PARTNER

November 17, 2016

Mr. Skip Rath
ABC Supply
1 ABC Parkway
Beloit, Wisconsin 53511

Subject: **Drive Area Geotechnical Evaluation**
Existing Commercial Property
2675 Akers Drive
Colorado Springs, Colorado
Project No. 16-173339.2

Dear Mr. Rath:

Partner Assessment Corporation (Partner) is pleased to present the following opinions regarding the geotechnical conditions on the project site based on the information contained in this report and our general knowledge and experience.

- *The geotechnical conditions on the site related to the planned construction are generally expected to be more favorable than those expected at other similar sites located within the project neighborhood[1], however the pavement is about 13 years into its original 20 year design life.*
- *The geotechnical conditions on the site related to the planned construction are generally expected to be more favorable than those expected at other similar sites developed at other locations in the country[2], however the pavement is about 13 years into its original 20 year design life.*

After evaluation of the project schedule and costs, we arranged for the Geotechnical Evaluation with a local consultant known as American GeoServices LLC (AGS). We have worked closely with AGS through the course of this project so that they had a full understanding of our expectations for quality and responsiveness and so that your expectations were communicated and realized throughout the project.

I have personally reviewed the contents of the report for quality control and have discussed the findings with the author. As such, we are able to assist with questions you might have regarding the report. For continuity between reports in different regions, we have completed the attached summary form, which will serve as a quick reference for your use on this project. The attached summary in no way replaces or overrides the findings of the report.

We appreciate the opportunity to assist with this phase of the project.

Sincerely,

Matthew Marcus
Technical Director – Geotechnical Engineering

Attachments: Geotechnical Summary
Pavement Evaluation Report: AGS 11/17/16

** "similar sites" refers to sites with similar access, value, size, zoning and current use, that are located within the same general neighborhood within the city[1] or at locations in the country[2] where we have recently performed similar work, and is a general statement not based on statistical analysis.*

GEOTECHNICAL SUMMARY

Project Background:

The subject property is located in the City of Colorado Springs at the eastern edge of the Rocky Mountains, in the Colorado Piedmont section of the Great Plains physiographic province of Colorado. This part of Colorado has moderate to low seismic potential. The Colorado Geological Survey identifies this site as being in an area of Aeolian sand deposits. Aeolian soils are prone to collapse. This region of Colorado is known for the presence of highly expansive clay soil. However, we did not observe signs of collapsible or expansive soil during our exploration. Other forms of geological hazards are not known or suspected on this site.

The site is a presently developed property with an asphalt parking lot and a roughly 30,000 metal industrial/warehouse building. The property was developed between 1999 and 2003 based on historic aerial photographs on Google earth. In addition, repairs were made to the asphalt in the high traffic areas on the southern portion of the lot between 2011 and 2015. The repairs consisted of mill and overlay in the vicinity of location C4, and a slurry seal or ½ inch seal coat in the locations of C2, C3, C5, and C6.

Subgrade Conditions

According to the report*: The site is currently developed and has existing utilities in place. The surface parking area is paved with asphaltic concrete and varied in thickness from 4-6 inches. The underlying base layer was averaging approximately 12 inches in thickness of processed aggregate material. Subgrade materials were identified as poorly graded sands and clayey sands, though non-expansive.

Asphalt Conditions

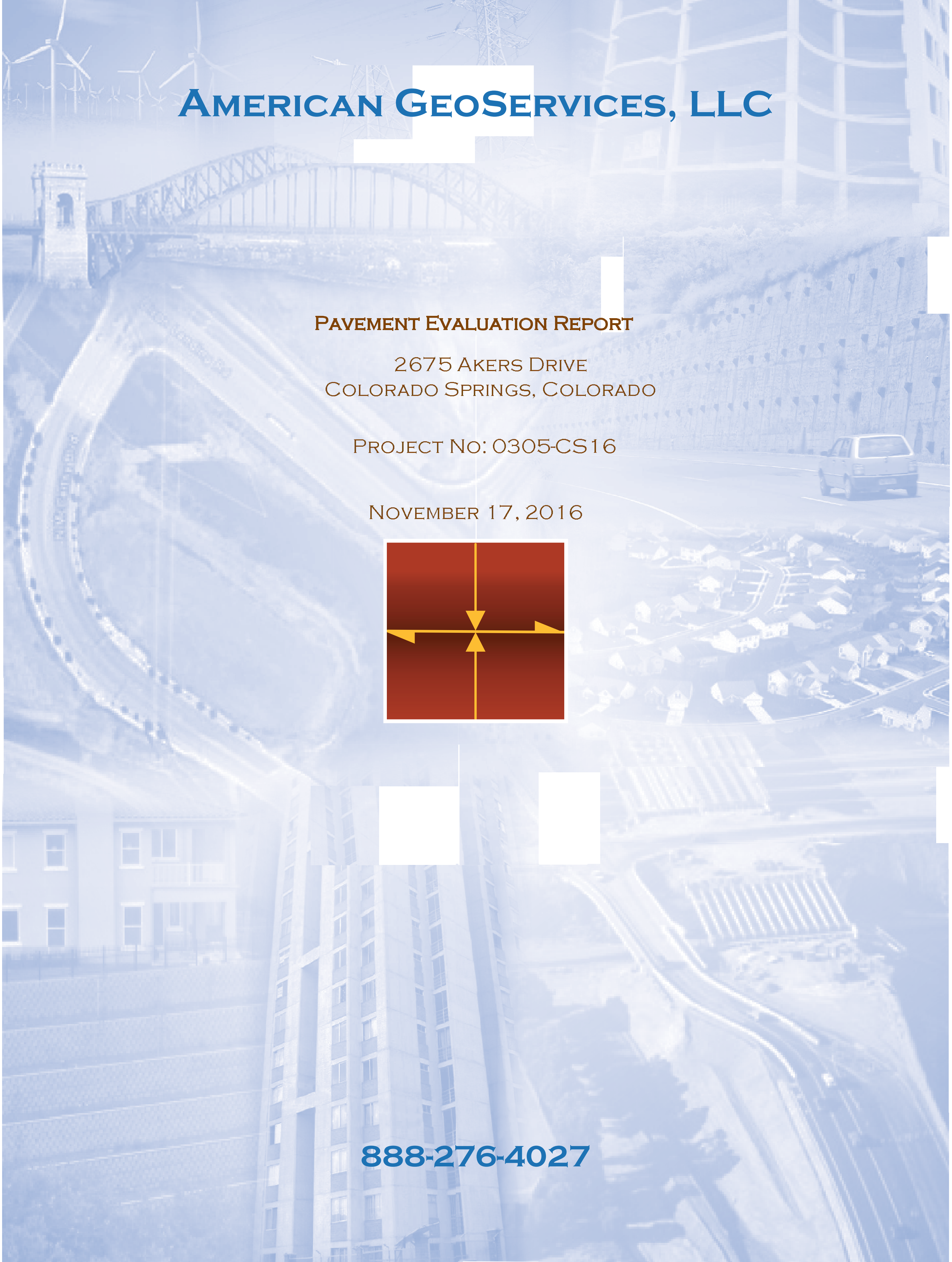
According to the report*: The asphalt pavement appears to be in relatively good condition, however it did exhibit block cracking with widths on the order of ½ to 1 inch. These are indicative of the mature pavement age, and result from seasonal temperature fluctuations. In addition, there were some areas where ponding of surface water was observed. This results from a poor surface water drainage condition.

Recommendations

We recommend that drainage improvements and crack sealing be completed within the next year to help extend the pavement life. In general, pavement design life is considered to be 20 years, so it is probable that major repairs would be needed by 2023. However, this will depend on actual traffic loading as described in the report.

This summary in no way replaces or overrides the referenced report*

*Based on: Report of Geotechnical Study By AGS (dated 11/17/2016)



American GeoServices, LLC

Pavement Evaluation Report

2675 Akers Drive
Colorado Springs, Colorado

Project No: 0305-CS16

November 17, 2016

888-276-4027

November 17, 2016

Client: Mr. Eric Brown
PARTNER ENGINEERING AND SCIENCE, INC

Re: Proposal, Pavement Evaluation, 2675 Akers Drive, Colorado Springs, CO

At your request, we have performed following services in general accordance with American GeoServices, LLC (AGS) Proposal No. 08116.

PROJECT BACKGROUND

The subject property (Figure 1 and Figure 2) is located in the City of Colorado Springs at the eastern edge of the Rocky Mountains, in the Colorado Piedmont section of the Great Plains physiographic province of Colorado. This part of Colorado has low seismic potential. The Colorado Geological Survey identifies this site as being in an area of alluvium derived from sedimentary rock and/or eolian sand deposits derived from sedimentary rock. Eolian soils are prone to collapse, however, the site is not located within the collapsible soils zone as per Colorado Geological Survey's published Collapsible Soils Hazard Map (Reference: Stephen S. Hart). We did not observe visual signs of collapsible soil during our site explorations. Other forms of geological hazards are not known or suspected on this site.

The site is a presently developed property with an asphalt parking lot and a roughly 30,000 metal industrial/warehouse building. The property was developed between 1999 and 2003 based on historic aerial photographs on Google earth. In addition, repairs were made to the asphalt in the high traffic areas on the southern portion of the lot between 2011 and 2015. The repairs consisted of mill and overlay in the vicinity of location C4, and a slurry seal or ½ inch seal coat in the locations of C3, C5, and C6, as noted in Figure 2.

SITE RECONNAISSANCE

In October 2016, we visited the site (Figure 1 and Figure 2) and performed a visual reconnaissance of the pavement areas. We noted visual evidence of significant ponding and inadequate drainage related damage, and some pavement cracking. Photographic documentation of site conditions is included in Appendix A.

ASPHALT CORING AND LABORATORY EVALUATION

Six 8-inch diameter asphaltic concrete cores were taken at locations C1 through C6 as shown in Figure 2. Photographic documentation of asphaltic concrete cores is included in Appendix B.

Cored asphaltic concrete samples were transported to the laboratory and individual core bulk specific gravities (BSG) were measured. Assuming the theoretical maximum specific gravity (MSG) of 2.49, % compaction of asphaltic concrete was determined. It should be noted that the MSG value was assumed based on experience with similar projects and due to the absence of mix design data. Results of our laboratory evaluation revealed percent compaction of at least 95% for the asphaltic concrete.

After the completion of coring and drive probe testing, all cored locations were backfilled with soil cuttings. Remaining soil cuttings were removed from the site and the entire site was left clean. All cored locations were capped with asphaltic concrete.

BASEROCK EVALUATION

Using hand-held auguring equipment, baserock materials were collected by auguring through the cored locations. Collected base rock materials were transported to the laboratory and evaluated for fines content (passing -#200 sieve) and/or gradation analyses. At some locations, the baserock materials were mixed with the subgrade soils, thus, leading to improper gradation analyses. Notwithstanding, the baserock materials mostly contained less than 10% fines and the baserock material thickness ranged from 12 inches to 18 inches, however, as noted above, some of the baserock materials was mixed with subgrade sandy soils. The maximum aggregate size was 3/4-inch.

PAVEMENT SUBGRADE EVALUATION

Drive probe testing was performed at each cored location using Williamson Drive Prove (WDP), which is a "relative density" exploration device used to determine the distribution and to estimate strength of the subsurface soil and decomposed rock units. The resistance to penetration is measured in blows-per-1/2 foot of an 11-pound hammer which free falls roughly 3.5 feet driving the ½ inch diameter pipe into the ground. This measure of resistance to penetration can be used to estimate relative density of soils. For a more detailed description of this geotechnical exploration method, please refer to the Slope Stability Reference

Guide for National Forests in the United States, Volume I, United States Department of Agriculture, EM-7170-13, August 1994, p. 317-321.

A representative schematic of WDP is included in Appendix C along with the published data on correlation between WDP and SPT. The penetration test results are shown on the individual Core Log included in the appendix. The Legend and Notes necessary to interpret our Borehole Logs are also included in the appendix.

Based on the results of drive probe testing, it was concluded that the subgrade was compacted to relative densities of 'medium dense to dense' and was equivalent to at least 95% of ASTM D698 maximum dry density. See Table 1.0 below for the summary of field exploration results.

Table 1.0: Summary of Field Exploration Results

Core Location	Core Thickness (inches)	Base Layer Thickness (inches)	Subgrade Conditions (USCS Classification)	Williamson Drive Prove (WDP) values in blows per foot (BPF) in upper 3ft.	Pavement Distress
C1	4.0	12.0	SP/SC; non-expansive	20 - 54	None
C2	4.5	12.0	SP/SC; non-expansive	20- 43	Minor surficial crack
C3	6.0	16.0	SP/SC; non-expansive	30 - 46	Cracked; possible overlay
C4	5.5	12.0	SP/SC; non-expansive	34 - 50	Cracked; overlay
C5	4.5	18.0	SP/SC; non-expansive	22 - 50	Cracked
C6	6.0	12.0	SP/SC; non-expansive	24 - 52	Significant cracking; overlay

EXISTING PAVEMENT CONDITION

The site is currently developed and has existing utilities in place. The surface parking area is paved with asphaltic concrete and varied in thickness from 4-6 inches. The underlying base layer was averaging approximately 12 inches in thickness of processed aggregate material. Subgrade materials were identified as poorly graded sands and clayey sands, though non-expansive. The asphalt pavement appears to be in relatively good condition, however it did exhibit pavement cracking with widths on the order of ½ to 1 inch. These are indicative of the mature pavement age, and result from seasonal temperature fluctuations. In addition, there were some areas where ponding of surface water was observed. This results from a poor surface water drainage condition.

Based on the results of our pavement evaluation, in our opinion, existing pavement distresses present at the site consist of the following:

Longitudinal (linear) and transverse cracking: This type of cracking is caused due to one or a combination of following factors:

a. poorly constructed paving joints
b. improper drainage
c. shrinkage of the asphalt layer
d. daily temperature cycling, and
e. longitudinal segregation caused by the improper operation of the pavers during construction.

Repair or maintenance activities for the above distress are discussed in the Conclusions and Recommendations section.

Ponding and associated Raveling/Weathering: This type of pavement distress is caused due to one or a combination of following factors:

a. primarily due to improper drainage and vehicular traffic over ponded or saturated areas.

b. in some areas, inadequate compaction effort was applied during the placement of asphaltic concrete which may have led to high initial air voids in the asphaltic concrete.

c. Inadequate compaction from traffic may have occurred giving rise to high initial air voids in the asphaltic concrete.

d. Improper drainage conditions combined with high initial air voids may have led to rapid oxidation of the mix resulting in existing pavement distresses such as raveling.

Repair or maintenance activities for the above distress are discussed in the Conclusions and Recommendations section.

ENGINEERING ANALYSES AND PAVEMENT DESIGN

Using the results of visual observations, coring, and laboratory testing, engineering analyses were performed to estimate pavement design parameters, to evaluate existing pavement distress, and to make final conclusions and recommendations.

Based on the results of our subsurface exploration, we anticipate sandy soil subgrades for pavements throughout the site, which is equivalent to soil classification between A-3 and A-2-4 in accordance with American Association of State Highway and Transportation Officials (AASHTO). We used the modified AASHTO pavement design method for the evaluation of the capacity of existing pavement. Results of our analyses and design are summarized below and illustrated in Figure 3.

Asphaltic Concrete

- Existing average/design pavement thickness: Average 4.5-inch
- Baserock average/design thickness: Average 14-inch
- Future overlays within 20 years of design life: 1.5-inch
- Calculated existing Structural Number based on above data: 2.5

Subgrade

- AASHTO Subgrade Soil Classification: A-3 / A-2-4 (Sands to clayey sands; medium dense)
- Visual Distress Conditions: Less than 10% of pavement areas with linear and transverse cracking, some ponding, minimal rutting; no potholes; no evidence of subgrade failure.
- Estimated Subgrade Resilient Modulus =10,000 psi

Design Criteria

- Design Life = 20 years
- Reliability = 85%
- Overall Standard Deviation = 0.44
- Design Serviceability Loss = 2.5

See Figure 3 for the results of pavement design.

CONCLUSION AND RECOMMENDATION

Based on the results of evaluation, in our opinion, the existing pavements are in relatively good condition, however, they do exhibit longitudinal and transverse cracking, poor surface drainage conditions, ponding related damage, and weathering indicative of the mature age and the impact from seasonal temperature fluctuations. Provided the following maintenance and repairs are performed, the existing pavements are suitable for use for truck traffic as noted below. In general, the pavement design life is considered to be 20 years, so we anticipate that major repairs will be required by 2013, however, the extent of the repairs will depend upon actual traffic loading vs allowable traffic loading as noted below.

Maintenance / Repairs Required within Next Year: Following maintenance and repair activities should be completed within a year from the date of this report.

a. Improve site drainage by connecting all rood downspouts to discharge pipes and not allowing discharge directly onto the pavements.

b. Install an interceptor drain between the paved and unpaved areas in the southeastern portion and minimizing surface water run-off towards the paved areas.

c. Seal longitudinal (linear) and transverse cracking with elastomeric sealant and/or fill cracks with asphalt emulsion slurry or light grade of asphalt mixed with fine sand.

d. Place thin overlay (1.5-inch thick) or surface treatment (seal coat) in the pavement areas impacted by ponding and weathering.

e. All repair or treatment areas must be cleaned of dirt and debris before sealer or surface treatment is applied.

Periodic Maintenance / Repairs (5-6 Years Interval): Place dense-graded thin overlay (1.5-inch thick) over the entire pavement area after any identified pavement cracks or distress areas are repaired, every 5-6 years. All cracks should be sealed, potholes (if any) should be patch, surface areas should be cleaned, and then a tack coat should be applied prior to the placement of an overlay.

Allowable Traffic Loading: Provided all the above maintenance and repairs are performed on a regular basis, we recommend following allowable traffic loading:

a. Maximum allowable wheel load = 4000 lbs/tire

b. Estimated total 18-kip equivalent single axle load (ESAL) capacity = 400,000

LIMITATIONS

Geotechnical evaluation of any kind for the existing building and detailed drainage evaluation was beyond our scope of services. Detailed materials testing and/or quality control testing of any kind was beyond our scope of services.

Conclusions contained in this report are based on our field observations and limited field and laboratory evaluation, and our present knowledge of the proposed use. Our Scope of Work for this project did not include research, testing, or assessment relative to past or present contamination of the site by any source. If such contamination were present, it is very likely that the exploration and testing conducted for this report would not reveal its existence. If the Owner is concerned about the potential for such contamination, additional studies should be undertaken. We are available to discuss the scope of such studies with you. No tests were performed to detect the existence of mold or other environmental hazards as it was beyond Scope of Work. Our scope of services did not include the evaluation of the impact of proposed construction, repairs, or replacement on existing adjacent structures on-site or off-site. At your request, we can perform these additional services at an additional cost.

Local regulations regarding land or facility use, on and off-site conditions, or other factors may change over time, and additional work may be required with the passage of time. Based on the intended use of the report within one year from the date of report preparation, AGS may recommend additional work and report updates. Non-compliance with any of these requirements by the client or anyone else will release AGS from any liability resulting from the use of this report by any unauthorized party. Client agrees to defend, indemnify, and hold harmless AGS from any claim or liability associated with such unauthorized use or non-compliance.

In this report, we have presented judgments based partly on our understanding of the construction and partly on the data we have obtained. This report meets professional standards expected for reports of this type in this area. Our company is not responsible for the conclusions, opinions or recommendations made by others based on the data we have presented.

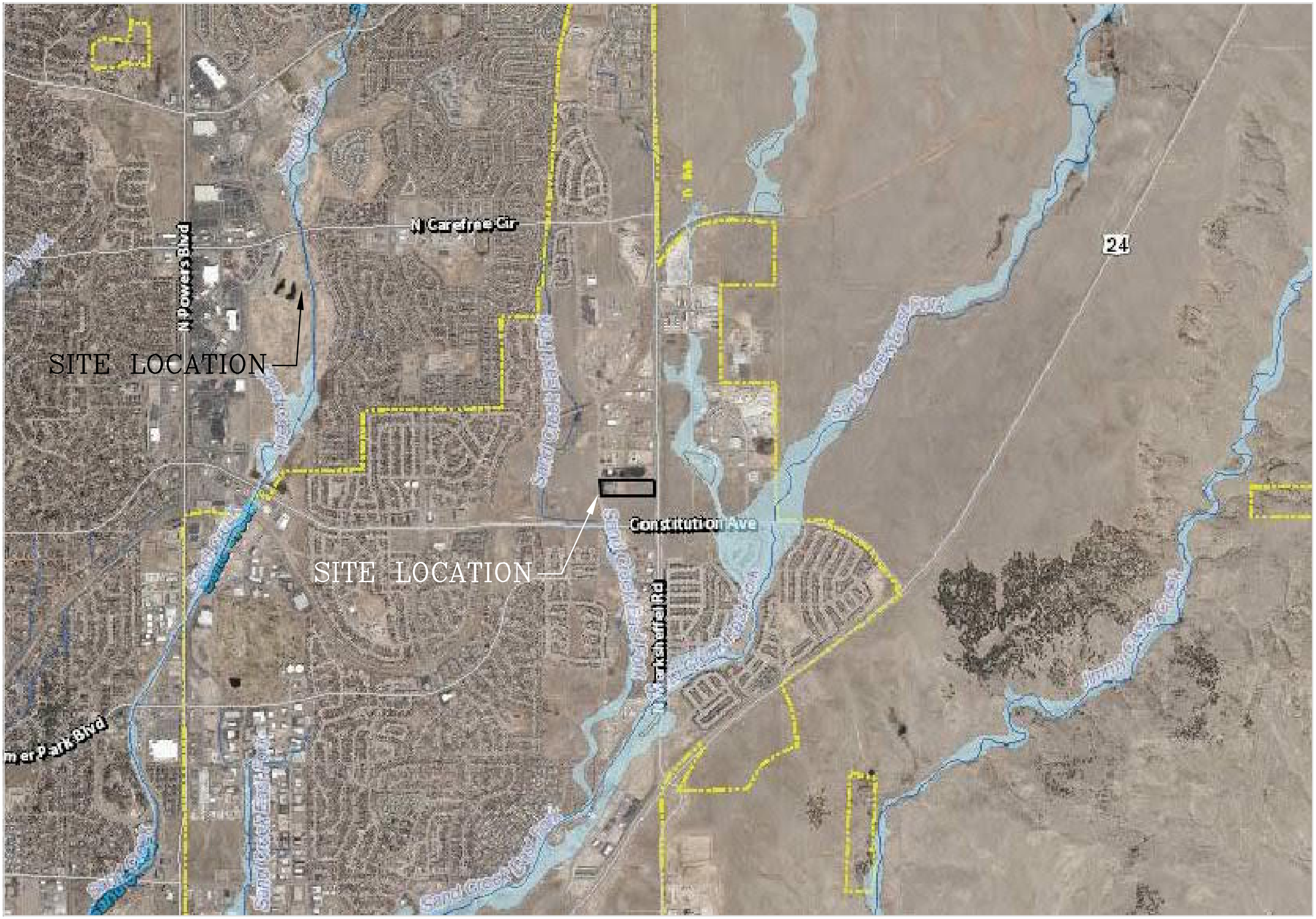
This report has been prepared exclusively for the client, its' engineers and subcontractors. No other engineer, consultant, or contractor shall be entitled to rely on information, conclusions or recommendations presented in this document without the prior written approval of AGS.

We appreciate the opportunity to be of service to you on this project. If we can provide additional assistance or observation and testing services during design and construction phases, please call us at 1 888 276 4027.

Sincerely,

Sam Adettiwar, MS, PE, GE, P.Eng, M.ASCE
Senior Engineer

FIGURES



REFERENCES:

Google Maps, 2016
Colorado Springs GIS, 2016

AMERICAN GEOSERVICES
www.americangeoservices.com
Ph.888-276-4027, Fx.877-471-0369

SITE LOCATION MAP

Pavement Evaluation
2675 Akers Drive
Colorado Springs, CO

SCALE	FIGURE NO.	PROJECT NO.	DATE
As Shown	1	0305-CS15	11/10/2015

NOTE:

Schematic Plan only to show approximate Soil Exploration locations.

Not to scale. Not surveyed.

LEGEND:

Designates Core Location

Explorations by American GeoServices, LLC, 10/2016.

REFERENCE:
Colorado Springs, 2016 GIS

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SCHEMATIC SITE PLAN

Pavement Evaluation
2675 Akers Drive
Colorado Springs, CO

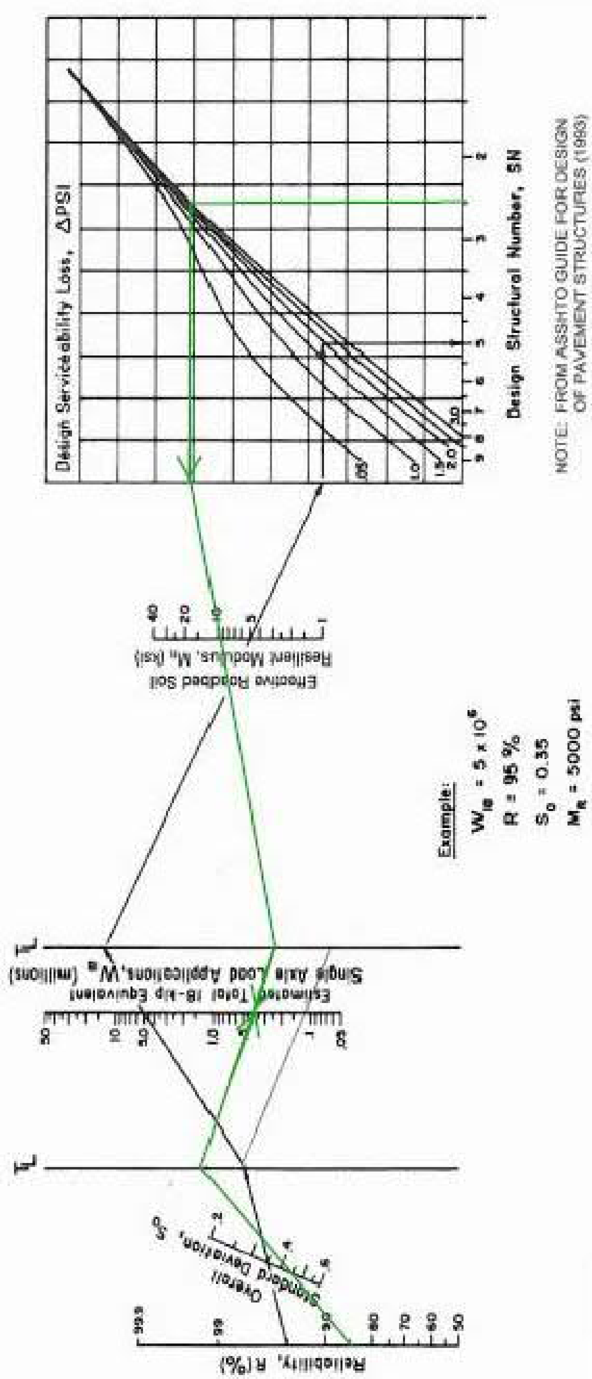
SCALE	FIGURE NO.	PROJECT NO.	DATE
As Shown	2	0305-CS15	11/10/2015

Figure 1

Design chart for flexible pavements

NOMOGRAPH SOLVES:

$$\log_{10} W_{18} = Z_R * S_o + 9.36*\log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left[\frac{\Delta PSI}{4.2-1.5}\right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32*\log_{10}M_R - 8.07$$



Design Chart for Flexible Pavements

FIGURE 1

PAVEMENT DESIGN

Pavement Evaluation
2675 Akers Drive
Colorado Springs, CO

SCALE	FIGURE NO.	PROJECT NO.	DATE
As Shown	3	0305-CS15	11/10/2015

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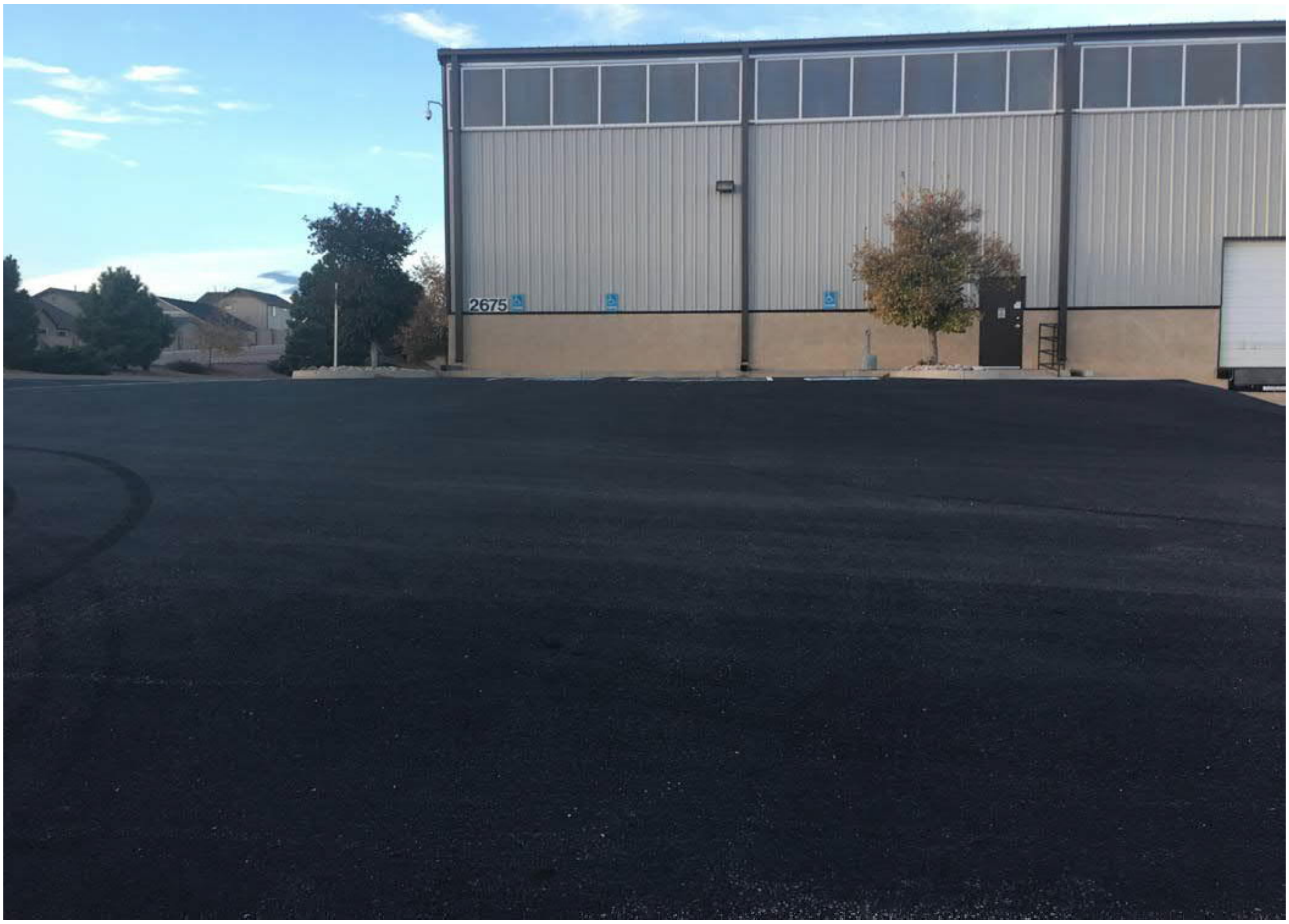
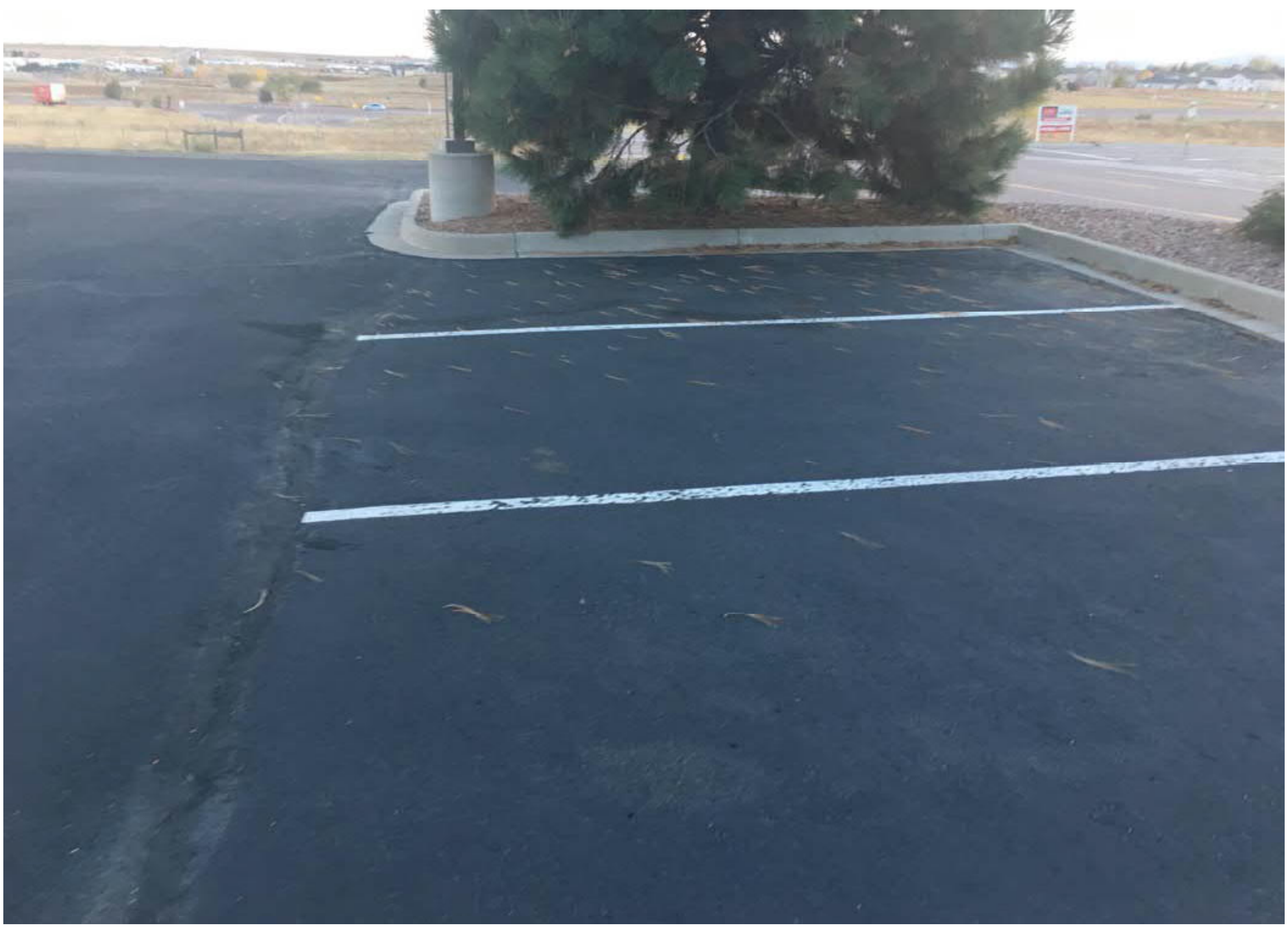
REFERENCE: City of Colorado Springs Design Chart for Flexible Pavements

APPENDIX A

SITE CONDITIONS
(ASPHALTIC CONCRETE PAVEMENT)


2675



APPENDIX B

ASPHALTIC CONCRETE CORES

CORE C1: SIDE VIEW

CORE C1: TOP VIEW

CORE C2: SIDE VIEW

CORE C2: TOP VIEW

CORE C3: SIDE VIEW

CORE C3: TOP VIEW

CORE C4: SIDE VIEW

CORE C4: TOP VIEW


CORE C5: SIDE VIEW


CORE C5: TOP VIEW

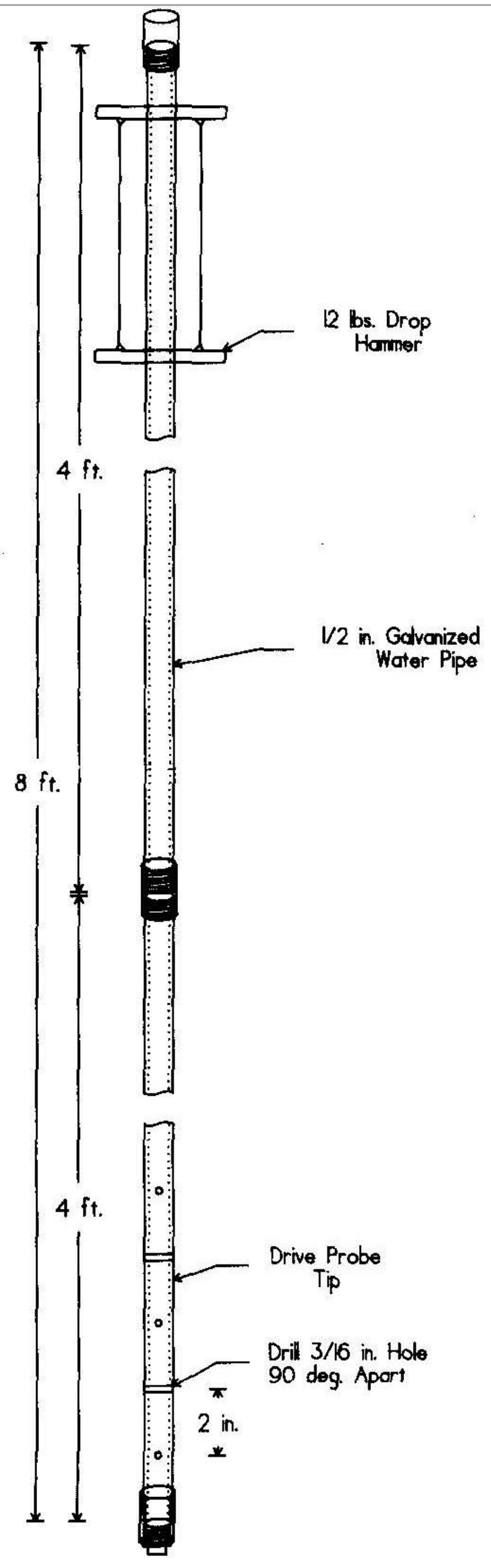
CORE C6: TOP VIEW

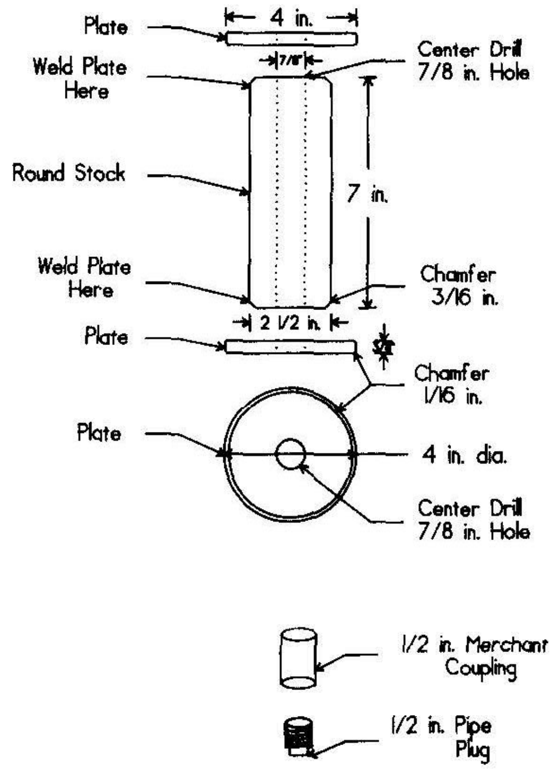
CORE C6: SIDE VIEW

APPENDIX C

WILLIAMSON DRIVE PROBE

Drive Prove Schematic



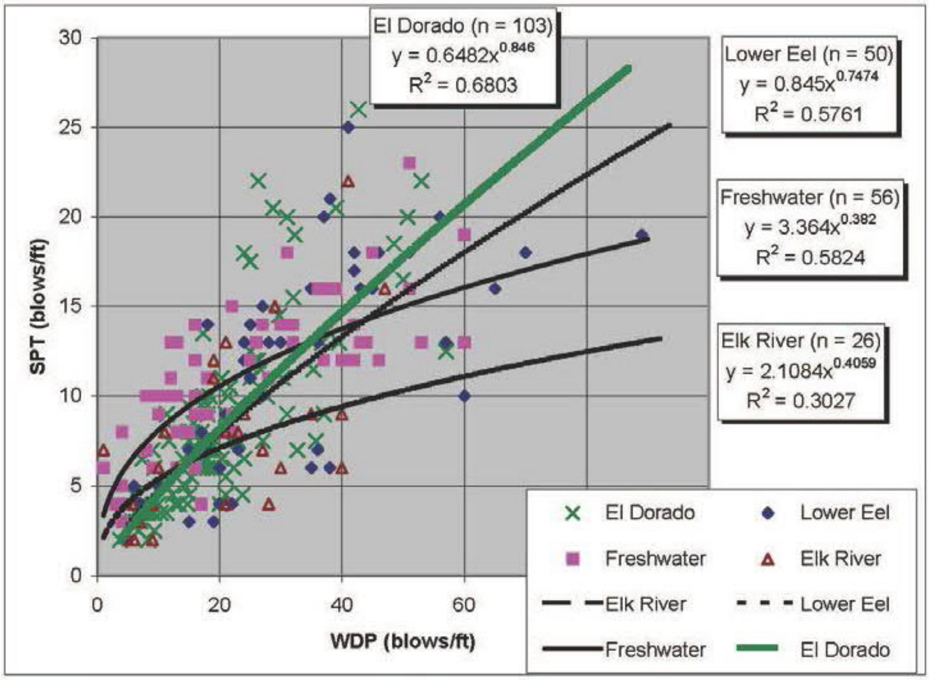


Williamson Drive Probe is a "relative density or consistency" exploration device which is used to determine the distribution and to estimate strength or compaction of the subsurface soil and decomposed rock units. The resistance to penetration is measured in blows-per-1/2 foot of an 12-pound hammer which free falls roughly 3.5 feet driving the ½ inch diameter pipe into the ground. This measure of resistance to penetration can be used effectively to estimate relative density of soils, especially for utility trenches. For a more detailed description of this geotechnical exploration / materials testing method, please refer to Volume I, United States Department of Agriculture, EM-7170-13, August 1994, p. 317-321. A representative schematic of WDP is shown here.

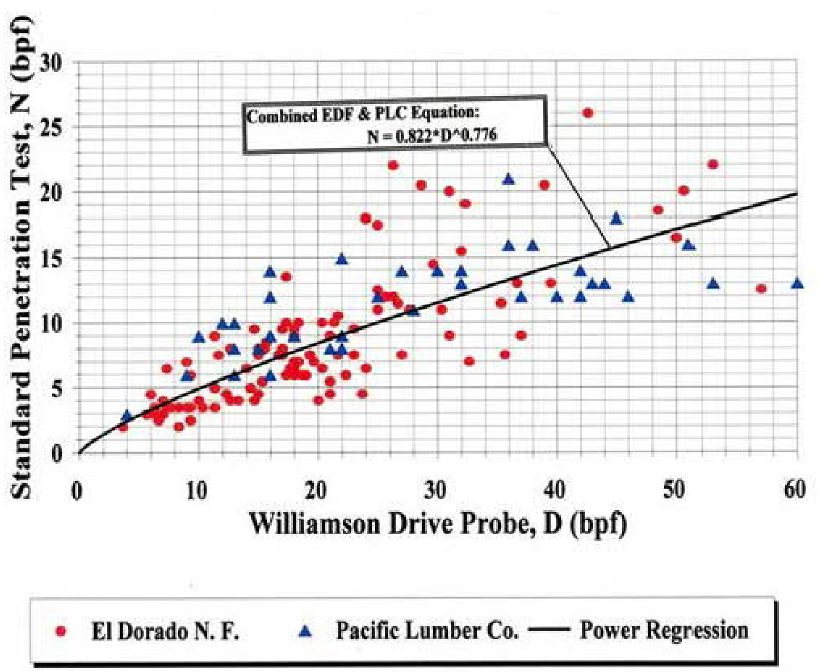
Reference: Figure 3.6.1, Appendix 3.6, Page No. 321, USDA EM-7170-13, August 1994, Volume I

CORRELATION

WILLIAMSON DRIVE PROBE (WDP)
STANDARD PENETRATION TEST (SPT)



SOURCE: Published literature by W.C. Adams (Hart Crowser, Inc.), R.W. Prellwitz (Bitterroot Geotechnical) & T.E. Koler (El Dorado National Forest).



SOURCE: United States Forest Service, Technology Development Program Website (http://www.fs.fed.us/t-d/programs/im/williamson_drive/correlation.shtml)

ASFE DOCUMENTATION

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor. ASFE/the Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A GEOTECHNICAL ENG.NEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS
Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates, Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations. you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

- when the nature of the proposed structure is changed. for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation. or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or .for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

A REPORT'S RECOMMENDATIONS CAN ONLY BE PRELIMINARY
The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site.

Because actual subsurface conditions can be discerned only during earthwork, you should retain your geo- technical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

SUBSURFACE CONDITIONS CAN CHANGE
A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consult- ant to learn if additional tests are advisable before construction starts. Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS
Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE
Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations

about the potential for hazardous materials existing at the site. The equipment, techniques, and personnel used to perform a geoenvironmental exploration differ substantially from those applied in geotechnical engineering. Contamination can create major risks. If you have no information about the potential for your site being contaminated. you are advised to speak with your geotechnical consultant for information relating to geoenvironmental issues.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid misinterpretations, retain your geotechnical engineer to work with other project design professionals who are affected by the geotechnical report. Have your geotechnical engineer explain report implications to design professionals affected by them. and then review those design professionals' plans and specifications to see how they have incorporated geotechnical factors. Although certain other design professionals may be fam- iliar with geotechnical concerns, none knows 'as much about them as a competent geotechnical engineer.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Geotechnical engineers develop final boring logs based upon their interpretation of the field logs (assembled by site personnel) and laboratory evaluation of field samples. Geotechnical engineers customarily include only final boring logs in their reports. Final boring logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings. because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs. delays. disputes. and unanticipated costs ara the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, give contractors ready access to the complete geotechnical engineering report prepared or authorized for their use. (If access is provided only to the report prepared for you, you should advise contractors of the report's limitations. assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. In other words. while a contractor may gain important knowledge from a report prepared for another party, the contractor would be well-advised to discuss the report with your geotechnical engineer and to perform the additional or alternative work that the contractor believes may be needed to obtain the data specifically appropriate for construction cost estimating purposes.) Some clients believe that it is unwise or unnecessary to give contractors access to their geo- technical engineering reports because they hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems. It also helps reduce the adversarial attitudes that can aggravate problems to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical engineers. To help prevent this problem, geotechnical engineers have developed a number of clauses for use in their contracts, reports, and other documents. Responsibility clauses are not exculpatory clauses designed to transfer geotechnical engineers' liabilities to other parties. Instead, they are definitive clauses that identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report. Read them closely. Your geotechnical engineer will be pleased to give full and frank answers to any questions.

RELY ON THE GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Most ASFE-member consulting geotechnical engineering firms are familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a construction project, from design through construction. Speak with your geotechnical engineer not only about geotechnical issues, but others as well, to learn about approaches that may be of genuine benefit. You may also wish to obtain certain ASFE publications. Contact a member of ASFE of ASFE for a complimentary directory of ASFE publications.

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