## THE USE OF WOOD IN RAILROAD STRUC-TURES.

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#### CHAPTER XXVIII.

HOWE TRUSS BRIDGES.

PLATES 119, 120 and 121 show a design for a Howe truss deck bridge of 66 ft. span. Plate 119 shows the general design, while the details will be found in plates 120 and 121.

The bill of materials given herewith will, with the plates, give all that is necessary to understand fully the construction of the bridge.

No. 48. BILL OF MATERIAL FOR HOWE TRUSS BRIDGE. DECK SPAN, 66 FT.

PLATES 119, 120 AND 121.

#### Timber.

No. of Pieces.	DESCRIPTION.	Size.		FT. BOARD M's'RE.	KIND OF WOOD.
4	Top Chord	6 in. × 14 in.	43 ft. 1 in.	1,207	Yellow Pine.
<b>1</b>	"	6 in. × 14 in.	20 ft. 1½ in.	816	66
<b>- T</b>		8 in. × 14 in.			
2	1	8 in. X 14 in.	1	~ ~	. 66
4	Bottom Chord			' ,	6 ' 6 6
4	1	6 in. X 12 in.		768	
	§	8 in. × 12 in.		1 '	
<b>4</b> 2	1	8 in. X 12 in.	Į.	'	66 66
8	Braces	ł		•	66
8	1	ro in. X 8 in	1	1	66. 66
8	•	9 in. × 8 in.		1	66
	Counters	1	1		
	End Posts	i e	1	1	66
10	Laterals	l .			
10	1	8 in. × 8 in.			4.6
2	1	6 in. × 8 in.	1	•	
2	1	8 in. × 8 in.		1	66
8	Bolsters	1	•	1	66
1		3		1	
8	Bridge-seats	1	_	288	66
1		8 in. × 12 in.	1	192	66
<b>1</b>	Sills	i e		864	Spruce or Pine.
20	Floor-beams		•		
6	Stringers	6 in. × 12 in.	72 ft. o in.	2,592	66 66
62	Ties	8 in. × 8 in.	12 ft. o in.		Oak.
2	Guards	6 in. × 6 in.	72 ft. o in.	532	Spruce or Pine.
	Plank	2 in. × 8 in.	72 ft. o in.	384	66 66
8	Blocks	2 in. × 8 in.	2 ft. o in.		Oak.

## Wrought-Iron--Rods and Bolts.

No.	į.		LENGTH.						
8	Rods	23/4 in.	26 ft. 10 in.	12	Bolster b'lts	r¼ in.	2 ft.	4	ín.
8	"	2½ in.	26 ft. 10 in.	12	66	11/4 in.	3 ft.	4	in.
8	66	2½ in.	28 ft. 10 in.	20	Fl.beam b'ts	1¼ in.	4 ft.	4	in.
4		13/4 1n.	26 ft. 10 in.	48	String rolls	% in.	2 11.	O	111.
8	Laterals	r1/2 in.	18 ft. 6 in.	28	Tie-bolts.	3/4 in.	2 ft.	6	in.
4		13/2 in.	18 ft. 6 in.	28	G'rd-r'l-b'lts	3/4 in.	I ft.	3	in.
102	Chord-bolts.	3/4 in.	2 ft. of in.	24	Spikes	1/2 in.		9	in.
,	Brace-bolts.								

## Other Iron Work.

Washers: 650 of pattern F; 88 of G; 24 of H.

\* Castings: 20 of pattern A; 8 of B; 4 of C; 4 of D; 28 of E; 36 of I; 16 of J; 8 of K; 72 of L; 64 of M; 28 of N; 24 of O; 6 of P; 12 of Q.

The kind of timber used may be changed when necessary, though that given is the best.

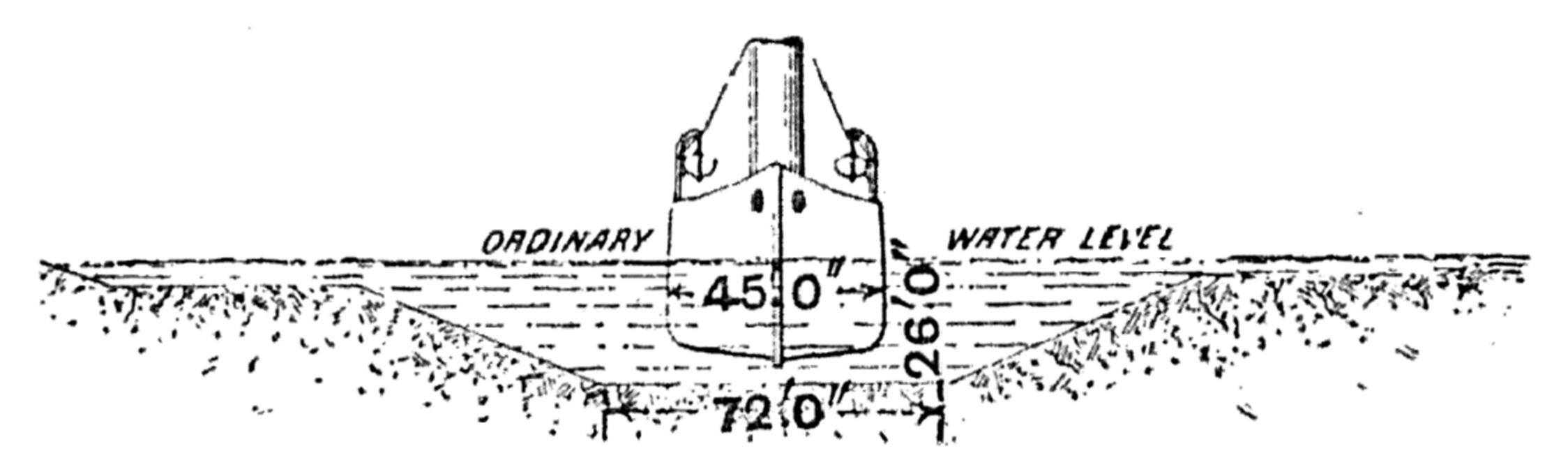
(TO BE CONTINUED.)

# THE MANCHESTER SHIP CANAL.

WORK on the Manchester Ship Canal, perhaps the greatest engineering work under construction in England, is now in progress on a large scale. It is intended to give access for large vessels to the great manufacturing city of Manchester, and the projectors believe that the saving effected by the delivery of raw materials and the loading of manufactured goods at the wharf in Manchester, avoiding the cost of trans-shipment and the railroad haul from Liverpool, will be a great benefit to the city.

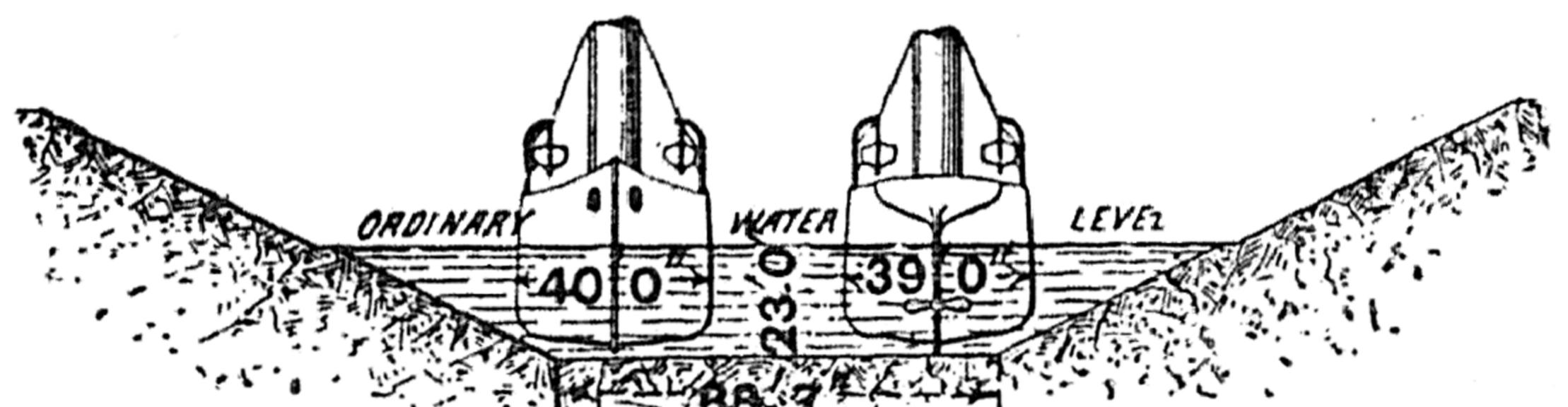
The canal begins not far from Liverpool, at the village of Eastham, on the Cheshire side of the Mersey, and ends at Throstle Nest, Manchester, in a group of docks; it is about 35½ miles long, and has a minimum width at the bottom of 120 ft., with a minimum depth throughout of 26 ft.; compared with the Suez Canal, the depth is the same, but the width is 48 ft. greater. The cross sections of the various canals given in the accompanying cut show the

#### SUEZ CANAL

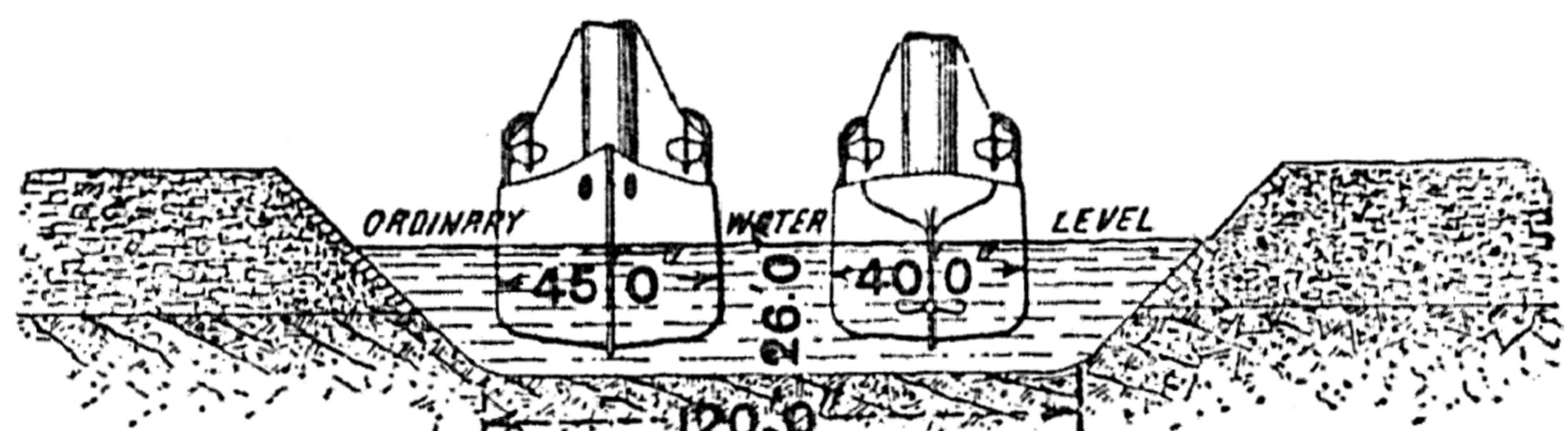


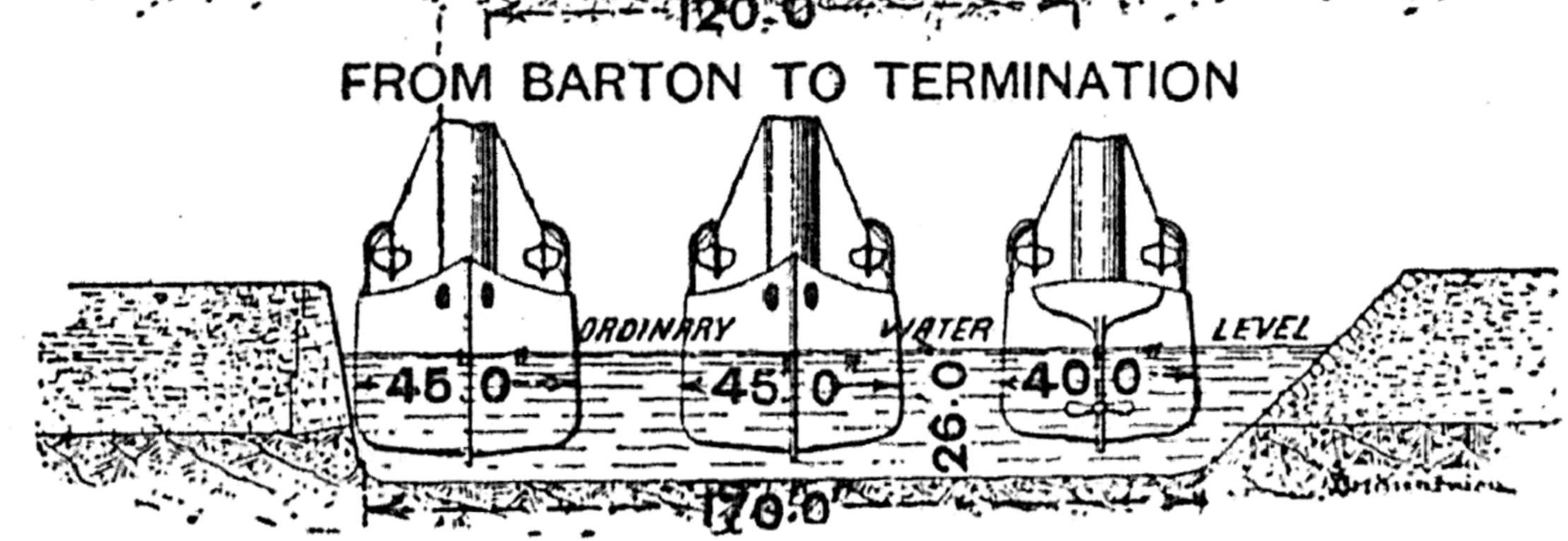
GHENT CANAL





MANCHESTER SHIP CANAL ORDINARY SECTION





capabilities of the Manchester Ship Canal in comparison with those of others. The railroads over the canal will be carried by high-level bridges, and the roadways by swing bridges, the minimum clear height under the fixed railroad bridges being 75 ft. The water supply of the canal is to be derived from the Irwell, Mersey, Bollin, and other smaller streams; but, if necessary, pumping will be resorted to to make up the loss through lockage.

The line follows the south bank of the River Mersey for a considerable distance very closely. After leaving the river bank it still follows the valley of the Mersey to Irlam, whence it runs up that of a tributary, the Irwell, to Man-

There are five sets of locks, the first, at Eastham, being a tidal lock through which vessels pass from the river to the canal. The second lock is at Latchford, 20½ miles from Eastham, and has 16 ft. 6 in. lift; the third is at Irlam, 28 miles from Eastham and has 16 ft. lift; the fourth is at Barton 30½ miles from Eastham, and has 15 ft. lift; the fifth is at Mode Wheel, 33½ miles from Eastham, and has 13 ft. lift.