

P2/1/110 (1)  
CITY OF LIMERICK FLOATING DOCK.

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GENERAL INSTRUCTIONS

FOR THE

EXECUTION

OF THE

WORK,

BY

JOHN MACMAHON, C.E.



DUBLIN:  
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1847.

**Board of Public Works.**

**NOTICE**

TO PERSONS DESIROUS OF CONTRACTING FOR LIMERICK  
DOCKS, &c.

Contractor to state period within which Works are to be completed.

Per Centages to be retained—10 per cent., until it amounts to a sum to be fixed  
by the Commissioners.

Payments for Work executed in furtherance of the Contract, to be made Monthly  
on account. Measurements to be made Quarterly, when Balances, minus  
per centages, will be paid up.

No Advances to be made on account of Plant; but any matters of Property  
brought on the Concern or Site, and intended or required for the construc-  
tion of the Works, or in furtherance of the Contract, are not to be removed  
without the express permission of the Board.

By ORDER,

JOS. C. WALKER,  
*Secretary.*

OFFICE OF PUBLIC WORKS,  
DUBLIN, 20th March, 1847.

**Board of Public Works.**

CITY OF LIMERICK

**FLOATING DOCK.**

GENERAL INSTRUCTIONS FOR THE EXECUTION OF THE WORK,  
WITH DETAILED DESCRIPTIONS OF THE QUALITY AND  
SPECIFICATIONS OF THE SCANTLINGS OF THE SEVERAL  
MATERIALS WHICH ARE TO BE USED IN ITS CONSTRUCTION.

1. The datum line adopted, and from which all altitudes are figured, is twenty-  
seven feet four inches below the low water of ordinary spring tides, or fifty feet  
below the bench mark on the plinth of the gas house, at its south-eastern angle.

2. The site is fixed within the county of the city, or borough of Limerick, on  
the south-eastern bank of the river Shannon, as delineated on the general Plan  
No. 1. Its length extends down stream from Meales-quay, about fourteen  
hundred feet, and its breadth, from the line of the low water of spring tides to  
the new road leading from Askeaton into the city, is about six hundred and fifty  
feet.

3. The communication from the river to the dock is to be by two neap tide  
locks, fifty feet in breadth each between the quoins; one at the northern end of  
the dock, next the commercial portion of the city, which is to be crossed by a  
swivel bridge for the convenience of the trade of the river wharf of the dock;  
the other is to be at the southern end, where there is no crossing required,  
except the footways on the gates.

4. The top rails of the lock gates are to be placed at the level of the high  
water of neap tides; and as the fixed sills of the platforms will stand three feet  
six inches below the low water of ordinary springs, or twenty-six feet two inches  
below the level of the top of the plinth of the gas house, at its south-eastern  
angle, there will be, at the high water of the every day tides of the year, sixteen  
feet four inches on these sills. The dock will be prepared to contain the high  
water of spring tides, without any inconvenience to the shipping or trade.

MANNER IN WHICH THE WORKS ARE TO BE EXECUTED.

EXCAVATION.

5. The earth and quarry excavation within the circumscribing lines of the  
intended locks or entrances, and the floating dock, is to be sunk to a length and  
breadth sufficiently capacious to contain the locks, their sluice tunnels, walls,  
counterforts, and puddle banks, as also the area of the dock, with its enclosing  
wall, counterforts, and puddle banks.



6. The bottom of the dock is (after being puddle lined) to stand four feet six inches below the low water of ordinary spring tides, and the entrance channels, as described on Plan No. 1, are to be finished off at the same level both by ordinary excavation and dredging; and all stanks and dams to be cleared away to this level.

7. The part to be excavated is shown on Plan No. 1 by a red shade, and the depths to which the sinking is to be carried are figured on the sections drawn on No. 3 sheet. These sections also denote the line at which the rock was met in the borings made under the directions of the Engineer; but it is requisite for the officers to satisfy themselves on the accuracy of these lines, as the Board do not hold themselves responsible for their correctness.

#### FILLING AND FORMING.

8. Such portion of the excavation as may be suitable, is to be applied to the construction of a water-tight mound or stank, the centre of which is denoted by a brown line on Plan No. 1; the remainder is to be applied, in the first instance, to the completion of the wharfs, quays, and puddle banks, and then to the formation (to the wharf level) of such other parts of the low land around the site as the Engineer shall direct, the length of carriage, unless specifically agreed for, not to exceed forty perches statute.

9. The wharfs and quays, when formed, as shown by the sections on sheet No. 3, are to be covered with eight inches in depth, of stones broken to pass through a ring of two inches diameter; the drainage sewers, pipes, and sillage grates, are shown on Plan No. 2, details of which are on sheet No. 6; the squared pavement set at the back of the coping and parapet walls is also shown on the same sheets.

#### THE LOCKS OR ENTRANCES.

10. These neap tide locks are to be fifty feet in breadth between the quoins; the several other dimensions, with the form, height, and batters, will be found on reference to the plans.

11. The earth or quarry, as the case may be, is to be excavated for the lock pit to the level of the bed of the lower sleepers, or seven feet under the surface of low water of ordinary spring tides, and cross trenches of three feet in width are to be opened to receive the several rows of sheeting and bearing piles, which are in all cases to be of sufficient length to be inserted nine inches into the rock which forms the substratum of the lock foundations, the tops of these bearing piles being truly levelled off; the bearing cills are to be laid thereon, and fastened down with an oak trenail of two feet in length and two inches in diameter, of an octagonal form, driven into the head of each pile, and the capping sills to be spiked to the bearing sills, with one one-eighth inch ragged bolts, sixteen inches long, one to each intersection.

12. The bearing and capping sills, marked on Plan No. 4, being carefully placed in their positions on the heads of the bearing piles, the sheeting piles, closely jointed, are to be laid in, and securely spiked to the sills, with two spikes twelve inches long in each pile.

13. The trenches are then to be well packed with puddle, properly made.

14. The several bearing sills, see Plan No. 4, being brought into their proper berths, the whole of the spaces are to be filled in with puddle of best material, well picked, mixed, floated, and sheered.

15. Between the two lower rows of sheeting piles marked on Plan No. 4, there is to be laid a platform of solid balk, tried up so as to bed fairly on the bearing sills, and to make perfectly close joints.

16. These balks are to be united with each other by oak dowels, and bolted down to the bearing sills with one and one-eighth inch ragged bolts, eighteen inches in length; this part of the work, when completed, to form a solid, well fitted, and closely jointed horizontal floor; the main and diagonal sills, sixteen inches square, and framing connected therewith, are to be let into the platform one inch and a half in depth, to be set thereon on a bed of patent felt, and secured thereto by wrought iron straps, as shown on Plan No. 7, and with ragged bolts one and a half inches square and two feet four inches long.

#### RECESS FLOORING.

17. From the inner row of sheeting piles to the pointed sills, thorough longitudinal flooring of four and one-half inch elm plank is to be laid on and fastened down to the balk with three-quarter inch spikes of twelve inches in length; this flooring is to be fitted, accurately to the pointed sills, and great care must be taken to have it closely jointed and truly levelled off.

18. The wrought iron traverse rails are to be let into the planking, seated on patent felt, and firmly secured by nine inch screw bolts three-quarter inch diameter.

19. The whole of the timber to be of the best Memel or other equally good Baltic timber, except the main and pointed sills and the recess flooring, which are to be of good sound Irish or English elm; the puncheons are to be of beech or elm, and of oak to support the pivots.

#### FLAGGING AND COUNTER ARCHES.

20. The flagging and counter arches are to be of ashlars, scappled on the setting beds, and fair jointed; the top bed close scappled; the side joints of the arch stones are to be radiated, as shown on Plan No. 7.

21. The paving in front of the counter arches, for the extent shown on Plan No. 2, is to be hammer-dressed sound stone pitching, eighteen inches in depth, not less than eighteen inches in length, and four inches in thickness.

#### SIDE WALLS.

22. The side walls are to stand upon the flagging, counter arches, and platforms, and to be built in courses from ten to eighteen inches in height; the front to be closely punched bond and ashlar work, in the proportions, lineally in each course, of one foot of bond in five feet of ashlar; the ashlars to average from eighteen inches to two feet three inches in the bed, which is in no case to be less than once and a half the height; the bonds not to be less than eighteen inches on the head, nor more than two feet, and to average from three feet to three feet six inches deep in the bed; the joints of both ashlars and bonds to be dressed square from the face for twelve inches, and the remainder of the beds and joints to be scappled, the face to be close punched fair out of winding, with a chisel draft on the arris.

#### BACKING.

23. The backing masonry to be of sound flat bedded rubble stone, set flush in good mortar, and levelled to the ashlar in front.

24. In the cross section of the side walls of the locks, the courses are to be horizontal, and to be connected by a correctly formed twisted wall with the curved finical batter of the dock and river walls—each course to be completed for the full breadth of the wall, and well grouted, before the succeeding course is commenced.



## CHAIN HOLES.

25. Preparation to be made in the side walls of the recesses to receive the machinery attached to the back of the gates, and chain holes, with hewn stone floors and side walls, covered with stone lintels twelve inches in thickness, and bearing six inches at least on each side wall, are to be carried up as shown on the drawings; and the metal frames for the friction rollers are to be inserted in sufficient sills, jambs, and heads of heavy scantling hewn stone, in such positions as may be pointed out by the Engineer in the progress of the works, and secured by Lewis bolts, nuts, and wedges, tented in.

## HOLLOW QUOINS.

26. The hollow quoins are to be prepared from sound unshaken limestone, of thickness suited to the courses in which they are respectively to set; each stone to be five feet in length, and four feet in breadth; the beds are to be quite parallel, and closely chisel-dressed; the faces worked fair out of winding, and the end joints true and square for their whole length.

27. The cove must be taken out, so that each stone when set will bond into the front wall and recess, and into the backing alternately.

28. Previously to hanging the gates, the coves are to be carefully dressed and fitted, so that the staunching joints, which are to present four inches horizontal contact, may be perfectly true from the flooring to the top rail of the gates.

29. The square quoins of the recesses, and the quoins against which the stopgates are to rest, must have two feet head at least, and to bond into the walls from two feet six inches to three feet six inches alternately; the form and dimensions of the grooves for receiving the stopgates are particularly marked on Plan No. 7, to which those who propose to tender will have reference.

## COPING.

30. The coping course to be one foot six inches in thickness, not less than two feet six inches in length on the face, and four feet six inches deep in the bed; the beds and joints respectively to be braced true for their whole extent; the faces and top beds to be closely punched and drafted, and the top front arris to be rounded to a radius of four inches.

31. Dowel holes, five inches square, are to be cut in each joint of the coping for its full depth, in which well fitted stone dowels are to be inserted and run with cement.

## PUDDLE.

32. A staunch puddle, of the thickness marked on the drawings, is to be carried round the back of the walls, from the level of the foundations to within one foot six inches of the top of the coping.

33. The square pavement which is to be set at the back of the coping, and the manner of forming the wharfs, are already described under the head of Filling and Forming Wharfs or Quays.

## LAND TUNNEL SLUICE CONDUITS.

34. These conduits are to aid the gate sluices in the discharge of the waters that enter the dock when the flood rises above the level of neap tides, and also to assist in the scour of the entrances.

35. The flagging is to be twelve inches in thickness, eighteen inches in breadth, and to extend for nine inches under each side wall; every alternate stone to be

thorough, the others to set fifteen inches in under the side walls, and to make a butt joint in the ope of the tunnels. On these the side walls composed of ashlar and bonds, are to set in a rebated bed, one inch in depth, the lintels are to be fifteen inches in thickness, eighteen inches in breadth at least, and to lap nine inches at least on each side wall. The flagging and lintels are to be jointed square from the face for twelve inches, and the face fair dressed. The side walls are to be built in the manner specified for the lock walls, except that the ashlar are to be headers and stretchers alternately; the headers not to be more than four feet apart, the courses not to be lower than twelve inches. Provision is to be made in these tunnels for the reception of the cast-iron sluice frames, see Plan No. 7.

36. The plans and sections of the upper entrance lock will be applicable in every instance to the lower one, with the exception of the bearing piles, sheeting piles, and foundations, the dimensions of which are particularly shown on Section No. 18, Sheet No. 5.

37. The bearing piles to be looped, shod, and driven, same as hereafter described for the northern talus wall.

38. The sheeting piles to have shoes of nine pounds weight each.

## DOCK WALL.

39. The dock wall is to be built in the lines shown on the general Plan No. 1, and of the form and dimensions exhibited in the sections thereof in Plan No. 2.

40. The work in front from the top of the footings to the bed of the cordon, or plinth course, is to be built entirely of hammer-dressed, flat bedded, rubble stone, in courses levelled off from eighteen inches to two feet in height, that is, work which will make close joints and require no pinners. Bonders, or Thoroughs, consisting of two stones, to be placed eight feet apart in each course. The plinth or cordon course is to be one foot six inches in height, and to average two feet nine inches in depth in the beds; no stone to be less than two feet three inches, and the bonds not less than eighteen inches in length on the faces, and not more than six feet apart. This cordon course is to serve as a capping for the rubble stone substructure, and a base for the stone fenders and rubble work above it. See Section on Sheet No. 2, and Elevation on Sheet No. 5. The cordon course is to be dressed similarly to the ashlar work of the side walls of the locks.

41. From the level of the cordon course to the underside of the coping, the wall is to be built of hammer-dressed rubble stone, as before described, except that the bonders, which are to be no more than nine feet apart, must in all cases be the full height of the respective courses, in which they are to be carefully set as leaders; they must be sixteen inches long on the face at least, have beds equal to double their height, carry their full dimensions for the whole depth, and to be so placed in every second course, as to stand in the centre between the stone fenders, which are nine feet apart. The space between the fenders, as well as between the bonders and fenders, is to be filled in with scarp stone, as before stated; no stone whatever to be less than six inches in height, and twelve inches in bed, to be sixteen inches long at least, joints squared for six inches in, and to have the same extent of overlap. See sketch in margin.



42. The fenders are to be of fine dressed solid ashlar work in front, backed with scrippled ashlar scantling, squared in beds and joints for the full breadth of the wall. On the front they are to be chamfered, so as to mitre with the chamfer on the plinth course and coping. See Drawing Sheet, No. 5.

43. The backing masonry to be the same as that already described in the Specification of the work of the Locks or Entrances. The counterforts are to be twelve feet from centre to centre, and are to be tied into the front wall at the internal angles, with stops at least two feet six inches long; the quoins are to have far beds, and to bond into the head and side twelve inches, and twenty-four inches at least alternately.

#### COPING.

44. The coping of the dock walls to be the same in every respect as that described for the coping of the lock walls, and to be similarly backed.

#### STAIRS OF ASHLAR MASONRY.

45. Landing steps to be carried up in the dock, from the level of fifteen feet six inches above the sill to the top of the coping, in the positions marked on Plan No. 2, the steps to have seven inches rise, twelve inches tread, and to be five feet in length out of the wall, into which they are to be let nine inches; the treads to be rough punched, and the beds and joints close punched.

#### MOORING POSTS.

46. Mooring posts, each formed out of a sound stone, are to be firmly built into the wharfs, in the manner shown, and in the situations marked on the general plan, the part above the level of the wharf to be neatly hewn and chiselled into a circular form, twenty-one inches in diameter at the waist, and two feet at the head, see Drawing No. 2.

47. The warping posts at the entrances are to have four inches more diameter, and six inches more height than the mooring posts.

#### MORTAR.

48. All the masonry, including the pitching of the northern sea slope, to be set flush in mortar, composed of the best hydraulic lime obtainable on the Shannon or elsewhere, and clean sharp sand. The lime to be ground into powder, by a stone running on edge, worked by horse or other power; and of this powder of lime unslacked, one part is to be added to three parts of sand, and well mixed, with a due proportion of water, in the usual mortar mill. No more mortar is to be made at any time than is necessary for a day's consumption, and the lime, before and after it is ground, must not be exposed to moisture until it is required for use.

#### GROUT.

49. The grout to consist of one part of lime, ground into powder, to four parts of sand, diluted in water, and joints must be taken that it is worked into every joint of the hewn stones and headers with a grouting sword, so as fully to saturate the work.

#### GATES, MACHINERY, METAL AND IRON WORK, &c.

50. The extreme dimensions of the gates, and the scantlings of the several details thereof, are particularly figured upon the drawings, and the various plans and sections of the several parts fully exhibit the mode of construction.

51. The framing, with the exception of the mitre posts, as also the sheeting of the gates, is to be of the best crown Mangel timber, free from shakes or sap; the mitre posts to be of Irish or English oak, sound and straight grained.

52. In putting the gates together, the joints throughout are to be flushed with white lead and oil.

53. The pivots, sockets, land ties, friction rollers and frames, sluices and sluice frames (with copper facings), gate rollers (case hardened) with wrought iron axles, turned true. Crab winch casings and brackets to be of the best quality of British iron, close cast, the castings to be in strict conformity with the several designs, to be quite fair and free from sand holes, or any other defect whatever, the utmost care to be taken in the fitting and putting them together, with copper facings and brass journals where directed, and felt steeped in boiling tar to be inserted in such joints as the Engineer may direct.

54. The D L and T straps, ragged and screw bolts and nuts, connecting rods and couplings of castors, scarf and collar straps, tie straps of cills, spikes, chains and fastenings, cases and screw movement machinery for sluices (worked in brass journals), and all other necessary iron work, to be of the best No. 3 British iron, wrought in the most workmanlike manner. The moving screws for the rollers and sluices to be wrought brass.

#### CRAB WINCHES OF DOUBLE POWER FOR OPENING AND SHUTTING THE LOCK GATES.

55. The details of these will be fully given in the progress of the works. The cost of each, including fixing, shall not exceed thirty guineas. The whole of the work, as well as the fitting and fixing connected with the gates, to be done in conformity with the general and distinct drawings, and to the entire satisfaction of the Commissioners and their Engineer, care being taken in the hanging to make each valve move evenly and freely, and that when shut they make a water-tight and staunch joint, with the coves, sills, and mitres.

#### WHARF.

56. The northern wharf is to be protected from the action of the tides by a talus wall, secured at bottom by piling apron pieces and wales. The piles to be of beech or elm timber, ten to twelve inches diameter, the front row to be driven four feet apart from centre to centre, and the back row twelve feet from centre to centre, both rows to be well hooped, shod, and driven to the required depth; the shoes of cast iron, with wrought iron straps, to be fourteen pounds weight each; the wale pieces to be eighteen inches in depth, fished at the headings, and six inches in thickness, of yellow pine, secured to the piles with twelve inch spikes; and the back and front piles to be connected by means of apron pieces twelve inches by six inches, of red pine, secured to the piles by bolts and nuts of seven-eighth inch square iron, see Drawing No. 2.

57. The talus wall to be faced with hammer-dressed stones, averaging two feet in depth, not less than eight inches in thickness, and eighteen inches in length on the face, having parallel beds for their whole depth, and six inch square end joints; these face stones are to rest on a packing of rubble stone and concrete two feet in depth, to be set close in continuous courses in approved hydraulic mortar, and with a view to accommodate the builder, by lessening the length of each respective course. Cross partings will be permitted in the construction of the works, consisting of square dressed stones, both on beds and joints eighteen inches in breadth, two feet six inches in depth, and three feet in length on the face, set as before stated, against which the pavement of the talus wall will head, and so save the cost of continuous courses for the whole length; these cross partings may be fifty feet or more asunder, at the option of the Contractor. The upper course of the talus wall throughout to be dressed so as have a horizontal top bed, on which the parapet wall is to rest.



56. This parapet is to be built of rough punched ashlar, four feet in height, exclusive of the coping, the stones to be of dimensions similar to those specified for the ashlar in the lock walls, the coping to be solid stone, with square end joints, close punched, and fair scappled, two feet in depth, and in length not less than four feet, each stone to be secured by means of horizontal, cast, or wrought iron tubular dowels, six inches long and two inches diameter, run in with Roman cement; the top bed of this coping to be chisel-dressed to an approved circular form.

59. At the inner face of the parapet a banquette is to be formed of broken stone and strong gravel, protected by a rough punch curb, set in mortar, having one ascending step twelve inches high and ten inches punched tread.

60. The river walls, from their extremities to the side walls of the locks, as well as the retaining walls of the steps, are to be built of ashlar masonry in the face, and rubble in back, and coped same as that described for the side walls of the locks.

61. The steps to be similar to those described for the dock, in workmanship, and carried up from the levels marked on the section.

62. The western wharf, from the road to the steps, marked O.P. on Plan No. 2, to be protected on the sea side by a talus wall and parapet, the talus to be pitched with rubble stone of heavy scantling, not less than eighteen inches in depth, set "hough and ham" on rubble packing two feet deep; the foundation under the pitching to be made solid previously to setting the first course.

63. The parapet wall, which is to be ten feet in height over the wharf, to be built of solid flat bedded rubble masonry (similar to that described for the dock walls from level of footings to plinth course), to be coped with hammered stone, twelve inches in depth and two feet in breadth, and in lengths not less than four feet, rounded on top.

#### SWIVEL BRIDGE.

64. Over the up-stream entrance lock, there is to be thrown a cast iron swivel bridge, having thirteen feet of roadway between the railings.

65. The cast metal work of this bridge is to be of the best quality of British iron, close cast, and in strict conformity with the several designs which will be furnished in detail at an early day, so as to ensure its completion without hurry by the time its use will be required for the works.

66. The wrought iron work in bolts, nuts, axles, railings, spikes, &c. &c., are to be of the best No. 3 British iron, wrought in such manner and form as the Board's Engineer may hereafter direct.

67. The planking of the roadway to consist of thorough oak battens, five inches broad and four inches in depth, laid transversely and secured to the ribs by suitable bolts and nuts; these battens are to be set one and a half inch apart; and the footways, which are to be separated from the carriageway by metal guide plates, are to be close jointed elm plankings, one inch in thickness, laid longitudinally on the battens, and firmly spiked thereto.

68. As the detailed plans cannot now be furnished, the Board deem it advisable (so as to enable the offerors to complete their tender in bulk for the whole work) to state that the cost of the bridge will be limited to thirteen hundred pounds sterling, on which a profit of ten per cent. will be allowed to the Contractor.

69. As excavations have been made by the Relief Committees of Limerick in the site of the proposed works, since the sections were taken and plotted by Mr. George Tarrant, C.E., the Contractor will be required to make an allowance to the Commissioners, at *pro rata* schedule prices, for the quantity that may have

been so removed, provided it has been deposited in situations from which it will not again be necessary to shift it. The sums thus obtained will go to the credit of the Relief Committees, or their Appointees, by an arrangement with the Board.

70. The Contractor is at his sole expense to provide all the materials, of every description, required for the completion of the works hereinbefore mentioned, as also the necessary workmen, implements, and machinery; and to bear all expenses and risk of putting in coffer dams or stanks, and keeping out the water, which is to be done in so effectual a manner as to lay the bottom works perfectly dry.

71. The entire of the works hereinbefore mentioned, as well as all matters and things of right belonging to them, are to be performed in a good, sufficient, and workmanlike manner; in strict conformity with the spirit of the specifications, and with the plans, and to the entire satisfaction of the Board and their Engineer.

JOHN MACMAHON, C.E.

*Office of Public Works,  
March 15th, 1847.*

#### LIST OF PLANS REFERRED TO IN THE FOREGOING INSTRUCTIONS.

- No. 1. General Plan of Proposed Works.
2. Plan of Proposed Floating Dock and Sections of Walls.
3. Sections of Dock Walls and Excavations.
4. Plan of Platforms and Sections of Locks.
5. Sections of Locks, Plan, Elevation, and Section of Dock Wall and Steps.
6. Sections of Locks and Plan of Parapets and Dock Wall.
7. Plan, Elevation, and Details of Entrance Lock Gates.



X D

Floating Dock

General instructions for  
Execution of the Work