

MUNICIPAL DEPARTMENT

CULVERT SPECIFICATIONS.

The following specifications for highway culverts include only these clauses necessary to the actual work of construction, and are intended more as a basis for a complete specification rather than to be followed in detail in every case.

If the work is done by a contractor, there are a number of clauses relating to excavation, protecting the public from accident while the work is in progress, manner of payment and other agreements which will be necessary to include.

The details of construction should be altered and amplified to suit local conditions, such as the quality of stone and sand obtainable. The paving of the stone culvert requires the use of flag-stone, whereas this may not be obtainable locally and a concrete or rubble stone paving may be more suitable. Local conditions may suggest various alterations.

A culvert of cement concrete will generally be found most economical, but there are circumstances, no doubt, in which municipal councils will wish to avail themselves of a plentiful supply of suitable stone within easy reach for a stone masonry waterway. The specification for a stone arch culvert will indicate the character of masonry most suitable for coursed rubblestone or broken range work, and is adapted to highway culverts up to a considerable span.

A STONE ARCH CULVERT.

1. The culvert shall be built in accordance with the dimensions indicated upon the plans and drawings hereunto attached and forming part of these specifications.

2. The masonry shall consist of coursed rubble or other approved stone laid in cement mortar. No stone shall be less than six (6) inches in thickness and not less than twelve (12) inches in its horizontal dimensions. At least one-fourth of the stone face shall be headers, evenly distributed throughout the wall. The stones shall be roughly squared on joints, bed and faces, laid so as to break joints and in full mortar beds. The face shall be "rock face" with edges pitched to line, with no face projections exceeding two inches. All vertical spaces shall be flushed with good cement mortar and then be packed full with spalls. No spalls will be allowed in the beds. Selected stones shall be used at all angles, and shall be neatly pitched to true lines and laid on hammer dressed bed; draft lines may be required at the more prominent angles. The foundation shall be of large sound stones, roughly

*From the fourth annual report of the Provincial Instructor in Road-Making for Ontario.

squared, no stone to measure less than two cubic feet.

3. The top of the parapet wall shall be capped with stones extending entirely across the wall, and having a front and end projection not less than six (6) inches. The steps of wing walls shall be capped with stone, covering the entire step, and extending at least six inches into the wall. Coping and step stones are to be roughly hammer dressed on top, their outer faces pitched to true lines, and shall not be less than six (6) inches in thickness.

4. Care should be taken that all stones are laid on their natural bed; that they are brought to an even bearing; that their shall be no vertical openings between the stones. Mortar should be used throughout the structure and the practice of using mortar only on the face and back of the walls shall not be permitted. The inside of the wing and side walls, that side on which the earth rests, shall have a frost batter of one (1) inch to the foot.

5. Arch stones must invariably extend through the entire thickness of the arch and have a minimum thickness of five (5) inches on the soffit. Each stone is to be well and closely fitted so as to give half-inch joints, and to break joints

with its fellow 9 to 7 inches. The whole must be laid in cement mortars, and each course well grouted immediately after being laid.

6. The face stones of the arch are to be as nearly uniform in depth as possible, of large size, and neatly incorporated with the perpendicular face of the masonry. The keystones are to be 10 or 12 inches on the soffit, to have chisel draught around their edges, and to project beyond the face of the wall 2 or 3 inches.

7. The extrados of the arch shall be flushed with cement mortar two (2) inches thick levelled up and rounded to a moderately even and smooth surface.

8. All outside joints should be raked out to a depth of one (1) inch and neatly pointed with a mortar made of one part Portland cement and one part sand.

9. Each course of masonry as laid shall be grouted with a mixture of one part of Portland cement to two parts of sand, no more water being used than that necessary to give the required plasticity.

10. The waterway of the culvert between the sidewalls, and to such distance between the wing walls at both ends as the engineer may direct, shall be paved with stones not less than three feet long, eight inches wide and four inches thick. The stones shall be cut and squared so as to form close joints with each other and with the walls of the culvert. The stones shall be laid on a bed of gravel two (2) inches thick, the joints to be filled with cement mortar.

(Concluded next week.)

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