Who we are

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Meeting Agenda

- Project Background
- Alternative Analysis
  - Structural Alternatives
  - Nonstructural Alternatives
- Design Charrette
As a result of the significant storms in 2007, the Town initiated evaluations of the nine major watersheds within the Town. The drainage evaluations recommended improvements within each watershed to help alleviate flooding, 65 projects in all. As these studies were being completed, the Town, with assistance from the Flood Erosion Control Board, began evaluating, ranking and prioritizing these recommendations. One important aspect of the prioritization and ranking was obtaining input from emergency personnel with respect to critical locations throughout the Town where flooding impacts the effectiveness of emergency response. Emergency personnel identified 10 locations, which were then put on the top of the prioritization list.
River flooding within the Cos Cob neighborhood from the April 2007 storm event.
Coastal flooding within the Cos Cob neighborhood during superstorm Sandy. Similar impacts but from different sources.
This map shows the locations within the watershed where flooding occurs. The light blue area is where both the Town’s mapping and the FEMA’s Flood Insurance Study have the same flooding limits. The green area is where the limits of the FIS are outside of the Town’s mapping and the dark blue area is where the Town’s flooding limits are outside of the FIS limits. Those that live within the dark blue area should consider purchasing flood insurance. Since that area currently is not within the FIS limits, flood insurance rates will lower than those who are within the limits. With FEMA’s current initiative to update mapping within the State of Connecticut, including the Town of Greenwich, those within the dark blue area will be put in the FIS once FEMA updates their mapping. At that time your flood insurance rates will be significantly higher. Since regulations restrict the annual increases on flood insurance, you will be “locked” into a lower rate with a cap on your annual rate increases, therefore saving you money on flood insurance. The Town strongly suggests those within the dark blue area consider purchasing flood insurance at this time.
The initial watershed study for the Strickland Brook watershed was completed in 2008. This study provided several recommendations to help alleviate flooding within the watershed. These recommendations were prioritized and ranked in 2010 and 2011 along with numerous other drainage improvements throughout the Town for other watershed studies. In 2012 the Town obtained additional detailed mapping of the watershed and completed an update of the alternatives evaluation. Currently, the Town is evaluating both structural and nonstructural alternatives within the Strickland Brook watershed.
This figure shows the comparison of flooding limits within the Cos Cob neighborhood. FIS limits for coastal are in pink hatching and riverine in yellow hatching. The results from the updated mapping study in 2012 resulted in extended riverine flooding limits as shown with the red outline. The more detailed mapping allowed us to confirm the overtopping of Bible Street Park during larger storm events, which result in flooding of the Bible Street and Cos Cob Avenue area. Once these flooding limits were confirmed, additional structural and nonstructural improvements were considered to address flooding within the updated expanded limits. We will now go into more detail with respect to the structural and nonstructural alternatives that were evaluated.
The original drainage study in 2008 evaluated several locations for providing storage within the watershed. It is important to know that storage can only be effective upstream of the impacted area.

Storage was considered at Mianus Park Pond in the northern headwaters for Strickland Brook. This included modifications to the existing dam to increase the storage within Mianus Park Pond. Due to the proximity of private residents surrounding the pond, the amount of storage available with these modifications is limited.

The next area considered for storage was the Pomerance Park Pond and Tuckman property. Both additional storage within Pomerance Pond and new storage within the Tuckman property were evaluated. Neither option provided enough storage to provide flooding relief within the downstream area.

Storage within Bible Street Park was also considered. An alternative was evaluated that included lowering the ballfields so they would flood during storm events. This area is limited and does not provide enough storage to alleviate flooding downstream of Bible Street Park.
Other alternatives that were considered included a diversion culvert. This alternative includes the installation of a 5 foot by 8 foot culvert under the roadway to convey flood water away from Bible Street Park during storm events. The photo on this slide shows the construction of a smaller culvert within Mason Street. As shown in this photo, numerous existing utilities exists that need to be considered and could cause conflicts with the proposed culvert. The evaluation of the diversion culvert included assessment of existing utility conflicts, constructability and permitting – all have a significant impact on feasibility and cost.
Different alignments were evaluated for the location of the proposed diversion culvert. The new piping would follow either the yellow line or green line shown in this figure. These two alignments were evaluated with respect to utility conflicts, constructability and permitting as described on the previous slide.
Additional structural improvements considered, included levees, berms and flood walls. These improvements would contain flood waters within the channel by constructing either levees or floodwalls on the banks of Strickland Brook. The photos on this slide show a levee that was constructed by the Army Corps of Engineers adjacent to the Byram River in the Pemberwick area. There is also an example of a short flood wall that would be consistent with what might be constructed to contain flood waters within Strickland Brook. It should be noted that the majority of Strickland Brook south of Bible Street Park is on private property which would require easements and land takings to construct levees or floodwalls along the brook.
Alternatives were evaluated to widen the brook in order to convey flood waters within the banks of the river. The figure on this slide shows the limits of Strickland Brook in blue and the potential widening in purple. This alternative assumed a proposed channel width of approximately 20 feet with an equal widening on both sides of the brook but this could be adjusted and refined at specific locations depending on site conditions. For example, at the Cos Cob Elementary School, the brook widening could be on the school/east side only, minimizing impacts to private property but because of the steep grades this would increase costs. As stated previously the majority of Strickland Brook is on private property which would require easements and land takings to construct the widening alternative.
Bridge and channel improvements were evaluated at specific locations based on the hydraulic modeling results. There are a few locations where either structures or channel configurations restrict flow. Improvements such as channel modifications and bridge replacements were evaluated to see if specific improvements have a significant impact on flooding. One location where the brook restricts flow is shown in the photo on this slide - just upstream of Route 1 adjacent to the Cos Cob Fire House. The modeling results showed that specific improvements at these bridges or channel locations did not significantly address flooding along Strickland Brook.
In order to address flooding at individual buildings along Bible Street and Cos Cob Avenue, nonstructural flooding proofing measures were evaluated. A nonstructural evaluating includes assessment of each structure/building within the floodplain with respect to the type of structure, condition, elevation of the first floor and flood depths relative to the first floor elevation. Extensive field survey and site investigations were conducted to obtain specific information on each structure in order to evaluate the type of flood proofing measures that would be appropriate for each building. It is important to realize that this type of flood proofing protection will protect each structure but will not address emergency access during storm events. Now we will describe each type of nonstructural flood proofing measure in more detail.
Wet flood proofing allows flood waters to enter the basement or lower levels during storm events and then the flood waters are pumped out after the rain event. It is important to elevate critical mechanical equipment to an area that is above the flood elevation. The photos on the left show flood vents that allow waters to enter the lower level and elevated air conditioning unit. Dry flood proofing measures include installation of prevention measures prior to the storm to prevent flood waters from entering openings such as doors and windows. It is important to remember that dry flood proofing measures typically require human implementation prior to the storm. The photos on the right show two types of door protections that have been installed prior to the storm event.
The two other types of nonstructural flood proofing are ring walls and structure elevation. Ring walls involve construction of a low wall that surrounds the building that will hold back flood waters. Any openings within the wall, such as driveways or walkways, would need to be blocked prior to the storm. The two photos on the left show ring walls with the walkway and driveway closures installed. Elevation of the structure is another type of nonstructural flood proofing measure. The structure is raised above flood elevations and the area below the structure is made into a wet flood proofed area. The photos on the right show two residential buildings in the Pemberwick area that were recently elevated. Both structures now have a garage below that has flood vents so water can enter the lower level during storms.
The structures within the 100 year floodplain were surveyed and inspected with respect to evaluating each structure for possible nonstructural flood proofing measures. Over 100 buildings were evaluated and the figure shows the recommended nonstructural improvements for each structure for the 100-year storm event. 25 structures shown in tan do not require any improvements and 81 structures do require improvements; wet flood proofing – shown in dark blue; dry flood proofing – shown in green; a ringwall – shown in bright blue; or elevation – shown in orange. It is important to note that nonstructural flood proofing measures require shallow flood depths. Also, remember that nonstructural flood proofing measures protect each structure and do not address emergency access in the area.
Evaluations of the various alternatives have been performed for the structural and nonstructural alternatives listed above. The results of this evaluation showed that structural improvements improve roadway flooding, address emergency access but are more costly than nonstructural improvements. The nonstructural evaluations showed that even though these improvements protect individual structures and reduce damages from flooding, nonstructural alternatives do not address roadway flooding or emergency access during storm events.
All of the various structural alternatives have advantages and disadvantages as listed on this slide. We would like your input with respect to observed flooding within the Strickland Brook watershed and comments on the various alternatives that have been evaluated.
We will now break out into groups to get feedback from you and answer any questions you may have.