(If a firm has branch offices, complete for each specific branch office seeking work.)

1. REVISED ADSPO13-00003465*: Annual Request for Qualifications*

a.	FIRM (OR BRANCH OFFICE) NAME:	Saguaro GeoServices, Inc.
b.	FIRM (OR BRANCH OFFICE) STREET:	3319 N Dodge Blvd. Ste. A-2
c.	FIRM (OR BRANCH OFFICE) CITY:	Tucson
d.	FIRM (OR BRANCH OFFICE) STATE:	Arizona
e.	FIRM (OR BRANCH OFFICE) ZIP CODE:	85716
f.	YEAR ESTABLISHED:	1996
(g1).	OWNERSHIP - TYPE:	Corporation
(g2)	OWNERSHIP - SMALL BUSINESS STATUS:	Small Business
h.	POINT OF CONTACT NAME AND TITLE:	Robert Cummings, P.E., President
i.	POINT OF CONTACT TELEPHONE NUMBER:	520-321-4644
j.	POINT OF CONTACT E-MAIL ADDRESS:	rcummings@saguarogeo.com
k.	NAME OF FIRM *(If block 1a is a branch office)*:	

2. EMPLOYEES BY DISCIPLINE

a. Discipline Title	b. Function: Primary (P) or Secondary (S)	c. No. of Employees - Firm	d. No. of Employees - Branch
Geological Engineer	P	1	
Geologist	P	1	
Mining Engineer	P	1	
Total		3	

3. PROFILE OF FIRM'S EXPERIENCE AND ANNUAL AVERAGE REVENUE FOR LAST YEAR

a. Approximate No. of Projects	b. Experience	c. Revenue Index Number *(see below)*
5	Soils and Geologic Studies; Foundations	2
4	Mining and Mineralogy	2
4	Highways; Streets; Airfield Paving; Parking Lots	1
3	Forensic Engineering	1
3	Construction Management	1
2	Seismic Designs and Studies	1
1	Testing and Inspection Services	1

PROFESSIONAL SERVICES REVENUE INDEX NUMBER

1. Less than $100,000
2. $100,000 to less than $250,000
3. $250,000 to less than $500,000
4. $500,000 to less than $1 million
5. $1 million to less than $2 million
6. $2 million to less than $5 million
7. $5 million to less than $10 million
8. $10 million to less than $25 million
9. $25 million to less than $50 million
10. $50 million or greater

4. RESUMES OF KEY PERSONNEL PROPOSED FOR THIS CONTRACT (*Complete one Section 4 for each key person.)*

a. NAME	b. ROLE IN THIS CONTRACT	c. YEARS EXPERIENCE	
Robert Cummings	Project Principal/Manager	1. TOTAL 34	2. WITH CURRENT FIRM 18

d. FIRM NAME AND LOCATION *(City and State)*
Saguaro GeoServices, Inc. Tucson, Arizona

e. EDUCATION *(DEGREE AND SPECIALIZATION)*
MS Geological Engineering-University of Arizona, 1979
BS Geological Engineering-University of Arizona, 1976

f. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
Professional Geological Engineer, Arizona, No. 19166

g. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*
Organizations - Deep Foundations Institute, Association of Engineering Geologists, Society for Mining and Exploration, International Society of Explosives Engineers.
Publications - Author of over 20 published technical reports and studies in the applied earth sciences and geological engineering.

H. RELEVANT PROJECTS

1)
(1) TITLE AND LOCATION *(City and State)*: Cerro Jumil Mine Slope Design, Tetlama, Morelos, Mexico
(2) Year Completed: Professional Services 2013; Construction *(if applicable)* 2013
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT MANAGER** ■ Check if project performed with current firm
Provide a feasibility-level slope design for a 300-m-deep open pit mine. Tasks included: design and execution of an oriented coring program, geologic cell mapping, field and laboratory rock strength testing, compiling and analyzing several years worth of previous exploration, establishment of design sectors, performing slope stability calculations for both pit (global) and bench (kinematic) scale slopes, prepare geologic baseline and feasibility slope design reports.

2)
(1) TITLE AND LOCATION *(City and State)*: I-17 Copper Canyon, Near Camp Verde, Arizona
(2) Year Completed: Professional Services On-Going; Construction *(if applicable)* 2014
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT MANAGER** ■ Check if project performed with current firm
On-Going. The project involves the excavation of high rock slopes for the addition of a south-bound climbing lane on a nearly 2-mile long section of I-17 at MP 280. Responsibilities include: review and approval of the Preliminary Blast Plan, review and approval of all individual shot plans and blast reports, and evaluation of unexpected geologic conditions uncovered during construction which affected blasting operations.

3)
(1) TITLE AND LOCATION *(City and State)*: US-191 Lower Colorado Trail – Lower Switchbacks Realignment, Near Morenci Arizona
(2) Year Completed: Professional Services 2013; Construction *(if applicable)* Pending
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT MANAGER** ■ Check if project performed with current firm
The project involves realignment of roughly ½ mile of the existing rural two-lane mountain highway in an area where historic rubble retaining walls are beginning to fail. The roadway will be realigned through a combination of cutting into the existing cut slope on the inside and constructing MSE retaining walls on the outside. Geologic/geotechnical mapping of the existing cut slopes, core drilling, and seismic refraction were utilized to arrive at recommendations for cut slope angles and retaining wall design parameters. A geotechnical design report and certain specific plan sheets were prepared for the project.

4)
(1) TITLE AND LOCATION *(City and State)*: San Francisco Phase III Leach Pad Design, Near Santa Ana, Sonora, Mexico
(2) Year Completed: Professional Services 2013; Construction *(if applicable)* 2014
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT MANAGER** ■ Check if project performed with current firm
This project involved the design of a heap leach system, including drainage, recovery, piping, and pumping systems, for an existing mine in northern Mexico. Foundation and slope stability designs were critical as the pad was to be constructed on sloping ground. Deliverables included a Final Design Report (in both Spanish and English) and a complete set of construction plans.

5)
(1) TITLE AND LOCATION *(City and State)*: Catwalk Rock Hazard Removal and Rockbolt Inspection, Catwalk National Recreation Trail, Gila Nat. Forest, Glenwood, New Mexico
(2) Year Completed: Professional Services 2013; Construction *(if applicable)* 2013
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT MANAGER** ■ Check if project performed with current firm
This project had two separate tasks. One involved the evaluation of 74 existing rockbolts installed in 2005. First, high-strength concrete pads were constructed under several improperly constructed bolt plates. Once cured, all bolts were tested with a torque wrench calibrated through pullout testing. Task two involved the evaluation of a large overhanging rock which caused the closure of the trail. Through the use of rock climbing and repelling techniques, the rock and its position were evaluated and a plan was developed for its removal. The plan, involving mechanical jacking and the strategic placement of several small explosive charges was implemented and the rock was removed without further destabilizing the slope.

e. NAME	f. ROLE IN THIS CONTRACT	c. YEARS EXPERIENCE	
Bradly Herbert	Project Geologist	5. TOTAL: 35	6. WITH CURRENT FIRM: 11

d. FIRM NAME AND LOCATION *(City and State)*
Saguaro GeoServices, Inc. Tucson, Arizona

e. EDUCATION *(DEGREE AND SPECIALIZATION)*
BS Geology-San Diego State University, 1977

f. CURRENT PROFESSIONAL REGISTRATION *(STATE AND DISCIPLINE)*
Registered Geologist, Arizona, No. 31654

g. OTHER PROFESSIONAL QUALIFICATIONS *(Publications, Organizations, Training, Awards, etc.)*
Organizations - Association of Engineering Geologists
Publications – 1989, Tucson CAP Tunnel, A Lesson In Engineering Geology, *in* Arizona Geology, Arizona Geologic Survey, Vol. 19, No. 4
Training - Various seminars and short courses in engineering geology topics, rock blasting, and slope stabilization.

H. RELEVANT PROJECTS

1)
(1) TITLE AND LOCATION *(City and State)*: Cerro Jumil Mine Slope Design, Tetlama, Morelos, Mexico
(2) Year Completed — Professional Services: 2013; Construction *(if applicable)*:
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT GEOLOGIST** ■ Check if project performed with current firm
Provide a feasibility-level slope design for a 300-m-deep open pit mine. Tasks included: design and execution of an oriented coring program, geologic cell mapping, field and laboratory rock strength testing, compiling and analyzing several years worth of previous exploration, establishment of design sectors, performing slope stability calculations for both pit (global) and bench (kinematic) scale slopes, prepare geologic baseline and feasibility slope design reports.

2)
(1) TITLE AND LOCATION *(City and State)*: Saddle Road Realignment Project Claim Evaluation, Hilo, Hawaii
(2) Year Completed — Professional Services: On-Going; Construction *(if applicable)*: 2013
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE ■ Check if project performed with current firm
As part of a claim by a blasting contractor on a roadway project in Hawaii, all available records were examined (shot plans, blast reports, seismic data, core hole logs, and "top of shot" surveys) to reconstruct the geometry of each individual blast. The reconstructed shots were plotted on the project cross-sections. Using those cross-sections, shots were sorted by depth range and shot rock volumes were calculated for each range.

3)
(1) TITLE AND LOCATION *(City and State)*: US-191 Lower Colorado Trail – Lower Switchbacks Realignment, Near Morenci Arizona
(2) Year Completed — Professional Services: 2013; Construction *(if applicable)*: Pending
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT GEOLOGIST** ■ Check if project performed with current firm
The project involves realignment of roughly ½ mile of the existing rural two-lane mountain highway in an area where historic rubble retaining walls are beginning to fail. The roadway will be realigned through a combination of cutting into the existing cut slope on the inside and constructing MSE retaining walls on the outside. Geologic/geotechnical mapping of the existing cut slopes, core drilling, and seismic refraction were utilized to arrive at recommendations for cut slope angles and retaining wall design parameters. A geotechnical design report and certain specific plan sheets were prepared for the project.

4)
(1) TITLE AND LOCATION *(City and State)*: US-89 Kanab to Kanab Creek Bridge, Kanab, Utah
(2) Year Completed — Professional Services: 2014; Construction *(if applicable)*:
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE ■ Check if project performed with current firm
PROJECT GEOLOGIST: the project included conducting pre-blast surveys of structures including Kanab Creek Bridge, buildings, existing retaining walls, irrigation Tunnel inlet walls and gate structure, culverts, and utilities as needed prior to conducting blasting activities for the widening and reconstruction of US-89. Documentation included video, still photos, and field notes which were compiled into reports for each structure.

5)
(1) TITLE AND LOCATION *(City and State)*: Catwalk Rock Hazard Removal and Rockbolt Inspection, Catwalk National Recreation Trail, Gila Nat. Forest, Glenwood, New Mexico
(2) Year Completed — Professional Services: 2013; Construction *(if applicable)*:
(3) BRIEF DESCRIPTION *(Brief scope, size, cost, etc.)* AND SPECIFIC ROLE **PROJECT GEOLOGIST** ■ Check if project performed with current firm
This project had two separate tasks. One involved the evaluation of 74 existing rockbolts installed in 2005. First, high-strength concrete pads were constructed under several improperly constructed bolt plates. Once cured, all bolts were tested with a torque wrench calibrated through pullout testing. Task two involved the evaluation of a large overhanging rock which caused the closure of the trail. Through the use of rock climbing and repelling techniques, the rock and its position were evaluated and a plan was developed for its removal. The plan, involving mechanical jacking and the strategic placement of several small explosive charges was implemented and the rock was removed without further destabilizing the slope.

5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION *(City and State)*	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION *(If applicable)*
ALMEDA MINE INVESTIGATION AND REMEDIATION DESIGN GRANT COUNTY, OREGON	**2010**	**N/A**

23. PROJECT OWNER'S INFORMATION

c .PROJECT OWNER	d .DOLLAR AMOUNT OF PROJECT	g. TOTAL COST OF PROJECT
U.S. BUREAU OF LAND MANAGEMENT	**$134,000**	**N/A**

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

The work performed at the Almeda Mine showcases Saguaro GeoServices, Inc.'s experience dealing with the investigation and remediation of abandoned mines, which blends mining and mineral technologies, environmental regulatory response, basic geological work in remote settings, skills in confined space entry, underground mine geological studies and mine surveying techniques, and geotechnical design. The Almeda Mine is an abandoned base/precious metals property on patented land now owned by the BLM. The mine consists of 5 separate levels that open to the surface on a mountainside above the Wild and Scenic section of the Rogue River, near Grants Pass in southwestern Oregon. The lower levels of the mine produce acidic, metal-laden water, some of which flows directly into the Rogue River. The BLM called on SGS to help arrest the mine water emissions into this critical salmonid habitat and recreation resource.

SGS began working on the problem at the Almeda Mine in 2002, and its involvement has included many separate field campaigns because funding for the project was only intermittently available. Initially, SGS personnel developed a site safety plan and confined space entry procedures, and then physically examined all portions of the underground workings that were not plugged or anoxic, sampled the water and sediments, reviewed available historical reports and documents pertaining to the mine operations, performed floodplain analysis, and evaluated and ranked various remedial treatment options. Because the main opening discharging water was within the 2-year floodplain of the river and was therefore plugged with debris, it could not be physically entered. Also, some other openings with the potential to discharge water were caved or inaccessible.

Based on SGS' findings, BLM agreed that it would be necessary to actually penetrate the plugged openings in order to assess their condition before further remediation activities could proceed. Over the succeeding years, SGS provided several phases of subsurface exploration, initially penetrating a critical stope with a core hole in 2003 and installing monitoring wells in the stope and in the country rock outside the stope. SGS imaged the stope with its borehole video system. This work determined that a bulkhead could effectively be used to raise the mine pool, so that the emission point would be high enough above the floodplain that the drainage handling system could be protected from flooding. For design, subsurface exploration accessing the vicinity of the potential bulkhead location would be required. An intermediate level that would affect the bulkhead design also had been identified from historical records, but it was buried beneath a dump and could not be located at the surface.

SGS then developed and implemented the core drilling program that successfully positioned a remote-access drill rig on an unstable dump and not only penetrated the 7-ft-wide main water-producing adit, but also confirmed the location of the buried overlying adit as well. Again, SGS' bore hole video system was used. The information was critical to reopening the flooded lowest level for physical inspection. That inspection was performed by SGS in 2009, after BLM hired a contractor to remove 70 years' worth of debris and mineral precipitate from the adit. SGS pressure-washed the adit walls and performed detailed geotechnical mapping, and then delivered a bulkhead design that would maintain mine pool levels just below that of the overlying adit, thereby avoiding overflows, and regulating mine outflows at levels that would permit implementation of a treatment system above the 25-year flood level of the Rogue River.

Between and subsequent to these involvements under contract to BLM, SGS on its own initiative coordinated closely with BLM personnel working on the project. The fact that SGS was engaged again and again by BLM is testament to SGS' effectiveness on the project.

5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION *(City and State)*	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION *(If applicable)*
ROCK SLOPE STABILIZATION AND TESTING SABINO CANYON RECREATION AREA, PIMA COUNTY, ARIZONA	**2010**	**2000**

23. PROJECT OWNER'S INFORMATION

c .PROJECT OWNER	d .DOLLAR AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
CORONADO NATIONAL FOREST	**$25,000**	

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

In 2000, SGS was contacted by the Coronado National Forest to address rock cut instabilities and rock fall problems from an 80-ft-high, near-vertical rock face above the Sabino Canyon access road. Sabino Canyon is visited by as many as 160,000 people per year, most of whom take a motorized tram to the turnaround at the top of the access road, which passes directly beneath the unstable outcrop. Others traverse the area on foot. These exposures presented a significant threat to public safety.

Under contract to the Coronado National Forest, SGS performed geotechnical reconnaissance and analyzed the rock geologic structure. SGS identified various inherently unstable rock wedge configurations, and designed a plan to scale and reinforce the rock face. That plan was implemented as part of a construction project to repair a retaining wall and associated drainage system at a nearby location. The Coronado National Forest turned to SGS to provide field inspection and technical oversight of the rock bolting and scaling activities, which included 86 tensioned, grouted rock bolts at elevations as high as 70 ft above grade. A significant quantity of rock was brought down before the rock bolting program could begin. The bolting was performed under a total road closure, using a special crane system that could be positioned on the 8% profile grade.

In 2010, The Coronado National Forest again turned to SGS to implement a recommendation made as part of the original design, to verify the performance of the rock bolts periodically. Using a man-lift to access the slope, SGS used its own 30-ton pull testing system to measure the capacities of a selected number of rock bolts, observing the procedures of the Post Tensioning Institute, measuring creep deflections as well as conformance with design capacities. All the bolts were torque-tested and inspected visually. The bolting system was found to still be effectively be stabilizing the slope. SGS wrote an inspection report documenting the findings.

As the result of this work, SGS performed a stability assessment and rock reinforcement design for a large detached slab at Tonto Bridge State Park in Arizona. The Gila National Forest also requested SGS to conduct a similar stability analysis and reinforcement design at the Catwalk National Recreation Area in New Mexico, where rock fall had forced the closure of the new ADA-compliant section of the Trail. In 2013, five years after SGS' rock reinforcement and scaling program was completed above the Catwalk Trail, SGS was again engaged by the Gila National Forest to check the bolts, this time using rock rappelling and climbing techniques, as well as to remove an unstable rock outcrop that had formed above the non-ADA trail which had forced total closure of the trail facility.

5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION *(City and State)*	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION *(If applicable)*
PRESCOTT LOWE'S RETAINING WALL REPAIR STUDY PRESCOTT, YAVAPAI COUNTY, ARIZONA	**2011**	**2012**

23. PROJECT OWNER'S INFORMATION

c .PROJECT OWNER	d .DOLLAR AMOUNT OF PROJECT	h. TOTAL COST OF PROJECT
CITY OF PRESCOTT/LOWE'S OF PRESCOTT	**$42,000**	**UNKNOWN**

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

SGS was contacted by the City of Prescott because of its expertise with soil nails and ground anchors. Lowe's Home Improvement Centers had constructed a new facility in Prescott. The store and parking lot were sited on retained embankment fill. The retaining wall, in 5 tiers reaching in excess of 60 ft tall overall, was constructed using a mechanically-stabilized earth concept and faced with a proprietary concrete segmental shell system. At several locations, in several episodes, the facing and much of the retained fill had fallen off, and the parking lot was extensively damaged by settlements and tension cracking; a considerable amount of parking space had to be fenced off. A neighborhood adjoins the wall at a lower elevation, and the media highlighted the impacts to this private property. These occurrences generated a great deal of local adverse publicity.

In response to the failures, the project Geotechnical Engineer had performed its own investigation, conducted numerous soil borings, installed inclinometers to investigate wall movements, installed piezometers to monitor water levels, and placed surface prisms on the intact sections of the remaining wall. It initially proposed a repair involving long soil nails drilled through the facing, and patching the damaged sections with shotcrete where the facing had fallen away. The City asked SGS to evaluate the repair design. SGS reviewed the design in considerable detail, including the output of soil nail design programs and numerical modeling, and prepared a series of design evaluations expressing concern about constructability, quality control issues inherent in this ambitious repair strategy, and disposition of ongoing settlements in the remaining fill.

Over the next several years, the design options evolved as the parties studied various remedial options. The soil nail proposal was dropped and a top-down buttressed soldier pile tieback wall concept was developed and proposed, along with a lengthy series of detailed engineering calculations on the stability of such a wall. SGS reviewed all this information also, and found that the concept presented its own suite of concerns. The tieback wall was eventually dropped in favor of an earth buttress. Throughout the entire process SGS continued to advise the City on the geotechnical impacts of the design proposals, reviewing in detail the soil testing data collected, the results of ongoing monitoring, construction records that were pertinent to evaluating the effectiveness of the repair options, and conducting several field reviews.

Inevitably, litigation resulted, involving Lowe's, the design architect, the design civil engineer, the design geotechnical firm (which also performed the construction observation), the manufacturer of the wall system, the construction contractor, the project surveyor, and a landscape contractor. SGS' scope of work specifically excluded the development of an opinion as to the cause of the failures, and so avoided rendering any such opinion. In parallel with the design evolution, a separate geotechnical firm had been performing a forensic geotechnical analysis, which identified several contributing causes to the failures. SGS was provided an opportunity to review the forensic report for information only.

In accordance with the legal process, SGS was subpoenaed to furnish its documents and give testimony on its activities. SGS was never named in the litigation. SGS gave a deposition as a factual witness, which took place over the course of two days in Phoenix, attended by legal teams representing all the parties.

5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION *(City and State)*	b. YEAR COMPLETED	
	PROFESSIONAL SERVICES	CONSTRUCTION *(If applicable)*
US-191 SWITCHBACKS AND RETAINING WALLS DESIGN GREENLEE COUNTY, AZ	**2013**	**PENDING**

23. PROJECT OWNER'S INFORMATION

c .PROJECT OWNER	d .DOLLAR AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
ARIZONA DEPARTMENT OF TRANSPORTATION	**$190,000**	**N/A**

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

Sections of US-191 north of Morenci, AZ contain dry-stack retaining walls built in the first half of the 20th century. In the area of this roughly 1/2 –mile long project (MP172 to 172.5) the existing roadway shows sever signs of distress at the locations of three of these walls. This section of roadway is in extremely rugged mountainous terrain.

Prior studies were conducted along this roadway segment, included GPR surveys, to evaluate the integrity of the walls. Because of their historic nature, this segment of roadway has also been studied by cultural evaluation specialist firms and were recognized as historic structures by State Historic Preservation Office (SHPO).

In order to preserve the historic dry-stack walls, SGS was originally contracted to evaluate an initial design concept of moving the road into the steep mountainside with new road cuts. SGS performed detailed geologic/geotechnical mapping of the existing road cuts to determine stable slope angles for the new cuts and provide recommendations additional stabilization measures (i.e. rock bolts). It was determined that realignment by strictly shifting the road into the cut bank was not feasible. The resulting cuts would be too tall and steep, not constructible (in some areas), and present earthwork concerns.

SGS recommended rock reinforcement to minimize tall inaccessible sliver cuts and questioned the conventional stability analyses that were performed previously on the dry-stack walls. The effect of a failure along this stretch of highway was considered critical enough that ADOT eventually received approval to reconstruct the retaining walls, noting that repairs over the years had compromised their integrity. This provide the opportunity to complete the realignment utilizing a combination of rock cuts on one side and retaining walls on the other, making earthwork balance more attainable, and avoiding excessively tall cut slopes.

For the proposed new retaining walls, SGS undertook a subsurface exploration program consisting of core drilling with remote-access drill rigs, seismic refraction geophysics, and rock and soil lab testing. The exploration program needed to be designed to have no effect on the dry-stack walls which were still listed by SHPO. Based on its findings, SGS provided design recommendations for rock cuts, developed rock reinforcement and scaling concepts, and provided design parameters for construction of MSE retaining walls, including seismic design, in accordance with LRFD guidelines.

The construction is currently awaiting funding.

5. EXAMPLE PROJECTS WHICH BEST ILLUSTRATE PROPOSED TEAM'S QUALIFICATIONS FOR THIS CONTRACT

(Present no more than five (5) projects. Complete one Section 5 for each project.)

a. TITLE AND LOCATION *(City and State)*	b. YEAR COMPLETED	
SOUTHBOUND STATE ROUTE 87 RECONSTRUCTION MARICOPA COUNTY, AZ	PROFESSIONAL SERVICES **2012**	CONSTRUCTION *(If applicable)* **2012**

23. PROJECT OWNER'S INFORMATION

c .PROJECT OWNER	d .DOLLAR AMOUNT OF PROJECT	e. TOTAL COST OF PROJECT
ARIZONA DEPARTMENT OF TRANSPORTATION	**$562,000**	**10.7 Million**

f. BRIEF DESCRIPTION OF PROJECT AND RELEVANCE TO THIS CONTRACT (include scope, size, and length of project)

In prior employment, personnel now with SGS performed the geotechnical engineering for the award-winning construction of the initial segment of ADOT's multi-year plan to upgrade SR 87 between Mesa and Payson. That project, which added northbound lanes to convert the previous congested 2-lane facility into a free-flowing 4-lane facility, introduced novel concepts to honor the scenic designation of the roadway, such as cut slope variation for visual enhancement, special warping and ledging provisions, lane rental concepts to create an effective incentive to minimize traffic disruption, specialized blasting and embankment siting techniques, and many other aspects that formed the pattern for ADOT rural highway development for the next decades. The project won numerous local and national awards for design and environmental attainment.

In 2009, SGS was asked to again serve on the reconstruction of a 5.4-mile long section the southbound roadway to alleviate sight distance and profile grade problems that had remained because the new southbound had been the original 2-lane SR 87. The project involved adding a climbing lane and providing for a wider ditch area for rockfall protection near tall rock slopes. All widening was performed on the outside (right). The vast majority of the widening was into existing rock cuts.

Geotechnical exploration included extensive deep core drilling with remote access coring rigs which were, in most cases, slung from site to site by helicopter. Additionally, many seismic refraction geophysical surveys were performed, as was geologic/geotechnical mapping, discontinuity (kinematic) surveys, rock fabric analysis using optical methods (Sirovision), and an extensive program of laboratory rock testing.

SGS provided detailed design recommendations for slope angles (using both kinematic and limit equilibrium analyses) and rockfall ditch configuration (using advanced rockfall computer modeling). Recommendations were also provided for excavation (blasting), rock stabilization, embankment construction and subgrade preparation, suitability of materials, and earthwork factors.

SGS provided complete design assistance to Jacobs Engineering Group, the project designer. In accomplishing the field investigation and report preparation, SGS worked in close coordination with another geotechnical firm which had responsibility for retaining walls, culverts and pavements. The field activities required coordination with ADOT traffic and permitting divisions as lane closures were often required during field activities. SGS also closely coordinated with biologists, landscape architects, cultural resources firms, and those responsible for different design elements (drainage, structures, civil, etc.).

SGS was retained to provide on-site direction, on a daily basis, throughout construction, guiding decisions of a geotechnical nature. In one area of extremely fractured rock, SGS proposed the installation of a special pinned wire netting application that not only stabilized the slope but met the Tonto National Forest's stringent visual and environmental criteria. SGS provided daily inspection of rock blasting and scaling operations as well as spotting rock bolt locations and inspecting during installation. SGS also oversaw and directed several local slope modifications to enhance the visual appearance.

SGS prepared portions of the project specifications, including provisions to protect a cantilever retaining wall that was installed as part of the northbound construction years before. Blasting was successfully carried out directly over the wall and within 40 ft of it. Other special activities included provisions for stabilizing large, loose-fitted boulders in place. The project was completed ahead of schedule and on budget.

6. ADDITIONAL INFORMATION

a. PROVIDE ANY ADDITIONAL INFORMATION YOU FEEL MAY BE NECESSARY TO DESCRIBE YOUR FIRMS QUALIFICATIONS. *(ATTACH ADDITIONAL SHEETS AS NEEDED.)*

Saguaro GeoServices is a geological engineering consulting firm that is especially respected for its work in the excavation and stabilization of rock masses. As a geotechnical engineering firm serving the broader mining and construction industries, SGS is also known for solving geotechnical foundation and stability problems, and remediating abandoned mine environmental and safety problems.

CLIENTELE

SGS' clientele consists largely of civil engineering design firms serving public agencies; large development interests, and governmental agencies engaged in heavy construction, mining, or mine reclamation. SGS has also served many heavy construction contractors directly, providing hands-on, field advice on aspects of rock excavation and rock mass stabilization. For some large, multidisciplinary projects, more than one geotechnical firm may be involved, with SGS holding responsibility only for the rock excavation portion. On such projects the client may request that SGS base its analyses on geological and geotechnical data collected by others. By clearly spelling out the duties of the various parties and committing to a team-oriented approach, SGS has been always been successful in these kinds of engagements.

FIRM PROFILE

SGS typically focuses on projects involving rock excavation for heavy construction or mining. SGS personnel have provided blasting consulting for owners and contractors for over 20 years, focusing on technical blasting applications in ecologically sensitive or urbanized areas, or where special expertise is needed on large or intricate blasting projects. SGS personnel have performed many pre-blast and pre-construction surveys on residences and historic structures, and have implemented seismograph arrays to measure the distribution and variability of vibration propagation from construction blasting.

Although it is highly regarded for its rock excavation and blasting expertise, SGS' personnel have extensive experience in other geotechnical endeavors, such as construction materials testing, pavements, and more conventional soil and foundation studies; and have applied this experience on major design projects. Notable among these are major bridges, highway corridor studies, and advance design assessments, where SGS has helped forecast environmental, time, cost, and land requirements. SGS has provided soil and foundation reports for large design projects, including slope revetments and soil nail walls, deep foundations such as micropiles and drilled shafts.

SGS' personnel have served the mining industry, and SGS has provided slope stability services directly for mining companies. SGS has also been engaged in the solution of difficult issues associated with abandoned mines, including waste embankment erosion, acidic mine drainage, sedimentation, subsidence, and stabilization of unsafe openings.

SGS offers a very high level of scientific expertise in a focused range of disciplines. We prefer to subcontract our drilling and laboratory materials testing to a few chosen firms that can provide the highest quality and reliability, leaving SGS to focus on quality engineering. However, SGS conducts its own soil and rock core logging, field geological mapping, downhole imaging, sampling, and field testing, to assure a hands-on familiarity with field geological conditions. In all of its activities, SGS relies on proven, state of the art engineering techniques in the geological and rock mechanics sciences.

CAPABILITIES

SGS was founded in 1996 and is headquartered in Tucson, AZ. SGS has operated widely in the western US and Mexico. On the web, a description may be found at www.saguarogeo.com.

SGS' field equipment includes heavy 4-wheel drive trucks, travel trailers, and ATVs to support remote field operations in difficult terrain for extended periods; laser rangefinding and profiling equipment capable of 2-D and 3-D operation; 6 blasting seismographs; high-resolution digital imaging equipment, a borehole video camera with 200 ft depth capability for imaging the subsurface; mine lights, self-rescuers, high-intensity lighting and AC generators for night work and work in mines and tunnels; core logging and testing equipment including point-load testers; a rock anchor pull test system expandable to 100-ton capability; a full range of personal protective equipment for construction and mining; and all the safety and accessibility equipment necessary for high-reach applications in rock cuts, including several complete sets of rock climbing and rappelling equipment.

In addition to the office equipment common to all engineering companies, SGS' offices and technical facilities include a comprehensive range of geotechnical and blasting software applications including finite-difference continuum modeling programs; voice-recognition software; stereographic image analysis equipment; up-to-date CAD software and equipment including a 12-square-foot digitizing table; and large-format image manipulation and plotting equipment.

CONSTRUCTION MANAGEMENT SUPPORT

SGS is well regarded in the design community for its extensive familiarity with the practices of construction contractors working in the field. Typically, SGS is retained by the owner or design professional during the construction phase, offering geological observations and evaluation of construction alternatives accordingly. Rock excavation conditions and procedures must be reviewed as they progress, and the construction procedures should be adapted proactively, to avoid difficulties in construction that can lead to poor work and claims. For example, SGS' role in highway construction administration is often to assist the Resident Engineer by tracking and evaluating the rock excavation procedures in use and recommending improvements jointly to the Resident Engineer and the construction contractor. SGS works closely with all components of the construction team: construction contractors, owners, and consultant construction administrators.

DESIGN SUPPORT

SGS' involvement in design is typically to assist with the development of plans, specifications, and bid packages, through the assessment of geological data. A typical SGS project begins with our own assessment of available geological data, followed by engineering analyses to identify construction related issues (such as the maintenance of traffic flow through construction zones involved with rock excavation, or the likely equipment and schedule requirements for the excavation phase of a major project, or aesthetic enhancement requirements). We always consider constructibility, construction cost, and schedule requirements when making design decisions. In fact, SGS is distinguished from most conventional A-E firms by its heavy construction-phase involvements, allowing SGS to view design projects from a construction contractor's perspective.

MULTIDISCIPLINARY INVOLVEMENTS

Most of SGS' projects are multidisciplinary, and often arise because of special constraints imposed by outside agencies or the public. These concerns include disturbance, appearance, environmental, and traffic. SGS has become particularly well regarded in its expertise for the aesthetic treatment of rock cuts in order to meet visual attainment objectives imposed by land management or regulatory agencies. SGS also supports designers and decision makers in public interaction, speaking directly with adjoining landowners and affected parties. SGS has had good success preventing blasting disturbance complaints and mediating those that are unavoidable. By explaining the key aspects of blasting and structure vibration response in clear and nontechnical terms, SGS has been able to educate and reassure concerned property owners adjoining construction projects.

7. ANNUAL AVERAGE PROFESSIONAL SERVICES REVENUES OF FIRM FOR LAST 3 YEARS

a.	Percentage of Total Work Attributable to State, Federal and Municipal Government Work:	21
b.	Percentage of Total Work Attributable to Non-Government Work:	79

8. AUTHORIZED REPRESENTATIVE. The foregoing is a statement of facts.

Signature: Robert Cummings Date: 15 Mar 2015

Name: Robert Cummings Title: President