"Site of Engagement" Lesson Plan

Essential Question: **How do people in our community try to manage or solve river related water problems?** Students will travel as a class with the White River Partnership to view a post Hurricane Irene rebuilt culvert on Broad Brook Road in South Royalton Vermont.
Up until this point students have been learning about the water cycle as well as the flow of water. The students have had an in class visit from the White River Partnership where the students have learned about how humans try and manage water and an understanding of why humans disrupt the natural flow of water, for example building roads. One of the ways humans manage water to build roads is using culverts. Lots of history about the landscape prior to Hurricane Irene and what happened during Hurricane Irene to our town of South Royalton has taken place up to this point. The larger outcome/ plan of this field trip is to help the students realize what goes into installing a properly sized culvert, including material, cost, with minimal impact on aquatic life and how humans can manage water with the least amount of disruption to the natural flow of water to avoid flooding in the future. This "site of engagement" lesson is addressing *Next Generation Science Standard Grade 4 ESS3-2 – Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans.* As well as *Next Generation Science Standard Grade 4 ESS2-1 – Make observations and / or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation.*
This "Site of Engagement" will take place at a rebuilt post Hurricane Irene culvert on Broad Brook Road in South Royalton, Vermont.
The culvert on Broad Brook was suggested by the White River Partnership. In fact during a training provided by the White River Partnership in the fall of 2013 I visited this culvert and together we decided this was a good spot to take a class. It is on a non - busy dirt road with easy accessibility upstream for the students to see signs of bankfull as well as be able to measure bankfull. We had before and after pictures of the culvert. This culvert is local so it ties in well with the Essential Question about our community managing / solving river related water problems.
Plan for the students
Pre - visit: The White River Partnership comes to the school and does a slide show presentation about the White River and the different branches that flow into the White River as well as the important tributary – Broad Brook. Students learn that in order for humans and nature to co-exist sometimes humans have to manage / disrupt the natural flow of water. In building culverts engineers need to consider many factors when installing culverts, for

example size, material, is it "fish friendly" etc. Students learn about properly sized culverts and measuring for bankfull.

On – Site: When on – site students will be given a culvert field sheet – provided by the White River Partnership. (See attached) This sheet was provided during a teacher training session for a "try out." Students are broken into smaller groups to with school, parent and White River Partnership chaperones. We start as a big group with the White River Partnership leading the discussion. We then break off into two smaller groups. Each group has a White River Partnership teacher as well as parent chaperones. Students go upstream of the culvert to measure bankfull in small groups. Students then have the opportunity to travel through the culvert to see if it appears "fish friendly." There is a concentration on the erosion around the culvert. Students then come back together in a big group and discuss their field sheets.

Post – visit: Students are then given an assessment sheet (see attached) created by the White River Partnership in coordination with teachers to see if students are able to determine bankfull, is it flood resilient as well as "fish friendly."

The OUTCOME of this experience

Students will be able to identify using specific math skills (see attached) if a culvert is "fish friendly," properly sized, cost efficient, made of the best material so that it would be flood resilient. See attached for resources including permission slip as part of the preparation.