Locks at Ardnacrusha

Part II

In Part I of the article on the locks at Ardnacrusha we described the lower foundation portion of the locks and the method of their operation. We will deal now with the superstructure and other details.

The upper lock is divided from the lower one by a gate and above that by a special vertical arch. The gate which is made of steel extends from level +13.35 — top of the filling chamber for the lower lock — to +21.00. Between levels +21.00 and...
View of the Intake Sluice House, and upper lock and landing stage in course of construction

Erection of the superstructure of the upper lock as viewed from the right Head Race bank
Entrance to upper lock from the Head Race and the super-
structure in course of construction

+ 36.50 the two side walls of the lock are spanned
by the vertical arch. The arch had to be designed
for the maximum water level of 35.70 in the lock,
namely a pressure of 14.70 m. of water; it had
furthermore to be perfectly water tight and made
in such a way as to reduce the danger of shrinkage
cracks to a minimum. The arch construction decided
upon consists of 3 layers, two outside ones of
heavily reinforced concrete and a centre one of
a special elastic compound which is both perfectly
water tight and can not crack as a result of tem­
perature variations. The two reinforced concrete
arch layers, being divided by the elastic, act
independently of each other. The one on the upper
lock side is only a thin concrete protection 0.15 m.
thick for the elastic, all the load due to water
pressure being taken by the other reinforced
concrete arch layer which is accordingly much
thicker and of a richer concrete mixture. Between
levels + 21.00 and + 24.90 the arch is of the “con­
crete filled” type. The upper lock face of the arch
is thus straight between the two side walls 6.10 m.
apart. The minimum combined thickness of all
three layers of the arch at the crown is 0.95 m.
and the clear rise 2.11 m. on the inside except for

The upper and lower locks in course of construction

a short bit between levels + 21.00 and + 21.90
where, in order to accommodate the water tightening
arrangement for the gate below them, the above
dimensions had to be increased to 1.25 m. and
2.36 m. respectively.

In order to save on concrete quantities the arch
has been stepped in thickness, it is thus only 0.65 m.
and 0.45 m. thick at the crown between levels
+ 24.90 and + 29.50, and + 29.50 and 36.50 re­
spectively, all arches in plan being kept concentric.
Furthermore between levels + 24.90 and + 36.50 the
arch is of the true and not “concrete filled” type
as below level + 24.90. The total amount of rein­
forcement used is just under 20 tons, a figure
conveying well the strength of the arch. The
springings of the arches have been well anchored
into the side walls of the lock. The gate when
lifting slides up the upper lock face of the arch
where special water tightening arrangements have
accordingly been provided. To safeguard the arch
from the ships accidentally bumping into it a thick
timber grillage spanning the two side walls imme­
diately in front of the arch and a strong timber
floating beam in front of that have been provided.
The floating beam runs in special recesses some 2 metres
Entrance to upper lock

of the building is reached by means of a staircase inside one of the two tower-like structures standing on either of the side walls. These have four floors and also accommodate the counterweights and guide recesses for the gates and a shaft for raising machinery parts etc. to the floor level of the service building at level +50.20. The building above the middle gate is larger than any of the other two, this was necessary in order to accommodate the operator's room. All the buildings and the gangways are of reinforced concrete including the flat V-shaped roof and were concreted by means of the cable crane. In addition a special tower crane, was used at the upper Head as the construction was too high for the cable crane to work alone.

The upper and lower lock between levels +37.20 and +18.30 and the lower lock and the navigation channel side walls between levels +18.30 and +9.50 are connected by staircases inside the walls. Special automatic water gauges have been placed at the middle and lower gate for recording the water level in the locks, a matter of extreme importance for the safe operation of the gates.

In conclusion one might mention that the entire construction of the locks has been planned with a view to ensure rapid and safe passage for the boats.