

TATA STEEL



Case study

New Watford Market, Hertfordshire

Client: Watford Borough Council

Architect: tp bennett LLP

Principal contractor: TSP

Structural engineer: AECOM

Steel fabricator: Nationwide Structures Ltd

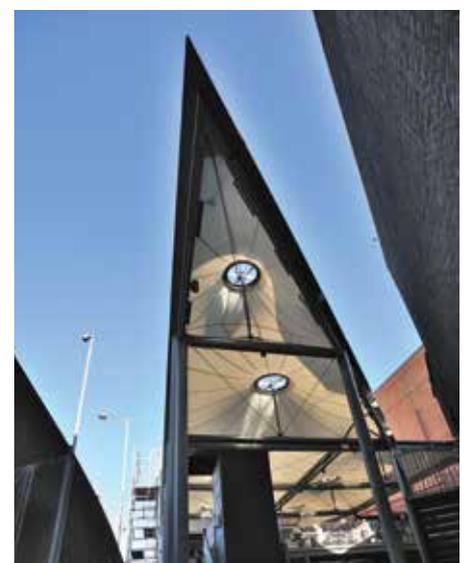
Tata Steel products:

Celsius® 355 Elliptical Hollow Section

Year: 2014

Watford as a market town has a long history dating back to the 12th century. The market has remained an important part of the town's identity. Opened in October 2014, the New Watford Market is a striking development which has reclaimed a forgotten piece of land near the town's high street. Conceived as part of a regeneration scheme for Watford's 1970s shopping centre, the new market features innovative engineering.

Recycled shipping containers are used in the modular, two-storey design. A conical, stretched fabric canopy roof gives a contemporary edge to this landmark development. An independent steel frame supporting the canopy is carefully detailed and constructed from Tata Steel's Celsius® 355 Elliptical Hollow Section. Use of the section in the portal frame columns and beams is both economic and elegant.



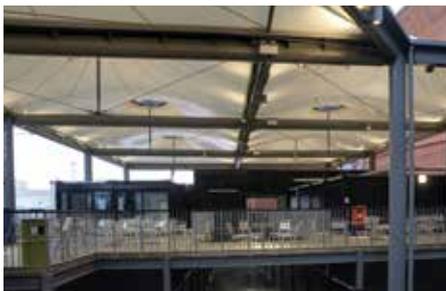
ELLIPTICAL SECTION PROVIDES AN EFFICIENT AND ELEGANT SOLUTION



Hot-finished elliptical hollow section is produced exclusively by Tata Steel in the UK. Tata Steel worked closely with structural engineers, AECOM, to meet the project needs in a tight timescale.

The challenge

The town of Watford, about 17 miles north-west of London, has boasted a market since the 12th century. Plans to re-energise the covered market were an important part of Watford Borough Council's regeneration scheme for the town's shopping centre. The decision was made to move the ageing market from Charter Place shopping centre to a new, purpose-built site on disused land



near a flyover. The move would open up a new route through the town – extending the public realm and creating a new shopping area connected to the high street.

A bold design was needed to draw in new visitors and create a thriving retail environment. The council decided to utilise recycled shipping containers as a cost-effective way to create an open and contemporary market space. This posed several challenges for the design and construction teams. The two-storey design meant strengthening work would be required throughout the structure of assembled containers. An efficient but attractive solution was required for the steel portal frame which would be on view, supporting the roof. The cramped, urban site with a complex, sloping topography posed another challenge – requiring carefully detailed groundworks to support the containers and allow easy access for shoppers.

The roof design was regarded as pivotal in creating a functional but inviting space.

“Visible to those driving into Watford from the adjacent ring road, the canopy roof was always seen as a key feature. Its shape even features in the branding for the new market. The brief was that the roof needed to provide shelter, be durable and low maintenance, allowing light in and keeping rain out.” Michael Wright, Regional Director, Building Engineering, at AECOM.

A restricted budget of just under £2 million and a tight one-year delivery schedule posed additional project challenges.

By the latter part of 2013, the market design had been fine-tuned. Work began on procuring long-lead items including 42 recycled shipping containers, supplied by Adaptainer.



Working with specialist roof fabricator, JJ Carter, AECOM also developed its concept for a stretched fabric canopy roof. The stretched fabric is raised up in conical forms with the use of stainless steel cables acting on a central glazed ring in the centre of each cone. These 1.5m diameter rings allow natural light to flow through. Intricate finite element modelling was used to analyse the loading on the canopy, taking into account multiple variations of drifted snow and wind loading. The loading was fed back into portal frame structural analyses to ensure accurate and efficient design of members and connections.

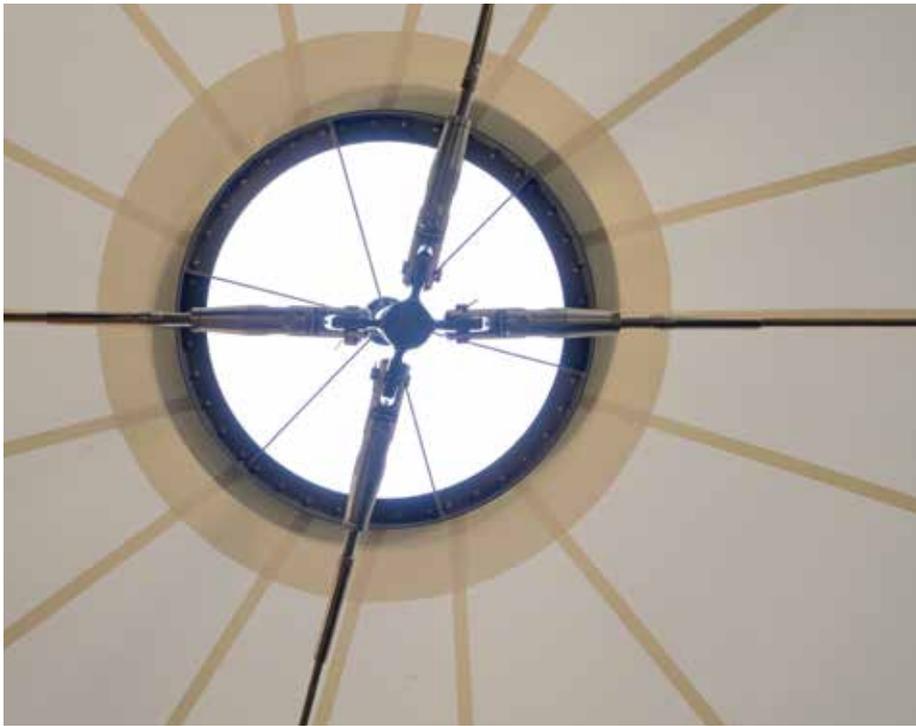
AECOM came up with the idea of using elliptical hollow section for the portal frame. Tata Steel's Celsius® 355 Elliptical Hollow Section is used in the same size, 400mm x 200mm, for all of the columns and beams, irrespective of span.

“The elliptical form meant that the section was very efficient in the way it resisted the forces imposed on the portal frame. This meant we could use less weight of steel in our design. Use of elliptical section also gives shoppers an ever-changing perspective of the structure as they pass through the market.

“With all of the design open and on view, every steel detail had to be carefully considered, with the smallest connections designed to offer a modern, sleek look. I was pleased that the client and the architect agreed that the use of elliptical section added further interest and elegance to the design. We're delighted with the end result which is both cost-effective and aesthetic.”

Michael Wright, Regional Director, Building Engineering, at AECOM.





Project support

Tata Steel liaised closely with AECOM to ensure that requirements for the Celsius® 355 material were met on time and in full.

“We always aim to provide good support to our customers – whether that’s with technical advice from our Customer Technical Services Team or ensuring that critical lead times are met. We’re obviously very pleased that AECOM recognised the benefits offered by Celsius® 355 Elliptical Hollow Section and chose it for the New Watford Market scheme. The new market is a striking development and provides the perfect showcase for our exclusive product.” Richard Clarke, Product Technologist at Tata Steel

Tata Steel products:

Celsius® 355 is a hot-finished hollow section suitable for all construction and mechanical applications – performing reliably in even the most arduous conditions. With a minimum strength of 355 MPa, it allows the highest fabrication factors and enables material cost savings and lighter structures. Available in a wide range of circular, square, rectangular and elliptical hollow sections, Celsius® 355 offers dimensional

consistency, high levels of formability and excellent weldability.

Celsius® 355 products are traceable, CE-marked and fully compliant with the Construction Products Directive. Celsius® 355 is the first structural hollow section to be certified to BES 6001, allowing British projects to maximise credits under the ‘Responsible Sourcing of Materials’ sections of BREEAM.

For technical advice on the application of Celsius® 355 for your project, please contact our Customer Technical Services Team:

T: +44 (0) 1536 404561

E: technicalmarketing@tatasteel.com

W: www.tatasteelconstruction.com

www.tatasteelconstruction.com

While care has been taken to ensure that the information contained in this publication is accurate, neither Tata Steel Europe Limited, nor its subsidiaries, accept responsibility or liability for errors or for information which is found to be misleading.

Celsius is a registered trademark of Tata Steel UK Limited.

Images courtesy of AECOM

Copyright 2016 Tata Steel UK Limited
Language English 0316

Tata Steel

Shotton Works, Deeside
Flintshire CH5 2NH

T: +44 (0) 1244 892199

F: +44 (0) 1244 892121