

## Capital Improvements

Capital improvements are an important part of our overall plan to address water quality issues in Colchester. Without a sound storm water infrastructure, there will continue to be a degradation of our waters. Repairing storm water outfalls, installing storm water treatment ponds and performing other storm water pollution projects is a difficult and expensive initiative. Subsequently, within our overall capital planning, we have made these types of projects a priority. An important part of our strategy involves securing the necessary funds to build these projects. Over the past several years, the Department has established a strong working relationship with the offices of Senators Leahy and Jeffords. With the assistance of these long time State Senators, we have secured over \$3 million in federal funding to improve Colchester's waters. Included below are some of the projects that have been completed through these efforts.



**Canyon Estates** - In Canyon Estates, a 75 lot residential sub-division, a storm water outfall failed causing substantial erosion. An innovative design was used to reconstruct the outfall that relied upon extensive vegetation to stabilize the steep slopes. Left, heavy equipment positions a large concrete vault about half way down the slope. The storm water is piped to this vault, where it is released

into a sedimentation pond. Below right, is the completed sedimentation pond that uses a series of logs that serve as a weir to distribute the water evenly down the remaining slope. The slope has been heavily stabilized with aggressively rooting vegetation. Over time, the logs deteriorate resulting in re-vegetation and the development of a natural weir. During construction, we had the privilege of being visited by Senator Leahy who had secured funding for this project.



**The Moorings** - The Moorings outfall is located on the inner bay, and collects runoff from the Diversity Hill area and the Shore Acres sub-division. Ongoing water quality monitoring data collected by the Town continued to identify this outfall as a source of bacterial pollution. With much of the bacteria attaching itself to sand and other solids within the storm water flows, the Public Works Department designed a "Baffle Box" which effectively traps the sediment in a large concrete vault, without interfering with the storm water flows. At the end of each summer during low water, a vacuum truck is used to remove the accumulated sediment from the box. The structure was designed by Colchester Town Engineer, Genie Soboslai, P.E., (now retired). Half of the project funding came from an environmental fine on a Colchester business by the State of Vermont. At left, Genie is shown standing next to her creation.



**Belwood** - The Belwood sub-division for many years, had experienced chronic flooding problems resulting in substantial property damage. Elevated ground water levels created a substantial threat to the many on-site wastewater disposal systems within this residential neighborhood. Of equal concern was the possible negative impacts that these flooded disposal systems may be having on ground water supplies. The solution was a large storm water under drain system that would not only collect surface waters to ease local flooding, but would also lower the ground water

tables to address possible ground water contamination concerns. However, with the neighborhood situated directly adjacent to a large Class II wetland, the State of Vermont raised concerns over the possibility of the large under drains draining the nearby wetland. The Public Works Department commissioned an extensive engineering study that conducted ground water analysis and modeling, which ultimately demonstrated to the States satisfaction that the project could be constructed as designed without negatively impacting the wetland. Above left, construction crews install the large diameter under drains. Below right, a settling basin and treatment structure was constructed at the discharge point of the new storm water system.



**East Lakeshore Drive** – In the late summer of 2004, heavy rains caused local flooding which washed out the old stone box culvert where Smith Creek flows beneath East Lakeshore Drive. The damage was severe, and the road was closed to public travel until repairs could be completed. Efforts began immediately to replace the culvert. A detailed study was conducted to determine the necessary size of the culvert. This was not only important to

prevent another failure, but to also improve the flow characteristics of the stream to minimize bank erosion. Above left, one of the many pre-cast concrete box culvert sections is lowered into position. Each of these sections were fabricated with baffled bottoms to collect sediment from the stream, preventing it from reaching the lake. They also created a stream bottom that was consistent with the rest of the stream to benefit stream habitat. Below right, the down stream end of the culvert was covered with heavy armor stone to



prevent erosion and the transfer of sediment into the lake.



**Shore Acres** – Shore Acres is a 70 lot residential sub-division, which in addition to the lots, collects storm water runoff from the Diversity Hill area. The primary outfall from this sub-division had failed, causing substantial erosion and sediment transfer into the receiving stream. The stream eventually drains to the inner bay where the Town is very concerned about water quality. In addition to the erosion problems, the failure and inadequacy of the outfall was also causing localized flooding during high

flow periods as is seen in the upper left photo. Design efforts began with the goal of developing improvements that would ease the localized flooding, provide pre-treatment of the storm water before discharging it to the stream, and slowing the velocity of the water down to prevent future erosion. A concept design was produced that accomplished these goals, with careful consideration to the aesthetic appearance of the



improvements. Unlike many other structures, the location is clearly visible from several of the neighborhood lots. To soften the appearance of the improvements, carefully placed landscaping was incorporated into the design. Construction began and workers carefully assembled the many Gabions that would reduce the velocity of the discharge. Gabions are a basket constructed of heavy steel wire that are filled with rocks about 4” to 6” in size. There were several

of these constructed, each at a lower level forming a series of steps for the water to flow through. Behind each Gabion was a small settling basin to further treat and slow the flows before discharging to the stream. Before reaching the Gabions, the water flows into a grassed line settling basin where the water is initially held to allow the solids to settle out of suspension, thereby providing pre-treatment of the discharge.





**Malletts Bay Avenue** – At the southern end of Malletts Bay Avenue, the roadway parallels the Winooski River with several pockets of development along the upland areas to the north of the roadway. Surface waters flows cross Malletts Bay Avenue to the lowland areas to the south, and eventually drain into the Winooski River.



The discharge points south of the roadway are typically old stormwater outfalls that were constructed without any outlet controls or stabilization, and have badly eroded and/or failed as additional flow was introduced by new development.

Town outfalls along this roadway have been repaired using a mixture of design strategies including energy dissipation and various forms of stabilization, with emphasis on the use of natural vegetation. The two photos above show two separate outfalls on Malletts Bay Avenue recently reconstructed by the Town.



**Village Drive** – Outfalls within the Village area have also been reconstructed. This particular outfall channel had been badly eroded over the years, discharging sediment into Pond Brook. Here the Town used primarily turf reinforcement matting to stabilize this eroded channel.