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Not to be folded or roughly handled

No. 457. Read the following letter from Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 23rd June 1874, No. 367:—

I HAVE the honor to lay before Government a report* by the Deputy Consulting Engineer upon the Southern Extension of the Great Southern of India Railway.

2. I feel sure that His Excellency the Governor in Council will consider the report to be highly satisfactory, with reference both to the progress that has been made and to the excellent character of the work to which Captain Thompson bears testimony.

Note on the Southern Extension of the Great Southern of India Railway (metre gauge) from Trichinopoly to Palamcottah and Tuticorin. Inspected in April and May 1874.

I HAVE the honor to report having completed an inspection of the Southern Extension of the Great Southern of India Railway, from Trichinopoly, via Dindigul and Madura, to Palamcottah and Tuticorin.

DISTRICT I.—LENGTH 15 MILES 57 CHAINS.

DISTRICT I.—LENGTH 15 MILES 57 CHAINS.

2. *Earthwork*.—The whole of this district has been completed to "formation" level, with the exception of about 22 chains of the fort branch at Trichinopoly, and about 36 chains of the main line near its junction with the Erode-Negapatam open line.

3. *Turfing*.—The embankment slopes of this district are very fairly protected from weather by spontaneous vegetation of various kinds. About five miles of embankment slopes have however been regularly turfed, and, where the line passes through tank-beds, nanul grass has been planted to break the wash of the waves in the windy season.

4. *Fencing*.—About seven miles of fence bund have been thrown up, but there has not been much live fence put down yet. The boundary fence mound round the Collatoor Station ground has been thrown up and planted with aloes, which appear to be thriving very fairly. About two miles of fencing have been put up at Trichinopoly, in the neighbourhood of the station and junction with the open line.

5. *Masonry—Bridges and Culverts.*—In this district there are twenty-six culverts, varying from 10 to 4 feet in width.

Five arch bridges, the largest of which is one of 20 feet spans, and twelve girder bridges, one of five 30 feet openings over the Coryaur river near Trichinopoly, being the largest work. The girders for this bridge were all ready for laying on, but the work was delayed owing to some of the small fittings belonging to it being still on board a ship at Negapatam, and stored away under the cargo which was being discharged.

6. There are only two bridges not yet up to girder stone level ; all the others are completed to that height. Copings and caps on wing-walls and abutments are as a rule not being put on before the girders have been hoisted or rolled into position. The two bridges above referred to will probably be completed before the end of July 1874.

7. Girders are in position on a bridge of four 20 feet spans in the 5th mile, and have been delivered at the sites of three other bridges.

8. *Stations—Trichinopoly.*—The station buildings at Trichinopoly are up to roof level and look very well; they are of brickwork relieved by stone quoins at the angles of the buildings and round the door frames.

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9. *Collatoor.*—The Collatoor Station buildings are also up to roof level, and the platform and loading bank retaining walls are up to coping.

The urinals were about 2 feet above foundation level when I passed through.

10. About 1,200 cubic yards of masonry have been executed in the Trichinopoly and Collatoor Stations; wells have been sunk and water is now available at each of these stations for locomotives.

11. *Platelayers' Huts.*—Platelayers' huts are to be erected at distances of two miles apart; one near Collatoor has been completed, and materials are collected for the remainder.

12. *Gate-keepers' Lodges.*—A Gate-keeper's lodge has been erected at the level crossing of the Madura road at Trichinopoly.

13. *Permanent-way.*—About fourteen miles of permanent-way material have been received in this district, and the road made passable for trollies or wagons up to the 14th mile 60th chain, a point about two miles south of Collatoor Station.

14. The Coryaur and other bridges between this point and Trichinopoly are, in the absence of girders, temporarily made up with sleepers, palmyra trees, etc., to admit of trollies and ballast wagons passing over them.

15. Of the fourteen miles of permanent-way laid, about eleven have been ballasted; no ballasting has yet been carried on where permanent-way has not been laid.

DISTRICT II.—LENGTH 15 MILES 21 CHAINS.

16. *Earthwork.*—The earthwork of the whole of this district is completed up to formation level, with the exception of some trifling filling up at the backs of bridge abutments, etc.

17. *Turfing.*—About nine miles of the embankment slopes have been regularly turfed, the remainder are on the whole fairly covered with grass and other vegetation.

18. *Fencing.*—Fence bunds have been constructed along about seven miles of the district, and of these about one and three quarter miles have been planted with aloes and euphorbia. It is, I think, a mistake planting euphorbia when aloes can be procured. The aloe is much quicker growing, and forms a more efficient fence.

19. I have carefully watched the growth of fences of both descriptions between Trichinopoly and Dindigul during the past two years, and am now convinced that euphorbia is not worth the trouble and expense of planting as a fence for railways.

20. No wire fencing has been put up yet in District II.

21. The approaches for passengers and goods to the Manapalay Station are completed.

22. *Masonry—Bridges and Culverts.*—The masonry of the bridges and culverts in this district is completed, with the exception, in some instances, of girder stones, caps, and copings. Girders have been laid in position on two 12 feet openings in the first and one 12 feet opening in the second mile. Girders have also been conveyed to the sites of three other bridges, viz., one in the 3rd, one in the 4th, and one in the 10th mile.

23. Eight other bridges are quite ready for girders as soon as they are available, and the remaining bridges only require girder stones and a little levelling to prepare them for their girders.

24. *Stations.*—Manapalay Station, at the 24th mile 67th chain from Trichinopoly, has been commenced. The foundations are masonry, and the superstructure is to be brickwork. The passenger and goods platforms, retaining walls, and the goods shed and ticket office foundations have been put in. About 200 cubic yards of rubble masonry have been executed.

25. *Station Wells.*—The well belonging to the bungalow of the Engineer of this district is situated within the station-yard limits; there is a good supply of water in it, and it only requires a little deepening and improving generally to make it available for watering engines.

26. *Platelayers' Huts and Gate Lodges.*—No platelayers' huts or gate lodges have yet been constructed.

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27. *Permanent-way.*—Sleepers for about twelve, and rails, etc., for about eight miles of line have been received. About 5½ miles of permanent-way have been laid and ballasted.

Two and a half more miles have been laid but not ballasted, and about 3½ more miles of line are ballasted and ready for permanent-way.

DISTRICT III.—LENGTH 15 MILES 59 CHAINS.

28. *Earthwork.*—The whole of this district has been brought up to formation level.

29. *Turfing.*—About four miles of embankment slopes have been turfed, and the remainder will be proceeded with when the weather is favorable.

30. *Fencing.*—Between four and five miles of fence have been planted, but not in fence mound, of which little has been thrown up yet.

In this as well as in the other districts the euphorbia has not proved a success; there appears to be no necessity to plant more of it as the soil is very suitable for aloes, and they are easily procurable. When ballast trains commence to run aloe plants can easily be collected and distributed where required along the line. No wire fencing has been put up yet.

31. *Masonry—Bridges and Culverts.*—There is only one bridge in this district not yet up to girder stone level; it will probably be completed about the end of June, or early in July 1874. Girders have been delivered for three bridges, and thirteen other bridges are ready for them as soon as they can be conveyed to their sites. With the exception of some cap and coping work, and the laying and levelling of a few girder stones, the masonry work of bridges and culverts may be considered finished.

32. *Stations and Wells.*—The station buildings and wells have not yet been commenced.

33. *Platelayers' Huts and Gate Lodges.*—Four platelayers' huts are in progress.

34. *Permanent-way.*—About four miles of permanent-way material have been received and all laid and ballasted. Between four and five more miles of line have been ballasted, and are now ready for permanent-way.

DISTRICT IV.—LENGTH 15 MILES 13 CHAINS.

35. *Earthwork—Turfing.*—Fifteen miles (or all but 13 chains of this district) are completed to formation level, and about ten miles of the embankment slopes have been regularly turfed.

36. *Fencing.*—There is not much vegetable fence planted yet; aloes have been put down for about six miles along the embankment slopes, but there has been little or no planting in fence mounds.

The euphorbia, which has now been planted for some time, looks weak, unhealthy, and unfit for fencing purposes. No wire fencing yet.

37. *Masonry—Bridges and Culverts.*—The masonry of the bridges and culverts in this district may be considered finished. There are only four works still in progress, and they will be completed by the end of June 1874. All the girder bridges are ready with the exception of girder stones, which will be laid on before girders are available for them. Girders have been delivered at the sites of three bridges, and will shortly be delivered at the sites of four more.

38. *Stations—Dindigul.*—The Dindigul Station, at the 60th mile 47th chain from Trichinopoly, is well advanced. About 600 cubic yards of masonry, including platform retaining walls, have been executed.

39. *Wells.*—The Dindigul Station well is being sunk; water is already available for locomotives.

40. *Platelayers' Huts and Gate Lodges.*—No platelayers' huts or gate lodges have yet been commenced.

41. *Permanent-way.*—About 2½ miles have been received and 1½ miles of permanent-way laid and ballasted. Three additional miles have been ballasted and are ready for permanent-way.

DISTRICT V.—LENGTH 15 MILES 22 CHAINS.

42. *Earthwork*.—Fifteen miles are now up to formation level.
43. *Turfing*.—About eleven miles of embankment have been turfed; and, at slopes have had aloes planted along them as a fence. No wire fencing is up yet.
44. *Fencing*.—One mile of fence mound thrown up, but not planted. Eight miles of the embankment slopes have been turfed; the remainder will probably be completed by August 1874.
45. *Masonry—Bridges and Culverts*.—The masonry of the bridges and culverts will, with the exception of the bed stones, all girder bridges are completed and ready for their position. Girders have been delivered at the sites of fifteen bridges, but have not yet been laid in. There are seventeen small bridges and culverts still in progress, but it is expected that they will all be completed by the end of July.
46. *Stations—Ammanaikanoor*.—The Ammanaikanoor Station buildings have been commenced. About 150 cubic yards of masonry executed. Ammanaikanoor is the station at which passengers for Kodikanel on the Pulney Hills alight.
47. *Wells*.—The station well has not yet been commenced.
48. *Platelayers' Huts and Gate Lodges*.—No platelayers' huts or gate lodges have been taken in hand.
49. *Permanent-way*.—No permanent-way material has been received, and no ballasting has been carried out yet.

DISTRICT VI.—LENGTH 15 MILES.

50. *Earthwork*.—With the exception of 3 or 4 chains now in progress the whole of this district has been brought up to formation level. Where the banks have subsided in a few places they are being made up again.
51. *Turfing*.—About twelve miles of embankment slopes have been turfed; the remainder of the district will probably not require regular turfing.
52. *Fencing*.—Eleven miles of fence mound have been thrown up, and a considerable portion planted with aloes. Planting is in progress and no euphorbia is being put down. No wire fencing has been put up yet.
53. *Masonry*.—Out of fourteen girder bridges in this district eight are quite ready for girders, and the remaining six are up to girder stone level. The girder stones are being dressed, and the six bridges will probably be completed before the end of June 1874.
54. *Stations—Sholavandan*.—The Sholavandan Station, 85 miles 2 chains distant from Trichinopoly, has been taken in hand, and about 250 cubic yards of masonry executed.
55. *Wells*.—The Sholavandan Station well is being sunk. About 6 feet of water is already standing in it.
56. *Platelayers' Huts and Gate Lodges*.—Platelayers' huts and gate lodges have not yet been commenced.
57. *Permanent-way*.—No permanent-way material has been received yet, and only about 20 chains of bottom ballast laid down.
58. *Earthwork*.—This district is completed to formation level, with the exception of about five chains south of the Vigay river, and about ten chains near the end of the district, just beyond Skandamullay.

DISTRICT VII.—LENGTH 12 MILES.

59. *Earthwork*.—The whole of the embankment slopes have been turfed, with the exception of about 20 chains north and 40 chains south of the Vigay.
60. *Fencing*.—About 4½ miles of fence mound have been thrown up and all planted with aloes, which appear to thrive. No wire fencing put up.
61. *Masonry—Bridges and Culverts*.—All the girder bridges are ready for girders, with the exception of the Vigay, but this bridge will most probably be completed and ready for them before the end of June 1874. Girders have been delivered at the sites of six bridges, viz., two of 6 feet, two of 12 feet, and two of 20 feet spans.
62. *Stations—Madura*.—The Madura Station, distant from Trichinopoly 98 miles 12 chains, has been commenced, and about 300 cubic yards of masonry executed.
63. *Tripnacoonidum*.—The Tripnacoonidum Station, 103 miles 12 chains from Trichinopoly, has also been commenced, and about 150 cubic yards of masonry finished.
64. *Wells*.—A well has been sunk in the Madura station-yard, and is all but completed; water is available for engines. The Tripnacoonidum well has just been commenced.
65. *Platelayers' Huts and Gate Lodges*.—The huts for platelayers and lodges for gate-men have not yet been taken in hand.
66. *Permanent-way*.—About six miles of permanent-way material have been received, five miles laid and partially ballasted. No further ballasting has yet been carried out. The five miles which have been laid have proved of great use in conveying stone to the Vigay from the quarries at Skandamullay.

DISTRICT VIII.—LENGTH 14 MILES 77 CHAINS.

67. *Earthwork*.—The whole of this district is up to formation level with the exception of about half a mile, which is almost a surface line, requiring little else but levelling, and the removal of vegetation to prepare it for ballasting.
68. *Turfing*.—Nearly thirteen miles of the embankment slopes have been turfed.
69. *Fencing*.—About 8½ miles of fence mound have been thrown up, of which two miles have been planted with aloes. No wire fencing has been put up yet.
70. *Masonry—Bridges and Culverts*.—The masonry of bridges and culverts may be considered completed. The arch of a 10 feet opening near Skandamullay has not been turned yet, but with this exception all the bridges and culverts are finished up to girder bed level. All the large bridges, viz., the Gondaur, Shevaracottay and Calgoody have their girder blocks laid on, and are ready for girders, which have been delivered at their sites. No girders have yet been delivered at the sites of smaller bridges.
71. *Stations Wells, Platelayers' Huts and Gate Lodges*.—No station buildings, wells, platelayers' huts or gate lodges have yet been commenced.
72. *Permanent-way*.—No permanent-way material has been received yet, and no ballasting has been carried out.

DISTRICT IX.—LENGTH 14 MILES 69 CHAINS.

73. *Earthwork*.—The whole of this district is up to formation level; and,
74. *Turfing*.—About twelve miles of embankment slopes have been turfed.
75. *Fencing*.—The boundary fence mound round the Viriduputty Station compound has been completed. The district fence mounds have just been commenced. No wire fence has been put up.
76. *Masonry—Bridges and Culverts*.—All the bridges and culverts will probably be completed (so far as masonry is concerned) by the end of June 1874. There are only three unfinished works now in the district, the rest are ready for their girders. All the girders for the Viriduputty bridge (nine 30 feet openings) have been delivered at the site of the works. Girders for the smaller bridges have not yet been delivered.
77. *Stations—Viriduputty*.—Excavations for the foundations of the Viriduputty Station 124 miles 69 chains from Trichinopoly, have been commenced.

DISTRICT V.—LENGTH 15 MILES 22 CHAINS.

42. *Earthwork*.—Fifteen miles are now up to formation level.
43. *Turfing*.—About eleven miles of embankment have been turfed; and, at slopes have had aloes planted along them as a fence. No wire fencing is up yet.
44. *Fencing*.—One mile of fence mound thrown up, but not planted. Eight miles of the embankment slopes have been turfed; the remainder will probably be completed by August 1874.
45. *Masonry—Bridges and Culverts*.—The masonry of the bridges and culverts will, with the exception of the bed stones, all girder bridges are completed and ready for their position. Girders have been delivered at the sites of fifteen bridges, but have not yet been laid in. There are seventeen small bridges and culverts still in progress, but it is expected that they will all be completed by the end of July.
46. *Stations—Ammanaikanoor*.—The Ammanaikanoor Station buildings have been commenced. About 150 cubic yards of masonry executed. Ammanaikanoor is the station at which passengers for Kodikanel on the Pulney Hills alight.
47. *Wells*.—The station well has not yet been commenced.
48. *Platelayers' Huts and Gate Lodges*.—No platelayers' huts or gate lodges have been taken in hand.
49. *Permanent-way*.—No permanent-way material has been received, and no ballasting has been carried out yet.

DISTRICT VI.—LENGTH 15 MILES.

50. *Earthwork*.—With the exception of 3 or 4 chains now in progress the whole of this district has been brought up to formation level. Where the banks have subsided in a few places they are being made up again.
51. *Turfing*.—About twelve miles of embankment slopes have been turfed; the remainder of the district will probably not require regular turfing.
52. *Fencing*.—Eleven miles of fence mound have been thrown up, and a considerable portion planted with aloes. Planting is in progress and no euphorbia is being put down. No wire fencing has been put up yet.
53. *Masonry*.—Out of fourteen girder bridges in this district eight are quite ready for girders, and the remaining six are up to girder stone level. The girder stones are being dressed, and the six bridges will probably be completed before the end of June 1874. No girders have yet been delivered in this district. There are a good many small culverts to be finished, but they are all well in hand now, and they will probably be ready for permanent-way some time before it is ready for them.
54. *Stations—Sholavandan*.—The Sholavandan Station, 85 miles 2 chains distant from Trichinopoly, has been taken in hand, and about 250 cubic yards of masonry executed.
55. *Wells*.—The Sholavandan Station well is being sunk. About 6 feet of water is already standing in it.
56. *Platelayers' Huts and Gate Lodges*.—Platelayers' huts and gate lodges have not yet been commenced.
57. *Permanent-way*.—No permanent-way material has been received yet, and only about 20 chains of bottom ballast laid down. The greater part of the district will have to be ballasted by train, as the material will have to be conveyed from considerable distances.

DISTRICT VII.—LENGTH 12 MILES.

58. *Earthwork*.—This district is completed to formation level, with the exception of about five chains south of the Vigay river, and about ten chains near the end of the district, just beyond Skandamullay.

59. *Turfing*.—The whole of the embankment slopes have been turfed, with the exception of about 20 chains north and 40 chains south of the Vigay.

60. *Fencing*.—About 4½ miles of fence mound have been thrown up and all planted with aloes, which appear to thrive. No wire fencing put up.

61. *Masonry—Bridges and Culverts*.—All the girder bridges are ready for girders, with the exception of the Vigay, but this bridge will most probably be completed and ready for them before the end of June 1874. Girders have been delivered at the sites of six bridges, viz., two of 6 feet, two of 12 feet, and two of 20 feet spans.

62. *Stations—Madura*.—The Madura Station, distant from Trichinopoly 98 miles 12 chains, has been commenced, and about 300 cubic yards of masonry executed.

63. *Tripanacoondum*.—The Tripanacoondum Station, 103 miles 12 chains from Trichinopoly, has also been commenced, and about 150 cubic yards of masonry finished.

64. *Wells*.—A well has been sunk in the Madura station-yard, and is all but completed; water is available for engines. The Tripanacoondum well has just been commenced.

65. *Platelayers' Huts and Gate Lodges*.—The huts for platelayers and lodges for gate-men have not yet been taken in hand.

66. *Permanent-way*.—About six miles of permanent-way material have been received, five miles laid and partially ballasted. No further ballasting has yet been carried out. The five miles which have been laid have proved of great use in conveying stone to the Vigay from the quarries at Skandamullay.

DISTRICT VIII.—LENGTH 14 MILES 77 CHAINS.

67. *Earthwork*.—The whole of this district is up to formation level with the exception of about half a mile, which is almost a surface line, requiring little else but levelling, and the removal of vegetation to prepare it for ballasting.

68. *Turfing*.—Nearly thirteen miles of the embankment slopes have been turfed.

69. *Fencing*.—About 8½ miles of fence mound have been thrown up, of which two miles have been planted with aloes. No wire fencing has been put up yet.

70. *Masonry—Bridges and Culverts*.—The masonry of bridges and culverts may be considered completed. The arch of a 10 feet opening near Skandamullay has not been turned yet, but with this exception all the bridges and culverts are finished up to girder bed level. All the large bridges, viz., the Gondaur, Shevaracottay and Calgoody have their girder blocks laid on, and are ready for girders, which have been delivered at their sites. No girders have yet been delivered at the sites of smaller bridges.

71. *Stations Wells, Platelayers' Huts and Gate Lodges*.—No station buildings, wells, platelayers' huts or gate lodges have yet been commenced.

72. *Permanent-way*.—No permanent-way material has been received yet, and no ballasting has been carried out.

DISTRICT IX.—LENGTH 14 MILES 69 CHAINS.

73. *Earthwork*.—The whole of this district is up to formation level; and, about five miles of embankment slopes have been turfed.

74. *Turfing*.—About twelve miles of embankment slopes have been turfed.

75. *Fencing*.—The boundary fence mound round the Viriduputty Station compound has been completed. The district fence mounds have just been commenced. No wire fence has been put up.

76. *Masonry—Bridges and Culverts*.—All the bridges and culverts will probably be completed (so far as masonry is concerned) by the end of June 1874. There are only three unfinished works now in the district, the rest are ready for their girders. All the girders for the Viriduputty bridge (nine 30 feet openings) have been delivered at the site of the works. Girders for the smaller bridges have not yet been delivered.

77. *Stations—Viriduputty*.—Excavations for the foundations of the Viriduputty Station 124 miles 69 chains from Trichinopoly, have been commenced.

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78. *Wells, Platelayers' Huts, and Gate Lodges.*—The station well, platelayers' huts, and gate lodges have not yet been commenced.

79. *Permanent-way.*—No permanent-way has been received. About three or four chains of ballasting have been done.

DISTRICT X.—LENGTH 14 MILES 67 CHAINS.

80. *Earthwork.*—The whole of the district is up to formation level, with the exception of about 20 chains in the aggregate where bridges occur, and the banks have not been quite completed up to the abutments.

81. *Turfing.*—About eleven miles of embankment slopes have been turfed.

82. *Fencing.*—The boundary fence mound round the Sattoor Station ground has been thrown up and planted with aloes. About four miles of fence bund have been completed along the line, but is not yet planted.

83. *Masonry—Bridges and Culverts.*—There are twenty-one bridges ready for girders, but none have yet been delivered. Four bridges are still in progress, two of these will most probably be completed by the end of June 1874. The other two are the Gunnecherry and Sattoor bridges.

84. *Sattoor Bridge.*—The Sattoor bridge will probably be completed by the end of September 1874. It is to carry the line over the Vypar river close to Sattoor, and will consist of twelve 70 feet girder openings. The south abutment and six piers next it are completed, the 7th is up to plinth, the foundation for the 8th was being excavated for, and the 9th, 10th, and 11th piers and north abutment have not yet been commenced. It is anticipated that there will be some difficulty in keeping the excavations for piers 8 and 9 dry when putting in the foundations. The other two piers and north abutment will, I think, give less trouble in this respect.

The early and very heavy rains this year have given a great deal of trouble with the Sattoor bridge; sudden freshes constantly filling in the coffer dams with sand, mud and water, choking the suction pipes of the Gwynn's steam pumps employed for pumping out the coffer dams, and causing a great deal of vexatious delay and expense.

85. *Gunnecherry Bridge.*—The Gunnecherry bridge of five 70 feet spans over the Gunnecherry river, chief tributary of the Vypar, has also been considerably delayed in its progress towards completion by a succession of sudden freshes. The south abutment is completed with the exception of copings. Pier No. 1, next the south abutment, is up to girder block level.

Pier No. 2 within two courses of girder block level.

Pier No. 3.—Coffer dam in, and excavation almost completed, but a fresh had come down and filled it all in again.

Pier No. 4.—Excavations for foundations partly taken out, but all filled in again by same fresh. Two courses of foundation for north abutment in, and masonry in progress. There is a Gwynn's centrifugal pump at this work, without which there would have been great difficulty in keeping the foundations clear of water. This bridge if not delayed by more freshes will probably be ready for girders in July 1874.

86. *Stations.—Sattoor.*—Excavations for the foundations of the Sattoor Station have been commenced, 141 miles 58 chains from Trichinopoly.

87. *Wells, Platelayers' Huts, and Gate Lodges.*—The station well, platelayers' huts, and gate lodges have not been commenced yet.

88. *Permanent-way.*—About four miles of permanent-way have been received and about three and a half miles laid, two miles of which are ballasted, and the remainder being ballasted.

DISTRICT XI.—LENGTH 16 MILES 29 CHAINS.

89. *Earthwork.*—Sixteen miles of this district have been brought up to formation level, and one mile of embankment slopes turfed.

90. *Turfing and Aloe planting.*—Eight miles of slopes have been planted with a description of small aloe which thrives well in black cotton soil; it is of no use for fencing purposes, but

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as a protection against weather on the embankment slopes, it will probably answer very well.

• Being all black cotton.

Grass forming good turf is not to be found along this district, * aloe planting has therefore been substituted for turfing.

91. *Fencing.*—About one mile of fencing mound has been thrown up but not planted. Caroovalum seed was sown in 1873 over about seven miles of this district with the view of forming fences and providing fuel, the remainder of the district is being sown in this year.

If the caroovalum trees grow, they will no doubt be valuable as fuel, but so far as my experience goes they will never form an efficient fence against sheep or cattle let them grow ever so well, merely from the fact that cattle, sheep, and goats, are fond of the leaves, and will always be liable to eat their way through the fence. No wire fencing has been put up yet; I imagine when trains begin to run it will be necessary in this district, and generally through the black cotton country, as there will be great difficulty in growing efficient vegetable fences, and they are certain to be very slow of growth.

92. *Masonry—Bridges and Culverts.*—The masonry may be considered complete in bridges and culverts, there being only one work still in hand, and by this time it is probably completed. There are thirty-three bridges now ready for girders, but no girders are yet delivered at their sites.

Two small additional culverts may possibly have to be built in this district, but as they can easily be constructed within a month from the date of their commencement, they will in no way interfere with the completion of the line.

93. *Stations, Wells, Platelayers' Huts and Gate Lodges.*—No station buildings, wells, or gate lodges have been commenced yet. Three platelayers' huts have been erected.

94. *Permanent-way.*—No permanent-way material has yet been received. About 60 chains of line have been ballasted.

DISTRICT XII.—LENGTH 17 MILES 60 CHAINS.

95. *Earthwork.*—This district is up to formation level throughout.

96. *Turfing and Aloe planting.*—As it runs through a black cotton country, the embankment slopes are all planted with aloes, there being no turf to be found near the line.

97. *Fencing.*—Caroovalum seed has been sown for fencing and fuel as in District XI., but, owing to dry weather, it has not come up as freely as it should have done. It is being again sown where it has failed to germinate.

I have already said that I do not think caroovalum trees will ever form an efficient fence against cattle and sheep, but the wood will in time be valuable for fuel.

98. *Masonry—Bridges and Culverts.*—The masonry work of bridges and culverts is completed. Twenty-seven bridges are ready for girders, but none have yet been received in the district.

99. *Stations.*—The station buildings have not yet been commenced.

100. *Wells.*—At Kuddumbeer, where a station is to be built, there is an old well which may possibly be utilized for watering purposes.

101. *Platelayers' Huts and Gate Lodges.*—No platelayers' huts or gate lodges have been built yet.

102. *Permanent-way.*—No permanent-way material has been received, and no ballasting done yet.

DISTRICT XIII.—LENGTH 16 MILES 30 CHAINS.

103. *Earthwork.*—Sixteen miles of this district have been brought up to formation level.

104. *Turfing and Aloe planting.*—The embankment slopes of about two miles near Tuticorin (all light sand) have been planted with creepers, nanul grass, etc., which are thriving remarkably well, and quite protecting the sandy slopes from being blown away, as heretofore, by the high Tinnevely winds. About eight miles more at the north end of the district have been planted with small aloes, as in Districts XI. and XII.

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105. *Fencing*.—About four and a half miles of fence mound have been thrown up, but not yet planted. No wire fencing has been put up yet.

106. *Masonry—Bridges and Culverts*.—The masonry of bridges and culverts is almost completed. Girders have been received for twenty-six bridges. Three small bridges have not yet been commenced, but they will most probably be completed by August 1874.

107. *Stations*.—Excavations have been commenced for the foundations of the Tuticorin Station building. The greater part of the enclosure wall has been built, the material is quartz (rubble).

108. *Permanent-way*.—About ten and a half miles of permanent-way material have been received and laid in this district. Thirty chains only have been ballasted. No other ballasting has been carried out yet.

109. *Girder bridge at Tuticorin on oblong wells*.—A girder bridge of one 30 feet span is being built close to Tuticorin. Each abutment, with its pair of wing walls, is to be carried by one oblong well. The dimensions of the two wells are 14' x 8' internal, and 20' x 14' external measurements; the thickness of the rubble masonry (not brickwork) being 3 feet, resting on wooden kerbs composed of timbers bolted together. The well to carry the north abutment has been sunk 13 feet 6 inches, and the south abutment well 15 feet 6 inches. They are to be filled with concrete, and will no doubt form excellent foundations.

110. *Permanent-way*.—Permanent-way material is arriving at Tuticorin, and several hundred tons of coal have been landed, so that as soon as an engine and some wagons are available, the permanent-way material will be pushed rapidly northwards, and ballasting will be carried on as well.

DISTRICT XIV.—LENGTH 15 MILES 57 CHAINS.

111. *Earthwork*.—The whole of this district is up to formation level with the exception of about 38 chains.

112. *Turfing*.—About eight and a quarter miles of the embankment slopes have been turfed, and the grass is growing well. One mile and thirty chains have been planted with the small aloes, where the line runs through the black cotton.

113. *Fencing*.—About eleven miles of fence bund have been thrown up, and nearly twelve miles of fence planted, some being planted along the embankment slopes, not in mound. No wire fence has been put up yet. The aloes which have been planted are growing remarkably well, especially towards the Tinnevely end of the district.

114. *Masonry—Bridges and Culverts*.—There are forty-three bridges and culverts in this district ready for girders. Seven other bridges are still in progress, but will probably be finished by August 1874. There are two culverts which have not yet been commenced, but will probably be finished by August 1874. Girders have been delivered at the sites of eleven bridges, viz., three of 15 feet span, and eight of 11 feet span, but none have been laid in position yet.

115. The construction of Chittaur bridge (ten 70 feet spans) has been greatly delayed by a succession of freshes. The state of the work was as follows about three weeks ago:—
The north abutment and two piers next it up to girder bed level.
The 3rd, 4th, and 5th piers to girder block level. The 6th and 7th pier foundations not yet in. The excavations for their foundations had been three times filled in by freshes.

The 8th pier was within 8 feet of girder bed level, and the 9th pier and south abutment were up to girder stone level.

The freshes in the Chittaur had been very sudden, the water coming down occasionally in a wave wall of 4 or 5 feet in height, giving but little warning, sweeping all before it, and filling in the excavations.

116. *Stations*.—The boundary wall of the Tinnevely station-yard has been commenced, and about 100 cubic yards of masonry executed. The station offices have just been commenced.

117. *Permanent-way*.—No permanent-way material has been received yet. About 3½ miles of line have been ballasted.

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118. *Total length of line up to formation level*.—By totalling up the amount of work done in the fourteen districts composing the Southern Extension, it will be found that out of 215 miles (the length of the line from Trichinopoly to Tuticorin and Palamcottah) 211 miles and 50 chains have been completed up to formation level. The aggregate of 3 miles 30 chains, not yet finished, is made up of a chain or two here and there, at the backs of bridge abutments, at gaps left for culverts not yet put in, or where embankments originally up to proper level have sunk from weathering.

119. *Total Turfing*.—About 110 miles of embankment slopes have been regularly turfed, and thirty-five miles planted with small aloes, where the line runs through black cotton soil and turf is not procurable. The line is thus protected from weather by turfing and aloe planting for a length of 145 miles, and as the slopes are not turfed where the line runs in cuttings, and as in many places the embankment slopes are already protected very fairly against weather by spontaneous vegetation, there is but little more work of this description to be carried out.

120. *Total Fencing—Vegetable*.—About sixty-one miles of fence mound have been thrown up, and fifty-seven miles of aloe, euphorbia, or carovalum fencing planted; some in mound and some in the slopes of the embankments.

I have not seen any attempt made to cultivate the corkapully as a fence in some places, where aloes do not thrive, it might possibly be found worth the trouble of introducing. My impression is, however, that if the line is to be efficiently fenced, wire fencing must be put up where aloes fail to thrive. I have no faith in euphorbia or carovalum, and very little in corkapully, for fencing.

121. *Total Wire Fencing*.—The only wire fencing put up yet is at Trichinopoly, where it has been found necessary to have a couple of miles of line passing through the cantonment protected.

122. *Total Masonry Bridges and Culverts*.—The masonry work of bridges and culverts may almost be considered completed, the Vigay, the Vypar, the Gunnecherry, and the Chittaur bridges being the only four of any importance still unfinished. The Vigay will probably be finished and ready for girders before the end of June, the Vypar by the end of September, the Gunnecherry by the middle of July, and the Chittaur by August 1874.

123. Between Trichinopoly and Palamcottah and Tuticorin there are in all 323 culverts of various sizes, single and double, varying from 2 to 4 feet in width. There are forty masonry arch bridges, varying in size from single 6 feet openings to bridges of three 20 feet spans. There are also 208 girder bridges, varying in size from single 6 feet openings to bridges of fifteen 70 feet openings. In all there are 576 bridges and culverts giving road or waterway under the line. Out of this number there are only nine small works which have not yet been commenced. Forty-one are still in progress, and will all be completed by September, most of them long before that date. Out of the total number of 576 bridges and culverts there are therefore 526 either fully completed or only wanting girder blocks, caps, or copings to complete them.

124. Girders have been delivered at the sites of 63 works, including the four important bridges over the Gondaar, the Shevaracootay, the Calgoody and the Virduputty rivers. Girders have been put in position on four bridges. As girders come in at Negapatam and Tuticorin from England, they are being distributed as rapidly as possible over the line.

125. *Stations*.—Out of twenty-five stations to be built, eleven have been commenced, viz. :—

Trichinopoly.	Madura.
Collatoor.	Tripanacoondum.
Manaparay.	Sattoor.
Dindigul.	Tuticorin.
Ammanaikanoor.	Tinnevely.
Sholavandam.	

About 3,500 cubic yards of masonry have been executed.

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126. Wells.—Wells have been sunk and water for locomotives is available at the following stations:—

Trichinopoly.	Sholavandan.
Collatoor.	Madura.
Manaparay.	Tripanacoondum.
Dindigul.	

127. Total Permanent-way.—About fifty miles of permanent-way material have been received along the line, and 547 miles of this amount laid. Forty-four miles of line have been ballasted. Permanent-way material is arriving rapidly at Negapatam and Tuticorin, and is being distributed along the line as quickly as carriage can be obtained for it.

When narrow gauge engines and a few wagons have been received at Trichinopoly, Madura, and Tuticorin, platelaying and the distribution of girders will make rapid progress.

If rivetters can be obtained in sufficient force to put up the girders on the large bridges, I see no reason why the line should not be completed and ready for traffic early in 1875.

128. In my former inspection reports upon the Southern Extension of the Great Southern of India Railway, I have noticed the thorough soundness and excellence of the masonry work throughout. It appears to have been constantly kept up to the same high standard to the present time, when the work may be said to be almost completed. It is very certain that the thoroughly good work which is to be seen all along the line has only been secured by the most unflagging attention, perseverance, and patience on the part of the Chief Engineer and all his office and executive staff, most of whom have had their own peculiar difficulties to contend with, either in procuring suitable materials, or in securing carriage for them, or in the disheartening delay and vexation caused by unexpected freshes, or in dealing with impracticable contractors.

BANGALORE,

12th June 1874.

(Signed) ROSS THOMPSON, Captain, R.E.,
Offg. Deputy Consulting Engineer for Railways.

No. 458.

ORDER THEREON, 21st July 1874, No. 1,960.

RAILWAY, No. 50.

ORDERED to be recorded, with an expression of the entire satisfaction of Government both as regards the progress and character of the works described in this report.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

To the Consulting Engineer for Railways.

Erd. S. T. Austin.

Spare Copies

Full Size - Not built yet
13th
Note on the Southern Extension
of the Great-Southern of India
Railway (Nitre Gauge) from
Trichinopoly to Palamcottah and
Tuticorin. Inspected in April
and May. 1874

1. I have the honour to
report having completed
an inspection of the
Southern Extension of the
Great-Southern of India
Railway from Trichinopoly
via Dindigul and
Madura to Palamcottah
and Tuticorin.

District-I. Length 15 miles. 64 Chains
Earth-works

2. The whole of this District
has been completed to
"formation" level, with
the exception of about
22 Chains of the Fort-
branch at Trichinopoly
and about 36 Chains
of the main line, near
its junction with the
Nitre Gauge. Negapatam open

Open Line

The Embankment Slopes of Mr District - are very fairly protected from weather by spontaneous Vegetation of various kinds. About 5 miles of Embankment Slopes have however been regularly turfed, and where the line passes through tank beds, Natural Grass has been planted to break the waste of the waves in the windy season.

Surfing
3.

About Seven miles of Fence bund have been thrown up, but there has not been much like fence put down yet. The boundary fence round the Callator Station Ground has been thrown up and planted with Aloes which appear to be thriving very fairly.

Fencing
4.

About two miles of fencing have been put up at Fickinsapo, in the neighbourhood of the Station and junction with the Open Line.

Masonry

Bridges & Culverts
6.

In this district there are 26 Culverts, ranging from ten to forty feet in width. Five Arch Bridges, the largest of which is one of 20 ft spans, and several girder bridges, one of five 30 ft openings over the Corycarr River near Fickinsapo, being the largest work. The girders for this bridge were all ready for laying on but the work was delayed owing to some of the small fittings belonging to it being still on board a ship at Negapatam and

Slowed away under
Mr. Cargo which
was being discharged

There are only two bridges up. 6.
Not yet up to grade.

Stone level, all the
stones are completed
to that height. Copings

and Caps on tunnel
walls and abutments
are as a rule not-

being put on, before
the Grinders have been
hoisted & rolled into
position.

The two bridges above
referred to will probably
be completed before
the end of July 1874

Grinders are in position 8.
on a bridge of four

20 foot spans in the
5th mile, and have
been delivered at the
site of 3 other bridges.

Stations

Friction 9.

5
17
The station buildings
at Friction are
up to roof level and
look very well. They
are of brick work raised
3 stone quoins at
the angles of the building
and round the door
frames

Calator 10.

The Calator station
buildings are also up
to roof level and the
platform and loading
bank retaining walls
are up to coping.

11. The windows are about
two feet above foundation
level when I passed
through.

12. About 1200 cubic feet
of masonry have been
executed at the
Friction and
Calator Stations.
Wells have been sunk
and water is now

Available at Each
of these Stations for
Locomotives —

Plate Layers huts are
now erected at distances
of two miles apart —
One near Colator has
been completed, and
materials are collected
for the remainder.

Plate Layers Huts
13. 11.

A Gate Kuper Lodge
has been erected at
the level crossing
of the Madura Road
at Trichinopoly.

Gate Kuper Lodges
14. 12.

About fourteen miles
of permanent way
material have been
received in this district,
and the road made
passable for trolleys
or wagons up to the
14th mile 60th chain
a point about two
miles south of Colator
Station —

Permanent Way
15. 10.

The Company and other 16.

Other bridges between the
point and Trichinopoly
are in the absence of
girders, temporarily made
up with sleepers,
palm tree trunks &c.
& admit of trolleys
and ballast wagons
passing over them.

17. Of the 14 miles of permanent
way laid, about three
have been ballasted;
no ballasting has yet
been carried on where
permanent way has
not been laid —

Length 15 miles 21 Chains District-II

The Earthwork of the whole Earthwork
of this District is completed 18.
Up to formation level
with the exception of
some trifling filling
up at the backs
of bridges about mounds -

About nine miles of Surfing
the Embankment Slopes 19.
have been regularly
terped, the remainder
are on the whole
fairly covered with
grass and other vegetation.

Three bunds have been Fencing
constructed along about 20.
Seven miles of the District
and of these, about
one and three quarters
miles have been planted
with Albes and Euphorbia

It is I think a mistake 18.
planting Euphorbia
when Albes can be
procured.

The Albes is much
quicker growing, and
forms a more efficient
fence -

19. - I have carefully watched
the growth of fences
of both descriptions
between Fichinapoy
and Dindigul during
the past two years,
and am now convinced
that Euphorbia is not
worth the trouble and
expense of planting,
as a fence for railways

20. No wire fencing has
been put up yet in
District-II

21. The Approaches for
passengers and goods,
to the Manapalay
Station are completed

Masonry
Bridges & Culverts.

22. The masonry of the
bridges and culverts
in this District is
completed, with the
exception in some

Some instances of Girders
Stones, Caps, and
Copings —

Girders have been laid
in position on two 12 ft-
openings in the first,
and one 12 ft-opening
in the second mile.

Girders have also been
conveyed to the site
of three other bridges,
viz. one in the third,
one in the fourth, and
one in the tenth mile.

Eight other bridges are 23.
quite ready for girders,
as soon as they are
available, and
the remaining bridges
only require girders,
stones, and a little
levelling, to prepare
them for their girders.

Manapouray Station,
at the 24th mile

67th Chain from
Trichinopoly

Stations
24.

Some has been 2/2
Commenced — 23

The foundations are
masonry, and the
superstructure is blue
brickwork —

The passenger and
goods platforms,
and retaining walls,
and the goods shed
and ticket-office
foundations have
been put in —

About 200 cubic
yards of rubble masonry
have been executed.

Station Wells.
25.

The well belonging
to the bungalow of
the Engineer of this
District is situated
within the Station
yard limits, there is
a good supply of
water in it, and it
only requires a little
deepening and
improving generally
to make it available

Platformers Huts
Gate Lodges 26. for watering Engines
No platformers huts or
gate lodges have yet
been constructed

Sluiceway for about-
12 and rails 900.
for about 8 miles of
line have been received.
About 5 1/2 miles of
Permanent-way have
been laid and ballasted.
Two and a half more
miles have been laid,
but not ballasted,
and about 3 1/2 more
miles of line are
ballasted and ready
for permanent-way.

Permanent-way
27.

District III

Earthwork

28.

Surfing

29.

Fencing

30.

Length 16 miles 59 chains

The whole of this District
has been brought up to
formation level

About four miles of
Embankment slopes
have been topped, and
the remainder will
be proceeded with
when the weather is
favourable

Between four and five
miles of fence have
been planted, but
not in fence mould,
of which little has
been thrown up yet.
In this, as well as
in the other Districts,
the Euphorbia has
not proved a success.
There appears to be
no necessity to plant
more of it as the
soil is very suitable
for Alas, and they
are easily procurable

Procurable.

When ballast trains
commence to run,
also plants can
easily be collected and
distributed where
required along the
line.

No wire fencing has
been put up yet.

There is only one bridge
in this district - not
yet up to Grider Stone
level, the little probably
be completed about
the end of June, or
early in July 1874.

Grades have been cleared
for three bridges, and
thirteen other bridges
are ready for them.
As soon as they can
be conveyed to their
sites.

In the exception of
some caps and coping
work, and in laying
and

Masonry.

Bridges & Culverts
31.

~~Grider Stone~~

Stations &
wells 32.

Platlayers Huts
&
Gate Ledges 33.

Permanent Way
34.

Grider Stone, the
masonry work of bridges
and culverts may be
considered finished.

The station building
and wells have
not yet been commenced.

Four platlayers
huts are in progress.

About four miles
of permanent way
material have been
secured, and all
laid and ballasted.
Between four and five
more miles of line
have been ballasted,
and are now ready
for permanent way.

District IV

Length - 15 miles 13 chains.

Fifteen miles (or all but thirteen chains of this district) are completed formation level, and about

ten miles of the embankment slopes have been regularly worked.

There is not much vegetable fence planted yet; also have been sent down for about 500 miles along the embankment slopes, but there has been little or no planting in fence grounds.

The Euphorbia, which has now been planted for some time, looks weak, unhealthy and unfit for fencing purposes -
No more fencing yet.

Earthwork
35.

Surfing

Fencing
36.

Masonry.

Bridges & Culverts
37.

The masonry of the bridges and culverts in this district may be considered finished.

There are only four works still in progress, and they will be completed by the end of June 1874.

All the girder bridges are ready, with the exception of girder spans, which will be laid on before girders are available for them.

Girders have been delivered at the sites of three bridges, and will shortly be delivered at the sites of four more.

Stations
Dindigul
38.

The Dindigul Station, at the 60th mile 47th chain from Pichinopoly is well advanced -
About - 600 cubic yards.

Gards of masonry
including platform
retaining walls have
been executed

The Dinagat Station
tunnel is being sunk,
water is already
available for locomotives

tunnels
39.

Platformers Built

40. Gate Lodges

Platformers built
or gate lodges have
yet been commenced

About 2 1/2 miles have
been cleared, and
1 1/4 miles of permanent
way laid and ballasted.

Permanent way
46.

Three additional miles
have been ballasted,
and are ready for
permanent way -

District V

Length 15 miles. 22 Chain

Earthwork

42.

Fifteen miles are now
up to formation level.

Graveling

43.

About eleven miles of
embankment have
been turfed, and

Fencing

44.

One mile of fence round
through up but not
planted. Eight
miles of the embankment
slopes have had
also planted along
them as a fence.
No more fencing is
up yet.

Masonry

Bridges and Culverts.

45.

The masonry of the
bridges and culverts
will probably be
completed by August
1874.

With the exception
of the bed stones, all
girder bridges are
completed and ready
for their girders.

Graders have been
delivered at the sites
of fifteen bridges, but
have not yet been
put in position.

There are 17 small
bridges and culverts
still in progress, but
it is expected that
they will all be
completed by the
end of July.

Four small culverts
have not yet been
commenced, but they
will probably be
completed by the
middle of August.

The Ammanakkanor
Station buildings
have been commenced,
(73 miles. 10 chains from
Trichinopoly).

The station platform
walls have been
completed. About
150 cubic yards of

Stations.

Ammanakkanor
46.

of Masonry Executed

13
33W
Ammanakkanor is
the station at which
passengers for Kodikkal
on the Palmy Hills
alight.

Wells.

47.

The station well has
not yet been commenced.

Platformers Huts
Gate Lodges

48.

No platformers huts
or gate lodges have
been taken in hand.

Permanent-way

49.

No permanent-way
material has been
received, and no
ballasting has been
carried out yet.

District VI

Length 15 miles.

With the exception of 3 or 4 chains, now in progress, the whole of this District has been brought up to formation level. Where the banks have subsided in a few places, they are being made up again.

Earthwork
50.

Turfing
51.

About twelve miles of Ambankment slopes have been turfed; the remainder of the District will probably not require regular turfing.

Eleven miles of fence ground have been thrown up, and a considerable portion planted with albes. Planting is in progress.

Fencing
52.

And the Euphorbia is being put down.

No wire fencing has been put up yet.

Inasoway

53.

Out of fourteen girder bridges in this District, eight are quite ready for girder, and the remaining six are up to girder stone level. The girder stones are being dressed, and the six bridges will probably be completed before the end of June 1874.

No girders have yet been delivered in this District.

There are a good many small culverts to be finished, but they are all well in hand now, and they will probably be

be ready for permanent-
way some time before
they are ready for them.

The Sholavandan

Stations

Sholavandan

Station, 85 miles 2 chains 54.

Distant from Trichinopoly

has been taken in hand,

and about 250 cubic

yards of masonry

executed.

The Sholavandan

Wells

85.

Station well is being

sunk. About 6 feet

of water is already

standing in it.

Plate Layers built and

Plate Layers built

Gate Lodges

56.

Gate Lodges have not

yet been commenced

No permanent-way

Permanent-way

57.

material has been

received yet and

only about 20 chains

of bottom ballast

laid down.

The greater part of

the district will

will have to be ballasted
by train, as the material
will have to be conveyed
from considerable

distances.

The material will

be taken from the

quarries in the

district and will

be conveyed by

train to the

station and then

by road to the

quarries.

The material will

be taken from the

quarries in the

district and will

be conveyed by

train to the

station and then

by road to the

quarries.

Length 12 miles

District - VII

This District is completed
to formation level, with
the exception of about
five chains south of
the Vigay River, and
about ten chains
near the end of the
District, just beyond
S. Kanda, Mullay.

The whole of the
embankment slopes
have been turfed,
with the exception of
about 20 chains north
and 40 chains south
of the Vigay.

About 4 1/2 miles of
fence mound have
been thrown up, and
all planted with
aloes, which appear
to thrive.

No wire fencing put
up.

Earthwork
58.

Turfing
59.

Fencing
60.

Masonry

Bridges & Culverts

All the girder bridges
are ready for girders, 61.

with the exception
of the Vigay, but
this bridge will most
probably be completed
and ready for them
before the end of June/44.

Girders have been
delivered at the sites
of six bridges; six
two of six feet, two of
twelve feet, and two
of 20 feet spans.

In Madura Station, Madura
about 98 miles 12 chains,
has been commenced,
and about 300 cubic
yards of masonry
executed.

In Tripura Condum
Station 102 miles
42 chains from Fitchingpore

Stations

Madura

62.

Piclinopolis has also
been commenced, and
about 150 cubic yards
of masonry finished

A well has been sunk
in the Madura Station
yard, and is all
but completed;
water is available
for engines —

The Tripunacoodum
well has just been
commenced

The sub-plates
and caddys for
have not yet been
taken in hand —

About six miles of
permanent way
material have been
received, five miles
laid and partially
ballasted.

No further ballasting
has yet been carried
out —

The five miles which

Wells
64.

Plate Layers Built
65. Gate Caddys

Permanent Way
66.

which have been
laid have proved
of great use in con-
veying stone to the
Tegay, from the
quarries at Skanda-
mullay

Length 14 miles of Chain District VIII

The whole of this district Earthwork
is up to formation level 67.

with the exception of
about half a mile, which
is almost a surface
line, requiring little
else but levelling,
and the removal of
vegetation, to prepare
it for ballasting.

Nearly thirteen miles Surfing
of the embankment - 68.
slopes have been
terped.

About 8 1/2 miles of Fencing
since mounds have 69.
been thrown up, of
which two miles have
been planted with
aloes.

No wire fencing has
been put up yet.

Masonry
Bridges & Culverts -
40.

The masonry of bridges
and culverts may be
be considered complete.
The arch of a ten feet
opening near Standa-
mullay, has not
been turned yet, but
with this exception,
all the bridges and
culverts are finished
up to girder level -

All the large bridges,
viz. the Gondour,
Shevaracottay and
Calgoody, have their
girder blocks laid
on, and are ready
for girders, which
have been delivered
at their sites -

No girders have yet
been delivered at
the sites of smaller
bridges -

Stations Wells
Laysro Buts and
Bath Lodges 71.
No station buildings, wells
Laysro Buts or Bath Lodges
have yet been commenced

No permanent way
material has been
received yet - and
no ballasting has
been carried out -

Permanent way

72.

District IX

Length 14 miles 69 Chains

145W

Earth work 73.

The whole of this district
is up to formation level,

Surfing 74.

And about twelve miles
of Embankment slopes
have been surfed.

Fencing 75.

The boundary fence
round the
Irishpaddy Station
Compound has been
completed. The district
fence grounds have
just been commenced.
No wire fence has
been put up.

Masonry
Bridges & Culverts 76.

All the bridges and
culverts will probably
be completed (so
far as masonry is
concerned) by the
end of June 1874.
There are only three
unfinished works
now in the district,

The rest are ready
for their girders.
All the girders for
the Tirupattly Bridge,
(since 30 ft openings)
have been delivered
at the site of the work.
Girders for the smaller
bridges have not yet
been delivered.

Excavations for the
foundations of the
Tirupattly Station
(124 miles 69 chains from
Trichinopoly) have
been commenced.

The station well, platform
layers, and gate
layers have not
yet been commenced.

A permanent-way
has been secured -
about 3 or 4 chains
of ballasting have
been done.

Stations
Tirupattly
77.

Wells, Platform
layers, and Gate
layers have not
yet been commenced.

Permanent-way
79.

District - II

Earthwork 80.

Length 14 miles, 67 chains
497

The whole of the district
is up to formation level,
with the exception of
about 20 chains
in the aggregate, where
bridges occur, and
the banks have not
been quite completed
up to the abutments.

Surfing 81.

About eleven miles of
embankment & slopes
have been turfed.

Fencing

82.

The boundary fence
around the
Sattor Station Ground
has been thrown up,
and planted with
aloes.

About 4 miles of fence
around have been com-
pleted along the line,
but is not yet planted.

Masonry
Bridges & Culverts 83.

There are twenty one
bridges ready for girders.

Girders, but none
have yet been delivered.
Four bridges are still
in progress, two of
these will most
probably be completed
by the end of June
1874. —

The other two are the
Summeherry and
Salton bridges.

The Salton bridge will Salton Bridge
probably be completed 8th.

By the end of September
1874. It is to carry
the line over the

Vypar River close to
Salton, and will
consist of twelve
70 ft girder openings.

The South Abutment
and six piers next
it are completed.

The 7th is up to
plinth. The foundation
for the 8th was being
excavated for, and

The 9th, 10th and 11th
piers and North
Abutment have
not yet been commenced.
It is anticipated that
there will be some
difficulty in raising
the piers for excavations
for piers 8 and 9, and
when putting in
the foundations. The
other two piers and
North Abutment
will I think give
less trouble in this
respect.

The early and very
heavy rains this year
have given a great
deal of trouble with
the Salton bridge.

Sudden freshes
constantly filling in
the Coffre dams with
sand, mud and
water, Choking the
suction pipes of

of the Juggins Steam
Pumps, employed
in pumping out
the Coffre dams, and
causing a great deal
of tedious delay
and expense.

Summicherry Bridge

85.

The Summicherry Bridge
of five 70 ft spans,
over the Summicherry
River, a chief tributary
of the Tygar, has
also been considerably
delayed in its progress
towards completion,
by a succession of
sudden frosts —

The South Abutment
is completed, with the
exception of Copings.

Pier No 1, next the
South Abutment, is
up to girder blocks
level.

Pier No 2, within two
courses of girder blocks
level.

22, W
Pier No 3. Coffre dam
in, and excavation
Almost completed, but
a fresh had come
down and filled it
all in again.

Pier No 4. Excavations
for foundations partly
taken out, but all
filled in again by same
fresh.

Two courses of foundation
for North Abutment
in, and masonry in
progress. There is
a Juggins Centrifugal
Pump at this work
without which there
would have been
great difficulty in
keeping the foundations
clear of water.

This bridge if not
delayed by more
frosts, will probably
be ready for girders
in July 1874

Excavations for the
foundations of the Salton
Station have been
commenced
(141 miles 58 Chains from
Frickinopolis)

Stations
Saltoor
86.

The Station well, Plate
Layers, and
Gate Lodge have been
commenced yet.

Wells. Plate Layers Anti
87. Gate Lodge

About four miles of
Permanent way have
been received, and
about three and a
half miles laid,
two miles of which
are ballasted, and
the remainder being
ballasted.

Permanent way
88.

District XI

Earthwork 89.

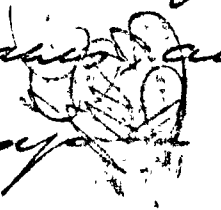
Surfing &
Aloe planting 90.

Length 16 miles 29 Chains

Sixteen miles of this
District have been
brought up to formation
level and one mile
of Rubankment slopes
turfed. Eight miles
of slopes have been
planted with a
description of small
aloe, which thrives
well in black cotton
soil. It is of no use
for fencing purposes,
but as a protection
against weather on
the Rubankment
slopes, it will probably
answer very well.
Grass forming good
turf is not to be found
along this District -
Aloe planting has
therefore been substituted
for turfing.

* being all black cotton.

About one mile of Fencing
fencing mound has 91.
been thrown up, but
not planted —
Carovalum seed was
sown in 1873 over
about 7 miles of this
district. In the
spring of forming fences,
and providing fuel,
the remainder of the
district is being sown
in this year.
If the Carovalum seeds
ever grow, they will
no doubt be valuable
as fuel, but so far
as my experience goes
they will never form
an efficient fence against
slugs or cattle, but
never grow over so tall,
merely from the fact
that cattle, slugs
and goats, are found
of the leaves, and
will always be liable



Masonry
Bridges & Culverts 92.

liable to eat their
way through the fence ^{55W}
No time fencing has
been put up yet.
Imagine when trains
begin to run it will
be necessary in this
district, and generally
through the black
cotton country, as
there will be great
difficulty in growing
efficient vegetable
fences, and they
are certain to be
very slow of growth.

The masonry may be
considered complete
in bridges and culverts.
There being only one
work still in hand,
and by this time it
is probably completed.
There are thirty three
bridges now ready
for girders, but
no girders are yet

delivered at their
Sites —

This small additional
Culverts may possibly
have to be built in
this District, but
as they can easily
be constructed within
a month from the
date of their commencement
they will in no way
interfere with the
completion of the line

93. In Station Buildings,
tells, ~~Platform~~ ~~Platforms~~ ~~and~~ ~~not~~ ~~Gali~~ ~~Ladys~~ have
been commenced yet.

Stations. tells. ~~Platform~~
Ladys ~~and~~ ~~not~~ ~~Gali~~ ~~Ladys~~
+ These ~~Platform~~ ~~Platforms~~ ~~and~~ ~~not~~ ~~Gali~~ ~~Ladys~~
have been ~~erected~~ ~~+~~

94. Permanent-way
Material has yet
been received, about
60 Chains of line have
been ballasted

Permanent-way
94.

District XII

25
51W
Length 14 miles 60 Chains

Earthwork
95.

Surfing &
Also planting
96.

Fencing
97.

This District is up to
formation level through-
out — as it runs
through a black
clay country, the
embankment slopes
are all planted
with aloes, there
being no turf to be
found near the line
Carrovalum seed
has been sown for
fencing and fruit
as in District XI,
but owing to dry weather
it has not come up
as freely as it should
have done. It is
being again sown
where it has failed
to germinate —
I have already said,
that I do not think
Carrovalum trees
will ever form an

Efficient fence against-
Cattle and Sheep,
but the wood will
at times be valuable
for fuel —

The masonry work of
Bridges & Culverts is
Completed —

Twenty-seven bridges
are ready for girders
but none have yet
been secured in this
district —

The Station buildings
have not yet been
commenced —

At Kuddumboru,
where a station is
to be built, there is
an old well, which
may possibly be
utilized for watering
purposes

Proplah Cayers huts
or Gah Lodges have
been built yet —

Masonry
Bridges & Culverts
98.

Stations
99.

Wells
100.

101

Plah Cayers Huts
& Gah Lodges

Permanent way

102.

No permanent-way
material has been
received, and no
ballasting done yet.

Length 16 miles 30 chains

District ~~XIII~~

Seventeen miles of this district have been brought up to formation level, and the

Earthwork
103.

embankment slopes of about two miles

Surfing &
also planting
104.

Near Fultoria, (all light-sand,) have been planted with creepers, named grass &c... which are thriving remarkably well, and quite protecting the sandy slopes from being blown away, as heretofore, by the high Finnerelly winds.

About eight miles more at the north-end of the district have been planted with ^{small} Aloes, as in districts ~~XI~~ and ~~XII~~

Fencing
105.

About four and a half miles of fence ^{is} now have been thrown up, but not yet planted. No wire fencing has been put up yet.

Masonry.

Bridges & Culverts

106.

The masonry of bridges and culverts, is almost completed. Orders have been received for 26 bridges. Three small bridges have not yet been commenced, but they will most probably be completed by August-1874.

Stations
107.

Excavations have been commenced for the foundations of the Fultoria Station building. The greater part of the enclosure wall has been built; the material is quartz (rubble).

About-ten and a half Permanent-way
 Miles of Permanent-
 way material have
 been received and
 laid in this district.
 Heavy Chains only
 have been ballasted.
 No other ballasting
 has been carried out-
 yet.

108.

A girder bridge of one Girder bridge at
 30ft-span is being Luticrin on
 built close to Luticrin. Oblong cells.
 Each Abutment, with
 its pair of wing walls,
 is to be carried by one
 oblong cell. The
 dimensions of the
 two cells are
 14' x 8' internal, and
 20' x 14' external
 measurements; the
 thickness of the rubble
 masonry, (not brick
 work) being 3 feet-
 resting on wooden

109.

Permanent-way
 110.

63W 28
 wooden Kerbs composed
 of planks, bolted together.
 The well to carry the
 north-abutment has
 been sunk 13 feet-6
 inches, and the
 south-abutment well
 15 feet-6 inches.
 They are to be filled
 with concrete and
 will no doubt form
 excellent foundations

Permanent-way
 material is arriving
 at Luticrin, and
 several hundred
 tons of coal have
 been landed, so
 that so soon as
 an engine and
 some wagons are
 available, the
 permanent-way
 material will be
 pushed rapidly
 northwards, and
 ballasting will
 be carried on as well

Length 15 miles, 57 chains.

District - I

The whole of this district is up to form above level with the exception of about 38 chains

Earthwork
111.

About eight and a quarter miles of the Embankment Slopes have been turfed, and the grass is growing well. One mile and thirty chains have been planted with the small alder, where the line runs through black cotton.

Turfing
112.

About eleven miles of fence bank have been thrown up, and nearly twelve miles of fence planted, some being planted along the Embankment Slopes, not in ground.

Fencing
113.

Masonry Bridges & Culverts 114.

6589
No wire fence has been put up yet. The alders which have been planted are growing remarkably well, especially towards the inner end of the district.

There are forty three bridges and culverts in this district ready for girders. Seven other bridges are still in progress, but will probably be finished by August 1874.

There are two culverts which have not yet been commenced, but will probably be finished by August 74. Girders have been delivered at the sites of 11 bridges, viz 3 of 15 ft. span, and 8 of 11 ft. span, but none have been laid in position yet.

The Construction of 115.
The Chittaur bridge,
(ten 40 ft-Spans,) has
been greatly delayed
by a succession of
frescos. The state
of the work was
as follows, about
3 weeks ago.

The North Abutment-
and two piers kept
it up to girder bed
level.

The 3rd, 4th and 5th
piers, to girder block
level - The 6th and
7th pier foundations
not yet in - The
Excavations for their
foundations had been
three times filled in
by frescos.

The 8th pier was within
eight feet of girder
bed level, and the
9th pier and South
Abutment were up
to girder stone level.

level — 67 W 30
The frescos in the
Chittaur had been
very sudden, the
water coming down
occasionally in a
wave wall of four
or five feet in height
growing but little
warming, and
sweeping all before
it, and filling at
the excavations —

Stations 116. The boundary wall
of the Trimmerly Station
yard has been
commenced, and
about 100 Cubic Yards
of masonry executed.

The Station Offices
have just been commenced.

Permanent-Way
117.

No permanent-way
material has been
received yet —

About three and a
half miles of line
have been ballasted.

By totalling up the
Amount of work done
in the 14 Districts
Comprising the
Southern Extension,
It will be found
that out of 215 miles
(The length of the line
from Trichinopoly to
Tuticorin and Palamcottah)
211 miles and 50 Chains
have been completed
up to formation level.
The aggregate of 3 miles
30 Chains not yet
finished, is made up
of a Chain or two
here and there, at
the backs of bridges
Abutments, at Gaps
Left for Culverts not
yet put in, or
where Embankments
originally up to proper
level have sunk down.

118.
Total Length of
line up to
formation level.

Total Turfing
119.

from weathering 31
89 W
About 110 miles of
Embankment - Slopes
have been regularly
turfed, and 35 miles
planted with small
aloes, where the line
runs through black
cotton soil and
turf is not procurable.
The line is thus
protected from weather
by turfing and also
planting for a
length of 145 miles
and as the slopes
are not turfed where
the line runs in
cuttings, and as
in many places
the embankment
slopes are already
protected very fairly
against weather
by spontaneous
vegetation, there
is but little more

More work of Mr
Description to be
Carried out-

About 61 miles of
fence around have
been thrown up, and
57 miles of alar, Euphorbia,
or Carrovalum fencing
planted. Some in
moorland, and some
on the slopes of the
embankments.

I have not seen any
attempt made to
cultivate the Corkapully
as a fence, in some
places where alar
does not thrive, it
might possibly be
found worth the
trouble of introducing.
My impression is
however, that if the
line is to be efficiently
fenced, wire fencing
must be put up where
alar fails to thrive.

Total Fencing
120. Vegetable

Total wire
Fencing

121. The only wire fencing
put up yet is at
Trickinapoly, where
it has been found
necessary to have
a couple of miles
of wire passing
through the Cantonment
protected.

Total Masonry
Bridges & Culverts

122.

The masonry work of
bridges and culverts
may almost be
considered completed.

The Vagay, the Vypar,
the Summichery and
the Chittaur bridges,
being the only four
of any importance
still unfinished.

The Vagay will
probably be finished

I have no faith in
Euphorbia or Carrovalum,
and very little in
Corkapully for
fencing.

And ready for girders
before the end of June.

The Tygar by the
end of September.

The Summery by
the middle of July.

And the Chittaur
by August 1874 —

Between Trichinopoly 123.

and Palamcottah
and Tuticorin, there

are in all, 328

Culverts of various sizes.

Single and double,

varying from 2 to

4 feet in width.

There are 40 masonry

Arch bridges, varying

in size from single

6ft openings, to bridges

of three 20ft spans.

There are also 208

Girder bridges, varying

in size from single

6ft openings, to bridges

bridges of fifteen ³³⁻³⁴
openings — 73W

In all there are 576

bridges and culverts

giving road or

water ways under

the line —

Out of this number

there are only 9m

small works which

have not yet been

commenced —

Forty one are still

in progress, and

will all be completed

by September — Most

of them, long before

that date.

Out of the total number

of ~~the~~ 576 bridges &

Culverts, there are therefore

526 either fully

completed, or only

wanting girder

124. Girders have been

delivered at the

sites of 63 works,

including the four

four important-bridges
 over the Gondawri,
 the Shevaracotta,
 the Calgooty and
 the Vidupally Rivers.
 Girders have been
 put in position on
 four bridges —

As Girders come in
 at Negapatnam and
 Tuticorin from England,
 they are being distributed
 as rapidly as possible
 over the line.

Out of 25 Stations to be
 built — Eleven have
 been commenced.

viz —
 Richinpoor
 Callator
 Manaparay
 Dindigul
 Annamalakur
 Sholavandan
 Madura
 Tripunacorum
 Sattor
 Tuticorin
 Tirunelveli

Stations
 125.

Wells 126. Wells have been
 sunk, and water
 for locomotives is
 available at the
 following Stations.
 Richinpoor
 Callator
 Manaparay
 Dindigul
 Sholavandan
 Madura
 Tripunacorum

Flat 127. About 50 miles of
 Permanent-way
 material have been
 secured along the
 line, and 47 miles
 of the amount
 laid. Forty four
 miles of line have
 been ballasted.
 Permanent-way
 material is coming
 rapidly at Negapatnam.

and Tuticorin; and
is being distributed
along the line, as
quickly as Carriage
Cin can be obtained
for it.

When narrow gauge
Engines, and a
few wagons, have
been secured at
Trichinopoly, Madras,
and Tuticorin, plate
laying and the
distribution of girders
will make rapid
progress.

Girders can be
obtained in sufficient
force, to put up the
girders on the large
bridges; I see no
reason why the
line should not
be completed and
ready for traffic
early in 1875.

128. In my former ³⁵77W
inspection reports
upon the Southern
Extension of the
G. S. & L. Railway,
I have noticed the
thorough soundness
and excellence of
the masonry work
throughout. It
appears to have
been constantly kept
up to the same
high standard
to the present time,
when the work
may be said to
be almost complete.
It is very certain that
the thoroughly good
work which is to be
seen all along the
line, has only been
secured by the
most unflinching
attention, perseverance,
and patience on
the part of the Chief

Engineer and all
his Office and
Executive Staff,
most of whom have
had their own
peculiar difficulties
to contend with,
either in procuring
suitable materials
or in securing carriage
for them, or in the
disturbing delay
and vexation caused
by unexpected frost,
or in dealing with
unpracticable Contractors

Post Thompson

Captain R.E.

Offg. Dy. Consul & Engineer for
Railways

15 June.

lls.

Bangalore
June 12th 1874

* G.O. No 1960-21-7-74

+ M 3844/74.

Ph. of 21st July 1874

In B.N. 457

Railway Department.

CONSULTING ENGINEER'S OFFICE.

No. 367.

From

LIEUT.-COLONEL J. H. M. SHAW STEWART, R.E.,

Consulting Engineer for Railways,

To

COLONEL G. W. WALKER, R.E.,

Secretary to Government,

Public Works Department.

Fort Saint George.

SIR,

* Dated
12 June. 74

I have the honour
to lay before Government a report
by the Deputy Consulting Engineer
upon the Southern Extension of
the Great Southern of India Rail-
way.

2.

I feel sure that His
Excellency the Governor in Council
will consider the report to be
highly satisfactory, with reference
both

both to the progress that has been made, and to the excellent character of the work to which Captain Thompson bears testimony.

I have the honor to be
Sir

Diri

Yours most obedt servant

Madras 23 June 1866

23 June 1874
 3 Boro. Engineers for
 R.R.
 Railway

1. The first part of the paper is devoted to a discussion of the
 various methods of determining the rate of reaction. It is shown that
 the most reliable method is the one which involves the measurement of
 the change in concentration of one of the reactants or products.

P. W. 1874 Dept.
No. 98170 July 8/74
RAILWAY DEPARTMENT.

RAILWAY DEPARTMENT

No: 3844

From

**The Consulting Engineer
for Railways,**

To

**The Secretary to Government,
P. W. Department,
Fort Saint George.**

Dated 23 } June 1874.
Recd. 24 } E.V.

No. 367.

Forward the
report by the Express
Cov: (imp)

Don't

10

Ordered to be referred to the Committee on the Judiciary for their consideration and report.

400-1582-117

3844

Govt. of 1874 Madras.

PUBLIC WORKS.

To The Com: Insp for
Railways.

Dated

Recd.

Encl. 1.

G. O., 21 July 1874, No. 988.

Nos 457-458.

Great S^r of India Railways

Letter from the Com Insp
submitting a report of the
to Com Insp upon the S^r
Selection on the Great S^r of India
Records of work an
impression of the entire calu-
bration of Govt both as re-
gards the progress & character
of the works described in the work