

EU

Cost-Efficient Soil Structure System For Early Detection Of Cavities

Information on the instability of underground excavations or natural soil subsidence is most of the time not reliable enough to ensure the total safety of new constructions.

The €900,000 Geodetect project aims to developing a cost-efficient, soil structure monitoring system to prevent the appearance of cavities for infrastructure predictive maintenance. This will consist of the development and integration on the geotextile of a grid of fibre optical sensors to measure deformations. When a cavity appears under the geotextile, the resulting deformation of the geotextile causes alterations to the sensors. The monitoring system will scan these deformation occurrences to set-up warning information according to the deformation of the geotextile. This monitoring system will enable road and railway operators to detect the appearance of a cavity before the infrastructure is damaged and make it possible to plan a cost-effective restoration operation.

The Geodetect consortium includes Bidim Geosynthetics, a French geotextile and geotechnique specialist, and I.D.Fos Research, a European Economic Interest Group (EEIG) based in Geel, Belgium specialised in civil engineering monitoring instruments based on fibre optic sensors. Bidim will define the most appropriate process to integrate the fibre optic wires onto the geotextile, and develop this process up to industrial scale that will meet all the technical and economic requirements. I.D. Fos Research will investigate the fibre-optics sensor technology in order to develop a fibre-optics system capable of measuring elongation rates over 2%. Contact Philippe Delmas, fax +33 134345364, philippe.delmas@bidim.com or Marc R. H. Voet, fax +32 14591514, eschoubs@id-fos-research.be. The project started in June 2001 and will be completed next November. Visit www.eureka.be/servlets/PDFResult?prjid=2579&xsl=projectFO.xsl&format=pdf

World Digest Of Tunnels Under Planning

Brazil. The International Bank for Reconstruction and Development (IBRD) has agreed to loan R\$85 million for the west line of the Fortaleza metro (Metrofor), which will link the city with Caucaia. It will cost a total of R\$176 million to construct the line. Metrofor will be a 20 km metro system, 13.8 km of which will run at grade, 4 km underground and 2.2 km elevated. The tunnels will be cut-and-cover.

Visit www.metrofor.ce.gov.br

France. The project to built a tramway line between Châtillon-Montrouge, Viroflay and Vélizy, south and west of Paris is still awaiting the go-ahead. A board meeting of Syndicat des Transports d'Ile-de-France (STIF), the Greater Paris transport authority, will be held in September to approve the project designed by STIF, the Hauts-de-Seine and Yvelines county councils, in partnership with the Ile-de-France region and the cities directly involved. The 13.7 km line will serve 21 stations running through a 1.6 km tunnel at the head of the line in Viroflay. Construction could begin in 2004. The total investment required amounts to € 210 million. Visit www.stif-idf.fr

Spain. The Navarre government has given its green light to the bidding process for the new NA-2040 road between Arce and Oroz Betelu, 8.2 km in length, to be built at a cost of €12.3 million. A 740 m-long tunnel will be driven under Mount Karrovide. The current road will be flooded when the Itoiz

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United Kingdom. A decision on whether to hold a public inquiry into plans for a new Tyne tunnel has been postponed for a month. Deputy Prime Minister John Prescott was expected to make his announcement on 16th August, but the deadline has been extended until 20th September for more deliberations on the environmental impact of the project. Provisional figures revealed opponents of the scheme outnumbered supporters by more than three to one. The new tunnel, which is being put forward by the Tyne and Wear Passenger Transport Authority, would run between East Howden on the north bank and Jarrow on the south bank. Visit www.tyneandwearmetro.co.uk and www.tunnelbuilder.com, item uk/36.

United Kingdom. An historic canal tunnel may be transformed into a major tourist attraction as part of a multi-million pound investment. British Waterways has submitted an application for funding to create a range of new facilities at the Trent and Mersey Canal's Harecastle tunnel at Kidsgrove. These facilities – which could include a visitor centre, educational programmes and boat trips into the 225-year-old 2.2 km-long tunnel – would form part of a wider project which would see £4.5 million ploughed into North Staffordshire's waterways over the next four years. Visit www.britishwaterways.co.uk

World Digest Of Bids

Spain. Open call for bids, deadline 2nd October, 2002 for work management of the Albuñol-Adra section of the Mediterranean highway which includes two double cut-and-cover tunnels, 150 and 200 m in length. Value €1.7 million. Visit <http://ted.eur-op.eu.int/udl?request=Seek-Deliver&language=en&docid=127142-2002>, OJ S 158, or contact Ministry of development, Madrid, fax +34 915978537 or +34 915978470. Read E-News Weekly # 30.

Spain. Open call for bids, deadline 12th September, 2002 for construction of the 2.8 km Cangas de Onís bypass in Asturias. Includes a 256 m-long cut-and-cover tunnel in the Contraquil area. Value €12.7 million. Visit <http://ted.eur-op.eu.int/udl?request=Seek-Deliver&language=en&docid=127734-2002>, OJ S 159, or contact Principado de Asturias, Oviedo, fax +34 985105884.

World Digest Of Ongoing Tunnelling

Italy. Only a short metro stretch, 3.5 km in length, between Brin and Principe is in service in Genoa. The line is being extended from west to east between Principe and Brignole to add another 3.5 km to the existing segment and add six stations in Darsena, San Giorgio (Caricamento), Sarzano, De Ferrari, Corvetto, and Brignole. Ansaldo Trasporti is the concessionaire of the line. Construction started in January 1998 for completion in December 2002 between Principe and the Grazie shaft, a 22 m x 18 m-wide and 14 m-deep shaft located 400 m east of Palazzo San Giorgio. The extension is a double-track single tunnel between Principe and the Grazie shaft. There, the line will carry on using an existing disused railway tunnel, the first part of which is a double tube between Grazie and Mazzini and then a single bore between De Ferrari and Brignole. Excavation of the 3.2 km tunnel between Principe and the Grazie shaft is realised with a Wirth EPB shield. The shield has just broken through the first tube. The 6.28 m-diameter machine will now be taken out of the Grazie shaft and taken back to the Principe shaft to drive the second tunnel. The shield is working 15 m below sea level in conditions of infiltration of water and pressures of up to 1/1.5 bar. Lining rings consists of seven precast concrete segments. The geology is characterised by a typical flysh sequence with marly chalk, marl, marly clay, silt, sand and sandstone. The soil treatment works and the excavation of the underground stations have underlined several problems regarding the stability of the structure near the working areas. The tunnels in Principe and De Ferrari, more particularly the San Giorgio station, lie under heavy traffic roads near old and historical buildings (high over 25 m) and under the viaducts of an elevated freeway. The major challenge is to excavate in some points just 2-3 m beneath the

buildings' foundations and the freeway's foundation structures. Visit www.wirth-europe.com
The Sarzano station started in November 2000 for completion in December 2003 while the De Ferrari station was completed in May 2001. Part of the Principe station is already open to travellers but it will be completed at the end of the excavation of the tunnel between Principe and San Giorgio, and after the removal of the EPB shield from the Principe shaft. Darsena and San Giorgio are underway. Visit www.genovametro.com, www.ansaldobreda.it/Inglese/1_sis_gen.htm and www.amt.genova.it

Switzerland. The A16 highway, known as 'Transjurane', is a 85 km north-south project in the Jura canton between the French border in the north and the border with the Bern canton in the south. It will be connected to the RN19 national road in Belfort, France and the A5 in Biel. The scheme has been divided into eight sections from north to south in the Jura canton (48 km). Then, the alignment runs in the Bern canton (36 km).

To date, only sections 1, 4, 5 and 6 in the Jura canton have been opened to traffic. These sections represent 23 km altogether, running from east Porrentruy to west Delémont. Sections 2, 3 and 7 are under construction. Section 8 is in the planning phase. Five sections in the Bern canton are under planning or in construction while the last two are already in service. The Transjurane highway will have 33 tunnels, either bored or cut-and-cover, single or double tubes, totalling 43% of the length. Section 2 between Boncourt and Porrentruy west, the longest of the project, has been approved in December 2001. Construction of the first two lanes, as part of the first phase, will end in 2008 and the second phase (two additional lanes) will start in 2009 and end in 2015. The pilot gallery of the Bure tunnel was completed late 2000. But no extra work has been launched for financial disagreement between the different players. Visit www.tunnelbuilder.com, item ch/29.

On section 3, excavation of the La Perche and Le Banné tunnels is now complete. They both have two lanes per tube. Technical galleries under the carriageways are now being executed. Completion is scheduled for end-2005. Visit www.tunnelbuilder.com, item ch/30.

The Moutier tunnel is under build since 18th June, 2001 by Groupement Tunnel de Moutier (GTM), a consortium of Marti

Tunnelbau, Berne Pro Routes, Georges Chételat, and Parietti & Gindrat. Geology consists of marls, sandstone, clayish silt and gravels. The first metres have been bored under an umbrella vault using an excavator to remove the crown. The heading and invert are excavated by a roadheader. Afterwards, a 12.5 m-diameter Herrenknecht TBM will be used to bore one tube after the other. Visit www.tunnelbuilder.com, item ch/34.

The Transjurane project has been plagued with heavy cost overruns, from the initial budget of CHF600 million in 1992 to CHF992 million in 2000 and is not expected to be fully completed before the next



decade. The 36 km section in the Bern canton will cost CHF2 billion, financed by the Swiss confederation (84%) and the canton (16%). The 48 km section in the Jura canton will cost CHF3.4 billion, financed by the confederation (95%) and the canton (5%). Visit www.ju.ch/services/pch/rn/m4_rn20.htm and www.tunnelbuilder.com, item ch/15.

Section	Location	Length (in km)	Cost (millions of CHF)	Tunnels Name – Length	Current status
1	French border-Boncourt	0.75		none	In service
2	Boncourt-Porrentruy west	13.4		Neu-Bois – 2 x 871 m Bure – 3,027 m Bois de Montaigne – 847 m + 897 m	Under planning Under planning Under planning
3	Porrentruy west-Porrentruy east	2.9		Le Banné – 1,068 m + 1,086 m La Perche – 1,003 + 1,027 m	Broken through, opening in 2005 Broken through, opening in 2005
4	Porrentruy east-Courgenay	5.2	211	none	In service since Nov 1998
5	Courgenay- St Ursanne-Grovelier	8	1,110	Mont Terri – 4,068 m Mont Russelin – 3,550 m	In service since Nov 1998 In service since Nov 1998
6	Grovelier-Delémont west	9.9		Develier cut-and-cover – 2 x 815 m	In service since Nov 1998
7	Delémont west-Delémont east	3.2	210	La Beuchille cut-and-cover – 2 x 928 m	Under construction, opening early 2005
8	Delémont west-border Jura and Bern cantons	4.9	414	none	Under planning, opening in 2010
	Delémont east-Choindez mid junction	4.9	330	Choindez – 2,870 m	Under planning, opening end 2008
	Choindez mid junction-Moutier north	4.3	240	La Roche Saint-Jean – 211 m Raimeux – 3,211 m	In construction in 2003, opening in 2006 Under construction
	Moutier north-Moutier south	1.8		Moutier – 2 x 1,191 m	Under construction, opening in 2007
	Moutier south-Court			Graitery – 2,420 m	Under planning, in construction in 2003
	Court-Loveresse	9.1	403	Court – 686 m Sorvillier cut-and-cover – 2 x 215 m Bévilard cut-and-cover – 2 x 180 m Malleray – 528 m Loveresse – 467 m	Final approval, opening in 2012-2015
	Loveresse-Tavannes	3.7	184	Sous-le-Mont – 1,210 m	Final approval, opening in 2008
	Tavannes-La Heutte	12.2	430	Pierre-Pertuis – 2 x 2,130 m La-Côte-de-Chaux – 2 x 660 m Sous-les-Roches – 2 x 180 m Métairie de Nidau – 2 x 550 m La Heutte – 2 x 310 m	In service since Nov 1997 In service since Nov 1997 In service since Nov 1997 In service since Nov 1995 In service since Nov 1995
	La Heutte-Bienne	4.6		Taubenloch (6 tubes) – 123 m to 1,010 m Rondchâtel – 180 m Boujean – 2 x 455 m	In service since 1970, 1978 and 1980 In service since 1965 In service since 1970