



August 17th, 2022

Mr. William Lovallo
Belmont High School Building Committee, Chair,
19 Moore Street.
Belmont MA 02478

**Re: Belmont High School – CHA Amendment #
Proposal for Irrigation Well Exploration**

Dear Mr. Lovallo,

CHA is pleased to submit a fee proposal to amend our current contract for Owner's Project Management services for the additional service associated with Irrigation Well Exploration.

Geosphere Environmental Management, Inc. (GEOSPHERE) will provide work for Irrigation Well Exploration. They will focus their efforts to find drilling locations for the irrigation wells in the northeast and west portions of the site. GEOSPHERE will perform a fracture trace analysis (FTA) of these areas using aerial photographs, reviewing existing topographic maps, surficial geology maps, and bedrock geology maps. The goal of the FTA is to identify areas that contain high concentration of fractures that might yield high amounts of ground water.

GEOSPHERE will then install up to five stakes at the best locations by using the methods described above.

Compensation:

Geosphere Environmental Management Inc.	\$14,400
5% CHA Mark Up on Consultant	\$720
	<hr/>
	\$15,120

Very truly yours,

A handwritten signature in black ink, appearing to read 'T. Gatzunis', written in a cursive style.

Thomas G. Gatzunis P.E.
CHA Consulting

August 17, 2022

Thomas Gatzunis, P.E., C.B.O.
CHA Consulting, Inc.
One Washington Mall, Suite 1500
Boston, MA 02108

**RE: Scope of Work and Cost Estimate
Irrigation Well Exploration
Belmont High School
Belmont, MA**

Dear Tom,

Pursuant to your request, Geosphere Environmental Management, Inc. (GEOSPHERE) is pleased to submit this revised scope of work and cost estimate to CHA Consulting, Inc. (CHA) to perform hydrogeological services associated with the exploration for irrigation wells for the athletic fields and related areas at the Belmont High School, Belmont, MA. Based on our experience working in the Belmont area, these irrigation wells will be constructed into the bedrock aquifer. We are not sure what the required yield of the wells needs to be, but our goal is to identify locations in proximity to the irrigation areas and away from the three geothermal test wells to site and drill the wells.

We have received the partial well logs for the three geothermal test wells, but there was no indication on the logs of the depths and locations of the fractures encountered during the drilling of the wells. In addition, there was no indication of the yield of each well. GEOSPHERE has been informed that this information does not exist for these three geothermal test wells. Our understanding is that 300 geothermal wells will be installed as part of the High School project.

CHA will provide us with updated site plans and geothermal well logs in order to identify the best locations on the site to perform our exploration program.

Based on the information we have been given, GEOSPHERE recommends the following scope of work.

SCOPE OF WORK

Based on our preliminary review of the Site, GEOSPHERE has prepared the following scope of work:

Task 1 – Fracture Trace Analysis

GEOSPHERE will focus our efforts to find a potential drilling locations for the irrigation wells in the northeast portion of the site identified as Phase 1, 2, and 3. In addition, there is an area along the west of the pond that will also be explored for a well location. CHA will update us with information if these original areas of exploration have changed. As part of Task 1, GEOSPHERE will perform a fracture trace analysis (FTA) of these areas using aerial photographs (preferred scale - 1" = 500') to locate prominent surface expressions of subsurface bedrock lineaments in the underlying bedrock. Once these photolinears are identified, their field locations will be evaluated to eliminate any man-made features.

Groundwater in crystalline bedrock travels through open fractures in the rock. As such, the goal of FTA is to identify areas on aerial photographs that contain a high concentration of fractures that might yield high

amounts of groundwater. A fracture trace or photolinear is a line that marks the intersection of a fracture in bedrock with the ground surface. FTA is a remote sensing (i.e. use of aerial photographs) method used to identify and map the locations of fracture traces.

Because water is one of the major weathering agents in rock, flow of water along fractures, in general, causes increased weathering and weakening of the bedrock along the fractures. This increased weathering causes geomorphic and soil moisture changes as well as changes in soil color, supporting biological processes, and vegetation. The weathering processes may manifest as straight stream segments, mark abrupt changes in course of a stream, alignment in a vegetation pattern, and alignment of topographic features.

An integral part of a FTA is the review of existing topographic maps, surficial geology maps, and bedrock geology maps. These maps will aid in identifying photolinear features on the aerial photograph that meet the criteria as a fracture trace.

As indicated above, the most favorable location for a high yield bedrock well is at the intersections of multiple photolinears (fracture traces).

The results of the FTA will be placed on a GIS-based Site Plan that contains the photolinears along with the locations of all existing structures and other subsurface systems or utilities.

Task 2 – Field Locating Potential Well Site

GEOSPHERE will install up to five stakes at the best locations in the areas described above.

ESTIMATED PROJECT COST

Based on the proposed scope of work presented above, the cost to complete the Tasks 1 and 2 is presented below. Fees associated with each task are broken out as follows:

Task	Description	GEOSPHERE Fees	Subcontractor Fees
Task 1	Fracture Trace Analysis	\$ 11,000	\$ 900
Task 2	Field Locating Potential Well Site	\$ 2,500	\$ 0
Subtotals		\$ 13,500	\$ 900
TOTAL ESTIMATED COST		\$ 14,400	

NOTES:

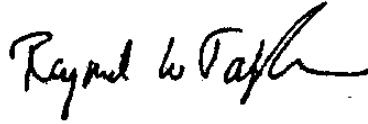
1. All estimated fees will be billed on a lump sum basis.
2. Task 1 cost includes the purchase of aerial photographs for use in the FTA.
3. Task 2 costs include field locating and staking the FTA irrigation well locations and field verifying the presence of fractures at the selected site.
4. If requested – a flat fee of \$1,000 per day for drilling supervision.

Project costs will be invoiced on a lump sum basis. If you are in agreement with the terms of this scope of work and cost estimate, please indicate your acceptance by signing in the space below. Receipt of this signed document will serve as our authorization to proceed. GEOSPHERE is prepared to begin work on this project immediately.

Mr. Thomas Gatzunis, P.E., C.B.O.
CHA Consulting, Inc.

As always, GEOSPHERE is pleased to have the opportunity to present this proposal. If you have any questions regarding the scope of work, please feel free to contact us.

Sincerely,



Raymond W. Talkington, Ph.D., P.G., C.P.G.
Principal Hydrogeologist

ACCEPTED AND APPROVED BY CHA CONSULTING, INC.

Company: _____

Name (printed): _____

Signature: _____

Title: _____ Date: _____