

**The special report of the committee of visitors of the County Lunatic Asylum at Colney Hatch as to the action brought against Mr. Daukes : to be presented to Court on the ensuing County-Day / [Middlesex County Lunatic Asylum].**

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Middlesex.

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THE  
SPECIAL REPORT  
OF THE  
COMMITTEE OF VISITORS  
OF THE  
COUNTY LUNATIC ASYLUM  
AT COLNEY HATCH,  
AS TO THE  
ACTION BROUGHT AGAINST MR. DAUKES.

*To be presented to the Court on the ensuing County-Day.*

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LONDON:

PRINTED BY JOHN THOMAS NORRIS, ALDERSGATE STREET.

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## Middlesex.

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TO HER MAJESTY'S JUSTICES OF THE PEACE  
FOR THE COUNTY OF MIDDLESEX IN GENERAL  
QUARTER SESSION ASSEMBLED.

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*THE SPECIAL REPORT of the COMMITTEE  
of VISITORS of the COUNTY LUNATIC  
ASYLUM at COLNEY HATCH, as to the  
Action brought against Mr. DAUKES.*

WHEN, in the month of December 1856, the Report of the Committee of Visitors of the Asylum at Colney Hatch respecting the state of that building, presented to the Court in the preceding October Session, was considered, the Court resolved to refer it back to them, with an expression of its confidence that the Committee would take all necessary steps for the protection of the interests of the County in that behalf. All the steps which had been taken up to that time had been submitted to the Court, and the Reports were printed and circulated in the usual manner, so that it is unnecessary to recapitulate them on the present occasion. The Committee will now endeavour, as fully and at the same time as briefly as possible, to inform the Court of all that has occurred subsequently to that period.

No time was lost in instructing the County Solicitor to prepare a Case to be laid before Counsel, in order that he might recommend the Committee what legal steps, if any, should be



adopted under existing circumstances. Mr. Atherton, one of Her Majesty's Counsel, was selected to advise them, and the following queries were propounded to him—

“Whether Mr. Daukes was liable in damages under his Covenant for neglect of duty? And, if so, what breaches should be charged against him?

Mr. Atherton gave his opinion in these terms:—

“Under the Deed of the 12th of April 1848, Mr. Daukes expressly bound himself to prepare drawings, plans and specifications for the erection of a Lunatic Asylum according to a settled design; to perform all the duties of an Architect and Surveyor for the purposes for which he was appointed Architect and Surveyor; to superintend the building of the Asylum, &c.; to ascertain that all materials used in the construction were proper, and that the terms of the contracts for the erection were strictly performed; and that he would not, without the express order of the Committee of Visitors, allow any deviation from such contracts. There are other stipulations contained in the deed and obligatory on Mr. Daukes, which it is not material for present purposes to consider. Under these circumstances, I am of opinion that Mr. Daukes was not responsible for the excellence or vice of the ‘design,’ of which the Committee of Visitors made themselves the judges; but that he was bound, in the first place, to exhibit the ordinary reasonable skill of a professed Architect and Surveyor, in devising and describing the methods of executing the particular design, and, in the next, to see that what he had so de-



vised and described was faithfully performed, according to the terms of the Contractor's agreement with the Committee. There is no covenant, certainly, in terms for the exercise of such reasonable skill as I have described; but to evince it appears to me to be a part of the duty 'of an Architect employed for the purposes for which Mr. Daukes was employed,' and so to come within even the letter of his contract. I gather from the reports of the Clerk of the Works and of Mr. Cubitt and the other Architects who have been called in to examine and report on the state of the building at Colney Hatch, that they attribute the existing mischiefs to causes of each of the two kinds referred to, namely, to unskilful methods of carrying out the particular design, as laid down on the plans, drawings and specifications, for example the principle on which the roofs have been constructed, &c., and to permitted departures from the provisions of Myers' contract, as in the matter of the cement for the foundations, &c. Assuming the opinions of these Gentlemen to be well founded, then I think Mr. Daukes is liable on his covenants, and that the breaches to be assigned would be of the double character I have pointed out. His certificates are proof that he 'allowed any deviations from the contract for the payment for which they were the authorities.'

In Money-  
penny v.  
Hartland,  
1 C. & P., 352  
S. C. 2 B, 378

"But, before taking proceedings, the Committee should obtain a report or reports on which they can implicitly rely, stating, in detail, what vices in Mr. Daukes' plans, as given to the Contractor to work by, and followed by him, have caused actual mischief, and whether such vices are, clearly, such as the exercise



of *reasonable and ordinary skill as an Architect* would have led Mr. Daukes to avoid, and, next, what departures on the part of the Contractor from the letter of his Contract have been attended with like consequences. The burthen of proof of want of ordinary skill will, of course, rest on the Plaintiff; and it should not resolve itself into a 'differing of doctors,' or merely opinion against opinion. It should be strong and clear. The evidence should be taken, even before any action is begun, as for a trial in Court, and it must not be forgotten, with reference particularly to ascertaining the nature and extent, past, present and prospective, of the damage sustained, that only one action can be brought for any particular breach of the Covenants; and that Mr. Daukes cannot be sued, *toties quoties*, on the mere recurring development of actual injury.

"The action may be in the name of the Clerk to the Committee of Visitors.

"WM. ATHERTON.

"*Temple, 5th January, 1857.*"

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In conformity with Mr. Atherton's advice, Messrs. Thomas Bellamy and George Pownall were called in by the Committee, and, they having consented to act, instructions were given to them in the following letter from the Clerk to the Committee:—

"*Colney Hatch Asylum,*

"*10th January, 1857.*

"DEAR SIRS,

"I beg to acknowledge the receipt of your letter of the 8th instant, in which you express your willing-



ness to take upon yourselves the duties involved in the Survey and Report upon this Asylum, set forth in my communication of the previous day, and with reference thereto I am directed to request that you will have the goodness, after having made yourselves masters of the Plans and Specifications for the erection of the Asylum, to go there and examine fully the state of the building. You will please to report what defects, if any, of original design you may discover, such as ought not to be found in an Architect who is bound to bring to his task a reasonable amount of skill and experience; you will please also to distinguish, from these, the existing defects according to your judgment, and shew, if there be such, that these are connected with any deviation from the original Specification. You will then be enabled to give evidence on these points in a Court of Law, if necessary. Before you make this Report the Committee of Visitors will endeavour to put you in communication with Mr. Daukes, to give him an opportunity of offering any explanations which he may think necessary.

“Your attention is particularly requested to the points—Whether the concrete specified to be put under the principal walls, and the narrowing of the footings, are directly connected with any damage existing or likely to accrue in the building.

“I send herewith, for your perusal and consideration, the Contract with Mr. Daukes to prepare plans, &c., and to act as Architect, with an abstract and list of drawings to be furnished, the contract with Mr. Myers for the building, the 13 Plans referred



to in that Contract, a Report from Mr. Daukes made after the Asylum was certified by him to have been completed according to the contract, when it had been discovered that divers omissions and deviations from the contract had taken place,—and a copy of the specification, with Mr. Daukes's notes, referred to in that report.

“I am, &c ,

“JOHN S. SKAIFE, *Clerk.*

“*T. Bellamy Esq.*

“*George Pownall Esq.*”

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Messrs, Bellamy and Pownall requested permission, after having very carefully, and on more than one occasion, inspected the Building, to have a personal interview with Mr. Daukes previously to making their Report to the Committee, and they invited Mr. Daukes to meet them. The interview took place ; after which Messrs. Bellamy and Pownall made the following Report :—

“*To the Committee of Visitors of the County Lunatic Asylum at Colney Hatch.*

“MY LORD AND GENTLEMEN,—

“Following the instructions of your Clerk's letter of the 10th ult. to us, we have made a very careful Survey of the above-mentioned Building.

“Those instructions were that, having made ourselves masters of the Plans and Specifications for the



erection of the Asylum, we should go there and examine fully the state of the Building ; report what defects, if any, we might discover, such as ought not to be found in a building where the Architect is expected to bring to his task a reasonable amount of skill and experience ; distinguish from these the existing defects according to our judgment; and shew, if there be such, that those defects are connected with any deviations from the original Specification.

“ And, further, we are particularly requested to state whether the Concrete specified to be put under the principal walls, and the narrowing of the footings, are directly connected with any damage existing in, or likely to accrue to, the Building.

“ Our Survey extended over the whole of four days, throughout which Mr. Johns, the resident Clerk of the works, and his workmen, have attended us, and rendered all the assistance we required.

“ Since our Survey, we have had a lengthened interview with Mr. Daukes, the Architect, who, without reserve, afforded us explanation on those points on which we required further information. Mr. Daukes was accompanied in this interview by Mr. Shoppee, the Clerk of the Works.

“ Before entering upon our Survey of the Building itself, we compared, very carefully, the Drawings with the Specification, and between these we found a serious discrepancy in the important items of the Concrete and the Brick Footings for the foundations.



“For example—The Specification provides for a maximum width of 4 feet 2 for the Concrete, and the minimum width of 3 feet 9 for the superincumbent Walls of 1 foot 6 and 1 foot 2 thickness respectively, with a common depth of 4 feet, and for six courses of Footings to the said walls.

“Whilst the Drawings define the Concrete to be 3 feet  $4\frac{1}{2}$  and 3 feet in width only, and a common depth of 1 foot 9, with two courses of Footings in each case ; which provision appears to have been carried out in the execution of the work, so far as our examination, which was comprehensive in its character, enables us to speak.

“We were, therefore, met at the very outset of our examination of the Specification and Drawings by the question of, What was the intention of the Architect in respect of those important provisions ? and which of the two, widely different ones, was to be required of the Contractor in the execution of the work.

“Upon this point, we are informed by Mr. Daukes, in distinct terms, that the Contract Drawings represent his intentions, and not the Specification, and that the greater depths and widths of Concrete and of brick Footings described in the latter document were only intended to apply to the foundations of the heavy and more important parts of the Building, such as the central staircase and cupola, as he considered the smaller provision defined by the drawings to be fully sufficient to secure a firm base for the superincumbent weight of the other portions of the Building.



“On these points, however, we are compelled to express our entire dissent from Mr. Daukes's views, since, in our opinion, even the larger quantity of Concrete provided for in the Specification falls short of, rather than exceeds, that which should have been applied on the occasion of founding a building on a stratum of clay, varying in its character, with a rapid declination of natural surface transversely to the section of the building to be erected upon it. The presence of an equable amount of moisture throughout the year, whatever may be the extremes of atmospheric range, is essential in such a stratum to efficiency of foundation ; and, therefore, no depth less than that which is below and beyond external influence can be considered sufficient to guard against the motion which must ensue if a building be founded within the limits of that influence.

“Whether, under the special reference to us, the diminution of the specified Concrete and the narrowing of the Footings are directly connected with any damage existing in or likely to accrue to the building, are questions which will be best answered by a reference to the statement we have already made, *i.e.*, that an expanding and contracting stratum, being always more or less in a state of action, must operate prejudicially upon walls founded upon such a stratum whilst within the influence of atmospheric change, and we found therefore on our survey, as might be expected, many settlements in different parts of the building due to these causes, as well as to others which we shall presently notice, but they do not appear to us to be of a serious character, except in the



case of those in the Ward No. 26, and in the boiler house, in which latter case the fractures that have taken place are manifestly the result of the intense heat of the furnaces immediately adjacent, acting upon and exhausting the moisture of the clay stratum.

“The various settlements in the external walls are, however, not alone due to the defective foundation, but are partly the result of neglect in the distribution of the pressure of the main body of these walls, under the window openings, by means of inverted arches or other available modes for securing that object, and unquestionably have been partly caused by the rapidity with which the works appear to have been carried on. The fractures in the stone Sills of the windows are to be accounted for from the circumstance of their having been placed in position as the walls were carried up—a necessity of the design which required the intermediate piers of the windows to be set as the work proceeded.

“Beyond the disfigurement consequent upon such dislocations little importance attaches to these defects, for they, as well as the fractures in the walls, must have followed immediately on the completion of the building, and there can be little doubt that they are mainly referable to the causes before mentioned.

“We proceed now to remark on the state of the Roofs of the Galleries and Dormitories.

“Of these Roofs throughout we are compelled to



state that they are defectively designed, and carelessly executed.

“ Without entering into minute technical details, we would observe that the tie-beams in the majority of cases are allowed to bear on the intermediate walls to the straining and general derangement of the Roof surface, whilst the absence of proper tie connexions between the different parts, together with the obvious insufficiency of strength in the hip-rafters and ridges, have contributed to the general feebleness of the Roofs, and fully account for their present defective condition.

“ The substitution of Battening for the boarding provided in the Specification has not only deprived the Roofs of a very considerable portion of the stiffness which that under-covering would have given to them, but has involved a large amount of breakage of Slates, which no care on the part of those employed in replacing broken ones can avoid so long as the Slates are supported only partially by Battens.

“ Our opinion is, that, with the inconsiderable span of this building, a King Post Roof would have been preferable to the Queen Post principle, which has been employed over the whole of the Wards, in which opinion Mr. Daukes concurs ; but he states that the last-named form was adopted in order to allow of a continuous ventilating chamber being carried over the centre of each Ward, and that this arrangement was afterwards abandoned, and, on Mr. Price's suggestion, the ventilating chamber was formed immediately over



the sleeping-rooms instead of being placed in the situation originally designed for it.

“It remains for us now to speak of the Arches of the Galleries,—the Arches formed of moulded bricks.

“It has been most unfortunate that these Arches of construction have been substituted for the curved laminated Tile Ceiling of arched form provided in the Specification; for in the latter case the arched form being produced by three courses of plain tiles set in pure cement, and breaking joint both transversely and longitudinally, becomes a homogeneous body in which no property of the arch is to be found, and demands nothing of the walls but sufficient strength to bear its direct vertical weight. Whilst, in the former case, all the elements of an arch of construction are brought into action, and that in the worst possible form—the very polygonal shape of the bricks preventing any longitudinal bond. The expedient resorted to for restraining the thrust of these latter-mentioned arches is very unsatisfactory, and not calculated to give assurance of their permanent efficiency in those portions where, on one side, the external wall forms the only abutment.

“In regard to the alleged defective system of drainage, having neither reliable documents nor any facts before us we are unable to form an opinion on the subject.

“The suggestion of remedies for existing defects not being within the scope of the reference to us, we



do not make them; nor do we refer, either approvingly or otherwise, to those made by the gentlemen who have preceded us in their surveys and reports.

“ We are,

“ My Lord and Gentlemen,

“ Your very obedient Servants,

“ THOS. BELLAMY,

“ GEO. POWNALL.

“ *February 14th, 1857.*”

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The Committee, having received this Report, requested Messrs. Bellamy and Pownall, on the 17th of February, to afford them a more detailed opinion on the Walls, and as to the best remedy for any evil which might arise, or be likely to arise, therefrom; and also their opinion on the plan proposed by the Clerk of the Works (previously submitted to Mr. Cubitt) for remedying the insecure state of the Roofs. The following questions were also proposed to them:—

“ 1. Is there not great want of skill exhibited in the design and execution of the Roofs? and, if so, state in what particulars.

“ 2. With only 2 feet of Concrete, ought not inverted Arches to have been inserted under all the lower openings of Doors and Windows?

“ 3. Has not the material used in the construction of the Gallery Arches caused the failures, which would not have taken place had the materials described in the Specification been used?



“ 4. How do you account for the discrepancies between the Drawings and Specification, and is it not most unusual for them to differ when Surveyors are employed to take out quantities previously to the work being tendered for ?

“ 5. If the Contract had been carried out as regards Concrete and Footings, in conformity with the Specification, do you believe that any of the cracks which now appear in the walls would have been visible ?

“ 6. If ordinary skill had been shown in the construction of the Building, would the defects which now appear in the Sills of the Windows and in the Doorways have existed ? ”

Messrs. Bellamy and Pownall's Report and the above-mentioned proposed questions were submitted to Mr. Atherton, who, having had a personal interview with Messrs. Bellamy and Pownall, wrote the following opinion on the 26th of February :—

“ I have read and considered the above Report of Messrs. Bellamy and Pownall, and have also had the advantage of a full conference with those gentlemen on the subject matter of such Report. Their answers and explanations were so full, that I do not find it necessary to suggest any further questions to be put to them ; and I am able to express my opinion on the whole case.

“ These points only have called for consideration (1) the Concrete, (2) the Roof of the Building, and (3) the Arches of the Galleries. And



"1. The state and quantity of the Concrete have not caused any serious or substantial practical injury, nor can a confident opinion be expressed that they will do so. The Contract with Mr. Myers, undoubtedly, shows a discrepancy in Concrete between the language of the Specification and the Drawings; but it is stipulated that, in case of such discrepancy, the Contractor is to be directed in his operations by the Architect, and it is not to be doubted that the Architect's orders were, in this instance, obeyed. Thus Mr. Myers is exempt from any apparent blame; and a defect in design or plan only is attributable to Mr. Daukes. But, bearing still in mind the great probability, even in such matters as this, of differing opinions, and looking also to the fact of the absence of substantial damage clearly traceable to this arrangement as a cause, I am compelled to advise the Committee to dismiss the state of the Concrete entirely from their consideration, with reference to legal proceedings against either the Architect or the Contractor.

"2. The roof of the Building: Here serious defects, injurious in present operation and necessitating a considerable outlay to remedy them, have been discovered. Mr. Daukes has adopted in the Roofs what is called the Queen-Post principle; whereas the King-Post roof would, probably, have been better. But this I advise the Committee also to pass over, as a point on which opinion would not be accordant, and not involving the ill consequences that have ensued. These, it seems, were owing to bad workmanship, and the substitution of Battens



under the Slates for Boards; the contract specifying the use of Boards. I collect from Messrs. Bellamy and Pownall, that the deficiencies in this part of the Structure are patent, such as could not have escaped ordinary observation on the part of an Architect, and such as no Architect, in the exercise of ordinary professional skill, would have sanctioned: under these circumstances, there seems to be a reasonable ground of action against Mr. Daukes, for not seeing that the work was properly executed and the Contract adhered to, and for improperly certifying that the Contractor had fulfilled his bargain. The Contractor, also, is liable in respect of the same consequences, so far as they flow from non-observance of *his* Contract. This might complicate the question of the amount of damages recoverable in an action against Mr. Daukes; but if a clear case of breach of duty were to be established against him, and considerable resulting damage shown, the main consequences would, most probably, be visited on him. The lapse of time and other circumstances (of final settlement of accounts, &c.), would, however, call for proofs of more than common stringency.

“ 3. The Arches of the Galleries are described as being on a bad principle or design, and at variance in that respect with the Specification; and here also the consequent mischief is described as substantial, and calling for a not inconsiderable outlay. The Arches on the Ground Floor are on the same principle; but I pass them by, because Messrs. Bellamy and Pownall agree that no bulging of walls or other material injury is the consequence. The liability with



respect to the Gallery Arches stands on the same footing as that on which I have advised with reference to the Roofs, and my above remarks apply both as to the responsibility of the Architect and the Contractor. It appears to be not certain that the Committee, or acting Members of it, did not sanction, by word of mouth, this departure from the Contract in the Construction of the Arches. Mr. Daukes may be a competent witness in his own cause, and, if he were to make a statement to this effect, and the Committee should not be in a condition to contradict him, though he might fail to set up a technical defence, he would most likely enlist the sympathies of the Jury, and in that way defeat the claim of substantial damages.

“My attention has been called to a singular circumstance, namely, that Mr. Daukes makes ‘extras’ and ‘omissions’ *just* balance each other, so as to entitle the Contractor to exactly the round contract price; and I have been asked what remedy there is, assuming an inaccuracy in this respect, and a payment, consequently, beyond what was just, to the Contractor? I can only answer, that if Mr. Daukes keeps his own counsel, or does not furnish weapons against himself, the Committee are in no condition, at this time of day, to rip up the matter, as they must do, if at all, in a Court of Equity. But Mr. Daukes may reasonably be asked, if he has any objection to furnish the Committee with lists and amounts of the extras and omissions, as, unless he prepared such lists, it is difficult to understand how he arrived at the balance which he described. These, if furnished,



or the terms of Mr. Daukes's refusal, may possibly alter the case.

"Proceedings should not be commenced without full notice, both to the Architect and Contractor, of the defects relied on.

"WM. ATHERTON, *Temple*.

"26th February, 1857."

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On the 23rd of February (before this opinion of Mr. Atherton was received), Messrs. Bellamy and Pownall, having themselves altered the form of the proposed questions, answered them as follows:—

"Mr. Bellamy and Mr. Pownall suggest the following as an amended form of queries to be answered by them, having reference to their Report of the 14th February to the Committee of Visitors.

"1. Is there not great want of skill in the design of the Roofs.—  
There is great want of skill in the design of the Roofs.—  
Roofs over the Galleries and The execution of the work is  
bed-rooms, and is not the execution of the said Roofs unsatisfactory?  
most unsatisfactory.

"2. The quantity of Concrete provided for in the Specification having been greatly reduced, should not have been guarded against by care have been taken to dis-  
The effect of unequal weights upon an imperfect artificial foundation should not have been guarded against by some one of the many means



tribute the weight of the walls available under these and equably under solids and voids, similar circumstances.

so as to guard against rupture in the walls under the latter ?

“ 3. If arches formed in the manner provided in the Specification had been executed, would any disturbance of the walls by reason of the action of Arches upon these walls have taken place ?

No disturbance could have taken place had the provision of the Specification been adhered to in this respect. Whatever disturbance has taken place is due to the departure from the original provision in the Specification. (*See* the reason for this in our Report of 14th February, 1857).

“ 4. How are the discrepancies between the Specification and Drawings in respect of the Concrete and brick footings to be accounted for ?

We are altogether unable to answer this question.

“ 5. When would the discrepancies, referred to in the last question, first come under the notice of Builders competing for the Contract ?

These discrepancies would become questions with the Surveyors employed to take out the quantities from which Builders would form their Estimates, when the maximum, minimum or a medium quantity must be arrived at as a determinate quantity—so that all Builders may estimate from the same data.



“ 6. If the quantity of Concrete and the ample footings provided for in the Specification had been executed, would not the worst of the settlements which now disfigure the building have been avoided? Had the provisions of the Specification in these respects been availed of, no settlements such as these referred to would have taken place.”

With these amended questions and the answers, Messrs. Bellamy and Pownall presented to the Committee the following Report:—

*“ To the Committee of Visitors of the County Lunatic Asylum at Colney Hatch.*

“ MY LORD AND GENTLEMEN,

“ Mr. Skaife's Letter of the 17th instant informs us that the Committee are desirous of receiving a more detailed opinion from us, as to the effect of the arches of the galleries upon the walls, than that conveyed by our Report of the 14th instant to the Committee, and, also, as to the best remedy for any evil which might arise therefrom.

“ By the same letter we are requested to state our opinion on the modes of remedying the present insecure state of the roofs, as set forth in Mr. Lewis Cubitt's and Mr. Johns' Drawings and Reports transmitted therewith.

“ On these two points of reference, we have to state—



“ *First*—As to the arches of the galleries, that at the extreme ends of the said galleries, where the abutment on one side is that of the external wall only; the thickness and height of which are not sufficient counterpoise to the thrust exerted by the arch, which is of the feeblest construction, the risk of failure would be imminent but for the tie-bars which were applied simultaneously with the completion of the arches themselves.

“ The application, however, of these tie-bars is erroneous in principle, and not calculated to give assurance of ultimate security.

“ With respect to the best remedy for this state of things, we have given it our careful consideration, and have designed a mode of securing the arches at their feeblest points before referred to, a drawing of which we herewith submit to the Committee.

“ By adopting this expedient, for an expedient it must be termed, the whole of the arches would remain intact, and very serious expense would be avoided.

“ Referring to the roofs, the design of Mr. Cubitt is complete; but seeing that its adoption would involve the rejection of the whole of the timber of the existing roofs, and be nothing short of the re-roofing the whole of the wards, we assume that the Committee would desire that some less expensive mode should, if possible, be devised for the rectification of the errors in the original construction.

“ There is considerable merit in the plan B of Mr. Johns, but if his drawing represents his intentions



the whole of the roofs would have to be taken to pieces and reframed, and the principal rafters rejected for deficiency of length. Labour and material would, therefore, become large items in the carrying out of this plan.

“ Looking at the alteration of these roofs under the circumstances which call for that alteration, we consider that the Committee are not so desirous of obtaining roofs constructively perfect as they are to ensure permanent efficiency in connection with a sound economy ; we have, therefore, keeping these points in view, prepared a design, a drawing of which accompanies this Report, by which all the timbers of the roofs remain, and only such auxiliary timbers are applied as necessity demands.

“ The full description of the mode of treating these roofs will be found in the drawing.

“ The Committee will observe that in the consideration of the two subjects specially referred to us, *i. e.*, the arches and the roofs, we have kept the important element of expense constantly in view, an element of no inconsiderable value when the extent of the building is taken into account, and the effect of multiplication of even a small item of cost.

“ We are,

“ My Lord and Gentlemen,

“ Your very faithful servants,

“ THOMAS BELLAMY.

“ GEORGE POWNALL.

“ 23rd February, 1857.”



On the 25th of February Messrs. Bellamy and Pownall, having been requested to advise the Committee as to the best mode and probable expense of rectifying the defects, made the following report:—

*“ To the Committee of Visitors of the County Lunatic Asylum at Colney Hatch.*

“ MY LORD AND GENTLEMEN,

“ In compliance with the request of the Committee, as communicated to us by Mr. Skaife's Letter of the 25th ult., that we should report upon the most effectual and economical means of remedying the present defective foundations under No. 26 Ward and the Boiler House, stating at the same time whether, in our opinion, there are any other parts of the building which have come under our cognizance to which we have not referred in our Report of the 23rd ult., where any defects exist which ought to be repaired, and in such cases what effectual and economical remedy can be applied—accompanying our report by an approximate estimate of the cost of the proposed remedies in all cases:—

“ We beg to report, That, as regards Ward No. 26, we see no reason to apprehend an extension of the fractures; the rebuilding, therefore, of those portions of the walls affected would, in our opinion, render them secure.

“ But, as it is in the contemplation of the Magistrates to add a story to this Ward, we consider that Mr. Lewis Cubitt, who is charged with the works of



the enlargement of the Asylum, and consequently with forming this additional Story as part of that enlargement, is the proper person to advise the Committee as to what should be done under the combined circumstances of rectification of existing defects and the superadding the said Story.

“In the case of the Boiler House, rebuilding the walls ruptured by the extensive contraction of the clay stratum on which they are built will, to some extent, be necessary, underpinning the remaining portions of the said walls.

“The mode which we advise in this part of the Building is, to underpin to a depth beyond the influence of the intense heat caused by the furnaces of these boilers; but, as this depth can only be determined by future and more minute examination, we are quite unable to furnish any estimate of the cost—it cannot, however, be a very serious or important item as regards the expense.

“We are not aware that there are any other parts of the building which exhibit defects requiring reparation; in stating this, it will, of course, be understood that we mean structural defects involving insecurity of the fabric.

“We have been favoured with a lengthened interview with Mr. George Baker, one of your Committee, who had been requested to confer with us on the subject of the remedies for rectifying, as far as possible, the defects in the Roofs and arched ceilings over



the wards ; and the result of this conference, and the suggestions he was good enough to make, are embodied in the two drawings marked A and B, which we now submit. We, however, after a most attentive consideration of all the circumstances of the case, which present unusual difficulties in executing the works, adhere to the recommendations contained in our Report of the 23rd ult., both as regards the amendment of the roofs and the security of the Arches, believing that those recommendations, carefully carried out, though they may not make the building perfect, will yet effect the object of making it substantially secure.

“In regard to the objection urged against the tie bars suggested by us to secure the Arches of the Galleries, we have to observe that we think the objection, both as regards the safety of the patients and the interruption to the ventilation, is in a great measure, if not entirely, overcome by our proposal to fill up the space between the bar and the arch with wire trellis of so close a mesh that, while it would admit a free current of air, would yet prevent anything else from being passed through it. Moreover, it will be remembered that these bars will be few in number, probably two only in each ward, and that they will be applied only in the upper galleries and towards the extreme ends of those galleries.

“ We have stated the estimated cost of the several remedial works to be executed, both on our original suggestions and those resulting from our interview with Mr. Baker, in an appendix attached to this Report ; but,



after careful consideration, and with every desire to be explicit on the subject of expense, on which point the Committee must naturally feel so much anxiety, we are compelled to state that the several sums mentioned are approximate only, and that the circumstances of the case, and the mode in which the works of reparation must of necessity be executed, render accuracy, or anything approaching to it, quite impossible.

“In the event of the Committee approving of the designs now submitted and determining upon carrying them into execution, the question as to the best mode of executing the works will be the next to arise, and here the same peculiarity of circumstances should determine the course to be taken.

“The undefinable extent of the works to be done, and the convenient times for doing those works, render it next to impracticable to invite tenders from builders in gross sums. We, therefore, advise that, seeing the Magistrates have in Mr. Johns an intelligent and active officer, the works be carried out under his immediate direction, subject to proper professional supervision, and that Tenders be invited for the materials only. A limited number of skilled Carpenters and other Workmen would be sufficient, and their operations could be directed to those portions of the building from time to time as the convenience of the establishment, so well known to Mr. Johns, might require.

“This working of section by section might, if



thought desirable, be made to distribute the outlay over a longer period than if the works were to be executed at once as a whole—which would, indeed, be almost impracticable, having reference to the fact that the Asylum is fully occupied by Patients.

“ Understanding that the Committee desire our opinion upon the subjects of underpinning and drainage of the Foundations generally, we beg to state that, in our judgment, underpinning is unnecessary, and that, in regard to drainage, to deprive the clay stratum on which the Building is founded of the moisture with which it is now charged, would, in our opinion, bring about very serious results—results analogous to that of the Boiler House, where artificial heat acting upon an earth largely charged with water has abstracted that water, diminished the bulk of the clay, and led to motion in the walls founded upon it, which has produced extensive and serious subsidence and fracture.

“ We are, &c.,

“ THOS. BELLAMY,

“ GEO. POWNALL.

“ 9th March, 1857.”

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*Appendix referred to in the foregoing Report.*

“ Roofs over Wards—	£	s.	d.
“ Stripping the slating and battening, strengthening Trusses with additional purlines, &c., new Boarding, and relaying Slating.....	5,000	0	0



“ If the Trusses are further strengthened by Fitches, as suggested by Mr. Baker, as shown in Drawing A, the cost would be.....	5,800	0	0
“ <i>To secure the arches over Galleries—</i>			
“ By Tie Bars, as suggested in our Report of the 23rd ult.....	600	0	0
“ By Cast Iron Ribs above the Arches, as suggested by Mr. Baker, and shown in Drawing B .....	900	0	0

Mr. Cubitt was also requested to make a Report of the like nature, which was as follows :—

“ MY LORD AND GENTLEMEN,

“ Agreeably to the instructions of the Committee requesting me to consider and state the remedies I propose to apply to the defects in the Asylum generally, I beg leave to report that my attention has to to the present time been directed—

“ To the improvement of the drainage,

“ The further security required for the foundations,

“ The remodelling in part, and securing in other parts, the arching forming the ceilings of the several galleries, &c.,

“ The entire re-roofing of the several buildings.

“ These works extend to all the blocks of wards, Infirmary Building, and Visitors' Room Building, both on the male and female side, but they do not apply to the centre mass of buildings comprising the



Chapel, Exercising Hall, and buildings adjoining, which do not exhibit the same defects as the wards.

“The two drawings herewith forwarded are intended to assist in showing the improvements proposed.

“That marked A is a section of a block of wards in its present state, showing the insufficient foundations, gallery, arches, and roofs.

“That marked B is a section of the same block, showing the remedies proposed for the said defects.

“I may observe that a perfect system of drainage is the preliminary and indispensable step towards these remedies; but as the situation, extent, and description of the existing drains is at present but partially known, it is not yet possible to determine where to alter, improve and extend. I therefore beg to recommend that your Clerk of Works be directed to continue his search, and put me in possession of the results, so that I may, at an early period, be able to submit a plan for your consideration.

“*As to the Foundations*—I propose as a remedy for their present inefficiency, to give greater solidity and depth, by shoring up, excavating, and underpinning the several external walls with Concrete and Brick-work, as shown in the Drawing.

“*As to the Gallery Arches*—I propose to strengthen those over the One Pair Stories only, by introducing cast-iron tie-bearers inserted into stone templates, to be cut and pinned into the walls to prevent them from spreading, the said ties having a broad flange on the



upper edge, as a bearing surface, to give steadiness to the Arch, as shown on Drawing.

“ The arches over the upper galleries being the worst in condition, and in the least secure state, I propose to remove them altogether, and to restore the fireproof character of the galleries by constructing a series of brick arches turned on iron girders laid transversely.

“ These girders would further have the effect of ties to the upper or weakest part of the walls.

“ *As to the Roofs*; I propose as the best, and at the same time the *cheapest* remedy to remove them altogether, and to substitute for them sound kingpost roofs, substantially boarded and slated, and with iron gutter at the eaves, to take off the water, in lieu of the present Bath stone gutter—removing and rebuilding in cement so much of the brickwork as may be needed, and introducing solid stone templates to receive the ends of the new timber trusses—all as shown on drawing.

“ Referring to the two blocks of wards marked F on plan, and on which I am directed to report specially. I have examined them, and am of opinion that a bed of Concrete four feet deep should be laid under their whole area and foundations, and that then, if the brickwork be underpinned, and the gallery arches tied and secured as before described—the present walls will be found sufficiently strong to receive the intended new story.

“ At the point, however, where an extra depth has



been sunk for the warming apparatus, some Concrete and Brickwork will be required beyond that intended for the general foundation.

“The probable cost of carrying into effect the before described works, is as follows :—

	Male Side.	Female Side.	Blocks F.F. to be raised.	Total.
The Foundations . . . . .	£3,150	£3,350	£1,610	£8,110
The Gallery Arches, &c. . .	2,902	3,021	357	6,280
The New Roofs . . . . .	5,877	6,268	—	12,145
Total for Male Side . . . . £	11,929			
Total for Female Side . . . . . £		12,639		
Total for Blocks F.F. . . . . £			1,967	
Grand Total . . . . . £				26,535

“These amounts do not include any underpinning to the internal walls of the buildings, nor the question of improved drainage, and must be considered approximative only, as the nature of the works to be done, and the peculiar circumstances under which they will have to be executed, render it impossible to estimate them with any degree of accuracy. Should it be found necessary in any way to increase the foundations of the internal walls, of course the cost will be materially increased.

“I remain,

“My Lord and Gentlemen,

“Your obedient humble servant,

“LEWIS CUBITT.”

“52, Bedford Square,

25th February, 1857.”



Following the advice given by Mr. Atherton in his opinion of the 26th of February, application was made to Mr. Daukes for a Dr. and Cr. Account, showing how the extras and omissions exactly balanced. On receipt of this application, Mr. Daukes referred the Committee to his Solicitors, between whom and Mr. Allen several communications on the subject took place, which resulted in Mr. Daukes' Solicitors declining to furnish the account. In conformity also with Mr. Atherton's opinion, special notice was given both to Mr. Daukes' Solicitors and to Mr. Myers, the Builder, of the defects which were intended to be relied on in the contemplated action.

Messrs. Bellamy and Pownall's Reports of 23rd February and 9th March were submitted to Mr. Atherton, with a request that he would advise the Committee—

“ 1st. Whether he recommends that an action for damages should be brought against Mr. Daukes; and if so, categorically on what points? and

“ 2ndly. Whether, in case he is of opinion that an action should be brought, it is advisable that the repairs which are necessary to be done to the asylum should be delayed until the termination of proceedings; or, whether such Repairs may be proceeded with, notwithstanding the commencement of proceedings?

Mr. Atherton's opinion was as follows:—

1. “ I can only repeat, in answer to this question, the advice which I gave in my opinion of the 26th



February last, namely, that in respect of the bad workmanship, and the substitution of Battens under the Slates for Boards in the Roof of the Building, and also in respect to the Gallery Arches on the Upper Floor, there is, in my opinion, a good ground of action against Mr. Daukes. If such action is commenced, other breaches of Contract may be inserted ; if, upon final consideration, such a course should be deemed expedient.

2. "The repairs may, and ought to be, proceeded with, without waiting for the termination of proceedings.

"W. ATHERTON,

"*Liverpool Assizes.*

"6th April, 1857."

In the course of these communications, Mr. Daukes' solicitors applied, on the 2nd of May, to Messrs. Allen for a copy of the Report of Messrs. Bellamy and Pownall, which they said they understood was about being made to the Justices ; but, under the advice of Mr. Atherton, their application was not complied with, although they were informed in general terms of the defects relied on.

Proceedings were accordingly instituted in May, 1857, the intention then being that the trial should take place in the ensuing Michaelmas Term ; and the services of Sir F. Thesiger were secured to conduct the cause. In the month of November, Messrs. Bellamy and Pownall were applied to by the Solicitors of the Committee to prepare a statement of their own evidence, as is usual in cases where scientific persons are called on to give evidence. Before they complied with



this request, and, within a very short time before the Committee expected the issue to be tried, they were not a little surprised by receiving from Messrs. Bellamy and Pownall the following Letter:—

“ *To J. S. Skiffe, Esq.*

“ *37, Bloomsbury Square,*

“ *November 20th, 1857.*

“ SIR,

“ We are informed by Mr. Allen that the action commenced against Mr. Daukes before we were called in to advise as to the state of the Colney Hatch Asylum, is now being proceeded with, and will probably be tried in the course of the ensuingittings, and that we shall be required to give evidence on the part of the Plaintiff.

“ Upon the propriety of continuing this action under the altered position in which our Reports have placed the Committee, we have not hitherto offered any opinion, feeling that it was a matter very much for their discretion, and that their course would be determined by the extent to which we might confirm or correct the very unfavourable opinions that had been previously expressed of the state of the Building, and the works required.

“ We feel it, however, now our duty to state, in justice alike to the Committee, to Mr. Daukes and to ourselves, the strong impression we entertain that, after the decided opinions we have expressed as to the safety of the Building and the comparatively

\* N.B. The action was not commenced until after Messrs. Bellamy and Pownall had made their three Reports set out above.



unimportant character and cost of the works we think necessary to rectify the existing defects, it is not a case which calls for further proceedings against the Architect.

“It will be in the recollection of the Committee that, when we were first consulted by them on the subject, they had been advised that it was urgently necessary to deepen and underpin the foundations of all the principal Walls; to take down the whole of the present Arches to the Galleries and Corridors, and put other Fire-proof construction; to take off the present, and put on entirely new Roofs to the several Wards; and to take up the present and form a new system of Drainage throughout.

“These works, if executed under the most favorable circumstances, must have involved the County in an enormous outlay; but this outlay would have been greatly increased from the fact of the Asylum being full of Patients, and the establishment must necessarily have been put to the utmost inconvenience during the whole time the works were going on.

“Had the result of our Survey been to confirm the alleged necessity for the whole, or even the greater portion, of such extensive works and costly outlay on a Building so recently erected, no amount of censure or blame would have been too great with which to visit the Architect.

“The contrary, however, is the case, and both from our Reports and the explanation we had the oppor-



tunity to offer to the Committee in our conferences with them, it was apparent that, although we stated distinctly that we disapproved in some respects of Mr. Daukes' mode of construction, we yet feel that a great deal of undue alarm had been excited as to the state of the Building, and that there was really no necessity for the great bulk of the works which the Committee, when they commenced the action, thought they should be called upon to perform, and that all, indeed, that we thought desirable was, that a few tie rods should be introduced in the Upper Galleries, where the abutments of the Arches were incomplete, and that the present Roofs should be strengthened and boarded, instead of being battened, as convenient opportunity might be offered.

“ This, then, is the altered position in which the Committee find themselves—viz., that instead of having to execute very large works, extending over every part of the Building, at a great cost to the County and to the serious inconvenience of the Establishment, they are, if they act upon our Report, only called upon to execute certain repairs to the Roofs and upper Galleries, comparatively trifling in amount, which can be carried on at intervals, and without any inconvenience either to the Officers or Patients in the Asylum.

“ It appears to us that this different state of things as regards the Building, and the consequent position of the Committee, would also vary the course proper to be pursued in regard to the Architect, and that while a prosecution (for the action against Mr. Daukes



amounts to that) might not only be justifiable, but proper, in the one case, it is wholly uncalled for in the other. At all events, we feel it our duty to state, now that we understand the action is proceeding, that we can take no part in it with satisfaction to ourselves, and although we shall not shrink from expressing our opinions where we think Mr. Daukes is wrong, if we are called upon to do so, we shall feel bound in common justice also to state our entire dissent from the views expressed in the published Reports as to the state of the Building and the works required to be done.

“It will, we are assured, not be without weight in the minds of the Committee in determining this question, that as to very considerable and most difficult and important portions of this great work (for it is a great work) there is not the slightest impeachment on the Architect’s skill and attention, and that the points on which his skill and attention were impeached have been reduced by us to a very trifling amount, and that this fact must, of necessity, be stated by us, should the pending inquiry take place.

“We are, Sir,

“Your obedient Servants,

“THOMAS BELLAMY,

“GEORGE POWNALL.”

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No time was lost in submitting this communication to Mr. Atherton, who advised as follows:—

“The very singular conduct of the two Architects,



Messrs. Bellamy and Pownall, on the strength of whose written Reports and verbal representations the action was brought, interposes very great difficulties in the Plaintiff's way; these are so great, and involve the necessity of so exact a reconsideration of numerous details, that I cannot advise the Committee of Visiting Justices to proceed to trial at the approaching Middlesex Sittings. I, therefore, recommend that the notice of trial be at once countermanded. This will give the Committee an opportunity of deliberately considering their position, embarrassed as it is; whereas I am clearly of opinion that to precipitate a trial at present would go very far to insure defeat.

“Before I finally advise on the case and evidence, I should be furnished with a full statement of everything that has passed, in writing or verbally, between the two Architects in question and the Committee or their advisers since the dates of their Report, and of the interview with the Solicitors and Counsel of the Committee in February last.

“WILLIAM ATHERTON,

“*Temple.*

“23rd Nov., 1857.”

In conformity with this advice, the trial was countermanded. A few days afterwards Messrs. Bellamy and Pownall sent in the following statement as their intended evidence:—

“MR. BELLAMY AND MR. POWNALL

“Will prove that on their Survey of the Roofs of the



several Buildings at the Asylum they found, as to the roofs of the Wards and some of the Offices, that in the disposition of the Trusses and other main Timbers there was an absence of proper arrangement; that some of the scantlings were too slight, and that they had been carelessly put together. The results are, that the Trusses are strained and distorted. The Tie Beams are in some instances fractured, and in others are sunk. The ridges are distorted and uneven, some of the hips are hollow, and the surfaces of many of the Roofs are very uneven. The necessary consequence of these defects is, that a great amount of breakage of Slates has taken place, which has been further increased by the substitution of Battens in place of the Boarding, with which the roofs were to have been covered. The omission of this Boarding has also unquestionably deprived the roofs of a very considerable portion of the stiffness which that under covering would have given to them.

“ As regards the more difficult and important Roofs—viz., those over the Chapel, Dining Hall, and Centre Building; they are well designed and carefully executed; and, as far as we could observe, there are no defects to the roofs of the Residences.

“ As regards the arched Ceilings, formed of moulded Bricks, we consider, that the curved laminated Tile Ceilings to the Wards originally contemplated were, as a matter of construction, preferable, because they exerted no lateral thrust on the Walls, as these Arches do; but we are of opinion there is no danger from the use of these Bricks where the abutment is suffi-



cient, and that in the few places where it is not so, in the Upper Wards, the introduction of some additional iron tie rods is all that is necessary.

“ Counsel will, of course, be informed that we consider very undue alarm has been excited as to the state of the Building generally, and that the extensive and costly works which, prior to our being called in, had been supposed to be urgently requisite, are, in our opinion, in a very great measure unnecessary. In particular, 1st—That the settlements are, with two exceptions, unimportant, and that the underpinning of the main walls is not required. 2ndly.—That it is not necessary to take down the Ceilings of arched Bricks (stated to be 8 miles in length) and substitute others. 3rdly.—That it is not necessary to lay down a new system of drainage throughout, and that the construction of the large intercepting drain, as suggested, would, in our opinion, be very unadvisable ; and 4thly.—That it was not necessary to take off and reconstruct the Roofs as has been done, though, having reference to the character and importance of the Building, it was desirable to do so.

“ THOS. BELLAMY,

8, Charlotte Street, Bedford Square.

“ GEO. POWNALL,

37, Bloomsbury Square.

“ *November 30th, 1857.*”

The statement required by Mr. Atherton having been prepared and submitted to him, he gave the following advice :—



“The Committee of Visitors of the Colney Hatch Lunatic Asylum have been placed in a position of great difficulty and embarrassment, with reference to this action, by the course which has been adopted by their selected Architects, Messrs. Bellamy and Pownall. These are the gentlemen chosen by the Committee, in consequence of the advice of Counsel that ‘a report, or reports *on which they can implicitly rely,*’ should be obtained in the first instance. It was also upon the written Reports and verbal statements of these gentlemen, that ‘serious defects’ and ‘substantial mischief,’ necessitating ‘a considerable outlay’ had been discovered, and that such defects and mischief clearly betokened the ‘absence of the exercise of reasonable and ordinary skill as an Architect,’ on the part of Mr. Daukes, that the Committee were advised that, to this extent, there was ‘a reasonable ground of action against Mr. Daukes,’ &c. &c. It was also owing to the implicit reliance which it was assumed might be placed on Messrs. Bellamy and Pownall, that the Committee was advised to limit their proceedings to defects in the ‘Roof’ and ‘Arches of the Ceilings’ only.

Vide opinion of 5th January, 1857.

Vide opinion of 26th February, 1857, and Messrs. Bellamy and Pownall's Reports of 14th and 23rd February, 1857, and their answers to queries of 23rd February 1857.

“Anything more at variance with the above Reports and statements than the letter of these Gentlemen to the Plaintiff, of the 20th November last, it is difficult to conceive. They now state, in effect, that the Building is safe, that the cost and character of the required works are unimportant, that they can ‘take no part in support of the plaintiff's case with satisfaction to themselves,’ that the points on which the Defendant's skill and attention can be

Vide Messrs. Bellamy and Pownall's Letter to Mr. Skaife of 20th November, 1857.



impeached are reduced to a very trifling amount, and, finally, that the case is not one 'which calls for further proceedings against the Architect,' it being plain that, if further proceedings against the Architect are not now called for, no proceedings ought originally to have been instituted. Both Mr. Bellamy and Mr. Pownall, it will be observed also, waver in their opinion as to the propriety of inserting 'Boarding' in lieu of 'Battens.'

"The result is that the '*implicit reliance*' which the Committee thought they might repose in these Gentlemen cannot be placed; and, indeed, the statements which they now make are such as, if made in February last, would have led to the Committee's being dissuaded from taking proceedings, instead of their being advised that they had reasonable grounds for commencing such proceedings.

"Under these very peculiar circumstances, the future course of the Committee will, probably, be determined by a reference to other testimony than that upon which, at the outset, it was intended that the main reliance should be placed; and I, therefore, advise that other Gentlemen, of undoubted skill and character, should be called in, to join with those who have already examined the work, in stating their views upon the material questions upon which the Jury, in the event of a trial, will have to decide. This becomes the more important, inasmuch as the Committee are threatened with evidence exculpatory of the Defendant, by such eminent persons as Mr. Tite, and the others who have written to the Com-



mittee stating what they are prepared to prove. The evidence to be adduced on the part of the Plaintiff should be so strong and clear as completely to overbear the effect of any professional evidence (and such must be expected, in a matter more or less involving *opinion*) the other way. The Gentlemen who have already examined the Buildings, &c., and who should attend as witnesses, are Messrs. Harris, Cubitt, Trimen, Johns, and Messrs. Bellamy and Pownall. As it is known that the latter have examined and reported, it may be difficult to dispense with them at the trial, and their proofs, as well as the others, should be taken in detail, and not in the form of mere general expression of opinion. Perhaps, when their attention is called to the Reports and representations they have made and to the matters to which the Plaintiff will confine himself, their evidence may not be so unsatisfactory as they themselves would represent it to be. Although at first I advised the Committee to leave out of question Mr. Daukes' defaults, with reference to the 'Concrete,' I think that, in the altered state of the case, they will do well to include such defaults in their list of complaints; especially if the evidence, when fully taken, shall clearly establish not only departures from the Contract in this respect, but also the want of ordinary skill, and material damage resulting. I, therefore, advise the attention of the intended witnesses to be called, and confined to the following matters, namely—

“ 1st. The depths of the Foundations and Quantity and disposition of the Contract.

“ 2nd. The Roofs of the Building.



“ 3rd. The arched Ceilings of the Galleries.

“ All these must be carefully examined by the professional Gentlemen who are to be called as witnesses for the Plaintiff. They must be examined and considered, moreover, 1st, with reference to, and in connexion with, the Contract of Mr. Myers, and the Specification ; and 2nd, with reference to the plan, or design, according to which they have been executed in point of fact. The reference to the Contract will be for the purpose of ascertaining whether the work (as executed) in plan and design, as well as in workmanship and material, is in conformity with, or in violation of, the Contract. The consideration of the plan or design on which these works have been actually carried out must have for its object to determine whether such plan or design (be it, or be it not, according to Mr. Myers' Contract) is a plan or design such as an Architect, in the exercise of ordinary intelligence and skill, might adopt ; or, on the contrary, such as no Architect of ordinary intelligence and skill could honestly sanction ? If the design carried out is that of the plan and specification attached to Myers' Contract, and is so defective, then the Defendant broke his agreement with regard to such original design ; and, if the vicious design carried out is a substituted plan, a breach of duty would be shown in the Defendant sanctioning and recommending it to the Committee ; even if he could prove that thereby he obtained an ' express order ' of the Committee for the change. Any significant defects discovered in the materials used, or in the execution or workmanship, (as matters apart from, and independent of, plan or



design) must be pointed out in detail, and particular attention called to those which an Architect, using ordinary and reasonable vigilance, must have detected ; and of which, therefore, the Defendant either was or ought to have been aware.

“The injurious consequences, *or damage*, forms an important part of the case, and much difficulty is thrown in the plaintiff's way by the conflicting views entertained by the various professional Gentlemen who have been consulted by the Committee, as to the reasonable, and (therefore proper) means to be resorted to by the Committee to repair, or prevent, the mischief traceable to, or to be apprehended from, the defendant's neglect of duty. As the Committee had fixed upon Messrs. Bellamy and Pownall as persons on whom they could ‘implicitly rely,’ it might have been as well if the remedial measures recommended by those gentlemen had been adopted : but this, I collect, has not been the case, and the Committee appear to have preferred renovation, and to make a thorough good job of it, ‘to the expedients’ suggested by Messrs. Bellamy and Pownall. To this part of the case also (including examination and consideration of the new works actually executed) the attention of the witnesses must be called, and each gentleman must state, in detail, his opinion of what it had become prudent to do under the circumstances (together with the actual or probable expense) in order to remedy the defects pointed out. Actual mischief (as cracks, subsidence, bulgings, &c.) should be carefully noted, and, beyond those, evidence may be given of general inferiority, with or without prospective or contingent



actual mischief, as pointed out with reference to the concrete in Messrs. Bellamy and Pownall's report of 14th February, 1857, last paragraph.

“ In addition to the defects in the Building, a material discrepancy appears between the Drawings and Specifications as to the quantities of Concrete to be employed—(*vide* Messrs. Bellamy and Pownall's Report of 14th February, 1857). It is not stated whether such discrepancy in itself implies the clear absence of ordinary skill and diligence on the part of the Architect (the Defendant) by whom those two documents were to be arranged. If it does, the evidence may as well apply itself to that matter also, and it would be necessary to apply to amend the particulars of Breaches, by the addition of a few words pointing out the defect. The Declaration alleging a breach of duty generally with reference to ‘Plans, Drawings, and Specifications,’ would, I think, extend to it.

“ Although proof of the alleged ‘leave’ by the Committee to Defendant to violate his Contract lies on him, the Plaintiff should be prepared with all available evidence to negative such leave; proof should, therefore, be at hand of the method of transacting the business which the Committee from time to time adopted; of their acting by Resolutions entered in a book kept for the purpose; and the book itself should be in Court. The Clerk or Clerks of the Works, engaged for the Committee during the execution of the works in question, should also attend the trial, to negative any leave communicated through



him, and Gentlemen who were members of the Committee during that period should be present for the like purpose. All witnesses must bring with them all original contemporaneous and other documents, by which their recollection can be either refreshed or confirmed.

“A part of the Breaches assigned, namely, that relating to allowed deviations from Myers' Contract, can only be justified, in point of law, under an ‘express order of the Committee,’ (Roe v. Harrison, 2 T.R. 425, West v. Blakeway, 2 M. and Gr. 729,) and to make the plea, to this extent, a good plea therefore, the ‘license’ set up must be taken to be license by *express order*. Unless it means this, and shall be so held on the trial, the Plaintiff, if defeated, should move for judgment *non obstante veredicto*, so far, at least, as these deviations are concerned; I am not sure whether it would not have been as well at the outset to demur to this plea for these reasons, as well as to put it in issue.

“As some question may be made as to what the duty of an Architect and Surveyor is, where the Contract is not precise, the professional witnesses should be examined, and their evidence given, on that point. Their attention may be confined to the particulars in which complaint is made, and the questions to put to them will be as to such matters, as not being in violation of express and specific stipulations, are charged as breach of general professional duty, are they matters ordinarily and notoriously looked to, and controlled by, the Architect and Surveyor? The



matters coming under this head will be, principally, the goodness, or the reverse, of the plans or designs, whether forming part of the original arrangement or being allowed deviations.

“The Defendant having alleged, in his report of the 11th June, 1851, that omission, &c., are more than balanced by additional extras (no charge for extras being made, but adjustment *pro* and *con* being arrived at), the Building, &c., should, if practicable, be examined in this point of view. It appears to me, however, that adding on at one point, without ‘express order,’ will not even go in diminution of the damage resulting from omitting, without such order, at another; and should the Defendant be allowed, under the head of quantum of damage, to go into that question, he would, of necessity, open the whole matter of account, which his Attornies have expressly refused to disclose.

“WILLIAM ATHERTON,

“23rd Jan., 1858.”

“Temple.

The Committee, as advised by Mr. Atherton, took immediate steps to obtain further professional advice, and of such a character as, they believed, would be most trustworthy, and carry the greatest weight if legal proceedings should still be recommended. Here, however, they met with considerable difficulties. To several applications direct refusals were given; in one instance the architect applied to had been already invited to inspect the building on Mr. Daukes’s behalf, and, in another, the gentleman applied to was precluded from acting by his official appointment. Ultimately, however, Mr. Hosking, an Architect and Civil Engineer and Pro-



fessor of engineering and architectural construction, at King's College, London, and Mr. George Edmund Street, the distinguished Architect of the Diocese of Oxford, accepted the invitation of the Committee to report upon the Building. Their Reports are herewith submitted.

The following Letter accompanied Professor Hosking's first Report:—

*“Chambers, 31, Parliament Street,  
10th May, 1858.*

*“Colney Hatch Asylum.*

“DEAR SIR,

“I beg to transmit herewith a Report, &c., of the results of my examination and consideration of the matters to which, by the memorandum inclosed with your letter of the 15th of March of this year, my attention was especially called—that is to say, to the *Foundations*—their depth, and the quantity and disposition of the Concrete—the *Roofs of the Buildings*, and the *arched Ceiling of the Galleries*.

“The heading of the memorandum to which I refer, and which indeed forms my instructions, intimates that my attention ‘is to be confined’ to the matters under those heads, but I have found it impossible so to confine myself with any degree of rigidness, nor have I, on the other hand, been able to include many considerations which the body of the same memorandum seems to intimate that it was desired I should embrace with the recited matters, notwithstanding the limitation of the heading. I am quite conscious, therefore, that this Report does not deal with several



important points upon which observations might have been expected; whilst I believe that the fuller treatment which I have given to the special matters will be found to anticipate in some degree what may be said of the rest.

“I have made allusion in the accompanying Report to the fact, that there is, upon some of the Drawings, a scale which has no relation to the ruling scale, and indeed none to the standard foot according to any of its usual divisions, but which, by being upon drawings, purports to be that at which such drawings are made, whilst it is not so. I have not thought it proper to make any more than a mere allusion to the circumstance in the Report herewith, but it is certainly a matter to be inquired into, and I shall be prepared to point out the fact to which I allude, and its probable bearing upon, and relation to some part at least of the case now under consideration, if it be desired.

“I shall now proceed, in conformity with the instructions contained in the memorandum first above referred to, with the consideration of the consequences of the derangements which have taken place, and of those which have to be provided against, and also of what it may be become prudent under the circumstances to do in the way of reinstatement and amendment.

“I am, dear Sir,

“Faithfully your’s

“WILLIAM HOSKING.

“C. P. Allen, Esq.”



Professor Hosking's First Report.

“COLNEY HATCH ASYLUM.

“ Report upon the case contained in the Memorandum communicated to me by Mr. C. P. Allen on the 15th March, 1858, and in the documents before me—such documents being an agreement dated the 12th day of April, 1848, between Mr. S. W. Daukes and the Committee of Justices of the Peace for the County of Middlesex, for providing an additional Asylum for Pauper Lunatics for the same County;—the Agreement dated 10th January, 1849, between Mr. George Myers and the same Committee, and the Specifications, general and particular, of the Works,—together with certain Drawings purporting to exhibit them; annexed, or referred to, in such latter Agreement, and forming together a Building Contract between Mr. Myers and the Committee;—and also a copy of a Report to the Committee signed ‘S. W. Daukes,’ and endorsed 11th June, 1851.

“ WILLIAM HOSKING, *Architect and C. E.*

“ 10th May, 1858.

“ *Chambers, 31, Parliament Street,*

“ *Westminster.*”

“ By the Memorandum first above referred to, my attention is called, and to be confined to the following matters, namely—

“ 1stly. The depths of the Foundations, and quantity and disposition of the Concrete.

“ 2ndly. The Roofs of the Buildings.

“ 3rdly. The arched Ceilings of the Galleries.



“It is desired that ‘all these should be carefully examined and considered; that they should be examined (1stly) with reference to, and in connexion with Mr. Myers’s Contract and the Specification; and (2ndly) with reference to the plan or design according to which they have been executed in point of fact.’ The reference to the Contract will be, I am advised, ‘for the purpose of ascertaining whether the work (as executed), in plan and design, is in conformity with, or in violation of the Contract.’ The consideration of the plan or design on which these works have been actually carried out must, I am instructed, ‘have for its object, to determine whether such plan or design (be it or be it not according to Mr. Myers’s Contract) is a plan or design such as an Architect in the exercise of ordinary intelligence and skill might adopt, or, on the contrary, such as no Architect of ordinary intelligence and skill could honestly sanction.’ It is next intimated ‘that any significant defects discovered in the materials used or in the execution or workmanship (as matter apart from plan or design) should be pointed out in detail; and particular attention paid to those which an Architect using ordinary and reasonable vigilance must have detected, and of which Mr. Daukes either was, or ought to have been, aware.’

“I pause at this point, at which inquiry into the *matters and things done* in connection with the erection of the Building or Buildings seems to cease, and from which the inquiry sought is to be directed to *consequences*, and to the consideration of any injury arising therefrom.



“I shall not be able to follow the course above set out as closely as appears to be wished, without too often separating effects from what appears to me to be their causes, but I will keep as nearly as I can within the prescribed limits.

“Upon a perusal of the Articles of Agreement with Mr. Myers for erecting the Buildings, and a collation of the several documents which go with the Agreement to form the Contract to that effect, and which documents purport to make the work to be done plain and certain, I could find neither plainness nor certainty. The Specification sets forth a something to be done, and refers to the drawings for illustration,—the drawings exhibit something else, or give no illustration of the matter at all; whilst dimensions written upon the drawings differ from those obtained by scale, and scales upon certain of the drawings differ from the scales at which upon investigation it becomes certain that the drawings had been made. The Agreement appears to provide, to some extent at least, for the determination of differences between the provisions of the Specification, the showing of the drawings, and the more precise expression of figures written upon the drawings; but it affords no means of resolving difficulties arising from discrepancies between dimensions yielded by different scales upon drawings drawn to the same scale, and to which one scale only, therefore, can make a true return. To this matter it will become necessary to revert; for the present it may be enough to advert to the great difficulty that presents itself in any endeavour to try the work, as it presents itself in execu-



tion, by documents which are themselves largely discrepant.

“ I am in the first place to examine ‘ THE DEPTHS OF THE FOUNDATIONS, AND THE QUANTITY AND DISPOSITION OF THE CONCRETE,’ and ‘ to consider’ these matters ‘ with reference to and in connection with, the contract of Mr. Myers’ and the Specification.’

“ I understand the expression, ‘ the depths of the foundations,’ to intend the depth, or thickness vertically of the Concrete placed to form the foundations of the several walls.

“ The specification states in the general description of materials and workmanship, that ‘ concrete foundations are to be formed under all the walls *four feet* in thickness,’ intending as the context shows, *depth*, or thickness vertically. Those of the drawings which show the concrete foundations to walls in vertical section, exhibit all that are shown to be with one exception—not more than *two feet*—and, in many instances, not so much as two feet, ‘ in thickness.’ The general sections of the ground and of the building at the scale of the general plans of the buildings, *twenty feet to an inch*—show the concrete foundations to the walls, two feet thick, except as to one exception—which is on the Foundations—to the walls of the great central tower, under which the concrete is drawn nearly four feet deep; whilst those of the sections which are drawn to the larger scale of five feet to an inch, show the concrete in no



case (with the same exception) more than two feet deep, and generally even less than two feet deep, the exception being again in the foundations of the great tower, under the walls of which, and, under the walls only, the concrete is drawn two feet six inches thick in depth. I repeat under the walls, and add 'only,' because it is provided in the Specification that there is to be a stratum of concrete laid over the whole surface of the space under the cupola four feet thick, and extending two feet beyond the face of the lower course of footings all round—the intention being evidently that the stratum of concrete described should be under the walls of the tower inclosing the space 'under the cupola,' as well as under the cupola itself, because of the extension of the stratum beyond the lowest course of footings under the walls. But how the work is executed in that respect I have not yet ascertained.

“Proceeding to inquire into the depth of the concrete in the foundations of the buildings generally as they are executed, I found it in no case less than two feet under the walls; and as the concrete at four several points, remote from one another, was of sound and good material, (not of burnt clay rubble as specified, it is true, but of large gravel,) well combined and thoroughly indurated, and the bed of the concrete so low down from the surface of the ground at each of such places, that the clay under it is, in my opinion, fully protected from any disturbing action of the atmosphere by the concrete and the filling in over it; I forbore to proceed further with the inquiry in that direction.



“The *width*, or thickness horizontally, of the concrete foundations at the places opened for my inspection—which were all at, or near to, points where fracture or other derangement appears in the walls above—extended, somewhat uncertainly, a little more or less than the letter of the Specification required, beyond the lowest brickwork footing-course of the wall. I had the floor taken up on the inside of the building—but in one place only—close to an external wall, and there found about the same lateral extension of the concrete from under that wall as appeared in the several places opened for my inspection on the outside, being so far, in a reasonable degree, conformable with the requirement of the Specification in that respect, viz., that ‘Concrete Foundations are to be formed under . . . . . the walls . . . . . one foot six inches wider than the footings;’—the expression ‘wider than the footings,’ meaning to my apprehension, ‘wider than the *base* of the footings.’ But the Specification, in the same general description, provides that ‘the footings of all the walls of the principal buildings are to be six courses high, in three double courses of  $2\frac{1}{4}$  inches offsets.’ This is a large and, so far as regards many of the walls—even of the external walls of the wards—an excessive provision of brickwork in footings; but it appeared, nevertheless, to afford ample breadth of base to the walls—an advantage not to be lightly esteemed nor needlessly sacrificed. But it has been sacrificed, and the doing so, has, as I am disposed to think, caused the derangements which appear in the superstructure in various places. The expansion, or spread, of footings required by the specification is not exhibited in the drawings, and is not applied in the work; and, con-



sequently, the width of the concrete is less than it must have been with the expanded footing, and thus the clay bed under the foundations is not covered and protected from atmospheric influences to so great an extent laterally (I spoke before of depth) as it ought to have been. Hence, as it appears to me, the settlements which have taken place and caused the fractures which are found in the walls. These occur for the most part where a heavier portion of the structure, as one of the smaller staircase towers, wanting a broader base of and upon the unindurated, and thereby, still yielding concrete, settled down and tore the lighter connected walls asunder. The departure from the directions of the specification in respect of the width of the concrete foundations, and of the expansion of the footings, respectively, has therefore, if I judge rightly, caused much and serious injury to the structure throughout; I cannot think, however, that there was any necessity for three expanding *double* courses of footings to any of the walls, unless it might have been to the walls of the great central tower, to which, nevertheless *four*, expanding single courses would have been of more value upon freshly laid concrete than four double courses, whilst three expanding single courses would, to the rest, have been sufficient and more economical.

“To ‘ascertain the quantity and disposition of the Concrete’ actually employed in the work, would involve so large an amount of labour, and create so great a disturbance throughout the whole establishment, and the proceeding, being one of fact only, involving no matter for technical opinion that may not be an-



swered irrespectively of quantity, I have thought it better to state the views I have formed, upon the only issue likely to arise out of that particular inquiry, before entering upon such a proceeding, if such should still be deemed necessary.

“It is, perhaps, almost too obvious to justify a suggestion, that to ascertain the *quantity* of Concrete employed in the foundations would give no result of the kind which appears to be sought, unless it were known what quantity was taken in estimate, and carried into the Bills of Quantities for the Contractors who tendered to do the work; whether, indeed, it was taken out as provided in the specification, or speculatively, from the wholly uncertain showing of the conflicting drawings. The course pursued, and the quantities estimated may, probably, be learnt from either of the Surveyors, who (if the ordinary course were followed in the case) took out the quantities for estimate.

“It may not be foreign to the matter of the first head—for although not strictly within the meaning of the term foundations, it is a question of ‘Concrete’—to remark that the Specification of the Works of the several Wards provides for laying a Stratum of Concrete ‘*over the whole surface,*’ which I understand to mean the whole surface within the walls throughout each Ward. Considering it necessary to ascertain whether this had been done or not, I made an examination in one of the Wards, and found no such thing; but I found instead, that the flooring-joists are damp, and show a strong tendency to rot,



and there can be no doubt that, if the joists rot, the flooring-boards will follow; and as the process goes on, the air of the place will be deteriorated, and the health of the patients will suffer. The Concrete provided, although it be but slightly combined (12 of ballast to 1 of lime) was necessary to cover the clay before a current of air could be admitted to pass over it; but now, so far as my observation has gone, there is damp, and a tendency to rot, where, in my view, there should be dryness and fresh air.

“ I am, in the second place, to examine and to consider ‘THE ROOFS OF THE BUILDINGS.’

“ So far as regards the large roofs of the Chapel, and of the Exercising or Dining Hall (which are both constructed upon the same principle, and with the same want of accurate knowledge of what that principle involves), they show, nevertheless, a better knowledge of construction than the Contract Drawings purport; the materials are of fair average quality; the mere workmanship is good, though skill be wanting in its application, for there are timbers in the roofs which are useless as they are applied, and which might have been well employed where timbers are wanting; some timbers are, moreover, too slight for their duty, and some are unnecessarily stout; the greatest defect, however, and a great defect it is, being that the weight of the roof is not, in either of the two cases, fairly on the walls; but, having regard to the general *ignorance existing on the subject of construction, and the consequent frequency of equally defective works in general practice*, it would be difficult



to say that these two roofs are worse than the average ; or, indeed, that they are not at present, or for anything that can be observed under existing circumstances, that they are not likely to continue to be safe and serviceable for years to come. The only defects which present themselves to the eye are the extreme cambering of the tie-beams—especially those of the chapel roof—and the hollowness of the upper surface of the slating,—the hollowness arising mainly, as I believe, from the shrinking of the timber employed ; but there is, nevertheless, the substantial defect, which these two large roofs have in common with all the roofs throughout the buildings, that the slating battens are too thin to hold the slating nails firmly, whereby the slates are liable to become loosened by the action of the wind, and in time to be thrown from their seats.

“ I pass over for the present the roofs of the accessorial buildings of the central group, because I have not yet had time to examine and consider them.

“ The specification affords no technical description of the roofs of the wards by means of which the very imperfect exhibition made by the drawings might be better understood. The specification sets forth schedules of scantlings for the various timbers which occur in the construction of roofs generally, and these are, where the timbers named occur in the work, to some extent complied with—with little regard, however, to the general provision that ‘ all the timbers are to be of the full size described in this specification, and to be sawn die square.’ The timbers



in the roofs, though purporting to be of the required scantling, seldom stand the full size described, and many are slab pieces, which, by way of compensation perhaps, do present the advantage of being of the full size. The straining beams—miscalled ‘collars’—are required by the specification to be 9 by 4; they are in the work, so far as my observation has extended, barely 8 in. by 4 in.

“The drawings of the Ward Roofs before me are, one upon a transverse section of one of the Wards taken clear of the projection, which includes the four four-bedded rooms, and the day-room or dining-recess, and another, a plan of the back or top surface of the roofs of one entire ward, bearing indications of the ridges, hips and gutters, with transversely laid lines upon it in yellow colour, upon each of which lines the word ‘principal.’ is written. What is shown in the former drawing—the section of a ward—which bears the inscription ‘*Section No. 9,*’ and is scheduled in the Specification as one of the Contract Drawings, is sufficiently intelligible, but the other Drawing, numbered 6, and also scheduled as a Contract Drawing, is wholly wanting in matter necessary to make the intention certain as to the proposed or contemplated mode and details of construction of the roof of the Ward as a whole. One thing, however, is certain, and that is, that the roofs were not executed according to these drawings or either of them. The Section No. 9, shows what is technically described as a Queen Post trussed tie-beam, with accessories which rendered it capable of being made the basis of a sound, strong and durable



roof. But the Plan No. 6<sup>b</sup>, indicates, by the yellow tint, and the word 'principal,' a disposition of the structure of the roof, as shown in section No. 9, which betrays the weakness out of which failure to a serious extent must have arisen, had not the failure that has happened been assured by the change made in the structure exhibited in Section No. 9, in carrying it into execution. The structure referred to, might have been with advantage of a simpler kind both as regards compactness and economy, but the available King Post truss, would have failed in like manner, had the bays been twelve feet long, and the pole-plates and wall-plates contemplated by the Specification, and shown in section No. 9, in connection with the Queen-trussed tiebeam, been the one omitted and the other diverted from its proper service to a service in which it has been found mischievous.

“For what purpose it would be difficult to say, unless it were to save materials, the pole-plates are omitted; pole-plates take their place *upon* the ends of the tie-beam, and are secured to it by cogging down, and even strapping, so that the beam shall, through them, be held to its proper duty of tying in the common rafters of a roof, which (being laid on an inclined plane, and loaded with the roof covering, have a necessary tendency to run down) are stepped on the pole-plates, which are thus at once their bases and their abutments. *These important timbers are shown in their proper places in the only intelligible drawing of the Ward Roofs, 'Section No. 9,' but are wholly omitted in execution.* The timber known as the wall-plate, which ought to be laid along the



whole length of a wall, to distribute the weight of a roof, coming through the tie-beam over the whole length, is shown in the same drawing, in its proper place, and the Specification properly directs that the tie-beam shall be secured to the wall-plate by joggles. *But the pole-plate being omitted, the wall-plate is misplaced, and made to do the duty of the pole-plate in receiving the feet of the rafters, the ends of the tie-beam being notched out so as to have the effect of strutting apart the plates which its duty is to hold together, whilst the dropping down of the feet of the common rafters to the lower level of the wall-plate forces the main trussing timbers in upon the tie-beam, and the whole affair become a mockery of construction.* Taken in connection with the infirmity before referred to, arising from the length of the bays, or spaces longitudinally of the building, from tie-beam to tie-beam, which are one-third, at the least, longer than with the slight and unsupported ridge-piece, and the practically uncogged purlines ought to be, and in connection, also, with the compound structure over the wider part in the middle of the length of each ward, failure became a certainty, *and the roof has failed.*

“The process of failure seems to have been thus:—the weight of the roof covering, and of all the materials in the construction of the roof itself above the tie-beam, is by the very action of the truss brought down by the principal rafters, (which, with the straining beam from the trussing timbers) upon the tie-beam, and the stepping of the principals being in this case considerably within the points of bearing, (the



walls of the building below) the weight was over a void; the tie-beams yielded to the pressure upon them by the principals, and, slight templates on the walls forming fulera, threw up the outer ends of the tie-beams, which had been cut down upon the wall-plate on the outside of the template, leaving the wall-plate free, except as to a partly drawn nail, to slip on the top of the wall under any pressure acting upon it from within or above. The common rafters stepped upon the liberated wall-plates at foot, were nailed at their upper ends or heads to a ridge piece that was itself wholly unsupported but by the rafters themselves; whilst, at about half-way down from the ridge to the wall-plate, an overloaded and ill-secured purline coggled down from  $\frac{5}{8}$  of an inch to  $\frac{3}{4}$  of an inch, instead of two or three inches upon the backs of the principal rafters, insufficient in scantling, and bearing over the inordinate length of twelve feet, gave insufficient support, and no restraint to the common rafters and their load; which, by the tendency of matter, to take the shortest available way to the earth pressed against the wall-plates, forced them forward on one side and the other from under the ends of the tilted and unrestraining tie-beams, dragged the purlines from their seats, and pulled down the ridge-piece or tore out the nails which seemed to hold the rafters to it.

“By the change made in the Roof now under consideration from the form and manner shown in Section No. 9, to that executed, the saving in timber cannot, however, be very great, for the omitted pole-plate is of very slight scantling, as prescribed by the Specification—so slight, indeed, as to give



rise to an idea that the author must have contemplated much shorter bays than the plan No. 6<sup>b</sup> shows by the transverse yellow lines, which are understood to indicate the places of those of the timbers of the roof which limit the bays; the timbers, generally, are all somewhat shorter than the design shows, but not so much so as to amount altogether to more than 15 to 18 inches cube, to a truss; short templates are added under the ends of the tiebeams, but a common rafter is saved in every 12 feet in length of the roof, making the saving upon a truss and two half bays, about 2 cubic feet of fir altogether. The common rafters are specified 12 inches from centre to centre—they are 12 inches apart. Some further saving in timber has been effected in a manner that has tended greatly to make the weak construction weaker, but I have not taken it into account, because I find nothing to the contrary in the Specification directly applicable, and the drawings show nothing either way. The purlines have been allowed to run out and abut anywhere, and, therefore, they meet more frequently between, and clear of, the principal rafters than upon them. The only places at which they are found to be cut off, to meet, are at the hips, where the ordinary purlines from side and end meet, and have, with the inefficient aid of a slight hip-board only, to support one another, or to fail as they have done. *There is a saving in wrought-iron straps, provided in the Specification, to hold the tie-beams up to the Queens, whilst lighter, but very sufficient bed-bolts are used in the work as executed.* The change made in the means of seating and fixing the slates on this roof, or these roofs, have, undoubtedly,



caused a great saving in expense, without affecting, to any serious extent, the stability of the structure of the Roof. The 'inch yellow deal close joint boarding, with proper tilting fillets,' provided in the Specification, would have given a firmer bed to the slating and a better hold to the nails than the  $2\frac{1}{2}$  inches wide by the  $\frac{5}{8}$  inch battens, which have been used without even eaves boards. The boarding would have tended to maintain greater equability of temperature in the building below, such being the only advantage it possesses above battening, when the battening is what it ought to be as a basis for the slates. *But the most thorough boarding of the roof in the present case would not have deferred the failure that has taken place for a day.*

"There appears throughout this matter a great want of concord between the Specification and the Detail Drawings, such as they are—so much so that it may be thought that the two classes of documents were written and drawn by different persons, holding no communication with one another; and in nothing does this appear more strongly than in the matter of Roof Gutters. The Specification, in respect of the Wards, evidently contemplates gutters of the ordinary form, arrangement, disposition, structure, and mode of treatment—whilst the Drawings give but the slightest indications of any except the Valley gutters, and these may be read with the Specification. But the Eaves gutters, as they appear in the Drawings, and as they have been executed, seem to be wholly different from anything the author of the Specification had in contemplation. The Plumber's work is, so far



as my observation has extended, good, in respect of both materials and workmanship ; whilst the arrangement that has been made of the work is—particularly in respect of the Eaves gutters—of a very questionable character. I have not yet been able to make sufficiently extensive observations of these gutters and of their working hitherto, to enable me to form a reliable opinion of the merits or demerits of the scheme ; but it is not consistent with experience that lead can be laid upon and fixed to stone, in breadths so narrow even as 14 or 15 inches, and in lengths of 15 to 20 feet, exposed to every variety of temperature, from summer's greatest heat to winter's severest frosts, without consequences wholly incompatible with the proper and enduring service of Eaves gutters to Roofs.

“ In the Report above referred to, signed ‘ S. W. Daukes,’ and endorsed 11th June, 1851, Mr. Daukes states that a change had been made of the ‘ Eaves Cornice Gutter,’ from Cast-iron to Lead and Stone, with a certain addition of Brickwork, and that the change is for the better ; but it does not appear whether the substituted work is claimed to be more costly than that which was provided. I remark, in considering ‘ Section No. 9,’ that there has been some saving at and near to the Eaves on the inner or Airing Court sides of the roofs of the ward buildings in the length of the common rafters, and in the Slating and Boarding of such length, in addition to the saving of the Cast-iron Guttering ; and I seem to think that the change made in carrying out the Ward roofs over the wider compartment in which the Day



or Dining Room occurs in each Ward from that contemplated by the Specification, and indicated by the plan No. 6<sup>b</sup>, must have left a large balance to the credit of the Building; but the uncertainty connected with the conflicting and imperfect documents, makes it impossible to say with authority where the advantage lies in point of cost, wherever it may be in point of construction.

“I am, in the third place, to examine and to consider ‘THE ARCHED CEILINGS OF THE GALLERIES.’

“The Specification directs, in the ‘General Description of Materials and Workmanship,’ that ‘the Ceilings of the whole of the Ward Buildings . . . . are to be made fire-proof by vaulting formed with three courses of plain tiles bedded in pure cement, or with brickwork, as described in detailed Specification;’ that ‘the skew-backs for tile and other arches are to be of Bath stone, 8 inches by 7 inches, with skew backs, sunk for the springing, and moulded on lower edge as per drawing at large;’ (no such drawing appears among the scheduled drawings) and that ‘the spandrels throughout are to be filled with concrete as before described’ (no previous description is found in the Specification) ‘and as shown in the drawings; (Nothing of the kind is found in any of the contract drawings.)

“In the detailed specification of the Bricklayers’ Work to the ‘Ward Buildings,’ it is directed that ‘The several . . . arches . . . are to be built of the height, thickness, and dimensions shown



on the drawings, and in the manner already described in the general clauses ;' and 'that the whole of the ground and one-pair stories are to be arched over with three courses of plain tiles, bedded in pure cement, with stone springing course, as shown in the drawings.' The third schedule to the Specification, being 'the schedule of detailed prices to be charged and allowed for extras and omissions,' gives 4d. per foot superficial for 'half-brick arches with stocks in cement, and 5d. per foot superficial for arches formed with three courses of plain tiles in pure cement.'

" In the report signed 'S. W. Daukes,' and endorsed '11th June, 1851,' Mr. Daukes says that 'hexagonal moulded tile arching has been used throughout the building in lieu of three courses of plain tiles.'

" What the cost of 'moulded tile arching' may be with reference to half-brick arches with stocks in cement, does not appear ; but as a half-brick arch of stocks implies an arch from  $4\frac{1}{4}$  inches to  $4\frac{1}{2}$  inches thick upon the radial line, whilst the 'moulded tile arching' is but of a somewhat better kind of brick-earth, from  $2\frac{1}{2}$  inches to 3 inches thick in the same direction—the half-brick structure would consume one-half more materials than the moulded tile arching, no difference having been made between the setting material of the one and the other. The plain tile vaulting was to have been formed with 'pure cement,' the half-brick arches in 'cement,' the latter being cement mixed, and thereby diluted with sand, and this composition is the material employed in setting the 'hexagonal moulded tile arching,' and *not* the



pure cement, which it supersedes, such being the case, a saving of 20 per cent. must have been effected upon the cost of the 'Arched Ceilings of the Galleries,' in using 'hexagonal moulded tile arching,' used throughout the building in lieu of three courses of plain tiles.

"But in considering the matter of the 'Arched Ceilings of the Galleries,' there is, as it seems to me, the far more important question than that of cost—which is that of safety.

"And it is a question, in my mind, whether either three courses of plain tiles though *rubbed up* instead of merely '*bedded*,' as the specification expresses it, in 'pure cement,' or the 'hexagonal moulded tile arching,' even if it had been joined, (for it is put together by its edge and is incapable, from its form, of being rubbed up) in 'pure cement,' can be deemed certainly safe to bear over 14 feet, whether vaulted or not. For it is a mistake to speak of either the vault-shaped laminated slab, produced by any number of layers of tiles, put together face to face, as arching, or the hexagonal bricks—for such they are, in one thickness, set and joined by the edges, as possessing any of the characteristics of an arch, or any of the qualities of arching. If it may be assumed that anything in the constitution of a plain tile vault, such as was contemplated for the ceilings of the galleries in this case, is good, that is, strong and well-formed tiles, not so much burnt as to refuse the cement, the cement good, the bending thorough, and the manipulation complete; such a combination would be stronger to



bear over than the means of giving it a bearing would possess of taking a bearing. Whether it be placed upon, or made to spring from (to speak of it as an arch) Bath stone springing courses, as directed by the Specification, or be lodged on skew-backs cut into the brick walls, as shown in 'Section No. 9' (which alone of all the Drawings gives any indication of the 'Arched Ceilings of the Galleries,') the bearing of the tile vaulting, and its only bearing, would be upon its narrow edges, being the mere thickness of the laminated slab. This bearing having regard to its direction would expose the slab to the liability of its being rent by the pressure of its own weight; for such a composition will split with far less weight than might be necessary to break it across, the artificial strength obtained in the plain tile and cement slab being obtained from the cohesion brought about between the broad faces of the tiles and the adhesive cement, and its weakness being in the freedom with which the cement may be torn away from the tiles by rending, or the tiles be themselves rent. But there can be no thrust or lateral pressure by such tile—vaulting until it has failed, and the structure is so thin in its substance, and so fragile in its nature, that if, in the case, three courses of plain tiles in cement would have been safe to hold together, it would be so by having a safe bearing *on* the walls, and not by virtue of any lateral resistance afforded to the structure by or through the walls. It is true that the surest way of making the vaulted structure act upon the walls of the Galleries, to force them out or apart, was directed to be applied. This is by resting it as a wedge upon skew-backs, as if it were really an



arch, and derived its strength and security from abutments.

“What is true of the effect of the structure of the ‘Arched Ceilings of the Galleries,’ as concave slabs of plain Tiles in Cement, is true also of the ‘hexagonal moulded tile arching,’—with these important differences, however, that while the latter is in far less danger of rending or splitting upon its narrow bearing, or, springing courses, upon the corbelling stone, chased brick skew-backs—the hexagonal tiles joined together by their narrow edges only, without the power of rubbing the joints up to aid the adhesion of the cement, and obtain a near approach to cohesion of the brick. The Ceiling might be safe in either case—that is to say, with plain tiles, or with the hexagonal tiles—so long as the substantial materials will hang together by the adhesive power, and strength in itself, of the adhesive material;—but the former presenting a broader face to the adhesive material, and the strength of the tile in addition to the strength of the cement at every lateral joint, three bonded courses of plain tiles in cement seem to offer a greater probability of continued security as a ceiling, than the one thickness of tile, being of the same thickness in one,—of the same kind of material, joined by the narrow edge only, and with the same kind of cohesive setting only.

“But the ‘hexagonal moulded tile arching’ over these galleries was *not* set in *pure* cement, so far as my observation has extended,—and *I have seen the ceiling of one of the galleries taken down, and one of*



*a Day or Dining Room, that had fallen down,—the setting material is the common cement mortar of cement and sand. The falling down to which I refer has, indeed, justified the opinion I had formed, that the structure did not act as an arch by forcing out the walls to make room for the substance to fall through, but it doubled up upon itself without causing more than a slight vertical fracture upon one of the walls.*

“The Constructor of the Ceilings seems, moreover, to have taken the same view of the tendency of the kind of structure that I have done, for he has applied straps of flat bar-iron, as inverted girths, over the convex backs of the vaulted ‘arching,’ evidently not as ties to the springing walls, *but to hold the structure down, so that it may not necessarily become a ruin, and fall throughout its full length upon the failure of a joint longitudinally, of the vault in any one part.* Such a structure as that which has been applied can only be really safe, as a soffit or concave facing to a true structurally-built arch over, and close down upon it, having sufficient abutments to restrain as well as bearings to carry it. The filling in over all with concrete, as directed by the Specification to the spandrills, might have had some such effect, if it had not, by its weight, forced the tile-vaulting down wedge-like between the inclined planes of the skew-back corbelled courses, and really forced out the outer springing walls where there are no cross or returning walls abutting them, but the concrete in the spandrills is, very judiciously, very limited in quantity.

“It is to be remarked that of the two modes of



forming the bearings or springings of the ‘Arched Ceilings of the Galleries,’ either of which would seem to be permissible, the better, and certainly the more expensive mode—that described in the Specification—has been adopted; corbelled courses of ‘Bath stone, with skew-backs sunk for the springings, and moulded on the lower edge,’ have been applied and built into the walls in an apparently secure manner—for none of it seems to have given way—instead of doing as might have been done according to the showing of ‘Section No. 9,’ hacking bird’s-mouth skew-back chases out of the walls. This is the more remarkable, as, in every other instance that has presented itself to my observation, in which the two classes of document have presented different modes of doing the same thing, and one of the two has been followed, *it has been the less efficient and the less costly of the two.*

“But with regard to another direction, or other directions, of the Specification, as above quoted, the case stands differently. ‘The whole of the ground and one-pair stories are to be arched over.....as shown on Drawing,’ and ‘the several .....arches .....are to be built of the heights.....shown on the Drawings.’

“Now the only one of the Drawings before me,—and I have all that are scheduled in the Specification—which shows the arched ceilings of the Galleries in such manner as to indicate *height*,—is, as I have before had occasion to remark, ‘Section No. 9,’—and on that Drawing the height from the ground floor to the under surface of the soffit of the vault, or the



crown of the so-called arch over it, is by scale 13 *feet* 10 *inches*, clearly intended for 14 feet; whilst the height, taken in like manner, in the wards of the Ground Floor Story, as built—(and I measured it in several wards)—is not more than 13 feet 7 inches, including the thickness of the flooring boards. The difference between the dimensions in the Drawing and in the work may, I think, be reasonably accounted for by supposing that the Ground Floor itself, or the Floor of the Ground Story, has been formed at a level a few inches higher than it might have been with reference to the height, or depth rather, of the walls,—and of this there is some evidence. But the Drawing ('Section No. 9') which shews a clear height of barely 14 feet in the Ground Floor Story, gives fully 14 *feet* in the upper or one-pair Story, whilst the height taken in the Galleries *immediately over those last above referred to, in the Ground Floor Story, is not more than 12 FEET 8 INCHES.*

“It is further to be remarked, nevertheless, that although such discrepancies are found in these dimensions of height between the Drawing and the Work, measuring the Drawing by the scale, at which it was certainly made, the Ward Buildings are not so high between the Floor of the lower story, and the crown of the vault of the upper, as dimensions obtained by scale from the Drawing ('Section No. 9') seem to require, while they appear to fulfil the requirements in point of height of the numeral figures written upon the same Drawing.”

This Report having been submitted to Mr. Atherton, he advised as follows:—



“I have very carefully perused the Report and Letter of Professor Hosking, but I regret to say that the very material portions of the Report which relate to the ‘Roofs of the Buildings,’ and ‘the Arched Ceilings of the Galleries,’ are of too technical a character, and not sufficiently accompanied by any statement of results, to enable me to found any opinion thereon, and to give the Committee any advice, either as to Mr. Hosking’s further reporting, or as to Mr. Street’s being desired to make his Survey and Report. With reference to the ‘Cement,’ I understand the Professor to be of opinion, that in vertical depth, the Cement is *sufficient*, whether it be according to the letter of the contract or no; but that he discovers that, in connection with a less expansion of the Footings of the Walls than the contract describes, there is a less width (horizontal) of Concrete at the foundations of the Walls than there should have been if the contract as to the Footings and Concrete had been fulfilled. To this infringement of the Contract, I also collect that serious practical damage is attributed by Mr. Hosking. Furthermore, I collect that a stratum of Concrete should have been laid over the whole surface of the Wards upon which the Flooring is laid; but that such a stratum has not been laid, and that damage is the consequence. So far, and assuming that to make good these defects any considerable outlay would be requisite (as to which the report is silent), the report is in favour of proceeding with the action, though it may be necessary, in so doing, to make some amendments in the particulars of Breaches and other formal parts of the proceedings.



“ Mr. Hosking misapprehends the meaning of the expression ‘ quantity and disposition of the Concrete,’ as used in the Instructions laid before him, and copied from my opinion of the 23rd January last. By ‘ quantity,’ I meant not gross quantity, but quantity or extent, by measurement in depth or width ; that is, in the sense in which he has already reported on the subject.

“ I do not find that Mr. Hosking has considered the subject of *damage*, though that is a matter (in connection with, and as a part of, the three specific heads only) which it was intended to be submitted to him.

“ All that I can advise under these circumstances is, that Mr. Hosking should, upon the second and third heads, answer the questions submitted to him more categorically, and in more popular terms ; and that he also be requested to extend his Report to the important question of *damage*, as explained in the ‘ Instructions.’

“ Whether Mr. Street should or should not be desired to examine and report, must [depend, to a great extent, on the general results, properly understood, of Mr. Hosking’s Report.

“ WM. ATHERTON.

“ *Temple, May 21st, 1858.*”

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Mr. Street’s Report was as follows :—

“ In proceeding to report, for the information of



the managing Committee of the Colney Hatch Lunatic Asylum, the result of my examination into the state of the building, I think it right, first of all, to observe that my report has been made without any knowledge of what Mr. Daukes may have urged in answer to the complaints that have been made upon the subject from time to time, and that it is possible, nay probable, that there may be some points on which I have to express an unfavourable opinion, but in which nevertheless Mr. Daukes may be able to show that he is not personally responsible.

“ My report is simply the result at which I have arrived from a close and scrupulously careful examination of the Contract, Plans, and Specification, as well as, and in connection with, the Building itself.

“ A difficulty presents itself at the onset in the fact that very serious discrepancies exist between the *Drawings and the Specifications, and that in many respects the work as executed agrees with neither.* Nor is it always clear to me whether the Architect was in all cases directly responsible for the works actually executed, as having given instructions and drawings which have been carefully carried into execution, or only indirectly, in not objecting to the way in which the Contractor departed from the Contract; as, however, in such a Building where the work consists of a vast multiplication of similar parts, it is almost impossible to suppose that the Architect did not see and consent to the alterations which have been made, I have no alternative but to assume that he would be willing to take the responsibility of their approval.



“In a small building it often happens that the foundations are put in, or the roofs framed and put up in the Architect's absence, so that it would be impossible to fix upon him the responsibility of any departure from the plans which he may not have detected. But here there must have been ample opportunity to see, and, if necessary, to object to what was being done. The execution of the Foundations, or of the Roofs, must have been works of many weeks' duration, and as they seem to have been executed in an uniform manner, the Contractor would, I think, be entitled to assert, that his work had obviously been done with the concurrence of the Architect.

“The discrepancy between the Drawings and Specification, is mainly in the amount of Concrete and Brick foundations, and as this is the point to which my attention was first directed, I proceed to give the result of my examination in detail.

“In order to explain at a glance, the actual state of the case, I caused about twelve excavations to be made in various parts of the building, so that I think I ascertained the nature of the Foundations throughout the entire range of walling.

“I found so much uniformity in the dimensions of the foundations everywhere, that I may assume that a greater number of excavations would not in any way have affected the result at which I arrived.

“In order to make the state of the case perfectly



clear, I subjoin Sections of the foundations as measured by me (marked A) sections of the same walls, as they are shewn on the Plans (marked B), and sections of the same walls as specified to be built (marked C.)

“It will be seen, that the Foundations marked C, are much larger in all ways, than the others; but it is important to observe, that though both B and C were equally binding on the Contractor; there is nevertheless, a special provision in the Contract that in the event of the Plans and Specification disagreeing, Mr. Daukes was to have power to decide which of the two should be followed. It is clear, therefore, that so far, Mr. Daukes had power to act, but it would be an important help to the accurate understanding of the whole bearings of this point, if it could be ascertained what amount of Concrete was provided in the Bill of Quantities, on which the Contractor's Tender was founded, for it is quite impossible that the discrepancy should not have been noticed from the first by the Surveyor, who measured the quantities.

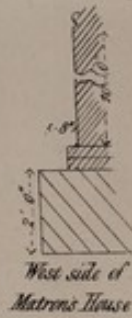
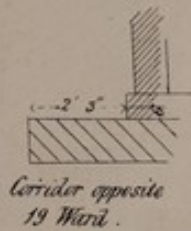
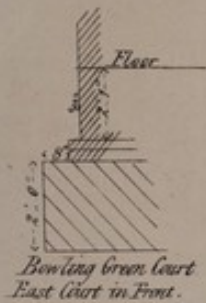
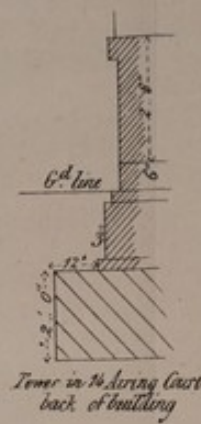
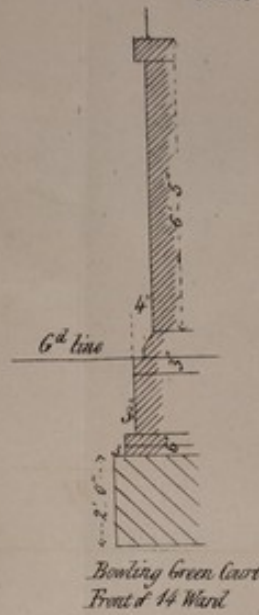
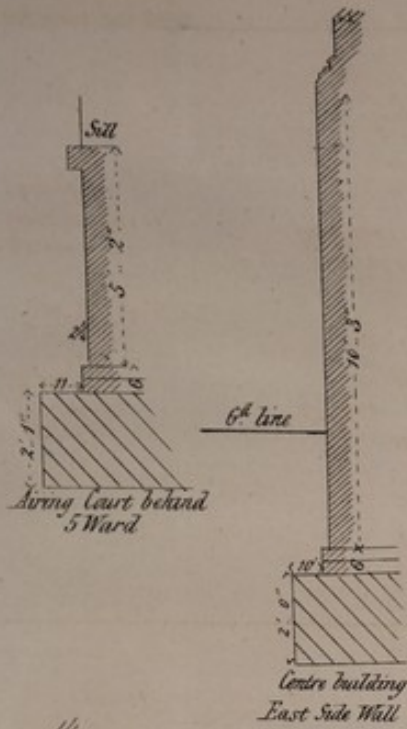
“I have but little doubt that it would be found that Mr. Daukes' own intentions were expressed rather by the Drawings than by the Specification, because any mistake in them would be so obvious as to attract notice immediately, whereas being described in words only in the Specification it might there easily escape notice.

“I think it will be obvious, upon an examination,

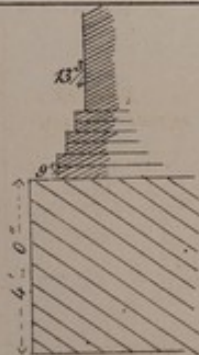


*A*

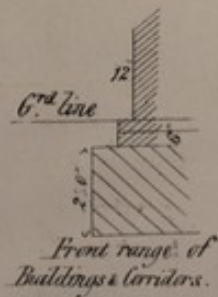
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*C*



*B*





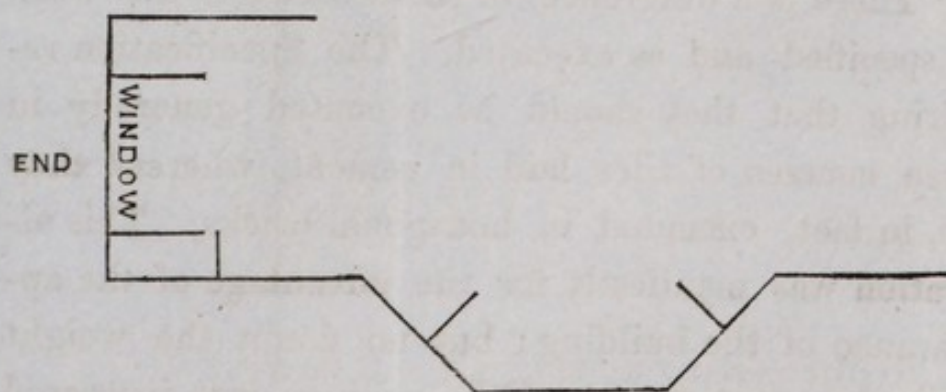




that there is no substantial or intentional difference between the foundations as shown on the Plans, and as executed, and that the question for consideration is therefore, only whether any damage, and, if any, what has resulted from their want of sufficient strength. *I cannot doubt that very many of the failures of the Walls are attributable to a deficiency in this respect.*

“It is true, and must not be forgotten, that the soil was of the worst possible description, and I think that the foundations marked C (*i. e.* as specified) would not have been at all extravagant under the circumstances.

“*The number of settlements and cracks throughout the walls is certainly very large, and I observe that they are to be found constantly just in those places where a deficiency in the projection of the footings would be likely to lead to them. They occur e. g. very frequently on each side of the external angles of the buildings, and on each side of the angles of the projecting bay windows in the day-rooms of the several wards.*



“There is no other explanation possible for these



cracks (*which in many places are of the most serious character, and require immediate attention*) than the insufficiency of the foundations, and I am clearly of opinion, that they would not so often have occurred had the Specification been followed instead of the Drawings.

“The settlements in the length of the Main Walls and Corridor Walls are numerous, but not so serious as those last referred to ; and so far as I can see, I do not apprehend serious danger to the fabric on this account, if only the necessary steps are taken for thoroughly securing all the external angles of the buildings.

“In some cases I found that cracks appeared to have been caused by making the steps in the foundations to suit the changes in the levels of the ground too rapid.

Ceilings.

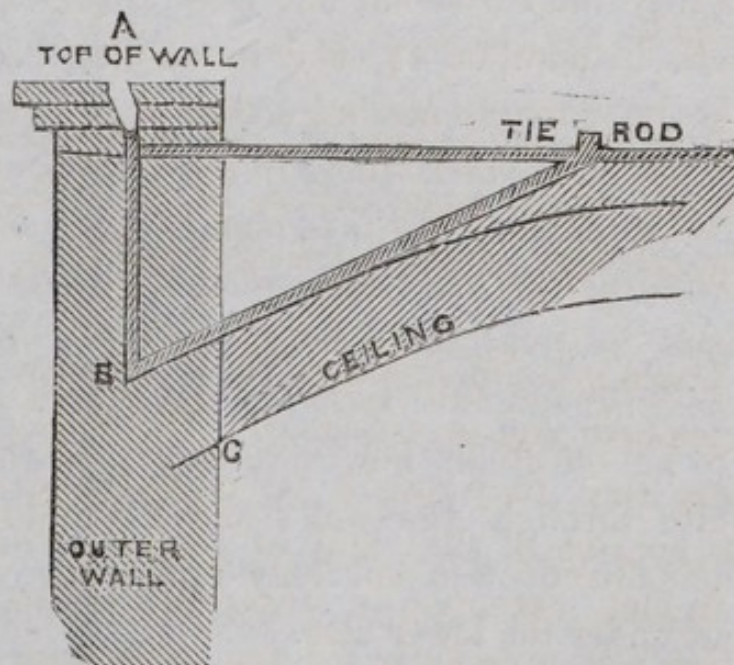
“It will be convenient, in the next place, to state the result of my examinations of the arched Ceilings of the corridors in the wards and passages.

“There is a difference in these between the work as specified and as executed. The Specification requiring that they should be executed generally in three courses of tiles laid in cement, whereas they are, in fact, executed in hexagonal bricks. This alteration was manifestly for the advantage of the appearance of the building ; but no doubt the weight and consequent thrust of the ceilings was increased to some extent by the alteration. At the same time,



a great number of iron ties were introduced throughout the building, just below the roof, with a view to counteracting the thrust, and as none of these were either shown on the drawings or specified, it appears to me that the building was, in this respect, erected more solidly than the Drawings or Specification required. Whether even then it was sufficiently solidly constructed, is an entirely different question, and one to which I fear I can give but one answer.

“The iron ties are let into the walls somewhat in this manner, and are introduced immediately over the upper ceiling of the corridors throughout the building, it having been supposed probably that the weight of wall would make it unnecessary to introduce any over the roofs of the lower system of corridor ceilings



“I found the tie rods to be generally in a state of extreme tension, showing that they were doing their work, and that the wall had generally evidenced a



tendency to fall outwards. This was further evinced by the fact that in almost all cases these ties have *split the upper part of the walls through their thickness from A to B, and the consequence is that if this splitting of the wall goes a little further, the tie-rods will cease to be of any use at all.* The tie is, in fact, placed so far above the point of thrust as to be of comparatively little value. To be useful, it should have been placed some two or three feet lower, and should have crossed the corridors below instead of above the ceilings at the point C.

“ With a view to ascertain in how far this pressure upon the external walls told upon them, I tried them in three or four places chosen at random on the Airing-court side of the walls, and the result was that I found in each case that the walls had fallen slightly outwards—in one case three-eighths of an inch, in another  $1\frac{5}{8}$ , and in another  $2\frac{3}{8}$  of an inch. The amounts are not large, but they indicate what is going on : *and I believe if the Ceilings are left as at present without the insertion of new ties, that this settlement of the external walls will make more rapid progress than before, owing to the degree to which the ties have split the upper part of the walls.* To be effectual, however, any new ties must pass quite through the wall; and I should recommend their introduction not only under the upper vaults, but under the lower also.

Conclusion  
as to Walls  
and Ceilings.

“ The result of this statement of my examination of the state of the walls and ceilings is, that I cannot but express my opinion that the foundations



are not sufficient for the weight imposed upon them, and that it is owing to their insufficiency that most of the settlements are attributable.

“ The remedy for these settlements is a matter of some difficulty ; but the course which I should recommend would be to add something in the form of a Buttress to all, or nearly all, the external angles of the building—resting upon solid beds of concrete, projecting boldly, and well bonded into the walls. It will be said that this will be contrary to the character of the architecture. This may be so ; but in such a case, I conceive it will be necessary to think more of the stability of the fabric than of architectural unity : and, indeed, I believe that buttresses successfully introduced would in no degree detract from the good effect of the building.

“ In the case of the arched ceilings, I do not think the case is so clear ; I should myself never have ventured to introduce them without iron ties at the springing of the Ceilings or Buttresses outside ; and I should even then have preferred vaulting them with quadripartite vaults to using waggon vaults, as by that means I should have obtained the entire thrust at the point where the iron tie passed through the wall. But I scarcely think it possible to test one man’s practice by another’s in this way ; and at any rate, I believe that these arched ceilings throughout the building might be effectually repaired by the insertion of additional iron tie rods (in the way I have indicated) below the springing of the vaults. This is an alteration which would not be attended with very heavy



expense. It may be well to say, also, that I doubt the wisdom of removing the upper arched Ceiling, and leaving the lower intact. I anticipate that one result will be, that owing to the diminished weight on the walls, there will be a greater tendency in the walls than before to bulge in the middle of their height, opposite the point at which the thrust of the Ceiling presses against them.

Roofs.

“ I now proceed to give the result of my examination of the Roofs.

“ In order to arrive at an accurate knowledge of their exact state, I have not been satisfied with a partial examination, because, though, when examined from the outside, the same Roof appears to be repeated over and over again, it seemed that it might be just possible that one portion of the Roof might be executed with less care than the others, owing to some accidental over-sight on Mr. Daukes' part, or to the incapacity of the foreman employed upon it.

“ The result of my examination is, however, entirely opposed to this hypothesis, there being but one exception to the uniform inferiority of the workmanship throughout the roofs of the whole body of the building—viz., the Central Roof over the Chapel and Dining-hall, and possibly the Roofs over the Residences, which I was not able to examine.

“ In order to make my remarks upon these roofs intelligible, I annex diagrams showing—



“ A. The section of a portion of the Roofs given on Contract drawing, No. 9.

“ B. Plan of the Roof intended to be put over one of the wards shown on drawing No. 6<sup>b</sup>.

“ C. Plan of the same Roof as executed.

“ D. Section of the same Roof as executed.

“ The plan refers to the Roofing over the centre of each ward, where the projection of the day room and some bed rooms increases the width of the building. This portion of roofing occurs no less than fourteen times over the different wards, and in all cases the same plan applied, and in all, the same alterations of the plan have been adopted.

“ In the case of the Roofs, there is no discrepancy between the Specification and the Drawings, though the latter are exceedingly meagre, and, in my opinion, improperly so, unless some drawing exists which has not come into my hands.

“ It will be observed on referring to Plans A and B that, in the original Contract, it was provided that there should be a lead-flat of large dimensions, 46 feet by 16 feet 6 inches. This is also provided for in the Specification, and was to have been covered with 8 lb. lead.

“ In execution these flats (fourteen in number) have been omitted altogether, the roofs have been slated,



and a gutter formed between them, the water from which is conveyed through the roof to the external wall.

“This alteration is, in my opinion, for the advantage of the building; for, looking to the absence of any drawing shewing the construction of this roof and flat, and to the insufficient nature of the Specification, it appears to me that it would have been difficult for the Architect to insist on the construction being sound enough to carry the weight which would have been imposed upon it without extra cost.

“At the same time, the alteration was largely for the advantage of the Contractor, though it is not in my power to decide how far it was within the power of the Architect to consent to such an alteration without consultation with the Committee of Magistrates.

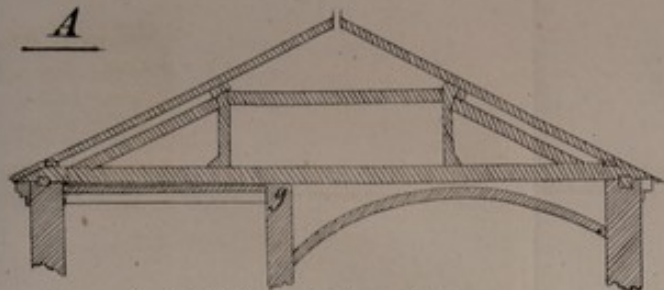
“In the same portion of the roof there are omissions, as will be seen from the fact that in each of these portions of the roof five principal trusses were shewn over the projecting Day Room, &c., whilst only one was really executed, making an omission of no less than 60 principal trusses. (See Diagrams B and C.)

“Throughout the roofs also a pole-plate, 4 inches by 4 inches, and a wall-plate, 5 inches by 4 inches, are specified, whereas, in execution, only one plate is used, so far as I have observed, in any part of the buildings.

“Then again, the Roofs were specified to be all

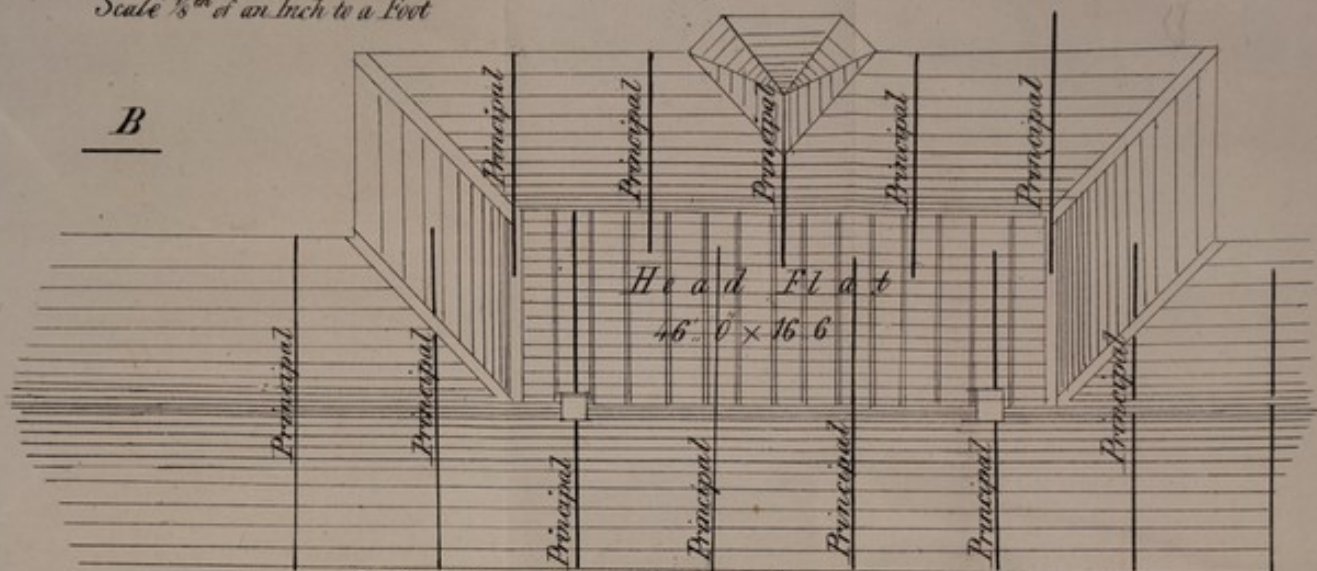


A



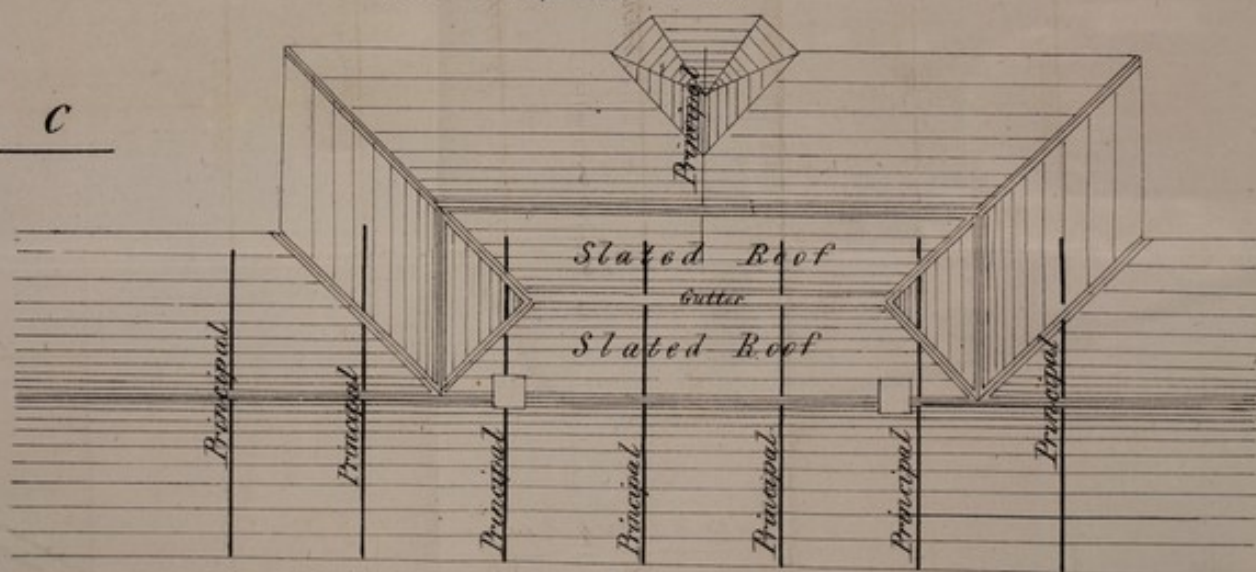
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B

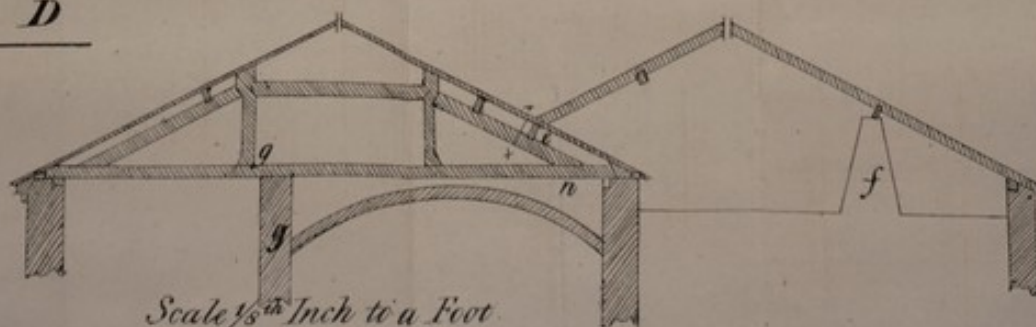


Scale of these Plans  $\frac{1}{8}$  Inch to a Foot

C



D



Scale  $\frac{1}{8}$ <sup>th</sup> Inch to a Foot





Sketch of a house in the style of a house



covered with inch deal boarding for the slates, whereas, in execution, there are battens  $2\frac{1}{2}$  inches by  $\frac{3}{4}$  inch,  $8\frac{1}{2}$  inches apart. I do not think that the Roofs would have stood any better if they had been boarded, though the slating no doubt would; but at the same time the alteration was of course largely for the benefit of the Contractor.

“The sizes of the timbers are less than specified, all the timbers of principal trusses being described to be 5 inches thick, whilst in execution they are only 4 inches thick.

“I proceed now to remark upon the mode in which the Roofs have been constructed, and in doing so I shall have mainly to refer to the roofs over the fourteen projections in the wards in which the construction is more insecure than elsewhere.

“The annexed Diagram is necessary to explain the very peculiar manner in which the Roofs have been framed.

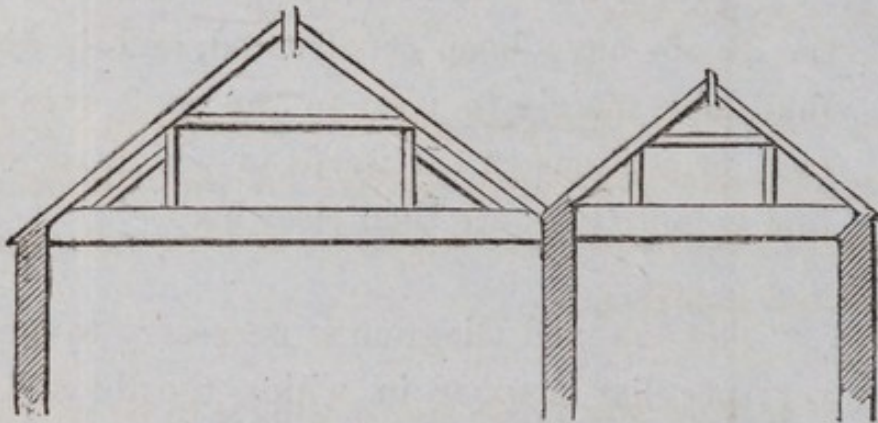
“The Diagram marked A is the only section of the Ward Roofs given on the plans.

“The Diagram D is a section made from actual measurement of the Roof as executed over the wider part of the Wards over Day Rooms, for which no detail of any kind appears to have been given on the Contract Plans, and the Diagram B is a copy of the plan of this portion of the Roofing showing the position and number of the principals in the Roof, &c.



“The section given at A has been generally followed by the Contractor, and as far as I can judge I conclude that he framed the Roof over the wider part of Wards (B) without special instructions, and only following the general Plans and Elevations in which the Ridges of the two roofs were shown to be level, though the proper span of one was much less than the span of the other.

“The obvious mode of dealing with such a roof would be somewhat after this fashion, instead of as executed (as shewn in the Diagram marked D), where the strain of the one roof resting on the middle of the



side of the other at X X could not fail to act most prejudicially.

“The only possible reason for this very bad piece of construction, was the desire to secure a certain kind of uniformity in the elevation, an attempt which to my mind, was perfectly uncalled for.

“I shall point out presently the actual consequences of this mode of framing the Roofs, but before doing so, I must refer to the mode in which the work



has been executed by the Contractor; I am sorry to say that I have seldom, if ever, seen a Roof in which so little care appears to have been taken to secure the work by careful execution of all the framing and carpentry.

“The Specification appears to have been sufficiently careful on this head, but to have been very little attended to. I notice among other defects—

“1. That few of the timbers are carked down on others, notched, or tenoned.

“2. That the common rafters are very frequently in two lengths.

“3. That the purlines are constantly—I may, I think, say generally—scarfed in the middle of the length between their supports, and are not pinned or bolted together.

“4. That the angle pieces appear to be only spiked to the plates.

“5. The walls marked G in Section as continuous walls really consist of a succession of piers 2 feet 3 inches by 1 foot  $1\frac{1}{2}$  inch, with openings 3 feet 6 inches wide between each. *They are consequently very weak, and are in many cases drawn over by the sinking of the tie-beams, and split and rent in a dangerous manner.*

“6. In place of five principal trusses in the Roofs



over Day Rooms, &c., in the fourteen wards, one only is executed in the centre, and the purlines are supported on one side by brick walls erected in a rude and hasty manner (f in diagram), and on the other by *quasi* principal rafters abutting at the feet on a plate resting on the other Roof (E), and at the top against the ridge. These Roofs have, therefore, no tie except at the centre; *and it is certainly difficult to speak too strongly of the carelessness and haste which marks the many rough expedients adopted in the support of plates, templates, &c.*

“7. The ironwork specified for the Roofs has not been executed exactly; but I do not attribute any of the defects to its absence.

*“The result of the faulty construction and careless workmanship of these Roofs is too evident to escape notice.*

*“Viewed from the exterior, it is very clear that they have sunk and twisted to a serious extent; but it is only by a careful examination of the interior that the full gravity of the case can be perceived.*

“1. I find that the purlines have generally given way considerably. Sometimes, in consequence of want of proper support, and at others owing to the system of scarfing them in the centre of their length.

“In roof over No. 21 Ward, I found a deflection of  $1\frac{1}{2}$  inches in about 11 feet length of purline, and as there was a scarf in centre, no doubt it must go farther.



In the same roof the purlines at the end are 16 feet 10 inches long, supported at one end against the back of roof, and at the other end meeting another purline at the hip. The deflection here is  $1\frac{5}{4}$  inches, and it is to be observed that a support might with the greatest ease have been provided for this from the wall below. *The corresponding purline on the other side of this roof has a similar deflection, and is moreover almost broken in two.*

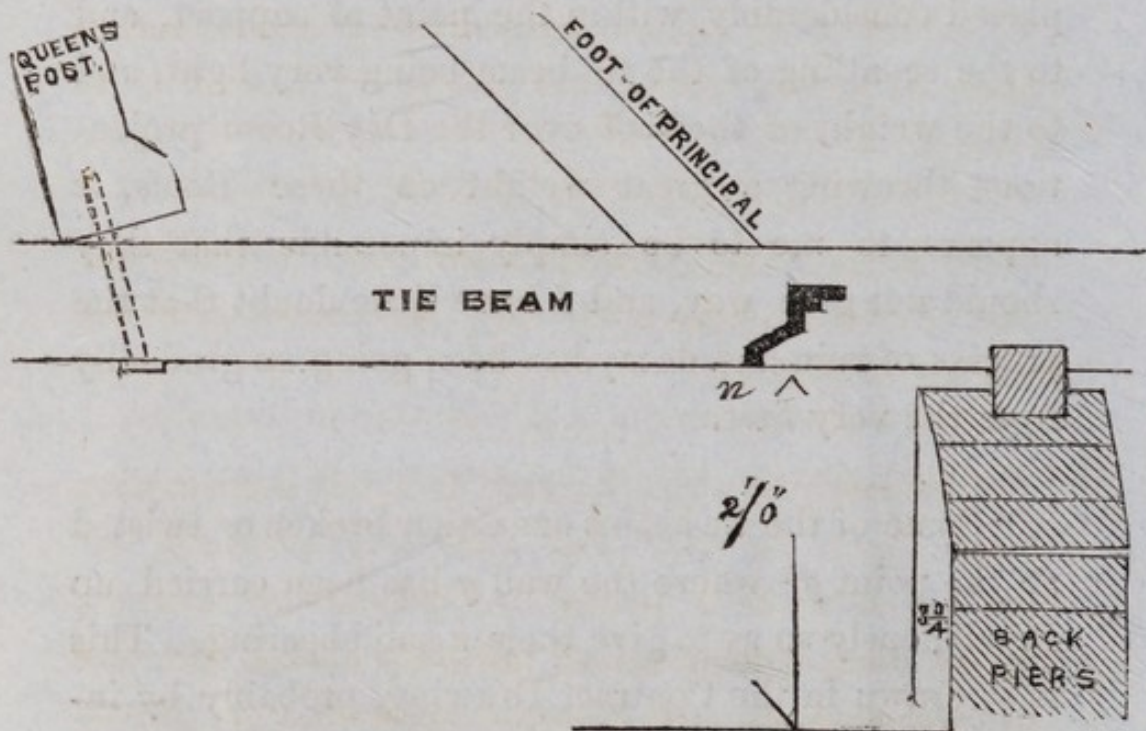
“ 2. Many of the tie beams are either broken, or seriously strained, and generally at the point (*n*) on the diagram. It would surprise me if this had not happened, for owing to the principal rafter being placed considerably within the point of support, and to the scantling of the tie beam being very light, and to the weight of the roof over the Day Room projections throwing a great weight on these Roofs, it appears to me to be simply impossible that they should not give way, and I have little doubt that the process of ruin and decay has been going on gradually from the very first.

“ Some of the tie beams are either broken or twisted at the point *g*\* where the wall *g* has been carried up injudiciously so as to give them a solid bearing. This is so drawn in the Contract Drawing, probably by inadvertence, but ordinary care on the part of the Clerk of the Works or Builder would have avoided any chance of the occurrence of this damage.

“ It is difficult to say, without knowing how much they were cambered, precisely how much the tie



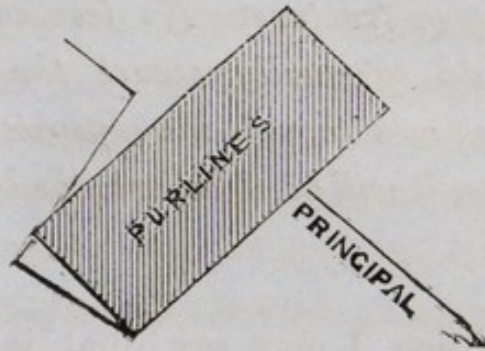
beams have deflected, but as I found some evidence in one or two cases of a cambering to the extent of  $1\frac{1}{2}$  or 2 inches in a length of 26 feet, and in others a deflection to the same amount, I have no doubt that it has taken place; besides which there is strong evidence of it in the Roof over No. 16 Ward, for here the tie beams have been corked down on to the plates, and in the process of sinking have drawn both plate and wall under plate over towards the centre in this manner. Generally speaking, the tie beams are only spiked to the plates, so that though the same thing has happened in all the roofs, it does not generally show quite so clearly as in this case.



“ 3. The principal rafters, which are only 5 feet 8 inches in length, have generally given way as much as  $\frac{3}{4}$  of an inch to 1 inch where the purline (E) rests on them, but I found no case of a broken principal rafter.



“ 4. The purlines have very generally been forced out of their original position in this way by the pressure of the roof.



“ 5. The pole-plates in general shew the effect of the same pressure, being pushed out of their original position. In one place I found this had occurred to the extent of  $1\frac{3}{4}$  inches, in another  $1\frac{1}{2}$  inches, and in others to a less extent, *but nearly all seemed to be moving.*

“ 6. Many of the principals are much twisted, and some of the timbers split with the strain to which they are subjected.

“ The result at which I arrive from this examination of the Roofs is, *that they have unquestionably not been executed in a proper or substantial manner ; that as their defects are all perfectly visible upon the slightest examination, I cannot think that the Architect was justified in certifying, as I presume he did, that the work had been properly executed.* But beyond this it appears to me that the roof shown on the Contract Drawing A, was not sufficiently strong for the span even if it had been well executed. *There is I believe only one mode of effectually*



*remedying all the defects, and that it is by following the same course that has been already commenced, viz., taking down the roofs and framing additional principals and ties, bolted to the others so as to secure them from further sinking or fracture. No less complete re-construction would effectually secure the building from further injury, and though the expense, no doubt, will be considerable, it will be, I believe, the best economy in the end.*

“In conclusion, I may say, that it is impossible, without entering into the question much more closely than I have been able to do, and without making drawings, &c., to say what the probable cost of the repairs I have indicated would be; I apprehend, however, speaking in a very general manner, and without pledging myself to the amount, that they would cost not less than from four to five thousand pounds.

“GEORGE EDMUND STREET.

“33, *Montague Place, Russell Square,*

“29th May, 1858.”

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Professor Hosking's second Report was as follows :—

“COLNEY HATCH ASYLUM.

“*REPORT upon that part of the case communicated to me by Mr. C. P. ALLEN on the 15th March, 1858, which has reference to the “Injurious Consequences or Damage,” and to the consideration of any Injury arising from Malconstruction or otherwise.*

“WILLIAM HOSKING.

“7th June, 1858.”



“ Having stated in my Report, dated the 10th May current, the facts as I found them, regarding and in relation to ‘The Depths of the Foundations,’ ‘The Roofs of the Buildings,’ and ‘The Arched Ceilings of the Galleries,’ to which my attention was to be confined, with the results of my consideration of such facts, and generally in conformity with the therein noted instructions, I now proceed to consider—

“ ‘*The Injurious Consequences or Damage*’ resulting from the defects observed, and the reasonable and therefore proper means to be resorted to by the Committee to repair or prevent the mischief traceable to, or to be apprehended from neglect of duty on the part of Mr. Daukes, such being the tenor of the instructions. I have also to consider the question implied in the material discrepancy which appears between ‘The Drawings and the Specifications; whether such discrepancy does not in itself imply the clear absence of ordinary skill and diligence on the part of Mr. Daukes, by whom those two documents were to be arranged.’ I elect to consider this latter question as a preliminary to the former, and to make it embrace such discrepancies generally.

“ Full consideration of ‘The Injurious Consequences or Damage’ involves the question arising from what? the answer to which seems to be found in an earlier part of the Memorandum, ‘Whether the Work, as executed in Plan and Design, as well as in Workmanship and Material, is or is not in conformity with or in violation of the *Contract*,’ the Contract having been just before described to be ‘the Contract of Mr.



Myers.' But this Contract was an engagement to Build according to a certain Specification and to certain Drawings, which purport to be scheduled (the first Schedule, &c. (with the Specification by Numbers from 1 to 13 inclusive, together with 'such explanatory and working Plans and Drawings as shall from time to time be delivered by the Architect and Surveyor for executing the Buildings and Works, according to the above-mentioned 13 Plans and Drawings, and the Specification,' which Specification forms the 2nd Schedule. No such explanatory and working Plans and Drawings are forthcoming thus far, and it is clear that none such could be admitted as part of the Contract which are not in accordance with the present 13 Plans and Drawings, and the Specification.' (*Plans* are '*Drawings*' in the sense in which the terms are here employed as much as Sections and Elevations, the '*Drawings*' intended, and, therefore, to avoid the repetition of the tautologous expression, '*Plans and Drawings*,' the latter term alone will be used hereafter to imply both, unless it be in quotations.)

"The Articles of Agreement bind Mr, Myers to 'erect, build, make, and complete' the contemplated Buildings and Works according to the last-named Documents, subject to the decision and determination therein of the Architect and Surveyor appointed by the Visiting Committee 'to superintend the construction of the said Works'—that is to say, the Articles of the Agreement between the Committee of Visitors and the Contracting Builder, contain the usual provision in such cases that any discrepancies which, in carrying



out the work, might be found to exist between the Specification and the Drawings, should be reconciled by the Architect of the Building, who is generally supposed to be entitled to, and who appears in this case to have possessed, the confidence of both parties. 'In case the Plans and Drawings or any of them shall not correspond and agree . . . . . with the Specification as to the dimensions of the Buildings and Works,' the Architect shall decide and determine whether to build according to the Drawings or according to the Specification, and the work is to be done according to his decision and determination,—'dimensions figured upon the said Plans and Drawings are to be taken to be correct in preference to any dimensions that may be obtained by the scale, and in case of any discrepancy between the dimensions figured on the different Plans and Drawings'—*then* the Architect shall decide which of such *Plans and Drawings* (not which of such *Dimensions*!) 'is or are to be considered and taken to be correct.'

"The Specification and the Drawings have been already found to differ greatly with regard to the extent in both depth and width, and thereby in the quantity of Concrete to be employed in the Foundations; and in like manner in the more costly matter, brickwork, with regard to the Footings to the walls, their depth and width; so that no estimate could have been made of the work required, without a determination previous to taking out quantities for estimate. The Drawings and the Specification must have been *altogether* in the hands of the Surveyors who took out the quantities, and the Surveyors must have been in-



structed by some one having authority, which of the two they were to regard—the unmistakable language of the Specification, or the unfigured lines of the Drawings, under the guidance of varying and irreconcilable scales—or without any scale at all. That the documents, differing as they do in expression upon points involving so much, both as regards the cost of executing the works, and the permanence of the structure, should have been allowed to go unreconciled into the Contract after the Architect must in fact have ruled ‘what was to be considered and taken to be correct,’ seems to raise a question of more moment than of either the skill or the diligence of the Architect employed. But the documents *were* allowed to go unreconciled into the Contract, and as they appear now, it is impossible to determine from them what Mr. Myers contracted to do, and impossible, therefore, to say whether the work, as executed in the Foundations and in the Footings of the walls respectively, is or is not in conformity with, or in violation of, the Contract.

“In like manner, with regard to other matters of, perhaps even greater magnitude, if not of equal importance to the stability and durability of the structure, it is impossible, because of discrepancies between documents of the same class, to say what Mr. Myers contracted to do. The only elevations of the building are the drawings bearing the Nos. 7 & 8 respectively. The drawing No. 7, being named in the first schedule ‘*Elevation of Centre Buildings and Wards,*’ and the drawing, No 8, ‘*Elevation of Surgeons’ Houses and Infirmaries.*’ These are upon the same sheet or roll



of paper, with a drawing, No, 9, and described in the first schedule, '*Transverse Section through Wards.*' (There is besides upon the same sheet, an explanatory or detail drawing, being a section of stone steps, as of a staircase, with a written intimation, that all the stairs in the building throughout are to be wrought as there shewn, and that the drawing itself is at the scale of two inches to a foot.) This drawing, section No. 9, placed between the elevations, Nos. 7 & 8, has no scale under or near to it, nor any description of a scale. But it has some dimensions written upon it, which almost all point to a scale of 5 feet to an inch, and this being in relation with the scale at which the general plans of the building are drawn—20 feet to an inch—and in accordance with others of the enlarged drawings, there can be no doubt but that the '*Transverse Section through Wards,*' was made at the scale of 5 feet to an inch. The Elevations, Nos. 7 and 8, severed as they are by No. 9, are evidently drawn at the same scale as the '*Section No. 9,*' that is to say, at the scale of five feet to an inch—but it is only by mechanical investigation, that this kind of relation between the Drawings can be established; for neither No. 7 nor No. 8 has a discoverable dimension of any kind figured upon it, to help to a determination of what the scale at which they or either of them had been drawn might be. Neither is there any declaration of a scale upon the sheet or roll, applicable to these drawings or any of them, but under the middle of the Elevation No. 7, there is what purports to be a scale drawn. This, however, is found to bear no relation whatever to the normal decimal scale of the general plans, and of the



drawings, as a set purporting to illustrate the same buildings and works, nor to any usual or practical available division of a foot. The nearest approach that can be made to the dimension which an inch in length of the scale presents in the Drawing, to which by being drawn under it, it purports to apply, being four feet five inches (4.416) or thereabouts. This is evidently no true scale, but it occurs also on one other of the Drawings (No. 11, being a cross or transverse section of the Chapel), whilst all the Drawings to which it may claim to be applicable, by being upon the same sheet of paper with them, without any rival scale, are found to be really drawn at the recognisable scale of five feet to an inch.

“ Or, to state the case in another form, there are four drawings, three of which stand in the same sheet, and bear consecutive numbers. All three drawn to the same scale, and really presenting the same matters in different aspects—the first in rotation bearing no dimensions, but having a scale connected with it, according to which the building could not be built and be in conformity with the other drawings. Whilst the articles of agreement make no provision for the solution of such a difficulty, the second in rotation is without figured dimensions, and without scale, neither has the third in rotation a scale, but it bears some figured dimensions which at once indicate a scale and contradict it; but the fourth of the four drawings referred to, (No. 11, upon a separate sheet of paper,) a transverse section of the Chapel in the Central Compartment of the building, which, (according to another corresponding drawing, being a longitudinal



section of that compartment traversing the other, and thereby transverse of the building, having a 5 feet to an inch scale upon it), is certainly drawn at the scale of 5 feet to an inch, though it has a 4.416 to an inch scale, and a figure dimension upon it; but the figured dimension, discordant as it is with the 5 feet to an inch scale, at which the drawing is made, does not agree with the irregular scale at which the drawing purports to be made. Further to the same effect—The Central Compartment of the buildings includes a tower, surmounted by a cupola, and this structure is shown in the elevation of the building in the drawing No. 7. By the scale upon that drawing, the greatest height of the structure from the level of the ground floor is about 90 feet; the transverse section of the building through same Central Compartment (one of the three drawings bearing the No. 10), passes through the same cupola-covered tower, and shows it at the same elevation (the same in every respect so far as an elevation and a vertical section show the same parts, and they do so in everything excepting height), but as this drawing bears a scale at which both the drawings, Nos. 7 and 10, were made, the tower, with its superstructure, measures more than one hundred, that is to say, about 104 feet from the same level, the level of the ground floor of the building at the main front entrance.

“There is no figured dimension in this case to check and correct the different dimensions yielded by differing scales, and there is no provision in the Articles of Agreement, as before remarked, for determining that particular difference, as if such a dif-



ference had not been contemplated as possible. But the structure is not, in fact, built of the greater height required by the one, nor so low as the other might have been taken to permit.

“It has been already stated that the general plans of the buildings (Nos. 2 to 4, inclusive, of the scheduled drawings) are drawn to a scale of 20 feet to an inch, and that a scale to such effect appears upon every such plan ; the sections of the ground and of the buildings in block, (No. 13 of the Schedule drawings) are drawn in like manner at 20 feet to an inch, and accompanied by a scale at 20 feet to an inch, and although a few figured dimensions appear, they are in the central compartment only, and do not therefore affect the general dimensions yielded by the scale, as those of the building as a whole ; and it is found that the general elevations are *drawn* in accordance with the general plans, though at a larger but still accordant scale ; that is to say, at the scale of 5 feet to an inch, but it is also found that a scale, at or about 4.4166 feet, that is to say 4 feet 5 inches to an inch is drawn under the principal elevation, overruling the assumption in favor of the possible conformity of the elevation with the plans, for no figured dimensions of any kind appear upon either plans or elevations to reconcile them, or to correct that one of which the scale may be in error, in respect of the lengths of the building. So although it is not difficult to ascertain of what lengths and to what heights Mr. Myers has built, it seems impossible to gather from the documents with any approach to certainty what Mr. Myers contracted to do in respect of the lengths and heights of the building or buildings.



“ But as in the case of the Concrete foundations of the buildings, and of the Footings to their wall, all these things must have been reconciled, or have been in such a condition, in the not improbable absence of the irregular scale, and of the figured dimensions now found upon some of the drawings, as not to require reconciliation, that is to say, all the really essential drawings (‘ Plans and Drawings ’) which do appear scheduled as part of the Contract, are drawn at what is in effect the same scale, **100 feet** to an **inch** or some aliquot part of **100 feet**, that is to say again at **20 feet** and **5 feet** respectively. There are, it is true, three drawings, all bearing the number 6 of the Schedule, which have been drawn at the familiar working scale of 8 feet to an inch, but each of the three has upon it either that scale drawn, or a written intimation that such is the scale of the drawing.

“ Whatever may have been the case with regard to the quantities of Concrete in the Foundations, and of brickwork in the Footings, whether they were taken out according to the Specification, or according to the drawings, I can have no doubt that notwithstanding the now conflicting scales and dimensions, the quantities in the buildings as a whole were taken from the drawings for estimate at the accordant scales of 20 feet and 5 feet to an inch respectively. I am unable to say ‘ whether the work, as executed in plan or design, as well as in workmanship and material, is in conformity with, or in violation of, the contract of Mr. Myers ; ’ and this uncertainty appears to me to be a consequence of want of skill and diligence on the part of Mr. Daukes, if it were he by whom the



Drawings and the Specification were arranged, and whose duty, as Architect and Surveyor for the Committee, it unquestionably was so to arrange them, that there should be certainty in the proceeding throughout. To repeat,—it may be taken for certain that the Surveyors who took out the quantities for the competitors for the contract to build, had the Specification and the Drawings before them, and that they took out the quantities under instructions, which made them appear strictly accordant. They are not so now, and they appear to be now as they were when they were admitted into the Contract as its exponents. And I can come to no other conclusion than that the drawings were altered by the insertion of new matters after the quantities had been taken out from them for the estimate.

“But the injurious consequences or damages traceable to, or to be apprehended from Mr. Daukes’ conduct, seem to be limited for the present consideration, to — *First*, the Foundations; — *Second*, the Roofs; and, *Third*, the Arched Ceilings of the Galleries.

“As to the Foundations—I now (25th May,) understand the expression, ‘the depths of the Foundations,’ in the memorandums to which I have referred, as the depths from the surface of the ground to the bottom of the Concrete employed to form the foundations of the Buildings, and the expression ‘quantity and disposition,’ to be intended to imply the actual dimensions of the Concrete itself in depth or height, and in width respectively. I have already intimated



in a previous statement of facts and deductions, what I now proceed to state more categorically that, in my opinion, the clay bed upon which the Concrete rests, where it is, as I have found it under main walls, about 4 feet down below the finished surface of the ground, is low enough down to be beyond any injurious influence from or through the atmosphere *to the extent to which the clay is covered by Concrete*, that the depths or vertical height of Concrete found in the work, about 2 feet 6 inches is sufficient to prevent the clay bed from being affected by the atmosphere; but that the Concrete is not generally wide enough, or does not extend outwardly far enough to cover, and thereby to protect from possible injury coming from or through the atmosphere, the clay at the level of the bed of the Concrete.

“ I have remarked before that the Specification provides in express terms a much greater thickness, vertically of Concrete than I have found in the work, and stated that I do not attribute any of the now patent injuries in the work above; that is to say in the main inclosing walls throughout to the want of greater thickness in that direction, and I have also remarked, that in providing for the breadth of the brick footings of the walls at their base, a much greater breadth or thickness horizontally was specified than has been given, and I have said, that to this want of breadth of base I am disposed to attribute the settlements which appear by fractures in some of the walls.

“ There is something exceptional about the corri-



dors of communication on the north or principal front of the ward buildings. They are low, and have but one special wall, and it would be almost absurd to provide such a large body of footings and so great a mass of Concrete under that wall, as for the main walls of the building; but I do not find the footings and foundations of the corridor wall are made an exception from the provision made in the general clauses. That provision is not complied with, however. A shallow stratum of Concrete is all that is given to it, bedded at a high level, and the wall has suffered accordingly. It shows more signs of disturbance in the brickwork, than any other wall of the same extent.

“Reverting to the main and external walls of the building, I desire it to be understood that I do not state it as a matter of ascertained fact, that the fractures found in the walls are attributable to the want of sufficient breadth in the footings and foundations; but as matter of opinion that if the extended footings in Brickwork required, and the relative breadth or width of Concrete pointed out by the Specification (though it were with the less *depth* of Concrete that is found) had been supplied, the settlements in the walls above would not have occurred. But, besides, and in addition to the actual mischief that has occurred, attributable as I say to the want of sufficient base, upon and thereby in, and of, the Concrete foundations, there is prospective and contingent mischief from the wearing away of the outer faces of the Concrete, under the outer and exposed faces by the corrosive influences to which they will be exposed from alternate dryness, wetness, frost



and thaw, and the earlier period at which necessity will arise of underpinning the Walls because of the reduced substance of the foundations.

“The *appearance* of fractures in the walls may be removed by a careful and costly operation; *but the strength of original structure cannot be given to the broken walls by any mere repairing operation.* In like manner as regards the Foundations. As at present impressed, I apprehend no early danger from their condition, and should question the propriety of doing more than remove the appearances, and cure the patent infirmities.

“There is also that other matter to which I have referred in my Report of the 10th May last, (the probable omission throughout of the stratum of Concrete over the whole surface within the walls of every Ward provided in the Specification) and stated my impression of the use it might have had in connection with a system of ventilation, by means of which the Works, if not the Inmates—I think both—might have been protected from injuries to which, as it seems to me, they are now liable. I may add to this, that I remarked under the sub-floor of the Chapel, some coarse uncombined gravel, which may be intended to represent in that part the stratum of Concrete referred to, but I could not recognise it as of the kind directed by the Specification.

“The ‘*damage*’ sustained by the County in the matter of the Foundations, with or without the other matter to which I have made allusion, seems to me



to be of two different kinds ; one arising from having charged for more work than has been done, and the other from the general inferiority of the Buildings, for want of what has been withheld. With reference to the first kind of damage, the difficulty of ascertaining the amount would be great only because of the cost and inconvenience of opening the works in the foundations throughout the Building, inside as well as outside, to ascertain the nature and extent of the work done ; for the means of ascertaining what ought to have been done are patent and attainable if I judge rightly, and I think I can show that I do so, that the estimate was made according to the Specification in the only particulars held questionable. The difference between the two results would be the amount of damage sustained under the first head when the costs of the investigation have been added to it. The second kind of damage is not a matter of calculation but of judgment. Matters which are capable of being set right by reconstruction, replacement, or even amendment, tell the story of the *damage* in the expense of effecting such operations. *But, after all, such works are done, there will still remain the continuing damage from the defects which are practically irremediable, and such are, I say, inter alia, the condition of the Footings and Foundations, the condition of the walls from overcharge of mortar, the defective carpentry of the greater Roofs, the defective bonding of the stone-dressings to corridor-wall, and other such matters yet to be remarked upon.*

“ As to the Roofs. The utter failure of the WARD



ROOFS or Roof, for it seems to be one Roof repeated so many times under the same circumstances, that is to say of the same form, the same span, and the same composition as a structure, and varying only, (and that in a degree of no importance to the question,) in length, and therefore liable to the same contingencies on whatever ward buildings erected, has but to be stated as a fact already arrived or certainly approaching.

“The Roof is a bad one from its excessive weakness, the weakness arising from the viciousness of its construction, which I have described and explained in my former Report, and from a miserable attempt to economise by making it in bays of excessive length.

“The relative strength of the timbers which bear the Roof covering of the Chapel and Dining Hall Roofs, respectively to the lengths of the bays as compared with the strength of the same timbers of the Ward Roof as specified, is such as to point to a length for the bays of the Ward Roofs very little more than one-half that of which they were made in fact. This plainly indicates a departure from the contemplated arrangement of the bays of the latter from long enough to too long; or, in other words, from the passably good construction of the Drawing, and the reasonable provision made and contemplated by the Specification, to the *viciously bad and ruinously weak of the work as executed*.

“The ‘*damage*’ in respect of the Roofs seems to be, at the very least, the expense of making such of them



as are capable of amendment strong for service and effective (and such as I think the case with those of the Offices about the central compartment of the Establishment), and the expense of taking off the present roofs and replacing them by strong and sufficient and thereby durable structures; and this must be the case with the Ward Roofs throughout if they be all, *as I believe from external appearances they all are, in, or fast approaching to, a condition similar to that of those which I have particularly examined.* The cost of effecting this, as a matter of mere outlay, must have been by this time ascertained by the outlay made in actual replacements; *and I am prepared to avouch, that less rather than more than enough has been done in the compartments which have undergone the process of re-roofing.*

“I am fully of opinion *that so far as the Ward Roof is concerned, nothing short of the renovation which the Committee are proceeding to effect, would have met the exigency of the case, I shall advise the Committee indeed to go somewhat further in the direction of strength, in the reconstruction of the Roof, and for the sake of permanence, in a manner that will add yet something more to the cost of replacement.*

“As to the Arched Ceilings of the Galleries. In my former Report I pointed out what I believe to be an error in the treatment of these ‘Arched Ceilings.’ They are in their nature rigid constructions, having no tendency to expand, and thereby to thrust, such as a constructed arch in its nature has,



and in placing them as if they were flat arches between two inclined planes, they have been made to act as wedges, whereby they might either rend or collapse in failing to force asunder the walls between which they were placed. Whether ceilings of plain tiles, or other such heavy matter were necessary at all, or not, is another question; if it be indeed a question as regards the ceilings of the uppermost Story, I think not; and *I am sure that the Committee have been well advised in determining to replace the 'Arched Ceilings' in the reconstructed works by a plastered Ceiling, so that the plastering be of strong and resisting character.* But had the 'Arched Ceilings' been formed by three Courses, of plain tiles bedded in 'pure cement,' as specified, they might, though placed wedgewise between the walls, have remained secure, if left unloaded by concrete, and if covered by a rightly-constructed roof; for the defective Roofs have, in fact, done the mischief to the Ward walls in their unabutted lengths, and made the 'Arched Ceilings' themselves the more untrustworthy.

"Whether the change made in the composition and mode of construction of the 'Arched Ceilings' is attributable to error of judgment, or to a desire to substitute a less expensive for a more costly composition, I am not to say; but I have no doubt that the result of the change has been to substitute what can never, without artificial aid, be deemed certainly safe, for what need not have been regarded as in any degree dangerous. A small saving may by the change have been made in the cost of the Ceiling, but a large



item of insecurity has been imparted to the structure.

“The appreciable ‘damage’ in respect of the replacement of the Upper Ceilings, which both prudence and necessity require to come down upon the removal of the Roofs of the Wards, is the cost of the new plastered Ceilings, and of any addition made to the strength of the Roof Trusses to carry it.

“It is a question requiring serious consideration, whether the Lower Ceilings should be retained or not. *I cannot myself think them so certainly safe as they ought to be. A kind of permanent Ceiling, of cast iron ribs, might be applied with some advantage, but it would be costly.*

“Thus, in my view, the condition of the Foundations is one that must be borne with, detrimental though it be to the character of the building as a work intended to be permanent, the damage being estimated at a per centage upon the whole cost of the work in connection with the other matters which are in the same position; that is to say, practically irremediable. The fissures in the walls, from settlement or otherwise, arising from defects in the Foundation, or mal-arrangement of the work, may be cobbled, as I have said, and some may be, by reconstruction, removed, but only at a cost exceeding any advantage derivable from such an operation.

“I confess myself unable to make any reliable, or even approximative, estimate of what sum may be



asked for, as sufficient to do all that it may be prudent and reasonable to do in the way of amelioration, and think the settlements may be more safely considered under the same head of general deterioration. If the omission of the Concrete under the Ward-floors be proved, or be admitted as a fact, the money saved may be ascertained by estimate, but the real damage would be deterioration.

*“ I have said that the cost of replacing the Ward Roof throughout is one that must of necessity be incurred, and the necessity seems surely to be damage to the amount of the cost of the operation, and something more, seeing that the great inconvenience and expense of removing the Patients, and of admitting workmen into the heart of the establishment, must be costly beyond what could be taken into estimate as works.*

“ In like manner, with regard to the ‘ Arched Ceilings’ to the upper galleries in the Wards, the cost of removing and replacing them by plastered Ceilings will have been ascertained by experience ; that is clearly damage, seeing that they were either unsafe as constructions, or were made so by the defective and mischievous roof constructed over them, or by a combination of both.

“ Having regard to the ‘ Arched Ceilings’ of the lower Galleries, it is certain that they are not necessarily unsafe, since they have remained in great part undisturbed for six or seven years, and the same, indeed, may be said of those of the upper Galleries,



but that they are more unfortunately placed with an unweighted as well as an unbuttressed wall on one side to some considerable extent. The mischief is, that they are not *certainly* safe. For this reason, something should be done to hold the ceiling of the lower gallery in check if it is not replaced by that which may be considered unquestionable; and, in any case, I do not think that anything could be done to much effect for less than **£100** each gallery. Light cast-iron permanent skeleton centring may, I believe, be applied to each for about that amount, and be a reliable preventive against calamity, in respect of the 'Arched Ceilings.'

"In exercising my judgment, and it is a mere act of the judgment, upon the difference between the Building as it is in respect of works, materials, and constructions, and the Building as the Specification and the Drawings seem to me to purport—reading the latter as conformable with the former, and having regard in the view I take to many matters of detail which have come under my notice, and which I propose to indicate in a further and supplementary Report—I am of opinion, that when the replacements and amendments above indicated have been effected, the difference in respect of quality and capacity will be at the least 10 per cent. of the original cost against the Building as it is, as compared with what the Specification and the Drawings would have made it.

"I do not mean by what I have now said to assert that 10 per cent. more has been paid for the Building as it is, than it might fairly cost as it is. It may or



may not be so ; but under the known circumstances of the case, I assume that the sum paid was a reasonable and sufficient sum for the Building required, as shown and described in the Specification and Drawings ; and in the exercise of my judgment upon the case, I say that the Building supplied is not, and will not be, when its immediately curable defects have been removed, such as it ought to have been by at the least 10 per cent. of the amount paid for it."

These Reports were submitted to Mr. Atherton, and he gave the following further opinion :—

"I have perused Mr. Hosking's further Report, (especially relating to Damage,) as well as Mr. Street's Report on the subject generally. The statements, of course, of these Gentlemen go strongly to shew that the Defendant was guilty of breach of duty at the various stages of the preparation of the Plans, &c., and arrangement of the Contractor's Contract—in superintending the execution of the Work—in superintending the Workmanship and Materials—in design (original or substituted) and in giving the Certificates of conformity to the Contractor from time to time. I hope it may be possible for the various Gentlemen of professional skill who have examined the Asylum and Contracts to compare notes, and state how far, at least, they are prepared to give in a common testimony—and amongst these I include the two gentlemen originally consulted. Mr. Maude, who drew the declaration and particulars of Breaches, should see the further statements—which have been laid before me, and consider whether it may not be expedient



to apply for leave to amend and deliver a further or amended particular of Breaches. No very material addition will, I think, be found requisite, nor any but such as a Judge would be disposed to allow. Both Mr. Street and Mr. Hosking point to substantial damage, though a precise *sum* may never, perhaps, be arrived at—in *evidence*, the inferences of a Jury may be trusted to apply the want, supposing them to be of opinion that the Defendant's Contract has been substantially broken, and that substantial damage has been the consequence.

“W. ATHERTON.

“*Temple, 9th June, 1858.*”

Subsequently, Mr. Hosking forwarded two further Reports, of which the following are Copies :—

Professor Hosking's Third Report.

“Report upon that part of the case communicated to me by Mr. C. P. Allen, on the 15th March, 1858, which has reference to defects in ‘materials,’ ‘execution or workmanship,’ not necessarily connected with any of the three special matters to which the instructions it contains are mainly addressed, and which have been dealt with in the two previous Reports,—that of the 10th May, and that of the 7th June respectively.

“WILLIAM HOSKING.

“31, *Parliament Street, Westminster,*

“*1st July, 1858.*”



“The instructions which I now proceed to endeavour to comply with, run as follows:—‘Any significant defects discovered in the materials used, or in the execution or workmanship, (as matters apart from and independent of plan or design), should be pointed out in detail, and particular attention called to those which an Architect, using ordinary and reasonable vigilance must have detected, and of which, therefore, Mr. Daukes either was, or ought to have been, aware.’

“And, first, in respect of the Brickwork.—The Brickwork throughout exhibits the significant defects of being composed of bricks of unequal thickness in the same courses, and of having its bed joints not only unnecessarily but mischievously thick; the thickness of the Mortar Beds being partly normal, but mainly, in consequence of the unequal thickness of the bricks; and in all these particulars the brickwork is not only defective in itself, but also contrary to the express provisions of the Specification, for this document provides in the general description of ‘materials and workmanship,’ under the head ‘Brickwork,’ that the bricks, generally, are to be stocks; those for the facings ‘Malms;’ and the *whole are to be of an uniform size*; and under the same head it is further stated, ‘no joint is to rise more than a quarter of an inch.’

“The Bricks used in the walls of the Buildings not only are not of the same size throughout, but they are not of the same size in the same course or courses of the same wall at the same level. The



malm, or facing bricks, of the fore front walls stand, as a rule,  $2\frac{5}{8}$  inches thick, whilst the average thickness of the stocks employed in backing them up and in hearting the work does not exceed  $2\frac{1}{2}$  inches. Many, indeed, of the stocks shewing in the fronts of the building to the Airing Courts are not more than  $2\frac{3}{8}$  inches thick. Thus four courses of malm facing with the specified rise in the mortar beds—(for it is the bed of mortar that is intended by the above-quoted expression ‘no joint, &c.’) of one quarter of an inch gives a height of  $11\frac{1}{2}$  inches; whilst four courses of hearting and backing stocks taken at  $2\frac{1}{2}$  inches thick, must, to bed and bond with the facing bricks, (an essential condition in brickwork, and one without which no wall of more than one brick thick can be built,) have bed joints of mortar once and a half the prescribed thickness. But it is not only the hearting and backing brickwork that is affected by disparity in the thickness of the facing bricks of a front wall, as in this case, but all the other walls of a connected building, whether internal or external, must follow the lead of the front wall; and the consequence is, that there will be throughout the most extensive buildings, as there is in the building of the Colney Hatch Asylum, in every forty-eight courses of hearting and backing of every fore front wall, and in every internal and every back front wall, mortar equal to two courses that ought to have been brickwork. Such must indeed be the case where it is the bricks only which are contrary to the requirements of the Specification—that is to say, when the bricks are not of the same thickness, and therefore not of an uniform size throughout. But, as above



intimated, both the quoted requirements are set at nought in the Colney Hatch Building. Four courses of the malm facing bricks of  $2\frac{5}{8}$  inches thick rise in the work from 12 inches to  $12\frac{1}{2}$  inches, and even to  $12\frac{5}{8}$  inches, instead of  $11\frac{1}{2}$  inches, shewing that upon an average of the four mortar beds to such four courses, the bed joint is often double the prescribed thickness of  $\frac{1}{4}$  inch, or from  $\frac{3}{8}$  to half an inch thick, whereby the same joint rises in the hearting and backing to half an inch and  $\frac{5}{8}$  inch in thickness. Consequently there will be to every four courses in height of a wall built with bricks  $2\frac{1}{2}$  inches thick which stands upon the average  $12\frac{1}{4}$  inches high,  $1\frac{1}{4}$  inch of mortar more, and  $1\frac{1}{4}$  inch of brickwork less than there ought to be, and thereby in a height of 12 feet, fifteen inches of mortar in excess, and in the place of more than five courses of brickwork proper.

“ But even this latter result is exceeded in the walls of the Colney Hatch Asylum Building, for many of the stock bricks used in the walls prove to be, as before said, of less thickness than  $2\frac{1}{2}$  inches, whereby the excess in mortar is made even greater, so as certainly to account for more than the greater thickness of the facing brick which leads off, and which lead the thinner hearting and backing bricks are compelled to follow; taking then the excess of mortar in the bed joints throughout at 1 foot 6 inches of every 12 feet in height of the walls, one-eighth of every wall is upon an average of all the walls composed of mortar instead of brickwork, that is to say, bricks and mortar in due proportion together. Now the mortar in the case



costs less than half the cost of the bricks, bulk for bulk, and the labour in building was diminished in proportion as the bricks were replaced by mortar; so, that at a moderate computation, the brickwork was executed at a cost to the Contractor of six per cent., at the least, less than if it had been executed according to the terms of the Contract, as set forth in the Specification—a saving probably of from £2,000 to £3,000,—so much for the disregard of the requirements above quoted, that the bricks should be of uniform size, and that the joints in the brickwork should not exceed a quarter of an inch in thickness, and the substitution, arising from such disregard, of mortar for bricks and mortar as an economical consideration in the first building of the walls.

“But mortar is, as a rule, more perishable than brick; so that Buildings built with more mortar in the structure of their brick walls than enough (and the Specification in this case determines, that *one* of mortar is enough where two and more than two have been applied in substitution of the more durable material, brick), are by so much less durable than they ought to have been. Moreover the larger surface of the more readily perishable material exposed, on the faces of the external walls, to the action of the weather, will lead much sooner, than might have been the case, to the expensive and most troublesome process of pointing the work—an operation in this case of vast extent, and one that having been once submitted to, is of certain and frequent recurrence. It may be remarked, however, with reference to this, that by an evident breach of any Contract, of which



the Specification may be considered an authoritative exponent, (but which breach, while it may have been to the advantage, pecuniarily, of the Contractor, is an advantage to the Building, by the better quality of the mortar employed), the mortar will stand the weather longer than it might have done, if it had been made in the proportion of lime to sand prescribed by the Specification. The prescription is one part lime to two parts sand—whilst the mortar employed contains fully three parts of the cheaper ingredient, sand, to one part of the costlier, lime. But it has happened, unfortunately, that, to a large extent, the Brickwork was executed in, or in the face of, winter ; for pointing indicates the failure of the original joints from frost—an enemy to fresh Brickwork, against which thin joints are the best protection, by leaving but small surfaces for it to take hold of.

This is merely opinion ; so that if the question is raised, the mortar should be analysed to determine the fact.

“ I next remark as a significant defect, that much of the Masons’ work, applied as dressings, is very imperfectly connected with the brickwork, which it purports to be incorporated with, and to decorate. This defect exhibits itself, in a striking manner, in the front, looking East, of the Corridor, flanking the Ward Buildings, next South of the Surgeon’s residence at the East end of the Asylum, being No. 9, and appearing to answer to letter D of the Specification. Much of the stonework in face is loose, out of the upright, and ready to fall away ; so, that it may be concluded that it is not attached to the brickwork by sufficient tailing and bonding stones, or otherwise. The same kind of work is found along the whole line of the Ward Corridor, upon the North or principal front of

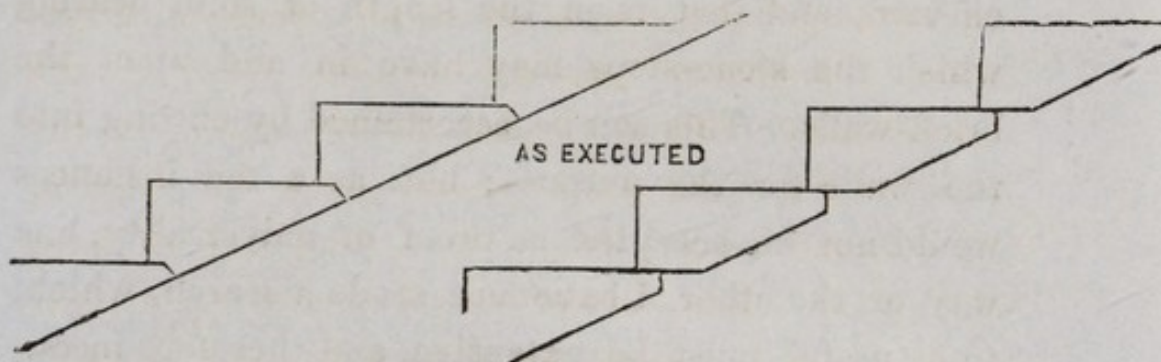


the building, but not in so advanced a stage of dilapidation. Defective masonry exhibits itself in the superstructure of the Central Tower, where, in the Attic to the main compartment under the Cupola, and forming its immediate base, dilapidations have taken place. Early attention and careful repair seem to be necessary ; indeed, not alone to the part particularly indicated, but to the whole compartment.

“The only explanatory or detailed working drawing found upon the same paper, with any of the scheduled Contract drawings, is that mentioned in a marginal note in my Report of the 7th June. It represents a section of stone steps as of a staircase, with a written intimation that all the stairs in the building throughout are to be wrought as there shewn, and that the drawing itself is at the scale of two inches to a foot.

“All the stone stairs are to be worked to this sketch, ‘scale two inches to a foot;’ a large and very sufficient scale to show, unmistakeably, what the Diagram purported. This seems to be the place to call attention to, and to contrast the fact, that the sketch shows steps bearing one upon another, with a birdsmouth back joint ; with the other fact, that in no one of the stone staircases throughout the building, as far as I have perambulated it, are the steps seated with the required back-joint, but with a plain bed running out horizontally, until the horizontal line meets the inclined soffit, thus—





Scale one inch to a foot as shown in Sketch.

“ Assuming, as it may be reasonably assumed,— that the quantities were taken out for the estimates, according to the diagram on the sheet with the Contract Drawing (for the Specification is in this case accordant with the Drawing); a considerable saving has been effected in both labour and material on that large item of cost—the stone-staircases throughout the whole range of buildings. It may be admitted, that the alteration might have been made without any practical disadvantage to the work in all the stairs of which, the steps are tailed in at both ends, and these are by far the greatest number; but in the stair-cases, like the great staircase between the Chapel and the Exercising or Dining Hall, in which the steps run into a wall at one end only, they are apt to work loose, unless they are seated with a birds-mouth back-joint, and these are all thereby, defective. Under any circumstances, there is a large amount of saved material and labour that ought to be accounted for.

“ There is, moreover, another direction in which a saving, judicious or injudicious, may have been



effected, and that is in the length of solid bearing which the stone-steps may have in and upon the brick-walls. This can be ascertained by cutting into the walls for the purpose; but, as a few instances would not be accepted as proof of universality, one way or the other, I have not made a search, which, to be useful, must be extensive, and therefore inconvenient and expensive. The Specification, in every instance, requires that the steps of the stone staircases shall be tailed six inches into the walls. This, in the case of steps bearing at both ends, is more than enough—but the steps must have been all taken in estimate of sufficient length to allow of such a bearing.

“It is possible, indeed, that credit has been taken as against the Contractor for any saving that appears, or that may be found to have been effected, in labour and materials, upon the stone stairs throughout. As Mr. Daukes intimates, in his Report to the Committee, of which a copy is before me, and which I had before referred to as indorsed ‘11th June, 1851,’ Mr. Daukes expresses his satisfaction that the Contract for building the Asylum had been completed ‘without a single extra,’ by the course he had adopted of compensating for additions and improvements by ‘the omission of unnecessary works,’ of which the abated labour and materials in the stone stairs may have been deemed a part. There are indeed other matters which may fall within the same category—such as the confessed substitution of [ $2\frac{1}{4}$  inches by  $\frac{5}{8}$  of an inch] battening [ $8\frac{1}{2}$  inches apart] for part inch and part  $\frac{3}{4}$ -inch yellow deal close joint boarding,



which is certainly an 'omission,' how beneficial soever it may be; and the undeclared omission, if it be omitted, of the fifth stratum of concrete provided to be laid over the whole surface of the wards. There are besides other things, of no mean value in money, which present themselves upon perusal of the Specification, which I have not yet been able to find, or to hear of, as existing in the work, such as 'a double course of strong slate bedded in pure cement,' in the walls over the footings; hoop iron bond in certain large quantities; a vat iron bonding course on the top of the external walls, under the stone cornice; and it may be, still other matters, the omission of all of which, so far as they have been really omitted, as unnecessary, *may* have been taken in and towards compensating for 'additions and improvements;' though, indeed, the 'additions and improvements' to be compensated for, are almost as difficult to discover as the stratum of concrete, the wrought iron bond, and the slate over footings. But Mr. Daukes refers for information on this question, or these questions, to Reports of the 13th May and the 27th June, 1849, and to 'the marginal notes in the Specification in blue ink,' which documents are not before me, nor, indeed, do the instructions, to which I endeavour to confine my observations, extend to any special investigation of the matter of the Report to which I have now made allusion.

"I had intended, in compliance with the letter of the instructions first above quoted, to set forth some 'significant defects' in the 'execution or workmanship,' but which I should designate the *carpentry* of



certain of the greater roofs ; but fearing that I may be thought hypercritical in dwelling upon defects in skill in respect of matters which, as a whole, I have passed over in a former Report, (ante Report, dated 10th May current, under the head ‘The Roofs of the Buildings,’ with the remark that, *for anything that can be observed under existing circumstances, they are not unlikely to continue to be safe and serviceable for years to come,*) I defer doing so. The roofs referred to do exhibit, nevertheless, in their design, defects which ought not to be found in them, and which, if it should be thought necessary, I shall be prepared at any time to point out in detail.

“ I have avoided hitherto any remarks upon that paragraph of the Instructions before me, which runs in the following terms :—

“ ‘The consideration of the plan or design on which  
 “ these works have been actually carried out, must have  
 “ for its object, whether such plan or design (be it or  
 “ be it not according to Mr. Myers’ Contract) is a plan  
 “ or design such as an Architect in the exercise of  
 “ ordinary intelligence and skill might adopt, or, on the  
 “ contrary, such as no Architect of ordinary intelli-  
 “ gence and skill could honestly sanction.’ ”

“ I have more than once intimated, both directly and indirectly, that the works have not been carried out in the manner which the design, as shown in the drawings, and as specified, very sufficiently indicates. And I now repeat, if repetition be necessary, in the words, very slightly paraphrased, of the Instructions,



that the plan or design on which these works have been actually carried out is (in many important particulars, most of which have now been pointed out) *not* such as an Architect in the exercise of ordinary intelligence and skill might adopt, but, on the contrary, 'such as no Architect of ordinary intelligence and skill could sanction.'

#### Professor Hosking's Fourth Report.

Report of what it had become prudent to do under the circumstances found to exist in the Building, in order to remedy the defects which have exhibited themselves, and are or have been supposed to be traceable to neglect on the part of Mr. Daukes.

WILLIAM HOSKING.

12th July, 1858.

"The instructional matter to the above effect is mixed up to some extent with narrative, which it is necessary to recite to make the intention plain, and thereby to make the reply and opinion more intelligible. It runs thus :—

"Much difficulty is thrown in the way of the Asylum Committee by the conflicting views entertained by the various professional gentlemen who have been consulted by the Committee as to the reasonable (and therefore proper) means to be resorted to by the Committee to repair or prevent the mischief—the mischief traceable to or to be apprehended from Mr. Daukes's neglect of duty.

"It has been suggested that it might have been



as well if the remedial measures recommended by some of the gentlemen who have been consulted by the Committee had been adopted, but this has not been the case; and the Committee have preferred renovation, and to make a thorough good job of it, to the 'expedients' suggested by some of the gentlemen referred to.

"To this part of the case also (including examination and consideration of the new works actually executed) attention is requested, and Mr. Hosking is requested to state, in detail, his opinion of what it had become prudent to do under the circumstances, together with the actual or probable expense, in order to remedy the defects.

"The first of these three paragraphs is preceded by the expression—'*The injurious consequences or damage forms an important part of the case;*' and I have not repeated it here, because I have already dealt with the subject to which it calls attention fully in my Report of the seventh of June, and because it does not seem to me to have any necessary connection with the structural question of repairing defects and providing against the further extension of mischief in, as I understand it, a structural point of view.

"I am not informed of the views of any of the professional men who may have been consulted, except as to those of Mr. Bellamy and Mr. George Pownall, as they appear in a joint Report bearing date early last year, regarding the condition of the buildings in respect of the Concrete in the founda-



tions—of the Roofs—and of the so-called Arched Ceilings of the ward galleries; together with their views of the means to be resorted to, to repair or prevent the mischiefs which they recognized. They seem to me to refer in such Report to other documents, and particularly to drawings as exhibiting their united views of what ought to be done to remedy existing defects, and to prevent further mischief. These I have not seen, but I gather from the Report I have alluded to, that the views and opinions of Mr. Bellamy and Mr. Pownall as therein expressed, and those which I have formed and expressed, though not wholly concordant, are capable of being to a great extent reconciled, both as regards causes of failure and means of reinstatement. As to the views of any other professional men in respect of what it has become prudent to do, I am, as I have said, uninformed. I declined indeed, when the matter came first before me, to look into the reports of others, which Mr. Allen proposed to put into my hands, lest I should be led into controversy, instead of being, as the matter found me, wholly unacquainted with the case, and in a condition therefore to form an independent judgment upon my own investigation of it.

“This I had already done, when subsequently, upon its being tendered to me a second time by Mr. Allen, I perused the report of Mr. Bellamy and Mr. Pownall, but I have not seen the drawings to which those gentlemen refer, nor the opinions or advice of any other persons; I am thus not in a position to judge of whatever remedial measures may have been recommended, or ‘expedients’ suggested for the considera-



tion of the Committee heretofore ; but I am sure that, as regards the roofs of the Wards, no merely remedial measures, and no expedient short of reconstruction was sufficient, or ought to have been adopted.

“ I have, as desired in the third of the above cited paragraphs of the Instructions, examined and considered the new works actually executed, having first informed myself by personal examination of the actual condition of the original works before disturbance took place, for the purpose of renovation : whereby I was enabled the better to judge of the causes of the derangements, and thereby whether simple renovation would suffice, or absolute reconstruction was necessary—where either could be attempted with any advantage.

Defects in  
the Founda-  
tions.

“ Having already, in my Report of the 7th June, expressed my opinion that nothing can be done to the concrete foundations to make them what they ought to be, or indeed to improve their efficiency, or to render them more durable, I must confine my suggestions to the means of repairing such dilapidations as appear in the walls, and in securing the footings above them. Where a fracture appears in the walls, the ground should be opened, and if the Concrete is found to have failed or to be scanty at the place, a piece of York Paving Stone should be pinned in under it, sufficient in area to take the footings of a Brick Pier, which being built in Cement should be racked back and carried up, so as to under-pin through the whole thickness of the Footings, and from two to three bricks in length of the wall, and so up

Cracks, Sub-  
sidences,  
Bulgings, &c.



to the surface, from which level, the wall should be carefully drawn in the line of the fissure, according to the bond in face, restoring with sound new work of bricks to match thoroughly bonded in. The work should be finished in face, so that the joints range truly, both vertically and horizontally, with the undisturbed work.

“This kind of operation is one of which it is impossible to estimate the cost before-hand. Probably no two defective places will be alike; while the places are many. My opinion is still, that the defects referred to can only be treated as general deterioration, and be taken (as I have said in my report of the 7th June) as deterioration, together with the other practically irremediable defects in the structure of the building. In like manner, as regards the sub-structure of the great Cupola. The extent of mischief can only be ascertained by probing the defects.

“The only Roof in the main central compartment of <sup>Roofs,</sup> the building that has utterly failed seems to be the Kitchen Roof; and as that is, as I understand, already in professional hands for re-construction, I need not consider it as among the matters upon which it is desired that I should make any suggestion.

“The other Roofs of the central compartment, including those of the Chapel and Dining Hall, are not in such a condition as to *demand* at this time any important operation; and, as I have before remarked, how defective soever they may be as works of car-



penry, it would be difficult to establish any claim for more than general deterioration; but they are certainly not such works as the spirit of the Specification would have made them, if the drawings had justified the Specification, and the Architect had executed them accordingly.

The Ward  
Roof as re-  
stored.

“The only new works of any importance actually executed, to which my attention was called at the Building, are in substitution of works of the original structure which have been taken down because of failure from insufficiency. These are the Roofs to certain of the Wards. I have, in my Report of the 10th May, stated my opinion, and the reasons for it, that the Ward roof failed from weakness occasioned by the great length of the bays, and by malconstruction, and I fear that the ‘renovation’ now going on will be found to retain too many of the causes of weakness of the original. Among these are the excessive length of the bays with reference to the strength of the timbers; the misplacement of the pole plate, and the consequent mal-arrangement of the main trussing timbers. I fear, too, that it will be found impossible to keep the Eaves Gutters of the same roof, or roofs, in a sound state, while they consist of lead laid upon stone, fixed to it in long lengths, and without drips.

“By the process employed in the re-instatement of the Ward Roof, as it is found in the roofs already reinstated, considerable strength is imparted to it; the pole plate is now secured somewhat more firmly than it was before to the ends of the tie-beam;



but it has still to resist, over a length of twelve feet, the natural tendency of the heavy roof covering to run, or slip down, and press against it in the middle of the bay, as well as near the tie-beams, and in like manner as regards the purlines and the ridge piece. The heads of the common rafters have nothing more than a nail-hold upon the latter; whilst the purlines, though deep, are thin, and will readily bend, not under the weight, but with the pull down the incline, of the roof covering. But even if the roof, as strengthened, should be found stiff enough to hold its own, it is replaced, as it was before, too low down upon the stone cornice to admit of a new troughed gutter under the eaves and above the cornice, with drips at sufficiently short distances apart for the lead to be able to move without puckering and cracking. I fear, therefore, that it may become a matter of regret hereafter, that any regard has been had to the arrangement of the Roof which had failed, and that it had not been taken in hand and constructed upon a sounder basis than as a restoration of what is radically bad. For this, in the words of my instructions, 'it had become prudent to do,' and this, I am of opinion, it would be still proper to do, so far at least as regards the Wards, of which the original defective Roof yet remains to be taken off, that it may be fitted with a Roof of permanent and effective character.

"Such a Roof need not, I think, greatly, if at all, to exceed in cost that which has been actually executed on the Wards, which have already undergone the operation of uncovering, and re-roofing, except in so far as the outer Eaves Gutters are concerned, and they

Suggested  
New Eaves  
Gutter to  
Ward Roof.



ought to be, as I have said, constructed wooden trough gutters in short lengths and drips, and lined with lead, which may be arranged to send the water down by the existing rain water trunks. The arrangement, which Mr. Johns has adopted, of making the long Roof of the Gallery and Sleeping Cells one, from tower to tower, and of covering the back compartment, consisting of the projected Day Room and associated Dormitories, with another Roof, both stepping upon the longitudinal wall of division, between the two compartments, seems to me to be a great improvement upon the former plan, but I should be disposed to make a groined return across the valley, as shewn in the annexed traced plan of Ward Roof looking down upon it, the object being to stiffen the Roofs by connecting them with each other (see fig. 1.)

Variation in  
form of Roof

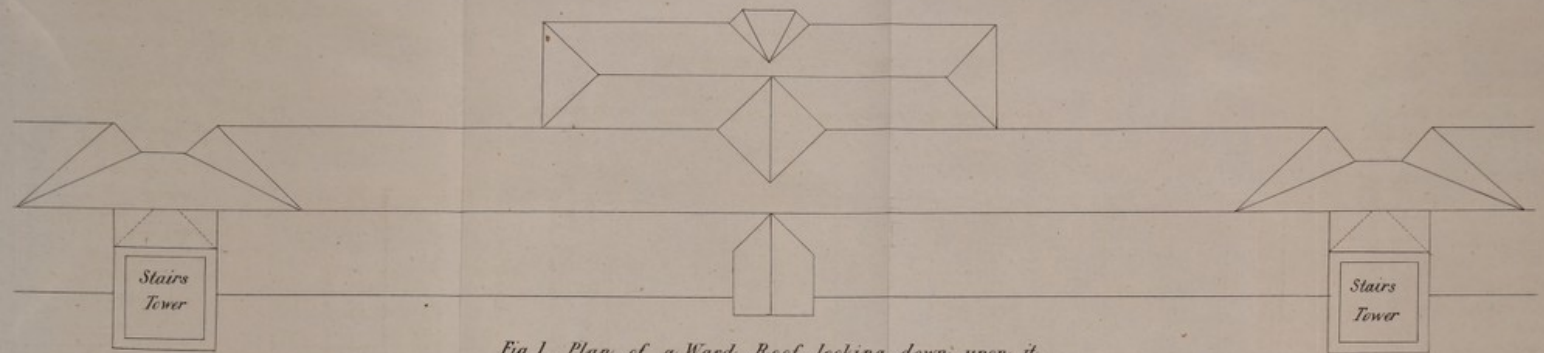
Suggestions  
for change in  
mode of re-  
construction  
of  
Ward Roof

“In re-construction, I would apply proper wall-plates to the walls, to receive the roofs, using the best of the old tie-beams, trussed as they are, alternately with new king trussed tie-beams upon the long galleries, arranged in bays, not less than eight, nor more than nine feet long, as the lengths of the ward compartments will allow them to come in, as shewn in the annexed traced plan of a Ward Roof at the level of the tie-beams, (see fig. 2). The old queen trusses from the gallery roof rendered superfluous by the new king-trussed tie-beams may be taken to pieces and adjusted to the projected compartments at the back.

“Efficient pole-plates should be coggged down *upon* (not under) the outer ends of the tie-beams, to take the



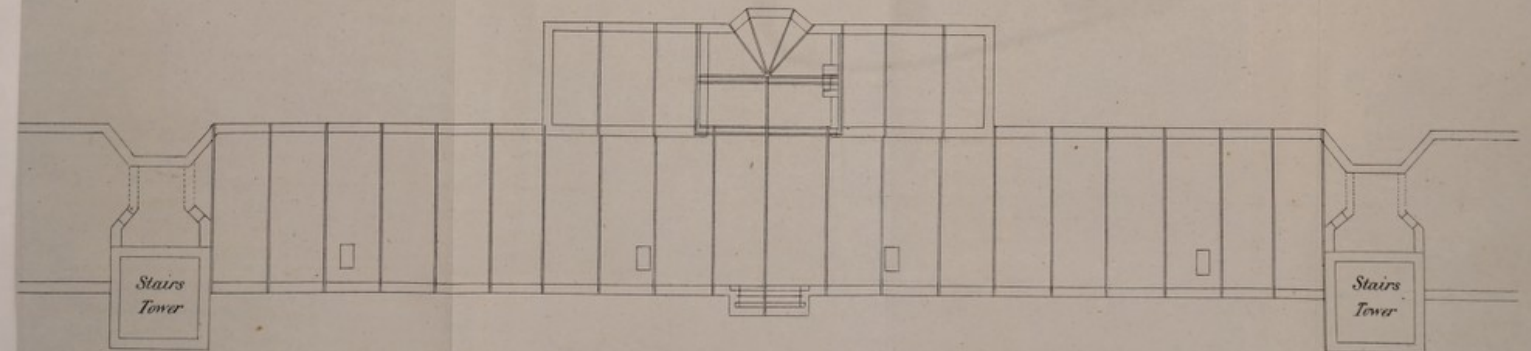
*Fig. 1.*



*Fig. 1. Plan of a Ward Roof, looking down upon it.*

*Scale, 20 feet to an Inch.*

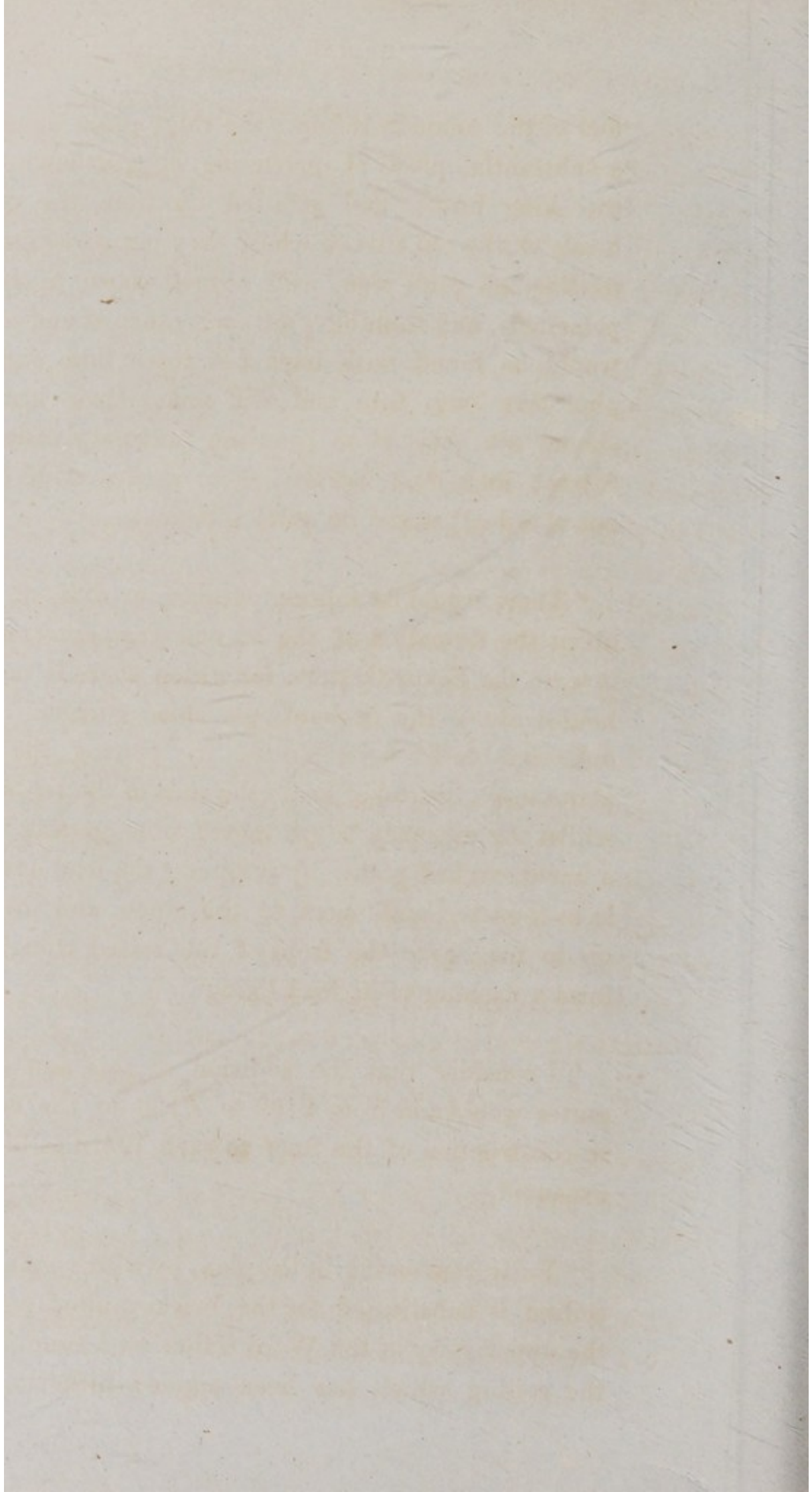
*Fig. 2.*



*Fig. 2. Plan of a Ward Roof, at the level of the Tie beams.*

*Scale, 20 feet to an Inch.*







feet of the common rafters ; the ridge piece should be a substantial piece of quartering, coggd down upon the king heads, and strutted up from the queen heads of the old trusses where they occur, whilst one purline, on each side, well coggd down upon the principals, and running past each other at end-joints, would be found, with bays not more than eight or nine feet long, firm and stiff under their load. I should not think close boarding necessary under the Slates ; inch deal battens, three inches wide (nine out of a deal) would be quite sufficient.

“ There would be nothing peculiar or difficult in or about the formation of the so combined roofs, unless it were the Eaves Gutters, for which there is now no height above the back of the stone cornice. That difficulty would be overcome by putting the pole plates *upon*, instead of *under* the ends of the tie-beams, whilst the rain may be prevented from getting under a new troughed gutter by retaining the lead now laid in as a gutter, and burnt to the stone, and lifting it up to turn over the front of the raised trough and form a flashing to its lead lining.

“ I consider that the addition of this new eaves-gutter would add from £100 to £150 to the cost of re-construction of the Roof to each Ward as hitherto executed.

“ Fully concurring in the plan, by which a plastered ceiling is substituted for the brick-vaulted soffit, to the upper story of the Ward Galleries, I cannot think the ceiling which has been applied hitherto, suffi-



ciently strong and substantial. The ceiling joists having to run through bays twelve feet long, are too weak to carry a proper body of plastering without sagging. This would be remedied in some degree by the shortening of the bays, which would follow upon the re-arrangement of the tie-beams, for the purposes of the roof, as I have suggested; the same ceiling-joists would carry a more substantial body of plastering, and tend to prevent the changes of temperature which may follow upon the use of a slight ceiling. I would recommend, indeed, the adoption of so much of the French system of plastering, as would require stronger laths than are commonly used with us in England, and a coat of plastering over the laths, as a key to that below them. The ceiling, ought, indeed, to cost half as much more than it does.

“I have already, in an earlier Report, stated my opinion, that the flat vaulted-brick ceiling—‘*Arched Ceilings*,’ as they are designated, of the galleries, may not be considered certainly safe, even in the Lower Story of the Wards, and intimated that I was prepared to suggest a kind of permanent centering of light cast iron ribs and rails, to be set up under the ceiling.

“The kind of thing I mean will be readily understood by supposing the usual light frame-work of a country tilted waggon, bowed ribs standing vertically across the waggon, at certain intervals, along its length, with light battens attached to the ribs longitudinally of the waggon, to bear the tilt up. I would have light iron ribs cast to the form of the Vault,



stout enough to carry across, and carry rails of the same, and a little more than the dead weight of one bay of the bricks. The transverse Section of both ribs and rails should be somewhat in the form of the letter U, with the open side up, and set clear of the soffit, so that the whole may be fixed upon stone corbels, pinned into the Walls, without any shock or jar to the fragile composition over-head; an easy bearing may be then given to the Vault by filling the space a little over-full with Portland or other Cement, that expands in setting, and thus all chance of a catastrophe will be effectually provided against, whilst the ribs and rails on the surface will give the appearance of ribs in the construction closely attached to it, and incapable of being laid hold of.

“Having regard to expense, I have already intimated my belief, that the disposition of the roof, and the mode of dealing with it in re-construction, which I am disposed to recommend, would not add in any great degree to the cost of the operation, as it has been effected on those of the Wards which have had the roof taken off and reconstructed. The new Eaves gutter which I propose to substitute for that which I consider untrustworthy, and the greater strength which I would give to the ceiling of the Upper Gallery would, however, make a material present addition to the cost of the operation of not less than from **£150** to **£200**. The preventive centering to the vaulted brick ceiling of the lower Ward Galleries, which I have suggested, would add quite **£100** more to each two-storied Ward Building. It should be understood, however, that in speaking of the cost of



work, consisting mainly of metal, as lead and iron, respectively, regard must be had to the fluctuations which so often occur in their prices, and which may render the best considered estimates fallacious.

“ I seem to think that having regard to the heading of the instructions with which I have been endeavouring to comply, and which confines my attention to certain special matters affecting the security of the Building, and the safety of the inmates, I am not to go further than I have now gone, notwithstanding the greater range which the third of the first above quoted paragraphs might be taken to imply. Reading beyond the quotation, the paragraph goes on to its conclusion thus : ‘ actual mischief ’ (as cracks, subsidence, bulgings, &c.,) should be carefully noted, and beyond those, evidence may be given of general inferiority, with or without prospective or contingent actual mischief.

“ I have already stated in detail my opinion of what it had become prudent to do, in order to remedy the defects I had observed within the limitation first prescribed ; and, it may be thought beyond those limits as to some matters. I have found it, indeed, impossible to pass by some things which presented themselves for consideration, and have introduced and remarked upon them ; but I do not think myself called upon to enter into all the details which the last above quoted sentence from my instructions would cover, believing that its real intention, or its intention in spirit, has been already complied with, without the full details.



“ But there is an extensive series of works, which casual observation, acting upon my knowledge of the requirements of the General Specification, induces me to think ought to be thoroughly examined and carefully measured, not only as to the character of the constructions, but also as to their depth, height, and thickness, and it may be, even length—having regard to the amount of work that must have been taken out in Estimate, and that actually supplied. I now refer to the Boundary and Airing Court Walls, both as regards superstructure and foundations. The measurements to ascertain depth, height, thickness, and length, would be a merely mechanical process ; but, in following it out, the character of the Works should be ascertained in detail, for the purpose of trying it by the Specification, in respect of its quality as well as of its quantity.”

In the month of June 1858, the case was set down for trial and witnesses were subpœnaed ; when, in consequence of Mr. Atherton's advice that the particulars of Breaches should be amended, a Judge's Order was obtained by the Plaintiff for that purpose, whereupon the Defendant's attornies applied to the Judge to have the trial put off. The application having been successful, the earliest possible date on which it could come on was the 1st of December last, and on that day it was tried before Lord Chief Justice Campbell, in the Court of Queen's Bench. A short time previously to this the County Solicitor received a verbal communication from Mr. George Pownall, who stated that Mr. Wyatt, one of Mr. Daukes' witnesses, proposed that the case should not be argued in open court, but referred to the arbitration of some architect or engineer to be agreed upon by both



sides ; intimating also that the *Profession* wished to take the matter up, and out of the hands of the lawyers. To this course the Committee entertained very strong objections on two grounds. They felt considerable doubt whether, acting as they were in the capacity of Trustees for the County of Middlesex, they would be justified in taking any step which might be construed into a desire on their part to evade giving the fullest publicity to the trial of so important an issue. They felt, also, that, if an arbitration were admissible at all, the only referee they could possibly agree to would be a Barrister—that being the ordinary course ; when the Judge before whom a cause is to be tried recommends it to be referred. After giving the subject full consideration, the Committee declined to consent to its being referred to arbitration at that stage of the proceedings. When the cause was called on, Lord Campbell, as the Committee anticipated, immediately advised that it should be settled by a legal arbitration, to which the Attorney General, on behalf of Mr. Daukes, positively refused to agree, but again offered to submit it to an Engineer or an Architect. The Lord Chief Justice objected to such a reference as strongly as the Committee had done ; though, perhaps, not for the same reasons ; his Lordship contenting himself with disputing the correctness of the Attorney General's ground of objection, that of expense. From the experience the Committee have had, in this instance, of the costly nature of advice, not of a legal character, they fully concur in his Lordship's views. The trial lasted during the greater part of three days, Mr. Daukes himself having been cross-examined at considerable length. After his cross-examination was concluded, and after the evidence of Mr. Myers and Mr. Shoppee, the Clerk of the Works, had been given, Mr. Atherton having expressed to the Chairman of the Com-



mittee a strong opinion that he should not succeed in obtaining a verdict, and that it would be an act of propriety on the part of a public body, in the performance of a public duty, not to protract the trial unnecessarily, the Chairman took upon himself the responsibility of allowing him to withdraw from the contest.

The Committee think that the most becoming course they can adopt, in thus reporting all the stages of this inquiry, will be to abstain from any comments upon the trial itself, or upon the observations of the Lord Chief Justice. But they think it right, in concluding this part of their Report, to submit his lordship's words as taken down by the short-hand writer upon the termination of the proceedings. "The case," he said, "has been most properly conducted from first to last by the learned counsel for the Plaintiff, and I think no discredit ought to attach to the Magistrates for the County of Middlesex in instituting this inquiry, but I think that it has resulted in the entire exculpation of Mr. Daukes from all imputation. The Magistrates have been misled, not by any bad professional advice, as far as the law is concerned, but by the advice of rival architects. We have heard a great deal of odium medicum and odium theologicum.—I think the *making of drawings* seems greater than either. There were a number of witnesses on the part of the plaintiff who evidently were rivals of Mr. Daukes. I think they made a very ungenerous and ingenious attempt to ruin his reputation. I am very glad that this matter has undergone a public inquiry, and the result is most satisfactory. It is creditable to Mr. Daukes, and I think that the Magistrates are absolved from all blame in the course that they have adopted."

Of the absolute necessity, for the interests of the county



that the very grave questions involved in this trial should be submitted to legal investigation, the Committee cannot entertain the slightest doubt. They have also the fullest confidence that the Court will agree in this opinion. Upon one point, at all events, they think there cannot be a dissentient voice—that if, upon the fullest consideration of the whole subject, and after taking the best advice they could obtain, they were satisfied that the Asylum at Colney Hatch was in a dangerous condition, and that that danger arose from neglect, from incompetence or from malfeasance on the part of those employed in its construction so very few years ago, it was their duty and the intention of this Court that a remedy should be sought at the hands of a legal tribunal. The perusal of the Reports of 1856, as preliminary to the present one, and the fact of the subject having been considered by three Committees of Visitors, will be sufficient evidence that no hasty decision was arrived at, and that, on the contrary, every precaution was taken to have the successive opinions corroborated or refuted by further independent testimony. Ten different persons advised the Committee as to the state of the building; one of them, a person whose professional engagements prevented him from giving sufficient time to the subject to enable him to appear as a witness, but whose name would, perhaps, have carried more weight, out of court at least, than any who appeared in it. Whatever may be the differences among these ten independent authorities, as to the amount of danger incurred or the nature and cost of the remedies, they one and all concurred in this—that danger existed, that a remedy was necessary without delay, that the design and execution of the Roofs was very defective, and that the Committee would incur serious responsibility by not taking steps to arrest the evil. What they did not agree in was as to the propriety of resorting to a court of law to re-



cover compensation for the want of that proper skill and attention on the part of an Architect which the Committee believe they had a right to expect. But such a question was never proposed to any of them. The Committee were satisfied that, if professional men in whom they could trust were of opinion that the defective state of the buildings arose from the laches of any persons concerned in its erection, the Court would expect them to consult counsel as to their remedy, and follow his advice.

The Court will naturally feel that, after the result of the trial, the Committee had still carefully to consider, whether it was necessary, or even expedient, to continue the reparation of the roofs, the whole of which had not been completed. They would upon many accounts have gladly consented to leave the building as it is, could they have done so without incurring the risk of placing the patients in jeopardy; but after a most careful examination had been made, they were very strongly recommended not to incur the responsibility of discontinuing the reparations already agreed upon.

Two Roofs, those of the Infirmarys, only remain to be reconstructed, and two Gallery Arches, one of which has been shored up for many months. The latter of these, the Committee are advised, is in so dangerous a state that if the supports were removed the lives of the patients would be imperilled. They have, therefore, resolved that they would so report to the Court, intimating at the same time that, unless the Court should express an opinion against any further works being undertaken, those originally projected would be completed as soon as the weather permits. The Committee themselves dare not incur such a responsibility. Sixteen roofs have been reinstated, and there is not one the



condition of which, when taken to pieces, did not fully justify the alarm which the Committee felt after the reports of the different Surveyors; and they confidently believe that the money granted by the Court was absolutely required, and has been well and economically laid out. It is with great regret that they are driven to the conclusion that it is absolutely necessary to proceed further. They are naturally most anxious not to add to the very serious sum already spent in these proceedings, and the inconvenience of moving the patients while the works are in progress, the inconvenience of having other works going on, when the enlargement of the Asylum is on the eve of completion, all combine to induce them to arrive at a different conclusion. The safety of the patients and other inmates of the Establishment is, however, the paramount consideration, and this necessitates the course recommended in this Report.

CHARLES HERBERT COTTRELL,

*Chairman.*

*Colney Hatch Asylum,*

*12th January, 1859.*



