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South River AOC 4

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Memo

Subject: Shiloh Baptist Church Bank Erosion

Introduction

On August 26, 2020, an inspection of the bank stabilization measures at the Shiloh Baptist Church identified a section of bank where significant erosion of the bank was observed with sloughing of the surface soils down the bank into the rip-rap toe exposing the geocell below. This erosion extended along approximately 140 linear feet from relative river mile (RRM) 0.60 to 0.63, where excavation was conducted during the remedial activities. The erosion covered approximately 75% of the area from 2' feet below the top of bank to the top of the rip-rap toe (Photos 1-3).

Site Inspection

AECOM conducted a site visit to inspect the areas of erosion on August 28, 2020. The erosion is restricted to the surface soils above the geocell, and there were no overall bank stability issues identified. Figure 1 is a typical schematic of the bank in these areas. Where the geocell was exposed, there was no evidence of erosion of the soil within the geocells, subsidence of the subgrade below the geocell, or overall sloughing of the geocell. There was little coverage of living vegetation in this area, with the surface cover on the bank face largely consisting of dead annual rye grass from the stabilization mixture; the permanent seed mixture had not become established.

In the eroded areas where there was undisturbed material there was approximately 6-8" of soil placed above the face of the geocell (Photo 4). This excess soil slid along the face of the geocell until it formed a buttress at the bottom of the slope against the stone toe, likely resulting from storm events that eroded the buttressing soils at the bottom of the bank which led to the material sliding down the face of the bank. Areas along the top of the slope where erosion occurred exhibited cracking from the loss of structural support on the face of the bank. The cracking appears to be a trailing indicator; rather than appearing before the erosion occurs, it forms after the bank materials slid down the face of the bank.

Discussion

The objective of using geocell in the remedial design is to provide structural stabilization along the face of the bank; it achieves this objective through two mechanisms. The first mechanism is by providing a physical matrix that prevents movement of soil, the pockets of the geocell hold the soil in place against mass sliding. The pockets also prevent deep rutting from runoff across the top or from transverse river flow by providing a physical barrier to keep ruts from forming and slowing down water flowing across the geocell. The secondary mechanism for stabilizing the bank is by providing a matrix that surface vegetation root growth can lock into, thereby locking in the planting substrate. This mechanism prevents long-term erosion of the planting soils from surface run-off across the soil in the geocell. Soils that are placed significantly above the geocell do not benefit from either of these mechanisms.

Recommended Repairs

In order to address this erosion and prevent future sloughing of materials, the existing soil above the geocell should be removed from the riprap toe to the top of the bank. Then a thin layer of planting substrate should be used to fill in any voids in the geocell pockets and cover the geocell, with no more than 1”-2” of material placed over the geocell, to match the Typical Primary B Restoration Cross Section on Sheet X-102 of the Shiloh Baptist Church Design Drawings and the restoration details on D-201 and D-202. The planting substrate should be seeded with an erosion control mix and covered with an erosion control blanket that is properly anchored at the top of the bank per the details in the construction drawings. The repaired area should be watered as needed between storms through the end of the fall growth season. In the spring, the area should be hydroseeded with the design bank mixture and shrubs re-planted as needed. Watering should be maintained through the summer as needed to fully establish vegetated growth, per specification 32 90 00 Planting and Habitat Restoration.

Photo 1 - Extent of Bank Erosion

Photo 2 - Bank Erosion at Top of Bank

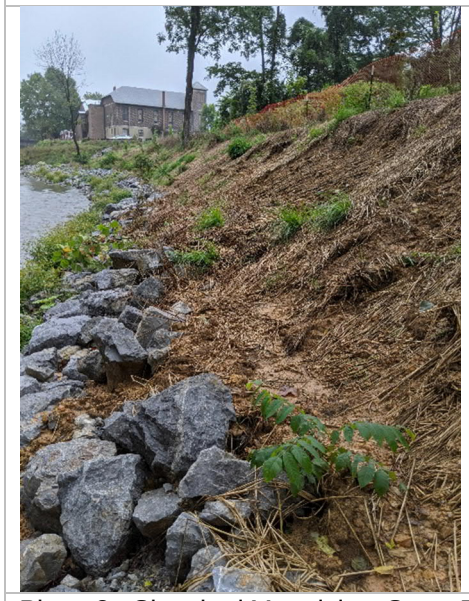

Photo 3 - Sloughed Material on Stone Toe

Photo 4 - Material above Geocell

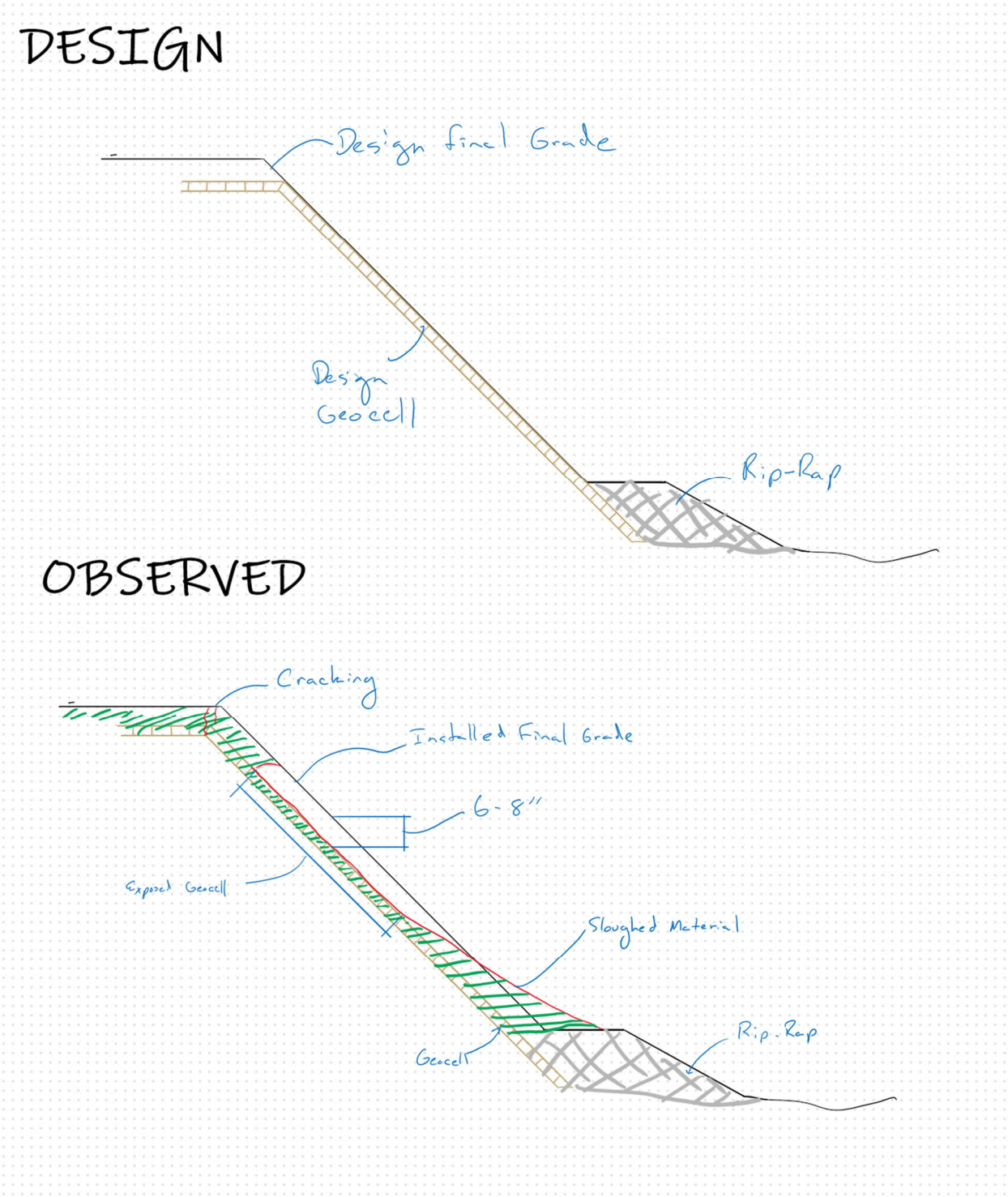

Figure 1 – Typical Markup Bank Sections