractor(-s).

5.11. Issuance of the Taking-Over Certificates

The issuance of the Taking-Over Certificates shall be performed by the CCS Engineer for every Service Section according conditions mentioned in the Works contract. The Taking-Over Certificates shall include:

a. The exact scope of Taking-Over Certificate and corresponding items in relevant Payment Plan. This shall include detailed quantities taken over, and corresponding list of assets,

b. The effective date and time of Taking-Over,

c. An explicit mention if Taking-Over Certificate is issued as per Works completed in accordance with the Contract (FIDIC 10.1 "Taking Over the Works and Sections") or per discretion of the Employer (FIDIC 10.2 "Taking Over of Parts of the Works"),

d. The detailed lists of all defects to be solved during Defect Notification Period, and schedule to remedy to every defect,

e. The necessity of Tests after Completion, if relevant,

f. The identification of application conditions, operational and technical restrictions derived from CCS Contractors reports, the summary of status of design and test documentation and the identification of open items,

g. The detailed list of As-built documentation and other documentation linked to the Taking-Over Certificates,

h. The maintenance conditions including list of relevant maintenance manuals and procedures,

i. Any other relevant conditions or elements.

5.12. Supervision of the Defect Notification Period

The tasks of the Consultant shall include (but not be limited to):

a. Identifying and assessing the status or every defect – whether they were included in the defect list annexed to the Taking-Over Certificate, or whether they are notified to the CCS Contractor(-s) during the DNP,

b. Establishing procedures for defect identification, registration and monitoring of remedied defects,

c. Submission of a notification on discovered defects to the CCS Contractor(-s) for remedial actions,

d. Technical support in improvement of the CCS subsystem`s functionality issues,

e. Established FRACAS procedure for CCS Contractor(-s),

f. Assessment of RAMS requirements,

g. Monitoring of the CCS subsystem during operation and maintenance phase,

h. Quantity survey of additional works, if any,

i. Monitoring of the spare part stock,

j. Monthly site meetings with the CCS Contractor(-s) at the sites of discovered defects and sites of remedied defects, preparing minutes of the meetings,

k. If deemed necessary, the CCS Engineer shall prepare a report to the Employer detailing the rationales to extend the DNP, and the proposed duration of such extension. DNP extension is a decision under the responsibility of the Employer,

l. Other tasks, necessary to ensure effective DNP supervision and closure.

5.13. Issuance of Performance Certificates

5.13.1. The CCS Engineer shall issue the Performance Certificate for a Service Section when all required conditions are met. Unfulfilled obligations, if any, shall be mentioned on the Performance Certificate.

5.13.2. As per the split of the Works in Service Sections, only the latest Performance Certificate shall constitute acceptance of the Works.

5.14. Measures needed until Works contract closure

5.14.1. Following issuance of the latest Performance Certificate, the CCS Engineer shall notify the CCS Contractor(-s) regarding his remaining liabilities (unfulfilled obligations, clearance of work site, warranties, liabilities part of the design supervision etc.) and the expiry dates of these liabilities.

5.14.2. The CCS Engineer shall process all necessary formalities and actions in order the Works contract closure to be effective as earlier as possible.

6. EXPERTS

6.1. Required Lead-Experts for provision of Services are stated in Table 12.

6.2. Required additional Experts for provision of Services are stated in Table 13.

6.3. The CCS Engineer shall be responsible for ensuring, that all proposed Lead-Experts and additional Experts have necessary certificates or/and other legal recognition documents in accordance to the European Union law and have at least B1 (B2 recommended) English language skill[26].

6.4. Lead-Expert and additional expert roles cannot be combined, i.e., for each expert's role must be designated separate person.

6.5. The CCS Engineer and all involved Lead-Experts and additional Experts shall not have any relation or connection to the designated CCS Contractor(-s) for the respective design sections Rail Baltica Global project. A performer (Expert) of Services shall certify in the opinion of the expert-examination that personal or material interests of neither expert, nor his or her relatives or transaction partners will affect the opinion of the expert-examination.

6.6. Lead-Experts and additional Experts stated in Tables 12 and 13 could be replaced only in justified cases. The CCS Engineer has no right to change the Lead-Experts or additional Experts stated without the Employers approval. To get the Employers approval, the CCS Engineer shall submit a formal written request which shall include all documents necessary for the Employer to make sure that the proposed Lead-Expert or additional Expert complies with the qualification requirements (if applicable) included in the procurement regulations and Lead-Expert gets at least the same points according to evaluation criteria (if applicable) included in the procurement regulations.

6.7. CCS Engineer shall upon Employer's request provide to the Employer certified copies of such certificates or/and other legal recognition documents and other evidence as required by the Employer verifying that such documents exist.

6.8. The Employer reserves the right to request the CCS Engineer to replace any Lead-Expert or additional Expert in case of any of the following reasons:

6.8.1. Non-timely performance of duties;

6.8.2. Repeated careless performance of duties;

6.8.3. Incompetence or negligence;

6.8.4. Occurrence of conflict of interest;

6.8.5. Non-fulfilment of obligations or duties stipulated in the Agreement;

6.8.6. Poor knowledge of English language or Local language (if applicable);

6.8.7. Termination of employment relations with the CCS Engineer.

6.9. The Employer shall approve or reject the replacement of a Lead-Expert or additional Expert as soon as possible, but not later than after 10 (ten) days after receipt of all information and documents mentioned in Chapter 6.6. The Employer is responsible for provision of clear justifications in each case of rejection.

[26] Language skill level is based on Common European Framework of Reference for Languages (see http://europass.cedefop.europa.eu/resources/european-language-levels-cefr)

6.10. The CCS Engineer shall identify Lead-Experts and all additional experts and their roles for each Service package.

6.11. Lead-Experts:

Table 12. Lead-Experts role and responsibilities

No	Experts Designation	Responsibilities during Service provision
1	**Technical manager**	a) Coordination of designers and different disciplines of CCS subsystem design, review and approval of technical deliverables of Technical Team; b) Coordinating development of a functional and technical specification using a structured requirement management for a Works contract. c) Technical coordination for all phases of the project, from design to construction, testing and commissioning and putting in operation; d) Technical interface management; e) Organisation of construction works: set-up, logistics, control, supervision; f) Supporting the Employer in meetings according to Scope of the services; **g)** Providing expert knowledge of CCS subsystem and legislation and processes, applicable international standards and a sound understanding of engineering management;
2	**Project manager**	a) Set up and manage the project in Estonia, Latvia and Lithuania and b) Set up the project management office and manage its works during the project duration; c) Coordination with internal and external stakeholders; d) Application of quality management principles and processes; e) Development and maintaining an agreed project plan; f) Planning and managing resources to meet project milestones; g) Leading delivery and quality of Services.
3	**ETCS system senior expert**	a) Contribute to elaboration of Operational Concept; b) Elaborate Concept Design for ETCS and transitions from ETCS to not equipped areas; c) Elaborate functional and technical specifications for Works procurement of ETCS; d) Provide supervision of all general Contractor works (design, construction, testing & commissioning).
4	**Traffic Management System expert**	a) Elaborate Operational Concept; b) Elaborate Concept Design for TMS c) Elaborate functional and technical specifications for Works procurement of TMS; d) Supervision of all general Contractor works (design, construction, testing & commissioning).
5	**Safety expert**	a) Review of existing Employee safety baseline documentation. b) To propose adaptation to RBR Safety documentation baseline; c) Review existing PHA and perform additional analysis. d) Establish Safety requirements for CCS systems. e) Review Safety deliveries from Contractor(s); f) To prepare safety case;

		g) Liaise with assessment bodies.
6	**Cyber Security expert**	a) Development of comprehensive multi-layered Cyber Security standardized concept; b) Supervision of the Cyber Security System design; c) Supervision of the Cyber Security System implementation works; d) Supervision of testing and commissioning of Cyber Security System; e) Development of the Cyber Security System maintenance programme; f) Cyber Security System requirement management.

6.12. Additional experts

Table 13. **Additional experts' roles and responsibilities**

No	Experts Designation	Responsibilities during Service provision
1.	FIDIC Engineer representative	a) Ensure that Works contract documents are accurate and well maintained; b) Provide advice and guidance related to Works contract management; c) Maintain the Employer expectations d) Create, prepare, review and edit Works contract; e) Accept Works invoices; f) Works contract claim management; g) Follow-up deadlines and Works contract requirements; Works contract variation management.
2.	Systems integration manager	a) Manage technical interfaces between all Systems of CCS subsystem and with ENE- and INF subsystems. b) Manage systems engineering and integration of all Systems of CCS subsystem; h) Leading development of a functional and technical specification for all Systems of CCS subsystem for design and construction works.
3.	Interlocking system senior expert	a) Contribute to elaboration of Operational Concept; b) Elaborate Concept Design for Interlocking system; c) Elaborate functional and technical specifications for Works procurement of Interlocking; i) Provide supervision of all general Contractor works (design, construction, testing & commissioning).
4.	Railway communication systems expert	e) Elaborate Operational Concept; f) Elaborate Concept Design for railway communication systems g) Elaborate functional and technical specifications for Works procurement of TMS; h) Supervision of the Railway communication System design; i) Supervision of the Railway communication System implementation works; j) Supervision of testing and commissioning of Railway communication System equipment; k) Development of the Railway communication System maintenance programme. l) Control and monitor Railway communication System, hardware and software architecture, system performance requirements; Requirement management.

5.	Radio coverage planning expert	a) Develop railway radio communication system architecture and networks; b) Handling radio system coverage analysis for the railway line; Supervision of all general Contractor works (design, construction, testing & commissioning).
6.	Non traction power supply senior expert	a) Develop system architecture, functional and technical specifications for Works procurement for power supply systems; b) Develop middle voltage and low voltage system requirements; c) Power supply demand analysis; d) Supervision of all general Contractor works (design, construction, testing & commissioning).
7.	RAM expert	a) Review existing Employee RAM baseline documentation; b) Propose adaptation to RBR RAMS documentation baseline; c) Review existing PHA and perform additional analysis; d) Establish RAMS requirements for CCS subsystem; e) Review RAM deliveries from CCS Contractor(-s); Liaise with assessment bodies.
8.	Building design expert	a) Develops Architectural design with Zero emission conceptual building solutions for: Shelters, track side containers, Data centre standard shall apply for core network and interlocking equipment, CTC building with workplaces; b) Provide virtual simulations to the Client (before construction works starts) of designed model on proving of his: Building energy class (according to EU) , forecasted lifetime of the measure, thermal transmittance of the building and so forth, including local weather impact such as sun and wind to the building
9.	Documentation manager	a) Record keeping for all Agreement-related (both Works contract and the CCS Engineer) documentation and correspondence in the Employers CDE; b) Monitoring Agreement execution; c) Managing communication, documentation and Agreement-related information distribution to all stakeholders; d) Following and updating respective information in requirements management; e) Reporting process management (including timesheet preparation, alignment process).
10.	Risk manager	a) CCS Deployment Risk management: – Identify risks – Analyse risks – Evaluate risks – Mitigate risks – Monitor risks
11.	Planning manager	a) Cooperate with the Employer planning engineers, provide information and input data; b) Regularly update time schedules (Detailed Technical Design Project Schedule) and development of non-standard time schedules based on specific information needs; c) Development and continuous update of the time schedules, collection of ETC (Estimate To Complete) data for progress report and updating the financial system. Graphic layout design for documentation of actual spent man hours/cost and expenses.
12.	Cost expert	a) CAPEX and OPEX estimates for CCS Deployment; b) Life Cycle Cost analysis; c) Environmental impact analysis;

		d) Multi Criteria Analysis: e) Cost estimation preparation.
13.	Requirement management expert	a) Populate CCS systems requirements in requirement management database; b) Managing of requirement management database c) Supervise contractor requirement implementation process;
14.	Quality management specialist	a) Preparing and implementing quality assurance policies and procedures. b) Performing routine inspections and quality tests. c) Identifying and resolving workflow and production issues. d) Ensuring that standards and safety regulations are observed.
15.	Procurement Expert	a) Preparation of technical specifications; b) Providing necessary assistance during the procurement for CCS Deployment process, c) support during the supplier market consultations, d) develop procurement strategies. e) participate in evaluation of technical proposals.
16.	Interface expert	a) Identify CCS interfaces; b) Define the scope of the CCS subsystem; c) Identify all involved Parties; d) Develop Interface matrix and Interface Management principles e) Prepare the Interface Control Documents and maintain them Register and resolve all interfaces;
17.	Construction supervisor in Estonia	a) Supervision of construction works according to legislation of Republic of Estonia; b) Expertise and knowledge of construction related legislation of Republic of Estonia; c) Communication with stakeholders in Estonian language.
18.	Construction supervisor in Latvia	a) Supervision of construction works according to legislation of Republic of Latvia; b) Expertise and knowledge of construction related legislation of Republic of Latvia; c) Communication with stakeholders in Latvian language.
19.	Construction supervisor in Lithuania	a) Supervision of construction works according to legislation of Republic of Lithuania; b) Expertise and knowledge of construction related legislation of Republic of Lithuania; c) Communication with stakeholders in Lithuanian language.
20.	Software engineering expert	a) Execute full software development life cycle according EN50128 standard; b) Develop flowcharts, layouts and documentation to identify requirements and solutions; c) Produce specifications and determine operational feasibility; d) Integrate software components into a fully functional software system; e) Develop software verification plans and quality assurance procedures; f) Document and maintain software functionality; g) Deploy programs and evaluate user feedback; h) Comply with project plans and industry standards; i) Ensure software is updated with latest features;
21.	Operational Expert	a) Develop Conceptual design of routing trains and shunting movements under Normal, Degraded and Emergency operation modes with ETCS status indication (FS , SH...) and ad hoc procedures;

		b) Detailed analysis of all routes (train & shunting movements) to be operated with specific attention to specific interlocking (dual controlled, routes, shunting on main tracks; c) OCC & LCP definition of principles & functionalities (CTC back-up, route setting & cancellations, OHLE protection, work protection etc...) and links with other systems such as train describer, telecoms; d) Involved in operation room layout development ergonomic.
22.	Cableway system expert	a) Development and Supervision of the Cableway System Concept and Detailed design; b) Supervision of the Cableway System works; c) Supervision of testing and commissioning of Cableway System equipment; d) Development of the Cableway System maintenance programme. e) Control and monitor Cableway System, hardware and software architecture, system performance requirements. f) Requirement management.
23.	Maintenance Expert	a) FMEA and RCM implementation and review for CCS systems levels 2, 3 and 4. b) Preparation and review of the CCS systems levels 2, 3 and 4 Maintenance Manual based on RCM output. c) Definition, review and verification of the NDT, CBM, PHM and AI best application for the CCS System levels 2, 3 and 4. d) Definition and review of maintainability and accessibility qualitative and quantitative requirements for CCS system levels 2, 3 and 4. e) Definition and review of Maintenance KPIs for CCS system levels 2,3 and 4. f) Preparation of optimized maintenance plan for CCS system levels 2, 3 and 4, considering team tasks, number of team members per task, tools, spare parts and tasks activities schedule. g) Preparation of optimized spare plan for CCS system levels 2, 3 and 4. h) Preparation of optimized maintenance LCC plan for CCS system levels 2, 3 and 4.
24.	Testing and commissioning specialist	a) Manage commissioning of the project by Coordinating between the Employer and the CCS Contractor(-s). b) Review and approve commissioning plans and test procedures in accordance with project guidelines. c) Supervise onsite commissioning activities. d) Review and approve test and commission records. e) Compile commission report data.
25.	Software verification and validation expert	a) Review and approve the Software Verification and validation plan in accordance with EN50128; b) Monitor and supervise software V&V activities c) Review and approve outputs of software Verification & Validation activities
26.	Expert of remote monitoring and control for power supply/ signalling/ telecom	a) Expertise of the control systems, interface specifications, systems integration, etc.; b) Development of functional and technical requirements for Works contract; c) Monitoring and controlling systems, Operating Control Centre requirements, interface management, requirement management, scheduling management.
27.	Signalling system expert	a) Requirements definition and management; b) Supervision of the CCS subsystem design;

		c) Supervision of the CCS subsystem construction works; d) Supervision of testing and commissioning; e) Development of the maintenance programme.
28.	Signalling system expert 1520	a) Requirements definition and management; b) Supervision of the CCS subsystem design; c) Supervision of the CCS subsystem construction works; d) Supervision of testing and commissioning; e) Development of the maintenance programme.
29.	Rolling stock onboard system expert	a) Requirements definition and management; b) Supervision of the CCS subsystem design; c) Supervision of the CCS subsystem construction works; d) Supervision of testing and commissioning; e) Development of the maintenance programme.
30.	Station system experts	a) Requirements definition and management for Station systems. b) Development and Supervision of the Concept and Detailed design for following Station systems: • Passanger information System, • Passenger Address System, • CCTV System, • Master Clock System, • Ticketing system System, c) Supervision of the construction works of above-mentioned Station systems; d) Supervision of testing and commissioning of above-mentioned Station systems; e) Development of the maintenance programme for above-mentioned Station systems.
31.	Ancillary system experts	a) Requirements definition and management for Ancillary systems. b) Development and Supervision of the Concept and Detailed design for following Ancillary systems: 1) turnout predictive monitoring, 2) point heating, 3) rolling stock health management, 4) meteorological condition monitoring, 5) flood monitoring, 6) road vehicle detection, 7) platform gates, 8) SCADA, 9) structures' monitoring, 10) broken rail detection, 11) rail temperature monitoring, 12) maintenance work monitoring and track possession; c) Supervision of the construction works of above-mentioned Ancillary systems; d) Supervision of testing and commissioning of above-mentioned Ancillary systems; e) Development of the maintenance programme for above-mentioned Ancillary systems.

7. ANNEXES

Annex No. 1 Design guidelines [1]

Annex No. 2 CCS Strategy study (Rail Baltica control-command and signalling (CCS) subsystems procurement and deployment strategy) [5]
Annex No. 3 ENE Engineering services – Appendix 1 Scope of Services [8]
Annex No. 4 Operational Plan study [2][27]
Annex No. 5 Updated Rail Baltica Track Layout
Annex No. 6 BIM use cases for construction and handover stage
Annex No. 7 ENE Strategy study (Rail Baltica energy subsystem procurement and deployment strategy) [7]

It is hereby certified that Appendix 1 Technical specification with all annexes indicated above are stored in a digital form and will be accessible for both Parties in the RB Rail AS ProjectWise storage cloud service under the link below:

[CONFIDENTIAL]

No.	*Title of document*	*Availability / Web link*	*Date of creation*
1	Design Guidelines	[CONFIDENTIAL]	[CONFIDENTIAL]
2	CCS Strategy study (Rail Baltica control-command and signalling (CCS) subsystems procurement and deployment strategy)	[CONFIDENTIAL]	[CONFIDENTIAL]
3	ENE Engineering services – Appendix 1 Scope of Services	[CONFIDENTIAL]	[CONFIDENTIAL]
4	Operational Plan	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/	15.11.2018
5	Updated Rail Baltica Track Layout	Publicly available: https://www.railbaltica.org/about-rail-baltica/documentation/	
6	BIM use cases for construction and handover stage	[CONFIDENTIAL]	[CONFIDENTIAL]

27 [CONFIDENTIAL]

7	ENE Strategy study (Rail Baltica energy subsystem procurement and deployment strategy)	[CONFIDENTIAL]	[CONFIDENTIAL]

Documents indicated above are a part of the Procurement documents which were submitted to the Consultant with the Procurement excercise and the Consultant confirms that these documents were already downloaded by the Consultant during the Procurement phase, and thus they were shared with the Consultant in a correct and convenient order.