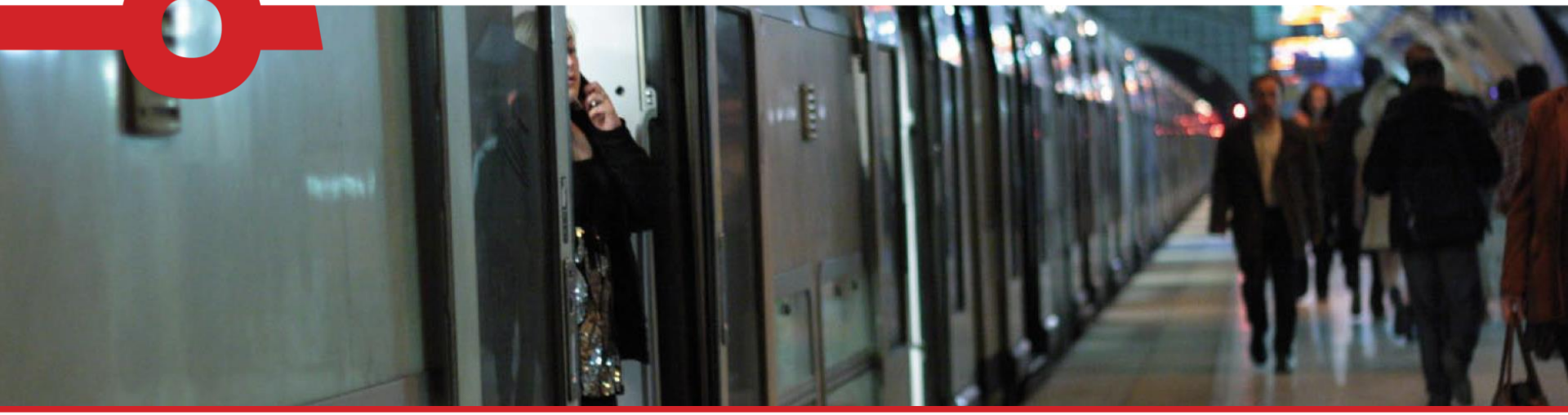
April 11, 2018

Rail Baltica - Design Guidelines



Rail Baltica

SYSTRA

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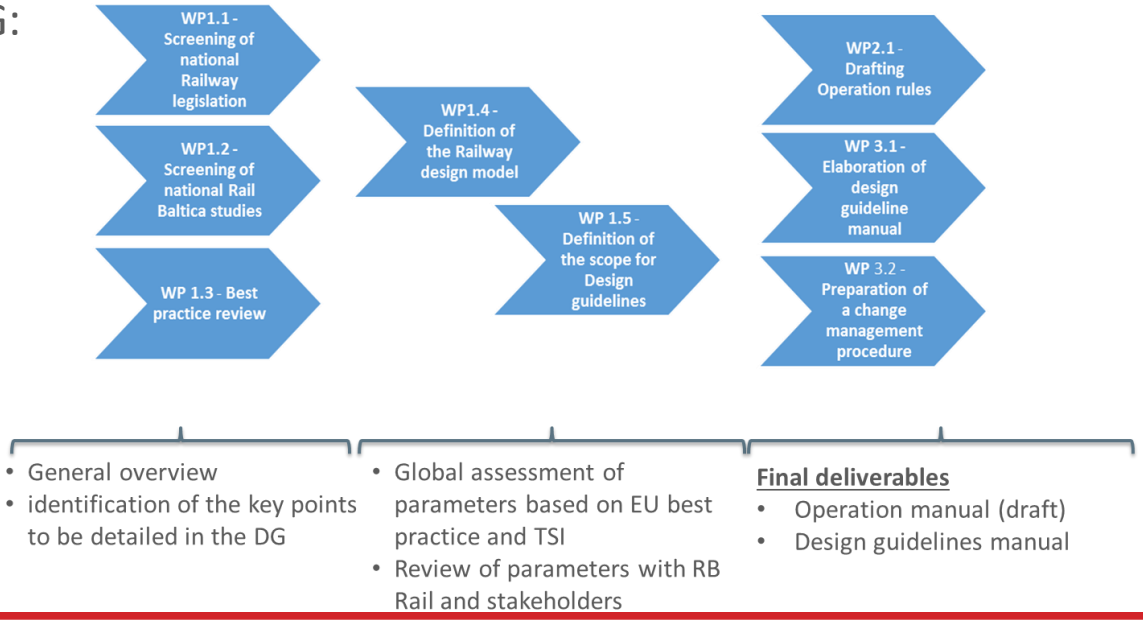
1. Design guidelines scope of work

- A need of a <u>common</u> design guidelines for the <u>whole Rail Baltica project</u> to ensure a standardized approach for the next procurement stages → Design Guidelines manual will be included in all design tenders.
- A need to detail some TSI requirements and to add some criteria with regards to mixed traffic and high speed for the Rail Baltica corridor.
- Main objectives for the DG requirements: Railways long-term vision, competition neutral and integration of the EU best practice for Railways.
- 3 steps approach for the DG:



2. Content of Design Guidelines manual

- ✓ Change management procedure (change of DG manual, derogation, clarification, corrigendum)
- ✓ General requirements
  - General parameters
  - Access requirements, Safety and security requirements (fences, portals)
  - Environmental conditions for systems, corrosion and exposure class
  - Anti-penetration device for highway, secondary road
  - Cable ducts requirements
  - Design life
- ✓ Railway alignment (mixed traffic and passenger/light freight train traffic)
- ✓ Railway superstructure - track
- ✓ Railway substructure Part 1 embankments and earthworks
  Part 2 hydraulic, drainage and culverts
  Part 3 bridges, overpasses, tunnels and similar structures
- ✓ Cross sections (48)
  - Main line (embankment, cut, passing loop, station)
  - Specific cross sections (acoustic screen/merlon, technical block, drainage)
  - Anti-penetration device for highway, secondary road
  - HSL with maintenance road
  - Structures (viaduct, overpass, tunnel/cut and cover)

Based on EN standards, UIC recommendations and best practice

2. Content of Design Guidelines manual

- ✓ Railway Energy Part 1 traction power system
  Part 2 catenary
  Part 3 Non traction power supply
  Part 4 Electromagnetic compatibility
- ✓ Railway control-command signaling system
- ✓ Railway telecommunications system
- ✓ Railway SCADA
- ✓ Infrastructure facilities (Stations, Passing loops, crossovers)
- ✓ Station and passenger platforms
- ✓ Environment
- ✓ Mechanical Electrical and Plumbing in Tunnel
- ✓ Adaptation to climate change
- ✓ BIM requirements
- ✓ Architectural and landscaping (visual design) requirements
- ✓ RAMS requirements

Prepared by RB Rail

No choice of technologies for systems (ENE and CCS).
→ Definition of the key requirements for system performance and for the interface with Civil works.

3. Key parameters included in the design guidelines manual

Traffic code	Gauge	Axe load	Design speed	Train length
P2	GB	25 t	249km/h	Track and system : 400m Passenger platform : 200m
F1	GC		120km/h	1050m

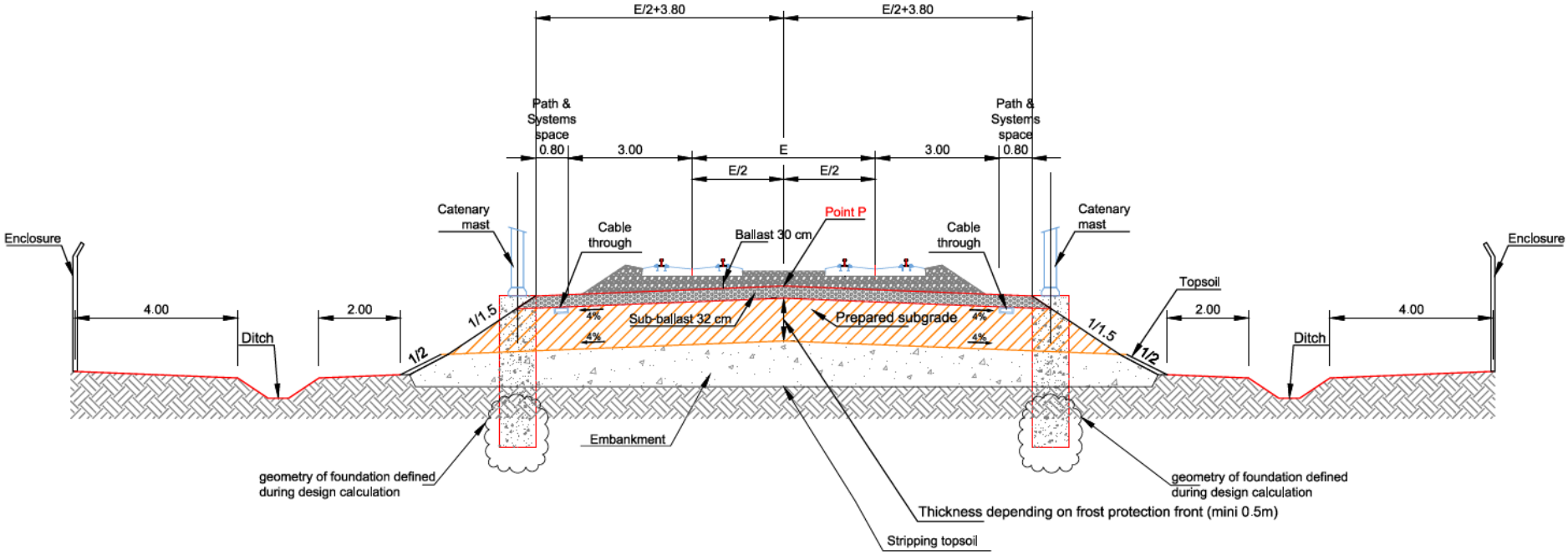
Parameter	Proposed value
Level crossing with roads	No level crossing
Gauge crossing with 1520mm Railways	No gauge crossing
Access for maintenance and emergency services	access to the main line every 2 or 3km and in specific areas
Type of track	Ballasted track
Distance between track centres	4.5m for the main line 3.8m for passenger line with speed 200km/h
Maintenance walking path	0,8m maintenance path at 3.0m from the track centres
Energy system	2x25kV
ERTMS	Level 2, Baseline 3
Vertical clearance Road bridges (<22.5m)	6.62m
Vertical clearance Road bridges (>22.5m) and tunnel	7.02m (249km/h) / 6.43m (200km/h)

4. Key examples of cross sections included in the Design Guidelines

- Key elements:
  - ✓ Distance between track centres
  - ✓ Catenary position
  - ✓ Walkway position
  - ✓ Ballast, sub-ballast thickness
  - ✓ Frost penetration (sub-grade thickness)

Main line embankment - Double track

Speed	E	E/2
200 km/h	3.80m	1.90m
249 km/h	4.50m	2.25m

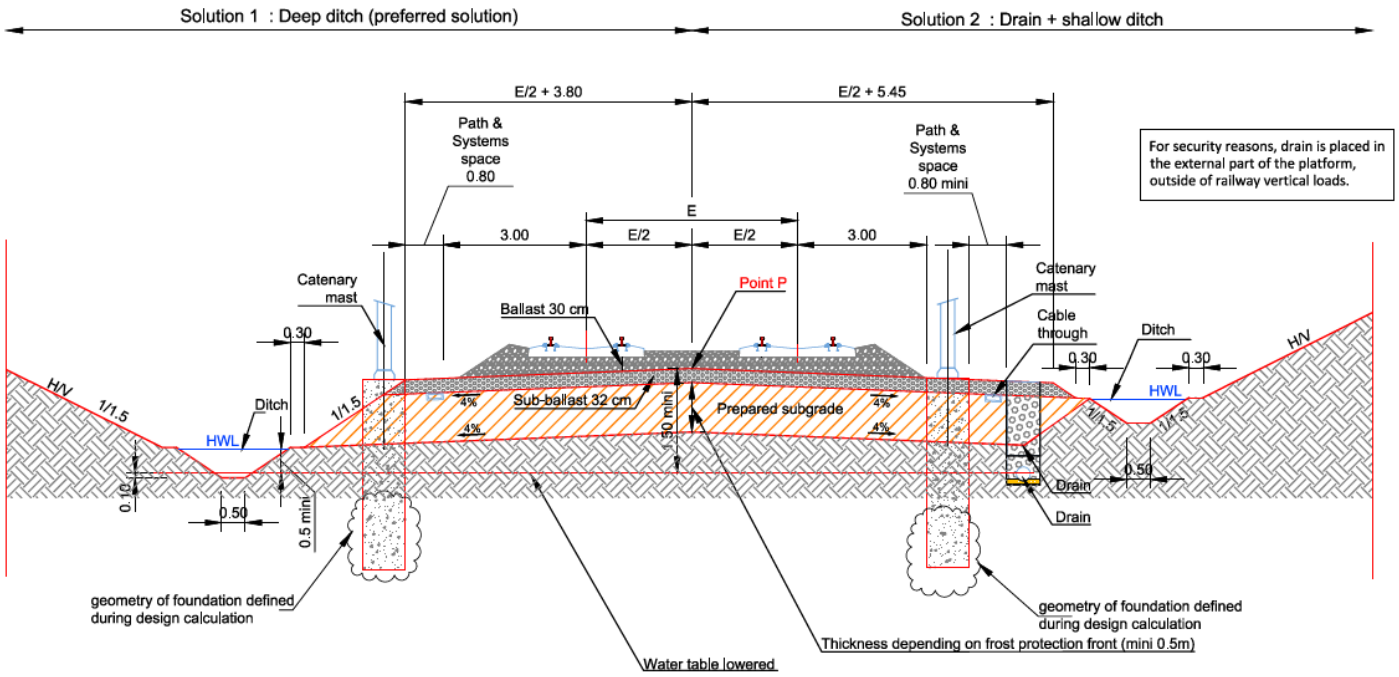


4. Key examples of cross sections included in the Design Guidelines

- Key elements:
  - ✓ Drainage requirements

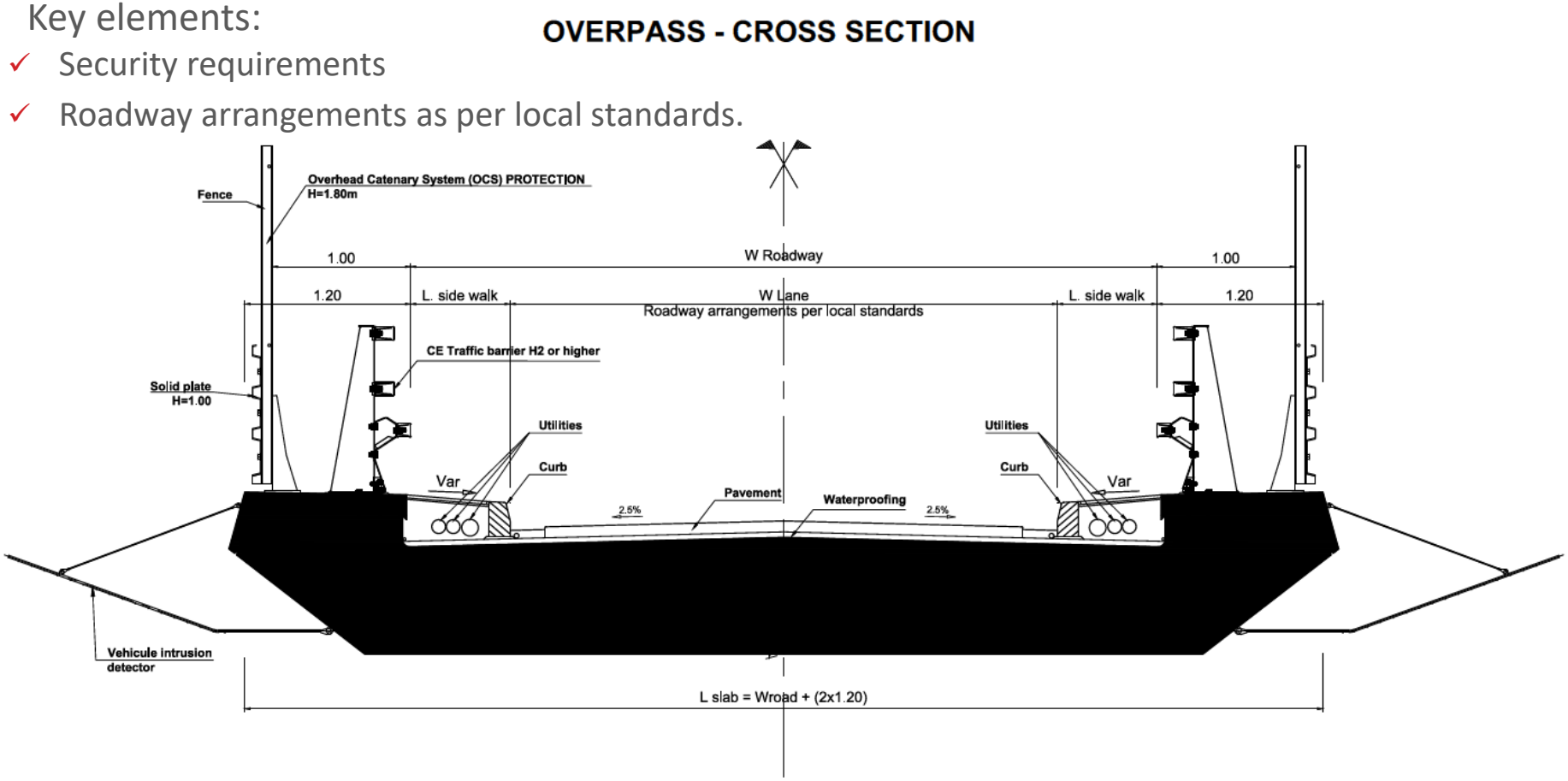
Main line cut - Double track – Wet cut (with water table)

Speed	E	E/2
200 km/h	3.80m	1.90m
249 km/h	4.50m	2.25m



4. Key examples of cross sections included in the Design Guidelines

- Key elements:
  - ✓ Security requirements
  - ✓ Roadway arrangements as per local standards.



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