shown in Figs. 1 and 3, where the walls stop behind the rack bars, so as not to obstruct the flow through the racks. The beams can then be determined from the conditions for uniform loading, and in Table 2 is given the loading per foot of length of beam. Where the spacing is too great for an economical beam, a steel truss can be placed midway between the walls.

TABLE 2—LOADS PER FOOT WIDTH OF RACKS

Bar (Inches)	P_1	P_2+P_2'	P_3+P_3'	P_4+P_4'	R_1	R_2	R_3	R_4	R_5
¼x2	2,610	3,210	3,610	3,860	870	3,250	3,395	3,730	2,045
¼x2½	3,450	4,230	4,890	5,285	1,150	5,290	4,535	5,075	2,800
¼x3	4,500	5,575	6,350	6,800	1,500	5,620	5,950	6,550	3,610
¼x3½	5,550	7,390	8,540	9,000	1,850	7,170	7,930	8,755	4,775
¼x4	6,650	8,250	9,400	10,100	2,217	8,308	8,785	10,740	5,350
¼x2	2,330	2,870	3,190	3,430	775	2,905	3,020	3,300	1,820
¼x2½	3,180	3,980	4,510	4,820	1,060	3,990	4,230	4,655	2,555
¼x3	4,010	5,020	5,650	6,100	1,335	5,025	5,310	5,870	3,230
¼x3½	4,900	6,140	6,950	7,510	1,633	6,147	6,520	7,415	3,985
¼x4	5,860	7,300	8,250	8,860	1,953	7,337	7,740	8,550	4,690
¼x2	2,110	2,580	2,900	3,050	703	2,620	2,627	2,975	1,615
¼x2½	2,860	3,535	4,030	4,360	953	3,567	3,770	4,185	2,310
¼x3	3,610	4,490	5,110	5,450	1,203	4,517	4,780	4,270	2,890
¼x3½	4,425	5,480	6,230	6,620	1,475	5,525	5,835	6,410	3,510
¼x4	5,300	6,350	7,400	8,010	1,767	6,518	6,835	7,690	4,250
¼x2	1,990	2,290	2,580	2,840	663	2,402	2,425	2,705	1,505
¼x2½	2,610	3,125	3,480	3,910	870	3,210	3,290	3,680	2,075
¼x3	3,320	3,850	4,320	4,775	1,107	4,023	4,070	4,530	2,535
¼x3½	4,050	4,700	5,290	5,800	1,350	4,910	4,970	5,535	3,075
¼x4	4,820	5,590	6,250	6,850	1,607	5,838	5,895	6,535	3,635
¼x2	1,775	2,080	2,390	2,625	592	2,160	2,228	2,500	1,390
¼x2½	2,450	2,870	3,320	3,620	817	2,983	3,080	3,460	1,920
¼x3	3,060	3,570	4,100	4,540	1,020	3,720	3,815	4,305	2,410
¼x3½	3,730	4,340	4,930	5,390	1,243	4,527	4,615	5,145	2,860
¼x4	4,500	5,240	6,000	6,520	1,500	5,460	5,585	6,245	3,460
¼x2	1,660	1,950	2,250	2,475	553	2,022	2,090	2,355	1,320
¼x2½	2,275	2,660	3,040	3,310	758	3,767	2,840	3,165	1,755
¼x3	2,840	3,310	3,825	4,170	947	3,448	3,350	3,985	2,215
¼x3½	3,480	4,085	4,710	5,170	1,160	4,240	4,375	4,930	2,740
¼x4	4,170	4,875	5,630	6,150	1,390	5,070	5,225	5,880	3,260
¼x2	1,560	1,820	2,120	2,330	520	1,895	1,965	2,220	1,235
¼x2½	2,110	2,460	2,870	3,110	703	2,562	2,650	2,985	1,650
¼x3	2,660	3,095	3,590	3,950	887	3,228	3,325	3,760	2,095
¼x3½	3,320	3,880	4,520	4,925	1,106	4,039	4,175	4,710	2,615
¼x4	3,900	4,550	5,310	5,800	1,300	4,740	4,900	5,550	3,070
¼x2	1,465	1,730	2,010	2,200	488	1,790	1,862	2,100	1,165
¼x2½	2,030	2,400	2,790	3,080	677	2,483	2,580	2,935	1,625
¼x3	2,550	2,970	3,430	2,860	850	3,095	3,185	3,165	1,515
¼x3½	3,070	3,640	4,210	4,550	1,023	3,070	3,905	4,320	2,410
¼x4	3,680	4,325	4,790	5,400	1,227	3,680	4,545	5,080	2,860

$R_1 = P_1/3$. $R_2 = 0.66P_1+0.47\ (P_2+P_2')$.
$R_3 = 0.53(P_2+P_2')+0.47(P_3+P_3')$.
$R_4 = 0.53(P_3+P_3')+0.47(P_4+P_4')$.
$R_5 = 0.53\ (P_4+P_4')$.

If the walls cannot be extended, then steel trusses will have to be built at intervals throughout the whole length of trash racks, and the beams supported on these.

In General

The effective area of the racks should be somewhat larger than the canal into which they lead, so as not to cause too great a loss in head.

The effective area will be the space between the bars multiplied by the perpendicular height. Allowance must also be made for obstruction by supporting beams and trusses.

The number of bars to make one panel is fixed by the the allowable weight and means for handling same when removing for cleaning, etc. Space the through bolts so that they come on a supporting beam and the bar will not be weakened.

Tenders will be received by the secretary of the Board of Control of Ottawa, Ont., until Tuesday, July 29th, for the supply of the following quantities of water meters: Fifty ⅝-in., twenty-five ¾-in., twenty-five 1-in., ten 1¼-in., fifteen 1½-in., seventy 2-in., thirty 3-in., ten 4-in., twelve 6-in. and four 8-in.

SUGGESTED STANDARD CONCRETE WHARF

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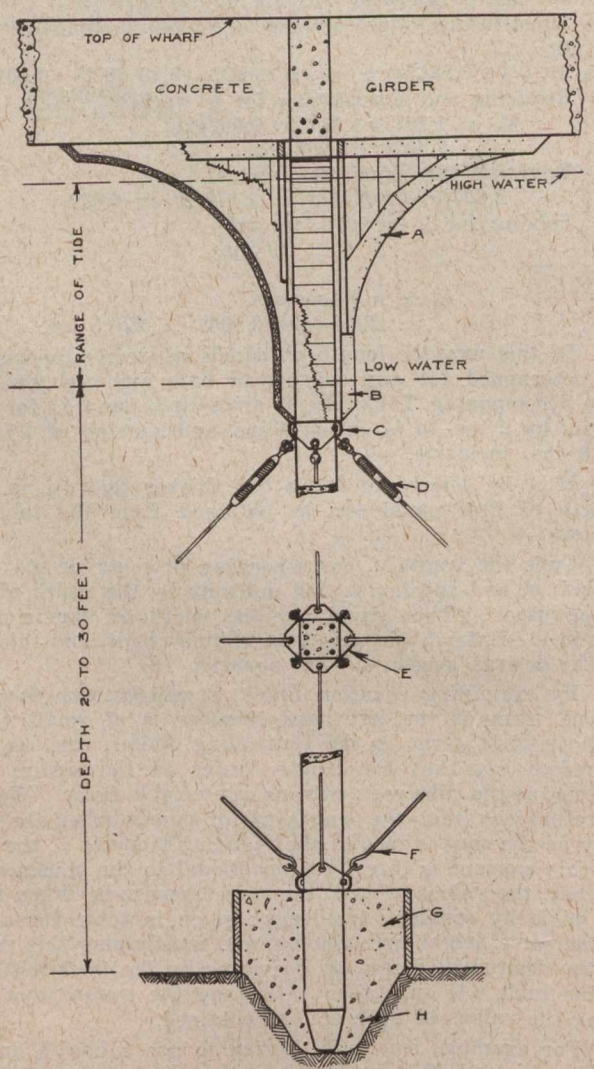
THE accompanying drawing is an endeavor to create standard practice with regard to wharf construction in fresh and salt water, and any criticisms of the type shown will be appreciated.

With rock bottom, or with rock only slightly covered with earth, it seems possible to secure the bottom of pile as shown.

The matter of diagonal bracing has been given much thought by many enginers. Steel seems to have a life of 25



TYPICAL CONCRETE PILE WHARF CONSTRUCTION

A—Concrete deposited into and protected by grooved and tongued, creosoted forms, lined with Muntz metal, that remain as part of structure; B—Step-out to ensure that steel reinforcing rods are well covered from salt air; C—Adjustable steel band; D—Steel tie-rod to foot of next pile, with turnbuckle for adjustment; E—Detail of adjustable steel band placed after concrete pile is driven, to which tie-rods are attached; F—Steel tie-rod to top of next pile; G—Concrete deposited in wooden form by pipe from surface, or in bags; H—Rock blasted out to insert foot of concrete pile.

years or more if kept always below water level in fresh or sea water. Reinforced concrete also appears to be permanent when always immersed.

Above low tide, concrete is affected by clinging ice and by salt air. To protect it, grooved and tongued, creosoted covering is suggested. To prevent oil affecting the concrete, the creosoted covering should be lined with sheet copper or Muntz metal or else painted.

If the steel band to which diagonals are attached tends to slip upwards, it is suggested that a canvas bag partially filled with cement be slipped down the pile to rest upon and seat around the steel.