



Dodd Road Embankment at the Roadway Bend Adjacent to the Chagrin River and East of Milann Drive in Willoughby Hills, Ohio

May 3, 2018  
Revision: May 31, 2018

Mayor Robert Weger  
City of Willoughby Hills  
35405 Chardon Rd  
Willoughby Hills, OH 44094

**RE:** Dodd Road Embankment at the Roadway Bend Adjacent to the Chagrin River and East of Milann Drive in Willoughby Hills, Ohio – KS #18111

**Introduction:**

KS Associates, Inc. (KS) is a 100% Ohio-based transportation engineering, coastal engineering, and surveying firm that has been headquartered in Elyria for 30 years. We have specialized expertise in complex bridge design and inspection, complex roadway design, surveying, coastal engineering, and Right-of-Way (R/W) plan development. Our 35-person team includes 15 Professional Engineers including transportation engineers, a 12-person Survey Group with three Professional Surveyors, R/W plan specialists, CAD technicians, and construction inspectors. Our technical diversity makes us uniquely qualified for this project.

We understand that this project aims to develop a cost-effective solution to restore the failed portion of the roadway embankment and protect the overall embankment for a long-term solution.

KS has formed a team consisting of roadway experts, coastal infrastructure engineers, and geotechnical experts for soil exploration, foundation recommendations, and slope stabilization. We are excited about this project, one that presents an opportunity for our technically strong and capable team to serve the City of Willoughby Hills Engineer's Office — with minimal to no oversight from the City.



**Project Approach:**

**Project Understanding:** The KS Team reviewed the project site and studied the Scope of Services required for the Dodd Road embankment at the roadway bend adjacent to the Chagrin River and east of Milann Drive in Willoughby Hills, Ohio. A small portion of the roadway embankment (around 75 ft.) has recently failed and has exposed guardrail posts and roadway material. This section of the road is approximately 500 feet and is in close proximity to the river bank that is in need of protection. Based on information received from and subsequent conversation with the City, we offer the following engineering services to adequately protect the embankment utilizing our waterfront structural engineering expertise:

- Perform field review, field surveying, and geotechnical investigation to establish the type, size, and location of the rehabilitation and identify the limits of construction. Geotechnical investigation will be performed by TTL, Inc., our subconsultant.



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- Design a system for a long-term protection of the slope and support the roadway. Provide construction plans, specifications, and cost estimate for the City to sell the project for construction.
- Maintain access to the property on the south side of the failure and construction areas for the duration of construction, with no roadway closures.
- Provide engineering consultation during construction.

**Project Approach:**

**Feasibility Study** – Upon Notice to Proceed, KS will perform a brief feasibility study to determine the most cost-effective and safest solution for the retaining wall to protect the embankment and Dodd Road. The results of the feasibility study, including field surveying and geotechnical report, will be submitted in a Type Study Report. This report will include alternatives for wall type, size, and limits of the wall; geotechnical reconnaissance; and roadway alignments. The costs of the alternatives will be summarized in a decision matrix, which will include our recommended alternative.

**Detail Design** – The KS Team will develop Stage 2 Plans, submit PS&E/tracings, and assist in preparing the Bid Package.

**Geotechnical Engineering/Slope Protection System** – TTL proposes to conduct a geotechnical subsurface investigation to evaluate the properties of the underlying materials with respect to remediation of the proposed slope. A drill rig and crew will be utilized to advance test borings into the underlying materials for sample collection and in-situ testing. Laboratory testing will be conducted on the collected samples to provide physical properties and characteristics of the underlying materials. Engineering design and construction recommendations for the proposed remediation will be developed based on information obtained from the drilling and laboratory testing.

Based upon the understanding noted above, the proposed scope of work has been divided into the following three tasks:

**Task 1 - Mobilization, Drilling and Sampling:**

Based on the provided information, two (2) borings located on Dodd Road are required for the project as noted in the table below:

Boring	Location	Approx. Surface Elev.	Soil/Rock Drilling (ft)	Rock Coring (ft)
B-1	West Side of Failure	660	35	10
B-2	East Side of Failure	660	35	10
<b>Totals:</b>			70	20

TTL will mobilize the drill rig and crew to the site, perform the indicated test boring, and return the collected samples to its laboratory for testing. The test boring will be located in the field by TTL based on the provided plans. TTL will notify Ohio Utilities Protection Service (OUPS) for utility markings and clearances. If obstructions, overhead power lines, or underground utilities are encountered, the test borings may have to be relocated. The relocation distance shall be kept to a minimum.

The test borings will be performed in accordance with ASTM D 1586 and D 5434. Soil samples will be collected at 2½-foot intervals to a depth of 10 feet and at 5-foot intervals thereafter using a split-spoon



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sampler. Standard Penetration Tests will be performed at the same intervals. Upon completion of the drilling operations, each test boring shall be backfilled with a mixture of bentonite chips and auger cuttings.

TTL will provide traffic maintenance during performance of the test borings consisting of signs, cones, and one flagger to direct traffic around the drill rig. We have assumed that the borings are located along roadways that are under Willoughby Hills, and that permits or fees will not be required for performance of test borings in the roadway Rights-of-Way.

**Task 2 - Laboratory Testing:**

Recommendations pertaining to bridge foundations and settlement will be evaluated using the soil properties and characteristics determined from the following recommended laboratory tests performed on the collected soil samples:

- Moisture content determinations (ASTM D 2216)
- Dry density determinations and unconfined compressive strength tests
- Atterberg limits test (ASTM D 4318)
- Particle size analysis (ASTM D 422)

All recovered soil samples will be tested for moisture content and visually or manually classified in accordance with the Ohio Department of Transportation (ODOT) system of classification. Unconfined compressive strength estimates will be obtained for the intact cohesive split-spoon samples using a calibrated hand penetrometer.

**Task 3 - Engineering Analysis, Recommendations and Report Preparation:**

A geotechnical engineer will take the information from the driller's field logs and prepare engineering logs describing each stratum encountered. Geotechnical-related design parameters for the retaining wall structure and construction recommendations will be prepared under the direction of a licensed Professional Engineer.

The final report will contain the field investigation and laboratory test data, state our findings and observations, and include a site plan and log identifying each test boring drilled. The final report will also include the results of the stability analysis, geotechnical design parameters for retaining wall design, and construction recommendations by a licensed Professional Engineer.

**Roadway/Drainage** – KS will prepare plans and specification to restore the damaged portions of the roadway and reconstruct the shoulders along the river between the retaining wall and existing roadway pavement. Because the retaining wall will be constructed, the roadway should be widened toward the river with an adequate drainage system. KS recommends a curb and gutter to control roadway drainage. Based on our initial reviews, the roadway drainage spread will be controlled by catch basins. This project will likely disturb more than one acre, requiring post-construction Best Management Practices (BMPs) that will need to address storm water quality only.

**Environmental Studies** – We assume no environmental studies and documentation preparation is required for this project. The construction will be developed such that all work could be performed from the



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embankment and above and outside the river. KS will coordinate, prepare and submit for a permit from the U.S Army Corps of Engineers (USACOE).

**Right-of-Way Impacts** – No R/W plans or R/W acquisition services are included in this proposal.

Based on our initial investigation and requests from the City, we assumed there are no hydraulic/hydrology analysis and studies required. The construction plans and specifications will be developed to provide protections for:

**Estimated Project Cost:**

Service	Fee:
KS proposes to perform initial investigation, field surveying, detail design, preparation of plans, specifications and estimate with one interim submission (Stage 2, at 80% complete) and final tracing submission. KS will also provide engineering consultation for during bid and construction for a total lump sum fee:	<b>\$53,500.00</b>
TTL proposes to conduct the investigation described above for a lump sum fee	<b>\$10,500.00</b>
Environmental, Hydraulic/Hydrology, R/W plans and acquisition (not anticipated)	<b>\$0.00</b>
Preparation, coordination with USACOE, and submittals of permit	<b>\$4,000.00</b>
Construction Inspection and Management (not included)	<b>\$0.00</b>
<b>Project Total</b>	<b>\$68,000.00</b>



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**Schedule:**

KS and TTL are prepared to begin work on this project upon receipt of written authorization to proceed. Based on our current staffing and TTL's drilling schedule, we anticipate that the field work can commence within three (3) weeks of authorization and will require three (3) months to complete.

Respectfully submitted,

A handwritten signature in black ink that reads "Hamid V. Homaei, P.E." with a stylized flourish at the end.

**KS Associates, Inc.**  
Hamid V. Homaei, P.E.  
Principal

**ACCEPTANCE:** Execution of this **AGREEMENT** or the issuance of any other written authorization by the **City of Willoughby Hills** to **KS**, such as a written Purchase Order, will constitute acceptance of this **AGREEMENT**.

By \_\_\_\_\_

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_