ITA TUNNELLING AWARDS 2019

Suseo High Speed Rail (Yulhyeon Tunnel) Republic of Korea

Presented by: Korea Rail Network Authority

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1 General Information

61.1 km in total length, 52.3 kilometers

Deep underground tunnel

Suseo High Speed Rail

(Yulhyeon Tunnel)

Seoul Station

Suseo Station

Dongtan Station

Jije Station

Gyeongbu HSR

61.1km

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1 General Information

1. Client: **Korea Rail Network Authority**
2. Engineering firms: **Dong Myeong Engr. Consultants** and 9 others
3. Contractors: **Samsung C&T** and 9 others
4. Other stakeholders: **Korea Railroad T&C** and 14 others

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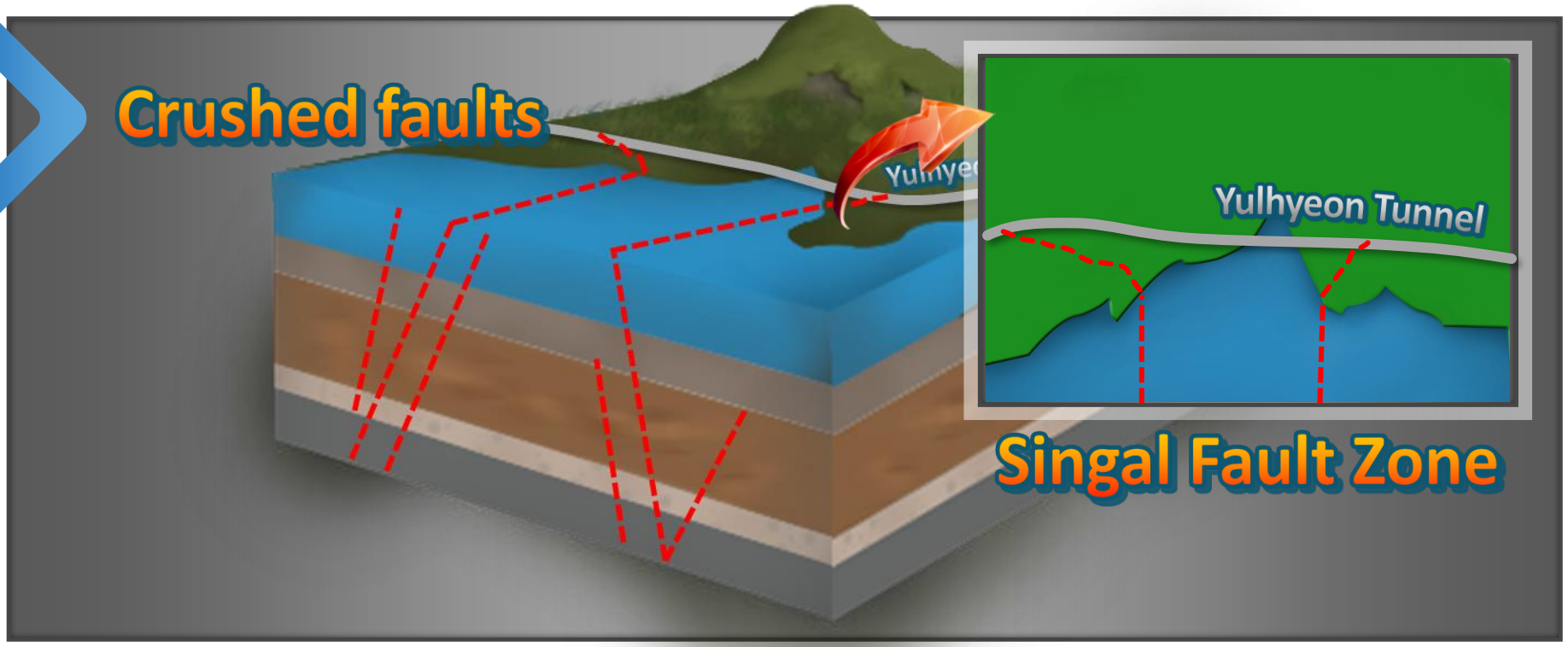
1 General Information

1. Tunnel length **52.3 km** (incl. 3-arch enlargement tunnel, NATM 48.4 km)
2. Cross sectional area **89.5 m^2**
3. Excavation volume **4,680,850 m^3**
4. Overall cost **€2,099 million**
5. Civil works cost **€967 million**

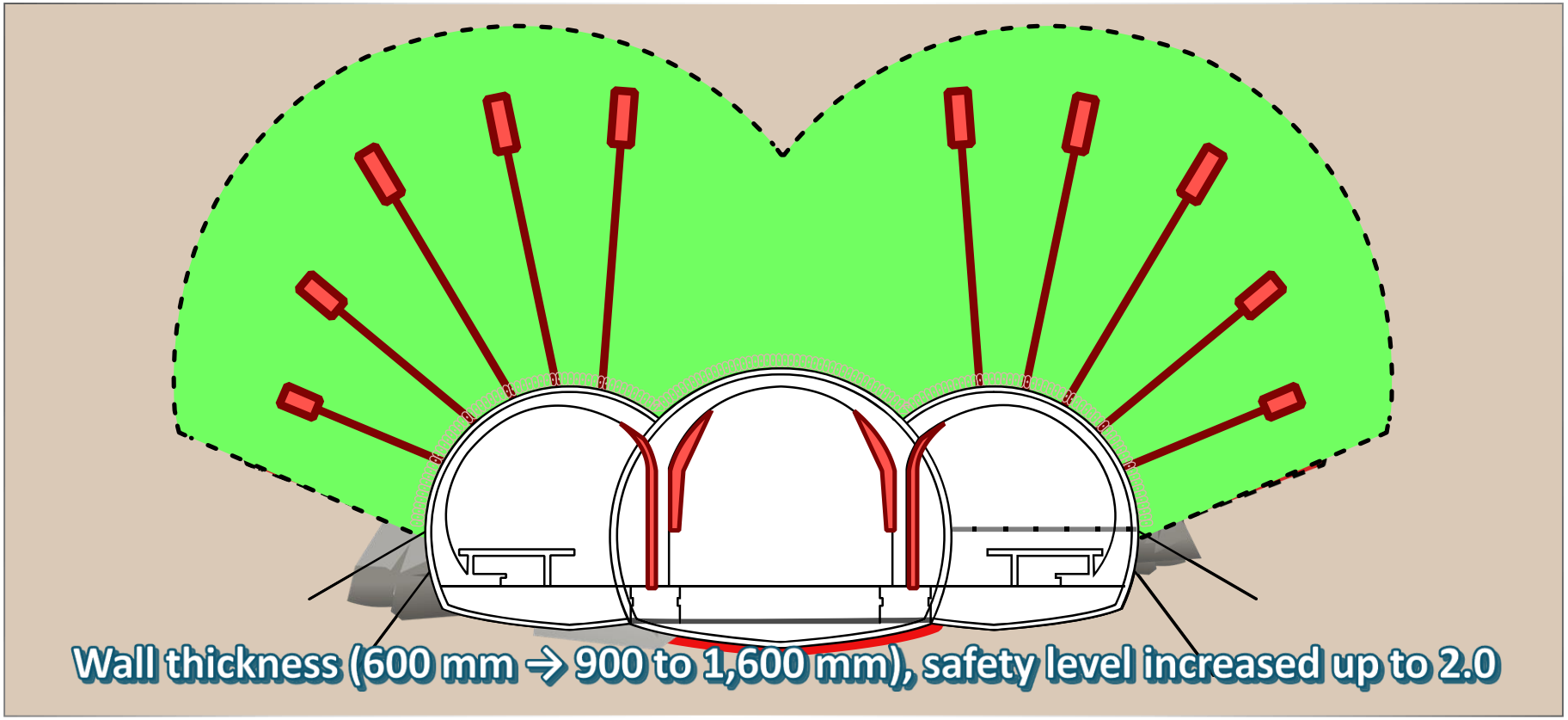
2 Project Details

- Safe construction on geological anomalies (Singal Fault Zone, L = 12.8 km)
  - 1st level of earthquake resistance (6.5 on Richter scale)



2 Project Details

- High quality construction of enlargement tunnel
  - 3-arch, 2-arch tunnels (L = 535 m)



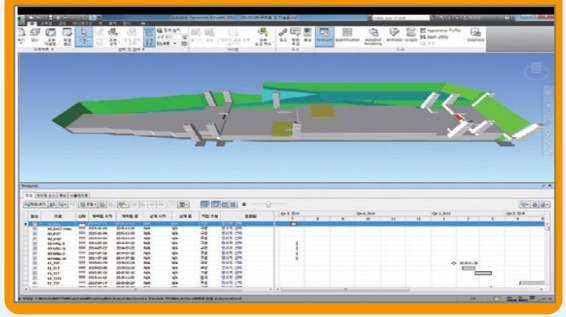
2 Project Details

2.1 Completed view of 3-arch tunnel

2 Project Details

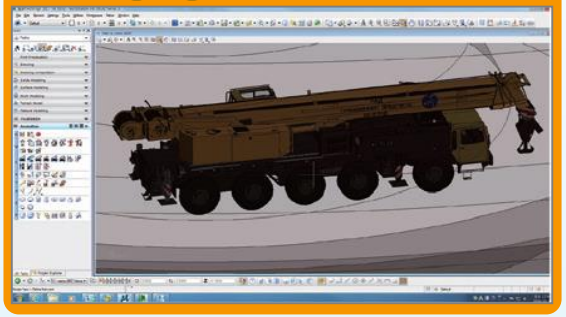
- BIM used throughout the project (planning, design and construction)

4D simulation

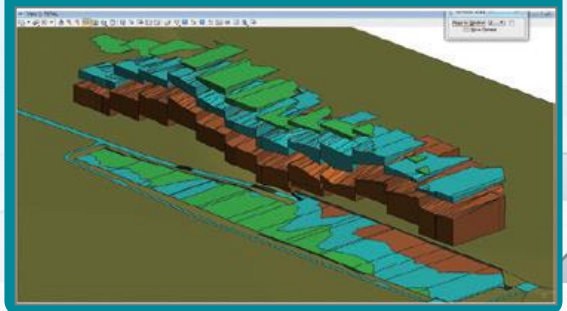


Station model

Equipment model

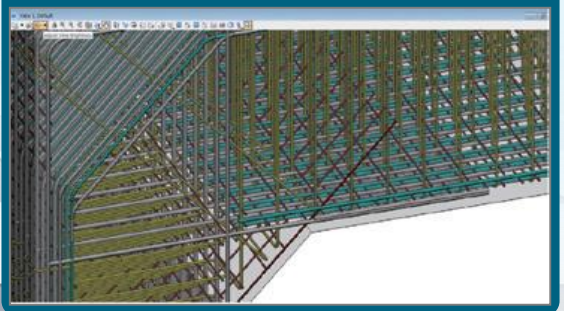


Earthwork model



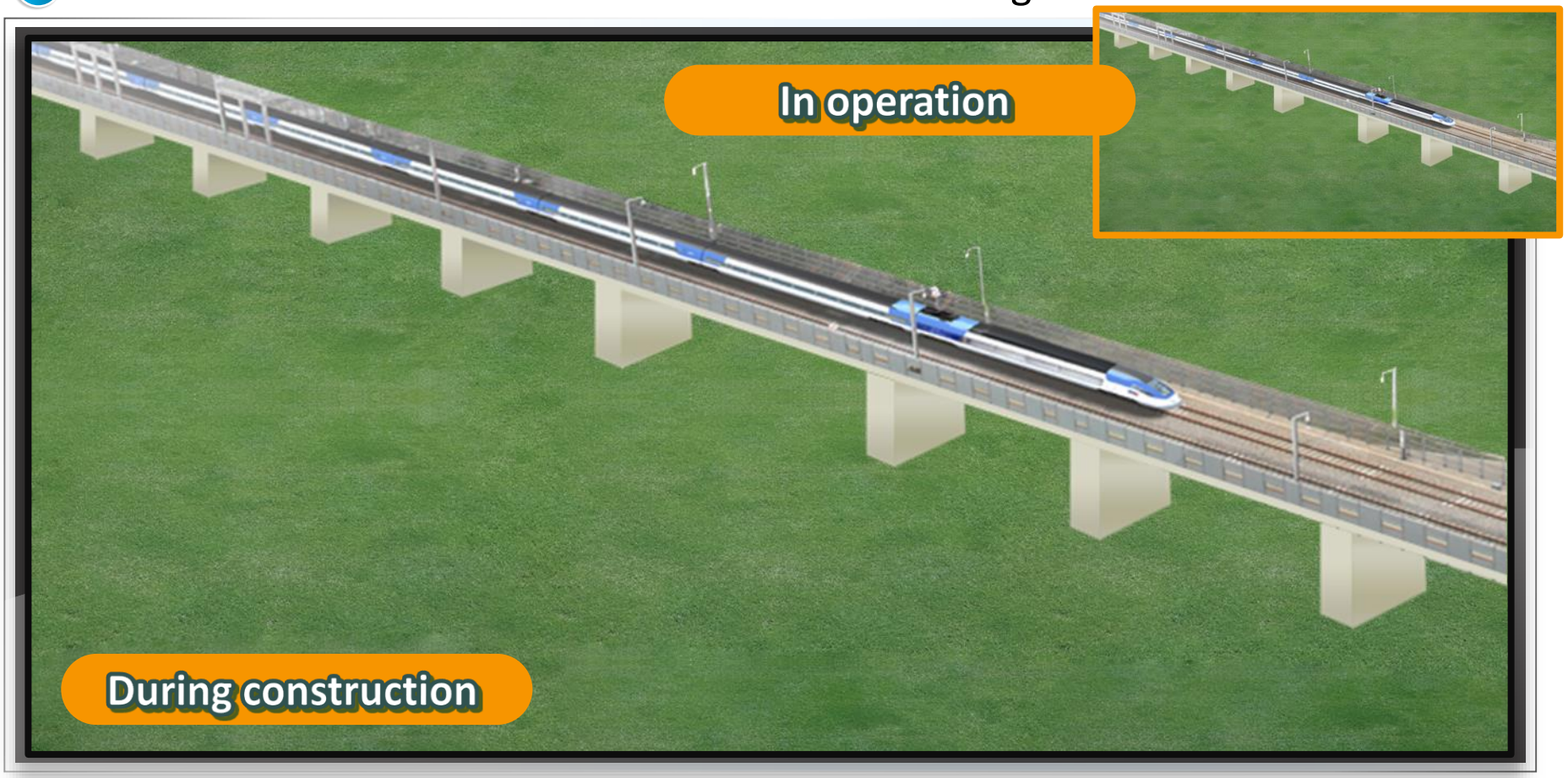
Additive model

Rebar model



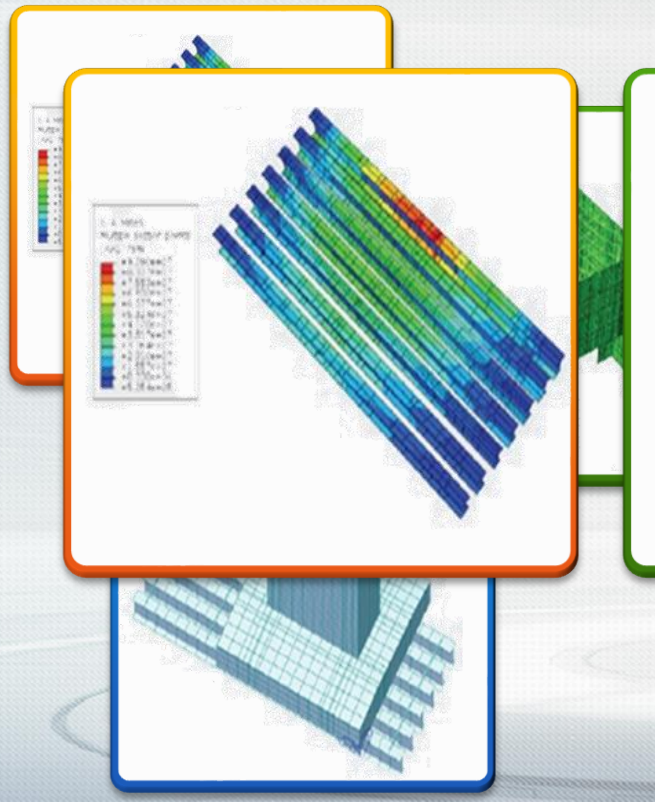
2 Project Details

- Safe construction with 0% settlement under existing HSR in service



2 Project Details

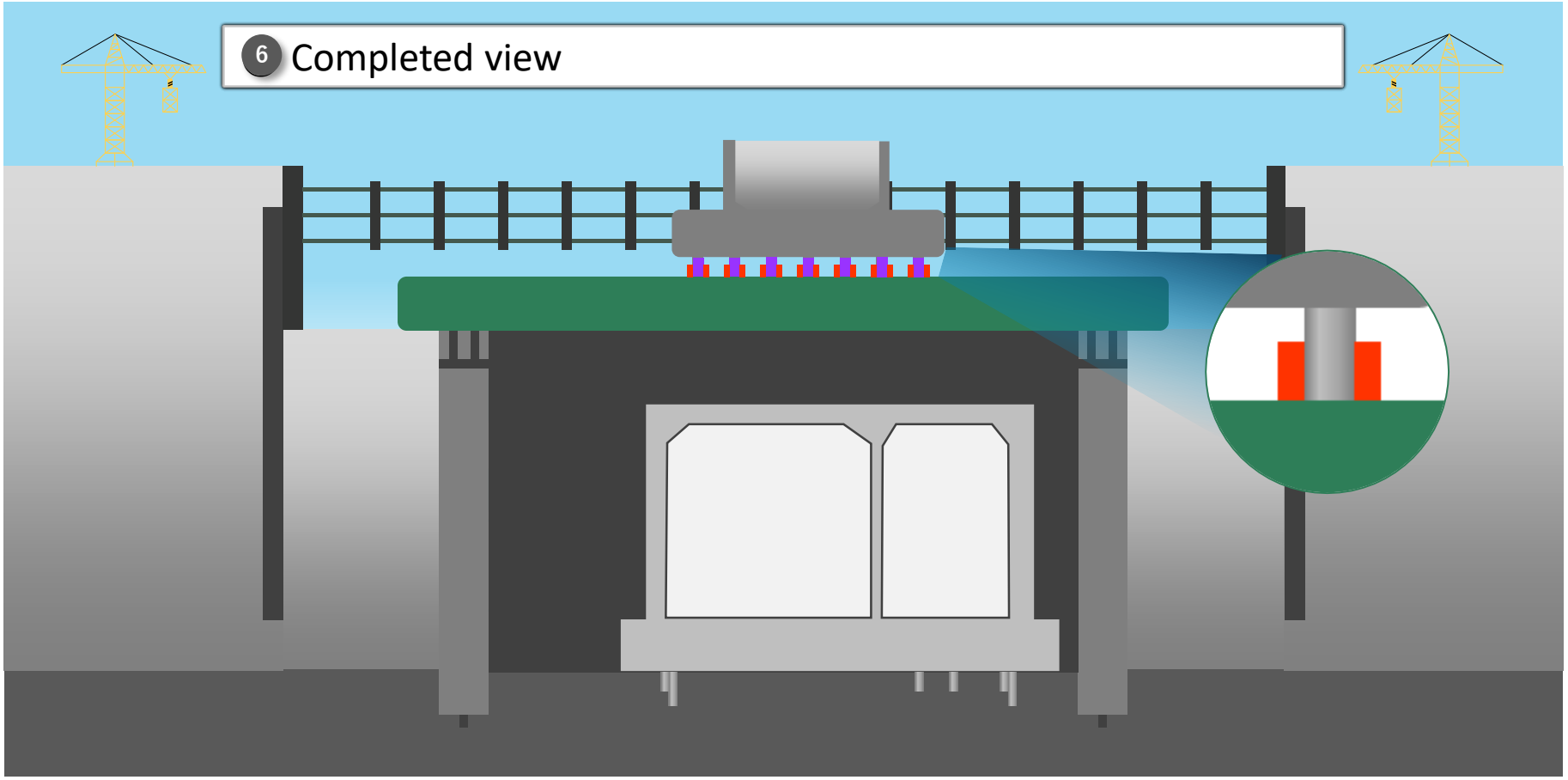
4 1 Analysis of stability and real-time management of displacement



	Maximum deflection (mm)	Angular displacement	Horizontal strain	Maximum horizontal displacement (mm)	Steel (Mpa)
Step 1	1.089	6.548E-05	1.399E-05	3.375E-04	-
Step 2	1.089	6.548E-05	1.399E-05	3.375E-04	-
Step 3	1.089	6.548E-05	1.399E-05	3.375E-04	69.43
Step 4	1.315	9.934E-05	1.132E-05	3.133E-04	90.90
Step 5	1.797 (0.482)	1.023E-04	1.099E-05	3.825E-04	120.70
Step 6	3.694 (2.376)	1.023E-04	1.122E-05	3.810E-04	162.40
Tolerance range	25(3)	1/800 (1.25E-03)	1/2000 (5.0E-04)	3	190.00
Evaluation	OK	OK	OK	OK	OK

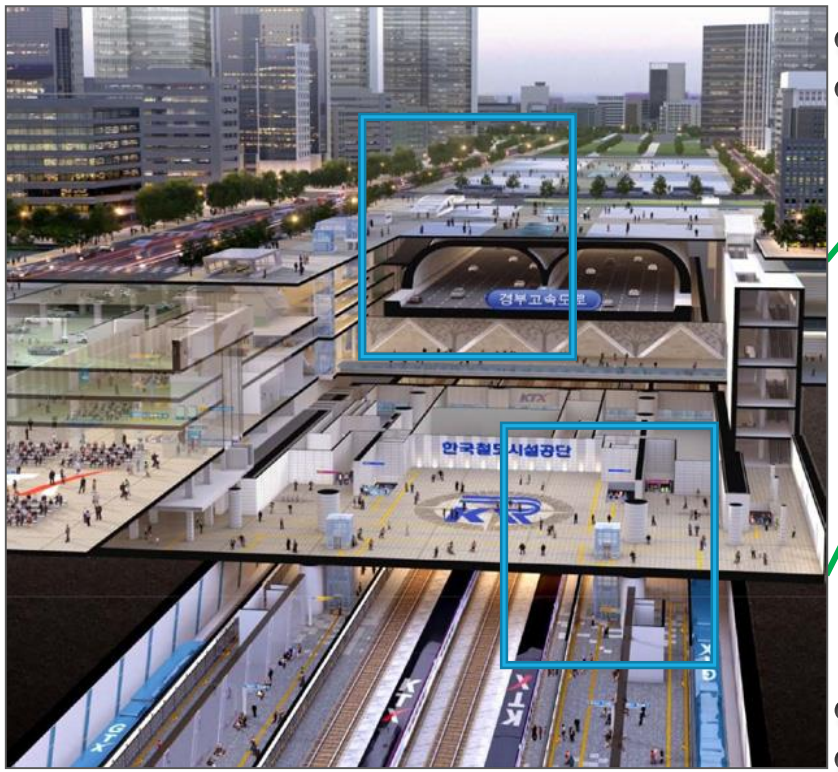
2 Project Details

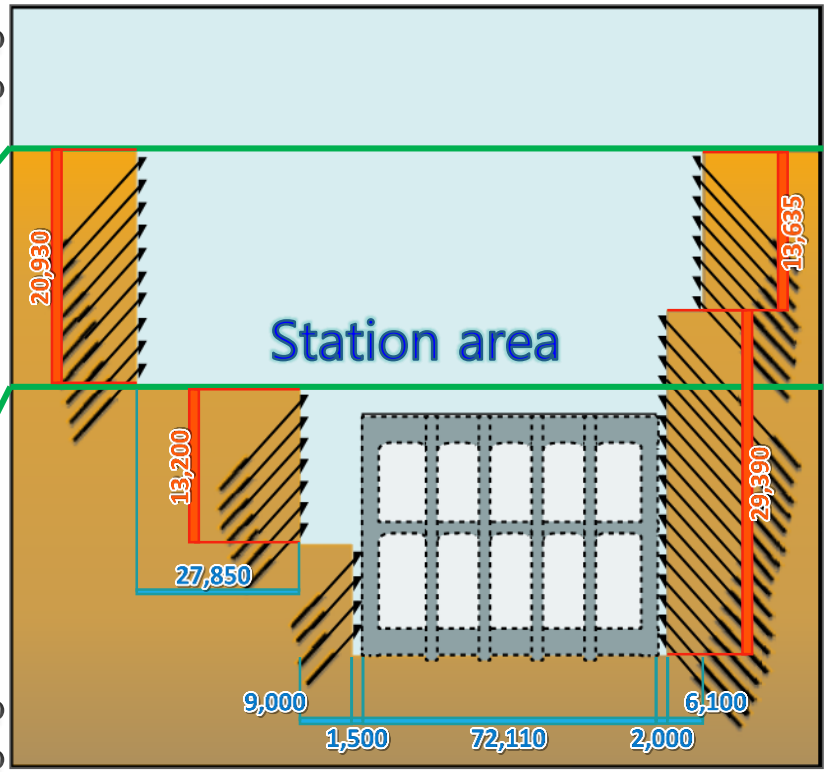
4 ··· 2 Underpinning method



3 Underground Station

Dongtan Station size **L = 607 m, W = 118 m, D = 43 m**





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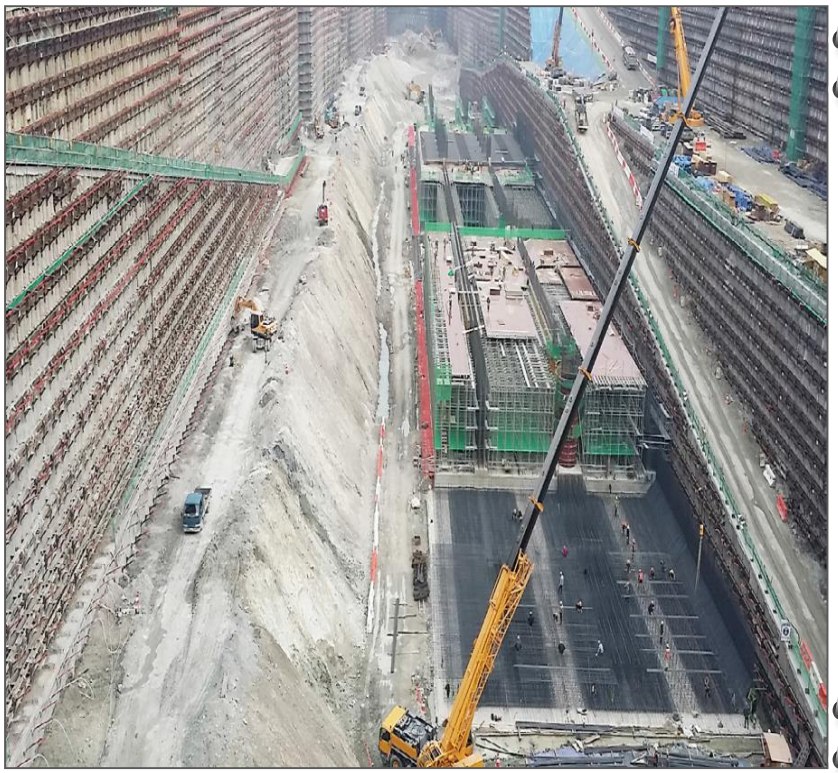
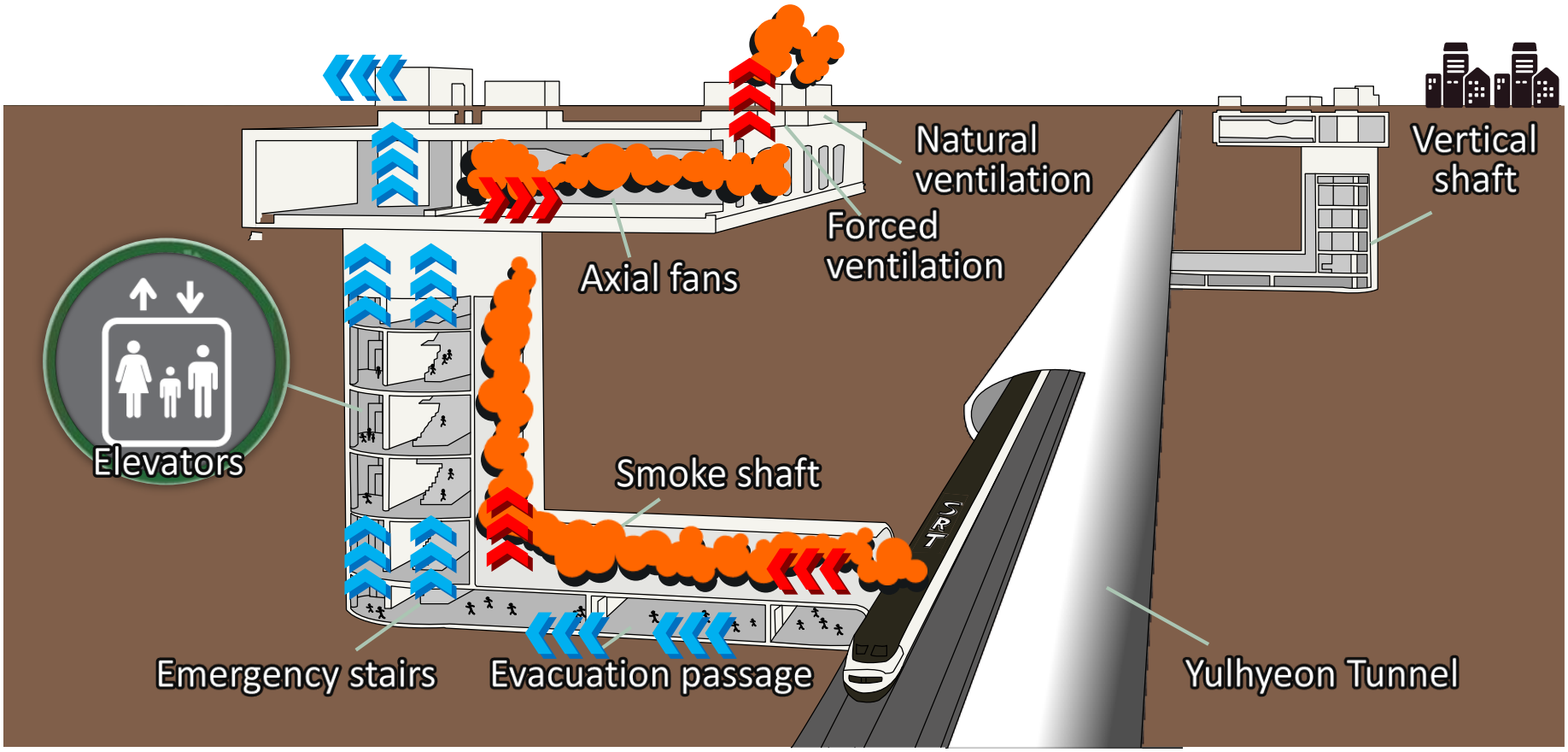
3 Underground Station

- Earthwork (**2,050,000 m³**), anchor (**17,011**)



4 Emergency Evacuation

- 22 evacuation routes (average distance 2.2 km: shortest 1.1km, longest 4.7km)



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5 Sustainability Criteria

1

Reduce access time to **15 to 16 mins.** compared to existing HSR stations (Seoul, Yongsan and Gwangmyeong Stns.)

2

Reduce travel time (Approximately **€16 million**)

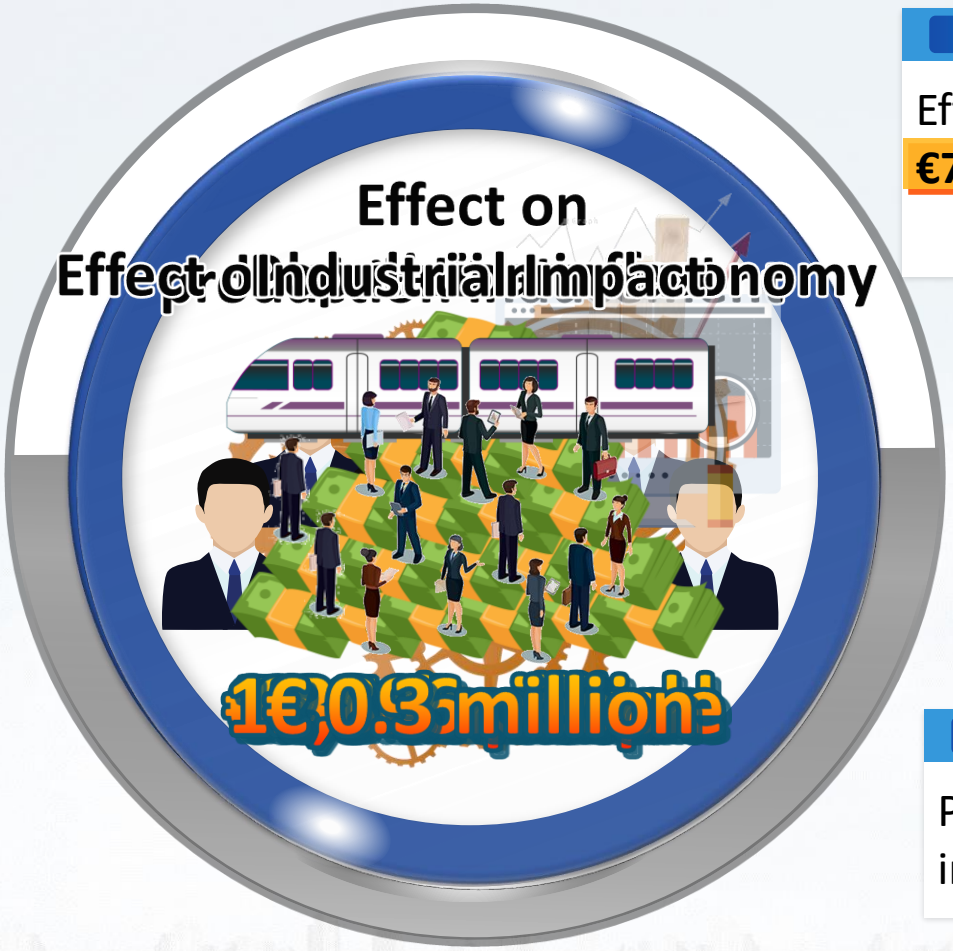
3

Reduce trip time (**7 to 8 minutes**)

4

Increase railway capacity from **29 to 51 times**

5 Sustainability Criteria



5

Effect on production inducement **€7,242 million**

6

Job creation effect **766 thousand**

7

Effect on station area economy of **€374 million**

8

Population influx **12,896 people,** industrial Impact of **€ 0.3 million**

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