Paper No. 6251

No. 1 Berth, Tilbury Dock †

by

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Ronald Frederick John Smeardon, E.R.D., A.M.I.C.E.

Discussion

Mr J. H. Jellett (Docks Engineer, Southampton Docks, British Transport Commission) said that the layout struck him as very revolutionary in many ways and as tending to run counter to many of the principles which had been advocated from the operating side. He noted, for example, that the waiting hall was placed on the far side of the Customs hall from the ship, so that it was not reached by the passengers until after they had been through the Customs examination. It had always been said that when a ship tied up the passengers insisted on getting on shore at the earliest possible moment, so that a waiting hall must be provided to enable them to satisfy that urge during the inevitable delay which took place while their baggage was landed. It would be interesting to know how this problem was overcome at Tilbury.

175. The rail layout showed three tracks for boat trains, and it was stated that this facilitated the handling of these trains, partly owing to the provision of cross-overs; but the cross-overs shown on the plan were only about 80 or 90 ft from the stop-blocks at the end of the track and were clearly meant to function only for engine release purposes. When, therefore, a boat train departed from the platform, even though another train might be stabled on an adjacent track it would have to be pulled out and pushed back into the platform road. Had consideration been given to the provision of an additional island platform between the second and third tracks? This would enable three boat trains to be loaded simultaneously. It might well be that train paths to London did not exist with sufficient intensity to make that worth while, but, with the space available, it would seem to be quite possible from an engineering point of view.

176. He could not refrain from commenting on a remark made by Mr Smeardon when showing the film, to the effect that the Customs tables had been specially designed for the Tilbury terminal. They in fact bore a strong family resemblance to those installed in the ocean terminal at Southampton in 1950.

177. It was very gratifying to see that the construction of a gravity quay wall had justified itself. There had been on previous occasions considerable propaganda to the effect that all ship berthing facilities could in these days be provided by means of piled construction, but in this case that alternative had been examined and rejected. It was unusual and interesting when the Authors of a Paper not only described what had been done but gave some insight into what it had been decided not to do.

178. It was of interest to learn that no fewer than seventeen alternative schemes had been examined, and he would like to know whether this consideration of alternatives had been applied to the form of roof construction. The shell roof was always a very gratifying style of construction once it had been completed, but he had never

† Proc. Instn civ. Engrs, vol. 8, p. 331 (Dec. 1957).

been convinced of the economics of it. Had alternative forms of roof been considered and how had they shown up from the economic point of view?

179. He had been impressed by the arrangements made for the demolition of the old quay wall, and particularly by the eloquence which must have been exerted by the P.L.A. engineering staff to persuade the harbour- or dock-master to consent to the touching off of 1,500 lb. of explosive in one blast. He had had on a previous occasion to use his powers of persuasion in the same connexion, and the destructive power which could be attributed to quite small charges of explosive when let off in the vicinity of shipping was remarkable. He had also been interested in the reference made by the Authors to the trouble caused, in drilling for this operation, by the aggregate jamming the drills. He had had that experience some years ago in a similar operation, and the trouble had been so bad that drilling had finally been deemed to be quite impossible. On that occasion it had been evident that the concrete contained patches of what was not much more than loose aggregate, and it had been the loose stones from this which had jammed the drill. The contractor in that instance had put forward a substantial claim on the ground that he had tendered to drill concrete and not piles of loose aggregate, and they had had some difficulty in rebutting this argument. It would be interesting to know, therefore, whether the aggregate which at Tilbury had tended to jam the drills had been in fact detached from the concrete or could have been loose inside the concrete at the time that the drill came down.

Mr P. W. E. Holloway (Director, Holloway Bros. (London) Ltd) said that from the contractor's point of view these had been two extremely interesting contracts, each with widely differing problems. The quay contract offered the contractor a greater opportunity to use his initiative in reducing to the shortest possible time, and therefore the minimum cost, the many repetitive operations involved in building and sinking monoliths, and Mr Holloway would like to give full credit to Mr William Storey Wilson, who unfortunately could not be present that evening, for his development of the method of shuttering the monolith walls, and also for the design of the interlocking kentledge blocks, which reduced the risk of stacking so much weight in a limited space, even when a monolith tended to tilt, and avoided any interruption in the grabbing from the wells, irrespective of the amount of kentledge being used.

181. The steel frame and plywood panel shuttering was briefly described in the Paper. While the principle of using this type of self-clamping shutter was not new, its use in such a massive form was worthy of note, in that it played an important part in enabling 6-ft lifts of concrete to be placed rapidly. In case any misunderstanding should arise from the description given in § 101 of the Paper, it should be emphasized that these shutters were constructed in the form of movable panels and were not the type lifted by jacks.

182. The successful demolition of the old wall, breaking it up into pieces sufficiently small to be removed by the dredger, had been well described in the Paper, and full credit was due to Mr Menzies, of the Metropolitan Construction Company, who had been the specialized sub-contractors for this work. There had been two major problems involved, the first being the drilling of 45-ft-deep holes in the type of concrete of which the wall had been known to consist, and the second the placing of the charges under water in holes of this depth, which it had been known would not be smooth-sided. In the case of the drilling, the large aggregate and the indifferent quality of the matrix caused, as had been anticipated, jamming of the drill, which had been particularly apparent at the construction joints. The normal power-feed drills were too powerful, and special mountings had been built and used which enabled the drill operators to hold the drills back rather than drive them on. These had proved entirely satisfactory. The irregularities in the size of the holes owing to the large aggregate had created difficulty in placing the charges in the deep holes. The solution had been suggested by Mr Hancock, of the Nobel Division of I.C.I., and consisted of the use of Seislok cardboard tubes with an internal thread which engaged a similar thread on the outside of the cartridge, so that long and fairly rigid charges could be made up. This had

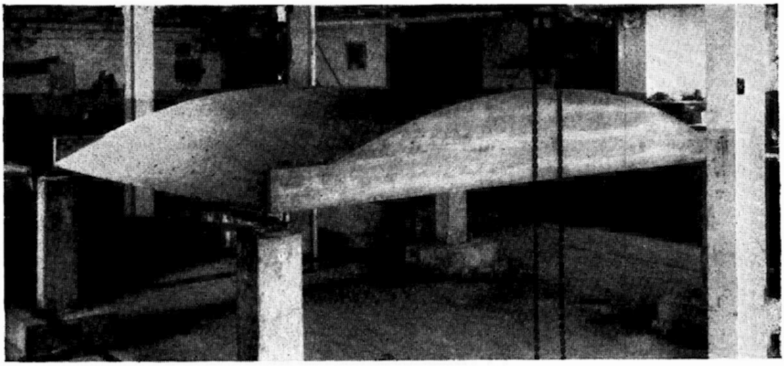

FIG. 21.—TYPICAL SHORT SHELL BEFORE TEST

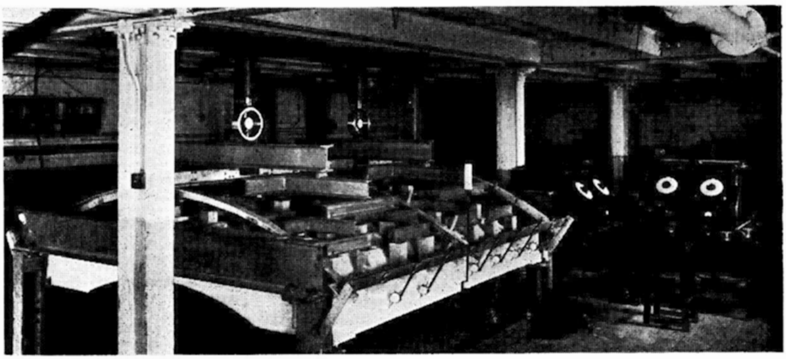

FIG. 22.—TEST RIG SHOWING DISTRIBUTION OF LOAD FROM TWO JACKS THROUGH A SYSTEM OF STEEL JOISTS

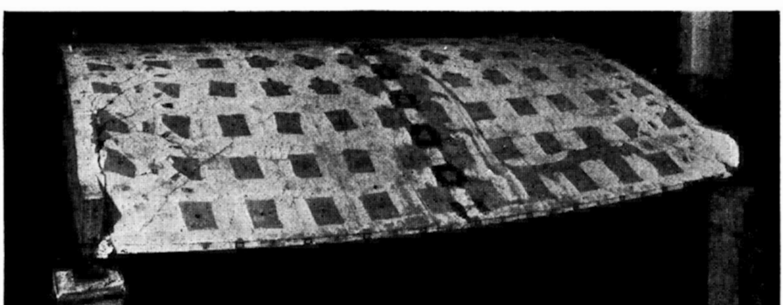

FIG. 23.—TYPICAL SHORT SHELL AFTER TEST

See contribution by Professor A. A. L. Baker on p. 203

been the first purely demolition work in which Seislok couplers, which had been intended for seismological exploration, had been used.

183. The contractors would like to express their appreciation of the helpful co-operation which they had received from Mr G. A. Wilson, Chief Engineer of the Port of London Authority, in making available one of the Authority's largest dredgers to handle the blocks of concrete when dredging the dock bottom to the required depth.

184. In §§ 95–97 of the Paper reference was made to the weight of the kentledge blocks and to the lifting capacity of the cranes, and this might be taken to imply that the contractors had made a regular habit of lifting 6¼-ton blocks with 5-ton cranes. This was due to the capacity of the cranes being incorrectly described. On the south side there had been one 10-ton and one 7-ton crane, and on the north side two 5-ton and two 7-ton cranes, and it had been the two 7-ton cranes which had been used for lifting the kentledge blocks.

185. In § 122, so that the records of the pile-driving might be correct in detail, an alteration should be made with regard to the type of hammer used to drive the octagonal reinforced concrete piles. In both cases a 4-ton drop hammer was used. The 4-ton single-acting drop hammers were used for the piles between the monoliths and for the test piles.

186. In §§ 136–140 of the Paper the Authors dealt with accelerated tests on concrete cubes. While fully accepting the advantages of this method, which was described in § 139, Mr Holloway would like it to be recorded that, as he was sure that the resident engineer would agree, these tests had never actually necessitated the cutting out of any defective concrete, nor had there been any errors in mixing to be rectified once the final proportion of mixes had been established.

187. He would like to express the contractor's appreciation of the co-operation received from Mr G. A. Wilson and all the members of the Authority's engineering staff. The contractor's agent on the site for both contracts had been Mr H. E. West to whom much credit was due for his handling of two major contracts of such a different nature.

Professor A. L. L. Baker (Professor of Concrete Technology, Imperial College of Science and Technology) said that the Authors had, very commendably, made some challenging comments in Appendix IV on the design of cylindrical shells. Would they confirm that they had finally considered the shell as a beam subject to transverse bending, assuming the edge beam and shell to act together, as indicated by Fig. 20 and § 171. Such a proposal had been made in relation to research then being carried out at Imperial College.[1] Had the Authors carried out any deflexion or strain measurements on the completed structures which had substantiated the validity of their assumptions?

189. A series of shells had now been tested at Imperial College by various post-graduate students, and test deflexions had been compared with values calculated by both elastic and ultimate load theories.

190. Figs 21–23 showed a typical short shell before, during, and after test, and Figs 24–28 gave the results of research carried out at Imperial College by postgraduate students.[2–5] In each case the results were indicated as follows:—

(*a*) Load and deflexion corresponding to yield stress calculated by elastic theory (Jenkins) by a round dot at the end of a full line.

(*b*) Ultimate deflexion and load by a square dot.

(*c*) Measured deflexions by small circles.

191. The ultimate load calculations had been based on the following assumptions:—

(*a*) The shells spanned longitudinally as beams of curved section in which strain was proportional to vertical distance from the neutral axis.[1]

(*b*) The stress in the longitudinal steel on the tensile side of the neutral axis at strains greater than the yield strain was assumed to have yield value.

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[1] References are given on p. 211.

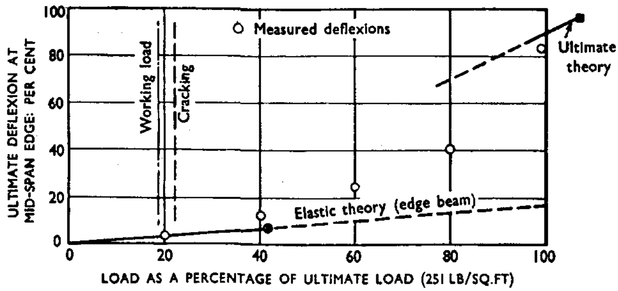

FIG. 24.—SHORT SHELL. LOAD/DEFLEXION DIAGRAM. FROM A THESIS BY A. K. E. LABIB, 1956

Span 8 ft; width 8 ft; opening 70°; radius 7 ft; thickness ½ in.; edge beam 1 in. × 2·5 in. depth

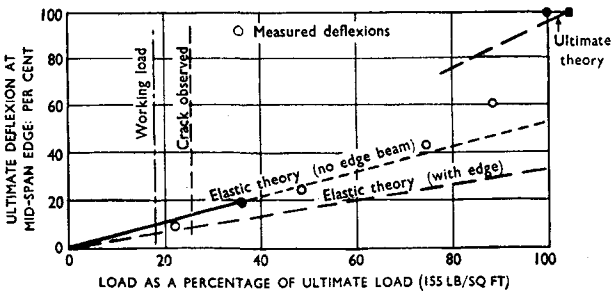

FIG. 25.—SHORT SHELL. LOAD/DEFLEXION DIAGRAM. FROM A THESIS BY L. G. BOOTH, 1954

Span 8 ft; width 8 ft; opening 70°; radius 7 ft; thickness ½ in.; edge thickening 0·8 in. × 1·0 in. deep

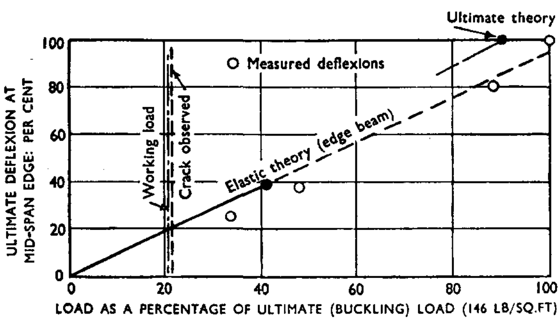

FIG. 26.—NORTH LIGHT SHELL. LOAD/DEFLEXION DIAGRAM OF UPPER EDGE. FROM A THESIS BY G. E. V. PANAS, 1956

Span 8 ft; width 4 ft; angle 35°; radius 7 ft; thickness ½ in.; upper edge beam 1·2 in. × 1·7 in deep; lower edge beam 1·2 in. × 0·875 in. deep

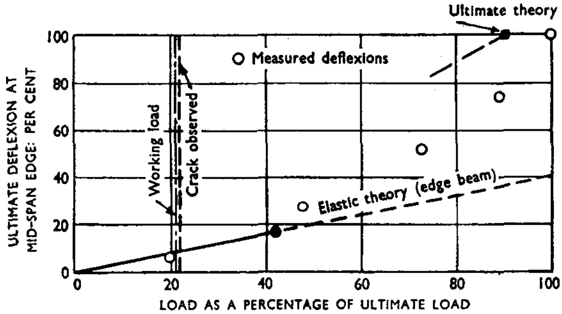

FIG. 27.—NORTH LIGHT SHELL. LOAD/DEFLEXION DIAGRAM OF LOWER EDGE

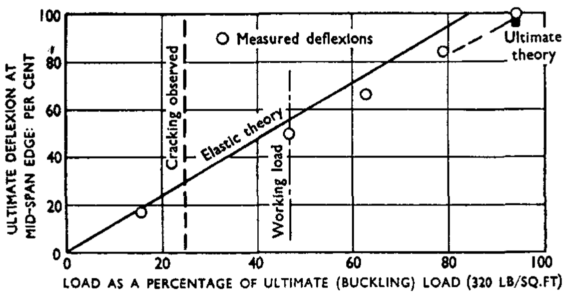

FIG. 28.—LONG SHELL. LOAD/DEFLEXION DIAGRAM. FROM A THESIS BY M. A. GOUDA, 1951

Span 21 ft 3 in.; width 8 ft 8½ in.; opening 95°; radius 6 ft 0 in.; thickness ⅞ in.; edge beam 2·5 in. × 2·5 in.

(c) Where significant, additional support to the load in a radial direction was assumed to be provided by the shell spanning longitudinally as a slab between the end gables with plastic hinges at the ends and at mid-span.

(d) The edge steel was assumed to yield sufficiently to provide edge support as a radial component of the longitudinal force.

192. The diagrams indicated that measured deflexions followed closely the elastic theory until cracking became significant. The load/deflexion curve of measured results then diverted from the linear relation and eventually, at the ultimate stage of load, approached closely the predictions of the ultimate theory.

193. It should be emphasized that, in the case of the short shells, the ultimate deflexions were very large, and in using the ultimate theory, the support provided by the sagging edges acting in suspension should be ignored. That effect was negligible, as would be noticed in the case of the long shell (Fig. 28).

The Chairman (Professor A. J. S. Pippard) said that in Appendix III the Authors had not hesitated to use mathematical symbolism, but in Appendix IV they had tried to explain in words certain points which might perhaps have been clearer if also expressed mathematically. Professor Pippard had found it rather difficult to follow exactly what had been done in the approximate process described, and he thought that the Authors might well consider whether or not the method described in Appendix IV could be expanded a little for the use of others.

195. In § 159 the Authors talked of "A comparatively simple theory". He thought that this was a case where it might have been given, and it would also be interesting to know with what particular published results it had been compared as a check. More details would be welcome.

196. In § 162 the Authors stated that taking into consideration the various approximations and uncertainties and so on with which they were faced there must be "a considerable degree of error," and they added that "Until much more research to measure actual stress distributions and their variation has been carried out it would seem to be of little value to compare at length the differences involved in different theories." He was not sure that he could go all the way with them there. The fact that there was doubt about the various theories and that there were uncertainties was, in his view, an added argument for analysing as far as possible such data as were available. Perhaps, however, he had misinterpreted the Authors.

Mr John Palmer (Partner, Rendel, Palmer & Tritton, Consulting Engineers) speaking informally, mentioned that he had on one occasion asked the Chief Engineer of the P.L.A. (Mr George Wilson) why he had adopted for the latest development at Tilbury the same fundamental basis for his new quay wall design as in the 1929 development, namely gravity-wall monolith construction. Mr Wilson had told him that he had given considerable thought to alternative designs, but that having had talks with one or two of the engineers who were on the original construction, he had come to the conclusion that monoliths were the right answer for the mud of Tilbury. Mr Palmer was certain that this decision was correct. He then recounted some of the early history of the Chief Engineer's Department of the P.L.A.

198. With regard to the cost of this berth, after deducting the figure for the shed from the total given in the Paper, a figure of £1,150,000 remained for a 842-ft berth for a 29,000-ton ship. In the conditions of Tilbury, this did not in any way seem to Mr Palmer excessive, but on the other hand some clients might complain if asked to pay this amount for one new berth. Mr Palmer also asked what use was now being made of the 1929 floating Landing Stage, specially built for large passenger liners, and how the dock authorities now determined which ships should use the new berth and which the old floating Landing Stage?

199. Finally Mr Palmer said that he hoped the Authors would be in full agreement with him that a substantial part of the driving force behind the initiation and execution of this fine job must have come from the Chief Engineer of the Port of London Authority, Mr George Wilson.

Mr R. C. Harvey said that the layout was essentially T-shaped, the stem of the "T" being at right-angles to the face of the quay. That in itself was unorthodox, but at Tilbury it was not new; the layout at the passenger landing stage in the river was also T-shaped. There was, however, a considerable difference between these two T-shaped installations. On examination it would be found that the second layout, within the dock, provided in the main for road transport rather than rail transport.

201. The general layout at Tilbury was given in Fig. 1, but Fig. 2 gave the layout of the new berth and shed in detail. The terminal was intended to deal with about 1,500 passengers at a time and on other occasions with about 2,000 tons of, probably, high-class cargo, and was a noteworthy structure for those purposes. It fitted the limitations of the site. From Fig. 2 it would be seen that on the east side of the wharf there was a large paved area used as a car park, which was stated to have accommodation for 700 cars. After allowing for its use by the various officials there would be parking for 600 cars, which was a car for every 2½ passengers. That seemed generous.

In this area, near to the stem of the "T", were two railway sidings, but only one of these had a platform about 120 ft long at the buffer-end. Presumably these sidings were to be used for goods loading—since they were not intended for passenger use—perhaps by means of fork-lift trucks, but away from the buffer-end, the sidings did not seem to be accessible for that purpose. Could the Authors explain the exact function of those two sidings?

202. Turning to the three tracks provided for passenger traffic on the west side of the stem of the "T", it was stated that they allowed for the speedy despatch of boat trains. Mr Harvey wished to supplement Mr Jellett's request for information by suggesting that some indication should be given of the interval at which these boat trains were despatched. If there was only one boat train at a time, the one platform would, of course, be sufficient. At the buffer-end this one platform was alongside the Customs hall. It seemed from the figure that the short length of it adjacent to the reception hall formed the main route of access to and exit from the Customs hall. In other words all passengers and their luggage, whether going by road or by rail, would use that part of the platform which would also be used by the returning empty luggage barrows. This short section might at times be congested, and it seemed to him that it formed a weak point in the layout. Was it working satisfactorily and had the berth been used yet to handle passengers quickly, up to its capacity?

203. The river landing stage had passenger facilities which were presumably still served by the railway. It seemed to him that when preparing the layout for the new terminal, the designers must have intended that the main method of handling passengers should be by road and not by rail. If that was so, it was regrettable. Everyone was interested in the railways, which were trying to get back the traffic which they had lost, but at Tilbury there was a large dock terminal, within a short distance of the capital of the country, which in his view had been laid out to encourage road traffic. From it arose the possibility of adding to the confusion and delay on the already highly congested roads around the metropolis. Had there been consultation, at the time the layout was being prepared, between British Railways and the Port of London Authority on that aspect of the matter?

Mr I. S. S. Greeves (Superintendent Engineer in charge of dock works, John Mowlem & Co. Ltd) said that he had been able to visit the works on a number of occasions, by the kind permission of the Authors. It had been very interesting to see how other people did the work and to admire the way in which the contractors had obviously laid out a good deal of money in having purpose-made kentledge, which must have been of great benefit to them in loading and unloading the monoliths. He had also admired the 2-cu. yd skips, which seemed to be beautifully balanced, making it possible to place the concrete exactly where it was wanted.

205. Fig. 14 of the Paper gave a considerable amount of information about the sinking of the monoliths. From this Figure he had calculated that the average skin friction, including the end bearing, had been 8·18 cwt/sq. ft. When his firm had tendered for the contract they had asked the soil mechanics experts to produce figures for the ultimate skin friction. Records had been turned up for previous work at Tilbury and at the Victoria Dock, and they had arrived at a figure of about 8 cwt/sq. ft. For any other work which had to be done at Tilbury a good lead had now been given as to what to expect in the way of kentledge for monolith sinking.

206. From the information given in the Paper it appeared that the average rate of sinking had been 33 ft 4 in/week, and the average hourly rate 2·72 in. From this he assumed that the contractors must have worked about 147 hours per week, and to do this they must have worked continuously, through Sundays. Had that been the case? When his firm submitted their tender they had estimated a rate of 2·86 in/hour, which compared very closely with that in fact found by the contractors. Discussions had been held during the preparation of the tender on the effect of the peat. In the past trouble had been experienced when sinking through peat. It compressed under load and could

be troublesome to cut through. Had any difficulties in fact been experienced in going through the peat strata, and, if so, had any special measures been taken to overcome the trouble?

Mr Peel, in reply, said that the layout, which Mr Jellett had referred to as revolutionary and which the Authors had described as unusual, had been dictated largely by the conditions at the site. It had been necessary to evolve a scheme which would be as economical as possible and which would enable the installation to be used for cargo and also as a passenger berth. The Authors believed that it was working satisfactorily in that way.

208. With regard to the reception hall being at the back of the shed, it had always been customary at Tilbury for passengers to stay on the ship while their baggage was unloaded. Many gibes had been made about the draughty sheds at Tilbury, but a comfortable ship was better than even a comfortable shed. It might be that at Tilbury the passengers, having enjoyed the luxury of a large ship for a voyage of perhaps 3 weeks, were more reluctant to leave that comfort than those who had crossed the Atlantic in a few days and who perhaps had urgent business on shore.

209. Reference had been made to the railway sidings and to the possibility of having an island platform. Usually there were three or four boat trains for each vessel, but they did not run head-to-tail, one after the other; they were despatched to or from St Pancras at hourly intervals. The necessity had not yet arisen, therefore, to deal with more than one boat train at a time. If the line between Tilbury and London was electrified and the railway facilities improved, that necessity might present itself, in which case a line could be laid on the other side of the passenger platform. Of the three present tracks, one served the platform, one was a release road, and one was a reserve in case it was necessary to shunt an empty train quickly out of the way by drawing it out of the platform and pushing it straight back on to the empty track.

210. So far as the Customs tables were concerned, the Authors were very ready to acknowledge the help which they had received from their inspection of the Customs tables at Southampton, but an attempt had been made, after consultation with the Customs, to arrange a somewhat novel form of layout, which was illustrated in Fig. 2. The tables were not in long lines, as was so often the case, an arrangement which led to a great deal of congestion, with the incoming passengers from the ship going to the tables, and their baggage having to be taken away after examination, so that there was considerable confusion with people and baggage going to and from the tables. The scheme had therefore been devised by which the baggage was brought off the ship and put against the initial letter of the passenger's name, and then the passengers came ashore 400 at a time, claimed their baggage and had it taken by a porter to a table, and it was dealt with without any difficulty.

211. For the design of the quay other forms of construction than that adopted had been considered, such as cylinders and piles and even sheet-piling. Sheet-piling was almost out of the question; it would have needed a very special type of design to get sufficient modulus of resistance in the sheet piling to hold the pressure of the very great depth of very soft material, and there would be the disadvantage that after 30 to 50 years it would all have to be removed, which for a scheme of the magnitude in question seemed hardly justifiable. With regard to the possibility of making an open quay, that might perhaps have been done, but there were certain background elements of risk in the possibility of slips. The main point, however, was that it would have been no cheaper; the very large amount of additional excavation needed with a 5/1 slope would have swallowed up any economies.

212. Blowing off a charge of 1,500 lb. in virtually one explosion had been made possible by the new technique evolved by I.C.I., whereby the charge is divided up into separate parts, as described in the Paper, which are connected with a fuse known as Cordtex fuse, a plastic tube with a small central hole filled with cordite. The actual explosions of each of the individual elements of the charge were separated by means

of 15 to 20 milli-second detonating relays. In that way, while the local shock was very large and produced the demolition, so far as the composite shock was concerned the peak of the vibration of one explosion could be made to coincide with the hollow of the vibration of the next and they therefore tended to be damped out. The contractors had been asked to investigate the latest methods of carrying out this demolition by explosion because it had been necessary to open up the way to the southern berth on the east side of the West Branch Dock at an early date. The first charge which had been exploded had been about 280 lb., and that had been experimental. The effects had been observed from a tug, one Sunday evening, about 300 ft away, and there had not been the slightest shock in the water or in the tug.

213. The difficulty with drilling in the concrete had been due simply to very bad concrete. There had been patches where the cement had run out and the vibration of the drill loosened the pebbles, causing jamming.

214. A steelwork roof had been considered in the early stages of the design but had been abandoned in favour of a barrel vault roof on the grounds of improved appearance and economy in maintenance.

215. Mr Holloway had referred to the work done on the scheme by Mr Storey Wilson. Mr Peel would certainly like to add his praise for the ingenuity and skill which Mr Storey Wilson had displayed, and would pay a tribute to the work of Mr West, the agent on the site, and of Mr Menzies, of the Metropolitan Construction Company, who had done the demolition work. Mr Peel also thanked Mr Holloway for his contribution of additional technical details and for the corrections he had made with regard to the capacity of the derricks and the use of the hammers.

216. Professor Baker's diagrams comparing theoretical stresses in short shells and long shells by the elastic theory and the ultimate theory with measured stresses were extremely interesting. There was need for a great deal more research of that kind; Mr Peel did not think that anyone could say exactly what those stresses were without measuring them. As was stated in Appendix IV to the Paper, there were so many unknown and uncertain factors that it was necessary to make many almost speculative assumptions whatever theory was adopted. The orthodox theory, as he understood it, had been developed originally from the analysis of stresses in a portion of a tube. The stresses at the edges of the tube were equated mathematically with those in the edge beam. That seemed to him to be quite artificial and resulted in a very elaborate theory and quite artificial assumptions had to be made in order to reach a practical solution of the equations. In the theory which had been used the whole structure was considered as one unit. The transverse stresses and moments had been derived for the shell and at the edge had been equated to those in the edge beam, but in getting the main longitudinal stresses they had treated the structure as a whole. It was true that the edge beam did not support itself; it hung on the shell and tended to make the shell sag inwards rather than spread outwards.

217. For purposes of comparison Blumfield's Paper,[6] which was one of the few in which an example was worked out by orthodox theory and the main stresses given, had been used and the alternative formulae which had been evolved had been applied and the results shown in Fig. 29 obtained. In each diagram there was a solid line and a dotted line, the former representing the stresses or moments obtained by the theory or formula which had been used, while the latter gave the published stresses and moments. It would probably be agreed that the disparity between the two curves in each case was, as stated in Appendix IV, negligible from a practical point of view. Professor Pippard had referred to the publication of formulae. Those for the forces on the back of the wall which had been given in the Paper were simple. There was no great difficulty about those evolved for the shell, but they were lengthy and would require a separate Paper.

218. Mr Palmer had referred to the use of monoliths. Monoliths had been traditional at Tilbury, and there had been no regrets at having used them in this instance. Mr Peel thanked Mr Palmer for his reference to the driving force of the Chief Engineer

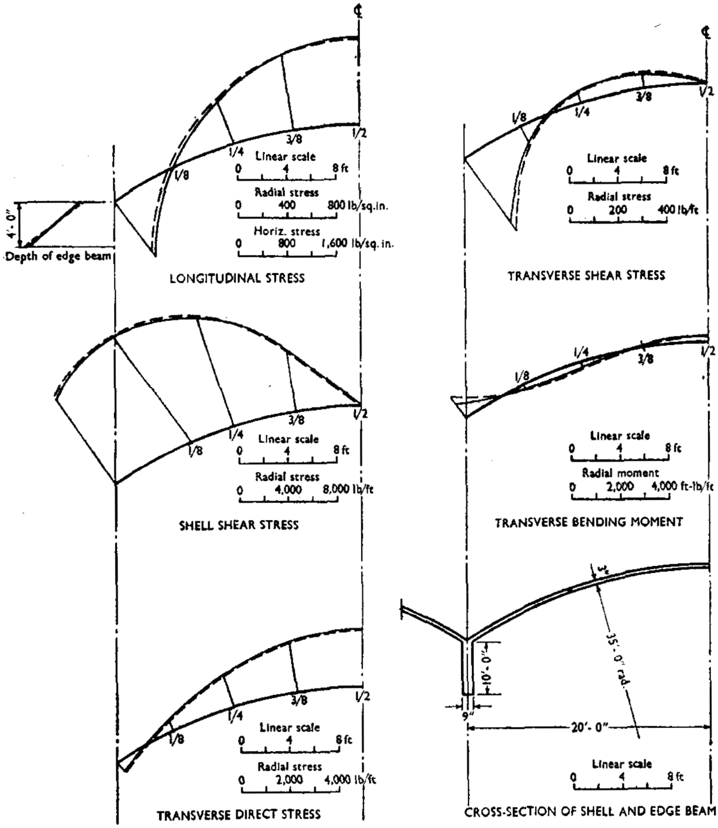

FIG. 29

to the authority, Mr Wilson, behind the scheme described in the Paper. Although he had had other types of construction examined Mr Wilson had decided upon monoliths in the conditions at Tilbury. It was he who had pressed for the permanent type of construction for the shed and who had pressed the contractors to adopt the latest methods of demolition so as to get the work done as quickly as possible.

219. The use of the Passenger Landing Stage and the No. 1 Berth in the dock itself was simply a matter of convenience. If time could be saved a ship would go straight into the dock, but if she had to wait for the tide she would use the landing stage, which also served the ships of other lines which carried passengers but went to other docks.

220. Mr Harvey had referred to the layout and made some comparison between the new berth and the landing stage, but no real comparison was possible because cargo could not be dealt with at the passenger landing stage.

221. With regard to the two sidings on the east side, one was obviously a standing siding for trucks and the other was a convenient means of dividing a rake into two, putting half into the platform and shunting the other half and then changing over. Alternatively, the second line had been used to load from rail vehicles into road vehicles

and vice versa. So far as the possibility of congestion on the platform was concerned, it had not yet occurred. There had been a little difficulty at the start, but that had been very quickly resolved. It had been suggested that the scheme provided an inducement to use the road rather than the railway. The fact was that when dealing with passengers it was necessary to provide for both, and it was not possible to dictate to passengers whether they should go by train or car. It was no use having a restricted road access and congestion; an adequate area must be provided for road vehicles, as well as adequate rail facilities.

222. With regard to Mr Greeves's remarks it was true that the figure of 8 cwt/sq. ft which had been mentioned was about right, and from previous records it had been possible to work out that on that basis about 2,000 tons of kentledge might be needed, and that had been specified. On the question of working hours, it was stated in § 112 that "Grabbing from monolith wells, loading and unloading kentledge, sealing, and hearting operations continued during the 24 hours." Work had continued through week-ends. No difficulty had been experienced in going through the peat.

223. In conclusion, with regard to the scheme as a whole, Mr Peel quoted words used by the late Chairman of the Port Authority (whose untimely passing they mourned that day) who, when addressing representatives of the shipping industry and the Press in the summer, had said:

> "In the design of this extension we made the best estimate we could of the developing requirements of the great ships which now use this dock. It must necessarily rest with others to take advantage of the facilities provided. We have performed this act of faith, and we hope for the helpful understanding and collaboration of all concerned."

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