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**Taisei Corporation Cooperates with Mitsubishi Electric for Marmaray Project**

## **OUTSTANDING TECHNOLOGY AND ENGINEERING FOR MARMARAY**

*Widely appreciated for its large scale construction projects in the world, Taisei Corporation has joined forces with Mitsubishi Electric, global automation giant, for Marmaray Project which runs under the Bosphorus to connect Asia and Europe via the deepest immersed tube tunnel in the world. While Taisei Corporation conducted assembly and commissioning of bored tunnel, immersed tube and all electromechanical systems for Marmaray BC1 Bosphorus Sub-Sea Tunnel, Mitsubishi Electric was in charge of high tech automation equipment, engineering and design, project design, software programming, hardware assembly, commissioning, training and service support.*

Distinguished with its superior technology used for various construction and infrastructure projects in various countries in the world including, most specifically, Japan since 1873, Taisei Corporation is appreciated in Turkey for its contribution to Marmaray Project known for the deepest immersed tube tunnel in the world. Another trademark that is appreciated for the automation solutions offered for Marmaray as a critical and challenging project is Mitsubishi Electric which is a leading world manufacturer in electric, electronic and automation industries.

### **International challenging standards duly applied**

Underlining that the two leading trademarks joined forces for Marmaray BC1 Bosphorus Sub-Sea Tunnel Project, **Taisei Corporation Electro Mechanics Manager Bülent Özince** provides the following information about the construction of Marmaray tunnel conducted by Taisei-Gama-Nurol consortium and the outstanding services offered by Mitsubishi Electric as an added value to the project:

“Taisei Corporation was responsible for opening bored tunnels between the stations, undertaking construction and assembly of immersed tube elements and construction of Sirkeci deep station as well as procurement and assembly of electromechanical components for tunnels and stations for Marmaray BC1 Bosphorus Sub-Sea Tunnel Project. We are especially proud of performing the assembly of the deepest immersed tubes in the world in the waters of Bosphorus marked with counter-currents. Given the fact that the historic peninsula is densely constructed, undertaking deep excavations for Sirkeci station required significant expertise. We are quite pleased to ensure that highly safe electromechanical systems were successfully assembled and commissioned in line with international challenging standards for Marmaray stations and tunnels.”

### **Superior engineering analyses conducted**

Indicating that Mitsubishi Electric understood the requirements of Marmaray project as well as safety criteria quite satisfactorily, Bülent Özince explained the reasons for cooperating with Mitsubishi Electric for the project: “Since Marmaray BC1 tender was designed in the form of “design-perform” principle, first of all, it was necessary to conduct engineering analyses successfully. Mitsubishi Electric conducted those analyses as required. During the next phase, we chose the most reliable products compatible with the requirements of the project. At that point, Mitsubishi Electric was chosen because of its outstanding reference projects.”

### **Contributions of Mitsubishi Electric to Marmaray**

Mitsubishi Electric Turkey Factory Automation Systems was in charge of “Station Information and Management System Project” for Marmaray as an infrastructure project. Mitsubishi Electric offered high tech automation equipment, engineering and design, project design, software programming, hardware assembly, commissioning, training and service support services for Marmaray BC1 Bosphorus Sub-Sea Tunnel Project. Conducting control and monitoring activities for electromechanical equipment in the tunnel, stations, ventilation buildings and generator buildings, Mitsubishi Electric realized the scenarios required for feeding the energy systems of Marmaray by means of two TEIAS and two generator groups at both sides.

The services conducted by Mitsubishi Electric in tunnels under Marmaray Bosphorus Sub-Sea Tunnel Project consist of controlling and monitoring ventilation system, initiating, suspending and monitoring smoke removal scenarios, opening and closing flood covers, monitoring drainage systems and alarms, monitoring and controlling illuminations, monitoring

environmental measurement systems and fire alarm and extinguishing systems. The services in stations and ventilation buildings are comprised of controlling and monitoring common spaces and room fans, low voltage distribution and UPS systems, fire and extinguishing systems, illuminations at common spaces, clean water, foul water and waste water system, escalators and elevators.

### **24/7 operating control system with 100 percent back-up**

Designed with 100 percent back-up by Mitsubishi Electric, the control system is made up of 37 thousand hardware monitoring and check points, 107 thousand software monitoring and check points, 750 operator monitor control pages and 100 kilometres of communication cables. The control system which operates 24/7 basis enables operators to contact the train operator at the scene and determine the air flow direction for eviction of passengers and smoke in case of any fire in the tunnel. Thus, the system provides guidance to the operator to initiate the defined ventilation scenario easily by minimising the error probability.

### **Everything is ready for passenger safety**

All the electromechanical systems of Marmaray BC1 project is controlled and monitored by SCADA system which is known as SIMS (Station Information Management System). Underlining the critical importance of tunnel and station ventilation, power distribution systems, illumination, flood covers, fire detection and extinguishing systems among those sub-systems, Taisei Corporation Electro Mechanics Manager Bülent Özince added “All of them are controlled and monitored with full back-up by means of the infrastructure designed by Mitsubishi Electric. The tunnel is equipped with a fiber structure with full back-up capability. The sub-systems are continually controlled by means of PLC’s with back-up capability at each station”.

Explaining that continuity of critical systems is indispensable for passenger safety at subway systems, Özince concluded his speech with the following remarks: “The continuity of those systems depends on supply of reliable PLC groups with full back-up capacity and SCADA software which may be easily used by operators. In that respect, Mitsubishi Electric made great contributions to the project thanks to its outstanding technology and engineering solutions in addition to its long-term expertise in the industry”.