



DSI References



Reference Details

Owner ASFINAG Bau Management GmbH, Austria +++ **Engineer of tie back walls and shore bridge** Kirsch-Muchitsch & Partner ZT GmbH, Linz, Austria +++ **Subcontractor Anchors** Lot 22: PORR Technobau und Umwelt AG, Abt. Grundbau, Vienna, Austria; Lot 23: Baubeteiligungs-GmbH, Graz, Austria

DSI Unit DSI Austria, Elsbethen/Salzburg, Austria

DSI Scope For lot 22: supply of approximately 1,300 DYWIDAG Multistrand Anchors in lengths of 13-40m; approximately 10,000m DYWI[®] Drill Hollow Bar Anchors; for lot 23: supply of 294 DYWIDAG Multistrand Anchors in lengths of 25-40m; For both lots: technical assistance; acceptance and suitability tests; rental of stressing equipment



Slope Stabilization using Permanent DYWIDAG Multistrand Anchors

Lots 22 and 23, S35 Expressway, from Bruck an der Mur to Graz, Austria

The S35 Expressway in the Austrian province of Steiermark runs along the river Mur, connecting the industrial city of Bruck an der Mur with the regional capital Graz. In order to close what used to be a gap between these two cities, the northern 7km lot from Mautstatt in the direction of Bruck an der Mur is currently under construction.

Road works of the northern lot, which are estimated to cost around 190 Million Euros, are to be finished in spring 2010. Construction measures include a comprehensive slope anchorage program as well as the permanent stabilization of a 900m long retaining wall.

Lot 22 includes the two double tube tunnels Kaltenbach and Kirchdorf, the interchanges Zlatten and Kirchdorf and several cross-country passages where a great number of slopes had to be stabilized by tie back walls.

To build the tie back walls, the slopes were first sealed with shotcrete and then nailed with approximately 10,000m of R32L+N DYWI[®] Drill Hollow Bar Anchors. Precast concrete ribs with consoles were then placed on top at a spacing of 4m each and permanently anchored with 1,300 DYWIDAG 2x0.6", 3x0.6" and 6x0.62" Multistrand Anchors, in lengths between 13 and 40m. Afterwards, these areas were concreted similar to arches. As a last step, concrete troughs were put into the cantilevers and then backfilled and planted with vegetation.

A total of six tie back walls are to be built in this manner. The 300m long tie back wall 1 between the two tunnels is especially impressive. It includes about 450 DYWIDAG Multistrand Anchors, which were installed in up to 9 layers. Lot 23 includes the construction of a shore bridge on 370 bored piles with a length of about 900 m near Zlatten reservoir. Because space was restricted in the shore area, the shore bridge had to be designed as a supporting structure.

That is why the bridge was permanently anchored with 294 4x0.62", 5x0.62" and 6x0.62" DYWIDAG Multistrand Anchors. Anchor lengths vary between 25 and 40m. The service loads are between 650 and 1,000kN. The anchor stressing operations were carried out in two steps: application of partial post-tensioning before backfilling and complete post-tensioning to 100% of the service load after completion of the backfilling for the retaining wall.

DSI Austria supplied approximately 1,600 DYWIDAG Multistrand Tendons and 10,000m R32 L+N DYWI[®] Drill Hollow Bar Anchors, including accessories for lots 22 and 23. In addition, DSI carried out the acceptance inspections and suitability tests for the anchorage systems supplied. Furthermore, DSI rented the equipment necessary for stressing operations.

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