IMHC

INTERNATIONAL MATERIALS HANDLING CONFERENCE

1989

The Planning of an Underground Manriding Conveyor System for Iscor's Tshikondeni Colliery

W Moller, Senior Engineer
E R Ascui, Plant Engineer
Mining Division, Iscor Limited

BELTCON 5

1 SUMMARY

The object of this paper is to give a brief description of some of the matters to be considered when planning a manriding conveyor system and to produce a proposed standard for manriding conveyors in the RSA. The proposed standard which is based on the UK National Coal Board codes and rules and the German recommendations for personnel transport by belt conveyor, is included herewith as Addendum I.

2 INTRODUCTION

Safety, economic and operating factors have forced Iscor to look closely at the different means of transporting personnel underground at Tshikondeni mine, where the rapid advancing of the fully mechanized faces have resulted in increased travelling time for underground personnel, thus decreasing the available time at the face. The machine available time (MAT) will gradually be eroded further unless personnel transport is improved to limit the travelling time.

The advantages to be gained from speedy and comfortable personnel transport are obvious, and there can be no doubt that such systems can result only in improved productivity because of increased MAT and fresher workers.

An investigation in Germany on the energy converted during different movements has revealed that the energy converted by a person while:

- lying or sitting on a conveyor belt is 300kJ/h
- sitting in a train, bus or other vehicle is 380kJ/h
- standing in a train, bus or other vehicle is 450kJ/h
- walking horizontal at 4,0 km/h is 900kJ/h
- walking uphill, 1 in 20 (3°) at 3,2 km/h is 1 100kJ/h
- walking downhill, 1 in 20 (3°) at 4,8 km/h is 1 500kJ/h

This indicates that travelling on a conveyor belt, is for personnel the least strenuous means of transportation to and from their working place. Its high transport capacity and continuous availability, as well as the significant reduction in waiting time, makes the mineral conveyor system very attractive for personnel transport.

The different means of transporting personnel and material which were considered for Tshikondeni included:

- chairlifts
- endless rope systems
- rack rails
- trackless vehicles
- and manriding conveyors.

Mainly because of the facts mentioned above manriding is presently being planned for personnel transport and a trackless cassette system for material.

Although an additional expenditure has to be made to convert existing mineral conveyors into two-way manriding systems, it is seriously considered, because once introduced, it will become a transport system to be considered for existing and future Iscor mines. The longterm benefit will therefore more than compensate for the additional capital now required.

3 THE TSHIKONDENI MINE

3.1 Mine location

The mine is situated in the Republic of Venda approximately 200km north east of Louis Trichardt. It is 10km south of the Masisi township which is located 107km east of Tshipise towards the Pafuri camp in the Kruger National Park.

3.2 Mine Underground Layout

Entry to the mine is through the Nyala incline shaft of which one road is used for the run of mine conveyor system (See sketches A1, and A2). The main seam being developed presently, has a seam height of approximately 3m. It extends from outcrop to approximately 400m depth over a distance of 4km. The average dip of the seam is 12 degrees. The geology of the mine is severely disturbed inter alia by numerous dykes, faults and dolorite sills.

3.3 THE PLANNED MANRIDING CONVEYOR SYSTEM

Presently personnel have to walk to and from their working places at Tshikondeni. This is a time consuming, exhaustive and unproductive practice. To alleviate this situation it is intended to convert conveyors H1 and H2 on sketch A1 into two-way manriding units by:

- extending the existing stools and raising the top belt stringers to provide the required clearance between the top and bottom belts for two-way manriding,
- providing the necessary electrical interlocks,
- brushing the shaft where more headroom is required,
- installing boarding and alighting stations according to the standards stipulated in Addendum I, and as per drawings TSO-1-45 to 49.

Conveyors H3, H4 and H5 shown on sketch A2 will eventually also be equipped for manriding. Conveyors H1, H2 and approximately 500m of H3 are already installed and operating mineral conveyors.

Drawing TSO/1/38 shows the planned boarding and alighting station positions for conveyors H1 and H2. Personnel will be transported for a distance of 250m from shaft bottom on conveyor H2. The lift over this distance is 35m. The following 260m length with a 43m lift is not suitable for manriding since there are three transfer points in this stretch. The final 460m out of the mine is the section of the conveyor most suited to manriding. The average gradient over this portion is approximately 9° (ie 70m lift).

After 1995, the bottom of the three transfer points will no longer be required. The manriding distance on conveyor H2 can then be increased by 90m, reducing the distance to be walked to 170m (26m lift).

The potential manriding distances of the remaining conveyors are respectively 1100m (70m lift) for conveyor H3, 600m (80m lift) for conveyor H4 and 500m (60m lift) for conveyor H5.

4 THE MAJOR DIFFERENCES BETWEEN UNDERGROUND MINERAL ONLY AND MINERAL AND MANRIDING CONVEYORS

4.1 Traditional systems

Traditionally all underground conveyors are not of the same standard as surface conveyor installations. Some of the reasons could be the following:

4.1.1 the geology,
4.1.2 the mine layout,
4.1.3 frequent conveyor extensions during roadway development,
4.1.4 tendency to erect main road conveyors to standards which are suitable only for short life district systems and
4.1.5 capital constraints, etc.

4.2 Recent trends in underground conveyor design

Because of the ever increasing cost of labour, collieries are steadily moving towards higher quality automated conveyors requiring more capital but resulting in less manpower.

The greatest scope for reducing the necessary conveyor operating manpower lies in the following areas:

4.2.1 Carryback prevention which requires:
- longitudinal space to remove spillage from the belt,
- effective multiple belt scrapers and
- vertical space to direct the removed spillage onto the next conveyor.

4.2.2 Spillage reduction, which requires:
- correct idler spacing for proper belt support,
- properly designed impact bed at loading points,
- chutes designed to assure centering of the load onto the belt,
- properly maintained belting,
- properly aligned (horizontal and vertical) and properly maintained troughing idlers,

- deeper troughing idlers, 35° rather than 20°,
- avoidance of abnormal surge loading,
- proper belt centering (alignment),
- alignment of complete length of conveyor structure and
- adequately sized conveyors.

4.2.3 Fault indication by indicator lamp on the control panel.

4.2.4 Location of faults such as:
belt tear, misalignment, blocked chute, belt sequence, belt slip, and emergency stop.

4.3 Special requirements for manriding conveyors

The following are general practical requirements. Please refer to section 5 for proposed detailed legal requirements.

Manriding conveyors need to be straight for as long a distance as possible to decrease the number of transfer points, because study of accident trends indicates that manriding is a relatively safe activity, but risk increases when boarding and alighting. It should be planned, where possible, to discharge district conveyors onto main conveyors in the vicinity of main conveyor transfers, thus reducing the number of boarding and alighting stations.

Adequate walkways must be provided along these conveyors to enable safe patrolling of same.

The following is a summary of the roadway size requirements stipulated in the standard, addendum I:
For one-way manriding at least 1800mm headroom is required and for two-way manriding the roadway height must be 2450mm. It must be noted that these heights must be maintained at air and tractor road crossings. At the boarding and alighting stations the required headroom for one and two-way manriding is respectively 2100mm and 2900mm for boarding and 2380mm and 3200mm for alighting.

5 LEGAL REQUIREMENTS FOR THE REGULAR CONVEYANCE OF PERSONS ON MINERAL CONVEYOR BELTS

The utilization of mineral conveyors for personnel transport has been in use for many years in the UK, Europe and elsewhere in the world, but it has not yet been used as an official means of personnel transport in the RSA. The advantages of conveyor belt manriding described in the introduction of this paper has, however, convinced Iscor officials to apply for permission from the Government Mining Engineer (GME) to introduce conveyor belt manriding at Tshikondeni.

The following is an abstract of a letter received from the GME, in reply to Iscor's application for exemption from Mines and Works Act No 27 1965 Regulation 18.4.2 - manriding on belt conveyors:

"In principle there will be no objection to the regular conveyance of persons on the main belt conveyor in the South West Shaft of Tshikondeni Coal Mine provided that the installation is designed and constructed in accordance with drawings No's TS0-1-10 R00 and TS0-1-11 R00 and the details given in your "Proposed Man-Riding Conveyor Standards" dated 1988-03-24 and provided further that persons are conveyed in accordance with the above-mentioned standards only.

It is recommended that the manager of the mine make formal application in terms of Regulation 18.4.2. when the installation is complete so that the Inspector of Machinery can check it and, if satisfied, grant permission to use it to convey persons. Conveyance of persons without supervisory attendants will not be permitted at this stage and a further condition will probably be the installation of a training simulator to teach prospective users to board and alight from the conveyor safely. It must be understood, however, that the permission will apply to the main conveyor only and will be granted initially for a limited period. If it is found that the injury rate is unacceptably high, the permission will be withdrawn".

The "Proposed Manriding Conveyor Standards" referred to in the abovementioned letter, are included herewith as addendum I. These standards are based on the British National Coal Board codes and rules and the German recommendations for personnel transport by belt conveyor.

The information depicted in the two drawings referred to in the abovementioned abstract has been incorporated in the standards and it is also included in drawings TS0/1/39 to TS0/1/41.

Drawing TSO-1-21 illustrates a typical manriding dummy conveyor for training purposes.

6 EXECUTION OF ALTERATIONS

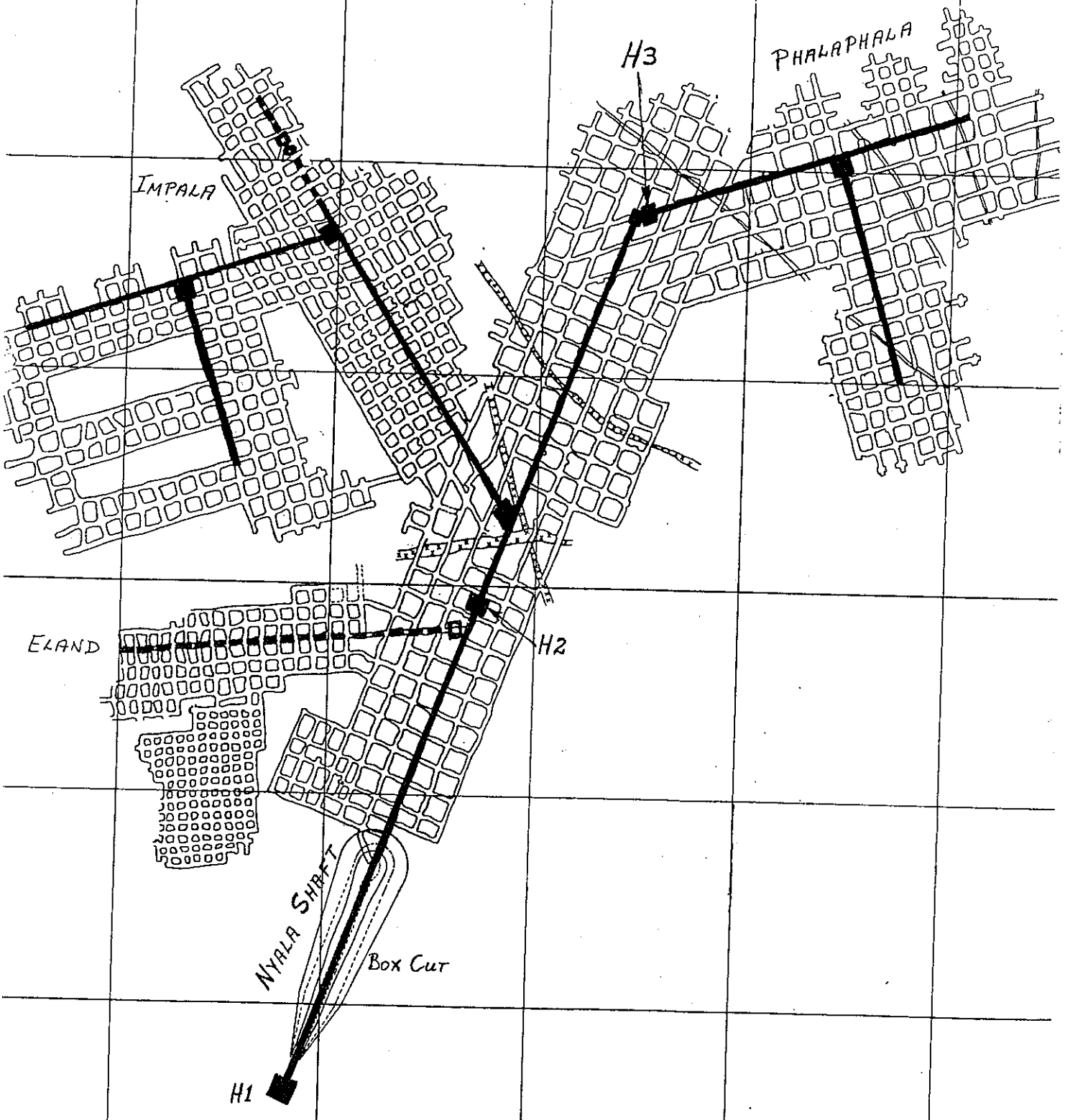
The execution of the modifications to conveyors H1 and H2 is scheduled for October/November 1989 and manriding will commence as soon as possible thereafter, once the GME has inspected and approved the installation.

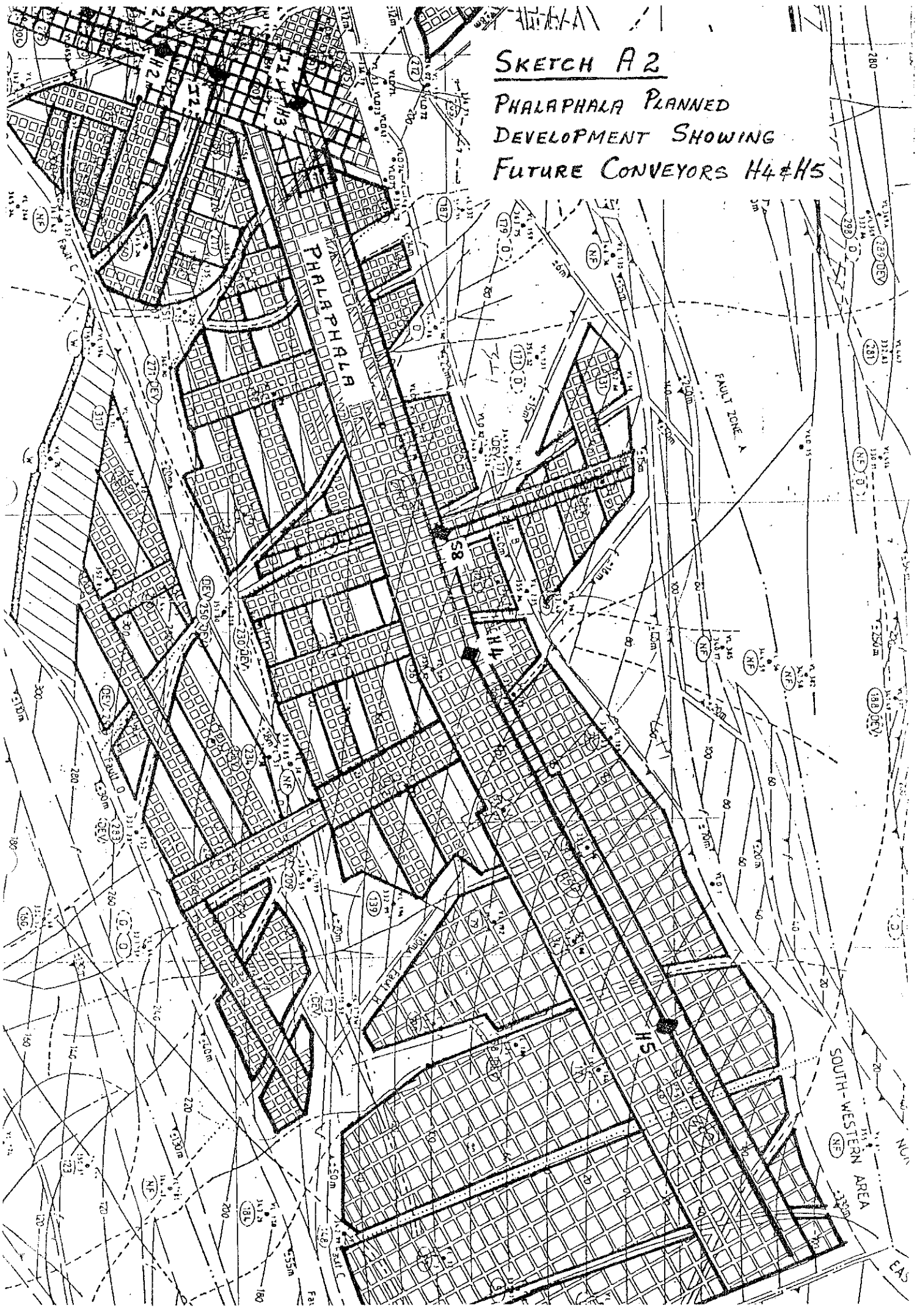
7 ACKNOWLEDGEMENT

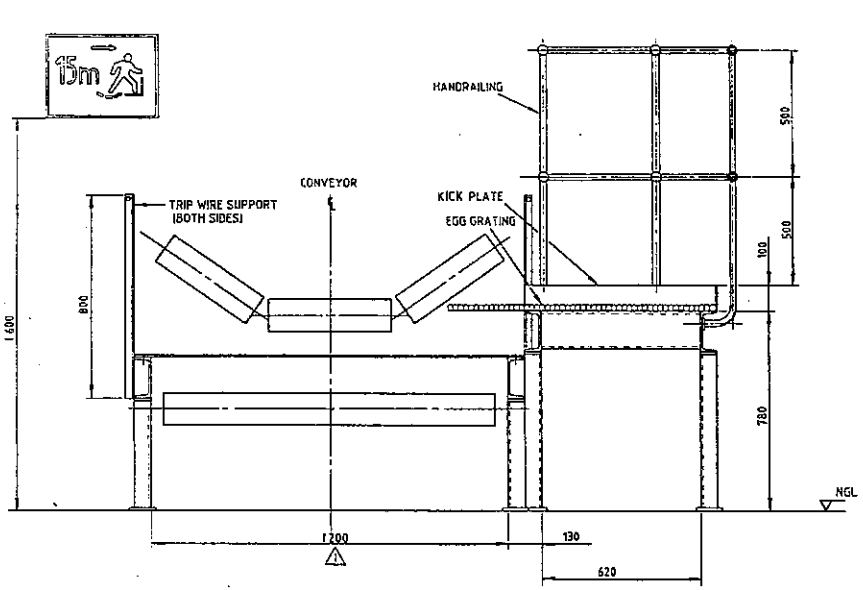
The authors wish to thank Iscor Management and the Government Mining Engineer for permission to present this paper.

SKETCH A1

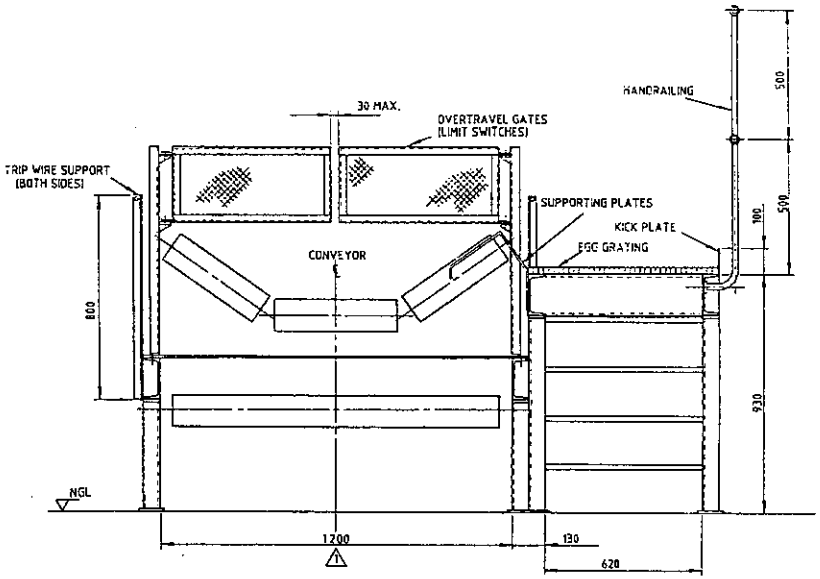
NYALA SHAFT DEVELOPMENT



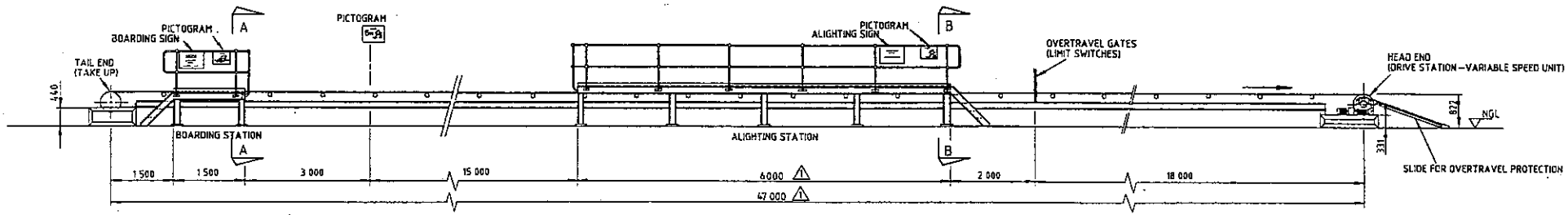

SKETCH A2
PHALAPHALA PLANNED
DEVELOPMENT SHOWING
FUTURE CONVEYORS H4 & H5
H1
H2
H3
H4
H5
S8
PHALAPHALA
FAULT ZONE A
SOUTH-WESTERN AREA



SECTION AA



SECTION BB

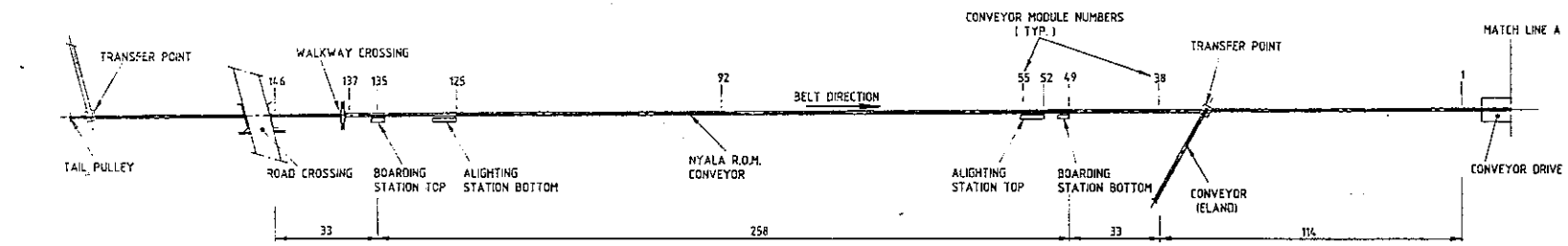


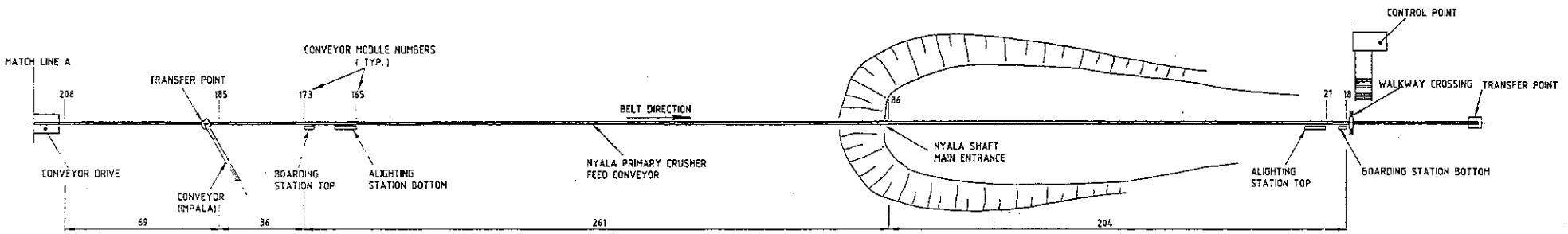
SIDE ELEVATION

ITEM	REQD	DESCRIPTION	ORG No - REMARKS
		ISCOR YSKOR TSHIKONDENI	
		MANRIDING DUMMY CONVEYOR	
		FOR TRAINING PURPOSES	
		1988 PROPOSAL	

DRN: JANEKE L.S. DATE: 88-08-24
SCALE: 1:50, 1:10
JOB No: 82-88
TS0-1-21 R01 A1

H 01 LSJ 09-06-05 ALTERED DIM. HK'D 1200 WAS 1380 6000 WAS 9000 47000 WAS 50 000 156-99





SURFACE TEXTURE SYMBOLS TO I.S.O. 1302. Ra VALUES
LIMITS & FITS TO I.S.O. R 286
STANDARD HOLE BASIS

MACHINING TOLERANCES (UNLESS STATED) ISO 2768 & DIN 7168 - MEDIUM

ABOVE	INCL.	
0.5	6	0.1
6	30	0.2
30	120	0.3
120	315	0.5
315	1000	0.8
1000	2000	1.2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

GEOMETRICAL TOLERANCING TO BS 308 PART 3

PERMISSIBLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE ____
FLAME CUTTING TO DIN 2310 ____ CASTING TOLERANCES TO DIN 1680 ____ GRADE ____

WELDING SYMBOLS TO SANS 044 PART II (I.S.O. 2553)
HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1553 PART 1
SCREW THREADS (I.S.O. METRIC) TO BS 3643 (UNLESS OTHERWISE STATED)

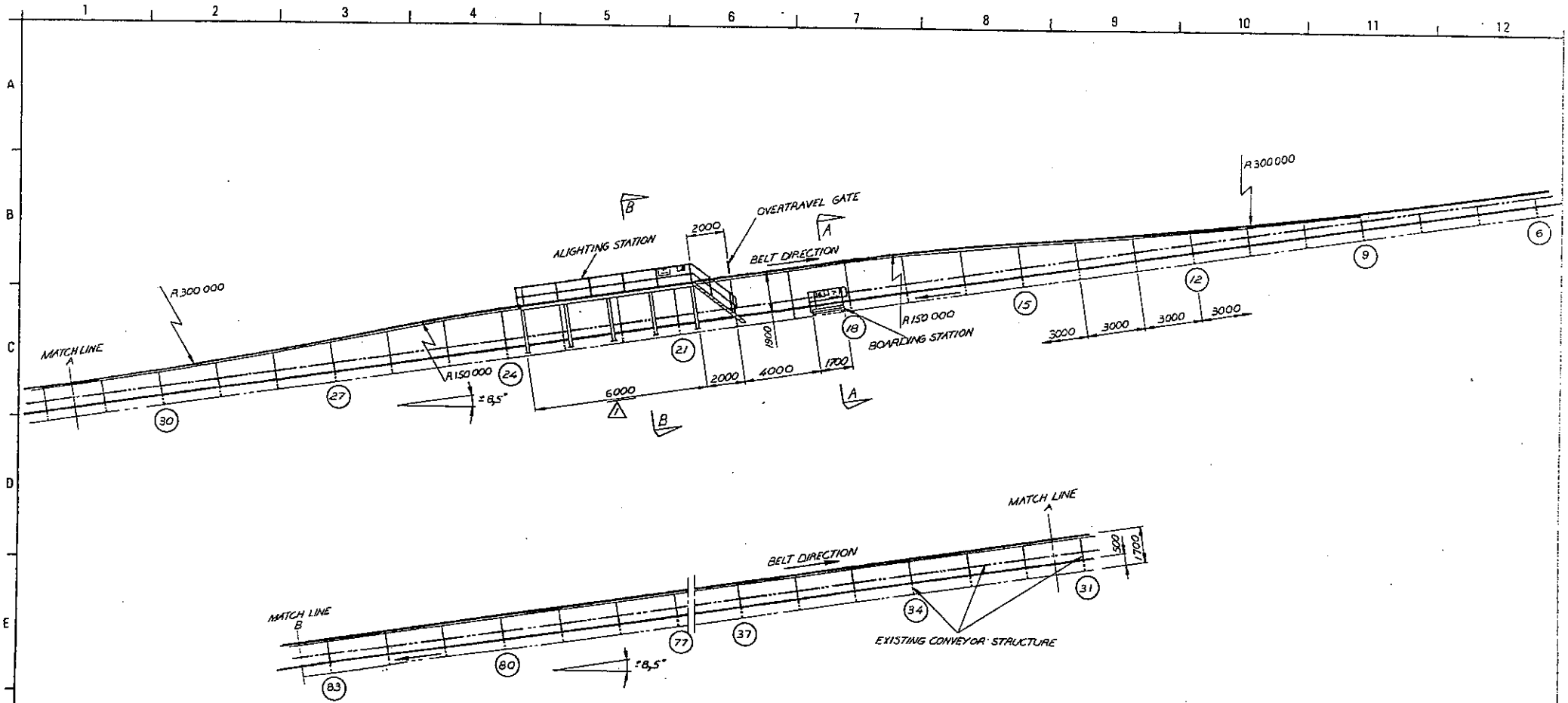
ITEM	REQD	DESCRIPTION	DRG No - REMARKS

ISCOR YSKOR TSHIKONDENI

DRN	JANKELS	CHKD	
DATE	89-05-08	DATE	
CHG.		CHG.	
S.I.		MAN/SUPT/ENG.	
APPROVED			
PROJR.		SCALE	N.T.S.

NYALA SHAFT
MANRIDING CONVEYOR
1989 PROPOSAL
PLAN VIEW

JOB/ORDER No. 82-88 | SHEET | TS 0-1-38 | R00 | A1



REF. DRG'S :-

FOR ALIGHTING STATION SEE DRG. NO. TS 0-1-47
FOR BOARDING STATION SEE DRG. NO. TS 0-1-49
FOR CONVEYOR MODULE MODIFICATION SEE DRG. NO. TS 0-1-44
TO BE READ IN CONJUNCTION WITH DRG. NO. TS 0-1-40 & 41
FOR EXISTING CONVEYOR MODULE SEE DRG. NO. TS 18-01-54
FOR SECTION A-A & B-B SEE DRG. NO. TS 0-1-46

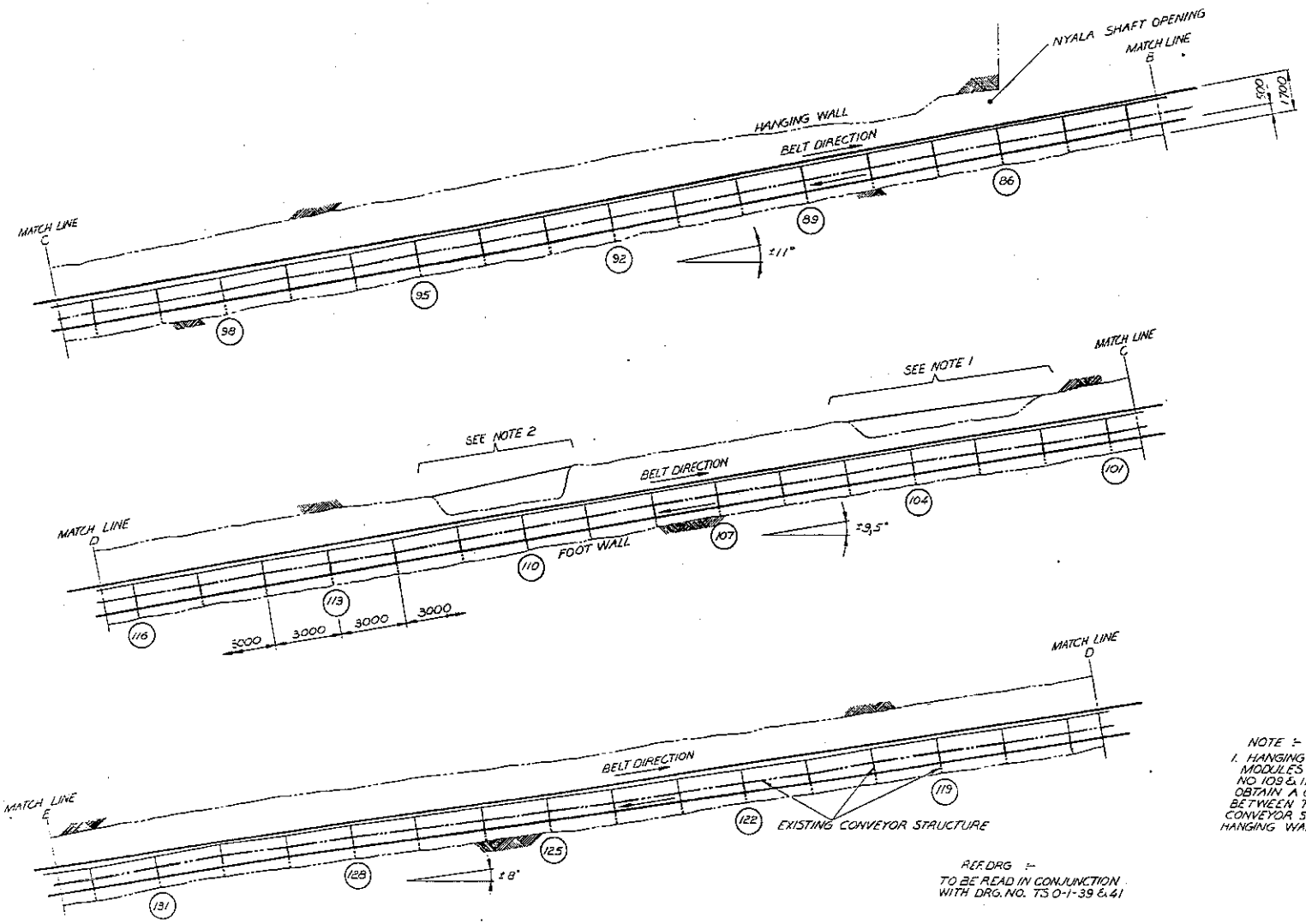
ITEM	REQD	DESCRIPTION	ORG No - REMARKS
R01	1	ISSUED	
89-04-03	1	ALTERED DIM NAD 6000 WAS 9000	
88-08-27	1	ISSUED	

ISCOR YSKOR TSHIKONDENI

DRN	JANEFELS	CHD	
DATE	89-05-03	DATE	
CHD		CHD	
SE		MAN SUPT/ENG	
APPROVED			
PROJN		SCALE	1:100
JOB/ORDER No.	B2 - RA	SHEET	

NYALA
PRIMARY CRUSHER
FEED CONVEYOR
1989 MANRIDING
PROPOSAL
MODULES 6 TO 38

TS 0-1-39 R01 A1



NOTE :-

1. HANGING WALL BETWEEN CONVEYOR MODULES NO. 101 & 105 AND MODULES NO 109 & 112 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 2000mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.

REF DRG :-
TO BE READ IN CONJUNCTION WITH DRG. NO. TS 0-1-39 & 41

PERMISSIBLE VARIATIONS-N DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE ... FLAME CUTTING TO DIN 2310 ... CASTING TOLERANCES TO DIN 1680 ..... GRADE .....

WELDING SYMBOLS TO SANS 044 PART III I.S.O. 2553
HYDRAULICS PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1553 PART 1
SCREW THREADS I.S.O. METRIC I TO BS 3643 (UNLESS OTHERWISE STATED)

SURFACE TEXTURE SYMBOLS TO I.S.O. 1302 - Ra VALUES
LIMITS & FITS TO I.S.O. R 286 STANDARD HOLE BASIS

MACHINING TOLERANCES UNO STATED TO ISO 2768 & DIN 3168 MEDIUM

ABOVE	INCL.	
0,5	6	0,1
6	30	0,2
30	120	0,3
120	315	0,5
315	1000	0,8
1000	2000	1,2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	25000	6

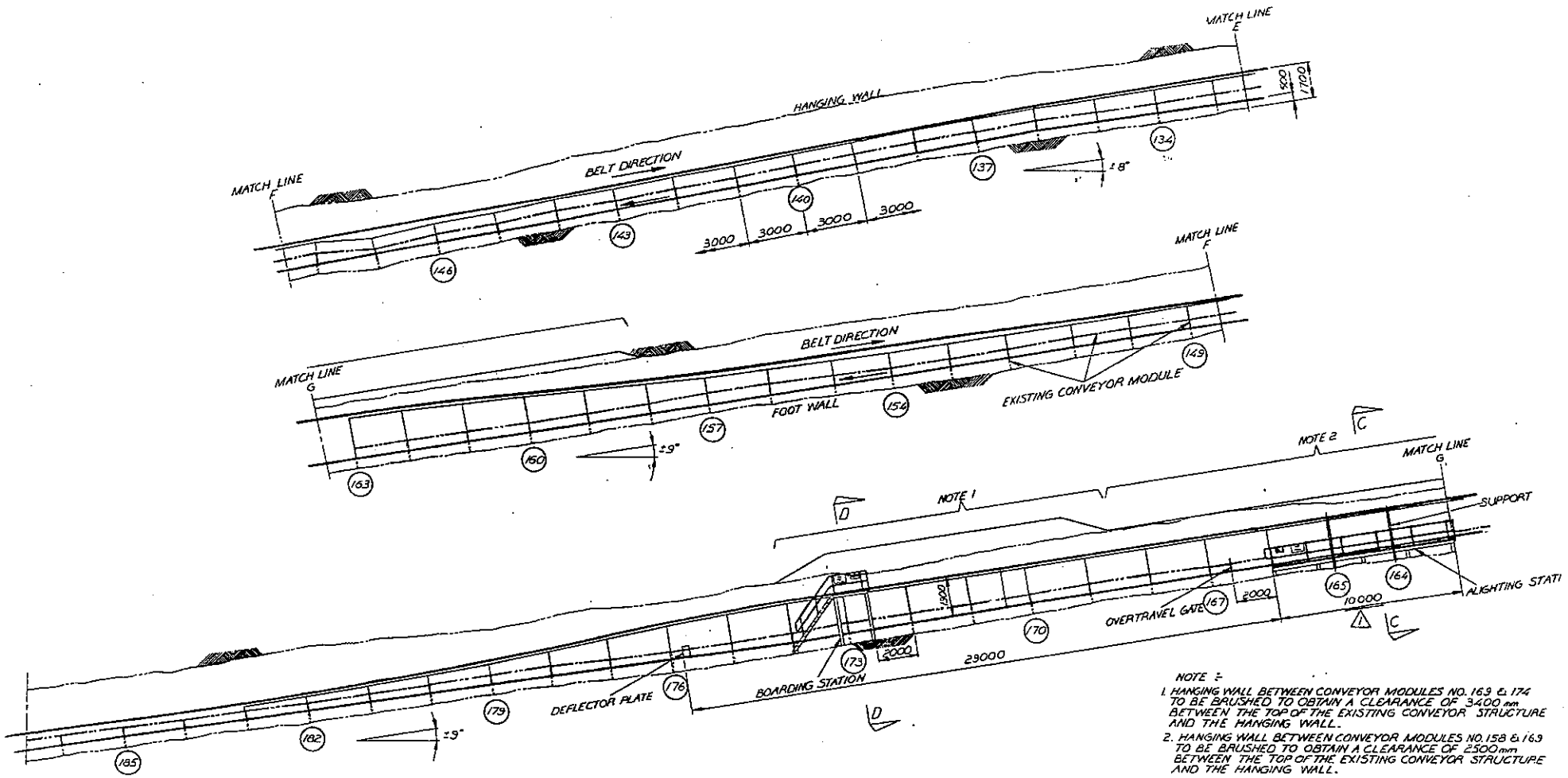
GEOMETRICAL TOLERANCING TO BS 308 PART 3

ITEM	REQD	DESCRIPTION	ORG No - REMARKS

ISCOR YSKOR TSHIKONDENI

DRN	VANEKELS	TRCD	NYALA
DATE	89-05-08	DATE	PRIMARY CRUSHER
CHD		CHD	FEED CONVEYOR
DES		MANAGER	1989 MANRIDING
APPROVED			PROPOSAL
PROJ'N		SCALE 1:100	MODULES 84 TO 132

JOB ORDER No: 82-88 | SHEET | TS 0-1-40 | R00 | A1



NOTE :-

1. HANGING WALL BETWEEN CONVEYOR MODULES NO. 169 & 174 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 3400 mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.
2. HANGING WALL BETWEEN CONVEYOR MODULES NO. 158 & 169 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 2500 mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.

REF. DRG :-
FOR SECTION C-C & D-D SEE DRG. NO. TS0-1-45
TO BE READ IN CONJUNCTION WITH DRG. NO. TS0-1-39 & 40

ITEM	REQD	DESCRIPTION	ORG No. - REMA
101	1	ALTERED DIM. MKD △ 10000 WAS 9000	158-89

ISCOR YSKOR TSHIKONDENI

DRN	VANCKE L.S	TRCD	
DATE	89-05-08	DATE	
CHD		CHD	
SS		MAN. SUPT./ENG.	
APPROVED			
PROJR.		SCALE	1:100
JOB/ORDER No.	82-88	SHEET	TS 0-1-41 R01

NYALA
PRIMARY CRUSHER
FEED CONVEYOR
1989 MANRIDING
PROPOSAL
MODULES 133 TO 186

SURFACE TEXTURE SYMBOLS TO I.S.O. 1302. Ra VALUES
LIMITS & FITS TO I.S.O. & BSI
STANDARD HOLE BASIS

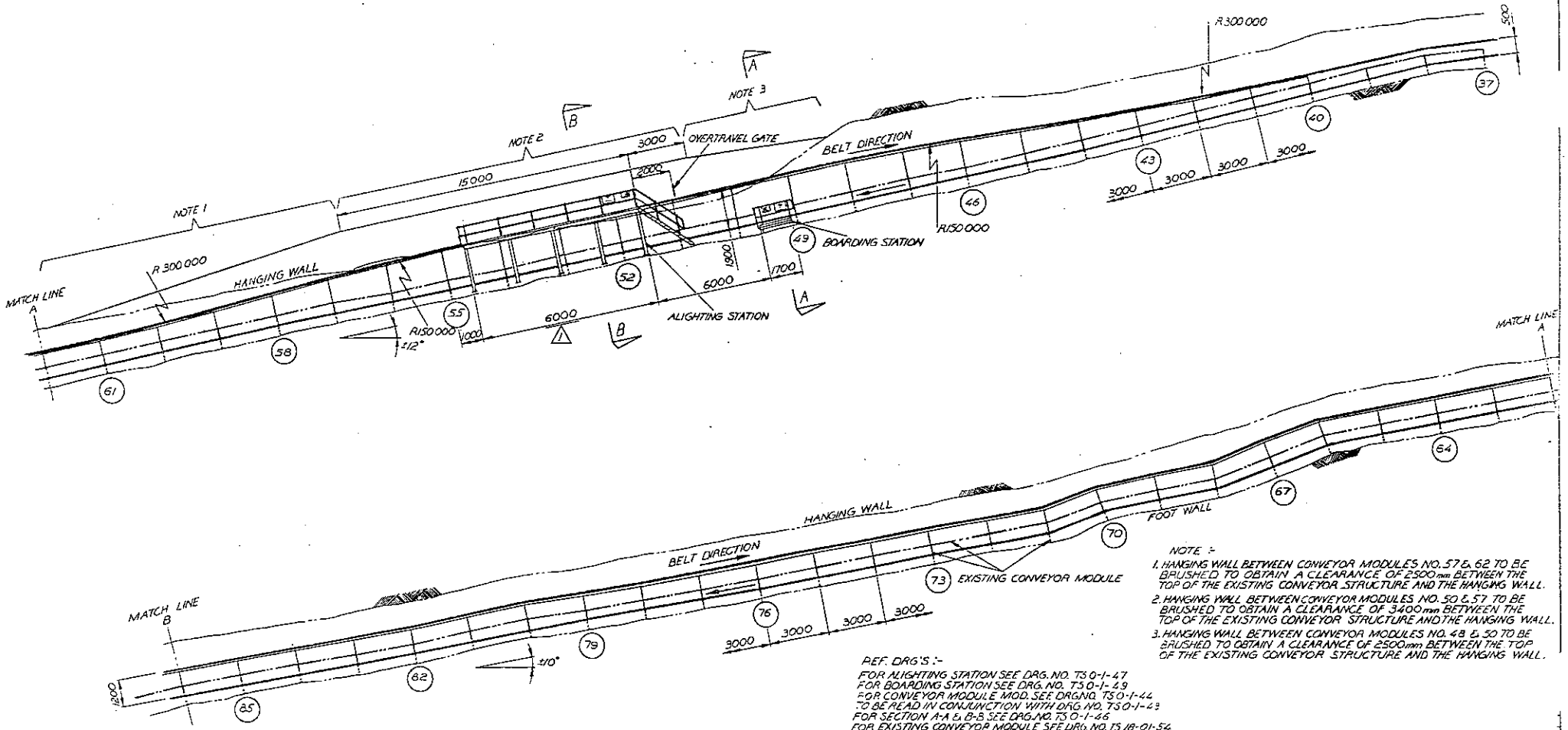
MACHINING TOLERANCES (ISO STATED) ISO 2768 & DIN 7168 MEDIUM

ABOVE	INCL.	
0.5	6	0.1
6	30	0.2
30	120	0.3
120	315	0.5
315	1000	0.8
1000	2000	1.2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

PERMISSIBLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE ____
FLAME CUTTING TO DIN 2310
CASTING TOLERANCES TO DIN 708 ____ GRADE ____

WELDING SYMBOLS TO SABS 044 PART II (I.S.O. 2553)
HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1553 PART I
SCREW THREADS I.S.O. METRIC TO BS 3643 UNLESS OTHERWISE STATED

GEOMETRICAL TOLERANCING TO BS 308 PART 2



NOTE :-

1. HANGING WALL BETWEEN CONVEYOR MODULES NO. 57 & 62 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 2500 mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.
2. HANGING WALL BETWEEN CONVEYOR MODULES NO. 50 & 57 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 3400 mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.
3. HANGING WALL BETWEEN CONVEYOR MODULES NO. 48 & 50 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 2500 mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.

REF. DRG'S :-

FOR ALIGHTING STATION SEE DRG. NO. TS 0-1-47
FOR BOARDING STATION SEE DRG. NO. TS 0-1-49
FOR CONVEYOR MODULE MOD. SEE DRG NO. TS 0-1-44
TO BE READ IN CONJUNCTION WITH DRG NO. TS 0-1-43
FOR SECTION A-A & B-B SEE DRG NO. TS 0-1-46
FOR EXISTING CONVEYOR MODULE SEE DRG. NO. TS 18-01-54

ITEM	REQD	DESCRIPTION	DRG No – REMARKS

ISCOR YSKOR TSHIKONDENI

DRN	JANEKE L.S	TRCD	
DATE	89-05-08	DATE	
CHD.		CHD	
SI		MAN-SUPTENG	
APPROVED			
PROJN		SCALE	1:100
JOB/ORDER No.	82-88	SHEET	TS 0-1-42 R01 A1

NYALA R.O.M.
MANRIDING CONVEYOR
1989 PROPOSAL
MODULES 37 TO 85

R01	C.J.	89-05-08	ALTERED DIM. MK D
		158-89	4000 WAS 9000

PERMISSABLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO SIN 8570 GRADE
FLAME CUTTING TO SIN 2310
CASTING TOLERANCES TO DIN 1680 GRADE

WELDING SYMBOLS TO SANS 044 PART III I.S.O. 2553
HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1552 PART 1
SCREW THREADS I.S.O. METRIC TO BS 3643 UNLESS OTHERWISE STATED

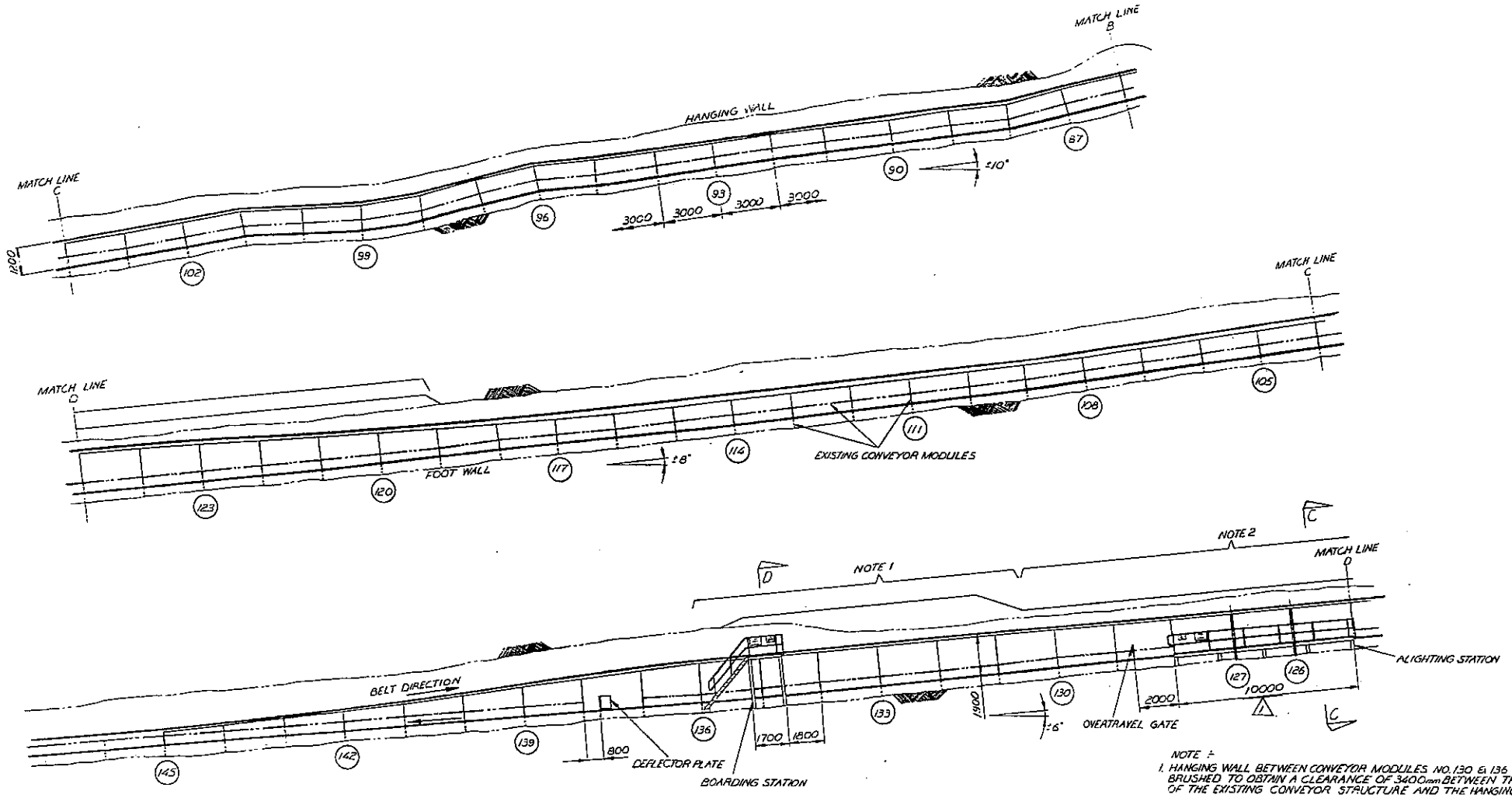
ABOVE	INCL	
0.5	6	0.1
6	30	0.2
30	120	0.3
120	315	0.5
315	1000	0.8
1000	2000	1.2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

GEOMETRICAL TOLERANCING TO BS 308 PART 2

SURFACE TEXTURE SYMBOLS TO I.S.O. 1302 Ra VALUES
LIMITS & FITS TO I.S.O. R 286
STANDARD HOLE BASIS

MACHINING TOLERANCES (UNLESS OTHERWISE STATED) TO BS 4500 & DIN 7168 MEDIUM

0 10 20 30 40 50 60 70 80 90 100



REF. DRG'S :-
FOR SECTION C-C & D-D SEE DRG. NO. TS 0-1-45
TO BE READ IN CONJUNCTION WITH DRG. NO. TS 0-1-42

NOTE :-
1. HANGING WALL BETWEEN CONVEYOR MODULES NO. 130 & 136 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 3400mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.
2. HANGING WALL BETWEEN CONVEYOR MODULES NO. 119 & 130 TO BE BRUSHED TO OBTAIN A CLEARANCE OF 2500mm BETWEEN THE TOP OF THE EXISTING CONVEYOR STRUCTURE AND THE HANGING WALL.

ITEM	REGD	DESCRIPTION	DRG No - REMARKS
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2	15.9.89	Δ 10000 WAS 9000	

ISCOR YSKOR TSHIKONDENI

DRN	JANEKEL	TRCD	
DATE	89-05-08	DATE	
CHD		CHD	
SI		MAN/SUPT/ENG	
APPROVED			
PROJN		SCALE	1:100

NYALA R.O.M.
MANRIDING CONVEYOR
1989 PROPOSAL
MODULES 86 TO 147

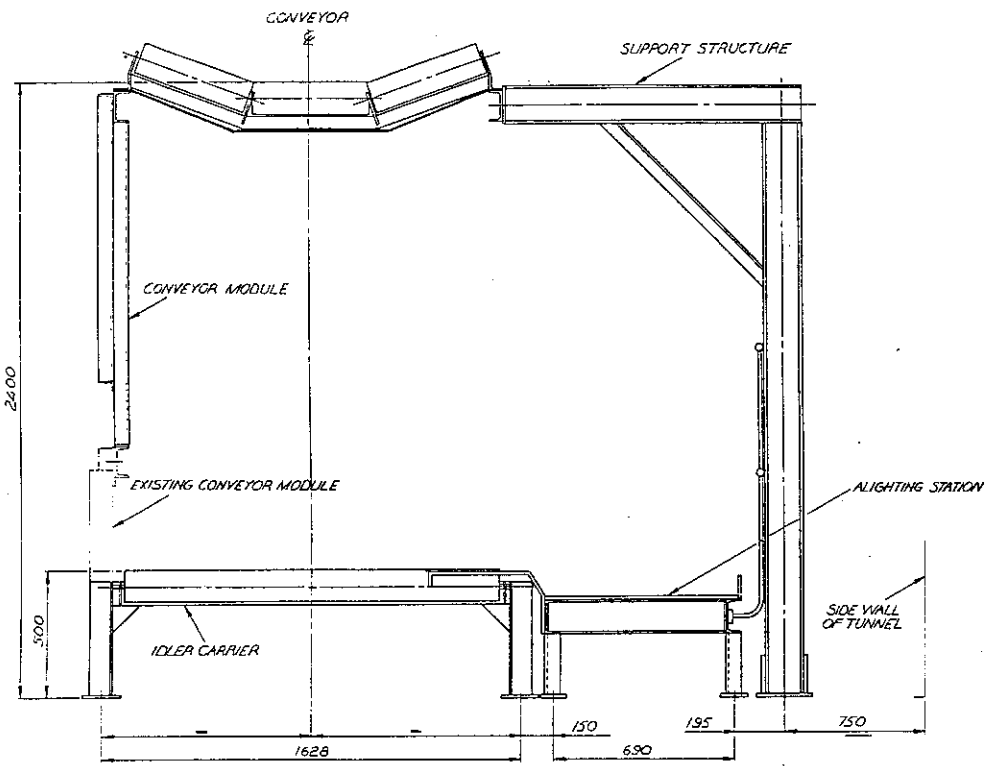
JOB/ORDER No 82-88 | SHEET | TS 0-1-43 | R01 | A1

PERMISSIBLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE
FLAME CUTTING TO DIN 2310
CASTING TOLERANCES TO DIN 1680 GRADE
WELDING SYMBOLS TO SABS 044 PART II (I.S.O. 2553)
HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1553 PART 1
SCREW THREADS IN S.O. METRIC TO BS 3643 UNLESS OTHERWISE STATED

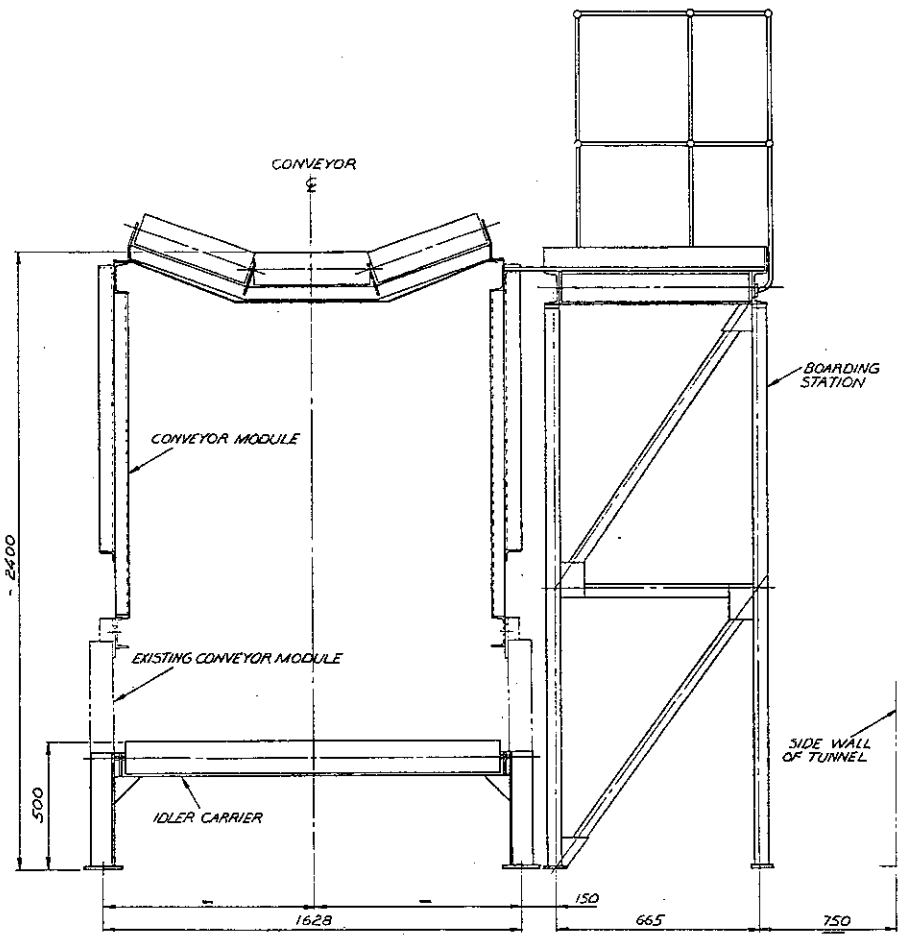
SURFACE TEXTURE SYMBOLS TO I.S.O. 1302 Ra VALUES
LIMITS & FITS TO I.S.O. # 286 STANDARD HOLE BASIS
MACHINING TOLERANCES TO STATED ISO 2768 & DIN 7168 - MEDIUM

ABOVE	INCL.	
0.5	6	0.1
6	30	0.2
30	120	0.3
120	315	0.5
315	1000	0.8
1000	2000	1.2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

GEOMETRICAL TOLERANCING TO BS 308 PART 3



SECTION C-C



SECTION D-D

REF DRG'S :-
FOR G.A. SEE DRG. NO. TS 0-1-41 & TS 0-1-43
FOR BOARDING STATION SEE DRG. NO. TS 0-1-49
FOR ALIGHTING STATION SEE DRG. NO. TS 0-1-48
FOR CONVEYOR MODULE SEE DRG. NO. TS 0-1-44
FOR EXISTING CONVEYOR MODULE SEE DRG. NO. TS 18-01-54

ITEM	REQD	DESCRIPTION	DRG No - REMARKS

ISCOR YSKOR TSHIKONDENI

DRN	JANEKE LS	TRCD	
DATE	89-05-08	DATE	
CHD		CHD	
S.L.		MAN SUPT/ENG	
APPROVED			
PROJR		SCALE	1:10
JOB/ORDER No	82-88	SHEET	TS 0-1-45 R00 A1

NYALA SHAFT
SECTION C-C & D-D
1989 MANRIDING CONVEYOR
PROPOSAL

SURFACE TEXTURE SYMBOLS TO I.S.O. 1302 Ra VALUES
LIMITS & FITS TO I.S.O. R 286
STANDARD HOLE BASIS

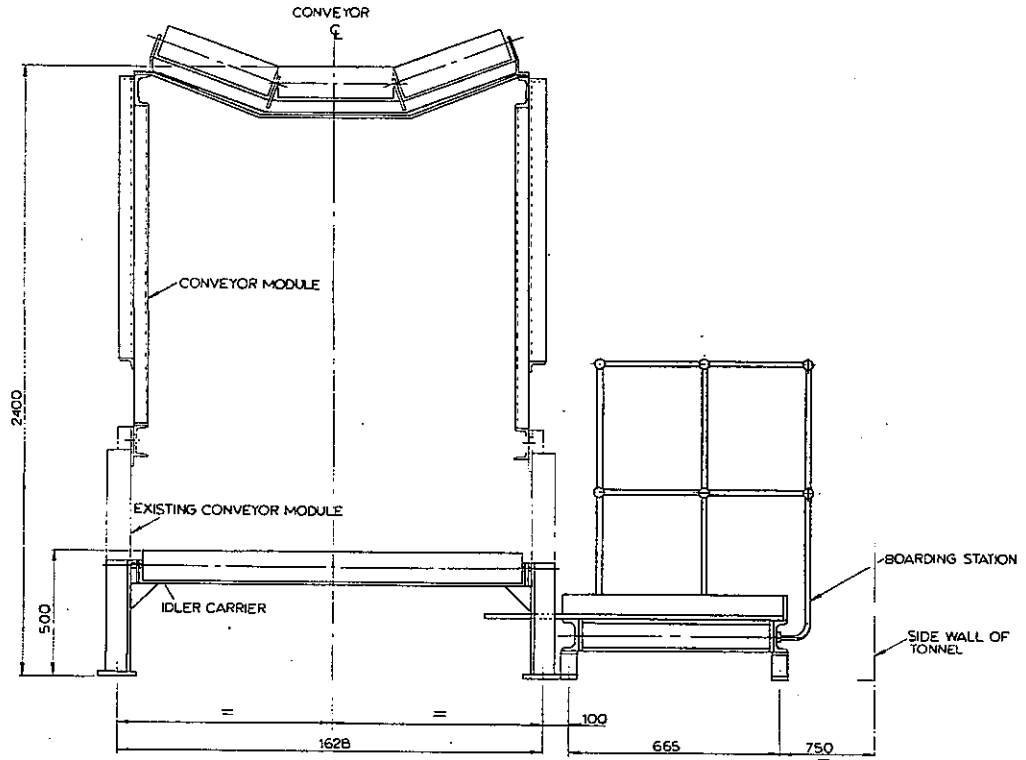
MACHINING TOLERANCES TO STATED ISO 2768 & DIN 7184 - MEDIUM

ABOVE	INCL.	
0.5	6	0.1
6	30	0.2
30	120	0.3
120	315	0.5
315	1000	0.8
1000	2000	1.2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

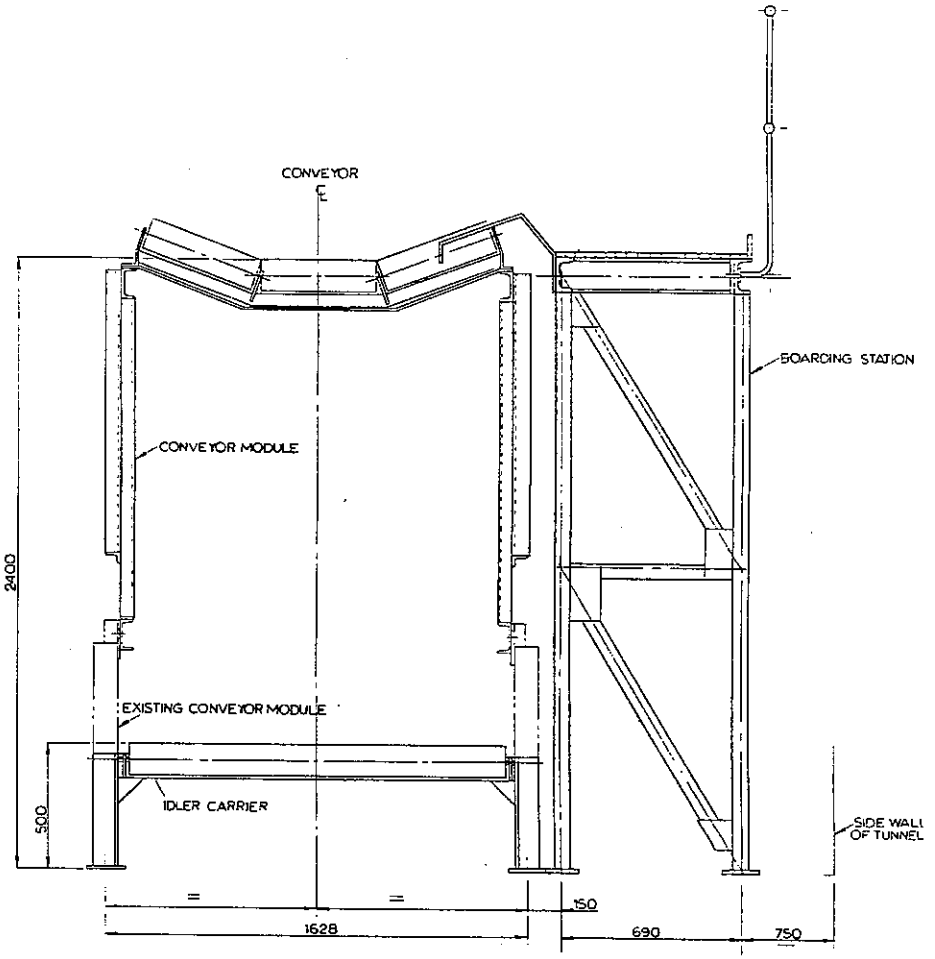
GEOMETRICAL TOLERANCING TO BS 308 PART 2

PERMISSIBLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE ____
FLAME CUTTING TO DIN 2310 ____
CASTING TOLERANCES TO DIN 1680 ____ GRADE ____

WELDING SYMBOLS TO SABS 044 PART II (I.S.O. 2553)
HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1553 PART 1
SCREW THREADS (U.S.) (I.S.O. METRIC) TO BS 3643 (UNLESS OTHERWISE STATED)



SECTION A-A



SECTION B-B

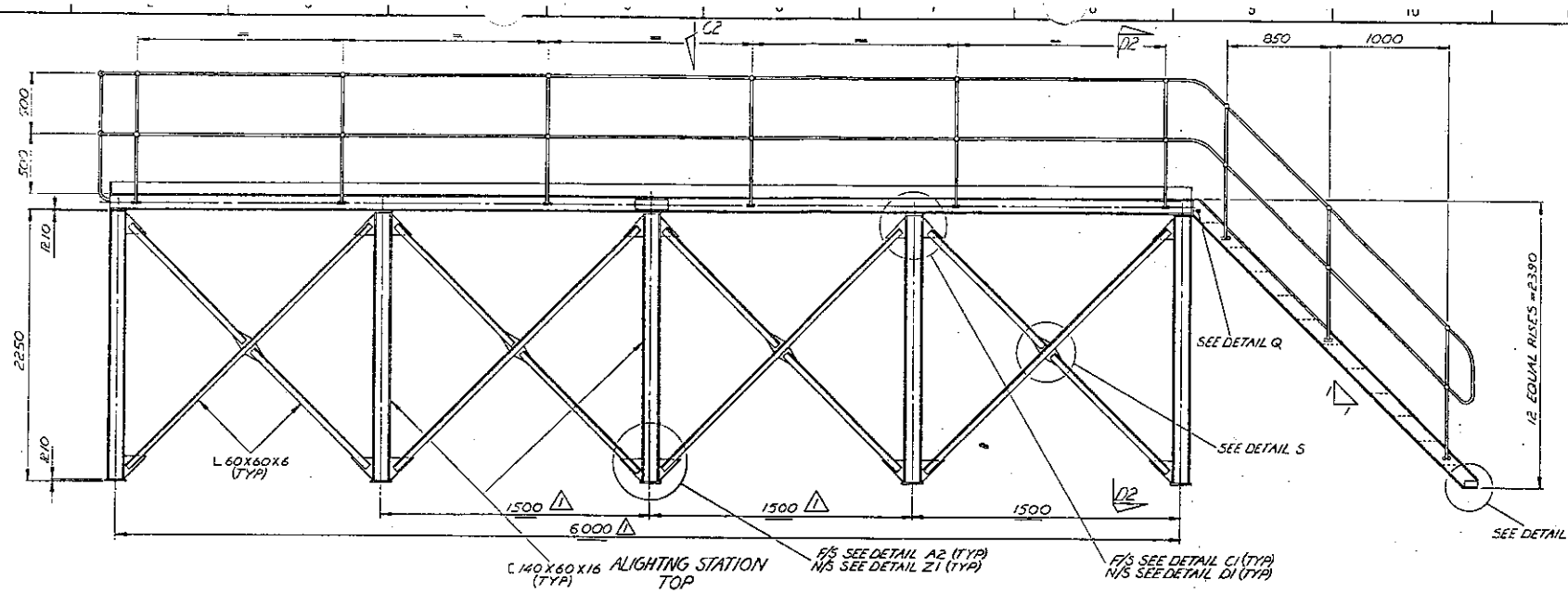
REF DRG'S :-
FOR G A SEE DRG NO TS 0-1-43
FOR BOARDING STATION SEE DRG NO TS 0-1-49
FOR ALIGHTING STATION SEE DRG NO TS 0-1-48
FOR CONVEYOR MODULE SEE DRG NO TS 0-1-44
FOR EXISTING CONVEYOR MODULE SEE DRG NO TS 18-01-54

ITEM	REDO	DESCRIPTION	DRG No - REMARK

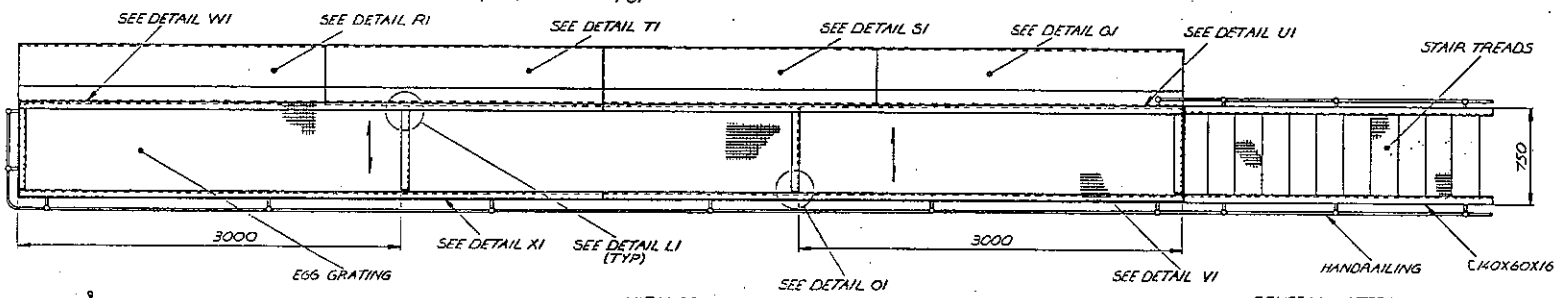
ISCOR YSKOR TSHIKONDENI

DRN	S.TAVARES	DES.	
DATE	89-04-18	DATE	
CHD		CHD	
SUPT.		MAN. SUPT. ENG.	
APPROVED			
PROJN		SCALE	1:10
JOB-ORDER No.	82 88	SHEET	TS 0-1-46 ROO A

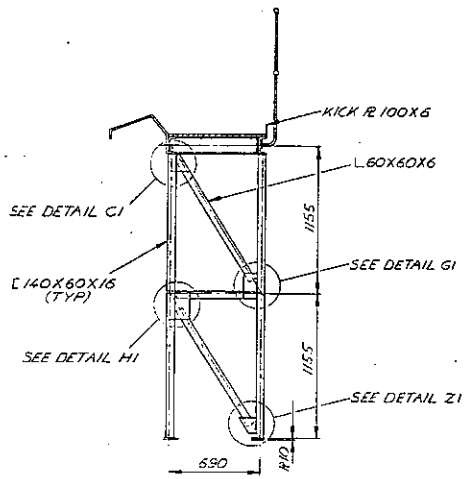
NYALA SHAFT
SECTION A-A & B-B
1989 MANRIDING CONVEYOR
PROPOSAL



ALIGHTING STATION TOP



VIEW C2



SECTION D2-D2

GENERAL NOTES :-

1. EGG GRATING TO BE SQUARE MESH TYPE WITH BEARER BAR SIZE 30X4,5 AT 40 CENTRES. THIS ARROW ——→ INDICATES DIRECTION OF BEARER BARS. ALL PANELS TO BE BANDED.
2. MATERIAL : ISCOR STEEL TO SABS 1431 GR 300 W
3. PAINTING : TO MATCH EXISTING CONVEYOR
4. WELDING : TO BE A SOLIDLY WELDED CONSTRUCTION. 6mm C.F.W.
5. HANDRAILING : TO BE BALL TYPE STANCHIONS – SIDE MOUNTED.
6. STAIR TREADS : TO BE SQUARE MESH TYPE WITH NON-SKID NOSINGS. BANDED ON BOTH SIDES.

REF. DRG :-
FOR DETAIL C1; D1; H1 & G1 SEE DRG. NO. TS 0-1-50
FOR DETAIL O; Q; S; Z1 & A2 SEE DRG. NO. TS 0-1-54
FOR DETAIL Q1; R1; S1; T1; O1; L1; U1; V1; W1 & X1
SEE DRG. NO. TS 0-1-52

ROI	LST	09-06-05	ALTERED DIM. MK'D △1500 WAS 2250 6000 WAS 5900	CHK	158-89

PERMISSIBLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE ... FLAME CUTTING TO DIN 2310 ... CASTING TOLERANCES TO DIN 1684 ... GRADE

WELDING SYMBOLS TO SANS 044 PART II N.S.O. 23537
HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219
PIPE & VALVE SYMBOLS TO BS 1552 PART 1
SCREW THREADS II S.O. METRIC TO BS 3643 (UNLESS OTHERWISE STATED)

SURFACE TEXTURE SYMBOLS TO I.S.O. 1302 Ra VALUES
LIMITS & FITS TO I.S.O. R 286 STANDARD HOLE BASIS

MACHINING TOLERANCES (UNLESS STATED) ISO 2768 & DIN 7168 MEDIUM

ABOVE	INCL.	
0,5	6	0,1
6	30	0,2
30	120	0,3
120	315	0,5
315	1000	0,8
1000	2000	1,2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

GEOMETRICAL TOLERANCING TO BS 308 PART 2

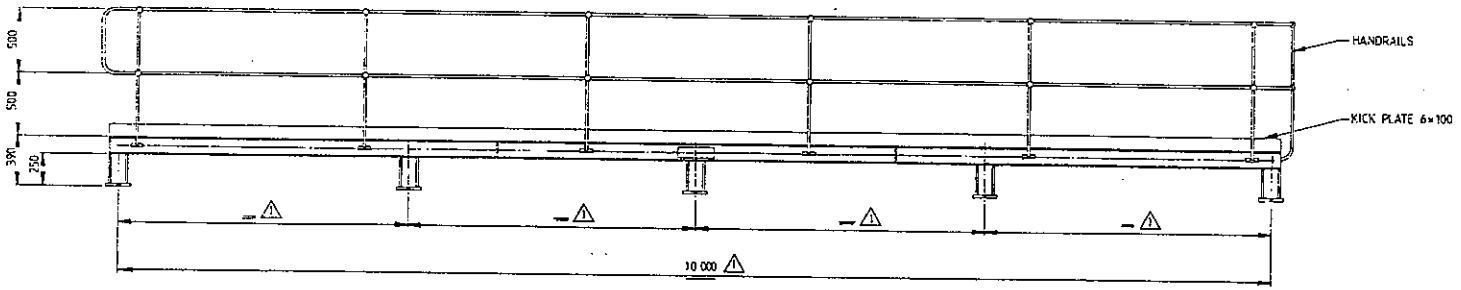
ITEM	REQD	DESCRIPTION	ORG No – REMARKS

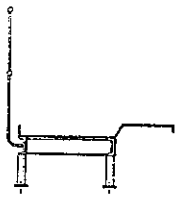
ISCOR YSKOR TSHIKONDENI

DRN	JANEKE L S	PROD	
DATE	29-05-08	DATE	
CHK		CHD	
SUPT		MAN. SUPTNDG	
APPROVED			
PROJN		SCALE	1 : 20
JOB/ORDER No	EE-88	SHEET	

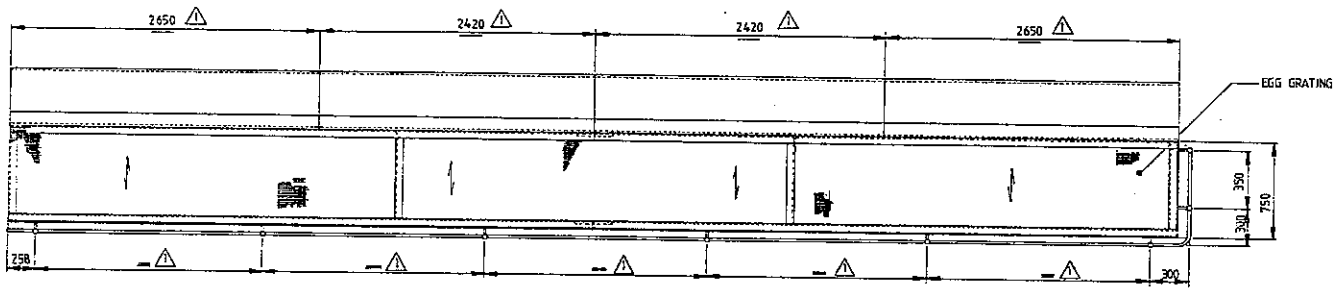
NYALA SHAFT
MANRIDING CONVEYOR
ALIGHTING STATION TOP
1989 PROPOSAL

TS 0-1-47 R01 A1





SECTION T-T



VIEW M

NOTES:

1. EGG GRATING TO BE SQUARE MESH TYPE WITH BEARER BAR SIZE 30 x 4,5 AT 40 CENTRES THIS ARROW ——— INDICATES DIRECTION OF BEARER BARS. ALL PANELS TO BE BANDED.
2. MATERIAL: ISCOR STEEL TO SABS 1431 GR 300W
3. PAINTING: TO MATCH EXISTING CONVEYOR
4. WELDING: TO BE OF A SOLIDLY WELDED CONSTRUCTION 6mm C.F.W
5. HANDRAILING: TO BE BALL TYPE STANCHIONS - SIDE MOUNTED.

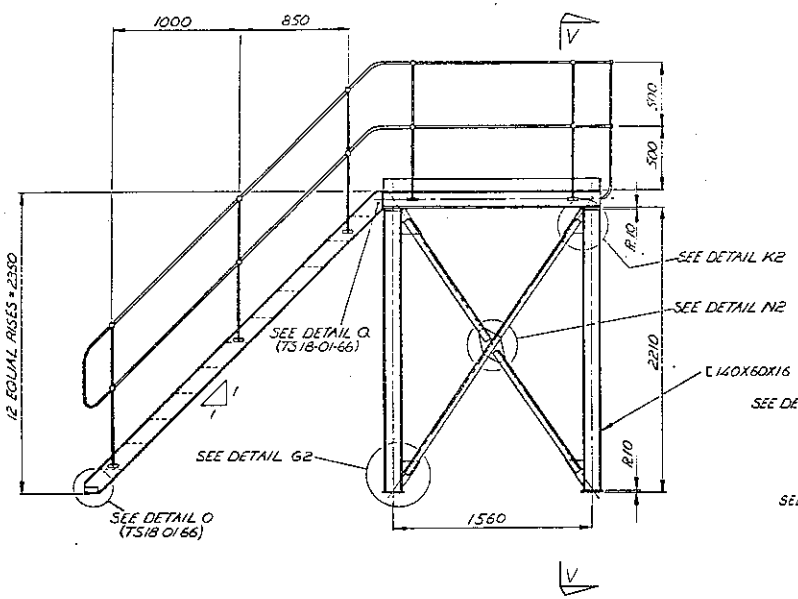
ITEM	REQD	DESCRIPTION	DRG No – REMARKS
R01	LSJ	ALTERED DIM HK10	
89-05-09		10 000 WAS 9000	
		2650 WAS 2400	
		2470 WAS 2170	
		158 – 89	

ISCOR YSKOR TSHIKONDENI

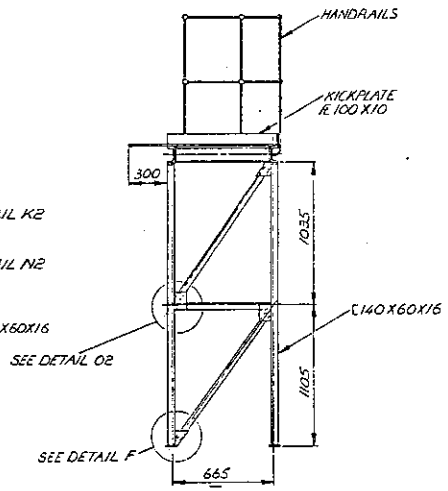
DRN	JANEKE LS	TRCD	
DATE	89-05-09	DATE	
CHD		CHD	
SL		MAN SUPTENG	
APPROVED			
PROJN		SCALE	1:20
JOB ORDER No	B2/88	SHEET	

NYALA SHAFT
MANRIDING CONVEYOR
ALIGHTING STATION BOTTOM
1989 PROPOSAL

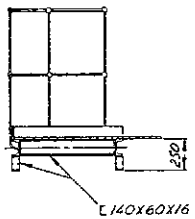
TS 0-1-48 R01 A1



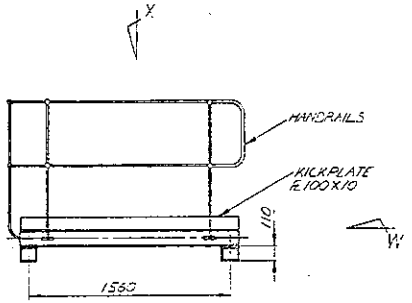
BOARDING STATION TOP



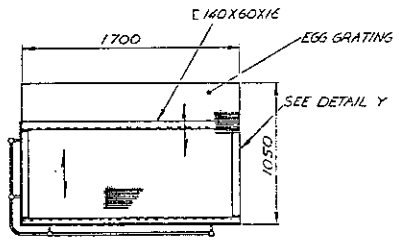
SECTION V-V



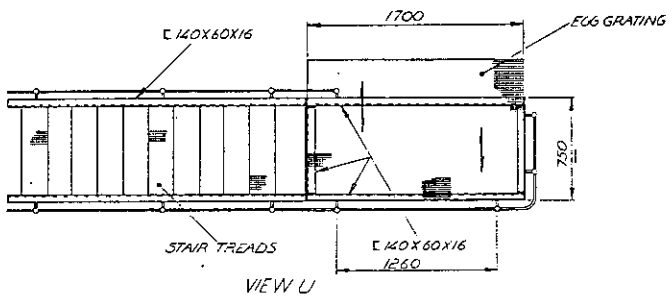
VIEW W



BOARDING STATION BOTTOM



VIEW X



VIEW U

GENERAL NOTES :-

1. EGG GRATING TO BE SQUARE MESH TYPE WITH BEARER BAR SIZE 30X4,5 AT 40 CENTRES. THIS ARROW ——— INDICATES DIRECTION OF BEARER BARS. ALL PANELS TO BE BANDED.
2. MATERIAL : ISCOR STEEL TO SABS 1431 GR. 300 W
3. PAINTING : TO MATCH EXISTING CONVEYOR
4. WELDING : TO BE A SOLIDLY WELDED CONSTRUCTION. 6mm C.F.W.
5. HANDRAILING : TO BE BALL TYPE STANCHIONS - SIDE MOUNTED.
6. STAIR TREADS : TO BE SQUARE MESH TYPE WITH NON-SKID NOSINGS, BANDED ON BOTH SIDES

REF. DRG. :
FOR DETAIL SEE DRG. NO. TS 0-1-53

ITEM	REQD	DESCRIPTION	DRG No - REMARKS

ISCOR YSKOR TSHIKONDENI

DRN	JANEKELS	TRCD	NYALA SHAFT
DATE	89-05-08	DATE	MANRIDING CONVEYOR
CHD		CHD	BOARDING STATION
S.		MAIN SUPERVISOR	TOP & BOTTOM
APPROVED			1989 PROPOSAL
PROJN		SCALE 1 : 20	
JOB/ORDER No	82-88	SHEET	TS 0-1-49 R00 A1

PERMISSIBLE VARIATIONS IN DIMENSIONS WITHOUT TOLERANCE INDICATION FOR WELDING CONSTRUCTIONS TO DIN 8570 GRADE ..... FLAME CUTTING TO DIN 2310 ..... CASTING TOLERANCES TO DIN 1680 ..... GRADE .....

WELDING SYMBOLS TO SABS 044 PART 1 I.S.O. 2553 : HYDRAULIC & PNEUMATIC SYMBOLS TO I.S.O. 1219 : PIPE & VALVE SYMBOLS TO BS 1553 PART 1 : SCREW THREADS IN I.S.O. METRIC TO BS 3643 UNLESS OTHERWISE STATED.

SURFACE TEXTURE SYMBOLS TO I.S.O. 1302 Ra VALUES : LIMITS & FITS TO I.S.O. # 286 STANDARD HOLE BASIS

MACHINING TOLERANCES (UNLESS STATED) ISO 2768 & DIN 7168 MEDIUM

ABOVE	INCL	
0,5	6	0,1
6	30	0,2
30	120	0,3
120	315	0,5
315	1000	0,8
1000	2000	1,2
2000	4000	2
4000	8000	3
8000	12000	4
12000	16000	5
16000	20000	6

GEOMETRICAL TOLERANCING TO BS 308 PART 3

ADDENDUM I

DRAFT
1988-03-24
REV 1 1989-05-05

MANRIDING CONVEYORS FOR UNDERGROUND MINE USE
PROPOSED STANDARD BASED ON INTERNATIONAL STANDARDS

1 CONVEYOR SPEED AND GRADIENTS

1.1 The speed of the conveyor shall not exceed 2,5 m/s

1.2 The maximum gradient at which persons and materials or minerals may be conveyed simultaneously on any section of conveyor shall not exceed 1:4 (14°) provided that all practicable measures are taken to prevent mineral or material from moving relative to the belt. (Also refer to 2.1).
Note: German standards accept gradients up to 18°.

2 LIMITATIONS OF USE

2.1 When mineral or material and men are conveyed at the same time there should be neither mineral nor material on the length of belt being used for man-riding and for not less than 5 metres in front of and behind this length.

2.2 No other form of mechanical haulage apparatus shall be in operation in the same roadway as a man-riding conveyor while persons are being transported during the main manriding time, or at any time when the gradient exceeds 1:10 (5,7°).

2.3 The safest downhill riding position for gradients greater than 9° is the sitting position.

3 CLEARANCES

3.1 Where conveyor belts are used for manriding, the minimum clearances above the centre of the belt shall be:

3.1.1 At the boarding platforms:
The minimum head clearance shall be 1,5m for a minimum

distance of 9m beyond the platform in the direction of travel.

3.1.2 At the alighting platforms:
The minimum head clearance shall be 1,6m for a minimum distance of 3m beyond the end of the alighting platform and 6m before the platform.

3.1.3 Elsewhere along the conveyor:
The minimum head clearance shall be 800mm for lying down position (head and arms forward) and 1000mm for sitting position and for a minimum of 9 meters beyond the safety gate.

3.2 Open-space requirements at boarding and alighting platforms are as follows: (refer fig 1)

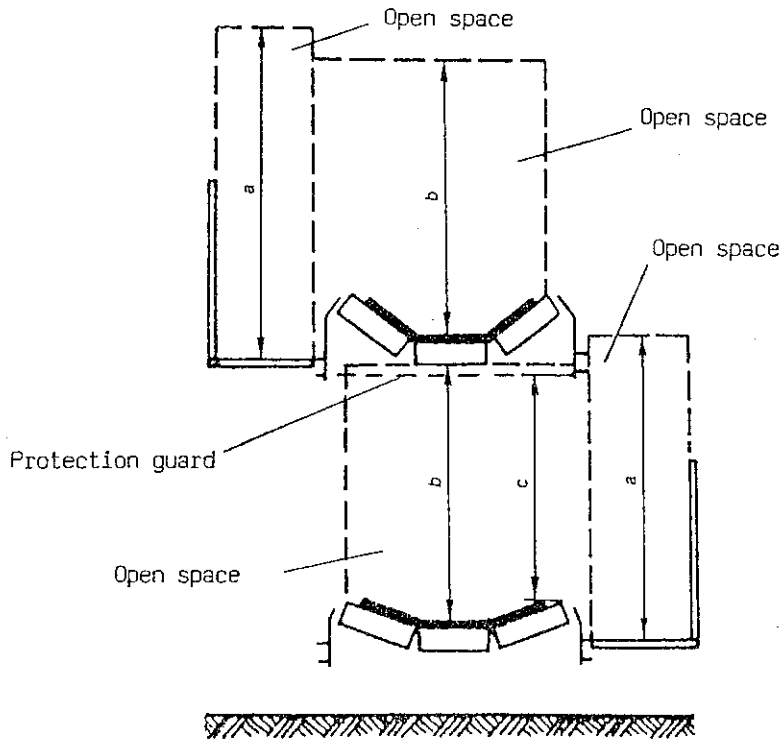


Fig 1

	Boarding	Alighting
a	1500mm minimum	1600mm minimum
b	1100mm minimum	1600mm minimum
c	1000mm minimum	1500mm minimum

Where the bottom belt is also used for man-riding the bottom of the top belt rollers shall be covered for at least the length of the platform plus 6m before the alighting and 6m beyond the boarding platform.

4 BOARDING AND ALIGHTING STATIONS

4.1 Boarding and alighting platforms shall be fitted with suitable ramps or staircases securely fastened to the platforms. The use of ladders or ladderways is prohibited.

4.2 Boarding and alighting platforms, ramps and staircases shall be free from obstruction and be constructed of fire resistant materials.

4.3 The walking surfaces shall be constructed so as to minimise the risk of slipping.

4.4 Where man-riding is practised on both the top and the bottom belts and a boarding and alighting platform occupy the same station, it is recommended that the boarding platform be the nearer to the respective end of the conveyor.

4.5 All boarding and alighting platforms as well as ramps or staircases shall be provided with hand-rails to assist persons boarding or alighting.

4.6 The minimum distance of any parallel alighting platform from the end of the conveyor towards which persons are travelling shall be the stopping distance of the conveyor plus 9m or a total of 18m whichever is the greater.

4.7 The gradient of the platform alongside a conveyor shall be the same as that of the conveyor.

4.8 Boarding and alighting stations located at the side of a conveyor shall have the following dimensions: Fig 2 refers.

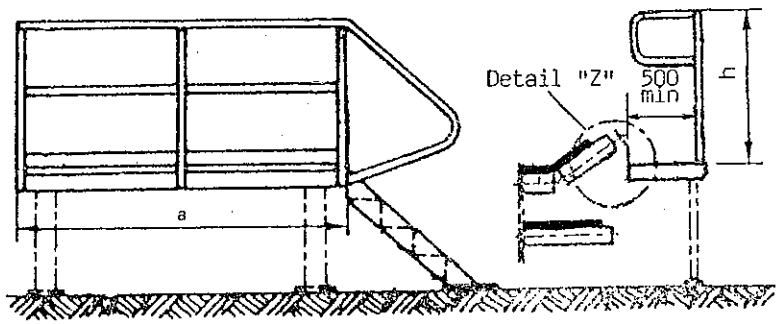
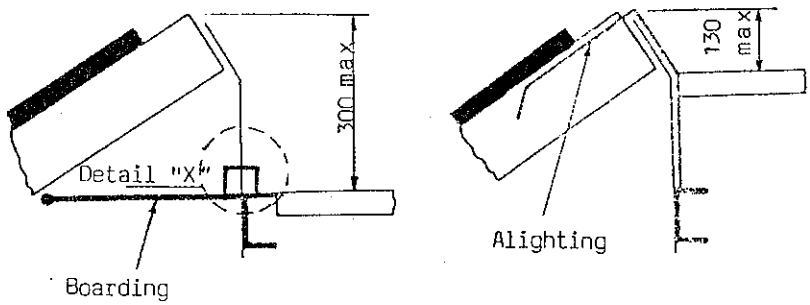


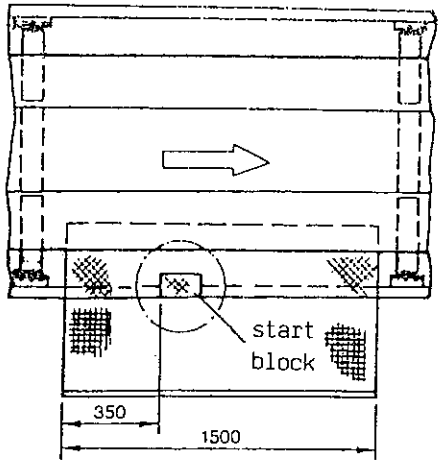
Fig 2

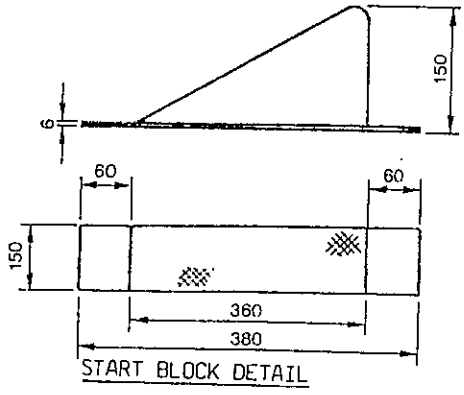


Detail - "Z"

	Boarding	Alighting
a	1500mm (minimum)	6000mm minimum or for down-hill alighting where the gradient is steeper than 1 in 10 (5,7°), four times the belt speed, whichever the greater.
h	900mm (minimum)	900mm (minimum)

The platform walkway materials to be galvanised non-slip grating.





DETAIL - "X"

Detail "X" illustrates a start block which is required for uphill boarding on slopes steeper than 9°.

5 MINIMUM REQUIREMENTS FOR THE EQUIPMENT

5.1 The belt shall have a minimum nominal width of 800mm and not more than 1400mm.

5.2 The max allowable wear of the edges of the belt shall not exceed 10% of the nominal width.

5.3 The belt shall be free from holes and slits and the belt joints shall be spliced or connected by mechanical belt fasteners in a proper manner.

5.4 The belt should be in contact with the conveyor idlers at all times.

5.5 The conveyor drive shall be designed so that, when the power is cut off, the belt shall stop within a safe distance.

As a guide the braking/acceleration should not exceed $1m/s^2$.

5.6 Guards shall be fitted to the satisfaction of the Inspector of Machinery.

6 SAFETY DEVICES

6.1 All manriding conveyors shall be equipped with a safety gate located not more than 2m beyond the end of the alighting platform, except where the alighting platform is in line with the conveyor. In addition, when men are riding on the bottom belt, a fixed diagonal plough shall be fitted beyond the safety gate at the stopping distance of the conveyor plus 3m. (Fig 3, Pg 12 refers).

6.2 The safety gate shall be so designed, constructed and installed as to cut off the power to the conveyor motor and apply the brakes where fitted in the event of a person overriding the alighting platform. The safety gate

tripping mechanism shall be so designed that it can be re-set only manually.

6.3 An automatic indicator at the boarding platform shall show when the safety gate is engaged and no person shall ride until such an indication is showing.

6.4 To prevent danger arising owing to belt slip, a slip detection device shall be fitted which, when operated, shall stop the conveyor.

6.5 Adequate means shall be taken to ensure that belts do not move out of line in excess of 75mm and a belt alignment device shall be fitted at the head end of every conveyor.

6.6 A belt breakage detection device or devices shall be fitted to the belt and, when operated, shall stop the conveyor.

6.7 A belt tear detection device shall be fitted to every conveyor used for manriding which, when operated, shall stop the conveyor.

6.8 The delivery chute of any manriding conveyor shall be fitted with a chute blockage detection device which, when operated, shall stop the conveyor.

6.9 Means shall be provided to preclude the inadvertent or unauthorised reversal of manriding conveyors.

6.10 There shall be means of stopping the conveyor in any emergency from any point along its length. The means provided shall be within easy reach of any person riding on the conveyor and any person standing in the conveyor roadway. Where the means of stopping comprises a trip

wire and trip switch, operation of the pull wire shall 'latch out' the switch which shall remain in this condition until deliberately reset. The stopping system shall be of the 'fail safe' type. The maximum spacing between switches shall be 100m (Maximum wire length shall be 50m).

7 COMMUNICATION

7.1 Direct telephone communication between the inspector or "patrol man" and the attendant or "control man" shall be provided at intervals of not more than 180m throughout the full length of the conveyor. Alternatively, an intercom or radio system shall be used.

7.2 The conveyor shall not be started unless the control man is satisfied that it is safe to do so, and he has confirmed that the belt is in a safe condition.

8 ILLUMINATION OF STATIONS

At every station the roadway shall be whitewashed for the full length of the boarding and alighting platforms with a minimum distance of 9m at each end of the boarding and alighting platforms and the full length of the station shall be adequately lighted. (For typical lamp positions, refer fig 4 on page 13)

9 BOARDING AND ALIGHTING PLATFORM SIGNS (Refer figs 5 to 12 for typical signposts)

Appropriate boarding or alighting signs shall be placed at the approach to each platform in such positions as to be easily seen by persons boarding or alighting from the conveyor. They shall be of the reflective type and should be electrically illuminated. (Refer fig 4 for typical positions).

10 ALIGHTING PLATFORM WARNING SIGNS

Warning signs shall be placed at the approach end of

every alighting platform at distances of 45m and 20m from the platform, and a final 'GET OFF' sign shall be placed at the platform. They shall be so located as to be easily seen by persons riding on the conveyor and shall be of the reflective type and should be electrically illuminated.

11 NOTICE TO BE POSTED AT STATIONS

A durable notice, signed by the manager, shall be posted at each station specifying the following:

11.1 No person shall board or alight from this manriding conveyor except at the authorised boarding and alighting platforms, unless otherwise instructed by an official of the mine, or in case of an emergency.

11.2 Every person riding on this conveyor shall do so in a position facing in the direction of travel.

11.3 Every person riding on this conveyor shall position himself in the centre of the belt and ensure that all parts of his body, clothing and equipment are within the confines of the belt.

11.4 A minimum distance of 5,0m shall always be maintained between any two adjacent persons travelling on this conveyor.

11.5 Every person shall behave in an orderly manner. No person shall stand or walk on this conveyor, except for the resetting of any emergency stop that he has operated, or at the boarding or alighting platform.

12 APPOINTMENT AND DUTIES OF PERSONNEL

The mine manager shall make the following written appointments:

12.1 An attendant shall be appointed to operate the controls

for each manriding conveyor in compliance with communications received when in use for manriding.

12.2 An Inspector shall be appointed for inspections to be made within two hours immediately before the commencement of any shift in which men are to ride on the belt conveyor and to report any unsafe condition and prohibit the use of the conveyor for manriding if the condition of the belt is unsafe. This shall be recorded in a log book.

13 INSPECTIONS

13.1 Daily

The person or persons appointed by the manager shall ensure that:

a) the belting is free from slits and holes;
b) belt edge wear does not exceed 10% of the nominal width;
c) all belt joints are sound and no joint pin or transverse stiffener projects beyond the belt;
d) all safety equipment is in working order;
e) the conveyor is free from excessive spillage or any foreign material likely to prevent it working satisfactorily;
f) the structure of the boarding and alighting platforms is free from all defects and is secure.

13.2 Weekly

The person or persons appointed in writing by the manager shall ensure that:

a) all idlers are sound, in position and working satisfactorily;
b) all clearances are correct;
c) braking devices where fitted are in working order;
d) the belt alignment devices are operative when the belt moves 75mm from its normal centre line;
e) the belt slip detection device is operative.

If any defect is found during daily or weekly

inspections, manriding on the conveyor shall cease forthwith until the defect has been rectified.

The results of and any action taken on the above daily and weekly inspections, examinations and tests shall be entered in a log book provided for that purpose.

14 TRAINING OF PERSONNEL

All the mine personnel and visitors who are likely to travel on manriding conveyors, shall be thoroughly informed and trained before they are allowed to travel on manriding conveyors. Trained personnel shall use identification cards appropriately marked.

15 RECORD BOOKS (Log Books)

Log books shall be kept in a safe place and all the information shall be up to date.

COMPILED BY : ER ASCUI

DATE: : 1988-03-24

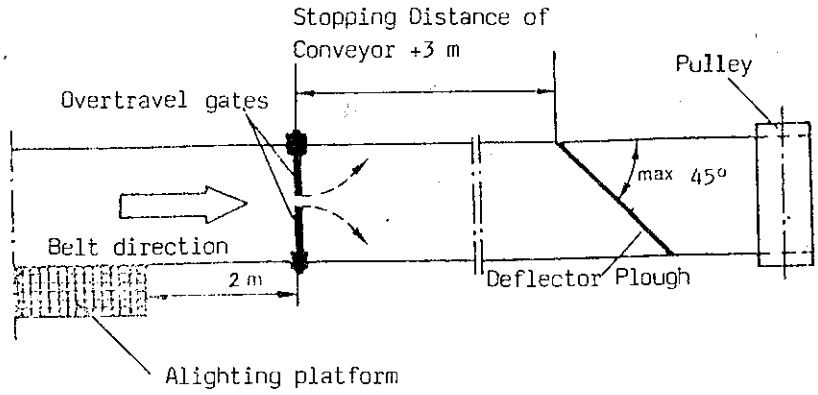
REVISED BY : WR MÖLLER

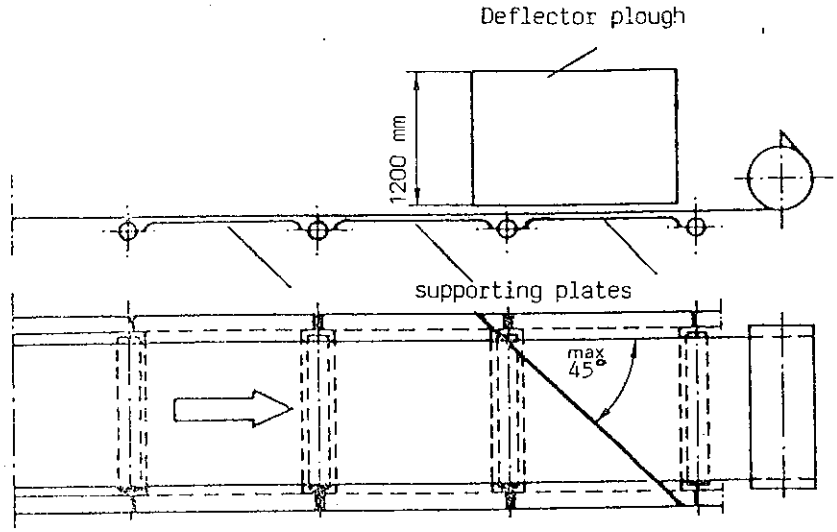
REV NO 1 : 1989-05-05

REFERENCES :

1 NCB (Production) Codes and Rules; manriding by belt conveyor.
2 German recommendation for personnel transport No 17.

SAFETY DEVICES: SAFETY GATE AND DIAGONAL PLOUGH





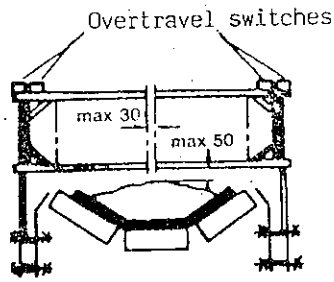
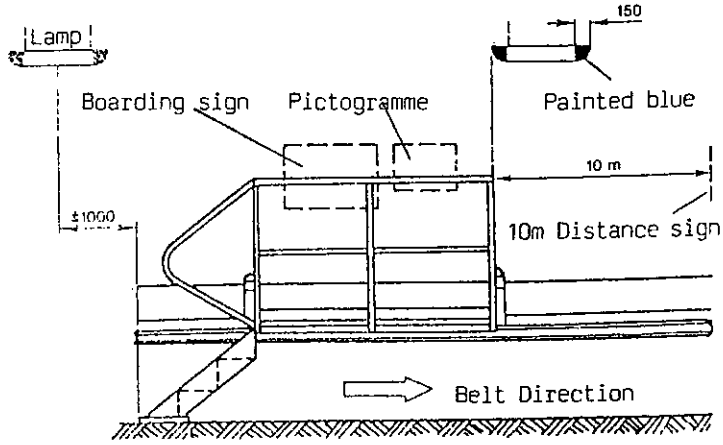


Fig 3

ILLUMINATION AND SIGNPOST POSITIONS (TYPICAL)

Boarding station



Alighting station

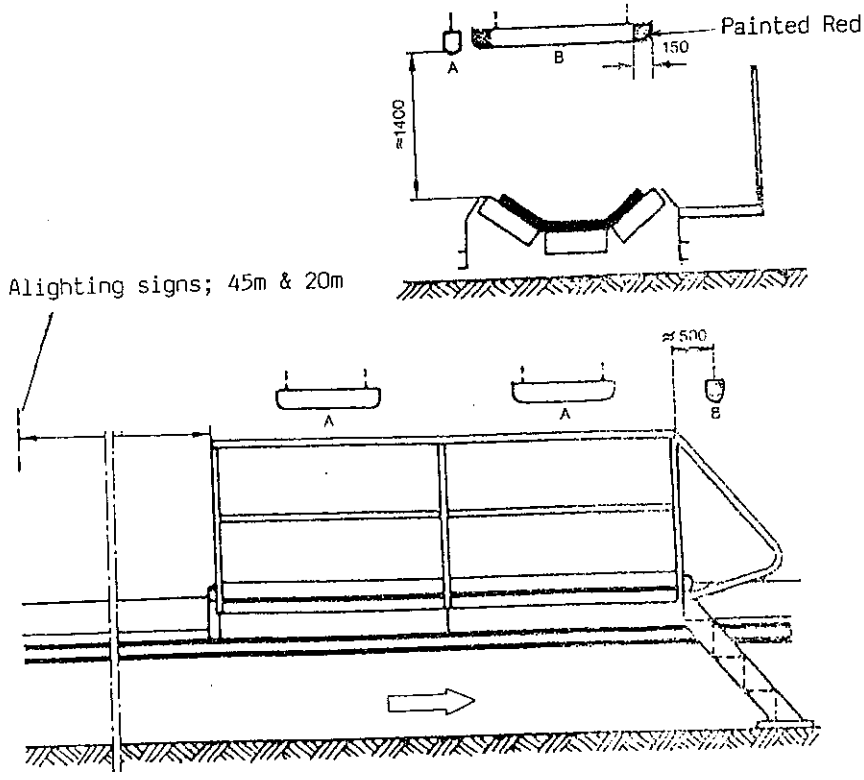


Fig 4

SIGNPOSTS

GENERAL: All signs lettering = white. Background = blue (reflecting).

FIG 5: BOARDING SIGN

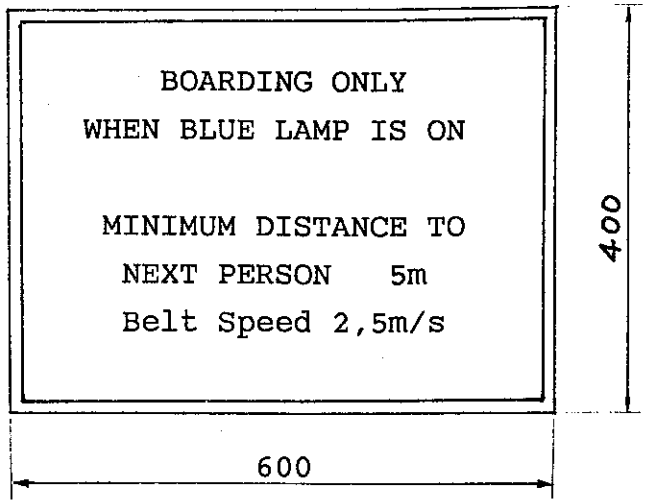
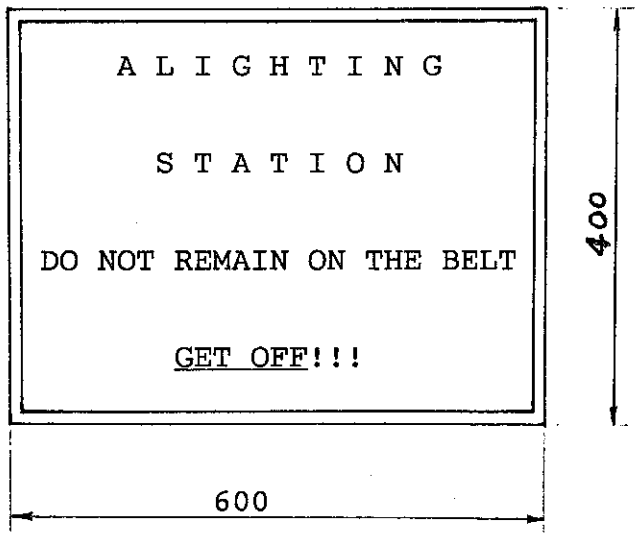


FIG 6: ALIGHTING SIGN



Note:

Signs shall be written in the official languages including the related native languages.

SIGNPOSTS (Continues)

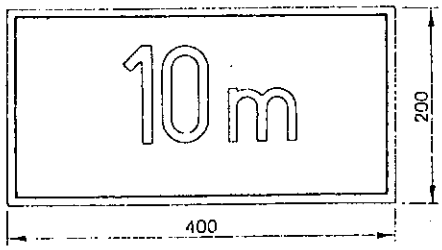


Fig 7
DISTANCE SIGN
(Typical)

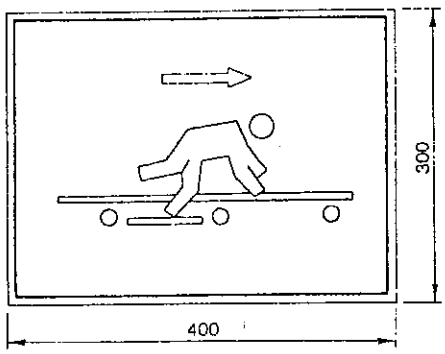


Fig 8
BOARDING

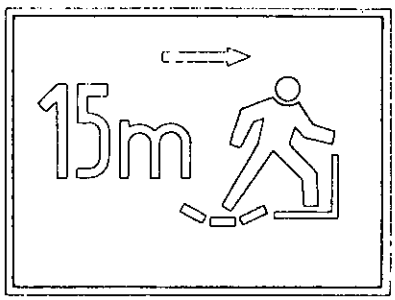


Fig 9
ALIGHTING
(Indicate left or right side alighting)

ALL SYMBOLS = WHITE

BACKGROUND = BLUE (REFLECTING)

SPECIAL SIGNPOSTS

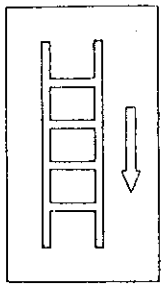


Fig 10
INTERMEDIATE ALIGHTING
Symbol white
Backgroud blue (Reflecting)

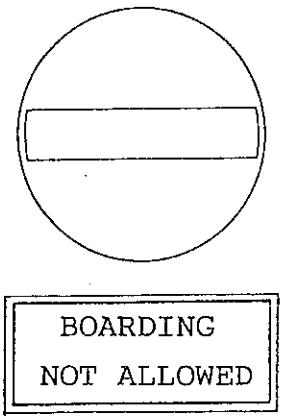


Fig 11
NO BOARDING WARNING
Symbol white
Background red (Reflecting)

Text black
Background white (Reflecting)

Fig 12
NO ALIGHTING WARNING
Symbol black
Background yellow (Reflecting)

Text black
Background white (Reflecting)