on the right-hand side and the line No. 3 on the left-hand side. Portions of the middle third lines are shown in dotted lines in this as well as in the circular arch. The line of pressure No. 2 lies entirely between the two middle third lines; hence the arch will not fail in tension. The line of pressure No. 3 lies a little above the centre line at the crown and between the crown and springings, and coincides with the same at the springings. The maximum stress at each section is found to be about 40,500 lbs. per square foot, and the line therefore satisfies the third assumption.

The diagrams may be drawn from Table II., the extrados and intrados being the curves which touch the circles drawn with their centres on the centre line and of diameter equal to the thickness of the arch ring. The centre line of the circular arch may be drawn with a beam compass, the radius being 90.83 ft., or from the ordinates given in the table:—

Notation.

x = distances on each side from the vertical line at the crown.

AC = ordinates of centre line.

AP_2 = ordinates of line of pressure No. 2.

AP_3 = ordinates of line of pressure No. 3.

AG = ordinates of line GA_0.

H_c = horizontal thrust for link polygon coinciding with centre line.

H_2 = horizontal thrust for line of pressure No. 2.

H_3 = horizontal thrust for line of pressure No. 3.

t = thickness of arch ring.

Table II.

Circular Arch.

H_c = 98,090 lbs.
[for gravel up to GA_0]
H_2 = 98,820 lbs.
H_3 = 112,200 lbs.
t = 4 ft.

Ideal Arch.

H_c = 97,500 lbs.
H_2 = 90,200 lbs.
H_3 = 96,720 lbs.
t = 3 ft.

All distances measured in feet.

AG	AP_2	AP_3	AC	x	AC	AP_3	AP_2
0	6.20	5.33	6	0	5.50	5.38	5
0.03	....	....	6.03	2	5.52	5.40	..
0.15	....	....	6.20	6	5.67	5.55	..
0.40	....	....	6.55	10	5.98	5.86	..
0.78	....	....	7.09	14	6.44	6.33	..
1.27	....	....	7.81	18	7.08	6.97	..
1.89	....	....	8.71	22	7.90	7.80	..
2.63	....	....	9.79	26	8.91	8.81	..
3.48	....	....	11.09	30	10.14	10.05	..
4.41	....	....	12.61	34	11.61	11.54	..
5.44	....	....	14.34	38	13.34	13.28	..
6.51	....	....	16.29	42	15.37	15.33	..
7.65	....	....	18.49	46	17.75	17.73	..
8.72	....	....	21.00	50	20.50	20.50	..
....	....	....	.....	54	23.69	.....	..

Though the remarks made in this article are intended to apply to masonry and concrete arches, most of the remarks are applicable to reinforced concrete arches as well, and it would evidently be an advantage to design such arches so that the centre line of the arch ring is a link polygon for the system of loads.

It is reported from Pittsburgh, Pa., that a process for extracting ferro alloys of manganese and silica from slag, which it is claimed will result in an immense saving to steel manufacturers, has been discovered by two students.

SASKATCHEWAN WATER COMMISSION.

WE print below some extracts from the report of the Saskatchewan Water Commission which was read before the Legislature at the recent session, which report deals with the question of the feasibility of diverting water from the Saskatchewan River for domestic and industrial purposes throughout central and southern Saskatchewan. The report was presented by the Saskatchewan Water Commission, of which the Hon. Senator J. H. Ross and Mr. A. J. McPherson were members. With the assistance of several well-known engineers, the whole area to be supplied was thoroughly examined and definite knowledge has been secured as to the practicability or otherwise of the scheme. The whole question is one of extreme importance in that it vitally affects the future of two of the large cities in the province, as well as the rural population of a large and thickly settled region.

The area proposed to be served is bounded by lines running on the north along the Qu'Appelle River from Elbow to Lumsden, through Balgonie, Francis and Weyburn on the east, and from Truax, skirting the Dirt Hills to Mortlach and the hills south of Thunder Creek, to Log Valley on the Saskatchewan.
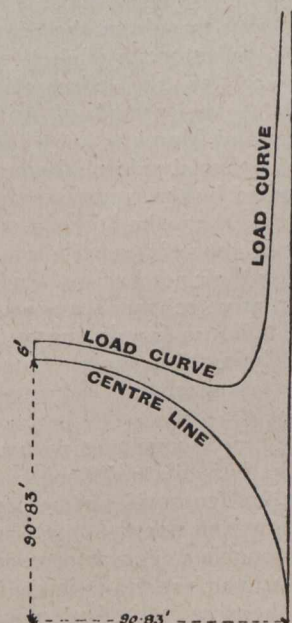
The water would have to be raised some 330 feet above the level of the Saskatchewan River and conveyed long distances with numerous pumping stations to where it would be used. The enormous expense of this can only be met if great quantities of water are used, and it is therefore necessary that the cities of Moose Jaw and Regina be included in the scheme unless its cost is to be prohibitive.

Over a large part of the area described above, water is scarce, no matter how deep wells are sunk, and there are stretches of country in which no water has been found, owing to the thickness of the clay deposit which is characteristic of most of the district. This means that many farmers have to haul water, often for great distances, during a part of each season.

Dealing with the present water supply for Moose Jaw, Mr. W. J. Francis, a consulting engineer of Montreal, states that after deducting the requirements of the railways, the city of Moose Jaw can only depend on about 400,000 gallons of water per day, or 20 gallons per capita

FIGURE 3

Design of Masonry and Concrete Arches.