**PROJECT PROGRESS**

Progress on the Dowse to Petone Project over the last two months has been very satisfying.

Hutt City residents will be pleased to know that the project is running to schedule and the team is on target to continue with steady progress throughout 2008.

Motorists travelling along SH2 may have noticed the columns for the new Dowse Interchange protruding from the ground alongside the railway line near the temporary traffic signal controlled intersection.

This is the first visible sign of what will become the new interchange structure connecting Dowse Drive and Hutt Road with the highway.

**MAJOR ACHIEVEMENTS**

Some of the major achievements in the last two months include completing 45 piles over seven different parts of the project site for the various structures throughout the project, creating a new (temporary) Park ‘n’ Ride area at Petone Station, and carrying out stage one of the Petone Park ‘n’ Ride footbridge upgrade.

The major traffic events we have had to date have all gone reasonably smoothly. The small initial northbound traffic diversion at the Dowse Intersection was implemented without incident and the team has been very satisfied with the level of cooperation from the public regarding the altered intersection layout at the bottom of Dowse Drive. Motorists have also managed the installation of southbound traffic signals at the Dowse Intersection well.

Motorists may have noticed the new span of the Petone Park ‘n’ Ride footbridge across SH2 at the Korokoro intersection, which was put in place overnight on 26 January. This is the first major bridge span lift of many on the project.

This complex job allowed the team to shift pedestrians from the old footbridge to the new span (in its temporary position) in order to demolish the original foundations and create new ones, while still allowing pedestrians to use the bridge to cross SH2 safely.

The other significant achievement so far is the installation of the Petone Station footbridge. The installation was the main driving force behind the initial preparation is underway to move the footbridge into its final position, a new northbound diversion is being finalised to allow the project’s construction to move into the section of SH2 between the Petone overbridge and Korokoro.

This minor deviation will move road users heading north off the current highway alignment and onto what will finally be the new Pito-One Road service lane running parallel to SH2.

At the same time as this change, one of several subtle shifts that will occur along this length of the road during the project, will allow the contractor to begin work on the new MacKenzie Avenue (Petone Station) overbridge into and out of the Park and Ride facility. It will mean that demolition is also a step closer for the building formerly known as “J Block” from its former life as part of the local polytechnic.

This new diversion will be opened as soon as it is ready, after work has concluded for the Petone Station footbridge.

**CURRENT WORKS**

Work at the Hutt Road area of the project continues in full swing, with a new wall at 410 – 420 Hutt Road becoming visible. This ‘Mechanically Stabilised Earth’ (MSE) wall will form a large part of the ramp between SH2 and Hutt Road. The pedestrian access structure at the end of Hume St is also now complete and used by pedestrians daily to access Hutt Road.

**FUTURE WORKS**

Looking ahead, work on the road over the long Easter weekend will finish by midday Thursday allowing those travelling out of town an easy drive through the site. Construction affecting the road will resume after midday on the Tuesday.

**ANOTHER MOVING EXPERIENCE**

The Petone Station footbridge will be manoeuvred into its final position overnight this coming Saturday (23 February).

It will mean a further closure of SH2 between Korokoro and the Petone overbridge from 8pm until 8am, but the footbridge upgrade will be almost complete as a result.

**DROP-IN**

Want to find out more about what’s been happening and what’s coming up?

The project team will be hosting another of their regular drop-in sessions in March where you will have the opportunity to see and hear for yourself the progress that’s been made and ask any questions.

When? Wednesday 5 March, 7pm – 8.30pm

Did you know?

- **The Wellington region has a number of active earthquake faults, but the major ones are the Ohariu Fault (from Kapiti to Makara) via Transmission Gully and Pehi Ki Te Rua, Wellington Fault (from the Tararua Ranges to the Wellington south coast via Hutt Valley, Wellington Harbour Bed, Tinakori and the Karori Stream) and the West Wairarapa Fault (running up the eastern side of the Tararua and Rimutaka ranges).**
- Only the West Wairarapa Fault has moved in historical times (1855), but all these faults have left evidence of recent activity (within last thousand years or so).
- The Wellington Fault is of particular importance to the D2P project because its surface trace is projected to pass beneath the ramp from Hutt Road at Hume Street in the event of an earthquake.
- In the area of the project evidence of a horizontal rupture of the fault is not visible. However the “step” left by the vertical movement of a number of earthquakes is visible where Hume and Te Mome Streets drop sharply away from Hutt Road.
EARTHQUAKES - ENGINEERING THE PROJECT THROUGH ITS FAULTS

Wellington is well known for its many fault lines that cross the region and have given many residents cause to consider if the earthquake they’re experiencing is “the big one”.

With this and the recent focus on seismic activity after the Gisborne quake prior to the past year, it seems sensible to elaborate on how these naturally occurring events have been factored into the D2P project.

The bridges on this project will experience many earthquakes over their lifetime as bridges, structures and buildings elsewhere in Wellington do. The 2.7km length of highway being upgraded on the D2P project lies alongside the Wellington Fault, which created the hills on the Western side of Hutt Valley. In addition, the Wairarapa fault, which shaped Wellington’s landscapes in 1855 during New Zealand’s largest recorded earthquake, is just over 20km away.

In the lower North Island, these two plates grind together at an angle, with the Pacific Plate sliding along and underneath the Indian-Australian Plate, at an average rate of around 50mm per year (the rate at which fingernails grow). The Wellington and Wairarapa faults form part of this boundary between the two plates.

Earthquakes happen when friction between rock planes along a fault line prevents the plates from moving smoothly past one another. This creates a build-up of energy that can be released suddenly in the form of a rupture or earthquake.

While we cannot accurately predict when earthquakes will happen, we can make estimates on the size and regularity of them occurring along particular fault lines. Based on observations of the geography around the Wellington fault, we are able to determine that this fault ruptures every 500 to 700 years. The last rupture at the Wellington fault was between 300 and 450 years ago, and so we believe this fault will be the most likely source of a major Earthquake that the D2P bridges may experience.

Based on what we know about the Wellington fault, the maximum credible earthquake that could happen on the Wellington Fault is a rupture of magnitude 7.3 at the surface.

MSE WALLS

Ground movements at the fault’s location are expected to be about four to five metres horizontally, and one meter vertically.

It’s difficult to build a bridge-type structure that can cope with the ground movements mentioned above, so a special system using mechanically stabilised earth (MSE) walls has been chosen to form the ramps for the Dowse East bridge of the new interchange.

This type of structure is expected to be very tolerant to ground movements of the extent anticipated. Should the MSE ramps experience the ground movements expected in a rupture of the Wellington fault, we would expect some damage to the structure, but this damage would be quickly repairable.

EARTHFORCE

The severity of horizontal and vertical shaking from the fault rupture depends on many things. The magnitude value of the earthquake is of little use to a structural engineer, as this is a measure of the energy released at the earthquake’s epicentre. It does not describe the ground accelerations that cause damage to structures. Much like a fighter pilot experiences G-forces from the acceleration of his jet, structures experience G-forces caused by acceleration of the ground beneath them. This acceleration can be predicted, and the resulting force on the structure from the earthquake can be calculated.

The bridges on the D2P project have been designed to remain stable in a major earthquake; however, we would expect to see some damage after a very strong earthquake. They are therefore deliberately designed so that any damage is concentrated in certain locations, called seismic fuses. Similar to electrical fuses, seismic fuses are sacrificial points where damage can be focused, controlled and more readily repaired. The locations of this damage will ensure that the bridge can still be used with some repairs, so that emergency services and supplies can still get through to Wellington.

ON THE JOB

Tom Watson - Beca Site Engineer

Tom is the on site structural representative for Beca, the engineers that carried out the design for D2P.

His role on site is to make sure that the construction works for the seven bridges on the project are carried out to the high standard expected by Transit.

In additional, he helps to answer the contractor’s queries regarding the structural design.

“My experience in contracting means I know where the contractor is coming from in most instances.”

However, structural engineering wasn’t the career path he intended to pursue. Tom says he originally wanted to become a mechanical engineer after working for a bus building company in Palmerston North.

It wasn’t the greatest of work, but it gave him a lot of time to think about what he wanted to do in future – design buses rather than build them.

Now, he is designing things far larger than buses and working as a structural representative for Beca on Transit’s biggest state highway roading project in Wellington.

Tom says he is enjoying the challenge of the D2P project because he’s able to see the product of his efforts.

“It’s really satisfying to see something being built. Plus it’s a huge project for Wellington so it’s good to be a part of it.”

Tom originally hails from Opiki, 20km south of Palmerston North, doing his engineering degree in Auckland, but really lives in the Capital City.

“Wellington is a cool city with great atmosphere. I couldn’t picture myself working anywhere else in New Zealand at the moment.”

WHAT ARE EARTHQUAKES?

What causes them? Well, basically, earthquakes are caused by the earth’s “plates” (small sections of the earth’s hard, shell-like outer surface) colliding with huge force causing one to slowly grind under the other. More than 14,000 of these earth movements happen in and around New Zealand every year. Most of these quakes are too small to be felt, but up to about 250 are big enough for us to notice a rocking, swaying or shuddering feeling underfoot.

Across the world there are 500,000 detectable earthquakes with 100,000 of them felt and only 100 causing damage.

WHICH QUAKES?

The interior of Antarctica has earthquakes and icequakes. These are much smaller than earthquakes and also more frequent.

There are even quakes on the Moon! Moonquakes happen less frequently and have smaller magnitudes than earthquakes on Earth. It appears they are related to the tidal stresses associated with the varying distance between the Earth and Moon.

Thanks for your patience while we improve your journey.

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