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Letter of Transmittal

Date: *3/6/2023* | Job No.: *324-891*

Attention: *Ian MacDonald*

To:
Conservation Commission
Town Hall
253 Atlantic Ave
Hull, MA 02045

RE:
51 Harborview Road

RECEIVED
MAR -7 2023
CONSERVATION DEPARTMENT

We are sending you *attached* via *Priority Mail* the following items:

☐ Shop drawings ☑ Prints ☐ Plans ☐ Samples ☐ Specifications
☑ Copy of letter ☐ Change order ☐ _____

Copies	Date	No.	Description
1			Revised Site Plan
1			Alternatives Memorandum

☑ For approval ☐ Approved as submitted ☐ Resubmit _ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _ prints
☐ For review and comment ☐ _
☐ For bids due ☐ Prints returned after loan to us

Remarks:

Copy to: -

Signed: _____
Steven Gioiosa

MEMORANDUM

Date: February 28, 2023

To: Conservation Commission
Town of Hull

From: Civil & Environmental Consultants, Inc.
Steven D. Gioiosa, P.E. and Karlis Skulte, P.E.

Subject: Slope Stabilization
DEP File # SE35-1735

Location: 51 Harborview Road
Hull, MA

CEC Project: 324-891

COMMONWEALTH OF MASSACHUSETTS
STEVEN D. GIOIOSA
CIVIL
NO. 32165
REGISTERED
PROFESSIONAL ENGINEER

RECEIVED
MAR - 7 2023
CONSERVATION DEPARTMENT

As requested, we have prepared the following summary of the options that have been considered to stabilize the coastal bank located on the north side of the 51 Harborview Road property. The potential options for stabilization of the slope were evaluated by our civil engineering staff including our geotechnical engineer, taking into consideration the soil conditions, slope, elevation change, down gradient municipal sanitary sewer, and property boundary limits.

Option 1 – Vegetated Slope

As always, we prefer to take a natural approach to slope stabilization for most projects. The creation of a stable grade coupled with the planting of a combination of native grasses and plants that would be salt tolerant in the subject environment was initially considered for this site. In order to create a stable base for planting, a maximum slope of 3:1would need to be established. Soils displaced by the erosion process would be re-established on the bank and would be supplemented by similar grain size material capped with an organic topsoil.

The elevation difference from the timber retaining wall to the north property line of the subject property is approximately 32 feet. Establishment of a stable 3:1 slope would require a horizontal land area of 96 feet. The actual distance from the retaining wall to the north property line is limited

to only 54 feet. Given this limitation the slope created would be 1.7:1 which is too steep to establish a stable vegetated slope. For this reason, this option was not considered to be viable for this location.

In addition, to create 3:1 slopes would require large volumes of fill material to be brought to the site. The access to this site is quite difficult and it is likely not practicable to move the necessary volume of materials in large trucks driving along the shoreline and over the municipal sewer line. Finally, the use of fill in that manner would require extensive grading further disturbing the natural vegetation of the surrounding area. This would be counter-productive to the overall stabilization goal.

Option 2 – Stone Embankment

In coastal settings, it is not uncommon to consider large stone placement for slope stabilization where the grade exceeds the 3:1 limit referenced above. This slope treatment consists of a minor regrading of the eroded surface to create a uniform grade, placement of a stabilization blanket, followed by the setting of large stones. The base stones would be buried to provide a stable base point followed by the careful setting of 1 to 2 cubic yard (CY) stones, chinked with smaller stones to lock the embankment in place.

The completion of this stabilization option would require the use of large construction cranes, positioned on the shore to maneuver the stones into position. This equipment is significantly larger than the equipment associated with the soil nailing process currently proposed for this site.

The rip-rap option would be potentially disruptive to the adjacent shoreline and the location of the existing municipal sewer line would add an additional complication to the operation. The heavier materials and equipment could impact the sanitary sewer line given the unknown condition of the pipe and associated bedding for this line.

Limiting the area of stone placement to the steeper portions of the embankment would still require approximately 140 to 150 CY of stone to be placed on the slope. The lower portion of the slope where a 3:1 grade could be established would be planted as currently proposed.

Option 3 – Terraced Retaining Walls

A third option considered for this site was the construction of a terraced retaining wall system. For this option a series of shorter drops would be created that would allow for drops of approximately 5 feet followed by a vegetated terrace which would separate each drop. Assuming a 6 foot wide

terrace, there would need to be approximately 5 steps to get to the more stable base that would be vegetated. Construction of the terrace would involve creating "U" shaped cells with the retaining walls, filling the cells with soil, and vegetating the surface. A wall design would likely involve the need to install piles driven in to create a support structure for a timber wall similar to the one constructed at the top of the existing slope.

The upper wall was created with an extensive tie back system that employs a concrete deadman for structural stability. This would not be possible for these lower terraced areas necessitating the need for driving piles deeper to gain the required stability. This would include the need for larger pile driving equipment creating the same concerns for the shoreline and sanitary sewer referenced above. Additionally, each cell would need to be filled with granular material capped with organic topsoil. An estimate of the required fill quantity reveals the need to truck in and place approximately 225 to 250 CY of material.

With the terraced approach, there is a concern for the potential for edge erosion on the sides of each terrace. Placement of rip-rap along the edges might be needed at the conclusion of the construction process due to the construction related disturbance of these areas.

Option 4 – Soil Nail Technology

The proposed option outlined in the Notice of Intent documents was presented after evaluating the options listed above. The ability to complete the work with smaller equipment, less disruption of the slope, and in a shorter time period all factored into our recommendation for this project.

Given the Commission's concerns with the work being completed close to the easterly abutting property, the attached revised plan pulls the soil nail surface 10 feet off this boundary line. It remains our opinion that a more complete solution would involve the approval of the easterly abutter to extend the stabilization onto their property, we understand that that is not an acceptable option at this time.

The slope created with the soil nail system will be sloped to direct any surface runoff away from the abutter and toward a toe drain for runoff control. The drainage filter strips to be located below the surface against the native soil will act to relieve any potential subsurface water impact and also direct the flow to the toe drain area. A level spreader will be installed at the toe to create a uniform overflow to the vegetated base area, matching natural flow patterns.

With the removal of the work to a point 10 feet from the abutting property, we propose to place a filter fabric erosion blanket capped with smaller stones (1/4 to 1/2 CY) to transition the slope to

the abutting property. In our opinion this is not ideal but given the direction to separate the structure from the abutter, we propose this approach for the areas where the land is steeper than 3:1.