

Contents

1	Construction of an underground passage with small cross-section under railroad tracks by covering with steel plates	2
2	Heaving of roadbed Countermeasures in Squeezing Ground – The Case of Tawarazaka Tunnel on the Kyushu Shinkansen (West Kyushu) –	3
3	Streamlining the Boring of an Urban Railway Tunnel by Using Two Methods Jointly, SENS and Shield Tunneling - Joint through service between Sagami Railway and Tokyu Line, Hazawa Tunnel	4
4	Improvement Project for Kiba Station on the Tozai Subway Line	5
5	World's First Application of Underground Large Diameter Tunnel Widening Technology Using Enlargement Shield Tunneling Machine	6
6	Tunnel drilling in weak ground using the Early Cross Section Closure Method – Chubu Odan Expressway, Hachinoshiri Tunnel –	7
7	The Largest Shield Tunnel Project in Japan – Tomei-North section of the main tunnel, Tokyo Outer Ring Road	8
8	Construction project on the Namboku Route close to the Port of Tokyo	9
9	Restoration of a Mountain Tunnel Damaged in the 2016 Kumamoto Earthquake	10
10	World's First Application of Underground Large Diameter Tunnel Widening Technology Using Enlargement Shield Tunneling Machine	11
11	Construction of a shaft and a water-tight pressure tunnel with a large cross-section in a lake - Project for construction of a new spillway at the Kano River Dam Tunnel	12
12	Widening of an extremely large underground cavity from small aqueducts	13
13	Direct excavation of RC structures with a shield machine and construction of a sharply curved alignment	14
14	Construction of an Underground Power Plant by Remodeling an Existing Plant – Project for remodeling the Bunsui Power Plant No.1 at Shikoku Electric Power Co., Inc.	15
15	Construction of a gas pipeline using small cross-section shield tunneling for rocks under high water pressure Construction of A-1 Nabiki section for Toyama pipeline	16
16	Ultra-large cross section tunneling by widening from inside -- Isshiki Tunnel, Chubu Odan Expressway	17
17	Construction of a long-distance deep shield that passes through the central part of the Tokyo Chiyoda Trunk Line Project	18
18	Construction of a shield tunnel under an operating railway track - Quadruple track construction on the Odakyu Line -	19
19	Development of an Upward Shield Machine Retrievable Through a Tube	20
20	Hard Rock Tunnel Boring Machine TM-100 Applied to the boring of hard rock with a uniaxial compressive strength 100 MPa	20

Innovations in Technology

21	FSC-100, machine drilling of an extremely long pilot hole	21
22	Technology for measurement of potential water inflow collected ahead of the tunnel face	21
23	High-compactability concrete: Concrete that enables economic construction of high-quality lining	22
24	Reduction of water inflow into tunnels, using ultrafine cement	22
25	ROCK GROUTING TECHNOLOGY FOR REDUCING GROUNDWATER INFLOW IN DEEP UNDERGROUND	23
26	New energy-saving cutter structure for large section shield machines for rapid construction	23
27	Construction of an underground discharge duct with prefabricated steel-concrete composite segment rings along a 3D composite curved path for deep a discharge conduit at pumping station	24
28	Shaft type remote control underwater machine T-iROBO UW	24

General Aspects of Tunneling in Japan	25
--	-----------

List of Members	26
------------------------------	-----------