

CPR – REBUILT TO LAST

Bonville Upgrade, Coffs Harbour, New South Wales (NSW) Australia

>>> DIAMOND GRINDING OF PLAIN CONCRETE PAVEMENT (PCP)

KNOWN AS ONE OF THE MOST dangerous and deadly stretches of road in Australia, the Pacific Highway contains long sections of undivided road along which all types of vehicles travel at speeds of up to 110 kilometers per hour (68.2 miles per hour). A substantial amount of this roadway is undivided so there is a very high risk of head-on collisions. In an effort to combat these issues, the Roads and Traffic Authority (RTA) NSW determined certain sections needed to be divided into a dual carriageway. The particular section for discussion is the Pacific Highway Bonville Upgrade. This major transportation route in eastern Australia is 9.6 kilometers (5.9 miles) long, and is a small plain concrete pavement (PCP) link between Sydney and Brisbane that was completed in 2008. The new pavement consisted of approximately 4.5 kilometers (2.8 miles) of PCP and approximately 5 kilometers (3.1 miles) of Continuously Reinforced Concrete Pavement (CRCP) with stone matrix asphalt (SMA) overlay. Subsequent roughness tests carried out by the RTA resulted in an average smoothness of 59 counts/km (144.46 in/mi IRI) when measured using the National Association of Australian State Road Authorities Roughness Meter (NRM), which is outside of the RTA specification. A plan to implement diamond grinding was developed.

The project involved grinding various areas on both the northbound and southbound carriageways, which included six on/off ramps to achieve a roughness of less than 35 NAASRA roughness counts (86.80 in/mi IRI). Conventional diamond grinding of this 54,000 square-meter (64,000 square-yard) section of road was done by way of an O3 Industries 8700 grinding machine with a 4-foot-wide head.

Having recently completed the construction of



the nearby Coffs Harbor Waste Water Treatment Plant, the road constructor, Abigroup Contractors Pty. Ltd., was able to negotiate the disposal of slurry into existing settlement ponds with a low pH level. This provided an added benefit of increasing the pH level, making the waste water more suitable to treatment through the newly commissioned plant. This environmentally conscious manner of disposal allowed Coffs Harbor Council (CHC) to process the existing waste water for further use in the shire.

Operating during the day time hours, construction had to contend with live traffic requiring traffic control. The coastal city's extremely hot and humid climate, coupled with the susceptibility to significant rainfall and particularly hard aggregate, made grinding conditions less than ideal. Further, the hand poured ramps were challenging due to the initial high roughness count (greater than 100 NAASRA roughness counts or 242.04 in/mi IRI).

"We were expecting about a 30 to 40 percent improvement in the ride results, but when we drove the first section on day one of grinding, we were very impressed. Our Profilograph confirmed results well below 20 NAASRA roughness counts on a section that started at over 50. We were blown away by the final ride quality of the ramps, which went from 100 plus to approximately 40 NAASRA roughness counts," said Ben Murray of Abigroup Contractors.

TEAM MEMBERS

- Roads & Traffic Authority NSW (Owner)
- Abigroup Contractors Pty Ltd.
(Prime contractor)
- Seovic Civil Engineering
(Grinding contractor)
- O3 Industries (Grinding machine manufacturer)
- Hilti North America (Blades)

According to Paul Miskell, General Manager, Seovic Civil Engineering, the average roughness count measured post grinding was 30 NAASRA roughness counts (74.76 in/mi IRI), which exceeded the expectations of their goals.

"The proof is in the final ride. The decrease in productivity as a result of the hard aggregates used in this concrete also provided a lesson for us in terms of just how efficiencies can alter due to the makeup of the concrete," said Miskell.

With a project grinding value of \$400,000, the average cost per kilometer was \$41,670 (\$67,797 cost per mile). The overall success of this project resulted in the reduced roughness count, which will enable the RTA to minimize the maintenance required. Locals commented on the smoothness of the ground pavement, in addition to the lower noise levels, the enhanced road visibility and skid resistance during heavy rainfall periods.