PART 1 GENERAL

1.1 Summary

.1 Unless otherwise indicated, follow the standards below when specifying rainwater management works. These standards are not intended to restrict or replace professional judgment.

.2 Any water retention solutions must be approved by the Design Services and the Utilities Services departments.

.3 All construction projects are to prioritize meeting the rainwater management requirements of a construction project within the project itself. The following strategic analysis is to be carried out by the Project Manager:

.1 All projects are to manage rainwater onsite unless it is shown to be unfeasible or the price of the rainwater management measures exceed a total construction cost of $25,000 and $2,000 per cubic meter of rainwater retention.

.2 Projects that are able to effectively manage rainwater onsite at a cost below $2000 per cubic meter, are to evaluate the potential to manage the rainwater of adjacent impermeable areas, such as roofs and paved surfaces, in order to offset the rainwater management requirements of future construction projects. Projects adopting this strategy must first request approval from the Director of Utilities and Energy Management.

.3 Projects unable to manage rainwater onsite, as stipulated in Part 1.1.3.1. above, are to submit a written request to the Utilities and Energy Management department to validate if an offset is available through one of the existing rainwater management projects on campus.

.4 Projects are to prioritize onsite rainwater management strategies in the order in which they are listed in section 1.2 – Rainwater Management Strategic Priorities. The order of priority was developed based on both the cost and environmental impact of the measures listed.

1.2 Rainwater Management Strategic Priorities

.1 The roof is to be transformed to act as the retention basin for the required retention volume (only for flat roof renovation projects). Projects must validate with the Utilities and Energy Management department and Operations department if the roof structure is capable of supporting the necessary load, if the parapets are high enough to ensure there is no risk to the building envelope, if the maintenance or operation of any existing or future equipment on the roof will be adversely affected, and if the retention of rainwater on the roof represents any unacceptable level of risk to assets of high value within the building.

.2 The landscape is to be modified to include natural Low Impact Design (LID) rainwater basins to manage as much of the required volume of rainwater as the available area permits. Retention must not occur within 3 meters of buildings' foundations. Planting strategy is to follow the requirements outlined in McGill's Landscape Design Standards and must be approved by the Design Services department.

.3 Plastic subsurface open retention systems, e.g. the StormTech Chamber, or similar low-cost subsurface retention systems, are to be installed a minimum of 3 meters away from buildings' foundations.

.4 Oversized subsurface rainwater drainage pipes with flow restrictors.

.5 Concrete, or similar, closed rainwater retention basins are to be installed within a building, or subsurface outside.

1.3 Total Cost of Ownership

.1 To assist project teams assess the Total Cost of Ownership (TCO) implications that decisions have throughout the course of design, McGill has developed a Total Cost of Ownership template to compare construction alternatives. It is best practice to include building operations staff in all TCO and value engineering review.

.2 With the assistance of a representative from the Utilities and Energy Management department, the engineer is to perform the required TCO analyses according to McGill's Total Cost of Ownership Calculation for Facilities Asset Management Framework (see table 1.5 in section 01 81 13 for details) to compare design options based on impacts on GHG, energy cost, maintenance costs, etc. The scope of TCO will vary depending on project. The Project Manager and a representative from the Utilities and Energy Management department will determine the scope of TCO analyses required. Requirements include:

.1 Design: TCO template for design options with 20-year impacts on GHG, energy costs, maintenance costs, etc.

1.4 Design Requirements

.1 Trench drains are to be avoided as much as possible. If trench drains are required:

.1 A heating element must be included.

.2 Trenches must be 300mm wide minimum for ease of maintenance

.2 All grates and covers need to be ADA compliant.

.3 The aesthetics of the location of grates and covers should be considered when laying out the underground infrastructures.

PART 2 PRODUCTS

2.1 Grates and Covers

.1 Shall be round when located in grass or shrub areas

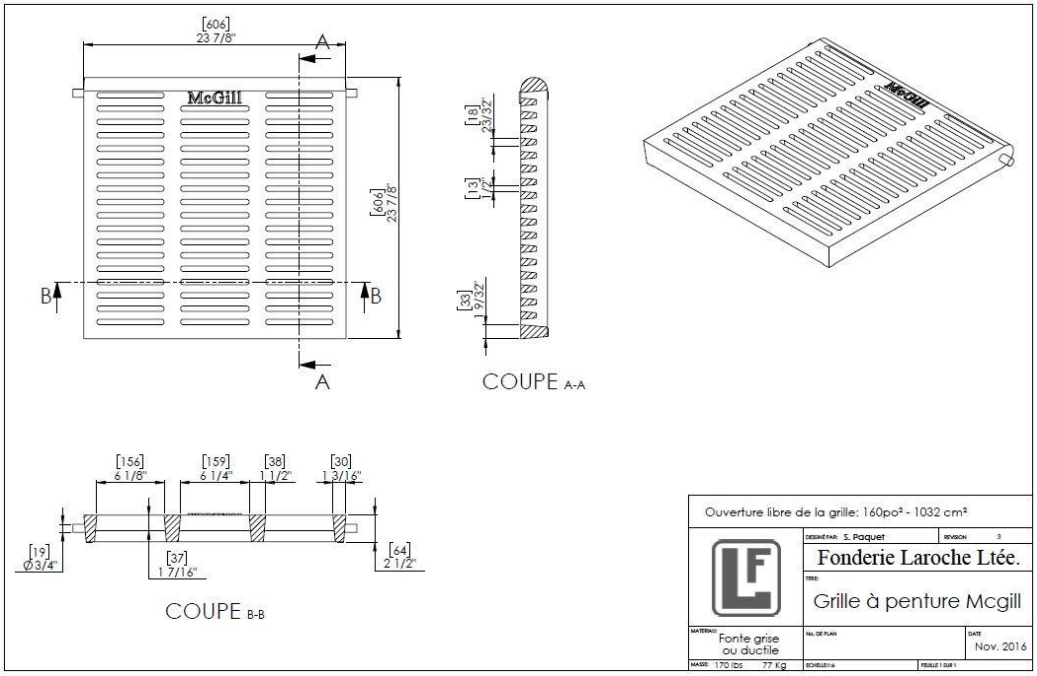
.2 Shall be square if located within paved areas

.1 McGill is the owner of the mold, stored at Fonderie Laroche, for a 600x600 cast iron catch basin grate, which is to be used when such size is appropriate. This grate is available with an optional hinge (as shown)

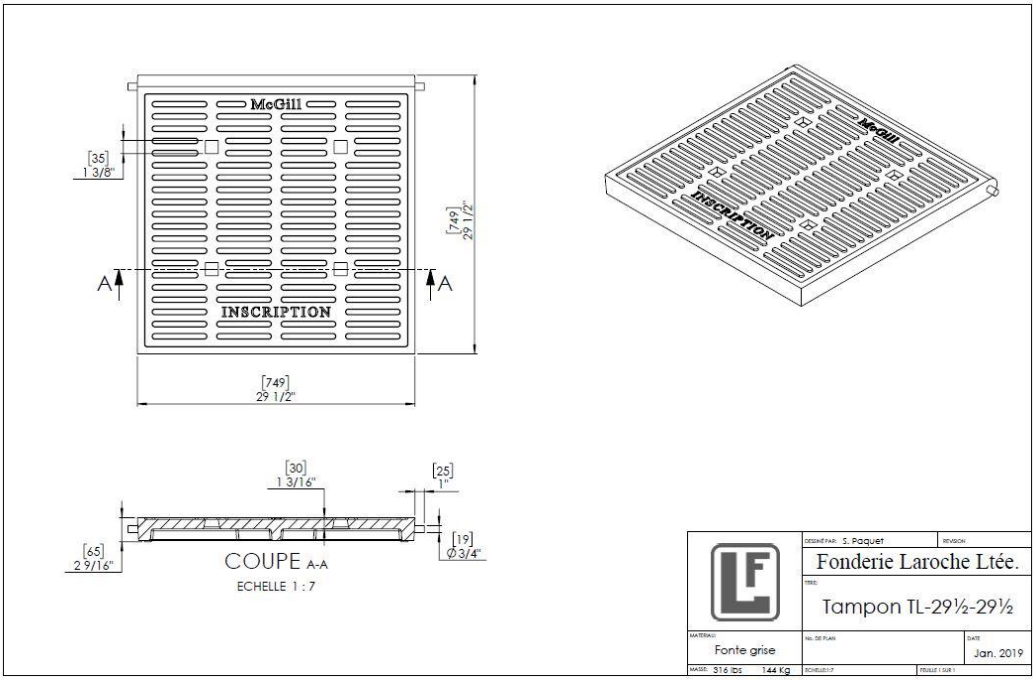
.1 If a smaller catch basin grate is needed (such as 300x300 or 450x450), such grate must still be square and ADA compliant.

.2 If a bigger catch basin grate is needed, this 600x600 grate can be installed side-by-side to double (or triple, etc.) its capacity. In such cases, the version without hinge must be used.

.1 For ease of maintenance, grates are to be doubled (to form a 1200x600 catch basin) as a minimum, unless impractical.



.2 McGill is the owner of the mold, stored at Fonderie Laroche, for a 750x750 cast iron manhole cover, with hinge. A space for a descriptive inscription is available, such as "PLUVIAL", "SANITAIRE" or other as approved by McGill:



END OF SECTION