HARTMAN ENGINEERING

150 South Parkway Drive Delaware, Ohio 43015
Phone/Fax: (740) 548-4702

November 19, 2012

Mr. Greg Vreeland
SedCatch Environmental Products
392 Congress Park Drive
Dayton, OH 45459

Re: Review of Culvert Hydraulics with SedJackets Installed

Dear Mr. Vreeland:

As requested I have attempted to assess the impact of your company's SedJackets on the inlet hydraulics of culverts when the SedJackets are installed. Summarized herein are the results of the analyses.

A review of the literature was made to determine if any field-observed hydraulic data currently exists for similar structures but nothing was found. Since no field-observed data are available, various assumptions had to be made in order to estimate the impact of the SedJackets. The results obtained are thus likely only approximations of the actual increases in the backwater elevations that result from the installation of a SedJacket. However, in my professional opinion, the assumptions made and results obtained are reasonable.

The assumptions made are as follows:

1. The effective pipe inlet diameter is reduced by 0.5" for all culvert sizes. This assumption takes into account the inside diameter of the SedJacket, the size of the wire used for the supporting mesh and the sizing ring, and the fact that a portion of the top of the SedJacket causes only a small wire obstruction and does not significantly block the flow.
2. The entrance coefficient (Ke) for the pipe is increased by 25% (i.e. the entrance is approximately 25% less efficient) to account for increased turbulence and energy losses at the entrance resulting from the SedJacket.
3. The sandbags placed in the SedJacket as ballast are at least 6" from the pipe inlet and do not impact the inlet hydraulics.
4. The SedJacket geotextile is impervious and thus all flow enters the culvert through the top, open portion of the SedJacket, and this portion of the SedJacket mesh and the pipe inlet are clear and free of debris.
5. The flow into the pipe is inlet controlled.
6. All pipes are flowing just full at the inlet, i.e. the flow at the inlet is at the crown of the pipe, under natural flow conditions.

Using the above assumptions the impact of the SedJackets was estimated for reinforced concrete pipe (RCP), corrugated metal pipe (CMP), and corrugated plastic pipe (CPP) culverts for various sizes of pipes and inlet conditions. The results of the analyses are summarized in the table on the following page. Please note the values in the table represent the worst-case scenario for the above assumptions since inlet conditions were assumed, and under inlet control conditions the impact to the inlet efficiency is typically greater than for outlet control conditions.

Table 1 – Increase in backwater elevation resulting from installation of SedJacket when culvert flow is at crown of pipe under natural conditions.

Type of Pipe and Inlet Condition	12" Pipe	15" Pipe	18" Pipe	21" Pipe	24"Pipe
RCP, Bell End Projecting	1.4"	1.6"	1.8"	1.8"	1.9"
RCP, Bell End with Headwall	1.4"	1.6"	1.8"	1.8"	1.9"
RCP, Square Cut End Projecting	2.2"	2.4"	2.6"	3.0"	3.1"
RCP, Square Cut End with Headwall	2.2"	2.4"	2.6"	3.0"	3.1"
CMP & CPP, Projecting with no Headwall	2.6"	3.1"	3.5"	3.8'	4.2"
CMP & CPP, Square Edge with Headwall	2.2"	2.4"	2.6"	3.0"	3.1"
CMP & CPP, Mitered to Conform to Fill Slope	2.4"	2.8"	3.1"	3.5"	3.7"
CMP & CPP, End Section Conforming to Fill Slope	2.2"	2.4"	2.6"	3.0"	3.1"

Please let me know if you have any questions.

Sincerely,

HARTMAN ENGINEERING

Doyle E. Hartman, P.E.