

***ISTANBUL STRAIT ROAD TUBE CROSSING PROJECT
(Eurasia Tunnel Project)***

March 2021

S. J Seo

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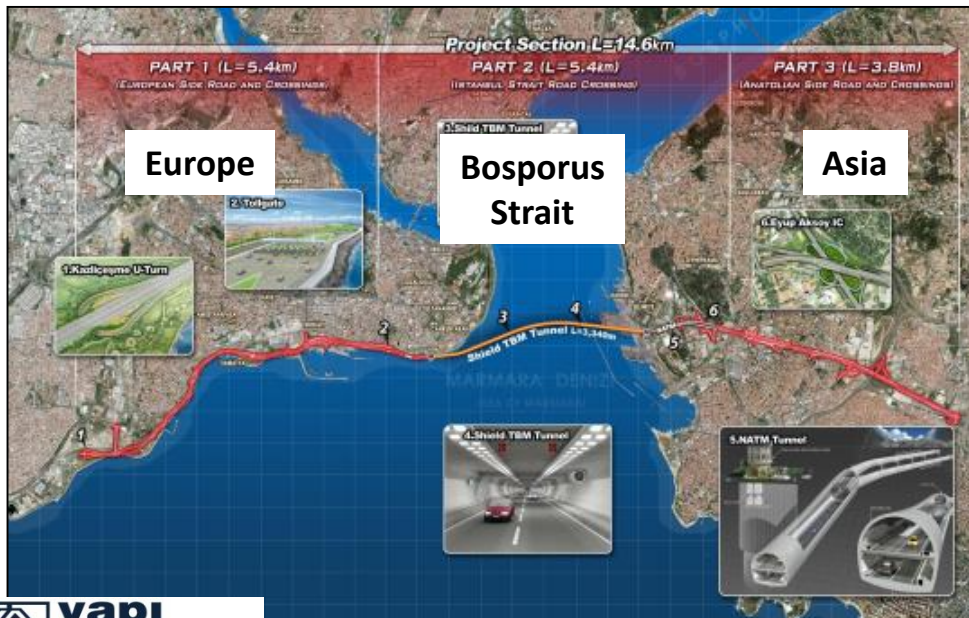


1. Project Overview

1. Project Overview

[Construction Overview]

- Construction of Tunnel under the Istanbul Bosphorus Strait
- Road Widening (8~10 lanes) in Europe and Asia
- Total Length 14.6km
 - ✓ Europe 5.4km, Asia 3.8km
 - ✓ Toll(Europe) to Toll(Asia) 5.4km
 - ✓ Undersea Tunnel: 3.34km

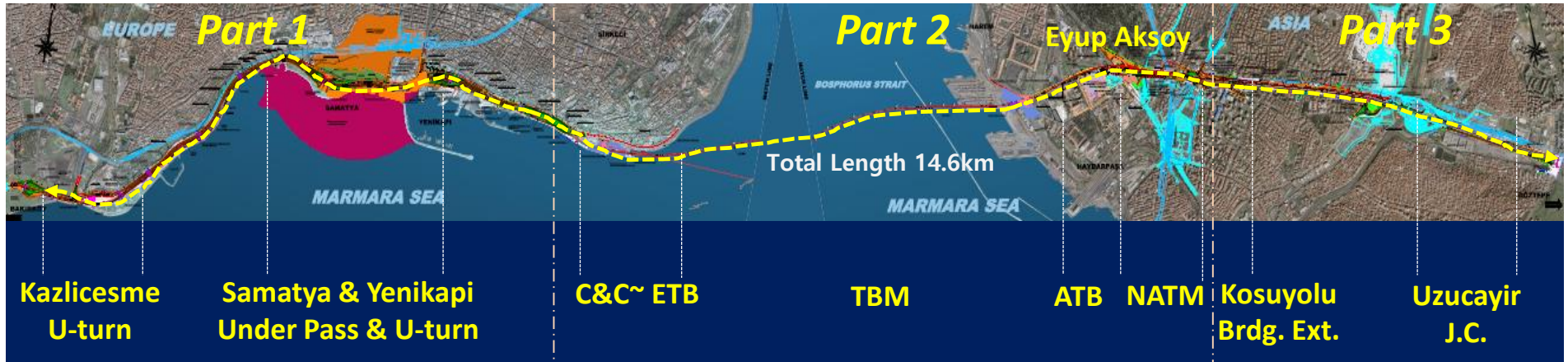


[Project Overview]

- Business Type : B.O.T.
- Concession Period : 29 Years
 - Construction : 4 Years
 - Operation : 25 Years
- Project Schedule
 - Construction : 2013. 4 ~ 2017. 3
 - Operation : 2017. 4 ~ 2042. 1
- Total Investment Cost : US\$1,245M
- Debt-Equity Ratio : 77% : 23%
- Sponsors : Yapi Merkezi, SK
- Construction Cost : US\$814M

1. Project Overview

❖ Project Alignment and Main Construction



Part 1 – Europe (5.4km)	Part 2 – Tunnels (5.4km)	Part 3 – Asia (3.8km)
<p>Main Task</p> <ul style="list-style-type: none"> ✓ Extension of road: 6 → 8~10 lanes ✓ Structure: U-turn pass (3), Underpass (2) 	<p>Main Task</p> <ul style="list-style-type: none"> ✓ TBM Tunnel: 3,340m (6th Biggest in the World, D=13.7m) ✓ Twin NATM Tunnel: 1,892 m ✓ Asian/European Transition Box ✓ Toll gate (Europe and Asia) ✓ O&M Building (Asia) ✓ Junction Rearrangement (1) 	<p>Main Task</p> <ul style="list-style-type: none"> ✓ Extension of road: 4~6 → 6~8 lanes ✓ Structure: Bridge Extension (2), Junction Rearrangement (2)

1. Project Overview

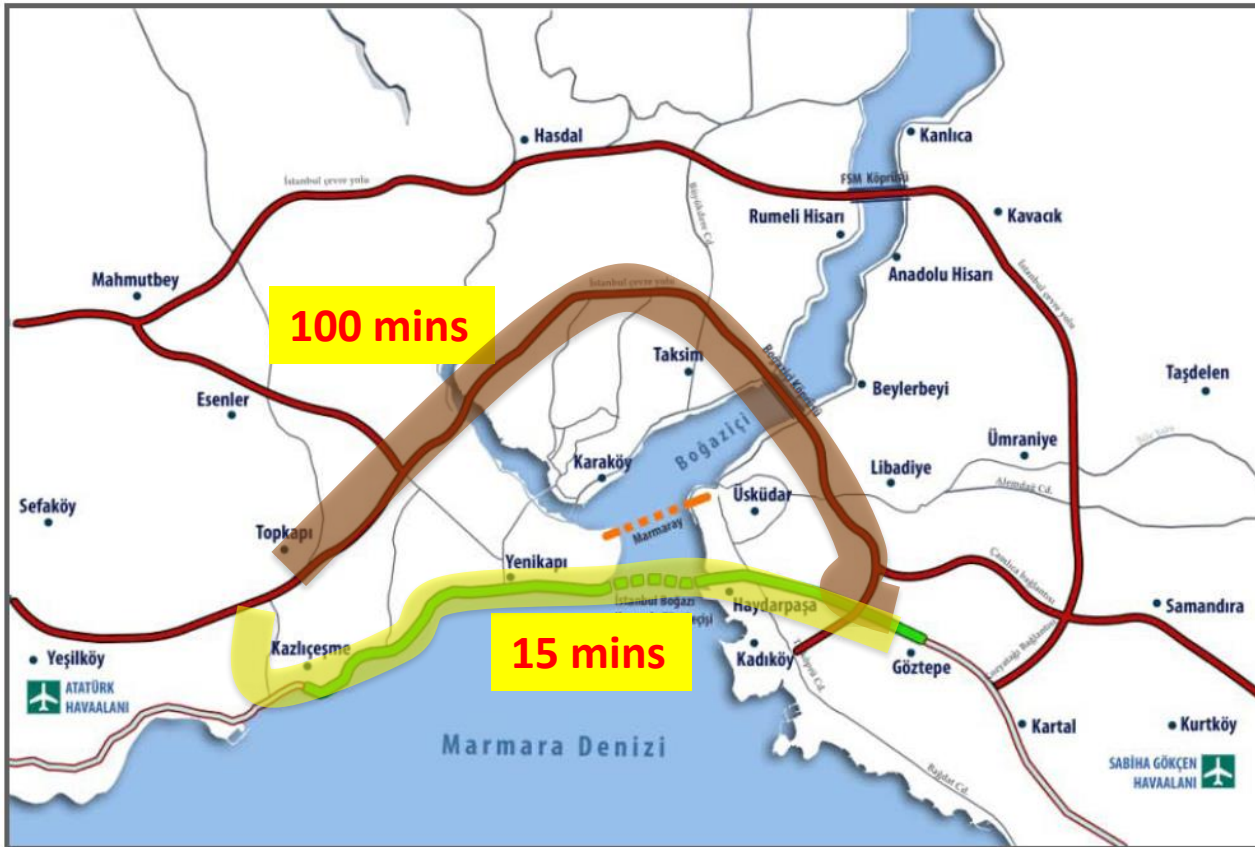
❖ The Location and Significance of the Project



1. Project Overview

❖ Contribution of the Project to Istanbul's Highway Network

- Many values to be provided to public and Istanbul

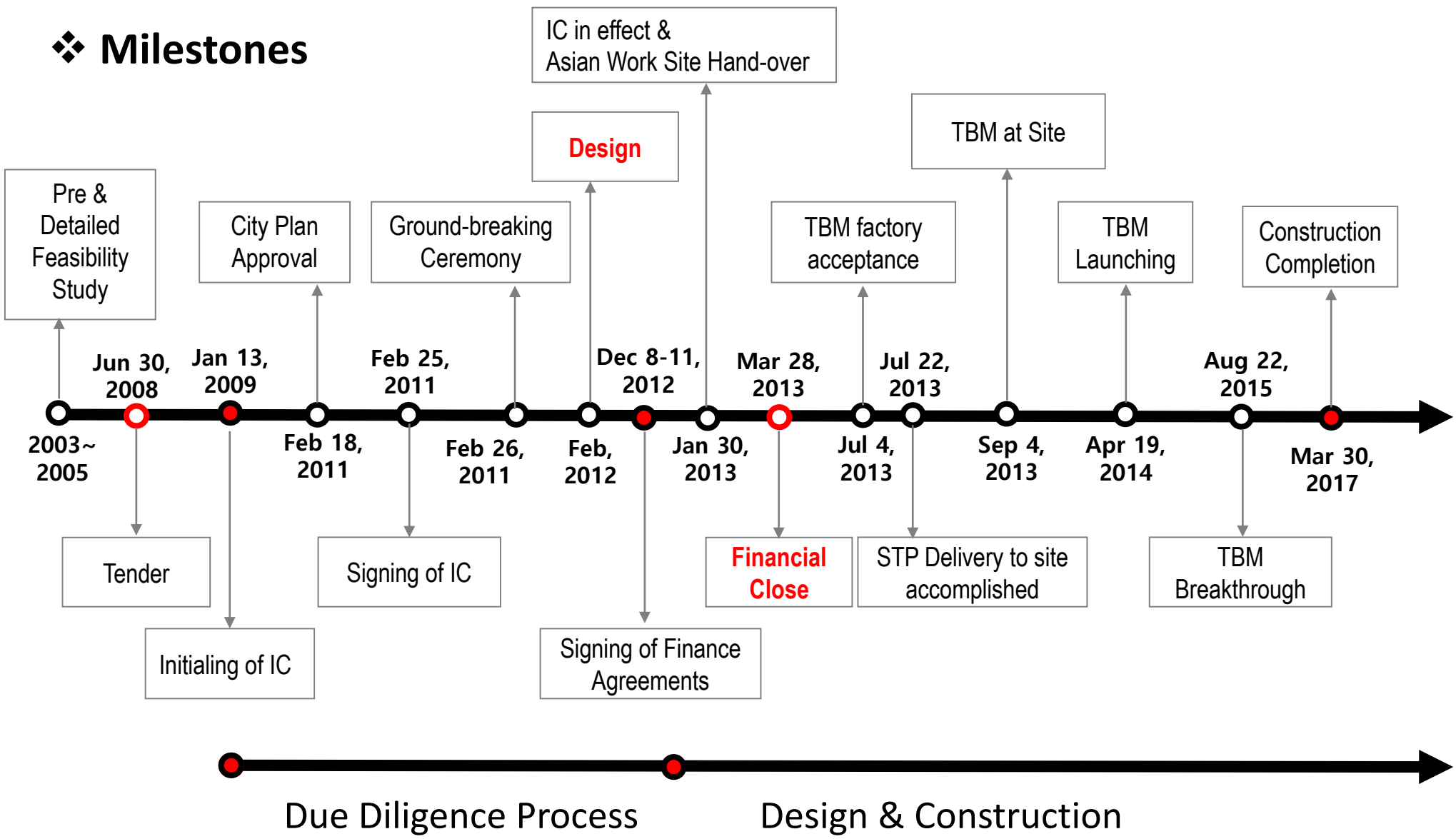


- Significant time savings
- Shortest path between Atatürk and Sabiha Gökçen airports
- No effect on the “Silhouette of Istanbul”
- Net savings in pollutant emissions

2. Milestones

2. Milestones

❖ Milestones



3. Due Diligence Process

3. Due Diligence (DD) Process

❖ Purpose of DD

- To assess all the risks associated the Project in order to pass down the risks to the EPC Contractors and the Operator so that exposures remaining with the Appointed Company would be limited and manageable.

❖ **Start date** : Jan, 2009, Initialing of IC

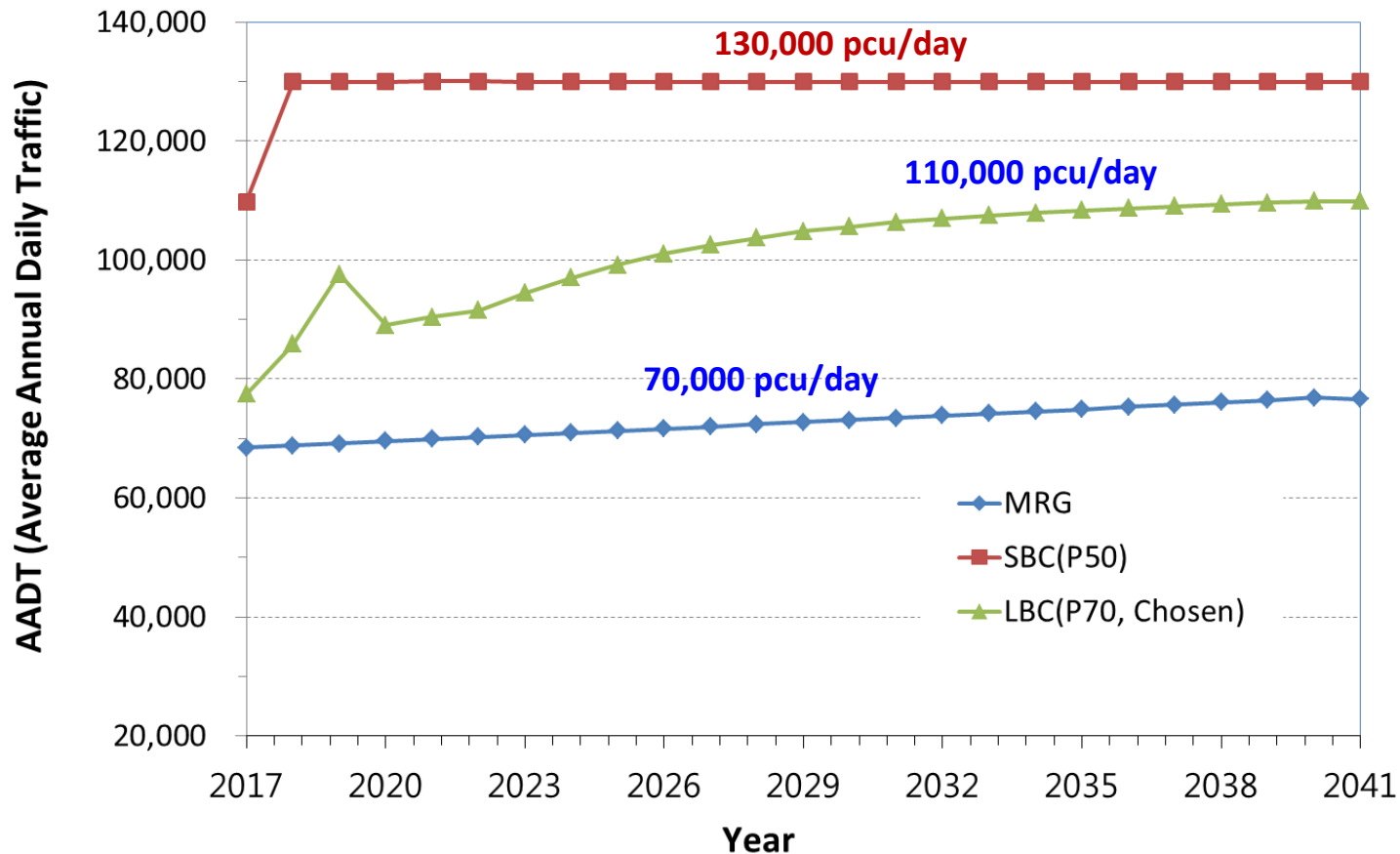
❖ **Finish date** : Dec, 2012, Signing of Financial Agreements (**4 years**)

❖ Major items of DD

Subject	Sponsor's Advisor	Lender's Advisor
Traffic	Jacobs	Arup
Environmental & Social	ERM	Arup
Insurance	Marsh	JLT
Legal	Skadden (International) HBO (Local)	Clifford Chance (International) Fidan & Fidan (Local)
Finance	UniCredit	Banks
Technical Studies	SAMBO, PB, EPC Working Group	Arup

3. Due Diligence Process: Traffic

- ❖ Appointment of Jacobs (UK) as Sponsor's Advisor, 2009
- ❖ Setting up of traffic macro model
- ❖ Auditing by Lender's Technical Advisor, Arup
- ❖ Agreement on traffic forecasts, 2012



3. Due Diligence Process: **ESIA**

❖ Risk Management Tool for Environmental & Social Impacts

- For Creditors
- For Sponsors

❖ Standards

- Equator Principles

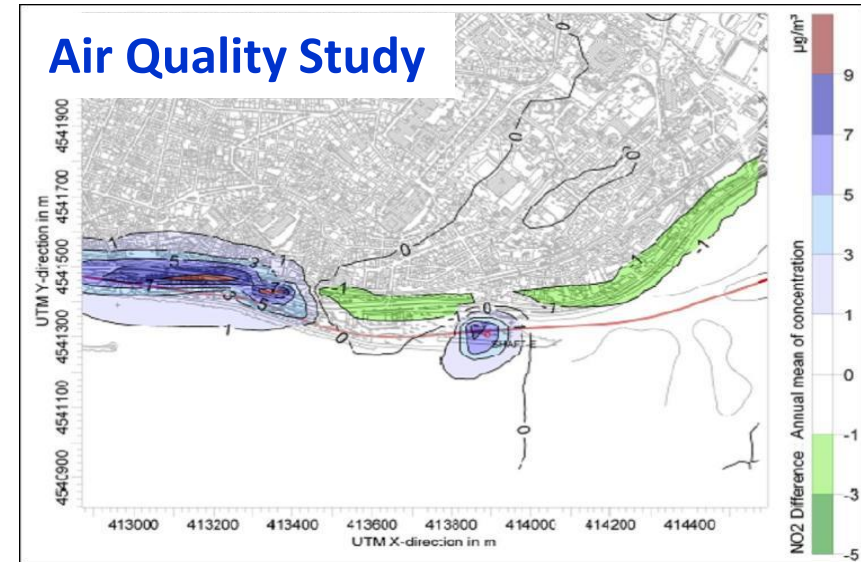


- IFC E&S Performance Standards
- EBRD E&S Performance Standards
- EIB E&S Performance Standards
- EU Directives
- Local E&S Performance Standards

3. Due Diligence Process: **ESIA**

❖ Analysis and Studies

- Archaeology
- Noise
- Air Quality
- Natural Habitat
- Traffic
- Expropriation



❖ ESIA Results (Documentations)

- Environmental and Social Impact Assessment Report (ESIA Report)
- Environmental and Social Action Plan (ESAP)
- Environmental and Social Management Plan (ESMP)
- Stakeholder Engagement Plan (SEP)
- Land Acquisition, Compensation and Resettlement Plan (LACRP)
- Employment Policy Document (EPD)

3. Due Diligence Process: **ESIA**

❖ Overall Procedure of ESIA and Implementation

- 09.2009 ~ 10.2009 : Legal & Regulatory Review and Initial Baseline Review
- 09.2009 ~ 11.2009 : Preliminary Assessment and Scoping
- 12.2009 ~ 09.2010 : Baseline Studies and Impact Assessment
- 05.2009 ~ 10.2010 : Mitigation Study and Workshop
- 05.2010 ~ 02.2011 : Final Assessment and Development of Management & Action Plan
- 01.2011 ~ 02.2011 : Draft Reporting
- 03.2011 ~ 05.2011 : Disclosure
- 06.2011 ~ 09.2011 : Final Reporting except ESIA
- 10.2011 ~ 11.2012 : Finalization of LACRP and LTA DD Technical Report
- 03.2013 : Financial Close
- 04.2013 ~ 03.2017 : Monitoring & Implementation in Construction Period
- 04.2017 ~ 06.2041 : Monitoring & Implementation in Operation Period

3. Due Diligence (DD) Process: **Insurance**

- ❖ Insurance Consultant and Broker for Sponsors: Marsh
- ❖ Insurance Consultant of Lenders: JLT

❖ **Insurance packages:**

- Construction all risks (CAR)
- Delay in start-up (DSU)
- Third party liability
- Marine cargo
- Marine delay in start-up
- O&M period insurances

❖ **Lead Re-insurers:**

- Munich Re,
- Zurich Re,
- Korean Re,
- Swiss Re

3. Due Diligence Process: **Legal**

❖ Total 60 Agreements and Contractual Documents

❖ Financial Agreements

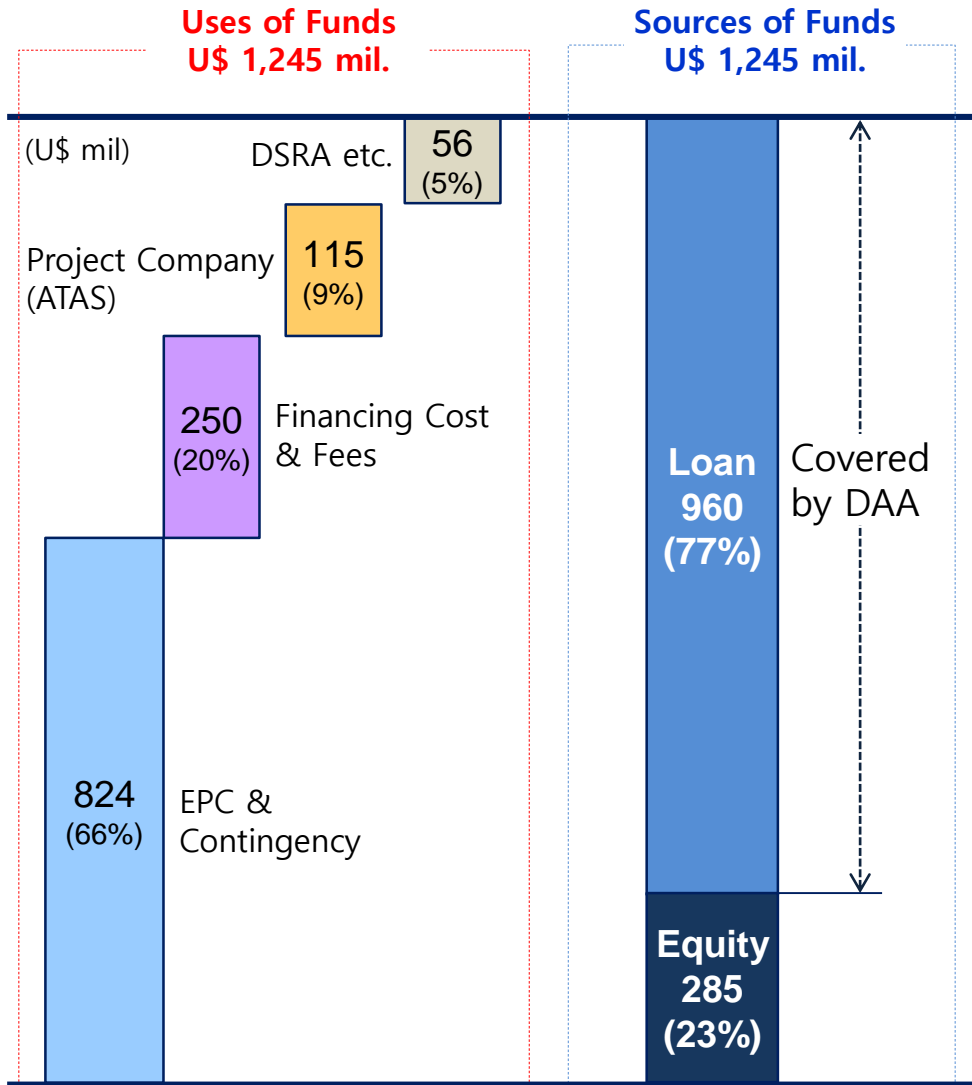
- **Loan Agreement** (8 December 2012)
 - ATAS and Lenders
- **Implementation Contract Direct Agreement (ICDA)** (11 December 2012)
 - Administration, ATAS and Lenders
- **Debt Assumption Agreement (DAA)** (11 December 2012)
 - Treasury, ATAS and Lenders

❖ Other Important Agreements

- **EPC Contract** (8 December 2012)
 - ATAS and YMSK JV
- **O&M Contract** (8 December 2012)
 - ATAS and EGIS (Operator)
- **Operation Protocol (OP)** (11 December 2012)
 - Administration and ATAS
- **Operation Coordination Protocol (OCP)** (15 February 2013)
 - IMM, KGM, EGM, Administration and ATAS

3. Due Diligence Process: Finance

❖ Financial Structure in Financial Model



DSRA: Debt Service Reserve Account

Loan Detail	U\$ mil	%
KEXIM Direct Facility	250	26%
KEXIM Covered Facility	30	3%
KSURE Covered Facility	180	19%
EIB Direct Facility	150	16%
EIB Guarantee Facility	200	20%
EBRD Direct Facility	150	16%
TOTAL	960	100%

3. Due Diligence Process: Finance

❖ Detailed Type of Facility

Type of Facility	Amount	Interest Rate
EIB Guarantee Facility (Yapı ve Kredi, Türkiye IS, Garanti Bankası Guaranteed Facility Loan)	200,000,000.00	%1,45+LiBOR
K-Sure Covered Facility		
Sumitomo Mitsui Banking Corporation (SMBC) (K-SURE Covered Facility Loan)	45,000,000.00	%2,25+LiBOR
Standard Chartered Bank (Standard Chartered) (K-SURE Covered Facility Loan)	60,000,000.00	%2,25+LiBOR
Mizuho Bank (MIZUHO) (K-SURE Covered Facility Loan)	75,000,000.00	%2,25+LiBOR
EBRD Senior Facility	150,000,000.00	%3,50+LiBOR
EIB Senior Facility (EIB Direct Facility)	150,000,000.00	%3,50+LiBOR
KEXIM Covered Facility		
Sumitomo Mitsui Banking Corporation (SMBC) (K-EXİM Guaranteed Facility Loan)	30,000,000.00	%2,25+LiBOR
KEXIM Direct Facility	250,000,000.00	%6,20 Fixed Rate
Total	960,000,000.00	

3. Due Diligence Process: **Technical**

❖ **Geotechnical Surveys**

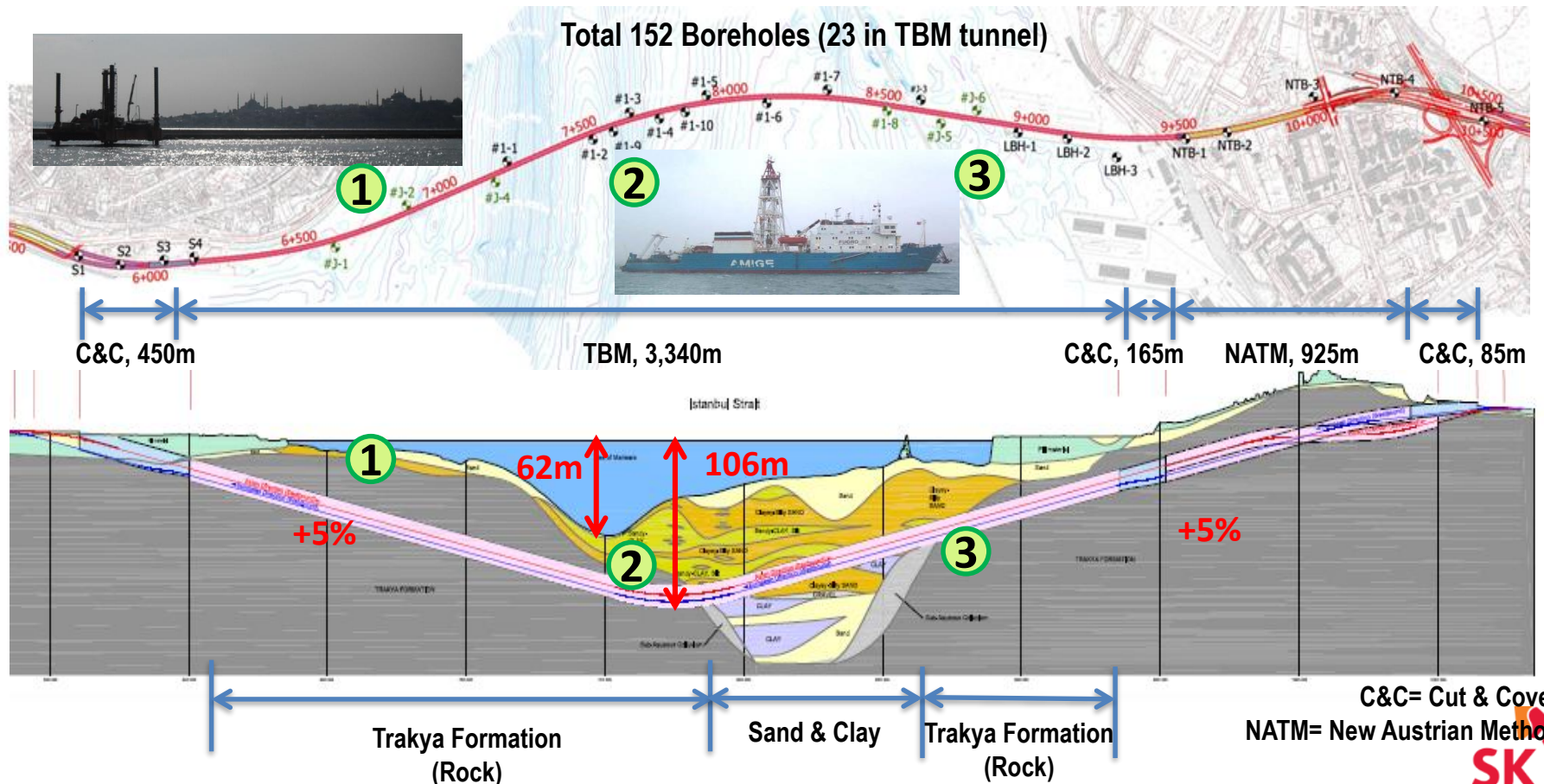
- Bathymetric and marine geological surveys
- Geological surveys on land
- Land surveying and mapping studies
- Determination of locations and features of utilities
- Determination of inputs for seismic design



3. Due Diligence Process: **Technical**

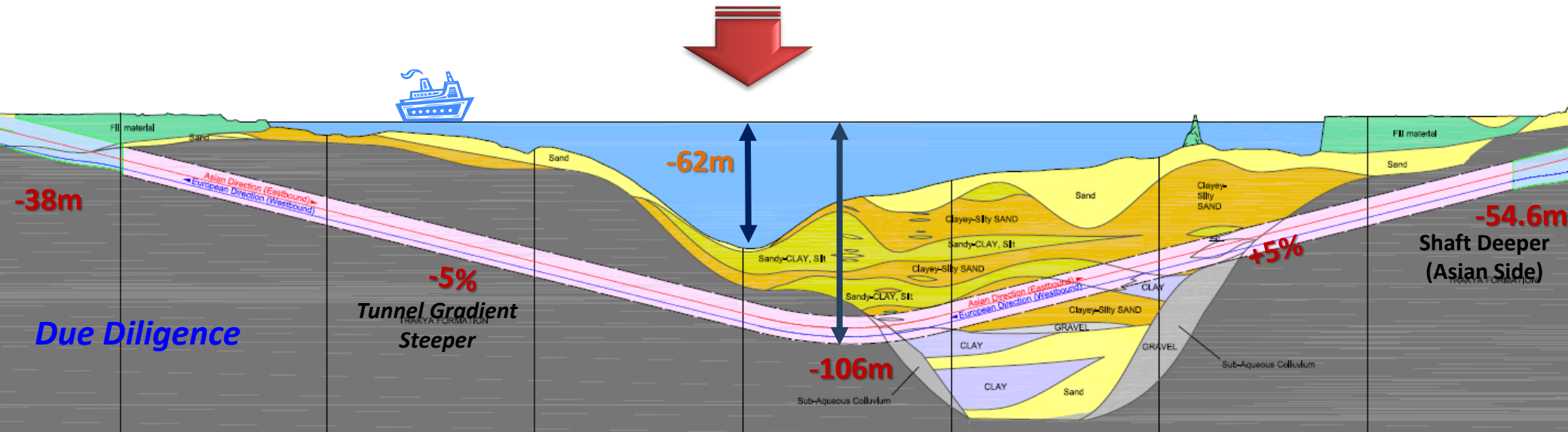
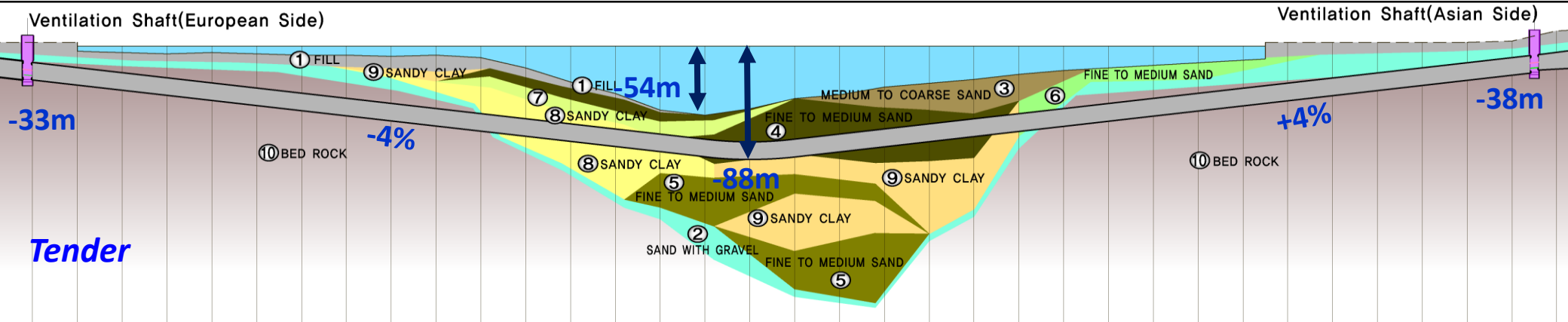
❖ Results of Geotechnical Surveys

- ① [Jack-up barge](#) was available at the location less than 20 meters of sea depth
- ② [Dynamic Drill Ship](#) identified soil and rock boundary and maximum sea depth are 61 meter
- ③ Rock/Soil transition zone was founded



3. Due Diligence Process: **Technical**

❖ Geotechnical Investigation



Tunnel Alignment Deeper

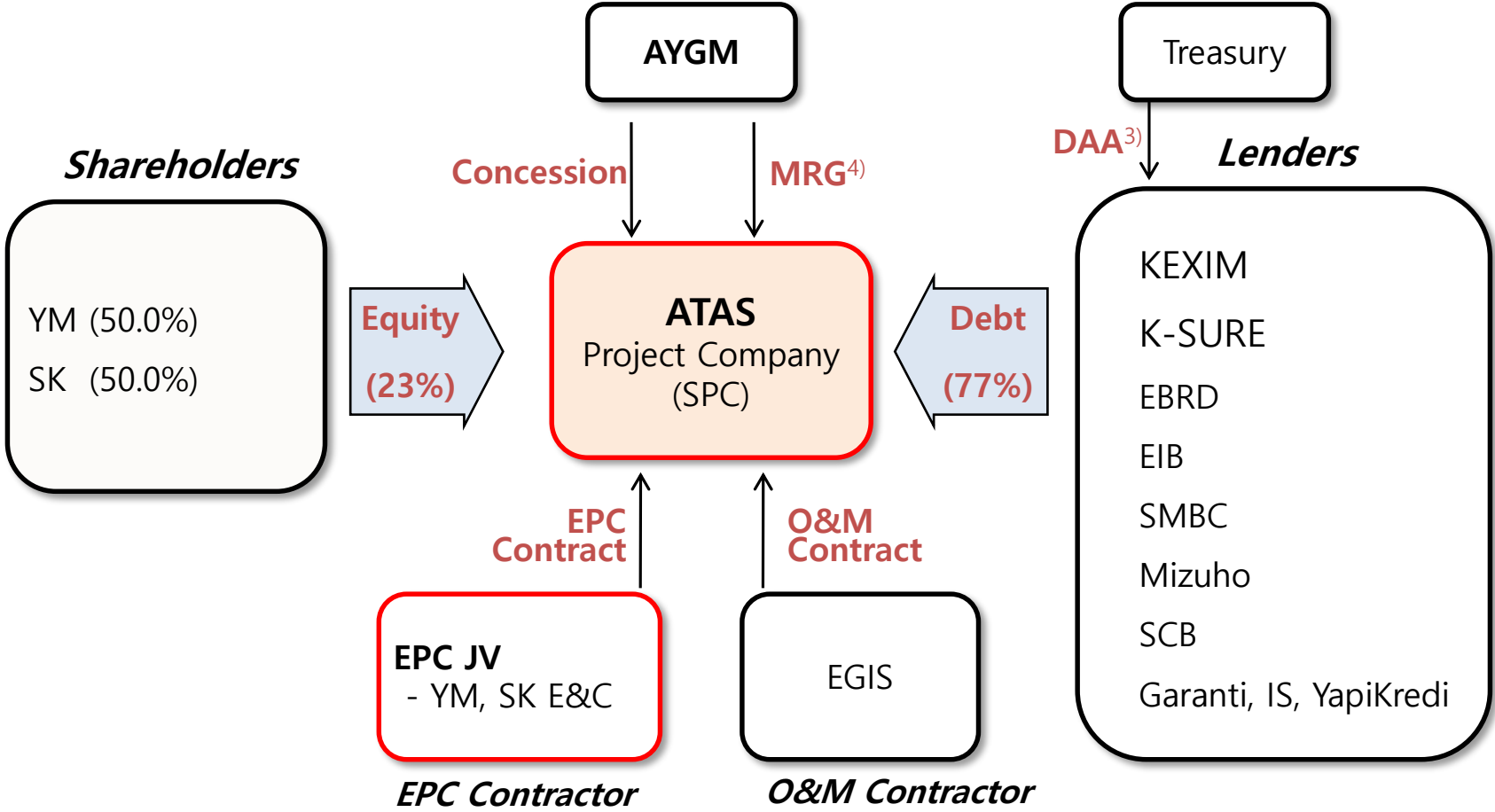
3. Due Diligence Process : **Others**

❖ Other Technical Due Diligence

- **Thorough review of project documents** such as the Implementation Contract, EPC contract, TBM subcontract, precast tunnel segment lining supply subcontract, operation protocol, operation coordination protocol and operation and maintenance (O&M) contract
- **In-depth examination of project participants** such as sponsors, Appointed Company, EPC contractor, O&M contractor (Operator) and key subcontractors to the EPC contractor
- **Review of available design elements** such as surveys, design constraints, seismic design, road designs and tolling facilities
- **Workability of proposed construction schedule**
- **Review of project costs** including design and construction, operation and maintenance, contingency allowances and development costs
- **Economic analysis** on financial model, investment costs, maximum payment curve, operational expenses, maintenance reserve account
- Construction permits, land expropriation, design approval and acceptance criteria, bureaucratic and legal background

4. Project Structure

4. Project Structure



1) ECA (Export Credit Agency) – KEXIM, K-Sure
 2) MLA(Multilateral Agency) or MDB(Multilateral Development Bank),
 - EIB (Europe Investment Bank)
 - EBRD (European Bank for Reconstruction and Development)

3) DAA : Debt Assumption Agreement
 4) MRG : Minimum Revenue Guarantee

5. Construction

5. Construction

❖ TBM (Tunnel Boring Machine)

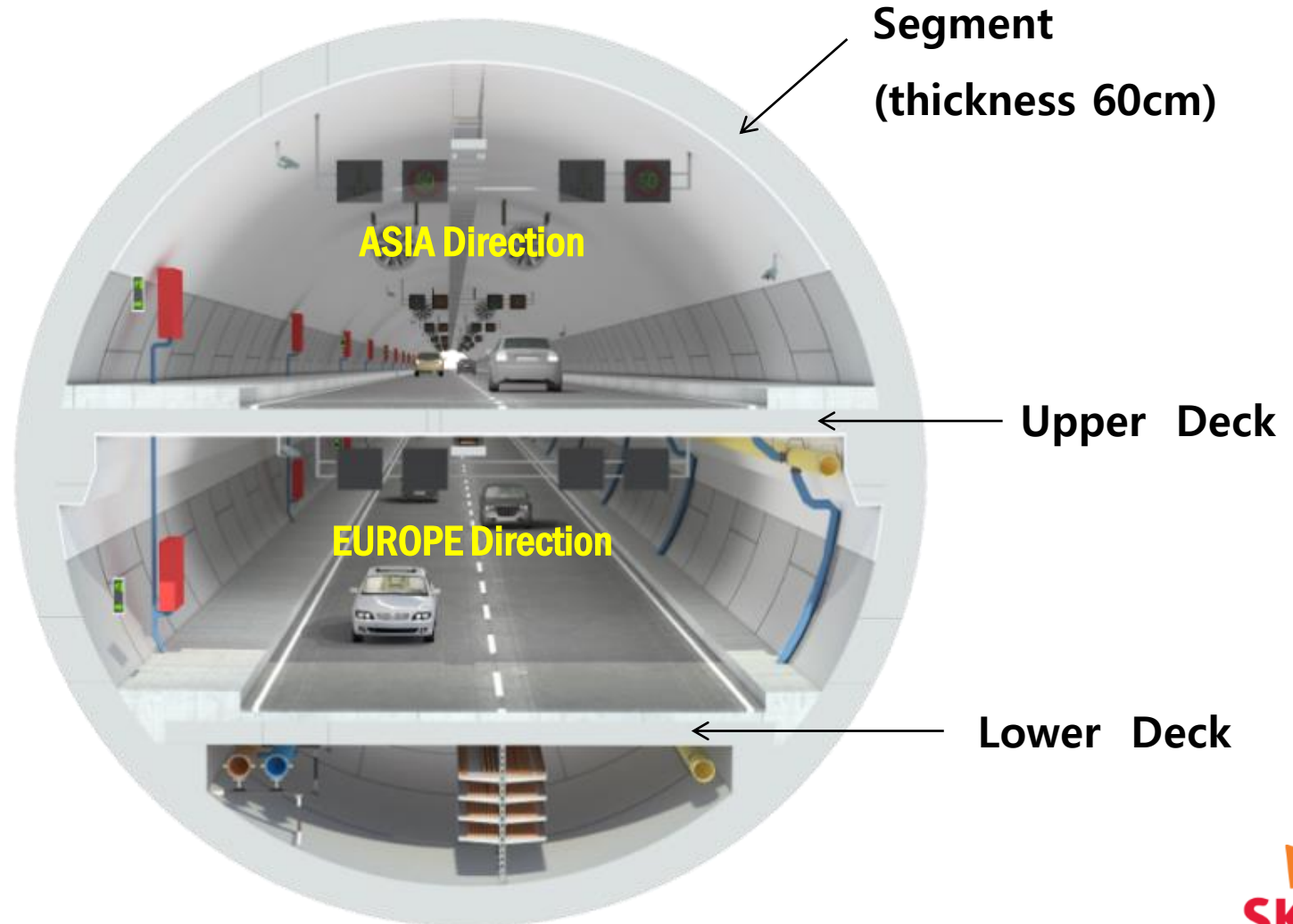
- Manufacturer : Herrenknecht (Germany)
- Outer Diameter : 13.7m
- Length : 120.0m
- Weight : 3,300 ton
- Design Water Pressure : 13bars (Real Water Pressure at Site: 10.8bar)



5. Construction

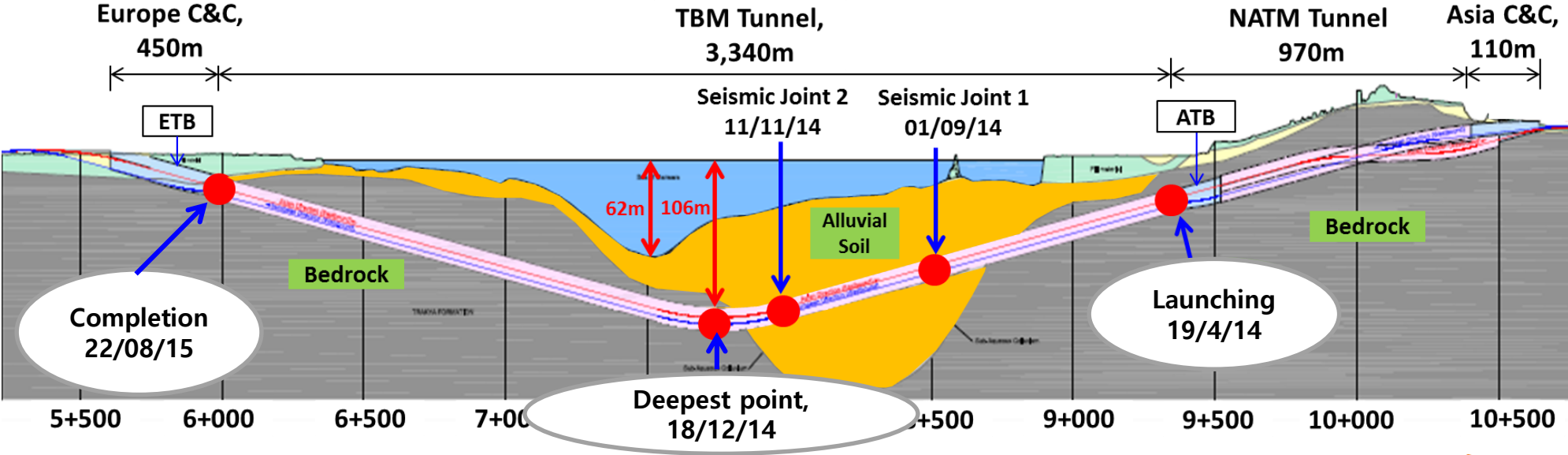
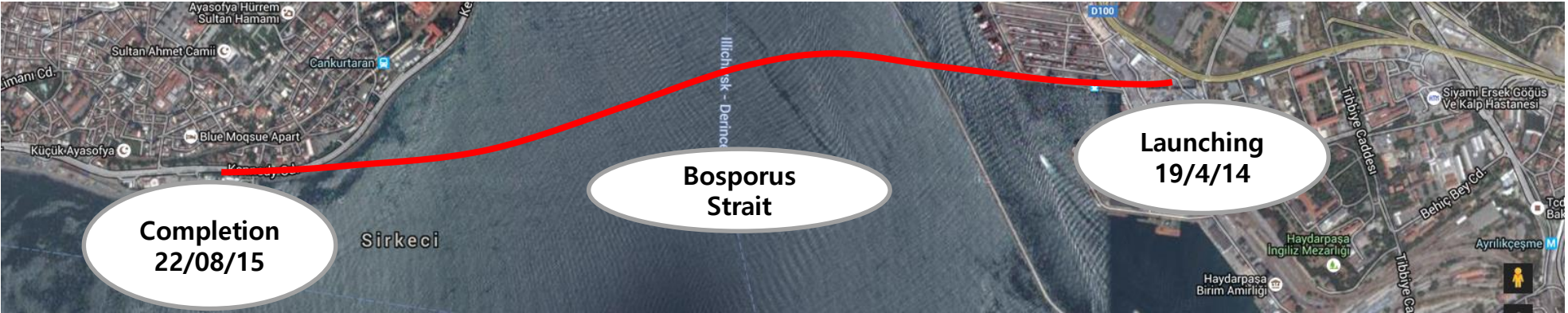
❖ Completed TBM Tunnel Section (Double Decker Tunnel)

- Outer Diameter: 13.2m
- Inner Diameter: 12m



5. Construction

❖ TBM Tunnel Excavation



5. Construction

❖ TBM Breakthrough Ceremony: 22 August 2015



5. Construction

❖ TBM Breakthrough Ceremony: 22 August 2015



YENİ BİR ÇAĞ AÇILDI" . "MILESTONE IN TU

**"KITALAR BULUŞTU"
"CONTINENTS MEET"**

5. Construction

❖ TBM Breakthrough Ceremony: 22 August 2015

중앙일보

2015년 08월 25일 화요일 B04면 경제



대륙이 이어졌다 - 유럽~아시아 터키 해저터널 관통

SK건설은 국내 건설업체로 첫 수주한 해저터널 공사인 터키 유라시아 해저터널을 관통하는 데 성공했다고 24일 밝혔다. 유럽과 아시아를 잇는 총 연장 14.6km 중 보스포루스해협 3.34km 해저구간을 뚫었다. 지난해 4월 공사를 시작한 지 16개월 만이다. 지름 13.7m, 길이 120m, 무게 3300t에 이르는 초대형 터널굴착장비(TBM·작은 사진)를 투입해 하루 평균 7m의 터널을 뚫고



협을 뚫고 나온 TBM 앞에서 축하하고 있다. 터키어로 쓰인 '대륙이 이어졌다'는 현수막이 걸려 있다. [사진 SK건설]

나갔다. 이 해저터널은 연결도로 공사 등을 거쳐 2017년 3월 완공 예정이다. 현장 직원이 해



유라시아 해저터널 개요

자료:SK건설

총 연장	14.6km
해저터널 구간	보스포루스 해협 3.34km
터널 길이	해저 90~100m
공사기간	2012년 12월 ~ 2017년 3월
사업비	12억4000만달러
굴착장비	지름 13.7m, 3300t 초대형 터널굴착기(TBM)

5. Construction

❖ Cutter Head Lifting



5. Construction

❖ General View of TBM Tunnel After Breakthrough



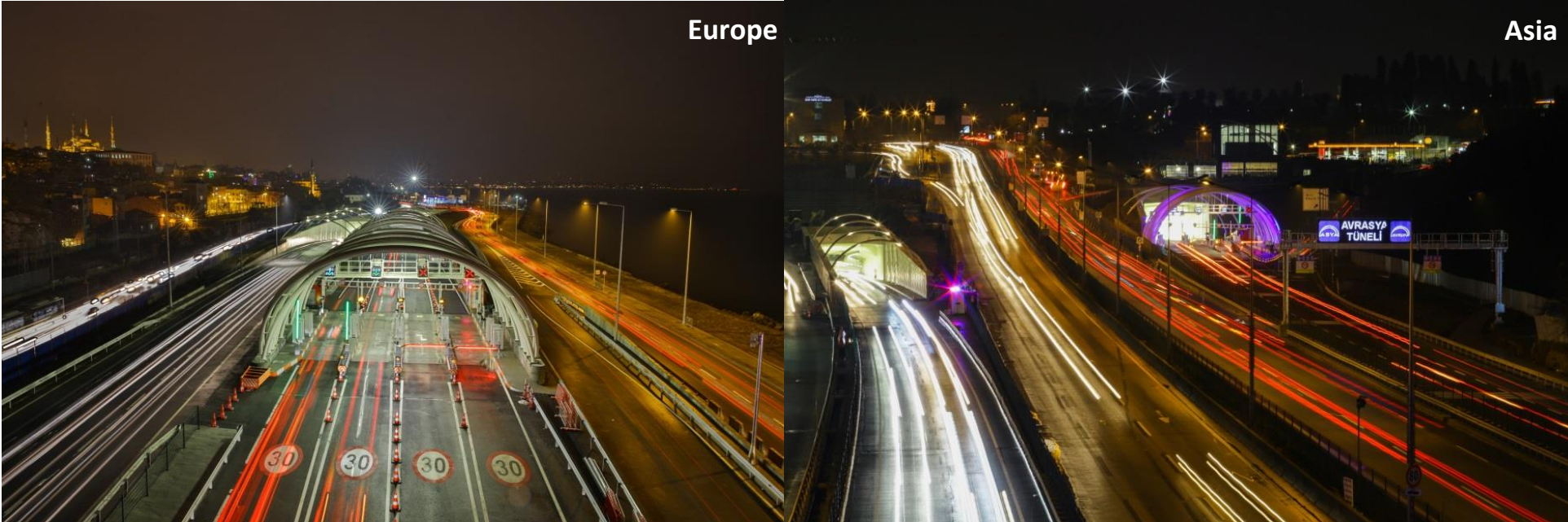
5. Construction

❖ Tunnel Opening Ceremony



6. Operation

❖ Tunnel Operation



7. Awards

7. Awards

4 International Financial & PPP Project Awards



DEAL OF THE YEAR –
TRANSPORT
Eurasia Tunnel PPP
(Bosphorus Tunnel, Turkey)



1 Sustainability Awards - "Environmental & Social Best Practice Award" - from EBRD

SUSTAINABILITY AWARDS
**ENVIRONMENTAL &
SOCIAL BEST
PRACTICE AWARD**
Tbilisi, 2015



European Bank
for Reconstruction and Development



2 Technical Awards from ITA and ENR



ITA TUNNELLING AWARDS 2015
MAJOR PROJECT OF THE YEAR
WINNER



ENR GLOBAL
Engineering News-Record
**BEST PROJECTS
AWARDS**



7. Awards

美 전문지 ENR 선정 올해 세계 최고 터널 프로젝트는?

SK건설 시공, 터키 '유라시아 해저터널'

SK건설이 시공 중인 터키 이스탄불의 유라시아 해저터널이 올해 세계 최고의 터널 프로젝트로 선정됐다.

SK건설은 지난 12일 유라시아 해저터널이 미국의 건설·엔지니어링 전문지 ENR로부터 올해 터널·교량 분야의 글로벌 베스트 프로젝트 상(Global Best Project)을 받았다고 13일 밝혔다.

ENR은 매년 터널·교량을 포함한 각 건설 분야에서 기술력·안전성·혁신성·디자인·지역사회 기여 등을 종합적으로 평가해 우수 프로젝트를 선정한다. 국내건설사가 ENR로부터 글로벌 베스트 프로젝트 상을 받은 건 SK건설이 처음이다.



서석재 SK건설 전무가 ENR 2016년 터널·교량분야의 글로벌 베스트 프로젝트 상을 수상한 후 소감을 발표하고 있다.

이날 뉴욕에서 열린 시상식에서 세계 각국의 23개 건설 프로젝트가 글로벌 베스트 프로젝트 상을 수상했다.

서석재 SK건설 유라시아터널 현장 전무는 “심해의 높은 수압과 무른 해저지반 등 매우 까다로운 작업환경에서 해저구간 공사를 무

사히 마친 기술력을 인정받은 것 같아 기쁘다”며 “터널 개통으로 보스포러스 해협을 통과하는 시간이 현재 100분에서 15분 수준으로 많이 줄어드는 등 지역사회에 기여한 점도 높이 평가된 것 같다”고 말했다.



SK건설 임직원들이 글로벌 베스트 프로젝트상 수상 후 기념촬영을 하고 있다.

2016년 세계최고 터널 프로젝트 수상



Thank you very much

Teşekkür ederim

**Istanbul Strait Road Tube Crossing Project
(Eurasia Tunnel Project)**