



**SOUTHPORT CORONER**

**FINDING OF INQUEST**

**CITATION:** Inquest into the death of **MICHAEL CHARLES LANG**

**TITLE OF COURT:** Coroner's Court

**JURISDICTION:** Southport

**FILE NO(s):** COR 272/03

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**HEARING DATE(s):** 24 October 2006

**FINDINGS OF:** J Brassington Coroner

**CATCHWORDS:** **CORONERS: Inquest – Demolition – Workplace Death**

**REPRESENTATION:**

*Appearances:*

Assisting:	Sergeant L Malloy Southport Police Prosecutions
For Ms Blackmore	Mr T Mathews i/b Quinlan Miller & Treston
For Mr Whittaker	Mr Zillman i/b Clewett, Corser & Drummond)
For Laing O'Rourke formerly Barclay Mowlam	Mr Boddice i/b Clayton Utz

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## **CORONERS FINDINGS**

1. On 10 December 2003 Michael Charles Lang sustained fatal injuries when two concrete beams fell onto the operator's cabin of his backhoe. At the time of his death Mr Lang was engaged in the demolition of a pedestrian bridge at Broadbeach. On 24 October 2006 at Southport an inquest was held into the death, and circumstances of death, of Michael Charles Lang.
2. Section 45(2) of the Coroners Act 2003 provides that a coroner must give a written copy of the findings to the family of the person that died, each of the persons that appeared at the inquest, and the State Coroner. Section 46(1) of the Coroners Act 2003 provides that a coroner may whenever appropriate comment on anything connected with a death investigated at an inquest that relates to public health or safety. When such comments are made a written copy of those findings must be given to the persons set out in s. 46 (2). These persons include the family of the person that died. These are my findings in relation to the death of Mr Lang. They will be distributed in accordance with the requirements of the Act and posted on the web site of the Office of State Coroner.

## ***THE CORONIAL JURISDICTION***

3. I have jurisdiction to inquire into the cause and circumstances of Mr. Lang's death under the Coroners Act 2003 as his death occurred on 10 December 2003. The Coroners Act 2003 applies to all reportable deaths after 1 December 2003.
4. Pursuant to s. 11(2) of the Coroners Act 2003 the coroner can investigate '*reportable deaths*' so long as they are not aware another coroner is investigating the death. Mr. Lang's death was a '*reportable death*' in accordance with s. 8 (2) and (3)(b) of the Act because it was a "*was a violent or otherwise unnatural death*" that occurred in Queensland. I am unaware of any other coroner investigating the death. Section 28 of the

Coroners Act 2003 provides for the holding of an inquest if the Coroner considers it desirable. In this case I did consider the holding of an inquest desirable.

5. A coroner has jurisdiction to inquire into the cause and the circumstances of a reportable death. Section 45(2) of the Coroners Act 2003 provides that when investigating a death the coroner must as far as possible find:-
  - Who the deceased person is; and
  - How the person died; and
  - When the person died; and
  - Where the person died; and
  - What caused the person to die.
  
6. A coroner must not include in the findings any statement that a person is or may be guilty of an offence or civilly liable for something<sup>1</sup>. A coroner may comment on anything connected with a death investigated that relates to public safety or the administration of justice or ways to prevent deaths from happening in similar circumstances in the future.<sup>2</sup>
  
7. A coroner is not bound by the rules of evidence but may inform herself in any way considered appropriate<sup>3</sup>. However, the coroner must act judicially and have regard to the rules of natural justice and procedural fairness.<sup>4</sup> The coroner may require the witness to give evidence that would tend to incriminate the witness if the coroner is satisfied that it is in the public

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<sup>1</sup> Coroners Act 2003, section 45(5). See also R v Shan Eve Tennent; Ex parte Jager [2000]JTSSR 64 where Cox CJ said of the similar Tasmanian provision : *the focus of an inquest conducted under the Act being the ascertainment of facts without deducing from those facts any determination of blame, and the mischief sought to be avoided being the public naming of persons as suspected of criminal activity when they may never be charged.* Section 46(3) provides the same prohibition with respect to comments.

<sup>2</sup> Coroners Act 2003, section 46

<sup>3</sup> Coroners Act 2003, section 37

<sup>4</sup> This means that no findings adverse to the interest of any party may be made without that party first being given a right to be heard in opposition to that finding. As *Annetts v McCann* (1990) 65 ALJR 167 at 168 makes clear, that includes being given an opportunity to make submissions against findings that might be damaging to the reputation of any individual or organisation.

interest for the witness to do so, but *derivative evidence*<sup>5</sup> is not admissible against the witness in a criminal proceeding.<sup>6</sup>

8. When making findings the civil standard of proof, the balance of probabilities is applied. However the principles of *Briginshaw v Briginshaw* must be adhered to. In the coronial context these are conveniently set out in the often cited judgment of Gobbo J in *Anderson v Blashki*<sup>7</sup>:

*In Briginshaw v Briginshaw (1938) 60 CLR 336, at 362 to 363, Dixon J, as he then was, provided a classic statement as to the appropriate standard of proof to be used in civil cases: ". . . reasonable satisfaction is not a state of mind that is attained or established independently of the nature and consequence of the fact or facts to be proved. The seriousness of an allegation made, the inherent unlikelihood of an occurrence of a given description, or the gravity of the consequences flowing from a particular finding are considerations which must affect the answer to the question whether the issue has been proved to the reasonable satisfaction of the tribunal. In such matters 'reasonable satisfaction' should not be produced by inexact proofs, indefinite testimony, or indirect inferences . . . . When, in a civil proceeding, a question arises whether a crime has been committed, the standard of persuasion is, according to the better opinion, the same as upon other civil issues ... But, consistently with this opinion, weight is given to the presumption of innocence and exactness of proof is expected".*

*In applying Dixon J's decision, Blackburn CJ in the Supreme Court of the Australian Capital Territory decision of *Barten v Williams (1978) 20 ACTR 10* held that the balance of probability standard is not to be applied merely mechanically on a serious issue such as a decision which could lead to the cancellation of the builder's licence and determine his capacity to earn his livelihood as a builder. The civil standard is qualified so that the court can regard a fact as established only if it can entertain a reasonable satisfaction of its truth.*

*These being civil proceedings, the assault allegation is required to be proved on the lesser standard on the balance of probabilities despite the criminal nature of the allegation. But, because of the gravity of the allegation, proof of the criminal act must be "clear cogent and exact and when considering such proof, weight must be given to the presumption of innocence". See *Cuming Smith and Co Ltd v Western Farmers Cooperative Ltd [1979] VR 129, at 147.*"*

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<sup>5</sup> *Derivative evidence* means any information, document or other evidence obtained as a direct or indirect result of the evidence given by the witness.

<sup>6</sup> Coroners Act 2003, section 39

<sup>7</sup> [1993]2 VR 89 at 95

## **THE INVESTIGATION**

9. On the 10 December 2003 officers of the Queensland Police Service and Workplace Health and Safety attended the scene of Mr. Lang's death. Photographs were taken of the scene. Arrangements were made for a professional structural engineer, Rod Prove, to come to the scene and inspect the headstock of the pedestrian bridge. Later concrete samples were taken from the headstock.
10. Malcolm Savage, Principal Inspector for the Brisbane South Coast Region, then interviewed relevant parties and took statements. Principal Inspector Savage closely cooperated with the police investigation of Senior Constable Graham Anderson. I have been provided with a report from Principal Inspector Savage and a supplementary report from the investigating police officer, Senior Constable Anderson of the Gold Coast Accident Investigation Squad and I am satisfied that a thorough investigation of the incident took place.
11. As a result of the investigation by Workplace Health and Safety Rebmik Contractors Pty Ltd (hereafter referred to as Rebmik) and Roger Kimber, a Director of Rebmik, were prosecuted under the Workplace Health and Safety Act 1995 for failures in their obligations under s. 28 of that Act. They pleaded guilty and were sentenced on 16 November 2005. The sentencing remarks of Magistrate Chilcott were tendered as an exhibit in the inquest.

## **THE INQUEST EVIDENCE**

12. Michael Charles Lang was born on 29 March 1962. He was 41 years of age when he died. For the previous six years he had worked for Earthfleet<sup>8</sup> as an owner/ backhoe operator. He also had the opportunity to work as a contractor independent of Earthfleet.

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<sup>8</sup> Trading name of Mainflag Pty Ltd

13. Earthfleet's<sup>9</sup> undertaking is the hiring out of the services of plant operators and their machinery. Essentially, Earthfleet acts as a booking agent and collects payment from those hiring Earthfleet operators. Earthfleet operators were responsible for their own taxation and insurance arrangements. Earthfleet does not assess jobs but rather supplies the requirements of the client.

14. Mr Lang was described by Paul Kuhemann, General Manager of Earthfleet on the Gold Coast as

*"a very competent operator and fastidious about doing the job right the first time. I never received any adverse comments about his behaviour or work performance"*

15. Ms Blackmore, Mr Lang's partner of twenty years, worked in partnership with him in his business. She stated<sup>10</sup> that Mr Lang was very fastidious about his machine and spent a lot of time maintaining it in top condition. Mr Lang was also very happy working for Earthfleet.

16. In December 2003 Earthfleet received a request from Roger Kimber (from Rebmik) for a "5-7 tonne excavator with a rock breaker". As no excavator was available Mr Kimber approved, on 9 December 2003, a backhoe in place of an excavator. Michael Lang was assigned to go to the site on 10 December 2003

17. Rebmik were involved in demolition work at the "Air on Broadbeach" construction site<sup>11</sup>. Barclay Mowlem Construction Limited<sup>12</sup> (referred to as "Barclay Mowlem") was the principal contractor undertaking the construction work at "Air on Broadbeach". This was a very large project that included the installation of new footings and lift core system through the existing structure from basement to level four, the construction of a thirty-three storey level apartment building above the existing level four

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<sup>9</sup> Statement of Paul Jason KUHNEMANN

<sup>10</sup> Debbie Lee-ann Blackmore statement dated 28/1/04

<sup>11</sup> Formerly known as the "Oasis on Broadbeach" Shopping centre.

<sup>12</sup> Now known as Laing O'Rourke

and the demolition of the existing pedestrian footbridge.<sup>13</sup> The demolition work with respect to that bridge was sub-contracted to Rebmik.

18. Barclay Mowlem made the determination that Rebmik was an appropriate sub-contractor by assessment list that looked at similar projects completed recently, price and their capacity to do the job (i.e. appropriately licensed). In the case of Rebmik Mike Colahan<sup>14</sup> stated that the prior demolition experience included Pacific Fair, the Mater Hospital and Forbes House. Mr. Colahan had not worked with Rebmik previously and there is no evidence that there was any further investigation of Rebmik's capacity beyond accepting that they were competent and licensed to undertake the demolition work. Mr Kimber, a Director of Rebmik,<sup>15</sup> testified that he held a business demolition license. He also testified to doing two demolitions of foot bridges (across the main roads) during the refurbishment of the Mater Childrens Hospital. He further added that these demolitions were similar to the demolition of the pedestrian footbridge at Broadbeach.<sup>16</sup>

19. Once Rebmik were contracted the responsibility for assessing whether their particular work plan meets appropriate industry standards rests with the project safety officers and the site manager. In this case the site manager was Bob Markey. Bob Markey was provided work method statement as to what work Rebmik was going to do but stated that Barclay Mowlam had no control over how the work was done.<sup>17</sup>

20. Andrew Campbell, a Workplace Health and Safety Officer with Barclay Mowlam, went through with Rebmik the process of the demolition of the bridge. From his statement it is apparent that he said he would not dictate how the demolition was conducted as they were competent people who

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<sup>13</sup> Statement Mike Colahan.

<sup>14</sup> Senior Project Manager, Barclay Mowlam

<sup>15</sup> Mr Kimber was required to give evidence that would tend to incriminate the witness as I was satisfied that it was in the public interest for the witness to do so. That public interest being the need to establish the underlying causes of Mr Lang's death to try and prevent future deaths.

<sup>16</sup> Transcript p. 69

<sup>17</sup> Statement dated 8 June 2004

had done it before. He focused on the 'safety aspect' such as working from heights.

21. As will be discussed later in these findings Rebmik's actual demolition work resulted in the removal of the top reinforcing bars on headstock number two of the pedestrian bridge. This meant that on 10 December 2003, before work commenced, the pedestrian bridge was already an "*unsafe brittle structure*".<sup>18</sup>

22. Turning then to the events of 10 December 2003.

23. The specific task of Rebmik on this day was to remove the remaining beams of the footbridge. There were no Barclay Mowlem personnel on site. This was because on this day there was to be installed structural steel over the existing atrium on level four of the shopping centre. What was supposed to happen on 10 December 2003 is set out in the work method statement of 10 December 2003:<sup>19</sup>

**Day 1 10 December 2003**

1. Establish road closure as detailed under previous statement.
2. Set up crane – refer Hanchard Cranes JSA.
3. Take Load of beam 1 (southern beam), (approximate load of 20 Tonnes) by way of slinging beam with chains passed through previously drilled core holes. Access by dogman to be way of cherry picker.
4. Ensure there are no unauthorised personnel within zone, (anyone without an approved reflective vest).
5. Lift beam, slew within zone and lower to car park.
6. Check for loose debris at column heads and stair
7. Repeat items 3 – 6 for all beams
8. Clean area
9. Remove cranes

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<sup>18</sup> Statement and report Prove

## 10. Reopen roads

24. However, as will be seen the work required on 10 December 2003 was more complex than that portrayed in the statement.

25. Rebmik employees on site included Roger Kimber, Anthony Whittaker, Charles and Coby Roles, Ian Haywood and Troy Yorsten. In addition to Rebmik employees there were employees from Hanchard Crane Hire who were to assist with lifting large concrete beams from the walkway. From Hanchards' were Craig Young, Chris Pinel (the crane operator) and Tim Collins. There was of course also the deceased, Michael Lang, from Earthfleet.

26. All those on-site on 10 December 2003 signed the work method statement<sup>20</sup> that was noted to have been prepared by Roger Kimber. Mr Kimber sets out the strategy of what should have occurred on 10 December 2003:<sup>21</sup>

*The strategy on the second half of it was to remove the wearing slab on top; locate the holding pins, core drill the holding pins to release the beams, because the pins are customed (sic) to the head stock. We saw-cut the slab into five – back into the five beams, because there's five beams sitting there. They lay a wearing slab over the top. So them – one third in to the beam, from either end, to loop the chains around. Lift the chains up, - and lift the beams up. If the bond break – doesn't break, just tap underneath it*

27. Anthony Whittaker and Roger Kimber directed the work.

28. While the work method statements refer to men in cherry pickers Craig Young from Hanchards, in his statement, describes the method that was actually settled upon to haul the beams away:

*...it would be easier for us to sling the beams from the top. That meant that we could use the existing handrail of the footbridge. We would then hook our safety lanion to the rail so we could safely work on the top of the beams.*

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<sup>19</sup> Exhibit 18  
<sup>20</sup> Exhibit 18  
<sup>21</sup> Transcript p. 70

*We would then tie a rope to the chain and then drop the rope through some predrilled holes between the beams. It meant that someone had to be underneath the beams as the rope and chain dropped through and they would throw the rope back up to us. We then pulled the chain up to make a sling around the beam.*

29. Mr Whittaker explains in his evidence<sup>22</sup> that part of the reason for the presence of Mr Lang's backhoe and the excavator was to assist in removing the beams. Previous experience had indicated that there had been some difficulty in simply lifting the beam straight off. Rather these beams needed a 'small tap' to break the seals. The small tap came from the backhoe with a rock breaker (operated by Mr Lang) and an excavator operated by Mr Haywood. Their machines were situated to permit them to use the extendable arms to reach the beams.

30. Ian Haywood, the operator of the excavator, gave a statement describing what was involved in breaking the seals:

*The two dog men then hooked chains around the first beam and the crane took up its weight. The crane driver has a gauge in the crane that tells him how much weight he has on the chain, so he knows when he has the beam fully supported. He usually takes the weight of the beam and then a little bit more.*

*The dog men then moved clear of the work and then Michael and I were given the signal from the foreman to start breaking up the putty. When I say 'dogmen' I refer to the two men whose job it is to hook up the chains onto the crane.*

*It only took about half a dozen hits with the jack hammer to break the putty from around the pins in the beam. When the putty is released, the beam jumps up about 50 mm or so because of the crane taking up the weight. Once the beam was released, the crane moved it away from us and put it down in an area of the Kurrawa Surf club car park that was fenced off. The crane then moved into position over the next beam and we did the same thing again. The second beam seemed to release just as easily as the first.*

*The dog men then hooked up the third beam, which was the one that was originally in the centre of the five beams. We were then*

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<sup>22</sup> Transcript p 37 - 40

*given the signal from Anthony to start jack hammering the putty on this beam. Everything was going fine with this beam also, we started jack hammering as normal and then I saw it 'pop up' like the first two beams.*

*As it popped up the remaining two beams came down. I couldn't see what happened; I just saw something come down beside my machine. The first beam came down and hit the side of my machine and banged me over and then the second one came down and just crushed the roof of my machine. The two beams came down in quick succession; it was the first one and then the second one straight after.*

31. The account of events is substantially corroborated by other witnesses. Hanchard's crane operator, Christopher Pinnel gave a statement describing Earthfleet contractors using their rock breaker attachments to break the grout to allow the crane to lift the beams free. He stated it took about 30 seconds to break the grout. The process was repeated successfully twice. On the third occasion both the backhoe and excavator drive chipped together on the beam. As the third beam became free the two remaining beams fell straight on the backhoe driver.
32. Mr Whittaker confirms that Mr Haywood was directly under the beam that the seal was broken upon. This was contrary, according to Mr Whittaker, to direction. Mr Lang was not directly under the beams but his backhoe cabin was crushed when the beams rolled outwards.
33. Photographs 3 and 13 tendered in the inquest show the catastrophic impact on the cabin area of the backhoe of the concrete beams. Doctor Milne, who provided the autopsy report noted:

*Post mortem examination showed relatively minor traumatic injuries only. There were several minor abrasions and lacerations on the limbs. Internal examination showed bilateral rib fractures. There were no injuries to any internal organs. There was no significant natural disease. Significantly, there were multiple pinpoint (petechial) haemorrhages on the eyes and skin. These are non-specific, but are commonly seen in asphyxial deaths.*

...

*Toxicology showed no alcohol or drugs.*

*There were no traumatic injuries significant enough to directly cause death. There were several fractured ribs indicating pressure on the chest. The multiple petechial haemorrhages that were present are consistent with an asphyxial death, resulting from pressure on the chest resulting in an inability to breathe. This type of death is known as traumatic asphyxia.*

#### **FINDINGS REQUIRED BY S45 (2)**

34. As a result of considering all of the material contained in the exhibits and the evidence given by the witnesses, I make the following findings in accordance with my duties under s. 45 (2) of the Act:

- Who the deceased person is: The deceased was Michael Charles Lang
- How the person died: The narrative above sets out how Mr. Lang died. In summary, during the demolition of a pedestrian bridge the headstock failed and two large concrete beams fell onto the backhoe cabin where Mr Lang was located.
- When the person died: He died at about 8am on 10 December 2003
- Where the person died: Mr Lang died at the east side of Old Burleigh Road, Broadbeach
- What caused the person to die: Traumatic asphyxia

#### **COMMENTS AND PREVENTIVE RECOMMENDATIONS**

35. Section 46, in so far as it is relevant to this matter, provides that a coroner may comment on anything connected with a death that relates to public health or safety or ways to prevent deaths from happening in similar circumstances in the future.

36. The narrative of the evidence resulting in the findings under s. 45(2) tells how Mr. Lang dies. It does not show what caused the beams to fall. It is knowing what led the beams to fall can there commence the process of prevention of future deaths.

## **WHAT CAUSED THE BEAMS TO FALL?**

37. The pedestrian footbridge being demolished was designed and inspected by Robert Bird and Partners. Grant Weir, the Managing Director of Robert Bird and Partners provided a statement to Workplace Health and Safety Queensland investigators. Mr Weir also gave evidence at the inquest.<sup>23</sup> He stated that the structural design drawings show the bridge to be made of pre-cast decking units supported on cast in-situ headstock on reinforced concrete columns. No record of the final inspection of the bridge following construction was able to be located. However, Mr Weir stated that the structural engineer who carried out the inspection was a competent and thorough engineer who would have ensured that the bridge was constructed generally in accordance with the intent of the design. There was no evidence that in the 15 years following construction the pedestrian bridge had any structural defect.

38. This pedestrian bridge is of a very common type. Brian Whaley<sup>24</sup> testified:

*the footbridge is of generic design, using Queensland Transport bridge beams, which are laid on top of a T-shaped head stock...and once those beams are placed they have in situ concrete topping to bind them together. You probably see 5,000 bridges of similar construction in and around Australia.*

39. Mr. Savage attended the site of the bridge after its failure and took some measurements of the actual bridge and the beams. The concrete beams sit on a corbel (support ledge) 500 mm in height and the remaining haunch of the headstock is approximately 590 – 600 mm which is the same depth as the bridge beams. A topping slab of approximately 110 mm was poured over the beams. The overall height of the headstock excluding the topping slab was approximately 1100 mm. Mr. Savage estimated the missing concrete would be measured at 400 – 420mm. The design drawings of the bridge show that removing this amount would mean the top tensile steel

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<sup>23</sup> Regrettably, Mr Weir's evidence and the evidence of two other witnesses was not transcribed due to problems with the digital recording. Despite their efforts the transcription staff experienced difficulties in the transcription. Reference to the contents of the witnesses evidence is thus from my notes. Where notes are relied upon I will indicate in my findings.

<sup>24</sup> Consulting Engineer, at transcript p. 14

reinforcement would have been removed leaving approximately 170 – 190 mm of concrete. Mr Savage tendered photographs attached to his report (photographs numbered 5, 6 and 7) showing the height of the missing concrete and cut tensile steel reinforcing. He also observed concrete rubble and steel reinforcement 'deformed reinforcing bars' with molten slag deposits scattered over stairs and on the ground around the site.<sup>25</sup>

40. Consulting engineer with Barclay Mowlem, Brian Whaley observed the bridge after its failure and his observations were similar to those of Mr Savage. He noticed nothing unusual about the beam but observed that the top reinforcement, which held the headstock in place, had been removed.

41. The report of another structural engineer, Robert Prove,<sup>26</sup> explains the significance of Mr. Whally's observations and his own examination of the design drawings of the footbridge.<sup>27</sup>

#### **Comments After Receiving Design Drawings of the Foot Bridge**

ix) *From the design drawings and the failed sections it appears that the headstock was constructed generally in accordance with the design drawings.*

x) *From the dimensions on the design drawing it appears that approximately 500 mm of the top section of the headstock had been removed prior to the removal of the precast beams.*

xi) *All the reinforcing steel in the headstock apart from two (2) Y12 trimmers was removed when the top section of the headstock was removed.*

#### **Conclusions**

1. *It appears from the failed sections of the headstock that failure of the headstock was due to a bending failure in the concrete. The concrete section of the headstock failed in bending due to the removal of the main top reinforcing bars prior to the removal of the precast beams.*

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<sup>25</sup> Coroners report p. 9 and 10 by Malcolm Savage.

<sup>26</sup> Called in by Workplace Health and Safety Queensland investigators.

<sup>27</sup> Exhibit 15

2. *The failure in the headstock would have been an immediate brittle failure, i.e. the failure would have occurred without warning. Concrete is a particularly strong material in compression, but is particularly weak in tension, unless it is reinforced with steel. When unreinforced concrete fails, it fails in a brittle manner without warning as happened in this headstock. The removal of the top reinforcing steel at some time before the incident, meant that the headstock went from a safe ductile structure to an unsafe brittle structure.*

3. *The reason for the failure at the particular moment that it occurred was probably due to a number of circumstances such as the intense vibration from the jack hammers working below the headstock at the time and also from a probable outward force on the headstock from the middle beam being removed at the time of failure.*

42. At the inquest Mr. Prove made it <sup>28</sup> plain that had the top reinforcing still been in place there would not have been a failure in the head stock. Mr. Prove's conclusions are essentially supported by Mr. Whaley:<sup>29</sup>

*So I could only surmise that the head stock was in its horizontal position when the – with no re-inforcement holding in place. All that was holding the head stock in position was the strength of the concrete which is very strong in compression, but not terribly strong in tension and that's why we put reinforcement in concrete to resist tension. So, it was sitting there and when - I can surmise – that the vibrations from the hammer at the other end of the beam were transmitted through the beam to the head stock, it cracked, fell over and the beam slid away onto the machine. But, obviously I wasn't there. But that's what I would surmise.*

43. A third expert opinion, a report by Mr. Brown, was tendered by Mr. Zillman. Mr. Brown, a Partner in Osborn Lane Consulting Engineers reported:<sup>30</sup>

*It can be seen from the photographs that roughly 500mm depth of concrete was jack hammered off the top of the headstock arm that collapsed, so this member was originally 1300mm deep, and finished up 800mm deep. Whether it was reinforced according to the drawings is not relevant, because the top reinforcing was completely removed before the failure. This greatly weakened the headstock, and must be seen as a primary cause of failure. (dimensions are approximate).*

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<sup>28</sup> Transcript p. 29

<sup>29</sup> Transcript p. 16.

<sup>30</sup> Exhibit 14

44. Hence, the conclusion is inevitable that the removal of the reinforcement weakened the headstock and was the primary cause of the falling of the beams, and thus, the consequent death of Mr. Lang.

45. Mr Brown's report also makes some comments on the type of headstock he observed. While he emphasised that the headstock was not structurally inadequate he did note two features that he considered made it somewhat unusual:

*It has considerably less reinforcing than what is commonly seen in road and rail bridge headstocks. Also, all its flexural steel reinforcing was concentrated in the top of the headstock, whereas it is more common for half of it to be in the bottom, and some in the middle. Both these features made it far more dangerous to remove the top reinforcing than it would usually be.*

46. To understand why the concrete reinforcement was removed from the headstock is thus necessary to consider whether the method of demolition used by Rebmik and how Rebmik conducted the demolition.

#### **WAS THE METHOD OF DEMOLITION UNSAFE?**

47. The method for demolition of the bridge, as recorded in the work method statements and as apparently understood by Barclay Mowlam, was discussed with the Consulting engineer Brian Whaley. Mr. Whaley was not consulted at any time by Rebmik with respect to their demolition method or process. He was not employed or contracted by Rebmik to provide expert engineering advice. Nor was he engaged by Barclay Mowlam to review any of the sub contractors work method statements. Despite no official 'engagement' with the bridge demolition process Mr Whaley was consulted about some aspects of the demolition:

- He was asked if the footbridge would support a five-ton excavator. He agreed that it would.
- On another occasion Rebmik had removed one of the pre-cast concrete beams and when it was laid onto the road it rotated and

cracked and Bob Markey (Site Manager) asked him to come and give advice on how its should be demolished.

48. These consultations indicate that Rebmik did not have ready access to expert engineering advice other then through Barclay Mowlam. Mr Kimber confirmed that no engineer's advice was sought in the demolition process except through Barclay Mowlam with respect to the excavator on the bridge.<sup>31</sup> However, Mr Whaley did have a conversation with Bob Markey as to the method to be employed by Rebmik and did not then, nor when he gave evidence, see anything particularly wrong with the method of demolition which was essentially the reverse of the construction process<sup>32</sup>, only the execution of the method:<sup>33</sup>

*Were you consulted with regards to the types of devices to use?-- As - I wasn't consulted in relation to specific method statement for demolition of the footbridge. As I previously stated, I had a discussion with Bob Markey.*

*... And his explanation to me was that the - they would saw cut the bridge along the lines of the joints of the pre-cast beams. So, essentially separate the bridge into five pre-cast elements, break away the concrete topping and lower core to where the bridge lands on the head stock to release a pin, which was a temporarily - temporarily locating device and then lift the beams back using a crane, which is a perfectly sensible method of removal. It's essentially the reverse of the method of construction.*

*... Were you consulted, or did you provide advice with regards to how much of that reinforcing concrete around those pins would be an appropriate amount to remove?-- No. As I said the reference was made to the topping, not to the head stock and the topping is the part of the concrete which covers the beam and the pin. So, that's the area you need to break up.*

*That's the area. And from your observations of attending that site, sir, are you able to tell the Court how much originally of that topping was there?-- Well, looking at this photograph again, the topping and the main section of the head stock concrete beam had been removed, so, they've gone way beyond removing the topping locally to get at the pins.*

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<sup>31</sup> Transcript p. 65.

<sup>32</sup> Transcript p. 25

<sup>33</sup> Transcript p. 18

49. Peter Brown's written opinion <sup>34</sup> echoes Mr. Whaley's opinion that while Rebmik's overall approach was reasonable, the removal of so much concrete from the top of the headstock was not a good idea and he would not have recommended it.

50. On the evidence then the method and theory of demolition employed by Rebmik was not intrinsically wrong. However, issues are clearly raised as to how Rebmik and its employees then carried out the demolition and why existing safety measures did not prevent the death of Mr Lang.

#### **WHY DIDN'T THE WELL ESTABLISHED PROCESSES OF REVIEWING AND MONITORING WORKPLANS PREVENT THESE EVENTS?**

51. Australian Standard AS 2601-2001 ("the Standard")<sup>35</sup> sets out the standards for demolition of structures. The existence of a standard, albeit not the revised standard in place at the time of the demolition was known to Mr Kimber.<sup>36</sup> The standard requires the preparation of a work plan that included documentation of the process including *details of protective measures, including overhead protection and scaffolding required by Clauses 1.5 and 1.7*. The standard requires the work in accordance with the work plans to be executed by competent persons (clause 2.5) and at all times supervised by a competent person (clause 3.1.1). Unsurprisingly the standard requires that the *structure to be demolished and all its components shall be maintained in a stable and safe condition at all stages of the demolition work*. The standard also gives sound guidance in developing demolition procedures:

*Unlike most industries, demolition is an occupation where the people working within it are unlikely to encounter the same procedures from one job to another. Every demolition project is unique and, as such, requires a unique approach to planning and execution.*

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<sup>34</sup> Exhibit 14

<sup>35</sup> Exhibit 11

<sup>36</sup> Transcript p. 69

52. As already discussed the theory of Rebmik's demolition was sound. However, the execution of the process was not. While there was cursory approval from Barclay Mowlam's engineer as to the actual process of demolition there was no monitoring of how Rebmik actually executed the demolition.

53. Rebmik did submit safe work method statements a couple of days before hand to get a perusal. Approval came back verbally. However, a perusal of the work statements demonstrates that they are of a most general kind with little information as to how the demolition is to be carried out. Indeed, if Rebmik diverged from their work plans there was no mechanism to highlight the divergence unless some site personnel happened to notice the change. For example, the change on 10 December 2003 from using a cherry picker to dogmen actually on the structure is one example of a revision of a workplan.

54. The work safety documents of 1 August 2003 and 12 August 2003 provide a good example of this divergence between general descriptive processes and what actually took place in the demolition. The brief description of the work to be undertaken is respectively "*to jackhammer down maximum 700mm to locate beam ends*" and "*saw cut between beams length of bridge core hole between ends of bridge beams*". Again the job safety analysis of 20 November 2003 has a brief description of the work to be undertaken:

*Rock breaker or K27 Excavator to jackhammer mass concrete at beam ends*

***Key safety issues to be managed and key safety controls to be implemented***

*Falling debri (sic) – Full road closure and exclusion zone spotters*

*Fall from heights existing balustrading to remain*

*Safety harness when needed*

*Noise – hearing protection to be worn while hammering*

*Unauthorised persons – haz-mesh – ATF – plastic barriers Rebmik personnel to wear reflective mesh.*

55. Coby Roles remembers on 20 November 2003 a mini excavator was lifted on top of the bridge by the crane. Shane Walder<sup>37</sup> operated the mini excavator with a rock breaker attached removing the “small section of cement grout”<sup>38</sup> filling at the ends of the beams. He also used the rock breaker to remove a “small section” of concrete to locate steel pins (dowels) that held the beams in place.

56. Andrew Campbell, Barclay Mowlam Workplace Health and Safety Officer saw these plans but had no understanding of the amount of concrete Rebmik took out:

*Like I said, I was under the impression that they were to take away hose top, like I said to locate the ends of those beams to split them, they had to find the ends of them. So that's what I was under the impression they were taking away just a skin coat or ...the layer across the top. It was only like a gravelly you know like pebble white finish on top. So that's all and even when they took these down all they had to do was, once the machine took it if the pins jammed, they were just to tap away, tap away from her and here if the pins jammed as they were pulling the thing straight up.*

57. Indeed Mark Wheatley<sup>39</sup> and Bob Markey<sup>40</sup> observed Rebmik employees working with jack hammers on the headstock two. This aspect of the demolition process was critical in causing the failure of the headstock on 10 December 2003.

58. Kimber also outlined in evidence what he expected the process of locating the ‘lugs’ involved:

*By jack-hammering the removal of the wearing slab over the top which was a pebble-crete finish concrete wearing slab..  
..over the top of the bridge, which went over the whole top, all of the bridge..  
..that's removed and you then get to the structural beam, and in the top of the structural beam you can see where the grout's been poured in, into the locating lugs. It just about 150ml diameter circle, it's just sitting*

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<sup>37</sup> No statement was taken from Mr Walder who left the Gold Coast after these events

<sup>38</sup> Statement Roles para. 14

<sup>39</sup> Another Workplace Health and Safety Officer from Barclay Mowlam

<sup>40</sup> Site Manager

*there, and then you just core drill down and remove all that from the locating lug.*

59. When asked about the removal of the pebble slabs Kimber notes that the removal of the pebble-crete involved included removal of mesh reinforcement. He expected the 'rod reinforcement' to be in the structural components and this would not have been removed but that *"It wasn't in the pebble-crete, not that I'm aware of, no. I'm only looking at drawings; I wasn't there at the time."*<sup>41</sup>

60. Later Mr Kimber, under cross-examination, maintains that Coby Roles had not cut the steel reinforcing bars despite being shown photographs. He concluded by saying that his instructions were only to remove the topping slab. When asked if he went up to actually have a look he said that he had not.<sup>42</sup> Anthony Whittaker<sup>43</sup>, supervising, observed the photographs of the failed headstock. He made the concession that the reinforcing had been cut. Coby Roles stated that upon instructions from Shane Walder, operating the excavator, he had cut vertical steel reinforcing and mesh. After he cut there was further jack hammering done.<sup>44</sup>

61. In this case the work method statements were orientated to identifying safety issues rather than identifying the viability of a particular demolition method. As Mr Campbell (Workplace Health and Safety Officer for Barclay Mowlam) said in his interview the focus of the safety officers is the safety aspects rather than the execution of the demolition. It is assumed that Rebmik were competent to demolish the bridge as they had done it before. Another Workplace Health and Safety Officer, Mark Wheatley, when asked to comment on whether the work method statement was a fair method says *'I can't comment on the demolition part but the control measures in place yes.*

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<sup>41</sup> Transcript p. 68

<sup>42</sup> Transcript p. 75

<sup>43</sup> Again, significant portions of Mr Whittaker's evidence was not transcribed. He claimed privilege and was directed to answer by myself.

62. The work method statements are not routinely reviewed by an engineer. This aspect of the demolition is particularly concerning given that Rebmik had no access to the actual plans of the pedestrian bridge.

63. Mr Kimber recalled that at the outset of the project asking for the drawings and being told they were not available. It was only after the death of Mr. Lang that the drawings were obtained. Mr Kimber admits that without the drawings Rebmik employees had difficulty locating “lugs” that had to be drilled out to lift the beams out. Mr Brown’s comments<sup>45</sup> upon the possible effect of the lack of drawings in his tendered report:

*It is a pity that the structural drawings were not available. Whether they would have prevented the accident is hypothetical, but they would have helped those on site evaluate what was safe and what was dangerous.*

*It is easy to imagine a workman removing the concrete from the top of the headstock without realizing the danger in doing it before all the beams were removed. It is likely that this was due to a lack of understanding of how the structure worked, and does not appear to be evidence of cost cutting or carelessness.*

64. The Australian Standard (AS2601- 2001) requires that (2.2.1) *at the earliest possible time, the demolition contractor shall be provided with copies of the as constructed drawings and other building information.*

65. However, the lack of understanding of the how the structure worked could have been so easily remedied if Rebmik or its employees had properly consulted with a structural engineer or indeed appreciated that the demolition without plans was inevitably a more difficult proposition requiring greater care and greater supervision than that ordinarily required. Demolition of old structures will inevitably mean that sometimes technical drawings might not be available. Those undertaking demolitions must be alert to the possible complications inherent in only operating on assumptions as to the structure rather than obtaining expert advice as to the actual structural features of a building. The onus must be on both the

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<sup>44</sup> Statement Roles para. 16.

<sup>45</sup> Report tendered at the inquest

contractor and sub-contractor to not begin demolition without initial, thorough and reliable investigation as to the nature of the actual structure being demolished. In this case the reinforcing bars actually protruding from the broken concrete match the bars shown in the technical drawings.<sup>46</sup> It may be confidently assumed that the drawings would have alerted Rebmik that significant amounts of reinforcing were concentrated at the top of the headstock.

66. However, any cursory inspection or supervision by an engineer or indeed a competent person well versed in the significance of the structural makeup of the beams to be removed would also have alerted Rebmik to the dangers inherent in removing so much of the top layers of the headstock. Such investigation is required in clause 2.2.2 of the Standard – Investigation of the Structure.

67. With respect to what actually happened with the beams it is apparent that much more extensive excavation and jack hammering took place than required simply locating pins on the beams. Mr Roles and Mr Walder worked on removing concrete from headstock number two. Mr Roles himself admitted to a '*rough idea of what he was doing*'<sup>47</sup> and he '*cut stuff*' as he did not want the stuff "*in the road*" to find what he needed- the pins. He also observed Mr. Walder operating an excavator and removing concrete from headstock number two. Mr Roles was a general labourer. He was regarded as competent on an excavator machine and possessed various certificates for work in the construction industry.<sup>48</sup> As of March 2004 he had worked in the construction industry for about three years. However, nothing in the evidence indicates any particular expertise or understanding of the properties of concrete or the particular significance of the quantities of concrete presumably removed by Mr. Walder or another.

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<sup>46</sup> Report Brown p. 2

<sup>47</sup> Again Mr Roles recording failed. I have taken the quotes directly from my written notes where I have noted the direct quote from Mr Roles' evidence.

<sup>48</sup> Statement (30.3.04): excavator, skid steer loader, elevating work platform and basic scaffolding.

Mr Roles stated<sup>49</sup> that he did not remember being involved in any other bridge demolition work with Rebmik.

68. I am satisfied to the requisite standard, that the structural integrity of the pedestrian bridge was significantly weakened by the removal of concrete, the cutting of tensile steel reinforcement and the removal of reinforcement and employees of Rebmik had removed that concrete and reinforcement and cut the tensile steel reinforcement.

69. I am also satisfied that no one with the expertise or knowledge to recognise the catastrophic mistake inspected the headstock closely to recognise the removal of reinforcement before the 10 December 2003 when Mr. Lang became involved in the demolition process. Nor did any employee of Rebmik appear to have averted to a risk, in any of the documentation, of weakening the structure by the process of demolition and what steps could be taken to minimise or eliminate risk.

70. The evidence also shows an over-reliance on work method statements or job safety analysis to monitor Rebmik's performance rather than an actual assessment of what was happening on-site. For example, on the evidence I accept that no representative of Barclay Mowlem was aware of the amount of concrete removed from the headstock. The Barclay Mowlem workplace health and safety officer's statements and evidence impress as concentrating on aspects of the demolition process that they were most familiar with such as working at heights. The aspects of demolition that actually impacted on the safety on site, such as the interference with the structural integrity of the bridge by the removal of too much concrete and reinforcement, was not assessed as this was regarded as part of the demolition process that was in the expertise of those carrying out the process.

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<sup>49</sup> Statement paragraph 4

## **CONCLUSION**

71. This case demonstrates that the monitoring of safety in a workplace cannot properly function with such an artificial division between those who monitor safety and those who perform the task. Safety involves continuous monitoring of the process of both how the work should be safely carried out and if the work is actually carried out safely. A safe workplace also requires the knowledge of those carrying out tasks to understand when particular expert knowledge is required to safely guide a process through to a safe conclusion.
72. In making recommendations to prevent a similar tragedy occurring in the future I have been assisted by the thoughtful recommendations of Senior Constable Anderson as to what might have prevented this tragedy.
73. The reality of our largely urban environment is that there is now little open land. New structures in our cities will require demolition of old structures. The uniqueness of each demolition job means that each job requires a different method of planning and execution. Demolition work will become more common and it will be carried out around large numbers of people. Unless it is carried out competently and safely workers, and also members of the public will be at risk. It is important to recall that this case could so easily have involved a double tragedy as Mr Hayward avoided death by a very narrow margin.
74. The only way to ensure safe demolitions is to ensure those licensed to carry out such demolitions are thoroughly conversant with the requirements of the Australian Standard and accountable for how they carry out the demolitions.
75. Unfortunately in this case there was only superficial adherence to the form of conduct prescribed in the standard (i.e. the work method statements) rather than true implementation of the standard to ensure a safe demolition process. One man died because of this failure. That death was

preventable. The existing standard prescribes procedures and a way of working that, if followed, would allow for safe demolitions.

76. As I have emphasised in these comments no demolition can be regarded as straight forward or routine. This is especially so when the structure is not thoroughly investigated by persons who are knowledgeable about the dangers inherent in the demolition process.

77. I do not have sufficient expertise or information to prescribe to Workplace Health and Safety a detailed reform for monitoring demolition practices in this State. Nevertheless I do recommend that Workplace Health and Safety work with the construction industry to develop a policy to improve the monitoring of those licensed to demolish to ensure actual adherence to the Australian Standard during demolitions.

78. Mr Lang was a much loved man. It is a tragedy that he died doing the work that he did so well. To Ms Blackmore and Mr Lang's family my sincere condolences go to you for your loss.

79. I also thank the police prosecutor appearing and assisting in this inquest. The inquest is now closed.

JM Brassington  
Innisfail  
26 April 2007