

The image shows the front cover of an antique book. The cover is decorated with a marbled paper pattern featuring a network of dark, branching veins against a lighter, textured background. A central, rectangular, light-colored paper label is pasted onto the cover, containing the title in a classic serif font. The label is framed by a thin, dark border. The spine of the book is visible on the left side, showing a dark, textured material and a circular metal fastener near the top.

G. T. SURVEY,
—
HEIGHTS,
—
N. W. PROVINCES
AND BENGAL.

T A B L E S
OF
H E I G H T S
IN N. W. PROVINCES AND BENGAL,
DETERMINED BY THE
GREAT TRIGONOMETRICAL SURVEY OF INDIA,
BY
SPIRIT LEVELING OPERATIONS,
TO MAY 1865.

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P R E F A C E .

THE following Tables of Levels are the result of Special Spirit-Leveling Operations of the Great Trigonometrical Survey of India, that were carried from Calcutta to Agra, in continuation of the great line of Levels connecting Agra with Káráchí, the details of which are published in the "Tables of Heights in Sind, the Punjab, North-West Provinces, and Central India, 1863."

The distance from Calcutta to Tiliagarhí (242 miles), on the line of the East India Railroad, was executed by Mr. Civil Assistant A. W. Donnelly; thence to Agra (688 miles) by Lieut. H. Trotter, R.E.

J. T. WALKER, *Lieut.-Colonel, R.E.,*
Supt., Great Trigonometrical Survey.

CALCUTTA, }
10th February, 1866. }

CONTENTS.

							PAGE
INTRODUCTION,	...	...	...	...	...	...	i
Specimen of Field Book of Leveling Operations of Great Trigonomet-							
rical Survey,	..	...	...	...	...	...	ix
References,	...	...	...	...	...	...	3
HEIGHTS.	Section I.—N. W. P.; Agra to Cawnpore,	...	...	...	...	...	5
“	Section II.—N. W. P.: Cawnpore to Allahabad,	...	...	...	...	...	13
“	Section III.—N. W. P.; Allahabad to Benares,	...	...	...	...	...	23
“	Section IV.—N. W. P.; Benares to Karumnafsa,	...	...	...	...	...	30
“	Section V.—Bengal; Karumnafsa river to Patna,	...	...	...	...	...	33
“	Section VI.—Bengal; Patna to Bhaugulpúr,	...	...	...	...	...	38
“	Section VII.—Bengal; Bhaugulpúr to Burdwán,	...	...	...	...	...	43
“	Section VIII.—Bengal; Burdwán to Calcutta,	...	...	...	...	...	50

INTRODUCTION.

IN 1863, Tables of Heights, determined by the Great Trigonometrical Survey Leveling Operations, in Sind, the Punjab, N. W. Provinces, and Central India, were printed and circulated. These Tables gave the results of the leveling operations up to May 1862, up to which date lines of levels had been run from the mean sea level of Manora harbour Káráchí through Sind *viá* Tatta, Kotrí, Sewán, Shikarpúr and Kusmor, to Mittunkot (563 miles); from thence a branch was taken to the Chuch Base line near Attock (458 miles), but the main line was carried across the Indus and up the left bank of the Sutlej to Ferozepúr (300 miles), and thence to the Dehra Doon Base line *viá* Umballa and Saharanpúr (230 miles). From the latter place it was carried to Agra (200 miles), and a branch taken down to the Sironj Base line in central India (247 miles). Since the above date, levels have been run by the G. T. Survey between Calcutta and Tilliagarhí, near Sahibgunge (242 miles); from Tilliagarhí to Patká Gerouli, half way between Benares and Allahabad (346 miles); and from Agra to Patká Gerouli (342½ miles)—three consecutive seasons' work.

Besides the above, Branch Levels have been run from the Main Line to connect various Stations of the G. T. Survey, to fix the heights of important towns, and the data of various systems of levels.

The system that has been followed in these operations, and the precautions which have been taken to guard against errors arising from every conceivable source, are detailed in the introduction to the Tables of Heights in Sind, the Punjab, &c., and in Vol. XXXIII. of the Memoirs of the Royal Astronomical Society.

The following brief description may be given in this place. The Instruments employed are standard levels, by Messrs. Troughton and Simms, of 20-inch focal length, and powers averaging 42—very superior to ordinary leveling instruments. The levels are fitted with finely graduated scales,

and have their runs determined by a series of observations on the vertical circle of a large theodolite or astronomical instrument. From the mean values of "run" tables are constructed for use in the field, showing the corrections for dislevelment, which are applied to every observation.

As this necessitates a certain amount of computation on the ground, a trained native recorder accompanies each observer; thus dividing the labor, and enabling the surveyor to concentrate his attention on the actual manipulation of, and observations with, the instrument.

To guide in obtaining a true perpendicular, the staves are supplied with plummets let into the sides and visible through glass doors. Swivels are fixed to the tops of the staves for four guy-ropes, by means of which they are adjusted and kept steady when once properly fixed. Whenever the staff is set up, a wooden peg is previously driven into the ground—into the head of this peg is driven a convex brass brad, which presents a smooth surface on which the staff rests, and rotates freely.

To prevent the possibility of errors in reading the staves escaping detection, the staves are graduated on both sides, one side having a white ground and black divisions (feet, tenths, and hundredths) numbered from 0·00 foot to 10·00 feet, the reverse side having a black ground with white divisions numbered from 5·55 feet to 15·55 feet. From the form of field-book employed (of which a copy is attached) it will be seen that by means of this double graduation two entirely independent values of difference of level are obtained at each station where the instrument is set up. The staves are read off to the third place of decimals of a foot, and should the difference between the two values obtained, after the correction for dislevelment has been applied, exceed $\cdot 006$ or $\frac{6}{1000}$ of a foot, the invariable rule is to repeat the observation. Should the day be unfavorable, observations have sometimes to be repeated as often as three or four times, the mean of all these observations being taken as the true value.

The instrument is invariably put midway between the back and forward staves, the distance (always measured with a chain) varying during the day from three or four chains (66 feet), the maximum distance at which satisfactory observations can be made over bad ground in the middle of a hot day, to ten or twelve chains, at which distance the divisions on the staves are very clearly visible on a fine clear morning or evening.

This rule of equal distances eliminates all errors of adjustment, also the effects of the Earth's curvature, and all constant refraction.

Once or more during each field season, the staves are compared with a 10-foot portable standard iron bar, and any error in the length of the staves is duly allowed for in the final computations.

The possible dislevelment of the instrument from the heating effects of the Sun's rays, is diminished as far as possible by carefully shading it, when set up, by a large umbrella. When carried from station to station, the levels are always placed in boxes in "doolies" covered with blankets, so that the instrument is never actually exposed to the direct rays of the sun from one year's end to another.

In previous leveling operations, it appears from very careful comparisons, made at various times and in various countries, that there is always a tendency to cumulative error in a long line, which has never been satisfactorily accounted for. The result of this error, whatever the cause or causes may be, is in the words of Professor Whewell, "that in proceeding with the leveling operations along a line which is really level, the further end constantly appears from the observation to be the lower end, and the amount of this depression appears to increase with the distance—hence, when we go to the end of the line, and then return to the starting point, we find the resulting elevations of the point lower than its real elevation."

Taking this matter into consideration, a system has been adopted in our operations of dividing the line into equal sections and leveling adjacent sections in opposite directions. This manifestly does away with the injurious effects of all errors of the above-mentioned nature, for the maximum error which can creep in, in a line of unlimited length, will be the cumulative error due to the length of a single section. By limiting the length of each section to four or five miles, we do away with the possibility of any appreciable error of the kind under consideration entering into our results.

In ordinary leveling operations this matter would perhaps not need to be considered, but in a line of some thousands of miles in length, the amount of error introduced might be very considerable, and consequently every effort should be made to cancel it by the system of operation. This system necessarily involves a large amount of extra marching (the whole ground having to be gone over twice), but the very superior accu-

racy of the results obtained by using this and other precautions, is well worth the extra labor entailed.

Another very simple contrivance for eliminating errors and giving us the advantage of the "circuit system," has been introduced into this department, viz., that of observing forward staves first at odd stations, and back staves first at even stations. By this means "all errors are cancelled that might occur in a constant order, such as might be caused by a uniformly rising or uniformly sinking refraction, or by a tendency in the instrument to settle on its axis one way more than another on being set up for observation."

The advantages of the circuit system are made apparent by comparing the differences between the respective reductions to origin from the black and white faces, one pair of which may be considered as an "Up Line," and the other as a "Down Line." We thus get two independent sets of results, which however accordant at the individual stations, are sometimes continuously divergent until, at the end of a distance of 100 miles, they may differ by as much as 5 or 6 inches.

On closing work at the end of a day the invariable rule is, if possible, to close on some "paká" mark. Should this not be possible, large pegs (2 feet long or more) are driven into the ground at the last two stations, and well rammed home. These stations are both re-observed when work is resumed.

A second observer, with a separate instrument, recorder, staves, and khalassies follows, station by station, over the same ground, in rear of the first, resting his staves on the same pegs and brads that were used by his predecessor, and carefully comparing the two results. Whenever a difference exceeding .006 of a foot appears between the results of the two observers, the observations of the second are repeated, and should the discrepancy remain, the prior observer is recalled to re-measure that station, unless it should appear that the difference is owing to the fore staff peg having been moved between the two sets of observations, which would be at once shown up by there being a corresponding and compensating error in the results obtained at the next station.*

As a test of the accuracy of the results, it may be stated that in bring-

* The first season's work was executed by *three* different observers, all using separate instruments, staves, &c, and following one after the other in the manner described.

ing up independently the results obtained from the two different observers, the maximum divergence between them in the section, Calcutta to Tilliagarhí, never exceeded $\cdot 2$ of a foot, the terminal difference having been $\cdot 15$ feet. In the section, Tilliagarhí to Patká Gerouli, the maximum difference was $\cdot 40$ of a foot, with a terminal difference of $\cdot 38$ feet; and in the section, Agra to Patká Gerouli, the terminal difference was only $\cdot 06$ foot, with a maximum of $\cdot 15$ foot.

The heights given in these Tables are all reduced to the datum of mean sea level at Manora harbour, Káráchí. The mean sea level throughout the world being assumed to be the same, all heights here given show the height above mean sea level of any part of the coast. In applying this theorem and comparing the hitherto *assumed* level of the Bay of Bengal with the level of the Indian Ocean, we find that the former is $2\cdot 33$ feet above the latter; but the former having been ascertained at the Kidderpore Dock, Calcutta, is in fact simply the mean level of the tidal river Hoogly, at Calcutta. Hitherto, however, it has always been received as the true mean sea level, and has been used as such in calculating the heights of all stations of the Trigonometrical Series in the N. E. of the peninsula of India. This discrepancy must arise from one or both of two causes—inaccurate leveling of the line from Káráchí to Calcutta, or an inaccurate determination of mean level. With reference to this question, a consideration of the levels recently taken in connection with the Salt Water Lake Reclamation Scheme, throws a good deal of light on the subject, and shows that the whole of the discrepancy may be due to the assumption that the level of the Bay of Bengal can be accurately obtained at Calcutta. From the printed report (see Supplement to Calcutta Gazette of August 16th, 1865) it appears that the range of spring tides in the Mutlah, at Port Canning, is $16\cdot 05$ feet, and that the high water level of spring tides is $12\cdot 53$ feet above Kidderpore Dock Sill in the Hoogly. Hence the mean level of spring tides at Port Canning is $12\cdot 53 - \frac{1}{2} \times 16\cdot 05 = 4\cdot 5$ feet above Kidderpore Dock. The mean level of neap tides is not given, but if ascertained and combined with that of the spring tides, the mean of both would probably be less than $4\cdot 5$ feet above Kidderpore Dock; by the Survey operations, the mean sea at Káráchí is $6\cdot 25$ feet above the said Dock, while by tidal observations on the Hoogly, taken during the dry season only, when the river is lowest the

mean sea level of the Bay of Bengal is 8·58 feet above the same Dock. The large difference between the determinations on the Hoogly and the Mutlah clearly indicate that the positions of the tide gauges are not adapted for ascertaining the level of the Bay of Bengal. The survey value falls between them, and for the present may be considered as furnishing a more reliable reference to the datum of true mean sea—though brought all the way from Káráchí—than either of the local determinations at Port Canning or Calcutta.

In the course of the leveling operations, connection has been made where possible with all stations of the Great Trigonometrical Survey within reach. One or more stations of nearly every meridional series extending northward from the longitudinal series between Calcutta and Sironj in Central India have been thus connected. The trigonometrically ascertained heights of all the stations of these series will be recomputed hereafter from the data now given.

Connection has been made in several places with the Ganges Canal Levels, which accord very fairly with our own. A difference of ·75 foot has been generated between the 62nd milestone from the head of the canal (near Hurdwar), and a point near Cawnpore (160th mile-stone from Nánún junction), a distance of more than 250 miles.

The connection with the East India Railway Levels have not been so satisfactory. According to our levels, Howrah Dock Sill (the Railway Datum) is 9·06 feet below the Sea at Káráchí, and by that amount therefore should the Railway values exceed ours—instead of which the average heights of the Railway Levels at Agra, Allygurh, and Kunowe Deota, exceed our values of the same point, by 23·56 feet; from which it appears that an error amounting to 23·56 — 9·06 or 14·50, feet has been generated between these places and Calcutta. The railway levels on the Bengal portion of the line were found to be very inaccurate; large discrepancies having occurred, amounting, occasionally to several feet. These errors were no doubt owing to the different sections of the Railway having been originally leveled quite independently of one another, each section having a different datum. The errors must have entered in connecting the different sections together afterwards. The levels of the N. W. P. Division of the Railway were very much more accurate; but the discovery of such large errors in the lower portion of the line, showed the necessity for our leveling between Calcutta and Agra,

and not trusting to the Railway Levels,* as had been at one time intended.

All sets of Cantonment and Road Levels, in the vicinity of our operations, when known to exist have been connected. Amongst them those of the Patna and Gyah Road, the Allahabad and Fyzabad Road, the Allahabad and Jubbulpore Railway, the Cantonments of Dinapore, Benares, and Agra, &c., &c.

A connection with the Oudh Railway Levels has been made at Cawnpore, and as we have laid down Bench-marks at Buxar, Benares, and Allygurh, (all of which places are connected by levels of the Indian Branch Railway Company,) it is to be hoped that data will soon be forthcoming to enable the whole of the network of levels with which Oudh and Rohilcund are now overspread to be collected and reduced to one common datum.

Two of the Madras Railway Companies have supplied us with the level sections of their lines, and when our own levels are carried down to the South of India, as doubtless they soon will be—we may hope that the ultimate connection of all levels throughout the country and their reduction to one standard datum, may not be very far distant.

HENRY TROTTER, LIEUTENANT, R.E.,
2nd Assistant, G. T. Survey.
(Late in charge Leveling Operations).

MUSSOORIE, *October 1st, 1865.*

* Especially where there was an apparent discrepancy at Agra of 11·91 feet to be accounted for (see Vol. of Heights in Scinde, &c.)

. TABLES OF HEIGHTS.

REFERENCES.

THE Latitudes and Longitudes herein given are extracted from the operations of the Great Trigonometrical Survey.

The Latitudes are referrible to the Kalianpúr Observatory, near the Sironj Base Line, in Central India.

The Longitudes are referrible to the old value of the Madras Observatory, viz., $80^{\circ} 17' 21''$, to which a correction of $-3' 25''.5$ is applicable, to reduce to the value adopted by the Admiralty, and the Royal Astronomical Society, or $-3' 1''.8$ to reduce to the results of Taylor's Observations up to 1845.

The stations of the Survey, when on hills or high mounds, consist of a circular masonry pillar, from 3 to 4 feet in diameter, for the large theodolites to rest on, surrounded by a platform, from 10 to 12 feet square, on which the observatory tent is pitched. Being invariably placed on the highest accessible point, they rarely require to be raised more than 2 or 3 feet.

In the plains, when mounds are not available, Tower Stations have to be built. They consist of a central masonry pillar, surrounded by a mass of unburnt brick-work, rising flush with the pillar, to serve as a platform for the tent and observers. All Towers of recent construction have their pillars perforated vertically, in order that reference may be made to the ground level, where the markstone is placed. There is then no upper markstone, and the heights are consequently referred to the surface of the pillar.

H. S., stands for a Hill Station.

P. S., or simply S, for a Platform Station, on a mound in the plains.

T. S., for a Tower Station.

SECTION I.

NORTH WEST PROVINCES.

Agra to Cawnpore.

THIS section commences at the East Indian Railway Bench Mark at Agra goods station, 516·26 feet above mean sea level. (Karáchí). See Tables of Heights in Sind, Punjab, N. W. Provinces and Central India, page 127. It is carried along the East Indian Railway as far as Ferozabad, whence it is taken along the Grand Trunk Road across the Etawah Branch, Ganges Canal, to Danahá Bridge (on the Cawnpore Branch, Ganges Canal), from which point, turning down the Canal, it is continued towards Cawnpore, branch lines having been run from various points of the line to connect the Civil Station of Mainpúrí, and the G. T. S. Stations of Ferozabad, Baragaon, Bisangarh, and Kalsán.

From Agra to Cawnpore.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
	Deducted by Spirit Leveling Opera- tions.		
On East Indian Railway between Agra and Ferozabad.	E. I. Railway Bench Mark, Agra, ..	516.26	Surface of platform of goods station at Agra railway terminus, about 4 feet above the rails, designated "reduced level 80.00, Agra district."
	G. T. S. Bench Mark, Agra, ..	510.92	Stone B. M. imbedded 5½ feet west of north pier of bridge over railway, west of Agra railway station.
	Railway culvert, ..	519.85	× mark on the top of north parapet wall of culvert, close by the 11th mile-stone from Toondla railway station.
	From Toondla railway station, ..	552.16	Level of rails opposite to mile-stone.
	Toondla junction, ..	548.66	Level of rails at junction of Agra branch, with the main line of the E. I. Railway.
	Toondla station plat- form, ..	551.98	Coping of passenger platform north-east of station, opposite termination of brick walls supporting roof of station-house.
	Toondla railway sta- tion, ..	548.36	Level of rails opposite centre of passenger platform.
	G. T. S. Bench Mark, Toondla railway sta- tion, ..	547.54	Stone B. M. imbedded 9 paces south of signal post at east end of station, and exactly opposite signal lever.
	Ferozabad railway sta- tion, ..	540.19	Level of rails at level crossing west end of station.
	" "	543.68	Coping of platform, south side of station, and 33 yards from east end of platform.
Ferozabad railway station, ..	540.02	Level of rails, centre of station.	
G. T. S. Bench Mark, Fero- zabad, ..	540.39	Stone B. M. embedded 5 feet from corner of water tank, opposite to and 6 feet from centre of bottom step of stairs leading to east end of platform.	

From Agra to Cawnpore.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
	Mile- stone.	Deducted by Spirit Leveling Opera- tions.	
Ferozabad, T. S., Lat. 27° 8' 38" Long. 78° 25' 56"	..	557.44	<i>Lower or ground markstone.</i> —This station is at the south-east corner of an old mud fort, situated about a quarter of a mile west of Ferozabad, in tahsil Ferozabad and zillah Agra. The station mark is a foot below the terre-pleine of the rampart, and is surmounted by a tower 43 feet 10 inches high, and about 14 feet square at top, with a hollow core and a gallery at bottom, for reference to the mark. This station is within a few hundred yards of Ferozabad railway station.
On G. T. Road between Agra and Cawnpore. {	From Agra, 30	537.06	} Top of mile-stones.
	" " 31	535.38	
	" " 32	534.08	
Shekoabad railway station,		538.35	Level of rails, down line, opposite railway chainage, 50.00.
" "		542.06	Platform coping above do.
G. T. S. Bench Mark, ..		538.78	Stone B. M. imbedded two paces east of steps leading to east end of platform, close to water tank, and two paces inwards from ash-pit.
East Indian Railway, chainage, 0.00, ..		538.84	Level of rails opposite junction of Etawah and Allygurh divisions.
On G. T. Road between Agra and Cawnpore. {	Agra, 40	528.02	} Top of mile-stones.
	" " 42	526.58	
	" " 43	525.23	
	" " 46	526.24	
	" " 47	535.64	
	" " 48	522.24	
	" " 49	525.24	
	" " 51	522.15	
" " 52	525.75		
Gihror bridge, ..		534.23	Over Etawah Branch, Ganges Canal, top of centre of north-west parapet wall.

From Agra to Cawnpore.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Deducted by Spirit Leveling Opera- tions.			
G. T. S. Bench Mark, Gihror,	Mile- stone.	527.29	Stone B. M. imbedded, at south-east corner of Gihror canal chouki.	
On Etawah Branch, Gan- ges Canal.	{ Nánún junction,	57	528.52	Top of mile-stone, 0.98 feet above plinth.
	{ " "	56	529.27	Top of mile-stone, 1.21 feet above plinth.
	{ " "	55	530.55	Top of mile-stone.
	{ " "	54	531.92	Top of mile-stone, 1.14 feet above plinth.
	{ " "	53	534.11	Top of mile-stone.
	{ " "	52	534.42	Plinth of mile-stone.
Baragaon T. S., Lat. 27° 15' 3" Long. 78° 44' 42"	..	573.30	<i>Lower or ground markstone.</i> —This station is on a mound within the village of Baragaon, in tahsil Mustafabad and zillah Mainpúri; the station mark is a foot below the crest of the mound, and is surmounted by a tower 45 feet 5 inches high, and about 14 feet square at top: similar in detail of construction to Ferozabad T. S.	
On G. T. Road.	{ Agra,	54	525.48	Top of mile-stone, about 20 yards off road.
	{ " "	55	524.82	Top of mile-stone.
	{ " "	58	521.85	Top of mile-stone.
	{ Danahá bridge,	..	531.71	Top of centre of west parapet wall of bridge, over Cawnpore Branch, Ganges Canal.
On Caw- pore Branch, G. Canal.	{ Nánún junction,	58	525.55	} Plinth of mile-stones.
	{ " "	60	522.27	
	{ " "	63	520.55	
	{ Singhpúr bridge,	..	523.29	Top of centre of west parapet wall of bridge, over Cawnpore Branch, Ganges Canal.
G. T. S. Bench Mark, Main- púri,	..	511.00	Stone B. M. imbedded opposite the entrance to Mainpúri jail, two paces inside of paká well.	
G. T. S. Bench Mark, Singh- púr,	..	517.83	Stone B. M. imbedded 4 feet from south-east corner of Singhpúr canal chouki.	
Nánún junction,	66	516.93	} Plinth of mile-stones.	
" "	68	515.71		
" "	70	513.37	} Top of mile-stones.	
" "	72	511.67		
" "	74	508.09	} Plinth of mile-stones.	
" "	75	505.37		

From Agra to Cawnpore.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Mile- stone.	Deducted by Spirit Leveling Opera- tions.		
Kasrādah bridge,	..	510·46	Top of centre of west parapet wall of bridge.	
Nánún junction,	79	501·59	} Plinth of mile-stones.	
"	80	500·82		
Bridge over canal,	..	507·41	Top of centre of west parapet wall.	
Nánún junction,	81	501·72	} Plinth of mile-stones.	
"	83	498·56		
"	84	496·83		
"	85	496·78	Top of mile-stone.	
"	87	494·75	Plinth of mile-stone.	
Rám Nagar bridge,	..	500·53	Top of centre of west parapet wall.	
G. T. S. Bench Mark, Ram- nagar,	..	494·31	Stone B. M. imbedded two paces from south- east corner of Rám Nagar canal chouki.	
Bisangarh T. S., Lat. 27° 6' 30" Long. 79° 27' 14"	..	518·88	<i>Ground markstone.</i> —" This station is a column 23½ feet high, situated on a mound to the south of the Baradari, and outside the fort. Chibramao, a large town on the Grand Trunk Road, is about six miles distant on the way to Chandanpúr."	
On Cawnpore Branch, Ganges Canal.	Fatehpúr bridge,	..	497·10	Top of centre of west parapet wall of bridge over canal.
	Nánún junction,	92	490·08	} Plinth of mile-stones.
	"	93	487·89	
	Mirzapúr bridge,	..	493·62	Top of centre of west parapet wall.
	Nánún junction,	97	483·56	} Plinth of mile-stones.
	"	99	480·33	
	"	101	479·24	
	Kánserou bridge,	..	483·30	Top of centre of west parapet wall.
	Nánún junction,	103	475·08	} Plinth of mile-stones.
	"	104	473·03	
"	107	471·29		
"	108	470·22		

From Agra to Cawnpore.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
	Mile- stone.	Deducted by Spirit Leveling Opera- tions.	
Kalsan T. S., Lat. 26° 57' 10" Long. 79° 41' 7"	..	501-22	<i>Lower or ground markstone.</i> —This station is placed on an elevated mound close to the residence of the zemindar, who inhabits the ghari. It is situated 2·5 miles north-east of Indargarh. The column at this station is 23·12 feet high.
On Cawnpore Branch, Ganges Canal.	G. T. S. Bench Mark, Bahosi, ..	474-09	Stone B. M. imbedded two paces from south corner of Bahosi canal chouki.
	Bahosi bridge, ..	477-22	Top of centre of west parapet wall.
	Nánún junction, 110	468-54	} Plinth of mile-stones.
	" " 112	466-39	
	Umerdú bridge, ..	471-96	Top of centre of west parapet wall.
	Nánún junction, 114	464-55	Plinth of mile-stone.
	Sáki bridge, ..	469-69	Top of centre of west parapet wall.
	Nánún junction, 119	464-03	} Plinth of mile-stones.
	" " 121	458-37	
	G. T. S. Bench Mark, Tmá, ..	458-09	Stone B. M. imbedded 7 feet from south-east corner of Imá canal chouki.
	Iron girder bridge, ..	463-10	Top of masonry pillar, centre of bridge, west side.
	Nánún junction, 123	454-60	} Plinth of mile-stones.
	" " 124	455-18	
	" " 125	452-58	
	" " 126	453-25	
Bridge over canal, ..	458-61	Top of west parapet wall of bridge.	
Nánún junction, 129	451-62	} Plinth of mile-stones.	
" " 130	449-58		
" " 131	447-76		
" " 132	448-78		
" " 133	446-11		
" " 135	445-25		

From Agra to Cawnpore.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Deducted by Spirit Leveling Opera- tions.			
On Cawnpore Branch, Ganges Canal.	G. T. S. Bench Mark,..	Mile-stone.	449·80	Stone B. M. imbedded two paces from north-east corner, of Kákúnd chouki.
	Nánún junction,	138	441·59	} Plinth of mile-stones.
	"	139	439·62	
	Kúndan bridge,	..	445·29	Top of centre of west parapet wall.
	Tartoulí bridge,	..	443·80	Top of centre of west parapet wall.
	Nánún junction,	143	436·67	} Plinth of mile-stones.
	"	145	435·49	
	Bhúsána bridge,	..	440·57	Top of centre of west parapet wall.
	Nánún junction,	146	433·54	} Plinth of mile-stones.
	"	147	431·74	
	Jagatpúr bridge,	..	438·67	Top of centre of west parapet wall.
	G. T. S. Bench Mark, Jagatpúr,	..	434·84	Stone B. M. imbedded 5 feet from north-east corner of Jagatpúr canal chouki.
	Nánún junction,	148	431·05	} Plinth of mile-stones.
	"	149	431·05	
	"	150	428·26	
	"	151	429·54	
	Halkapúr bridge,	..	432·14	Top of centre of west parapet wall.
	Nánún junction,	154	425·43	} Plinth of mile-stones.
	"	156	424·78	
	Kalsoulí bridge,	..	429·32	Top of centre of west parapet wall.
Nánún junction,	157	423·71	Plinth of mile-stone.	
Bárah bridge,	..	428·22	Top of centre of west parapet wall.	
G. T. S. Bench Mark, Bárah,	..	424·10	Stone B. M. imbedded two paces from north-west corner of Bárah canal chouki.	
Nánún junction,	160	421·29	Plinth of mile-stone.	
Kajourí bridge,	..	423·69	Top of centre of west parapet wall.	

From Agra to Cawnpore.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Descriptions of Stations.
		Deducted by Spirit Leveling Opera- tions.	
On East Indian Railway.	Railway culvert, ..	Mile- stone. 416.38	Top of parapet of small culvert, about $\frac{1}{2}$ mile west of Cawnpore railway station.
	Old Bench Mark, ..	415.96	Mark B. \square M. cut on cornice over north archway of towing path of railway bridge, passing over Ganges Canal, and 13 yards from pnká gate-post, north-west corner of bridge.
	Cawnpore railway station, ..	417.42	Coping of north passenger platform, exactly opposite centre of station.
	" "	413.71	Level of rails opposite centre of station house. This height corresponds to a height of 216.00 feet above the datum of the Lucknow branch section of the Oudh railway.
On Cawnpore Branch, Ganges Canal.	Nánún junction, 168	} 412.91	Plinth of mile-stones.
	" " 169			409.66
	G. T. S. Bench Mark, Cawnpore, ..	407.75	Stone B. M. imbedded 7 feet south-east of canal mile stone, No. 169. The top is about 6 inches above the surface of the ground.
	Grand Trunk Road. Allahabad, 127 Delhi, 261	} 413.09	Top of mile-stone, which is near B. M.
	Bridge over canal, ..			413.75	Top of parapet. This bridge is situated between the 127th G. T. Road mile-stone from Allahabad, and the 169th canal mile-stone from Nánún.

SECTION II.

NORTH WEST PROVINCES.

Cawnpore to Allahabad.

FROM the Railway Station Platform at Cawnpore the levels were carried to Allahabad; sometimes along the Grand Trunk Road, sometimes along the East India Railway, which runs nearly parallel to the former the whole distance. Branch lines were occasionally run from the main line to connect stations of the G. T. Survey, and one was also run from Allahabad to Malaká, on the Allahabad and Fyzabad road (on the left bank of the Ganges) in order to connect the levels of that road with our own.

From Cawnpore to Allahabad.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
		Deduced by Spirit Leveling Opera- tions.			
On E. I. Railway.	Allahabad,	Mile- stone. 118	413·17	} Top of mile-stones. *	
	"	117	413·28		
On G. T. Road.	Allahabad, Delhi,	122 266	410·34		
	Allahabad, Delhi,	121 267	407·88		
	Allahabad, Delhi,	120 268	408·71		
Jajmáo S., Lat. 26° 25' 51" Long. 80° 27' 10"	..	461·67	<i>Upper markstone.</i> —This station is situated on the eastern extremity of the high ground overlooking the Ganges, and on which formerly stood the fort attached to the village of Jajmáo, zillah and tahsildári Cawnpore. The station is on a mud platform raised about 8 feet in height.		
On Grand Trunk Road.	Allahabad, Delhi,	118 270	398·04		Plinth of (broken) mile-stone.
	Allahabad, Delhi,	117 271	402·77		} Top of mile-stones.
	Allahabad, Delhi,	116 272	405·70		
	Paká telegraph post,	402·78		Plinth of 2nd (from east end) of five old paká posts on north side of Grand Trunk Road, opposite to Maharajpúr Paráo.
	G. T. S. Bench Mark, Maharájpur,	400·40	Stone B. M. embedded with top one foot below ground, four paces north west of east corner boundary pillar of Paráo, on south side of Grand Trunk Road.	
	Allahabad, Delhi,	115 273	402·14	} Top of mile-stones.	
	Allahabad, Delhi,	114 274	405·13		

From Cawnpore to Allahabad.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Deduced by Spirit Leveling Opera- tions.			
On Grand Trunk Road, between Allahabad and Cawnpore.	Allahabad, Delhi,	Mile- stone. 113 275	403-00	Top of mile-stone.
	Bridge, No. XXXII, ..		402-00	Top of north parapet wall of bridge, No. XXXII, on Grand Trunk Road, close by the 111th mile-stone.
	Allahabad, Delhi,	110 278	398-69	Top of mile-stone.
	Road culvert,	..	399-58	Top of north parapet wall of culvert, No. XXIV., Grand Trunk Road.
	Allahabad, Delhi,	109 279	395-98	Top of mile-stones.
	Allahabad, Delhi,	108 280	395-70	
	Allahabad, Delhi,	106 282	389-37	
	Allahabad, Delhi,	105 283	381-96	
	Allahabad, Delhi,	104 284	396-26	
	Allahabad, Delhi,	102 286	395-54	
	G. T. S. Bench Mark, Aong,	..	392-41	Stone B. M. imbedded 6 inches below ground, south-south-west of south-south-west corner of 2nd, from south of four large paká columns in front of Aong Paráo, east side of road and opposite Tháná.
	Allahabad, Delhi, Calcutta,	101 287 594	394-77	Top of mile-stone.
	Allahabad, Delhi,	99 289	397-88	Top of mile-stone.

From Cawnpore to Allahabad.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions,	
On East Indian Railway.	Mohar railway station, ^{Mile- stone.}	395·10	Level of rails north side, opposite centre of station.
	“ “	397·49	Coping of passenger platform, opposite ditto.
	E. I. R., Allahabad, 91	392·992	Top of mile-stone.
	Paká bridge, ..	395·45	Top of parapet of culvert, near 88th East India Railway mile-stone.
	E. I. R., Allahabad, 86	392·23	} Top of mile-stones.
	“ “ 85	390·37	
	“ “ 84	389·87	
	Mulwah railway station,	389·52	Coping of centre of north passenger platform.
	“ “	387·43	Level of rails, centre of station.
	G. T. S. Bench Mark, Malwá, ..	385·65	Stone B. M. imbedded flush with ground, one pace in rear of platform, north-east end of station, opposite ramp leading to platform.
Culvert, ..	385·42	Top of north parapet wall of small culvert, near 81st East India Railway mile-stone.	
Allahabad, 79	383·10	Top of mile-stone.	
Paká well, Fatchpúr, ..	374·85	North-west corner of surface of paká well on south side of road from Etawah to Fatchpúr, close by a Siwála on the same side of the road, near its junction with the Grand Trunk Road, west of Fatchpúr.	
On G. T. Road between Allahabad and Cawnpore.	Fatchpúr tahsil, ..	372·58	Surface of roadway over paká drain at south-east corner of Fatchpúr tahsil.
	G. T. S. Bench Mark, Fatchpúr, ..	365·23	Stone B. M. embedded in Fatchpúr Paráo, 3 feet in rear of 78th mile-stone from Allahabad.
	Allahabad, 78	} 369·42	} Top of mile-stones.
	Delhi, 310		
Allahabad, 76	} 367·07		
Delhi, 312			

From Cawnpore to Allahabad.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Mile- stone.	Deducted by Spirit Leveling Opera- tions.		
On the Grand Trunk Road between Allahabad and Cawnpore.	Allahabad, Delhi,	74 314	} 372·85 } } 371·18 } } 369·49 } } 366·06 } } 367·56 } Top of mile-stones. } 361·85 } } 359·94 } } 357·69 } } 357·36 } } 352·20 } Stone B. M. imbedded in direct line between 63rd milestone and paká well in Arrahpur camping ground, 16½ yards from mile-stone, and 10 yards from nearest part of well. } 356·18 } } 357·28 } } 357·13 } Top of mile-stones. } 352·07 }	
	Allahabad, Delhi,	73 315		
	Allahabad, Delhi,	71 317		
	Allahabad, Delhi,	70 318		
	Allahabad, Delhi,	69 319		
	Allahabad, Delhi,	68 320		
	Allahabad, Delhi, Calcutta,	65 323 558		
	Allahabad, Delhi,	64 324		
	Allahabad, Delhi,	63 325		
	G. T. S. Bench Mark,			352·20
	Allahabad, Delhi,	62 326		
	Allahabad, Delhi,	61 327		
	Allahabad, Calcutta, Delhi,	60 553 328		
	Allahabad, Calcutta,	58 551		

From Cawnpore to Allahabad.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.	
		Deducted by Spirit Leveling Opera- tions.		
Khága railway station,	Mile- stone. ..	356.23	Level of rails, centre of station.	
“ “	..	358.43	North platform coping, centre of station.	
On Grand Trunk Road.	Allahabad, Delhi, Calcutta,	57 331 550	} 354.24	
	Allahabad, Delhi, Calcutta,	55 333 548		} 352.07
	Allahabad, Calcutta,	53 546	} 351.17	
	G. T. S. Bench Mark Katohun,	..		346.65	Stone B. M. imbedded 5 feet south-east of 546th mile-stone from Calcutta.
	Majilgaon, T. S., Lat. 25° 45' 15", Long. 81° 13' 17"	..	395.53	<i>Upper markstone.</i> —This station is placed on a mound adjoining the village of the same name in the pergunah of Hatgaon, zillah Fatehpúr. The Grand Trunk Road passes half a mile to the south of the station. The tower is 25 feet high, having a centre core of paká masonry with markstones at bottom and top, and intermediate ones at every 5 feet. The station bears about 1½ miles east of Khága, a large bazaar on the Grand Trunk Road and about 2½ miles south-west of Alipúr Bhadar.
On Grand Trunk Road.	Allahabad, Calcutta,	52 545	} 347.64	
	Allahabad, Calcutta,	51 544		} 345.35
	Allahabad,	48	347.62		} Top of centre of north parapet wall of bridge, No. II., passing over Sarsúkarera nádi, close by road chonki, and between 46th and 47th mile-stones.
	Sarsúkarera bridge,	..	349.81	

From Cawnpore to Allahabad.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Deducted by Spirit Leveling Opera- tions.	Remarks, and Description of Stations.	
On Grand Trunk Road.	Allahabad,	Mile- stone. 44	} 346.40		
	Calcutta,	537			
	Delhi,	344			
	Delhi,	345	343.46		Top of (broken) mile-stone.
	Allahabad,	42	} 347.06		Top of mile-stone.
	Delhi,	346			
Saini bridge,	..	348.88	Top of north parapet wall of small bridge, opposite Saini Thána.		
G. T. S. Bench Mark, Saini,	..	345.37	Stone B. M. imbedded two paces outside of inner of two old paká telegraph posts, at south-east corner of Saini Paráo, and nearly opposite Thána.		
Karra T. S., Lat. 25° 41' 57" Long. 81° 24' 38"	..	332.80	<i>Lower or ground markstone.</i> —This station is a tower on the highest part of the old fort on the south bank of the Ganges. The tower is built of burnt brick, is 27 feet high, and the top is 135 feet above the level of the Ganges.		
On Grand Trunk Road between Allahabad and Cawnpore.	Allahabad,	41	} 346.31	} Top of mile-stones.	
	Delhi,	347			
	Allahabad,	40	} 344.54		
	Delhi,	348			
	Allahabad,	39	} 345.35		
	Delhi,	349			
	Allahabad,	37	} 339.84		
	Delhi,	351			
Allahabad,	35	} 342.20			
Delhi,	353				
Allahabad,	34	} 342.98			
Delhi,	354				
Allahabad,	32	} 332.451			
Delhi,	356				

From Cawnpore to Allahabad.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.		
	Deducted by Spirit Levelling Opera- tions.				
On Grand Trunk Road between Allahabad and Cawnpore.	Allahabad, Delhi,	Mile- stone. 31 357	} 336·83	} Top of mile-stones.	
	Allahabad, Delhi,	30 358			} 335·61
	Allahabad, Delhi, Calcutta,	29 359 522				} 334·68
	G. T. S. Bench Mark, Kokhráj,	..	328·35		Stone B. M. imbedded 24½ yards north of north flight of steps of paká well near Tháná, on south side of Kokhráj Paráo, (2nd from Allahabad.)
	Calcutta, Delhi, Allahabad,	521 360 28	} 332·85		} Top of mile-stone.
	Sekára bridge,	..				314·68	Top of parapet wall of three arched culvert, No. XVIII., over Sekára nála.
	Allahabad, Delhi, Calcutta,	26 362 519	} 329·77		} Top of mile-stones.
	Allahabad, Calcutta,	24 517				} 332·93
	Allahabad, Calcutta,	23 516	} 328·57		
	Allahabad, Calcutta,	21 514				} 312·81
	Allahabad, Calcutta,	20 513	} 329·37		
	Allahabad, Calcutta,	19 512		} 330·18	
	Allahabad, Calcutta,	17 510	} 325·84		
	G. T. S. Bench Mark, Mukti- púrwar,	..		315·89		Stone B. M. imbedded on high ground 73 yards east of paká well near Tháná, in Mukti- púrwar Paráo (1st from Allahabad.)

From Cawnpore to Allahabad.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.	
Paká well,	Mile- stone. ..	316.11	Top of surface of paká well in Muktipúrwar Paráo.
Manowric railway station, ..		330.65	Platform coping, centre of railway station.
“ “ “ ..		327.92	Level of rails opposite do.
On East Indian Railway.	Allahabad, 9	323.83	} Top of mile-stones.
	“ “ 8	322.05	
	Railway culvert, ..	317.94	Top of parapet of culvert, east of 5th East Indian Railway mile-stone.
	Allahabad, 2	316.19	} Top of mile-stones.
	“ “ 1	316.05	
	Allahabad Ry. station,	315.79	Level of rails, centre of station Kutchpúrwa.
	“ “ “	319.60	Coping of platform, centre of station.
	Allahabad Fort station,	287.56	Level of rails, centre of station.
	“ “ “	291.44	Platform coping, centre of station.
	Allahabad Fort, ..	288.97	Plinth of sentry box, outside sallyport. East main entrance of fort.
“ “ ..	298.38	Plinth of sentry box, inside re-entering place of arms. East main entrance of fort.	
G. T. Station Bench Mark, Allahabad Fort, ..	298.72	Stone B. M. imbedded in right hand corner (as you enter from the outside) of re-entering place of arms, four paces from counterscarp of ditch of bastion, and the same distance inside of traverse; top of stone nearly flush with ground.	
On road from Allahabad to Fyzabad via Mou Serai and Malaka.	Mou Serai, ..	307.38	Top of west parapet wall of culvert nearest Mou Serai Ghát, old B. M., arrow mark.
	Ganges flood level, ..	289.91	Reported highest flood level of Ganges at Mou Serai Ghát.
	Ganges river level, ..	256.60	Surface of Ganges river at Mou Serai Ghát, on April 3rd, 1863 (said to be 1.9 feet above lowest known level).

From Cawnpore to Allahabad.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
	Deduced by Spirit Leveling Opera- tions.		
On road from Allahabad to Fyzabad viâ Mou Serai and Malakâ.	Mile- stone.		
	Ganges river level, ..	258·87	Surface of Ganges river (left channel) between Mou Serai and Malakâ, on 5th April, 1865.
	G. T. S. Bench Mark, Malakâ, ..	306·25	Stone B. M. imbedded 1½ paces from north-east corner of road officers' chouki, Malakâ.
	Malakâ culvert, ..	308·18	Top of parapet of drain on slope near chouki.
	Fyzabad and Allaha- bad road, ..	312·57	Centre of road at top of high bank, Malakâ.
" "	312·70	Centre of road at junction with road from Bareilly (close by the above).	
Fyzabad, 90	315·41	Top of mile-stone on Allahabad and Fyzabad road.	

SECTION III.

NORTH WEST PROVINCES.

Allahabad to Benares.

THE levels in this section are carried from the Allahabad Fort, *viá* the Grand Trunk Road, to Benares, the Ganges having been crossed opposite Júsí. A branch line of levels was run, across the Jumna from Allahabad, to connect the levels of the Jubbulpore and Allahabad Railway, and another across the Ganges from Patkú Geroulí, the second Paráo from Benares on the Grand Trunk Road, to Mirzapore.

From Allahabad to Benares.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.	
On E. I. R. Main Road.	Mile- stone. Jumna railway bridge,	296.48	Top face of the stone on which the abutment bed plate of girder is bedded, on right bank of Jumna. This stone is now covered over.
	Signal post, ..	316.97	Surface of masonry surrounding lever at foot of signal post, south of Jumna bridge station.
	E. I. Railway junction,	311.09	Level of rails at junction of Jubbulpore branch with main line, E. I. Railway.
On E. I. Railway Jubbulpore Branch.	Jubbulpore Railway Bench Mark, ..	309.19	Original B. M. mark cut in mangoe tree, the largest of a clump, 100 feet west of centre line Jubbulpore Branch Railway, at chainage 37 from junction, 182.48 feet above district datum.
	G. T. S. Bench Mark, ..	308.81	Stone B. M. imbedded 4½ yards from above Railway B. M., between the latter and the Railway.
	Jubbulpore Railway Bench Mark, ..	307.77	Original B. M. cut on mangoe tree south-east of, and 100 feet from centre of line, at chainage 60 from junction; height above district datum 181.01.
On E. I. Railway	Jubbulpore Railway Bench Mark, ..	308.74	Original B. M. cut on nim tree, 90 feet left of centre line, at chainage 84 from junction; height above district datum 181.96.
	G. T. S. Bench Mark, Allahabad fort, ..	298.72	See last section.
On the Grand Trunk Road.	From Calcutta, 495	277.57	On Grand Trunk Road, top of stone (on right bank of Ganges).
	G. T. S. Bench Mark Júsí, ..	300.58	Stone B. M. imbedded in Júsí Paráo (on left bank of Ganges) 45 yards from west flight of stairs of paká well.
	Júsí well, ..	303.55	Surface of 2nd step of west flight of stairs of well in Júsí Paráo.
	Júsí barrack, ..	292.71	Surface of lower step of south-east corner of barrack nearest river at corner of Júsí Paráo.

From Allahabad to Benares.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.		
		Deducted by Spirit Leveling Opera- tions.			
On Grand Trunk Road.	Calcutta,	Mile-Stone. 493	307-19	} Top of mile-stones.	
	"	492	309-01		
	"	491	304-60		
	"	490	307-91		
	"	488	306-17		
	"	487	307-10		
	"	486	304-80		
	"	485	306-72		
	Bridge, No. V.,	..	307-91		Top of north parapet wall of large paká bridge, close by 483rd mile-stone from Calcutta.
	Calcutta,	482	302-60		} Top of mile-stones.
	"	481	304-22		
	"	480	300-90		
"	479	303-76			
"	478	302-16			
Ganespúr T. S., Lat. 25° 20' 5", Long. 82° 8' 24",	..	323-78	Highest existing markstone. The village from which this station is named is in the distr- ict of Allahabad and pergunah of Júsí; the tower, 30 high, is elevated 40 feet above the level country, and has an interior pillar of masonry in which marks are placed, at heights of 0, 10, 19, 27, and 30, feet. When this station was visited by the leveling party, the upper mark stone was found re- moved, and the highest existing (i. e. 27 feet above ground) markstone was therefore con- nected.		
On Grand Trunk Road.	Calcutta,	477	300-69	} Top of mile-stones.	
	"	476	295-05		
	"	475	297-43		
	"	474	299-79		
	"	473	295-24		
	"	472	292-76		
	"	471	292-95		
	Barúd well,	..	291-76	Surface of inner ring of masonry (south side) of paká well in Barúd Paráo.	
	G. T. S. Bench Mark, Barúd,	..	290-43	Stone B. M. imbedded 44 yards from inner edge of well, and one yard from north-west corner of Bardasbt Khána, in Barúd Paráo.	
	Calcutta,	470	294-70	} Top of mile-stones.	
	"	469	294-66		
	"	468	293-77		

From Allahabad to Benares.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.	
		Deducted by Spirit Leveling Opera- tions,		
	Mile- stone.			
Baripúr T. S., Lat. 25° 15' 33", Long. 82° 19' 55",	..	320·82	Upper mark-stone. This station is on the northern bank of the Ganges, about 100 yards from the river, and half a mile east of the village of the same name in the district of Benares, and pergunah Budhi. The tower is 30 feet high, and marks are inserted in an interior pillar of good masonry, at heights of 0, 10, 19, 27 and 30, feet.	
On Grand Trunk Road.	Calcutta,	467	} Top of mile-stones.	
	"	465		
	"	464		
	"	463		
	"	462		
	"	461		
	"	460	286·52	
	Gopigunge Paráo,	..	289·49	Top of north-side of cattle trough of largo paká well in Gopigunge Paráo (south of road), 2½ feet below outer rim of masonry of surface of well.
	Calcutta,	459	288·53	Top of mile-stone.
	Gopigunge,	..	282·73	Centre of Grand Trunk Road at Gopigunge, at its junction with the branch road from Mirzapúr.
Calcutta,	458	282·72	} Top of mile-stones.	
"	457	281·77		
"	456	284·36		
"	455	283·58		
"	454	283·47		
Paká well,	..	281·77	Top of lower step of north flight of stairs of largo paká well on south of Grand Trunk Road, at 45¾ miles from Calcutta.	
Calcutta,	453	283·49	Top of mile-stone.	
Madhopúr,	..	283·82	Coping of basement, south-west corner of largo Siwala, on north side of road, village Madhopúr.	

From Allahabad to Benares.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.		
On G. T. Road.	{ Calcutta,	Mile- stone. 452	282.32	} Top of mile-stones.
	{ " "	451	281.67	
	{ " "	450	280.88	
On Branch Road from Jounpūr to Mirzapūr.	{ Mirzapūr,	8	282.83	} Top of mile-stones.
	{ " "	7	281.38	
	{ " "	6	282.25	
	{ " "	5	260.00	} Plinth of mile-stones.
	{ " "	4	257.89	
On Branch Road from Jubbulpūr to Mirzapūr.	{ " "	3	258.38	} Plinth of mile-stones.
	{ " "	2	258.85	
	{ Paká well,	..	261.35	Top of second step of large paká well on east side of road near the 1st mile-stone from Mirzapūr.
On Branch Road from Jubbulpūr to Mirzapūr.	{ Mirzapūr,	1	258.53	Plinth of mile-stone.
	{ Chíl well,	..	265.84	Top of second step of large paká well in centre of Chíl village, east side of road, and just above the descent to Ganges river.
Ganges river, Mirzapūr,		..	211.80	Height of surface of river opposite Nárglát, Mirzapūr, on March 14th, 1865.
Ganges river,		..	206.22	Zero of Mirzapūr gauge.
" "		..	255.97	Flood of September, 1861.
" "		..	203.29	Lowest known level (April and May 1861).
Branch Line to Mirzapūr.	{ Mozuffergunge,	.. ..	274.24	Top of lower step of paká well in Muzuffergunge suburb, leading from Nárglát, Mirzapūr.
	{ G. T. S. Bench Mark, Mirzapūr,	..	279.21	Stone B. M. imbedded at foot of counter-slope of platform Mirzapūr Railway Station, 5½ yards east of east end of passenger station house, and 6 yards from inner corner of ditto.
	{ Mirzapūr railway sta- tion,	..	278.54	Level of rails, centre of railway station.
" "		..	282.08	Coping of passenger platform, exactly opposite centre of station house.

From Allahabad to Benares.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.		
Branch Line to Mirza- púr.	Mirzapúr station,	railway ..	282.63	Coping of goods station platform, south-west corner of station, 200 yards from centre of station house.
	Calcutta,	449	279.52	} Top of mile-stones.
"	448	280.62		
"	447	277.84		
On Grand Trunk Road between Allahabad and Benares.	Grand Trunk road,	..	274.96	Centre of road at Maharájgunge, opposite its junction with a branch road from Mirzapúr.
	"	"	273.93	Centre of road opposite Maharájgunge Dák Bungalow.
	Calcutta,	445	277.54	Top of mile-stone.
	G T. S. Bench Mark, Patká Gerouli,	..	275.91	Stone B. M. imbedded 10 links east of centre of east end of Police chókí, and 100 links from 445th mile-stone from Calcutta, in Patká Gerouli Paráo (2nd from Benares.)
	Patká Gerouli well,	..	277.82	Top of second step of paká well near Bench Mark.
	Patká Gerouli bridge,	..	278.50	Top of parapet of small bridge (over drain) close by well.
	Calcutta,	445	277.54	} Top of mile-stones.
	"	444	274.26	
	"	443	273.05	
	"	442	272.11	
	"	441	273.19	
	"	440	272.39	
	"	439	271.52	
	"	438	270.61	
	"	437	271.87	
"	436	270.50		
"	435	269.63		
"	434	265.37		
"	433	264.69		
"	432	264.33		
"	431	264.72		
"	430	262.13		
"	429	262.63		

From Allahabad to Benares.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Descriptions of Stations.
		Deducted by Spirit Leveling Opera- tions.		
On G. T. Road.	Calcutta,	Mile- stone. 428	263.32	} Top of mile-stones.
	"	427	261.09	
	"	426	259.03	
	"	425	258.83	
	Lakianpúr well,	..	257.89	Top of second step of west flight of stairs of well near 425th mile-stone.
	Calcutta,	424	257.04	Top of mile-stone.
	G. T. S. Bench Mark, Be- nares,	..	251.85	Stone B. M. imbedded half way between two large trees, close to General Pogson's tomb, in corner of military encamping ground, Benares (just opposite race-course). Surface of B. M. one inch above level of ground.
	Benares,	..	255.52	Top of bottom step, north corner, of monument to General Alexander (late commanding Benares Division), in Benares church yard.
	Benares Cantonment Bench Mark,	..	253.30	Top stone of corner of Post Office. Cantonment B. M. 60 feet above datum.
	Birna bridge Cantonment Bench Mark,	..	253.63	Top of centre of parapet of stone bridge over Birna river, Cantonment B. M.
	Ganges river—zero of Gauge at Maun Mandir Observatory, Benares, ..		196.80	
	Ganges river, Benares,	..	246.55	Highest flood level known (10th and 11th September, 1865.)
	" " "	..	198.60	Lowest level known (6th and 15th May, 1861).

SECTION IV.

NORTH WEST PROVINCES.

Benares to Karumnafsa.

THE levels of this section start from Benares along the Benares and Gházípúr road, but soon turn down a country road to Balwá Ghát (*viá* Jálúpúr) at which place the Ganges was crossed, and where the breadth of the River (water) is barely one-fourth of a mile. Thence by cross country road to Sakaldíya, on the Patna and Benares road (about 20 miles from the latter place), along which the line was continued as far as the Karumnafsa river, which divides the North Western Provinces from Bengal.

From Benares to Karumnafsa.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.	
On Road to Ghazépúr.	Birna bridge, Benares, Mile- stone.	253·63	Canal B. M., top of centre of parapet of stone bridge over Birna river.
	Large sun-dial, Bena- res, ..	250·10	On the road near entrance to Cantonments, nail head driven between two slabs of stone at foot of gnomon.
	From Benares, 1	262·96	Top of stone.
On Road from Benares to Balwá Ghát.	Paká well, ..	246·46	Top of lower step of large paká well at junction of roads from Ghazépúr to Balwá Ghát.
	Arsopúr, ..	251·90	Level of road, centre of village Arsopúr.
	Road culvert, ..	255·16	Top of parapet of the culvert nearest to Milkopúr tank and temple, between the latter and Benares.
	Jálúpúr, ..	248·37	Level of road, village of Jálúpúr.
	Sirsowa Manda, ..	238·70	Plinth of small paká Mandir on road on north bank of river Ganges, opposite Balwá Ghát.
	Ganges river, ..	195·44	Surface of river at Balwá Ghát (about 12 miles below Benares) 21st March 1864.
	Balwá well, ..	248·145	Nail head on top of well at entrance of Balwá village, close by Tháná, and about one-fourth mile from Ghát.
Roa junction, ..	245·13	Surface of road at junction of roads from Balwá Ghát, Sherpúr, and Zamaníya.	
Junction bridge. ..	238·15	Top of corner of plinth of bridge near the above junction.	
Matelá bridge, ..	246·71	Top of parapet wall of bridge near Matelah village; from this point a branch line of levels was run to Hírdepúr T. S.	
Hírdepúr T. S., Lat. 25° 24' 24", Long. 83° 16' 42", ..	288·88	Top of tower, which stands on a mound about 400 yards south-south-west of the village of the same name in zillah Benares, pergunah Mahuari, and half a mile south of the road from Benares <i>viá</i> Balwá to Gazpúr.	

From Benares to Karumnafsa.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Mile- stone.	Deducted by Spirit Leveling Opera- tions.		
Mahgaon bridge,	..	246.29	Top of parapet of páká bridge near village of Mahgaon.	
G. T. S. Bench Mark, Darúrah,	..	242.56	Stone B. M. imbedded at foot of Hindú Manda, Darúrah (2 miles east of Sakaldiya) 2 feet from corner of foundation platform facing the road approaching from Buxar.	
On Road from Benares to Patna.	{	Gazpúr village, ..	237.23	Level of road, centre of village.
	{	Kamulpúr village,	231.68	Do. do. do.
	{	Mojt village, ..	227.21	Do. do. do.
Dildernuggur railway station,	..	224.78	Level of rails, centre of station.	
G. T. S. Bench Mark, Dildernuggur,	..	225.00	Stone B. M. imbedded 12 paces from north-east corner of Railway Station house, opposite entrance to platform.	
On Benares and Patna road.	{	Dildernuggur road,	219.25	Centre of surface of main road, at junction with branch road from railway station.

SECTION V.

B E N G A L .

Karumnafsa river to Patna.

THIS section was carried along the Benares and Patna road as far as Beeheea Railway Station, whence it was taken along the railway to Patna. Branch levels were run to connect the G. T. S. Station of Nuaín, Dinapore, and Patna Golá, with the main line.

Karamnasa river to Patna.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.	
	Deducted by Spirit Leveling Opera- tions.		
On Road from Benares to Patna.	Mile- stone. Paká well, Kamíria vil- lage, ..	208.54	Top of lower step of north-east flight of stairs of well on south of road.
	G. T. S. Bench Mark, Buxar, ..	204.08	Stone B. M. imbedded outside, and close to, the doorway of a Musjid, on road close by bank of Ganges river, and near the stud stables, Buxar.
	Stud Musjid, Buxar, ..	200.83	Top of parapet of small culvert, north side of road opposite an old Musjid.
	Paká bridge, ..	207.01	Top of parapet of small bridge, at junction of roads near east corner of Buxar fort.
	Bazár well, Buxar, ..	204.83	Top of lower step of north-west flight of stairs of well, on south side of main road, east end of bazar.
	Ahrora bridge, ..	204.19	Top of parapet of small bridge about half way between 42nd and 43rd mile-stones from Arrah (about 2 miles east of Buxar).
	Bhojpúr bridge, ..	199.99	Top of parapet of bridge, near 36th mile-stone from Buxar.
	G. T. S. Bench Mark, Nowah Bágh, ..	221.87	Stone B. M. imbedded amongst some trees at junction of main road (from Buxar) with a road from Dumraon railway station, close by the 34th mile-stone from Arrah.
	Nowah Bágh well, ..	222.26	Top of upper step of well opposite the above B. M., at junction of road from Buxar with another to Chota Bhojpúr. (This latter road produced goes to Doomraon railway station).
	Paká well, ..	223.43	Right hand corner (as you ascend) of second step of north flight stairs of large paká well, just off the main road, and exactly opposite the 32nd mile-stone from Arrah.
	Nuaún bridge, ..	201.75	Top of parapet, at junction with wing wall, north-east corner of bridge on main road, over small nullah, village of Nuaún (near 29th mile-stone from Arrah.

Karunnafsa river to Patna.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.		
Nuaón T. S. Lat. 25° 34' 40" Long. 84° 16' 42"		Mile- stone. ..	250·97	This station is fixed upon a high mound in the village by which it is named, and is surmounted by a tower 20 feet in height, furnished with centre marks at every 5 feet of height. The station is close to the road from Buxar to Arrah, and lies about three miles east of Dumraon, a large town in pergunah Bhajpur, zillah Shahabad.
On Benares and Patna Road.	From Arrah,	24	196·57	} Top of mile-stone.
	“ “	19	197·35	
	Belouti well,	..	195·99		Top of lower step of paká well, just off the road, west side of Belouti village.
On East Indian Railway.	Beehcea railway station,		205·40	Level of rails at centre of station.
	“ “	...	208·09	Platform coping, north side west corner.
	“ “	..	203·92	Centre of road at level crossing, Beehcea station (near 445th mile-stone from Calcutta).
	Paká bridge,	..	191·62	Top of parapet of bridge, near 430th mile-stone from Calcutta.
	From Calcutta,	436	193·25	Level of rails opposite.
	G. T. S. Bench Mark, Arrah,	..	190·85	Stone B. M. imbedded four paces from foot of west end of goods' platform, north side of Arrah railway station, three paces inwards from prolongation of face of platform.
	Arrah railway station, ..		191·17	Level of rails, centre of station.
	“ “	..	193·53	Platform coping, north side, centre of station.
	From Calcutta,	430	193·95	Top of parapet of culvert, near 430th mile-stone.
	Soane bridge, west end,		222·69	Level of rails opposite signal post, west of bridge.
	Soane bridge, east end,		222·66	Level of rails, east end of bridge.
	Bihta railway station,		183·90	Level of rails centre of station.

Karumnafsa river to Patna.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.	
On E. I. Railway.	Railway bridge, ..	Mile- stone. 189-12	Top of parapet of bridge, about 416½ miles from Calcutta.
	“ “ ..	179-56	Top of parapet of culvert, about 412¾ miles from Calcutta.
	“ “ ..	178-93	Top of parapet of culvert, near 409th mile-stone from Calcutta.
	Dinapore railway station, ..	175-29	Level of rails, centre of station.
G. T. S. Bench Mark, Dinapore church, ..		170-72	Cantonment B. M., No. XIV, Dinapore Cantonment church, nail head south side of church, west of portico, on paká floor between plinth and drain. This B. M. is now surrounded by a stone slab with an inscription.
Ganges river, Dinapore, ..		169-70	Highest flood level of 1861.
On East Indian Railway.	Railway culvert, ..	175-43	Parapet of culvert near 405th mile-stone, from Calcutta.
	Bankipúr railway station, ..	171-25	Plinth of goods' shed. B. M. of Patna and Gyah branch road; the levels of which road start from this point.
	“ “ ..	168-76	Level of rails at level crossing, west of station.
On Patna and Dinapore Road.	Patna Golá, ..	171-91	Nail head on top of lower step of east flight of stairs.
	Bankipúr church, ..	168-69	Top of lower step of main entrance, Bankipúr church, about one foot from right hand corner as you enter.
On E. I. Railway.	Railway culvert, ..	169-89	Top of parapet wall of culvert, near 401st mile-stone from Calcutta.
	“ “ ..	168-11	Top of parapet of culvert, half way between 398th and 399th mile-stones.

Karumnafsa river to Patna.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.	
	Deducted by Spirit Leveling Opera- tions.		
On E. I. Railway.	G. T. S. Bench Mark, Patna, ..	177.17	Stone B. M. imbedded at foot of first telegraph post beyond the north west corner of railway station platform, its upper surface is 6 inches above the level of the ground.
	Patna railway station,	174.26	Level of rails, centre of station.
	" "	176.90	Coping of passenger platform, centre of station.

SECTION VI.

B E N G A L .

Patna to Bhaugulpúr.

THIS Section was carried from Patna along the East Indian Railway to Burrheea railway station, thence by the Patna and Bhaugulpúr road as far as Monghyr, and thence again by Railway to Bhaugulpúr. Branch Sections were run to connect the G. T. Survey Stations of Fúlbaría, Barári, and Pírpahar.

Patna to Bhaugulpúr.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deduced by Spirit Leveling Opera- tions.	
G. T. S. Bench, Mark, Patna,		Mile- stone. 177·17	See last page.
On the E. I. Railway.	East Indian Railway,	168·00	Level of rails, opposite 393rd mile-stone.
	Futwah railway sta- tion, ..	169·15	Coping of platform, centre of station.
	“ “	165·39	Level of rails, centre of station.
Foolburria T. S., Lat. 25° 30' 28" Long. 85° 23' 51"	..	188·03	<i>Upper markstone.</i> —This station is situated on the south bank of the Ganges, immediately to the east of the large village of the same name in the pergunah Baikatpúr, tháná of Futwah, and zillah of Patna. The station mark is on the top of a masonry pillar, 3 feet 6 inches in diameter at top and 30 feet high, surrounded by a platform 25 feet in diameter at bottom and 16 feet at top, built of sun-dried bricks with a spiral staircase of the same material. The distance of Shek Mahomedpúr from this station is 1·47 miles, and its azimuth 23° 48' 29".
On the East Indian Railway.	East Indian railway bridge, ..	167·29	Top of parapet of bridge, near 386th mile- stone from Calcutta.
	Bucktiarpúr railway sta- tion, ..	159·69	Level of rails, centre of station.
	“ “	163·16	Coping of south platform, centre of sta- tion.
	Bucktiarpúr G. T. S. Bench Mark, ..	163·52	Stone B. M. imbedded 20 links east of station house, and 7 links north of back wall of platform, north side of station.
	Barrh G. T. S. Bench Mark, ..	151·83	Stone B. M. imbedded 20 links west of north side of platform, and 60 links north-east of water tank, also 210 links east of rail- way bridge.
Barrh railway station,	152·27	Railway B. M., black mark on first bridge, west of railway station.	

Patna to Bhaugulpúr.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.	
On the East Indian Railway.	Mokameh railway station, ..	Mile-stone. 145·60	Level of rails, centre of station.
	“ “ ..	149·21	Coping of platform, centre of station.
	G. T. S. Bench Mark, Mokameh, ..	145·44	Stone B. M. imbedded on east side of railway station house, and 50 links south of paká well.
	Burrheea railway station, ..	150·81	Level of rails, opposite booking-office.
	“ “ ..	154·11	Platform coping, opposite booking-office.
On Patna and Bhaugulpúr Road.	Burrheea village, ..	138·19	Level of road, opposite camping ground.
	Luckiserai G. T. S. Bench Mark, ..	143·54	Stone B. M. imbedded a few inches below the surface of the ground, near the south-east corner of a small paká Hindú temple [at junction of two roads at entrance (Monghyr side) of village of Balguda, two miles west of Luckiserai], at a distance of 17 feet from corner on prolongation of south side. This temple is situated near a Musulmán monument, erected to Malik Sahib.
	Nawabgunje, ..	134·22	Level of road, centre of village.
	Súrajgarah, ..	132·79	Level of road opposite encamping ground.
	From Bhaugulpúr, 46	136·10	Top of mile-stone.
	“ “ ..	133·00	Level of road, opposite mile-stone.
Belan bazar, ..	130·26	Top of parapet of small culvert at west entrance of Belan bazar.	
Pírpahar H. S., ..	333·63	This station is situated on the summit of a highish hill, situated nearly due north of Monghyr ; not far from the “ hot springs.”	
Lat. 25° 22' 42" ..			
Long. 86° 33' 12" ..			
Monghyr railway station, ..	130·31	Level of rails, centre of station.	
Monghyr railway station, ...	133·21	Coping of platform, centre of station.	

Patna to Bhaugulpúr.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.	
Monghyr G. T. S. Bench Mark,	Mile- stone. ..	148.12	Stone B. M. imbedded opposite centre of porch at main entrance of Monghyr church (in fort) thirty-two paces from the porch and eight paces from the church-yard paling.
Railway level crossing,	..	140.61	Level of rail where road from Pírpahar H. S. to Monghyr bazar crosses the railway.
On Patna Road.	{ Village of Bámk, ..	142.23	Level of road at east entrance.
	{ Bhaugulpúr, 30	124.56	Top of mile-stone.
	{ " " 27	127.30	Top of mile-stone.
On East Indian Railway.	{ Burriarpúr railway station, ..	129.00	Level of rails, centre of station.
	{ Railway culvert, ..	131.35	Top of parapet of culvert, near 285th mile-stone from Calcutta.
	{ Sultangunje railway station, ..	126.29	Level of rails, centre of station.
	{ " " ..	129.72	Platform coping, centre of station.
	{ Sultangunje G. T. S. Bench Mark, ..	127.49	Stone B. M. imbedded one foot from back of centre of slant line platform, north-west corner of Sultangunje railway station.
Barara T. S., Lat. 25° 15' 51" Long. 87° 3' 23"	..	211.86	<i>Upper markstone.</i> —This station is situated about a mile and a quarter south of the large village of Barara, from which its name is derived in the pergunah of Dhurinpúr, zillah Purnia. The station is marked by a square tower 21 feet high with an internal pillar of paká masonry, in which are placed five of the usual markstones of the following heights; 1st, 9 inches below the surface of the ground; also, at 7, 14, 20, and 21 feet above the ground, respectively.
Bhaugulpúr G. T. S. Bench Mark,	..	146.58	Stone B. M. imbedded on prolongation of face of station platform south side, at a distance of 27 feet from end, and at a distance of 3 feet from end of front wall of water-tank.

Patna to Bhaugulpúr.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
	Deducted by Spirit Leveling Opera- tions.		
Bhaugulpúr railway station,	Mile Stone.	149.59	Coping of platform, south-west corner.
“ “ ..	..	149.23	Corner of platform, north-west corner.
“ “ ..	..	146.23	Level of rails, centre of station.
Bhaugulpúr church,	..	158.93	Top of upper step leading from porch into church (about same level as church floor).

SECTION VII.

B E N G A L.

Bhaugulpúr to Burdwán.

THE levels were carried along the East Indian Railway throughout this section.

Bhaugulpúr to Burdwan.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.	
	Deducted by Spirit Leveling Opera- tions.		
On East Indian Railway.	Mile- stone. Bhaugulpúr G. T. S. Bench Mark, ..	146·58	See page 41.
	Ghogan railway station,	117·91	Level of rails, centre of station.
	“ “ “ ..	120·99	Coping of south platform, centre of station.
	Railway Bench Mark,	116·24 •	About 251½ miles from Calcutta ; level of rails, nearly.
	Colgong railway station,	120·96	Level of rails, east end of station.
	G. T. S. Bench Mark, Colgong,	121·07	Stone B. M. imbedded at north-west corner of platform of Colgong railway station, on prolongation of wall, and at a distance of four feet from it.
	Railway Bench Mark,..	119·18	Near 246th mile-stone from Calcutta (level of rails nearly).
	“ “ ..	162·23	Near 241st mile-stone from Calcutta (level of rails, nearly).
	Railway bridge, ..	128·06	Top of parapet of bridge, near 238th mile- stone.
	Railway Bench Mark,..	146·01	About 233½ miles from Calcutta.
	East Indian railway, ..	151·90	Level of rails, opposite 233rd mile-stone.
	G. T. S. Bench Mark, Peerpointee railway station,	155·03	Stone B. M. imbedded at north-west corner of Peerpointee station house, 4 feet prolon- gation of its inner side.
	Railway Bench Mark,..	122·12	Top of paká pillar, about 228½ miles from Calcutta.
	Mirza chouki, ..	109·40	Cross mark on parapet wall of culvert, west of 226½ mile-stone from Calcutta.
Railway Bench Mark, Tilliaghari fort, ..	113·445	Cross mark on centre pillar, end of curve west gate of fort.	
Tilliaghari fort, original railway Bench Mark,	99·19	Heelstone of old gateway, west gate of fort ; north side.	

Bhaugulpúr to Burdwán.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
	Deduced by Spirit Leveling Opera- tions.	
Mile- stone. Railway Bench Mark,..	118·47	No. 2249.
“ “ “ ..	106·92	Square paká pillar, about one chain west of Tilliaghari sidings.
“ “ “ ..	118·92	Paká pillar at change of gradient, about 1½ chains west of double culvert, near 221st mile-stone from Calcutta.
Sahibgunje G. T. S. Bench Mark, ..	114·66	Stone B. M. imbedded 3 feet from north east corner of station house.
Sahibgunje railway station, ..	112·85	Level of rails, centre of station.
“ “ “ ..	116·37	Level of platform, centre of station.
“ “ “ ..	116·985	Plinth of north-west corner of station house.
Railway Bench Mark,..	116·38	Paká pillar, No. 1620.
“ “ “ ..	120·84	Paká pillar, No. 1640, in cutting, 36 chains east of 214th mile-stone.
Maharajpúr railway station, ..	100·33	Level of rails, centre of station.
“ “ “ ..	103·76	Level of platform, centre of station.
Railway Bench Mark,..	115·46	About 1,580 feet north of 206th milc-stone, and north of cutting.
“ “ “ ..	120·00	130 feet south of 199th mile-stone.
“ “ “ ..	124·43	Paká pillar, 200 feet south of 197th milc-stone, and 50 feet west of line.
G. T. S. Bench Mark, Teenpahar, ..	111·08	Stone B. M. imbedded to north of station house, 5 feet north of temporary station house (1862) and 30 feet east of line.
Teenpahar railway station, ..	106·33	Level of rails, centre of station.
“ “ “ ..	109·78	Level of platform, centre of station.

On East Indian Railway.

Bhaugulpúr to Burdwan.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions,	
On East Indian Railway.	Railway Bench Mark,.. Mile-stone.		Centre of line, change of gradient between 193rd and 194th mile-stones.
	Seetapahar, ..	147.73	Edge of paká drain at north end of cutting.
	Bahawa railway station,	105.85	Level of rails.
	“ “ “	109.30	Level of platform.
	East Indian railway, ..	97.05	Level of rails at bridge, south of, and close to, the 183rd mile-stone.
	Bridge plinth, ..	107.08	Plinth of north-west pier of girder bridge, about 1,390 feet north of 180th mile-stone.
	Paká platform, ..	97.89	Top of platform, 10 feet square and 6 inches high, about 130 feet south of 177th mile-stone.
	Railway Bench Mark,..	85.31	Square pillar, about 460 feet south of 173rd mile-stone.
	Pakowr railway station,	110.27	Level of platform, opposite booking-office.
	“ “ “ ..	106.94	Level of rails.
	G. T. S. Bench Mark, Pakowr, ..	111.38	Stone B. M. imbedded 60 feet from north end of station house and 5 feet west of wall, which runs from station house to end of platform.
	Railway Bench Mark,..	82.60	Square pillar, 792 feet south of 165th mile-stone.
	“ “ “ ..	90.87	Square pillar, 520 feet north of 164th mile-stone.
	“ “ “ ..	83.96	1,320 feet north of 163rd mile-stone.
East Indian railway bridge, ..	89.48	Top of west parapet of bridge near Raja-gaon chonki, between 161st and 162nd mile-stones.	
Railway Bench Mark,..	102.31	Square pillar, about 130 feet south of 160th mile-stone.	

Bhaugulpár to Burdwán.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
	Deducted by Spirit Leveling Opera- tions.		
On East Indian Railway.	Railway Bench Mark,	Mile-stone. 105·98	Square pillar, about half-way between 158th and 159th mile-stones.
	“ “ “ ..	117·521	Square pillar, south of bridge, about half-way between 157th and 158th mile-stones.
	Múraroe railway station, ..	102·69	Level of platform, centre of station.
	“ “ “ ..	99·85	Level of rails.
	Railway Bench Mark,	106·21	Square pillar in centre of line, 850 feet north of 153rd mile-stone.
	“ “ “ ..	101·48	Square pillar in centre of line, 1,580 feet south of 152nd mile-stone.
	“ “ “ ..	122·07	Square pillar in centre of line, about 149½ miles from Calcutta.
	“ “ “ ..	133·83	Square pillar in centre of line, about 700 feet north of 145th mile-stone.
	Nulhatee railway station, ..	131·89	Level of rails, centre of station.
	“ “ “ ..	134·84	Surface of platform, centre of station.
	G. T. S. Bench Mark, Nulhatee, ..	134·46	Stone B. M. imbedded 20 feet north of station house, 5 feet east of wall surrounding platform, and 30 feet east of line.
	Railway Bench Mark,...	129·81	Square pillar, near 140th mile-stone.
	“ “ “ ..	136·04	Square pillar in centre of line, near 139th mile-stone.
	Rampúr Haut railway Bench Mark, ..	119·36	Square paká pillar, opposite booking-office Rampúr Haut railway station (same level as rails nearly).
“ “ “ ..	119·64	Paká pillar, about 131½ miles from Calcutta.	
East Indian railway bridge, ..	124·14	Plinth of centre pier (south side) of iron girder bridge, near 129th mile-stone.	

Bhaugulpúr to Burdwán.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.	
	Deduced by Spirit Leveling Opera- tions.			
On East Indian Railway.	Mullarpúr railway station,	Mile-stone. ..	144.05	Level of platform, centre of station.
	" "	..	146.25	Plinth of north-west corner of station house.
	" "	..	140.58	Level of rails, centre of station.
	East Indian railway bridge,	..	136.47	Level of rails on bridge about 125½ miles from Calcutta.
	Durmá chonki,	..	151.20	Level of rails opposite.
	Cynthia bridge, west of station,	..	171.06	Top of west parapet wall, north end of bridge.
	" "	..	171.28	Top of east parapet wall, south end of bridge.
	" "	..	174.31	Level of platform, centre of station.
	" "	..	170.87	Level of rails.
	G. T. S. Bench Mark, Cynthia,	..	174.76	Stone B. M. imbedded 150 feet from northern extremity of station house, 10 feet west of wall surrounding it, and 25 feet west of line.
	Ahmedpúr railway station,	..	139.80	Level of platform, centre of station.
	" "	..	136.76	Level of rails.
	Doposi chonki,	..	142.77	Level of rails opposite (—), near 104th mile-stone from Calcutta.
	G. T. S. Bench Mark, Bulpúr,	..	164.20	Stone B. M. imbedded north of station house, 250 feet from edge of platform, and 120 feet west of line.
	Bulpúr railway station,	..	162.17	Level of rails, centre of station.
	" "	..	165.16	Level of platform.
	From Calcutta,	97	146.94	} Level of rails opposite.
	" "	96	148.27	
Beddiah railway station,	..	134.81	Level of rails, centre of station.	

Bhaugulpúr to Burdwán.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.		
On East Indian Railway.	Mile- stone. Beddiah railway station,	137-87		Level of platform, centre of station.
	From Calcutta, 90	118-03	}	Level of rails opposite.
	" " 89	117-94		
	Gúshkarrah railway station, ..	113-05		Level of rails, centre of station.
	" " ..	116-21		Level of platform, centre of station.
	G. T. S. Bench Mark, Gúshkarrah, ..	110-73		Stone B. M. imbedded north of station house, 200 feet from edge of platform, 60 feet west of line, and close to the railings which run parallel to the line.
	East Indian railway, 82	140-28	}	Level of rails opposite.
	" " 81	138-12		
	" " 80	135-26		
	" " 79	130-22		
	" " 78	122-04		
" " 77	127-30			
G. T. S. Bench Mark, Kanoo junction, ..	124-38		Stone B. M. imbedded 5 feet west of point house, at junction of the Ranígunj branch with the main line, East Indian railway.	
Kanoo junction, ..	124-08		Level of rails.	
" " ..	126-06		Level of platform, opposite booking-office.	
On Grand Trunk Road.	From Calcutta, 79	120-63	}	Top of mile-stones.
	" " 78	116-65		
	Hindú temple, ..	114-19		North of road, at large tank near 76th mile-stone. Paká platform on which temple stands.
	From Calcutta, 76	108-69	}	Top of mile-stones.
	" " 75	102-23		
	" " 74	100-46		
	Burdwán railway station, ..	102-87		Level of rails.
	G. T. S. Bench Mark, Burdwán, ..	97-22		Stone B. M. imbedded under nim tree in compound of hotel, 132 feet south of 73rd mile-stone, and 200 feet north-east of hotel.

SECTION VIII.

B E N G A L .

Burdwan to Calcutta.

THIS section is carried along the Grand Trunk Road as far as the 19th mile-stone from Calcutta, between which and Calcutta the line is continued along the road to Howrah (on the right bank of the river.) From Howrah the levels are carried across the river and connection made with Kidderpore Dock. Branch sections were run to connect the Grand Trigonometrical Stations of Nial and Chinsurah.

Burdwan to Calcutta.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.		
	Burdwan G. T. S. Bench Mark, ..	Mile- stone. ..	97.22	See last page.
On G. T. Road.	From Calcutta, ..	73	100.61	} Top of mile-stones.
	" " ..	71	99.40	
	Burdwan church, ..	..	98.57	Top step of main entrance (nearly on level with floor).
	From Calcutta, ..	70	97.86	} Top of mile-stones.
	" " ..	63	77.32	
" " ..	58	72.27		
" " ..	56	66.91		
	Mymaree railway station, ..		71.30	Level of platform, opposite booking-office.
On G. T. Road.	From Calcutta, ..	52	62.89	} Top of mile-stones.
	" " ..	48	50.12	
	Boinchee railway sta- tion, ..	..	54.83	Level of rails.
	Boinchee camping ground, ..	..	50.57	Parapet of well in south-east corner (1.53 foot above ground level).
	From Calcutta, ..	45	45.84	Top of mile-stone.
	Nial S., ..	..	39.11	Ground level mark-stone. This station is situated on a tank-bank, immediately on the southern skirt of the village of this name, in zillah Hoogly, and thaná Pandwá, a paká square hollow tower, 36 feet in height, has been erected over the station, and is marked in the usual manner below.
	Lat. 23° 7' 31" ..	..	
	Long. 88° 17' 50" ..	..	
On Grand Trunk Road.	From Calcutta, ..	44	48.71	Top of mile-stone.
	Pundooah railway sta- tion, ..	..	47.39	Level of platform, opposite booking-office.
	" " ..	..	44.96	Level of rails.
	From Calcutta, ..	42	43.29	} Top of mile-stones.
	" " ..	40	39.87	
" " ..	39	37.52		

Burdwan to Calcutta.

Names of Stations.		HEIGHT IN FT. ABOVE MEAN SEA LEVEL.		Remarks, and Description of Stations.
		Deducted by Spirit Leveling Opera- tions.		
On Grand Trunk Road.	From Calcutta,	Mile- stone. 36	34-78	} Top of mile-stones.
	" "	35	31-86	
	" "	33	32-98	
	" "	31	37-73	
	" "	29	30-97	
	" "	27	32-76	
	" "	26	27-13	
Chinsurah, S., Lat. 22° 52' 59" Long. 88° 26' 39"	..		86-40	<i>Top of pillar.</i> —This station has been fixed on the roof of the Hoogly or Syud Mohsin's College, the station being marked on a stone, and imbedded at the intersection of two of the walls; a pillar 9 feet in height has been raised above the station for the instrument.
On Grand Trunk Road.	Chinsurah Barrack church,	..	30-93	Level of floor at entrance of church.
	From Calcutta,	21	27-99	} Top of mile-stones.
" "	19	26-92		
On road between Howrah and Hooghly.	From Cal- cutta,	19	29-71	} Top of mile-stones.
	" "	17	20-91	
	" "	16	20-73	
Serampúr railway station, ..			26-02	Level of platform, opposite booking-office.
" "	..		23-48	Level of rails.
On road on right bank of Ganges.	From Calcutta,	13	24-41	} Top of mile-stones.
	" "	12	23-94	
	" "	11	21-52	
	" "	10	20-33	
	" "	9	25-53	
	" "	8	23-68	
	" "	6	23-77	
	Road level,	..	20-85	Opposite gateway of Government Hospital, Cotaparrah.
	Howrah station Bench Mark,	..	18-26	At Howrah terminus, south of gateway of court enclosing the station.
Howrah Dock sill,	..		- 0-06	Datum of East Indian Railway levels.

Burdwan to Calcutta.

Names of Stations.	HEIGHT IN FT. ABOVE MEAN SEA LEVEL.	Remarks, and Description of Stations.
	Deducted by Spirit Leveling Opera- tions.	
Calcutta Mint Bench Mark, ^{Mile- stone.}	+17·96	Top of B. M. in mint compound, near north-west corner of small tank, adjoining the river.
Calcutta Bench Mark, ..	+18·07	No. 40. Top of B. M. imbedded at junction of Fairlie Place and Strand.
Calcutta Bench Mark, ..	+19·89	No. 4. (25·35) opposite Prinsep's Ghât, imbedded by Captain Tucker, Garrison Engineer.
Kidderpore Dock sill, ..	- 6·25	