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To: Bo-Rit CAG

From: Doug Streaker, P.E.
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Re: Summary of Streambank Stabilization

These comments on the streambank stabilization are based on my understanding of the design as discussed with EPA and their designers in a August 20th meeting and site visit. Unfortunately, the final design plans have not been completed to provide a fully detail approach to the stabilization of the upper section of the Wissahickon Creek down to its confluence with Rose Valley Creek.

Overall, I agree with the EPA's approach to stabilizing the streambanks and adjacent asbestos piles within these project limits. Walking the site allowed me to gain a much greater appreciation for the difficulties presented in the stabilization. The proposed rip rap protection up to the existing top of bank (approximately 5' high) will provide protection to many currently eroding banks. Above the rip rap armoring, there is a flat terrace that varies in width from 0' to 20'. The use of geocells in this section is a good application, but I strongly encourage the use of soil filled cells with native riparian vegetation instead of the concrete filled cells. The vegetated cells will provide more sustainable protection then the concrete, which has a tendency to become undermined when applied to a streambank. The vegetation at this elevation should be able to withstand the shear stresses at this elevation because the storm flows at this elevation will overtop the opposite right bank, thus reducing the shear stresses. The vegetated cells seemed to be the direction that the EPA was going to take, but this detail was not finalized. The EPA and CAG's concern about removing all trees within fill material and not planting any large trees in the re-vegetation of this zone is valid, to avoid exposure to asbestos during a tree fall. Above the flat terrace, there is a steep, tall side slope that is primarily all fill material with asbestos containing material. The application of turf reinforced mats (TRMs) along with seeding the slopes is a viable solution to contain this material.

A different approach may be feasible and more beneficial on select locations of the stream. For the first approximate 100 feet of the Wissahicken, the left bank (looking downstream) contains a very stable, low bench comprised of bedrock and what appears to be native material that is approximately 20 feet wide before showing evidence of asbestos containing fill. This area would not benefit from a rock toe or geo cells/tree removal along the bench, as the existing bench is very stable. Adding rip rap and geo cells to this area is going to raise the bench elevation, causing greater stream confinement and potentially increasing shear stress. Stabilization in the form of geo grid and TRM will still be needed on the steep side slopes of the fill material located past the bench. If it can be verified that the bench is native material through the used of soil borings, then tree loss would not be a concern. This would maintain the stability of this area and reduce the cost, both ecologically and economically of the design. Conditions like this appear to be the exception and not the rule for the Wissahickon Creek, but it would be beneficial to recognize these areas and consider them in the design plan.

Recommendations During Construction

- All exposed asbestos containing material that is located along the streambank should be removed prior to construction. The installation of rip rap using large machinery will likely destroy any material that is located above ground, causing the asbestos to become air-borne.
- Keying in the rip rap at the toe of slope will be difficult in many places due to the presence of bedrock. Rip rap sitting on top of uneven bedrock has a tendency to rock in place, causing potential failure at the toe. In areas where no bedrock is present or the bedrock is friable, we recommend keying in the rip rap below the invert of the stream. Where there is solid bedrock, it is necessary to carefully place rip rap that has several flat sides, commonly referred to as imbricated rock atop the bedrock. This will minimize any shifted that a more “blocky” shaped rock could encounter.

Future Design Concerns

During my site visit, I was able to walk both the Rose Valley Creek and Tannery Run tributaries to the Wissahickon. Both these tributaries will present extremely difficult sites to stabilize.

- Rose Valley Creek contains asbestos fill on both streambanks and is only 10-15 feet wide. Stabilizing both banks using a hardened structure will essentially channelize the entire channel cross section, turning the stream from a natural channel into a fully armored conveyance channel. While this may succeed at stabilizing the asbestos fill, the impacts to the natural stream dynamics could be great. During my field walk, I noticed several schools of fish within the creek. Fish migrating up the channel from Wissahickon Creek will not follow a fully armored channel due to it inherent lack of habitat, thus eliminating fish from the entire creek stream. Also, a fully hardened channel will transport the stream energy downstream from the culvert outfall to the confluence with the Wissahickon, potentially causing instability in this area. A detailed geomorphic study of the creek would be extremely useful in developing viable stabilization alternatives.

- Tannery Run contains asbestos fill on only one streambank and does not appear to support a base flow (meaning there is probably no fish). But this channel is severely incised (meaning the stream channel is approximately 10' below its banks). This, along with the private property adjacent to the stream and lack of good construction access, makes this a difficult stabilization project even if asbestos was not contained within its banks. Again, a detailed geomorphic study of the creek would be extremely useful in developing viable stabilization alternatives.
- I have not seen Wissahickon Creek below Rose Valley Creek, but I would again urge the EPA to perform a detailed geomorphic study in addition to a hydraulics study to determine what sections of the creek must be stabilized with hardened structures, and what sections can be stabilized with a more ecologically sustainable approach.

Summary

I believe that the dialogue between the CAG and the EPA has been beneficial at incorporating some of the concerns of the community with the design goals of the stream stabilization, but limited due to the fast timeline that this project is on. For future work at this site, better defined goals and future use of the land should be considered initially before a design plan is put in place.