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The Bulletin Kaikōura earthquake update



NEW WORKS AT ŌHAU POINT

The crews at site 6 and 7 around Ōhau Point recently achieved a massive goal of getting the seawall up to height, as well as shaping it to accentuate the surrounding reef and beach, and they are already hard at work on their next project.

Around Ōhau Point, the new alignment of State Highway 1 (SH1) has been lowered by 14 metres at the Ōhau Point corner, and shifted about 30 metres away from the cliff face. It is difficult to imagine the old alignment, which was almost entirely covered by the massive slip caused during the November 2016 earthquake.

Project engineer Tomislav Diklan says the crews will be busy clearing slip and debris material from the old alignment of SH1 as well as shaping and trimming an earth bund to three to four metres high as protection against any future movement.

One team will be forming a green terramesh bund 80 metres long, south of Ōhau Point, just before the tunnel. At the same time a shotcrete crib wall north of Ōhau Point about 60 metres long will be constructed to blend in with the surrounding landscaping just below the earth bund. Crews working from both ends of the slip will meet in the middle as their projects near completion.

An 800 metre long rockfall catch-fence will be installed as primary road protection, while the roading team works to complete the sealing of the road and streetscaping of the new SH1 alignment. Embankments between the old and new culverts at Ōhau Stream require completion.

'It's a very exciting time for us. Last year we were working from both sides of Ōhau Point, putting in a work track and clearing material in order to get the road open, and now the road is open and each day as we work, we are visibly closer to what this area will look like when the project is finished,' says Tomislav.



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The pre-earthquake SH1 alignment

This bulletin provides the latest information about the rebuild of road and rail networks damaged by the Kaikōura earthquake in November 2016. The bulletin is produced by the North Canterbury Transport Infrastructure Recovery (NCTIR) – an alliance representing the NZ Transport Agency and KiwiRail, on behalf of Government.





ALTERNATE ROUTE - TRAFFIC VOLUMES BACK TO NEAR PRE-EARTHQUAKE LEVELS



With the reopening of State Highway 1 to 24/7 operation, traffic volumes on the alternate route are back to near pre-earthquake levels.

The NZ Transport Agency is expecting to soon hand the alternate route from Picton to Christchurch, via the Lewis Pass, back to the maintenance contractors to manage as 'business as usual'.

The alternate route has proven to be a resilient route with more than \$65 million of improvement works undertaken since November 2016. The Government's \$60 million of funding was used for essential safety improvements including widening, slow vehicle bays, bailey bridges, additional safety barriers and rock fall protection, and road renewals (resurfacing and reconstruction).

There are still improvements and maintenance work to be completed along the route, which has been deferred to the summer 'roading season' in 2018/2019. Drivers can expect to still see maintenance work as the winter programme begins ensuring the road is safe over winter.

Network operations manager Tresca Forrester says the past 18 months has been challenging for drivers with the sheer intensity of so many stop/go sites on this route, but overall people have been supportive and provided positive feedback around the long term benefits of this work.

'With more than 30 worksites in its peak and traffic from the closure of SH1 using this route it was a challenging and intensive time.

'Special thanks to the Police who have had a dedicated team supporting road safety along this route over the past 18 months which has been critical for keeping our teams, the community and road users safe.'

Tresca added; 'as well as acknowledging the patience and support of the residents and driving community, we also want to recognise our road crews who have worked on a tough and considerably accelerated programme to achieve so much and keep the road open'.

'Many lived away from family to be on call 24/7 over winter to keep the road safe and open as much as possible.'

Like last year, this winter the Lewis Pass will continue to be either open or closed, and this is expected to remain in place until the work on SH1 is complete.

CHECKING ON ROAD STATUS

The winter months for June to August can provide challenges to road users. As we have experienced this week weather can cause road closures or delays.

Travel information, journey times and road conditions can change at short notice.

It is important to plan ahead and stay safe by staying up-to-date with conditions and road status by:

- Call **0800 4 HIGHWAYS** (0800 44 44 49)
- Visit **www.journeys.nzta.govt.nz**

Check at least two hours before you travel in case you need to change your route.

To check whether State Highway 1 north and south of Kaikōura is open or closed always check **www.nzta.govt.nz/p2c** for the live status of the road.



BAILEY BRIDGES TO BE DECOMMISSIONED

Three Bailey bridges on SH63 at Upper Buller, Homestead and Speargrass that were installed next to permanent one-way bridges to help manage the increase in traffic volumes on the alternate route, will be decommissioned later this month as traffic volumes have now returned to pre-earthquake levels.

Once these bridges are decommissioned, signage will be in place to clearly identify the give-way rules returning to the permanent one-way bridges that are alongside them.



ALWAYS PLAN FOR AN EMERGENCY

Safety of our teams has always been a top priority for the Kaikōura earthquake recovery and rebuild programme. Last week as part of our efforts to be prepared for any emergency we undertook a collaborative and evolutionary practice scenario between NCTIR, Helicopter Suppliers, Abseil Contractors, Mines Rescue Services and specialist ropes rescue advisor Over the Edge Rescue. Together we safely carried out a practice rescue scenario requiring the evacuation and treatment of an injured abseiler from the slope at Slip 6 at Ōhau Point.

The response included initiating the site emergency response plan by the scene controller, incident control through KERC (Kaikōura Emergency Recovery Centre), mobilising the on duty Abseil Rescuer to site with first response equipment, and the deployment of the Human Sling Load rescue helicopter and crew.

‘It’s one thing to talk about something, it’s another to do it in practice,’ says safety, health and environmental advisor Ryan Sutherland.

‘Our abseiling crews are working on steep and unstable terrain which provides unique challenges in preparing for and responding to an emergency. The rescue scenario was an opportunity to build confidence in our abseiling teams so if something was to go wrong they know what we can do to help and how they can help themselves in the immediate. ‘These efforts have also afforded us with the ability to launch a timely response to emergencies in the difficult access work areas we are working in.’

In addition, the exercise provided insight to our teams for how to improve preparedness and response so the safety of our crews is guaranteed.



Join us for an **information evening** for a project update and find out more about the improvements work of the Kaikōura coastal corridor

When Thursday 28 June 2018, 5.30 – 7.30pm

Where Kaikōura Museum, 96 West End



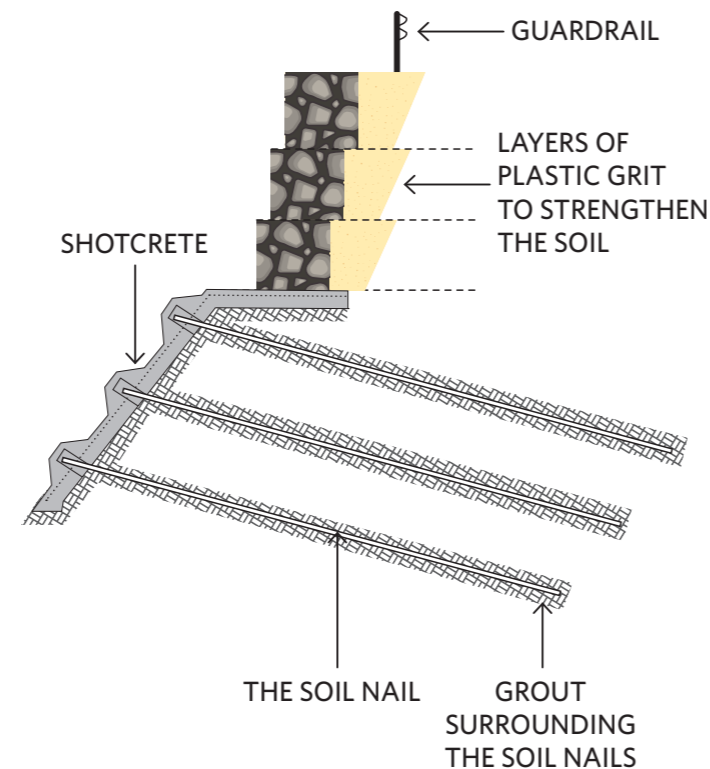
REBUILDING A ROAD: WHAT LIES BENEATH?

Many considerations are taken into account when designing and building highways. It's a balance of finding the best fit for the topography of the landscape, the geology of the site, the safety of the construction crews, and minimising environmental impacts while creating safe and enjoyable journeys and aiming for ongoing low cost maintenance.

Our designers, engineers and construction crews have incorporated these factors into the design and rebuild of State Highway 1 after the 2016 earthquake. On the Hundalee Hills, part of the highway slumped down the hillside in the earthquake. In one area we are using four different types of retaining walls to stabilise the natural geological material beneath the road. While not visible to drivers these retaining structures will support their vehicles as they drive along the route.

Soil nails

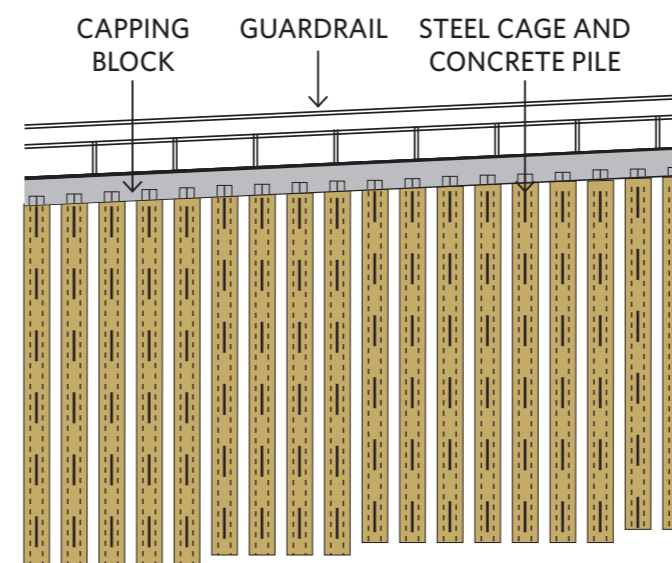
Soil nails stabilise the hillside lying under the road. Typically six to nine metre long steel bars are drilled into the hillside slope. Grout is pumped into the drill hole with the steel bar to fill voids and surround the nail. How many nails used at any given site will depend on the stability of the soil and the site topography. Steel reinforcing mesh is laid over the surface of the slope over the tops of the nails. Then a layer of shotcrete – a spray on concrete – is applied on the exterior over the nails to create extra stability and protect the slope. The road is then rebuilt over the newly stabilised earth below it. At the area on the Hundalee Hills gabion baskets have been used on top of the soil nail sections to build up the road height to achieve the required road ride improvements.



Bored concrete pile retaining walls

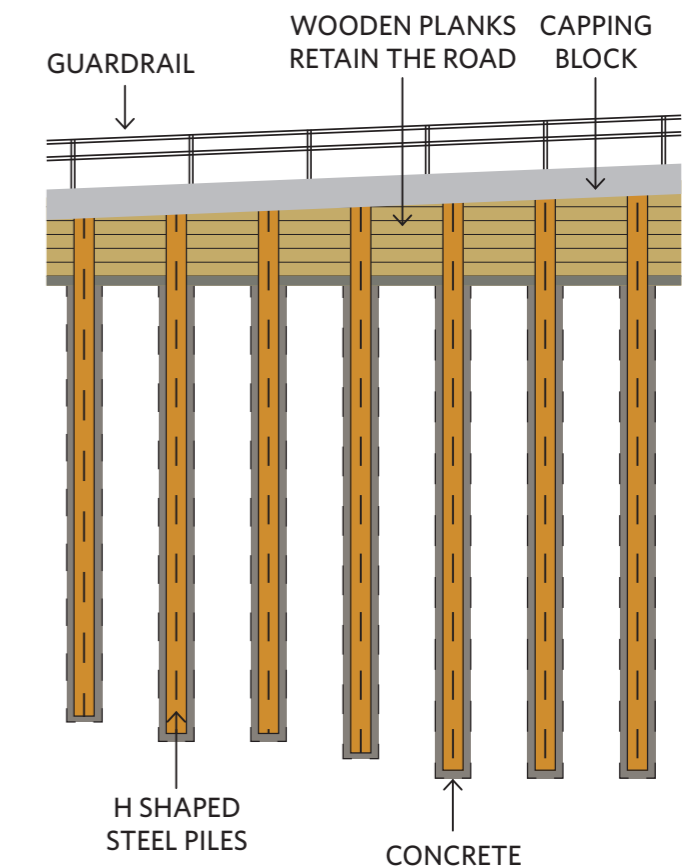
Another structure designed to bring stability to the Hundalee Hills route and the traffic which moves over it are bored concrete pile retaining walls. The cranes, diggers, and rigs drivers and passengers can see on the side of the one way sections over the Hundalee Hills are being used to build two of these walls. Metal tubes, called casings, up to 800mm wide are pushed into the ground 12 metres deep. The material captured inside the casing is bored out, circular steel cages are inserted inside the now empty holes, and concrete is poured in with the steel cages, the casing is then removed. The concrete sets around the cage with the soil surrounding it. On one of the walls anchors are used near the tops of the piles and are placed horizontally under the road. Capping blocks are put on top of the piles before the road is built across the top of the piled walls.

Before work could begin at this site our crews had to do temporary works so the heavy machinery could fit. Sheet piling holds up the side of the hill so work can be done. Once the retaining walls are completed the sheet piling will be removed and reused as part of the walls creating extra stability.



King post walls

These walls are often built using H shaped steel piles. As with the bored concrete pile walls metal casings are pushed into the ground. The material captured inside the casings is bored out, the H shaped steel beams are placed inside the now empty holes, and concrete is poured around the beams, the casing is then removed. Treated wooden planks are placed between these steel piles in the top three or so metres of the wall to retain the road. The balance of the structure is below ground. The retaining wall holds the soil behind it in place – this type of wall is relatively easy to build and have been built where there is suitable geology and the safety of crews constructing them could be guaranteed.



Designing a safe system

New Zealand roads are designed to create safer, enjoyable journeys.

The NZ Transport Agency has been committed to a 'Safe System' on New Zealand roads since 2010 to reduce fatalities and serious injury. The Safe System focuses on safe speeds, safe vehicles, safe road use, safe roads and roadsides. It acknowledges drivers make mistakes and accidents will occur, however the key is to reduce the risk and likelihood of serious injury or death.

Throughout the design process many factors are taken into account with the aim to provide drivers with a self-explaining road. Factors include the shape of the corners and how they are coordinated with the vertical profile to avoid 'hidden' elements.

Other items like painted lines, edge markers and signs are used to guide a driver along the road. Where there are hazards along

the side of the road which cannot be removed barriers are positioned to protect drivers from these objects.

Drivers may not consciously be aware of it, but these parts of the Safe System communicate how to navigate safely along the route they are travelling. Speed is one of the biggest considerations in road design; the shape of the road is determined by an ideal speed, which keeps vehicles on the road, passengers travelling comfortably, and the possible outcome of a collision at the given speed. For example, speeds given around corners are calculated to keep you and other drivers safely on the road.

Our engineers and safety auditors have brought these elements into the design and rebuild of State Highway 1 north and south

of Kaikōura. When looking at the road through the Hundalee Hills and the topography of the landscape – windy, narrow, and along hillsides – our teams are designing and building a transport system to keep people safe and on the hillside road. The road has been built up, the geometry of it attuned to ensure a safe drive, guardrails are being installed.

We're also aiming to improve the resilience of the road so it reduces the need for maintenance and thus exposing road crews to risk of working on the road, while ultimately providing New Zealand with a safe and cost effective State Highway network.

Check out this great video into the science of the Safe System: <https://youtu.be/mFcLUCtUAzc>



IMPROVING TRAIN SPEEDS

Trains will soon be able to travel faster through an area north of Kaikōura as repairs of Rail Bridge 113, just south of Irongate Bridge, are getting underway.

Trains have had to slow down considerably to cross the bridge because its piers were cracked in the 2016 earthquake.

‘While the cracks are significant trains have still been able to use the bridge, but at a reduced speed to minimise vibrations,’ says structural engineer, Fabrizio Biserna.

The team on-site has repaired the cracks and will now build intermediate pier infill walls, filling the existing gap between the columns. This will make the cracked piers redundant as it will shift the load onto the pier infill.

At the same time work is being done to the track just south of the bridge, which will also improve train speeds through the area. New rail tracks will be laid to replace older rail tracks initially laid in order to get the line open again as quickly as possible.

‘Completing both of these jobs will enable one of our most onerous speed restrictions on the Main North Line to be removed. Removing it will make a decent difference to the speeds at which trains operate in this area and will help us to increase our reliability for our customers,’ says KiwiRail asset owner representative, Daniel Headifen.

Our design and construction crews on this project are working closely with our environment team to ensure Blue Duck Steam flowing under the bridge is well protected from the construction work.





HARBOUR FOLLOW UP WITH WRAP UP WORK

The weather isn't making it easy, but NCTIR is working towards putting the finishing touches on repair works at the South Bay marina. The distinctive specialist dredging vessel (pictured) arrived at Queen's Birthday Weekend to do a final sweep of the harbour to confirm the basin's depth. The final work will be the installation of navigational aids to mark the approach to the marina.

The marina sustained extensive damage in the November 2016 earthquake when the seafloor under it lifted by about one metre, resulting in significant new navigation hazards. The marina, and Coastguard Kaikōura's neighbouring boat ramp, were largely unusable outside of high tides.

Both the inner and outer harbour required excavation, in particular the breaking up and removal of limestone bedrock. This work had to be completed before the replacement structures such as the mooring piles, vertical seawalls and jetties were constructed.

Close collaboration with tourism operators and key stakeholders meant improvements were incorporated into the final marina design to facilitate future growth and prosperity, such as the ability to berth larger vessels and the safe transfer of tourists from cruise ship tenders.



SITE 9 TEMPORARY PROTECTION HOLDING UP

Intense rainfall brought down rockfall at site 9 near Waipapa Bay last week, and again this week during the wet weather. A temporary concrete wall, installed last year, provided the necessary rockfall protection doing exactly what it was intended to do in such a situation - stop the falling rocks from reaching the rail and road. This temporary rockfall protection wall is due to be replaced by a higher bund offering permanent protection to the road and rail, both of which will soon be realigned closer to the coast line and further away from the vulnerable hillsides.





HIGHWAY HEROES

We had some lovely feedback recently from Nell Mooney about our traffic control people along the State Highway 1 route.

'It rained all the way as I drove from Blenheim to Christchurch today down State Highway 1 but that didn't prevent the stop/go workers from smiling and waving repeatedly at the long lines of passing traffic. This is not an unusual experience when travelling that coast road since the 2016 earthquake. From the day the road was reopened to Kaikōura and then further onto Blenheim those workers have continued to make the trip quite an enjoyable novelty. I can't express how valuable that is for Cantabrians who are so tired of facing road works. I know I'm not alone in this opinion as everyone I speak to is equally impressed. So massive kudos to everyone who is working to fix our beloved east coast road but a special thanks to the traffic controllers who warmly accept and return our appreciative waves and smiles no matter the conditions. Keep up the great work!'

Spray Marks traffic controllers, Laura and Koha were out managing traffic this week during the wet weather. Local resident Koha has been managing traffic along the coastal route for over a year now.

'I love my job and love seeing the progress along the route. We are a friendly bunch and keep warm with hot soup daily with warm gear to protect us. Depending on what we are doing we may need to use umbrellas.' Koha says.

Spare a wave and a thought for our staff in their high vis layers as they take in the fresh winter air!

