☐Consent
☐Action/Discussion
☒Information/Discussion
☐Public Hearing

SUBJECT: WALK ON Kleinfelder Contract Extension and GPR Test Results at Robert Down Elementary

DATE: January 23, 2020

PERSON(S) RESPONSIBLE: Matt Kelly, Director, Facilities and Transportation

---

RECOMMENDATION:
WALK ON

The District Administration recommends the Board approve the contract extension for $46,800.00 to Kleinfelder for soils testing, monitoring, and remediation recommendations at the Robert Down basement.

BACKGROUND:

At the end of last year's rain season, multiple small sinkholes were discovered in the Robert Down basement beneath rooms 6,7, and 8. We had a civil engineer and multiple soils engineers look at the area to assess the structural integrity of the soils and foundations. We did not discover any signs of structural damage in the foundations but agreed that further investigation and testing would be necessary. The District entered into a contract with Kleinfelder to identify any voids in the subsurface using a Ground Penetrating Radar (GPR).

INFORMATION:

The GPR data did not show definitive voids except in the immediate area of the sinkholes. Data did show an anomaly five to thirteen feet wide of disturbed subsurface to about a depth of three feet below ground surface (bgs). This data would suggest that the subsurface beneath the basement may comprise of extremely loose soil. In addition to the GPR Kleinfelder investigated the subsurface using a soil probe. They reported that within the area of the anomaly that there is a "stiff" 6" thick surface layer capping much looser subsurface material which the probe meets very little resistance. They observed that the "feel" of the probing strongly suggests the presence of a void, and the absence of void images on the GPR profiles is surprising.
Staff had a conference call with Kleinfleder on Tuesday, January 14, 2020 to discuss the report and "next steps." In addition to the information above, Kleinfelder incorporated mapping of the area. Looking at a topographic map from 1913 it shows a ravine that flows north to south and basically mirrors the anomaly found with the GPR. The logical theory, without doing further investigating and testing, is that the ravine was backfilled with a sandy material found locally near the Spanish Bay area.
Further investigation is recommended to find a possible water source and to identify the type of soils in the anomaly. The District is receiving a proposal from Kleinfelder to install a monitoring system, identify the type of soils in the anomaly, locate the water source that is flowing through the anomaly, and provide recommendations for remediation.

Because of the timing of the January Board meetings, the full agenda on the January 23, 2020, and the need to expedite providing information and receiving contract approval staff will be walking on a contract for services on the January 23, 2020 Board Meeting.

FISCAL IMPACT:
$30,000 – Fund 40 Capital Outlay
$16,800 – Fund 14 Deferred Maintenance

KLEINFELDER
Bright People. Right Solutions.

January 23, 2020
Proposal No.: 20202190.001A

Pacific Grove Unified School District
435 Hillcrest Ave
Pacific Grove, CA 93950

Attention: Matt Kelly, Director of Facilities & Transportation

SUBJECT: Change Order Request for Geotechnical Services
Robert Down Elementary School Basement
485 Pine Ave, Pacific Grove, CA 93950

Mr. Kelly:

Pursuant to your recent request, Kleinfelder is pleased to submit the enclosed change order request to PGUSD to perform additional geotechnical services for the subject project.

Our proposal is based on:

- Kleinfelder's site visit to the Robert Down Elementary school campus on October 4, 2019;
- Kleinfelder's preliminary investigation of the school basement area performed November 25, 2019
- Conversations with you on a teleconference on January 14, 2020; and
- Our experience on similar projects and local geology.

PROJECT DESCRIPTION

Per conversation with you and our recent site visits, Kleinfelder has been requested to conduct a limited geotechnical investigation to evaluate the soil conditions beneath the basement at Robert Down Elementary School in Pacific Grove, CA. During our previous site visits we identified various soft spots in the subgrade. The locations were observed to be impacting several of the foundation areas. We subsequently conducted a survey of the basement and building exterior using a third-party Geophysical consultant (Advanced Geological Services). The consultant employed Ground Penetrating Radar (GPR) and Subsurface Interface Radar (SIR) techniques to identify the soil conditions below the basement surface. While the large areas were mapped and interpreted as "extremely loose soil", no definitive voids were located. A preliminary evaluation of the publicly available topographic and geologic conditions prior to the school being constructed suggest a former alluvial channel exists in the general vicinity of the school. This will be further addressed in Steps 1 and 3 outlined below. As such, additional investigation is required in order to determine the cause and remedy for the loss of foundation support.

Based on our previous discussions on January 14, 2020 we understand that the District is working on the following action items;

1. Installing temporary support measures for the columns in the basement that are not currently in contact with their foundations.
2. Contacting the utility providers along the frontage of the school to see if they have any recent information on the integrity of their lines. For example, recent scoping of the lines.
3. Assembling as-built drawings of the existing structure and an surrounding infrastructure to provide to Kleinfelder to aide in our investigation.

SCOPE OF SERVICES

This change order request outlines several steps for the District in monitoring and remedying this issue. They are as follows;

Step 1: Data Review

Based upon the information provided by the District, publicly available documents, and our own experience in the surrounding area Kleinfelder proposes to do a site-specific data review for this project. That will include reviewing both historical and current geologic maps, review of development in the surrounding areas, and review of published geotechnical information.

Step 2: Monitor the On-Going Settlement

We proposed to have a survey crew take a baseline survey of the current state of the basement subgrade and surrounding areas. During their first visit they would install survey monuments so that we have a fixed place of measurement. Additionally, we proposed that the survey be performed quarterly to monitor any additional settlement that may take place while investigations into the cause are occurring. If any event should occur that causes noticeable building distress or settlement elsewhere in the basement area, we should immediately be contacted to perform a survey of the area.

Step 3: Further Exploration of the Subsurface

We propose to use the information gathered during our data review in Step 1 to strategically locate and perform a minimum of 4 exploratory borings around the school property to depths of 50 feet or refusal. Should we encounter shallow bedrock we will drill a minimum of 5 feet into it. We also propose to hand trench in a few areas in the basement to classify the soils and identify the current depth of the loosened soils.

Pre-field & Permitting

Prior to drilling, we will mark the proposed boring locations and contact Underground Service Alert (USA) to clear the boring sites of any underground utilities. Kleinfelder will work with the District and the drilling subcontractor to provide at least three working days' notice to Underground Service Alert (USA), as required by law. We request that the District provide existing utility plans for the site or have a maintenance staff member meet with our representative at the site during our site visit to mark boring locations. It should be noted that USA will only check for utilities on the public right-of-way and does not include private property.

Therefore, we have planned on utilizing the services of a private utility locator to clear the locations of our subsurface exploration points on the school property.

A project-specific health and safety plan will be prepared prior to accessing the site to explore and investigate the subsurface conditions. Prior to each day's activity during the subsurface exploration, tailgate safety meetings will be held with all onsite personnel to discuss safety issues and protocols.

Any necessary water district or drilling permits will be obtained and coordinated by Kleinfelder.

Subsurface Investigation

As mentioned above, our subsurface exploration plan includes four borings and three trenches. The borings will be used to evaluate and characterize the subsurface conditions and to obtain soil samples for laboratory testing. If access near the planned boring location is not feasible, we will locate exploration points within a reasonable proximity for standard geotechnical engineering practice. We have assumed our field exploration will take two days.

The borings will be drilled using a truck mounted drill rig equipped with hollow-stem augers, depending on access constraints. If groundwater is encountered, then the drilling method will be switched to rotary-wash. The drilling spoils will be drummed and off-hauled. An experienced engineer or geologist from Kleinfelder will maintain a log of the soils encountered and obtain samples for visual examination, classification, and laboratory testing. If encountered, groundwater depths will also be measured.

Upon completion, the borings will be backfilled with grout. Excess cuttings will be spread thin near the boring locations.

Laboratory Testing

Laboratory tests will be performed on selected soil samples to evaluate pertinent physical characteristics and engineering properties. Laboratory tests which we plan on performing include measurement of moisture content and dry density, strength tests, Atterberg Limits, and sieve analyses. After the field investigation is complete, if we find it necessary to perform additional tests, we will contact you for prior approval.

Analysis & Mitigation Recommendations

We will evaluate the field and laboratory data and perform geotechnical engineering analyses to develop conclusions and recommendations for foundation support and earthwork for the project. Results of our field explorations, laboratory tests and engineering analysis will be summarized in a written letter report prepared under the supervision of a registered Geotechnical Engineer. At this time, we anticipate that the report will include the following items at this time:

- Vicinity map and site plan showing the approximate boring/test pit locations;
- Logs of borings/test pits;
- Results of laboratory tests;

- Discussion of general site subsurface conditions, as encountered in our field exploration;
- Recommendations for mitigation design with appropriate factors provided such as allowable bearing pressure, lateral load resistance, active and at-rest pressures, seismic surcharges, static surcharges, and passive resistance (if applicable)
- A brief cost/benefit analysis for each mitigation option provided including general costs, complexity of installation, estimated schedules, appropriateness of mitigation (level of risk)

Step 4: Mitigation Recommendations

Geotechnical mitigation recommendations can be made once a method of mitigation is selected by the District based off our recommendations made during Step 3. Mitigation methods considered at this time include, but are not limited to, compaction grouting, micropile installation, screw pile installation, and general grading. Regardless of the mitigation method selected it is anticipated there will be structural work that will need to be done to reinforce or replace the vertical columns and to tie them to the new or existing foundations. The scope for the mitigation recommendations will depend on the results of the field investigation. It is undetermined at this time.

FEE ESTIMATE

Fees for our geotechnical services will be charged on **a time and materials, not to exceed basis** in the amount of **$46,800**, billed on a percent complete basis. For the scope of services outlined in this proposal, our fee will be as follows:

Step	Description	Fee
1	**Data Review**	$3,200
2	**Monitor On-Going Settlement** ($5,600 per event, assumes 3)	$16,800
3	**Further Exploration of Subsurface**	$26,800
4	**Mitigation Design** (currently unknown scope, will be bid after Step 3 complete)	$0
ESTIMATED PROJECT TOTAL		**$46,800**

This fee estimate selected will not be exceeded without your prior authorization for the scope of services outlined above. If weather, access, and/or site conditions restrict our field operations, we may need to revise our quotation. Our fee does not include any site access charges and assumes that the site work is not restricted by current usage. Also, our fee applies to work commenced within 90 days of this proposal. After that time, we should review our proposal. All outside services will be marked up 10 percent and mileage will be charged at current IRS rate.

In addition, this proposal assumes that work is able to be performed during normal working hours, Monday through Friday. Any night or weekend work would be subject to additional fees.

If a portion of this proposal does not meet your needs, or if those needs have changed, Kleinfelder is prepared to consider appropriate modifications, subject to the standards of care to which we adhere as professionals. Modifications such as changes in scope, methodology, scheduling, and contract terms and conditions may result in changes to the risks assumed by the Client as well as adjustments to our fees.

The fees presented in this proposal are based on prompt payment for services presented in our standard invoicing format. Late fees will be charged if payment is not received in accordance with terms contained in our contract.

PREVAILING WAGE PROJECT

The California Prevailing Wage Law requires payment of a local "prevailing wage" to workers on publicly funded projects. This includes projects "paid for in whole or in part out of public funds" and has been expanded to include various types of payments, credits and monetary equivalents provided by the State or public entity. The Prevailing Wage Law extends to geotechnical engineering consultants, their soils/material testing and building inspection personnel. Services subject to prevailing wage are typically non-professional field services and are applicable during design as well as construction. This law significantly increases employee wages for qualified activities on publicly funded projects. **It is our understanding that this project falls under the definition of a prevailing wage project.** We need to be notified if certified payroll is required. Certified payroll will incur administrative processing fees in addition to those listed in this proposal.

LIMITATIONS

Our work will be performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the Bay Area, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations will be based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This proposal specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances at the site. As a leader in providing environment services throughout the western United States, we would be pleased to discuss environmental services on this project with you. If so desired, a separate proposal for environmental services can be prepared for your specific needs on this project.

AUTHORIZATION

Enclosed with this proposal are our Master Service Agreement (MSA) and Work Order under which our services will be provided. Kleinfelder has an existing MSA with PGUSD which has lapsed. Please sign where indicated on the MSA and Work Order, make a copy for your files, and return the entire proposal. Acceptance of this proposal will indicate that an authorized representative has reviewed the scope of work and determined that they do not need or want more services than are being proposed at this time. Any exceptions should be noted and may result in adjustment to our fees.

CLOSURE

We appreciate the opportunity to submit this proposal and trust that this proposal meets your needs. If you have any questions or require additional information, please contact the undersigned at (408) 595-3275. Thank you.

Respectfully submitted,

KLEINFELDER, INC.

Dan Dockendorf, EIT
Staff Professional

Andrea Traum, PE
Senior Program Manager

Attachments: Work Order

APPENDIX A: WORK ORDER SJO20W106559 (Change Order 1)

Issued Pursuant to The Client Master Services Agreement SJO19C102362 effective as of October 9, 2019 by and between Pacific Grove Unified School District (**Client**) and Kleinfelder, Inc. (**Kleinfelder**).

Client Name: Pacific Grove Unified School District

Kleinfelder Project No: 20202190.001A

Project Name: Robert Down Elementary School Basement GEO

Work Order Type: (Check One)
☒ Time-and-Materials
☐ Fixed-Price

Kleinfelder Office: San Jose, CA

Subcontractor Reference No:

Kleinfelder Contact Name: Andrea Traum (408) 595-3275 atraum@kleinfelder.com (Kleinfelder Project Manager)

1. SCOPE OF WORK: Perform additional geotechnical services per the attached Change Order Request for Geotechnical Services, document: 20202190.001A/SJO20C106557, dated January 23, 2020.

2. LOCATION/CLIENT FACILITY INVOLVED: 485 Pine Avenue, Pacific Grove, CA 93950

3. PERIOD OF PERFORMANCE: FROM: TO:

4. AUTHORIZED FUNDING: $8,350 (Authorized)
$46,800 Not to Exceed (Change Order 1)
$55,150 (project total)

5. SPECIAL PROVISIONS: N/A

NOTICE TO PROCEED IS GIVEN ON (DATE): _____

CLIENT:	**KLEINFELDER:**
By: _____	**By:** _____
Printed Name: _____	Printed Name: _____
Title:	Title:
Address:	Address:

ADVANCED GEOLOGICAL SERVICES

1605 School Street, #4
Moraga CA 94556
925 (808-8965)

December 9, 2019

Andrea Traum
Kleinfelder
40 Clark St # J,
Salinas, CA 93901

Subject: **GPR Sinkhole Investigation**
Robert Down Elementary School
485 Pine Avenue
Pacific Grove, California

Ms. Traum-

1.0 INTRODUCTION

This letter presents the findings of Advanced Geological Services, Inc. (AGS) ground penetrating radar (GPR) survey to investigate the cause of a number of small sinkholes in the basement floor of the Robert Down Elementary School at 485 Pine Avenue in Pacific Grove, California (Figure 1).

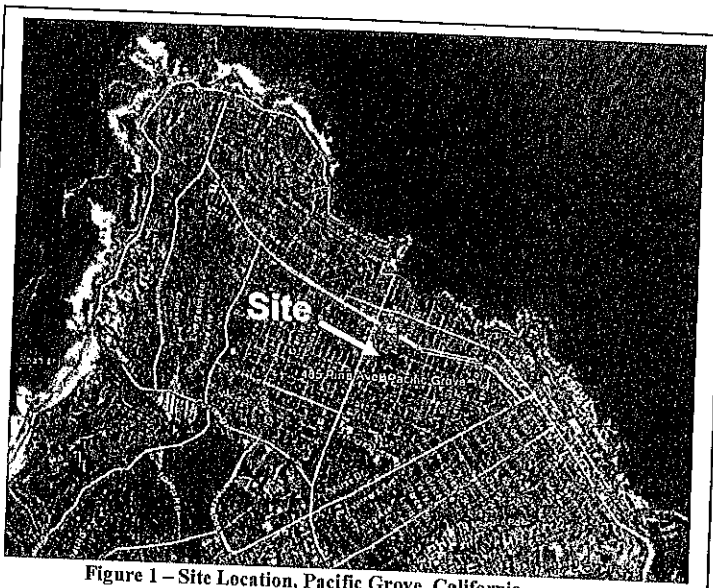


Figure 1 – Site Location, Pacific Grove, California

The field work was performed on November 25, 2019 by AGS geophysicist Roark Smith, who scanned the basement with a GSSI SIR-3000 ground penetrating radar (GPR) system connected to a 400-MHz antenna. Kleinfelder representative Jeff Elefante was also on hand to observe the GPR survey work.

2.0 RESULTS SUMMARY

- GPR data show a five- to 13-foot wide band of anomalous reflections indicative of disturbed subsurface conditions (Figure 3). The anomaly band spans the basement survey area in the north-south direction and includes the observed sinkhole locations.

- Except at the immediate sinkhole locations, the GPR data do not show definitive void images. The data suggest the subsurface beneath the basement may comprise extremely loose soil and that voids, if present, are deeper than the GPR investigation depth which is estimated to be about 3 feet bgs. AGS speculates that voids may work their way to the surface over time.

- AGS and Kleinfelder also investigated the subsurface using a soil prob. In general, probing within the GPR anomaly band suggests the presence of a "stiff" 6-inch thick surface layer

capping much looser subsurface material through which the probe meets very little resistance. It is worth noting that the "feel" of the probing strongly suggests the presence of a void, and the absence of void images on the GPR profiles is surprising.

3.0 SITE DESCRIPTION

The GPR survey was performed in the basement along the west side of the school building (Figure 2). The basement survey area is divided into three main rooms by plywood-sheathed "cripple walls" running in the east-west direction; the rooms are further divided by unsheathed (i.e., studs only) walls running in the north-south direction (Figure 2). The floor is unpaved and topographically flat, and a number of small-diameter (two feet or less) "sinkholes" were observed in the floor. Overall, the basement survey area measured 30 feet by 30 feet. In addition, AGS also surveyed a 20-foot wide strip outside of the building, adjacent to the basement survey area.

4.0 GEOPHYSICAL METHOD AND EQUIPMENT

GPR uses radar technology to produce a graphical profile of the subsurface that shows soil layering and images of buried objects. GPR systems typically use a single transceiving antenna (one that both transmits and receives the radar signal) that is dragged along the ground surface. The antenna emits a radar pulse into the ground; some of the radar energy reflects off of interfaces between materials with different electrical properties (e.g., soil and a metal pipe, or soil and an air pocket {void}) and returns to the surface where it is detected by the antenna and sent via the cable to a separate control unit where it is amplified and displayed on a computer screen as a vertical "wiggle trace," which is a plot of the strength (amplitude) of the received GPR signal (i.e., the reflection) over time. Although the vertical scale of a GPR profile is usually considered as depth, it actually measures the travel time of the radar pulse from the surface to a reflecting interface and back to the surface. Published conversion factors ("dielectric constants") for different types of soil, which are input to the GPR control unit, are used to convert the vertical scale from time to distance (*i.e.*, depth). Burial depths of features imaged with GPR can be more precisely determined by calibrating GPR profiles with images of objects buried at known depths. Culverts and storm drain pipelines observed in drop inlets are often used for this purpose.

A subsurface profile is built as the antenna is pulled along the survey line and successive wiggle traces are recorded. GPR data are usually displayed as an array of closely-spaced traces; this procedure produces an image of the subsurface as the reflections (wiggles) on adjacent traces merge into coherent patterns. Soil layer boundaries appear as laterally continuous horizontal bands across a GPR profile. Air-fill voids (e.g., animal burrows/dens) often appear as a stack of multiple, high-amplitude ("dark) reflections that disrupt the regular horizontal banding associated with undisturbed soil and fill. Buried objects appear as localized, high-amplitude (dark) reflection patterns. Buried pipes and USTs exhibit a characteristic "upside down U" hyperbolic pattern, which allows them to be readily identified on a GPR record.

AGS used a GSSI SIR-3000 Ground Penetrating Radar (GPR) system connected to a 400-MegaHertz (MHz) antenna for this investigation.

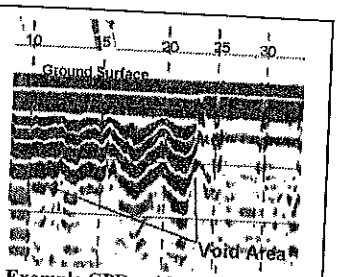
5.0 FIELD PROCEDURES

Upon AGS' arrival the basement survey area was crowded with furniture, crates and boxes, and other items to such a degree that the GPR survey could not be performed. Accordingly, school maintenance personnel first removed these items from the basement to facilitate the survey. Once the basement was cleared, AGS prepared a basemap of the survey area by laying out a number of fiberglass tape measures in a grid pattern and plotting significant site features (e.g., the walls and sinkholes) on grid paper at a scale of one inch equals five feet. Next, AGS performed the GPR survey by hand-pushing the cart-mounted GPR system across the basement floor along survey lines spaced fro 3 to 5 feet apart in both the north-south and east-west directions. AGS monitored the GPR data as it scrolled in "real-time" across the instrument's viewing screen as the survey progressed to look for anomalous refection patterns indicative of subsurface voids and other disturbed soil conditions. Areas exhibiting such reflections were marked on the ground surface with pink spray paint as the survey progressed, and were also plotted on the basemap (along with the GPR line locations). AGS surveyed the area outside the building basement in a similar fashion. Approximately 1,200 line-feet of GPR data were obtained for this investigation.

It is worth noting that, in addition to performing the GPR survey, AGS and the Kleinfelder representative also probed the surface using a soil probe (a 4-foot long stainless steel rod). The probe was pushed into the subsurface at numerous locations and the resistance was qualitatively assessed for void indications (*i.e.*, probe could be pushed into the subsurface with little resistance).

6.0 DATA PROCESSING AND ANALYSIS

Preliminary analysis of the GPR data was performed in the field by viewing the subsurface profiles on the instrument's view screen as the survey progressed. In general, AGS looked for multiple shallow localized, high-amplitude (dark) reflections indicative of near-surface voids. An example of a GPR void image (from another project) is shown on the right. Upon returning to the office, AGS re-examined all of the GPR profiles for more subtle void indications that may have been missed in the field.



Example GPR void image ***(not from the Robert Down school project)***

7.0 RESULTS

The investigation results are shown on Figure 2 and 3. Figure 2, right shows an example GPR image from the investigation at Robert Down school. Figure 3 presents the investigation results and also shows the GPR survey line locations.

Overall, the GPR data show a five- to 13-foot wide band of anomalous reflections indicative of disturbed subsurface conditions. The anomaly band spans the basement survey area in the north-south direction and includes the observed sinkhole locations.

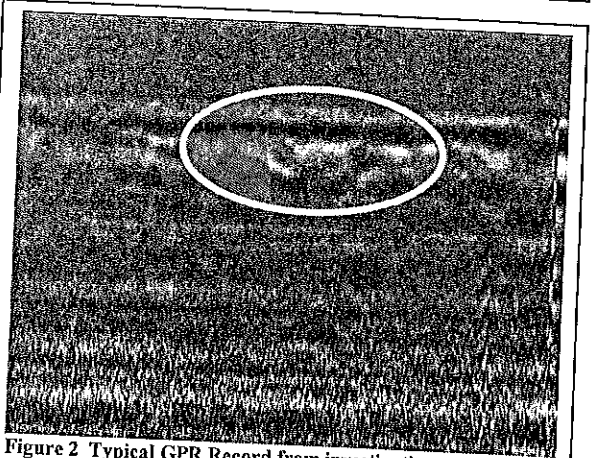


Figure 2 Typical GPR Record from investigation at Robert Down School showing weak image indicating disturbed subsurface conditions in the upper 1 foot of subsurface, but voids are not indicated

However, except at the immediate sinkhole locations, the GPR data do not show definitive void images. The data suggest the subsurface beneath the basement may comprise extremely loose soil and that voids, if present, are deeper than the GPR investigation depth which is estimated to be about 3 feet bgs. AGS speculates that voids may work their way to the surface over time.

AGS and Kleinfelder also investigated the subsurface using a soil prob. In general, probing within the GPR anomaly band suggests the presence of a "stiff" 6-inch thick surface layer capping much looser subsurface material through which the probe meets very little resistance. It is worth noting that the "feel" of the probing strongly suggests the presence of a void, and the absence of void images on the GPR profiles is surprising.

8.0 CLOSING

All geophysical data and field notes collected for this investigation will be archived at the AGS office. The data collection and interpretation methods used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses with probable subsurface features is based on the past results of similar surveys although it is possible that some variation could exist at this site. Due to the nature of geophysical data, no guarantees can be made or implied regarding the targets identified or the presence or absence of additional objects or targets.

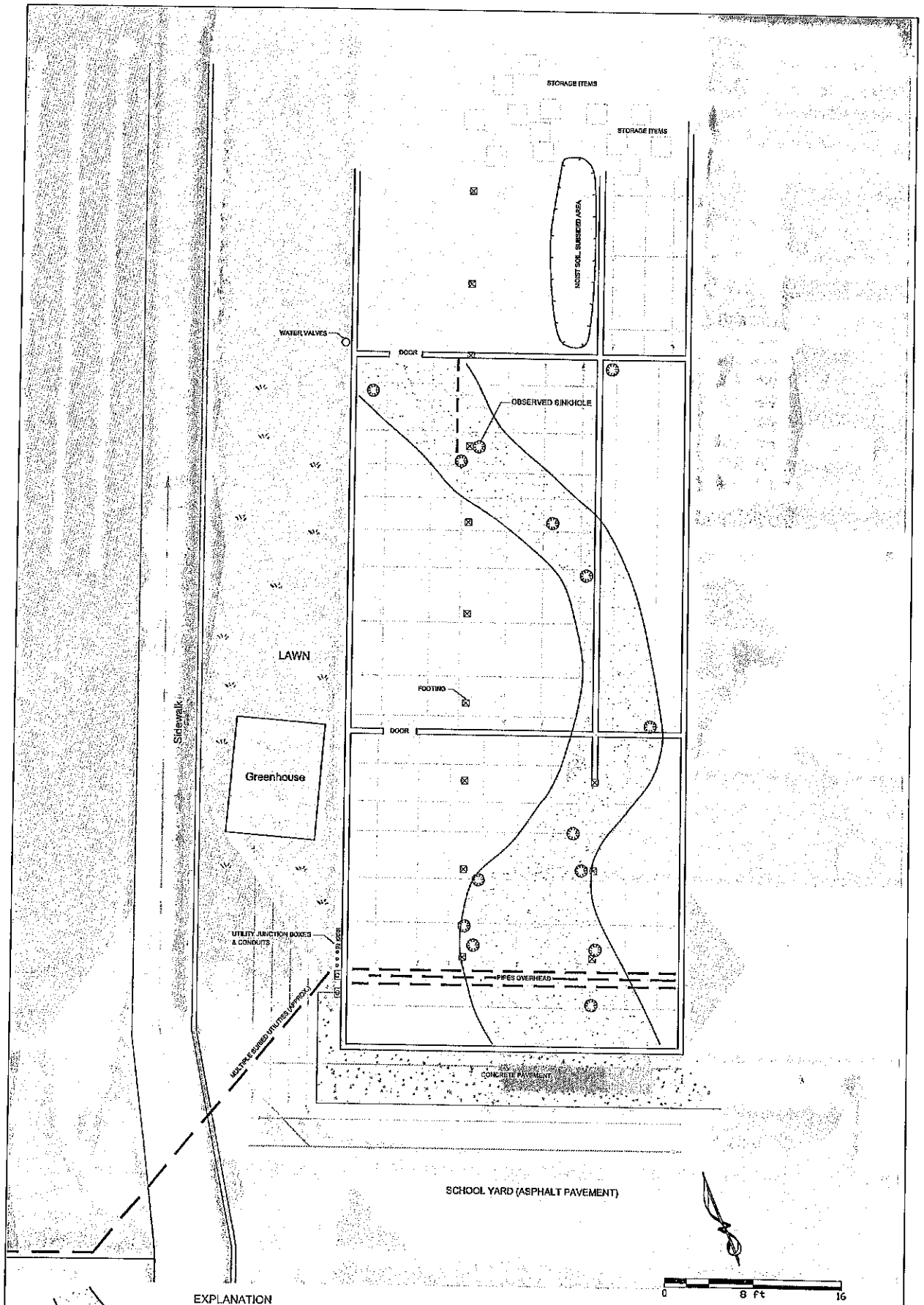
We appreciated working for you on this project and hope to work with you again. If you have any questions, I can be reached at (925) 808-8965 or Rsmith@Advancedgeo.com.

Respectfully,

Roark W. Smith, GP 987
Senior Geophysicist
Advanced Geological Services

Figures:

Figure 1	Site Location Map (imbedded in Report text, above)
Figure 2	Example GPR Record Showing Indication of Disturbed Subsurface Conditions
Figure 3	GPR Investigation Results and GPR Line Locations



EXPLANATION

GPR ANOMALY INDICATIVE OF DISTURBED SUBSURFACE CONDITIONS

OBSERVED SINKHOLE

GPR SURVEY LINE

ADVANCED GEOLOGICAL SERVICES

1605 School Street
Suite 4
Moraga, CA 94556
(925) 808-8965

GPR Survey Lines
Basement Sinkhole Investigation
Robert Down Elementary School

LOCATION: Pacific Grove, California
CLIENT: Kleinfelder, Inc.
PROJECT #: 19-139-1CA
DATE: Dec 8, 2019
DRAWN BY: R. SMITH

FIGURE 3