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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

Handbook on Indian Railway Standard Drawings & Specifications for Signalling

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EXCELLENCE IN MAINTENANCE

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Handbook on indian railway standard Drawings & Specifications for Signalling

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CONTENTS

1 Introduction 3
2 Plans for New and Working Installations (Ref SEM Chapter 8 Sec 1) 3
2.1 Preparation –General Procedure (SEM Para 8.1.1) 3
2.1 Plans for other departments (SEM Para 8.1.2) 4
2.2 General practice & sizes of drawings (SEM Para 8.1.3) 4
2.3 Titles & Numbering of drawings (SEM Para 8.1.4) 6
2.4 Details on drawings (SEM Para 8.1.5) 7
2.5 Check & issue of drawings (SEM Para 8.1.6) 8
2.6 Completion (as made) drawings (SEM Para 8.1.7) 9
2.7 Supply of plans (SEM Para 8.1.8) 9
2.8 Care & filing of tracings (SEM Para 8.1.9) 11
3 Signalling drawings 11
3.1 Indian Railway Standard Drawings (SEM Para 8.2.1) 11
3.2 Supply of standard Drawing 12
3.3 Other Signalling Drawings & plans 12
3.3.1 Engineering Scale Plan (ESP) 12
3.3.2 Signal Interlocking Plan (SIP) 17
3.3.3 Station Working Rule Diagram (SWRD) 21
3.3.4 Locking Table/Selection Table/Control Table/Route Control Chart 21
3.3.5 Control Cum Indication Panel (CCIP) Diagram/VDU Diagram 23
3.3.6 Track Bonding Diagram 23
3.3.7 Cable Route Plan 23
3.3.8 Cable Core Plan 24
3.3.9 Location box/Junction Box diagram 24
3.3.10 Relay room floor plan 24
3.3.11 Relay Rack layout 24
3.3.12 Relay Contact Analysis 25
3.3.13 Power Supply scheme 25
3.3.14 Circuit diagrams 25
4 List of drawings to be kept at station (Ref. SEM Annexure 3-A5) 25
5 List of completion documents during handing over to division 26
6 Specifications & Books of Reference 27

6.1 Indian Railway Standard Specifications (Ref. SEM 8.3.1) 27
6.2 Books of Reference (Ref. SEM para 8.4.1 & 8.4.2) 27
7 Maintenance of Drawings, Specifications and Book of Reference (Ref. SEM para 8.5.1 & 8.5.2) 28
7.1 Folders for Drawings 28
7.2 Responsibility 28
8 Various Books of Reference and their Distribution among the Staff (Ref. SEM Annexure: 8-A1) 29
9 Annexure: Drawing Example 32

INDIAN RAILWAY STANDARD DRAWINGS & SPECIFICATIONS FOR SIGNALLING

1 INTRODUCTION

In Indian Railways, all signalling works are required to be carried out strictly in accordance with the approved plans, standard drawings and specifications and should conform to the provisions of Signal Engineering Manual where such are applicable.

Deviations, if any, shall have the prior approval of the Principal Chief Signal and Telecommunication Engineer. All deviations shall be marked on the completion drawings and forwarded to the Principal Chief Signal and Telecommunication Engineer for correction of the tracings and issue of revised prints.

Thus standard drawings and specifications are important documents for execution, commissioning as well as maintenance of signalling installations. These form the basis for inviting tenders and entering into contracts. Unless otherwise agreed to specifically, the execution of works and supply of materials on contract shall be according to the Railway's Drawings and the Specifications.

Apart from above, there are other signalling drawings and reports which are very important for a signal interlocking installation. The details of these are given at appropriate places in this handbook.

2 PLANS FOR NEW AND WORKING INSTALLATIONS (REF SEM CHAPTER 8 SEC 1)

New signaling works require altogether new signalling drawings. Signalling design and its modifications follow a definite and defined stage in its design life cycle from its conception to commissioning.

2.1 PREPARATION –GENERAL PROCEDURE (SEM PARA 8.1.1)

a) All ‘Signalling & Interlocking Plans’ (SIP) shall be prepared for Station, Automatic Block Section and LC Gate as required in accordance with the instructions issued by the Principal Chief Signal and Telecommunication Engineer.
b) The names of the junction or terminal stations should be noted on plans on both sides, that on the left-hand side being the one from which the kilometer progressively increases along with direction of traffic which shall be based on engineering scaled plan (ESP). On receipt of ESP, the same shall be checked for relevant details as per Annexure: 8-A2. The names of the adjacent block stations and midsection sidings/interlocked level crossing gates/IBSs connected with concerned stations should also be indicated on the plans as also their respective distances from the centre line of the station for which the plan is prepared. Communication to mid-section Manned LC gates shall be shown on the plan of the station to which such communication is established.
c) Standard drawings shall not be deviated and Typical drawings shall not be issued without the specific approval of the Principal Chief Signal and Telecommunication Engineer.
d) The Signal and Telecommunication Engineer in charge should ensure that drawings submitted with an estimate for a work are complete and include all information necessary.

i. For the proper understanding of the scheme, relevant notes are being written on the drawings.
ii. For proper check of the design and estimate.

e) When a part of the work has to be done to a standard plan or to an existing drawing, the fact should be stated. Such drawings need not be re produced. If a part of the information necessary has to be supplied by another department, the officer in charge should obtain and incorporate the details on the drawing.
f) North direction should be shown on every signalling interlocking plan.
g) All drawings should be quoted by number in their proper place in the estimate and in the covering letter accompanying the estimate.
h) Tentative signalling & interlocking plans (SIP) prepared for estimating purposes should bear the legend: "Tentative - For estimating purposes only". Tentative signalling interlocking plans issued for tender purposes should bear the legend: "Tentative - For Tender purposes only". Draft signalling interlocking plan sent to Divisions for comments should bear the legend: "Draft Signalling interlocking Plan For comments". All tentative/draft plans should be signed by at least a Senior Scale Officer.
i) Those signalling plans, which have been superseded, shall be stamped accordingly & visibly as “Superseded by …..” with Date and details. Old signalling plans shall also be Crossed across to avoid it`s mistaken adoption.
j) History of each station’s Signalling plans shall be recorded in chronological order along with CRS/PCSTE sanctions, Date of commissioning, Date of Plan updating, details etc. with remarks for any review required.

2.1 PLANS FOR OTHER DEPARTMENTS (SEM PARA 8.1.2)

a) Divisional/Sr. Divisional Signal & Telecom Engineer/Dy. Chief Signal & Telecom Engineer may at his discretion prepare sketches for officers of other Departments or for Deposit Works. No detailed plans for Deposit Works should be prepared except on receipt of orders from the Principal Chief Signal and Telecommunication Engineer.
b) Sr. Divisional Signal & Telecom Engineer/Dy. Chief Signal & Telecom Engineer shall obtain complete details from officers of other Departments when preparing plans that affect those departments and embody their requirements on the plans, if considered necessary. He should arrange for the plans, to be signed by the representative of the department concerned in token of approval.

2.2 GENERAL PRACTICE & SIZES OF DRAWINGS (SEM PARA 8.1.3)

a) The code of Practice for General Engineering drawings and the standard sizes of drawings - IS. 696 shall be followed as far as practicable.
b) In preparing plans or making ferro prints, wastage of drawing paper, tracing cloth and ferro paper should be avoided. Multiple ferro copying should be avoided by use of scanning from tracing. All field units should be issued soft copies only in PDF or TIF or JPG from scanned drawings. Field units to take colour prints from scanned soft copies for application to CRS’s/ PCSTE’s sanction.
c) The following considerations decide the size of a drawing
   i. Folding, approximately to foolscap size to accompany correspondence and reports.

ii. The commercial size of drawings, tracing and paper rolls.

d) The plan sizes given below in Table-1 shall be adopted.

TABLE-1

Sketches	A-4	210 mm x 297 mm	10 mm
	A-3	297 mm x 420 mm	
Locking Table	A-3	297 mm x 420 mm	10 mm
Control Table	A-3	297 mm x 420 mm	10 mm
Circuit Diagram	A-3	297 mm x 420 mm	10 mm
Power Supply Diagram	A-3	297 mm x 420 mm	10 mm
Track Bonding Plan	A-4	210 mm x Any length	10 mm
	A-3	297 mm x Any Length	
Cable Termination Diagram	A-3	297 mm x 420 mm	10 mm
Control Cum Indication (CCIP)	A-3	297 mm x Any Length	10 mm
Signaling Interlocking Plan	A-3	297 mm x Any Length	10 mm
Locking Diagram	A-3	297 mm x Any Length	10 mm
Cable Route Plan	A-3	297 mm x Any Length	10 mm
Cable Core Chart	A-3	297 mm x Any Length	10 mm
VDU Diagram	A-3	297 mm x 420 mm for Standard Yard	10 mm
	A-2	420 mm x 594 mm for Bigger Yard	
Floor Plans for TSAA, Earthing Plan	A-3	297 mm x 420 mm	10 mm
Note: 30 mm margin to be provided on the left-hand side for the binding purpose			

e) Drawings for a large project should be bound together, each such drawing should be marked as sheet 1, 2 and so on as also the total number of sheets (e.g., 1/3, 2/3, 3/3) and bear in the proper place, the separate numbers by which each is identified. These numbers should be entered in the Office Register of Drawings and should also be marked on the outside bindings.

2.3 TITLES & NUMBERING OF DRAWINGS (SEM PARA 8.1.4)

a) The title and number may be placed at the bottom right-hand corner of the plan, sufficient space being left for "Notes" to be entered as necessary.

b) Drawings of any station, viz., Signalling Interlocking plans, Locking Tables/Control Tables/Route Control Charts, Locking diagrams, wiring diagrams, etc. shall bear the same number SIP.SCR.GTL.VPL.01.

c) Document or Drawing type to have standard abbreviations such as SIP/RSP/ PD/ST/LT/RCC/WD etc. and for Electronic Interlocking Configuration Diagram (EIC), Relay Disposition Chart (RDC), Inter-Rack Cable Schematic (IRC), Earthing Arrangements (EAR), Equipment Rack Layout (ERL), Signal Equipment Room Layout (SER), Station Master Room Layout (ASM), Power Supply Room Layout (PSR), Interlocking Logic Circuit Diagrams(ILC), Interface Circuits (IFC), Visual Display Units (VDU), etc. All plans/drawings shall be version controlled & updated in the following manner:

i. Any controlled drawing or document needs to be identified uniquely and unambiguously.

ii. The drawing number shall indicate the document type, zone, division, station, and version number.

iii. Unique codes are to be assigned for the zone, division and station, and document type.

iv. The version number is two digit number XX which can cater to 99 versions.

v. Electronic record copies shall have the file names the same as the drawing number.

vi. Structure of the drawing number: Doc Type. Zone Code. Div Code. Station Code. Version. For example, the SIP of Venkatampalli (VPL) Station, Guntakal (GTL) division of South Central Railway (SCR) may have a drawing number - SIP.SCR.GTL.VPL.IZ1.

vii. When drawings are having multiple sheets such as Interlocking Logic Circuits, Interface Circuits, etc., shall have an index sheet.

viii. Structure of the drawing number where multiple drawing sheets are involved - Index Sheet - Doc Type. Zone Code. Div Code. Station Code. Version Sheet -Sheet#nnn. Version For example, Internal Circuit diagrams of Venkatampalli (VPL) Station may have a drawing number ILC. SCR.GTL.VPL.IZ1 Sheet#ClCl1. IZ1.

ix. Drawing number for Part drawing or document sometimes, only part of the drawing may be required for illustration or planning purposes. In such cases, the drawing may have the suffix '.Part'. SIP.SCR.GTL.VPL.B1.Part.

d) If more than one sheet is used for a particular work, each must be distinguished by the sheet number as indicated in Para 8.1.3(e) immediately following the drawing number. The title may be placed below the number. If the drawing cancels the previous one, a note to this effect and the number of the cancelled drawing should be recorded at the right hand top corner of the drawing.

e) Every plan/drawing/circuits should bear in small letters at the lower left hand corner, the name and initials with designation of the JE/SSE (D&D) who prepared and officials who checked & approved the plan/drawings/circuits. If plan/drawing/circuits are prepared by

contractor, then Contractor's designer name/designation/license number with their initials shall be ensured.

f) All signatures in tracings should be in indelible ink. All signature should be dated with date month and year. If feasible, plans/drawings/circuits may be digitally signed.

2.4 DETAILS ON DRAWINGS (SEM PARA 8.1.5)

a) All dimensions and distances shall be written carefully upon that part of the drawing to which they refer. The distance to be embraced by the figures shall be indicated by arrow heads. Figuring and descriptive matter should be so printed that without moving the plan, it can be read with ease.

b) The following information should invariably be shown on signaling interlocking plans:

i. Standard of interlocking and Class of station.
ii. Holding capacity of all running lines and sidings.
iii. Direction of reception and despatch on running lines and description of sidings.
iv. Restriction on dead-end sidings (For example: “Not For Stabling”) if any.'
v. All gradients within the station limits and up to 2.5 kilo-metres in rear of first stop signal.
vi. Kilometrage and class of level crossings within the station limits, whether interlocked or not.
vii. Type of Block Working with adjacent station and location of block Instruments.
viii. Up and Down directions and names of important junctions on either side.
ix. Reference to condonation of gradient infringements, CRS's dispensation for deviations from General Rules/Signal Engineering Manual, if any.
x. Reference to approved Engineering plan based on which the signalling interlocking plan is prepared.
xi. Note regarding telephone communication provided between ASM/Cabin man and level crossings within and outside station limits.
xii. Aspect sequence chart.
xiii. Whether turnout is 1 in 8-1/2 or 1 in 12 or 1 in 16 or Symmetrical split or Thick web switch etc.
xiv. Details of Detection Table etc., which are not apparent in the plan.
xv. Details of Track Circuits/Axle Counter.
xvi. Signals, Inter-signal distances and distance between Warning Boards and Signals.
xvii. Details of open bridges/RUB/ROB/LHS. List all Main routes with all overlaps, Calling-On routes & Shunt routes.
xviii. Custody of spare keys.
xix. Date of all previous references of commissioning the installation with their sanction numbers and deviations (if any) and date of commissioning. A sample copy of Signalling Interlocking plan & Control table are at Annexures II.

2.5 CHECK & ISSUE OF DRAWINGS (SEM PARA 8.1.6)

a) Signalling Interlocking Plans and Locking Tables/Control Tables shall be checked in full at two levels by officer before they are approved and signed by an officer in Junior Administrative grade or above, authorized by the Principal Chief Signal and Telecommunication Engineer.

b) Cable plans, power supply distribution diagrams etc. shall be checked in full at two levels by officers before they are approved and signed by Divisional Signal and Telecommunication Engineer/Senior Signal and Telecommunication Engineer.

c) All Circuit Diagrams including those submitted by the contractors or Firms (including PSUs) shall be checked in full at two levels by officer before they are approved and signed by Deputy Chief Signal and Telecommunication Engineer. Detailed wiring diagrams for individual stations prepared on the basis of approved typical circuit diagrams should be checked in full by an officer and Divisional Signal and Telecommunication Engineer or Senior Signal and Telecommunication Engineer who may approve and sign them. They are shown below in Table-2.

TABLE-2

	Type of Drawings	Drawn & Checked by	Level Check	Level 2 Check	Approval
1. HQ-level drawings	SIP, TOC, Circuit diagrams	JE/SSE/D&D	ASTE	SSTE/ D&D	Dy.CSTE or Above
2. Divisional/ Unit Level	Cable core plan, Cable route plan, Power distribution diagram, Interface drawing for El.	JE/SSE/D&D	ASTE	ASTE/ DSTE	DSTE/ Sr.DSTE/ Dy.CSTE
	Track Circuit bonding diagram, Location termination particulars, Perimeter earthing for El.	JE/DCD	ASTE	ASTE/ DSTE	DSTE/ Sr.DSTE

Note: PCSTE may add more drawings and amend details given above as required

2.6 COMPLETION (AS MADE) DRAWINGS (SEM PARA 8.1.7)

a) The Signal and Telecommunication Engineer in charge of Construction/Work executing agency should submit site verified signed paper prints to the Principal Chief Signal and Telecommunication Engineer for works completed. These should indicate the work as actually carried out including the dimensional details as actually measured at site, location of signals, details of cables laid, wiring diagram, locking diagram etc. Completion of Signalling interlocking plan shall be based on completion Engineering scale plan if there is any change in ESP. Completion plan/drawings/circuits original tracings shall be signed by ASTE/DSTE of executing unit as confirmation of 1st level check. In case of work done by Railway PSUs then 1st level check should be carried out by PSU's officer equivalent to rank of Executive Engineer and signed by divisional officials before submission to zonal HQ. 2nd level check should be done by railways ASTE/DSTE and approved & signed by an officer in JAG or above, authorized by the Principal Chief Signal and Telecommunication Engineer.

b) On receipt of these drawings, the original tracings will be amended in the Office of Principal Chief Signal and Telecommunication Engineer and marked "Completion Drawing". Scanned completion drawings will be sent to division and Requested number of copies of the completion drawing can be printed by Sr. Divisional Signal and Telecommunication Engineer.

2.7 SUPPLY OF PLANS (SEM PARA 8.1.8)

a) Plans of working installations - In addition to the Standard drawings, each Divisional Signal and Telecommunication Engineer/Assistant Signal and Telecommunication Engineer shall have copies of the following diagrams and charts of working installations:

   i. Engineering Plan and Signalling Interlocking Plan for each interlocked station including interlocked level crossings situated outside station limits and interlocked mid-section sidings.

   ii. Station Working Rule diagram where issued, for each station including interlocked level crossings situated outside station limits.

   iii. Locking Table and Locking diagrams of each interlocking frame, Station Master's slide control frame, interlocking key box, power frame with mechanical locking.

   iv. Control Tables/Locking Table/Route Control Chart for each station.

   v. Control Cum Indication Panel (CCIP) Diagram/VDU Diagram: VDU diagram shall be submitted to actual size or in proportionate reduced size of the VDU for approval. Track Layout as per approved signalling interlocking plan with symbol for direction of traffic for each line of the layout; nomenclature of each line/siding; boards for BSLB/GWB/STOP; SM's key In/Out indications; SI cancellation Key-In indication; provision of all un-blocking; List of all emergency counters; relevant signalling details such as track section numbers with route set-clear/set-occupied or occupied lit indications in different colour; main/calling-on/shunt signal numbers with timer, locked indication & each aspects indications; points numbers with 'Normal' & 'Reverse' indication slits, locking indications, sub route cancellation symbol in blue colour with white dot; each signal route initiation & signal overlap set/release timer indications; block instruments

status LCPR/SR/Block release indications; Crank handle Key-In/Key-Out indications for each crossover; status of active/ standby VDU; Link status, health status, OC/CIU status, CRC/Checksum; Date/Time, colour scroll for flashing indication etc. are the least but not limited, to be shown. Drg. No: 8-D3 for typical VDU layout may be referred.

vi. Bonding diagrams of track circuits for each yard showing complete layout and diagrams of individual track circuit showing location of insulation joints, jumpers, relay and feed ends, polarity, length, traction bonds etc.

vii. Diagrams of connections at track, line and other relays, as necessary for each track circuited yard.

viii. Diagram of Relay Interlocking, Electronic Interlocking circuits for each yard.

ix. Diagrams of single and double line block instrument circuits.

x. Diagrams of Location/Junction boxes showing description of wires at terminals for each yard.

xi. Arrangement of relays in relay racks and contact analysis sheet, fuse & terminal analysis sheets for Relay Interlocked/Electronic Interlocked stations.

xii. Diagrams showing connections of power supply panels for each power supply installation with perimetric/ring earthing diagram.

xiii. Cable route plan showing disposition of underground cables at OHE mast/regular intervals with respect to nearest track center, for each yard.

xiv. Disposition charts of underground cables for control telephones, block instruments, administrative trunks and other railway circuits.

xv. Cable core plans of underground cables for signalling circuits under the charge of each SSE/JE (Signal).

b) Senior Section Engineers/(in charge) and Sectional Senior Section Engineers/ Junior Engineer (Signal) shall be supplied with copies of the above mentioned drawings and charts.

c) At stations provided with centralised operation of points and signals, a set of signalling interlocking plans, locking/selection tables/route control chart, locking diagrams and wiring diagram, cable route plan etc. may be kept at the station for reference by the maintenance staff.

d) While signalling interlocking plans, Locking table/Section table/Route control chart and wiring diagrams shall be supplied by Headquarters Office, other plans mentioned in Para 8.1.8 shall be issued by Deputy Chief Signal & Telecommunication Engineer (Construction) or Senior Divisional Signal & Telecommunication Engineer (maintenance) as the case may be. Signalling interlocking plans for non-interlocked stations shall be prepared by Deputy Chief Signal & Telecommunication Engineer (Construction) or Senior Divisional Signal & Telecommunication Engineer (maintenance) as the case may be.

2.8 CARE & FILING OF TRACINGS (SEM PARA 8.1.9)

a) Tracings shall not be used for reference as they are likely to get lost or damaged. A required number of prints taken from scanned tracing should be supplied to Officers and JE/SSEs. Each particular file should contain a print taken from a scanned tracing of the works relating to it.
b) Should it be necessary to send a tracing from one office to another, it shall be rolled and inserted in a cardboard cylinder.
c) Print from scanned tracing should be folded in a concertina fashion and shall when folded measure approximately 210 mm x 300 mm. The folding should be arranged to make visible the title of the plan without unfolding the plan. When prints are rolled for dispatch, they should be rolled with the working side outwards.
d) The Records section of each Drawing Branch may file every tracing of an original drawing based on the subject classification and the index card filing system. A classification number should distinguish each drawer of the index card cabinet: each card should be complete as regards the title of the drawing, other connected drawings, file reference, and the drawer number in which the original is stored.
e) The storage drawers should have placards on the outside indicating the contents of each. The plans should be stored flat in shallow drawers of convenient dimensions. The probability of damage by moths or white ants or fires should be guarded against.

3 SIGNALLING DRAWINGS

For any new signalling work, standard drawings are required and execution of work is strictly carried out as per approved standard drawings. Apart from standard drawings, there are various other drawings required to be prepared during design stage of signal installation. These along with standard drawings are also very helpful after commissioning of signal installation, during maintenance and alteration works. The details of all types of signaling drawings are given in following paragraphs.

3.1 INDIAN RAILWAY STANDARD DRAWINGS (SEM PARA 8.2.1)

Indian Railway Standard Drawings, designated by the code word I.R.S. have been issued by the Director-General, Research Designs and Standards Organisation, Ministry of Railways, Lucknow. The signal drawings are marked IRS (S) where" S" stands for "Signal ". The particulars of the drawings and their reference numbers are detailed in an "Index of Indian Railway Standard Signalling and Interlocking Drawings-IRS.(S)".This index shows all the IRS.(S) drawings arranged alphabetically, as well as serially, in the order of their numbers. Each drawing number is either prefixed with the letters ' SA ' or the letter 'S'. The letter 'SA' stands for a signal assembly and ' S ' stands for a part of a signal assembly.

New designs and drawings which are accepted for adoption as standards have the word 'Advance' suffixed to their number e.g. S: 6085 (Advance), pending their final adoption as Indian Railway Standard Drawing. For such drawings, the manufacturers shall have a sample approved by the purchaser before undertaking the bulk manufacture.

The drawings are prepared in the first instance by the RDSO and circulated to the Railways for offering their comments. The drawings together with the comments are put up for discussion before the Signal Standard Committee SSC which, if considered in order, will recommend that the particular drawing be issued as "Advance Standard". The Railway Board will order whether it is acceptable or not. When the Railway Board orders, the drawing is issued as "Advance Standard". The word Advance is deleted when no further comments are received and when the design is seized.

3.2 SUPPLY OF STANDARD DRAWING

RDSO drawings available on the RDSO website shall be referred to as and when require. However, a set of RDSO drawings shall be maintained in the office of Sr.DSTE/Dy.CSTE, DSTE/ASTE, and by each SSE/JE as required.

A set of all IRS(S) drawings shall be supplied to the office of each DSTE, ASTE, and each JE/SSE(S) as required.

The Zonal Railway should not trace IRS drawings. Copies in reproduction tracings should be obtained from the Director General, Research, Designs and Standards Organization (Signal and Telecommunication), Ministry of Railways, Lucknow, whenever required.

3.3 OTHER SIGNALLING DRAWINGS & PLANS

Standard drawings are same for a particular signalling gear such as signal unit, point machine, Boom for LC Gate irrespective of station where these are going to be installed. However there are various other drawings which are to be prepared as per the layout and requirement of interlocking at a station. These drawings are station specific and are crucial for planning and execution of signalling works. Details of some such drawings are given in following paragraphs.

3.3.1 ENGINEERING SCALE PLAN (ESP)

Engineering plan shows the geographical details of a yard. It shows various dimensions, gradients, points and crossings, cabin building, relay room, SM's office, passenger lines, goods lines, sidings, foot-over bridges, platforms, quarters near station, railway boundary etc. It is an important drawing issued by the office of the CE of the zonal railway. An approved Engineering Plan is required before issue of Signal Interlocking Plan / Interlocking Plan. No work within a yard can be taken up till such time the Engineering Plan and subsequently the SIP/IP (wherever required) are issued to the effect. An Engineering Plan should contain the following Information as per SEM Annexure: 8-A2: (*See figure: 1*)

TABLE-3

S. No.	Description of the item	Remarks of		
		JE/SE/SSE/ Drg.	ADSTE	SSTE/ DSTE
1	Complete layout of the yard should be shown by the Engg. Dept. even for works for minor nature. Alteration/Modification should not be shown in a part plan.			
2	Plan should be prepared in 1:1000 scale.			
3	North Point should be shown on the top of the sheet.			
4	Kilometerage and Chainage (0.00 m) of the station building should be clearly indicated.			
5	Direction of Train movement i.e. UP & DN should be clearly indicated at the top center as well as at the ends of the yard.			
6	Name of the adjacent Block Stations with their distances at both ends and name of the Junction Stations to be indicated. The Kilometerage shall start incrementing from left hand side to right hand side & mid section siding if any to be shown.			
7	All Gradient at the yard must be shown and should be in sequence. Gradient & its chainages upto 2.5 km from first stop signal both ends should be shown.			
8	a) Gradient of new Stn. Yard within 50 m from outermost point should be 1 in 1200. Permitted up to 1 in 400 with out condonation. b) Allowed up to 1 in 400. CRS‘s Dispensation required for gradient steeper than 1 in 400 upto 1 in 260. Rly.Bd’s Condonation required for gradient steeper than 1 in 260. Despensation or condonation obtained/to be obtained should be indicated clearly in Engg. Scale Plan.			
9	There must be no change of grades within 30 meters of any points & crossing.			
10	If any alteration is proposed for the existing yard, the portion of the yard where alteration is proposed shall be marked with Red colour, and the portion of the yard where alteration is not proposed is tallying with the existing sigg. Plan.			
11	All Lines should be designated for identification and reference. All lines No. to be written starting line No.1 from station Bldg. side.			

12	The clear standing room of all lines e.g., running lines, Sdg. Lines, should be mentioned. CSL should be minimum 720 m for New lines and 686 m for existing lines.			
13	Platforms should be provided on lines on which it is intended to receive passenger trains .Platform level e.g, RL, LL, HL etc. to be indicated.			
14	The classification, kilometerage, chainage from Centre of station building, Manned/ Unmanned and number of each level crossing should be shown. Classifications of L.C. Gates are to be revised according to present TVU. Spl- >50000, A->/=30000 & <50000, B1->/=25000 & <30000, B2>/=20000 & <25000, C-up to 20000.			
15	a) Level crossing gate should be located clearing Block Overlap ahead of the first-stop signal and Signals Overlap ahead of the starter signals as far as practicable. b) LC Gate within berthing track shall be avoided.			
16	a) The angle of turnouts and type of Switches (ST or CS) of each point in the yard should be shown. b) Passenger lines turnouts shall be 1 in 12 or 1 in 16.			
17	The distance between center of tracks in Stn. Yds. Should be shown. Minimum Track Centers as per SOD.			
18	As far as possible, Turn-Outs should be taken off clearing the Fouling of adjacent T.O. Distance between SRJ's of two crossovers shall be normally 13 m minimum and with Glued joints 7m minimum.			
19	Location of cabins/Goomties/Stn Bldgs: (a) They should not be in front of a trap, or dead end. (b) Where two cabins are provided, they should be so located on either side of the track so that Cabin men can ensure complete arrival of trains.			
20	All running lines must be isolated from sidings (i.e. non running lines).			
21	All passenger lines must be isolated from goods running lines.			
22	Traffic yard should be isolated from the private siding, loco Yard or Engg. siding, if any.			
23	Traffic yard should be isolated from the private siding, loco Yard or Engg. siding, if any.			
24	Sidings should take-off from the loop line, and not from the main line.			

25	Chainages of all Points, De-railing switches, Dead Ends, Fouling Marks, LC Gates, Platform ends etc., should be shown.			
26	Reference of the Work is to be mentioned i.e. sanction particulars.			
27	Drawing No. shall be indicated.			
28	The stations in busy section are to be provided with simultaneous reception and dispatch facilities.			
29	Details of open bridges: Span more than 6.1 meters, insulated or not.			
30	Note regarding PSC Sleepers			
31	Points in the vicinity of LCs (SRJ shall be 25 meters away from Center Line of LC).			
32	Distance between Buffer Stop/Derailing Switch to LC Gate shall be 60 meters.			
33	Any Cup-shape (<50 m) movement in the yard to be restricted.			
34	Any other station specific items.			
35	Details of ROB/RUB/FOB with its length, and distance/ Chainage from C/L of Station. (Details of Steel/Concerts a bridges)			
36	CSR's of lines shall be checked from starter to starter or Fouling Mark to Fouling Mark, keeping 24 M from SRJ on either side for locating Starter signals. Clearance from SRJ/Trap to be indicated.			
37	Provision of Slip Siding/Catch Siding as required. a) If the Gradient steeper than 1 in 100 falling towards Block, Slip Siding is to be provided b) If the Gradient steeper than 1 in 80 falling towards Station side, Catch Siding is to be provided.			
38	Details of LC Gates with their class, Kilometerage, Gate Lodge position, Manned/Unmanned, Interlocked/Non interlocked, Lifting Barriers/Swing Gates, etc. up to 2.5 km. on both sides.			
39	A Single Goods line should not be sand witched between two passenger lines or between Main line and passenger line since the passenger lines cannot be safely isolated from the Goods line			
40	Electronic Weigh Bridge if any in Track Circuit portion, to be shown.			

41	Color schemes for drawings as per Indian Railways Works Manual 2000 chapter IX, para No.907 is as follows: a) Existing work that is to remain should be in full line – Black. b) All proposed works - Vermilion Red or Scarlet Lakevariety. c) All future proposals- Emerald Green. d) Work that is to be dismantled should in thin dotted lines − Yellow. e) Phase-I − Red f) Phase-II − Green Dotted g) Sanitary Works − Blue			

Signature of: JE/SSE/D ADSTE DSTE

Name Name Name

1. The above check list after scrutiny of the ESP has to be submitted by division to HQs under covering letter for further action at Headquarters.
2. Same format of the check list shall be followed at HQs for scrutiny of the ESP before obtaining the approval of competent authority till further amendment.

Signature & Designation			
	ASTE/D&D/HQ	SSTE/D&D	Dy.CSTE/D&D
Name			

Note: (1) The above list is not exhaustive, zonal railways may add or modify as per local requirements.

(2) Where electronic form of checking/approvals are in place, they may be adopted.

3.3.2 SIGNAL INTERLOCKING PLAN (SIP)

Signalling Plan/SI Plan/IP is prepared on the basis of Engineering Plan. It contains the information regarding type of Signalling & Interlocking arrangements, method of operation of points, signals etc. Various Inter-signal distances, overlaps and line capacities are also detailed in it. It also gives information regarding the type of block working and telecommunication facilities provided at a station. Sig. Plans should be drawn to scale in metric dimensions The Signalling Plan is approved by CSTE. (*See figure: 2*)

Information to be recorded in Signalling Plan

1. Standard of interlocking and class of station, Mileage of station building.
2. Name of the station in full
3. Names of Adjacent stations, their distances, Type of Block Working and location of block Instruments.
4. Holding capacity of all running lines and sidings. (CSL)
5. Direction of reception and dispatch on running lines and description of sidings,
6. Restriction on dead-end sidings (e.g. no stabling) if any.
7. All gradients within the station limits and up to 2.5 kilometers in rear of first stop signal,
8. Kilometer and class of level crossings within the station limits, whether interlocked or not,
9. Up and Down directions and names of important junctions on either side.
10. Reference to condonation of gradient infringements, CRS dispensation for deviations from GR / SEM, (if any.)
11. Reference to approved Engineering plan on which the Signalling plan is based.
12. In case of an interlocked level crossing gate within the station limits mention the KM No., distance, width, class, type of barrier, method of operation and control on signals, Telephone communication provided, showing the place to which it is connected. Bell / warning and road signals provided are to be indicated. Indicate whether it is operated electrically or mechanically and from where.
13. Actual inter signal distances and lengths of overlaps
14. Note regarding telephone communication provided between A.S.M./ Cabin man and level crossings within and outside station limits.
15. Aspect sequence chart for color light signals.
16. Whether turnout is 1 in 8-1/2 or 1 in 12 or 1 in 16 etc.
17. Details of Detection Table etc., which are not apparent in the plan.
18. Details of Track Circuits / Axle Counters. Relay end and Feed end of track circuits.
19. SM’s slide control for individual signals & routes.
20. Type of signalling, standard of Interlocking and method of operation of various points, detection table of points for various signals to be given.
21. Gradient and level posts.
22. Inter-signal distances and distance between Warning Boards and Signals.
23. Details of open bridges.
24. Location of water column, ash pit/tray.
25. Signal overlap in big yards.
26. Custody of spare keys.

27. Details of dispensation, obtained from CRS with letter number & date Item No of Booof sanction (for Execution of Works)
28. Brief history of previous versions & Date of their commissioning.
29. Present Version Number.

For the execution of S&T projects in Indian Railways, Signal Interlocking Plan (SIP) is the most important document. SIPs are prepared based on the Engineering Scale Plan (ESP). There are some important points to be kept in mind while approving or preparing the SIP. So, Here is the summarised checklist for the Signalling plan approval.

TABLE-4

1	Title Block	a) Format, font, and information in Title Block are as per standard. b) Name of the station: Shown Correctly in English & Hindi. c) Name of the work with a brief description is mentioned. d) Plan No. is correct as per the register maintained by Open Line. e) Supersedes Signalling Plan, ESP Plan numbers are correct. f) Other information in title block columns is correct as per Working Time Table (WTT).
2	General Layout	a) Station Building symbol (PI/RRI/EI) is shown with centre line & KM. b) Yard layout is correct, some lines, points, sidings, traps, etc.. as per ESP c) Work to be dismantled is shown dotted as per ESP & referred SIP. d) Description of UP, DN, main, and loop lines/sidings is correct and shown wherever needed. e) Name of the adjacent junction, block, and 'D' class stations with distance line is given the distance between lines. f) Signals are placed wherever required as per yard layout and the symbolic aspect is correct. g) Gradient of station yard is more than 1:400 h) All chainages are matching for Paints, Dead Ends, LC gate, FM, P/Fend, sidings, traps, bridges, etc with that of ESP.
3	Gradient posts	a) Chainages and grades of all Gradient Posts are correct, no Gradient Posts are missing. b) Consecutive gradients are matching.
4	Points	a) Numbering is correct. b) Chainages & descriptions (1:12 or 1:8.5) are shown correctly. c) Crack handle groups are grouped & numbered properly.

5	Tracks	a) Numbering is correct b) Maximum length DC track circuit 350 m for practical purposes. c) One Point, One Track circuit d) Calling ON track – 5RL, Adv. Starter track -3RL e) When another Point originates from a line before FM if the previous point is placed, the track may be fouling – marked as (F) f) Berthing generally has an odd no. of track circuits. g) Point and LC gate tracks should be as small as possible.
6	Signals	a) Aspect, Chainages, and numbering is correct. b) Signalled movements/routes are shown on the lines. c) Aspect control chart is correct & matches that of the signal aspect. d) If the gradient is less than 1:300 in the approach of the Home signal, GWB at 600m from Distant. e) If the gradient is less than 1:260 in the approach of Home, then the Home signal is to be provided at 300m from FP/BSLB if cris-cross movement is to be done. f) BSLB is placed for trailing point/ station with no loop (DL station). g) Starters placing Glued joint 3m beyond FM, starter 0-3m from the glued joint. h) SH7/SH44: 13m from SRJ of point i) Advance Starter: 120m from SH7/SH44. j) Signal line: Home at 300m from Adv.Starter. k) Double Line: Home at 180m from FP/BSLB. l) In case of LC (OSL) gate in the vicinity, follow CSTE DRG No.6197. m) Distant Signal at 1000m beyond Home Signal. n) Goods Warning Board at 400m/600m beyond distant signal as the case may be. o) SH7/SH44 are to be provided, other shunts as per requirement e.g. for a siding shunt for going in & going out are needed. p) Stop Boards where signals are not given.
7	Block Instrument	a) Which type of block instrument – symbol & description. Axle Counter resetting & cooperation arrangement. b) HADAC symbol for block sections c) For MSDAC DPs in the yard should be shown. d) Track naming – AXT.

8	LC gates	a) Name, Class, Manned/Unmanned, Inter Locked/Non-Inter Locked ATVU, Chainage, and Centre Line to be shown with the gate. b) If Manned – gate lodge is shown & gate equipment is shown near it. c) Sliding boom: at WSL LC gate- Sliding boom to be provided. At OSL LC Gates- Sliding Boom to be provided if interlocked. d) Interlocking of LC Gates required for all WSL LC Gates, and OSL LC gates should only be interlocked if is in the vicinity of the station & ATVU>20000 e) Lifting barriers – Mechanical or Electrical. f) Direction of barrier locking is right as per traffic direction. g) If the road width is >8m, two lifting barriers are provided. h) If the new barrier is provided, the earlier one is cut, and the new one is made in red. i) WSL: gate control slot, gate console, and emergency triple lock are shown. Corresponding control at station provision to throw danger in case of emergency for all signals directing towards LC gate. j) OSL: gate console & gate panel both. k) Gate telephones- Individual for each LC, corresponding telephone at the station. l) For OSL gates in the vicinity, distance from the first point is given, accordingly signals as per CSTE DRG No.6199 m) Road signals & descriptions shown. The normal aspect should be checked as per WTT.
9	Other Items to be checked	a) Control Panel – Spare for Signal, CH, point, and slot are shown. b) Bridges- Name& description are correct. c) Crank Handle box is shown. d) Previous Plan History e) Note for containing signals, SLB, starter within 3m of GJ, dispensation. f) Once this SIP Check List is followed thoroughly during the approval of SIP, the chances of mistakes in SIP would be very less. So, this checklist for approval of the Signalling Plan must be followed thoroughly.

3.3.3 STATION WORKING RULE DIAGRAM (SWRD)

Station Working Rule diagram (SWRD) of a station is based on the Station Working Rules (SWR) issued for that particular station. SWRD is a miniature Signal Interlocking Plan which contains location of station, yard layout, description of signalling & interlocking, gradients within and at approach of station limits, catch / slip / other siding, adjacent station names, block section limits, level crossing gates if any etc. The objective of the SWR is to regulate safe working of trains at and in between stations.

Local conditions, special features viz. yard layout, signalling & interlocking, gradients within and at approach of station limits, catch / slip / other siding are detailed in it. It aims to draw the attention of staff to rules governing granting of Line Clear, taking "off" signals, reception & dispatch of trains, berthing of trains, working of gates, shunting, stabling of vehicles etc. It is meant to draw the attention of staff to rules regarding working during failure of points, failure of signals, failure of interlocking, failure of block instruments, partial / total interruption of communication and in an emergency etc.

The Station Working Rules (SWR) shall be prepared by the concerned Construction/ Project Officer or Rly PSUs Officer and signed by the Divisional S&T and Operating Officers.

3.3.4 LOCKING TABLE/SELECTION TABLE/CONTROL TABLE/ROUTE CONTROL CHART

Locking table is a set of interdependencies/relationships/requirements with applicable conditions, among various signaling functions/equipment at a station/yard, presented in a logical way in a tabular format with all possible combinations of routes for all the signals to achieve safety and to provide for operational requirements. It is also called Selection Table/Route Control Chart. Locking table is used in Mechanical Interlocking, while Selection Table/Control Table/Route Control Chart is used in Electro-mechanical/Relay and Electronic Interlocking. It is the basis on which detailed design of circuits is undertaken for implementing Interlocking requirements

The control table should be read in conjunction with the scheme plan or signaling plan. Different Railways have different formats for the Control Table. (*See figure: 3*)

A typical Interlocking Control Table (ICT) (Table of Control) shall generally have the following columns:

1. Serial no
2. Signal no
3. To Destination
4. Select Route
    a) Signal Button/Knob
    b) Route Button/ Knob

5. In Route

a) Points Normal
b) Points Reverse
c) Track Circuits

6. Overlap

a) Points Normal

b) Points Reverse

c) Track Circuits

7. Isolation

a) Points Normal
b) Points Reverse

8. Crank Handle Normal

9. Fouling Track Circuits

10. Approach Lock by Track Circuits

11. Back Locked By Track Circuit

12. Signal Replaced by Track Circuit

13. Overlap Release after 120 sec

a) By Occupation of Track Circuit
b) By Clearance of Track Circuit

14. Slotted By Gate

15. Released By Other Controls & Siding Point Detection

16. Lock Routes

17. Signal Aspect Controlled By

a) Yellow With Route, Yellow, Double Yellow, Green

18. Remarks - Typical

a) Controlled by Up/ Dn Line Block Line Clear
b) Controlled by Up/Dn BPAC clear
c) Time Release 120”
d) DG Controlled by DG/HHG with Points xxx Normal, xxx Normal
e) HG Clears after 30”
f) Siding Point Key A In
g) Complied GR 5.16

3.3.5 CONTROL CUM INDICATION PANEL (CCIP) DIAGRAM/VDU DIAGRAM

A panel Diagram is required for developing and manufacturing an operating panel or VDU kept in the Station master room for operating the signals. VDU diagram shall be submitted to the actual size or in proportionately reduced size of the VDU for approval. Track Layout as per approved signaling interlocking plan with symbol for direction of traffic for each line of the layout; nomenclature of each line/siding; boards for BSLB/GWB/STOP; SM's key In/Out indications; SI cancellation Key-In indication; provision of all un-blocking; List of all emergency counters; relevant signaling details such as track section numbers with route set-clear/set-occupied or occupied lit indications in different colour; main/calling-on/shunt signal numbers with timer, locked indication & each aspects indications; points numbers with 'Normal' & 'Reverse' indication slits, locking indications, sub route cancellation symbol in blue colour with white dot; each signal route initiation & signal overlap set/release timer indications; block instruments status LCPR/SR/Block release indications; Crank handle Key-In/Key-Out indications for each crossover; status of active/ standby VDU; Link status, health status, OC/CIU status, CRC/Checksum; Date/Time, colour scroll for flashing indication etc. (*See figure: 5*)

3.3.6 TRACK BONDING DIAGRAM

Track Bonding Diagram consists of complete layout of yard and diagrams of individual track circuit showing location of insulation joints, jumpers, relay and feed ends, polarity, length, traction, bonds, etc. (*See figure: 7*)

3.3.7 CABLE ROUTE PLAN

Cable Route Plan shall show disposition of underground cables at OHE mast/regular intervals with respect to nearest track centre, for each yard. The cable route plan should be got approved from the division before undertaking the work of trenching & cable laying.

The route shall be shown clearly on a cable route plan showing the actual alignment of track, giving offsets from permanent way or permanent structures. The diagram should indicate the various road and track crossings, crossing with power cables, water and sewage mains and other points of importance. It is preferable to chart the route on a route plan on

which the existing routes of power cables, etc. are shown. Changes if any should be incorporated in the chart/plan.[SEM Para15.1.2.(e)].

The cable route plan should indicate the route with respect to the main line centre of track, that is, whether the route along the DN main line or UP main line in case of double line sections and whether it is on both side or right side of the main line when facing a particular direction in case of single line section. In addition to above, the cable route plan should also indicate the route with respect to other available permanent structures for easy identification of route.

Cable route plan shall also be approved by Engineering and Electrical departments. Approval of S&T open line is also required where ever it is prepared by other than open line. In case of

Construction works cable route plan shall be signed by Engineering and Electrical departments of executing agencies as well. [SEM Para 15.1.2(f)].

3.3.8 CABLE CORE PLAN

The Cable Core plan shows distribution of various outdoor signalling cables including power cables

Cable Core plans are necessary for:

a) Commissioning and testing
b) Producing other design details (circuit diagram termination sheets, power supply wiring, etc)
c) Updating for record purposes
d) Routine and incidents testing
e) Facilitating preventive and corrective maintenance
f) Correlation of site wiring and records
g) Alterations to show proposed signaling works

The cable core plan should contain the following information:

a) Cable size
b) Number of conductors
c) Specification and type of cable
d) Unique cable name
e) Locations in which the cables are terminated
f) Cable core numbers and allocations. (*See figure: 4*)

3.3.9 LOCATION BOX/JUNCTION BOX DIAGRAM

Diagrams of Location/Junction boxes show the details of termination of cable conductors, wires and fuses on termination board including Wago /ARA terminals.

3.3.10 RELAY ROOM FLOOR PLAN

The Relay room floor plan shows the arrangement of relay racks in relay room along with CT Rack and other equipment like EI equipment, data logger, Power Board, Maintenance PC if any. This plan also shows the location of doors and windows. (*See figure: 9*)

3.3.11 RELAY RACK LAYOUT

Relay Rack layout shows brief description and position of relays, wago and fuse terminals in relay rack. Each relay rack is assigned a number. The relays are arranged in rows in each rack and each relay bears serial number and nomenclature as per standard practice for easy identification. The same relay numbers along with rack number are mentioned in the circuit diagrams for contacts/coils used in the circuits. (*See figure: 8*)

3.3.12 RELAY CONTACT ANALYSIS

A contact analysis chart shows the contacts used circuit-wise with reference and spare contacts available, wire count for each contact and relay position in the rack. This avoids duplication of contacts in circuits during designing stage and help in identification of spare contacts for assigning them during circuit alterations. (*See figure: 10*)

3.3.13 POWER SUPPLY SCHEME

The Power Supply Scheme shows connections of the various power supply modules to the signalling installation. This scheme diagram has all the details about incoming sources (AT/Main/Generator), change over switches, and distribution of power supply to different signalling equipment. (*See figure: 11*)

3.3.14 CIRCUIT DIAGRAMS

These are the interconnection wiring diagrams of Interlocking equipment such as Signals, Points, Crank handles, LC Gate, Siding point, Block Instrument, Axle Counters, etc. (*See figure: 12*)

These circuits diagrams are prepared on the bases of

a) Approved Signalling Plan.
b) Approved Panel Diagram.
c) Approved Control Table
d) Details of any additional Interlocking equipment to be interlocked with the EI/RRI system.

4 LIST OF DRAWINGS TO BE KEPT AT STATION (REF. SEM ANNEXURE 3-A5)

1. Signal Interlocking plan of station (SIP)
2. Table of Controls (TOC)/Selection Table/Route Control Charts
3. Approved Relay/E.I Room Wiring Circuits (with Contact Analysis updated)
4. Approved EI Logic circuits
5. Approved E I Interface circuits
6. Relay Racks layout & Relay Disposition Plan
7. Cable Termination details in Relay Room
8. Power Supply Distribution/Wiring Diagram
9. Power Equipment Layout
10. Track Circuit bonding diagram
11. Traction Bonding Diagram
12. Cable Route plan
13. Cable core/distribution plan
14. Location Termination particulars
15. Signal Sighting committee Reports
16. Station Working Rules (SWR) & SWOD
17. Safety Certificate
18. EI Checksum certificate
19. Any other as per requirements

5 LIST OF COMPLETION DOCUMENTS DURING HANDING OVER TO DIVISION

While handing over the maintenance of the works executed by the construction organisation or Rly PSUs, the following completion documents and maintenance accessories shall be handed over to the division. All the drawings should be in standard size as laid down in Para 8.1.3 of Signal Engineering Manual.

i. Approved SIP of the station
ii. Completion wiring diagrams
iii. Control Table/Selection Table/Locking Table/Route control chart and Dog-Chart
iv. Panel diagram/VDU diagrams (in case of panel or EI installations)
v. Sighting Committee certificate on proper Performa as per SEM.
vi. Approved as well as updated 'As Laid' Cable route plan.
vii. Cable termination plan/diagrams in relay room and location boxes, power supply room.
viii. Wire counts details in case of RRI.
ix. Power supply arrangement plan.
x. Cable insulation test record.
xi. Signal infringements at the station.
xii. Track circuit bonding plan.
xiii. Battery history card, track circuit test card and earth resistance measurement record.
xiv. The tools and plants and spares.
xv. 3 sets of DVDs containing all completion drawings.
xvi. Floor Plans of Relay room, IPS room, Battery room, ASM room OFC/Telecom cable room, Maintainer room.
xvii. Earthing Plan of Relay room, IPS room & Control Panel/VDU ASM's room
xviii. Earthing value joint measurements records. One laminated copy of the documents mentioned at i, ii, iii, vi, vii, ix, x, xi, xii, xiii, xvi, xvii above shall be kept at the station for reference of the maintenance staff. The safety certificate shall be also be handed over to the Division at the time of handing over of the maintenance of the station. In addition, technical documents of the new equipment, if installed, shall also be handed over.

6 SPECIFICATIONS & BOOKS OF REFERENCE

6.1 INDIAN RAILWAY STANDARD SPECIFICATIONS (REF. SEM 8.3.1)

a) Indian Railway Standard Specifications - Specifications for materials used for signalling purpose are issued by the Signal Directorate, Research Designs& Standards Organisation, Ministry of Railways, Lucknow and are titled as "Indian Railways Standards Specifications". These specifications are issued under a fixed serial number e. g. S-12-54, the letter "S" denoting "Signals" the number "12" representing the serial number of the specifications and the final number "54" indicating the year of original adoption as standard, or in the case of revision, the year of last revision. IRS/RDSO specifications are available on RDSO website.

b) Other Specifications: Specifications issued by national/international standards bodies like Bureau of Indian Standards, British Standards Institution, CENELEC (European Committee for Electro technical Standardization), IEC (International Electro technical Commission), ASTM (American Society for Testing and Materials) International, DIN (German Institute for Standardisation) may also be referred for signalling purposes, where required.

c) Each Sr. Divisional Signal and Telecommunication Engineer and Assistant Signal and Telecommunication Engineer should have a copy of all Indian Railways Standard specifications for signalling items in his office. Copies of other specifications issued by national/international standards bodies that are generally required for signalling purpose may also be kept. He should also have a copy of all specifications issued by Principal Chief Signal and Telecommunication Engineer for local use.

d) Availability of Specifications: Indian Railway Standard Specifications, Indian Standard Specifications, British Standard Specifications are available online, at respective websites.

6.2 BOOKS OF REFERENCE (REF. SEM PARA 8.4.1 & 8.4.2)

Books of reference should be supplied to Officers, JE/SSEs and Technicians for their personal use, as well as for use in their offices. A statement showing the various books and their distribution is at Annexure: 8-A1. Where soft copies are available such distribution may be dispensed with completely or partially.

Each Sr. Divisional Signal and Telecommunication Engineer should arrange to have under mentioned technical literature in the Divisional Library

a) RDSO Specifications with latest amendments
b) Other relevant specifications with latest amendments, as required for signalling purpose
c) Reports of the Signal Standards Committee
d) Current Vendor Directory with latest monthly amendment
e) Approved recommendations of Signal Standards Committees
f) Approved recommendations of Maintenance Study Groups
g) Railway Board's instructions issued time to time
h) Updated Codes and Manuals with latest correction slips
i) RDSO's guidelines/Technical Advisory Notes (TAN)/Pre-Commissioning Check lists/Amendments issued time to time

j) Specifications/Drawings/Instructions/Guidelines issued from Zonal Railway Headquarter with latest amendments
k) Technical papers and Journals relevant for signalling, etc.

7 MAINTENANCE OF DRAWINGS, SPECIFICATIONS AND BOOK OF REFERENCE (REF. SEM PARA 8.5.1 & 8.5.2)

7.1 FOLDERS FOR DRAWINGS

a) Typical drawings, plans of working installations and specifications should be maintained in a book form separately bound in suitable folders.
b) Where Soft Copies are maintained, they shall be securely stored Division Wise, Section wise, Sub section wise, Station wise, with Version number. A secured Computer server with UPS back up & Data back up shall be utilized for such storage.
c) Standard Drawings and Plans of working Installations - Railway should publish lists of standard drawing as also lists of plans of working installations for the information of the staff. Addenda and Corrigenda slips should be issued to these lists regularly once in six months incorporating particulars of drawings and plans issued, modified or cancelled.
d) Accountal of Books of Reference and their Addenda & Corrigenda shall be maintained in the same way as tools and plant items.

7.2 RESPONSIBILITY

a) All officials to whom books of reference have been supplied shall be responsible for:
   i. Their safe custody and good order.
   ii. Pasting of all addenda and corrigenda slips promptly and seeing that these are up-to-date to the last slip as modified from time-to-time.
   iii. Returning of all books issued to them for personal use prior to retirement.
b) Each JE/SSE (Signal) shall be responsible to see that
   i. The standard drawings and plans of working installations are properly maintained and kept up-to-date in respect of new drawings issued and old ones cancelled; The staff working under him understand and carry out work in accordance with standard drawings and plans of working installations. Any mistake in drawings and plans that may come to his notice should be promptly intimated to the Divisional Signal and Telecommunication Engineer for arranging correction; and
   ii. The staff under them maintain their books of reference up-to-date and in good order.
   iii. Each Senior Divisional Signal & Telecom Engineer shall be responsible to see that
c) The standard drawings, plans and specifications in his custody are kept up-to-date and that the obsolete and cancelled ones are destroyed.
   i. All JE/SSEs (Signals) keep their standard drawings and plans up-to-date.
   ii. The staff properly understand and carry out work in accordance with the standard drawings and plans.
   iii. Any mistake in the standard drawings, working plans and specifications, which comes to his notice, is promptly intimated to the Principal (or Coordinating) Chief Signal and Telecommunication Engineer for arranging necessary correction.

iv. Each Sr. Divisional Signal and Telecommunication Engineer shall make periodical check to see that JE/SSEs maintain their books of reference up-to-date and in good order. He should encourage his JE/SSEs and other staff to study reports, proceedings, papers and journals mentioned in Para 8.4.2. So as to enhance their knowledge and to keep themselves informed about the up-to-date developments, methods and technique in Railway Signalling and Telecommunications.

v. Proper Distribution & Accountal of Documents.

8 VARIOUS BOOKS OF REFERENCE AND THEIR DISTRIBUTION AMONG THE STAFF (REF. SEM ANNEXURE: 8-A1)

Sl. No	Publications	Scale						
		Office of			Personal Possession of			
		Sr.Divl. S&T Engineer	Asst. S&T Engineer	SSE (Signal) In charge	Sr.Divl./ S&T Engineer	Asst. S&T Engineer	SSE (Signal) Incharge Sectional SSE/JE	Technician (Signal)
1	2	3	4	5	6	7	8	9
1	Rules for the opening of a Railway for the Public carriage of passengers	1	1		1	1	--	--
2	General and Subsidiary Rules	1	1	1	1	1	1	1
3	Schedule of Dimensions (B.G)	1	1	1	1	1	1	--
4	Signal Engineering Manual	1	1	1	1	1	1	1
5	Telecommunication Manual	1	1	1	1	1	1	--
6	Block Working Manual	1	1	1	1	1	1	1
7	Accident Manual	1	1	1	--	--	--	--
8	A.C. traction Manual	1	1	1	--	--	--	--
9	Permanent Way Manual	1	1	--	--	--	--	--
10	Track Manual	1	1	--	--	--	--	--

11	Indian Railway Code for the Engineering Department	1	1	--	--	--	--	--
12	Indian Railway Establishment Code	1	1	--	--	--	--	--
13	Indian Railway Financial Code	1	1	--	--	--	--	--
14	Indian Railway Code for Stores Department	1	1	--	--	--	--	--
15	Indian Railway code for Accounts Department	1	1	--	--	--	--	--
16	Schedule of Powers of Divisional/district and Assistant Officers in other than Establishment matters (as published)	1	1	--	--	--	--	--
17	Pass Manual	1	1	1	--	--	--	--
18	The Hours of Employment Regulations with modifications as issued	1	1	1	--	--	--	--
19	Payment of Wages Act with Notifications as issued	1	1	1	--	--	--	--
20	Working Time Table and Appendix there to	1	1	1	1	1	1	1
21	Alphabetical list of Railway stations	1	1	1	--	--	--	--
22	Catalogue of stores	1	1	1	--	--	--	--

23	Indian Railways Act	1	1	--	--	--	--	--
24	Indian Workmen's Compensation Act	1	1	--	--	--	--	--
25	Indian Electricity Act	1	1	--	--	--	--	--
26	Indian Petroleum Act	1	1	--	--	--	--	--
27	I.R.S Drawings	1	1	1*	--	--	--	--
28	I.R.S. specifications (as required)	1	1	--	--	--	--	--
29	Railway Standard Drawings	1	1	1*	--	--	--	--

* As Required.

Note: Where soft copies are available, such distribution of physical copies may be dispensed with completely or partially.

9 ANNEXURE: DRAWING EXAMPLE

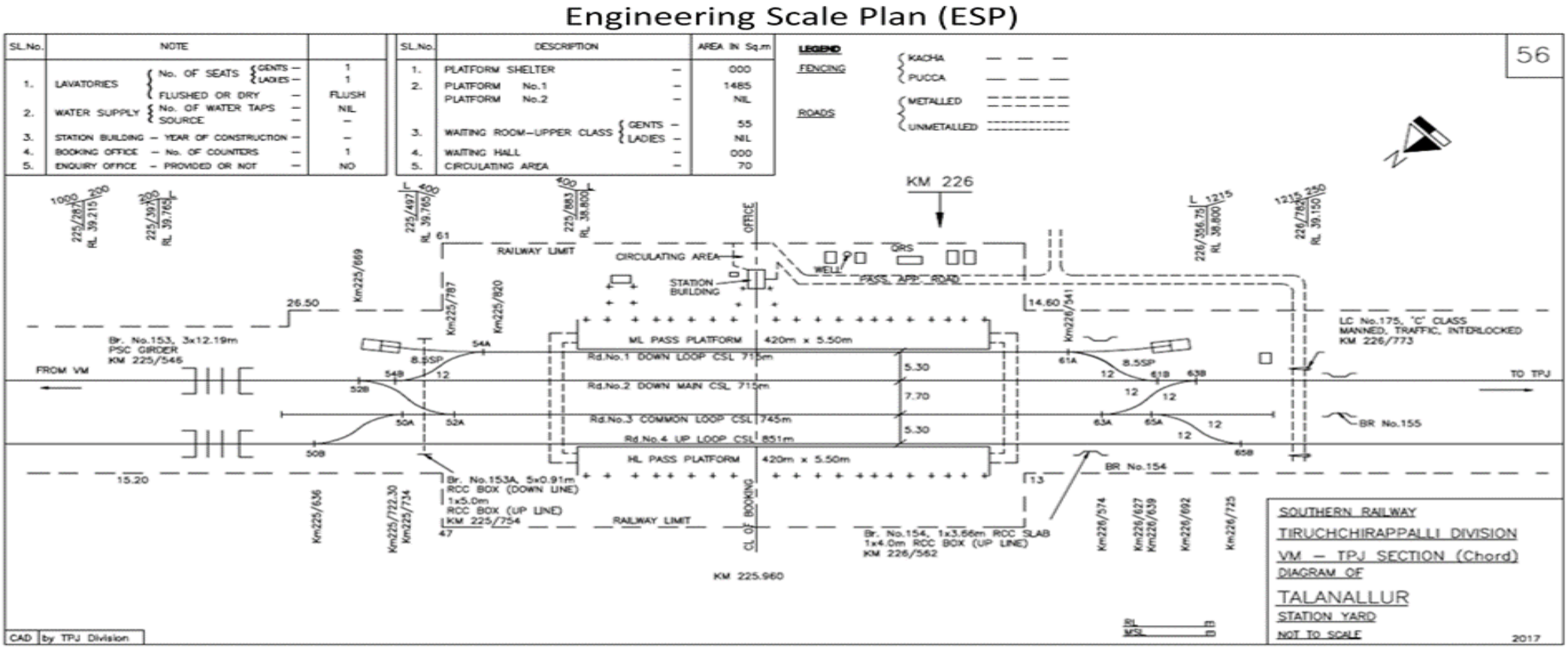


Figure: 1 Engineering Scale Plan

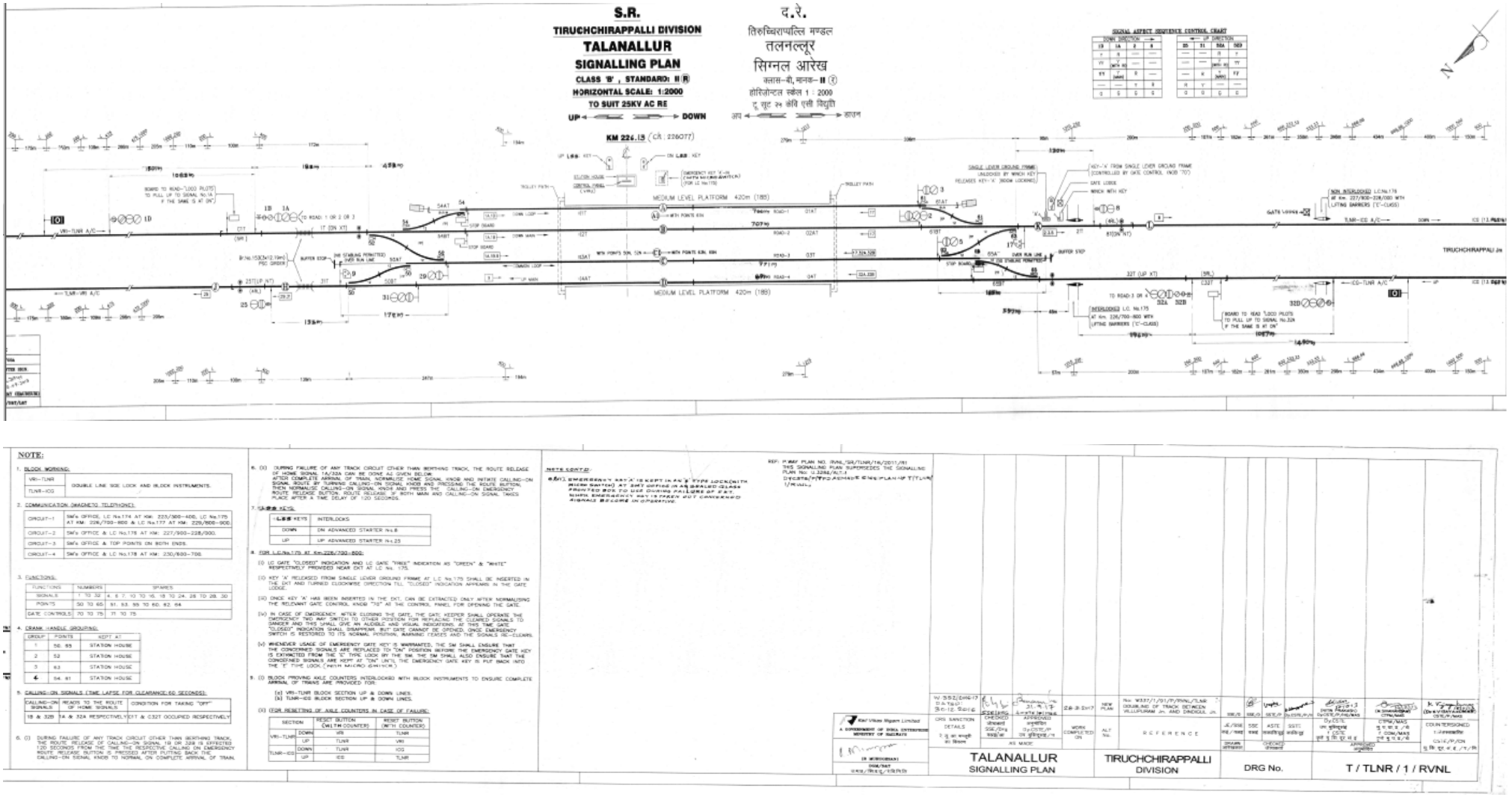
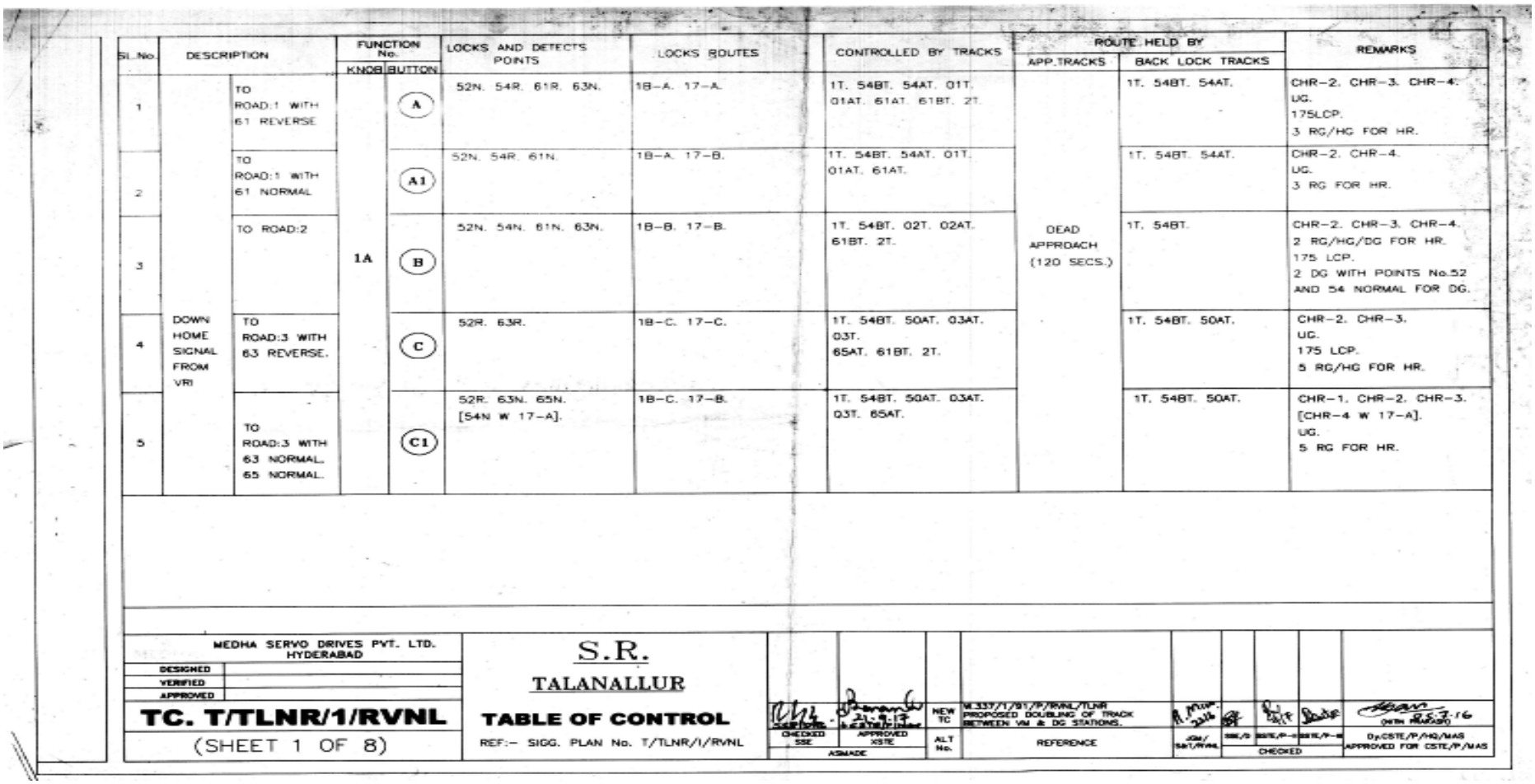


Figure: 2 Signal Interlocking Plan



Sl.No.	DESCRIPTION		FUNCTION No. KNOB	FUNCTION No. BUTTON	LOCKS AND DETECTS POINTS	LOCKS ROUTES	CONTROLLED BY TRACKS	ROUTE HELD BY: APP.TRACKS	ROUTE HELD BY: BACK LOCK TRACKS	REMARKS
1	DOWN HOME SIGNAL FROM VRI	TO ROAD:1 WITH 61 REVERSE	1A	A	52N. 54R. 61R. 63N.	1B–A. 17–A.	1T. 54BT. 54AT. 01T. 01AT. 61AT. 61BT. 2T.	DEAD APPROACH (120 SECS.)	1T. 54BT. 54AT.	CHR–2. CHR–3. CHR–4. UG. 175LCP. 3 RG/HG FOR HR.
2		TO ROAD:1 WITH 61 NORMAL		A1	52N. 54R. 61N.	1B–A. 17–B.	1T. 54BT. 54AT. 01T. 01AT. 61AT.		1T. 54BT. 54AT.	CHR–2. CHR–4. UG. 3 RG FOR HR.
3		TO ROAD:2		B	52N. 54N. 61N. 63N.	1B–B. 17–B.	1T. 54BT. 02T. 02AT. 61BT. 2T.		1T. 54BT.	CHR–2. CHR–3. CHR–4. 2 RG/HG/DG FOR HR. 175 LCP. 2 DG WITH POINTS No.52 AND 54 NORMAL FOR DG.
4		TO ROAD:3 WITH 63 REVERSE.		C	52R. 63R.	1B–C. 17–C.	1T. 54BT. 50AT. 03AT. 03T. 65AT. 61BT. 2T.		1T. 54BT. 50AT.	CHR–2. CHR–3. UG. 175 LCP. 5 RG/HG FOR HR.
5		TO ROAD:3 WITH 63 NORMAL. 65 NORMAL.		C1	52R. 63N. 65N. [54N W 17–A].	1B–C. 17–B.	1T. 54BT. 50AT. 03AT. 03T. 65AT.		1T. 54BT. 50AT.	CHR–1. CHR–2. CHR–3. [CHR–4 W 17–A]. UG. 5 RG FOR HR.

MEDHA SERVO DRIVES PVT. LTD. HYDERABAD

DESIGNED | VERIFIED | APPROVED

TC. T/TLNR/1/RVNL

(SHEET 1 OF 8)

S.R.

TALANALLUR

TABLE OF CONTROL

REF:– SIGG. PLAN No. T/TLNR/1/RVNL

CHECKED SSE | APPROVED XSTE | ASMADE | NEW TC | ALT No. | W.337/1/81/P/RVNL/TLNR PROPOSED DOUBLING OF TRACK BETWEEN VM & DG STATIONS. | REFERENCE | CHECKED | Dy.CSTE/P/HQ/MAS APPROVED FOR CSTE/P/MAS

Figure:3 Table of control

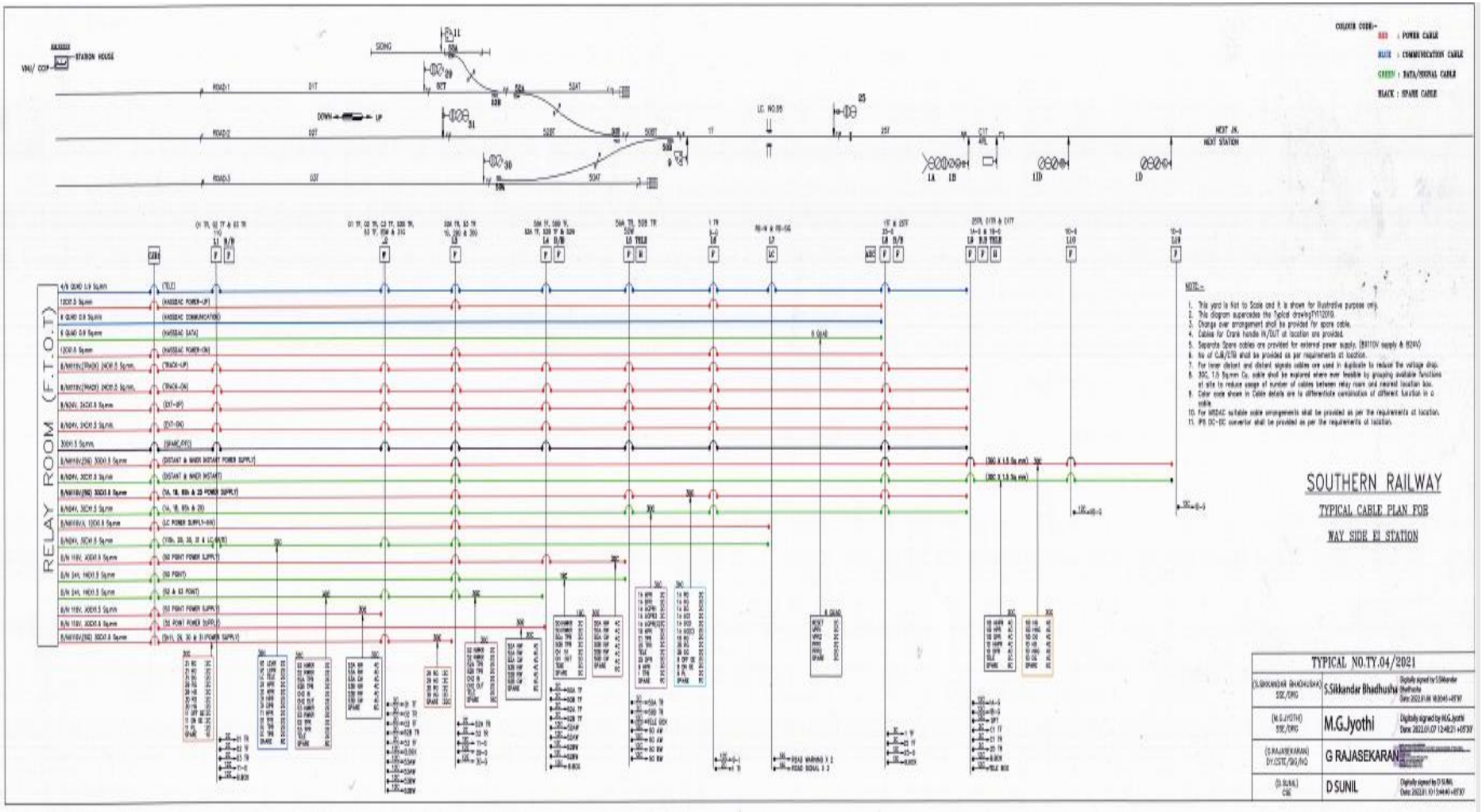


Figure: 4 Cable core plan

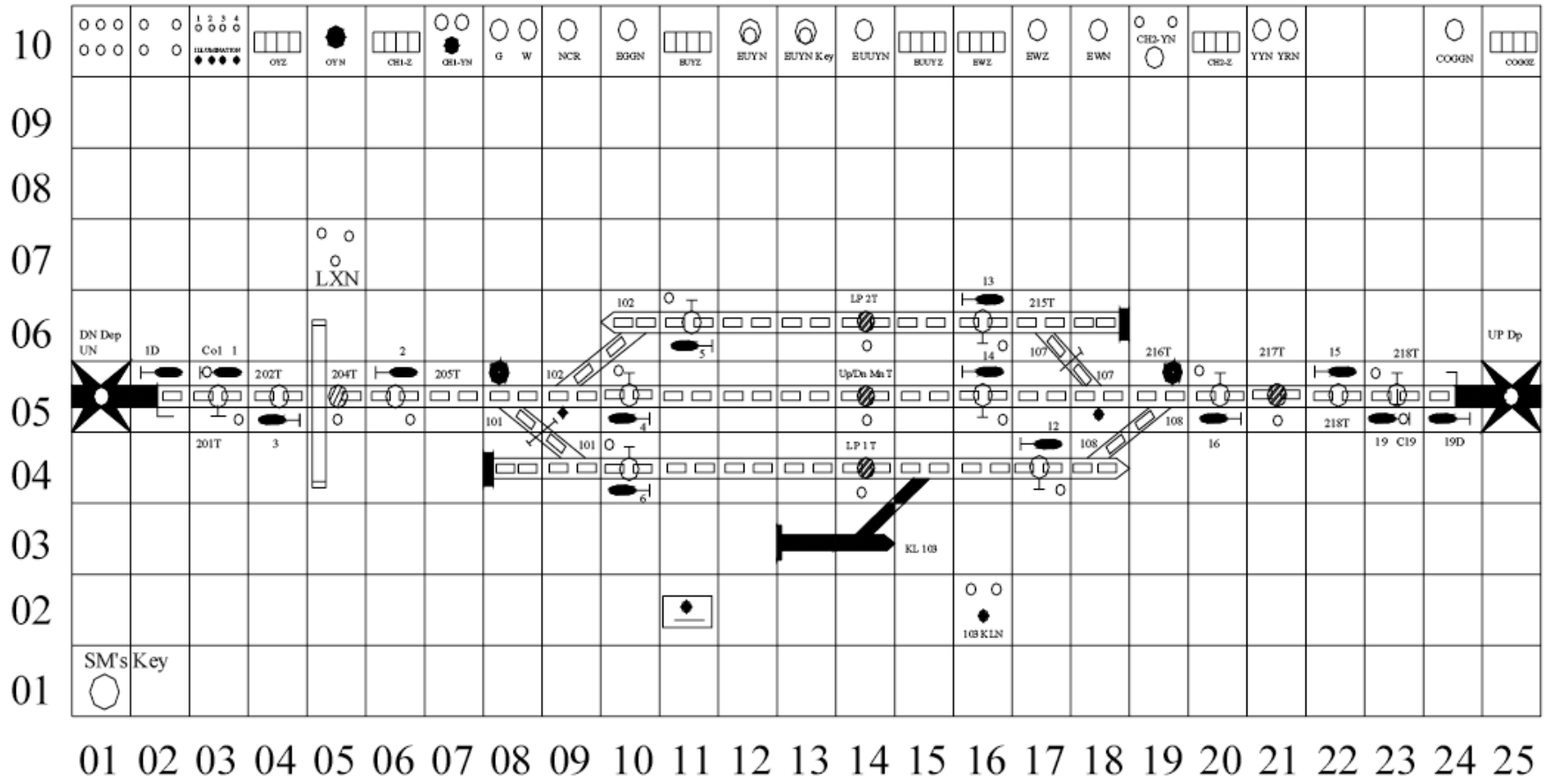


Figure: 5 Panel Diagram (Control cum indication panel)

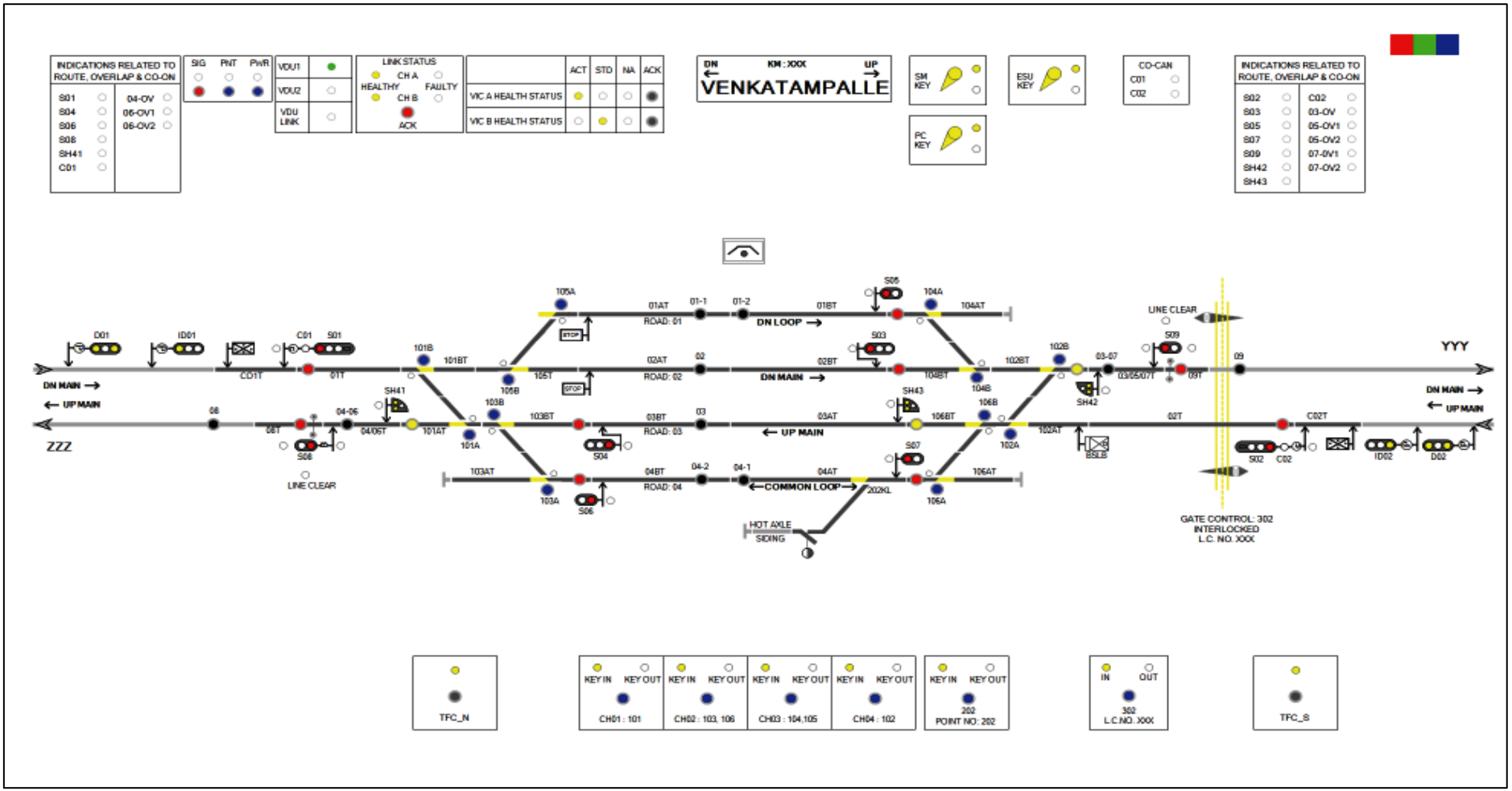


Figure: 6 VDU Layout for EI

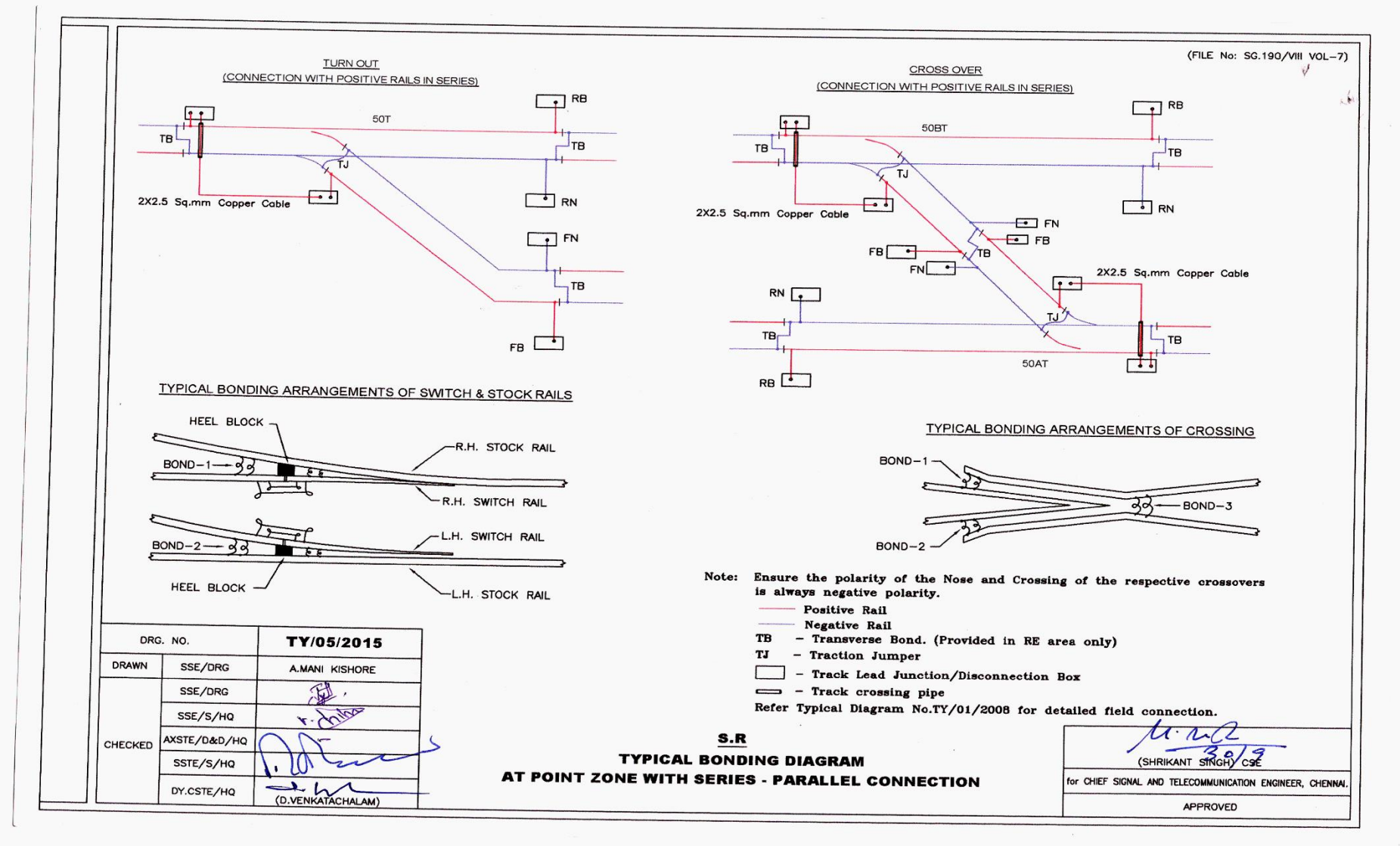


Figure:7 Track bonding diagram

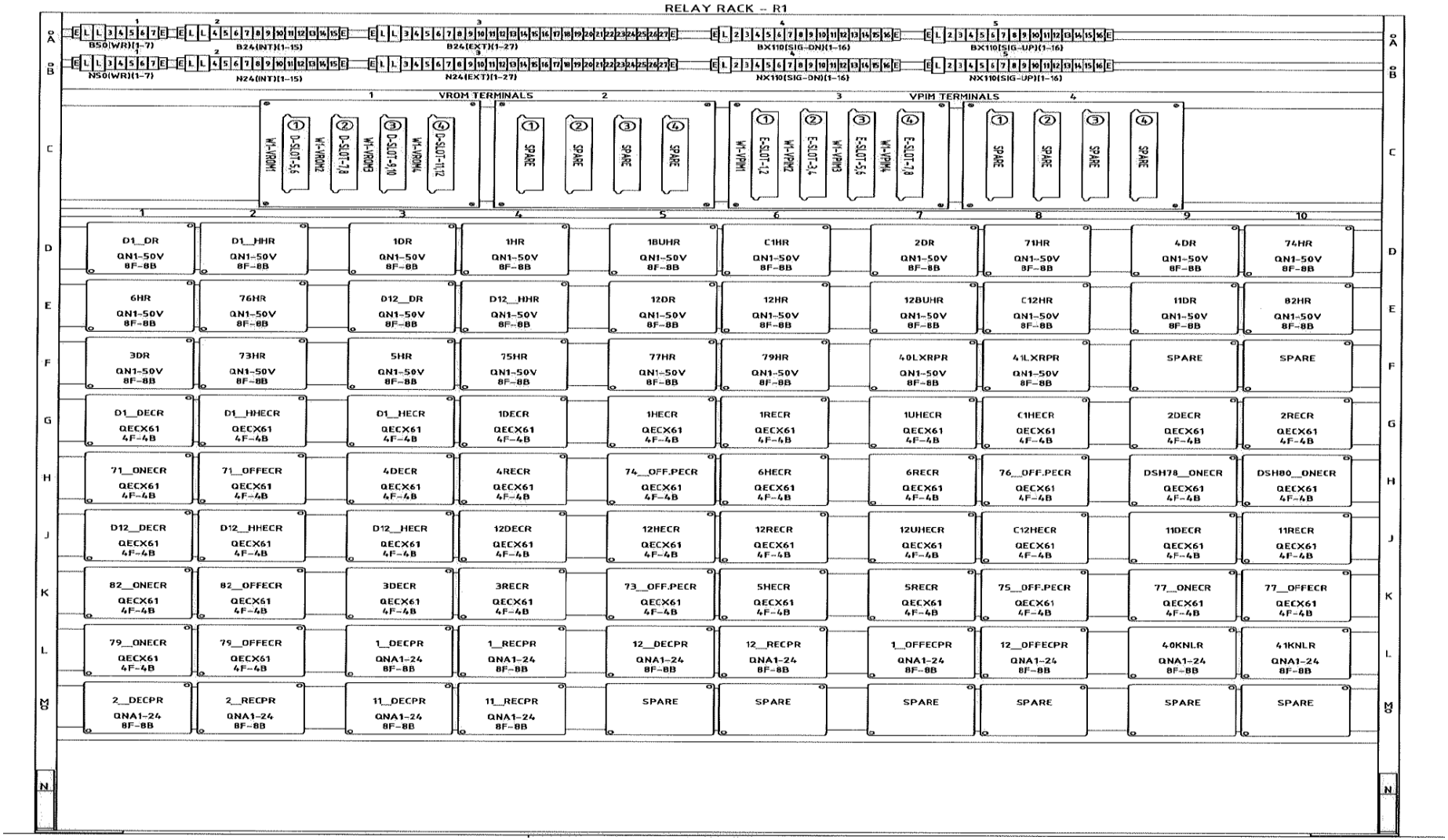


Figure: 8 Relay Rack Layout

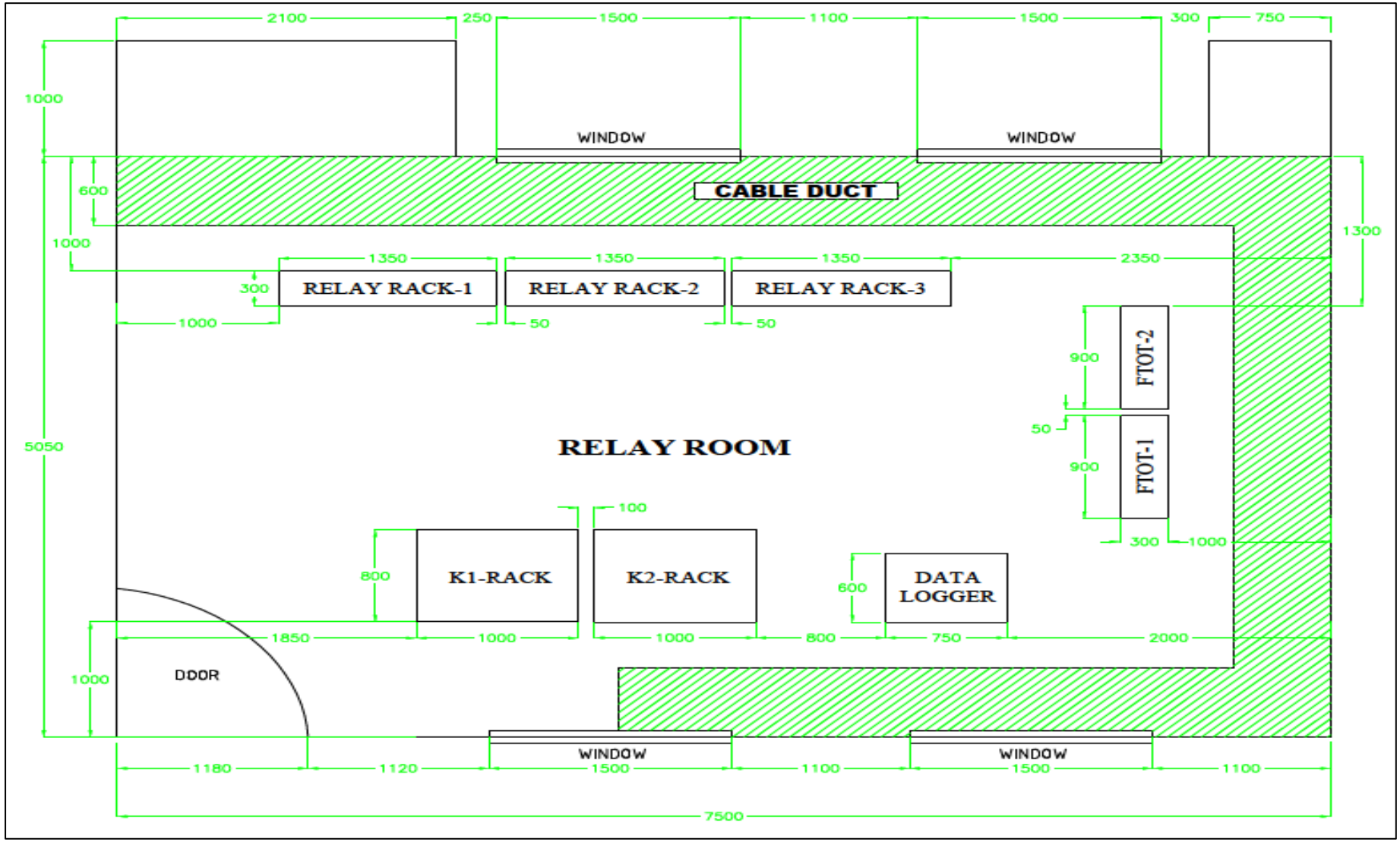
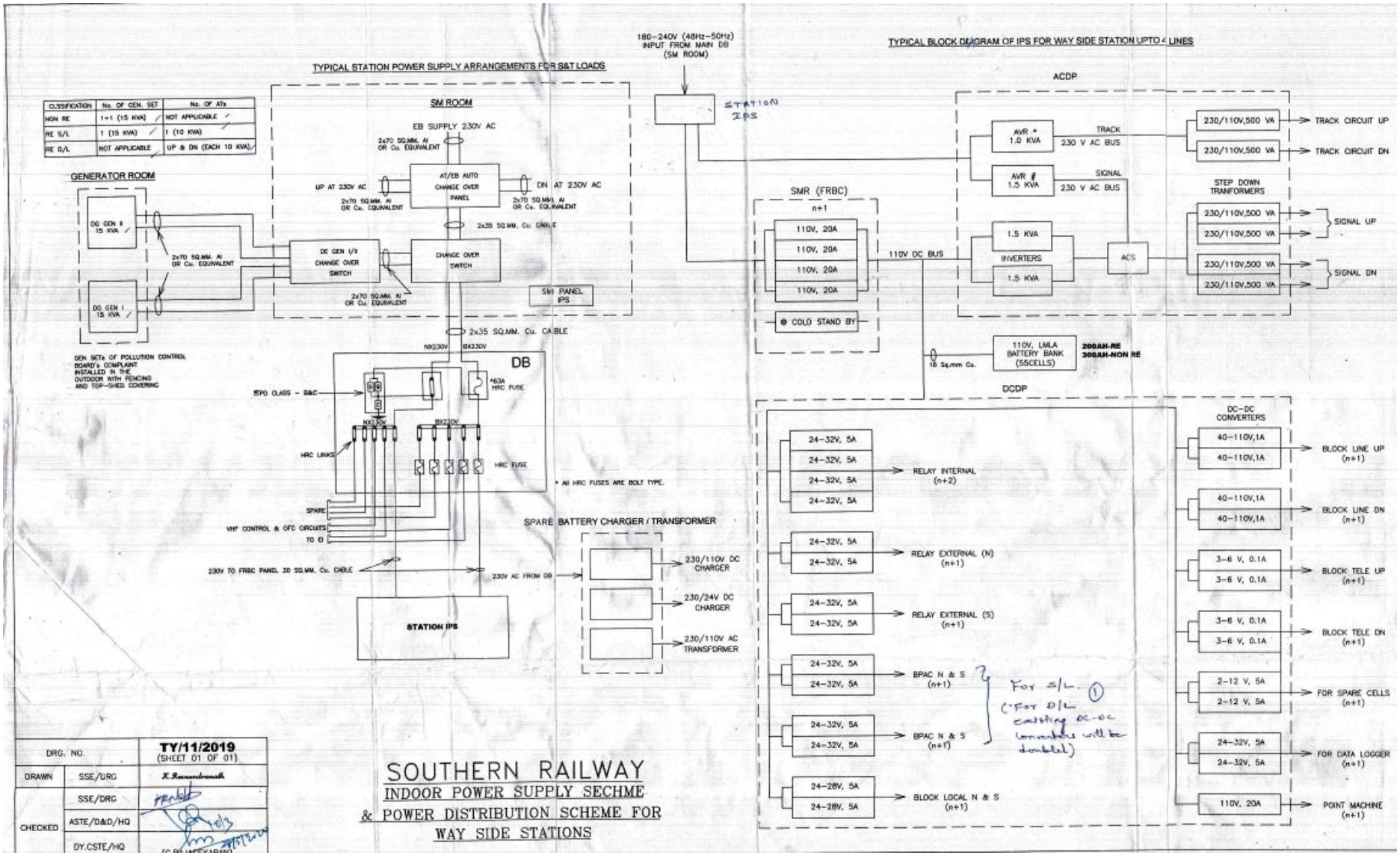


Figure: 9 Relay Room Floor Plan

RELAY				COILS			CONTACTS																																															
TITLE	STYLE		POSITION				A1		A2	A3		A4	A5		A6	A7		A8	B1		B2	B3		B4	B5		B6	B7		B8	C1		C2	C3		C4	C5		C6	C7		C8	D1		D2	D3		D4	D5		D6	D7		D8
	TYPE	CONTACTS CONFIG.		R1		R2	F		A	F		A	A		B	A		B	F		A	F		A	A		B	A		B	F		A	F		A	A		B	A		B	F		A	F		A	A		B	A		B
				W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W	W	SH	W
8.TPR	QNA1	8F-8B	R2J1	1	00402	1	1	00117	2										1	00552	2																																	
25.TPR	QNA1	8F-8B	R2J2	1	00402	1	1	00117	2										1	00552	2																																	
C32.TPR	QNA1	8F-8B	R2J4	1	00403	1	1	00117	2										1	00552	2																																	
32.TPR	QNA1	8F-8B	R2J5	1	00403	1	1	00117	2										1	00552	2																																	
50A.TPR	QNA1	8F-8B	R2J7	1	00403	1	1	00118	2										1	00552	2																																	
50B.TPR	QNA1	8F-8B	R2J8	1	00403	1	1	00118	2										1	00552	2																																	
65A.TPR	QNA1	8F-8B	R2J10	1	00404	1	1	00118	2										1	00552	2																																	
65B.TPR	QNA1	8F-8B	R2J11	1	00404	1	1	00118	2										1	00552	2																																	
47.LCPR	QNA1	8F-8B	R2J14	1	00451	1	1	00118	2										1	00552	2																																	
1.CHR	QNA1	8F-8B	R2J16	2	00425	1	1	00118	2										1	00425	1										1	00552	2																					
2.CHR	QNA1	8F-8B	R2J17	2	00426	1	1	00119	2										1	00426	1										1	00552	2																					

Figure: 10 (Relay Contact Analysis)


TYPICAL STATION POWER SUPPLY ARRANGEMENTS FOR S&T LOADS
180–240V (48Hz–50Hz) INPUT FROM MAIN DB (SM ROOM)
CLASSIFICATION | No. OF GEN. SET | No. OF ATs
NON RE | 1+1 (15 KVA) | NOT APPLICABLE
RE S/L | 1 (15 KVA) | 1 (10 KVA)
RE D/L | NOT APPLICABLE | UP & DN (EACH 10 KVA)
GENERATOR ROOM
DG GEN II 15 KVA
DG GEN I 15 KVA
GEN SETs OF POLLUTION CONTROL BOARD's COMPLIANT INSTALLED IN THE OUTDOOR WITH FENCING AND TOP-SHED COVERING
SM ROOM
EB SUPPLY 230V AC
AT/EB AUTO CHANGE OVER PANEL
UP AT 230V AC
DN AT 230V AC
DG GEN I/II CHANGE OVER SWITCH
CHANGE OVER SWITCH
SM PANEL IPS
DB
STATION IPS
SPARE BATTERY CHARGER / TRANSFORMER
230/110V DC CHARGER
230/24V DC CHARGER
230/110V AC TRANSFORMER
TYPICAL BLOCK DIAGRAM OF IPS FOR WAY SIDE STATION UPTO 4 LINES
ACDP
AVR I 1.0 KVA
AVR II 1.5 KVA
TRACK 230 V AC BUS
SIGNAL 230 V AC BUS
STEP DOWN TRANFORMERS
SMR (FRBC)
n+1
110V, 20A
COLD STAND BY
110V DC BUS
INVERTERS
ACS
110V, LMLA BATTERY BANK (55CELLS)
200AH-RE
300AH-NON RE
DCDP
DC–DC CONVERTERS
RELAY INTERNAL (n+2)
RELAY EXTERNAL (N) (n+1)
RELAY EXTERNAL (S) (n+1)
BPAC N & S (n+1)
BLOCK LOCAL N & S (n+1)
TRACK CIRCUIT UP
TRACK CIRCUIT DN
SIGNAL UP
SIGNAL DN
BLOCK LINE UP (n+1)
BLOCK LINE DN (n+1)
BLOCK TELE UP (n+1)
BLOCK TELE DN (n+1)
FOR SPARE CELLS (n+1)
FOR DATA LOGGER (n+1)
POINT MACHINE (n+1)
DRG. NO. TY/11/2019 (SHEET 01 OF 01)
DRAWN SSE/DRG
CHECKED SSE/DRG
ASTE/D&D/HQ
DY.CSTE/HQ
SOUTHERN RAILWAY
INDOOR POWER SUPPLY SECHME & POWER DISTRIBUTION SCHEME FOR WAY SIDE STATIONS

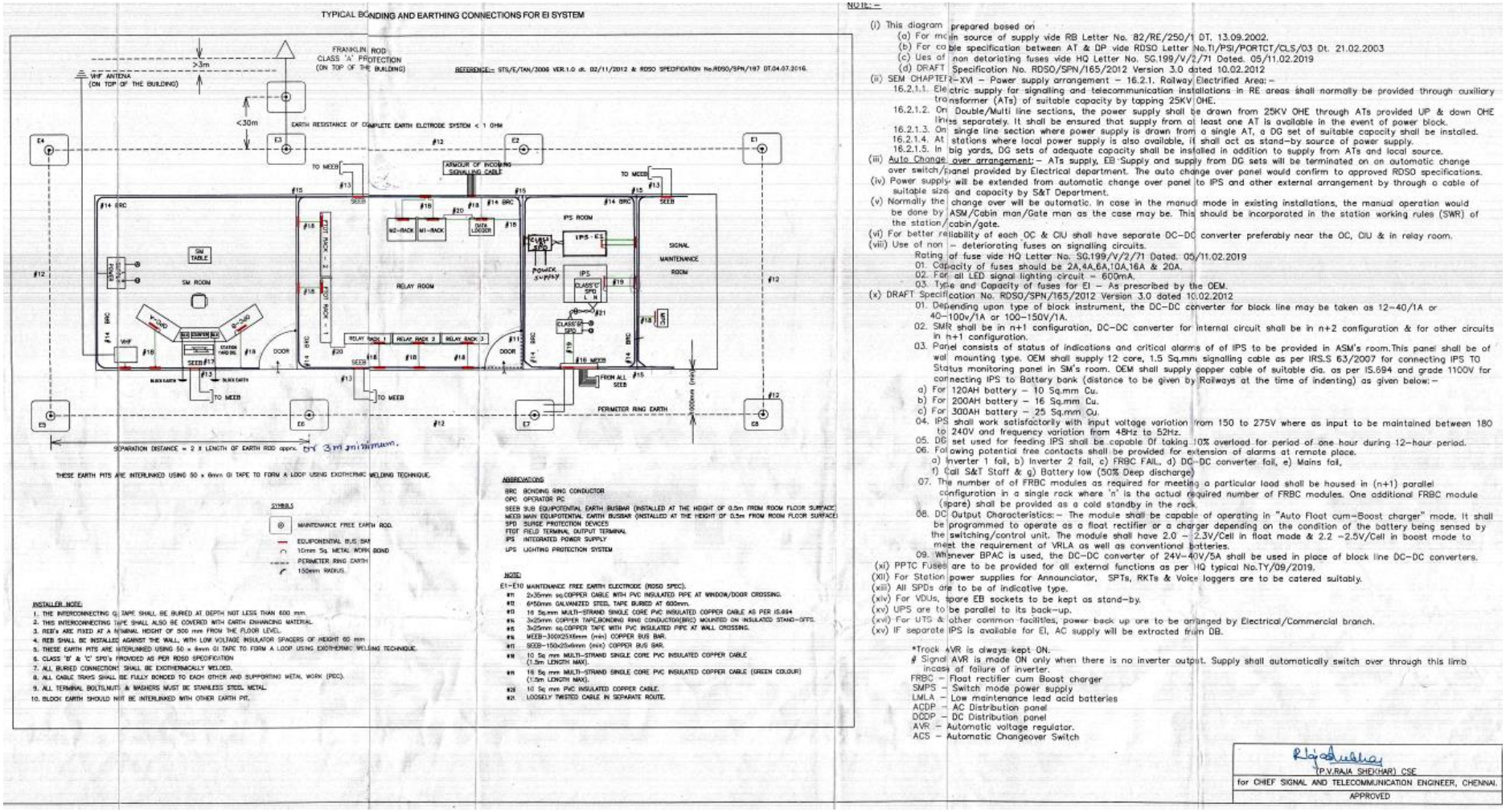


Figure: 11 (Power supply scheme diagram)

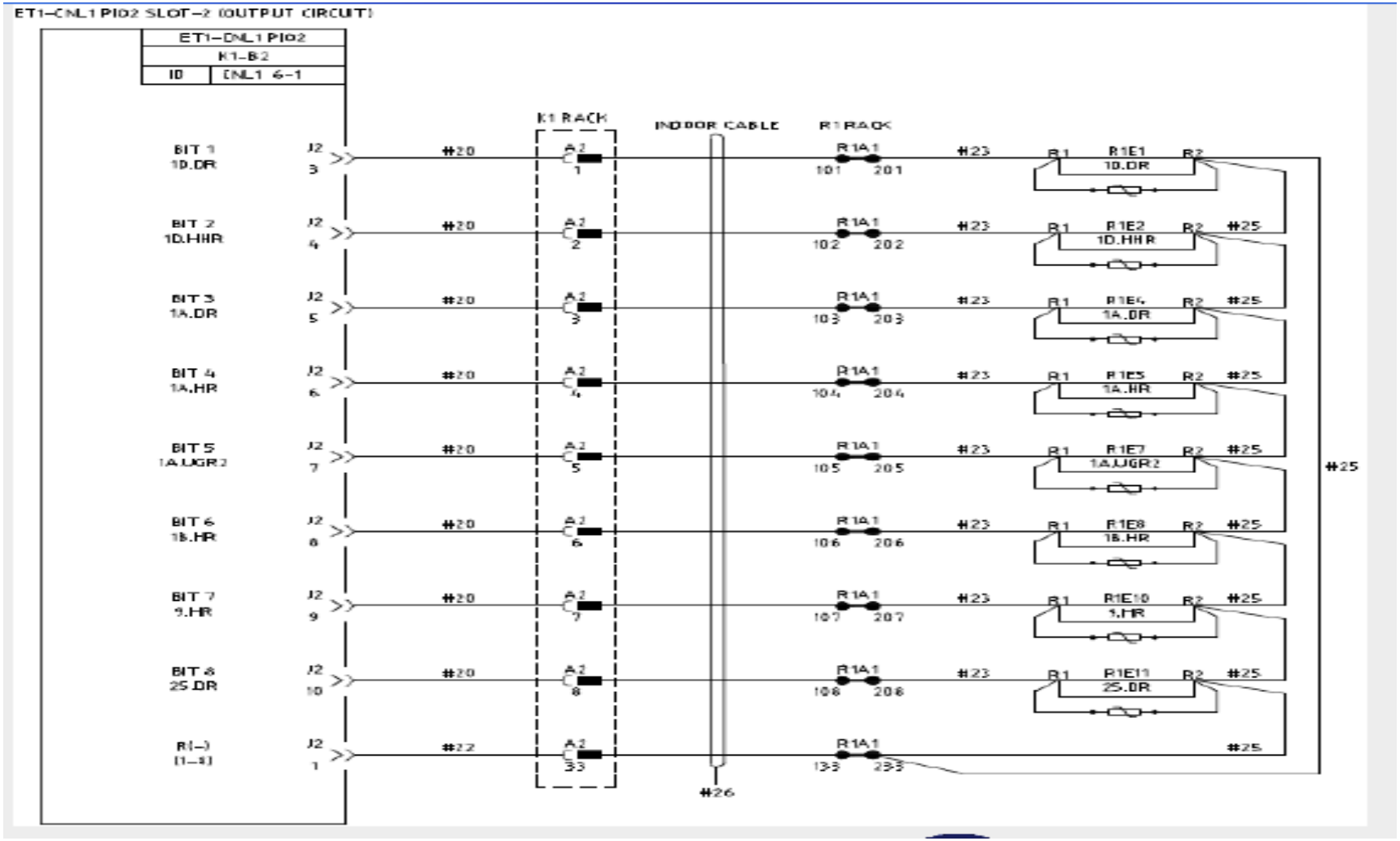


Figure: 12 (Circuit diagram)



Reference:

- *Signal Engineering Manual 2021*
- *IRISET Technical Literature*

DISCLAIMER:

The information given in this handbook does not supersede any existing provisions laid down in Signal Engineering Manual, Railway Board and RDSO publications. This document is not statutory and instructions given in it are for the purpose of guidance only .If at any point contradiction is observed, then SEM, Railway Board/RDSO guidelines or Zonal Rly, Instructions may be followed.

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