

Public Works (189⁴) Department.

RAILWAY BRANCH.

G.O., No. 337. R

DATED 4th June

[Despatch Abstract.]

Rules for the preparation of Railway Papers
Letters from the Govt of India forwarding
amended — with necessary forms & enclosures
communicated to the Agents, Madras and
South Indian Railways, and the Engineer-in-
Chief, Madras-Berhampore Railway Survey.

Indexed.

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RULES FOR THE PREPARATION OF RAILWAY PROJECTS.

1893.

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RULES

TO BE OBSERVED FOR THE

PREPARATION OF RAILWAY PROJECTS

TO BE SUBMITTED FOR THE SANCTION OF THE

GOVERNMENT OF INDIA.

REVISED 1893.

ISSUED BY ORDER OF THE GOVERNMENT OF INDIA.

RULES FOR THE PREPARATION OF RAILWAY PROJECTS.

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FORMS AND ENCLOSURES.

(N.B.—These are issued separately.)

FORMS FOR ESTIMATES.

(Referred to in Chapter V.)

- E. I. General Abstract (paragraph 20).
- E. II. Cost of Minor Bridges (paragraph 9) (d).
- E. III. Articles required from England (paragraph 25).

FORMS FOR TABULATED DETAILS TO ACCOMPANY REPORT.

(Referred to in Chapter VI.)

- R. I. Curve Abstract.
- R. II. Gradient Abstract.
- R. III. Bridge Abstract.
- R. IV. Important Bridges.
- R. V. List of Stations, Station Buildings, &c.
- R. VI. Station Machinery.

ENCLOSURES.

- I. Compensation to be allowed for Curves on Gradients—
(Diagram referred to in Chapter III, paragraph 4.)
- II. Notification for Railway Survey—
(Specimen form referred to in Chapter III, paragraph 21.)
- III. Rules for the acquisition of Land—
(Referred to in Chapter V, paragraph 7.)
- IV. Pattern for Plan and Section—
(Referred to in Chapter IV, paragraph 3.)
- V. Special points requiring attention—
(Referred to in Chapter V, paragraph 26.)

I.—PRELIMINARY.

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1. Rules to be strictly observed—

(a) In submitting a Railway project for sanction, the rules published herewith must be strictly observed, both as to the nature of the information to be supplied, and also as to the details of the arrangement of that information and the form in which it is to be given.

(b) These rules in their entirety apply to complete projects made out with a view to obtaining sanction to the immediate construction of the line. They should, however, also be followed, as far as applicable, in submitting to Government information obtained on a reconnaissance or preliminary examination of the country to be traversed by a proposed Railway.

(c) In special cases provisional sanction to the construction of a Railway may be given on the results of a reconnaissance and rough estimates. In such cases, however, it is to be understood that the sanction so accorded is provisional only; and the line must be properly located, and a complete project, worked out in accordance with these rules, must be submitted for final sanction as early as practicable.

2. Responsibility of the Engineer—

(a) The Engineer by whom the project is submitted is responsible for the correctness of the estimates and the sufficiency of the arrangements proposed to properly construct and equip the line in a manner suitable to the expected traffic. He is also responsible for the project generally, and for all details of the same from a professional point of view.

(b) The sanction of the Government of India to a project for a Railway does not in any way imply that the engineering details of the designs have been examined and approved; and, except in cases where definite orders on engineering questions are given, it is to be understood that the responsibility in such matters rests wholly with the Engineer in administrative charge of the undertaking.

II.—CLASSIFICATION OF SURVEYS.

1. Reconnaissance Survey—

When a reconnaissance is ordered, an engineer of experience will, with the aid of existing maps, examine the route or routes proposed. The only instrumental observations will usually be such as can be made with barometers, prismatic compass, and similar instruments. On the information which can thus be collected, the engineer will frame his report and rough estimate of the probable cost per mile.

2. Detailed Survey—

(a) This must be based on a good theodolite traverse, which should closely approximate to the centre line likely to be finally located; and permanent marks should be left which will enable the line surveyed to be picked up within the succeeding five or six years.

(b) The amount of detail in sectioning will be determined by the Engineer-in-Chief, and will depend in great measure on the nature of the country to be traversed. Cross sections should be taken where considered necessary. Sufficient data must be obtained to determine the nature of the ground in cuttings, the approximate waterway of bridges, the character of their foundations, and generally all information which will enable a fairly approximate estimate to be prepared of the cost of the line. This "Approximate Estimate" should be made out in accordance with the instructions laid down in Chapter V—Estimates, and should be prepared with sufficient care in order that the results may not materially differ from those given by the detailed estimates, which will be made when the work is sanctioned.

(c) In the case of an important river crossing, the site should be carefully examined and data of all kinds collected, which will enable the character of the design of the bridge and extent of the work to be determined.

(d) The plan and section to be submitted with this survey is to be similar to that shewn in the forms and enclosures. These should be accompanied by an index plan and section—see Chapter IV, paragraphs 1 and 2.

(e) The results of the survey here described are all that will be required for obtaining the sanction of the Government of India to the project.

3. Final Location—

When the sanction of the Government of India has been accorded, the line will be finally located, and a working section prepared.

III.—DETAILED SURVEY — FIELD WORK.

1. The Centre Line—

(a) The unit of measurement is the chain of one hundred feet in length.

(b) The centre line to be marked by pegs at every thousand feet, and each peg to have its number branded or stamped on it in figures not less than one inch high. The numbers branded on the pegs are to indicate thousands of feet: thus 57 would mean a distance of 57,000 feet from the zero of chainage. Square masonry pillars to be built on centre line at intervals of not less than half a mile.

2. Curves—

(a) Curves are to be defined by their 'angle of curvature' in degrees and minutes. The angle of curvature is to be taken as the angle at the centre subtended by an arc of one hundred feet in length; thus the radius for a one degree curve is 5,729.578 feet.*

(b) The apex angle formed by the intersection of the tangents should, where practicable; be observed, if not, it should be calculated.

(c) The springing points of the curve are to be marked by a large peg, distinguished in some suitable manner from the thousand feet pegs, and round masonry pillars to be built at the beginning and end of every curve.

(d) The maximum angle of curvature allowable without special sanction of the Government of India is as follows:—

	5 ft. 6 in. Gauge.	Metre Gauge.
In ordinary country ...	3° 0' (rad. = 1,910 ft.)	5° 0' (rad. = 1,146 ft.)
In difficult country ...	6° 0' (rad. = 955 ft.)	10° 0' (rad. = 573 ft.)

These are absolute maxima, and should only be worked to in special cases where the adoption of an easier curve would be impracticable or lead to considerable extra expense.

3. Gradients—

Gradients are to be defined by the distance in which a rise of one foot occurs, and by their rise in feet per standard chain of 100 feet. Thus a gradient of six inches in a hundred feet is to be described as "1 in 200 or 0.5 per cent."

4. Compensation for Curves on Grades—

(a) The compensation to be allowed should be calculated by the diagram given as Enclosure No. 1 (see 'Forms and Enclosures') and should be calculated for the standard wheel base of Goods Stock.†

(b) As a rule, such compensation will only be necessary on curves sharper than 2° on the 5 feet 6 inch gauge and 3° on metre gauge.

* On the Plan and Section or on other documents, the radius of a curve may, if desired, be added in brackets, thus:—"Angle of curvature 2 degrees—(Radius 2,865 feet)."

† This is approximately 0.08 per cent. per degree of deflection on 5 ft. 6 in. gauge and 0.064 per cent. per degree on metre gauge.

5. Bench-marks—

(a) Bench-marks should be left at distances of not less than half a mile along the line, and at the sites of important bridges. In every case the position chosen for the bench-mark should be such that it can be conveniently referred to during construction, and at the same time not be liable to be interfered with during the progress of the work.

(b) It will generally be more convenient to use bench-marks specially made for the purpose, either built up of masonry or formed of a single block of stone bedded in concrete. If cut on the stump of a tree, a spike or nail should be driven in, and the level taken on it. In any case, however, the bench-mark must be of such character or construction as not to be readily moved or injured by accident or mischief. All bench-marks to be so formed and marked as to be easily identified, and their correct description and location recorded.

6. Datum for Levels—

The datum to which all levels are to be referred is the 'Mean Sea Level' as adopted for the Great Trigonometrical Survey of India. During the progress of the survey and location of the line every opportunity should be taken to connect the levels with any Survey of India level stations in the neighbourhood, and to check the difference between any temporary datum and Mean Sea Level.

7. Compass Bearings—

The compass bearing of each tangent should be taken at every curve, and the mean of the readings at the two ends taken as the average bearing for each straight line.

SCOPE OF SURVEY OPERATIONS.

8. General—

(a) Unless otherwise specified, a strip of country lying within a distance of about 300 feet on each side of the centre line is to be surveyed in such detail as to be suitable for plotting to a scale of 400 feet to 1 inch. Particular care is to be taken in determining the boundaries of village lands.

(b) In addition to the foregoing, the following details are to be included in so far as they lie within a distance of a thousand feet on either side of the centre line:—

Rivers requiring a waterway of over 40 lineal feet.

Important roads, with all bridges, culverts, mile-marks, and fractional mile-marks belonging to the same.

Canals and large tanks.

The outlines of all towns and villages, and, in the case of a line going through large towns, the more important streets and thoroughfares.

The boundaries of Provinces and Local Administrations or Native States.

Hill peaks or other important features of the country.

Great Trigonometrical Survey stations.

(c) The position of hill peaks, large towns, Great Trigonometrical Survey stations, and other important objects in the neighbourhood of the Railway, but at a distance therefrom greater than a thousand feet, should, as far as practicable, be determined by bearings or angles taken from convenient points on the centre line.

9. Alternative Routes—

As a rule, definite orders will be given when it is desired that detailed surveys should be made of alternative routes; when such orders are not given, the Engineer-in-Chief will be responsible for selecting the best alignment.

10. Important Rivers—

(a) For each river requiring a provision of waterway of 1,200 square feet or upwards, the field work to be done is as follows:—

(b) A complete survey of such portion of the river and of its affluents as may lie within a distance of one mile on either side of the centre line of the Railway. This distance of one mile is to be taken to mean one mile from any point on the centre line measured at right angles thereto, not a mile measured along the course of the river.

(c) Three cross sections of the river bed taken at intervals of about a mile measured along its centre, the first cross section being about one mile above the crossing of the Railway, the second at the crossing, and the third about one mile below the crossing. Each cross section to be at right angles to the general direction of the river at the place where that cross section is taken, and to extend from the line of highest known flood on one bank to the corresponding line on the opposite bank. The position of each cross section is to be shown on the survey; and at each cross section is to be noted the level of the highest known flood, of ordinary flood and of ordinary low water.

(d) The average slope of the river bed is to be determined from a point one mile above the railway crossing to a point one mile below the same—i.e., for a length of two miles in all, extending from the first cross section to the third.

11. Diversions of Rivers—

Should it be considered desirable to divert the course of any river or stream, the best method of doing so should be examined, the necessary surveys and sections made, and the diversion shown on the plan.

12. Protection Works—

Any protection works required to prevent encroachment of rivers, to mitigate the effect of the bursting of tanks, or of scour of surface water in the vicinity of the line should be carefully considered on the ground, and the position and extent of such works determined and surveyed.

13. Station Sites—

(a) The sites for stations should be carefully selected on the ground, and for important stations completely surveyed in such detail as to be suitable for plotting to a scale of 100 feet to 1 inch and cross sections taken if necessary. This detailed survey is to take in everything within the proposed boundary of the station yard.

(b) The dimensions of the plot of ground intended for the station yard should be sufficient to allow ample space, not only for first requirements but also for extended accommodation likely to be needed to meet increased traffic in the future.* Care must also be taken to make arrangements for sufficient land *outside* the boundary of the station yard for borrow pits or spoil banks.

(c) Where practicable, the line through a station yard should if in embankment be on the level, and if in cutting on an easy grade and on the straight. A station must not, in any case, be on a steeper grade than 1 in 500 or 0.2 per cent. without the special permission of the Government of India, and, if possible, should not be near a curve. (See para. 19).

* For ordinary third class stations (see foot-note, page 12) where land can be acquired at moderate rates, it is recommended that the length of the plot of ground taken up for the station yard be not less than 2,500 feet for the 5 ft. 6 in. gauge, or 2,000 feet for the metre gauge. The width for such stations should be about 300 feet, of which about two-thirds should be on the side of the line on which the station building is to be situated, and one-third on the opposite side.

The passenger platform for an ordinary third class station should, as a rule, be on the main line, unless it be on that side of the railway on which a strip of land has been reserved for doubling, in which case it will generally be convenient to put the platform on a siding.

14. Junctions with other lines—

(a) Where a junction is intended to be effected with another Railway, in addition to the field work required for station yards, a complete survey and section of the existing Railway is to be made, extending to a distance of one mile on each side of the proposed junction. The survey is to extend in width to a distance of 1,000 feet on each side of the centre line of the existing Railway, and is to be in such detail as will allow of any portion required being plotted to a scale of 100 feet to 1 inch. Particular care is to be taken in determining the position of all buildings, bridges, level crossings, mile and gradient posts, telegraph posts and other works, or marks on or belonging to the Railway, also the spring-points and radius of each curve.

(b) If practicable, a copy of the original plan and section of the existing Railway for one mile on each side of the proposed junction should be obtained and carefully checked on the ground, all discrepancies being noted.

NOTES TO BE MADE IN THE FIELD.

During the progress of the survey careful notes with dates should be made on the ground from personal enquiry and observation, regarding any information likely to be useful in working out the details of the project, and in determining the prospects of the proposed line as a commercial undertaking. The following points should receive special attention:—

15. General—

(a) The nature of soil for banks and cuttings* and notes for use in grading the section.

(b) Protection works, and precautions to be taken against scour, encroachments of rivers, damage from the bursting of tanks, &c. The waterway to be provided for small rivers and streams, and particulars of diversions proposed. The probable depth and character of foundations for bridges and culverts, and any particulars to be taken into consideration as affecting the design or construction of the same. The selection of sites for temporary staff quarters to be used during construction, taking into account the convenience of the situation as regards the work, and also any conditions, such as water-supply, likely to affect the health or comfort of the occupant. The extent and character of fencing to be provided. The correct spelling in English and vernacular of all towns or villages included in the survey.

16. Accommodation Works—

Means of crossing the line by level crossings and bridges under or over. Width of roadway for crossings, and gradients to be allowed on approaches to the same with reference to the class of traffic to be accommodated. Special facilities for crossing to be allowed in the case of villages lying close to the Railway and owning a large amount of land on the opposite side of the line. Diversions of roads. Provision for canals and irrigation channels, and any special arrangements required for leading water from sources of supply on one side of the Railway to land lying on the other side.

17. Facilities for Construction—

Materials for building, such as stone, brick, lime, fuel, slate, timber, &c., and means for obtaining, working and preparation of the same. Arrangements for ballast and for sleeper supply. Materials suitable for fencing. Style of roofing to be adopted. Labour,

* Trial pits should be sunk where considered necessary to obtain this information.

skilled and unskilled, available in the district. Any special difficulties regarding supply of food or water. Prevailing rates and wages, and modifications in the same likely to be caused by the construction of the Railway. Means of transport by land or water existing or capable of development, and probable rates. Facilities for delivering bridge materials, permanent way, &c., during construction. The use of temporary lines, tramways, &c. Depôts for receiving and forwarding material. Generally, any local conditions likely to affect rates or methods of construction.

18. Important Rivers—

For rivers requiring a waterway of 1,200 square feet or upwards, information should, as far as practicable, be obtained regarding all circumstances likely to affect the design of the bridge, the waterway to be provided, the depth and character of the foundations and other details. The average rainfall over the area drained by the river, with particulars as to the amount and duration of any exceptionally heavy fall which may have been recorded. The level of the highest flood determined from careful enquiries and observations on both banks of the river, the evidence adduced being examined and checked to such extent as may be practicable. Any special floods, with particulars and dates. Any peculiarities of the drainage area as regards form or declivity, and geological or botanical conditions likely to affect the amount or velocity of the flood discharge. Physical characteristics of the bridge site or river bed in the vicinity as affecting the design of the bridge or amount of waterway required. Evidences of scour or liability of the river to alter its course. Nature and extent of protection works likely to be required. Depth and character of foundation and any special difficulties likely to be encountered.

19. Stations—

(a) For each station the nature and extent of traffic to be expected should be considered, and the accommodation to be provided on opening the line. Arrangements for extension to meet increase of traffic. The selection of a suitable site with reference to nature of soil, depth of foundation for buildings, water-supply and other physical conditions. The situation of the station on one side or the other of the Railway with a view to convenience of local traffic, position of neighbouring towns, roads, rivers, &c.

(b) The possibility of new crossing stations being introduced when traffic develops should be considered in grading the section.

20. Trade and Statistics—

Population of large towns in the vicinity of the Railway, and average population of the district per square mile. Existing means of transport by land or water and extent to which used and present traffic routes. Nature of trade or occupation of the people. Principal articles of local import or export, and extent to which this commerce might be expected to increase with the opening of the Railway. Through traffic to be expected. Special sources of traffic, either existing or which might be developed, such as coal or minerals, timber, pilgrims, &c. Recent statistics of traffic, applicable to the Railway proposed, should, whenever possible, be obtained from the Local Civil Authorities.

**RELATIONS WITH THE PUBLIC
AND GOVERNMENT DEPARTMENTS.****21. Notification in Local Gazette—**

Before any survey operations are commenced, a notification in accordance with the terms of section 4 of the Land Acquisition Act, is to be inserted in the local Government Gazette.*

22. Damage to property and trespass—

(a) The general sanction for a Railway Survey given by the Government of India or a Local Government does not authorize any interference with the rights or property of public bodies or of private individuals.

* To facilitate the drafting of this notification a specimen form is given in 'Forms and Enclosures.'

(b) The permission of the officer commanding should be obtained for the entry of the survey party into any military cantonment, fort, or entrenched post.

(c) In the case of a survey passing through a military cantonment or civil station, the wishes of the officer commanding or in charge of the station should receive due consideration, and his permission must, in any case, be obtained before any trees are cut or other damage done to station property.

23. Compensation for damage—

(a) Where damage to private property is unavoidable, compensation should, if practicable, be paid or tendered direct to the owner on the spot before the damage is done. In case of any dispute, the matter should be referred to the local civil authorities to settle with the owner, and the compensation decided upon should be paid as soon as practicable.

(b) Should the owner of the property be willing to clear the line himself, he should be allowed to do so, and should in that case be paid a reasonable sum for labour in addition to compensation for the damage done.

24. Religious Edifices, &c.—

Every endeavour should be made to avoid interference with religious edifices, burial grounds or other places or objects which may be considered sacred. Where such place or object is enclosed, the enclosure should not be entered except with the permission and in the presence of the person in charge.*

25. Military positions and Cantonments—

(a) Where the line lies in the vicinity of a military post, camping ground, or cantonment, the location should be decided in communication with the local military authorities. Should it, however, be found that the military requirements would involve a considerable extra expense in construction, great inconvenience to traffic, or would be open to serious objection from an engineering point of view, the matter should be referred to the Government of India for orders.

(b) Special attention is drawn to Government of India Circular No. XI Railway of 1892 regarding the acquisition of land under the control of the Military Department.

26. Assistance from Civil Authorities—

The local civil authorities should be freely consulted during the progress of the survey operations, and their opinion should have due weight in determining the most profitable route to be followed. Their assistance should also be invited in the collection of information relating to trade and population and other statistics likely to be found useful.

The local civil authorities should also be asked to use their influences, as far as practicable, to protect the bench-marks, pegs and other Railway marks from removal or injury.

* See Section 4 of Land Act, under "Forms and Enclosures" Form of Notification.

IV. PLANS, SECTIONS AND DESIGNS FOR WORKS.

PLANS AND SECTIONS.

1. General—

(a) A set of Plans and Sections for a project is to consist of—

- (a) Index Plan and Section.
- (b) Detailed Plans and Sections.
- (c) Plans and Cross Sections of Rivers.
- (d) Plans of Station Yards.

(b) The Plans and Sections are to be on tracing cloth, not paper. The size of each sheet is to be 48 inches by 36 inches.* The sheets are to be fastened together along their left-hand edges, and interleaved with longcloth, not paper, the backing being fastened to the tracing at the right-hand edge, and bound between limp covers, so as to allow the set to be easily rolled up. The Index Plan and Section should form the first sheet, and on it should be clearly shown the extent of each of the detailed sheets.

(c) Throughout each set of Plans and Sections, the mileage is to be reckoned from the same 'fixed point.' This fixed point should, if practicable, be at that end which is in the direction of the nearest seaport with which the line is in through communication by rail, and is to be clearly defined on the Index Plan and Section, and on at least the first and last sheets of the Detailed Plans and Sections.

(d) Each sheet is to be plotted in the direction of the through mileage, so that the mileage may read from left to right.

(e) The datum used for all Plans and Sections is to be Mean Sea Level,† and all heights are to be referred to this datum in feet and decimals. Should any other datum have been adopted for temporary use during the progress of the survey, the figures referring to such temporary datum must be reduced to Mean Sea Level before being entered on the Plans and Sections.

(f) On each sheet is to be noted a reference number or letter, the name of the Railway or Section of Railway, the Gauge and the Scale. The scale may be described in words, and need not be drawn. The magnetic north is to be indicated on each sheet by a line not less than six inches in length.

(g) The Index Plan and Section, and the first and last sheets of the set of Detailed Plans and Sections, are to be signed by the Engineer in administrative charge of the Railway and by the Executive or District Engineer who may be responsible for the work.

2. Index Plan and Section—

(a) The Index Plan and Section are to be drawn to a scale of 1 mile to 1 inch horizontal, and 100 feet to 1 inch vertical, the plan above the section on the same sheet.

* As exceptions to this rule, Index Plans and Sections and Plans of Stations may be longer than 48 inches, if necessary, to enable all the information to be shewn on one sheet. In such cases, however, the width of 36 inches must still be kept to, and the length in excess of 48 inches must be folded so as not to project beyond the edges of the other sheets.

† By 'Mean Sea Level' is to be understood the Mean Sea Level adopted for the Great Trigonometrical Survey of India.

(b) *The Plan.*—On the Index Plan to be shown all towns, roads, canals, rivers, hills and other features of country within a distance of five miles on each side of the Railway. The centre line of the proposed railway is to be indicated by a full red line one-thirty-second of an inch in thickness. The position of each station is to be shown by a block, the name of the station being given. The mileage from fixed point to be marked and figured at every mile and the extent of each sheet of the detailed plan shown. **The radius of all curves should be figured.*

(c) *The Section.*—The Index Section need only show formation in red. The gradients to be figured, and height of formation above Mean Sea Level to be entered at each change of gradient. The position of each important bridge with name of river and number and size of bridge spans. The crossing of each important road. The position of each station with its name and distance from fixed point to the nearest eighth of a mile. The mileage from fixed point to be marked and figured at every mile.

3. Detailed Plans and Sections—

(a) The detailed Plans and Sections are to be drawn to a scale of 400 feet to 1 inch horizontal, and 40 feet to 1 inch vertical, the plan in each case above the section on the same sheet. Three miles of line to be illustrated on each sheet, and the divisions between the sheets in each case to be at a mile mark. To enable the sheets to be readily connected, it is convenient to have, on each sheet, a skeleton outline for a few hundred feet beyond the mile mark at each end repeated from the adjoining sheets on both the plan and section.

(b) *The Plan.*—On the plan to be shown in detail all features of the country within a distance of three hundred feet on each side of the centre line of Railway with the boundaries of village land, and the apportionment of such lands for different kinds of cultivation, forest, pasture, waste, &c.; the centre line of the proposed Railway being indicated by a full red line one-thirty-second of an inch in thickness.

The position of all masonry centre line pillars and the exact position and description of each bench-mark to be shown.

(c) In addition to the foregoing, the following details are to be shown, in so far as they lie within a distance of 1,000 feet on either side of the centre line :—

Rivers requiring a waterway of 40 lineal feet or upwards.

Important roads with all bridges, culverts, mile marks and fractional mile marks belonging to the same.

Canals and large tanks.

The outlines of all towns and villages, and in the case of large towns, the more important streets and thoroughfares.

The boundaries of Provinces and Local Administrations.

Hill peaks or other important features of the country.

Great Trigonometrical Survey stations.

(d) All new works proposed for the purposes of the Railway or for the accommodation of the public are to be marked on the plan, also all alterations, diversions, protection works, &c., proposed in connection with existing railways, roads, rivers, canals, or tanks. The sample plan given as enclosure No. IV (a) should be followed. (See 'Forms and Enclosures'.)

(e) In the case of a junction with an existing Railway, the plan must show the existing line for not less than one mile on each side of the proposed junction, showing the position of all buildings, bridges, level crossings, mile-posts and other works on or belonging to the existing Railway, and for curves the springing points are to be marked and the angle of curvature noted.

* Where practicable the Index Plan should be traced from the sheets of the Survey of India map published to a scale of 1 mile to 1 inch, the details in the immediate neighbourhood of the railway being filled in, or corrected if necessary, from the information given by the railway survey. For districts where a map to the scale of 1 mile to 1 inch is not available, the information required should be plotted to that scale from such other maps or data as can be obtained.

(f) *The Section.*—On the section the formation level is to be shown by a red line, the ground line being black. Cuttings are to be coloured red and embankments green. If practicable, throughout each sheet, the ground line and formation should be continuous, i.e., without 'steps' or changes of datum.

(g) The heights or levels are to be given in feet to one place of decimals, and are to be entered at every 1,000 feet, vertical ordinates being ruled up to connect the figures with the ground line. These vertical lines to be in blue, except where they occur at a change of gradient. Two sets of heights or levels are to be given, viz. :—

(1) Height of ground above Mean Sea Level.

(2) Height of formation above Mean Sea Level.

The first set of figures showing ground level are to be the lowest in position, i.e., nearest the bottom of the sheet. The Bed level and High flood level of all rivers and nullas should be shown, also the position, description and level of all Bench-marks, and position of all Masonry pillars.

(h) Gradients are to be entered in a plain and conspicuous manner and defined by the distance corresponding to a rise of one foot, and by their rise in feet per 100 feet. Thus a gradient of six inches in a hundred feet is to be described as "1 in 200 or 0.5 per cent." At each change of gradient an ordinate is to be drawn in red up to formation level, and the height of formation noted to two places of decimals. Where a change of gradient occurs at any point other than one of the 1,000 feet marks the chainage of the changing point is to be noted. Where the ruling gradient is used, it should be compensated for curvature (see Chapter III, paragraph 4).

(i) In addition to the above the following should be shown—the beginning and end of all curves, the mileage and chainage, the general description of the soil, the position of all bridges, level crossings, &c.; where roads or waterways are diverted this should be noted; the sample section given as enclosure No. IV (b) should be followed. (See 'Forms and Enclosures'.)

(j) Tunnels are to be drawn to scale on the section, and the length in feet to be noted in each case.

(m) A station is to be indicated by a vertical red line at each end drawn upwards from formation level to define the limits of the station yard. The name of the station and the length in feet of the station yard are to be noted.*

(n) Where cross sections have been taken, a reference to each is to be given on the main section with a vertical line indicating the position. Cross sections should, as a rule, be plotted to a natural scale, both the vertical and horizontal scales being the same as the vertical scale used for the main section (i.e., 40 feet to 1 inch), and on each cross section the outline of the cutting or embankment is to be correctly shown.

(o) Long cuttings should be on grade not on the level.

4. Plans and Cross Sections of Rivers—

For each river requiring a provision of waterway of 1,200 square feet or upwards, the following particulars are to be given :—

(a) *Plan.*—A plan to scale of 400 feet to 1 inch of such portion of the river or of its affluents as may lie within a distance of one mile from the proposed centre line of Railway, measured from any point on that centre line. On the plan to be shown by lines the positions of cross sections taken of the river, with references; the centre line of Railway with mile, and 1,000 foot chainage distances marked and figured; the position of the two abutments of the proposed bridge to be marked on the railway centre line; the position and extent of any protection or training works proposed, with such notes as may appear necessary; the direction of the current to be shown by arrows.

* See also Chapter III, paragraph 19 (b).

(b) *Cross Sections*.—Three cross sections of the river bed are required, plotted to a natural scale of 40 feet to 1 inch.* These cross sections are to be taken at intervals of about a mile measured along the centre of the river bed, the first cross section being one mile above the crossing of the Railway, the second at the crossing, and the third about one mile below the crossing. Each cross section is to be at right angles to the general direction of the river at the place where that cross section is taken, and is to extend from the line of highest known flood on one bank to the corresponding line on the opposite bank. On each cross section, lines are to be drawn to indicate the level of highest known flood, ordinary flood, and ordinary low water, with the reduced level figured on each.

(c) On the cross section taken on the centre line of Railway an elevation of the proposed bridge is to be drawn to scale in its proper position. The chainage is also to be figured on this cross section. Where borings or trial pits have been sunk, their position, with note of results, should also be given. The cross sections may be plotted on the same sheet as the plan, or on separate sheets as may be found convenient in each case.

5. Plans of Station Yards—

(a) For First Class Stations† a plan of the Station Yard to a scale of 100 feet to 1 inch, showing all lines, sidings, platforms, buildings, wells, tanks, water-cranes, ash-pits, turntables, traversers, weigh-bridges, signals, &c., within the boundary of the Station Yard; also any roads, buildings, &c., lying outside the Station Yard but immediately adjacent thereto. The name of each work or structure must be entered against it on the plan, with such notes and dimensions as may be necessary to define clearly its size, position and purpose for which intended.

(b) For Second and Third Class Stations, a plan giving similar information is required for each different type or arrangement adopted. On each type plan should be noted the names of the stations which are to be laid out in general accordance with that plan, with a description of any important variations adopted at one or more of those stations.

6. Subjects for drawings—

(a) Drawings of works to be submitted with Detailed Surveys, and Approximate Estimates will be sent up on tracing cloth of the same size as the Plan and Section sheets, and interleaved and sewn in the same way. They will represent:—

Type of sections of earth work.

Types of small Bridges and Culverts.

Skeleton drawings to small scale of large Bridges.

Type of Fencing.

Types of Station Buildings and Staff Quarters.

(b) The type of Permanent way should be described in the detail of the estimate, and drawings are not required for workshops‡ or station machinery. Tunnels will be of Standard Section and no drawing is necessary.

(c) Each sheet of drawings should be signed by the Engineer in administrative charge of the Railway, and by the Executive or District Engineer who may be responsible for the work.

* Where the width of the river in flood exceeds 3,000 feet, this scale may be reduced. With a width from 1,500 feet to 3,000 feet it will generally be convenient to plot the cross section in two halves.

† Stations are roughly classed as 'First,' 'Second' and 'Third,' according to size and extent of accommodation provided, thus:—'Third Class' are ordinary roadside stations at which the arrangements are generally limited to the means for crossing trains, and the provision of some accommodation for local third class passenger traffic. 'Second Class' stations are on a larger scale with more siding accommodation, provision for goods traffic, and engine sheds if required. 'First Class' stations are those of considerable size and importance for which special designs are necessary, as for example, as Delhi and Lahore.

‡ Workshops will generally cost more than Rs. 50,000 for which a detailed estimate to be sanctioned by the Government of India will subsequently be required.

V. ESTIMATES.

PRELIMINARY REMARKS.

1. Nomenclature—

All Railway estimates may be divided into three classes—

(a) *Rough Estimates on Reconnaissance.*

(b) *Approximate Estimates on Detailed Survey.*

(c) *Detailed Estimates.*

2. Rough Estimates—

For a 'Rough Estimate,' each sub-head, such as 'Earthwork,' 'Permanent Way,' &c., would be treated as a whole, and its probable cost deduced from the ascertained cost per mile for work over similar country done under similar conditions on Railways already constructed.* A 'Rough Estimate' would therefore usually be made out in the form of a mere general abstract, showing under each sub-head of account the assumed rate per mile and the probable cost deduced therefrom by multiplying the same by the length in miles of the proposed line.

3. Approximate Estimates—

(a) The proposed line of railway having been properly surveyed, and plans and sections made, an approximate estimate should be framed on the following basis:—

Land.—Approximate rate per mile, as ascertained from the Civil Authorities.

Earthwork.—To be taken from the section, with cross sections where necessary.

Tunnels.—From cost per foot run, showing lining separately.

Minor bridges†.—From average types, due allowance being made for depth of foundations; see Form E. II. (*Forms and Enclosures*).

Major bridges†.—Each must be estimated for separately.

Fencing.—Cost per mile, and number of single miles provided.

Ballast and Permanent Way.—Detail of cost per mile and number of miles, including sidings.

Stations and Buildings.—From average types, due allowance being made for depth of foundation.

Plant.—From rates on similar lines.

Rolling Stock.—At rate per mile.‡

(b) When a project for the construction of a Railway is submitted to the Government of India for sanction, 'Approximate Estimates,' as defined in the foregoing paragraphs, will, as a rule, be sufficient, and estimates worked out in detail should not be prepared until the local circumstances affecting the execution of the work have been carefully examined and all conditions on which the details depend have been completely ascertained.

* Statements showing the cost of Railways already constructed can be obtained, on application, from the Consulting Engineer for State Railways. These statements, for each Railway, give the total cost and cost per mile under the different sub-heads of account, with explanatory notes and other particulars.

† Bridges having a total waterway of sixty lineal feet or over, or a clear span of 40 feet or over, are Major Bridges, all others are Minor Bridges.

‡ A list of the most recent rates for all imported articles can be obtained on application to the Director General of Railways.

CLASSIFICATION FOR RAILWAY ESTIMATES.

MAIN HEADS.	SUB-HEADS.
I.—Preliminary Expenses—	1. Survey expenses. 2. Plant. 3. Establishment.
II.—Land—	
III.—Formation—	1. Earthwork. 2. Tunnels.
IV.—Bridgework—	1. Major Bridges. 2. Minor Bridges.
V.—Fencing, &c.—	1. Fencing. 2. Road crossings. 3. Mile and Gradient Posts.
VI.—Electric Telegraph—	
VII.—Ballast and Permanent Way—	1. Ballast. 2. Permanent Way.
VIII.—Stations and Buildings—	1. Stations and Offices. 2. Workshops, Store-buildings, &c. 3. Staff Quarters. 4. Station Machinery.
IX.—Plant—	1. Engineering. 2. Locomotive. 3. Carriage and Wagon. 4. Station and Office Furniture.
X.—Ferries, &c.—	1. Ferries. 2. Floating Bridges.
XI.—Rolling-Stock—	1. Locomotive. 2. Carriage and Wagon.
XII.—General Charges—	1. Direction or General. 2. Engineering. 3. Stores. 4. Audit and Account. 5. Medical and Sanitation. 6. Locomotive. 7. Traffic.

4. Detailed Estimates—

(a) As a rule, work will be put in hand on the general sanction accorded to the Approximate Estimates submitted with the Project, and Detailed Estimates will not be made out until the work has been commenced and all details likely to affect the cost of the same are known.

(b) Detailed estimates are not, as a rule, required to be submitted to the Government of India, except in the case of works costing over Rs. 50,000, *vide* Circular No. 6 Railway of 1892. Detailed or working estimates and drawings for all works should be prepared at as early a stage as possible, and after sanction by the Engineer-in-Chief are to be sent to Executive Engineers in charge of divisions for guidance, and copies of the abstracts of these estimates are to be sent to the Examiner of Accounts for Audit purposes.

5. Classification to be adopted—

(a) The classification to be adopted in estimates for Railway projects is as given in the table on the opposite page. Estimates are to be made out by the heads and sub-heads there specified, and by those only. The following detailed instructions show what is to be included in the Estimates, whether approximate or detailed, under each head and sub-head, in what sets or groups the estimates are to be made out, and other particulars.

(b) Estimates must show separately the English and Indian expenditure on all imported articles. English expenditure includes—*

Cost f. o. b. in England,
½ths sea freight;

Indian expenditure includes—

½th sea freight,
Insurance at 1 per cent. on f. o. b. cost *plus* full sea freight.
Landing charges, Indian carriage, erection, &c.

(c) Provision for loss by exchange on the English cost, as detailed above, must be made in the estimates, and the basis on which it is calculated must be stated. (*See also paragraph 25*).

6. Preliminary Expenses—I.

Expenses of all kinds connected with the survey and location of the line, preparation of the plans and estimates for the project, and administrative and general charges incurred *before* the work of construction is sanctioned or commenced. The cost of preliminary expenses connected with any extensive alterations to a project requiring the employment of a distinct staff after the general project has been sanctioned or commenced, should be charged to this head; the cost of petty revisions of alignment, &c., for which no special staff is engaged, should be charged to the estimates for construction. This estimate is to be divided into three sub-heads, *viz.*, Survey Expenses, Plant, and Establishment.

Estimates for 'Preliminary Expenses' are to be made out for the line as a whole, or for well defined sections or branches of the same.

* A list of the latest English prices and freights can be obtained on application to the Director General of Railways.

7. Land—II. *Vide India's Circular No. 4 of 21.9.95 and 17th April 1997.*

Compensation to the owners or occupiers of such land as may be required, either permanently or temporarily, for the purposes of the Railway, including payments for houses, trees, crops or other property situated on such land. ~~Land required for the manufacture or stacking of materials, also for the acquisition of materials by quarrying, mining, boring or other operation, and payments for royalty, mining rights, &c., connected with the same.~~ Compensation for damage, loss or injury caused to adjacent property by operations incidental to the construction of Railway. Salaries, fees, allowances, &c., of Civil Officers and other persons deputed for, or employed on, the valuation, transfer or demarcation of land. The data for this estimate should be obtained from the Civil authorities.*

*The rent or cost of buildings required for the accommodation of the staff, or for offices, store buildings, &c., for the general purposes of the Railway, is not chargeable to this head.**

8. Formation—III.

(a) *Earthwork.*—All charges connected with the earthwork in formation of embankments and cuttings (except those included under 'Preliminary Expenses' or 'Land'). Retaining walls, masonry side drains, pitching, turfing, or other protection to such earthwork; tree planting, service roads, also diversions of roads, streams or rivers incidental to the execution of such earthwork. All repairs and maintenance necessary to keep the earthwork in proper order until the opening of the Railway.

Diversions of the Railway in connection with bridges or other works are chargeable to the works concerned.†

(b) *Tunnels.* 2.—Each Tunnel is to form the subject of a separate estimate, each different class of work appearing as a distinct item with its own quantities, rate and cost.

Diversions of the railway, plant for rope inclines, and other works required for temporary use during the construction of a tunnel, are chargeable to the estimate of the tunnel concerned.†

9. Bridgework—IV.

(a) Bridges, viaducts, culverts, flood openings, spill causeways, irrigation channels, and all pitching, protection or training works connected with the same. Also diversions of the railway incidental to the construction of bridges or bridgeworks,‡ and any temporary means provided for crossing a river during the progress of the work.†

Overbridges provided for taking public roads or footways across the Railway are chargeable to 'Road Crossings.'

(b) Bridges having a total waterway of sixty lineal feet or upwards, or having a clear opening of forty lineal feet or upwards in any one span, are classed as 'Major Bridges.' All other works of this nature are classed as 'Minor Bridges.'

* See rules for the acquisition of Land—"Forms and Enclosures".

† Important diversions of the line for special purposes may be considered as temporary Railways and separately estimated for. Each such case will be considered on its merits according to the purpose for which it is required and other circumstances.

‡ Important temporary Bridges may be considered as special works and estimated for separately.

(c) For 'Major Bridges' a separate estimate is required for each, together with a brief report showing the mileage, the size and number of spans and description of girders, the description of foundation and nature of soil, arrangements, if any, for cart traffic, &c.

(d) For 'Minor Bridges' all the works of this class will form the subject of one estimate, but the estimate must be framed in such a way that each minor bridge may appear as a distinct item with its own separate quantities and cost clearly shown according to Form E II ('Forms and Enclosures').

10. Fencing, &c.—V.

1. (a) *Fencing.*—Fences, walls, palings, hedges, ditches, boundary marks, and other means employed for demarcation of, or prevention of trespass upon, the land taken up for the railway line, stations, &c. The unit to be adopted is the mile, a mile being taken to mean one mile in length of single fence, not fencing sufficient for both sides of a mile of Railway.

The fencing of detached portions of land occupied for separate purposes, such as General Offices, Staff quarters, &c., will be charged to the works concerned.

2. (b) *Road Crossings.*—Level crossings, with gates, bars, turnstiles, gatekeepers' lodges, approaches, and any signals or other appliances connected with the working of the same. Also all overbridges provided for taking public roads or footways across the Railway.

3. (c) *Mile and gradient Posts.*—Mile Posts and distance marks of all kinds, the numbering of telegraph posts, and gradient posts.

11. Electric Telegraph—VI.

(a) The cost of a permanent cable over a river which it is not intended to bridge in the immediate future, if it is required for the Railway; also the cost of any instruments obtained otherwise than through the Government Telegraph Department.

(b) *The cost of provision of all lines of telegraph as required for the open line, and as a general rule of instruments for working the same, is borne by the Telegraph Department, the Railway paying rent and maintenance charges only.*

(c) *If any part of the permanent line is erected and worked for the benefit of Construction before the Railway is opened, the cost of rent and maintenance is chargeable to "General Charges-XII, Engineering, Office expenses."*

(d) *Any special expenditure incurred for the erection of temporary lines required for Construction purposes only, and maintenance and rent of instrument for the same, is chargeable to the works concerned.*

(e) *Any special expenditure incurred for laying a temporary line or cable across a river to enable the permanent line to be worked during the construction of a bridge is chargeable to the bridge.*

12. Ballast and Permanent Way—VII.

1. (a) *Ballast.*—Includes the provision and laying on the line, including sidings, of ballast up to the full section required by the specification, and also maintenance of the same until the opening of the Railway. The unit to be adopted is one mile of ballasting complete and up to full section for a single line.

2. (b) *Permanent Way*.—Includes the provision and laying of the permanent-way complete, both for main line and sidings, with all sleepers and fastenings, and maintenance of the line in good running order until the opening of the Railway. A detailed abstract for one mile showing separately the weight and cost of rails fish-plates, fish-bolts and nuts, bearing plates, sleepers, spikes or other fastenings, the average cost of carriage to site, and cost of laying and maintaining till the opening of the Railway should be furnished.

• *Points and Crossings with apparatus and fittings connected therewith, are to be estimated under 'Station Machinery,' not under 'Permanent Way.' Additional permanent way required as a reserve for maintenance purposes after the line is opened is not to be included in the estimates for construction.*

13. Stations and Buildings—VIII.

1. (a) *Stations and Offices*.—Booking offices, Waiting and Refreshment rooms, Goods Sheds, Post and Telegraph Offices, Platforms, Latrines for the use of passengers, Administrative Offices, and generally all Station Buildings, Offices and other structures connected with the passenger and goods traffic and general business of the Railway, excepting such as are classed under 'Workshops,' 'Staff Quarters,' or 'Station Machinery.'

The estimates for Stations and Offices are to be made up by stations, or by groups of buildings where not intended specially for station purposes. Each individual building or structure appearing as a distinct item with its own separate quantities and cost clearly shown.

Permanent fittings and furniture specially made to suit a particular building or purpose is chargeable to the estimate for that building or purpose. Ordinary moveable furniture liable to be shifted or transferred from one building to another is to be estimated for under "Plant—Station and Office Furniture" (see paragraph 14 (d)).

Temporary Offices erected for the use of the staff employed during construction are to be estimated for under 'General Charges' (see paragraph 17(c)) unless such offices are erected specially for a particular work, in which case their cost is chargeable to the contingencies of that work.

2. (b) *Workshops, Store-buildings, &c.*—Erecting, Fitting or Pattern shops, Foundries, Smithies and other buildings specially intended for the construction, erection or repair of locomotive engines or carriage and wagon stock, or for other mechanical work required for the purposes of the Railway after opening for traffic. All permanent foundations in such buildings for heavy tools or machinery; also columns, chimneys, pits and other structures forming an integral part of the building itself as distinguished from articles of plant and machinery separately fitted up or erected therein. Also all offices, out-buildings, enclosure walls, roads, &c., belonging to, or in connection with, the workshops, and all store buildings and store yards, either for workshops or for general purposes.

Estimates for Workshops are to be made out for each group or set of buildings separately; the individual buildings or structures in each group appearing as distinct items, each having its own separate quantities and cost clearly shown.

Lines of rail laid into workshops are to be estimated for under 'Permanent Way sidings,' and points and crossings under 'Station Machinery.'

A small workshop attached to an engine shed for carrying out petty repairs to running engines is to be estimated for as a part of the Engine shed under the sub-head 'Station Machinery.'

Temporary Workshops for construction purposes are not chargeable to this head, but to the estimate for the work concerned.

3. (c) *Staff Quarters*.—Quarters for the residence of the staff employed on the open line, also buildings connected with their instruction, amusement or general accommodation, such as Schools, Institutes, Recreation-rooms, Swimming-baths, Gardens, Hospitals, Dispensaries, Running-rooms, and all out-buildings, wells, fences, roads and other works required in connection therewith.*

Estimates for Staff Quarters are to be made out for each group or set of buildings separately, the individual buildings or structures in each group appearing as distinct items, each having its own separate quantities and cost clearly shown.

Temporary Quarters erected for the accommodation of the staff employed during construction are to be estimated for under 'General Charges' (see page 20) unless such quarters are erected specially for a particular work, in which case their cost is chargeable to the contingencies of that work.

4. (d) *Station Machinery*.—All machinery and arrangements in use at stations for watering, fuelling, and turning of engines;—repairing, cleaning, and examination of running locomotives and carriage and wagon stock;—loading, unloading, and weighing of goods;—shunting or transfer of rolling stock from one line to another, and starting, stopping, and crossing of trains. Under this head, therefore, are classed such items as Engine-sheds, Wells, Reservoirs, Tanks and Tank-houses, Pumps, Piping, Water-cranes, Ashpits, Turntables, Fuel-stages, Carriage sheds, Carriage-examining Pits, Traversers, Points and Crossings and special sleepers for the same, Hydraulic Machinery, Capstans, Platform Cranes, Weigh-bridges, Buffer-stops, Scotch-blocks, Signals, &c., &c.

Estimates for Station Machinery are to be made out by stations, each individual structure or appliance appearing as a distinct item, with its own separate quantities and cost clearly shown.

14. Plant—IX.

(a) *Engineering*.—Tools, Machinery, Instruments, Live-stock, Camp Equipage, Trolleys, and appliances of all kinds required for the Engineer Department or for Engineers' Workshops for the open line

Engineers' plant required for construction purposes is not to be included under this head, but is chargeable to the estimates for the works concerned. On the completion of a work, the plant will be sold or returned into store at a depreciated value, and the account of the work credited†.

2. (b) *Locomotive*.—Tools, Machinery, Instruments, and appliances of all kinds required in connection with Locomotive Workshops or for the purposes of the Locomotive Department, including all work in the erection, fitting, painting, &c., of the same.

Foundations in workshops for heavy machine tools, also chimneys, pits and other works forming an integral part of the building itself, will be provided for in the estimate for the building under 'Workshops, &c.' The arrangements for washing out engines, and fittings connected with water-supply for a running shed, will be provided for in the estimate for the shed under 'Station Machinery.'

3. (c) *Carriage and Wagon*.—The same rules as for Locomotive Plant.

*Gate-keepers' lodges at level crossings are an exception to this rule. [See 'Road Crossings,' paragraph 10 (b).] All expenditure on Institutes and Recreation Rooms requires the special sanction of the Government of India.

† A complete list, with estimated prices, of all plant required for construction purposes should nevertheless be made out, showing the proposed allocation of cost to the different works.

4. (d) *Station and Office Furniture.*—All furniture for stations, and for the permanent offices for the open line.*

Furniture required for the temporary offices of the staff employed during construction is to be estimated for under 'General Charges' [see paragraph 17 (e)].

15. Ferries, &c.—X.

Ferries of all kinds to be provided and worked by the Railway for the public conveyance of passengers, animals or goods, with all plant, stock, appliances, jetties, wharves, landing stages, &c., connected therewith also Floating Bridges formed on pontoons or boats.

Each ferry or floating bridge is to form the subject of a separate estimate.

Steamers or boats for the general purposes of the railway, and not intended for public carriage of passengers or goods, are not to be estimated for under this head, but are to be classed as 'Plant.'

16. Rolling Stock—XI.

1. (a) *Locomotive.*—Locomotive Engines and Tenders required for the Railway after opening for traffic.

2. (b) *Carriage and Wagon.*—All Coaching and Goods stock required for traffic purposes, also rolling stock for the Engineer and Locomotive Departments on the open line, such as Ballast Wagons, Rail-carriers, Travelling oil or water tanks, Break-down trains, Travelling Cranes, &c.

Trolleys of all kinds are to be classed under 'Plant—Engineering.'

17. General charges—XII.

All expenditure incidental to the construction of the railway as a whole as distinguished from expenditure incurred in connection with particular works.

General charges are to be classified under the following sub-heads, according to the department or purpose for which the expenditure is required:—

1. Direction or General.
2. Engineering.
3. Stores.
4. Audit and Account.
5. Medical and Sanitation.
6. Locomotive.
7. Traffic.

For each of these departments the charges will further be allocated according to subject as follows:—

(a) *Salaries and allowances.*—Salaries and allowances of all kinds payable to officers employed on the general work of the railway, and to their subordinates and office establishments. The pay of servants on the regular staff of the railway, such as office messengers, watchmen, post-runners, chain-men, &c. The wages of office servants employed on menial work, such as sweepers, water-carriers, &c. Also fees to professional persons not on the regular staff of the Railway whose services may be occasionally or periodically required.

The salaries of Foremen or Inspectors specially engaged for a particular work, their office establishment (if any), and the pay of workmen and labourers generally are chargeable to the work concerned.

(b) *Quarters.*—Dwelling houses erected or acquired for the general staff employed during the construction of the Railway and not required for the open line.

* Permanent fittings and furniture, specially made for a particular building or purpose, is, however, chargeable to the estimate for that building or purpose. For example, a fixed counter in a ticket office would be chargeable to the estimate for the building. A chair in the same office would be classed as 'Station and Office Furniture.'

The cost of temporary quarters erected specially for the staff or workmen employed on a particular work, is chargeable to the work concerned.

(c) *Office Accommodation.*—Offices erected, acquired or rented for purposes connected with the construction of the Railway, and not required for the open line. Also furniture for use in such offices.

The cost of a temporary office erected specially for a particular work, is chargeable to the work concerned.

(d) *Instruments.*—All instruments, mechanical appliances and apparatus required during the construction of the line, whether for out-door work or for office use. Also surgical instruments for dispensaries, &c.

The cost of instruments and appliances procured specially for a particular work, is chargeable to the work concerned.

(e) *Office expenses.*—All contingent expenses connected with the working of offices and maintenance and rent of Telegraph instruments during the construction of the line; such as the charges for books, maps, professional papers, stationery and petty office requirements. Also legal expenses and advertising.

Office rent and the cost of office furniture is chargeable under (c) 'Office accommodation.'

(f) For special rules regarding the employment of Temporary Engineers on State Railways, see P. W. Dept. Code, Vol. III, Chapter III.

(g) Detailed Estimates for 'General Charges' will, as a rule, not be required until after construction has commenced, and it has been definitely ascertained what arrangements will be most suitable with reference to the nature of the work, the Engineers to be employed and other particulars.

18. Abstracts only required—

(a) The Estimates, as submitted, are to be in abstract only, but for each Estimate the details must be properly worked out and be available if called for.

(b) The Abstract Estimates are to be sent up in print, foolscap size; thirty-six copies are required.

(c) The Estimates for each branch line, and for each definite section of the main line must be separate and distinct, and arranged in such a way that the estimated cost of each can be readily ascertained, and any modification which may be desired made in the details for one section without affecting the Estimate for any other section.

19. Note on Estimate—

A brief note should be given abstracting from the report a statement showing how the various rates were arrived at, the class of masonry to be adopted in different structures, the type of girders to be used, the type of permanent way and reasons for its adoption, &c., also what provision has been made for Loss by Exchange, and on what basis.

20. General Abstract—

At the beginning of each set of estimates is to be given a General Abstract showing separately under each main head and sub-head the total cost and rate per mile. For the whole line, the total cost, the length in miles, and general rate per mile. See Form E. I. (*Forms and Enclosures*).

21. Special Abstracts—

(a) Each Abstract Estimate is to be made out in such a way as to show clearly at a glance, without calculation or reference to other documents, the nature of the work or

structure to which the estimate applies, its size or extent, total estimated cost, and rate (deduced from size and cost) per square foot, per lineal foot, per mile or other unit according to circumstances.*

(b) In the case of estimates in which provision is made for articles to be obtained from England, the English and Indian expenditure† must be shown separately in the abstract.

(c) On each abstract is to be entered the name of railway or section of railway to which it applies, the gauge of the railway, the extent of application (whether to the whole line or to a particular district or section), the classification main-head and sub-head, and a reference to any drawing or plan on which the estimate may have been based.

22. Indirect Charges—

In submitting a project to the Government of India for sanction Direct Charges only should be included. The indirect charges, *viz.* :—

I.—Capitalization of abatement of Land Revenue

II.—Leave and Pension allowances

should not be entered, but will be added by the Government of India when necessary.

23. General Instructions—

The Estimates for the Construction of a Railway must provide for the proper making and equipment of the line, with all works, plant or stock chargeable to capital and considered necessary before the line can be opened for public traffic. Charges incurred in the repair and maintenance of completed works, so long as the portion of line on which they are situated is not opened for public traffic, are also chargeable to the construction estimates of such works.

24. Accommodation Works—

Where it is proposed to provide Accommodation Works for the use of the public, the requirements must be considered as carefully as if such works were for the immediate purposes of the Railway. For example, if a road is to be diverted, care must be taken that the accommodation provided by the new road will be well suited to the character and amount of traffic expected, and that the formation of the new road shall be at least as good as that which it is intended to supersede.

25. Material from England—

In the case of ironwork, machinery or other Material to be Imported from England, the estimate must show separately, for each article, its cost under English and Indian expenditure.† A separate abstract should be given, showing in Sterling the English cost of all such articles, the rate at which exchange is taken, and the English cost in Rupees at that rate. See Form E. III. (*Forms and Enclosures*).

26. Special points requiring attention—

A memorandum of the points to be observed on the construction of Railways for Public Traffic to meet the requirements of the Government of India is given as enclosure No. V and should receive special attention—(see '*Forms and Enclosures*').

27. Quantities and Rates—

In making out estimates for the under-mentioned descriptions of work, the quantities and rates are to be taken as follows, the rates being given in rupees and decimals:—‡

Land—In acres and decimals. Rate per acre.

Earthwork, Excavation or Filling—In cubic feet. Rate per 1,000 cubic feet.

Masonry, brickwork, concrete and materials for the same—In cubic feet. Rate per 100 cubic feet.

Pitching, Turfing, &c.—In square feet. Rate per 100 square feet.

* If it be desired to keep the rates from being generally known, the rates and amounts may be left blank in the office copies; a special copy with this information entered in manuscript being submitted separately in a sealed cover marked "Confidential."

† See chapter V, paragraph 5 (b).

‡ Local weights or measures are not to be used in any report or estimate connected with a Railway Project.

Flooring, Roofing, &c.—In square feet. Rate per 100 square feet.

Plastering, painting, whitewashing, &c.—In square feet. Rate per 100 square feet.

Doors and Windows—In square feet and decimals. Rate per square foot.

Timber—In cubic feet and decimals. Rate per cubic foot.

Ironwork—In tons and decimals. Rate per ton. (Where more convenient for small quantities hundredweights and decimals, or pounds and decimals may be used.)

Transport by Land—Weight in tons, distance in miles. Rate per ton-mile.

28. Units of Measurement—

The units of measurement prescribed below are to be adopted wherever applicable in all estimates, calculations, reports, &c., connected with Railway projects:—*

Distance—Miles and decimals.

Length—Feet and inches, or feet and decimals.

Area or Surface—Square feet and decimals (except for land measurement, which is to be taken in acres and decimals).

Capacity or Solid—Cubic feet and decimals.†

Weight—Tons and decimals. (Or for small quantities hundredweights and decimals, or pounds and decimals.)

Specific weight—Pounds and decimals per cubic foot.

Pressure—For boilers, pipes, &c., pounds per square inch. For foundations, &c., tons per square foot.

* Stress on Ironwork—Tons and decimals per square inch.

Temperature—Degrees on Fahrenheit scale.

Speed of Trains, &c.—Miles and decimals per hour.

Velocity of rivers, &c.—Feet and decimals per second.

Water discharge—Cubic feet per second.

* Local rates or measures are not to be used in any report or estimate connected with a Railway Project.

† The cubic foot is also to be adopted (instead of the gallon) as the unit of measurement for tanks, water-supply, &c. The equivalent in gallons may also be given in brackets if desired.

VI. REPORT, STATISTICS, &c.

1. The Report—

(a) The Report should state clearly and concisely the gauge of the line, the leading characteristics of the project, the advantages which may be expected to result from the construction of the railway both from an administrative point of view and as a commercial undertaking, the principal engineering difficulties and the methods by which it is intended they should be overcome, drawing special attention to any points which may appear to be of particular interest of importance.

(b) Throughout the report the distances are to be given by mileage from 'fixed point' as adopted on the index plan and section (*see Chapter IV, 1*), and any levels to which reference is made must be in feet above the mean sea level as adopted for the Great Trigonometrical Survey. The local or temporary chainage, and the local or temporary datum which may have been adopted for convenience during the progress of the survey, are not to be used or quoted in any papers relating to the project when submitted to the Government of India.

(c) The report should be preceded by an Index, with a list of plans and table of distances, also an Index Map to scale of 32 miles to an inch, taken from the Survey of India Map, and showing on it the location of the Railway, and when submitted to Government should be in print, foolscap size. ³⁰Thirty-six copies are required.

The following points should receive special attention, and should be dealt with in the order mentioned :—

2. Preliminary—

(a) References to orders of Government, and previous correspondence, with a brief statement of the special object of the Railway or reasons for making the same.

(b) Reference to previous reports or other sources of information on the subject, giving where practicable the substance of such documents, so that the report may be complete in itself, and render a reference to the other papers unnecessary. Where, however, it may appear desirable to quote lengthly extracts, tables of figures, &c., these should be given separately as an appendix.

(c) A general description of the country to be traversed by the line, with its leading physical, geological and botanical features, in so far as these would be likely to affect the cost of construction, the alignment, or the future prospects of the Railway.

(d) The gauge, and the reasons for adopting it.

(e) A definition of the 'fixed point' from which the mileage is reckoned.

(f) The total length of the line, and the length in each Province, Local Administration or Native State.

3. Location—

A general description of the location adopted for the Railway, noting obligatory or important points in the same. Selection of junctions with other lines, with a brief description of the works contemplated at such junctions. Crossings for important rivers. Station sites in or near large towns or centres of trade.

4. Alternative Routes—

The leading features of practicable alternative routes, with the advantages and disadvantages of each, and the reasons for preferring the location finally selected.

5. Gradients and Curves—

The ruling gradient and distribution of the same. Adjustment of grades to engine power and direction of loaded traffic. The sharpest curve and distribution of the same. Compensation allowed for curves on grades.

6. Construction and Engineering—

(a) The general character of the works as determined by the physical features of the country, by the nature or direction of the probable traffic, or by local circumstances.

(b) The number of lineal feet of water-way per mile, and a brief description of each important work, such as a large bridge or tunnel, noting any difficulties to be expected, special methods proposed for construction, materials to be used, and other particulars.

(c) The description of fencing to be employed, noting if it is intended that the line shall be completely fenced, or if not, to what extent it is intended that fencing shall be used.

(d) The Permanent Way proposed to be adopted. Weight of rail with reference to expected traffic. Description of sleepers recommended, with reference to their relative durability, economy or other advantages.

(e) The height, length and width of platforms.

(f) Position selected for general and branch workshops. Their extent. What work, if any, is to be done by the workshops of neighbouring lines.

(g) Water-supply for stations, workshops, running sheds, staff quarters, &c. Remarks on difficulties which may be expected, and how such difficulties are to be overcome. A description of any special water-supply works which may appear necessary.

(h) The arrangement of Engine Changing Stations, the length of each Engine-run and number of engines provided for.

7. Labour and Materials—

(a) Facilities for carrying out the work by contract or otherwise. Labour available and whence obtained. Employment of military labour, *e.g.*, 'Sappers and Miners,' or 'Pioneer' regiments. Prison or convict labour.

(b) Materials for building, such as stone, brick, lime, slate, timber, fuel, &c., and means of obtaining, working and preparation of the same. Arrangements for ballast and sleeper supply. Style of roofing to be adopted.

(c) Means of transport by land or water existing or capable of development, and probable rates. Facilities for delivering bridge materials, permanent-way, &c., during construction. The use of temporary lines, tramways, &c. Depôts for receiving and forwarding materials.

(d) Prevailing rates and wages, and modifications of the same likely to be caused by the construction of the Railway. Any local conditions which may be expected to affect rates or methods of construction.

8. Arrangement of Staff—

(a) The division of the line for construction purposes into sections, districts, &c. The length of each such portion, and head-quarters proposed for Divisions and for Engineer-in-Chief.

(b) Staff quarters, permanent or temporary. How far accommodation of a suitable character can be obtained in Military Cantonments or Civil Stations. Quarters or offices to be specially built, either for temporary use during construction or for permanent occupation on the open line. Huts for workmen if required.

Vide Ref. I
Corrigendum of
2.9.95

(c) The sanitary condition of the district as affecting the location of the staff, the supply of labour, or the mode of carrying out the work. Medical staff and assistance required during construction, arrangements for dispensaries, &c.

9. Relations with the Public, and Government Departments—

(a) Cases in which the proposed Railway works would interfere with existing military cantonments, buildings or communications. Extent of such interference. Opinion of military authorities and how their objections, if any, can best be met. What adaptation of bridges is possible to enable them to take guns and other military traffic.

(b) Works proposed for the accommodation of the public, including the provision of stations, and selection of station sites. Opinion of local civil authorities as to the sufficiency of such works. Adaptation of Railway bridges to take ordinary road traffic or foot passengers.

(c) Interference with religious edifices or places considered sacred. Extent of damage or interference. Arrangements for compensation, and if agreed to by the owners or persons interested. Opinions of the local civil authorities.

10. Land—

The general cost of land to be occupied for the Railway, noting any special causes which may affect the rates in making them either higher or lower than the average. Difficulties which may be expected in acquiring land in any district owing to occupation by buildings or for religious purposes, the existence of mining rights or other special causes.

11. Traffic and Statistics—

(a) Principles adopted generally for the arrangement, design or position of stations. Special arrangements for stations at large towns or important junctions. Temporary stations.

(b) Notes on nature, extent and direction of existing traffic and alteration to be expected when line is open. Local and through traffic. Population and trade of districts to be served by the line. New traffic which may be expected to be developed by facilities for carriage, *e.g.*, coal or minerals, petroleum, agricultural produce, timber, pilgrims, &c.

(c) Statistics of a lengthy character to be given as an appendix.

12. Tabulated Details—

With the Report the following Tabulated Details of the more important characteristics of the proposed Railway and its equipment are to be submitted:—

- i—Curve Abstract.
- ii—Gradient Abstract.
- iii—Bridge Abstract.
- iv—Important Bridges.
- v.—List of Stations, Station Buildings, &c.
- vi.—Station Machinery.

These Tabulated Details are to be drawn up in accordance with the pattern forms (see 'Forms and Enclosures,') and are to be submitted in print, ⁶⁰thirty-six copies being required.

13. Appendix—

In the Appendix should be given tables of statistics, copies of correspondence, lengthy extracts from other documents, and generally any matter which it may be considered essential to place on record in connection with the project, but which it would be inconvenient to give in the body of the report.

*Vide Gof I
Consequendum of
2.9.95*

[General Distribution.]

3.

Circular No. 7 Railway.
GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.
RAILWAY CONSTRUCTION.

To

THE GOVERNMENTS OF MADRAS, BOMBAY, AND BENGAL.
THE CHIEF COMMISSIONERS OF THE CENTRAL PROVINCES, BURMA, AND ASSAM.
THE RESIDENT AT HYDERABAD.
THE RESIDENT IN MYSORE.
THE AGENTS TO THE GOVERNOR GENERAL FOR CENTRAL INDIA AND RAJPUTANA.
THE DIRECTOR GENERAL OF RAILWAYS.
THE CONSULTING ENGINEERS TO THE GOVERNMENT OF INDIA FOR RAILWAYS,
CALCUTTA, LUCKNOW, CENTRAL DIVISION AND ASSAM.

Simla, the 9th October 1893.

Rules for the preparation of railway projects.

READ—

The following letters from the Director General of Railways :—

No. 221-2 C., dated 21st April 1890.

No. 307 C., dated 26th May 1890.

No. 422 C., dated 24th July 1890.

OBSERVATIONS.—The original rules for the preparation of railway projects were drawn up by the Director General of Railways with a view to ensure uniformity of practice and were supplied by that officer to all Local Governments and Administrations, to Engineers-in-Chief and Managers of State railways, and to Agents and Chief Engineers of guaranteed and other railways.

Some revision of the rules in question having been found necessary, it is now considered desirable that the same should be published by the Government of India for general information.

RESOLUTION.—The Governor General in Council is pleased to promulgate the accompanying code of rules, in supersession of all previous orders, and to direct that they be circulated for the guidance of all who may be concerned in preparing, for new railways or extensions of railways, projects which are intended for submission to the Government of India.

Encl 1
No 9065/93

ORDER.—Ordered, that this resolution and the rules referred to be communicated to the Governments, Administrations and officers named in the margin, for information and guidance; also to the Government of the North-Western Provinces and Oudh, the Government of the Punjab, the Agent to the Governor General for Baluchistan, and the Accountant General, Public Works Department, for information.

The Governments of Madras, Bombay, and Bengal.
The Chief Commissioners of the Central Provinces, Burma, and Assam.
The Resident at Hyderabad.
The Resident in Mysore.
The Agents to the Governor General for Central India and Rajputana.
The Director General of Railways.
The Consulting Engineers to the Government of India for Railways, Calcutta, Lucknow, Central Division and Assam.

By order,

[Signature]

for Under Secretary.

To The Joint Secretary to the Government of Madras,
New: 25.10.93 Public Works Department,
Railway Branch.

Documents accompanying.

Rules for the preparation of railway projects, and forms and enclosures.

All communications should be addressed to the Secretary.

To

The Joint Secretary to the Government of Madras,
Railway Branch, Public Works Department.

Simla, the 26th October 1893.

Sir. In continuation of Government of India Circular No. 701 dated 9th October 1893 promulgating the rules to be observed in the preparation of Railway projects, I am directed to inform you that the forms and enclosures referred to are not yet ready for issue, but that the requisite number of copies will be supplied to you in due course.

I have the honour to be,

Sir,
Your most obedient servant,

Admit this

Documents accompanying:-
- 12 -

[Signature]

J. A. Roberts

Under Secretary.

P. W. CURRENT No. 9450

Recd 6. 11. 93

No. 697C

Government of Madras.

PUBLIC WORKS DEPARTMENT,
RAILWAY BRANCH.

To

THE SECY. TO THE GOVT. OF INDIA,

P. W. DEPARTMENT.

Calcutta

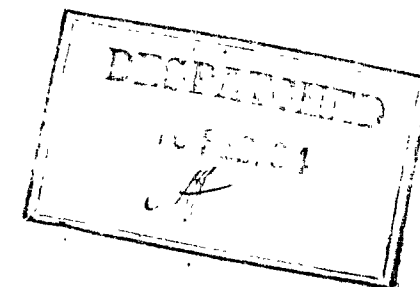
15th February 1894.

SIR,

I am directed
to inquire when the
Government may expect
to receive copies of the
forms and enclosures to
the Rules for the preparation
of Railway projects re-
ferred to in your letter
No. 1111 R. C. of 26 Oct 1893

Recd
14/2/94

Recd
14/2/94



All communications
should be addressed to
the Secretary.

No. 198 R. C.
GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.
RAILWAY Construction.

To

The Joint Secretary to the Government of Madras,
Public Works Department, Railway Branch.

Calcutta, the 26th February 1894.

Sir,

I am directed to acknowledge the receipt of your letter No. 697 C. dated the 15th February 1894 and in reply to say that the forms and enclosures referred to in the Rules for the preparation of railway projects are not yet ready for issue.

I have the honour to be,

Sir,

Your most obedient servant,

J. L. Abbott

Under Secretary.

Documents accompanying :-

Nil.



A.K.

Rd 5-0-94

**RULES FOR THE
PREPARATION OF RAILWAY PROJECTS.**

1893.

FORMS AND ENCLOSURES.

**RULES FOR THE
PREPARATION OF RAILWAY PROJECTS.**

1893.

**FORMS
FOR ESTIMATE AND REPORT.**

Form E. I. (Rules for the preparation of Railway Projects.) *Gonda-Azingarh Railway.*
Form for Estimate.

(5 ft. 6 in. Gauge.)

(152.36 miles.)

ABSTRACT OF
COST OF RAILWAY.

HEADS OF ACCOUNT.	TOTAL COST IN RUPEES.			
	SUB-HEADS.		MAIN HEADS.	
	Total cost.	Rate per mile.	Total cost.	Rate per mile.
I.—Preliminary Expenses—				
1. Survey expenses	26,078	171	1,30,420	856
2. Plant	10,352	68		
3. Establishment	93,990	617		
II.—Land	05,073	624	05,073	624

Rules for the preparation of Railway Projects.

Estimates.

If it be desired to keep the rates from being generally known, the rates and amounts may be left blank in the office copies; a special copy with this information entered in manuscript being submitted separately in a sealed cover marked "Confidential."

To be inserted in "Forms for Estimates."

1. Floating bridges	...	...	—	—			
XI.—Rolling Stock—							
1. Locomotive	...	...	6,26,657	4,113	7,32,790	11,373	
2. Carriage and Wagon	...	...	11,06,133	7,260			
XII.—General charges—							
1. Direction	...	...	1,55,562	1,021	7,95,733	5,223	
2. Engineering	...	...	4,74,299	3,113			
3. Stores	...	...	77,702	510			
4. Audit and Account	...	...	54,386	357			
5. Medical and Sanitation	...	...	15,544	102			
6. Locomotive	...	...	18,240	120			
7. Traffic	...	...	—	—			
Total Expenditure						Rs.1,34,08,589	
Total rate per mile						Rs.83,006	

MINOR BRIDGES.

Gonda-Azingarh Railway.

(Costing over Rs.5,000 each.)

(5 ft. 6 in. Gauge.)
(152.36 miles.)

Mile.	NATURE OF BRIDGE.	EXCAVATION.		Concrete.	MASONRY.		Arching.	Ironwork.	Timber.	Coping.	Dry Filling.	Pitching.	TOTAL.
		Wet.	Dry.		In Foundations.	In Super-structure.							
		Cub. ft.	Cub. ft.	Cub. ft.	Cub. ft.	Cub. ft.	Cub. ft.	Tons.	Cub. ft.	Cub. ft.	Cub. ft.	Cub. ft.	
0.35	1 Arch — 20 feet .	12,240	12,240	5,370	2,826	12,432	1,352	—	—	525	6,210	1,640	
0.82	3 Arches — 6 feet .	—	11,150	6,280	2,134	4,758	630	—	—	312	3,762	1,200	
1.13	3 Girders — 12 feet .	8,400	8,400	6,560	3,100	2,432	—	4.82	127.5	120	4,210	2,400	
1.47	2 Girders — 20 feet .	7,980	8,000	4,890	3,750	7,248	—	6.28	132.8	85	2,786	1,680	
1.82	2 Arches — 12 feet .	4,250	5,370	3,400	3,590	8,651	1,432	—	—	182	6,336	1,320	
2.07	4 Girders — 12 feet .	9,270	9,270	8,273	4,581	14,652	—	6.72	172.7	247	7,381	2,150	
2.42	2 Arches — 20 feet .	9,080	9,080	5,087	5,484	15,403	2,226	—	—	283	16,790	1,000	
etc.	etc.	—	—	—	—	—	—	—	—	—	—	—	
Total quantities		5,42,160	7,36,420	46,3,540	3,25,626	8,41,254	68,727	224.38	6,527	21,382	5,13,585	1,58,620	
Rates		12 ¹ / ₁₀₀	6 ¹ / ₁₀₀	20 %	30 %	36 %	50 %	English. 180/-	Indian, 80/-	-/12-	10 %	6 %	
Amount R		6,506	4,409	92,708	97,688	3,02,851	34,364	40,388	19,581	16,037	51,359	9,517	6,93,114
										Add for Contingencies @ 5 % Add for Bridges costing less than Rs.4,000 each as per list C. Add for share of Plant			
										R 34,656 R 1,57,983 R 8,546			
										GRAND TOTAL R 8,94,299			

NOTE.—This form is to be used for all bridges costing over Rs.5,000 each; it is advisable to include all costing over Rs.4,000 each to allow for possible excess over estimates. For bridges costing less than Rs.5,000 each a lump sum for each may be given in a separate list, the total so obtained being added to the total of this statement.

LIST OF ARTICLES
REQUIRED FROM ENGLAND.

Gonda-Azingarh Railway.

(5 ft. 6 in. Gauge.)
(152.36 miles.)

DESCRIPTION.	QUANTITY.	ENGLISH COST.		RATE OF EXCHANGE.	ENGLISH COST IN RUPEES.	INDIAN CHARGES (a).	TOTAL.	DATE BY WHICH DELIVERY IS REQUIRED.
		F. O. B.	½th freight.					
Girders for Major bridges	2,372 tons	£ 28,464	£ 2,846	1s. 2½d = 16.2712 Rupees per £ sterling.	R 5,09,451	R 21,415	R 5,30,866	October 1894.
Girders for Minor bridges	258 "	2,768	310		50,083	2,278	52,361	April 1894.
Fencing	30 miles	1,899	134		33,079	1,544	34,623	Dec. 1894.
Permanent-way	168 "	143,579	11,066		25,16,260	1,53,152	26,69,412	April 1894.
Station Machinery	as per list H†	15,000	412		2,50,772	4,524	2,55,296	Dec. 1894.
Plant and Workshop Machinery.	as per " Lt	12,000	95		1,96,800	2,454	1,99,254	" 1894.
Locomotives	12 No. †	26,640	960		4,49,085	9,996	4,59,081	{ ¼ in May 1894. ¾ in Dec. 1894.
Coaching Stock	48 " †	7,491	628		1,32,106	4,812	1,36,918	Dec. 1894.
Goods Stock	240 " †	21,672	1,760		3,81,267	14,492	3,95,759	48 ballast wagons in May 1894, remainder in Dec. 1894.
TOTAL		259,513	18,211		45,18,903	2,14,667	47,33,570	

(a) ½th Freight, Insurance and Landing charges only. Indian freight, erection, etc., not to be included.

* 50 miles cast iron sleepers and tie bars; the remainder for wooden sleepers.

† As a general rule there will be no details of these items in approximate estimates; the approximate English prices should, however, be given.

Form R. I. (Rules for the preparation of Railway Projects)
(To accompany Report.)

Gonda-Azingarh Railway.
(5 ft. 6 in. Gauge.)
(152.36 miles.)

CURVE ABSTRACT.

ANGLE OF CURVATURE, OR RADIUS.	NUMBER OF EACH.	TOTAL LENGTH. — Miles.	TOTAL CURVATURE. — Degrees.
(FORM FOR 5 FT. 6 IN. GAUGE)			
4°-20' (R.=1322 feet)	2	0.32	72°.4
4°-0' (R.=1432 feet)	1	0.17	36°.0
3°-20' (R.=1719 feet)	7	1.06	177°.7
3°-0' (R.=1910 feet)	17	3.10	491°.0
2°-0' (R.=2865 feet) up to 2°-59'	43	8.71	987°.9
1°-0' (R.=5730 feet) up to 1°-59'	58	15.81	948°.0
Flatter than 1°=0'	16	2.82	110°.5
TOTAL	144	31.99	2849°.5

Ratio of curve to total length of line—21 per cent.

Average amount of curvature per mile—18.7 degrees.

(FORM FOR METRE GAUGE.)			
6°-40' (R.=859 feet)	2	0.34	120°.0
6°-0' (R.=955 feet)	1	0.15	46°.0
5°-30' (R.=1042 feet)	6	0.80	214°.5
5°-0' (R.=1146 feet)	9	1.20	316°.0
4°-0' (R.=1432 feet) up to 4°-59'	13	1.73	365°.0
3°-0' (R.=1910 feet) up to 3°-59'	17	3.10	491°.0

Rest of form same as for 5 ft. 6 in. gauge.

NOTE.—For all curves of 3°-0' or sharper on 5 ft. 6 in. gauge or of 5°-0' or sharper on metre gauge the actual angle of curvature, length, etc., are to be shown as in the forms above. Below these limits the curves may be classed as above.

Form R. II. (Rules for the preparation of Railway Projects.)
(To accompany Report.)

Gonda-Azingarh Railway.
(5 ft. 6 in. Gauge.)
(152.36 miles.)

GRADIENT ABSTRACT.

INCLINATION.	NUMBER OF EACH.	TOTAL LENGTH. — Miles.	PERCENTAGE OF TOTAL LENGTH OF LINE.
1 in 50, or 2 per cent.	3	2.12	1.39
1 in 67, or 1.5 per cent.	13	7.21	4.73
1 in 80, or 1.25 per cent.	6	3.64	2.39
1 in 100, or .1 per cent.	23	9.05	5.95
1 in 101 to 1 in 150, or 0.67 per cent.	16	7.72	5.07
1 in 151 to 1 in 200, or 0.5 per cent.	47	16.53	10.85
1 in 201 to 1 in 300, or 0.33 per cent.	25	11.40	7.48
1 in 301 to 1 in 500, or 0.2 per cent.	82	23.27	15.27
1 in 501 to 1 in 1000, or 0.1 per cent.	103	41.35	27.14
Flatter than 1 in 1000 including level	...	30.07	19.74
TOTAL		152.36	100.01

The longest continuous grade of 1 in 50 extends for 0.93 miles, followed by a grade of 1 in 67 for 1.26 miles.

All grades of 150 or steeper are confined to the length between miles 14 and 47.

NOTE.—For all grades of 1 in 100 or steeper, the actual inclination, length, etc., are to be shown as in the form above; grades below these limits may be classed as above.

Form R. III. (Rules for the preparation of Railway Projects.)
(To accompany Report.)

Gonda-Azingarh Railway.

(5 ft. 6 in. Gauge.)
(152.36 miles.)

BRIDGE ABSTRACT.

CLASS.	TYPE OF BRIDGE.	Total Number of Spans	Waterway. lin. ft.
Open tops	2 feet	72	144
Flat tops	2 feet	168	336
Arched Culverts	3 feet	234	702
	6 feet	222	1,332
	12 feet	94	1,128
	18 feet	3	54
Girder Bridges	6 feet	32	192
	12 feet	56	672
	20 feet	97	1,940
	40 feet, 12 of one span	12	480
	" 4 of three spans	12	480
	150 feet one of six spans	6	900
	" one of eight spans	8	1,200
TOTAL FOR WHOLE LINE		...	9,560
AVERAGE PER MILE		...	62.7

This does not include irrigation channels of 6 to 12 inches diameter.

NOTE.—For bridges of less than 40 feet span, only the total number of openings of each span need be given; for 40 feet span and over the number of separate bridges and the number of spans in each should also be given.

Form R. IV. (Rules for the preparation of Railway Projects.)
(To accompany Report.)

Gonda-Azingarh Railway.

(5 ft. 6 in. Gauge.)
(152.36 miles.)

IMPORTANT BRIDGES.

(For bridges having a total waterway of 1,200 square feet or upwards.)

NAME OF RIVER.	Mileage.	Drainage Area. Sq. Miles.	Rise of ordinary flood above low water. Feet.	Slope of bed of river, per mile. Feet.	Mean velocity in flood, per second. Feet.	Sectional Area in flood. Sq. feet.	Discharge per second. Cub. feet.	Span.		HEIGHT OF UNDER-SIDE OF GIRDERS.		Average depth of foundations. Feet.
								Feet.	No.	Above low water. Feet.	Above flood level. Feet.	
Ranganga	5	5,935	19	1.3	6.9	21,954	151,483	150	8	31	12	60
About one-half of the area drained by the Ranganga is under cultivation, the remainder being pasture and waste. The average rainfall over the district in the year is about 42 inches and the maximum registered at any station in 24 hours is 9 inches, which record was obtained at Rajgarh on 12th July 1876, when the river rose to 18.7 feet above low water. The soil is chiefly sandy loam overlying sandstone which crops out on the surface occasionally.												
Bangsara	109	4,880	13	1.7	6.3	18,980	119,574	150	6	33	20	20
The area drained by the Bangsara is chiefly covered with forest which probably acts to a great extent as a flood moderator. The rainfall is said to be occasionally very heavy, but there is no rain-gauge station in the district. In the cyclone of 1876 the river is reported to have risen to 14.3 feet above low water, but ordinary heavy floods are from 12 to 13 feet above low water.												

Wells, 16 ft. diameter, of brickwork hearted with concrete, two to each pier, sunk to stiff clay at an average depth of 60 feet below low water level.

Rails between girders. Single line. Cart road on upper booms, floored and ballasted. Girders upright.

Masonry. Open foundations, 20 feet below low water level, on rock. Rails above girders. Single line. Decked and ballasted at rail level for cart traffic. Girders hanging.

STATION BUILDINGS.

NAME OF STATION.	Class.	Mileage.	DISTANCE APART.	STATION BUILDING.	GOODS SHED.	PASSENGER PLATFORM.		GOODS PLAT- FORM.	STATION MASTER'S QUARTERS.		ASSISTANT MASTER OR SIGNALLER'S QUARTERS.		MENIALS' QUARTERS.		WELL — Diam. (c)
						Length.	Height above rails.		No.	Sq. feet.	No.	Sq. feet.	No.	Sq. feet.	
GONDA	...	0	12 $\frac{3}{8}$	3,120	3,200	(b)	—	400	1	4,280	4	2,560	12	1,680	—
Dharnpur	...	12 $\frac{3}{8}$	10 $\frac{1}{2}$	1,630	—	600	1	—	1	1,200	2	1,280	6	840	6
Salwan	...	23 $\frac{1}{2}$	15	1,630	—	600	—	—	1	1,200	2	1,280	6	840	—
Shahpur (a) ...	...	38 $\frac{1}{4}$	16 $\frac{3}{8}$	1,630	—	600	1	—	1	1,200	2	1,280	6	840	6
Nawabganj (a)	...	54 $\frac{5}{8}$	18 $\frac{3}{8}$	1,630	1,800	600	3	300	2	2,400	2	1,280	8	1,120	—
Musani (a)	...	73	14 $\frac{1}{2}$	1,630	—	600	1	—	1	1,200	2	1,280	6	840	—
Mandwal (a) ...	...	87 $\frac{3}{4}$	13 $\frac{1}{2}$	1,630	—	600	1	—	1	1,200	2	1,280	6	840	6
Bishanpur (a)	...	101 $\frac{1}{4}$	9 $\frac{1}{2}$	1,630	—	600	3	—	1	1,200	2	1,280	6	840	6
BANDA	...	111 $\frac{1}{2}$	8 $\frac{1}{2}$	2,460	3,200	600	3	400	2	6,460	4	2,560	12	1,680	—
Shergarh	...	120	10 $\frac{1}{2}$	1,520	—	600	1	—	1	1,200	2	1,280	6	840	6
Gujran	...	130 $\frac{1}{2}$	9	1,520	1,800	600	3	300	1	1,200	3	1,920	8	1,120	—
Kheri	...	139 $\frac{1}{4}$	12 $\frac{3}{8}$	1,520	—	600	1	—	1	1,200	2	1,280	6	840	6
AZINGARH	...	152 $\frac{1}{2}$	—	4,380	5,400	600	3	400	2	6,460	4	2,560	16	2,240	—

(a) The section is graded to admit of stations being put in at miles 29 $\frac{1}{2}$, 43 $\frac{1}{2}$, 62 $\frac{1}{2}$, 79 and 93 $\frac{1}{2}$.

(b) Existing platform at Gonda will be used.

(c) Well is only entered where it is provided for the use of the staff only.

STATION MACHINERY.

NAME OF STATION.	Station ashpts.	WATER COLUMNS.		PIPING.		WATER-TANK.		WELL.	Steam pump.	Hand pump or water lift.	SWITCHES.			CROSSINGS.			Main Signals.		Distant Signals.		WEIGH-BRIDGE.		ENGINE SHED.		Loco. ashpts.	Engine Turntable.
		Number.	Diameter.	Length.	Diameter.	Capacity.	Diameter (a).				15 feet.	12 feet.	Total.	1 in 12.	1 in 8 $\frac{1}{2}$.	1 in 6.	Total.	No.	No.	No.	Number.	Tons.	Sq. feet.	Area.	No.	No.
GONDA	2	1	6	620	6	3,072	16	1*	—	—	4	4	8	4	4	—	8	1	3	3	1	30	5,280	3	1	—
Dharnpur	—	—	—	—	—	—	—	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
Salwan	1	1	8	110	8	1,200	12	—	—	1	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
Shahpur	—	—	—	—	—	—	—	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
Nawabganj	1	1	8	110	8	1,200	12	—	—	1	4	3	7	4	2	1	7	1	2	2	1	—	—	—	—	—
Musani	1	1	8	110	8	1,200	12	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
Mandwal	—	—	—	—	—	—	—	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
Bishanpur	—	—	—	—	—	—	—	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
BANDA	2	2	6	836	6	3,072	16	1†	—	—	4	8	12	4	6	2	12	1	2	2	1	30	5,280	4	1	—
Shergarh	—	—	—	—	—	—	—	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
Gujran	1	1	8	110	8	1,500	16	—	—	1	2	5	7	2	4	1	7	1	2	2	—	—	—	—	—	—
Kheri	—	—	—	—	—	—	—	—	—	—	2	1	3	2	—	1	3	1	2	2	—	—	—	—	—	—
AZINGARH	1	1	6	842	6	3,072	16	1*	—	—	4	7	11	4	5	2	11	1	1	1	2	—	5,280	2	1	—
TOTAL	9	8	—	2,738	—	14,316	70 $\frac{1}{2}$	3	4	—	34	35	69	34	21	14	69	13	26	5	—	—	15,840	9	3	—

(a) Not including wells for staff only.

* 8 Horse-power.

† 6 Horse-power.

**RULES FOR THE
PREPARATION OF RAILWAY PROJECTS.**

1893.

ENCLOSURES.

- I. Diagram for compensation of curves.
 - II. Notification for Survey.
 - IV.(a) Pattern Plan.
 - IV.(b) Pattern Section.
 - V. Special points requiring attention.
-

*NOTE.—Enclosure III "Rules for the acquisition of land," is bound up separately
as it is not usually required until the estimate has been sanctioned.*

DIAGRAM TO FACILITATE THE DETERMINATION OF THE COMPENSATION TO BE ALLOWED FOR CURVES ON GRADIENTS.

Example No. 1.

On a 5 ft. 6 in. gauge Railway it is decided that, with Goods Stock 12 feet wheel base, the maximum resistance is not to exceed that due to a grade of 1.0 per cent. (1 in 100) on the straight. What is the steepest gradient permissible with a 5 degree curve (1,146 feet radius)?

Taking from the diagram the height (up to the line for 12 feet wheel base, 5 ft. 6 in. gauge) of the vertical ordinate for a 5 degree curve, and measuring downwards on the gradient scale from the line of 1.0 per cent. grade, the height on the scale remaining after this reduction is found to indicate a grade of .6 per cent.

Hence the steepest grade that can be used, without exceeding the maximum resistance, is .6 per cent. (1 in 167).

Example No. 2.

On a Metre gauge Railway it is decided that, with Bogie Stock 4 ft. 6 in. wheel base, the maximum resistance is not to exceed that due to a grade of 1.0 per cent. (1 in 100) on the straight. What is the sharpest curve permissible on a grade of .8 per cent. (1 in 125)?

Taking from the gradient scale the difference from the .8 per cent. grade line to the 1.0 per cent. grade line, and applying this to the diagram, it will be found to correspond to the height (measured to the line for 4 ft. 6 in. wheel base, Metre gauge) of the ordinate for a 6 degree curve.

Hence the sharpest curve that can be used, without exceeding the maximum resistance, is 6 degrees (955 feet radius).

Example No. 3.

On a 5 ft. 6 in. gauge Railway, with Coaching Stock 16 feet wheel base, if a 4 degree curve (1,432 feet radius) be used on a grade of .8 per cent. (1 in 125), what will be the resistance due to curve and gradient combined?

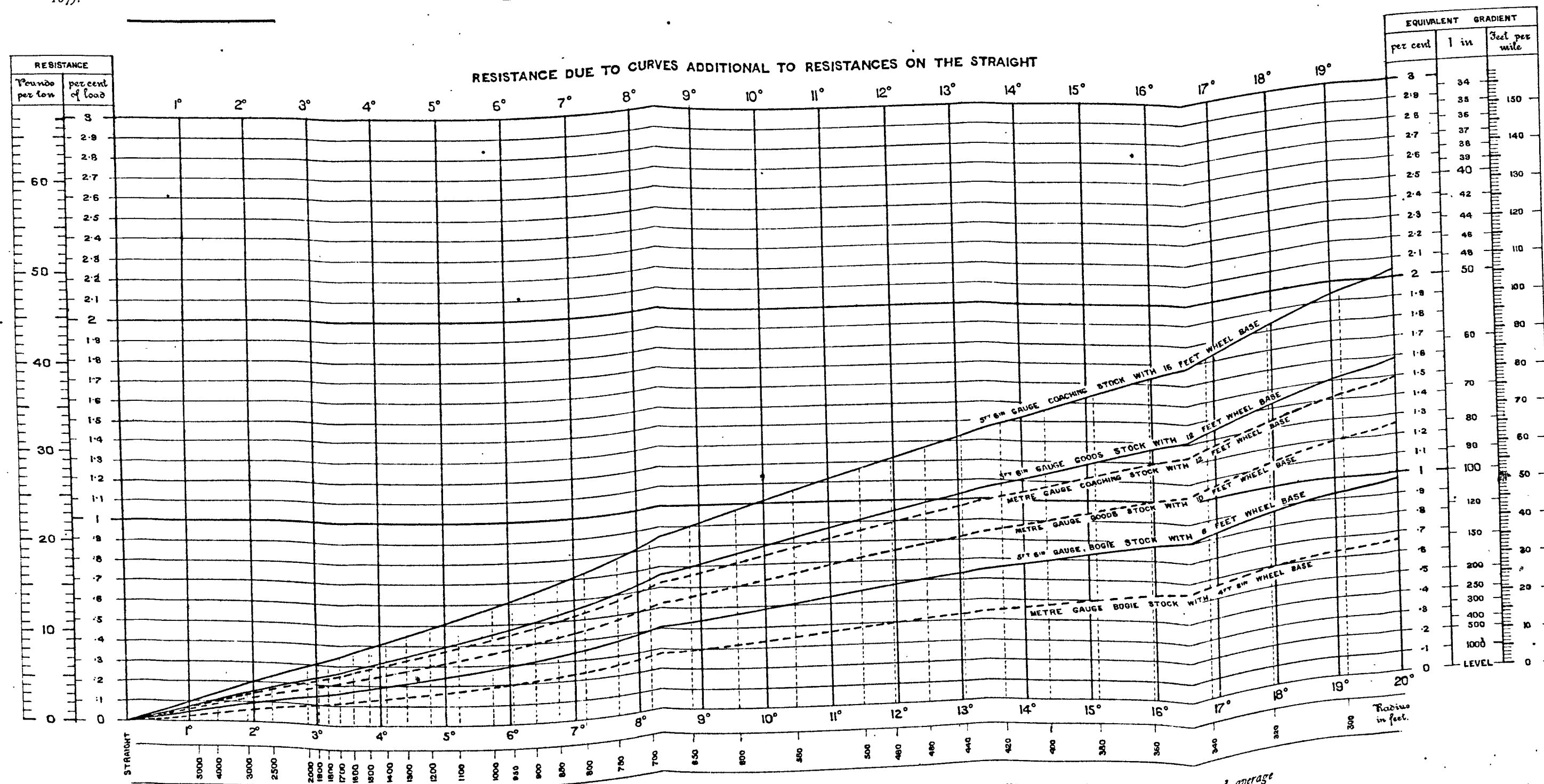
Taking from the diagram the height (up to the line for 16 feet wheel base, 5 ft. 6 in. gauge) of the vertical ordinate for a 4 degree curve, and adding this to the height on the gradient scale representing a grade of .8 per cent., the total will be found to correspond on the resistance scale to 1.2 per cent. on the gross load, or about 27 lb. per ton.

Example No. 4.

On a Metre gauge Railway, with Goods Stock 10 feet wheel base, what curve on the level would give a resistance equivalent to that due to a grade of .5 per cent. (1 in 200) on the straight?

Taking from the scale the length representing a grade of .5 per cent. and applying it to the diagram, it will be found to correspond to the height (measured to the line for 10 feet wheel base, Metre gauge) of the ordinate for an 8 degree curve.

The curve of equivalent resistance is therefore 8 degrees (716 feet radius).



NOTE.—The results given by the diagram may be taken as applicable to Railways on which ordinary conditions prevail, with the rolling-stock and permanent-way in good average order, and adhesion about 1 in 4. With rails and wheel flanges badly worn the resistance on curves would be increased, and with wet slippery rails the resistance might be very much reduced.

(Rules for the preparation of Railway Projects.)

Enclosure No. II-A.

(To be substituted for Enclosure No. II in the Rules of 1893.)

NOTIFICATION FOR RAILWAY SURVEY.

For the actual notification different Local Governments use different forms, and in some cases, where a survey only is contemplated, and there is no immediate intention of actually acquiring land, do not publish any notification in the local gazette.

The Local Government must in all cases be informed of the intention to carry out a survey, and its instructions regarding the preparation and submission of a notification asked for.

NOTE.—Sections 4 and 5 of the Land Acquisition Act, 1894, are as follow :—

Preliminary Investigation.

4. (1) Whenever it appears to the Local Government that land in any locality is likely to be needed for any public purpose, a notification to that effect shall be published in the official Gazette, and the Collector shall cause public notice of the substance of such notification to be given at convenient places in the said locality.

(2) Thereupon it shall be lawful for any officer, either generally or specially authorized by such Government in this behalf, and for his servants and workmen,—

to enter upon and survey and take levels of any land in such locality ;

to dig or bore into the sub-soil ;

to do all other acts necessary to ascertain whether the land is adapted for such purpose ;

to set out the boundaries of the land proposed to be taken and the intended line of the work (if any) proposed to be made thereon ;

to mark such levels, boundaries, and line by placing marks and cutting trenches ;

and, where otherwise the survey cannot be completed and the levels taken and the boundaries and line marked, to cut down and clear away any part of any standing crop, fence or jungle :

Provided that no person shall enter into any building or upon any enclosed court or garden attached to a dwelling-house (unless with the consent of the occupier thereof) without previously giving such occupier at least seven days' notice in writing of his intention to do so.

5. The officer so authorized shall at the time of such entry pay or tender payment for all necessary damage to be done as aforesaid, and, in case of dispute as to the sufficiency of the amount so paid or tendered, he shall at once refer the dispute to the decision of the Collector, or other chief revenue officer of the district, and such decision shall be final.

NOTE.—Enclosure No. III, "Rules for the acquisition of land," is bound up separately, as it is not usually required until the estimate has been sanctioned.

(Rules for the preparation of Railway Projects.)

Enclosure No. II.

NOTIFICATION FOR RAILWAY SURVEY.

For the actual notification, different Local Governments use different forms, and in some cases, where a survey only is contemplated, and there is no immediate intention of actually acquiring land, do not publish any notification in the Local Gazette.

The Local Government must in all cases be informed of the intention to carry out a survey, and its instructions regarding the preparation and submission of a notification asked for.

NOTE.—Sections 4 and 5 of the Land Acquisition Act, 1870, are as follow:—

Preliminary Investigation.

4. Whenever it appears to the Local Government that land in any locality is likely to be needed for any public purpose, a notification to that effect shall be published in the local gazette, and the Collector shall cause public notice of the substance of such notification to be given at convenient places in the said locality.

Thereupon it shall be lawful for any officer either generally or specially authorised by such Government in this behalf, and for his servants and workmen—

to enter upon and survey and take levels of any land in such locality :

to dig or bore into the sub-soil :

to do all other acts necessary to ascertain whether the land is adapted for such purpose :

to set out the boundaries of the land proposed to be taken and the intended line of the work (if any) proposed to be made thereon :

to mark such levels, boundaries and line by placing marks and cutting trenches ; and where otherwise the survey cannot be completed and the levels taken and the boundaries and line marked, to cut down and clear away any part of any standing crop, fence or jungle.

Provided that no person shall enter into any building or upon any enclosed court or garden attached to a dwelling-house (unless with the consent of the occupier thereof) without previously giving such occupier at least seven days' notice in writing of his intention to do so.

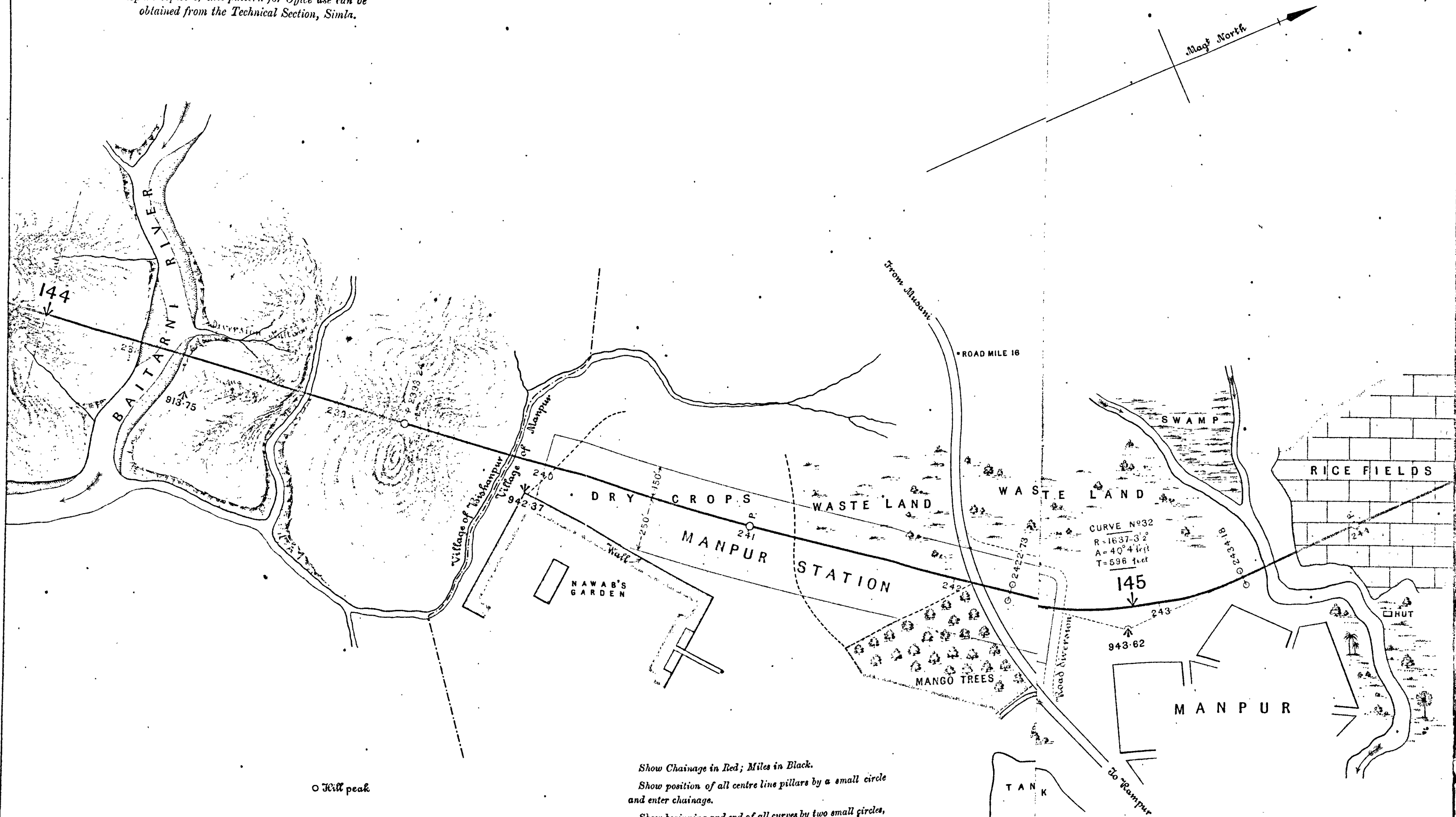
5. The officer so authorised shall at the time of such entry pay or tender payment for all necessary damage to be done as aforesaid, and in case of dispute as to the sufficiency of the amount so paid or tendered, he shall at once refer the dispute to the decision of the Collector, and such decision shall be final.

NOTE.—Enclosure No. III, "Rules for the acquisition of land" is bound up separately, as it is not usually required until the estimate has been sanctioned.

(Rules for the preparation of Railway Projects).
Enclosure No. IV (a).

Spare copies of this pattern for Office use can be obtained from the Technical Section, Simla.

○ Temple on hill



○ Hill peak

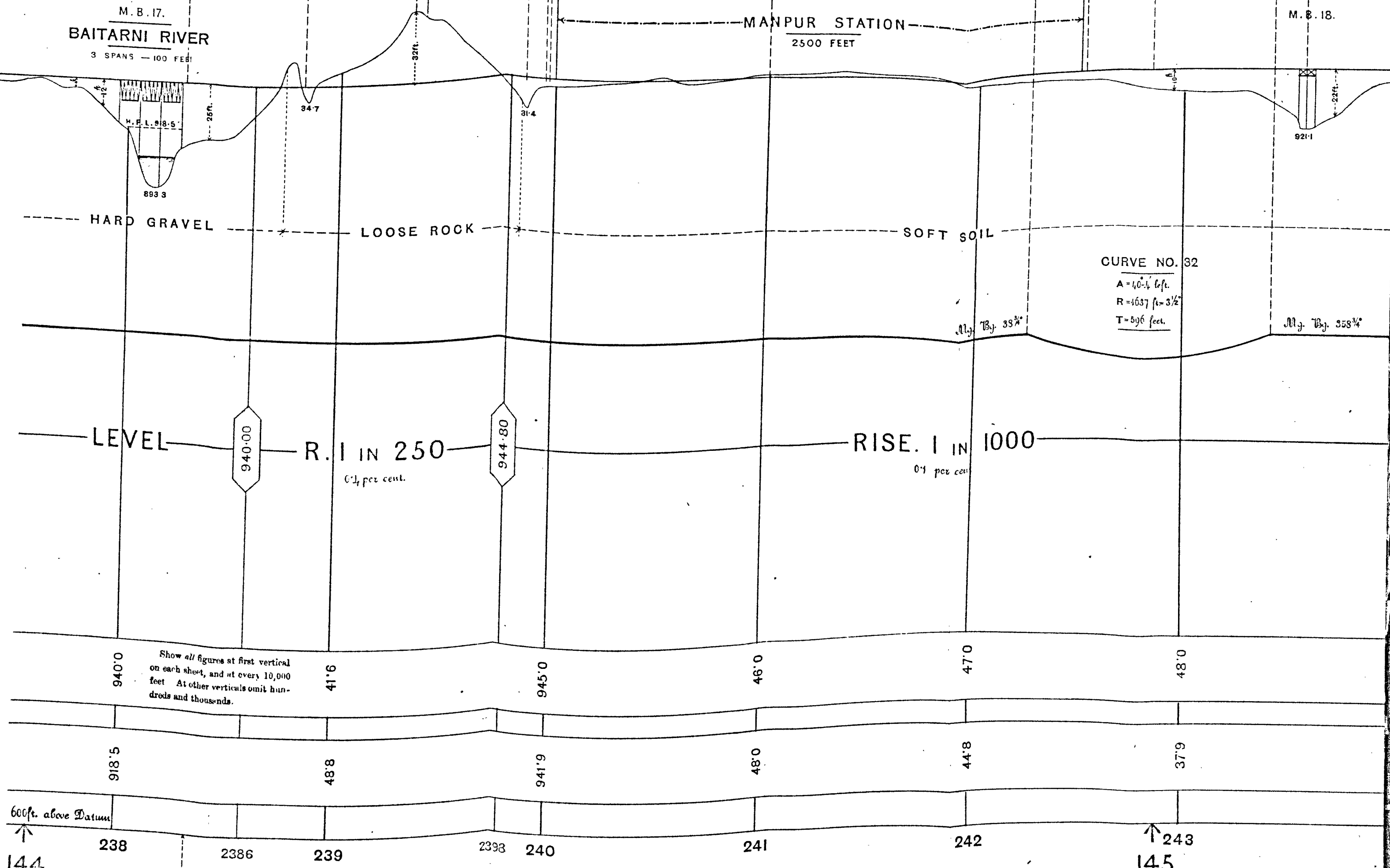
- Show Chainage in Red; Miles in Black.
Show position of all centre line pillars by a small circle and enter chainage.
Show beginning and end of all curves by two small circles, one on each side of centre line, and enter chainage.
Show width of Station Yard each side of centre line.
Show position and level of all Bench Marks.
Show all details within 300 feet of centre line.
Show the following within 1,000 feet of centre line:—
Rivers of more than 40 feet Waterway, Main Roads, Canals, Large Tanks, Outlines of Villages, Boundaries of Provinces or Districts, Hill Peaks, &c.
Take bearings to all prominent hill peaks or buildings visible, and show position by a small black circle.
Make separate plan for large rivers of more than 1,200 square feet of waterway.

NOTE.—A curve should not be in or near a Station if it can possibly be avoided.

(Rules for the preparation of Railway Projects)
Enclosure No. IV (b).

Spare copies of this pattern for Office
use can be obtained from the
Technical Section, Simla.

Show chainage of all masonry pillars and
cross sections, and position of all Bench Marks.



SPECIAL POINTS REQUIRING ATTENTION IN THE CONSTRUCTION OF A RAILWAY FOR PUBLIC TRAFFIC.

Formation, Earthwork, &c.

1. When sharp curves and steep gradients cannot be avoided, special precautions should be adopted to ensure the safe working of the line.
2. Slips in cuttings and embankments to be guarded against by the adoption of proper slopes or special precautions.

Tunnels.

3. Tunnels to be properly lined where necessary, particular care being taken to leave no portion of the sides or roof in such a condition as to be likely to fall in, or projecting so as to infringe Standard Dimensions.
4. Facilities to be provided to enable workmen to escape from an approaching train without difficulty.

Bridges and Culverts.

5. Wooden floors, bedplates and sleepers on bridges to be protected, where necessary, from fire.
6. Provision to be made for expansion, by rollers or other means, for bridge girders of spans of 100 feet or upwards, and man-holes, ladders, or other facilities for examination and repair, to be provided.
7. When the track is carried by timbers resting directly on the main girders, the timbers and fastenings are not to be considered as bracing.
8. Hand rails or parapets to be provided where necessary.
9. Long bridges should be provided with facilities which will enable workmen to escape from an approaching train without difficulty.
10. A sufficient cushion of earth to be allowed on arched bridges between bottom of ballast and crown of arch.
11. The width of arched bridges, face to face, for a single line should, as a general rule, be twenty feet on the 5 ft. 6 in. gauge, or sixteen feet on the metre gauge.

Fencing.

12. Fencing, where provided, to be of efficient design, good construction, and in proper order, without gaps or interruptions.

13. In every case, the boundary of the Railway land must be properly defined by suitable marks which can at any time be readily found and identified.

14. Whether the line generally is fenced or not, efficient fencing is in any case to be provided round every station yard, and for at least a hundred feet of line beyond the station yard at each end; if there is a level crossing at the end of the yard, the fencing should stop at it.

Level Crossings.

15. Where gates are used capable of closing *across* the line, provision is to be made for the following requirements:—

- (a) A gate-keeper with a suitable hut.
- (b) Efficient and simple means of fastening each gate both across the Railway and across the road.
- (c) Proper signals and lamps to show both along the Railway and road.
- (d) Where a clear view of the gates cannot be had by the driver of an approaching train for a distance of at least a quarter of a mile in each direction, a special self-acting signal to be provided and so placed as to be visible for that distance.
- (e) Special signals, and interlocking apparatus where necessary, near large stations or crowded thoroughfares.
- (f) Gates not to be made of iron.

16. Where a gate is *not* intended to close *across* the line, such gate is to be so placed that, whether open or closed, no part of it can come within a distance of seven feet from the centre line of rails. This rule is also to be taken to apply to any hinged bar, chain or other device intended to be used for closing any road crossing a railway.

17. Guard rails to be provided at all level crossings.

Over-bridges.

18. The roadway for the public over the bridge to be of proper width with suitable inclines according to the class of traffic to be accommodated. Approaches to be fenced where necessary to prevent accident. In the neighbourhood of important towns the bridge to be provided with continuous closed parapets of suitable construction and proper height and length to prevent horses being frightened by passing trains.

Mile and Gradient Posts.

19. Mile and gradient posts to be well constructed and placed in convenient position to enable the figures to be read with facility from a passing train. The figures to be bold and clear, and not less than four inches high.

20. In the case of a railway in through communication with a seaport, the mileage is to be reckoned from the end which is nearest to that seaport. For a branch line the mileage is to be reckoned from the same zero as that adopted for the main line.

21. Mile posts to be provided at every mile, and intermediate numbers to be given on each telegraph post.* When, owing to their distance from the line or other cause, telegraph posts are not numbered, quarter-mile posts should be provided.

22. All changes of gradient to be marked by gradient-posts.

* For example, $\frac{35}{9}$ on a telegraph post would signify a distance of nine posts beyond mile 35.

Ballast and Permanent-Way.

23. Ballast to be of good quality, not liable to deteriorate under the influence of the weather or the working of the sleepers, and sufficient in quantity.

24. Sleepers to be of good quality and of a suitable description.

25. With flat-footed rails, on pine sleepers, bearing plates should be used on the sleeper next the joint on each side, double spiked outside each rail; with hard wood sleepers, double spiking only would suffice. On sharp curves the outer rail should be double spiked on the outside, and with pine wood sleepers should also have bearing plates.

26. Rail joints to be properly fished.

27. Check rails required on all sharp curves likely to be run over at speed.

Station Buildings, Platforms, &c.

28. Suitable accommodation for passengers to be given at all stations and proper arrangements for lighting platforms and stations where trains run by night. Latrines to be provided where required, to be situated at a safe distance from the well, to be provided with suitable means for lighting at night, and to be so constructed and arranged as to be easily kept clean. As a rule, latrines should be near the end of the platform, furthest from the well.

29. Foot-bridges or subways for crossing the line to be provided where necessary. On staircases to foot-bridges the steps should be not less than eleven inches in the tread, nor more than seven inches in the rise, and if their total height exceeds 15 feet an intermediate landing not less than 4 feet in length should be provided.

30. The ends of all platforms to be ramped, not steeper than 1 in 6, and hand rails or other suitable protection to be provided to all high level platforms, staircases, over-bridges, &c.

31. The names of stations to be shown, both in English and vernacular, in large and distinct letters, in conspicuous positions so as to be readily seen by passengers in the trains. At the more important stations the names should also be shown on the lamps in English and vernacular alternately.

32. Clocks to be provided at all crossing stations and so placed as to be easily seen by the guards and drivers.

33. Proper facilities for booking passengers to be provided, and weighing machines for parcels and goods to be supplied.

Signals.

34. Stations and junctions to be properly protected by fixed signals. Distant signals to be placed as a rule at a distance not less than 1,500 feet from the outside points in the main line, this distance to be increased if on a grade falling towards the station.

35. Both main and distant signals to be so placed as to be plainly visible for a sufficient distance to the driver of an approaching train; distant signals should be plainly visible from the main signals, and each distant signal lamp arranged to show a small back tell-tale light towards the station to indicate the position of the front spectacle.

36. All semaphore signals to be so arranged that the signal shall be given by the arm on the left of the post as seen from an approaching train, and distant signals fitted to show 'danger' and 'caution' only.*

* The arm must be prevented by a stop from falling below the "caution" position.

37. The arrangements for working signals to be such that the arm cannot be lowered by any alteration in the length of the connections due to change of temperature, and that it shall show 'danger' in the event of breakage or failure of any of the connections.

Points and Crossings.

38. Switch handles to be so placed that the pointsman may be exposed to no danger or inconvenience from passing trains. As a rule, switch handles should not be placed between two lines of rail; but if so placed, the levers are to be arranged to work parallel to the line, *not* at right angles thereto.

39. Facing points on the main line or sidings over which passenger trains may pass are to be provided with arrangements by which the points can be securely fastened in either direction and locked with a padlock, unless provided with approved automatic locking apparatus.

40. Points worked from a distance are to be connected with the lever by rods properly compensated for temperature. Wires are not to be used for this purpose. Facing points, when so worked, should be provided with a locking bar longer than the greatest distance between any two consecutive wheels, and an indicator visible from the lever to show which way they are set.

Turntables.

41. Proper provision is to be made for turning engines either by turntable or triangle* at every engine station or working junction, and at every terminus, whether permanent or temporary.

Station Yards, &c.

42. Sufficient siding accommodation for the traffic immediately expected should be provided at all stations, and facilities for interchange of traffic at all junctions with foreign lines.

43. Provision to be made by scotch-blocks or other means to prevent vehicles escaping from dead end sidings. It is recommended that the scotch-block, or other arrangement, be so constructed as to lie below rail level, when out of use, and it must be so designed as not to injure the gear of automatic brakes when in use.

44. Stations should, if practicable, be on a level when in bank, or on an easy grade when in cutting. A station must in no case be on a gradient steeper than 1 in 500 or 0.2 per cent. without special permission of the Government of India, nor should a falling grade steeper than 1 in 500 commence within 150 feet of the outside facing points, unless a slip siding is provided.

45. At any station situated on or in the immediate neighbourhood of a heavy incline, if the incline be falling *towards* the station, a catch siding — or if the incline be falling *from* the station, a slip siding — is to be provided in a suitable position with the points locked over for the siding as their normal position.

46. Station yards should be so arranged that shunting past junctions or level crossings may be avoided as far as practicable.

* This rule may be relaxed in the case of short branch lines. In such cases tank engines should, if practicable, be used.

RULES RELATING TO LAND.

Classification of Railway Land—

I.—Railways constructed by Government.

1. On Railways constructed by Government land is divided into two classes, viz.:—

I.—Permanent Land.

II.—Temporary Land.

2. *Permanent Land*.—Land which will be required permanently after the Railway is open for traffic and the work of construction is complete. Under this head will be included all land to be occupied by the formation of the permanent line of Railway, with side slopes of banks and cuttings, and the berms connected therewith; the entrances to tunnels and shafts belonging to the same; the sites of bridges and protection or training works; station-yards; landing places for Railway ferries; ground to be occupied by works belonging to the Railway, such as gas-works, arrangements for water-supply, etc.; ground for the storage, manufacture, or acquisition of materials; land for cemeteries, plantations, gardens, and recreation grounds; sites for permanent stations, offices, workshops, dwelling-houses and other buildings required for the purposes of the Railway, or the accommodation of the staff, with the grounds, yards, roads, etc., appertaining thereto.

Under this head will also be classed land which will be permanently occupied by the diversion of roads or rivers, or for other works undertaken for public purposes incidental to the construction of the Railway, although such land will cease to be held by the Railway authorities on the completion of the works.

3. *Temporary Land*.—All land which is required for temporary purposes only, and which is relinquished after the work of construction is complete.

II.—Railways constructed by Companies.*

4. On Railways constructed by Companies land is divided into four classes, viz.:—

I.—‘Class A’ land.

II.—‘Class B’ land.

III.—‘Class C’ land.

IV.—‘Class D’ land.

5. *‘Class A’ Land*.—Land which the Company receives for permanent occupation free of charge under its contract or other arrangement with Government. Under this head is included all land required for the permanent works of the Railway, including the formation of the line with its side-slopes, berms, bridges, etc.; and for all stations, workshops, permanent store-houses, and the like, necessary for the line when opened, and which, under the contract or other arrangement, is to be provided by Government free of cost to the Railway Company. The occupation of this land by the Company will be so far permanent that it will cease only when the contract is terminated or surrendered and the whole lapses to Government.

* The classification given here would apply fully only in the case of a Railway for which land was taken up on terms similar to those adopted for the old Guaranteed Companies. The conditions under which land is occupied by other Railway Companies in India vary according to the terms of their respective contracts (or other arrangements) and are in some cases practically the same as specified above for Railways constructed by Government. For the exact text of the rules laid down for the old Guaranteed Companies, see reprint of Government of India, P. W. Dept., Circular No. 55, dated 29th June 1861, given as Appendix C (page 12).

RULES RELATING TO LAND.

Amount of land required.

6. *‘Class B’ Land*.—Land which the Railway Company receives for temporary occupation free of charge under its contract or other arrangement with Government. Under this head is included all land essential for the execution of the permanent works of the Railway, but not required after the completion of the line in part or whole. Such is land for spoil banks, for extra excavation to make banks, and for the storage of material held in stock by the Railway Company pending the construction of the line or their despatch to the works.

7. *‘Class C’ Land*.—Land which the Railway Company has to provide at its own cost. Under this head is included land which is required for the provision or preparation of materials, for purposes contingent on the actual execution of the works on the line, or for other miscellaneous objects which the Government recognises as falling legitimately within the scope of the Railway Company's operations, though not giving the Company a claim to the provision of land free of charge. ‘Class C’ land will be taken up by Government and handed over to the Railway Company for occupation at a fixed rental.

8. *‘Class D’ Land*.—Land which, being required in consequence of the works of a Railway, still does not come directly into the occupation of the Railway Company at all. Under this head is classed land required outside the Company's boundary, for the diversion of roads or rivers, and for the construction of roads which are made for public purposes and which will not afterwards be maintained by the Company. ‘Class D’ land will be provided by Government free of charge.

Amount of land required—

9. In estimating for the amount of land to be taken up for a Railway, care should be taken to make provision not only for the land which will be required permanently for the purposes of the open line (such as those indicated on page 1 under ‘Permanent Land’), but also for such land as will be required during construction only, for spoil banks, side cuttings, quarries, stacking and preparation of material, temporary offices, workshops and quarters, and for temporary purposes generally, to be relinquished after the work is complete.

10. Land is everywhere (except under the special sanction of the Government of India previously obtained) to be provided of a width sufficient to allow of the line being doubled. For this purpose the minimum width required for the ‘Permanent land’ (in the case of a Railway constructed by Government) or ‘Class A land’ (in the case of a Railway constructed by a Company) under ordinary circumstances is as follows* both for the 5 ft. 6 in. and for the metre gauge:—

Embankment	70 feet + 2 slopes.
Cutting	76 feet + 2 slopes.

11. It is to be remembered that the width here specified is, in each case, the minimum, and that it may frequently be necessary to arrange for extra land which will be required after the line is open, for repairs to embankments, for stacking material, or for other purposes. Land so provided would be additional to the minimum permanent land shown on the diagram, and during the construction of the line should be reserved and kept free from excavation or spoil.

* For details see sections showing widths of land to be taken up, Appendix A, pages 8 and 9. The ditch shown on these sections need not be dug, unless required, but whether the ditch is required or not, a width of not less than 24 feet must in every case be preserved from toe of slope to edge of side-cutting, or from edge of cutting to foot of spoil-bank.

Land for a Railway on the metre gauge should ordinarily be taken up of the full width required for the 5 ft. 6 in. gauge, as specified above. In special cases, however, where it may be considered as practically certain that the Railway will, at no future time, be converted to the 5 ft. 6 in. gauge, the width given in the diagram for metre gauge may be worked to.

Plans to be made.

23. The data for the preparation of the Land Plans should generally be obtained during the progress of the survey for the location of the line, and the general instructions for the preparation of plans to accompany a project for a Railway, when submitted to the Government of India, are to be held to apply also to plans required for the acquisition of the land necessary for the construction of the Railway.*

24. The following *additional* information is to be supplied on the Land Plans :—

- (a) In the case of a Railway to be constructed by Government, or by a Company under the terms of whose contract land is divided into two classes, 'permanent' and 'temporary,' the plans made out for the first acquisition of the land will shew the outer boundary line; and all land, for whatever purpose it may be required, will be taken up as for permanent occupation. This land will be distinguished on the land plans by being coloured pink.

N.B.—This rule applies only to the copies of the plans made for the Civil authorities for use on the acquisition of the land, and is not intended to prevent Engineers from marking on their Office copies the intended disposition of the land as 'permanent' and 'temporary', or any other information which may be found convenient for use during construction, or for the purpose of the estimate.

As early as practicable, after the line is opened, and it is known definitely what land can conveniently be relinquished, the original plans will be corrected (or fresh plans made), shewing the boundaries of the land required for permanent occupation ('Permanent Land'), and also those of the land to be relinquished ('Temporary Land'). On these latter Land Plans, the two classes of land are to be distinguished by colour as follows :—

Permanent Land — Pink.

Temporary Land — Yellow.

- (b) In the case of a Railway constructed by a Company, by the terms of whose contract (or other arrangement with Government) land has to be taken up under special classes A, B, C and D as defined on page 1 of these rules, or under other conditions of a like nature, the plans made out for the first acquisition of the land will shew clearly the boundaries of the land to be taken up under *each* of these classes.

As early as practicable, after the line is opened, the original plans will be corrected (or fresh plans made), shewing the disposition of the land as determined after the work of construction is completed.

On these Land Plans, the four classes of land are to be distinguished by colour as follows :—

Class A Land — Pink.

Class B Land — Yellow.

Class C Land — Purple.

Class D Land — Green.

- (c) Detached portions of land should be referred to some fixed point on one of the main sheets with distances and compass or other bearings, or such reference to the published maps of the neighbourhood as will ensure a ready identification of the land. A corresponding entry should in each case be made on the nearest main sheet to draw attention to the detached plot.
- (d) On all Land Plans, whether made out under clause (a) or under clause (b), the position of the boundary of each class of land is to be determined by dimensions written on the plan; these dimensions to be sufficiently complete to enable such boundaries to be, at any time, readily ascertained or verified.
- (e) The names of villages to which the land belongs are, in each case, to be written on the plan alongside of the line indicating the village boundary. If the boundary line crosses the Railway line the names are to be repeated on the other side of the Railway line, and the chainage of the crossing point noted.
- (f) When boundary marks have been erected for the demarcation of the land occupied by the Railway, the position and corresponding number of each detached boundary mark is to be shown on the Land Plans.

25. The Land Plans are to be made up in sets for continuous portions of land, each set being complete for a revenue district or charge of a Collector or Deputy Commissioner (or length of Native State). On each end sheet (first and last) of every set of Land Plans, a

* See Rules for the preparation of Railway Projects, pages 11 and 12.

Acquisition of Land.

sufficient portion of the continuation sheet of the next set should be repeated, to enable the two sheets to be connected or traced together, if required. For each set of Land Plans the sheets are to be numbered consecutively throughout, and the name of the Civil district (or Native State) to which the set belongs, is to be marked conspicuously on each sheet.

26. For a Railway constructed by Government, the minimum number of sets of Land Plans required is two, *viz.*, one for the Civil authorities and one for the Railway. For a Railway constructed by a Company, the minimum number of sets of Land Plans required is three, *viz.*, one for the Civil authorities, one for the Railway, and one for the Consulting Engineer.

27. Each set of Land Plans is to be signed by the officer immediately responsible for its preparation, and by the Chief Engineer of the Railway. In the case of land required for a line already opened, the Manager will also countersign the plans before sending them on.

28. Land Plans are to be kept up to date either by adding to the existing plans or substituting new sheets as may be necessary. Each such addition or alteration is to be carefully checked by the officer in immediate charge of that portion of the Railway, and attested by his signature. It is to be understood that the Land Plans at any date must shew a clear and accurate record of the land occupied by the Railway on that date.

29. A complete series of Land Plans for the whole line is to be kept in the office of the Chief Engineer of the Railway.

Acquisition of Land—

30. All arrangements for the acquisition of land required for the construction of a Railway will be made by the local Civil officers.*

31. To this end each Civil officer in charge of a district, in which land is required for Railway purposes, is to be furnished with particulars of such land, as follows:—

- (a) A complete set of Land Plans prepared in accordance with the instructions given above.
- (b) A complete set of schedules prepared in the form given as Appendix B (see pages 10 and 11).

32. On receipt of sanction for the construction of the Railway, a statement containing the following information should at once be sent to the Secretary to the Local Government or Administration, with a request that the notification required under Section 6 of the Land Acquisition Act of 1870 may be inserted in the local official Gazette, and that the district Civil officers concerned may be instructed to arrange for the transfer of the land required:—

- (a) The name of the Railway.
- (b) A copy of the order of Government sanctioning the construction of the Railway.
- (c) A brief general description of the route to be followed by the Railway, with the names of the more important villages or towns through or near which it is intended that the Railway shall pass.
- (d) A list of the Civil districts in which land will be required for the purposes of the Railway, with the approximate area in acres of the land required in each.
- (e) For each Civil district the name or description of the place or places at which the Land Plans for that district will be available for inspection by the public.

33. With the statement above specified should also be sent, for the information of the Local Government or Administration, a general index plan to a scale of 1 mile to 1 inch, shewing the route to be followed by the Railway.†

34. On receipt of the information specified above, the Local Government or Administration will publish in the local official Gazette the notification required under the provisions of Section 6 of the Land Acquisition Act of 1870, together with such statements as may be considered advisable under Section 3, clause 1 of the Land Acquisition (Mines) Act of 1885, and will instruct the local Civil Officers to arrange for the acquisition of the land required, and its transfer to the Railway.

* This rule is not intended to prevent preliminary enquiries regarding the probable cost of land being made by the Railway Officers direct from the owners.

† This index plan should be prepared in accordance with the instructions given on page 11 of the Rules for the preparation of Railway Projects under the head 'Index Plan and Section.'

Valuation and Payment—Land Relinquished.

35. When orders are received for the construction of the Railway, the land required should be properly marked out, unless this has already been done.

36. Except so far as may be necessary for the proper survey or marking out of the land required, work must not be commenced or damage done, materials deposited, or any excavation or demolition put in hand until the land has been formally made over, or unless approval in writing has been obtained from the local Civil authorities.

37. Where land required for Railway purposes forms part of a cantonment or camping ground, the Military authorities in the Quarter-Master General's Department should be consulted before steps are taken for the acquisition of such land.

38. In the case of a Railway to be constructed by a Company, all arrangements with the Civil authorities (or with the Political officers for Native States) for the acquisition of the land required will be made through the Consulting Engineer, who will be responsible that the proper procedure is followed, and that the Land Plans and Schedules are drawn up in accordance with these rules. All such Land Plans and Schedules will be furnished by the Company to the Consulting Engineer, in triplicate. The Consulting Engineer will countersign all three copies, and will then return one set to the Company and forward a second set to the Civil authorities, retaining the third set for record in his office.

Valuation and Payment—

39. The valuation of the land and assessment of all claims and payment for the same will be made by the Civil authorities.*

40. All land for Railway purposes, whether required temporarily or permanently, will be taken up in the first instance as for permanent occupation, and valued accordingly. It is to be understood that the distinction between 'Permanent' and 'Temporary' land, or 'Class A' and 'Class B' land, is merely of the nature of a forecast shewing what the disposition of the land will probably be on completion of the work.

41. In the case of a Railway constructed by Government, or by a Company under the terms of whose contract land is divided into two classes 'Permanent' and 'Temporary', the Railway will, in the first instance, be debited with the full cost of all land which may be acquired, and will afterwards be credited with the amount realised by the sale of such land as may be relinquished.

42. In the case of a Railway constructed by a Company, by the terms of whose contract (or other arrangement with Government) land has to be taken up under special classes A, B, C, and D, as defined on page 1 of these rules, or under other conditions of a like nature, 'Class C' land will be acquired by Government and leased to the Company, the rent being fixed at 5 per cent. on the cost of the land, plus any Government revenue with which the land may be chargeable. An annual settlement of accounts connected with the 'Class C' lands will be made between Government and the Company; the Company bearing any loss owing to diminished value and being credited with any gain arising from enhanced value.† Houses, trees, tanks, or other property, on land which is not provided free of charge, and for which special payment or compensation is necessary will be paid for at once by the Railway Company. In the case of land provided free of charge, the materials, etc., derived from the 'clearance' of the surface (which then will be at the expense of Government), will be disposed of by the Revenue officers to the best advantage.

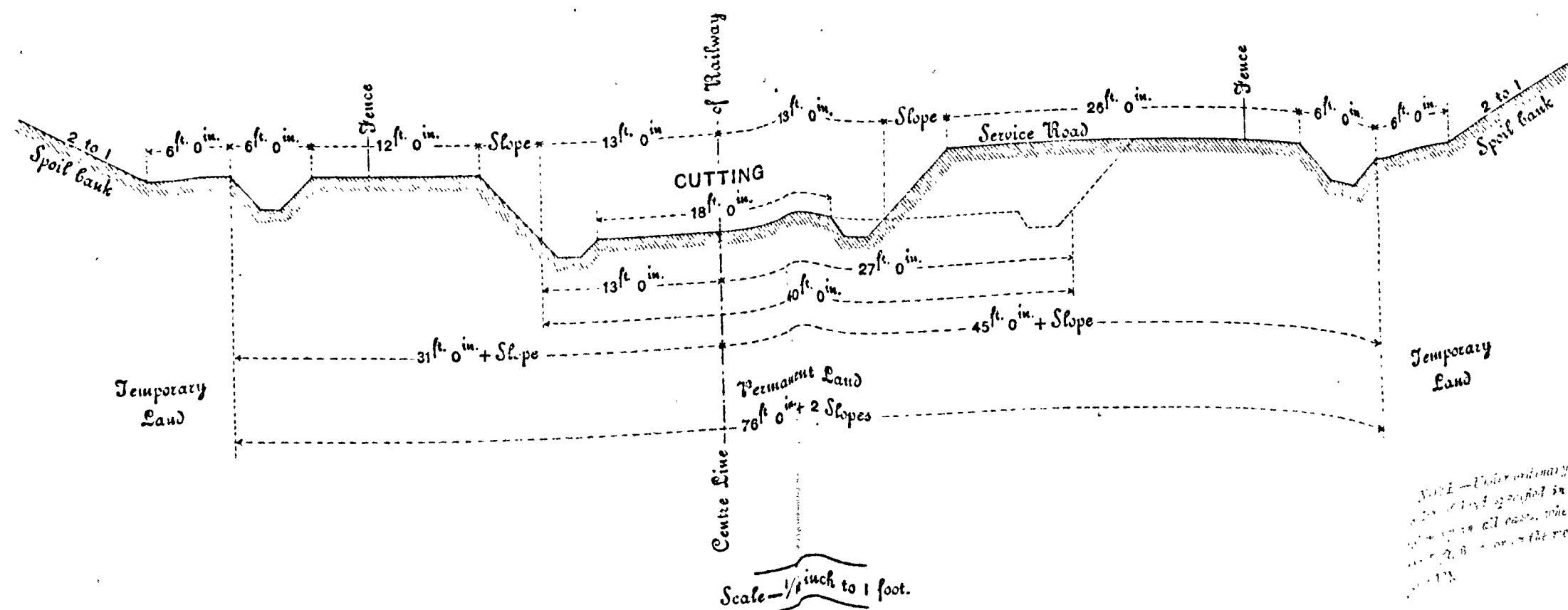
Land Relinquished—

43. Land having been occupied for the purposes of a Railway, should, when no longer required, be made over to the local Civil authorities, who will arrange for its disposal.

* The procedure to be adopted by the Civil authorities and Accounts officers in connection with this work is laid down in Govt. of India, Fin. Dept., Resolution No. 1580, dated 29th June 1886.

† This rule came into force in 1877, and does not apply to land for which, under the previous rules, an enhanced rent had been paid to allow for deterioration (see Govt. of India, P. W. Dept., Resolution No. 3755—60 K., dated 16th October 1877).

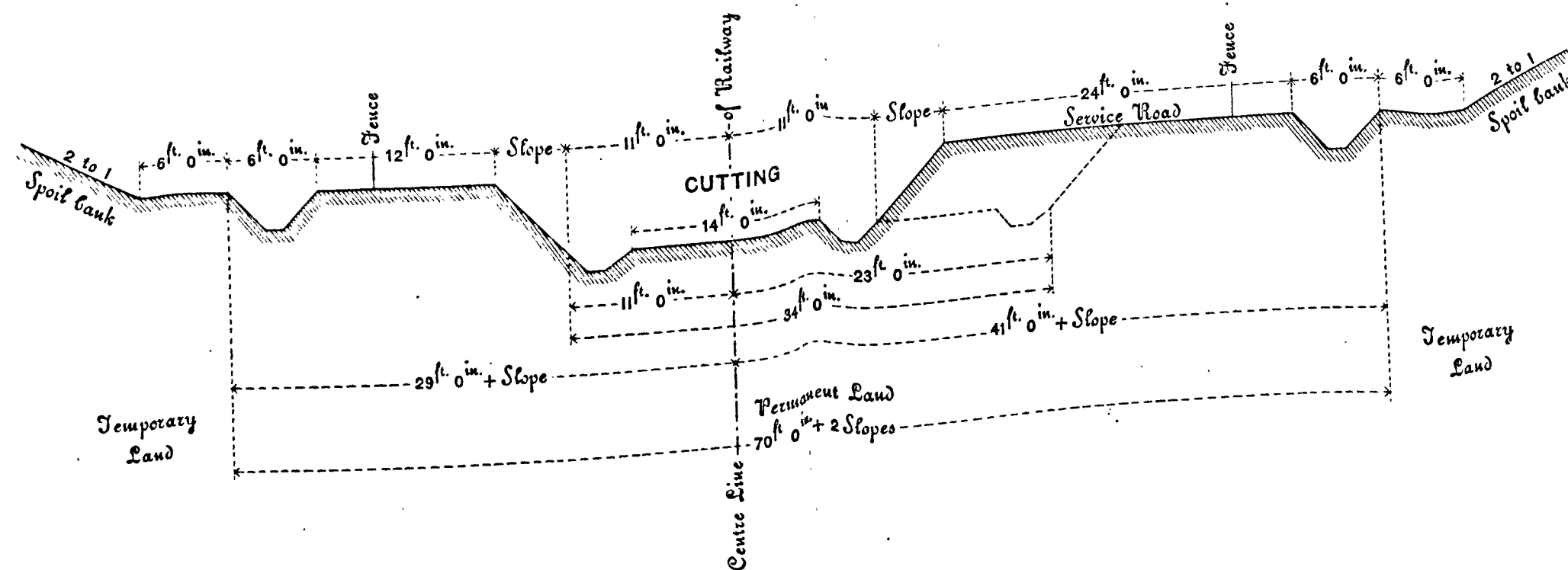
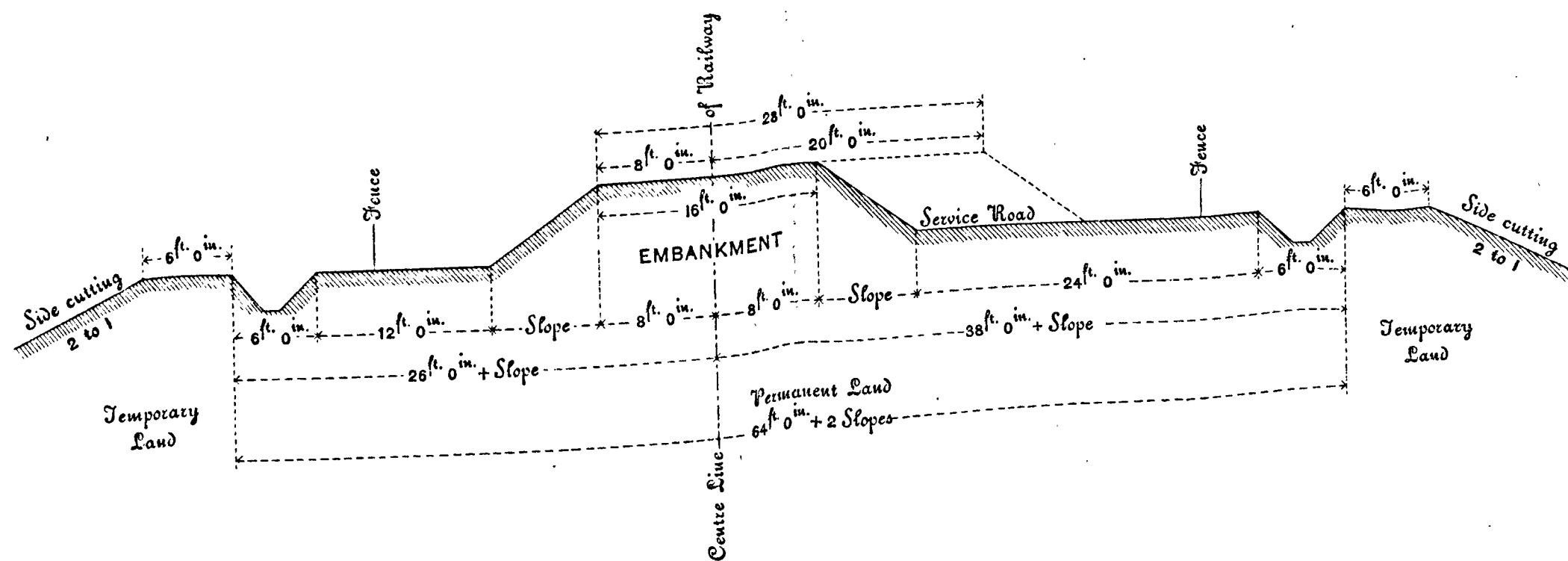
The diagram illustrates a cross-section of a railway embankment and its surrounding land parcels. The central feature is the **EMBANKMENT**, which is flanked by **Temporary Land** on the left and **Permanent Land** on the right. A **Service Road** is situated on the right side of the embankment. The **Centre Line of Railway** runs vertically through the center of the embankment. The diagram includes various dimensions in feet and inches, such as **6 ft. 0 in.**, **12 ft. 0 in.**, **28 ft. 0 in. + Slope**, **10 ft. 0 in.**, **34 ft. 0 in.**, **24 ft. 0 in.**, **20 ft. 0 in.**, **26 ft. 0 in.**, **42 ft. 0 in. + Slope**, and **70 ft. 0 in. + 2 Slopes**. It also indicates **Side cutting 2 to 1** on both ends and **Fence** lines. The embankment itself is labeled **EMBANKMENT** and **Slope**.



NOTE - Under ordinary circumstances, the
 effect of a signal in this diagram should be
 the same in all cases, whether the Railway be
 single or double track, the retro-gauge (see further on).

(Rules relating to Land).
Appendix A.

GENERAL CROSS SECTIONS. SHOWING WIDTHS OF LAND TO BE TAKEN UP.



Scale — $\frac{1}{8}$ inch to 1 foot.

NOTE.—Under ordinary circumstances, for a metre gauge line, the total width of land taken up should be that specified on the diagram for 5 ft. 6 in. gauge (see foot-note, page 13), and that diagram should be worked to in all respects, except as regards width of formation.

Appendix B.—Form of Schedule for Land Acquisition.

BANDA DISTRICT.
Bilaspur Tahsil.

GONDA-AZIMGARH RAILWAY.

Azimgarh Section.

Schedule shewing land required for Railway purposes in the
Bilaspur Tahsil of the Banda District.

Name of Village—MANDWAL.

REFERENCE TO PLAN.		PURPOSE FOR WHICH THE LAND IS OCCUPIED.	AREA OF LAND REQUIRED.			
Set.	Sheet.		Class A (Pink). Acres.	Class B (Yellow). Acres.	Class C (Purple). Acres.	Class D (Green). Acres.
Set C—Banda District.	3	Main line from chainage 36,627 to chainage 38,900, land to be permanently occupied.	4'6963	...	...	...
	3	Same length for side cuttings	...	...	...	...
	3	Extra land for stacking material, etc., at site of Bridge No. 57.	9'5500	...	...	...
	4	Mandwal Station-yard	28'6961	...	...	...
	4	Approach road to Mandwal Station	...	...	...	2'7548
	4	Site for temporary House and Office for Assistant Engineer.	...	5'5096	...	...
	5	Brickfield to north of line opposite chainage 42,350.	...	...	11'2163	...
	6	Main line from chainage 41,440 to chainage 42,728, land to be permanently occupied.	2'4389	...	...	...
	6	Same length for side cuttings	...	1'5243	...	...
TOTALS			35'8313	19'7148	11'2163	2'7548

Azimgarh,
17th September 1891.

Consig. Engineer.

District Engineer.

Chief Engineer.

Appendix B.—Form of Schedule for Land Acquisition.

BANDA DISTRICT.
Bilaspur Tahsil.

GONDA-AZIMGARH RAILWAY.

Azimgarh Section.

Schedule shewing land required for Railway purposes in the
Bilaspur Tahsil of the Banda District.

Name of Village—MANDWAL.

REFERENCE TO PLAN.		PURPOSE FOR WHICH THE LAND IS OCCUPIED.	AREA OF LAND REQUIRED (Pink). Acres.
Set.	Sheet.		
Set C—Banda District.	3	Main line from chainage 36,627 to chainage 38,900, land to be permanently occupied.	46'963
	3	Same length for side cuttings	3'1309
	3	Extra land for stacking material, etc., at site of Bridge No. 57.	9'5500
	4	Mandwal Station-yard	28'6961
	4	Approach road to Mandwal Station	2'7548
	4	Site for temporary House and Office for Assistant Engineer	5'5096
	5	Brickfield to north of line opposite chainage 42,350	11'2163
	6	Main line from chainage 41,440 to chainage 42,728, land to be permanently occupied.	2'4389
	6	Same length for side cuttings	1'5243
TOTAL			69'5172

Azimgarh,
17th September 1891.Manager
(for open line State Railway).Consig. Engr.
(for Company's Ry.)

Executive Engineer.

Engr.-in-Chief.

Appendix C.—Rules for Guaranteed Railway Companies.

APPENDIX C.

RULES LAID DOWN IN 1861 FOR THE ACQUISITION OF LAND REQUIRED FOR RAILWAY PURPOSES BY THE OLD GUARANTEED COMPANIES.

See Government of India, Public Works Department, Circular No. 55, dated 29th June 1861.

1. Land required for Railway purposes may be divided into four classes, A, B, C, and D. First, Class A, land which a Railway Company receives free of charge, under the contract with the Government, for permanent occupation. Second, Class B, land also provided free of cost, but only for temporary occupation. Third, Class C, land which the Railway Company has to provide at its own cost. Fourth, Class D, land which does not come directly into the possession of the Railway Company at all.
2. Class A will comprise the land required for the permanent works of a Railway, including the road with its bridges, etc., and all stations, workshops, permanent store-houses and the like, necessary for the line when opened, and which under the contract is to be provided by Government free of cost to the Railway Companies. The occupation of this land by a Railway Company will be so far permanent that it will only cease when their contract is terminated or surrendered and the whole lapses to Government. It is all provided free of charge.
3. Class B will contain land essential for the execution of the permanent works of a Railway, but not required after the completion of the line in part or in whole. It also is provided free of charge; such is land for spoil-banks, for extra excavation to make banks, for river diversion, and for the storage of Railway materials held in stock by the Railway Company, pending the construction of the line, or their despatch to the works.* The occupation of this class of land will be temporary. On its restoration to the Government—the proper time for which will be settled in each case between the Railway officers and the Consulting Engineer—it will be for the Revenue officers to dispose of it to the best advantage of Government.
4. Class C will contain the land which a Railway Company has to provide at its own cost. This is land which is required for the provision or preparation of materials; for purposes contingent on the actual execution of the works on the line, or for other miscellaneous objects which the Government recognizes as falling legitimately within the scope of the Railway Company's operations, though not giving the Company a claim to the provision of land free of charge. As a Railway Company is bound to pay for the construction of all works out of the capital, receiving only from Government, without charge, the land on which the works stand, the provision of all materials, and the means of facilitating the execution of all works, are to be at the cost of the Railway Company (a). It is

(a) The following words were also in the original rules:—
“In this class, therefore, will fall all land for brick-making, for quarrying ballast,* for houses for persons employed on the work, etc. So also land for houses for engine-drivers, and the like, on the line when opened, and for other similar purposes, will come under Class C.”

But Her Majesty's Secretary of State for India thought that any particularization in the rule might raise questions as to the power of Government to alter or vary the terms of the contract (a power which the Government has no intention of claiming). It has therefore been thought best to give these words in a note simply for the guidance of the officers of Government, and parties interested, as to the construction which Government puts on the contract in regard to certain points of frequent practical application.

* In the original rules the words “for roads to works in progress” here found place. They have now been struck out as calculated to mislead. It is clear a road may be required from a site used temporarily for storage of materials itself in Class B. This would carry the road itself into the same class. A road from a brick-field or quarry would be in the same category as the brick-field or quarry, *viz.*, Class C. Whereas a road from a detached but permanent store-yard, although leading “to works in progress,” would not the less come under Class D, should such road still be necessary after the completion of those particular works. Thus, generally, the circumstances of the tenure of land at the end of the road furthest from the Railway will decide the class into which the road itself shall be placed.

Appendix C.—Rules for Guaranteed Railway Companies.

proper to bear in mind, in fixing the rent, that this land will in part deteriorate by the use to which it is put, and in part will not so deteriorate. In all cases, however, it will be most convenient to deal with the land, in the first instance, in the same manner. It will be taken possession of by Government, and handed over to the Railway Company for occupation at a fair rental. When the necessity for occupation ceases, the land will be given up again to Government by the Railway Company, the proper time for this being determined, as under Class B, by the Railway officers and Consulting Engineers.

5. Class D will contain that land which, being required in consequence of the works of a Railway, still does not come directly into the occupation of the Railway Company; it will be provided free of charge. It will be exclusively land for roads; either new roads leading to railway stations, or to permanent store-yards or workshops detached from the main works, or diversions or changes of old roads made necessary by railway works.

6. Inconvenience is likely to arise if Railway Companies are permitted to hold land, on their own account, or otherwise than is above explained. By causing them to rent from the Government all land to which they are not entitled free, in the manner above explained, simplicity in the tenure of their property will be secured, which will be a matter of importance at a future time when the Railway may be transferred to Government. The determination of the value to be paid by the Government for any land not included in Class A, which might be held by a Railway Company, would certainly be, in such an event, a great embarrassment.

7. Houses, trees, tanks, or other property on land which is not provided free of charge and for which special payment or compensation is necessary, will be paid for at once by the Railway Company. In the cases of land provided free of charge, the materials, etc., derived from the “clearance” of the surface, which then will be at the expense of Government, will be disposed of by the Revenue officers to the best advantage.

8. All land required for a line of Railway will be applied for in continuous portions: the plans will be drawn to a scale of 150 feet to the inch, and the measurements and areas will be recorded in accordance with the fiscal divisions of village estates of mouzahs, pergunnahs, and zillahs, in a schedule, of which a form is annexed, showing in detail the several classes to which the land belongs.

9. The several classes of land will be coloured pink, yellow, purple, and green, respectively, in the plans, and the exact purpose to which each parcel of land is to be devoted will be noticed in the schedule.

10. Detached portions of land should be referred to some fixed point on one of the main sheets, with such distances and compass or other bearings as will enable the land to be identified at once. A corresponding entry should also be made on the main sheet to draw attention to the detached portion.

11. The general correctness of the plans and schedules of the Railway Engineers being attested by the Consulting Engineers to Government, the applications will be forwarded to and dealt with, as may be necessary, by the Revenue authorities under the orders of the Local Government: The Revenue officers are to be held strictly responsible for the regular adjustment by Railway Companies of all charges on account of land, to be determined in the manner above explained.

12. A complete set of Land Plans should be recorded in the Chief Engineer's Office of each Railway, and a copy forwarded to the Consulting Engineer to Government by whom a duplicate will be given to the Revenue Board, which, in turn, will supply Collectors of districts with transcripts of parts included in their respective zillahs. When it may be found expedient, in order to expedite the making over of the land, to employ a special Land Commissioner for this duty, the Railway Engineers should supply an additional copy of the Land Plan for the use of the Land Commissioner.

13. The Consulting Engineer to Government and the local Revenue authorities will, respectively, be held responsible for the punctual fulfilment of the foregoing orders in their several departments, and for the careful record of plans in their respective offices.

Appendix C.—Rules for Guaranteed Railway Companies.

14. All contemplated changes in the land in possession of a Railway Company should be promptly reported by the Railway Agent to the Consulting Engineer to Government, who will notify the same to the Local Government. It will be for the latter to see that the necessary steps are taken by the Revenue authorities for entering such changes in their records, and for carrying out all further proceedings that are requisite on such an occurrence.

15. It will be necessary for the Local Government to see that a correct register and record of title of all Railway lands is maintained; for the whole of such lands will one day revert to the Crown: also that all rents or payment for clearances, etc., chargeable in behalf of Government against the Railway Company, are duly realized.

16. It is essential that there should be for each Railway one set of plans, in a regular sequence, to shew all the land; and that the plans of each Railway Company's estate, after they have once been prepared, should constantly be corrected and always be maintained complete.

AMENDMENT OF RULES RELATING TO
ADJUSTMENT OF ACCOUNTS CONNECTED WITH "C CLASS" LANDS.*

See Government of India, Public Works Department, Resolution Nos. 3755-60 R., dated 16th October 1877.

I am directed to acknowledge the receipt of your letters Nos. 4645 and 4646, dated the 22nd December 1871, on the subject of the adjustment of the rent and sale-proceeds of Railway class C lands, and to say that the Governor General in Council concurs in the proposals contained in your letter to the Board of Revenue, No. 3976, dated 14th October 1871, viz., that an annual settlement should be made with Railway Companies of all accounts connected with the re-sale of C lands, the net loss being charged against the Companies, on condition that this rule shall apply to the case of all lands re-sold whenever they may have been taken up, unless (under paragraph 5 of the Public Works Department Circular No. 55 of 1861) a specially high rent has been charged to meet the probable loss by deterioration. The rent of C lands will in future be in all cases fixed at the rate of 5 per cent. on the capital expended, plus any Government revenue with which the land may be chargeable.

* This amends paragraph 4 of P. W. Dept. Circular No. 55, dated 27th June 1861, above.

Appendix D.—Land for Dwelling-houses for Railway Staff.

APPENDIX D.

LAND REQUIRED FOR DWELLING-HOUSES FOR EMPLOYÉS
OF A RAILWAY COMPANY TO BE PAID FOR AS UNDER 'CLASS C.'

Government of India, Public Works Department, Circular No. 16, dated 6th April 1861.

The following extract of orders, passed by the Governor General in Council on a reference from Madras, is circulated for guidance in cases where application may be made by Railway officers for land to build dwelling-houses on, or where the Railway officers propose to build such dwelling-houses on, land provided at the cost of the State. It will be seen that, whatever may have been admitted in some such cases hitherto, no claim should in future be recognised for the provision of land for such dwelling-houses at the cost of the State.

Extract from letter to Secretary to Government of Madras.

"I am directed to state in reply that the Government of India cannot admit that dwelling-houses for Engine Drivers or Station Masters, and still less for general workmen, are 'conveniences' under terms of the contract. This sort of accommodation being given or refused is merely a question of wages."

Appendix F.—Quarrying in Land belonging to Native States.

APPENDIX F.

PROCEDURE TO BE FOLLOWED IN THE ACQUISITION OF LAND IN NATIVE STATES REQUIRED FOR QUARRYING FOR THE PURPOSES OF A RAILWAY.

Govt. of India, P. W. Dept., Circular No. XXVIII Railway, dated 7th November 1882.

It having been brought to the notice of His Excellency the Governor General in Council that it not unfrequently happens that local Railway officers obtain access to land in Native States for quarrying and other purposes of the like nature, without reference to the Native States concerned, and that the procedure often gives rise to misunderstandings as to the terms on which such land is to be held and used by the Railway, His Excellency in Council is pleased to direct that in future no quarry is to be opened outside the limits of the land made over to the Railway in any Native State, until the permission of the Native State or Durbar concerned shall have been obtained by the local Railway officers through the Political officer attached to the State. In short, the procedure followed in connection with the acquisition of land in British territory should be observed, except that, instead of the land being acquired under the Land Acquisition Act (*Act X of 1870*), it will have to be obtained through the Political officer on such terms as may be agreed upon with the Durbar after the submission of the necessary Land Plans.

All communications
should be addressed
to the Secretary.

No. 447 R. C.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

RAILWAY *Construction.*

7

30/5/94

Simla, the 16th May 1894.

The under-mentioned papers are forwarded

to the Joint Secretary to the Government of
Madras, Public Works Department, Railway
Branch, in continuation of the Government of
India Circular No. 7 Railway dated the 9th
October 1893.

*No. 497 R.
1894
Railway Circular
No. 1734 dated
5/5/94*

By order,

J. H. Abbott

Under Secretary.

Documents referred to.

28

Terms and Enclosures to the Rules for
the preparation of Railway Projects.

80/2/94 by 6/1/94

No 337 R of 4 June 1894

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following

Circular from the Govt. of India P. W. Depto. — No. 7 Railway of 9th Oct 1893
Letter from — do — 1111 R.C. of 26th — do —
Letter from — do — 198 R.C. of 26th Feb 94
Memo from — do — 447 R.C. of 16th May 94

Communicated to
the Agents Madras and South
Indian Railways and to the
Engineer in Chief Bangalore Madras
Railway Survey for information
and guidance.

7/6/94 R

To the Agent in Charge Madras by 9/6
- to the Agent in Charge S. Ry. 9/6
- to the Engineer in Charge Bangalore by 9/6
- to the Engineer in Charge K. Ry. 9/6
- to the Political Dept. 9/6
- to the Local & Municipal Dept. 9/6
Sir R. & L. D. Bridge St. C. S. B. Carlton Club London 13/6
Messrs J. H. & Co. M. S. C. E. & William Lonsdale, 31 Lombard Street London 13/6
Mr. G. S. G. M. S. C. E. 37, Old Jewry, E.C. London 13/6
Messrs Wallace Brothers & Austin Friars London 13/6
Mr. G. S. G. Secy. to Govt. of Mysore P. W. Dept. 14/6
Mr. L. S. G. Bangalore 14/6
J. H. & Co. Barrow Esqrs, Oxford & Cambridge Club & Augustan
Grange, Dursley, Pall Mall S. W. London.

Enclos
Recd: 31-5-94

337 R of 4-6-94