Materials used in the Sydney Harbour Bridge Construction

The following article appeared in the "Border Watch" 14th January 1928. It is by J.J.C. Bradfield, D. Sc. (Eng.). M.E., M. Inst., C.E., Chief Engineer Sydney Harbour Bridge, and Metropolitan Railway Construction.

Steel, granite and concrete are the chief materials used in the construction of the bridge.
Granite was probably the first material to solidify on the earth's crust, the strongest and most beautiful building stone, which has withstood the ravages of time for thousands of years, exemplified in those prehistoric works of man still extant; concrete is man's artificial stone, and steel, man's masterpiece, the strongest and most reliable material yet manufactured by him.

Steel is, in general, a combination of iron, with small percentages of carbon, manganese, silicon and other elements as desired; carbon renders it less ductile and more liable to fracture under sudden shock; manganese makes steel tough and workable; silicon adds to its strength and soundness.

(There follows a description of the steel making process, but of interest to Moruya is the piece about the granite.)
When preparing the plans and specifications in 1921, Moruya was selected as the most suitable place from which to obtain the granite. The outcrop is on the bank of the Moruya River, about 1 ½ miles from the town and about the same distance from the river entrance and 170 miles by sea from Sydney. The appearance of the granite was in its favour, the black biotite mica giving the stone a pleasing appearance, sparkling in the sun and so enhancing the beauty of the white quartz and feldspar. The quality was all that could be desired; tests showed it to have a crushing strength of about 1,200 tons per square foot. This quarry was made available to tenderers and has now been developed by Dorman, Long and Co.
The granite used in the Cenotaph was obtained from this quarry.

To house their masons, the company have built the settlement Granite Town, some 70 houses, each consisting of four rooms, with wash and outhouses, and provided with water and sanitation.

Apart from the quality of the stone, the quarry has proved to be an excellent one for working. Blocks of granite, the biggest so far about 2,200 tons weight, are being quarried. These blocks are cut to suitable sizes, from which the finished stones can be dressed. The blocks are split by plug and feather. The men in charge of this operation are skilled and expert in recognising the grain of the granite, and where to locate the line of plugs and feathers, which, by light hammer blows, gradually splits the stone in two.

Two classes of exposed surface finish will be used, rock face and four cut, the former being that of the stone as it leaves the quarry, or as split by wedges, and the latter is obtained by dressing the face down to a plane surface by hand or with pneumatic hammers, having for a cutting surface four blades per inch.

The culls and pieces not large enough for facing stones are spalled, the granite being broken small enough to be loaded by hand into skips and tipped therefrom into the jaws of the crusher. After crushing, the aggregate for the concrete is conveyed to the storage bin, which has a capacity of 800 tons.

Three freighters, each having a carrying capacity of 400 tons on an eight feet draught, have been built to carry the aggregate and dressed stone from Moruya to Sydney. These freighters also carry water to the settlement from Sydney, if necessary.

The concrete used in the construction of the Abutment Towers of the main arch and the piers of the approach spans is made of crushed granite, obtained from Moruya, sand from the Nepean River, and cement.

For facing the piers and abutment towers, 28,000 cubic yards of granite will be required.
For the bridge and approaches, cement approximating 1,200,000 bags will be required, the manufacture of which will necessitate the mining of 100,000 tons of limestone, 12,000 tons of shale, and 40,000 tons of coal. In addition to the cement for the concrete, 120,000 yards of sand, principally from the Nepean River, and 260,000 cubic yards of broken granite, or other aggregate, will be required. The steel in the bridge will total 50,200 tons, to produce which about 80,000 tons of iron ore, 15,000 tons of limestone, 3,700 tons of dolomite, and about 180,000 tons of coal will be required.

For lining the steel furnaces upwards of 20,000,000 fire and silicon bricks will be necessary.