

in•site

Rebuild ball starts to roll

A lot of progress has been made this year on the Christchurch rebuild particularly by government departments, schools, and tertiary institutions such as the University of Canterbury.

Their plans are bold and focus on new opportunities, and they position Christchurch to be strong and successful in the future. Private developers also have their eye on development opportunities.

It is very positive and exciting that many projects have now definitely made it to the drawing board and others are underway. The next three to four years will certainly see many of these projects built and completed for us all to enjoy and benefit from.

However, we were frustrated this year when a large 'trusted' player in the construction industry, who had portrayed themselves as solid and certain, defaulted and dumped on us. Hopefully important lessons have been learnt from the Mainzeal collapse. It is important that everyone gets a fair deal all the way down the chain.

The whole team at C Lund & Son has put in a lot of hard work this year. Our building and site management teams have taken on some very challenging projects. Not all of it has been plain sailing, but it has been exciting to be a part of it all.

We hope that all our staff feel they have achieved a lot and can take pleasure from the positive feedback we have received from the clients and consultants we have worked with. It is well deserved.

We have all given health and safety an even greater focus this year, and most importantly encouraged a proactive culture on our sites. We are committed to addressing these issues and to making continual improvements to our company-wide Health & Safety Programme.

We wish everyone a great holiday break and all the very best for 2014. We are all looking forward to Jamie Macgregor joining us in the business early next year. He does cast a rather large shadow though, just like his grandfather.

*See you next year from
Jo, Andrew and Wayne.*





When Mainzeal stopped trading C Lund & Son was under contract to provide the decorative ceiling for the Air NZ Koru Lounge at Christchurch Airport.

MAINZEAL MELTDOWN, SUBCONTRACTORS & RETENTIONS

At the beginning of this year, Lunds Joinery had two subcontracts in full flight for Mainzeal. One was to provide joinery and the feature ceiling for the Air NZ Koru Lounge, the other was for joinery at St Andrews College's new boarding houses.

Mainzeal went into receivership in February 2013 because they could not find \$1.8m to satisfy their bank. The true value of their losses is said to be closer to \$100m.

At the time of Mainzeal's collapse there were statements from industry and media commentators that main contractors do not go under very often so we should not worry about it. These statements are irresponsible. One chief executive claimed that the Mainzeal bankruptcy would just be a 'blip' in six months' time. We doubt he considered his subcontractors when he made that statement.

In reality, when times are good, main contractors can trade solvent but, when the industry slows down, turnovers drop and main contractors can trade insolvent on the back of credit extended by subcontractors. Subcontractors are all unsecured creditors, and most would have no idea about the true financial position of the main contractors they work for.

Their bank ultimately called time on Mainzeal but the bank was in the comfortable position of being a secured creditor.

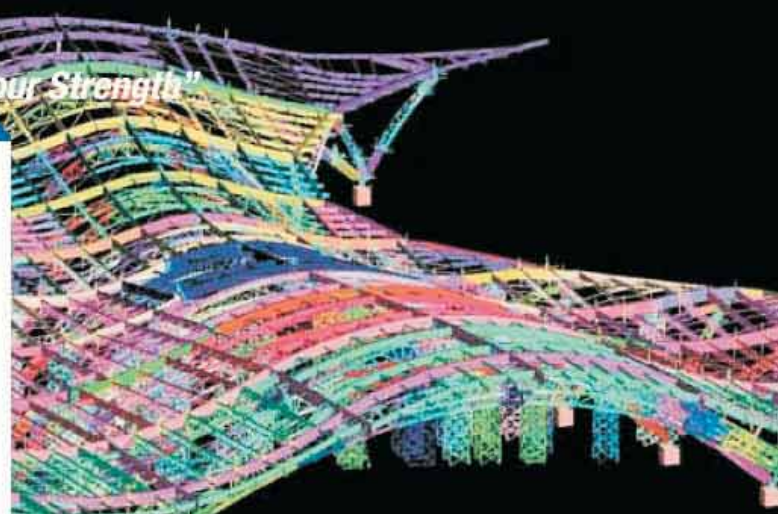
Up to 90 percent of construction work is subcontracted. In a system of monthly payments subcontractors may wait to get paid for their work for 60 to 90 days. Subcontractors front billions of dollars for wages and supplies, and then wait to be paid themselves. Main contractors also deduct 10 percent of what they owe their subcontractors for retentions.

Subcontractors bore the brunt of the Mainzeal collapse.

Retentions are a sum of money subcontractors pay to ensure their work is free of defects. Retentions should not serve as an additional margin for main contractors to keep up their sleeves - to keep their business solvent, for example, or to help them negotiate down the final value of a contract.

We support all subcontracting businesses in their efforts to have issues around retentions resolved. Retentions should be used purely to ensure fault-free work and they should be applied at a level and for a time that are realistic and fair.

A meeting of master builders in Christchurch discussed the suggestion that a one-off 2.0 to 2.5 percent deduction for defects retained at the end of a job would be fairer and adequate for the purpose. This proposal has not made its way to Wellington yet but we hope it will.



A 3D modelling programme details how tower bars are tied into towers at Midfield Terminal, Abu Dhabi.

A stint as 'THE OTHER ENGINEER'

By Jamie Macgregor
For the last 6 months I have been working in London as a temporary works engineer, for a specialist team called Excallos within the international construction firm Robert Bird Group.

Temporary works design is something I previously attributed to shoring and false work. However after having some involvement in a couple of big projects while at RBG it is obvious that there is a growing market for specialists in this area.

As design tools such as parametric modelling and 3D building information models allow more complex and optimised structures to be proposed, the onus is shifting to the contractor to take a technical role in projects, and develop methodologies that allow structures to be built within design constraints such as locked in stresses and deflections.

One notable example is the Midfield Terminal in Abu Dhabi, a huge clear-spanning structure with a total project value of around US\$3.2 billion. RBG's involvement came from the steelwork contractor, who needed help to develop a methodology that would be acceptable to the client and project team, while still being practical from a constructability point of view.

The design engineer had set limits for the utilisation of each member during construction, so it then became a case of creating a full finite element model of the roof to conduct a construction stage analysis. This is no small undertaking on an 80,000 tonne roof structure with up to 180m arch span and 34,000 members.

One of my tasks was to develop a way to close off the arches. Due to the long-spans, the arches were shown to be expanding and contracting up to 50mm each day under temperature alone. It was integral to the original design that the arches were locked off at a known temperature so that the stresses in each member could be analysed.

This involved designing a connection that could be left released, and locked off within about half an hour (before the temperature changed too much), and was then capable of transmitting about 300 tonnes of load across it while the permanent welded splice was made.

Midfield is an extreme example of a project where the temporary works and construction analysis roles were borne out of necessity. There are also a large number of projects where program acceleration methods, such as top-down construction and skinny builds, require a temporary works engineer to validate, design and oversee a particular methodology.

Projects like this are a very different beast to working in Christchurch, with such high levels of complexity comes enormous amounts of administration and coordination. My involvement in this short time has been as a very small cog in a very big machine and the benefits of the standard fixed-price contract structure that is so popular in New Zealand are quite obvious. I'm very excited about getting home and working on the other side of the table... no longer will I be 'the other engineer'.

Experience counts in Arts Centre STRENGTHENING

Over the past decade C Lund & Son has built up a lot of experience in seismic strengthening older buildings. That experience is now a vital asset as their specialist building team gets stuck into repairing and strengthening part of New Zealand's largest heritage complex, the Christchurch Arts Centre.

The Arts Centre's site manager Chris Whitty says C Lund & Son is one of four major contractors working on the complex, and it has responsibility for the northeast section known as the Boy's High Building.

"We received our earthquake insurance money early and we got our work underway before most other places in the inner city. Our aim is to have sections of the Arts Centre, including Boys High, open to the public by mid-2015," Chris says.

"Strengthening these buildings while preserving as much of their heritage features as possible is very tricky work. A lot of it is not easy. It is not standard, it is done in constrained spaces, and there is very little room on site to store materials or machinery."

C Lund & Son quantity surveyor Matt Shankland says the Arts Centre was pretty badly damaged in the earthquakes. The Boys High building lost all but one of its gables and has some serious cracking along

the exterior walls.

To strengthen the building the Lunds team will create a solid internal core with skin walls anchored along the top with in situ concrete beams. Other parts of the building will then be reinforced and tied into this core.

"The building has stone masonry foundations so the first thing we had to do was strengthen them by digging down and pouring new reinforced concrete foundations alongside them. Reinforcing bars were drilled into the original foundations to tie them into the new ones," Matt says.

The core of the building is being strengthened with 150mm-thick poured concrete skin walls. Once again, horizontal rods have been drilled through the existing wall to tie them into the new skin walls.

A modern addition to the building is a lift shaft that is also being built in the core of the building.

A beam will secure the new skin walls on the second level and a capping beam will be added at roof level. A continuous capping beam will also be added to strengthen all external walls.

"We will have to prop up the roof so the walls just below it can be cut down and replaced with the capping beam. The back exterior wall in particular was pretty dicey

and we will add concrete piers to strengthen it before the capping beam goes on," Matt says.

"All of the original floors will also be replaced with a ply floor that will serve as a skin and bracing element. All floor joists will either be replaced or bolted into new joists that are incorporated into the skin walls."

While the C Lund & Son team will install the steel and timber framing that will carry the new exterior of the building, the Arts Centre has its own team of stone masons who do the exterior work. They will cut down the original stones to 150mm thick to do the recladding.

Matt says their builders at the Arts Centre don't have it easy. All the reinforcing steel used to build the skin walls and the slim soldiers used to hold the form work have to be moved by hand because there is no crane access.

Chris Whitty says he has been impressed with the work the C Lund & Son crew has done.

"Their concrete pours have been very good with a nice finish and very accurate boxing. It's very good to see."

"C Lund & Son is a family business and they are good to work with. They fit in and make life as easy as possible."

Tamati Brocherie pouring a concrete skin wall through the roof of the Art Centre.





ST ELMO rebuild

demands innovation and precision



The new building features a unique structure of precast concrete columns and post-tensioned LVL beams.

A building with a pioneering approach to seismic strengthening has presented some unique challenges both to the C. Lund & Son engineers and builders who are constructing it and to the Australian manufacturer who provided the specialised timber beams that are at its heart.

The rebuild of the six-storey St Elmo Courts building in central Christchurch makes use of two technologies that give it more strength and allow it to flex in case of an earthquake: a base isolation system, and a post-tensioned frame structure of precast concrete columns and structural laminated veneer lumber (LVL) beams.

The LVL beams are up to 8.7m long. Interior ducts run the length of the building through the beams and columns, and once they are in place a cable is run through the ducts and tensioned to give added strength to the building.

C Lund & Son general manager Andrew Macgregor says a number of issues had to be worked out to install and tension the LVL beams. Chief among them was propping.

"The timber beams actually become shorter when the huge post-tensioning load comes onto them. In order for the load to be transferred to the structure of the building, each column has to move toward the beam and not bend," Andrew

says.

"This means we could not anchor and grout the base of the columns until the specialist engineers had tensioned the beams. We had to come up with temporary propping that would hold the columns in place, even during an earthquake, but still allow them to move during tensioning. The sequence to install, tension and grout the beams and columns was carefully planned to ensure that the movement occurred where it was intended and the column locations were correct after tensioning was completed.

"The propping was far more complex than in a standard concrete structure. We built some of the props ourselves and modified proprietary systems. It also required a lot of planning and coordinating to get things done in precisely the right order."

Lining up the columns and beams so the cables could be fed through them without damage was also a key part of the operation. It required some very precise work on the part of the precast team and also some innovative steps by the builders.

C Lund & Son engineer James Green says the industry standard in precast concrete beams and panels is $\pm 5.0\text{mm}$ and the Lunds precast team generally aims for $\pm 3.0\text{mm}$. For the St

Elmo Courts job they had to be $\pm 1.0\text{mm}$.

"The cable tendons pass through a line of several beams, and the ducts in the columns and the beams have to line up exactly. If there are sharp edges along any of the joins where the beams meet the columns, it could damage the cables when they are tensioned," James says.

Grout is used to make a seal where the beams meet the columns. This possibility of grout leaking into the conduits for the post tensioning tendons was another dilemma the Lunds team had to resolve.

The solution was to create a donut-shaped gasket made of polyethylene foam that would fit between the conduit in the column and the beam. Builder Tim 'Ringo' Fry experimented with the rings and came up with a way of making them more efficient and easier to insert by slicing them in half and adding a layer of ply to stiffen them.

Another inventive trick the Lunds team used to make sure all the ducts in the columns and beams lined up exactly prior to pouring grout and tensioning the cables was to use a drainage camera.

St Elmo Court is one of the first major rebuilds in the city centre and is on track to be completed in July 2014.

PRECAST team handles some tricky curves

C Lund & Son's precast division has closed out a busy year that was not exactly business as usual. As the year drew to an end it was finishing three major projects, some of which called for panels and beams that were either differently shaped or more precise than usual.

Two of the precast team's big jobs - the DMC and St Elmo Courts rebuilds - were C Lund & Son projects, and they also provided 140 structural panels and beams to Leighs Construction for the Hornby Hub retail centre.

Precast foreman Phil Brook says several of the panels his team made up for the Hornby Hub were curved, including one very large one with sides that were so steep it had to be sprayed rather than poured.

"They were the first curved panels we have done for many years," Phil says. "Lunds Joinery made the curved casting bed for the large one, and a subcontractor sprayed the concrete. It was not a particularly difficult job for us except for the finish. The entire finish had to be done with hand trowels, which was a good challenge."

The big curved panel stayed in its boxing while it was craned onto a truck bed and transported to the building site.

The St Elmo Courts rebuild has also tested the skills of the precast team.

"Some of the columns were three storeys high and they had lots of reinforcing plus technical details for stressing ducts, seating plates and connectors. We have very good quality assurance systems, which helped us make them as accurate as they had to be.

"Paul Barwick was the head of the team that made the templates, moulds and forms.



The curved pre-cast panel C Lund & Son provided for the Hub shopping mall in Hornby.

They did a good job," Phil says.

The DMC building was another high volume assignment with the precast division producing about 150 structural panels, some of them pushing the size limit the precast facility can handle.

The main people on the precast team are Peter Johns, Hayden Coulsen and Nathan Westaway. One of their final jobs for the year was to pour 24 flights of stairs for St Elmo

Courts. They too were a challenge because of the mould requires some tricky steel work.

Two long-serving member of the precast team moved on this year as 'steelle' Mika Rairi retired and truck driver Marty Kaipo switched to operating a crane. They have been replaced by Dean Niethe and Dan Ferris respectively and Phil says they are both stepping up to the mark.

LVL specialist steps up to big assignment

When C Lund & Son came to source the LVL beams for the St Elmo Courts rebuild, there was no one in New Zealand with the capacity to manufacture them so they looked across the ditch.

Timberbuilt Solutions is a Melbourne-based timber engineering specialist that has been manufacturing LVL building systems for more than 25 years.

Timberbuilt general manager Bruce Hutchings says the beams for this project were among the biggest and most technically complex the company has produced.

"Within the hollow box section we had to include post-tensioning cable ducts, deviators and blocks to ensure they could be precisely located to match the ducts in the concrete columns. There were also

holes for shear reinforcement, bolts and service ducts and notches for shear transfer to the overlying concrete slab.

"Our specialised CNC carpentry machine enables us to precisely cut, shape and bore each component before it is assembled. There were up to 44 separate LVL pieces in some beams and up to 1300 steps to make the components for a single beam."

"All these LVL pieces plus hardware had to be glue assembled within the very short time. A very significant challenge."

C Lund & Son general manager Andrew Macgregor says during visits to the factory during manufacture of the beams C Lund & Son staff came to fully appreciate the skills of the Timberbuilt engineers and technicians.



A specialist team from Fulton Hogan post-tensions the LVL beams.

"It required precise machining of the components and coordination during the complex gluing, screwing and bolting steps to successfully assemble the beams. It was clear that the job demanded many years of accumulated experience working with LVL," Andrew says.

Bruce says working with C Lund & Son was very positive.

"They are very professional and we were very happy dealing with them. We felt we were working as part of a team and didn't have everything just shoved down the line for us to sort out.

They were very receptive when it was necessary to work out what we needed to do to make improvements."



C. Lund & Son strengthens modern classic

One of the country's "most charming, respected and well-planned buildings" is how the NZ Institute of Architects (NZIA) describes the residential and office building that noted architect Sir Miles Warren built at 65 Cambridge Terrace in Christchurch.

The modern classic is an icon for New Zealand architects and is still in use as commercial offices, and the meeting rooms of the local Branch of the NZIA. The charitable Warren Trust owns the building and devotes the funds it generates to support architectural education.

Completed in 1962, 65 Cambridge Terrace is essentially two double-height boxes on legs, arranged either side of a central stair and crowned with a pair of signature Warren and Mahoney 'carpentry bravura' half-gable roofs.

Thanks to some prompt interim strengthening work after the September 2010 earthquake, it survived the much stronger February 2011 shake. Nevertheless it was in need of repairs and further strengthening work.

A team of C Lund & Son builders led by John Taggart spent six months in 2013 carrying out this work. It entailed adding new foundations, strengthened ground and first floor walls, rewiring throughout, a new fire detection system, re-roofing, and a fresh coat of paint.

The crew says it was rewarding work that

will go largely unnoticed because the whole point of the exercise was to strengthen the building while maintaining its original appearance.

C Lund & Son quantity surveyor Matt Shankland says to reinforce the foundations of the interior walls and columns it was necessary to cut out the floor, trench along the existing foundations, and then pour new foundations to buttress the existing ones.

New 100mm insitu shear walls were added along one side of the interior ground floor walls. Holes were formed in the floor above so concrete could be poured into the formwork to create the full-height walls.

Different technology was used to strengthen the first floor interior walls. The walls were first ground, then epoxied, and finally a carbon-fibre skin was added to provide the reinforcing. A plaster finish ensured only a skilled eye would detect them as not original.

One of the most tedious parts of the job was to strengthen the original concrete block walls by drilling into every block and grout filling to suit.

Warren & Mahoney principals Richard McGowan and Barry Dacombe oversaw the strengthening work, designed by Hamish Neville of Holmes Consulting Group, the building's

original structural engineer. Richard says it was a fiddly and challenging project undertaken in difficult conditions during the winter months but the results have been spectacular.

"It was a difficult job with tricky alteration work that had to be carried out in confined spaces. The C Lund & Son team did an exceptional job. Not only was the building work exemplary, the communication with the management was also very good at every stage of the project."

"The tender, contractual arrangements, sequencing of work and cost reconciliation were all very clear. They were proactive in their repair strategy, the reporting was absolutely transparent, and the on-site management was excellent," Richard says.

"They have achieved a seamless and almost invisible strengthening and repair of one of New Zealand's most well-regarded modern buildings. In terms of Christchurch's earthquake recovery, this represents a rare and welcome win for heritage architecture."

"The building is now preserved for the future and once again useful in the present. All our tenants are back in the building, well ahead of others elsewhere in the central city."



Long, skinny building presents a challenge



Billy Gloag working safely.

A four storey precast panel car parking building with office spaces is the kind of job C Lund & Son normally takes in its stride but the assignment is not so straightforward when it is a long, narrow structure that has to link into existing building on both sides.

The work to build the DMC building that fronts Moorhouse Avenue in Christchurch began in late 2012 and it will be completed early 2014. The task was to replace a carpark building that partially collapsed in the earthquake in a space that is about 25m wide and 100m long.

C Lund & Son contract manager Kim Smythe says because of the narrow shape of the site, it was not possible to build each level of the building in one go as would be

the case in a normal site.

Tying into the existing office buildings on one side and the existing carpark building on the other also presented some challenges. Seismic joints had to be put in place along the walls and the floors on each side of the new building.

"Our builder Kevin Lane took on the assignment of installing the seismic joints," Kim says. "It was a big job and I am not sure he was too thrilled to get it but he did a good job. The joints along the floor have cover plates and a spring system to accommodate car traffic while the vertical joints along the walls have a rubber core."

The job also included adding two storeys to the existing buildings' lift shaft and stair wells. To extend the lift shaft C Lund & Son took a

unique approach and worked with Pegasus Engineering to prefabricate the steel-framed and gib-lined structure at its yard. It was then transported to the site and craned into place.

"It was much easier to work on the shaft at ground level than working in an occupied building. When we lifted it into place we had to peel back to roof to drop it into place," Kim says.

The job entailed a number of variations from the original assignment, including grinding out and grouting hundreds of cracks in the floors of the existing carpark.

C Lund & Son also got the contract to fitout the offices of the law firm and Yellow Pages, which will occupy the new office space in the DMC building. Lunds Joinery provided the joinery for the fitout.

Variety is healthy for Lunds Joinery

The pace of the post-earthquake rebuild is now picking up and Lunds Joinery is pricing some contracts for next year but over the past two years it has had to scramble a bit harder than usual to find work.

As a result it has carried out an assortment of projects for clients that include not only C Lund & Son construction division but also other commercial and residential builders from Queenstown to Christchurch.

Lunds Joinery sales and contracts manager Mark Albert says Lunds Joinery supplied joinery for the strengthening of 65 Cambridge Terrace and the fitout of the offices in the DMC building in Christchurch.

"Cambridge Terrace is a heritage building and we helped refurbish the interior. We made solid timber doors to match the existing doors and our other work was designed to complement the original designs.

"Over the past few years we have done a number of jobs for the South Canterbury company Thompson Construction and Engineering. We have designed and supplied the joinery for a number of their buildings.

"Along with the Drummond & Etheridge fitout, we have provided joinery to Thompsons for the Rural Transport offices in Ashburton, Prattley Industries' offices in Temuka, SRS head offices in Temuka, and Farmers Mill offices in Washdyke."

This year the Lunds team provided cabinetry and other joinery for a number of high-end houses. This included a stained American white



Lunds Joinery made the large service desk for Drummond & Etheridge's new premises in Rolleston.

oak kitchen for the Coupland house in Timaru, and melamine and timber veneer joinery for High Peak Station and Whitehead house in Ashburton.

"Another interesting job we have done this year is to supply joinery for the refurbishment of the administration area and distinguished visitors rooms at Scott Base in Antarctica. The joinery units had to be finished to meet the deadline for the one and only ship heading to

the ice in the new year!"

Mark says Lunds Joinery is working with a new management structure. He, Andrew Patterson and office administrator Gaya Griffin work together and share responsibilities while carrying out their own specific roles.

"We are looking forward to getting stuck into some large scale jobs as the Christchurch rebuild gathers momentum," he says.



MEET THE SUBBIES

Purposeful painter proud to be part of C Lund & Son team

Not every commercial painter gets a chance to pose with penguins but John Lyall's business has taken him far.

JL Decorating Ltd provides commercial and domestic painting, wallpapering and decorating services, and its biggest client is C Lund & Son Ltd.

"We have a team of seven people, that includes six hands-on painters and me," John says.

"Our commercial work includes painting and specialist coatings. We are licensed applicators of Equus Industries products, which include membrane coatings, water proofing and floor coatings. We can handle all types of wallpaper including mural patterns and

specialised fabrics and glues.

In addition to commercial building projects John and his crew also paint and redecorate for corporates, working office buildings and a number of major Christchurch retailers.

"Most of our work is done with brush and roller though we do use the spray gun on surfaces that do not need to be retouched," he says.

The quality of John's work has earned him three trips to Antarctica to repaint the inside and outside of New Zealand's Scott Base.

"Each trip lasted three weeks. I did exterior walls and window frames and interior walls and floors at Scott Base. The inside surfaces take normal paint but the exterior



John Lyall (right) and his company have subcontracted to C Lund & Son for 20 years.

paint has to stand up to extreme conditions so the paint is mixed 4-to-1 with boiled linseed oil. It would never dry here in New Zealand but Antarctica is the driest place on earth," he says.

JL Decorating's working relationship with C Lund & Son Ltd goes back 20 years.

John says he likes working with the company because it is a family-oriented firm that is very professional.

"Everybody seems to cooperate better than with some other firms. That includes management,

quantity surveyors, project managers and foremen. Everyone is approachable and pleasant to deal with.

"It is easy to work in with them and give feedback. If there is a lot of 'aggro' on a site you might hold back from making a comment or suggestion to do the job better but not with C Lund & Son."

In recent years JL Decorating has done the painting at such C Lund & Son projects as the City Mission, fire proofing Manapouri power station, the DMC building, and 65 Cambridge Terrace.

Social Club tries trains, tree tops and 10 pin bowling

When the plans C Lund & Son's Social Club made for a big weekend in Queenstown fell through it could have been a fizzer but fortunately crane operator Rusty Ross came up with a very good 'Plan B'.

Social Club members and their partners took the KiwiRail's TranzAlpine train to Greymouth to sample some of the delights of the West Coast.

The outing offered lots of options with some people making the train trip on Saturday and some on Sunday. Some stayed overnight and some made the round trip in a day.

Once in Greymouth people had different options as well. Some carried on to Hokitika where they went on the West Coast Treetop Walk, while others stayed in Greymouth and toured Monteith's Brewery.

On Sunday some of the party travelled up to Punakaiki to check out the pancake rocks while others found a pub near the railway station where they held court until the return trip across the Alps.

Earlier in the year the Social Club had a night of 10 pin bowling followed by a session at a nearby pub.

Engineer James Green says the social activities are a great way to see people in the company who work at different sites in an informal atmosphere, where people are less reserved and professional.



Farewell Judith

Early 2013 Judith McLintock retired after 18 years looking after our wages payroll and in a support roll for accounts. We wish Judith a very happy and long retirement.



C. Lund & Son
wishes all its
staff and
colleagues in the
building industry
a happy
Christmas and
New Year.



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