

ISARailgroup

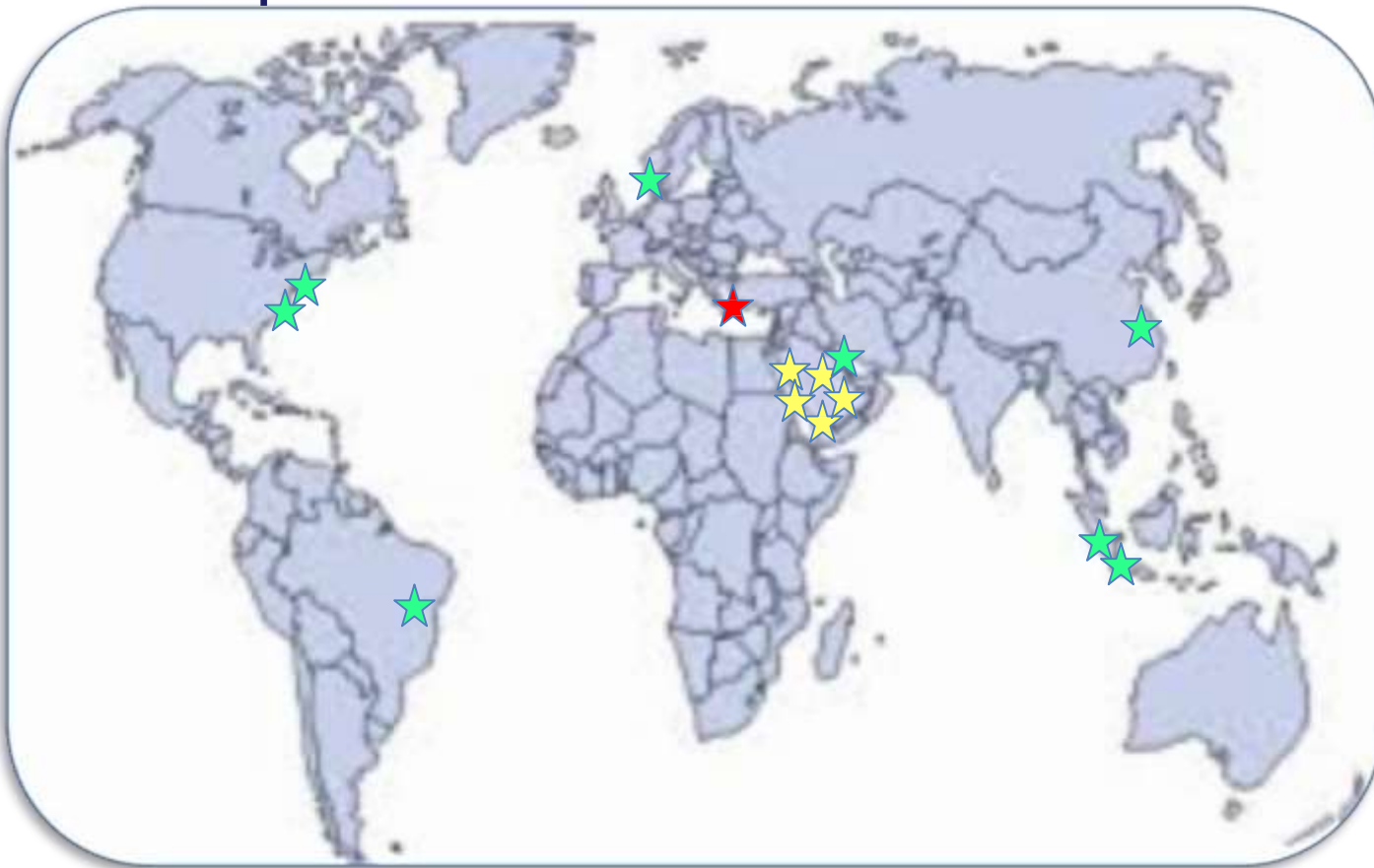
CORPORATE PRESENTATION

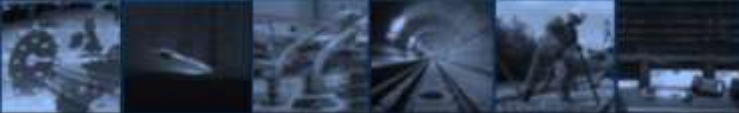


International Activities














Worldwide Experience





ISARail Group International Division

Status	Activity	Customer	Location	Sub-System
	Assessment of Maintenance Process	SEPTA	New Jersey - USA	O&M
	Track Geometry Inspection Services	PATCO	Philadelphia, PA - USA	Infrastructure
	ISA Assessment of Interlocking System	GE Transportation	Stockholm	Signalling
	ISA Assessment of Command Control Center	Alta Rail Tec.	Colombo - Brazil	Signalling
	ISA&ICP Assessment Civil Works RMP L1&L2 - PD & DD Stages	BACS Consortium	UAE - Riyadh, KSA	Infrastructure
	ISA&ICP Assessment Rolling Stock RMP L1&L2 - PD & DD Stages	BACS Consortium	UAE - Riyadh, KSA	Rolling Stock
	ISA&ICP Assessment Traction Power RMP L1&L2 - PD Stage	BACS Consortium	UAE - Riyadh, KSA	Energy
	ISA&ICP Assessment Civil Works RMP L3 - PD & DD Stages	ANM Consortium	UAE - Riyadh, KSA	Infrastructure
	Audit of Downtown Line OSS Stage 1	Land Transport Authority	Singapore	O&M
	Audit of Downtown Line OSS Stage 2	Land Transport Authority	Singapore	O&M
	ICE Services for vignole rail turnouts of Education City People Mover	Habtoor Leighton Group	Doha - Qatar	Track Works



International Division Services

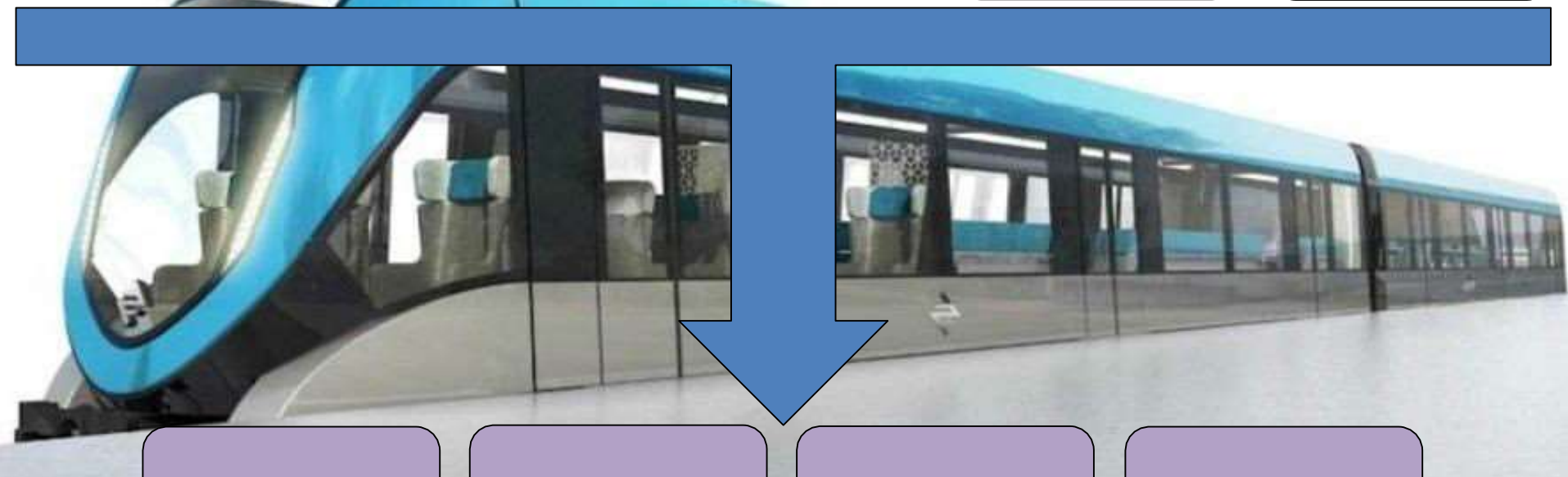
Inspecting

Testing

Certifying

Consulting

Training



Products

Systems

Processes

People



International Division Fields of Operation

Infrastructure



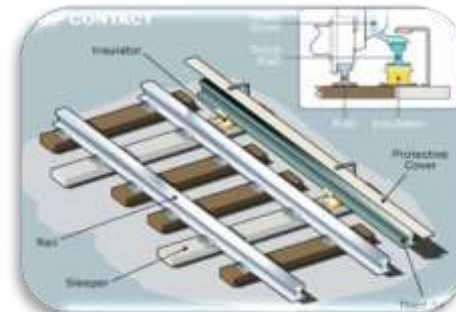
Signalling



Rolling Stock



Traction Power



Project Life Cycle Phases:

Development



Design



Construction



O&M





ISA&ICP Assessment for Riyadh Metro Project - Line 1 & Line 2

Independent Safety Assessment (ISA) and Independent Competent Person (ICP) Assessment for Civil Works Preliminary and Detailed Design Stages



Line 1:

- 38 km, 25 stations (2 Iconics)
- Tunnelled 16 km
- Elevated 12 km
- At Grade 10 km
- n.2 Depots, n. 3 P&R

Line 2:

- 25 km, 15 stations
- Tunnelled 3 km
- Elevated 4 km
- At Grade 18 km
- n. 1 Depot, n. 2 P&R



ISA&ICP Assessment for Riyadh Metro Project - Line 3

Independent Safety Assessment (ISA) and Independent Competent Person (ICP) Assessment for Civil Works Preliminary and Detailed Design Stages



Line 3:

- 41 km, 22 stations (2 Iconics)
- Tunnelled 10 km
- Elevated 27 km
- At Grade 4 km
- n.2 Depots



ISA&ICP Assessment for Riyadh Metro Project

Principles derived from UK Regulation:

The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS)

Three Roles:

ISA – Independent Safety Assessor: assess the Fitness for Purpose of the systems for the Management of Risk, the correct definition and application of the Safety Process and Risk Management Process, assess that every identified risks are ALARP

ICP – Independent Competent Person: perform an independent review of Technical Design Packages and Safety Risk Assessment against Safety Requirements

ICE – Independent Checking Engineer: perform a third party review of Technical Design Documentation against contractual requirements

Three Levels of Assessment:

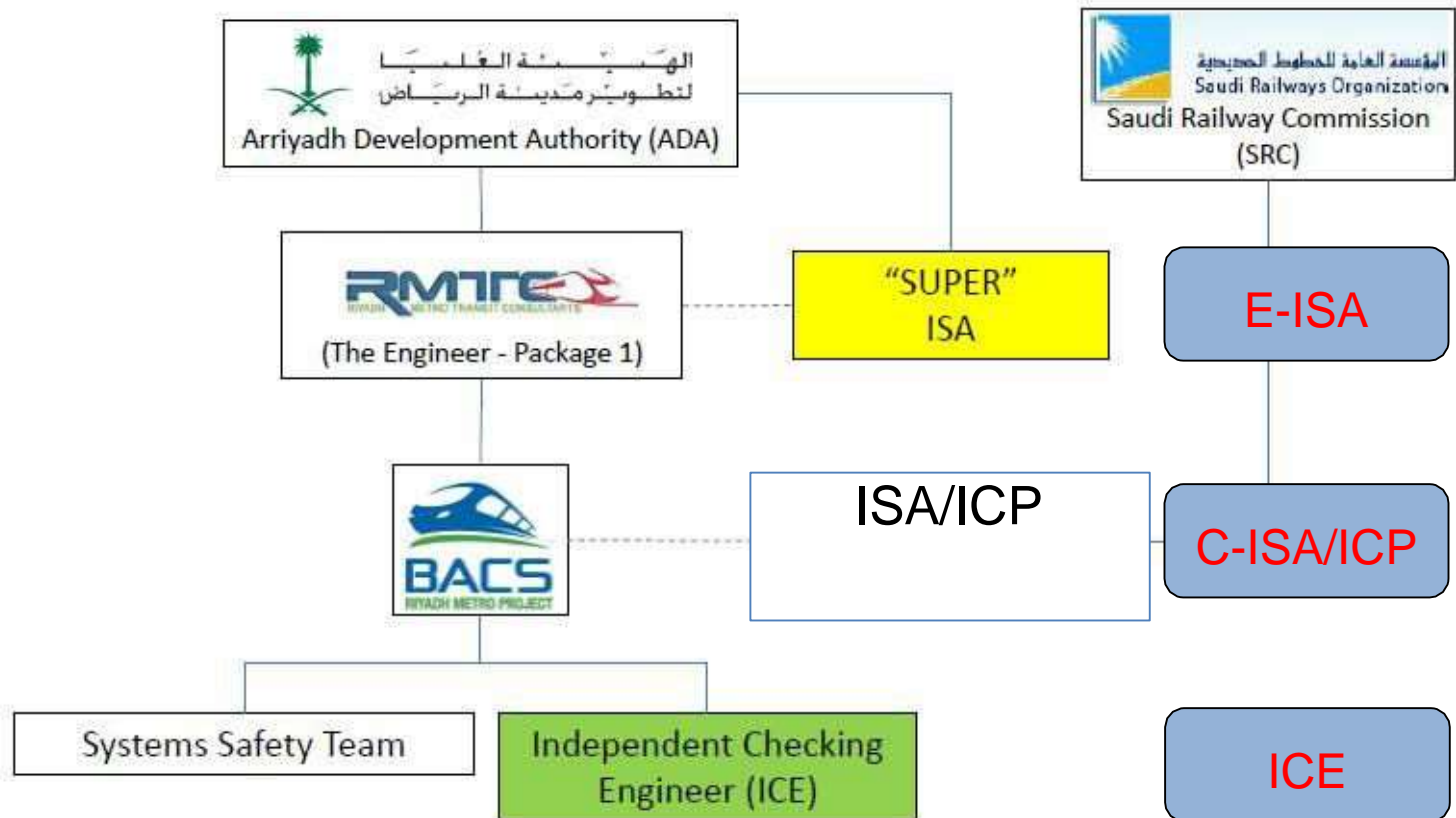
E-ISA – Employer's Level

C-ISA/ICP - Consortium/Systems Level

ICE - Sub-Systems Level



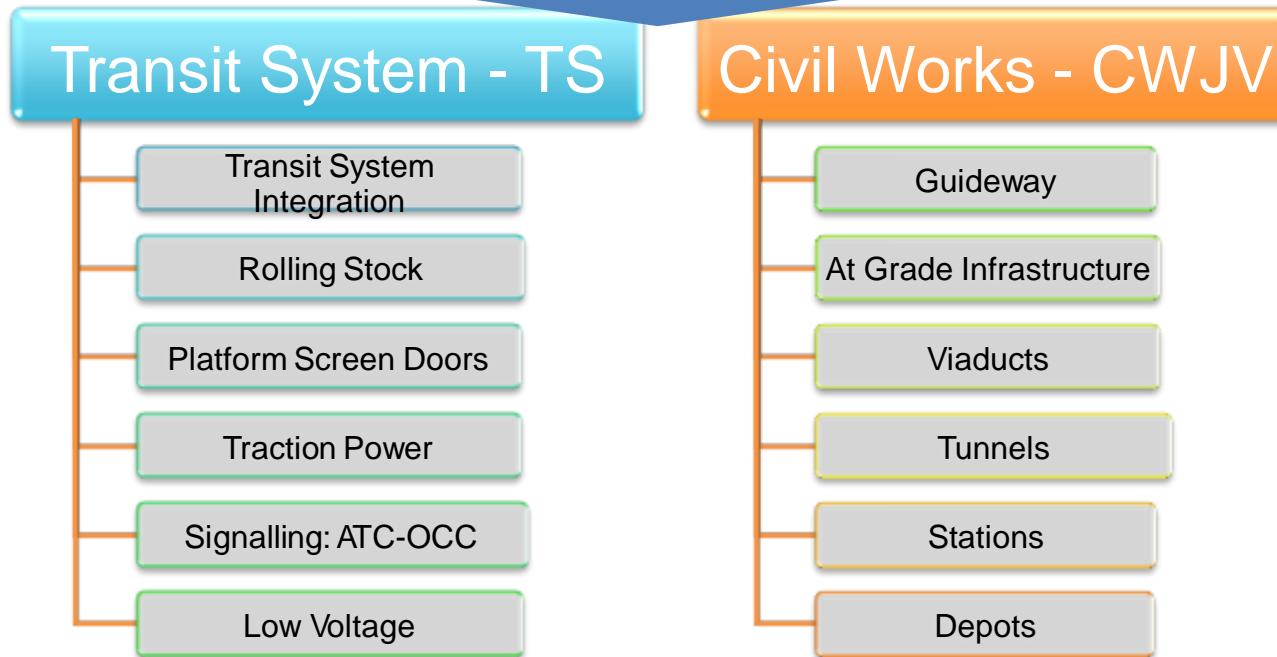
ISA&ICP Assessment for Riyadh Metro Project





ISA&ICP Assessment for Riyadh Metro Project

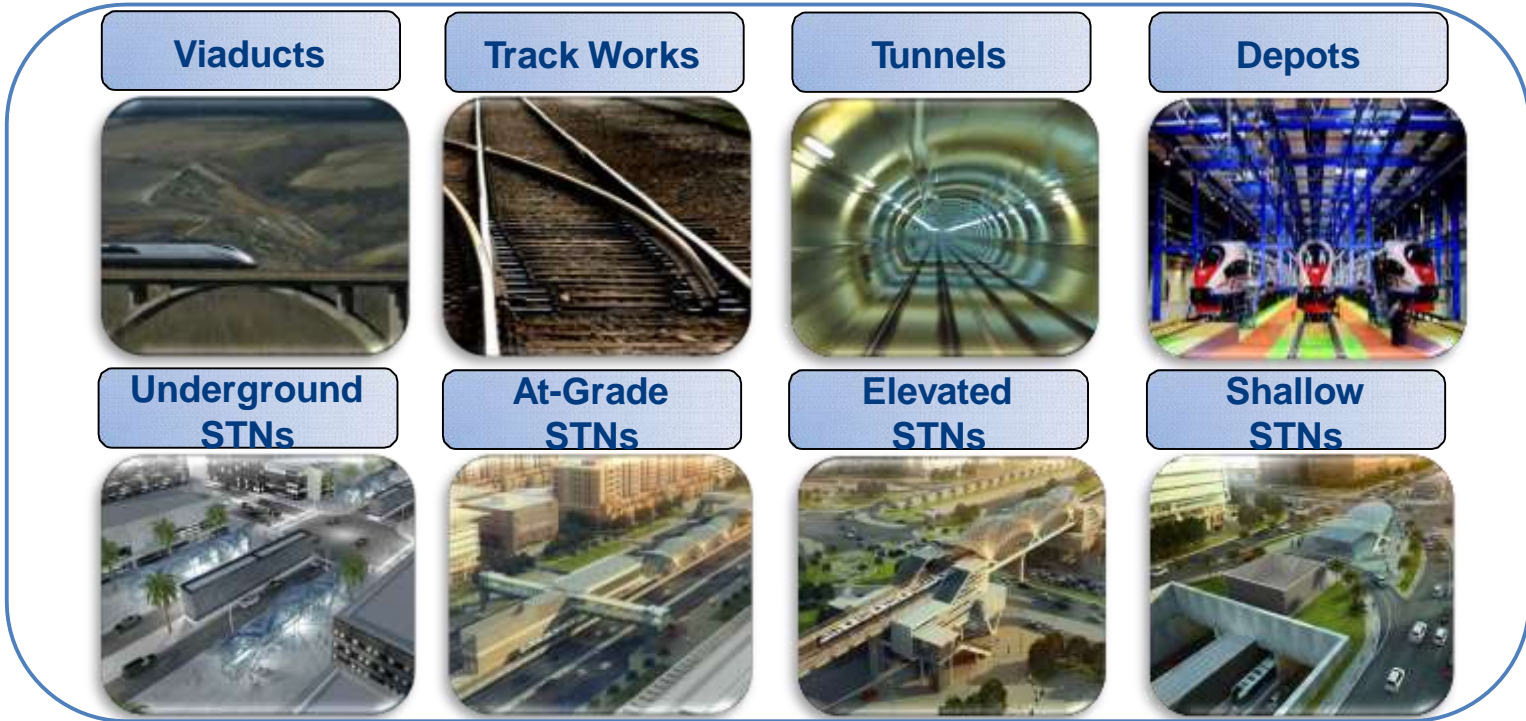
Riyadh Metro Project Line 1 & Line 2



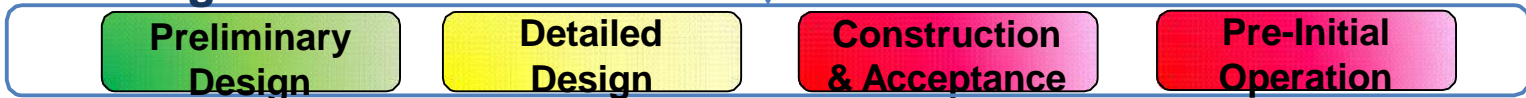


ISA&ICP Assessment of Civil Infrastructures

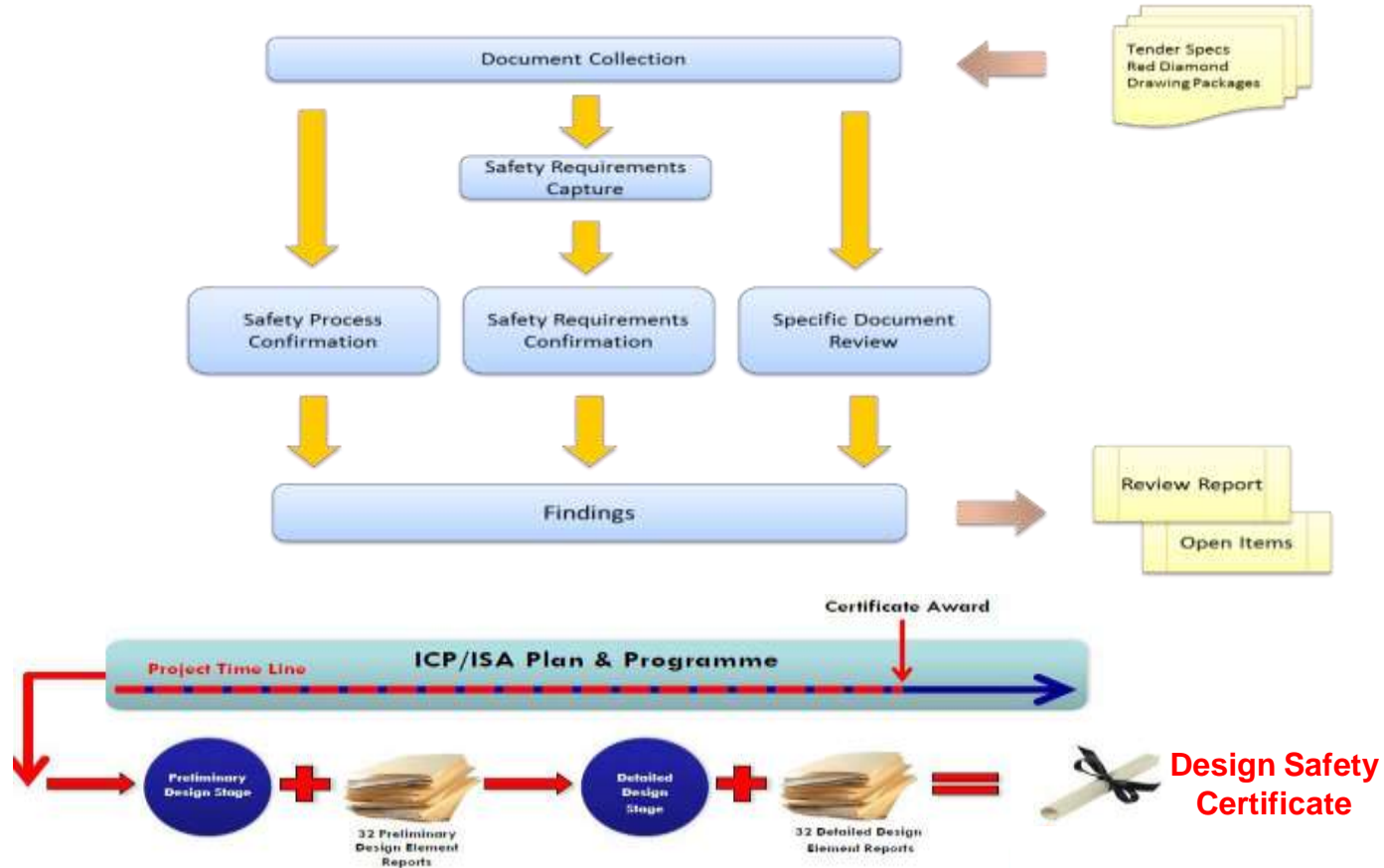
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Assessment Stages:



ISA&ICP Assessment of Civil Infrastructures





Assessment of Civil Infrastructures: Key Applied Standards

Safety Assurance and Risk Management

- CENELEC - EN 50126 - PART 1: Railway Applications – The specification and demonstration of reliability, availability, maintainability and safety (RAMS) PART 1: Basic requirements and generic process
- CENELEC - EN 50126 - PART 2: Railway Applications - The specification and demonstration of reliability, availability, maintainability and safety (RAMS) PART 2: Guide to the application of en 50126-1 for safety
- CENELEC - EN 50129 - Railway Applications – Communication, signalling and processing systems – safety related electronic systems for signalling

Fire & Life Safety

- NFPA 130 - Standard for Fixed Guideway Transit and Passenger Rail Systems
- NFPA 101 – Life Safety Code

Technical Standards

- AAS HTO LRFD Bridge - Design specifications
- ACI 318-11 – Building Code Requirements for Structural Concrete
- ASCE 7-02 - Minimum Design Loads for Buildings and Other Structures
- ASCE 21-00 – Automated People Mover Standard
- ADA 2010 - Americans with Disabilities Act – Standards for Accessible Design



KAFD Iconic Station – Task Order

Independent Safety Assessment (ISA) and Independent Competent Person (ICP) Assessment for KAFD Iconic Station Preliminary and Detailed Design Stages

Designed by Zaha Hadid Architects



Transfer Station between Lines 1, 4, and 6 approaching the station on a combined viaducts.

The station includes Retail Area, two basement levels with plant rooms and parking and has multiple elevated connections for pedestrians to adjacent buildings



ISA&ICP Assessment for Rolling Stock - Riyadh Metro Line 1&2

Independent Safety Assessment (ISA) and Independent Competent Person (ICP) Assessment for Rolling Stock Preliminary and Detailed Design Stages

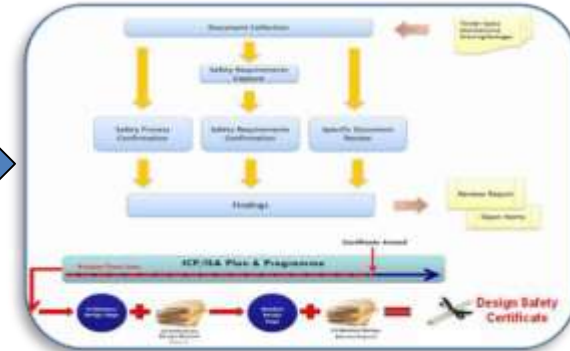


Line :	No. 1 / Blue	No. 2 / Red
Capacity:	10.000 pphpd	5.000 pphpd
Headway:	3 Min. Peak / 6 Min. Off-Peak	
Rolling Stock:	45 x 4-car trains	29 x 2-car trains
System:	driverless (GOA 4)	
Configuration:	MC – M – T – MC	MC - MC
Dimensions (LxWxH)	75,7 x 2,63 x 4 m	37,9 x 2,63 x 4 m
Empty weight:	~117 t	~64 t
Speed:	80 km/h in Service, max. 90 km/h	
Maximum axle load:	13,5 t	
Track gauge:	1435 mm	
Power Supply:	750 V DC / third rail	
Compartments:	First Class – Family Class – Single Class	
Capacity:	max. 994 Pax	max. 504 Pax



ISA&ICP Assessment for Rolling Stock - Riyadh Metro Line 1&2

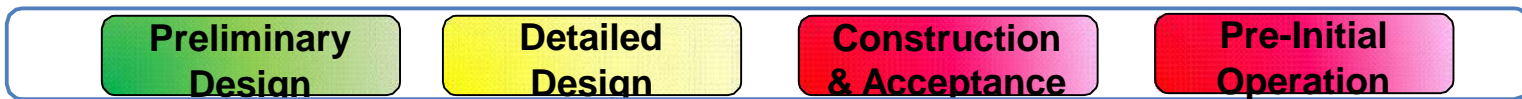
Assessment Methodology: The same applied to CW ➡



Scope Elements: Rolling Stock Sub-Systems

- Bogies
- Braking system
- Traction system
- Carbody structure
- Vehicle doors

Assessment Stages:





ISA&ICP Assessment for Rolling Stock - Riyadh Metro Line 1&2

Safety Assurance and Risk Management

- CENELEC - EN 50126 - PART 1: Railway Applications – The specification and demonstration of reliability, availability, maintainability and safety (RAMS) PART 1: Basic requirements and generic process
- CENELEC - EN 50126 - PART 2: Railway Applications - The specification and demonstration of reliability, availability, maintainability and safety (RAMS) PART 2: Guide to the application of en 50126-1 for safety
- CENELEC - EN 50129 - Railway Applications – Communication, signalling and processing systems – safety related electronic systems for signalling

Fire & Life Safety

- NFPA 130 - Standard for Fixed Guideway Transit and Passenger Rail Systems

Technical Standards

- EN 13749 Railway applications - Wheelsets and bogies - Method of specifying the structural requirements of bogie frames
- EN 14198, Railway applications – Braking – Requirements for the brake system of trains hauled by a locomotive
- EN 15179, Railway applications – Braking – Requirements for the brake system of coaches
- EN 15220-1, Railway applications – Brake indicators – Part 1: Pneumatically operated brake indicators
- EN 12663-1 Railway applications – Structural requirements of railway vehicle bodies – Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)
- EN 12663-2 Railway applications – Structural requirements of railway vehicle bodies – Part 2: Freight wagons



ICE Services for Education City People Mover - Doha

Independent Checking Engineer Services for the track works on the Education City People Mover in Doha, Qatar.

The scope of work is limited to the vignole rail turnouts as detailed in the Technical/Economical Proposal.

The scope of work applies to the complete track system including tunnel sections if applicable.

The scope of work also includes turnout fastening system, welding and trackform.





ICE Services for Education City People Mover - Doha

A third party review as part of the acceptance and handover of the vignole rail turnouts was required in order to assess if:

- The designed and produced vignole rail turnouts comply with the contract
- The turnouts are suitable for use in the Qatar climate conditions
- The turnouts are maintainable within a normal operational maintenance schedule
- The turnouts have no design aspects which might cause future issues with this component.

To meet the above requirements the ICE scope included the review of FAT/SAT test evidence (Tests Results) i.e. Design Verification and Element Compliance.

Scope of work included on-site inspection to ensure that the 'As Built' system complies with the design (and the contract requirements). The on-site validation ensured that the components installed comply with 'As Built' design (Issued For Construction drawings) therefore no additional tests or measures will be carried out.



ICE Services for Education City People Mover - Doha

Assessment Methodology:

1. Requirements Capture Stage and requirements classification: Detailed review of the Client contractual requirements, detailed design specification and applicable standards to be captured in a Requirements Log
2. Conduct a detailed review of relevant Plans, Specifications, design data, reports and “As Built Drawings”
3. Requirements Confirmation Stage: Verify the design against the Client Requirements and applicable standards
4. Conduct a detailed review of Factory and Site Acceptance test results
5. Conduct on-site inspection for examination of compliance with the assured design Conduct a detailed assessment of all related Maintenance plans and associated documentation
6. Delivery of ICE Report: Report discrepancies and non-compliances regarding contractual and regulatory requirements.

Key Applied Standards

- Client contractual requirement found in the Tender Technical Information
- BOStrab German Federal Regulations on the construction and operation of light transit systems issued 11th December 1987



Training Courses on Rolling Stock Sub-Systems - China

Training Courses on technical issues provided in order to support the certification of a new High Speed Train to the TSI Loc&Pas 1302/2014: Technical specification for interoperability relating to the 'rolling stock — locomotives and passenger rolling stock' subsystem of the rail system in the European Union, developed by CRRC.





Training Courses on Rolling Stock Sub-Systems - China

Fire Protection Topics:

1. BS EN 45545-1:2013: Railway applications. Fire protection on railway vehicles. General
2. BS EN 45545-2:2013: Fire testing of materials and components for trains
3. BS EN 45545-3:2013: Fire resistance requirements for fire barriers
4. BS EN 45545-4:2013: Fire safety requirements for rolling stock design
5. EN 45545-5: Fire safety requirements for electrical equipment
6. BS EN 45545-6:2013: Fire control and management systems
7. BS EN 1363: Fire resistance tests.

Carbody Topics:

EN 15227: Railway applications. Crashworthiness requirements for railway vehicle body

1 Passive safety and EN 15227

2 Coupler

3 Equipment cabin under carbody frame

4 Life guard

5 Aerodynamics

6 Cover of coupler



Independent Safety Assessment of IXL System Generic Product

Assessment activities in accordance with CENELEC standards 50128 and 50129 of the generic safety platform (SIL4) for implementing Interlocking for a Light Rail in Stockholm in Sweden.

System produced by General Electric Transportation: IXL-B

In railway signalling, an Interlocking is an arrangement of signal apparatus that prevents conflicting movements through an arrangement of tracks such as switch or crossings.

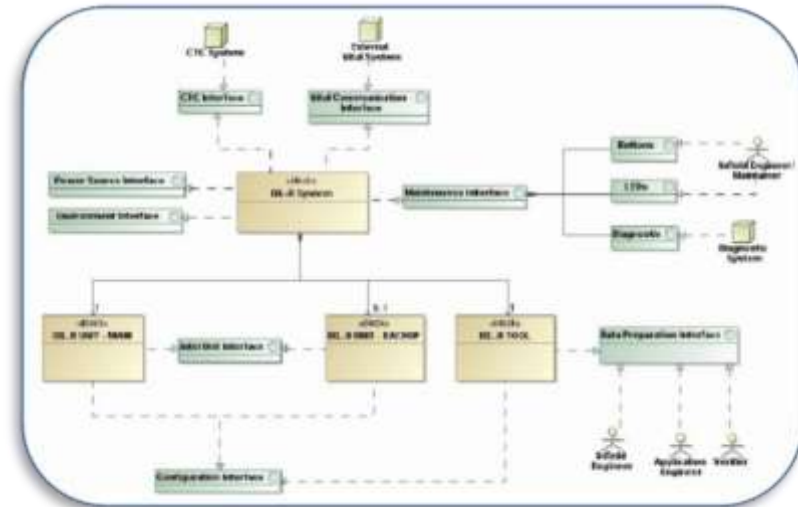
Certification activity in accordance with:

➤ CENELEC 50128 2002-04

Railway applications - Communications, signalling and processing systems - Software for railway control and protection systems

➤ CENELEC 50129 2004-01

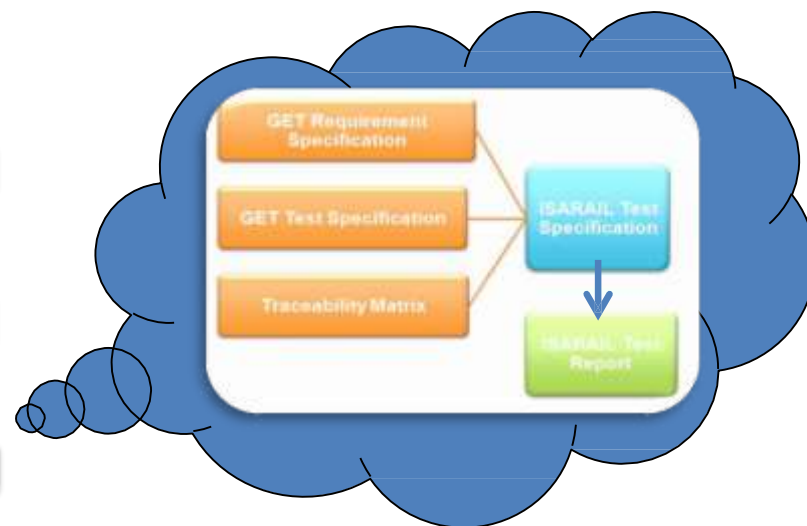
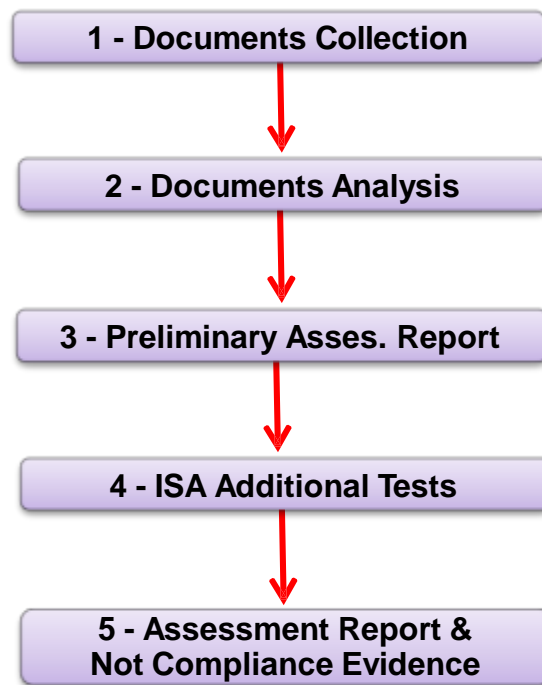
Railway applications - Communication, signalling and processing systems - Safety related electronic systems for signalling





Independent Safety Assessment of IXL System Generic Product

Assessment Methodology





Independent Safety Assessment of IXL System Generic Product

Id_Clause/Req	Analyzed Documentation	Finding	Result
8.4.2	<p>Software Requirements Specification SWFR-DLT-IXLB_UNIT_bs01_v1_1702x_r04 of 09/05/2014</p> <p>Software Interface Requirements Specification SWIR-DLT-IXLB_UNIT_bs01_v1_3_r04 of 08/05/2014</p> <p>Architecture Specification AS-DLT-IXLB_UNIT_bs01_v1_105_r00 of 08/04/14</p> <p>MTR3-SRVR1-DLT-IXLB_UNIT_bs01_v1_18_r02 of 09/05/2014</p>	<p>By analysis of the Software Interface Requirements Specification SWIR-DLT-IXLB_UNIT_bs01_v1_3_r04 of 08-05-14 we can say:</p> <ul style="list-style-type: none"> IXLB_UNIT_SWIR_IR_39 doesn't specify which CPU's MAC address is needed <p>By analysis of the MTR3-SRVR1-DLT-IXLB_UNIT_bs01_v1_18_r02 of 09/05/2014 document about traceability between Architecture Specification AS-DLT-IXLB_UNIT_bs01_v1_105_r00 of 08/04/14 and Software Requirements Specification SWFR-DLT-IXLB_UNIT_bs01_v1_1702x_r04 of 09/05/2014 we can say:</p> <ul style="list-style-type: none"> the IXLB_UNIT_AS_SR_25 and IXLB_UNIT_AS_SR_26 requirements aren't covered completely by the IXLB_UNIT_SWFR_FR_184 because this doesn't take in account of the validity of the NVRAM data; 	Not Compliant

Id_Clause/Req	Analyzed Documentation	Finding	Result
5.3.4	<p>Safety And Validation Report Addendum SCAD-SEV-IXLB-001r04 of the 10/06/2014</p>	<p>At §1.1 you can find that the document SAFETY AND VALIDATION REPORT ADDENDUM is related to IXL-B product enhancement but the safety plan has not been updated.</p> <p>Even if personnel involved in the project has chanced (see Id_clause 5.2) the safety plan has not been updated.</p>	Not Compliant



PATCO – Track geometry Inspection Services



ISA has provided an interpretative report to explain the results got by the inspection and for evaluating the track geometry quality over the line.

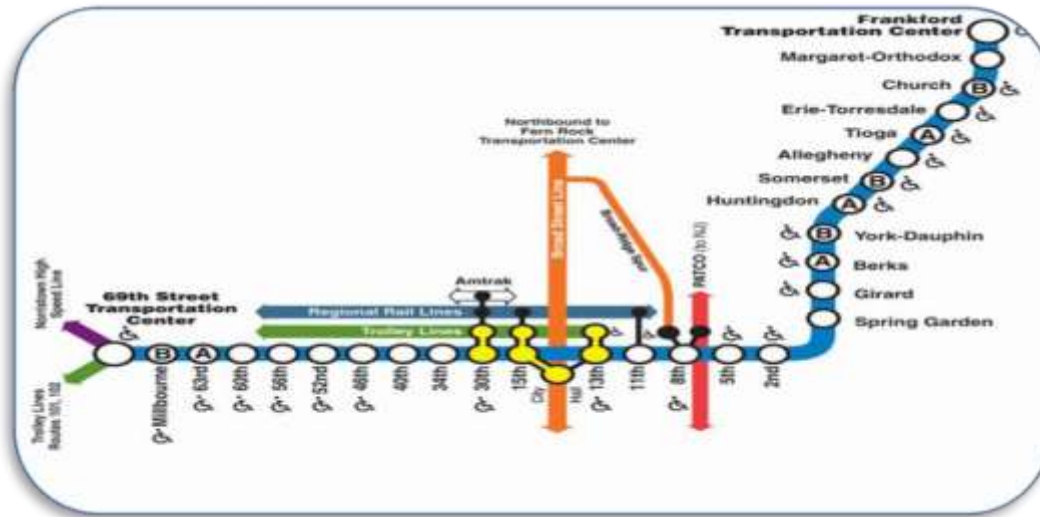
- ✓ Automatically inspect and measure the Track Geometry of the **Port Authority Transit Corporations** System of 28 miles of mainline track.
- ✓ The Track Geometry Test included both Track 1 and Track 2 from Lindenwold Station to 15th-16th Street Station.
- ✓ A complete track geometry test to measure track gauge, cross level (super elevation), alignment, profile, and twist was performed. Automatic location detection of the milepost was provided.



Requirements Assessment - SEPTA Frankfurt – Market Line

The purpose of the SEPTA Audit was to verify the maintenance activity required by:

- **C&S1** - Standard Instructions Governing Construction and Maintenance;
- **C&S2** - Standard Instructions for Making Test on Signal Apparatus
- **FRA (Federal Railroad Administration) - 49 cfr part 236** - Rules, standards, and instructions governing the installation, inspection, maintenance, and repair of signal and train control systems, devices, and appliances



Audit was performed by ISARail at Septa's Market-Frankfurt Line (Blue Line) to verify the management and execution of the signal system maintenance.



Requirements Assessment - SEPTA Frankfurt – Market Line

PHASE ONE

Checking :

- The maintenance activity for year 2014;
- The existence of calibration of measuring instruments;
- If there was evidence of a controlled flow regarding sending and receiving records and reports from and to the Maintenance facility, and a list of those records;
- If there was evidence of the controlled distribution of technical standards of interest to the staff.

PHASE TWO

The main processes and procedures related to the management and execution of maintenance of signal related systems for the Transportation Center has been checked. Specifically:

- Switch maintenance activities performed in February 2014;
- Track circuits and signals maintenance activities performed in February 2014;
- TCS-CSS-MICROPROCESSOR CONTROLLED SIGNAL SYSTEMS maintenance activities performed in February 2014.

PHASE THREE

Some “Live” tests related to the management and execution of maintenance of signal related systems were witnessed and observed by the Audit Team (Witnessing).



Requirements Assessment - SEPTA Frankfurt – Market Line

Example of findings

- There are no current calibration certificates of measuring instruments available at the Field Maintenance Office;
- There are no clear records of how the instruments were distributed in the various maintenance locations, however all employees needing access to an instrument were provided with it;
- There is not a year-end report certifying that all operations that were performed in a regular cycle were carried out;
- There is no record of the actual working hours spent for the monthly maintenance activities.



Audit of Down Town Line Pre-Final Operation Safety Submission (OSS) - Singapore

Audit of DownTown Line Mass Rapid Transit System (DTL) and Operator's Operation Readiness – Stage 2

The DTL is a 42km long fully automatic driverless system consisting of 35 underground stations (some serving as civil defense shelters). It is built in 3 stages – DTL1 (4.3km) covering stations DT14 to DT19, DTL2 (16.6km) covering Depot 1 to station DT13 and DTL3 (21km) covering stations DT20 to DT35. DTL1 commenced passenger operations since Dec 2013. The DTL2 was scheduled for opening on Dec 2015. DTL3 is expected to be completed in 2017.





Audit of Down Town Line Pre-Final Operation Safety Submission (OSS) - Singapore

Audit of the Pre-Final Operation Safety Submission - to determine the adequacy of the safety demonstrations – Stage 2

Description	DTL Stage					
	DTL 1		DTL 2		DTL 3	
Rapid Transit System (RTS)						
Audit of	Pre-Final HSS	Pre-Final OSS	Pre-Final HSS	Pre-Final OSS	Pre-Final HSS	Pre-Final OSS
	Final HSS	Final OSS	Final HSS	Final OSS	Final HSS	Final OSS

Audit and comment on the adequacy of the safety demonstrations and the thoroughness of the Pre-final OSS for DTL2, and evaluate that the Operator has established the necessary organizational structure and processes to commence trial running



Audit of Down Town Line Pre-Final Operation Safety Submission (OSS) - Singapore

The major aspects to be audited included the following:

- Operator's Management team
- O&M readiness on the following systems:
 - Rolling Stock, including Electric Train and Engineering Train
 - Signaling
 - Communication
 - Integrated Supervisory Control System
 - Power and Electrical Services
 - Tunnel Ventilation
 - Trackwork and Mechanical & Electrical (M&E) Services
- Rail Operation
- Training
- Human Resource
- Material Management
- Safety and Quality
- Operational interfaces with DTL1
- Operation safety issues arising from DTL1 operation
- New/revised O&M procedures for DTL 2 operation
- O&M readiness for safe operation of DTL 2 conducting Trial Running for DTL2



Thank you

ISARail group

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