

Rugsundet Bridge, Norway

LOCATION

Between Kolset and Krakevik, Norway

STRUCTURAL ENGINEER

Norconsult AS

LIGHTWEIGHT PRODUCER

Carolina Stalite Company

CONTRACTOR

Christie & Opsahl AS

READY MIX SUPPLIER

Ferdigbetong Anlegg AS

OWNER

Norway Public Roads Administration

ON-SITE LAB

Norway Public Roads Administration

SPECIFICATIONS

Main Span:

190 Meters (623 ft.)

Lightweight Aggregate Concrete:

LC60

Cube Strength:

8,700 psi (60 MPa)

Density 122 pcf

(1,950 kg/m³)

Normal Weight Concrete C65

Cube Strength:

9,400 psi (65 MPa)

Density 150 pcf

(2,400 kg/m³)

Norway Buys American

by Ken Harmon, Carolina Stalite Company



Rugsundet Bridge Under Construction

RUGSUNDET IS NORWAY'S 2ND BRIDGE TO USE STALITE

The Rugsundet Bridge was completed in January 2001. This is the second bridge in Norway to use lightweight aggregate from Carolina Stalite Company. The Rugsundet Bridge is part of a mainland connection to the island of Bremanger in Sogn county and Fjordane County in the western part of Norway. The bridge crosses the strait between Kolset on the mainland and Drakevik on Rugsund Island.

ORIGINAL DESIGN

The bridge was originally designed as a 3-span, free cantilever, concrete box girder bridge with a total length of 311 meters (1,020) feet. The main span was to be 172 meters (564 feet) and built using normal weight concrete. Norconsult AS of Norway conducted a peer review of the original design calculations and drawings on behalf of the owner, the Norway Public Roads Administration. They proposed a redesign of the bridge incorporating the use of rotary kiln expanded lightweight aggregate concrete in central part of the main span of the superstructure.

REVISED DESIGN WITH STRUCTURAL LIGHTWEIGHT CONCRETE

The use of structural lightweight concrete allowed increasing the main span from 172 meters (564 feet) to 190 meters (623 feet). One of the most significant advantages of increasing the main span was that the foundations could be moved into water of less depth. This simplified the construction of the bridge considerably. It reduced the height of the pier columns and reduced the cost of the foundation. Carolina Stalite Company of Gold Hill, North Carolina, USA, was selected as the lightweight aggregate (expanded slate) supplier.

COST COMPARISON— A 15% COST SAVINGS WITH STRUCTURAL LIGHTWEIGHT CONCRETE

A preliminary cost comparison between the two alternatives showed that the structural lightweight concrete alternative was at least 7% lower in cost than the original design. The public Roads Administration, therefore, decided to put both alternatives out to bid. When bids were received, the structural lightweight concrete alternative was actually 15% lower in cost than the original normal weight concrete design.



Cantilevered main span of Rugsundet Bridge under construction

RAFTSUNDET BRIDGE — A FIRST IN NORWAY

The first bridge project in Norway to use structural lightweight concrete placed by pumping was the Raftsundet Bridge (pictured at right) completed in 1998 in the northern part of the country. The Raftsundet Bridge has a main span of 298 meters (977 feet).



Completed Raftsundet Bridge

For Additional Information About Structural Lightweight Concrete

Expanded Shale, Clay and Slate Institute

Suite 102 • 2225 Murray-Holladay Road • Salt Lake City, Utah 84117

801-272-7070 • Fax 801-272-3377 • e-mail: info@escsi.org

www.escsi.org