

NEW EQUIPMENT & SYSTEM APPROVAL PROFORMA		Ref: 08-08-11-100
MONOBLOCK – CAST MANGANESE CROSSING, FROM PRE		
1	Equipment or System to be approved * Fully cast manganese crossing (known as Monoblock crossing)	
2	Originator * Name: Joint - Neil Balbirnie, Martin Baggott and Tim Calver Company: Pacific Rail Engineering (PRE) Pty Ltd, GHD and ARTC.	
3	Introduction * Fully cast weldable manganese crossing suitable for 60kg ARTC Footprint and wheel profiles (i.e. interchangeable with current fixed nose crossings). Design life is estimated at 400mgt as being delivered and warranted in KCRC track(Hong Kong) , ie much longer than current ARTC crossings.	
4	Determination of Need * <ul style="list-style-type: none"> This crossing is an alternative to the current crossings used i.e Manganese Vee , Rail Bound Managanese or fabricated (eg in yards etc). By having one interchangeable type it provides greater applicability of spares and availability across the whole network and a superior crossing in all situations at the lowest cost ARTC use three types of fixed nose crossing , two of which are manganese steel the other one is fabricated using standard head hardened rail. The Monobloc can replace all three in a single solid unit. Elimination of joints and bolts reduces potential failure points and increases reliability Current crossings are more expensive , less reliable , harder to maintain in track and less available (eg explosive hardened RBM's) More extensive use of manganese will promote longer wear and give sufficient volume to weld in track without heating/material issues. wing rails are also repairable and cracks very slow to propagate thus improving safety. Canted wing rails and modelling of nose profile to suit traffic conditions will reduce rolling fatigue, impact and thus reduce stress and wear. Explosive hardening to higher standards reduces initial wheel impact and wear. Besides being a better designed product it will wear better through less impact (wheel/rail modeling)and is more easily maintained in track (less cost). Current practice of taking out the RBM insert to repair requires additional track possession plus results in a mis matched manganese insert and wing rail which leads to an impact point and thus accelerated wear The monoblock is not new in terms of material used or minimum standards it is manufactured to (i.e castings are higher than current standards). The casting profile is new to ARTC but follows ARTC wheel profile , flange width , foot print and other key dimensions etc 	
5	Significant Change or Not (as determined by the Manager Standards) * This change in equipment or system is assessed as Minor	
6	Review Panel (as determined by the Manager Standards) * <ul style="list-style-type: none"> John Furness, Manager Standards Graeme Templer, Executive Manager, Asset Maintenance Tim Calver, Track Standards and Technical Services Engineer 	
7	Safety <ul style="list-style-type: none"> The manganese casting is manufactured to UIC 866-1 standards (specifically for cast managanese crossings)as per what ARTC already uses for its manganese crossings. This is used for Manganese crossings used by ARTC in Australia Slow bend tests of the flash butt welded legs are successfully undertaken to 30% above UIC standard , then fishplated on top of this. Test certificates are attached. The crossing will meet ARTC standards plus dimensions for turnouts which PRE use for its current business with ARTC so will not introduce any impact or out of tolerance issues that will lead to wheel mis alignment etc Rail Corp conducted tests from a signalling point of view to confirm that the Monoblock does not contribute any electrical interference – refer D Nolan. PRE believes that these are suitable for all ARTC track conditions from predominately passenger through to mixed to predominately heavy freight (ie different wheel sizes and wheel conditions).They are designed to suit axle loads over 30T 	

8	<p>Performance and Suitability</p> <p>The crossing is made to ARTC footprint , which is signed off before manufacture and rechecked afterwards so there are no interface issues . Steps will be taken to ensure no long term dips at the flash butt weld . This will allow for the settling in of the softer manganese section. Design and track experience shows this is beneficial. However, ARTC standards on current crossings require zero dip which can be achieved.</p> <p>The attached quality document show that material content complies to UIC 866 standard and is comparable to current manganese crossings used by ARTC.</p> <p>ARTC personnel have already visited a Rail Corp trial site to gauge performance. ARTC has also installed for trial a crossing at Whitehaven site.</p> <p>General arrangement drawings including major dimensions and cross section profiles are attached in the appendix which are based on 60kg RailCorp footprint plus standard gauge. Nose profiles will be made to suit ARTC new/worn wheel profiles</p>
(i)	<p>Use in other rail networks</p> <ul style="list-style-type: none"> • Monoblock crossings are the main type of crossing worldwide and manufactured by several companies mainly using RE British and UIC rail profiles . • Estimated production would be well in excess of 50,000 per annum. • The crossings manufactured for PRE to PRE/Tekway designs (ie to AS60KG rail and Australian wheel profiles) are under trial in Rail Corp and on order to go into trial for Queensland Rail (narrow gauge) plus 68kg / 40 tonne axle load for Pilbara Rail and BHP Billiton having gone through desk top appraisals by their engineering staff. • Reference material is in the appendix
(ii)	<p>Use in the ARTC network</p> <p>Initial use is expected to be in NSW, but could be used across ARTC</p>
(iii)	<p>Issues arising from usage of the equipment/system</p> <p>Trialling on Rail Corp site shows that wear and impact can be reduced if PRE take greater consideration towards transfer zones for a worn wheel profile and look at the traffic direction . Knowing this will influence final machining of the running surfaces . Attached worn wheel profiles should assist with design aspects.</p>
(iv)	<p>Changes required to infrastructure or systems for use of the equipment</p> <p>No changes are required as crossings are interchangeable with current and maintained using current equipment etc</p>
9	<p>Reliability</p> <p>See trialling detailed in performance and suitability. Parallel testing at the Rail Corp sites (but at an advanced stage) and the lessons learnt will be cross referenced to ARTC.</p> <p>References are available , an international one being supplied in the appendix based on many units over 200 mgt usage. RailCorp experience is based on 8 months , 20 MGT , 26t axle loads and shows very little wear from mixed traffic and minor reliability issues. There is common worldwide preference of these crossings , proven characteristics of manganese crossings plus the design characteristics that will reduce impact and therefore wear plus the fact that they have no fishplates or bolts that localise stress and introduce impact force.</p> <p>Expected life</p> <p>Design life is estimated at 400 mgt as being delivered and warranted in KCRC track (Hong Kong) , ie much longer than current ARTC crossings.</p>
10	<p>Maintainability</p> <ul style="list-style-type: none"> • Maintainable using current practices and maintenance providers. • Manganese steel should be kept below certain temperatures during weld repairing . This means that welding on small masses builds heat up quickly and lengths possession time . Having a larger mass and welding patterns gives more possibility of larger welds in track under tight possession. • A maintenance manual will be supplied . Initial and on going grinding as per other crossings should be followed to minimise initial metal flow and optimise life. Repairs should be done ASAP to minimise propagation • In addition depending upon the level of technical complexity and innovation in the equipment/system, training courses for maintenance staff may be required. The Supplier will nominate Training Course Materials available. • Manufacturing lead times are approximately 4 -5 months, once patterns established. As ARTC crossing range is covered by the Rail Corp, then total range development is mainly done and we are manufacturing into stock for immediate despatch (i.e. no manufacturing needed). It is anticipated that between ARTC and Rail Corp this demand will justify larger stocks. As the crossings are interchangeable, then ARTC are not solely reliant on PRE. • PRE expects that this crossing will be much more common place for a long time into the future so availability will not be an issue. • Designs and patterns are the property of PRE and they have a supply agreement for Australia . ARTC can request to alter the final machining to give different characteristics. If they want to go further which will require a different pattern there may be upfront design or pattern costs. • Warranty is subject to intended use and maintenance as per other products.

Attachments:

- GHD review report dated December 2007.
- PRE supporting documents dated 27th July 2007.
- Comments from PRE dated December 2007
- Reference Letters
- SAI Global ISO 9001 Accreditation certificate
- Manufacturers Quality Inspection certificate
- Non dimensioned drawing 500-15 Monoblock Xing PRE
- ARTC submission "Wheel hollowing Issues and Standards" dated 25th October 2006.
- Photo showing cut away sections of crossing.

11 **Approval ***

The PRE Monoblock cast manganese crossing is approved for use across the ARTC network.

12 **Conditions of Approval ***

1. PRE to maintain Quality management accreditation to ISO 9001. Appropriate QA checklists to be supplied to ARTC with crossings. Minimum certification to include:
 - X-Ray verification re internal defects.
 - Hardness testing.
 - Alignment details.
 - Profile details.
2. PRE to machine profiles to optimise contact for both new WPR 2000 and worn wheels to the attached PN profiles. All sections of contact band, including connecting welds to comply with ARTC standard ETM-01-01.
3. PRE to provide ARTC with appropriate Training Course materials, including a weld repair manual and upon request, accredited trainers (at ARTC cost) to train ARTC staff and maintenance contractors.
4. ARTC Delivery Managers to monitor wear patterns, especially during the first 10 MGT, taking particular notice of gauge at the vee. Appropriate remedial actions to be taken.

13 **Does the Originator accept the additional Conditions of Approval as set by the Review Panel:**

Yes ☐ No ☐ N/A ☐

14 **Sign off**

Review Panel:

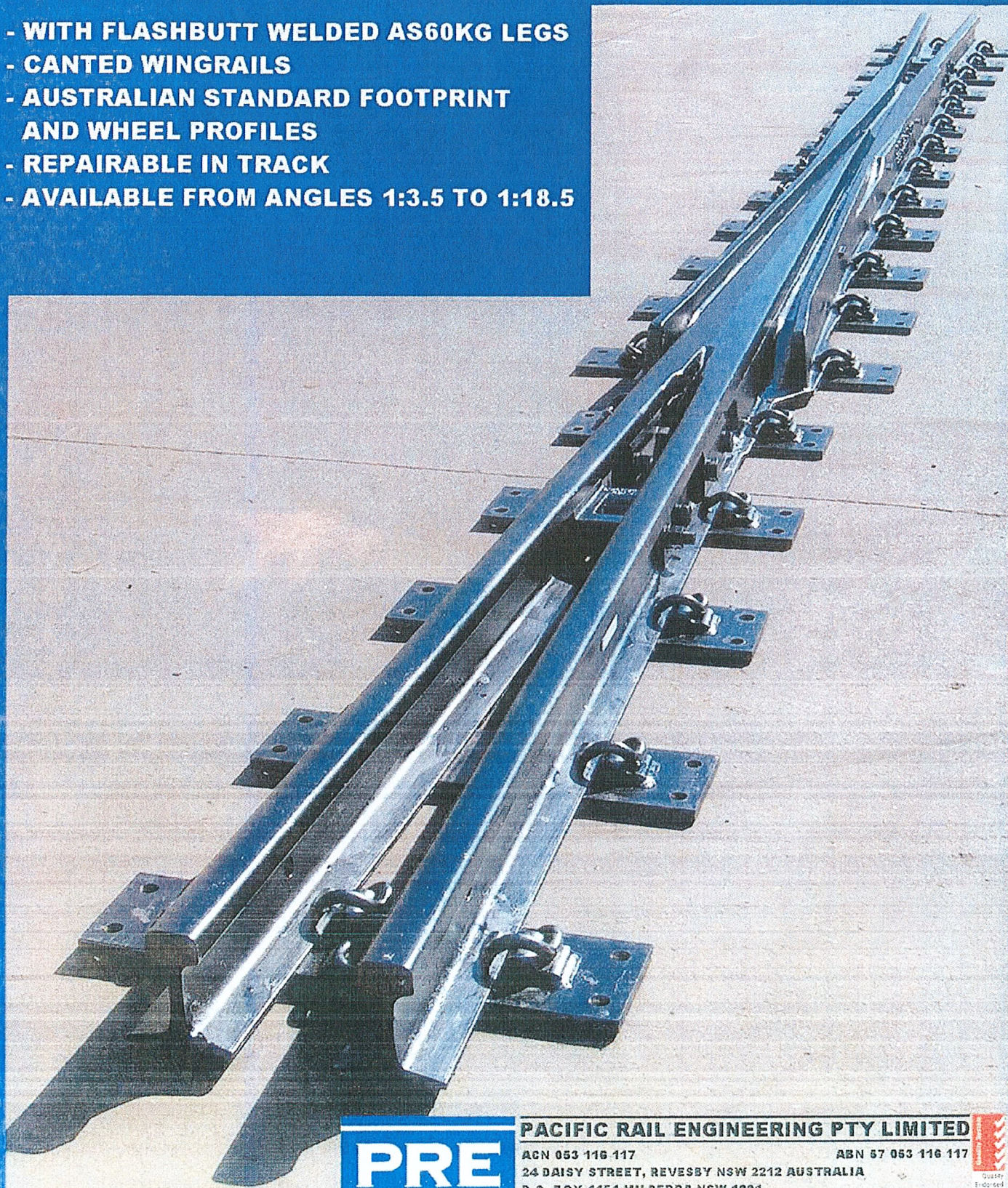
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Date: *18/1/08*
Date: *16/1/08*
Date: *16/1/08*

WELDABLE CAST MANGANESE MONOBLOCK CROSSING

- WITH FLASHBUTT WELDED AS60KG LEGS
- CANTED WINGRAILS
- AUSTRALIAN STANDARD FOOTPRINT AND WHEEL PROFILES
- REPAIRABLE IN TRACK
- AVAILABLE FROM ANGLES 1:3.5 TO 1:18.5



PRE

PACIFIC RAIL ENGINEERING PTY LIMITED

ACN 053 116 117

ABN 57 053 116 117

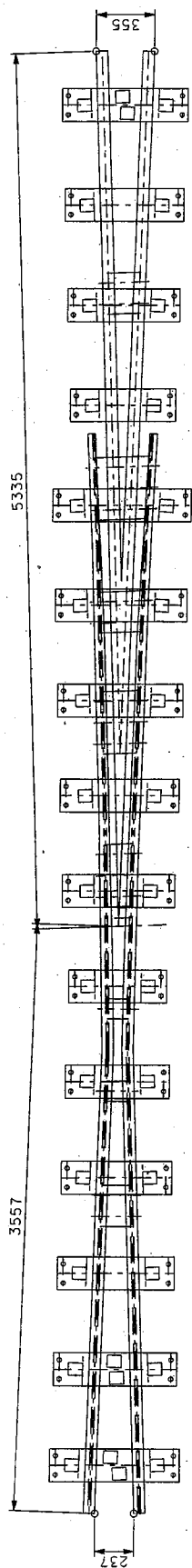
24 DAISY STREET, REVESSY NSW 2212 AUSTRALIA

P.O. BOX 4454 MILPERRA NSW 1891

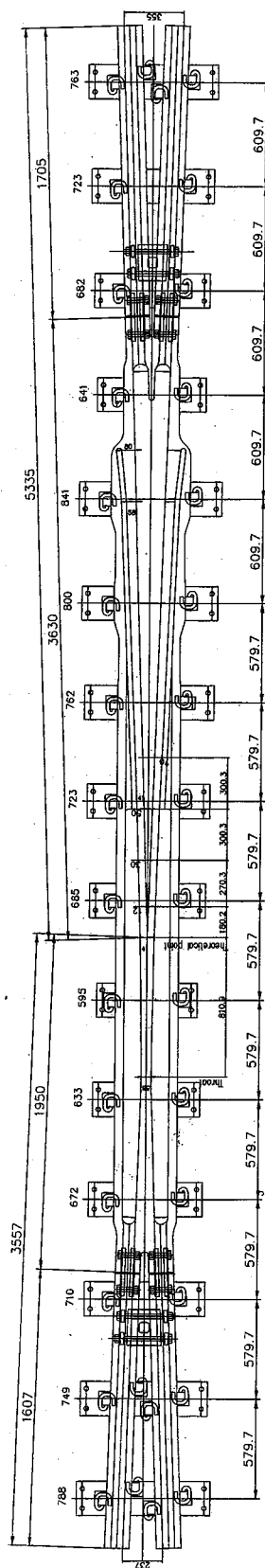
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PRE

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