



Innovation at Elephant Hill

New Zealand's latest, state of the art winery estate, Elephant Hill, is a \$40 million investment in Hawkes Bay's wine industry - and a showcase for Firth's technical expertise.

Located in Te Awanga on the Hawkes Bay coastline, the winery is owned by German couple Reydan and Roger Weiss who fell in love with the beauty of the region when visiting in 2001. For this ambitious project, they commissioned well known architect John Blair, who also designed Craggy Range in Havelock North, and the main contractors were Alexander Construction.

The estate's main building is nearing completion. It includes a winery, a large cellar and a restaurant/lounge area with views towards Cape Kidnappers. Ultimately, the dining area will be surrounded by a lake and look over the vines planted on the 25 hectare property. When it's fully operational, Elephant Hill will produce at least 200 tonnes of grapes with capacity to double that.

Elephant Hill involves around 2,500m³ of various grades of concrete, mostly 30MPa.

The impressive vaulted, concave ceiling in the winery involved a total volume of more than 500m³ of standard 30MPa super plasticised concrete with 19mm aggregate. It features an unusual wood-grain finish created by pouring the concrete over rough sawn Radiata Pine and peeling it off to reveal the textural effect once the concrete had dried.

Firth's Certified Concrete®'s Supply Manager Dave Fraser explains two layers of reinforced steel, supported by scaffolding spaced just a metre apart, were used to bolster the thick concrete slab. These were lined with the Radiata Pine to add the wood grain texture to the ceiling surface.

Due to the varying depth of the concrete, from over a metre deep in the middle to 300mm at the sides, the ceiling involved three separate pours: the two outer sides before the big centre pour. As the concrete was poured, it was pumped in to no higher

than 400mm depths each time. Then, it was vibrated thoroughly to help it settle, before the next 400mm was placed.

A special mix of self-compacting concrete was created to pour the in situ feature walls in the winery. The concrete was poured into the boxed upright walls lined with Radiata Pine. The timber panels were then peeled off to create the same woodgrain effect as the vaulted ceiling.

It resulted in a very good finish, very close to what we were trying to achieve.

Alexander's Project Manager Troy Briggs says his company had never done a vaulted ceiling like this before. He was very pleased with the amount of technical expertise Firth could offer to make the project a success. "It resulted in a very good finish, very close to what we were trying to achieve."



update

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Welcome to the Winter edition of Firth Update. It's been a year of change driven by global economic factors and this will continue into the coming year - Firth is more than ready for the challenge.

Over the last financial year Firth Certified plants were successfully established at Marsden Point, Silverdale, Whitianga, Tauranga Bridge, Hanmer Springs and Darfield. Firth launched nationally a number of new products including the fashionable large format Chancery® Pavers, GuardBloc® the water resistant masonry, Diamond Pro Stone Cut™ Retaining Wall and updated the paving colour palette with the addition of new designer colours. Dricon launched a bulk bag range to achieve economies and eliminate waste for our key builders merchants and also relaunched the Oxitone® colour oxide range nationally.

All of these initiatives supported a satisfactory result for Firth for the financial year under difficult market conditions which have effected the whole industry over the last six months.

During the year the Department of Building and Housing announced changes to clause H1 - Energy Efficiency of the Building Code to improve the indoor environment of all New Zealand homes and to conserve New Zealand's energy resource. At Firth we have undertaken significant development work to ensure that our products economically support this important government energy efficient policy. Firth's marketing support including, promotional brochures, merchandising, technical guides, involvement in Masterspec® and Greenbuild™ are designed to help facilitate the success of your businesses in today's fast changing building environment.

As you will agree concrete's durability, thermal efficiency, acoustic performance, fire resistance and roading and stormwater management applications will ensure that it's contribution to a sustainable New Zealand construction industry continues to be significant. Firth will continue to provide the necessary support and information for your businesses to succeed and make a significant contribution to a sustainable built environment.



Auckland's Hamer Street Operation on the Move

Changes are afoot for Firth's Certified Concrete® batching operation in Central Auckland's, Hamer Street. Firth is relocating just 200 metres along the road to remain the only concrete batching plant in the CBD.

The move comes earlier than anticipated. Firth's Business Development Manager Mark Harris explains the lease had some time to run. "But the existing corner site is designated as a key position on Wynyard Quarter - part of The Tank Farm - an area being redeveloped into a world-class marine village over the next 20 to 30 years."

Wynyard Quarter is the area of land running from Fanshawe Street to the Harbour, with Halsey Street on its eastern side and Beaumont Street to the west. Sea + City Projects Limited, which manages the revitalization project for Auckland Regional Holdings in conjunction with Auckland City and Auckland Regional Councils, wants this first stage of The Tank Farm project ready for the 2011 World Cup.

Firth agreed to relocate because they were offered a much longer term than their existing lease. And it

gives the chance to secure a coveted address in the CBD, which opens up some exciting prospects for the future. Mark explains Firth will be well-positioned to service the growing demand for Certified Concrete® in the CBD, reinforcing Firth's National coverage and the ability to provide concrete from strategically located plants.

"We can take advantage of the chance to help with numerous big development projects, soon to be announced, that are part and parcel of the city vision for the area."

Next year, Firth will start construction on the new site and exit the existing one. The new site is particularly high profile and its location is "somewhat unusual" when compared to Certified Concrete® plant locations that are normally surrounded by industrial activities.

Mark Harris says Firth will recognise that in the way it goes about building. "We have to do a particularly good job to minimise the visual impact of the amenity and to ensure it fits in with the surrounding landscape."

Hanmer Springs Wins Big Slice of the Action

Firth's North Canterbury customers have been quick to respond to the accessibility of the new plant at Hanmer Springs, which opened early this year to improve Firth's service to that part of the country. The plant is a Goughs loader fed, 40m³/hour plant with a 55 tonne horizontal silo.

Plant Supervisor, Jason Dick says when he first moved to the new operation, he expected the market to require small volumes of concrete from his two trucks. However, at a very early stage, four large projects saw him reappraise his previous expectations of output.

Jason confirms the new plant is proving its worth by providing much easier and quicker supply to local customers. "Our clients know we are here, and they are definitely taking advantage of our ability to supply them with all their needs."

In the plant's first three weeks of production, Firth completed extensions to the famous Hanmer Springs Hot Pools complex. "Firth supplied structural and exposed aggregate concrete to various locations around the pools complex".

In March, his busiest month to date, the plant

produced double it's budgeted volume, but still got by with it's two trucks. The work ranged from a complicated bridge repair project 90 kms away in Lewis Pass to a new apartment complex in Hanmer village.

The bridge work was a structural re-strengthening project, says Jason, involving repair and strengthening of two single lane bridges. These were widened to create two lanes and a concrete topping slab was poured across both.

Using a combination of structural concrete, block fill and Firth masonry, 12 new Hanmer Lake apartments required significant amounts of product. Since November last year, the plant has also supplied significant volumes to a modern, two storey office complex soon to be completed in the township.

Though snowfalls have taken the temperature to a frosty -8° C some mornings, that hasn't cooled Jason's enthusiasm as he eyes more big projects on the horizon. Among them are some major dairy farm conversions. "Many farmers in the North Canterbury region are switching from sheep to dairy. Firth is involved in helping build some brand new milking and implement sheds."

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In this newsletter our intent is to communicate Firth's products, services, technical expertise and record of

innovation and leadership to construction industry customers, specifiers, builders and all those interested in concrete today. For any information about Firth products and services covered in the articles please contact Firth Information Service 0800 800 576, or

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Linking with the West to get Auckland Moving..



Earlier this year West Aucklanders will have noticed huge improvements made to local roads, which ease flows between the city and home. The \$3million upgrade of Tiverton Road in Blockhouse Bay forms a key part of Auckland City Council's transport plan, designed to "get Auckland moving". Tiverton Road through Avondale, Blockhouse Bay, Waterview is the first stage of an important link for Auckland City and Waitakere City residents to access State Highway 20.

It was a seven month long project for Dempsey & Wood Civil Contractors and sub-contractor Auckland Speedfloor Contracting, both of whom used Firth products extensively. In all, there was 300m³ of concrete poured.

Stage One and Two involved construction of two large retaining walls, widening the busy road to four lanes, improving road safety and access to public transport, developing drainage, landscaping the surrounding area and putting overhead power lines underground.

📐 Quite a feature of the job was keeping the homeowners happy and safe, and not blocking access to the road throughout the exercise. 📐

Conal Dempsey, Managing Director Dempsey & Wood Civil Contractors says there were many challenges to the project, but, "it was one of those jobs where everything went right. It was great to be involved in our first Transit funded job and finishing on time and within budget under difficult conditions should hold our company in good stead for future works".

Jim Cavanagh, Director of Speedfloor Contracting, oversaw all the form work and structural work for the pillars and retaining walls. He says at the end of the day, the success of the project came down to the great working relationship between the engineers, the client – Auckland City Council, Dempsey & Wood, Speedfloor and the suppliers: Firth and the steel

fabricator. "It was important we were on site every day as we were able to anticipate and resolve problems before they occurred."

The client, Marcus Pillay, Auckland City Council's Infrastructure Delivery Group's lead Project Manager – Transport, says the initial challenge was getting the funding and resource consents in place before the work began.

Once Dempsey & Wood commenced construction, access to the narrow site was extremely difficult, says Dempsey. "We had to create a temporary road along a grassy bank, dotted with trees. There wasn't a lot of room for the piling rig. So, it was a bit of a logistical battle. But we worked sequentially along the track, installing the piles and columns."

He explains each of the columns was cast in situ. The embedded depth is between 10 to 15 metres, and a metre in diameter, they make up the retaining wall structure that supports the new strip of road.

The neighbours also needed consideration, adds Dempsey. "Quite a feature of the job was keeping the homeowners happy and safe, and not blocking access to the road throughout the exercise." Dempsey and Wood achieved this through continuous and effective communication with the stakeholders and residents.

Jim Cavanagh says Speedfloor had their work cut out for them from the beginning as the retaining wall was drawn as if it were on flat ground as a square detail. "When we went on site, the road had a rise and a hump in it. We had to emulate that for every single column to form a curve. That was quite a feat."

Speedfloor also had to calculate information from the engineers and transfer it to the actual

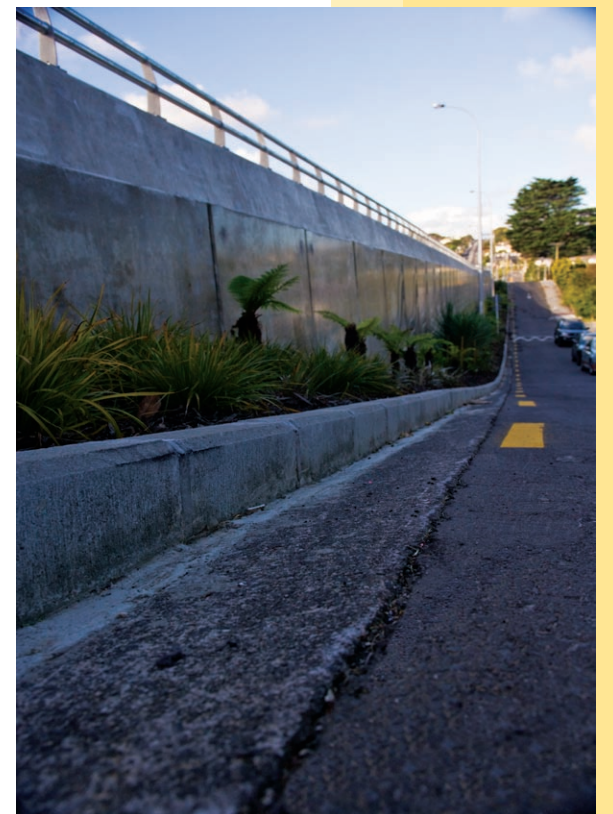
environment. "It was difficult because the calculations were based on a site platform that wasn't as it was on site. Keeping on time was also crucial for this project. To meet the deadline, we had to pour two sections per day. Once we'd started, we just had to keep going and we'd often finish late in the evening. Then, the weather conditions affected us severely and traffic flows became heavier the later we worked. We had to work out how to deal with it."

Cavanagh coordinated the various contractors involved on a daily basis and made sure "they were all working on a level playing field" and were aware of the changes to expect.

Getting the materials was another major task, says Cavanagh. It helped that he was dealing with Firth daily, constantly making sure the concrete mix was precisely what was required by the engineers. "Firth were great. They gave us a lot of technical support."

Now the work is complete, it's impossible to see the scale of what was involved as the columns are anchored back into the retaining walls - one 140 metres long and the other 120 metres long - and neatly concealed behind a decorative façade of slim, concrete panels. Native landscaping in front will grow up and soften the look of the wall. Dempsey & Wood are delighted the feedback on the project from the adjacent neighbours and everybody involved is very positive.

According to Marcus Pillay, construction of the wall, the capping beam and ground anchors progressed well, despite challenges with the weather in Winter 2007. Completion of the project offers some major benefits to the area. He says pedestrian and vehicle safety have been improved and the road design helps reduce speeding. The service lanes are safer and the traffic flow has been enhanced, making it easier to move through the area. It has also reduced flooding to properties.



Firth Mucks In with TVNZ'S Garden Designs



▮▮ They're simple, stunning and with the addition of Firth pavers, very easy to care for – and they'll look good for at least another 30 years. ▮▮

In TVNZ's latest series of Mucking In, Landscape Designer Tony Murrell inspires people who've never had a nice garden, nor any interest in gardening before. He says he wants to show that gardening: "is good for the soul; good for the mind; good for your physical fitness and it's increasingly gratifying as the more time you spend in the garden, it just keeps getting better."

On the other hand, these are gardens designed for people whose activities in the community keep them very busy. They don't have a lot of time to spend on maintenance. Tony aims to make it easy for them to enjoy their gardens. The products he selects have to not only create an interesting design effect, they have to be reliable, durable and stand the test of time, which is why he uses an enormous amount of Firth paving and Dricon concrete products in his landscaping. Because the whole production takes place in an incredibly short timeframe, two days over a weekend, he opts for fast setting concrete plus larger sized pavers. Tony says Firth has a great selection that makes it simple to create a big impact fast.

One of the more interesting programmes was creating a garden for Mike Keenan, key organiser behind the Wild Food Festival in Hokitika. "Mike has a big personality. I put his amazingly demonstrative, gregarious behaviour right back into the garden." It was a sloping back yard, largely unusable, with just a huge vegetable garden and a coal bin. "Mike was producing food from it, but that was it. He never used his garden. I wanted to redefine the spaces and compartmentalise it into rooms for socialising and intimacy plus a more utilitarian aspect to dry clothes and grow food."

Mike had a small terrace just off his garage, not used for vehicles...he offered it to the community as a gym and a hangout. Using hardwearing Firth Courtyard Flagstones™ in Natural, Tony extended the deck for easier socialising. There were 130 bags of Dricon's RapidSet™ used to secure the posts for a wind deflecting trellis screen that wraps around the deck. The enlarged terrace gives a glimpse of the ocean plus access to the garden with a better link through the house.

Off that terrace, Tony used Firth Meadow Stone® Medium in Rockface to create two steps, which drop down to an intimate area in Courtyard Flagstone™ pavers. Slightly away from everybody, this moody retreat was designed just for Mike and his mates to enjoy some downtime.

Next, he utilised the contour of the land to create links, using the Meadow Stone® Medium retaining blocks, secured in place with 48 bags of HandiCrete®. The decorative path leads to the rest of the garden – to a shed, folly and a utility area complete with fruit trees. Hardy aromatic coastal herbs and flowering shrubs will help to attract bees for pollination of the fruit trees with the added bonus of harvesting the herbs for his wild food. It's a space that's fragrant and colourful. With big areas for entertaining, serene aromatic escapes, better utility spaces and improved links.... "It was like a taming of the wild," says Tony.

Ricky Houghton in Massey had owned his property for 30 years and the only thing he had done in the garden was run the lawn mower over it. The family never ventured to the bottom of the property. There was no reason to. But they all spilled out onto the tiny deck when it came to alfresco dining.

Tony created a huge outdoor entertainment loggia area, installing an electric Vergola roof, off the house, so family and friends could utilise this extension of their home, in both summer and winter. To ensure structural stability, 30 bags of Dricon's HandiCrete® were used to secure the posts supporting the Vergola roof system. "In this big space, we put in an outdoor kitchen with a barbecue, sink, benches, built-in day beds and an outdoor table."

Tony used 201 Chancery® Paver units in Natural for the area. "In this high traffic area, the pavers had to be durable. They also had to be easy to clean and continue to look good over time." Because of the sheer size of the pavers, it meant his team could complete the deck quickly.

To enhance the paving in the loggia, Tony wrapped the entire area in native plants peppered with sub-tropicals and palms. They would eventually enclose the space, adding shelter and warmth. In the rest of the garden, he created secluded spaces that offer a holiday resort feeling with lush layers of texture and colour. The plants will establish with time and provide a screen from the neighbours beyond.

Firth pavers were also used as foundations on the lawn to showcase some art – a lovely sculptured piece of ponga. To give definition and privacy across the front of the property, a low perimeter fence was constructed and the posts were secured in the ground using 150 bags of Dricon's RapidSet™.

And the final verdict? Of course, everyone was elated with the projects. Tony explains he gives people exactly what they want. Extensive research takes place before devising the garden plans. He asks people what they have always dreamed of. Then Tony does exactly that, adding many additional surprises he knows they'll love. But these people aren't gardeners so there's no point in elaborate gardens. "They're simple, stunning and with the addition of Firth pavers, very easy to care for – and they'll look good for at least another 30 years. And hopefully evoke and encourage new gardeners and a passion for all things gardening."



Technical Talk: Self Compacting Concrete

Self Compacting Concrete, SCC, is defined as concrete that is able to flow and consolidate under its own weight. It can completely fill formwork even in the presence of dense reinforcement, whilst maintaining homogeneity and without the need for any additional compaction. Its advantages over traditional concrete are:

- A rapid rate of placement and therefore faster construction times.
- The elimination of noise associated with vibration. For precast plants near built up areas noise control maybe a condition of their resource consent.
- Longer lasting moulds. The elimination of wear and tear associated with vibration can significantly increase the life of a mould. Given the high cost of moulds this can provide a significant financial advantage.
- Better surface finishes.
- Enhanced durability due in part to the removal of the dependence on good vibration to achieve dense, durable concrete.
- In some instances reinforcement congestion makes SCC the only feasible alternative.

The challenge for the designer of a self compacting mix is to ensure that concrete flows but does not segregate, i.e. the larger aggregates do not sink.

This is most often achieved by using combinations of supplementary cementitious materials and specialist admixtures. Due to the high cement and fines content, SCC mixes are more expensive than a comparable standard concrete, however reduced labour requirements on site and greater reuses of formwork can result in considerable savings.

Firth has considerable experience in the development and production of SCC. A key ingredient in obtaining the maximum value from SCC is the development of a team approach to construction. The best results are obtained when the Contractor, or Precaster, and concrete supplier work together to find the optimal solution. Exploration of the appropriate solution would include:

- The main objective of using SCC. A mix designed for a superior finish will be different from that required because of reinforcement congestion.
- Placement planning, issues such as how SCC will be introduced into the formwork and how to achieve consistent delivery times.
- Formwork design as the speed of construction can mean raised formwork pressures.
- Formwork oils, as the composition and method of application can make a difference to the finish.
- Communication plan.
- On site quality control.

In terms of its engineering properties, SCC should be considered as an alternative method of construction rather than an alternative material. The design properties listed in NZS3101, are applicable to self consolidating concrete (clause 5.2 of NZS3101), however the coefficient of thermal expansion is 15% greater (clause 5.2.9).

There are considerable sources of information to assist designers and contractors looking for greater understanding of this construction alternative. CCANZ information IB86 provides a good summary and is available from www.cca.org.nz. A comprehensive document "The European Guideline for Self Compacting Concrete - Specification, Production and Use" can also be downloaded from the internet from www.efca.info. However, probably the easiest way is to contact your local Firth Plant to explore the alternatives available.



Dene Cook
National Technical Manager

Smooth Sailing Ahead for Tauranga Bridge



You will remember from the Summer edition of Firth Update that we talked about Stage One of the Tauranga bridge which included the four-laning of Hewletts Road on the Mount Maunganui side of the harbour from Jean Batten Drive to the old toll plaza. Stage Two of the \$130.8 million dollar new Tauranga

Harbour Bridge and flyover being constructed by Fletcher Construction for Transit New Zealand is well under way. To service the demands of the project, Firth has established a mobile batching plant at Sulphur Point, Mt Maunganui and purchased four new trucks.

"Already the project has seen a number of 'firsts'," said Rowan Johnstone, Bay of Plenty Area Manager for Firth. "The first T-Roff viaduct bridge beam has been poured; the first pile has been constructed in the Tauranga Harbour for the new harbour bridge; and the first columns have been poured for the viaduct."

With ground improvements completed, progress on the new harbour bridge casting shed is also becoming visible. The concrete foundations have been poured and structural steel support for the bridge segment mould has been installed. The casting shed will house the bridge segment mould that will produce the 20 metre long segments for the new bridge. These will be launched from the Tauranga side of the harbour across the 11 columns to reach the causeway on the Mt Maunganui side.

With 60% of the piling complete, there will be a noticeable change in the landscape over the coming months as the Chapel Street viaduct begins to take shape.

There is still a lot of work to do as Firth expects to supply 36,000m³ of concrete over the life of the project. But Johnstone says research and development of the mixes is now complete. "It's now a matter of supplying the demand. We're well set up for that. From here on, it's basically about keeping up the good service and quality of product that we've given before."

Novel Solutions Attain New Heights

At 23 storeys high, the tallest residential apartment block in the South Island became one of the most spectacular building projects Firth Hornby has ever worked on. Siteworks began on the \$50 million, 86 metre high, C1 Tower in Gloucester Street, Christchurch – a minute's stroll from Cathedral Square – in February last year. The large project tested Firth's abilities to the max. But their performance in overcoming huge obstacles meant each pour was problem-free, ensuring the building programme's tight timeframe remained on track.

Canterbury Area Manager Dominic Sutton, explains the site is extremely small and difficult to service. "All the concrete pours required road lane closures and traffic management – which for a central city street was hard on the locals."

The main challenge was to lift the concrete up the steel frame construction tower, and especially to pour the floors at higher levels, in a limited amount of space.

The biggest pour – approx 500m³ – was for the foundations. These were started at 4.00 am to avoid congestion and were placed in just eight

hours. At one stage, a truck was delivering concrete every six minutes.

JFC Pumps (a Firth Joint Venture company) and AMC Construction devised a novel solution to get the rest of the concrete up the tower. JFC's new 37 metre Sermac piston pump, which was purchased last year, was used to pump concrete to the first 12 floors. Rated at 130m³ per hour capacity, the pump has incredible power, says Dominic. "It's the biggest in the South Island and it reached the 12th floor with little effort."

Most of the floor pours were only 90-70m³. However, they were awkward for the concrete placers as the building structure prevented free movement of the pump delivery hose. Also, the concrete supply had to be continuous to keep the pump operating at all times."

There was no equipment available to pump concrete up to the height required. So, for the remaining floors, JFC's smallest squeezecrete pump was craned up to the last poured floor so they could pump to the floors below.

Lifting the smaller pump by tower crane to the top of



the building was an incredibly unnerving experience, says Dominic. "The pump's lifting platform was physically welded to the building's structure to both minimise vibration and improve safety for the operator. Once up there, the pump's boom was unfolded down the lift shaft and concrete was pumped to two floors below. This pump was supplied concrete from a skip manoeuvred by the tower crane.

On a Grand Scale

Looking down from high above, the 38 concrete trucks used on the 1,100m³ pour gathered around the four pumps at No.1 Featherston Street in Wellington, must have resembled bees around the honeycomb. It would have been an extraordinary sight. But this is no ordinary project, says Wellington Area Manager Cameron Lee.

With Fletcher Construction as the main contractor for the No. 1 Featherston Development, the

completed project will involve about 14,000m³ of concrete in total. Already the piling and footings have soaked up some 3,000m³. Some of the piles had to be drilled up to 42m deep as the area sits across the road from the harbourfront and is all reclaimed land. The small site in the middle of Wellington's CBD, opposite the railway station also meant congestion was always an issue.

Because of its scale and locational challenges, very

few companies could be relied on to service such a project. But Cameron says, the main 1,100m³ pour went without a hitch, due to good planning by the team involved – Fletchers, Firth and Aardvark Concrete pumps. He says it helped that there were some very experienced personnel on the project who had developed a good, working relationship whereby they all looked out for each other before and during the pour to ensure it was a success.

Firth responded well to the demands of the large pour that required completion in very tight timeframes. Firth completed the 1,100m³ pour in just under seven hours. "The pour had four pumps on it so the speed of supply was critical. We utilised our two Wellington plants and there were 38 trucks on the job," says Cameron Lee.

A special concrete mix was required for the shear walls in the initial floors. It contains a large amount of Fly-ash to reduce the heat of hydration. Firth continues to monitor the heat build-up of the walls over time.

For the next stages, Firth is about to install a placing boom with Aardvark Concrete and Fletchers to place concrete for each of the 16 floors.

The project is not expected to be complete until September 2010, with the concrete structure due for completion late 2009.





World's Tallest Building Challenges Concrete

Burj Dubai, the world's tallest high-rise building in the heart of the United Arab Emirates, made possible with concrete, has already reached twice the height of Auckland's Sky Tower. At a breathtaking 160 levels or 650m, it will climb to around 800m, though the exact height will be kept confidential, says Greg Sang, the Auckland who is the building's Project Manager for Turner Construction (USA).

The extreme height of the Burj Dubai's inspirational design demanded construction innovation on a grand scale. To raise extraordinary loads of high compressive strength concrete to increasingly higher levels was a feat engineered by the German pump company Putzmeister. Super high performance pump machines were designed to cope with the extreme delivery pressures.

Putzmeister set a new world record height for pumping concrete in April with repeated extensions to a delivery height of 601 metres. At this height, a wall of the central building core was concreted on level 155. The actual concrete placement took place at a height of 585m. The pumps were adapted to cope with extreme pressures and temperature variations, which sometimes climbed to 50 degrees Celsius outside. Most of the concrete placement was done during the evenings and night-time hours. As concrete can only be placed when its temperature is, at most, 35 degrees, the aggregates are chilled in the concrete plant before preparation and part of the water is replaced with shards of ice.



With three high performance concrete pumps, a sophisticated delivery line system, four non-ballasted stationary booms and challenging concrete mixtures, the Burj Dubai has been under construction since 2005.

Many kinds of concrete mixes were used. Various admixtures – chemical and physical – were put into the basic mix to produce different performance characteristics. Some were designed to limit heat of hydration and cracking while others made the concrete flow better in pipes so it could be pumped easily and retain its properties throughout the building process.

The precise positioning of the formwork was carried out with satellite support. Any deviations from the vertical were kept to just a few millimeters. After 10 to 12 hours the formwork was opened and in 24 hours, completely removed. Every few days, a new level of the building core and deck formwork was completed.

Excluding the massive foundations, there is

230,000m³ of concrete in the tower which represents a solid block with 61m sides; or a footpath 1,900 metres long; or the weight of 100,000 elephants!

The base plate for the tower and the three tower wings was produced by truck mounted concrete pumps with different boom reaches. The 7,000m² foundation is supported by 200 concrete piles (each 1.5m in diameter) for the actual tower and 650 platform piles (0.9m across) for the wings. The piles reach a depth of up to 55m. In total 45,000m³ of concrete was laid for the Burj Dubai's foundations, including the base plate.

So will concrete go the extra mile?

Now that concrete has met the Burj Dubai challenge the question is - will concrete enable the building of the 1,600 metre Mile High Tower, twice as high, currently being planned for Jeddah in Saudi Arabia? Watch this space.

Keeping Track

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Trucks Switch Into Top Gear

Big volume improvements will be made to Firth's Auckland fleet with the arrival of two new five axle trucks. Commissioned to service Auckland's large infrastructure projects, the big vehicles will significantly enhance the concrete volumes Firth can carry which will increase efficiencies.

Gough Engineering in Christchurch, developed the mixer technology that enabled the installation of the Ready-Mixed bowls on the big, five axle trucks.

Firth's National Certified Manager Francis Leslie says existing three axle trucks can only carry a

maximum of 5m³. "The new trucks will allow us to carry an extra 2.6m³ of concrete per trip. On a percentage basis, that's huge. You can only do this with the five axle configuration."

"These trucks will really come into their own when we next supply concrete out of the Auckland Airport Plant. Here we can load them up with 8.5m³ of concrete as we are not subject to strict axle load rules."

The first of the new trucks has arrived and was put to work straight away. Another is due in Auckland in late July.

