of the flood tide, under their lee, and ſail weſtward, when ſhips in the Downs cannot purchaſe their anchors.

10th. That large craft might be conſtantly kept afloat in Ramſgate Harbour, at low water, ſuch as might be able to carry out pilots, anchors, cables, and other aſſiſtance to men of war and large ſhips in diſtreſs in the Downs;* and the matter is ſo circumſtanced that whenever they could not go from Ramſgate, boats may go out from Dover to ſhips in the Downs.

Upon this evidence, which I have carefully extracted from the Committee's report, I only beg leave to obſerve; that the tides, the ſands, and the coaſts remaining the ſame, as alſo the natural powers, what was true in the year 1749 will remain true in the year 1791.

During the whole of this inveſtigation the great project of a harbour at Sandown Caſtle ſeems to have been altogether loſt ſight of; and perhaps at this we may the leſs marvel; if caſting our eye upon the poſition thereof; veſſels breaking looſe from their anchors there, with wind at any point from S. S. E. to S. S. W. would be driven to the leeward of the harbour's mouth before they could get under way, ſo as to be under dominion of their helm; and therefore, after all, liable to be wrecked or run aſhore upon the ſouth coaſt of the iſle of Thanet †.

Nor indeed, according to my judgement, could a more injudicious conſtruction than the piers propoſed at Sandown, be well imagined; for the heavy ſeas that would fall in between the heads (that is, all thoſe producing diſtreſs in the Downs) would be ſo augmented by the gradual contraction of the diſtance of the piers, from 300 feet at their entry, to 100 feet near the baſon; that veſſels would not only be liable to be wrecked between the piers, but thoſe augmented ſeas would infallibly deſtroy the gates of the baſon; and

* Such crafts and pilots now actually ſtation themſelves at Ramſgate, and are the means of ſaving many lives and much property.

† While the inveſtigation for a harbour at Sandown Caſtle was going on before Parliament in 1744, reaſons were offered againſt making a harbour near Sandwich; to which at that time no regard ſeems to have been paid, viz. Sandwich having no convenient outlet for ſhips bound to the weſtward, they muſt remain wind-bound with many fair winds. 2dly. The inlet is inconvenient to receive ſhips bound to the weſtward, which are detained in the Downs by contrary winds and ſtormy weather; for if any ſhip's anchor ſtart, or cables give way, they muſt drive paſt the harbour, before the ſhip can be brought into a poſition to put for the entrance.

probably

probably the fixed part of the ſtone work alſo.—It hence appears moſt evident, that nature has not in reality furniſhed any ſituation for a harbour for the Downs preferable to that at Ramſgate; and therefore we need not wonder, that the project of the long-wiſhed for harbour for the Downs was at that time promoted to be at Ramſgate, with a degree of eagerneſs and even of enthuſiaſm.

The Act paſſed that ſeſſion, ſetting forth in its preamble, "Whereas frequent loſſes of the lives and properties of his Majeſty's ſubjects happen in the Downs for want of a harbour between the North and South Forelands; the greateſt part of the ſhips employed in the trade of the nation being under a neceſſity at going out upon as well as returning from their voyages, to paſs through the Downs; and frequently by contrary winds being detained there a long time; during which they (eſpecially the outward-bound ſhips) are expoſed to violent ſtorms and dangerous gales of wind, without having a ſufficient harbour to lie in or retreat into, or from whence they can receive any aſſiſtance: And whereas a harbour may be made at the town of Ramſgate proper and convenient for the reception of ſhips of and under 300 tons burthen; and from thence larger ſhips in diſtreſs in the Downs may be ſupplied with pilots, anchors, cables, and other aſſiſtance and neceſſaries; and by the ſmaller ſhips taking ſhelter in this harbour the larger ſhips may take the anchorage which at preſent is occupied by the ſmaller, and by that means their anchors will be fixed in more holding ground, and the ſhips not ſo expoſed to the ocean; for carrying therefore a work of ſuch public utility into execution, &c. be it enacted," &c.

The firſt meeting of the truſtees was appointed at the Guildhall London the firſt Tueſday in July 1749, (that was then next following), at which a large number named in the Act, to the amount of ſixty-ſix, appeared to qualify.

SECTION II.

PROCEEDINGS of the Truſtees from the Commencement of the Work in 1749, to the total Stoppage of the ſame in 1755; upon Petition to the Houſe of Commons.

THE firſt act of the truſtees regarding conſtruction was to appoint a Committee of their body to view the place at Ramſgate, where a new harbour was intended to be made; and report their obſervations and opinions to the truſtees at their next meeting;

and that Mr. Robins and Mr. Turner of Goſport ſhould be deſired to attend them as engineers.*

The Committee accordingly met at Ramſgate, and on their return, reported, that in conſequence of objections having been made before the Committees of the Houſe of Commons to Ramſgate, for want of a back-water, they having examined found from information, that in the year 1715 the pier then ſtanding had been lengthened; and by inſpection it appeared, that a bar of about forty yards breadth and length had been caſt up, its higheſt part in thickneſs two feet and a half; and they conſidering this ſmall quantity as the gradual effect of 34 years, thought it reaſonable to expect, that when a greater depth of water was made by two piers inſtead of one, the filling up by ſullage or beach would become ſo inconſiderable, that a ſmall expenſe would continually prevent its increaſe.

They further obſerved, that the ſeaweed or ſullage that drove in, came from the weſtward; and that from the eaſt there was a drift of large ſhingle; which if it ſhould take place, would be of advantage in backing the new piers. They alſo made and reported many other obſervations confirming what was given in evidence before the Houſe of Commons in its favour.

They endeavoured to fix their opinions as to one material point, which could not be ſo conveniently ſettled in evidence before the Houſe; and about which there was ſome diverſity of opinion; and that was the poſition of the harbour's mouth, whether South, S. S. W. or S. W. were to be preferred. Towards the reſolution of which queſtion the committee premiſed, "that the ſtream of the tide in the Downs ſets for ſix hours to the northward, or at leaſt between the north and the eaſt, and then for the next ſix hours the ſtream turns and ſets to the ſouthward, or between the ſouth and the weſt; but the time of high and low water does not correſpond to the beginning and end of theſe ſtreams; for it is high water about two hours after the ſtream has begun to run to the northward; and it is low water two hours after the ſtream has ſet to the ſouthward, ſo that when the tide firſt ſets to the northward, more than two thirds of the tide has flowed; and high water happens about two hours after:" and that having ſeparately examined eleven captains or maſters of ſhips of Ramſgate, they all unanimouſly agreed, that the moſt dangerous winds in the

* It may at this day ſeem extraordinary, why Mr. Labelye, who appears to have made the original plan, upon which himſelf and aſſociates proceeded as mentioned above, ſhould not have been called upon and conſulted in this latter ſtage of the buſineſs; but if it be remembered that in the year 1748, one of the piers of the new bridge of Weſtminſter, built under his direction, moſt unfortunately ſettled, ſo as to oblige two of the arches to be taken down, after the bridge had been opened to the public, we may be the leſs ſurpriſed.

Downs

Downs were from the S. S. E. to S. S. W.; and that the time when ſhips run the greateſt riſk of being forced from their anchors, is when the northward ſtream ſets in; and that about the ſame time, that is the beginning of the northern ſtream, was likewiſe the moſt prudent for ſuch ſhips as ſhould intend to make for Ramſgate harbour, to ſlip their cables; for, that in either caſe, they would have both wind and tide in their favour, in ſtanding for Ramſgate; and that on their arrival, they would find it near high water, allowing an hour for their paſſage: and they unanimouſly agreed, that an entrance to S. S. W. was to be preferred: for if placed full ſouth, the tide near high water would run ſo ſtrong acroſs it, as to render it difficult to get in; and if at ſouth-weſt, they feared there might be too great an indraught of ſullage. All the bearings then referred to were ſettled by the compaſs, which in the Downs was then $1\frac{1}{2}$ point weſt.

They alſo particularly attended to the point, whether the piers ſhould be built with wood or ſtone; but agreed unanimouſly ſtone was greatly to be preferred, had it not been for the great difference of expenſe, eſpecially as they had found (and brought up ſpecimens) that the worm bit conſiderably in the pier then ſtanding. On the whole they were ſatisfied, a harbour at Ramſgate would be as practicable, uſeful, and important, as they had before thought; and concluded with obſerving, that no other motive than that of avoiding expenſe ſhould have any weight in aſſigning to this harbour a form leſs perfect or extenſive than it was by nature capable of receiving. It does not, however, appear that the Committee, on this occaſion, were attended by Mr. Robins or Mr. Turner.

The next ſtep of the truſtees was to advertiſe to invite engineers to deliver plans ſealed up, to their ſecretary Mr. Elliot, for piers of ſtone or of wood, with the neceſſary ſpecifications, and explanations, againſt the 29th September following.

At this time, ſeveral plans and models were offered, and the 19th October appointed for taking the plans into conſideration: and alſo the ſecretary was ordered to invite engineers, or gentlemen acquainted with engineery, to aſſiſt the truſtees upon that occaſion. Accordingly, upon the 19th ſeveral perſons attended under that deſcription, and were deſired to appoint a meeting among themſelves to conſider the ſeveral plans, and give their opinion to the truſtees; and the ſecretary was ordered to invite the gentlemen who ſhould attend to dinner, at the expenſe of the truſt.

On the 26th of October the engineers delivered their report, which was ſubſcribed by Benjamin Robins, Thomas Innes, J. Leake, John Muller, and John Turner. The moſt material things that occurred therein were:

That it was improper to lay the foundation of the piers below low water mark, with looſe ſtones thrown in at random.

That if the piers were not carried out into a greater depth of water than 6½ feet, at low water of ſpring tides, it did not appear neceſſary to be at the expence of carrying on the foundation by caiſſons.

That the propereſt method of laying the foundation of the intended piers in the parts covered at low water, was by making a baſement of ſtone ſomewhat higher than low water mark, after the manner propoſed by Mr. Turner.

At a ſubſequent meeting, Mr. Deſmaretz, Mr. Prat, and Mr. Mill, gave their opinions relative to the manner and materials neceſſary for the building the piers of the intended harbour.

The truſtees then ordered notice of a meeting upon the 15th December, for taking into their conſideration all the plans and propoſals that had been or ſhould be laid before them, and to come to a determination thereon: and that all perſons having any thing further to offer, ſhould be deſired to deliver in their propoſals before that time; recommending a full meeting of the truſtees on this extraordinary occaſion.

At this meeting ſeveral plans and ſections were examined, amongſt which was a plan from Captain Robert Brooke of Margate, and a ſection from Mr. Deſmaretz chief engineer at Portſmouth; and at a ſubſequent meeting, three more plans and ſections were delivered, amongſt which was a plan and ſection by William Ockenden Eſquire, one of the truſtees: and at a meeting after that, ten different plans, laid before the board in conſequence of the original advertiſement, were examined; and an abſtract ordered to be made by the ſecretary, and laid before the next meeting; at which, on the 12th January 1749-50, it was reſolved, that the harbour ſhould be proceeded with according to the plan ſigned by the chairman, ſubject to the further alterations of the board. That the eaſt pier ſhould be proceeded upon with ſtone; and the weſt pier with wood.

At a ſubſequent meeting it was reſolved, that the plan and ſection propoſed and delivered by William Ockenden Eſquire, for erecting a ſtone pier, ſhould be the method of building the eaſt pier; and that the ſection and model which was propoſed and delivered for a wooden pier by Captain Robert Brooke, ſhould be the method of building the weſt pier to low water mark neap tides: and that Mr. Ockenden and Captain Brooke ſhould be applied to, for their deſcription of the proper materials for the piers reſpectively propoſed by them.

The

The 2d February 1749-50, it was reſolved, that the eaſt pier ſhould be carried on by workmen appointed by the truſt, and materials purchaſed for 100 feet of pier; and Thomas Preſton was appointed maſon or foreman of the ſtone work; who by the Board's order, ſet out for Maidſtone, Folkſtone, Dover, and Ramſgate; and was to follow the inſtructions given him; and Captains Conway, Stevens, and Bennet, were deſired to aſſiſt Captain Brooke in purchaſing materials and carrying on the weſt head.

Mr. Preſton's firſt report of the 23d following, chiefly contained an account of the ſtone materials afforded, and uſed at the places ſpecified; whereupon he was ordered to go to Purbeck, to make the proper enquiries concerning the ſtone there: Mr. Ockenden, Sir Peter Thompſon, Mr. Fry, Captain Barker, Captain Hughes, Mr. Hyde, Mr. Norris, and Mr. Pole, were appointed a committee for carrying on the eaſt head, and were deſired to confer with the committee for the weſt head, as often as they ſhould find neceſſary. Mr. John Scott was appointed foreman for carrying on the weſt pier.

Things being thus ſettled, nothing happened but what might be expected to be the reſult of the diſpoſitions mentioned; and it is worthy of notice, that a quantity of Barrow limeſtone was got, as recommended by Mr. Preſton.

In 1751, a committee being appointed by the board to make a ſurvey of the ſtate of the works, made their report the 25th July. The moſt material things to be obſerved were as follows:—

That the ſtone pier extended 390 feet, of which 104 feet were completely ready for the parapet, and the reſt above the reach of a ſpring tide; and that while the committee was there, the foundation was run on 83 feet further, in the whole 473 feet. They examined the work, and found it free from any kind of failure whatever.

The weſt head was carried out about 460 feet from the cliff; and 540 feet thereof were propoſed to be completed that year.

The commitee were attended by Mr. Turner of Goſport and Mr. Vincent of Scarborough, and recommended the uſe of aſhler inſtead of backing ſtone, ſince a cube foot of ſhell lime * coſt more than a cube foot of aſhler.

A locker or grind was then recommended, the committee being of opinion it would collect the ſand and ſhingle in the outward angle of the eaſt pier with the land.

* At this time ſhell lime was uſed for the backing of Ramſgate harbour.

By

By the ſeparate report of the engineers, of the ſame date with that of the committee, it appears they were of opinion, that the part of the ſtone pier then done, was but barely ſufficient to reſiſt the force of the ſea; therefore recommended the future parts to be made with 40 feet baſe, and 30 feet at top; and an additional courſe of aſhler, to the height of 18 feet above the foundation, both inſide and outſide; and above that, one courſe only; the core to be leſſened. The chalk to be well beaten, and mixed with gravel; and not mixed with mortar as then practiſed. All the aſhler to be ſet with terras mortar, and the backing mortar made with brick-duſt or ſea-coal aſhes.

In ſurveying, they found the bottom regular, and in the circumference of the harbour, the depth of low water not exceeding five feet ſix inches; and that the foundation might be carried out without caiſſons, ſo as to anſwer the deſign, in a manner by them deſcribed; which was that of laying large Portland blocks in the ground courſes, ſo as to reach above low water.

The following Board agreed to the uſe of aſhler for backing, for the reaſons given by the committee in their report. A locker or grind to be made as propoſed. Captain William Read was appointed haven-maſter, with inſtructions to hoiſt a flag when there was ten feet water at the old pier head.

6th December 1751, a general meeting was appointed to conſider of the method of founding the piers beyond low water mark, when Mr. William Etheridge produced a model of a caiſſon; and a model of a tool, and method of working it, for making a trench, and levelling the ground under water for ſetting the caiſſon upon. Captain Robert Brooke ſent a model for laying the foundations of ſtone, without caiſſons, accompanied with a deſcription. In conſequence of which the truſtees ordered an advertiſement for contractors to deliver plans, propoſals, and eſtimates, for conſtructing the piers beyond low water mark.

The 3d January 1752, Mr. James Morehouſe preſented a plan, propoſals, and eſtimates; which however were not approved; but it was reſolved, that a foundation, not exceeding 200 feet, ſhould be carried on with large blocks of ſtone, agreeably to two plans given in by Mr. Preſton the maſon.

24th January; it was reſolved that the ſaid 200 feet of ſtone pier ſhould have its foundation laid in a channel or trench, dug into the chalk ten or twelve inches deep; and a motion was made, and agreed to, that a ſurveyor ſhould be appointed; and that a proper advertiſement

advertiſement ſhould be conſidered for the purpoſe: Friday the 21ſt was appointed for the election of one, from ſuch perſons as ſhould offer, to inſpect and direct the careful and expeditious carrying on of the building; and the maſon's report was poſtponed till a ſurveyor ſhould be choſen; but Boulogne lime and lime kilns were ordered to be ſet about immediately.

21ſt January. It was reſolved that ſuch ſurveyor as ſhould be choſen, ſhould have a ſalary of £200. per annum, and reſide at Ramſgate.

On this occaſion, ſeven perſons applied; amongſt whom were Mr. Etheridge, and Mr. Vincent the Engineer of Scarborough Pier, who both produced ample teſtimonials; but on holding up of the hands, the majority was declared for Mr. Etheridge, who was ſtrongly recommended by Mr. Ockenden; and who received on this occaſion the thanks of the Board for his plan, care, and attention; and which were deſired to be continued.

28th February. Inſtructions were given by the truſtees to the ſurveyor, and were in ſubſtance as follows:—

"The ſurveyor is to reſide in Ramſgate, and not be abſent without leave firſt obtained from the truſtees at one of their meetings; and to have the inſpecting and directing of all the works that have already or ſhall be hereafter carried on, under the direction of the truſtees of Ramſgate Harbour; and alſo to have the direction of all the perſons employed therein, at Ramſgate, except the clerk of the cheque. He is weekly to tranſmit to the ſecretary an account of the progreſs of the work, and of the tranſactions relative thereto, that they may be laid before the Board at their ſeveral meetings. He is truly and faithfully to inſpect the ſeveral materials which ſhall be delivered, and report to the Board thoſe which are not according to agreement or contract; and frequently to examine the liſt of the workmen employed, and ſee that they perform the labour they are paid for; and as ſoon as he conveniently can, he is to take an account of the abilities of the ſeveral workmen employed, and report to the ſecretary, whether they are deſerving the wages therein charged; but no alteration of wages ſhall at any time be made by him, without firſt mentioning his intention to the truſtees, and receiving their approbation. The increaſing or leſſening the number of workmen to be left to his diſcretion. But he is from time to time to acquaint the Board of his reaſons for whatever alterations he ſhall make among them. Nor is he to make any material alteration of any kind, without previouſly acquainting the ſecretary thereof, and taking the directions of the truſtees thereon. In general he is to inſpect and direct every thing relating to the works, ſo that they may be carried on in the moſt expeditious and frugal manner."

25th

25th March. Mr. Etheridge delivered his firſt report, which deſcribes the ſtate of the works at Ramſgate on a general view; and having inſpected a cargo of backing ſtone brought from Purbeck, he thought it very good, and capable of making very ſufficient work, without building the wall entirely with aſhler; but for the benefit of the work, he recommended to ſend a proper perſon to Purbeck, at the expenſe of the truſt, to ſee that the ſtone be good, properly worked, and the courſes ſhipped as wanted; which was afterwards ordered by the Board.

Here it may be neceſſary to obſerve, that Mr. Etheridge appears to have been a perſon of a truly mechanic genius, and having been brought forward by the celebrated Mr. King, carpenter of the works of Weſtminſter Bridge, as his foreman, and after Mr. King's death become his ſucceſſor in completing this branch of thoſe works, might be preſumed to be a man of much experience in the carpentry line:* but being here appointed director of the whole work, and looking upon himſelf as competent to the maſonry as to the carpentry branch, there very ſoon aroſe a difference of opinion betwixt the ſurveyor and Mr. Preſton the maſon, that afterwards turned out of great detriment to theſe works. Mr. Preſton, though by no means equal to Mr. Etheridge in general mechanical knowledge, yet was an excellent maſon, and well informed in the nature of the materials proper to his trade:—the making of mortar being rather of a chemical than a mechanical nature. Mr. Preſton, before the appointment of Mr. Etheridge, not being ſatisfied with the uſe of ſhell lime under water, which was in part uſed at Ramſgate Harbour, recommended to the truſtees the trial of various lime ſtones; viz. Aberthaw, Barrow, and that of Boulogne, of which cargoes had been ordered; but their merits had not then been ſufficiently inveſtigated. Mr. Etheridge unfortunately had adopted ſhell lime for waterworks, and accounted that of Maidſtone, and St. Vincent's Rocks at Briſtol Hot Wells, as preferable to the above. †

Mr. Etheridge, as reported, being of an auſtere temper, not readily giving up what he had once advanced, a ſhyneſs took place between theſe two officers; which though it did not prevent either of them from punctually doing his duty, that is, did not prevent Mr. Preſton from ſcrupulouſly purſuing his orders from Mr. Etheridge; yet it prevented that interchange of ſentiments and confidence, which is ſo eſſentially neceſſary among the principal officers of a great work or enterprize, that it may be carried on to the beſt advantage.

* Mr. Etheridge afterwards deſigned and built the famous wooden bridge at Walton-upon-Thames; the middle arch of which ſpanned 120 feet.

† See the chapter on water cements, Smeaton's account of Edyſtone lighthouſe.

Mr.

Mr. Etheridge now proceeded to put in practice his propoſed method of laying the foundation of the piers, in caſes or caiſſons, and ſhewed that method of digging a trench under water, and levelling it, which, being attended with certainty, and every neceſſary degree of diſpatch, has ever ſince been the method put in practice here, and ſo continues to this day.

Every thing appeared to go ſucceſsfully on during the year 1752; and the committee of the 29th September, reported that 68 feet of ſtone pier, of the ſame dimenſions as the eaſt pier, had been added to the 550 feet of timber work of the weſt pier, and 138 feet of foundation carried out five feet high.

The 26th January 1753, produced an order of Board, that Mr. Ockenden, and any other gentlemen of the truſt, ſhould be deſired to go to Ramſgate to conſult with the ſurveyor there, and give directions for a proper plan to be drawn of the extent and manner in which the work ſhould be carried on and finiſhed; and that the ſaid plan ſhould be laid before the Board for approbation.

14th May 1753, the Board read Mr. Ockenden's report of his ſurvey made at Ramſgate, and conſidered the plan for carrying out the work, which is dated the 21ſt April, and ſigned by him and the ſurveyor, but came to no reſolution thereon; however Mr. Ockenden received the thanks of the Board, for his great care and pains in making his late ſurvey and report.

At a general meeting, 14th December 1753, for conſidering the plan of the Harbour, a motion was made, that the Harbour be contracted to 1,200 feet in width, according to the plan this day laid before the Board by Mr. Ockenden; which, being debated, was carried on a diviſion of 28 to 15. And on an adjournment to that day ſe'nnight, the reſolution was confirmed; 26 to 7.

Upon this contracted plan, which appears to have originated with Mr. Ockenden, Mr. Etheridge ſeems not only to have vigorouſly proceeded, but even to have puſhed the execution; for, by the Committee's report on their viſitation, the 9th October 1754, after declaring their opinion, that the contraction ordered by the Board would leave the Harbour large enough to contain more ſhips than would ever have occaſion to lie there, at the ſame time; and "that the curve at the weſt pier continuing the ſame as it was in the original plan, would give ſufficient room for ſhips to bring up;" they reported, that at the weſt pier, the 138 feet of foundation mentioned laſt year to be laid, was taken up, and a tempo-