



Utah State University.

Utah Water Research Laboratory
8200 Old Main Hill
Logan, Utah 84322

July 16, 2020

Khaled A. Hasan, PhD, P. Eng.
Sr. Structural Engineer
T&C Structural Engineering Inc.
1 Yonge St. Ste 1801
Toronto, ON M5E 1W7

Re: ProTecStrong 855-SPL

Dear Dr. Hasan,

As you have requested, I have completed a hydraulic analysis of the ProTecStrong 855-SPL (Structural Protective Liner) samples produced and supplied by TCI Carbon Fibre Technologies Incorporated. I received the samples and inspected them and considered the hydraulic performance properties when applied to the interior of a pipe or other conveyance channel.

The samples received were of varying thicknesses ranging from approximately 1/32 of an inch to approximately 5/16 inch. Three samples were adhered to concrete as well as one sample that was adhered to plyboard. The samples have an exceptionally smooth surface that is similar or nearly equal to that of Polyvinyl Chloride (PVC) pipe. There were very small surface imperfections on the samples that appear to part of the application process which are so small that they will not have an impact on the hydraulic performance of the product. I also understand that the surface may be made even smoother by a post treatment process. For practical purposes, the material provides a very smooth surface which can best be characterized as hydraulically smooth. I do not believe there to be any localized form or roughness loss from the surface finish.

After my inspection and analysis, it is my expectation that the ProTecStrong 855-SPL product, when properly applied to the interior of a conveyance channel, will produce Manning's n values that are equal to that of PVC pipe. Based on the calculations that I have completed, the expected Manning's n value for the surface resulting from product application will be in the 0.009 range and perhaps even slightly lower.

Kind Regards,

Michael C. Johnson, PhD, PE
Research Professor