specimens are stronger than open air ones, while in natural cements the reverse is the case.

STRENGTH OF MORTAR IN COMPRESSION IN BRICK MASONRY.

All engineers realize that the strength of mortar is much less, tested in cubes, than in thin layers, but just what proportion they bear to one another is not very well known. The following table shows the results of tests made:—

| Strength of Mortar per sq. in. | | | Loads released at 17,500 lbs., set observed per lineal foot. | |
|---|---|---|---|---|
| In joints. | In cubes. | In tens'n. | | |
| 235 | 40 | 17 | ..... | 1 week old, mortar, 1 lime, 5 sand. |
| 469 | 57 | 20 | .01" | 3 " " " 1 " 5 " |
| 400 | 57 | 20 | .03" | 3 " " " 1 " 5 " |
| 287 | 21 | ..... | .08" | 1 " " " 1 " 3 " |
| 968 | 250 | ..... | ..... | 1 " " " 1 natural cement, 1½ sand. |
| 755 | 341 | 43 | .00 | 1 " " " 1 Portland " " |

Roughly speaking, the lime mortar at 1 week 5 to 1 is 6 times as strong; the lime mortar at 1 week 3 to 1 is 14 times as strong; the natural cement mortar at 1 week 1½ to 1 is 4 times as strong; the Portland cement mortar at 1 week 3 to 1 is twice as strong, as the same mortar tested in cubes, at the same age.

Referring to the amount of compression in Table VII., it will be seen that the amount of compression per foot is much less according as this ratio is less—*i.e.*, the less yielding the mortar the nearer does the strength in cubes approach to the strength in joints; this is to be expected, because the more yielding substances will be at a much greater disadvantage when unsupported at the sides than if enclosed in a thin masonry joint.

In the 2nd, 3rd, 4th and 6th tests—at 17,500 lbs., the load was released, and the permanent set observed was as given in the 5th column of the preceding table. It seems probable from this, therefore, that the lime mortars must have yielded to an injurious extent before there were any external signs. But whether this was the case or not, it is impossible to say, because the compression was quite uniform up to and in many cases much past the points of evident failure.

It seems fair to suppose that 1 week and 3 weeks are about the minimum and average times which would elapse before the maximum load might be put on a brick wall, and when it is remembered that these joints were less than ¼" thick. The amount of compression in a high brick wall under a load of 80 or 90 lbs. per sq. inch is seen to be very great, and under a load of 300 to 400 lbs. per sq. inch, a brick wall 50 feet high in lime mortar would not only fail, but compress from 2 to 6 inches in doing so—the compression practically all taking place in the mortar, as in the unyielding Portland cement mortar the compression is seen to be very small.

## THE VERDUN DYKE.

The Verdun Levee is being built along the bank of the River St. Lawrence, from the tailrace of the Montreal Water Works at its junction with Wellington street in a southerly direction, for a distance of about one mile to the boundary line between the property of Joseph Rielle and the Estate Brault; thence in a westerly direction along the property of Joseph Rielle and the Estate Galt, for a further distance of about one-half mile until the high land is reached. The Verdun Levee is a continuation of the St. Gabriel Levee, which was built by the corporation of Montreal about eight years ago—and which has been the means of populating the large district now known as St. Gabriel Ward—which previous to the building of the levee was annually subject to inundation. The total area of land which will be acquired by the corporation of the village of Verdun for the construction of the levee will be close upon one million superficial feet, and the area of land to be protected from inundation by the levee, will be about six hundred acres, and will extend from the River St. Lawrence to the Montreal Water Works Aqueduct. The levee is built of selected clay and will be a thorough water-tight embankment. It will have a width of ten feet on top with a slope of 1½ horizontal to 1 vertical, and will have an average height of fifteen feet along the river bank. The top of the levee will be two feet above the high flood of the 18th April, 1886. The greatest height of the bank will be about 23 feet, and the least 4 feet. The amount of material used will be about 83,500 cubic feet.