Fig 1

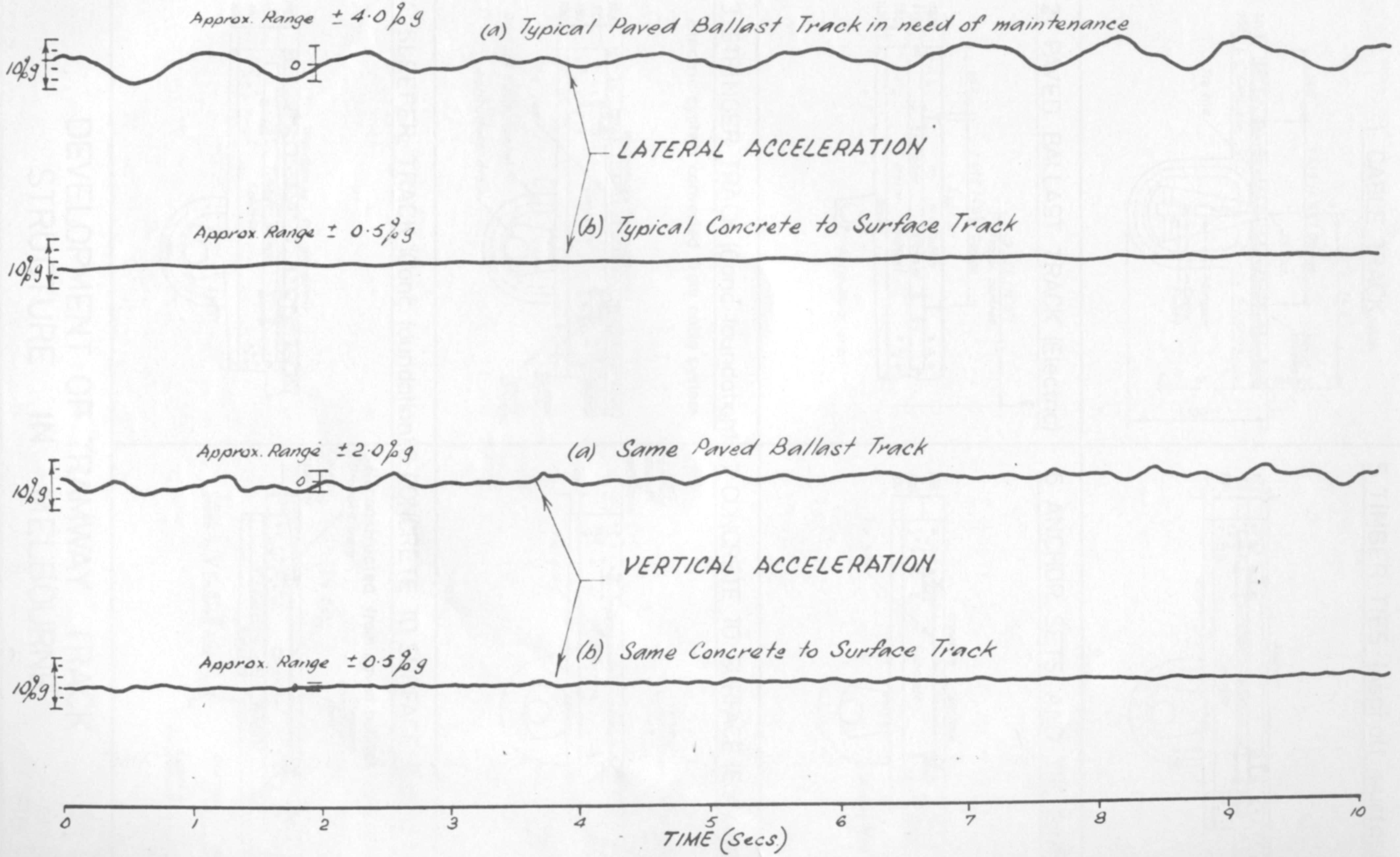
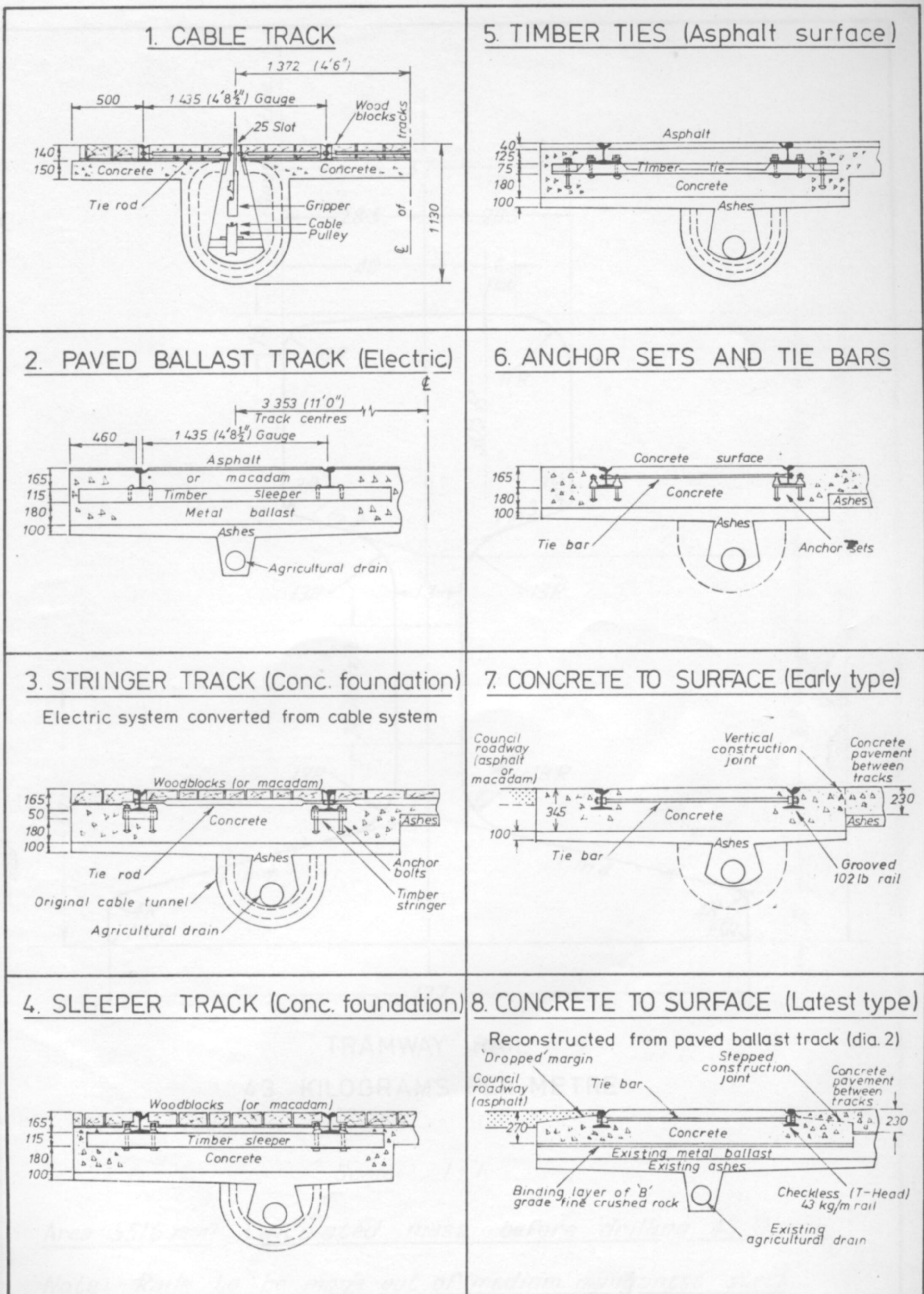
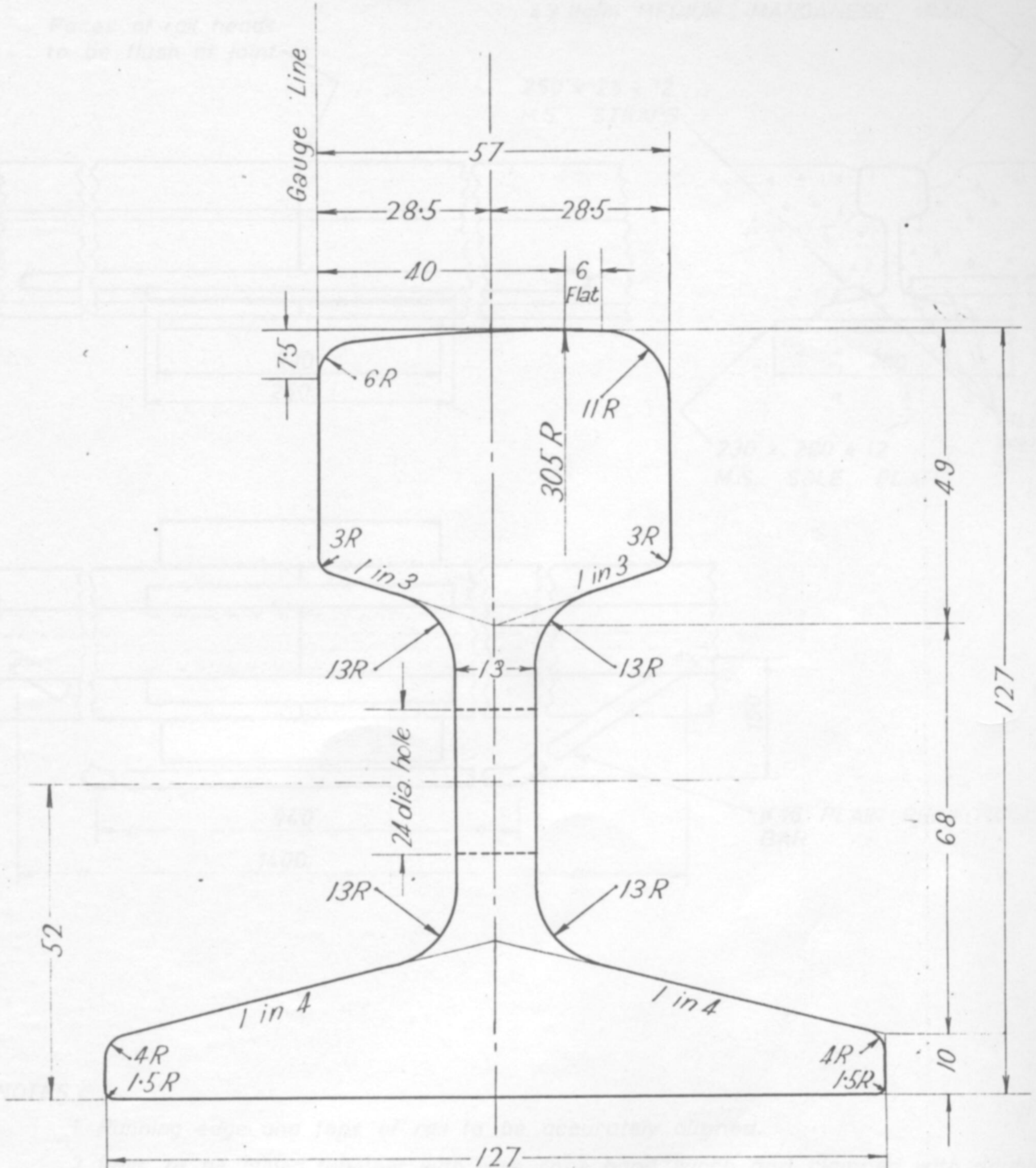


Fig. 2 COMPARISON OF RIDE QUALITIES – Paved Ballast track in poor condition compared with Concrete to Surface track



DEVELOPMENT OF TRAMWAY TRACK STRUCTURE IN MELBOURNE

FIG. 3



TRAMWAY RAIL

43 KILOGRAMS PER METRE

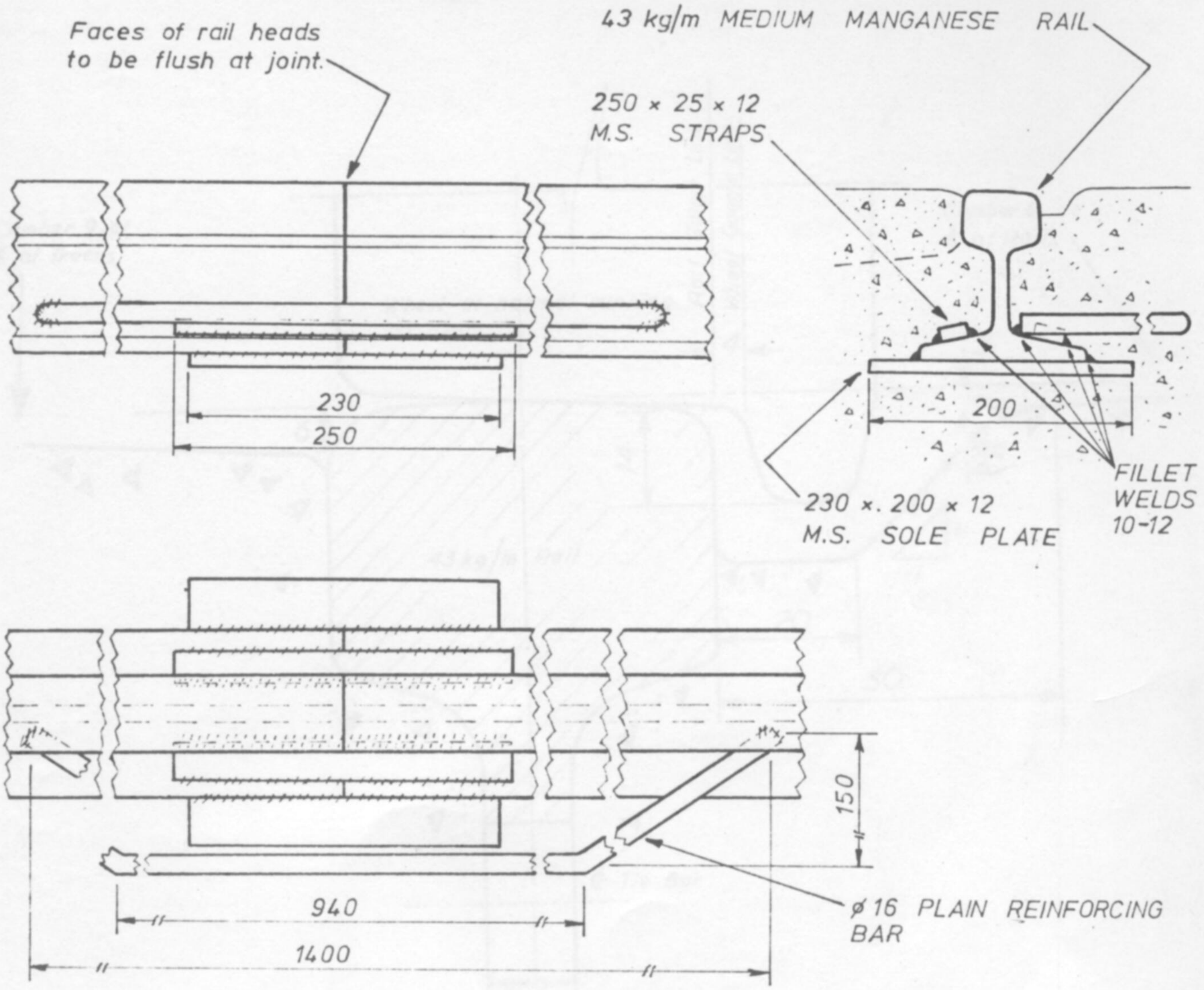
Scale 1 : 1

Area : 5516 mm^2 Calculated mass before drilling 43·30kg/m

Note: Rails to be made out of medium manganese steel in accordance with M.M.T.B. Specification

Fig 4

Part of Drg No P.14603



NOTES

1. Running edge and tops of rail to be accurately aligned.
2. Rails to be pulled together with wire rope hand winch and clamped with double "U" clamp during welding.
3. End of web and foot to be ground to ensure full contact at head of rails.
4. Self shielding flux-cored continuous electrodes to be used for all welds.

Fig 5

KIRBY TYPE RAIL JOINT

FOR 43 kg/m RAIL

MELBOURNE & METROPOLITAN TRAMWAYS BOARD

DATE	CHIEF ENGINEER		
DRAWN	CHECKED	PASSED	APPROVED
E 4.5.79			

SCALE 1:5

P. 14869

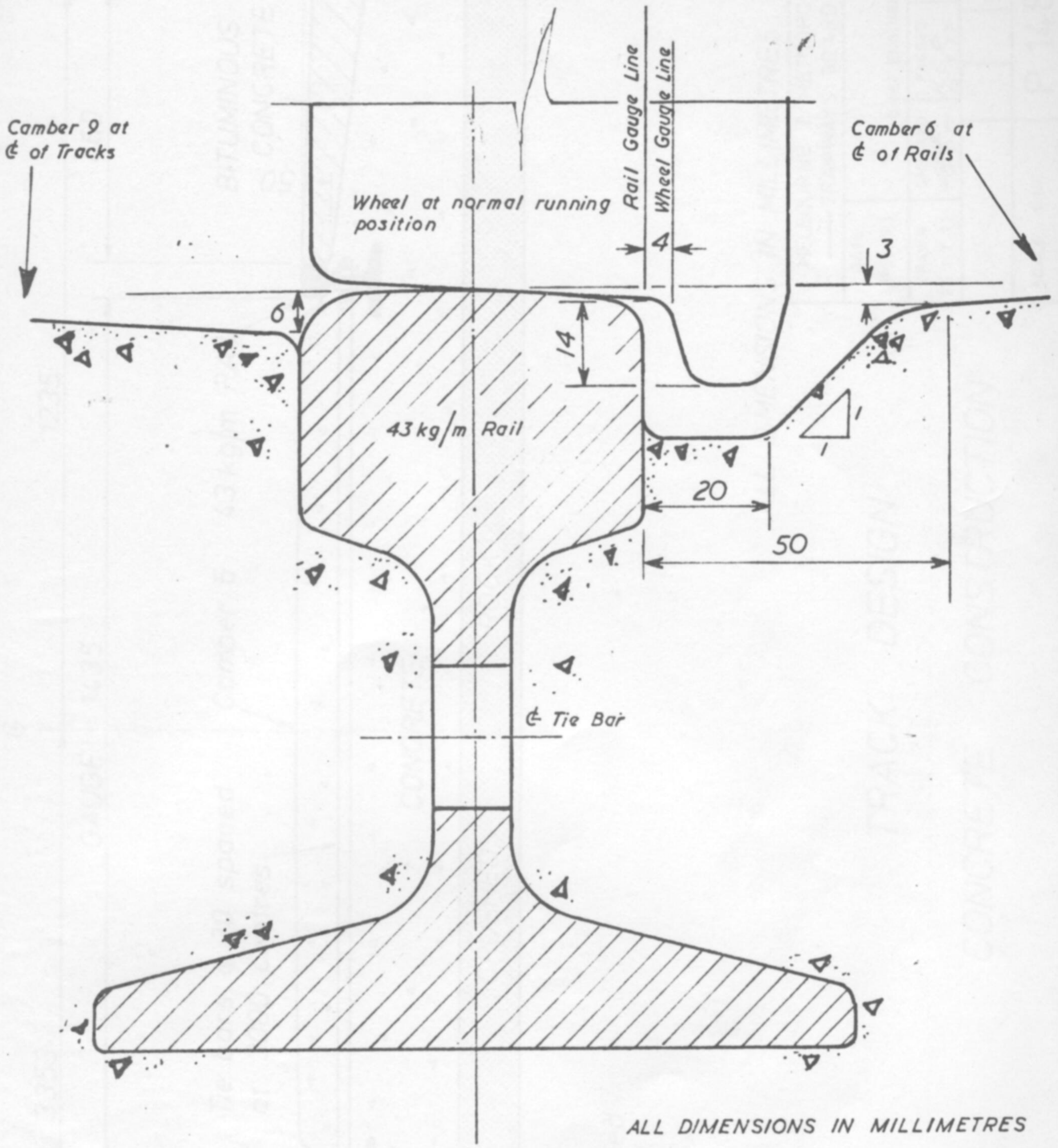
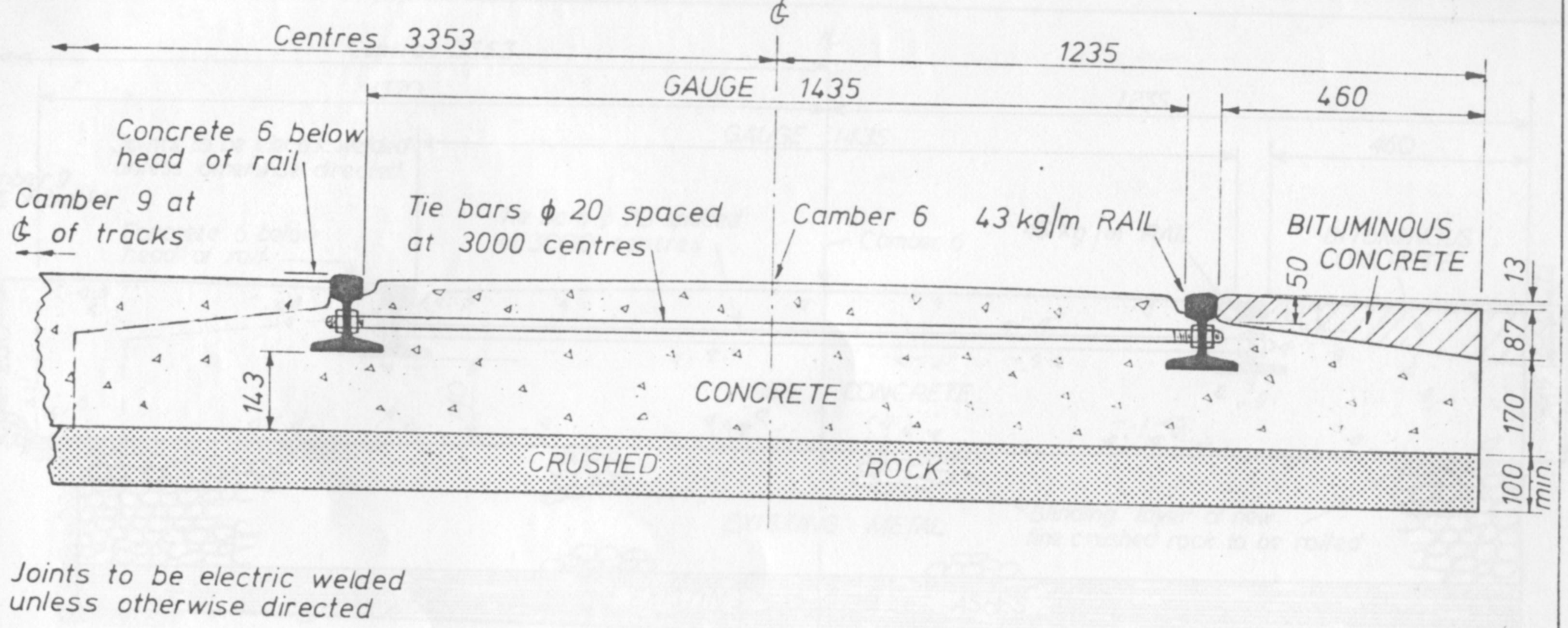


Fig 6

TRACK DESIGN
DETAIL OF GROOVE
IN CONCRETE SURFACE

MELBOURNE & METROPOLITAN TRAMWAYS BOARD			
DATE 14-8-75	CHIEF ENGINEER		
DRAWN J.Chau 6-8-75	CHECKED	PASSED K.C.P. 11-8-75	APPROVED
SCALE: 1:1	P.14670		



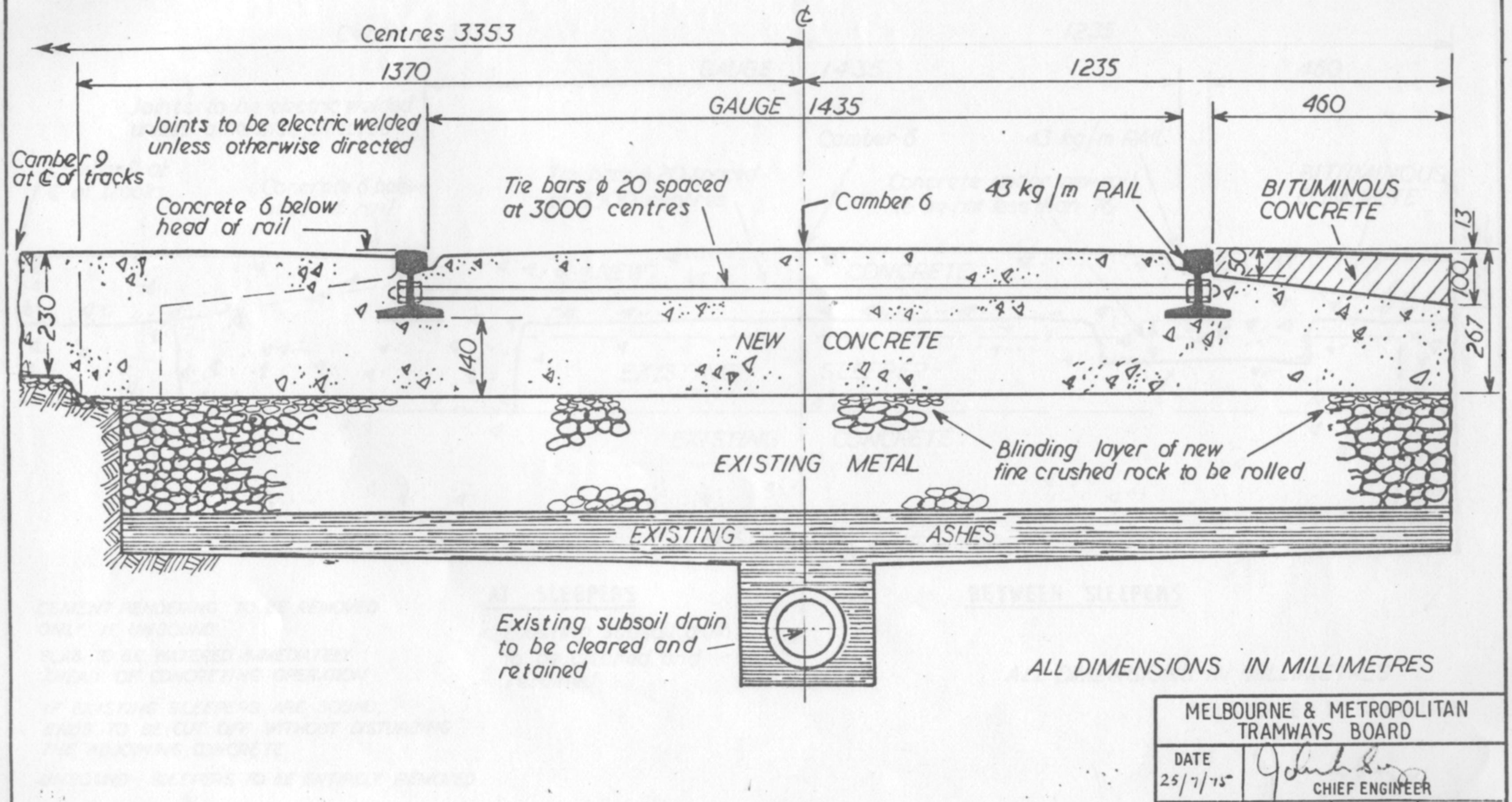
ALL DIMENSIONS IN MILLIMETRES

TRACK DESIGN

CONCRETE CONSTRUCTION

MELBOURNE & METROPOLITAN TRAMWAYS BOARD			
DATE 20·7·77	CHIEF ENGINEER		
DRAWN FE. 1·7·77	CHECKED 18·7·77	PASSED K.C.P. 15·7·77	APPROVED
SCALE 1:10	P. 14809		

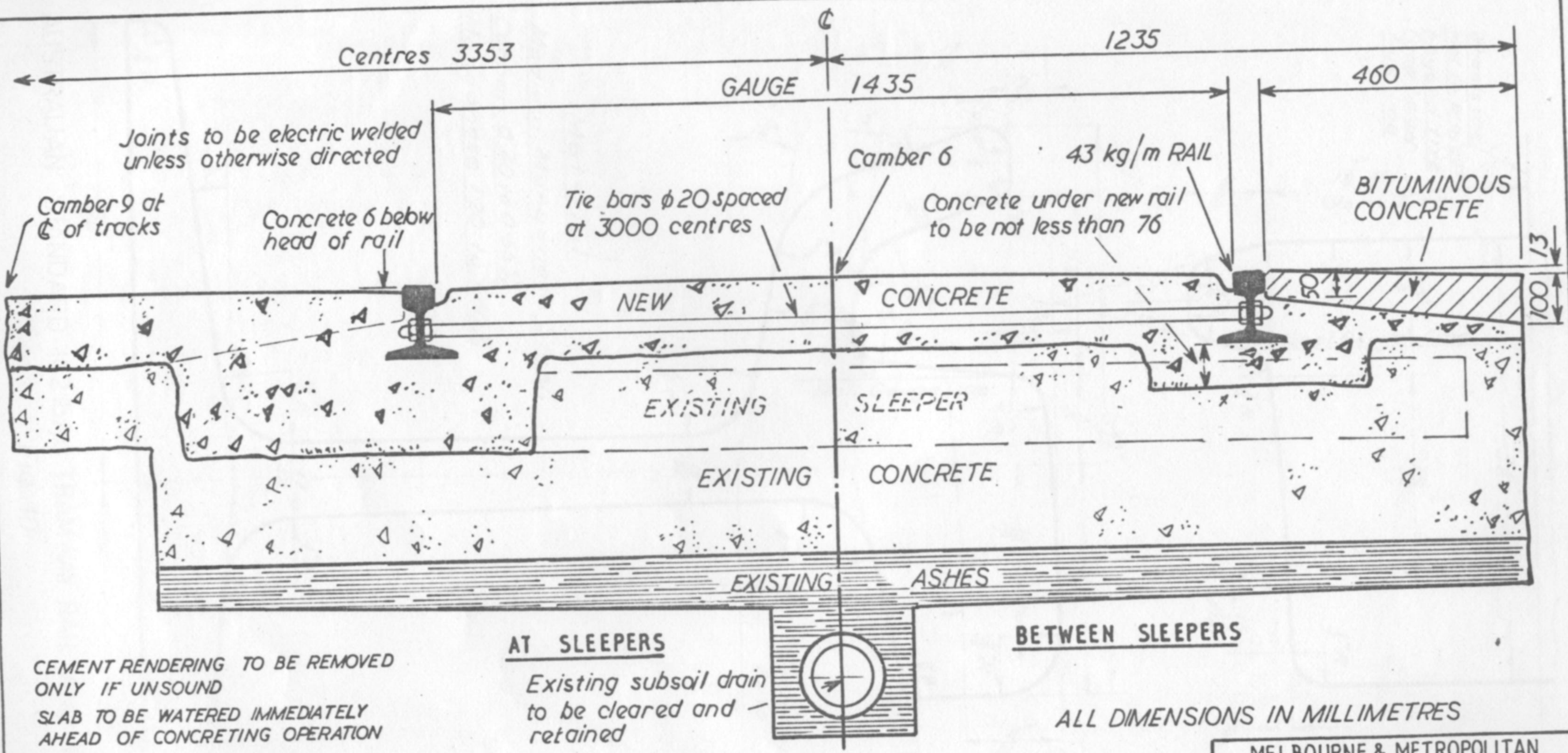
Fig. 7



TRACK DESIGN

RECONSTRUCTION OF PAVED BALLAST TRACK

Fig 8



CEMENT RENDERING TO BE REMOVED ONLY IF UNSOUND

SLAB TO BE WATERED IMMEDIATELY AHEAD OF CONCRETING OPERATION

IF EXISTING SLEEPERS ARE SOUND, ENDS TO BE CUT OFF WITHOUT DISTURBING THE ADJOINING CONCRETE

UNSOUND SLEEPERS TO BE ENTIRELY REMOVED

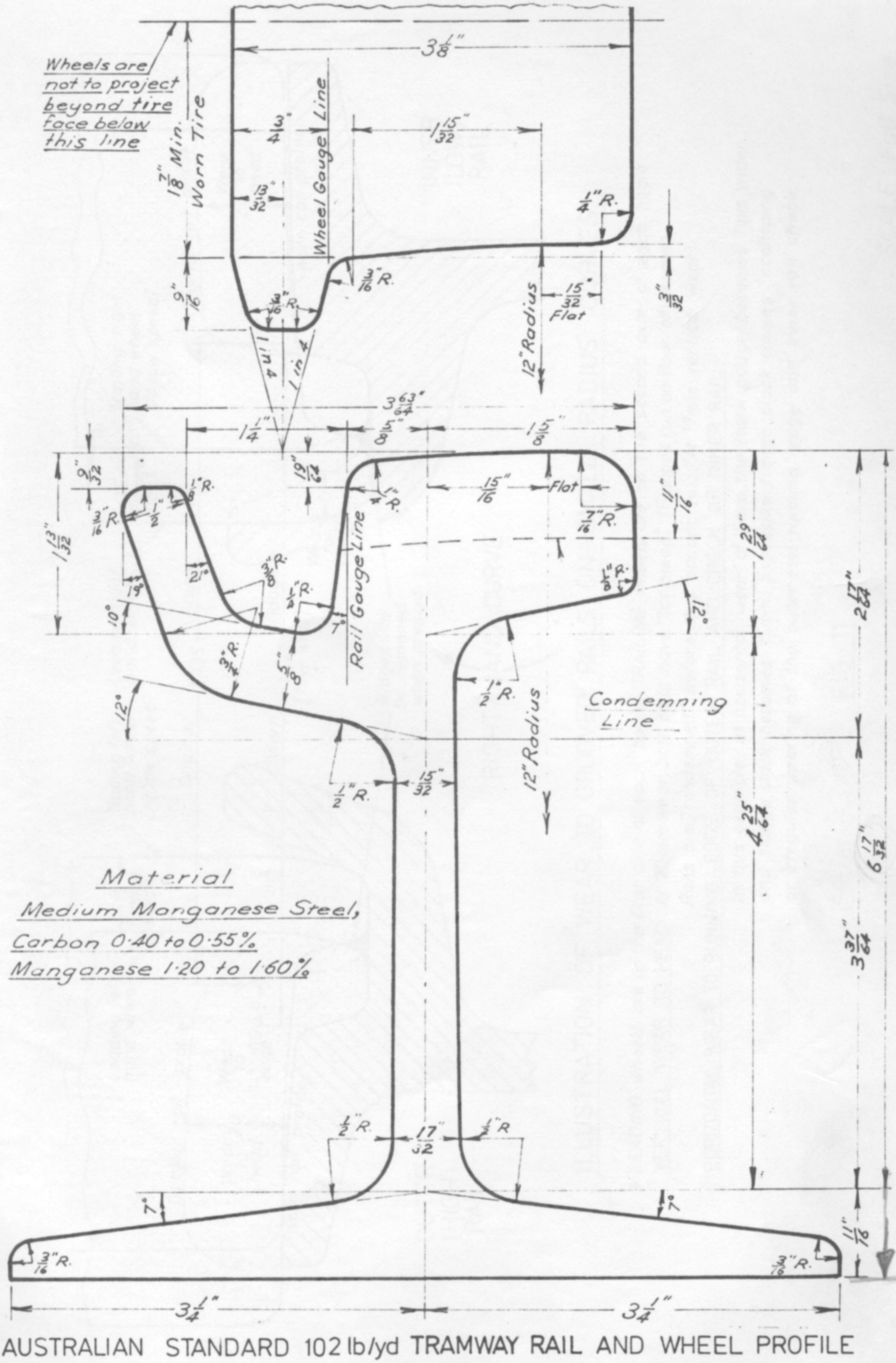
ALL DIMENSIONS IN MILLIMETRES

MELBOURNE & METROPOLITAN TRAMWAYS BOARD			
DATE 25/7/75	CHIEF ENGINEER		
DRAWN J.Chau 24-7-75	CHECKED	PASSED K.C.P. 25.7.75	APPROVED D.V.L.
SCALE. 1:10	P.14665		

TRACK DESIGN

RECONSTRUCTION OF TRACK WITH CONCRETE FOUNDATION

Fig. 9



AUSTRALIAN STANDARD 102 lb/yd TRAMWAY RAIL AND WHEEL PROFILE

Fig. 10

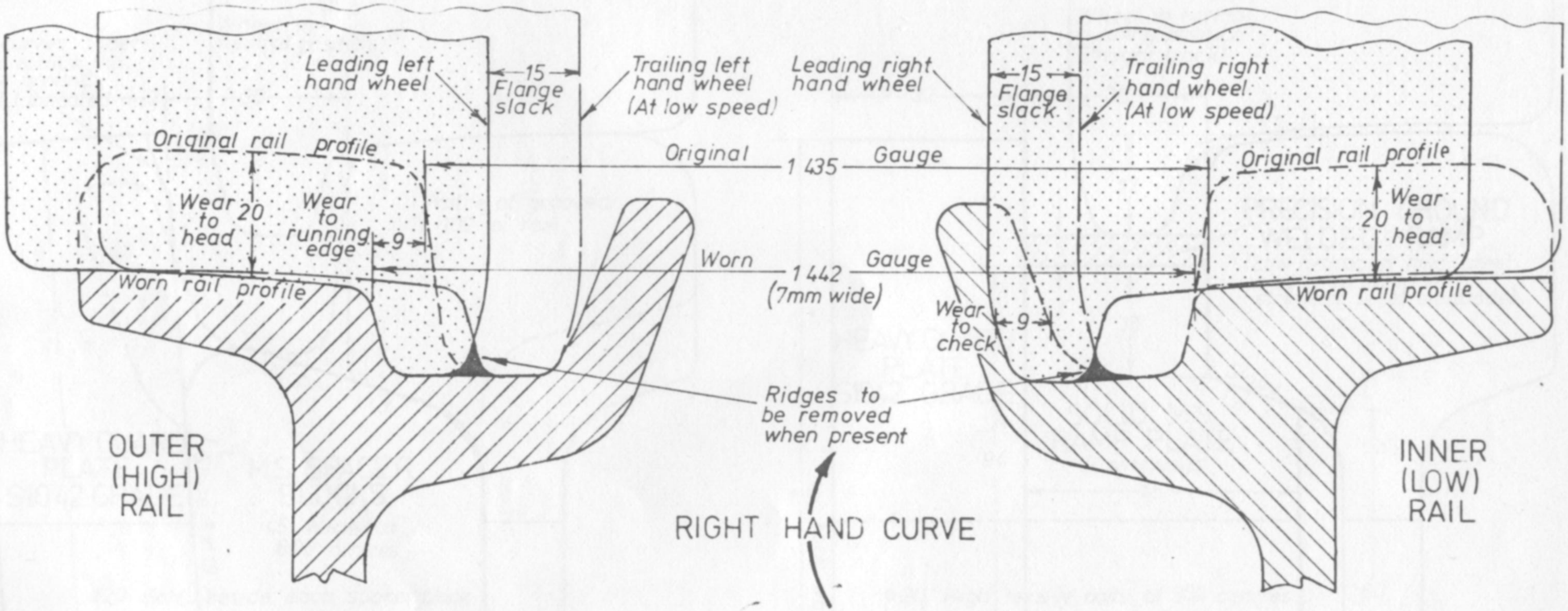


ILLUSTRATION OF WEAR TO GROOVED RAILS ON SMALL RADIUS CURVES.

* LEADING wheels are on the first axle of each bogie. TRAILING wheels are on the second axle of each bogie

VERTICAL WEAR TO HEAD At 20mm wear, both rails have "bottomed". (Flanges run on floor of groove). Rails are "condemned" before this occurs. (viz. At 17mm vertical wear).

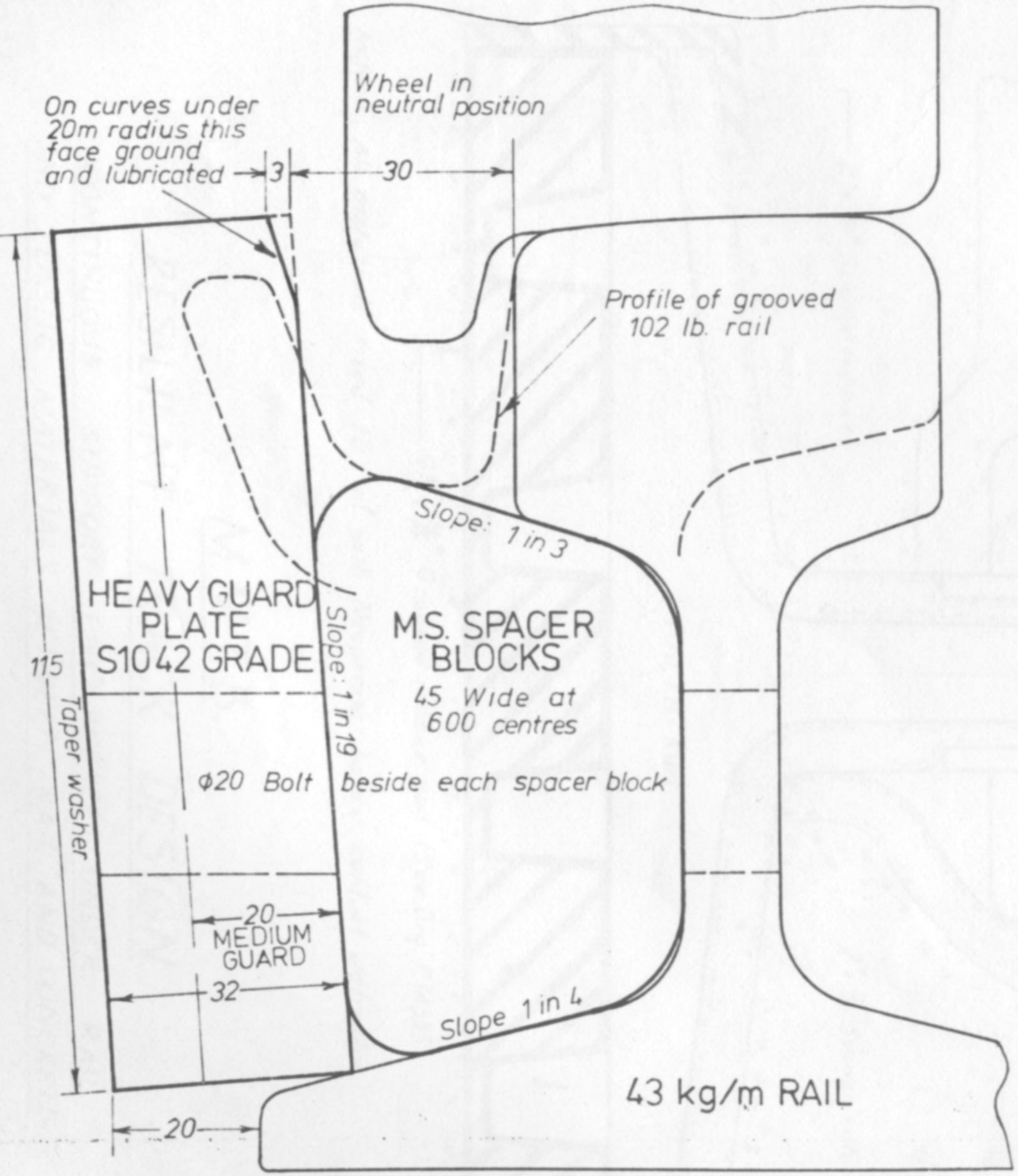
HORIZONTAL WEAR TO RUNNING EDGE OF OUTER RAIL AND CHECK OF INNER RAIL

In this example, at horizontal wear of 9mm, the track gauge becomes 7mm wider and flange slack becomes 15mm. Excessive flange slack causes "scalloping" or irregular wearing of the outer rail running edge and inner rail check.

FIG. 11

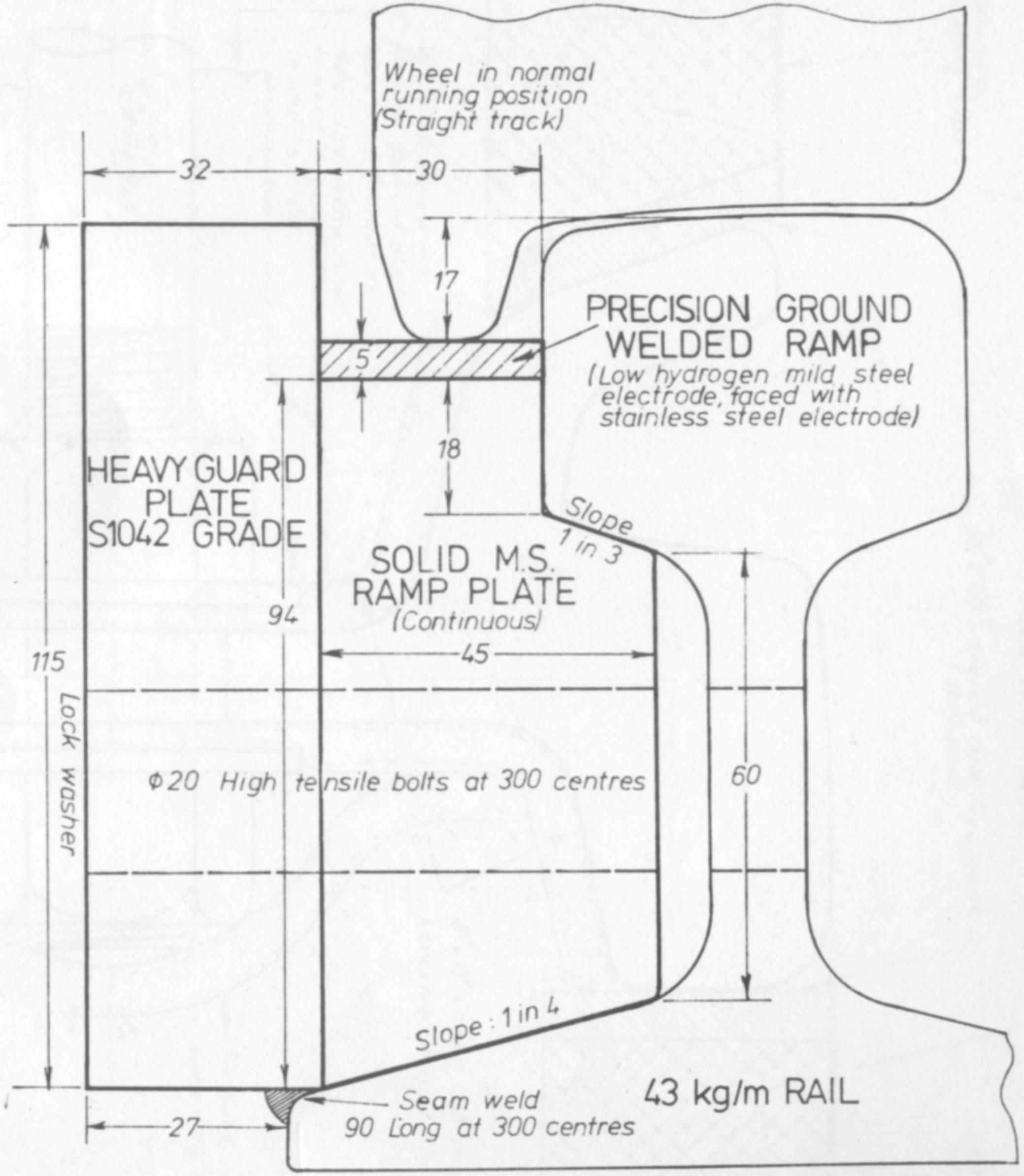
E.K. 10-5-79

SCALE: Full Size



HEAVY AND MEDIUM GUARD FOR CURVES

FIG. 12

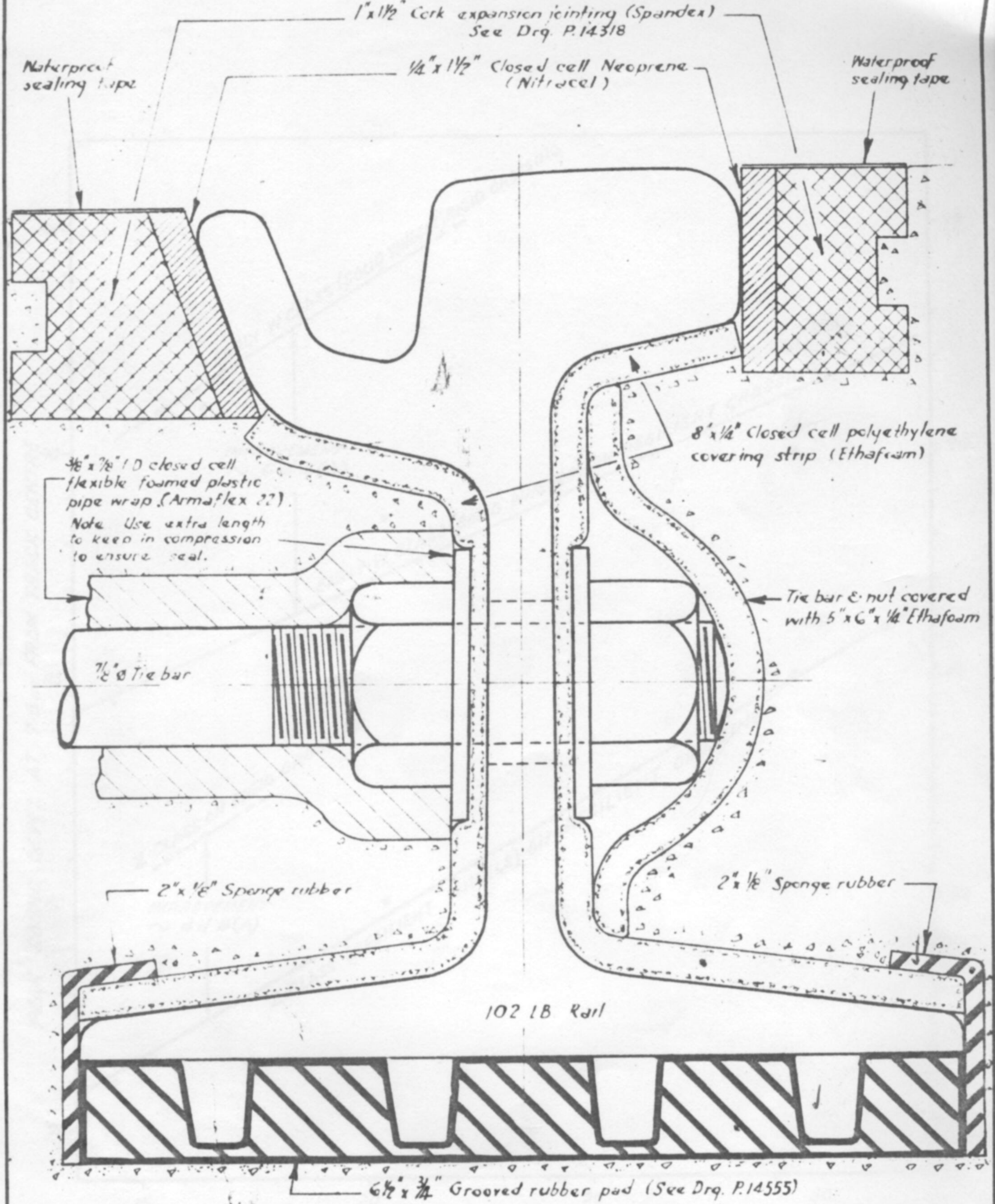


RAMPING AT CROSSINGS

FIG. 13

SCALE: Full Size

E.K. 8/5/79



Note: All materials fixed to rail with Neoprene based contact adhesive

M.M.T.B.

RESILIENT TRACK DESIGN

CONTINUOUS SUPPORT (¾" RUBBER) UNDER RAIL AND ELASTIC MATERIALS BETWEEN RAIL AND CONCRETE

Fig.14

Scale Full Size

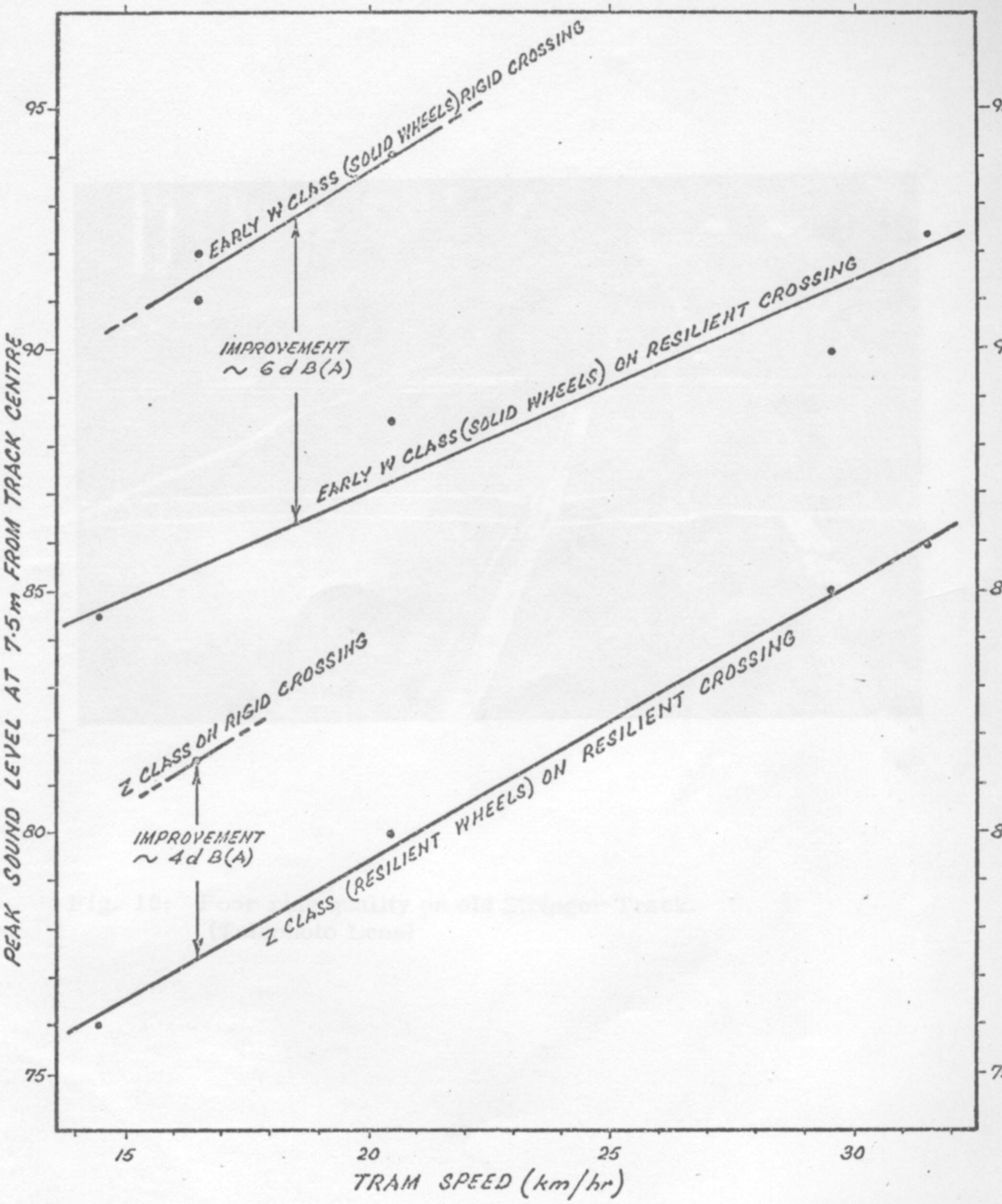


Fig. 15: COMPARISON OF NOISE LEVELS OVER RECTANGULAR CROSSINGS
(EXPERIMENTAL CONCRETE TO SURFACE CROSSINGS, RIGID & RESILIENT)

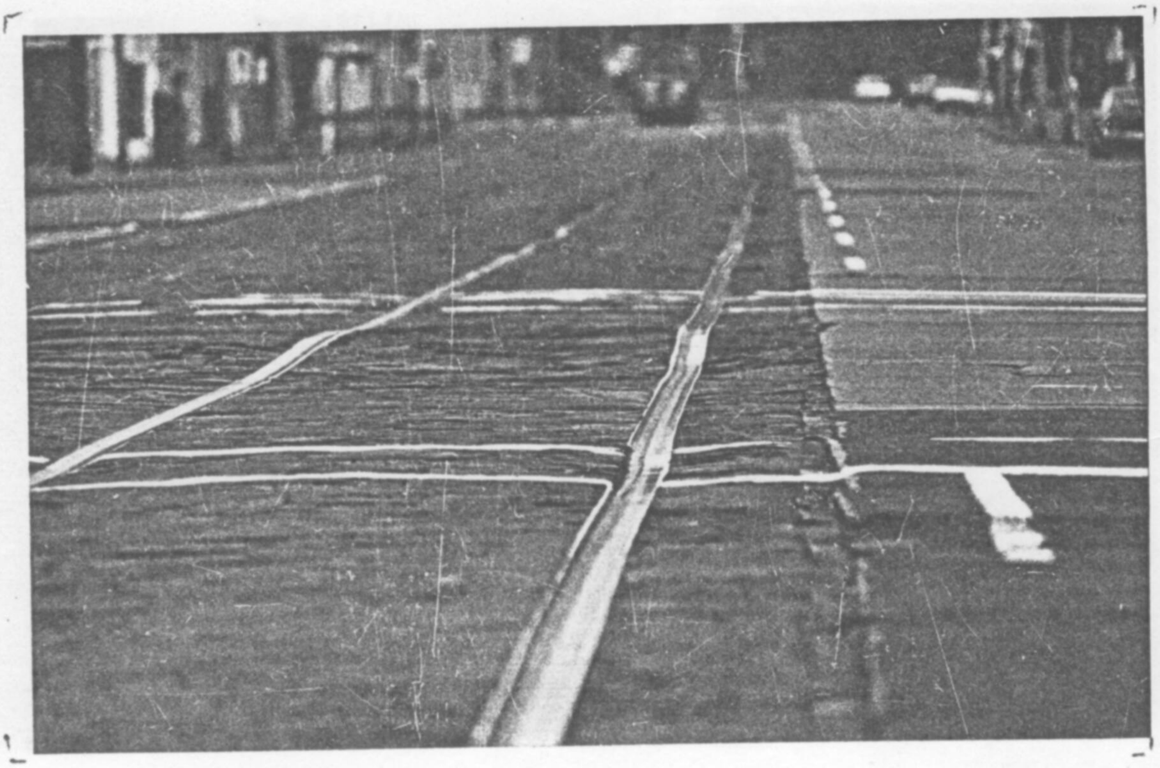


Fig. 16: Poor ride quality on old Stringer Track.
(Telephoto Lens)

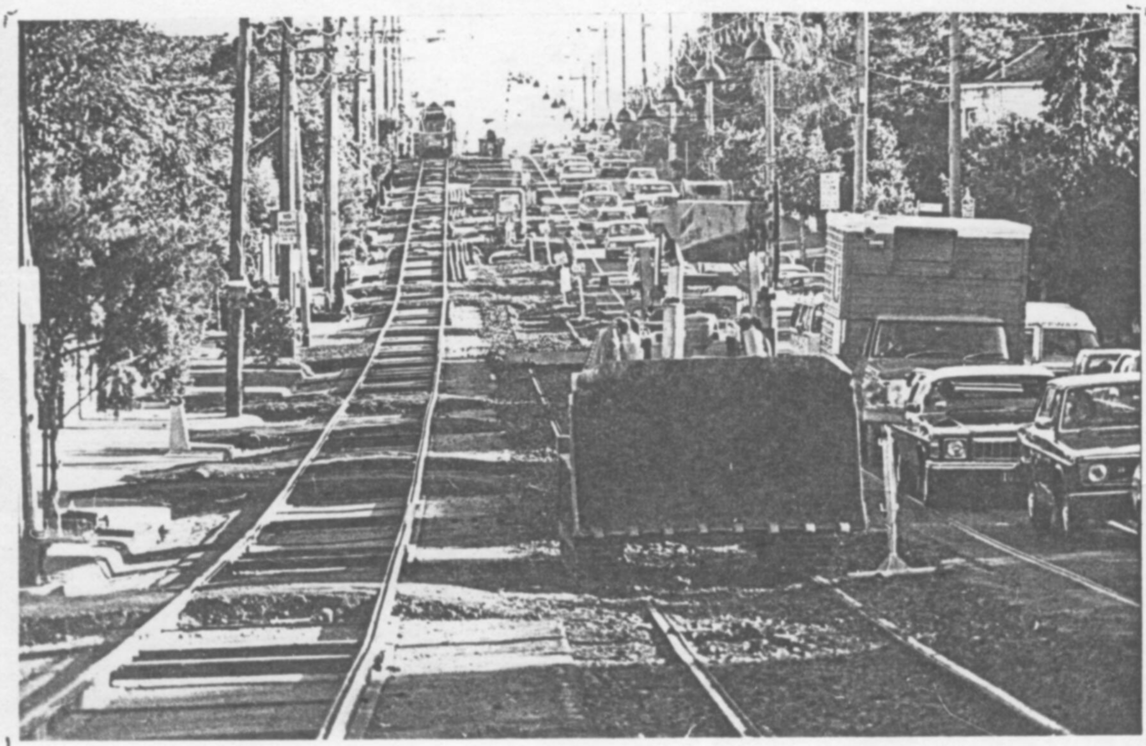


Fig. 17: Temporary Track in narrow (20 m) Street.

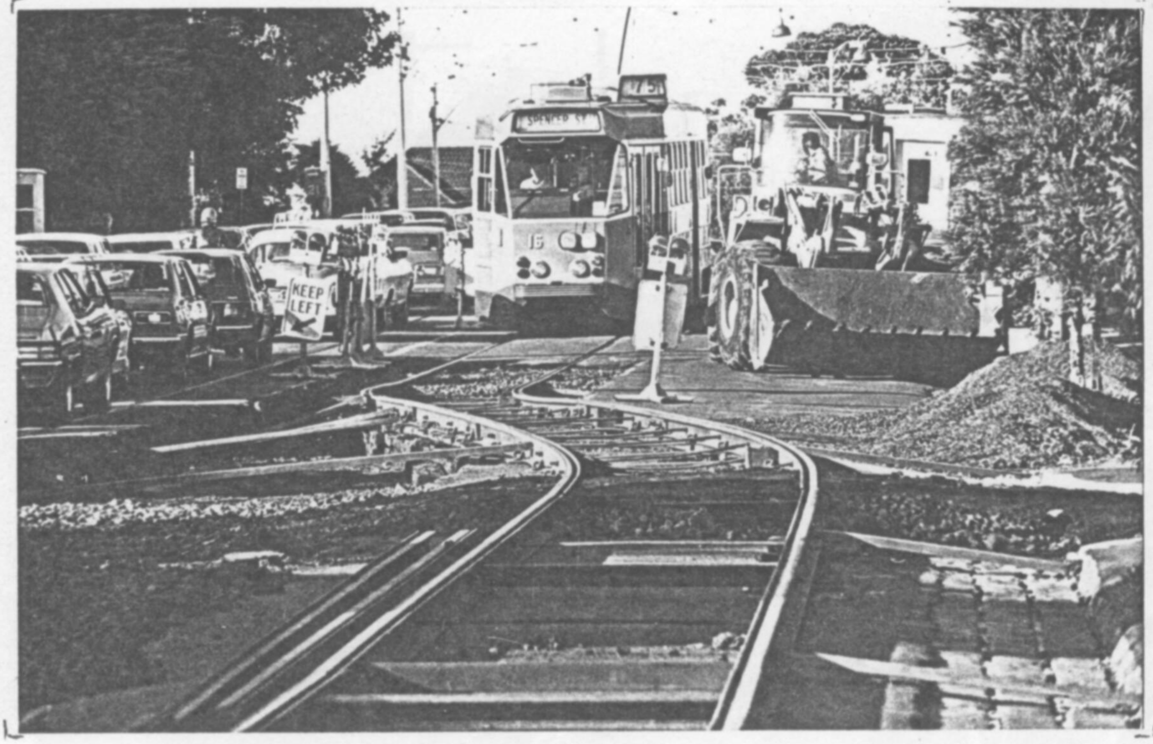


Fig. 18: 'Swing' joins Temporary Track to Permanent Track

Fig. 19: Removal of Macadam Pavement to Sleeper Level
by special bucket attachment.
(Reconstruction of Paved Ballast Track).

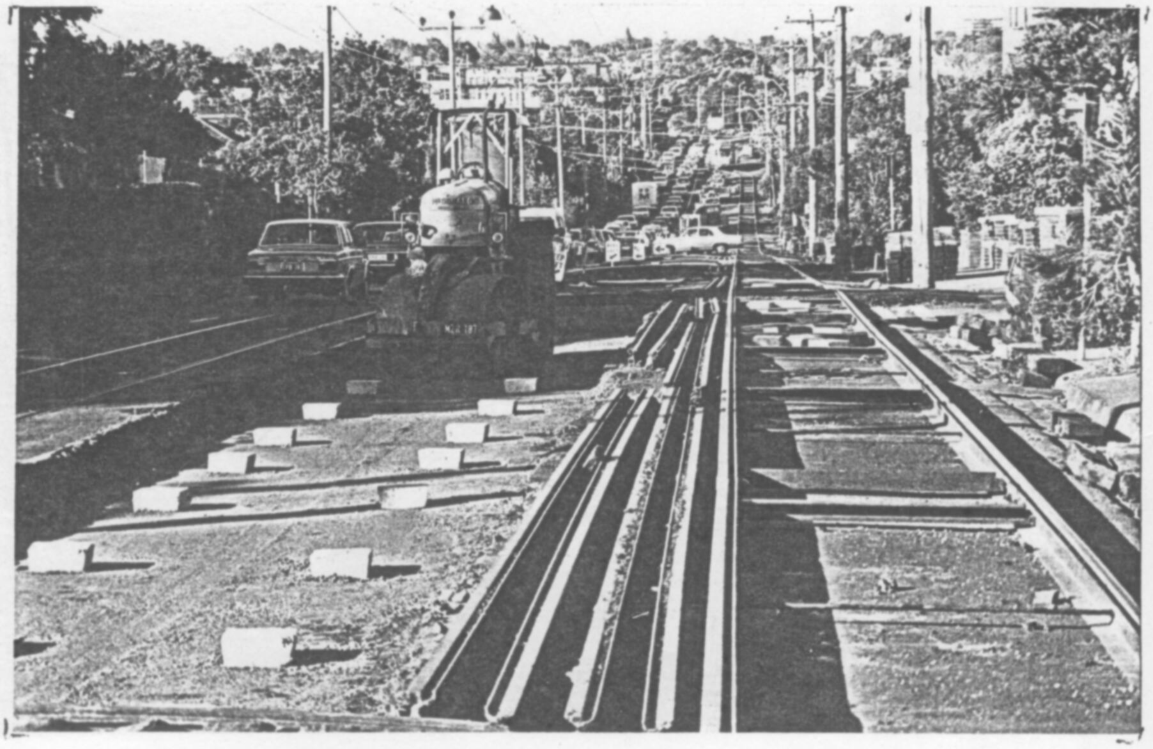


Fig. 20: Prepared Sub-Base, ready for Rail

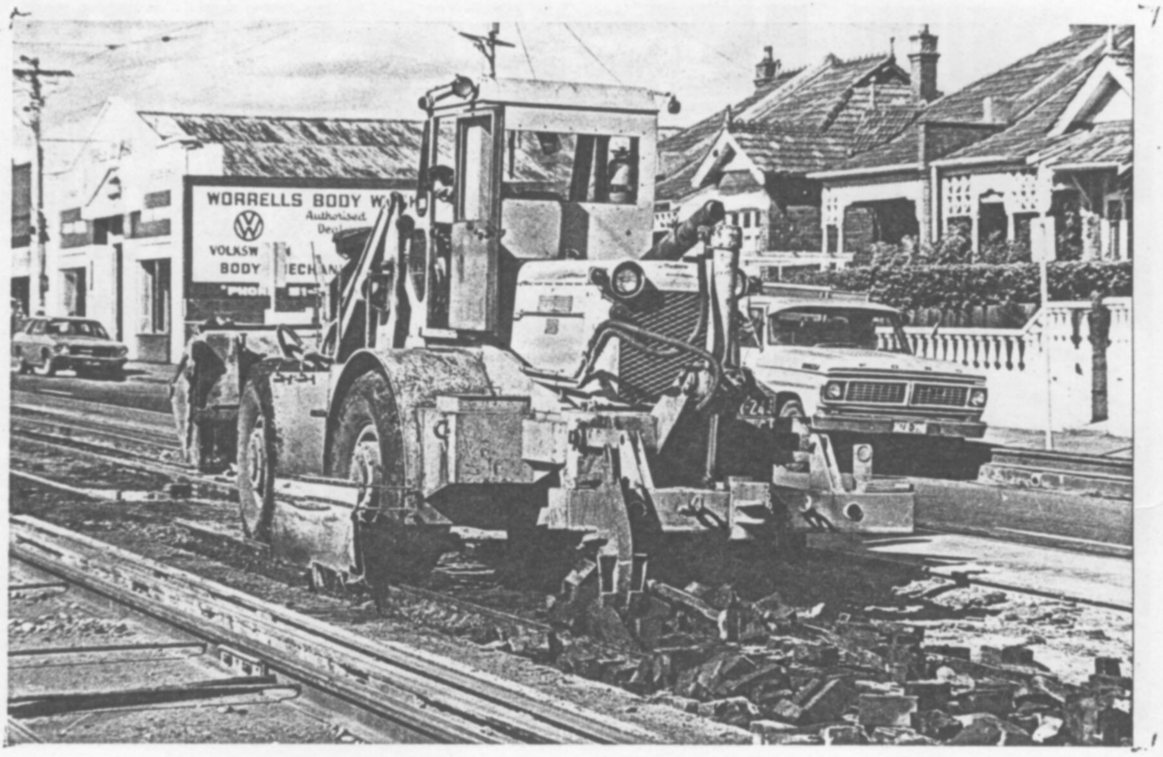


Fig. 21: Ripping Wood-block Pavement.
(Reconstruction of Stringer Track).

Fig. 22: Removing Timber Stringers from Concrete Foundation

Fig. 23: Placing New Rail over Old Concrete Foundation.

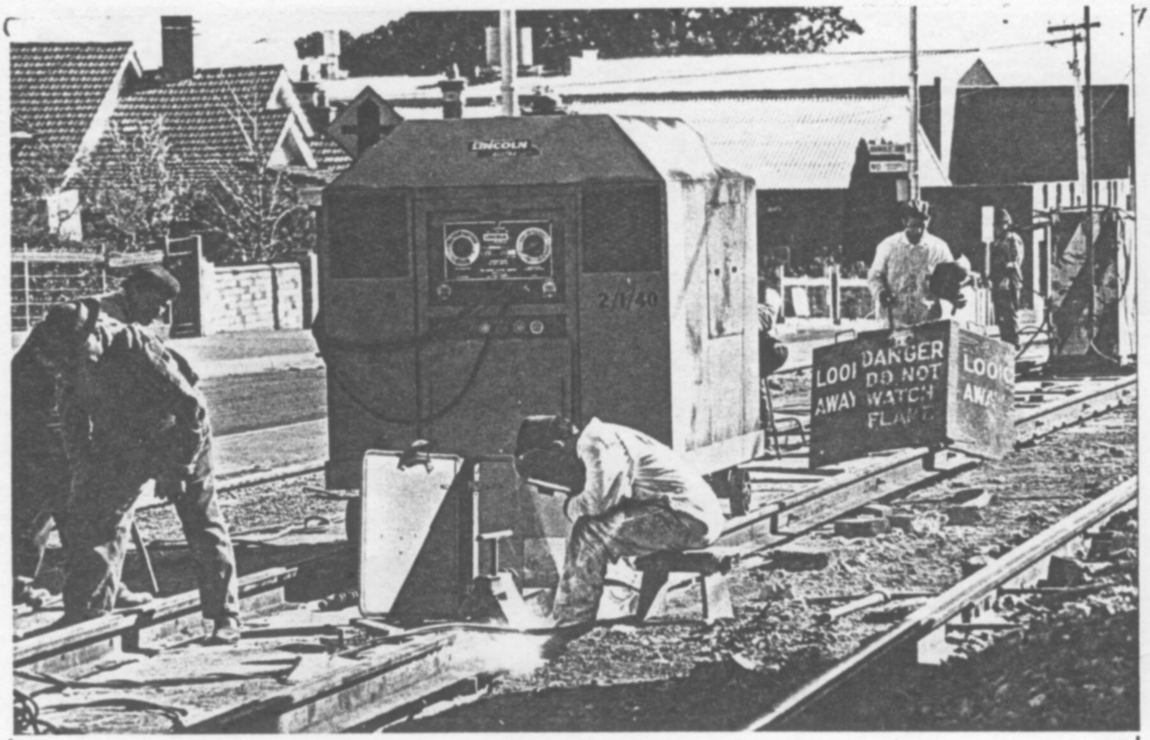


Fig. 24: Welding Kirby Joints with Semi-Automatic and Manual Arc Machines.

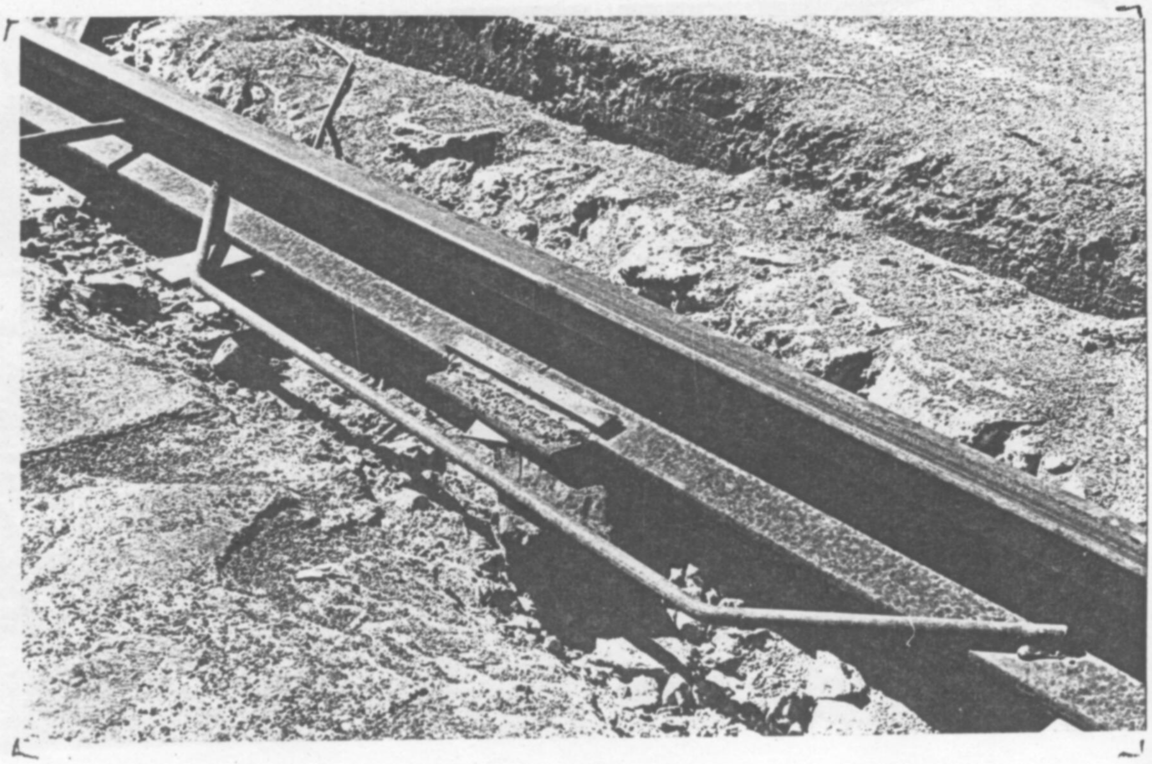


Fig. 25: The Kirby Joint (43 kg/m rail)

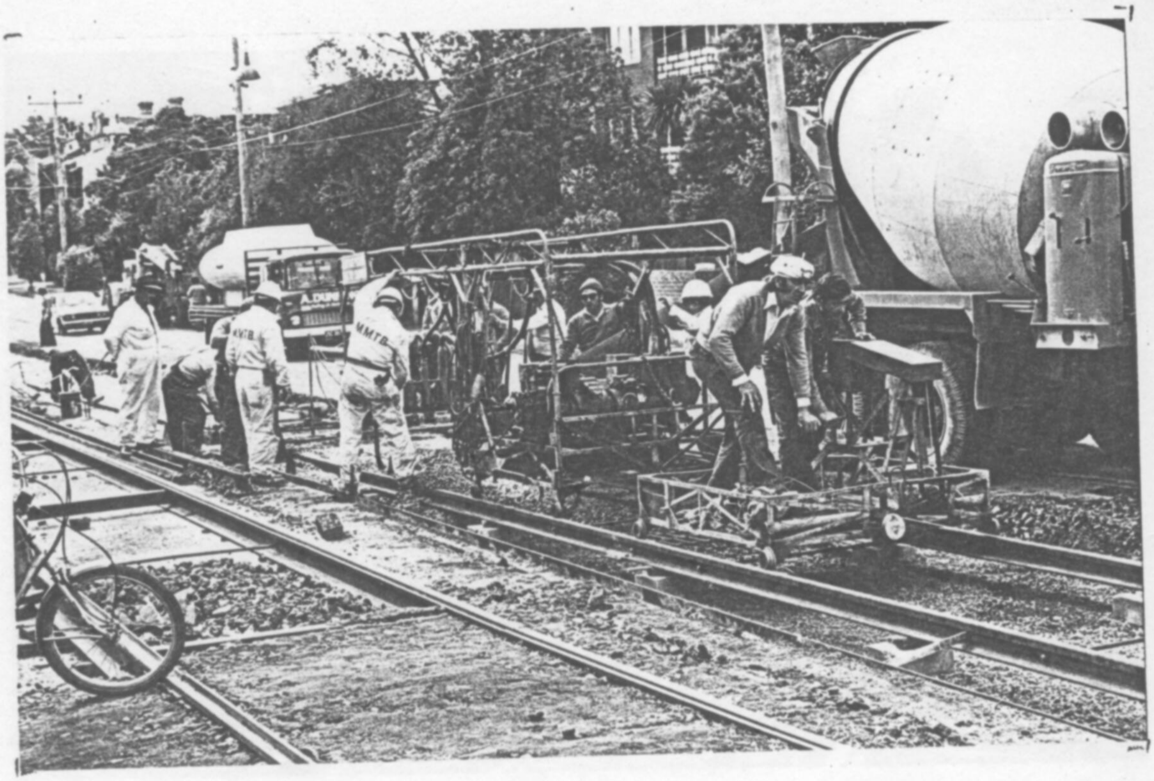


Fig. 26: The Concrete Train advances over the new track skeleton.

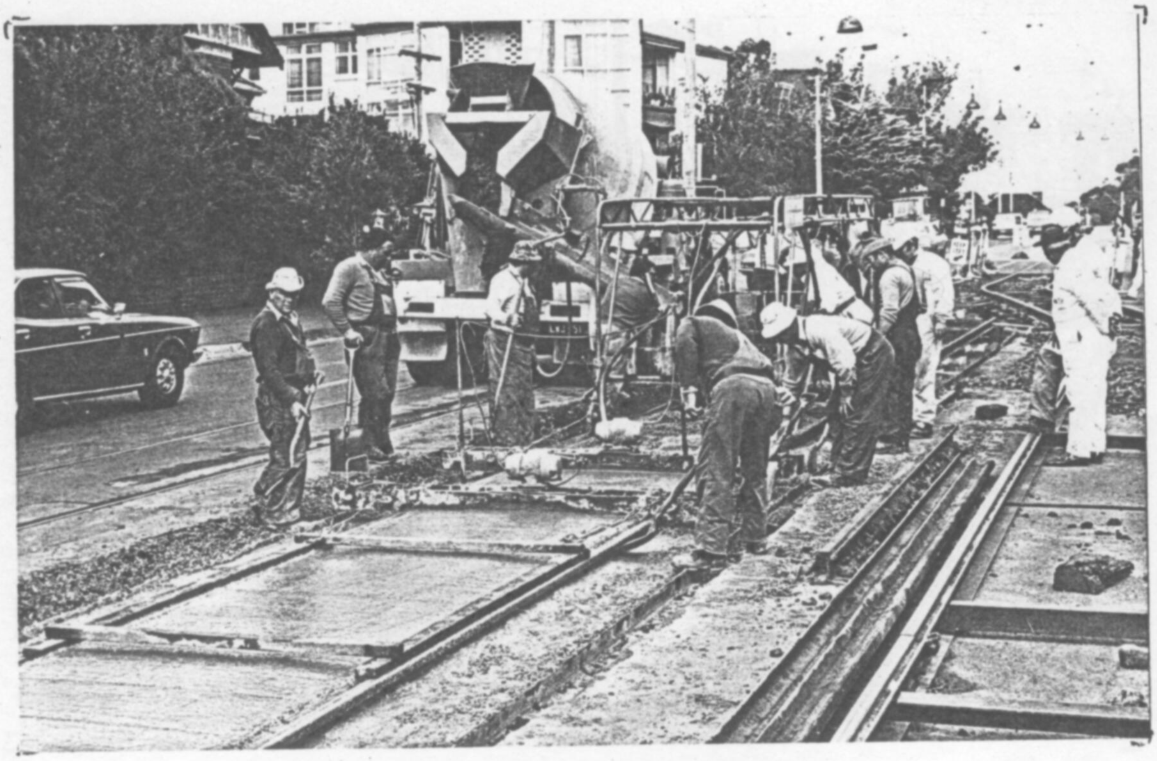


Fig. 27: Vibrating Screeds and Grooving Sled follow the Concrete Train.

Fig. 28: Wetting the surface for Longitudinal Screeding, Completed Track in Foreground.

Fig. 29: Hand finishing of Rail Grooves and Spraying the Curing Compound.

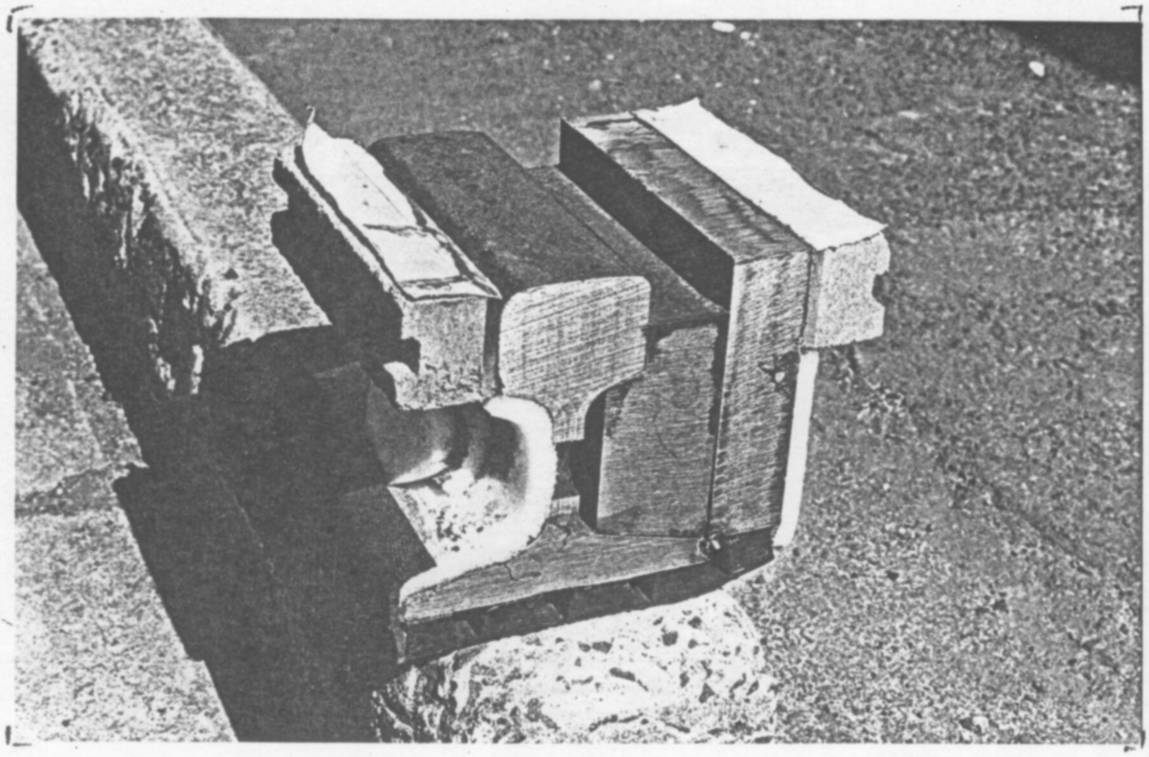


Fig. 30: Resilient Ramped Rail for use in Rectangular Crossings.

Fig. 31: Resilient Rectangular Crossing being Concreted.