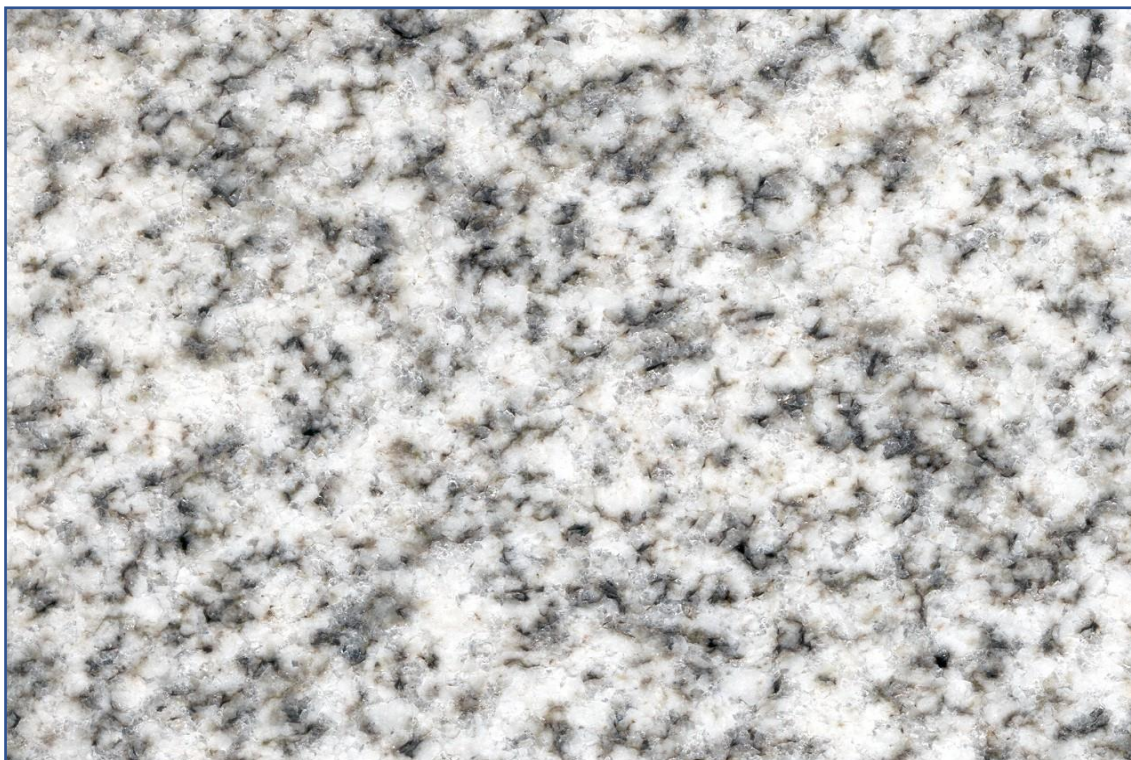


Størengranitt (Støren Granite)

Støren Trondhjemitt

Silver White

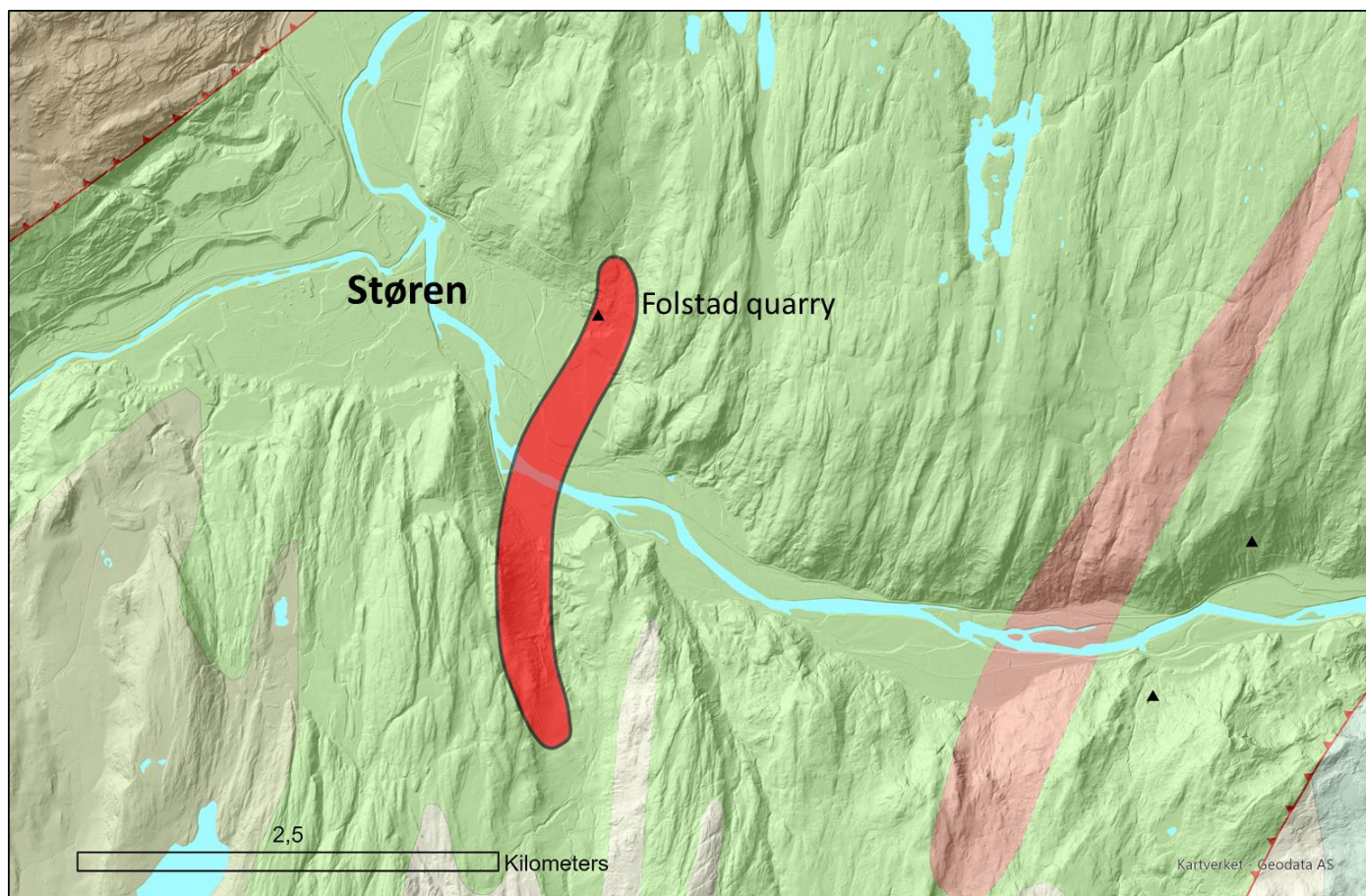


5 centimeters

Short description: White tonalite with black spots. The image displays a polished surface.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial Granite	Tonalite	White	Norway	Trøndelag	Midtre Gauldal	Folstad

Geological setting



Geology: The Støren Granite belongs to a group of dyke-shaped, tonalitic intrusions formed in the later phases of the Caledonian orogeny (Silurian). These tonalitic intrusions were also named “trondhjemite”, and the deposit is the type area for description of such rocks. The quarry is situated at Støren, about 50 km south of Trondheim.

Production: Production may have started as early as 1852, but production grew when the work with the railroad started, and even more when the railroad between Trondheim and Oslo was completed I 1921, facilitating transport to more remote markets. Since, the Folstad quarry has been operating on a small to medium scale.

Geological age: [Silurian \(332 Ma\)](#)

Geological unit: [Gula Nappe](#)

Application, use and heritage

Description: The Støren Granite has been widely applied for structural purposes, such as bridges and buildings and paving. In recent years, its most important uses are funerary monuments, building facades and interior floors and walls.



Oslo Concert House (1977) with façade clad with Støren Granite.



Façade of new addition to Grand Hotel, Oslo, with Støren granite slabs showing igneous lamination.

Petrography

Description: Samples from the quarry are holocrystalline, medium-grained (0.5-1.5 mm) and hypidiomorphic-granular in texture. Slight metamorphic overprint have been found in some samples, and cores of plagioclase crystals may display alteration to sericite. In some samples, magmatic layering defined by biotite-rich planar features may be seen.

Source of information: Geological Survey of Norway

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Plagioclase (%)	Potassium feldspar (%)	Muscovite (%)	Biotite (%)	Epidote (%)	Magnetite (%)
26,06	57,78	3,3	5,96	1,84	4,42	AM
Apatite (%)	Sphene (%)	Zirkon (%)	Chlorite (%)	Calcite (%)		
AM	AM	AM	AM	AM		

Source of information: Average of five samples from [Size, 1979](#)

Physical properties

Apparent density (EN 1936), kg/m ³	Open porosity (EN 1936), % vol	Water absorption at atmospheric pressure (EN 13755), % wt	Uniaxial Compressive strength (EN 1926), MPa	Flexural strength under concentrated load (EN 12372), MPa
2690		0,31	195-275	13,5-15,5

Real density (EN 1936), kg/m ³	Total porosity (EN 1936), % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161), MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -), %	Change in open porosity (increase: +; decrease: -), %	Change in ultrasound pulse velocity (increase: +; decrease: -), %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm ³ / 50cm ²	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
Polished				

Source of information: Historical data from Federation of Norwegian Stone Industries

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
71,47	16,21	0,58	0,23	0,48	2,72	5,33	4,98	0,02	0,08		

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Average of five samples from [Size, 1979](#)

Sources of more information

Type of information	Name of provider	URL
Data sheet	Geological Survey of Norway	https://geo.ngu.no/api/faktaark/mineralressurser/vi/sNaturstein.php?objid=9387&lang=eng
Maplink	Geological Survey of Norway	https://geo.ngu.no/kart/common mobil/? /kart/mineralressurser mobil/ lang=eng::extent=262384.6 111495493,6997327.719882453,264230.493962049 3,6998129.012851203::map=9
Non-commercial directory	Natural stone online	Detailansicht (naturalstone-online.com)
Commercial directory		
Scientific publication	Size 1979 Dunning and Grenne 2000	https://www.ngu.no/FileArchive/NGUPublikasjoner/NGUnr_351_Bulletin_51_Size_51_76.pdf https://www.ngu.no/upload/publikasjoner/Bulletin/Bulletin437_57-65.pdf
Other publication		

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