MWH

BUILDING A BETTER WORLD

MEMORANDUM

TO: File

DATE: October 27, 2009

FROM: Matt Wilson - MWH

CC:

SUBJECT: Contract 4 – Summary Memo for of Rehabilitation Alternatives for CAM001

During development of construction plans for the installation of a floatables control baffle inside the existing CAM 001 regulator structure, defects in the existing CSO outfall were discovered. Photos taken during confined space entry indicated what appeared to be a localized defect at the CSO regulator exit. Subsequently, a CCTV inspection of the outfall was requested and upon review of the tape, more significant damage to the outfall pipe was observed. Approximately 23-ft of the total 48-ft length of the outfall pipe was observed to be VCP and the remaining 25-ft is RCP. A majority of the 23-ft VC section has experienced significant cracking and in many cases, 10-20% deformity. See Figure 1 below.

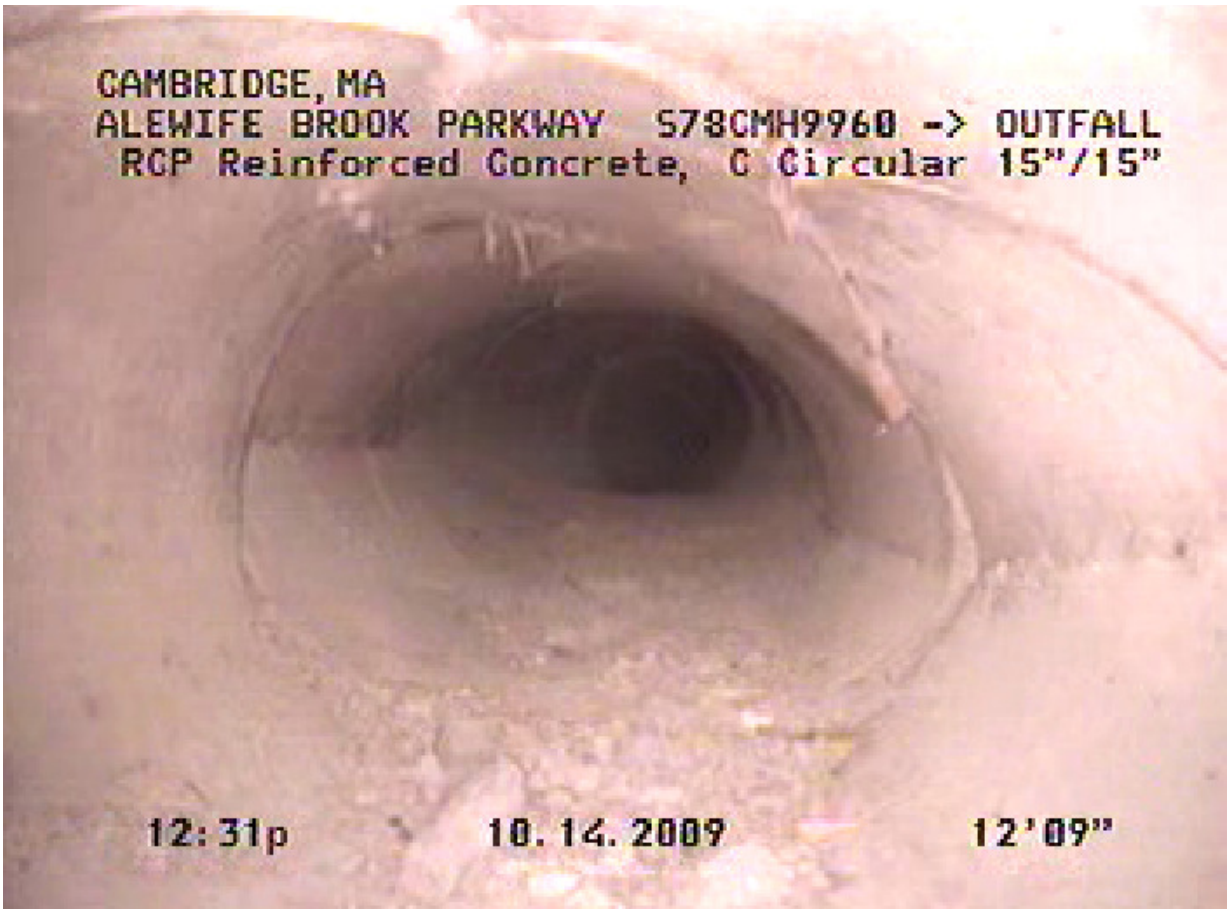

Figure 1: CCTV screen shot of CAM 001 defects

A hydraulic analysis of current and future flows showed that for the given slope of the pipe, a minimum inside diameter of approximately 10.5" is required. In attempt to rehabilitate the outfall while still satisfying the demand, several alternatives were considered, including excavation and replacement, in addition to several trenchless approaches.

Excavation & replacement is the preferred rehabilitation option. An alternatives analysis follows.

Excavate & Replace

Excavation & replacement is considered the most practical rehabilitation of the CAM 001 outfall due to ease of construction, i.e. similar work is proposed nearby, minimal environmental impacts, minimal traffic impacts, and cost. A portion of the work will take place in the 25-ft riverfront area buffer and an NOI will be required for work on DCR property.

Replacing the 23-ft defective section of the CAM 001 outfall involves work on a shallow pipe with approximately 4-ft of cover. It is off the Alewife Brook Parkway traveled way on the DCR grassed area. The proposed trenching would bisect a line midway between two existing trees and is outside of the drip line of both. The existing bituminous bike path crossing over the pipe alignment will require a bituminous patch after trenching is complete. Due to the shallow nature of the outfall, a final product with new RCP is desirable in order to limit the uncertainties associated with the structural strength of some trenchless solutions.

See Figure 2 for proposed improvements at CAM 001.

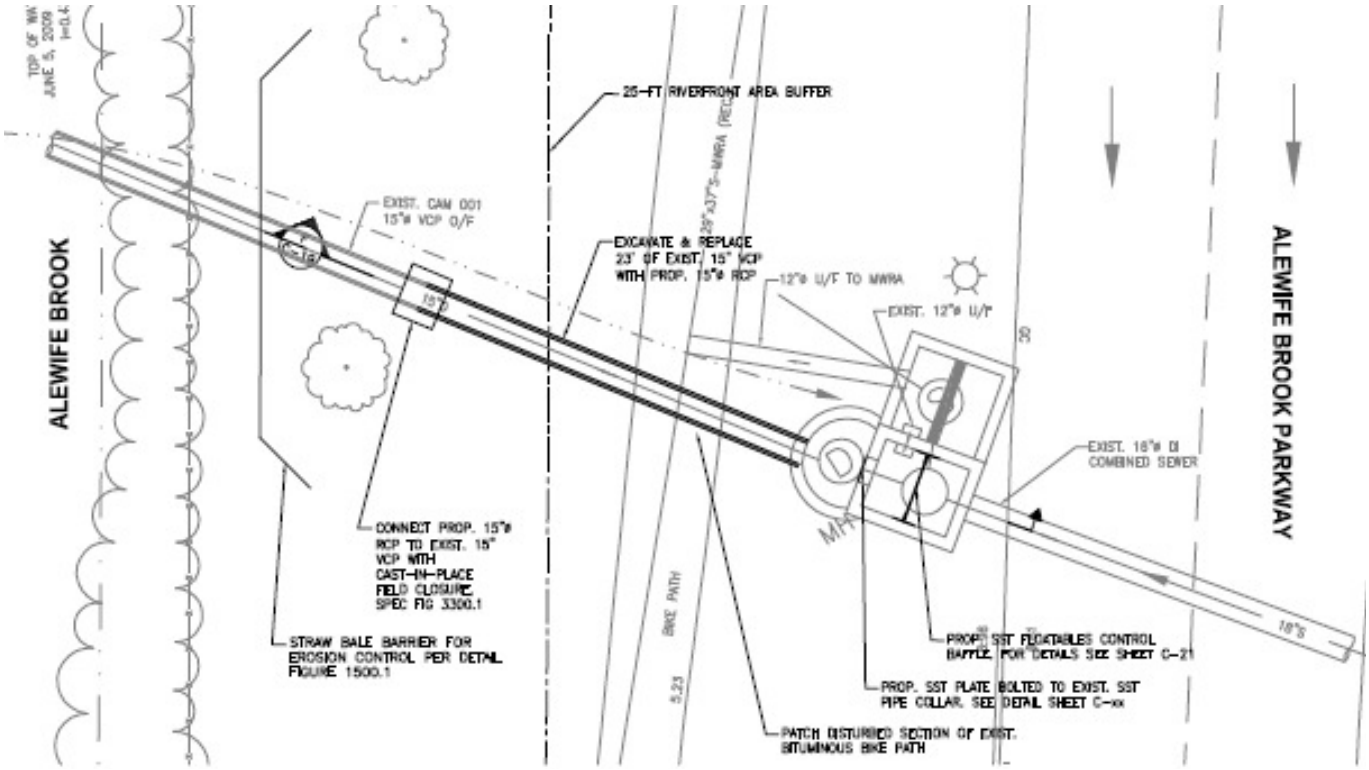

Figure 2: Proposed excavation & replacement improvements of CAM 001 outfall

Trenchless Alternatives

Generally speaking, trenchless alternatives could allow for less disruption to DCR property. However, avoiding work on the grassed DCR land in most cases requires work within Alewife Brook itself, which is assumed to create additional permitting and logistical challenges. This, coupled with the mobilization of specialized equipment and labor, and cost considerations, makes trenchless approaches less appealing.

CIPP Lining

CIPP lining is not recommended under standard pipe rehabilitation approaches when pipe deformation is greater than 10% of the cross-sectional area. A CIPP liner formed to the host pipe in its deformed condition produces some structural strength uncertainties. CIPP would also require work in the Brook itself since the liner would need to be cut at the outfall. Also, provisions would need to be made to prevent the release of curing water into the Brook. For these reasons, CIPP lining was rejected.

Fold and Form PVC Lining

Fold and form is a technology that rehabilitates sewer lines via insertion of a folded liner in the host pipe and expanding it through pressure, heat, or mechanical means to restore its original shape. The end result is a sleeve with wall thickness similar to that of normal PVC pipe. However, the installation of a fold and form liner requires the mobilization of a boiler and would involve work in the Brook at the outfall to cut the liner. Provisions would also need to be made to prevent the release of the hot curing water/steam into the Brook. A fold and form liner formed to the host pipe in its deformed condition would result in some structural strength uncertainties. Permitting requirements were also assumed to be a challenge with this alternative, contributing to the rejection of this approach.

Pipe Bursting

Pipe bursting of the existing outfall was considered but would require significant disruption in the Brook and/or at the CAM 001 regulator on DCR property. Equipment could be set up to pull the pipe from downstream toward the upstream regulator, but this would require the HDPE pipe to be laid out in the Brook and/or across the banks of the Brook perpendicular to the flow. It was assumed that this would create permitting challenges, in addition to community relations challenges. For the length of pipe under consideration (48-ft), this alternative was dismissed as impractical and was thus rejected.

Sliplining

The existing outfall is 15” diameter. There are some sections of pipe that appear to be up to 20% deformed based on TV inspection, leaving approximately 12” of height available. Sliplining would be most practical utilizing short lengths of HDPE pipe that are fastened together with a chain wrench. Completed sections can be hydraulically pushed or winched further into the sewer until the entire pipe insertion is finished. However, pipe satisfying the inside diameter requirement is too large to slip through the existing deformed cross section. Standard sliplining was considered impractical due to the length of pipe involved and the necessity of working in the Brook and associated permitting challenges (similar to pipe bursting). The sliplining alternative was therefore rejected.

Link Sealing

Cconsideration was given to using Link Seal, which is a product which makes use of a series of stainless steel bands sleeved inside a host pipe. An epoxy is applied to the outside of the steel band and the steel is expanded radially outward to take the shape of the host pipe. The steel bands have a locking mechanism which preserves the final shape. However, to counteract the deformation observed in the VC pipe, the installer would need to manually jack up short sections, i.e. every 2-ft or so, of the host pipe in order to set the steel bands. This was considered to be impractical and link sealing was rejected.