

Sustainability for Roads



Norra Länken's Junction Värtan. Courtesy of Skanska

A major junction in a new motorway around northern Stockholm is built using lean duplex stainless steel reinforcement bar from Outokumpu to optimize economy and maintenance-free durability - a solution for sustainability on roads.

The Swedish capital Stockholm looks to a future with less traffic in the city: traffic will soon be re-routed away from the centre to a new ring road around Stockholm, complete with an urban motorway named Norra Länken – Northern Connection. Completed in phases by 2017, Norra Länken constitutes Sweden's largest road construction project to date.

The new motorway, which largely runs in tunnels, connects Sweden's main Baltic port at the Värta harbour (Värtahamnen) with the national Swedish and European road networks. Traffic flows will be joined in the major Junction Värtan at the harbour. Construction of this junction, realized with overpasses, takes four years and consumes ten thousand truckloads of concrete alone.

Stainless to ensure structural longevity

Junction Värtan should serve largely maintenance free for a very long time. To achieve this goal, the Stockholm Road Authority specified stainless steel reinforcement for the concrete structures from the very beginning of the design process, aware of the many benefits of stainless that would enable the long life span. The stainless grade was austenitic EN 1.4404 (ASTM 316), a standard grade used in corrosive conditions.

Roads in northern climates are particularly corrosive environments due to chlorides from de-icing salts. Stainless steel reinforcement bars, rebars for short, are an insurance against corrosion, which could result in structural failure. As such, stainless steel rebars help to avoid expensive repairs and resulting disruption to traffic.

The Road Authority's contractor for the junction design and construction is Skanska, a Sweden-based major multinational construction and development company.

Lean duplex – the optimal stainless rebar choice

Solution Manager Mats Segerbäck of Outokumpu's Group Sales & Marketing in Sweden recalls the moment when Outokumpu became involved in Junction Värtan. He received a phonecall from a Skanska representative requesting a quote for 1.4404 rebars – Outokumpu is one of the leading manufacturers of stainless rebars in the world.

Segerbäck and his team introduced Skanska to Outokumpu's proprietary lean duplex stainless steel LDX 2101® as a replacement for 1.4404. Segerbäck recounts his arguments to Skanska: "Duplex LDX 2101® equals 1.4404 in terms of corrosion resistance. But as a low-alloyed stainless steel, LDX 2101® is far more cost efficient. Its very low nickel content results in good price stability, so it brings the benefit of much welcome predictability for long-term projects against fluctuations in the nickel price."

With documentation and references from Outokumpu, Skanska presented a solid case to the Road Authority for switching to LDX 2101® rebars in Junction Värtan. Convinced, the Road Authority approved, reaping a major financial benefit as a result.

Technical assistance in choosing the right grade

"Outokumpu's expertise was very valuable for us in selecting the right grade," says Lars Tidgård of Skanska. "The price stability of LDX 2101® was an important factor in the grade selection, as this project goes on for a very long time."

"The specification of stainless steel rebar is moving towards a performance basis with specifiers requiring more detailed performance information about their materials," says Theo van der Zanden, Outokumpu's Stainless Rebar Product Manager for Europe.

Outokumpu's Avesta Research Centre (ARC) in Sweden is the world's leading research organization in providing this information and making the difference for specifiers choosing stainless rebar as their durability solution. ARC have worked with KIMAB, the Swedish Corrosion Institute for four years, together with the major interested Swedish agencies, on projects proving the advantages of using LDX 2101® rebars. Segerbäck sees Junction Värtan as just the start of LDX 2101® rebars being used in Sweden's infrastructure and worldwide.

Project details:

Construction of Junction Värtan:

A road junction in the Värta harbour (Värtahamnen), Stockholm, part of the Norra Länken motorway development around northern Stockholm. The road is part of European route E4 and E20 and the incomplete Stockholm ring road. Junction Värtan is scheduled for completion in 2015.

Owner:

Stockholm Road Authority Trafikverket Stockholm

Contractor:

Skanska, Sweden-based multinational construction and development company, www.skanska.com

Concrete reinforcement:

Achieved with LDX 2101® lean duplex stainless steel ribbed rebars from Outokumpu, 12 mm in dia., approximately 300 tonnes

Research papers:

<http://www.outokumpu.com/Products/Stainless-Rebar/>

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Concrete reinforcement with LDX 2101® rebars at Junction Värtan.
Photo Lars Tidgård, Skanska.

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