

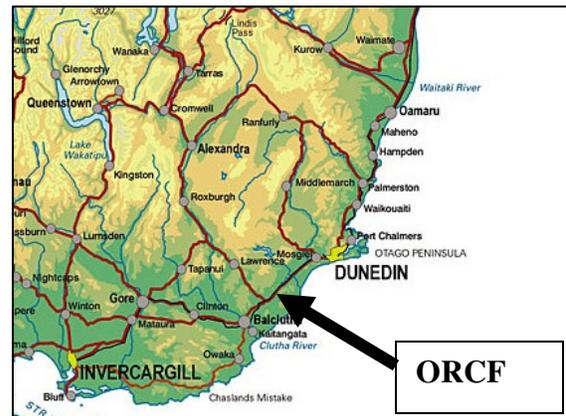
QUARRY TO CORRECTIONS FACILITY

Presented by Gavin Hartley, Quarry Manager, Blackhead Quarry.
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I had the opportunity while employed by Fulton Hogan Dunedin to become a customer rather than supplier for two years, during the construction of the Otago Regional Corrections Facility (ORCF) at Milburn, South Otago. The project was one of four corrections facilities being built in New Zealand to house 1600 of the ever increasing prison population.

The site at Milburn was one of 38 sites that were considered between Balclutha and Waikouaiti, site selection process started in August 2001. Planning commenced in November 2002 with a Clutha District Council designation change lodged in June 2003. An Environment Court Decision was confirmed in December 2004 at which time work begun on Narrowdale Rd, linking State Highway 1 and the site. A number of issues become conditions on the designation they included – screen planting, bunding, light spill and noise.

My reason for doing the paper was, many people in our industry know what contribution the extraction industry has on every day life, but nothing has ever been written down. Although there are many differences, the ORCF project is an equivalent of an 800 person (approximate 300 house) subdivision. Both have buildings, road construction, under ground services, water, waste water, pump mains, lighting, etc, etc. The numbers presented in this paper are real and I hope they may be of some use to quarryman when dealing with councils or politicians, convincing them our industry is very important to the well being and growth of our community's.



Physical works on the site started January 2005, with the site being stripped using scrapers. The site is located in the middle of a dairy farm, cow lanes and stock watering systems were the first things to be re established, during this time there were a number of conflicts with the share milker leasing the land from the land owner.

The first rock to be used on the project was for the strengthening of Narrowdale Road and construction of new cow lanes around the site. The rock was sourced from two quarries. Firstly the old Milton Borough Council Quarry, the quarry used to be managed by the Clutha District Council, but is now run by Blackhead Quarries Limited. The majority of the rock was sourced from Blackhead Quarries Ltd, Balclutha Quarry. The volume of rock required allowed the quarry to remove a number of years stripping programmes in a short period. The Balclutha operation also supplied basecourse, dust, sealing chip and concrete aggregate to the project. Raw feed is sourced from both a greywacke hard rock quarry and gravel extracted from the Clutha River.

A mobile crushing plant working out of Marshall's Quarry, 10 km north of the site produced the majority of the basecourse. The quarry works a basalt cone that is traditionally used to supply maintenance aggregate to the local market.

The project required the installation of 33 km of under ground services. (Stormwater, waste water, ducting, power, security, potable water, fire water and gas), the main area of the site measured approximately 650m x 150m, many services could be placed in the same trench, but the subsurface was a mine field when trying to install forgotten services. Trench back fill material was sourced from the Balclutha operation.

A large number of concrete culvert pipes were used on the project they were sourced from Christchurch and although small quantities aggregate was used to make the pipes it did come from a quarry, the same applies to mud tanks and duct pits they were sourced from Alexandra.

Twenty seven precast buildings were built on the site along with a 5.0m high, 1600m long precast perimeter wall. With such a short construction period, seven yards were used to supply panels. All the perimeter wall panels were cast on site, as well as many of the building panels. The remaining panels were cast in yards from Invercargill to Christchurch, all required high quality concrete aggregate. Buildings were clad with corrugated iron, blocks and Eterpan a fibre cement board. All require material from an extractive site. One hundred tonne of eterpan was used



on the project and 115400 cream coloured blocks were supplied from Oamaru Sand & Shingle plant at Hilderthorpe for cladding and block walls. (1450 tonne of aggregate). Concrete foundations, reinforced with steel and long run roofing also rely on iron sands as a major raw product. Sadly neither product was made in New Zealand but did come from an extractive site in Australia. All buildings have windows the prison environment is slightly different with many of the glass panes being 25mm thick, again the manufacture of glass requires raw products from a quarry – 72% silica sand, 13% soda ash, 8% limestone, 4% dolomite. Again speciality glass was imported from Europe and the standard glass imported from Australia.

Within the perimeter wall, all buildings are linked with 3.0m wide concrete footpaths, Allied Concrete set up a batching plant on site for site concrete and the site precast yard. Allied's concrete aggregate was sourced from Blackhead Quarry and Walton Park Sand in Dunedin and Southern Aggregates Ltd sand plant in Invercargill. Immediately inside the perimeter wall is 10 m wide chip sealed sterile zone enclosed with a taut wire fence (3m high, 27 sensored barbed wires), inside the taut wire fence is an internal chip sealed road that goes around the entire site 1.6 km. The total chip sealing for the project including works to Narrowdale Road and the access road was 52400 m² or 1300 tonne of G3 & G5 chip.

The main service areas on both sides of the Gatehouse are asphalted. (20000 m² or 1450 tonne of aggregate). (The Gatehouse is built in the perimeter wall and is the only place you can get into and out of the prison)

The project required infrastructure for both potable water and waste water to be constructed to the site. Two 470 m³ wooden tanks were built to store drinking and fire fighting water. The supply line from the Milton water plant was constructed under separate contract.

Waste water produced at the site passes through a screen and muncher and pumped up to two primary ponds where bacteria start to break down the sewerage. The two ponds hold 15000 m³ and were excavated in a paddock lined with 200 mm of filter material (5000 tonne of 5-10 mm rice) and covered with a PVC mat. The second of the two ponds has two filter bunds made of 60 –100 mm rock, 2200 tonne. The discharge is then gravity feed to the waste water plant in Milton.

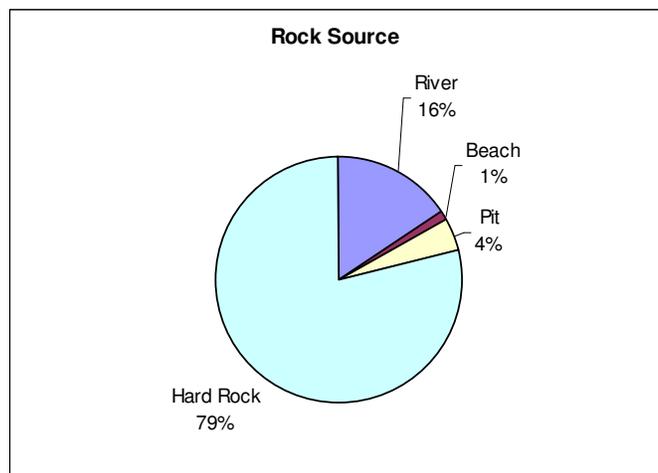
The designation conditions required bunding, landscaping, amenity and screen planting.

Some 35000 plants were planted in and around the site. Landscaping also used a number of quarried products including feature rocks, schist rock walls from Poolburn, sand for levelling sports field, agricultural lime to get grass growing. One of the focal points in the Spiritual centre is a water feature made from rock found in the Catlins and a rock sourced from each major river in the Otago Southland area.

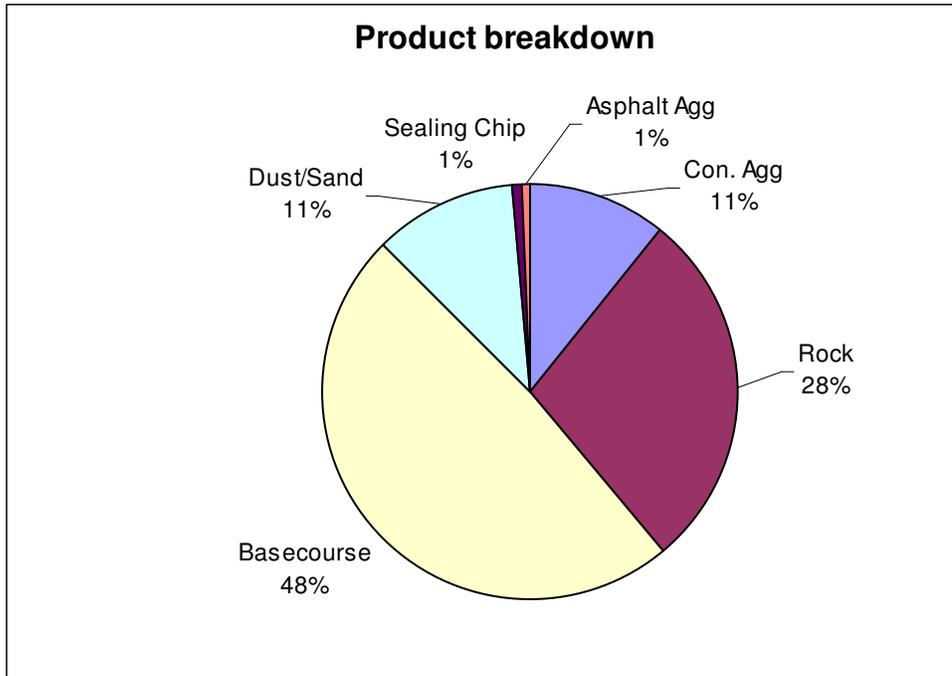


Two creeks on either side of the site required a number of new and upgraded culvert crossings, each crossing required concrete pipes up to 1800mm in diameter and scour protection with rip rap, yet another quarried product.

The attached graph confirms what was assumed, most aggregate in the Coastal Otago Market is won from hard rock quarries. Other than Central Otago and Canterbury this could be the same as most of New Zealand.



In total quarried products for the Otago Regional Corrections Facility were produced from 15 operations from Christchurch to Invercargill, ranging from 50 tonne of schist walling rock to 92000 tonne of basecourse. The value of quarried products was \$3.1M on a project worth \$176M. Production of quarried products equated to 14000 man hours including the winning of material, contributing \$320K to the economy in wages over an 18 month period.



Quarried Products	Tonne
Rock	60000
Concrete Aggregate	22910
Dust/ Sand	23780
Basecourse	104150
Sealing Chip	1300
Asphalt Aggregate	1440
Total	213580

(While putting this presentation together I have gather many statistics on quarried products to build the Corrections Facility in Milburn, if you would like to discuss further please give me a call 027 4369 138)