Bismarck

Engineering Department

DATE: March 17, 2020

FROM: Gabe Schell, City Engineer

ITEM: Geotechnical Service Contract Amendment

REQUEST

Consider approval of amended consultant agreement with Terracon Consultants, Inc (Terracon) relating to Geotechnical Services associated with River Road slope stability.

Please place this item on the 3/24/2020 City Commission meeting agenda.

BACKGROUND INFORMATION

On September 24, 2019 the Board of City Commissioners approved ongoing geotechnical services for River Road slope stability contract with Terracon for $21,756.00.

The preliminary findings indicate subsurface movement of 200 feet in length on the west side of River Road is taking place at an approximate depth of 18 to 20 feet below existing grades. There has been approximately 0.25 to 0.3 inches of movement that took place from October 30, 2019 to December 5, 2019 during the monitoring period. At this time, no permanent solutions or costs have been estimated as the magnitude of the movement is still unknown.

From these findings, additional geotechnical services on the east side of River Road is recommended to be conducted to check for movement between the hill on the east and the visible signs of movement at the centerline of the roadway.

For ongoing services, we have negotiated a scope of work and fee for $14,107.00 with the option to negotiate for additional services that would be brought before the City Commission for approval. These services are to be funded by sales tax initially and eventually allocated to the special assessment district once one is created. Final reports for the ongoing work will be delivered by June 1, 2020. See attached scope of services.

Further actions will be brought before the Board for approval, once the additional geotechnical services final report has been delivered and proposed solutions and costs completed.

RECOMMENDED CITY COMMISSION ACTION

Approval of the contract with Terracon for ongoing geotechnical services.

STAFF CONTACT INFORMATION

Gabe Schell, PE | City Engineer, 355-1505 or gschell@bismarcknd.gov

March 10, 2020

City of Bismarck Engineering Department
221 North 5th Street
P.O. Box 5503
Bismarck, ND 58506

Attn: Mr. Gabe Schell, P.E. - City Engineer
P: (701) 355 1505
E: gschell@bismarcknd.gov

Re: Proposal for Geotechnical Engineering Services
River Road Slope Stabilization
River Road
Bismarck, North Dakota
Terracon Proposal No. PM2195090

Dear Mr. Schell:

We appreciate the opportunity to submit this proposal to the City of Bismarck Engineering Department to provide Geotechnical Engineering services for the above referenced project. The following are exhibits to the attached Supplememt to Agreement for Services.

Exhibit A	Project Understanding
Exhibit B	Scope of Services
Exhibit C	Compensation and Project Schedule
Exhibit D	Site Location
Exhibit E	Anticipated Exploration Plan

Our base fee to perform the Scope of Services described in this proposal is **$14,107**. See Exhibit C for more details of our fees and consideration of additional services.

Your authorization for Terracon to proceed in accordance with this proposal can be issued by signing and returning a copy of the attached Supplement to Agreement for Services to our office.

Sincerely,
Terracon Consultants, Inc.

Chad A. Cowley, P.E.
Department Manager

Alex L. Sprunk, P.E.
Project Engineer

Reference Number: PM2195090

SUPPLEMENT TO AGREEMENT FOR SERVICES

CHANGE TO
SCOPE OF SERVICES AND FEES

This **SUPPLEMENT to AGREEMENT FOR SERVICES** to the original Agreement for Services (original Agreement dated 09/16/2019, Agreement reference number PM2195090) is between City of Bismarck ND ("Client") and Terracon Consultants, Inc. ("Consultant") for additional or changed Services to be provided by Consultant for Client on the Project, as described in the Agreement for Services. This Supplement is incorporated into and part of the Agreement for Services.

1. **Scope of Services**. The scope of the additional or changed Services are described in the Scope of Services section of the Consultant's Supplemental Proposal, unless Services are otherwise described below or in Exhibit B to this Supplement (which section or exhibit are incorporated into the Supplement).

   See Terracon Proposal PM2195090

2. **Compensation.** Client shall pay compensation for the additional or changed Services performed at the fees stated in the Supplemental Proposal unless fees are otherwise stated below or in Exhibit C to this Supplement (which section or exhibit are incorporated into the Supplement).

   See Terracon Proposal PM2195090

All terms and conditions of the **Agreement for Services** shall continue in full force and effect. This Supplement is accepted and Consultant is authorized to proceed.

Consultant:	**Terracon Consultants, Inc.**	Client:	**City of Bismarck ND**
By:	Date: **3/10/2020**	By:	Date:
Name/Title:	**Chad A. Cowley / Department Manager**	Name/Title:	
Address:	**1805 Hancock Dr PO Box 2084**	Address:	**PO Box 5503**
	Bismarck, ND 58501		**Bismarck, ND 58506-5503**
Phone:	**(701) 258-2833** Fax: **(701) 258-2857**	Phone:	**(701) 355-1505** Fax:
Email:	**Chad.Cowley@terracon.com**	Email:	

EXHIBIT A - PROJECT UNDERSTANDING

Our Scope of Services is based on our understanding of the project as described by the City of Bismarck and the expected subsurface conditions as described below. A site visit was conducted on August 22, 2019 to better understand and document the distress experienced. Monitoring equipment was installed in October 2019 on the west side of River Road.

Site Location and Conditions

Item	Description
Parcel Information	The project is located along River Road in Bismarck, North Dakota. The experienced pavement distress and slope instability is approximately 500 to 600 feet north of the Grant Marsh Bridge. Latitude: 46.8253° N, Longitude: 100.8290° W (approximate) See **Exhibit D**
Existing Improvements	River Road roughly runs north-south and is a two-lane asphalt-paved road. There is a cable-wire guard rail along the west edge of River Road. There is an asphalt-paved bike path approximately 100 feet to the west, and the Missouri River is approximately 200 feet to the west of River Road.
Current Ground Cover	Asphalt-surfacing along River Road; heavy vegetation to the west, moderate vegetation and trees to the east.
Existing Topography	Hilly; River Road transects a ridge that slopes steeply downward to the west. The total change in elevation to the east of River Road is estimated to be on the order of 50 feet. The terrain to the west of River Road slopes downward about 5 to 10 feet before flattening towards the river. The gradients on the upslope and downslope sides of the roadway generally range from about 1.5H:1V to 2H:1V.
Site Access	All proposed exploration locations are accessible with our track-mounted drilling equipment. We understand the City of Bismarck will issue the notice of closure of River Road, and Terracon will provide the signage necessary to close the road. We estimate fieldwork will take approximately 8 to 10 hours.

Item	Description
Project Description	Based on our initial observations of the experienced distress, we estimate up to about 200 lineal feet of the roadway is currently impacted by slope instability in the location as described previously. The experienced distress consisted primarily of a crack, up to 6 inches in width, within the pavement and underlying pavement subgrade. The crack is suspected of being associated with the apparent head scarp of the slide. The new inclinometer on the east side of the road is to check for movement uphill of the apparent head scarp. The monitoring well will be used to measure groundwater levels on the east side of the road to be used in modeling of the slope.

EXHIBIT B - SCOPE OF SERVICES

Our proposed Scope of Services consists of field exploration, laboratory testing, and engineering/project delivery. These services are described in the following sections.

Field Exploration

The field exploration program will include the advancement of borings, installation of slope monitoring instrumentation, and monitoring observations after installation under the guidance of a geotechnical engineer to characterize the subsurface conditions and failure surface(s).

Boring ID	Planned Boring Depth (feet) [1]	Planned Location	
B-4	50	Inclinometer	See **Exhibit E**
B-5	30	Monitoring Well	

1. Below ground surface.
2. Boring B-5 will be near boring B-4, and the depth will be dependent on the depth of groundwater encountered during the field exploration program.

Boring Layout and Elevations: We will mark the boring locations prior to our arrival of drilling equipment to the site. We will also use handheld GPS equipment to locate borings with an estimated horizontal accuracy of +/-20 feet. Field measurements from existing site features may be utilized. If available, approximate elevations will be obtained by interpolation from a site specific, surveyed topographic map.

Subsurface Exploration Procedures: We will advance soil borings with a track-mounted drill rig using continuous flight augers (solid stem and/or hollow stem, as necessary, depending on soil conditions). Samples will be obtained at 2½-foot intervals in the upper 15 feet of each boring and at intervals of 5 feet thereafter. Soil sampling is typically performed using thin-wall tube and/or split-barrel sampling procedures. The split-barrel samplers are driven in accordance with the standard penetration test (SPT). The samples will be placed in appropriate containers, taken to our soil laboratory for testing, and classified by a Geotechnical Engineer. In addition, we will observe and record groundwater levels during drilling and sampling.

Our exploration team will prepare field boring logs as part of standard drilling operations including sampling depths, penetration distances, and other relevant sampling information. Field logs include visual classifications of materials encountered during drilling, and our interpretation of subsurface conditions between samples. Final boring logs, prepared from field logs, represent the Geotechnical Engineer's interpretation, and include modifications based on observations and laboratory tests.

Property Disturbance: The borings will be converted to inclinometers or monitoring wells as described below after their completion. Excess auger cuttings will be dispersed in the general vicinity of the boreholes.

Inclinometer Construction: Boring B-4 will be converted to inclinometers upon their completion. The inclinometers will be constructed of 2.75-inch QC Casing with a bottom anchor. The casings will feature a grouted anulus extending to the ground surface. The casings will extend approximately 3 feet above the existing ground surface, and feature slip caps and steel locking protective covers.

We anticipate that the instrumentation will consist of inclinometer casings in which we can survey slope movement on a daily, weekly, or monthly basis. We anticipate taking baseline readings of the instrumentation within a week of initial installation, and on a weekly basis over the next month following initial installation. Additional readings have been requested following these weekly readings on a monthly basis through May of 2020. The total number of readings necessary to monitor the slope is an estimate and subject to change based on the movement observed in the inclinometers.

As requested, we can remove and abandon the inclinometers in late Spring of 2020, unless it is recommended to keep the inclinometers installed as part of the repair and remediation recommendations. The frequency of inclinometer readings and abandonment will be discussed with the city after the conclusion of the initial readings.

Monitoring Well Construction: Boring B-5 will be converted to a monitoring well upon its completion. The monitoring well will consist of two-inch diameter Schedule 40 PVC pipe and will include a 20-foot screen section. The screen section will be sand packed to 1.5 feet above the top of the screen, with a bentonite seal extending to the ground surface. The monitoring well will extend approximately 3 feet above the existing ground surface and feature a locking steel protective cover. We will register the monitoring well with the State of North Dakota Board of Water Well Contractors after the completion of field work.

Safety

Terracon is not aware of environmental concerns at this project site that would create health or safety hazards associated with our exploration program; thus, our Scope considers standard OSHA Level D Personal Protection Equipment (PPE) appropriate. Our Scope of Services does not include environmental site assessment services, but identification of unusual or unnatural materials encountered while drilling will be noted on our logs and discussed in our report.

Exploration efforts require borings (and possibly excavations) into the subsurface, therefore Terracon will comply with local regulations to request a utility location through North Dakota One Call. We may consult with the owner/client regarding potential utilities, or other unmarked

underground hazards. Based upon the results of this consultation, we will consider the need for alternative subsurface exploration methods, as the safety of our field crew is a priority.

Private utilities should be marked by the owner/client prior to commencement of field exploration. Terracon will not be responsible for damage to private utilities not disclosed to us. If the owner/client is unable to accurately locate private utilities, Terracon can assist the owner/client by coordinating or subcontracting with a private utility locating services. Fees associated with the additional services are not included in our current Scope of Services and will be forwarded to our client for approval prior to initiating. The detection of underground utilities is dependent upon the composition and construction of the utility line; some utilities are comprised of non-electrically conductive materials and may not be readily detected. The use of a private utility locate service would not relieve the owner of their responsibilities in identifying private underground utilities.

Site Access: Terracon must be granted access to the site by the property owner. By acceptance of this proposal, without information to the contrary, we consider this as authorization to access the property for conducting field exploration in accordance with the Scope of Services.

Laboratory Testing

The project engineer will review field data and assign laboratory tests to understand the engineering properties of various soil strata. Exact types and number of tests cannot be defined until completion of field work. The anticipated laboratory testing may include the following:

- Water content
- Unit dry weight
- Atterberg limits
- Unconfined compressive strength
- Grain size analysis

Our laboratory testing program often includes examination of soil samples by an engineer. Based on the material's texture and plasticity, we will describe and classify soil samples in accordance with the Unified Soil Classification System (USCS).

Engineering and Project Delivery

Results of our field and laboratory programs will be evaluated by a professional engineer. The engineer will develop a geotechnical site characterization, interpret slope monitoring data, perform the engineering calculations necessary to evaluate the experienced slope instability, and develop appropriate geotechnical engineering recommendations for the project.

Your project will be delivered using our ***GeoReport®*** system. Upon initiation, we provide you and your design team the necessary link and password to access the website (if not previously registered). Each project includes a calendar to track the schedule, an interactive site map, a

listing of team members, access to the project documents as they are uploaded to the site, and a collaboration portal. The typical delivery process includes the following:

- Project Planning – Proposal information, schedule and anticipated exploration plan will be posted for review and verification
- Site Characterization – Findings of the site exploration
- Geotechnical Engineering – Recommendations and geotechnical engineering report

When utilized, our collaboration portal documents communication, eliminating the need for long email threads. This collaborative effort allows prompt evaluation and discussion of options related to the design and associated benefits and risks of each option. With the ability to inform all parties as the work progresses, decisions and consensus can be reached faster.

When services are complete, we upload a printable version of our completed geotechnical engineering report, including the professional engineer's seal and signature, which documents our services. Previous submittals, collaboration and the report are maintained in our system. This allows future reference and integration into subsequent aspects of our services as the project goes through final design and construction.

The geotechnical engineering report will provide the following:

- Boring logs with field and laboratory data
- Stratification based on visual soil classification
- Groundwater levels observed during and after the completion of drilling
- Site Location and Exploration Plans
- Subsurface exploration procedures
- Description of subsurface conditions
- Slope monitoring instrumentation data readings
- Slope stability analysis
    - Slide 2018 models, as appropriate
    - Conceptual recommendations for slope mitigation and repair alternatives

EXHIBIT C - COMPENSATION AND PROJECT SCHEDULE

Compensation

Based upon our understanding of the site, the project as summarized in **Exhibit A**, and our planned Scope of Services outlined in **Exhibit B**, our base fee is **$14,107**. The itemized costs are provided in the detailed cost schedule, presented in **Exhibit F**.

Our Scope of Services does not include services associated with site clearing, wet ground conditions, tree or shrub clearing, or repair of/damage to existing landscape. If such services are desired by the owner/client, we should be notified so we can adjust our Scope of Services.

Unless instructed otherwise, we will submit our invoice(s) to the address shown at the beginning of this proposal. If conditions are encountered that require Scope of Services revisions and/or result in higher fees, we will contact you for approval, prior to initiating services. A supplemental proposal stating the modified Scope of Services as well as its effect on our fee will be prepared. We will not proceed without your authorization.

Project Schedule

We developed a schedule to complete the Scope of Services based upon our existing availability and understanding of your project schedule. However, this does not account for delays in field exploration beyond our control, such as weather conditions, permit delays, or lack of permission to access the boring locations. In the event the schedule provided is inconsistent with your needs, please contact us so we may consider alternatives.

We will record baseline readings of the instrumentation within a week of initial installation, and on a weekly basis over the next month following initial installation. After the last reading of the month has been recorded, we will prepare and issue a draft geotechnical engineering report, and schedule a meeting with the City of Bismarck Engineering Department to discuss the various potential repair alternatives.

If warranted, additional readings can be provided for the same fee as presented in **Exhibit F**.

***GeoReport* Stage**	**Posting Date** [1, 2]
Project Planning	March 30, 2020
Mobilization of Exploration Team [3]	Week of April 6, 2020 [4]
Site Characterization	April 20, 2020 [4]
Geotechnical Engineering (Final Report)	May, 2020 [4, 5]

GeoReport **Stage**	**Posting Date** [1, 2]
Removal and abandonment of Inclinometers [5]	May of 2020

1. These dates are based on receiving written notice to proceed no later than **March 12, 2020**.
2. We will maintain a current calendar of activities within our ***GeoReport*** website. In the event of a need to modify the schedule, the schedule will be updated to maintain a current awareness of our plans for delivery.
3. Based on availability at the time this proposal was prepared, subject to change.
4. We anticipate field work will take approximately one to two days to complete.
5. If part of the mitigation and repair alternatives include further monitoring of the slope, we recommend keeping the inclinometers installed.

EXHIBIT D – SITE LOCATION

River Road Slope Stabilization ■ Bismarck, North Dakota

March 10, 2020 ■ Terracon Proposal No. PM2195090

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXHIBIT E – ANTICIPATED EXPLORATION PLAN

River Road Slope Stabilization ■ Bismarck, North Dakota
March 10, 2020 ■ Terracon Proposal No. PM2195090

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXHIBIT F - ESTIMATED COST SCHEDULE

FIELDWORK	Qty.	Unit	Rate		Subtotal
Mobilization[1]	1	lump sum @	$724.00	/ea.	$724.00
Traffic Control	1	lump sum @	$1750.00	/ea.	$1750.00
Monitoring Well Materials	1	lump sum @	$200.00	/ea.	$200.00
Locking Steel Protective Cover	2	each @	$140.00	/ea.	$280.00
Inclinometer Materials	1	lump sum @	$1,000.00	/ea.	$1,000.00
Monitoring Well Installation (includes drilling to 30 feet)	2	hours @	$225.00	/hr.	$450.00
Inclinometer Installation	2	hours @	$225.00	/hr.	$450.00
Drilling and sampling (max 50 foot depth)	50	feet@	$20.00	/ft.	$1,000.00
Boring layout, cleanup, and downtime	1	hours @	$225.00	/hr.	$225.00
Inclinometer removal and abandonment[2]	1	lump sum @	$865.00	/ea.	$865.00
			Fieldwork Subtotal:		**$6,944.00**

LABORATORY TESTING	Qty.	Unit	Rate		Subtotal
Moisture Content (ASTM D2216)	10	each @	$6.00	/ea.	$60.00
Dry Density Determination (ASTM D7263)	4	each @	$40.00	/ea.	$160.00
Atterberg Limits (ASTM D4318)	2	each @	$90.00	/ea.	$180.00
Grain Size Analysis (ASTM D422)	1	each @	$98.00	/ea.	$98.00
Unconfined Compressive Strength (ASTM D2166)	1	each @	$50.00	/ea.	$50.00
			Laboratory Testing Subtotal:		**$548.00**

PROJECT MANAGEMENT, ANALYSIS AND REPORTING	Qty.	Unit	Rate		Subtotal
Senior Engineer	4	hours @	$180.00	/hr.	$720.00
Project Engineer	2	hours @	$165.00	/hr.	$330.00
Staff Engineer/Geologist	8	hours @	$120.00	/hr.	$960.00
Inclinometer base + weekly readings for 1 month	5	each @	$750.00	/ea.	$3,750.00
Inclinometer readings, once per month until May, 2020	1	each @	$750.00	/ea.	$750.00
Technician	1	hours @	$105.00	/hr.	$105.00
			Project Management, Analysis, and Reporting Subtotal:		**$6,615.00**

ESTIMATED TOTAL: **$14,107.00**

1. Mobilization includes drill rig and pickup travel, marking boring locations, utility check, job instructions, and loading of equipment.
2. Includes time and materials to abandon the inclinometers and traffic control.