

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works

DEPARTMENT

G.O. No.	2270	Press
B.P. No.		Mis.
Dated	17-8-1954	874

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

No. 333. Read the following endorsement of the Chief Secretary to Government, dated Ootacamund, 9th July 1874, No. 1,240:—

From W. D. HORSLEY, Esq., Magistrate of Cuddapah, to the Honorable D. F. CARMICHAEL, Chief Secretary to Government, Judicial Department, dated Codoor, 25th June 1874, Extra No. 10.

I HAVE the honor to report that the inquiry regarding the Railway accident on the 16th June at the Kamalapur bridge was commenced on the 19th and was closed on the 20th.

2. Messrs. Robinson and Haworth, the Deputy Chief and Resident Engineers, and the Guard Johnstone were in the train when the accident occurred, and they are the only passengers from whom information was obtainable. The Driver Lem is, as I mentioned in a former letter, in Madras. Colonel Shaw-Stewart and Mr. Elwin were present during the inquiry, and gave me much assistance.

3. Mr. Robinson, whom I examined first, says he left Cuddapah in a very light inspection special, consisting of a tank engine, an inspection carriage, and a brake-van. He regulated the speed of the train, which speed never exceeded fifty-five miles an hour between Cuddapah and the bridge. At about half a mile from the bridge a curve in the line commences. The driver there shut off steam. The brakes were not applied but were put down by the fireman, ready for application. Solely by shutting off the steam he states that the speed on the bridge was reduced to thirty-five miles an hour, and he considered it safe to travel on an elastic girder bridge resting on screw piles at that rate. There were three brakes in the train, one on the tender, one in the inspection carriage, and one with the guard in the van. None of them were applied to check speed. He supposes that the guard's brake was not applied because the driver did not whistle for it. This supposition will hereafter be shown to have been correct. A very marked oscillation was felt in the train when on the bridge. This swaying motion caused the train to leave the rails some twelve or fifteen yards further on, and when off the rails the train brought down the bridge. After the accident Mr. Robinson walked over the bridge and could find nothing in the condition of the rails or in the structure of the bridge to account for the accident. He found some dog bolts which fasten the sleepers to the girders loose, but not to an extent to account for the accident. He found a bulge in the left rail, but this was equally unimportant. He is not aware that there was any defect in the engine. He has been quite unable to satisfy himself as to why the train left the rails, and refuses to acknowledge that speed was the cause. He considers it unfair to travel over a long girder bridge, such as that at Kamalapur, at a high speed, and he has travelled over the bridge frequently at thirty-five miles an hour. There is no rule limiting the speed at which his train may travel, nor does any rule limit the speed over the Kamalapur bridge. He usually travels at from forty to sixty miles an hour. High speed is necessary to enable him to detect inequalities in the rails.

4. Mr. Haworth, who is still suffering from the effects of the accident, was next examined. He is fortunately able to fix the departure of the train from Cuddapah at as near 6 A.M. as possible. His watch was found on the 19th, buried in the sand of the Paupugnee river, with the glass broken. The grit had stopped the

hands at 18 minutes past 6, which may fairly be taken as the time at which the accident occurred. All questions relative to the speed at which the train travelled he hesitates to answer. This he explains by saying that he has had little experience in the speed of railways, having till the beginning of this year been chiefly employed on construction and not on open lines. I could see, however, from his hesitation that he had formed an opinion which was contrary to that which has been expressed by Mr. Robinson, but being inexperienced, he is reluctant to pronounce his opinion. From his manner and speech during the examination, I have come to the conclusion that Mr. Haworth attributes the accident to the rate at which the train travelled. He gives his reasons for believing that the bridge and the line were in good order, and he has no reason for supposing that there was a defect in the engine. The train was travelling fast, as all inspection trains do. The accident might be attributed to speed over an elastic bridge with long openings as in the Kamalapur bridge. He considers the pace at which the bridge was traversed was not dangerous. I must mention that very great difficulty was experienced in eliciting this statement, but Mr. Haworth adds "it might have been safer if we had been going slower," and then again "I think I would have travelled slower if I had charge of the train." There is no doubt what Mr. Haworth's opinion as to the speed of the train is, but he says he was not the least uneasy in his mind, and trusted to those in the train who had more experience. This was very natural, as no accident had then occurred. What Mr. Haworth's opinion was, immediately after the accident, will appear afterwards. Mr. Haworth considers that this train and all inspection trains are run at a higher speed than is necessary for inspection purposes.

5. Mr. Swan, Inspector of Police, lives not far from the bridge, and was at the scene of the accident about seven minutes after its occurrence. He asked the guard the cause of the accident, and he replied "we were going too fast." Mr. Swan went over to Mr. Haworth, and mentioned what the guard had said. Mr. Haworth replied "Did he say so? I am afraid we were." This shows what was passing in Mr. Haworth's and the guard's minds immediately after the accident.

6. The guard says that the speed over the bridge was from thirty to forty miles an hour, and between Cuddapah and the bridge it had been from forty to fifty miles an hour. Whether it was from the effort with which this was said, or from illness, I cannot say, but the guard nearly fainted while deposing. He gave most absurd methods of calculating speed, and then gave, after considerable leading to the point, the simple method of looking at his watch and the telegraph post on which the distances are marked. This man's evidence is not worth much.

7. Mr. Boodle, the Locomotive Superintendent, speaks to the good condition of the engine, and estimates the weight of the train and engine at about 36 tons. I must mention that the right driving wheel of the engine was found in its place but broken from the axle. In the axle there was what appeared to me to be a flaw. Mr. Boodle explains that the mark was not a flaw. It is quite clear, as he shows, that if the breaking of the driving wheel had caused the accident the wheel would not have been found as it was on the engine. The engine falling on the wheel broke it. The engine having outside cylinders would oscillate more than

an engine with the cylinders fitted inside, and if driven over a girder bridge at thirty-five miles an hour the oscillation would be greater. He is of opinion that the train must have at times travelled between Cuddapah and the bridge at the rate of fifty to sixty miles an hour at least, and that during the greater part of the way. From what he has seen of the wreck at the bridge the train at the time of the accident must have been travelling at thirty-five miles an hour at least.

8. Mr. Going, the Chief Engineer, inspected the bridge after the accident, and apart from the damaged portion found it in very good order. The displacement of the dog bolts was not such as to upset the train. He speaks of the dog bolts on that portion of the bridge over which the train had not passed being less displaced than the bolts in that part of the bridge over which the train had passed, and naturally he attributes the greater displacement to the vibration in the bridge caused by the high speed of the train. Speed over such bridges as the Kamalapur bridge should be slower than over any other class of bridge. He would wish to limit the speed over that bridge to thirty miles an hour, while twenty miles an hour would be quite safe. The bridge being near a station the facing points of which should not be passed at a speed greater than five miles an hour, there has been hitherto no rule limiting the speed over the bridge. From the distance at which the engine lies from the place it left the rails, he is of opinion that the train travelled over the bridge at from thirty-five to forty miles an hour, a speed not unusual and quite safe on the line generally, but not so on girder bridges resting on screw piles. He says inspection trains run from thirty to sixty miles an hour, but for the purposes of inspection forty five miles an hour would be sufficient. This particular train must, he thinks, have travelled in some places between Cuddapah and the bridge at the rate of sixty miles an hour, but looking at the general character of the line that pace was not dangerous. He does not think that if the speed half a mile from the bridge was fifty-five miles an hour that by shutting off the steam the speed could be reduced to thirty-five miles an hour without the application of the brakes. In conclusion, he attributes the accident, unless there was a defect in the engine, solely to the vibration of the bridge caused by the speed of the inspection train.

9. Several line watchmen and two maistries were examined. The former say that the inspection train on this occasion travelled faster than any inspection train they had ever seen. A gang maistry says he screwed up the dog bolts on Monday, the 15th. A section maistry says he was ordered by Mr. Satur, the Permanent-way Inspector who lost his life in the accident, to see that the bolts were properly screwed down, and produces his written instructions regarding the bridge and the line generally. Mr. Satur apparently closely inspected the bridge and the line on the 13th. One Striramaya Moodelly, when waiting at a gate on the line about a mile from the scene of the accident, saw the inspection train pass at such speed that he remarked to a relative that an accident would be the result. A minute or two afterwards he heard the crash of the falling train. This man was not present during my inquiry, and his deposition was taken by Mr. Sharkey, the additional Deputy Magistrate. He is spoken of as an intelligent and a well educated man.

10. Colonel Shaw-Stewart was present during the inquiry and had previously on several occasions after the accident minutely inspected the bridge

and scene of the accident. His observations are valuable, made as they were after personal inspection and after hearing what had been said by so many persons during the inquiry. He gives ample reasons for stating it as his belief that the train travelled on the bridge at a rate exceeding thirty-five miles an hour. He considers that thirty-five miles an hour over such a bridge as the Kamalapur bridge to be unsafe, and he would like to see speed limited to fifteen miles an hour. Not that he thinks there is anything wrong with the bridge, on the contrary, he considers the bridge is perfectly safe, but owing to its design, it being a girder bridge supported by screw piles, it has more spring in it than a similar bridge on masonry piers. There is a very slight incline with a gradient of 1 in 1,023 which continues up to the bridge. This incline commences at the 173rd mile, 15th telegraph post. The curve on this incline, at which the steam is said to have been shut off, commences at the 174th mile, 12th telegraph post. The bridge commences two posts further on. From what he knows of the curve and the gradient Colonel Shaw-Stewart says: "I do not consider it possible that by merely shutting off the steam on a small Kitson's tank engine with large driving wheels that speed at fifty miles an hour at the commencement of the curve could be reduced to thirty-five miles an hour on the bridge." He goes on to say what he believes was the strength of the wind at the time, from his observations of the wind on the 17th and 18th. But I need not allude to these conjectures any further, probably right though they are, because Mr. Robinson subsequently stated that there was no noticeable wind against him, though it rose afterwards to a high wind. Colonel Shaw-Stewart's opinion as to the possibility of speed being checked in the manner described by Mr. Robinson without the aid of brakes must therefore stand. I know nothing about these matters, but I must confess I was rather surprised at Mr. Robinson's statement, and I made a point of obtaining information on the subject from experienced persons, such as Mr. Going and Colonel Shaw-Stewart. The condition of the bolts on the Cuddapah side of the bridge are alluded to by Colonel Shaw-Stewart as in a condition differing from those on the Kamalapur side, which the train had not reached. He attributes the displaced bolts to the rapidity at which the train was driven. The length of the bridge he states is 1,400 feet, and its girders are not so rigid as those which have lately been sent from England.

11. Opinions being so much in favor of speed, I asked Mr. Robinson if he wished to modify or add to what he had stated. All I could gather from him was that if the train had been going slower there would have been less chance of its running off the rails, but he still maintained that the catastrophe is to be attributed to some unknown cause, and if that cause had not existed the rate at which he travelled was not sufficiently high to cause the accident. He then says that if he had been in the driver's place he would have gone slower, yet he absolves the driver from all blame. This is quite natural, as Mr. Robinson regulated the speed, which he clearly did not consider excessive, as he did not apply the brake in his carriage, nor did he give, as he was in a position to do, any orders to the driver or firemen to check speed by means of their brakes.

12. I have endeavoured in this inquiry to raise as many issues as I could think of for investigation, but I have not been able to get beyond three, and they are—

1st.—Was the accident caused by excessive speed.

2nd.—Or owing to a defect in the engine.

3rd.—Or owing to a fault in the permanent-way or bridge.

13. Taking the last point first, the evidence is all in favor of the good condition of both permanent-way and bridge. Even Mr. Robinson is of this opinion. After the inquiry was closed I went on Monday, the 22nd, again to the bridge. It was there suggested to me that a fish-plate or key had been removed from the rails by some former subordinate on the line, whom Lem, the driver, had prosecuted. It is quite possible that such a thing might happen, but I am quite sure it did not occur in this case. Had a key or fish-plate been removed, the train would not immediately have gone off the rails, though it would have done so in a very short space of time. Until it went off the rails the havoc to bridge and permanent-way did not commence, and, therefore, the fact that a fish-plate or key was missing would have been observed by Mr. Robinson in his inspection after the accident. What I mean is, the spot whence the fish-plate or key was removed was not so disfigured as to prevent the want of them being detected.

14. A rail was pointed out to me as a possible cause of the accident. This rail, down the greater part of its length on the inside, is flattened as if something had been pressed against it. This flattening is at first slight but becomes more distinct as it goes along until a piece of iron is split off the rail, and then there is a mark showing where a wheel crossed, or, as it is technically termed, mounted the rail. The question is whether a projection or flaw on the side of the rail caught the wheel which caused the rent, and so the wheel mounted. This, I think, is very improbable. If there was a flaw in the rail, it would not account for the flattened edge of that portion of the rail which was travelled over before the flaw was reached. Besides, Mr. Robinson says he thinks he felt the great oscillation of the train some twelve or fifteen yards before it left the rails. This oscillation increasing, the pressure on the inside of the rail would increase until the wheel crossed the rail and in so doing it split the rail. Taking facts and statements together it seems to me that the split was the effect of the wheel mounting the rail, and this again was caused by the oscillation of the train.

15. I have failed to discover that the breaking down of the engine was the cause of the accident. According to the Locomotive Superintendent, the engine had done very little work since its thorough repairs in the Perambore Workshops. The driver had the whole of the previous day (Monday) to examine the engine. It is not at all likely that there was anything wrong in the engine to account for the accident. Unfortunately the engine is so completely smashed as to make it impossible to say for certain in what condition it was immediately before its fall.

16. Mr. Robinson says the speed at which the train travelled over the bridge was thirty-five miles an hour. Mr. Going and Colonel Shaw-Stewart consider that rate of speed over a bridge constructed as is the Kamalapur bridge unsafe. Colonel Shaw-Stewart believes that the speed on the bridge exceeded thirty-five miles an hour, and he and Mr. Going agree in saying that speed in half a mile could not be reduced from fifty-five to thirty-five miles an hour by simply shutting off the steam, which was the only means employed to check speed according to Mr. Robinson. That the speed half a mile from the bridge could not have been less than

fifty-five miles an hour, while it may have been more, is proved by Mr. Haworth's watch. He has good reason for saying that the train started at 6 A.M., and his watch shows that the accident occurred at 18 minutes past 6. Experienced persons assert that to travel the distance of fourteen miles in that time, allowing for the time taken to start and for the check of speed at the end, the greater portion of the way must have been covered at the rate of sixty miles an hour. This all goes to make it probable that the speed on the bridge exceeded thirty-five miles an hour. I can, therefore, only come to the conclusion that the train travelled over the bridge at a rate of speed exceeding what Colonel Shaw-Stewart and Mr. Going consider to be dangerous. According to Mr. Robinson the train oscillated greatly, and this is accounted for by Colonel Shaw-Stewart and Mr. Going as being due to vibration in the bridge, the consequence of speed. Then there are the admissions made by Mr. Haworth and the guard to the Police Inspector, to the effect that speed was the cause of the accident. Then there is the statement of Mr. Haworth before me, which says almost as plainly as words can make it, that the accident was caused by the train being driven too fast. With all this in favor of speed, I do not consider it is necessary to think any further of a possible but improbable defect in the engine. Mr. Robinson blames nobody and nothing for the accident, and attributes it to an unknown cause. In his ill-advised statement he has done very little to absolve himself. I can quite understand that he did not think that the speed at which he travelled over the bridge was excessive, but I cannot understand, when he has seen and unfortunately felt the consequences of his act, and when the real cause has been suggested to him, why he should wander in search of an unknown cause of the accident.

17. I can only come to the conclusion that the accident which caused the death of two persons is to be attributed to the excessive speed at which the train was driven over an elastic girder bridge, and for that speed Mr. Robinson, the Deputy Chief Engineer, is responsible. In travelling at that rate over a girder bridge Mr. Robinson transgressed no rule, and he firmly believed at the time that the rate at which he travelled was perfectly consistent with safety.

18. Copies of the statements taken during the inquiry are forwarded for the perusal of Government.

19. I wish to draw the attention of Government to the fact that inspection trains are allowed to travel at unlimited speed, while forty-five miles an hour is a rate quite sufficient for the purposes of inspection. And further, that girder bridges of any great length are springy, and that speed over them should be restricted however sound the bridges may be. The proximity of the Kamalapur station to the bridge at that place has hitherto been considered a sufficient barrier to excessive speed over the bridge. Though the speed in this case was excessive on the bridge, I understand that it might have been so reduced as to pass the facing points at the station at five miles an hour. So that the proximity of the station will not in some cases prevent excessive speed over the bridge.

I wish also to draw the attention of Government to the admirable conduct of Mr. Swan, Inspector of Police. Accident it is true, placed the break-down in his neighbourhood. He lost no time in getting to the bridge, and when there did what he could for the wounded and at the same time saw and heard all that passed.

Nothing escaped his notice and consequently he was able to give me valuable information regarding every particular when I visited the scene. The activity and intelligence displayed by Mr. Swan is most commendable, and I trust that Government will accord him the promotion to which he is so justly entitled. Mr. Swan is in every way suited to occupy the position of an Assistant Superintendent of Police.

*Colonel Shaw-Stewart, R.E., Consulting Engineer for Railways, sworn:—*I should say from the damage done to the bridge, from the distance at which the engine lies from where it first mounted the rails, fully if not more than fifty yards, and taking into consideration that the inspection train was a light one, that the train was travelling over thirty-five miles an hour at the time of the accident. From the design and construction of the bridge, I should say that to travel over it at thirty-five miles an hour was unsafe. I examined the bridge very minutely on the evening of the 16th and on the morning of the 17th, and I found that the bridge was perfectly safe. I found a few bolts loose, but I do not think that their condition would render the bridge unsafe. The bolts I refer to fasten the sleepers to the girders. At the Kamalapur end the bolts were in a better condition than those at the Cuddapah end. The inspection special had not passed over the Kamalapur end of the bridge. I have no doubt whatever that the loose condition of the bolts at the Cuddapah end was caused by the speed at which the inspection train was driven. I should like to see trains restricted to a maximum of fifteen miles an hour when passing over the bridge at Kamalapur. This is owing only to its peculiar design, because I have already said that the bridge was perfectly safe. At the 173rd mile, 15th telegraph post, a rising gradient of 1 in 1,023 commences, and is continued uninterruptedly to the bridge. That is a very slight incline. The curve at which the steam is said to have been shut off commences at the 174th mile, 12th telegraph post, and continues to the 175th mile, 1st telegraph post. The bridge commences at the 175th mile, 3rd telegraph post. I have no special knowledge of engines, but for the last nine years nearly I have been closely connected with Railways. From what I know of the curve and the gradient, I do not consider it possible that by merely shutting off the steam on a small Kitson's tank engine with large driving wheels that speed at fifty miles per hour at the commencement of the curve could be reduced to thirty-five miles an hour on the bridge. I believe that there was little or no wind at 6 A.M. on the 16th. I say so because on three mornings in this week when I have been at the bridge at that hour there was no perceptible movement of air. The wind has always risen at 9 or 10 in the morning on those days. Had the wind been very high from the west, it would certainly have impeded the speed of the train. I have no doubt that the accident is to be attributed to the excessive speed of the train. The engine left the rails after passing over the twelve openings of the bridge. The bridge commences at 13½ miles from Cuddapah station. Each opening is 70 feet. There are twenty such openings in the bridge. The engine left the rails at three-quarters of a mile from Kamalapur station. I believe I saw the wreck before anything had been touched. The Kamalapur bridge being a girder bridge on screw piles there is less rigidity, and much more spring on such a bridge than upon one of which the girders rest on masonry piers. I believe the Kamalapur bridge was built in accordance with Sir John Hawkshaw's designs. Besides the element of elasticity introduced by the screw piles, the girders of which it is built have not the same strength and rigidity as those which have lately been sent from England for Madras Railway bridges.

(Signed) J. H. M. SHAW-STEWART, Lieut.-Colonel, R.E.

Given before me at Cuddapah this 20th June 1874.

(True Copy)

(Signed) W. D. HORSLEY,
Magistrate.

*Thomas H. Going, Acting Chief Engineer, sworn:—*On the evening of the 16th and on the morning of the 17th I inspected the Kamalapur bridge. Apart from the damaged portion

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

the bridge was in very good condition except that some dog bolts were loose. I do not think that the dog bolts were in such a condition as to cause a train to leave the line. I observed that the bolts on that part of the bridge over which the inspection train had passed were more displaced than on that part of the bridge over which the train had not passed. The displacement of the bolts I attribute to the vibration of the bridge caused by the speed of the inspection train. The speed over such bridges as the Kamalapur bridge should be slower than over any other class of bridge. I should not like the limit of speed to pass beyond thirty miles an hour. Twenty miles an hour would be quite safe. There is no rule limiting the speed over the Kamalapur bridge. If the bridge were not so near a station, I think it would be necessary to fix a limit of speed. I have seen the wreck at the bridge. The inspection train was a very light one. From the damage done I cannot say what was the speed at which the inspection train travelled. From the distance at which the engine lies from the place where the train first left the rails, I am of opinion that the impact was very great and due to high speed. I cannot form an opinion as to what that speed was. I call high speed on the Madras line thirty-five to forty miles an hour. That speed is not unusual, and is quite safe on the line generally, but not on girder bridges on screw piles. Inspection trains travel from thirty to sixty miles an hour. That great speed is desirable to test the permanent-way, but it is not absolutely necessary. The rate of forty-five miles an hour would, I think, be sufficient as a test of the permanent-way. The inspection train must, I think, have travelled in some places at the rate of sixty miles an hour between Cuddapah and the bridge. Looking at the general character of the line between this and Kamalapur that speed I do not consider was dangerous. The gradients are light and the line straight. If the speed, half a mile from the bridge, was fifty-five miles an hour, I do not think that by merely shutting off steam without applying the brakes that the speed on the bridge could be reduced to thirty-five miles an hour. The speed on the Chitravati bridge was limited to eight miles owing to the cap on one of the piers having shown a slight crack. I do not consider the condition of the Kamalapur bridge to be such as to render it necessary to limit the speed to so low a rate. I attribute the accident to the vibration of the bridge caused by the speed of the inspection train. Solely to the speed of the train, unless it is found that there was a defect in the engine.

(Signed) T. H. GOING.
Given before me this 19th June at Cuddapah.
(True Copy)

(Signed) W. D. HORSLEY,
Magistrate.

William Robert Robinson, Acting Deputy Chief Engineer, Madras Railway, sworn:—
It was my inspection special train which broke down on the Kamalapur bridge at 20 minutes past 6 in the morning. I left Cuddapah at 6 o'clock in the morning of Tuesday the 16th instant. The greatest speed we attained is about fifty-five miles an hour, but at the time of the accident we went at the rate of thirty-five miles an hour. We slackened speed in consequence of the curve and station and bridge. I can suggest no cause for the accident. The bridge is in good order. I observed a few oscillations before the accident occurred. They were so marked that I jumped up. There was a slight bulge in the left rail close to the scene of the accident, and I am of opinion that it existed before my train came up and was not caused by my train. I can scarcely attribute the accident to that defect in the rail. After the accident I went along the line and could find nothing to account for the accident. I believe the Kamalapur bridge to be in good order. The train brought down the bridge. As I was half a mile from the commencement of the bridge the driver shut off the steam, viz., at the commencement of the curve. I fancy the engine ran along the left hand girder, and the trussle on the left hand side is considerably bent. The train was a very light one, consisting of a tank engine, an inspection carriage, and a brake-van. The damage to the bridge would be in proportion to the speed at which the train was going. I consider the damage done might be caused by a train travelling at the rate of thirty-five miles an hour. A girder bridge on screw piles is less rigid than a girder bridge on masonry piers. I should have thought that thirty-five miles an hour is a safe rate to travel on a bridge such as the

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

Kamalapur one. I regulated the speed of the train. I have no fault to find with any one connected with the train. I saw the driver shut off steam at the commencement of the curve, and I saw the fireman lower the brake at the curves; he slackened off and as he came on to the bridge I saw him screw it on again. He did this of himself, seeing no order. There was a brake in my carriage, but that was not down. A long time before we felt the oscillation he put on the brake the second time. There is no rule limiting the speed on the Kamalapur bridge, as the bridge is considered a very steady one, being single screw piles and not jointed. The Chitravaty bridge is of a similar structure, but the piles are jointed and the speed is limited to eight miles an hour over this bridge partly in consequence of one of the caps snapping. There is a rule that facing points should not be passed at a greater speed than five miles an hour, and I am bound by that rule. Three-fifths of a mile from the Kamalapur station is the scene of accident. I could have easily pulled up and passed the points at the regulated speed. I would always slacken speed going over a large girder bridge, because it is not fair to travel a long girder bridge like the Kamalapur one at a high speed. I do not consider thirty-five miles an hour too much for a bridge of that description, and I have travelled over the bridge frequently at that speed. Over small bridges the inspection trains do run at the rate of sixty miles an hour. There is no rule limiting the speed at which I travel. It is necessary for an inspection train to travel fast in order to detect the condition of the road. You may detect inequalities of a serious nature at twenty miles an hour, but to detect slight inequalities you must travel fast. I usually travel between forty to sixty miles an hour. I do not know whether there is any defect in the engine. I noticed that about six of the dog bolts over that part of the bridge I travelled were loose. These bolts fasten the sleepers to the girders. The number of dog bolts which were loose were not sufficient to cause the accident. I heard that the mail train and a special passed over the bridge a few hours before I did, and both were much heavier than my train. I cannot account for these trains having passed the bridge safely, and my train meeting with this accident. The swaying of the train caused the wheels leaving the rails. The only inequality I observed was the bulge I alluded to, and the rails appeared slightly bent. I think I noticed the swaying some twelve or fifteen yards from the place where she left the rails. I think the swaying commenced before we reached the inequality in the rails. The engine ran very steadily over the bridge nearly up to the point when she left the rails. I noticed a shake in a girder bridge on masonry piers some four miles nearer Cuddapah. I was anxious to travel over the Kamalapur girder bridge slowly. As far as I can see I cannot attribute the accident to a defect in the road or engine or to excessive speed. There must have been a reason for the accident, but I have not been able to satisfy myself what that reason is. As far as I could see the Kamalapur bridge was in good order. The brake was never screwed down so as to effect the speed of the train. The fireman was only getting it into a state of preparation. When coming up to the curve we were going at least at fifty miles an hour, so that at half a mile from the commencement of the bridge we were travelling at that rate and the brakes were not put on but steam was shut off. I am sure the speed was reduced to thirty-five miles by the mere shutting off the steam. I do not know whether the guard put on his brake, but the driver did not whistle for the brake.

(Signed) W. R. ROBINSON.
Given before me this 19th June at Cuddapah.

(Signed) W. D. HORSLEY.

*Mr. Robinson re-examined, sworn:—*I consider it is quite possible merely by shutting off the steam of a Kitson's engine, and without applying brakes, the train being a light one, to check the speed in half a mile from fifty miles an hour to thirty-five miles an hour. I do not think that the fact of the engine having had a large driving wheel is an important element in the matter. There is a certain amount of nervousness in going over a bridge, and if I had been in the driver's place I would have certainly run slower by putting on a brake. There was a brake in my carriage which was not applied because I did not think the speed was dangerous, and because the speed was gradually decreasing. I think the driver would have exercised a wiser discretion if he had gone

slower. Speed combined with some other cause unknown to me caused the accident. I am of opinion that an engine might be taken over that bridge now at the same speed with safety. I cannot say but I do not think there was a strong wind against me. I know there was a very strong wind some hours afterwards. It did not appear to me to be necessary to interfere with the driver. I must therefore absolve him from all blame. When passing with the inspection train over a bridge at the 170th mile there was a violent oscillation. On returning to Cuddapah after the accident I examined the bridge and found that one of the packings was loose under one sleeper. The sleeper could be moved. I could find nothing else to account for the oscillation. The rest of the packing was fair. It appeared to me to be a slight cause for so strong an oscillation. I spoke sharply to the Inspector, and said if any other bridge is in a similar state we must go dead slow. He said "No."

(Signed) W. R. ROBINSON.
Given before me at Cuddapah this 20th June 1874.
(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Henry Haworth, Resident Engineer, sworn:—I was in the inspection special on the 16th June. It left Cuddapah at 6 A.M. I suppose we must have started as near as possible to 6 o'clock. I know after starting Mr. Robinson made some allusion to the time, and it was then two minutes past 6 o'clock by my watch. This is my watch. After the accident it was missing. It was brought in this morning by Mr. Elwin. It is 18 past 6. I am not sufficiently experienced to judge of the speed of trains. I have been the last seven years on railway construction, but have never been in charge of open lines until I joined the Madras Railway in January 1874. From the injuries I received I was unable to inspect the line. I am inclined to say the bridge was in good order because the fireman put his hand on the engine brake as we went on to the bridge, and looked back to the Inspector as if asking for instructions as to the working of the brake. The Inspector waived his hand and shook his head as if the brake was not necessary. Also because I travelled over the bridge on Sunday, the 14th, and I considered the bridge was in good order. I have no reason to suppose that there was any defect in the engine. There was no greater motion than I have experienced in an inspection train which always travels faster than an ordinary train. We went very smoothly over the first part of the bridge and over the curve before the bridge. Any train is more likely to leave the line at the curve than at the bridge. The accident might be attributed to speed, because there is more elasticity in a girder bridge like the Kamalapur bridge which has long opening. I do not think that the bridge being on screw piles

* This is stated with great hesitation.
(Initialed)

would make a material difference in its elasticity. I am a bad judge of speed,* but I consider the pace at which we travelled over the bridge, and were travelling at the time of the accident, was not dangerous. It might have been safer if we had been going slower. I think the steam was shut off at the beginning of the curve. Nothing was done except that to check speed. The fireman only lowered the brake, but did not apply it. The steam was not put on again after we got on the bridge as far as I observed. If the train had not gone off the rails, the bridge would not have been smashed. I give my evidence as to speed and the elasticity of bridges with some diffidence owing to my want of experience. I think I would have travelled slower if I had had charge of the train. I was not the least uneasy in my mind. I trusted to those in the train who possessed more experience. I think that the speed at which we travelled on the bridge was greater than was necessary for inspection purposes. I am of opinion that inspection trains are usually run at a higher speed than is necessary for inspection purposes.

(Signed) HENRY HAWORTH.
Given before me this 19th June at Cuddapah.
(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Robert Swan, Inspector of Police, Kamalapur Division, sworn:—About seven minutes after the inspection train broke down I was at the scene. I went straight to the bridge and found Mr. Haworth lying half stunned. I saw the guard there, and after inquiry of Mr. Haworth as to his injuries I spoke to the guard. I asked him among other questions what was the cause of the accident. The guard replied "we were going too fast." I went then to Mr. Haworth where he was lying on the sand, and told him what the guard had said. He remarked, "Did he say so. I am afraid we were." After putting Mr. Haworth on a mattress I went up to the station. There I saw the driver and Mr. Robinson. The driver was wounded on the head and scalded. I spoke to Mr. Robinson. I mentioned to him that a fish-plate had a short time ago been removed from the line between the bridge and the station, and I asked whether he suspected that anything of that sort had been done on the bridge. He said, "It might have been so. I should not wonder if it was." The driver said he had shut off steam before coming to the bridge and had slackened speed. The driver at the time gave no cause for the accident. I did not mention to Mr. Robinson or the driver what the guard had said about driving too fast. When the driver was in the train I asked him the cause of the accident, and he said "it was the bloody fish-plate." I think he said he was always afraid of the bridge because it shook so and he always came over it gently. I was not in uniform when I hurried to the bridge, and it was not known that I was a Police Officer. Then there were no Constables with me.

(Signed) ROBERT SWAN.
Given before me at Cuddapah 19th June 1874.
(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

James Johnson, Chief Guard, sworn:—I was in charge of the inspection train on the morning of the 16th June. We left the Cuddapah station exactly at 6 A.M. My watch agreed with the station clock. Between Cuddapah and the accident I did not put on my break. I have been three and a half years a guard. I never travelled before on an inspection train. The train between Cuddapah and the bridge had been travelling at forty to fifty miles. It crossed the bridge at thirty to forty miles an hour. The driver shut off the steam about three-fourths of a mile from the bridge about the level crossing. I ascertain speed by counting the number of mile posts and looking at my watch. The train went properly and did not shake about. I lost my watch when thrown out of the van, and, therefore, had no means of knowing when the accident occurred.

(Signed) JAMES JOHNSON.
Given before me at Cuddapah this 19th June.
(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Edward Chilvers Boodle, Acting Locomotive Superintendent, sworn:—I know Engine No. 9 which worked the inspection train on the morning of June the 16th. It was in perfect working order. The engine driver had worked on it the whole of Monday, the 15th, and had thoroughly examined it. Three or four months ago it was in the Perambore Workshops, when it was thoroughly repaired with half new boiler and new types and tubes. I have examined the engine as it lies in the bed of the river. I can find nothing at all in it to account for the accident. There is not a flaw in the driving-wheel axle. The grain of the iron is slightly visible. Had the driving-wheel come off on the bridge it would not have been in the position in which it was found under the engine. The height of the engine falling on the wheel broke it. The driver was a steady man, an old hand, and knew the road. I cannot say whether that engine could be pulled up in half a mile over the curve solely by shutting off the steam from fifty-five to thirty-five miles an hour. The weight of the engine was about 24½ tons. The weight of the inspection train would be about 36 tons. Allowing for starting and the check at the end, if the train left

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

Cuddapah at 6 and reached the scene of the accident at 6-18, I should say it must have travelled at times at least from fifty-five to sixty miles an hour the greater part of the way. From what I have seen of the wreck, I should say the train travelled at least thirty-five miles an hour when the accident happened.

(Signed) EDWARD C. BOODLE.

Given before me at Cuddapah this 19th June.

(Signed) W. D. HORSLEY.

Mr. Boodle re-examined:—A Kitson tank engine when driven at fifty miles an hour oscillates more than a tender engine. No. 9 is a Kitson tank engine and would oscillate more because it has outside cylinders and not because it is a Kitson tank engine. If driven over a girder bridge at thirty-five miles an hour the oscillation would be greater.

(Signed) EDWARD C. BOODLE.

Given before me this 19th June at Cuddapah.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Statement made on the 16th June 1874 by V. Streeramu Moodelly, son of Veeraswamy Moodelly, religion Pishnu, residing at Tirupathy, Manager of Abkarry Farm at Tirupathy:—This day at 6-20 A.M., according to my watch, while I was standing at the main road gate crossing the rail about a mile from the scene of the accident, I saw the special engine, a first-class carriage and a brake-van pass me with very great speed, so much so that I remarked to my brother-in-law, Rungaswamy Moodelliar, that the train would surely drop, and in about a minute or two after this observation I heard a crash and saw the whole thing tumbling into the river. I ran to the scene of accident, and saw the whole train capsized into the dry part of the river at the 175th mile. I saw one man, an East Indian, with his head cut in two, a native with his two arms smashed, the Railway District Engineer with a wound on the right side of his face and on the cheek bone about 4 inches long. There being a curve in the embankment about four chains or so from the bridge, and the train being allowed to run with very great speed, endanger the bridge and the oscillation being very great as the train ran over the bridge, necessarily threw the train into the river. I saw Mr. Satur as the train passed me (in the front compartment of the Engineer's carriage) holding on to a cross bar, and his body was shaking frightfully at the time, which would give an idea of the great speed at which the train was running.

The evidence was read over to the witness in Telugu, which he understood, and acknowledged to be correct.

16th June 1874.

(Signed) V. STREERAMU MOODELLY.

(„) W. C. H. SHARKEY,
Deputy Magistrate.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Muctoom Sahib, Watchman, solemnly affirmed:—On Tuesday morning at sunrise I was on the line four posts from the bridge on the Cuddapah side. I have been four or five years in the service of the Railway Company. The inspection special train came from Cuddapah. The train came at very great speed. I have seen inspection specials. This came faster than any I have seen before. I never saw a train run so fast before. It came with a cloud of dust, and I could not see if it travelled steadily. I was at the side as far from the train as it passed me as that wall (about six yards). When the train had passed me I walked smartly up the bank, and then I saw a great smoke on the bridge and no bandy was visible. I saw the train one and a half mile off as

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

it was coming. When I saw it first I was beside the rails. I went down the bank this far six yards when the bandy passed me. The wind was blowing pretty strong from the west.

Given before me this 20th June 1874 at Cuddapah.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Valur Sabapathy Moodelly:—On the morning in question I heard the bell and ran from the gate-shed towards the platform, and I heard a sound and looked up to the telegraph wire, and looked again in front towards the bridge and saw the smoke rise up. I saw the dog bolts fastened on by the workmen. After 10 o'clock I did not see the dog bolts fastened on. At 6 A.M. on Tuesday the Maistry said that the dog bolts were fastened. On Saturday at 11 in the day the Inspector gave me written instructions to have the dog bolts fastened on. He gave me this written order, marked A.

Given before me this 19th June at Cuddapah.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Imam Sahib, Watchman, solemnly affirmed:—On Tuesday morning at 6 A.M. I came over the bridge from the Kamalapur to the Cuddapah side. I stood waiting for the Chief Engineer's special train. I have been in the service of the Railway Company about a year. I saw the inspection special coming from a mile and a half off. I cannot say how long it took to reach me, but it went very fast. I have seen four or five such inspection specials before. I never saw a train travel so fast before. I was a chain from the bridge when the train passed me. I was on the right side of the line far off from the line as that wall (six yards). I cannot say whether the train was running steadily or not. The dust and the speed frightened me, and I saw nothing. The train began to sway when it got on the bridge. The next thing was a crash. I showed the red flag.

Given before me this 20th June at Cuddapah.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Arumugam, Maistry on the Railway, sworn:—I am employed on the line between the 174th and 176th mile. I did not see the Inspection train pass. I have charge of the Kamalapur bridge. I knew it was to be inspected on the 16th. I received orders regarding the bridge ten days before the Deputy Chief's arrival, from the Inspector, Mr. Satur. His orders were that I was to look after the line. He ordered me to serve the dog bolts tight. I did so on Monday from 6 in the morning to 6 in the afternoon. The whole of the bolts were fastened. I was at the station when the accident occurred, removing the grass from the platform and sides. They ring the bell usually when the train is a mile or so from the station. I was at the station when the bell rung on the morning in question for the special train. After I fastened on the dog bolts two trains passed, one the mail train and the other a special. Mr. Satur inspected the bridge carefully on Saturday by walking over the bridge. Eight of us were employed in the work of tightening the dog bolts. On Monday afternoon I saw that the fish-plates were all fastened. / mark of ARMUGAM MAISTRY.

19th June 1874.

Given before me this 19th June at Cuddapah.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

Yellapa Rajagopal, Bridge Watchman :—On the morning of the accident I was about two chains from the bridge towards the station. I saw the train when it was about two miles from the bridge. I saw the train and stood up and within a minute and half the train fell in. The train ran with very great speed, and I never saw a special train run like that. I have seen four special inspection trains during the time I have been employed. I know the difference between a special train and special inspection train. The latter has only one light and small engine, a first-class carriage and a brake-van. The other has several carriages attached to it. Given before me.

20th June 1874.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

Kamal Sahib, Watchman, solemnly affirmed :—I have been three years in the service of the Railway Company. On Tuesday morning I was at the 173rd mile, 1st post. This was at 6 A.M. The Chief Engineer's special passed me. I came on duty at 5½ A.M. and examined the line. I first saw the train at Pirjahpet Wunka about two or three miles from where I was. It came to me in about three minutes. There are 60 minutes in an hour. I can read Telugu. I have seen Chief Engineer's special before. They come once every three months. I never saw an Engineer's special travel so quickly as this did. If it had had wings I would have thought it was flying. It was swaying about so when it passed me that I thought it would have fallen before it reached the bridge. I heard that the train had fallen at the bridge. There was not much wind then.

Given before me this 20th June at Cuddapah.

20th June 1874.

(True Copy.)

(Signed) W. D. HORSLEY,
Magistrate.

TRANSFERRED to the Department of Public Works. His Excellency in Council notices with pleasure the mention made by the Magistrate of the admirable conduct of Mr. Swan, Inspector of Police, whose behaviour will be brought to the special consideration of the Inspector-General of the department.

(Signed) D. F. CARMICHAEL,
Acting Chief Secretary.

No. 334.

ORDER THEREON, 17th August 1874, No. 2,270.

RAILWAY, No. 52.

It is the decided opinion of His Excellency the Governor in Council that the accident on the Paupugnee bridge was attributable chiefly, if not solely, to the excessive speed with which the inspection train was driven over the bridge; for which the Acting Deputy Chief Engineer, Mr. Robinson, who has gone home for his health, is responsible, as he has admitted that he regulated the speed.

2. Considering Mr. Robinson's position, his admission that "speed combined with some other cause unknown to me, caused the accident" is as much as could be expected of him. Mr. Haworth's hesitation in pronouncing a decided opinion as to what he had thought of the speed of the train before the accident, is excusable from his inexperience as Engineer in charge of an open line. It is quite reconcileable with what he has stated to have said to Mr. Swan immediately after the accident. The inquiry has been very carefully conducted, and every import-

*Proceedings of the Madras Government, Public Works Department,
17th August 1874.*

ant fact bearing on the accident elicited, and its chief, if not sole, cause ascertained. As Mr. Robinson has gone home, the Government must leave it to the Directors of the Company to deal with him as they deem fitting. It now remains to take precautions that such causes shall not again lead to similar catastrophes.

3. With this view His Excellency the Governor in Council is pleased to order that the maximum speed at which any inspection train shall hereafter be driven must not exceed forty-five miles an hour, a speed admittedly sufficient for the object in view, viz., to test the permanent way; and the maximum speed with which any inspection train shall cross the Paupugnee or other bridge of similar construction, fifteen miles an hour. The Consulting Engineer will report when the necessary arrangements for carrying out this latter order shall have been made, as it would appear that no warning in regard to speed is now exhibited on this bridge; and, in consultation with the officers of the Railway, he will suggest safe maximum rates for inspection trains over every bridge of any size or of peculiar formation on the North-West and South-West Lines. He will also ascertain the practice of the Great Southern of India Railway in respect to inspection trains.

4. The driver's statement will be taken as soon as he is able to make it.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

To the Consulting Engineer for Railways.
" Judicial Department.

Exd. S. T. Austin.
Spare Copies.

Gobt. of 1874 Madras.
PUBLIC WORKS.

THE CONSULTING ENGINEER
FOR RAILWAYS.

Dated August 17th.

Recd.

Encl.

G. O., 17th. August 1874, No. 2,270.

AUGUST.

Nos. 333-334

Late accident at the Pongalur Bridge,
Madras Railway.—Passing orders on the
report of the Magistrate of Cuddalore on
the late accident.

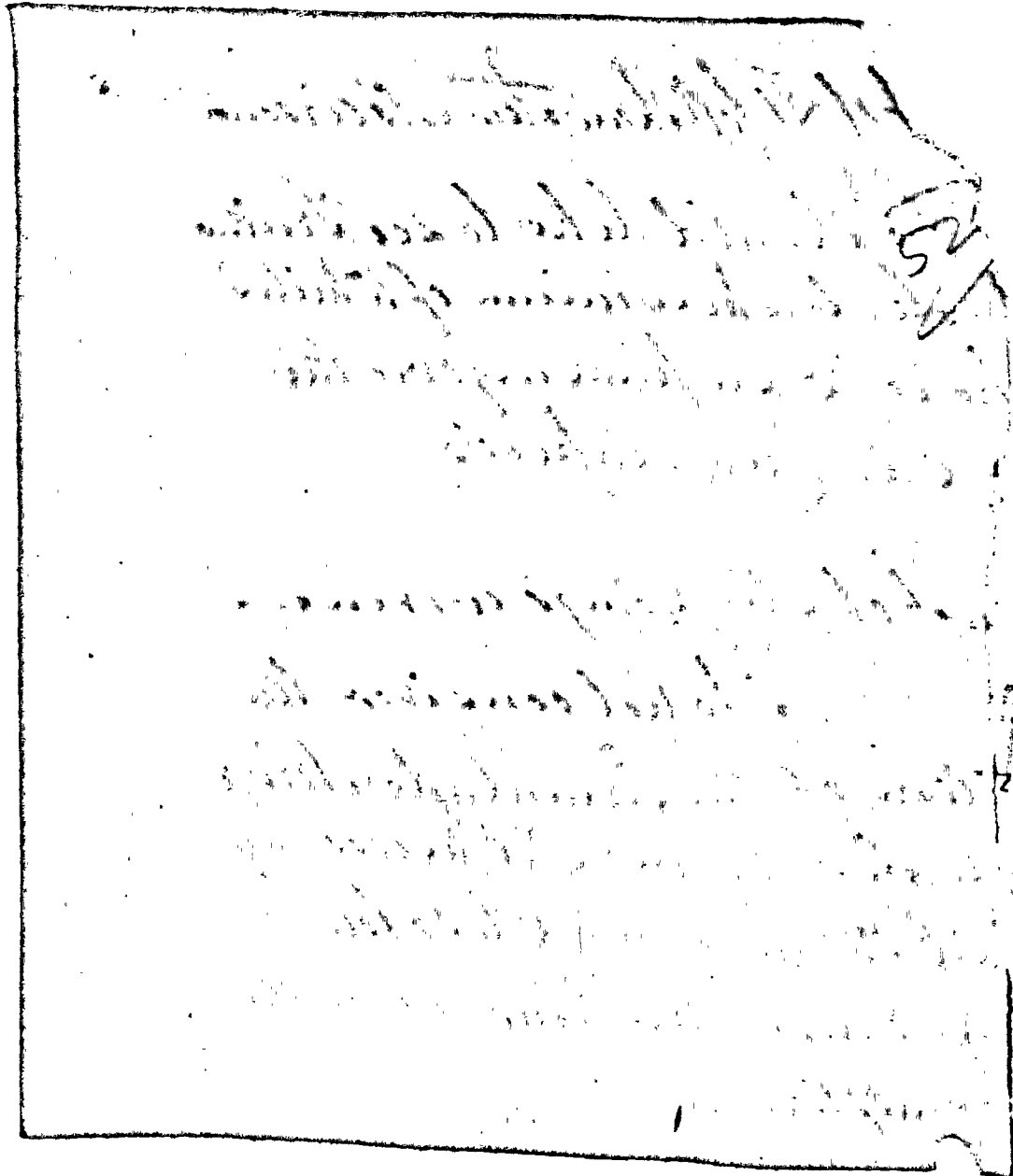
531.

Extract of Mr. Shaw Stewart's evidence.
"I should like to see trains
restricted to a maximum of 15 miles
an hour when passing over the
Bridge at Camalapuram."

Extract of Mr. Goings' evidence.
"I do not consider the
condition of the Camalapuram Bridge
to be such as to render it necessary
to limit the speed over it to so low a
rate as 8 miles an hour, as on the
Chitraootty Bridge."

2

Exhibit of 1874. 31st Dec. 1875.



Colonel Shaw Stewart R E
Consulting Engineer for Railways.
Sworn.

I should say from the damage done to the bridge, from the distance at which the Engine lies from where it first mounted the rails fully if not more than 50 yards and taking into consideration that the inspection train was a light one that the train was travelling over 35 miles an hour at the time of the accident. From the design and construction of the bridge I should say that to travel over it at 35 miles an hour was very safe. I examined the bridge very minutely on the evening of the 16th and on the morning of the 17th and I found that the bridge was perfectly safe. I found a few bolts loose but I do not think that their condition

would render the bridge unsafe. The bolts I refer to fasten the sleepers to the girders. At the Kamalapur end the bolts were in a better condition than those at the Buddapah end. The inspection special had not passed over the Kamalapur end of the bridge. I have no doubt whatever that the loose condition of the bolts at the Buddapah end was caused by the speed at which the inspection train was driven. I should like to see trains restricted to a maximum of 15 miles an hour when passing over the bridge at Kamalapur. This owing only to its peculiar design because I have already said that the bridge was perfectly safe. At the 173rd mile 15th telegraph post a rising gradient of 1 in 1023 commences and is

continued uninterruptedly to the bridge. That is a very slight incline. The curve at which the steam is said to have been shut-off commences at the 174th mile 12th telegraph post and continues to the 175th mile 1st telegraph post. The bridge commences at the 176th mile 3rd telegraph post. I have no special knowledge of Engines, but for the last 9 years nearly I have been closely connected with railways. From what I know of the curve and the gradient I do not consider it possible that by merely shutting off the steam on a small portable tank engine with large driving wheels that speed at 50 miles per hour at the commencement of the curve could be reduced to 35 miles an hour on the bridge. I believe that there was little or no wind at

At 6 AM on the 16th. I say so because
on 3 mornings in this week when
I have been at the bridge at that
hour there was no perceptible move-
ment of air. The wind has always
risen at 9 or 10 in the morning on
those days. Had the wind been very
high from the West it would
certainly have impeded the speed
of the train. I have no doubt that
the accident is to be attributed to
the excessive speed of the train.
The engine left the rails after
passing over the 12 opening of the
bridge. The bridge commences
at $13\frac{3}{4}$ miles from Buddapah
station. Each opening is 70 feet.
There are 20 such openings in
the bridge. The engine left the
rails at $\frac{3}{4}$ of a mile from Hama-
lapur station. I believe I saw
the wreck before anything had

20
been touched. The Hamalapur
bridge being a girder bridge on
screw piles there is less rigidity
and much more spring on such
a bridge than upon one of which
the girders rest on masonry piers.

I believe the Hamalapur bridge
was built in accordance with Sir
John Hawkshaw's designs. —
Besides the element of elasticity
introduced by the screw piles, the
girders of which it is built have
not the same strength and rigidity
as those which have lately been
sent from England for Madras
railway bridges.

Signed J Shaw Stewart Esq
Given before me at Buddapah
this 20th June 1874.

Signed R D Forsley
True Copy

W. H. H. H.
Massachusetts

Mr. 4665/74.

Ph. 7/7 & Aug 1/74
In S. N. 333

Thomas H. Going. Acting
Chief Engineer. Swdn. 10/

On the evening of the 16th and
on the morning of the 17th I inspec-
ted the Kamalapur bridge. Apart
from the damaged portion the
bridge was in very good condition
except that some dog bolts were
loose. I do not think that the dog
bolts were in such a condition as to
cause a train to leave the line. I
observed that the bolts on that
part of the bridge over which the
inspection train had passed were
more displaced than on that part
of the bridge over which the train
had not passed. The displacement
of the bolts I attribute to the vibra-
tion of the bridge caused by the
speed of the inspection train. The
speed over such bridges as the

Kamalapur bridge should be slower than over any other class of bridge. I should not like the limit of speed to pass beyond 30 miles an hour. 20 miles an hour would be quite safe. There is no rule limiting the speed over the Kamalapur bridge. If the bridge were not so near a station I think it would be necessary to fix a limit of speed. I have seen the wreck at the bridge.

The Inspection train was a very light one. From the damage done I cannot say what was the speed at which the inspection train travelled. From the distance at which the Engine lies from the place where the train first left the rails I am of opinion that the impact was very great and due to high speed. I cannot form an opinion as to what that speed was. I call high speed on the Madras line 35 to 40 miles an hour.

That speed is not unusual and is quite safe on the line generally, but not on girder bridges on screw piles. Inspection trains travel from 30 to 40 miles an hour. That great speed is desirable to test the permanent way but it is not absolutely necessary. The rate of 45 miles an hour would I think be sufficient as a test of the permanent way. The inspection train must I think have travelled in some places at the rate of 60 miles an hour between Cuddapah and the bridge. Looking at the general character of the line between this and Kamalapur that speed I do not consider was dangerous. The gradients are light and the line straight. If the speed half a mile from the bridge was 55 miles an hour I do not think that by merely shutting off steam without applying the breaks

that the speed on the bridge could be reduced to 35 miles an hour. The speed on the Chitravati bridge was limited to 8 miles owing to the cap on one of the piers having shown a slight crack. I do not consider the condition of the Namalapur bridge to be such as to render it necessary to limit the speed to so low a rate. I attribute the accident to the vibration of the bridge caused by the speed of the inspection train. Solely to the speed of the train unless it is found that there was a defect in the Engine.

Signed J H Goring
Given before me this 19th
June at Cuddapah.

Signed P D Norbury
True Copy

W H M
Wagstaffe
M. 4665/4
2

William Robert Robinson
Acting Deputy Chief Engineer
Madras Railway. Sworn.

It was my Inspection Special train which broke down on the Namalapur bridge at 20 minutes past 6 in the morning. I left Cuddapah at 6 o'clock in the morning of Tuesday the 16th Instant. The greatest speed we attained is about 55 miles an hour, but at the time of the accident we went at the rate of 35 miles an hour. We slackened speed in consequence of the curve and station and bridge. I can suggest no cause for the accident. The bridge is in good order. I observed a few oscillations before the accident occurred. They were so marked that I jumped up. There was a slight bulge in the left rail

close to the scene of the accident and I am of opinion that it existed before my train came up and was not caused by my train. I can scarcely attribute the accident to that defect in the rail. After the accident I went along the line and could find nothing to account for the accident. I believe the Kamalapur bridge to be in good order. The train brought down the bridge. As I was half a mile from the commencement of the bridge the driver shut off the steam namely at the commencement of the curve. I saw the Engine ran along the left hand girder and the trucks on the left hand side is considerably bent. The train was a very light

one consisting of a Tank Engine an inspection carriage and a break van. The damage to the bridge would be in proportion to the speed at which the train was going. I consider the damage done might be caused by a train travelling at the rate of 35 miles an hour. A girder bridge on screw piles is less rigid than a girder bridge on masonry piers. I should have thought that 35 miles an hour is a safe rate to travel on a bridge such as the Kamalapur one. I regulated the speed of the train. I have no fault to find with anyone connected with the train. I saw the driver shut off steam at the commencement of the curve and I saw the fireman lower

the break at the curve, he slackened off and as he came on to the bridge I saw him screw it on again. He did this of himself seeing no order. There was a brake in my carriage but that was not down. A long time before we felt the oscillation he put on the break the second time. There is no rule limiting the speed on the Kaimalapuri bridge, as the bridge is considered a very steady one, being single screw piles and not jointed. The Chitravaty bridge is of a similar structure, but the piles are jointed and the speed is limited to 8 miles an hour over this bridge partly in consequence of one of the caps snapping. There is a rule that facing points should not be passed at a greater speed than 15 miles an hour.

than 5 miles an hour and I am bound by that rule. $\frac{3}{5}$ of a mile from the Kaimalapuri station is the scene of accident. I could have easily pulled up and passed the points at the regulated speed. I would always slacken speed going over a large girder bridge because it is not fair to travel a long girder bridge like the Kaimalapuri one at a high speed. I do not consider 35 miles an hour too much for a bridge of that description, and I have travelled over the bridge frequently at that speed. Over small bridges the inspection trains do not travel at the rate of 35 miles an hour. There is no rule limiting the speed at which I travel. It is necessary for an inspection train to travel

fast in order to detect the condition of the road. You may detect inequalities of a serious nature at 20 miles an hour, but to detect slight inequalities you must travel fast. I usually travel between forty to sixty miles an hour. I do not know whether there is any defect in the Engine. I noticed that about six of the dog bolts over that part of the bridge I travelled were loose. These bolts fasten the sleepers to the girders. The number of dog bolts which were loose were not sufficient to cause the accident. I heard that the mail train and a special passed over the bridge a few hours before I did, and both were much heavier than my train. I cannot account for these trains having passed the bridge safely, and my train

meeting with the accident. The swaying of the train caused the wheels leaving the rails. The only inequality I observed was the bulge I alluded to and the rails appeared slightly bent. I think I noticed the swaying some twelve or fifteen yards from the place where she left the rails. I think the swaying commenced before we reached the inequality in the rails. The Engine ran very steadily over the bridge nearly up to the point when she left the rails. I noticed a shake in a girder bridge on masonry piers some four miles near Cuddapah. I was anxious to travel over the Kamalapur girder bridge slowly. As far as I can see I cannot attribute the accident to a defect in the road or Engine or excessive speed. There must have been a reason for the accident.

but I have not been able to satisfy myself what that reason is. As far as I could see the Kama Laper bridge was in good order. The break was never screwed down so as to effect the speed of the train. The fireman was only getting it into a state of preparation. When coming up to the curve we were going at least at 50 miles an hour so that at half a mile from the commencement of the bridge we were travelling at that rate and the breaks were not put ^{on} but steam was shut off. I am sure the speed was reduced to 35 miles by the mere shutting off the steam. I do not know whether the guard put on his break but the driver did not whistle for the break.

Signed W. Robinson
Given before me this 19th June
at Cuddapah.

Signed W. D. Rowley

W. Robinson re-examined.
Sworn.

I consider it is quite possible merely by shutting off the steam of a Wilson's Engine and without applying breaks the train being a light one to check speed in half a mile from 50 miles an hour to 35 miles an hour. I do not think

that the fact of the Engine having had a large driving wheel is an important element in the matter.

There is a certain amount of nervousness in going over a bridge and if I had been in the driver's place I would have certainly run slower by putting on a break. There was a break in my carriage which was not applied because I did

not think the speed was dangerous and because the speed was gradually decreasing. I think the

Driver would have exercised
a wiser discretion if he had gone
slower. Speed combined with some
other cause unknown to me caused
the accident. I am of opinion
that an engine might be taken
over that bridge now at the same
speed with safety. I cannot
say but I do not think there
was a strong wind against me.
I know there was a very strong
wind some hours afterwards.
It did not appear to me to be
necessary to interfere with the
Driver. I must therefore absolve
him from all blame. When passing
with the inspection train over
a bridge at the 170th mile there
was a violent oscillation. On
returning to Buddapah after
the accident I examined the
bridge and found that one of the

packings was loose, under one
 sleeper. The sleeper could be moved.
I could find nothing else to
account for the oscillation. The
rest of the packing was fair. It
appeared to me to be a slight cause
for so strong an oscillation. I
spoke sharply to the Inspector
and said if any other bridge is
in a similar state we must go
dead slow. He said "No".

Signed W R Robinson.

Given before me at Buddapah
this 20th June 1874.

Signed W D Horsley

(True Copy)

W Horsley
Magistrate

310 128

Henry Haworth, Resident
Engineer. Sworn.

I was in the inspection special
on the 16th June. It left Cuddalore
at 6 A.M. I suppose we must
have started as near as possible to
6 O'clock. I know after starting
Mr. Robinson made some allusion
to the time and it was then 2 minutes
past 6 O'clock by my watch. This
is my watch. After the accident
it was wiping. It was brought
in this morning by Mr. Clewin.
It is 12 past six. I am not suf-
ficiently experienced to judge of the
speed of trains. I have been the
last 7 years on railway construc-
tion but have never been in charge
of open lines until I joined the
Madras Railway in January 1874.
From the injuries I received I
was unable to inspect the line.
I am inclined to say the bridge

was in good order because the fireman put his hand on the Engine break as we went on to the bridge, and looked back to the Inspector as if asking for instructions as to the working of the break. The Inspector waived his hand and shook his head as if the break was not necessary. Also because I travelled over the bridge on Sunday the 14th and I considered the bridge was in good order. I have no reason to suppose that there was any defect in the Engine. There was no greater motion than I have experienced in an inspection train which always travels faster than an ordinary train. We went very smoothly over the first part of the bridge and over the curve before the bridge. Any train is more likely to leave the line at the curve than at the bridge. The accident might

² This is stated with great hesitation -
(S?) F.R.H.

be attributed to speed, because there is more elasticity in a girder bridge like the Kamalapur bridge which has long opening. I do not think that the bridge being on screw piles would make a material difference in its elasticity. I am a bad judge of speed but I consider the pace at which we travelled over the bridge and were travelling at the time of the accident was not dangerous. It might have been safer if we had been going slower. I think the steam was shut off at the beginning of the curve. Nothing was done except that to check speed. The fireman only lowered the break but did not apply it. The steam was not put on again after we got on the bridge as far as I observed. If the train had not gone off the rails, the bridge would not have been smashed. I give my

evidence as to speed and the elasticity of bridges with some diffidence owing to my want of experience. I think I would have travelled slower if I had had charge of the train. I was not the least uneasy in my mind. I trusted to those in the train who possessed more experience. I think that the speed at which we travelled on the bridge was greater than was necessary for inspection purposes. I am of opinion that inspection trains are usually run at a higher speed than is necessary for inspection purposes.

Signed Henry Haworth

Given before me this 19th June at Geddapah.

Signed H. D. Bosley

True Copy

W. M. M. M.

30
Robert Swan, Inspector of Police, Kamalapur Division, Swdn.

About 7 minutes after the Inspection train broke down I was at the scene. I went straight to the bridge and found Mr. Haworth lying half stunned. I saw the guard there and after enquiry of Mr. Haworth as to his injuries I spoke to the guard. I asked him among other questions what was the cause of the accident. The guard replied "we were going too fast." I went then to Mr. Haworth where he was lying on the said and told him what the guard had said. He remarked "Did he say so. I am afraid we were." After putting Mr. Haworth on a mattress I went up to the station. There I saw the Driver and Mr. Robinson. The Driver was wounded on the head and scalded. I spoke to Mr. Robinson. I mentioned to him that a fish plate had ^a short time ago been removed from the line.

between the bridge and the station
and I asked whether he suspected
that anything of that sort had been
done on the bridge. He said "it
might have been so. I should not
wonder if it was." The Driver said
he had shut off steam before coming
to the bridge and had slackened speed.

The Driver at the time gave no
cause for the accident. I did not
mention to Mr. Robinson or the driver
what the guard had said about driving
too fast. When the driver was in the
train I asked him the cause of the
accident and he said "it was the
bloody fish plate." I think he said
he was always afraid of the bridge because
it shook so and he always came over
it gently. I was not in uniform when
I hurried to the bridge and it was not
known that I was a Police Officer.
Then there were no constables with me.

Signed Robert Swan.

Given before me at Buddapah
19th June 1874.

(True Copy)

Signed R.D. Forsyth

W. R. N. S.

James Johnson. Chief
Guard. Sworn.

I was in charge of the Inspe-
ction train on the morning of the
16th June. We left the Buddapah
station exactly at 6 A.M. My
watch agreed with the station
clock. Between Buddapah and
the accident I did not put on
my break. I have been $3\frac{1}{2}$ years
a guard. I never travelled before
on an Inspection train. The train
between Buddapah and the bridge
had been travelling at 40 to 50 miles.
It crossed the bridge at 30 to 40
miles an hour. The driver shut
off the steam about $\frac{3}{4}$ of a mile
from the bridge about the level
crossing. I ascertained speed by
counting the number of mile posts
and looking at my watch. The
train went properly and did not.

shake about. I lost my watch
when thrown out of the van and
therefore had no means of knowing
when the accident occurred.

Signed James Johnson

Given before me at Budda
pale this 19th June.

Signed W.D. Moreley.

True Copy!

W.D. Moreley
Magistrate

Edward Chilvers Boole.
Acting Locomotive Superintendent.
Sworn.

I know Engine No. 9 which
worked the inspection train on the
morning of June the 16th. It was in
perfect working order. The Engine
Driver had worked on it the whole of
Monday the 15th and had thoroughly
examined it. Three or four months
ago it was in the Perambore Park
shops when it was thoroughly re-
paired with half new boiler and
new types and tubes. I have exa-
mined the Engine as it lies in
the bed of the river. I can find
nothing at all in it to account for
the accident. There is not a flaw
in the driving wheel axle. The grain
of the iron is slightly visible. Had
the driving wheel come off on the

bridge it would not have been in the position in which it was found under the Engine. The height of the Engine falling on the wheel broke it. The driver was a steady man, an old hand and knew the road. I cannot say whether that Engine could be pulled up in half a mile over the curve solely by shutting off the steam from 55 to 35 miles an hour. The weight of the Engine was about $24\frac{1}{2}$ tons.

The weight of the inspection train would be about 36 tons. Allowing for starting and the check at the end, if the train left Cudda-
pale at 6 and reached the scene of the accident at 6.18 I should say it must have travelled at times at least from 55 to 60 miles an hour the greater part of the way. From which I

33
seen of the wreck I should say the train travelled at least 35 miles an hour when the accident happened.

Signed Edward C Boole
Given before me at Cudda-
pale 19th June.

Signed P D Norley

W. Boole re-examined.

A Hixson Tank Engine when driven at 50 miles an hour oscillates more than a tender Engine. No. 9 is a Hixson Tank Engine and would oscillate more because it has outside Cylinders and not because it is a Hixson Tank Engine. If driven over a girder bridge at 35 miles an hour the oscillation would be greater.

Signed Edward C Boole

Given before me this 19th
June at Cuddapah.

Signed P. D. Rowley

(True Copy)

W. M. M.
Magistrate

Statement made on the 16th June 1876.
By V. Sheeramma Mudali Son of Veerashwami
Medali. Religion - Vishnu. Residing at Tirupathi,
manager of abkary Tax at Tirupathi.

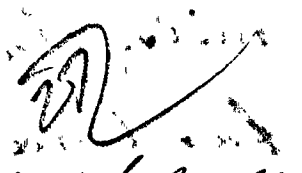
This day at 6.20 A.M. according
to my watch, while I was standing at
the main road gate crossing the rail
to about a mile from the scene of the
accident, I saw the special engine,
a first class carriage and a break
van pass me with very great speed,
so much so that I remarked to my
brother-in-law, Rungaswami Mudali,
that the train would surely drop and
in about a minute or two after this
observation I heard a crash & saw
the whole thing tumbling into the
River. I ran to the scene of accident
& saw the whole train capsized in to the
dry part of the river at the 175th mile.
I saw one man, an East Indian, with
his head cut in two, a native with his
two arms smashed, the Railway-

District Engineer with a wound on
the right side of his face and on the
cheek bone about four inches long.
There being a curve in the embankment
about 4 chains or so from the bridge,
and the train being allowed to run
with very great speed, endanger the
bridge and the oscillation being very
great as the train ran over the
bridge, necessarily threw the train
into the river. I saw Mr. Sahu as
the train passed me, in the front
compartment of the engineers carriage
holding on to a cross bar and his
body was shaking frightfully at the
time which would give an idea of
the great speed at which the train
was running.

The evidence was read over
to the witness in Telugu which he understood
and acknowledged to be correct.

16.6.74. (signed) Sherrama Mudally.

True Copy signed H.C. P. Sharkey
By Master 8
W. M. M.
Master

35
Mr. M. S. Sahib. Patkumar
So lennely affirmed. 
On Tuesday morning at sun
rise I was on the line to posts from
the bridge on the Buddapah side.
I have been for 5 years in the service
of the Railway Company. The Inspec-
tion special train came from Budda-
pah. The train came at very great
speed. I have seen inspection specials
tho came faster than any I have
seen before. I never saw a train run
so fast before. It came with a
cloud of dust and I could not see
if it travelled steadily. I was at
the side as far from the train as
it passed me as that wall (about
6 yards). When the train had
passed me I walked smartly up
the bank and then I saw a great
smoke on the bridge and no bandy
was visible. I saw the train 1 1/2
mile off and was coming. When

I saw it first. I was beside the
rails. I went down the bank the
far 6 yards when the bandy
passed me. The wind was blowing
pretty strong from the west.

Given before me the 20th June
1874 at Buddapah signed W.D. Moreby

[True Copy]

W. Moreby
Magistrate

9

370 36
Valur Sabapathy Mudellin
[Signature]

On the morning in question
I heard the bell and ran from the
gate shed towards the platform.
and I heard a sound and looked up
to the telegraph wire and looked
again in front towards the bridge
and saw the smoke rise up. I saw
the dog bolts fastened on by the
workmen. After ten o'clock I did
not see the dog bolts fastened
on. At 6 A.M. on Tuesday
the maistry said that the dog
bolts were fastened. On Satur-
day at 11 in the day the Inspector
gave me written instructions to
have the dog bolts fastened on.
He gave me the written order mark-
ed A.
Given before me the 19th June

at Buddapah. Signed W D Horsley.
True Copy

W D Horsley
Magistrate

Swain Sahib. Watchman.
Solemnly affirmed:
On Tuesday morning at 6.
A M I came over the bridge
from the Kankla pier to the
Buddapah side. I stood waiting
for the Chief Engineer's special train.
I have been in the service of the
Railway Company about a year.
I saw the inspection special com-
ing from a mile and a half off.
I cannot say how long it took to
reach me but it went very fast.
I have seen 4 or 5 such inspection
specials before. I never saw a train
travel so fast before. I was a chain
from the bridge when the train
passed me. I was on the right
side of the line far off from the
line as that wall (6 yards).
I cannot say whether the train
was running steadily or not.
and the speed frightened

me and I saw nothing. The
train began to sway when it got
on the bridge. The next thing was
a crash. I showed the red flag.
Given before me this 20th June at Cuddalore.

Signed W D Morsley.

True Copy!

W Morsley
Magistrate

138
Aramugam Mastry

On the Railway. I sworn

I am employed on the line between the 174th and
176th mile. I did not see the Inspection train pass

I have charge of the Kamalapore Bridge. I
knew it was to be inspected on the 16th. I received
orders regarding the bridge 10 days before the Deputy
Chief's arrival, from the Inspector Mr. Satoru.
His orders were that I was to look after the line

He ordered me to serve the dog bolts light. I did
so on Monday from 6 in the morning to 6 in the
afternoon. The whole of the bolts were fastened.

I was at the station when the accident occurred,
removing the grass from the platform and sides.

They ring the bell usually when the train is a mile
or so from the station. I was at the station

when the bell rang on the morning in question
for the special train. After I fastened on the
dog bolts two trains passed, one the Mail train

and the other a special. Mr. Satoru inspected
the bridge carefully on Saturday by walking

over the bridge. Eight of us were employed in the work
of tightening the dog bolts. On Monday afternoon
I saw that the fish plates were all fastened

19th June 1874

} Maskof Arumugam Naichy

Given before me this 19th June at
Cuddapah.

Signed B D Rowley
True Copy

W. M. N. S.
Magistrate

2

39
Yellapa Raja Gopal.

Bridge watch man

On the morning of the accident,
I was about 2 chains from the bridge
& wards the station. I saw the
train when it was about 2 miles from
the bridge. I saw the train and stood
up and within a minute and half the
train fell in. The train ran with very
great speed & I never saw a special
train run like that. I have seen
four special inspection trains during
the time I have been employed. I know
the difference between a special train
& special inspection train. The latter
has only one light and small engine,
a first class carriage and a break
van. The other has several carriages
attached to it. Given before me.

June 20/74. True Copy

W. M. N. S.
Magistrate

40
Kamal Sahib, Watchman. Sol. Affo.

I have been 3 years in the service of the Railway Company. On Tuesday morning I was at the 173rd mile 1st post. This was at 6 A.M. The Chief engineers Special passed me. I came on duty at 5 1/2 A.M. and examined the line. I first saw the train at Pirjahpet Wunka about 2 or 3 miles from where I was. It came to me in about 3 minutes. There are 60 minutes in an hour. I can read Telugu. I have seen Chief Engineers Specials before. They come once every 3 months. I never saw an Engineers Special travel so quickly as this did. If it had had wings I would have thought it was flying. It was swaying about so when it passed me that I thought it would have fallen before it reached the bridge. I heard that the train had fallen at the

the bridge. There was not much wind then.
Given before me the 20th June at Cuddapah.

June 20/74. (Signed) W. D. Horsley.

True Copy

W. D. Horsley
Magistrate

Pl. 717 Augt. 1874
In B. N. 333

Cuddapah Magistrates Office
Extra No. 10. In Circuit at Godoot
25th June 1874

From W. D. Horsley Esquire
Magistrate of Cuddapah
To The Honorable D. F. Carmichael
Chief Secretary to Government
Judicial Department
Fort Saint George

Sir

I have the honor to report that
the enquiry regarding the railway
accident on the 16th June at the
Kamalapur bridge was commenced
on the 19th and was closed on the 20th.

2 Messrs Robinson and
Hawarth the Deputy Chief and
Assistant Engineers and the Guard
Johnstone were in the train when
the accident occurred and they are

the only passengers from whom information was obtainable. The Driver Lumb is as I mentioned in a former letter in Madras. Colonel Shaw Stewart and Mr. Elwin were present during the enquiry and gave me much assistance.

3. Mr. Robinson whom I examined first, says, he left Buddapah in a very light inspection special consisting of a tank Engine, an inspection carriage and a brake van. He regulated the speed of the train which speed never exceeded 55 miles an hour between Buddapah and the bridge. At about half a mile from the bridge a curve in the line commences. The Driver there shut off steam. The brakes were not applied but were put down by the fireman ready for application. Solely by shutting off the steam

he states that the speed on the bridge was reduced to 35 miles an hour and he considered it safe to travel on an elastic girder bridge resting on screw piles at that rate. There were 3 breaks in the train, one on the tender, one in the inspection carriage and one with the guard in the van. None of them were applied to check speed. He supposes that the guard's break was not applied because the Driver did not whistle for it. This supposition will hereafter be shown to have been correct. A very marked oscillation was felt in the train when on the bridge. This swaying motion caused the train to leave the rails some 12 or 15 yards further on and when off the rails the train brought down the bridge. After the accident Mr. Robinson walked

over the bridge and could find nothing in the condition of the rails or in the structure of the bridge to account for the accident. He found some dog bolts which fasten the sleepers to the girders loose but not to an extent to account for the accident. He found a bulge in the left rail but this was equally unimportant. He is not aware that there was any defect in the Engine. He has been quite unable to satisfy himself as to why the train left the rails and refuses to acknowledge that speed was the cause. He considers it unfair to travel over a long girder bridge such as that at Kamalapur at a high speed and he has travelled over the bridge

3
bridge frequently at 35 miles an hour. There is no rule limiting the speed at which his train may travel, nor does any rule limit the speed over the Kamalapur bridge. He usually travels at from 40 to 60 miles an hour. High speed is necessary to enable him to detect inequalities in the rails.

4. Mr. Haworth who is still suffering from the effects of the accident was next examined. He is fortunately able to fix the departure of the train from Cuddapah at as near 6 A.M. as possible. His watch was found on the 19th buried in the sand of the Papagni river with the glass broken. The grit had stopped the hands at 18 minutes

part-6 which may fairly be taken as the time at which the accident occurred. All questions relative to the speed at which the train travelled he hesitates to answer. Then he explains by saying that he has had little experience in the speed of railways having till the beginning of this year been chiefly employed on construction and not on open lines. I could see however from his hesitation that he had formed an opinion which was contrary to that which has been expressed by Mr. Robinson but being inexperienced he is reluctant to pronounce his opinion. From his manner and speech during the examination I have come to the conclusion that Mr. Haworth

4
attributes the accident to the rate at which the train travelled. He gives his reasons for believing that the bridge and the line were in good order and he has no reason for supposing that there was a defect in the Engine. The train was travelling fast as all inspection trains do. The accident might be attributed to speed over a elastic bridge with long openings as in the Hamalapur bridge. He considers the pace at which the bridge was traversed was not dangerous. I must mention that very great difficulty was experienced in eliciting this statement, but Mr. Haworth adds "it might have been safer if we had been going slower" and then again "I think I would have travelled slower if I had

had charge of the train". There is no doubt what Mr. Haworth's opinion as to the speed of the train is, but he says he was not the least uneasy in his mind and trusted to those in the train who had more experience. This was very natural as no accident had then occurred. What Mr. Haworth's opinion was immediately after the accident will appear afterwards. Mr. Haworth considers that this train and all inspection trains are run at a higher speed than is necessary for inspection purposes.

5. Mr. Swan, Inspector of Police lives not far from the bridge and was at the scene of the accident about 7 minutes after its occurrence. He asked the guard the cause of the accident and he replied "we were going too fast". Mr. Swan went over to Mr. Haworth and

and mentioned what the guard had said. Mr. Haworth replied "Did he say so? I am afraid we were". This shows what was passing in Mr. Haworth's and the guard's minds immediately after the accident.

6. The guard says that the speed over the bridge was from 30 to 40 miles an hour and between Buddafah and the bridge it had been from 40 to 50 miles an hour. Whether it was from the effort with which this was said, or from illness I cannot say but the guard nearly fainted while deposing. He gave most absurd methods of calculating speed and then gave after considerable leading to the point, the simple method of looking at his watch and the telegraph post on which

the distances are marked. This man's evidence is not worth much.

7 Mr. Boodle the Locomotive Superintendent speaks to the good condition of the Engine and estimates the weight of the train and Engine at about 36 tons.

I must mention that the right driving wheel of the Engine was found in its place but broken from the axle. In the axle there was what appeared to me to be a flaw. Mr. Boodle explains that the mark was not a flaw. It is quite clear as he shows that if the breaking of the driving wheel had caused the accident the wheel would not have been found as it was on the Engine. The Engine falling on the wheel broke it. The Engine having outside

cylinders would oscillate more than an Engine with the cylinders fitted inside and if driven over a girder bridge at 35 miles an hour the oscillation would be greater. He is of opinion that the train must have at times travelled between Cuddapah and the bridge at the rate of 55 to 60 miles an hour at least and that during the greater part of the way. From what he has seen of the wreck at the bridge the train at the time of the accident must have been travelling at 35 miles an hour at least. 8. Mr. Goring the Chief Engineer inspected the bridge after the accident and apart from the damaged portion

found it in very good order. The displacement of the dog bolts was not such as to upset the train.

He speaks of the dog bolts on that portion of the bridge over which the train had not passed being less displaced than the bolts in that part of the bridge over which the train had passed and naturally he attributes the greater displacement to the vibration in the bridge caused by the high speed of the train. Speed over such bridges as the Hannaford bridge should be slower than over any other class of bridge. He would wish to limit the speed over that bridge to 30 miles an hour while 20 miles an hour would be quite safe. The bridge being

being near a station the facing points of which should not be passed at a speed greater than 5 miles an hour, there has been hitherto no rule limiting the speed over the bridge. From the distance at which the Engine lies from the place it left the rails, he is of opinion that the train travelled over the bridge at from 35 to 40 miles an hour, a speed not unusual and quite safe on the line generally but not so on girder bridges resting on screw piles. He says inspection trains run from 30 to 60 miles an hour but for the purposes of inspection 45 miles an hour would be sufficient. The particular train must be thinks have travelled in some places between Buddafah and the

of the accident. His observations
are valuable made as they were after
personal inspection and after hearing
what had been said by so many
persons during the enquiry. He
gives ample reasons for stating it
as his belief that the train travelled
on the bridge at a rate exceeding
35 miles an hour. He considers
that 35 miles an hour over such a
bridge as the Kamalapur bridge
to be unsafe and he would like to
see speed limited to 15 miles an
hour. Not that he thinks there
is any thing wrong with the bridge,
on the contrary he considers the
bridge is perfectly safe but owing
to its design it being a girder bridge
supported by screw piles it has
more spring in it than a similar
bridge on masonry piers. There
is a very slight incline with a
gradient of 1 in 1023 which
continues

continues up to the bridge. This
incline commences at the 173
mile 15th telegraph post. The curve
on the incline at which the steam
is said to have been shut-off com-
mences at the 174th mile 12th tele-
graph post. The bridge commences
two posts further on. From
what he knows of the curve and
the gradient Colonel Shaw Stewart
says "I do not consider it possible
that by merely shutting off the
steam on a small Kitson's tank
Engine with large driving wheels
that speed at 50 miles an hour
at the commencement of the curve
could be reduced to 35 miles an hour
on the bridge." He goes on to say -
what he believes was the strength
of the wind at the time from
his observations of the wind on the

17th and 18th. But I need not allude
to these conjectures any further,
probably right though they are,
because Mr. Robinson subsequently
stated that there was no noticeable
wind against him though it rose
afterwards to a high wind. Colonel
Shaw Stewart's opinion as to the
possibility of speed being checked
in the manner described by Mr.
Robinson without the aid of breaks
must therefore stand. I know nothing
about these matters but I must
confess I was rather surprised at
Mr. Robinson's statement and I
made a point of obtaining informa-
tion on the subject from experienced
persons such as Mr. Hoing and
Colonel Shaw Stewart. The condi-
tion of the bolts on the Buddafah
side of the bridge are alluded to
by Colonel Shaw Stewart as in a
condition differing from

on the Hamalapur side which the
train had not reached. He attri-
butes the displaced bolts to the rapid-
ity at which the train was driven.
The length of the bridge he states
is 1400 feet, and its girders are not
so rigid as those which have lately
been sent from England.
Opinions being so much
in favour of speed I asked Mr.
Robinson if he wished to modify
or add to what he had stated. All
I could gather from him was that
if the train had been going slower
there would have been less chance
of its running off the rails, but
he still maintained that the
catastrophe is to be attributed to
some unknown cause and if that
cause had not existed the rate
at which he travelled was not
excessively high because the

to accident. He then says that if he
had been in the Driver's place he
would have gone slower yet he abs-
olves the Driver from all blame.
This is quite natural as Mr. Robin-
son regulated the speed which
he clearly did not consider excessive
as he did not apply the brake
to his carriage nor did he give as he
was in a position to do any orders
to the Driver or Fireman to check
speed by means of their brakes.

12. I have endeavoured in
this enquiry to raise as many
issues as I could think of for
investigation but I have not
been able to get beyond three and
they are

1st. Was the accident caused
by excessive speed.

2nd. Growing to a defect in the Engine

3rd. Growing to a fault in the permanent
way

way or bridge.

13. Taking the last point first
the evidence is all in favour of the
good condition of both permanent
way and bridge. Even Mr. Robin-
son is of this opinion. After the
enquiry was closed I went on
Monday the 22nd again to the
bridge. It was there suggested
to me that a fish plate or key had
been removed from the rails by
some former subordinate on the
line whom Lemih the driver
had prosecuted. It is quite possi-
ble that such a thing might hap-
pen but I am quite sure it did not
occur in this case. Had a key or
fish plate been removed the train
would not immediately have
gone off the rails though it would
have done so in a very short space
of time. Until it went off the

rails the have to bridge and permanent way did not commence and therefore the fact that a fish plate or key was missing would have been observed by Mr. Robinson in his inspection after the accident. What I mean is, the spot whence the fish plate or key was removed was not so disfigured as to prevent the want of them being detected.

14. A rail was pointed out to me as a possible cause of the accident. This rail down the greater part of its length on the inside is flattened as if something had been pressed against it. The flattening is at first slight but becomes more distinct as it goes along until a piece of iron is split off the rail and then there is a mark showing where a wheel crooked it. It is technically termed "mounted the rail".

12
is whether a projection or flaw on the side of the rail caught the wheel which caused the rent, and so the wheel mounted. This I think is very improbable. If there was a flaw in the rail, it would not account for the flattened edge of that portion of the rail which was travelled over before the flaw was reached. Besides Mr. Robinson says he thinks he felt the great oscillation of the train some 12 or 15 yards before it left the rails. This oscillation increasing the pressure on the inside of the rail would increase until the wheel crooked the rail and in so doing split the rail. Taking facts and statements together it seems true that the split was the effect of the wheel mounting the rail and this again was

caused by the oscillation of the train.

15. I have failed to discover that the breaking down of the Engine was the cause of the accident. According to the Locomotive Superintendent the Engine had done very little ^{work} since its thorough repairs in the Perambore workshops. The Driver had the whole of the previous day - Monday to examine the Engine. It is not at all likely that there was anything wrong in the Engine to account for the accident. Unfortunately the Engine was completely smashed as to make it impossible to say for certain in what condition it was immediately before its fall.

16. Mr. Robinson says the speed at which the train travelled over the bridge was 35 miles an hour.

hour. Mr. Hoing and Colonel Shaw Stewart consider that rate of speed over a bridge constructed as is the Kanna Lapiur bridge, unsafe. Colonel Shaw Stewart believes that the speed on the bridge exceeded 35 miles an hour and he and Mr. Hoing agree in saying that speed in half a mile could not be reduced from 55 to 35 miles an hour by simply shutting off the steam which was the only means employed to check speed according to Mr. Robinson. That the speed half a mile from the bridge could not have been less than 55 miles an hour while it may have been more is proved by Mr. Hawthth's watch. He has good reason for saying that the train started at 6.15 and his watch shows that the accident

occurred at 18 minutes past 6.
Experienced persons assert that
to travel the distance of 14 miles
in that time, allowing for the
time taken to start and for the
check of speed at the end, the
greater portion of the way must
have been covered at the rate of
60 miles an hour. This all goes
to make it probable that the
speed on the bridge exceeded
35 miles an hour. I can therefore
only come to the conclusion that
the train travelled over the bridge
at a rate of speed exceeding what
Colonel Shaw Stewart and Mr.
Goring consider to be dangerous.
According to Mr. Robinson the train
oscillated greatly and this is
accounted for by Colonel Shaw
Stewart and Mr. Goring as being

due to vibration in the bridge the
consequence of speed. Then there
are the admissions made by Mr.
Haworth and the Guard to the Police
Inspector to the effect that speed
was the cause of the accident. Then
there is the statement of Mr. Haworth
before me yesterday almost as plain
as words can make it that the
accident was caused by the train
being driven too fast. With all this
in favour of speed, I do not consider
it necessary to think any further
of a possible but improbable defect
in the Engine. Mr. Robinson
blames nobody and nothing
for the accident and attributes it
to an unknown cause. In his
ill advised statement he has done
very little to absolve himself. I
can quite understand that
he did not think that the speed
at which he travelled over the

bridge was excessive but I cannot understand when he has seen and unfortunately felt the consequences of his act and when the real cause has been suggested to him why he should wander in search of an unknown cause of the accident.

17. I can only come to the conclusion that the accident which caused the death of two persons who he attributed to the excessive speed at which the train was driven over an elastic girder bridge and for that speed Mr. Robinson the Deputy Chief Engineer is responsible. In travelling at that rate over a girder bridge Mr. Robinson transgressed no rule and he firmly believed at the time that the rate at which he travelled was

was perfectly consistent with safety.

18. Copies of the statements taken during the inquiry are forwarded for the perusal of Government.

19. I wish to draw the attention of Government to the fact that inspection trains are allowed to travel at unlimited speed, while 45 miles an hour is a rate quite sufficient for the purposes of inspection - and further that girder bridges of any great length are springy and that speed over them should be restricted however sound the bridges may be. The proximity of the Kaimalapur station to the bridge at that place has hitherto been considered a sufficient barrier to excessive speed over the bridge. Though the speed in this

case was excessive over the bridge
I understand that it might have
been so decided as to pass the sailing
points at the station at 5 miles
an hour so that the proximity of
the station will not in some cases
prevent excessive speed over the
bridge.

I wish also to draw the atten-
tion of Government to the admirable
conduct of Mr. Swan Inspector
of Police. Accidents it is true placed
the break-down in his neighbourhood.
He lost no time in getting to the
bridge and when there did what
he could for the wounded and
at the same time saw and heard
all that passed. Nothing escaped
his notice and consequently he
was able to give me valuable infor-
mation regarding every particular
when I visited the scene. The

activity and intelligence displayed
by Mr. Swan is most commen-
dable and I trust that Govern-
ment will accord him the promo-
tion to which he is so justly en-
titled. Mr. Swan is in every way
suited to occupy the position of
an Assistant Superintendent
of Police.

I have the honor to be,
Sir,
Yours faithfully,
W. M. Bailey
Magistrate

Obituary of 19th July 1874 2:1240.

Transferred to the Dept of

P.W. R.E. and other matters

The mention made by the

Mayor of the admirable conduct

of Mr. Lewis, Inspector of Police

whose labours will be long to

be special consideration of

the Insp. Genl. of the Dept.

29/6/74

5/7

To the Dept.

It is a case for Trans

fer to S.D.M. before disposal

Judicial Dept.

Mr. lines have been

lost - the ostensible cause

being excessive and improper

Deed such as involved danger

for Mr. Robinson & the

Drinks are responsible & I don

think don't the verdict of a

Coroner's jury but have been

manipulated

I am not in favor of

ordering a trial but it is a

matter of consideration

2/7

MR

What is the result of the

case?

2/7

12110

Judicial Department

1874.

Magisterial Dept.

From the Magistrate

of Cuddalore

To the Chief Secretary

to Government

Judicial Dept.

For want of

Dated 25th June 1874

Received 26th June 1874

Enclosures 14.

Extra No. 10.

N: 1608

Submits a report on

the enquiry regarding

the Railway accident

at Kamalapur.

with details

19

P. W. 1874 Sept.
No. 2165

From

The Chief Secy
to Government

Dated 29 June 1874
Received 27 July 1874

C. 2.

C. Q. no: 2270. 7-8-74.
Transferring
the Report of the
Magistrate of the
Cuddapah Fe-
lute Railway Ac-
cident at the Per-
pugnee Bridge.

No 333

Public Works Department
Proceedings of the Madras Govt
Read the following
From The Magistrate of Cuddapah - (P. B. C. 10 - Dated 25 June 1874)

Should not the Driver's
Statement be taken
as far as he is able
to make it.

~~Intimate~~
13/7

14/7

Ordered that
these papers be com-
-municated to the Govern-
-ment of India, with
the decided opinion
of His Excellency the
Governor in Council
that the accident was
attributable solely to
the excessive speed with
which the Inspection
Train

Train was driven over
the bridge; for which
the Acting Deputy Chief
Engineer Mr. Robinson,
who has gone home for
his health, is responsible.

as he has advised
R.C. to regulate
the speed.

Considering Mr.
Robinson's position, his
admission that "speed,
"combined with some other
"cause unknown to me,
"caused the accident" is
as much as could be
expected of him - Mr.
Haworth's hesitation
in pronouncing a de-
cided opinion as to

what he had thought of
the speed of the train
before the accident, is
excusable from his in-
- experience as Engineer
in charge of an open
line - It is quite reason-
- able with what he is
stated to have admitted
to Mr. Swan afterwards.
The inquiry has been very
carefully conducted, and
every important fact
bearing on the accident
elicited, and its true
cause determined. It
now remains to take
precautions

I should say - its
chief - if not sole -
cause ascertained.

say +
As Mr. Robinson has
gone home

precautions that such
causes shall not again
lead to similar catas-
trophes -

With which view
His Excellency the Gover-
nor in Council is pleased
to order that the maxi-
mum speed at which
any Inspection Train
shall hereafter be driven,
must not exceed 45
miles an hour, a speed
admittedly sufficient
for the object in view, viz
to test the permanent
way - And the maximum
speed

Speed with which any
Inspection Train shall cross the
Paupugnee or other
Bridge of similar
construction, while
in hour. The Consulting
Engineer will report when
the necessary arrange-

ments for carrying out
this latter order shall
have been made -

docketed July 1874.

Copy of the above

forwarded to the Govt of

The Director

Statement

made

minutes rates for
Inspection Trains over
every bridge of any
size or span line for
material on the R. W. &
S. W. lines - He will also
ascertain the location
of the S. S. R. in work
to be done on the

[illegible]

5th reading the evidence can
come to any other conclusion
than that the locomotive
- accident was due to excessive
speed - locomotive trains are
always run at higher speed
than other trains - and the
speed at which this train was
being run was not dangerous,
though unnecessarily ^{fast}, and
the line itself - and would not
apparently have been dangerous

like a bridge, with ^{the} ~~unusually~~ ^{little} ~~with~~
but - though nothing can really
justify excessive speed any
where. The construction of the
bridge was such that it was only
elastic - and the unfortunate
omission or neglect in efficiently
to slacken speed was ⁱⁿ ~~the~~ ^{drift}
the corner of the train, a very
light one, first oscillating &
finally overturning the rail.
The evidence of the driver
could not be taken by Mr. Hensley

has come I can only be held responsible
as Mr. Robinson admits that he
knew the speed. but his evidence
will be valuable & should be taken
as soon as possible. The last few nights
I think it is entirely in the hands
of Mr. Robinson. I do not think a further
admission; it is going to be
that it would be a failure. It is
absolutely certain that the accident
may not have been caused by the
removal of a pile. but by the
in the engine - or a rail - and the
person in charge is not by the driver
& Mr. Robinson would I think be influenced
the very best way. The Director of

Ordered that these papers
be communicated not only
to the Govt of India, but
also to the Secy of State
for India; for information
of the Director of
the Madras Railway,
and their guidance
in dealing with Mr. L.
Binson, the Actg Dy. Secy.
who has some
business ^{on acc of his health} and whose (sole)
responsibility for the
accident is clearly
established.

The occurrence of the
accident being clearly
attributable to excessive
speed in crossing the
Pampassee Bridge, the

speed at which Inspec-
 tion. I am sure we have
 actually driven having
 admitted been some-
 what great, H. P.
 The G. N. Co. is pleased to
 order that the maximum
 speed at which any
 inspection shall be
 hereafter be driven be
 45 miles an hour; &
 the maximum speed
 at which the Pampunall
 bridge shall be crossed, the
 15 miles an hour. The
 same to be notified by
 legible placards at the
 each end of the bridge.

L. M. W.
 Secy.

J. W. Deane
 9/

To The Right Honorable
 the Secy. of State
 for India.
 My Lord Margins

G. C. 13 July 176 Dec 1878.
 17 Aug .. 2270
 21 Sept .. 2672
 22 Dec .. 3378

We have the honor
 to forward for your Lord-
 ship's information copies
 of our Proceedings in
 connection with a
 serious accident on the
 16 June at the bridge
 spanning the Pampun-
 all River on the north
 West line of the Madras
 Railway. After careful
 consideration of the
 reports of our Consulting
 Engineer and the officers
 of the Company as well

as the evidence elicited at
the magisterial enquiry
which was subsequently
held, we have arrived at
the conclusion that the
accident was due chiefly,
if not solely, to the exces-
sive speed at which the
inspection train of the
Deputy Chief Engineer
was driven over the
bridge. The speed of the
train was regulated by
the Deputy Chief Engineer
in charge, Mr. Robinson
and we consider that
officers therefore to be
responsible ^{in a great measure} for the
deplorable results which
followed.

2. The accident resulted
in the death of two persons
and in severe injury

to four others. Three of the
twenty 40-foot girders open-
ing of which the bridge
is formed were more or
less destroyed, and the
Engine and the Inspection
carriage were completely
ruined.

3. We have left it to
the Directors of the Com-
pany to deal with
Mr. Robinson as they
may think fit, and have
adopted the precautions
indicated in our Proce-
dings of the 17th August
and 21st September, Nos.
2240 and 2692 for the
prevention of future
accidents of a similar
nature.

2270 Ry. 59

Proceeding of the Madras Government
Read the following

From the Magistrate of Cuddalore - (F.R. No. 10 of 25th June 1874)

[Signature]

MR
24/7

Ex-1

It is the decided opinion of His Excellency the Governor in Council that the accident on the Pampunee Bridge was attributable chiefly, if not solely, to the excessive speed with which the Inspection Train was driven over the Bridge for which the Acting Deputy Chief Engineer

[Signature]

Mr. Robinson, who has
gone home for his health,
is responsible - as he has
admitted that he regulated
the speed.

Considering Mr.
Robinson's position,
his admission that
"speed combined with
some other cause un-
known to me, caused
the accident" is as much
as could be expected of
him. Mr. Hamworth's
hesitation in pro-
nouncing a decided
opinion as to what
he had thought of the
speed of the train before
the accident, is excusable
from

42
from his inexperience
as Engineer in charge of
an open line. It is
quite reconcileable with
what he has stated to
have ^{said} (admitted) to Mr.
Swan immediately
after the accident. The
inquiry has been very
carefully conducted,
and every important
fact bearing on the
accident elicited, and
its chief, if not sole,
cause is ascertained.
As Mr. Robinson has
gone home, the Govt.
must leave it to the
Directors of the Company
to

to deal with him as they
deem fitting. It now
remains to take pre-
cautions that such
causes shall not again
lead to similar catas-
trophes.

With this view
His Excellency the
Governor in Council
is pleased to order that
the maximum speed
at which any Inspec-
tion Train shall
hereafter be driven
must not exceed 45
miles an hour; a speed
admittedly sufficient
for the object in view,
viz, to test the permanent
way.

It would appear that
no warning in re-
gard to speed is
now exhibited
on this bridge.

61 43
way. And the maxi-
mum speed with
which any Inspection
train shall cross the
Pauzeque or other
Bridges of similar con-
struction, 15 miles
an hour. The Consulting
Engineers will report
when the necessary
arrangements for car-
rying out this latter
order shall have been
made. And, in con-
sultation with the
Officers of the Railway,
he will suggest safe
maximum rates
for

for Inspection Trains
over ^{every} ~~any~~ bridge of
any size or of peculiar
formation on the
North West and
South West lines.

He will also ascertain
the practice of the Great
Southern of India
Railway in respect
to Inspection Trains.

The Director's state-
ment will be
taken as soon as
he is able to make
it.

Ymn.

20
2

To
12 Cong Secy for
Judicial Dept. P. O.
S. Copies despt. 22/8/14.

6/10/4665



Govt. of 1874 Madras.

PUBLIC WORKS.

To The Consulting Engineer
for Railways

Dated

Encl.

Encl. 2

G. O. 1874, No. 7270

No. 333 & 334

at the Panipat
Railway —
Report of the
lab. on the