

# Attachment A - Scope of Work

## **Project Description and Understanding**

A slope failure occurred as a result of the flooding event on July 10, 2023, generally between 2640 and 2455 Broad Brook Road. The failing slope is situated above Broad Brook and extends into the roadway, which has resulted in the temporary closure of Broad Brook Road.

Jonathan Ashley, PE, of DuBois & King, Inc. (D&K) and Jacob Wimett, PE, PhD, of GEODesign, Inc. (GEODesign) visited the site in August 2023 and reviewed GIS mapping information on the site. From visual observations, it appears that the toe of the slope was scoured by the floodwater and the upper soils slid into the brook along the steep clay interface. There is a pool in the brook at the toe of the slope and the movement of the brook through this area appears to be continuing the erosion of the slope toe.

The slope appears to be more than 70 feet in height and appears to be steeper than 1V:2H. There appears to be approximately 120 feet of head cut along the road at the top, widening to approximately 250 feet long at the toe. The initial, very steep to near-vertical head cut is about 8 feet high and the toe is a near-vertical scour about 6 feet high. Exposed soils in the slide appear to be silt and clay at the top transitioning to a gray silty clay with boulders evident in the sidewalls towards the bottom. The bottom 10 feet of the slope appeared saturated at the time of our site visit.

Broad Brook Road crests at the top of the slide, and it appears that the road profile could be lowered to reduce the overall height of the roadway slope to the brook. Lowering the profile may help improve the slope geometry for affordability and longevity of the repair and the associated slope stability. If the Town selects an alternative that includes lowering the road, the uphill slope will need to be laid back onto private property, which will require easements.

The Town has requested an evaluation of design alternatives with an overall objective of reestablishing the slope and restoring vehicular access through the area. The Town requested an evaluation of alternatives to include a full restoration of the road to its pre-slide width, stabilization of the road section and slope without full restoration of the road width, and a roadway relocation. After the alternatives review, the Town has requested final design, permitting, bid, and construction phase engineering assistance to support the construction of a preferred alternative. The Town's goal is to restore traffic expediently with a cost-effective and long-term repair.

## **Scope of Services**

D&K offers the following preliminary and final design, permitting, bid, and construction phase services to remedy the slope failure and reopen Broad Brook Road.

### **Task 1: Project Coordination**

DuBois & King will provide ongoing coordination of the project with the Selectboard, state and federal regulators, and FEMA.

### **Task 2: Topographic Survey**

D&K's survey crew will survey the failed slope, the road above and below the damaged section, edges of tree line and large trees within 20 feet of the failed slope section, existing drainage ditches,

existing roadway and guardrail, and aboveground utilities within the road right-of-way (ROW) adjacent to the failed slope. D&K will establish vertical and horizontal control points and we will show these on the drawings with the applicable tie information. The survey limits will extend along the roadway beyond each end of the failed slope, from approximately the start of the vertical curve west of the slope failure, to the first residential driveway east of the slope failure. We will obtain four stream cross sections, representing the upstream end, mid project sections, and the downstream end.

The project control will be based on the GPS-derived state plane coordinate system and NGVD vertical datum. We will represent the ROW and property lines on the plan to the extent feasible using tax maps and other information provided by the Town.

D&K will prepare an existing condition plan with one-foot contours, including the roadway and topographic features of the failed slope. We will show features on the existing condition plan, including trees, tree lines, edges of road, aboveground utilities, guardrail, and other surficial features relevant to the design.

D&K will work with the Town to identify the ownership of the area impacted by the proposed project. D&K will represent the approximate easement areas required from private landowners on the design plans based on Town tax maps or other mapping provided by the Town. It is assumed that a full boundary survey is not required, but is available to the Town via an amendment.

### **Task 3: Resource Inventory (Wetlands, etc.) of Project Site**

D&K's Qualified Wetland Scientist/Field Naturalist will delineate wetlands in the project area along with potential bat habitat trees, which we will mark and identify on the site plans. We will evaluate the estimated ordinary high water (OHW) elevation and will flag the OHW in the field and include it in the base map. We will incorporate the limits of wetland areas and/or other resources that could be impacted by the work on the existing conditions plan. To the extent possible, our design will avoid and minimize work in these areas.

### **Task 4: Subsurface Investigation and Laboratory Testing**

D&K's geotechnical subconsultant GEODesign, will prepare a Proposed Exploration Location Plan (Plan), which we anticipate will include two soil borings at the crest of the slope with one groundwater monitoring well and field vanes in the clays to characterize in-situ soil and groundwater conditions. We will present the plan for the Town's consideration prior to drilling operations. GEODesign will pre-mark the site by measuring prominent site features and obtaining Dig Safe utility clearance prior to drilling.

GEODesign will subcontract drilling of the soil borings and will provide a geotechnical engineer on a full-time basis to observe and log the subsurface conditions in the soil borings, collect soil samples, and measure groundwater levels during drilling. GEODesign will select soil samples from the subsurface exploration program to be sent to a certified geotechnical laboratory for analysis.

GEODesign will measure and record groundwater levels in the newly-installed groundwater monitoring well a few times after the completion of the borings and well installation.

#### **Task 5: Geotechnical (Slope Stability) Analysis and Geotechnical Report**

GEODesign will evaluate subsurface soil and groundwater conditions and prepare a two-dimensional slope stability model of existing site conditions. Potential slope repair options will be incorporated into the model to develop a proposed long-term slope repair recommendation.

GEODesign will summarize the results of the slope stability analysis work in a geotechnical engineering letter report describing the subsurface exploration program, the subsurface conditions encountered, and our team's geotechnical engineering recommendations. The geotechnical report will also include test boring logs, an Exploration Location Plan, the geotechnical laboratory testing reports, results of the slope stability modeling, and recommendations.

#### **Task 6: Preliminary Design**

Based on the results of the slope stability analysis, the D&K team will develop typical cross sections and preliminary opinions of probable construction costs (OPCCs) for up to four slope stabilization alternatives. We will include conceptual plans for the typical repairs on the plans for each alternative, along with notes regarding drainage improvements and other site work.

We will present the findings of the geotechnical report and the preliminary design alternatives to the Town at a regularly-scheduled Selectboard meeting to support the Town's selection of the preferred alternative to advance the project into final design.

#### **Task 7: Final Design**

After incorporating input from the Town on the preliminary plans, D&K will develop the final design plans and an OPCC for the preferred alternative selected by the Town. The plans are anticipated to consist of:

- Title page
- Layout sheets showing existing and proposed features in plan view
- Approximate right-of-way lines, construction limits, and proposed access locations
- Plans showing easement areas needed to construct and maintain the project improvements
- Typical sections for the proposed improvements
- Typical and site-specific details of design elements
- Soil boring information
- Cross sections
- Stream restoration plan and notes
- Construction details and notes

D&K will meet with the Selectboard to review the plans and costs and we will incorporate the Selectboard's input into the permit and bid documents.

#### **Task 8: Permit Applications**

D&K will incorporate comments from the design and Town review, and submit wetland permit application documents to the State of Vermont and US Army Corps of Engineers (USACE), if necessary. The USACE permit may include US Fish and Wildlife requirements for protection of endangered species, specifically the protection of potential bat-roosting trees.

D&K also anticipates submitting a Stream Alteration Permit application and applying for project approval from the Town's floodplain administrator.

All associated permitting fees will be the responsibility of the Town and are not included in D&K's proposed budget.

If, during the course of developing the project, the need for additional permitting efforts and/or additional permits are identified as necessary, we will bring this to the Town's attention and discuss how to proceed. Additional permitting assistance services can be incorporated via amendment.

#### **Task 9: Bid Documents**

D&K will revise plans to accommodate regulatory, Town, and public comments after the comments have been evaluated by the Town and the design team. We will conduct a quantity takeoff estimate for the final plans and revise the OPCC accordingly. We will assemble VTrans contract documents with FEMA-required provisions suitable for bidding and construction of the project along with technical specifications.

#### **Task 10: Bid Phase Assistance**

D&K anticipates providing the following bid phase services for implementing the recommended long-term improvements.

- Conduct a pre-bid meeting with prospective Contractors.
- Respond to Contractor questions and issue one to two addenda.
- Attend the Bid Opening.
- Evaluate bids for responsiveness, price, and references.
- Make a recommendation to the Town for award of the construction contract based on our review of the bids.
- Prepare and assist the Town with issuing a Notice of Award.
- Prepare a conformed set of contract documents for execution and coordinate a Contract Signing.
- Conduct a Contract Signing and assist the Town with issuing a Notice to Proceed.

### Task 11: Construction Phase Assistance

D&K anticipates assisting the Town with the following services during construction of the recommended improvements:

- Schedule and conduct a preconstruction meeting, including preparing an agenda and meeting notes.
- Provide a Project Manager point of contact for the project.
- Respond to the Contractor's questions.
- Review shop drawings, product data, and submittals from the Contractor.
- Provide one day of construction layout and review of the grade stakes, cuts, and fills with the Vermont Stream Alteration Engineer.
- Track quantities of installed materials during construction and review Pay Requests (we assume three Pay Requests with three site meetings).
- Provide daily construction observation to document the repairs and conformance of the work with the design plans and applicable permits (assume 40 site visits).
- Review and issue change orders if necessary (assume 1).
- Conduct a Substantial Completion walkthrough and generate a punchlist of remaining work.
- Conduct a Final Completion walkthrough.
- Provide Record Drawings noting modifications made during construction.

The construction period is only an estimate based on similar-size slope repairs. D&K reserves the right to adjust the proposed construction observation schedule and budget based on the construction schedule that is ultimately accepted by the Contractor.

### Budget

Based on the above-outlined scope of services and experience on similar projects, D&K proposes to complete the work on an hourly basis with the following estimated task budgets:

| Task   | Proposed Budget  |
|--|------------------|
| Field Work and Preliminary Design Alternatives | \$78,700         |
| Final Design and Permitting                    | \$55,300         |
| Bid and Construction                           | \$102,300        |
| <b>Total</b>                                   | <b>\$236,300</b> |

A level of effort estimate of the anticipated labor hours for each task is attached. The proposed budget includes subcontracted geotechnical engineering and construction laboratory testing services and customary direct expenses and incidentals, such as mileage reimbursement.

## Schedule

D&K will initiate the work in 2023 and will focus on completing necessary field work first, including the topographic survey and wetlands delineation.

D&K will advance the project design through the winter with a goal of having the project ready for bid in spring of 2024 for construction in the summer of 2024 when stream alteration permits typically allow in-stream work to occur. Following is an overview of project milestones that would be targeted to achieve the Town's schedule objectives:

| <b>Project Task/Milestone</b>                              | <b>Schedule Goal</b>   |
|--|------------------------|
| Initiate field work  | September 2023         |
| Complete geotechnical evaluation and alternatives analysis | Early November 2023    |
| Final design of preferred alternative                      | December-February 2024 |
| Submit permit applications (and Town secures easements)    | February 2024          |
| Bid project (after securing easements and permits)         | March-April 2024       |
| Construct project (assume 8 weeks of construction)         | July-October 2024      |



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| Project Phases & Tasks  | Labor Categories |                    |                        |                    |                      |                 |                                      |                              |                                   |                        | Total Hours |                   |             |                |
|---|------------------|--------------------|------------------------|--------------------|----------------------|-----------------|--------------------------------------|------------------------------|-----------------------------------|------------------------|-------------|-------------------|-------------|----------------|
|   | Senior Principal | Principal Director | Sr. Project Manager II | Project Manager II | Sr. Project Engineer | Senior Designer | Staff Engineer I / Survey Technician | Landscape Architect/ Planner | Env. Scientist / Field Naturalist | Construction Inspector |             | Licensed Surveyor | Survey Crew | Admin. Support |
| 1 Design Phase  |                  |                    |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             |                |
| A. Initial Project Coord. with Town Regulations, and Funding Agencies | 1                | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 6              |
| B. Topographic Survey   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             | 30                |             | 35             |
| C. Draft Permitting   |                  | 1                  |                        | 5                  |                      | 8               |                                      |                              |                                   |                        |             |                   |             | 18             |
| D. Resource Evaluation  |                  | 1                  |                        |                    |                      | 3               |                                      |                              |                                   |                        |             |                   |             | 17             |
| E. Subsurface Investigation   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 11             |
| F. Coordination with GE/Designer, Site Visit                          |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 30             |
| G. Slope Stability Analysis and Geotechnical Report                   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 31             |
| H. Preliminary Design Alternatives                                    |                  | 1                  |                        | 4                  |                      | 10              |                                      |                              |                                   |                        |             |                   |             | 12             |
| I. Alternative Analysis, Evaluation, Plans - 4 Alternatives           |                  | 1                  |                        | 2                  |                      | 6               |                                      |                              |                                   |                        |             |                   |             | 12             |
| J. OFCC Staff Meetings  |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 12             |
| K. Summary and Meet with Town   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 12             |
| L. Final Design Drawings  |                  | 1                  |                        | 8                  |                      | 60              |                                      |                              |                                   |                        |             |                   |             | 121            |
| M. 90% OFCC   |                  | 1                  |                        | 7                  |                      | 3               |                                      |                              |                                   |                        |             |                   |             | 20             |
| N. Meet with Town   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 6              |
| O. Permit Applications  |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 13             |
| P. Wetland Permit - State of Vermont                                  |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 13             |
| Q. Other Corps of Engineers   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 13             |
| R. Stream Alteration Permit (includes 4 meetings, meeting)            |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 26             |
| S. Floodplain Administration Review                                   |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 17             |
| T. Bid Documents  |                  | 1                  |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 24             |
| U. Plan Revisions, Res. Reviews, Comments and Permittals              |                  | 1                  |                        | 1                  |                      | 4               |                                      |                              |                                   |                        |             |                   |             | 24             |
| V. Technical Specifications, Special Provisions                       |                  | 1                  |                        |                    |                      | 12              |                                      |                              |                                   |                        |             |                   |             | 31             |
| W. Contract Document  |                  | 1                  |                        |                    |                      | 8               |                                      |                              |                                   |                        |             |                   |             | 27             |
| X. Final OFCC   |                  | 1                  |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 17             |
| 2. Bid Phase  |                  |                    |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             |                |
| A. Advertisement/Schedule   |                  |                    |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 7              |
| B. Attend and Lead Pre-bid Meeting                                    |                  |                    |                        |                    |                      | 2               |                                      |                              |                                   |                        |             |                   |             | 7              |
| C. Respond to Questions and Issue Cng. Addendum                       |                  |                    |                        |                    |                      | 7               |                                      |                              |                                   |                        |             |                   |             | 17             |
| D. Attend Bid Opening   |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 4              |
| E. Tabulate and Evaluate Bids and Provide Recommendation              |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 4              |
| F. Prepare Notice of Award  |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 7              |
| G. Construction Contract, Signing, Issue Notice to Proceed            |                  |                    |                        |                    |                      | 2               |                                      |                              |                                   |                        |             |                   |             | 16             |
| 3. Construction Phase Services  |                  |                    |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             |                |
| A. Construction Administration  |                  |                    |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             |                |
| 1. First Construction Meeting   |                  |                    |                        |                    |                      |                 |                                      |                              |                                   |                        |             |                   |             | 14             |
| 2. Respond to Contractor Questions (Assume 1 Site Meeting)            |                  |                    |                        |                    |                      | 4               |                                      |                              |                                   |                        |             |                   |             | 17             |
| 3. Review Submittals / Shop Drawings                                  |                  |                    |                        |                    |                      | 8               |                                      |                              |                                   |                        |             |                   |             | 18             |
| 4. Track Quantities and Review Pay Requests (Assume 7)                |                  |                    |                        |                    |                      | 10              |                                      |                              |                                   |                        |             |                   |             | 20             |
| 5. Review and Issue Change Orders (Assume 1)                          |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 12             |
| 6. Substantial Completion Inspection and Punchlist                    |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 17             |
| 7. Final Completion Inspection  |                  |                    |                        |                    |                      | 8               |                                      |                              |                                   |                        |             |                   |             | 20             |
| 8. Prepare Record Drawings  |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 21             |
| 9. Project Closeout Coordination                                      |                  |                    |                        |                    |                      | 1               |                                      |                              |                                   |                        |             |                   |             | 21             |
| B. Resident Day Representative (at 10 days)                           |                  |                    |                        |                    |                      | 13              |                                      |                              |                                   |                        |             |                   |             | 29             |
| C. Survey Layout and Stream Alteration Permit Meeting                 |                  |                    |                        |                    |                      | 6               |                                      |                              |                                   |                        |             |                   |             | 26             |
| <b>Total Hours:</b>   | 8                | 172                | 35                     | 92                 | 70                   | 246             | 30                                   | 24                           | 30                                | 1                      | 1           | 10                | 30          | 1,115          |

