May 8, 2024

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Packet A – Geotechnical Engineering & Project Delivery (Area 1)

Contents

HALEY ALDRICH

Criterion 1 Qualifications/Expertise of Firms on Team

Haley & Aldrich, Inc. (Haley & Aldrich) has supported the Washington State Department of Transportation (WSDOT) under several direct contracts since 2000. Our most recent geotechnical engineering and seismic design experience is summarized in Table 1 (see following page). Specifically related to the Geotechnical Engineering and Project Delivery (Area 1) contract, we are currently providing geotechnical support for the I-405 Program (***I-405/Brickyard to SR 527 Improvements***) and subject matter expert (SME) review on the first two WSDOT progressive design build (PDB) projects (***US 101/SR 109 Coastal 29 Fish Passages [FP]*** and ***SR 303-308 Kitsap Co 29 FP***).

To help WSDOT meet its 15% Disadvantaged Business Enterprise (DBE) utilization goal for the Area 1 contract, we have partnered with two Washington State-certified DBE subconsultants. **HWA GeoSciences Inc. (HWA)** (DBE, Minority Women-owned Business Enterprise [MWBE]) will be providing primary support. Some of their WSDOT project experience and expertise is also listed in Table 1. **Ciani & Hatch Engineering (CHE)** (DBE, Women-owned Business Enterprise [WBE]) will be providing secondary support within their areas of expertise, as needed. Because they are a newly formed firm, CHE do not have project experience as engineer of record (EOR), but their staff have completed numerous WSDOT projects over the past decade for other firms. Our two DBE partners will augment our geotechnical expertise and provide additional depth and flexibility during high workloads.

A. DESCRIBE THREE HIGHWAY PROJECTS IN WASHINGTON WHERE THE CONSULTANT PROVIDED STAMPED RECOMMENDATIONS FOR 13 GEOTECHNICAL ANALYSES AND DESIGN CATEGORIES

The Haley & Aldrich team brings extensive geotechnical analysis and design experience working on WSDOT projects throughout the state for over 20 years. Table 1 below summarizes some of our recent experience for specific highway projects that Haley & Aldrich and our team members have worked on. The geotechnical analysis and design category descriptions 1 through 13 are abbreviated for presentation purposes but are intended to cover the more detailed category descriptions in the WSDOT Request for Qualifications (RFQ) Criteria Definitions. Detailed descriptions of each numbered project where we provided stamped recommendations are presented on pages 3 through 14.

B. DESCRIBE THREE HIGHWAY PROJECTS IN WASHINGTON WHERE THE CONSULTANT PROVIDED STAMPED RECOMMENDATIONS FOR VARIOUS TYPES OF SEISMIC DESIGN

Haley & Aldrich has been known for our expertise in earthquake engineering and advanced seismic analyses for decades. Our seismic staff have close relationships with research universities and researchers in multiple countries, and we take an active role in advancing the practice of earthquake engineering. Our seismic group includes six Ph.D. level staff with published expertise on liquefaction constitutive modeling, dynamic soil behavior, and laboratory testing. Several of our senior engineers are active in standards development, such as the American Society of Civil Engineers (ASCE) 7 committees for tsunami hazards and seismic source characterization and the ASCE 61 committee. They were involved with the development of basin effects for high-rise structures in the city of Seattle several years ahead of official adoption into the seismic hazard maps. One of our senior engineering seismologists has direct experience in seismic hazard assessment and seismic monitoring for critical infrastructure. Table 1 below summarizes how our specialized seismic staff has applied this experience on specific highway projects that Haley & Aldrich have recently worked on. Detailed descriptions of each numbered project where we provided stamped recommendations for seismic design are presented on pages 3 through 14.

TABLE 1. SUMMARY OF PROJECT EXPERIENCE FOR 1A - GEOTECHNICAL ANALYSES AND DESIGN AND 1B - SEISMIC DESIGN

Project #	Project Name	Geotechnical Analyses and Design													Seismic Design					
		1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6
		Retaining walls	Highway bridges	Spread footings	Driven piles	Drilled shafts	Ground improvement	Slope stability	Landslides	Excavation and shoring	Fill and compaction	Settlement analysis	Laboratory test data	Field test data	Seismic disaggregation	Seismic effects – slope stability	Seismic effects – foundations	Liquefaction evaluation	Liquefaction effects – slope stability	Liquefaction effects – foundations
	Haley & Aldrich																			
1	SR 542 UNTs to Mitchell Creek FP	■		■			■	■			■		■					■		
2	I-90 Issaquah Creek Bridge Seismic Retrofit							■		■			■			■				
3	SR 9 Marsh Road to 2nd Street Vicinity – Widening Project	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■
4	I-90/Cabin Creek Interchange (I/C) to W Easton I/C	■						■			■		■							
5	SR 544 UNT to Fourmile Creek FP	■		■				■			■	■	■	■				■		
6	I-90/SR 900 Lewis, West Village Park, Schneider Creek FP Design Build (DB)	■	■	■				■		■	■		■	■	■	■	■	■		
7	SR 539/Duffner Ditch FP	■		■				■			■							■	■	■
8	SR 169 Ravensdale FP/King County Bridges	■	■	■				■			■		■	■		■	■	■		
9	I-82/SR 14 Plymouth Weigh Station			■							■			■						
10	SR 542 Squalicum Creek FP	■	■	■				■	■			■	■	■		■	■	■		
11	I-90/SR 18 I/C to Deep Creek – I/C Improvements and Widening DB	■	■	■		■		■	■	■	■	■	■	■		■	■			
12	I-405/Renton to Bellevue Widening and Express Toll Lanes DB	■	■		■						■	■		■	■	■	■			
13	I-5 – Portland Ave. to Port of Tacoma Road Southbound HOV DB	■	■		■	■	■	■			■	■	■	■	■	■	■	■	■	■
14	US 101/SR 116 North Olympic Peninsula – Remove Fish Barriers DB	■	■	■		■		■			■	■	■	■	■	■	■	■	■	■
15	I-5 Steilacoom-DuPont Road to Thorne Lane Corridor Improvements DB	■	■	■				■		■	■	■	■	■	■	■	■			
	HWA GeoSciences (HWA)																			
16	OR-24FP Olympic Region Design Engineering – 24 FP	■	■	■		■		■		■	■	■	■	■	■	■	■	■	■	■
17	SR 3/SR 16/SR 166 Gorst Vicinity – Remove Fish Barriers DB	■	■	■		■		■		■	■	■	■	■	■	■	■	■	■	■
18	SR 302 Victor Area Corridor Planning Study	■				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

1 SR 542 UNTs to Mitchell Creek FP, Deming, WA. Haley & Aldrich evaluated several geotechnical design alternatives to mitigate liquefaction and accommodate post-seismic soil strength loss and liquefaction-induced settlements below the new split box buried structure and wingwalls. Haley & Aldrich evaluated several geotechnical design alternatives to mitigate liquefaction and reduce impact of post-seismic soil strength loss and liquefaction-induced settlement below the new FP split box buried structure and wingwalls. We managed the subsurface exploration program, evaluated subsurface stratigraphy and soil strengths, estimated liquefaction-induced settlement, analyzed global stability of wingwalls (SLIDE modeling), developed ground improvements recommendations for liquefaction mitigation and provided foundation design parameters. Haley & Aldrich recognized questionable standard penetration test (SPT) blow counts associated with the preliminary scoping borings. We determined this was due to faulty SPT hammer and advocated for additional exploration to confirm. Based on revised field data, the predicted liquefaction-induced settlement was significantly less, allowing for a reduction in the depth of ground improvement from 30 to 17 feet. After initial evaluation of a soldier pile wall system, our staff switched to a soil-cement ground improvement design to mitigate liquefaction below the buried structure and conventional concrete wingwalls. This eliminated the need for more costly deep foundations or contractor-designed solutions with higher perceived construction risks. We worked quickly to update geotechnical design calculations and provided final geotechnical deliverables within a very fast timeframe to meet tight WSDOT project advertisement deadline.

Relevance to WSDOT Area 1

☑ Retaining walls
☑ Ground improvement
☑ Fill and compaction
☑ Liquefaction evaluation
☑ Spread footings
☑ Slope stability
☑ Laboratory test data

Key Staff

- Principal-in-Charge (PIC): Mike Schmitz
- Engineer of Record (EOR): Mike Schmitz
- Project Manager (PM): Jason Sved
- Technical Contributor (TC): Dan Trisler

Value Statement

Quick response allowed a late wall design change and delivery of report in two weeks to meet schedule.

2 I-90 Issaquah Creek Bridge Seismic Retrofit, King County, WA. Haley & Aldrich staff provided geotechnical recommendations for a seismic retrofit of I-90 Bridge 90/72N, located adjacent to East Fork Issaquah Creek near the bottom of a 300-foot-high steep slope with a historical landslide scarp at the top and several nearby mapped landslides. The proposed seismic retrofit (column steel jackets) required up to 15-foot-deep temporary excavations along the base of the historical landslide slope. We performed a geologic evaluation of mapped historical landslides and historical borings to develop a realistic stratigraphic model of the bluff subsurface for stability analyses. This included an interpretation of likely historical landslide failure plane

Relevance to WSDOT Area 1

☑ Slope stability
☑ Laboratory test data
☑ Excavation and shoring
☑ Seismic effects – slope stability

Key Staff

- PIC: Jeff Wagner
- PM/TC: Rolf Hyllseth

Value Statement

Statistical slope stability analysis allowed prudent, risk-based excavation, with slot cutting option to further reduce risk.

locations and disturbed/residual soil strength within the historical failure zone for slope stability modeling purposes. Haley & Aldrich performed a statistical slope stability evaluation (SLIDE modeling) to evaluate the potential impact on the planned temporary excavations along the steep slope base. Assuming a slot excavation approach, we analyzed the change in slope stability safety factor for varying amounts of base excavation (slot cut width as percentage of total excavation length). Results indicated a slope stability safety factor reduction ranging from 2 to 4% for partial to full excavation length. This allowed the WSDOT design team to assess both the limited overall risk of the planned temporary excavations and how temporary slot cutting could be used to further reduce risk.

3 **SR 9 Marsh Road to 2nd Street Vicinity – Widening Project, Snohomish County, WA.** Haley & Aldrich staff initially provided geotechnical value engineering (VE) during WSDOT's Cost Estimate Validation Process (CEVP) and then developed a cost-effective exploration program and geotechnical engineering design for two multi-span bridges up to 1,000 feet long across a BNSF railroad and the Snohomish River. Specific design features included 10-foot-diameter drilled shafts more than 200 feet deep and large-diameter driven steel pipe piles to support bridge loads. The project included advanced laboratory testing including constant rate of strain consolidation testing, direct simple shear testing, and cyclic direct simple shear testing of soft alluvial soil and deep soft lacustrine deposits. Seismic design included a site-specific seismic response analysis with adjustments for two-dimensional basin effects, and an evaluation of potential lateral spreading loads on the drilled shafts along the Snohomish River. A portion of the embankment widening required the use of aggregate stone columns to protect one of the bridge abutments from flow failure loads. Significant road widening embankment fill required careful evaluation of total and differential settlement over the soft and liquefiable flood plain alluvial deposits. Both short-term and long-term embankment fill stability were analyzed (SLIDE modeling), resulting in specifying staged embankment construction to protect the temporary stability of the embankment during construction. Steepened slopes were used to avoid impacting wetlands, resulting in a tiered reinforced slope system.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Drilled shafts
- ☑ Slope stability
- ☑ Fill and compaction
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Seismic effects – foundations
- ☑ Liquefaction effects – slope stability
- ☑ Liquefaction effects – foundations
- ☑ Highway bridges
- ☑ Driven piles
- ☑ Ground improvement
- ☑ Excavation and shoring
- ☑ Settlement analysis
- ☑ Field test data
- ☑ Seismic effects – slope stability
- ☑ Liquefaction evaluation

Key Staff

● PIC/EOR: Brice Exley ● PM: Rolf Hyllseth ● TC: Zach Yell

Value Statement

Site specific hazard analysis and light-weight embankment fill options resulted in optimized design at reduced cost.

4 I-90/Cabin Creek I/C to W Easton I/C Phase 3, Kittitas County, WA. Haley & Aldrich was asked by the State Geotechnical Office (SGO) staff to provide advanced numerical modeling (Plaxis computer analysis) and geotechnical expertise for a 50-foot-tall mechanically stabilized earth (MSE)/tieback soldier pile hybrid retaining wall supporting new I-90 eastbound (EB) lanes on a slope, as part of the Snoqualmie Pass East construction project. The size and complexity of the soldier pile supported MSE wall structural system required sophisticated computer modeling to evaluate wall loads and predicted movements, to validate the design tools being used by SGO. Haley & Aldrich performed multiple iterations of a 2-dimensional (2D) Plaxis model to study the performance of traditional geosynthetic and welded wire MSE reinforcement options. Modeling included calibration of constitutive models using historical information, validation of the wall performance based on past case histories and looking at differences in results for varying backfill assumptions. Our staff extracted tieback loads, lateral earth pressure estimates, MSE reinforcement loads, and deformations at multiple locations to allow SGO staff to compare/validate their analysis methods, resulting in higher assurance that the complex hybrid wall system would work. Our modeling included a creative implementation of reinforcement elements to overcome shortcomings of the geosynthetic elements built into PLAXIS, resulting in a new software element released to the public by PLAXIS. We also helped assess risks of construction staging based on predicted wall performance to increase construction efficiency.

Relevance to WSDOT Area 1

☑ Retaining walls
☑ Slope stability
☑ Fill and compaction
☑ Laboratory test data

Key Staff

- PIC: Brice Exley
- PM: Jeff Bruce
- EOR: Todd Mooney (SGO)
- TC: Brice Exley/Tony Allen (SGO)

Value Statement

Provided advanced computer modeling validating a new WSDOT hybrid soldier pile/MSE wall system.

5 SR 544 UNT to Fourmile Creek FP, Lynden, WA. Haley & Aldrich provided geotechnical design for a 40-foot-long buried structure and associated wing walls. Given a significant SGO drill rig availability backlog during the 2020 pandemic, timely exploration was not feasible. Instead, we relied on preliminary scoping boring information coupled with experienced understanding of consistent subsurface stratigraphy and hand borings to confirm peat depth for final design. This allowed geotechnical design to proceed uninterrupted to maintain WSDOT project delivery schedule, using a reasonably conservative design approach without the need for additional exploration drilling. The foundation design was complicated by presence of a settlement-sensitive peat deposit below the planned structures. To avoid long-term settlement

Relevance to WSDOT Area 1

☑ Retaining walls
☑ Spread footings
☑ Slope stability
☑ Fill and compaction
☑ Settlement analysis
☑ Laboratory test data
☑ Field test data
☑ Liquefaction evaluation

Key Staff

- PIC: Jeff Wagner
- PM/EOR: Rolf Hyllseth
- TC: Luke Kevan/Brice Exley/Michael Liu

Value Statement

Strategic use of lightweight fill and computer settlement evaluation of deep peat layer led to cost-effective design.

and the high cost of ground improvement, Haley & Aldrich designed wing walls to be backfilled with low density cellular concrete (LDCC). Based on consolidation test results, field vane shear testing, and advanced knowledge of peat soil behavior, a 3-dimensional settlement analysis was performed to assess potential long-term settlement, accounting for historical settlement and aging below the existing embankment. Steel reinforcement within the LDCC backfill helped provide overall global stability (SLIDE modeling) and allowed for the use of shotcrete fascia in lieu of conventional cast-in-place concrete wing walls, which would be seismically unstable over the deep peat subgrade.

6 **I-90/SR 900 Lewis, West Village Park, Schneider Creek FP DB, King County, WA.** Haley & Aldrich developed contract documents for this DB FP bundle involving multiple new buried structure and bridges along Lewis and West Village Park/Schneider Creeks below I-90 and SR 900. Work was done in close coordination with SGO staff and the Project Engineering Office (PEO) to meet complex project delivery requirements. Our staff wrote the Request for Proposal (RFP) Section 2.6 technical requirements and compiled multiple geotechnical baseline and data reports, several geotechnical reference documents, geotechnical interpretive reports, and probabilistic seismic hazard analysis (PSHA) memoranda. To meet WSDOT Critical Corridor requirements, we performed seismic hazard analyses and provided response spectra contract documents for each FP site along I-90. The conceptual project design included re-routing West Village Park Creek 1,300 feet along I-90 to combine with Schneider Creek, requiring a permanent tieback soldier pile retaining wall system. A portion of this wall will be constructed within glaciolacustrine, slickensided clays, requiring use of reduced design shear strengths. Haley & Aldrich developed reduced strength parameters based on advanced soil laboratory testing and a field electrical resistivity array, and evaluated global stability (SLIDE modeling) of a conceptual tieback soldier pile wall for project feasibility/planning purposes.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Excavation and shoring
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Seismic effects – foundations
- ☑ Highway bridges
- ☑ Slope stability
- ☑ Fill and compaction
- ☑ Field test data
- ☑ Seismic effects – slope stability
- ☑ Liquefaction evaluation

Key Staff

- PIC: Mike Schmitz
- PM/EOR: Luke Kevan/Michael Chamberlain
- TC: Brice Exley/Michael Chamberlain

Value Statement

Provided advanced analysis of tieback soldier pile wall in slickensided clays to allow a critical creek relocation to optimize project design.

7 SR 539/Duffner Ditch FP, Lynden, WA. Haley & Aldrich staff provided geotechnical design for a 100-foot-long buried structure and associated wing walls. The foundation design was complicated by the presence of potentially liquefiable alluvial soil below the planned structures, resulting in post-liquefaction global instability of the wing walls. Based on global slope stability analysis (SLIDE modeling), Haley & Aldrich used a multifaceted design approach to provide separate engineering solutions for different wall locations, heights, and orientations. Relatively short walls less than 10 feet tall were aligned to not impact the traveled roadway in case of total seismic collapse. For a longer, taller wall that could not be reoriented, Haley & Aldrich designed a geosynthetic reinforced structural earth wall with elongated basal reinforcement, improving global stability in the post-seismic liquefied case. This design was optimized by allowing the wall to settle with the buried structure and roadway. Our analysis incorporated laboratory based residual liquefied soil shear strength, mitigating the risk of punching failure that could potentially allow wall to collapse and impact traveled way. This avoided use of more costly ground improvement.

Relevance to WSDOT Area 1

☑ Retaining walls ☑ Spread footings
☑ Slope stability ☑ Fill and compaction
☑ Liquefaction evaluation
☑ Liquefaction effects – slope stability
☑ Liquefaction effects – foundations

Key Staff

- PIC: Jeff Wagner
- PM/EOR: Rolf Hyllseth
- TC: Luke Kevan/Brice Exley/Michael Liu

Value Statement

Used different design solutions for various wall locations and ground conditions to optimized design avoiding costly ground improvement.

8 SR 169 Ravensdale FP/King County Bridges, King County, WA. This project replaced a fish barrier culvert with a 121-foot-long, single-span highway bridge where SR 169 crosses Ravensdale Creek. Design and construction included two cantilever concrete curtain walls, two cantilever concrete wingwalls, and two structural earth walls up to 142 feet long. The project also included construction of a 110-foot-long, 20-foot-high, single-span pedestrian bridge for King County along a fish barrier railroad embankment. This highway bridge required evaluation of excavation and shoring, embankment and abutment/wall construction, fill placement and compaction, cofferdam construction, and dewatering. We reduced the overall amount of earthwork, project timeline, and structural costs by recommending structural earth walls instead of conventional cast-in-place concrete walls. Instead of supporting the pedestrian bridge on conventional concrete foundation wall abutments, Haley & Aldrich recommended and designed less costly MSE wall supported bridge abutments, requiring

Relevance to WSDOT Area 1

☑ Retaining walls ☑ Highway bridges
☑ Spread footings ☑ Slope stability
☑ Fill and compaction ☑ Laboratory test data
☑ Field test data ☑ Seismic effects – slope stability
☑ Seismic effects – foundations ☑ Liquefaction evaluation

Key Staff

- PIC: Dan Trisler
- PM/EOR: Luke Kevan
- TC: Tony Allen (SGO)

Value Statement

Designed truncated MSE wall supported abutments, reducing open cut excavation volume/height and saving construction time and costs.

less construction time. The reinforcement of the planned MSE wall was truncated to reduce the amount of required earthwork and project costs. Haley & Aldrich advocated for allowing the truncated MSE wall design on the dense glacial bearing soil, based on bearing/global slope stability analysis (previously only allowed on bedrock). The project required skillful project management and consistent communication to balance the interests of both WSDOT and King County as primary stakeholders. We managed both bridge projects under one task, providing design efficiency and additional cost savings.

9 **I-82/SR 14 Plymouth Weigh Station, Benton County, WA.** Haley & Aldrich staff provided geotechnical engineering for a new weigh station facility, involving construction of a scale house building and stormwater infiltration ponds. We provided geotechnical parameters for shallow foundation design, based on the international building code (IBC). We planned the subsurface exploration program and worked with SGO/PEO to understand project performance expectations and to provide efficient recommendations. Haley & Aldrich staff performed pilot infiltration tests (PIT) to confirm design infiltration values. A Haley & Aldrich hydrogeologist assessed soil hydraulic conductivity and helped the PEO better understand the results of the PITs. This reduced the potential risks associated with selecting appropriate soil infiltration value for final stormwater pond design.

Relevance to WSDOT Area 1

☑ Spread footings
☑ Fill and compaction
☑ Field test data

Key Staff

- PIC/EOR: Mike Schmitz
- PM: Jeff Bruce
- TC: Roy Jensen (hydrogeologist)

Value Statement

Our hydrogeologist provided large-scale PIT field testing to confirm soil infiltration rates for pond design, improving long-term system performance.

10 **SR 542 Squalicum Creek FP, Whatcom County, WA.** This project replaced a fish barrier culvert with a roughly 55-foot-high, 105-foot-long, single-span highway bridge where SR 542 crosses Ravensdale Creek. We collaborated with SGO senior staff and PEO to develop the best solution with respect to geotechnical, structural, scheduling, and cost considerations. This resulted in selection of a hybrid, lightweight MSE/LDCC abutment system with shotcrete wall fascia to minimize structure settlement over soft Bellingham Drift Clays. We performed direct simple shear (DSS), cyclic direct simple shear (CDSS), constant rate of strain consolidation (CRS), and consolidated undrained (CU) triaxial laboratory tests to assess clay strength and consolidation

Relevance to WSDOT Area 1

☑ Retaining walls
☑ Highway bridges
☑ Spread footings
☑ Slope stability
☑ Landslides
☑ Settlement analysis
☑ Laboratory test data
☑ Field test data
☑ Seismic effects – slope stability
☑ Seismic effects – foundations
☑ Liquefaction evaluation

Key Staff

- PIC/EOR: Mike Schmitz
- PM/EOR: Jeff Bruce
- TC: Brice Exley/Todd Mooney (SGO)/Tony Allen (SGO)/Rolf Hyllseth

Value Statement

Used advanced laboratory testing and cutting-edge MSE/LDCC research to develop a cost-effective, reduced schedule bridge abutment design.

properties. Haley & Aldrich collaborated with SGO staff to assign appropriate LDCC design parameters for global, internal, and compound abutment wall stability analyses, based on current industry LDCC research. A permanent sheet pile cofferdam provided temporary construction excavation support, long-term scour protection, and enhanced global wall stability. Haley & Aldrich worked with SGO to develop a field instrumentation program to monitor LDCC behavior during construction and provide valuable data for future research and design. Haley & Aldrich licensed geologist staff also evaluated stability and potential risk of future reactivation of a mapped landslide near project area, assessing the risk of future landslide activity affecting the new structure to be low, based on slope stability analysis and evaluation of potential debris flow path. Slope inclinometers were installed and monitored to provide early warning of potential slide creep during construction excavation. During construction, we proactively worked with SGO and the contractor to help foster a strong teaming environment that led to successful delivery of the project.

11 **I-90/SR 18 I/C to Deep Creek – I/C Improvements and Widening DB, King County, WA.** The project will construct a four-lane diverging diamond interchange at the I-90 and SR 18 interchange, in combination with the widening of SR 18 to four lanes. Haley & Aldrich provided geotechnical support to Stantec and the design builder for the design of two bridges with deep foundations, an MSE wall supported abutment type bridge, and several fish-passable structures. We used advanced analyses such as a finite element modeling to simulate the unique hybrid soldier pile walls to be constructed with micropiles below the existing I-90 bridges. We evaluated the need for site-specific hazard analyses, carefully evaluating the nearby faults and disaggregation for the site. This was accomplished with direct communication with the U.S. Geological Survey (USGS) to understand the cause of differences between different seismic source models. This research allowed us to confidently use the current code-based seismic design criteria and avoided the added design duration associated with a site-specific hazard analysis.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Slope stability
- ☑ Excavation and shoring
- ☑ Laboratory test data
- ☑ Seismic effects – slope stability
- ☑ Highway bridges
- ☑ Drilled shafts
- ☑ Landslides
- ☑ Fill and compaction
- ☑ Field test data
- ☑ Seismic effects – foundations

Key Staff

- PIC/EOR: Mike Schmitz
- PM/EOR: Barbara Thunder
- TC: Brice Exley/Jenna Jacoby/Zach Yell/Michael Chamberlain

Value Statement

Completed finite element model to predict deformations imposed on the existing settlement-sensitive I-90 bridges.

12 I-405/Renton to Bellevue Widening and Express Toll Lanes DB, King County, WA. Haley & Aldrich provided geotechnical design for this DB project that involved four complex bridge structures: an MSE supported single-span bridge, a lightweight MSE/LDCC abutment supported bridge (to reduce surcharge loads on adjacent structure), a narrow infill bridge between the existing SE 8th Street north and south overpass bridges, and the new Main Street bridge. We analyzed and designed MSE walls, soil nail walls, a semi-gravity wall, soldier pile walls, and a unique tiered wall system including a partially backfilled soldier pile wall supporting an MSE wall. Several of these walls required evaluation of the seismic effects on overall slope stability of the wall (SLIDE modeling). This included deformation analyses for one of the MSE walls due to site constraints and to protect existing structures/site conditions. Site-specific shear modulus values were provided to the structural design teams to evaluate the seismic effects on the bridge foundations. At the 112th Street intersection, Haley & Aldrich also analyzed potential settlement of driven piles for two new single-span bridges. This involved advanced neutral plane analyses using soil properties from sophisticated interpretation of cone penetration test (CPT) data. One of the new pile-supported bridges required particularly close coordination with two separate structural design teams to evaluate the seismic effects of the interaction between the bridge piles and tieback soldier pile wall beneath the bridge. Haley & Aldrich also provided PSHA and disaggregation for the project. Geophysical surface wave measurements were collected to refine the site class at one of the bridge locations.

Relevance to WSDOT Area 1

☑ Retaining walls
☑ Driven piles
☑ Settlement analysis
☑ Seismic deaggregation
☑ Seismic effects – foundations
☑ Highway bridges
☑ Fill and compaction
☑ Field test data
☑ Seismic effects – slope stability

Key Staff

- PIC/EOR: Brice Exley/Mike Schmitz
- PM: Barbara Thunder
- TC: Jenna Jacoby/Alessandra Connors/Michael Chamberlain

Value Statement

Provided site-specific hazard analyses that more accurately estimate seismic hazard along project alignment.

13 I-5 – Portland Avenue to Port of Tacoma Road Southbound HOV DB, Pierce County, WA. Haley & Aldrich provided geotechnical engineering analysis and design for this 2-mile-long DB project involving multiple bridges and a variety of wall types,

Relevance to WSDOT Area 1 *(Project 13)*

☑ Retaining walls
☑ Driven piles
☑ Ground improvement
☑ Fill and compaction
☑ Laboratory test data
☑ Seismic deaggregation
☑ Seismic effects – foundations
☑ Liquefaction effects – slope stability
☑ Liquefaction effects – foundations
☑ Highway bridges
☑Drilled shafts
☑ Slope stability
☑ Settlement analysis
☑ Field test data
☑ Seismic effects – slope stability

Key Staff

- PIC/EOR: Barry Chen/Mike Schmitz
- PM: Jenna Jacoby
- TC: Brice Exley

Value Statement

Evaluated existing ground improvements to validate their contribution in extreme limit states.

including use of lightweight geofoam wall backfill. Much of the project alignment is located over liquefiable and soft material, which necessitated evaluation of potential long-term settlement, seismic-induced settlement, and seismic-induced strength loss. This included the new Southbound Bridge over the Puyallup River, which was designed using stone column ground improvement near the river to resist lateral spreading, similar to what was installed by WSDOT at the recently constructed Northbound Bridge. However, new evaluation methods suggested the existing ground improvement may perform differently than originally assumed during design, resulting in the need to evaluate the impacts of liquefaction strength loss on the stability of the walls and drilled shaft lateral loading. Haley & Aldrich also performed peer reviewed site-specific hazard, disaggregation, and ground motion response analyses that received unsolicited positive feedback from the WSDOT SMEs.

14 **US 101/SR 116 North Olympic Peninsula – Remove Fish Barriers DB, Clallam and Jefferson County, WA.** Haley & Aldrich is providing geotechnical engineering for this DB project to construct one FP buried structure and three bridges. The project includes a 40-foot-long buried structure with a clear span width of approximately 70 feet to be constructed over soft soil. A key design aspect was to evaluate and mitigate liquefaction impacts on bearing capacity and overall stability of several bridge abutment walls and buried structures. We performed seismic CPTs to supplement existing exploration boring information, providing quicker turnaround than additional borings to meet a tight design schedule. Haley & Aldrich leveraged our extensive knowledge of CPT data interpretation to refine design parameters derived from previous boring samples. This identified inaccuracies in prior laboratory tests and resulted in reinterpreting of some of the soft soils as non-liquefiable clay. Based on this, we recommended a shallow overexcavation solution instead of deep ground improvement to mitigate liquefaction, resulting in reduced construction risk and environmental impacts. Site-specific racking analyses accounting for the anticipated shear modulus reduction curves of the backfill material were provided for buried structure design. We specified multichannel analysis of surface waves (MASW), horizontal to vertical spectral ratio (HVSR), and 2D resistivity geophysical tests to help inform our understanding of subsurface conditions between boring and CPT exploration locations, reducing the uncertainty and potential for unanticipated conditions during construction in unexplored areas of the site.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Slope stability
- ☑ Settlement analysis
- ☑ Field test data
- ☑ Seismic effects – slope stability
- ☑ Seismic effects – foundations
- ☑ Liquefaction effects – slope stability
- ☑ Liquefaction effects – foundations
- ☑ Highway bridges
- ☑ Drilled shafts
- ☑ Fill and compaction
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Liquefaction evaluation

Key Staff

- PIC/EOR: Brice Exley
- PM: Barbara Thunder

Value Statement

Evaluation of CPT results and retesting of existing samples identified different soil conditions, saving construction costs.

15 **I-5 Steilacoom-DuPont Road to Thorne Lane Corridor Improvements DB, Pierce County, WA.** This I-5 widening project near Joint Base Lewis-McChord involved constructing a new northbound I-5 auxiliary lane and reconstructing the Berkeley Street and Thorne Lane interchanges, which included three new bridges over I-5 and grade separation over the Sound Transit railroad. Other major work included utility relocation, earthwork grading, highway bridge construction and demolition, spread footings, settlement analysis, retaining walls, slope stability, excavation and shoring, stormwater management facilities, paving, noise walls, and overhead and sign structures. The primary challenge on this project for Haley & Aldrich was schedule. Through careful scheduling and effective communication between WSDOT and the geotechnical team, all deliverables were completed and released for construction within the required timeline, including the Berkeley Bridge Foundation and Wall Technical Memo, and the requisite submittals.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Excavation and shoring
- ☑ Settlement analysis
- ☑ Field test data
- ☑ Highway bridges
- ☑ Slope stability
- ☑ Fill and compaction
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Seismic effects – slope stability
- ☑ Seismic effects – foundations

Key Staff

- PIC/EOR: Mike Schmitz
- TC: Jenna Jacoby

Value Statement

Delivered the early works package for bridge foundations within three months of notice to proceed.

16 **OR-24FP Olympic Region Design Engineering – 24 FP, Jefferson & Kitsap Counties, WA.** HWA is currently serving as the project manager providing geotechnical engineering services for the construction of eight buried structures in support of the OR-24FP project that will deliver a total of 24 FP barrier removals. These fish barriers will be replaced with a combination of bridges and four-sided box structures, some of which will be delivered as DB projects. Engineering services included laboratory testing and field explorations evaluating liquefaction potential, anticipated long-term and liquefaction settlement, and slope stability, design recommendations for retaining structures, drilled shaft foundations, temporary shoring, stormwater facilities, and pavement design. Additionally, risk analysis was performed as part of alternatives evaluations and engineering services for seismic deaggregation,

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Slope stability
- ☑ Fill and compaction
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Seismic effects – foundations
- ☑ Liquefaction effects – slope stability
- ☑ Liquefaction effects – foundations
- ☑ Highway bridges
- ☑ Drilled shafts
- ☑ Excavation and shoring
- ☑ Settlement analysis
- ☑ Field test data
- ☑ Seismic effects – slope stability
- ☑ Liquefaction evaluation

Key Staff

- PIC/EOR/PM/TC: Sandy Brodahl (HWA)

Value Statement

Provided timely geotechnical support to multiple design teams for FP bundles with overlapping timelines, meeting schedule and budget.

slope, and foundation stability are being provided to assist with the successful completion of this project.

17 **SR 3/SR 16/SR 166 Gorst Vicinity – Remove Fish Barriers, Gorst Vicinity DB, WA.** This project will be delivered as a DB project and includes five locations within the Gorst vicinity. To prepare DB RFQ and RFP documents and assist WSDOT in support of the DB procurement process, HWA coordinated a geotechnical site investigation and related geotechnical evaluations for the FP structures included in this project/bundle. The types of structures to be advanced to a preliminary design include three single-span bridges, one three-span bridge, and one prestressed slab girder bridge. As part of the exploration program, 15 geotechnical borings were drilled within WSDOT right-of-way, requiring extensive coordination with WSDOT to ensure their safe completion. Laboratory testing and analysis included soil and rock shear strength, soil consolidation, compaction, and soil permeability. Analysis and recommendations for this project included American Association of State Highway and Transportation Officials (AASHTO) seismic design parameters, settlement evaluation, liquefaction analysis, global stability evaluations, drilled shaft foundations, retaining walls, slope stability, and preliminary infiltration rates for stormwater facilities.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Spread footings
- ☑ Slope stability
- ☑ Fill and compaction
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Seismic effects – foundations
- ☑ Liquefaction effects – slope stability
- ☑ Liquefaction effects – foundations
- ☑ Highway bridges
- ☑ Drilled shafts
- ☑ Excavation and shoring
- ☑ Settlement analysis
- ☑ Field test data
- ☑ Seismic effects – slope stability
- ☑ Liquefaction evaluation

Key Staff

- PIC/EOR/PM/TC: Sandy Brodahl (HWA)

Value Statement

Evaluated and provided geotechnical recommendations for multiple bridge options to optimize project construction cost and schedule.

18 **SR 302 Victor Area Corridor Planning Study, Victor, WA.** For decades, landslides and roadway collapses near Victor have resulted in partial or full closures of SR 302, causing significant impacts to communities spanning both Mason and Pierce Counties. The goal for this project was to evaluate potential mitigation options for slides along the coastal roadway that could also support improvements to safety, multimodal mobility, and resiliency within the communities. The project required HWA to perform an extensive historical data review of decades worth of reports for the area and to implement a field exploration program to monitor existing, and install new, inclinometers and groundwater monitoring wells. HWA used the accumulated information

to demonstrate that the slides were within a larger, deep-seated slide caused by changes in groundwater elevations related to seasonal rains and high tide events. Based on this information, HWA developed a number of possible mitigation recommendations, including horizontal drains, lightweight cellular concrete, slope anchors and retaining walls design, drilled shaft foundations, ground improvement, slope stability, excavation and shoring, fill placement and compaction, laboratory testing, and geophysical data.

Relevance to WSDOT Area 1

- ☑ Retaining walls
- ☑ Ground improvement
- ☑ Landslides
- ☑ Fill and compaction
- ☑ Laboratory test data
- ☑ Seismic deaggregation
- ☑ Seismic effects – foundations
- ☑ Liquefaction effects – slope stability
- ☑ Liquefaction effects – foundations
- ☑ Drilled shafts
- ☑ Slope stability
- ☑ Excavation and shoring
- ☑ Settlement analysis
- ☑ Field test data
- ☑ Seismic effects – slope stability
- ☑Liquefaction evaluation

Key Staff

- PIC/EOR/PM/TC: Sandy Brodahl (HWA)

Value Statement

Used seismic deaggregation to develop multiple landslide mitigation options to optimize/align with project goals and schedule.

Criterion 2 Qualifications of the Proposed Senior Level Geotechnical Engineer

A. QUALIFICATIONS AND EXPERTISE OF THE CONSULTANT'S SENIOR LEVEL GEOTECHNICAL ENGINEER

Haley & Aldrich has selected Rolf Hyllseth, P.E., L.G., to be our contract manager and Senior Level Geotechnical Engineer (SLGE) for this contract. For the last four years, Rolf has served as contract manager and a team leader for Haley & Aldrich under our current Geotechnical Engineering Personnel Augmentation Contract (Agreement Number Y-12335) with SGO. In this role as Lead Senior Level Geotechnical Personnel (SLGP), he has been responsible for ***overall management and deliverable quality control (QC) for over 50 Haley & Aldrich assigned geotechnical design projects and support tasks.***

He has worked closely with Haley & Aldrich task and project managers, senior SGO management, regional PEO engineers, and WSDOT design team consultants to help deliver ***dozens of successful geotechnical design projects to almost all WSDOT regions.***

Rolf Hyllseth, P.E., L.G.

Haley & Aldrich

WA: Professional Civil Engineer (1994)
Registration No. 31760

WA: Licensed Geologist (2002)
Registration No. 1615

34 years of experience

He has also served as ***geotechnical EOR*** and directly managed SGO project delivery of several highway improvement and FP projects, such as the ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project***, ***SR 544 UNT to Fourmile Creek FP***, and ***SR 539/Duffner Ditch FP*** (see project descriptions under Criterion 1). With this recent experience working as an extended member of SGO, Rolf has intimate knowledge of the WSDOT Geotechnical Project Delivery system and processes and is uniquely suited and qualified to serve as SLGE for this contract.

B. FAMILIARITY WITH STATE DESIGN AND CONSTRUCTION STANDARDS

Because most State transportation projects require familiarity with both the WSDOT Geotechnical Design Manual (GDM) and AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications (AASHTO LRFD), we are presenting Rolf's combined experience with these geotechnical design standards in this section.

Rolf has referenced and used various versions of the GDM and AASHTO LRFD manuals on both commercial and public infrastructure projects for more than 30 years, in addition to attending a week-long Federal Highway Administration (FHWA) workshop on AASHTO LRFD design. His project design experience referencing the GDM and AASHTO LRFD include complicated WSDOT highway and bridge design projects, such as the following:

- ***SR 520 Floating Bridge and Landings Replacement.*** Rolf led the Haley & Aldrich slope stability analysis for the 40-foot submarine gravity anchors and 10-foot drilled shaft foundations, involving:
  - Lateral foundation soil loading and sliding resistance analysis;
  - Evaluation of low-strength submarine soil parameters under 40 feet of water/artesian pressure;
  - Evaluation of drilled shaft shear pile resistance contributing to overall slope stability; and
  - Seismic loading on drilled shafts from potential post-liquefaction soil/slope flow failures.

  This all required an intimate understanding of both the GDM and AASHTO LRFD bridge design procedures. He worked with the DB team to identify risk-based design solutions, including identification of the seismic lateral loads on the shafts from potential slope failure, which was used to optimize the drilled shaft design.
- ***I-5 M Street to Portland Avenue – HOV/CRIP.*** Rolf was lead soil nail wall designer, evaluating the influence of existing upper walls and foundation surcharge and reduced pseudo-static loading on the new 70-foot-high permanent soil nail wall system, referencing both the GDM and AASHTO seismic design standards. The cost-saving design took advantage of incorporating support from a partially buried, existing upper soil nail wall into the new wall design, allowing elimination of about 1,000 feet of cast-in-pace retaining walls.
- ***Tumwater Boulevard and I-5 Interchange Improvements.*** Rolf provided senior engineering review and geotechnical design using AASHTO LRFD and GDM procedures for the City of Tukwila. Construction included bridge widening requiring several significant MSE and cast-in-place retaining walls, bridge pier foundation design over liquefiable soil (residual shear strength design), and liquefaction mitigation using ground improvement (compaction grouting).
- ***King County Foothills Trail Phase 2 – White River Crossing to 252nd Ave SE.*** As geotechnical EOR, Rolf worked with a multi-disciplinary design team for a 2-mile-long trail project involving foundation design for a 240-foot bridge span over the White River. In addition to bridge foundations, he designed MSE Ultrablock retaining walls, soil nail walls, and a micropile shear reinforcement system for a 30-foot vertical creek erosion bluff. Rolf worked closely with the structural engineer to develop an AASHTO

micropile LRFD shear pile design that was consistent with the allowable stress design (ASD) slope stability analysis approach.

As Lead SLGP for Haley & Aldrich under our current SGO Staff Augmentation Consultant Contract over the past four years, Rolf has gained an even deeper understanding of both the GDM and the AASHTO LRFD. This includes referencing the GDM and AASHTO LRFD as a project manager on several contract tasks, such as the ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project*** (see project description under Criterion 1). As part of this recent work, he has often reviewed and discussed GDM and AASHTO LRFD design requirements with the State Geotechnical Engineer and other SGO geotechnical staff.

Finally, Rolf has over the past year been deeply involved with the development of the ***next edition of the GDM.*** As manager of the Haley & Aldrich team assigned by SGO to update/rewrite several of the new GDM chapters, he has reviewed, edited, and helped write many of the new chapters. This has involved extensive discussions with Haley & Aldrich chapter authors, the State Geotechnical Engineer, SGO staff, and other geotechnical consultants, regarding how much design direction/guidance and construction risk management is appropriate to include in the GDM.

C. FAMILIARITY WITH PROJECT MANAGEMENT

Over the past four years, Rolf has served as Haley & Aldrich Augmentation Contract Lead SLGP for our team of three principal engineers, four geotechnical task managers, and many other Haley & Aldrich professional staff. In this role, Rolf has been responsible for managing all consultant contractual matters and overall WSDOT project delivery aspects of Haley & Aldrich assigned tasks.

He has also directly managed several contract project tasks, such as the ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project,*** a complex multi-year, multi-bridge, complex roadway widening project where Rolf was responsible for overall project management and overseeing geotechnical design. As a result, he has intimate knowledge of all WSDOT project management procedures, including project scoping (scope of work and cost estimate [SOWCE]) and project budget/schedule tracking for SGO and regional PEOs, to name a few. As such, he knows what is required to be an effective project manager within the WSDOT work environment.

Some unique examples of project management experience Rolf has gained over the years include:

- ***Port of Seattle Terminal 18 Redevelopment***, where Rolf served as ***DB QC manager*** for a two-year DB project that included major repaving, utility upgrades, and construction of new flyover bridge structures for the largest container facility in the Pacific Northwest (almost 200 acres).
- ***General Metals of Tacoma Site Improvements***, where Rolf served as ***owner's representative*** and ***QC manager*** for a five-year construction project involving installation of a low-permeable asphalt capping layer over a continuously operating, 22-acre ferrous scrap metal recycling facility.

As a result of serving in these various geotechnical consultant roles, Rolf has gained a unique perspective of seeing the value of good project management and communication skills from the viewpoint of all stakeholders in the building design and construction process. This varied experience has given him the ability to effectively manage and prioritize his project work considering the interests of all design team members and project stakeholders.

Rolf has over 30 years of direct experience with project management at all stages of the project delivery process, including scope development, budgeting, scheduling, engineering design, and final document deliverable production. He understands the importance of clear and frequent team/client communications and work prioritization to meet project schedule and budget goals, especially when

these are controlled by outside factors beyond the engineering design. Examples of this include client-driven priorities or permitting restrictions, such as in-water fish window construction limitations.

1. Experience managing multiple projects with overlapping schedules

Over the past four years as Haley & Aldrich Augmentation Contract Lead SLGP, Rolf has continuously tracked and coordinated scoping, design, and general project delivery for several dozen contract tasks/projects assigned to Haley & Aldrich. All of these have involved overlapping exploration planning and design schedules. With detailed planning, proactive communication, and careful coordination with internal design staff, SGO staff, and WSDOT design teams, Rolf has been able to ensure that Haley & Aldrich has successfully delivered these geotechnical project design tasks to the regional PEOs within the timeframe required for WSDOT project advertisement.

More specifically, Rolf was Haley & Aldrich project manager for *the* ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project***, a complex multi-year, multi-bridge highway project. As such, he was responsible for tracking and coordinating all aspects of SGO geotechnical project delivery to the regional PEO. His project management included overseeing scope development and budget tracking; field exploration; engineering design; plans, specifications, and cost estimates (PS&E); document review; PEO design team coordination; WSDOT VE; and timely delivery of all required geotechnical engineering documentation. This project required careful planning and coordination of many different, time-sensitive, and overlapping exploration/design tasks. Prioritizing and providing timely, reliable, preliminary geotechnical design information to a multi-disciplinary design team was key to keep the overall project on schedule.

Throughout his long career as a consulting engineer, Rolf has continuously managed multiple projects and deadline-driven tasks at any given time. This has given him a keen understanding of the importance of task prioritization and proactive engagement with various internal and external project design team members and clients to meet deliverable deadlines and achieve design/project goals.

2. Experience prioritizing limited resources to optimize project delivery

During the 2020 pandemic, WSDOT exploration drilling operations were put on hold for many months, resulting in a backlog of scheduled drilling projects. Boring explorations were required to supplement previous preliminary scoping explorations for final buried structure design on the ***SR 544 UNT to Fourmile Creek FP*** project. Waiting for availability of drill rigs to collect subsurface data for final design would have significantly delayed the overall project. Instead, Rolf reprioritized available resources and devised an alternate approach, relying on the preliminary boring information coupled with experienced understanding of consistent subsurface stratigraphy and hand borings to confirm peat depth for final design. This allowed geotechnical evaluation to proceed uninterrupted to maintain WSDOT project delivery schedule, using a reasonably conservative design approach without the need for additional exploration drilling.

As Haley & Aldrich Augmentation Contract SLGP Team Lead, Rolf has been overseeing and coordinating internal staff assignment, scoping, exploration activities, engineering milestones, and preparation of geotechnical deliverables for all contract tasks assigned to Haley & Aldrich. In this role, he is constantly juggling and prioritizing multiple required tasks to meet various deliverable timelines and deadlines of varying importance. This can at times put significant strain on one of the most valuable limited resources—availability of time itself. When this happens, Rolf steps in to work with our staff to prioritize and reassign tasks as necessary to fulfill contractual obligations and optimize delivery of time-critical engineering design and documentation.

After 34 years practicing as a consulting geotechnical engineer, Rolf understands the importance of prioritizing use of limited resources to achieve project design and schedule goals. He has developed the ability to recognize ways to do the work smarter, quicker, and more cost-effectively, whenever possible.

3. Experience as a subject matter expert on multi-disciplinary teams delivering complex transportation projects

Rolf has provided geotechnical SME support for multi-disciplinary design teams on many WSDOT projects, most recently as part of our current SGO Staff Augmentation Consultant Contract. One example of this is ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project*****,** a complex multi-year, multi-bridge roadway widening project where Rolf was responsible for overall project management and overseeing geotechnical design. As such, he provided valuable geotechnical input to the WSDOT design team during the initial VE and subsequent CEVP phases. This included both technical and cost-related information for several proposed cost-saving measures considered as part of the WSDOT VE process. Rolf proposed and presented detailed conceptual design approach to the CEVP group for the use of LDCC and geofoam fill to reduce anticipated embankment settlement over soft, fine-grained, alluvial soils.

Other examples where Rolf provided geotechnical SME support for multi-disciplinary design teams include:

- ***SR 520 Floating Bridge and Landings Replacement***, involving complex submarine gravity anchor design and drilled shaft slope stability analysis;
- ***I-5 M Street to Portland Avenue – HOV (CRIP)***, involving tall soil nail walls and seismic slope effects;
- ***City of Tukwila Tumwater Boulevard and I-5 Interchange Improvements***, involving bridge foundation and MSE wall design on ground improved subgrade; and
- ***King County Foothills Trail Phase 2 (White River Crossing to 252nd Ave SE)***, involving micropile shear pile stabilization of a 30-foot-high vertical erosional bluff.

D. FAMILIARITY WITH DESIGN BUILD PROJECT TEAM LEADERSHIP/MEMBERSHIP

Rolf has been involved with multiple DB projects in various roles as geotechnical design engineer, geotechnical SME, and QC manager. He has assisted DB teams developing cost-effective proposals on the pre-award side and he has managed geotechnical design and provided construction support after award.

1. Experience preparing geotechnical documents for design build contracts

As Haley & Aldrich Augmentation Contract SLGP Team Lead, Rolf has been responsible for overseeing development and QC review of all Haley & Aldrich deliverable documents. As such, he has guided and assisted Haley & Aldrich staff developing all contractual geotechnical documents required to develop RFP packages for several WSDOT DB projects, including:

- ***I-90/SR 161/SR 202/SR 203 FP Bundle*****;**
- ***SR 161 Hylebos Creek FP*****;**
- ***I-90/SR 900 Lewis/West Village Park/Schneider Creek FP Bundle*****;** and
- ***SR 3/SR 104/SR 303-308 Kitsap Co 29 FP Bundle (Progressive Design Build).***

These DB documents have included geotechnical data reports, geotechnical baseline reports, geotechnical reference documents (historical data and interpretive design memoranda), site-specific seismic hazard memoranda, seismic response spectra contract documents, and Section 2.6 geotechnical requirements.

2. Experience as a subject matter expert on teams supporting design build contracts

Rolf has provided geotechnical SME support for multi-disciplinary design teams on various DB projects over the past 25 years. Some examples of this include:

- ***SR 520 Floating Bridge and Landings Replacement***, involving complex submarine gravity anchor design and drilled shaft slope stability analysis;
- ***I-5 M Street to Portland Avenue – HOV (CRIP)***, involving tall soil nail walls and seismic slope effects; and
- ***Sound Transit – Downtown Redmond Link Extension (DRLE)***, where Rolf provided geotechnical SME design and advice for 21 permanent and 5 temporary soil nail walls up to 25 feet high and located at various cut areas along the alignment. Rolf was the lead soil nail wall designer for the pre-design phase of this DB project, which included evaluation of lateral loading from rail system pole foundations on the soil nail wall fascia. He provided valuable geotechnical design and construction input to the multi-disciplinary design team and his soil nail wall design was incorporated into the final post-award construction plans.

E. FAMILIARITY WITH CONSTRUCTION SUPPORT

As part of our current SGO Staff Augmentation Consultant Contract, Rolf was geotechnical EOR and has provided PEO construction support for several Haley & Aldrich assigned project tasks, such as ***SR 544 UNT to Fourmile Creek FP***, and ***SR 539/Duffner Ditch FP*** (see project descriptions under Criterion 1). As a result, he has direct experience with WSDOT's geotechnical construction support requirements and protocols, including use of the Primavera Unifier Construction Document Review System WSDOT has recently started using.

In his various roles as on-site inspector, project manager overseeing field inspection, and overall QC manager for complex transportation projects (such as ***Port of Seattle Terminal 18 Redevelopment*** project), Rolf has gained a complete understanding of the whole construction QC/QA process.

1. Experience that demonstrates familiarity with the WSDOT Standard Specifications for Road Bridge and Municipal Construction

Rolf has worked with the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction (WSS) on both private infrastructure and public transportation projects since he started his geotechnical career over 30 years ago. The following specific projects are just a few examples of this:

- ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project;***
- ***SR 544/546 Fourmile/Kamm/Pepin Creek FP;***
- ***SR 539/Duffner Ditch FP;***
- ***Port of Seattle Terminal 18;***
- ***General Metals of Tacoma***; and
- ***King County Foothills Trail Phase 2 – White River Crossing to 252nd Ave SE.***

As Haley & Aldrich SLGP Team Lead, Rolf is also responsible for ensuring consistent application of WSS to all Haley & Aldrich assigned projects/tasks.

2. Experience evaluating/reviewing contractor submittals, requests for information, and cost reduction incentive proposals

As the Haley & Aldrich Augmentation Contract SLGP over the past four years, Rolf has provided geotechnical SME support and contractor submittal/ requests for information (RFI) reviews for multiple

WSDOT projects across the state, giving him a thorough understanding of SGO's role within the WSDOT construction support process (including coordinating reviews with the WSDOT Bridge & Structures Office). He is also the lead SME reviewer coordinating all Haley & Aldrich geotechnical submittal reviews and RFI responses within the Primavera Unifier Construction Document Review System WSDOT has recently started using.

Rolf has over 30 years of experience evaluating contractor submittals, RFI, and other construction support documentation on a wide range of commercial developments and public infrastructure projects, including WSDOT transportation projects. He has reviewed construction submittal documents from a variety of perspectives—as geotechnical EOR, QC manager, and owner's representative (see ***project examples listed under subsection 1 above***).

On the ***I-5 M Street to Portland Avenue – HOV (CRIP)*** project, Rolf helped the DB team evaluate a cost reduction incentive proposal to eliminate need for 1,000 feet of cast-in-pace retaining wall, as part of his soil nail wall design.

3. Experience evaluating change of condition claims and plans errors

Rolf has over 30 years of experience evaluating contractor claims of changed conditions and plan errors on behalf of various clients and stakeholders, including Washington State Department of Enterprise Services (DES) and multiple Washington State cities and counties. Specific examples of this includes:

- ***General Metals of Tacoma Site Improvements***, where Rolf administered the contract as owner representative. This included review/approval of contractor change orders (change of conditions claims), review of construction material submittals, and facilitating interpretation and verification of contractor compliance with project plans and specifications (including plans error resolution).
- ***King County Foothills Trail Phase 2 – White River Crossing to 252nd Ave SE***, where Rolf managed geotechnical construction support and QC inspections for all aspects of the project. This included contractor submittal/RFI review, evaluating contractor changed condition claims, addressing plan errors, and providing construction (as-built) plan modifications and QC documentation.

Criterion 3 Qualifications/Expertise of Selected Consultant Staff

A. QUALIFICATIONS AND EXPERTISE OF THE CONSULTANT'S SELECTED SENIOR STAFF

Haley & Aldrich has selected the following five senior staff geotechnical engineers, four from Haley & Aldrich and one from HWA GeoSciences, to support this contract in collaboration with Rolf Hyllseth as SLGE. Each selected senior staff has more than 10 years of experience managing geotechnical projects (including WSDOT project design) and they all bring various specialized geotechnical and seismic skills. Rolf and these five senior staff will work with Haley & Aldrich's and HWA's geotechnical, geologic, seismic, and pavement technical experts to solve the geotechnical challenges WSDOT may face under this contract. They will be supported by a wide range of geotechnical staff engineers and professionals assigned to manage tasks and do the day-to-day contract work.

Mike Schmitz, P.E.

Haley & Aldrich

WA: Professional Engineer (2006) (Reg. No. 54223)

20 years of experience

Brice Exley, P.E.

Haley & Aldrich

WA: Professional Engineer (2017) (Reg No. 55274)

14 years of experience

Dan Trisler, P.E.

Haley & Aldrich

WA: Professional Engineer (2002) (Reg No. 38279)

31 years of experience

Madan Karkee, Ph.D., P.E.

Haley & Aldrich

WA: Professional Engineer (2012) (Reg No. 49586)

29 years of experience

Sandy Brodahl, P.E.

HWA GeoSciences

WA: Professional Engineer (2015) (Reg No. 52917)

13 years of experience

1A. Area of Expertise based on Scoring Criterion 1A – Geotechnical Analysis and Design

Mike has worked on many WSDOT projects that have involved a wide range of geotechnical analysis and design, as can be seen in Table 1 and the project descriptions under Criterion 1. A few examples of this include ***I-90/SR 18 I/C to Deep Creek***; ***I-405 Renton to Bellevue;*** and ***I-5 Steilacoom-DuPont Road to Thorne Lane Corridor Improvements.*** His design work on these include retaining walls, highway bridges, shallow and deep foundations, slope stability, excavation and shoring, fill placement and compaction, settlement analysis, advanced laboratory testing, and instrumentation. Mike also completed landslide analysis and/or remediation on the ***I-90/SR 18 I/C to Deep Creek*** and ***SR 542 Squalicum Creek FP*** projects, and a landslide repair on the ***SR 518 Embankment*** project in SeaTac, WA. As part of the ***SR 542 UNTs to Mitchell Creek FP,*** Mike designed ground improvements that were necessary to mitigate seismic hazards at the site.

Brice has a wide variety of geotechnical project experience covering all the areas of expertise listed in Table 1, except for landslide analysis and remediation. In addition to providing geotechnical design for large diameter driven and drilled shaft foundations, he has installed, specified, and been responsible for a significant amount and variety of load testing. Throughout his career, Brice has focused significant effort on the collection and interpretation of geotechnical data. He has actively worked to advance the laboratory testing capabilities of Haley & Aldrich's Seattle office, and is often leveraging a combination of CPTs and geophysics with conventional boring exploration to better understand site subsurface conditions. Brice was responsible for geotechnical instrumentation monitoring of the ***SR 99 Tunnel*** project and more recently during excavation and shoring on the award-winning ***Rainier Tower*** and ***Climate Pledge Arena*** projects.

As one of Haley & Aldrich's geotechnical principals in the Pacific Northwest, Dan has broad responsibility for managing, executing, and reviewing technical work. He is well-versed in all of the areas of expertise listed in Table 1, though he is mostly a go-to resource for retaining walls, single-span bridges, spread footings, driven piles, ground improvement, earthwork and shoring, and field investigations. Some examples of Dan's recent WSDOT project work related to Table 1 areas of expertise include ***SR 169 Ravensdale FP*** (see Criterion 1 project description) and various others—such as ***SR 104 Lyon Creek FP***, ***SR 4 Cathlamet Luminaries***, and ***SR 500 Pedestrian Bridge***.

Madan has worked on many projects requiring a wide range of geotechnical analyses and design listed in Table 1, including WSDOT projects such as ***I-405 Bellevue to Lynnwood.*** Another example is the ***Sound Transit Downtown Redmond Link Extension (DRLE)*** project, which included various types of retaining walls and aerial guideway/highway bridges. This required evaluation of shallow and deep foundations, embankment and slope stability, excavation and shoring, settlement analysis, ground improvement, advanced laboratory testing, and instrumentation monitoring. Madan completed a load testing program on the ***DRLE*** project (with Brice Exley and Jeff Bruce) on fully instrumented drilled shafts using the bi-directional load testing method, to refine the design of drilled shafts supporting the aerial guideway structures. Madan also has extensive experience in the geotechnical design of multistory buildings with deep excavations into various geologic and hydrogeologic conditions, such as ***Lincoln Square South*** in Bellevue and ***2030 Eighth Avenue*** in Seattle.

Sandy has a wide range of geotechnical analysis and design experience on WSDOT projects, as reflected in Table 1 and the project descriptions under Criterion 1 (such as the ***OR-24FP Olympic Region – 24 FP*** and ***SR 302 Victor Area Corridor Planning Study***). She has particular expertise related to retaining walls, highway bridges, shallow and deep foundations, ground improvement, slope stability, landslide analysis and remediation, excavation and shoring, settlement analysis, and analysis of geotechnical laboratory testing and field data. Her geotechnical analysis and design experience is also highlighted by the ***Northgate Pedestrian Bridge, Fairview Bridge Replacement,*** and the ***Peter Western Bridge,*** to name a few.

1B. Area of Expertise based on Scoring Criterion 1B – Seismic Design

As principal engineer, Mike is often involved with seismic design on projects he is overseeing, including most recently on the ***SR 542 UNTs to Mitchell Creek FP*** WSDOT project (see Table 1/Criterion 1). This required evaluation of seismic and liquefaction effects on slope stability and foundations, which were a major design component that eventually led to the design decision to use a cost-effective ground improvement approach. As can be seen in Table 1, most of Mike's projects include seismic design for slope stability and foundations.

As EOR for the ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project*** (see Table 1/Criterion 1), Brice directed Haley & Aldrich seismic specialists to develop site-specific hazard analysis, which was used by WSDOT to design two multi-span bridges over deep soft soil conditions. He shares leadership in Haley & Aldrich's seismic engineering and modeling group with Doug Lindquist and Michael Chamberlain. In 2022, Brice was invited to participate and present at the Pacific Earthquake Engineering Research (PEER) center sponsored workshop on liquefaction susceptibility (PEER Report No. 2023/02). He also had a poster accepted to CPT'22 in Bologna, Italy on the interpretation and liquefaction susceptibility of silt in the Pacific Northwest. Other examples of Brice's seismic design work on WSDOT projects include peer review and providing senior guidance of dynamic FLAC modeling for the ***SR 520/I-90 Interchange*** and ***I-405/Brickyard to SR 527 Improvements*** projects. He has also peer reviewed advanced dynamic time history numerical models in multiple states on the West Coast. He regularly manages projects with 1- and 2-dimensional site response and soil-structure interaction (SSI) models, overseeing Ph.D. level staff who have published on constitutive modeling and soil dynamics and testing.

Over his long career, Dan has assessed seismic/liquefaction hazards and their effects on slopes, foundations, and walls for many hundreds of infrastructure and development projects. Recent examples of this include the ***SR 500 Pedestrian Overcrossing*** WSDOT project and a ***dozen school seismic retrofits*** for the ***Washington Office of the Superintendent of Public Instruction (OSPI)***. For the recent OSPI projects and a ***U.S. Coast Guard (USCG) Fast Response Cutter***

(Oregon) project, he also provided technical oversight and review of advanced seismic site ground response analyses performed by Haley & Aldrich seismic experts. He is a voting member of the national ***ASCE-7 subcommittee on tsunami loads and effects*** that are setting and updating nationwide design standards for structures within tsunami inundation zone.

Madan completed his Ph.D. in Japan with focus on seismic geotechnical engineering and has a substantial record of publications in seismic design, deep foundations, ground response to earthquake shaking, and post-seismic field observations. This includes papers on the ***1995 Kobe Earthquake*** in Japan and ***2001 Bhuj Earthquake*** in India. At the Ports 2022 conference in Honolulu, Madan presented a paper on the seismic design of Washington State Ferry (WSF) ***Mukilteo Ferry Terminal*** that he coauthored. He regularly collaborates with Haley & Aldrich's seismic engineering group (including Doug Lindquist, Brice Exley, and Michael Chamberlain) to apply advanced seismic design on various projects. Madan is regularly involved with performance-based seismic design (PBSD) and peer review of high-rise structures in Seattle and Bellevue. This year, Madan and Michael Chamberlain are presenting a paper on ***Seismic Peer Review*** at the ***Eighth International Conference on Earthquake Geotechnical Engineering (8ICEGE)*** in Osaka, Japan.

Sandy's seismic design experience is exemplified by the HWA experience projects listed in Table 1 and described under Criterion 1. This includes WSDOT projects such as the ***OR-24FP Olympic Region – 24 FP***; ***SR 3/SR 16/SR 166 Gorst Vicinity – Remove Fish Barriers;*** and ***SR 302 Victor Area Corridor Planning Study.*** Other specific projects where Sandy has provided seismic design related to seismic deaggregation and seismic/liquefaction analysis and effects on slope stability and foundations are highlighted by her work on the ***Fairview Avenue Bridge Replacement, Grand Park Avenue Bridge,*** and ***Forbes Creek Bridge Seismic Retrofit***.

2A (1&2). Professional Licensures and Years of Experience Managing Geotechnical Projects

Our senior staff professional licensures and years of experience are listed on page 21.

2B (1&2). Familiarity with State Construction Standards (GDM & AASHTO LRFD)

Mike has over 20 years of experience working on transportation projects. His first project using LRFD design was for a bridge in Missouri while he was working in Kansas City. Mike began familiarizing himself with the GDM when he moved to Washington in 2016. Since then, he has referenced and used the GDM and AASHTO LRFD regularly on WSDOT projects, such as the ***I-5 Steilacoom-DuPont Road to Thorne Lane Corridor Improvements*** and ***SR 542 Squalicum Creek FP*** projects, to name a few. On the ***I-90, SR 161, SR 202 & SR 203 – FP*** DB project, Mike served as geotechnical SME for SGO, greatly increasing his understanding and design experience using both the GDM and the AASHTO LRFD. In this role, Mike had to review other geotechnical engineering reports for conformance with WSDOT contract documents, which included reference to the GDM and AASHTO manuals. Finally, Mike is primary author of the DB chapter and has provided senior review of several other chapters of the ***next edition of the GDM.***

Since starting work with Haley & Aldrich (formerly Hart Crowser), Brice has nearly continuously worked on WSDOT projects and projects for other authorities that rely on the GDM and AASHTO LRFD design procedures. Brice has served as a geotechnical SME for SGO, reviewing other geotechnical engineering reports for conformance with contract documents, which include the GDM and AASHTO manuals. He has also worked on the ***next edition of the GDM***, both writing and reviewing several chapters.

Since working on his first WSDOT project, ***I-205/Mill Plain Interchange Improvements***, more than 20 years ago, Dan has used both the GDM and AASHTO LRFD manuals for his work on well over 100 infrastructure projects. Over the last three years, Dan has been the principal-in-charge of approximately 30 WSDOT and local agency transportation projects, including bridge, culvert replacement, and road widening projects, such as those listed in Criterion 1. Dan also provided significant technical input, review, and content for several chapters of the ***next edition of the GDM.***

Madan has over 20 years of experience applying GDM and AASHTO LRFD design standards on transportation projects in U.S. and Canada. After he moved to Seattle in 2008 to join Haley & Aldrich (formerly Hart Crowser), Madan developed a deep understanding of both standards as he worked on various WSDOT projects such as the ***SR 99 Tunnel, SR 520 Floating Bridge,*** and ***I-405 Bellevue to Lynnwood***. Over the years, he has followed up on version updates and upgrades in these documents to reflect the state of practice and newer research, and has contributed the ***next edition of the GDM.***

Sandy has over 10 years of experience working on transportation projects, including over 30 bridge projects that require conformance with the GDM and AASHTO LRFD. Over the last five years Sandy has been dedicated to mostly working on WSDOT projects, such as the ***OR-24FP Olympic Region – 24 FP, SR 3/SR 16/SR 166***, ***Gorst Vicinity – Remove Fish Barriers***, and ***SR 302 Victor Area Corridor Planning Study***.

2C. Familiarity with Project Management (Criterion 2C)

1. Experience managing multiple projects with overlapping schedules

Over the last few years, Mike has served as the principal engineer and reviewer on several DB projects and senior design engineer on multiple design bid build projects for WSDOT, all with overlapping and competing task/document deliverable schedules. Over the last year alone, he has been the SGO geotechnical SME on the ***US 101/SR 109 Coastal 29 FP*** PDB project; ***I-90, SR 161, SR 202 & SR 203 – FP*** and ***I-405/Brickyard to SR 527 Improvements*** DB projects; and the ***SR 167 Corridor Improvements*** project, requiring constant juggling of overlapping project needs. Additionally, he served as the Geotechnical Group Manager (GGM) on the ***I-90/SR 18 I/C to Deep Creek*** DB project, and as the principal geotechnical engineer on portions of the ***I-5 – Mounts Road to Steilacoom-DuPont Road Corridor Improvements*** project.

Brice is regularly involved with multiple Haley & Aldrich and WSDOT projects. As an example of this, he has over the last year been the senior engineer responsible for the technical delivery of three large federal infrastructure projects. Each of these has required advanced seismic soil structure interaction modeling in addition to regular day-to-day project management. In the last year, Brice has been very involved with several WSDOT projects requiring management of overlapping schedules, including ***US 101/SR 109 Coastal 29 FP***, ***US 101/SR 116 North Olympic Peninsula – Remove Fish Barriers***, and the ***I-90/SR 18 I/C to Deep Creek*** DB projects.

Dan is the principal-in-charge for multiple projects with overlapping schedules for local, state, and national agencies. He is currently overseeing a ***2-mile-long industrial railroad corridor widening project*** involving six rail lines for the Port of Longview; the ***Boeckman Road Corridor DB project*** that includes a multi-span bridge; three WSDOT projects (***SR 104 Lyon Creek FP***, ***SR 163 Point Defiance Tollbooth*** and ***SR 500 Pedestrian Bridge***), and eight school seismic retrofits (***North Beach and Aberdeen School Districts***). This is just one example of how Dan manages projects with

overlapping schedules on an ongoing basis, all with competing project commitments and client expectations and goals.

Madan has regularly and actively managed multiple DB and design bid build (DBB) projects simultaneously over the past decade, all involving overlapping and competing project delivery requirements. While he was managing the WSF ***Mukilteo Ferry Terminal*** project, he was simultaneously managing two high-rise building projects and two Port of Seattle projects. He managed the Sound Transit ***DRLE*** DB project spanning over several years while concurrently managing Port projects and building projects. He has extensive hands-on experience managing overlapping schedules and project priorities through proactive planning, aligning staff to meet project goals, and effective communication.

Sandy has extensive experience managing multiple projects with overlapping schedules, while meeting deliverable deadlines and maintaining quality standards on each project. For example, on WSDOT's ***OR-24FP Olympic Region – 24 FP*** project that was divided into four bundles with multiple structures in each, she assisted in the procurement process to prepare the RFQ and RFP for one of the DB bundles while providing final design recommendations for another of the bundles that was delivered as a DBB project. Both bundles were in progress at the same time, requiring careful coordination with different consultants managing separate bundles.

2. Experience prioritizing limited resources to optimize project delivery

As the Haley & Aldrich geotechnical group leader for the Pacific Northwest and Hawaii, Mike constantly has to manage limited resources to ensure that all Haley & Aldrich projects are properly staffed to deliver contracted geotechnical services. When at times multiple Haley & Aldrich projects require intensive resource needs, Mike will often redirect staff from other projects that are winding down to optimize project deliveries and maintain schedules. If needed, he is also able to pull in staff from California and East Coast offices to complete project delivery when resources are not locally available. While most Haley & Aldrich geotechnical engineers are well-versed in AASHTO methodologies, Mike will pair out-of-state staff with a local engineer who is familiar with local practice and design standards, including WSDOT manuals and specifications.

Brice manages both overlapping schedules and limited resources by working to understand which project engineering activities are on the critical path, and then reallocating staff with required expertise as needed to maintain project delivery schedule. In addition, he works with staff to pre-mortem projects and analyze needs to minimize rework, allowing staff to focus on project engineering and reduce risks. He also works with project managers to identify whether directing, coaching, supporting, or delegating is the correct leadership model for each situation. As Haley and Aldrich's National Geotechnical Practice Leader, Brice is focused on providing staff with integrated tools that improve our quality of work and reduce rework.

Dan maintains continuity and progress on his projects by having weekly meetings with his project managers and several of his clients to review project and staff commitments. If there are resource conflicts between projects, they are assessed as a group so that appropriate staffing prioritization can be implemented cooperatively. To support his projects, Dan uses project engineers and managers geographically located across multiple Haley & Aldrich offices (Washington, Oregon, California, Hawaii, and Georgia), which allows him to take advantage of staff availability in other offices to support his local Washington projects.

As a principal geotechnical engineer with extensive experience in managing multiple projects simultaneously, Madan works in concert with project managers to optimize use of available staff and resources while maintaining high project deliverable technical standards. The majority of the ***DRLE*** project design occurred during the initial phase of the COVID-19 pandemic. Despite the sudden changes and restricted work environments causing a huge strain in availability of resources, Madan successfully coordinated with the project team under limiting circumstances to maintain timely project delivery.

Sandy regularly manages multiple projects with overlapping schedules and resource needs. Every week, Sandy holds a staff resource meeting with project managers where project needs, deliverables, and schedules are carefully evaluated. This helps identify project activities that are on the critical path, allowing the reallocation of resources as needed.

3. Experience as a subject matter expert on multi-disciplinary teams delivering complex transportation projects

Mike has been an SME for several of the DB projects that are listed in Table 1, all complex projects involving multi-disciplinary design teams. On some—such as the ***US 101/SR 109 Coastal 29 FP***—he is providing PDB oversight review for SGO. This project includes coastal sites with complex subsurface/geometry that are often too far away from concrete batch plants, so the majority of structure elements have to be precast. He has also been acting as the GGM on the ***I-90/SR 18 I/C to Deep Creek*** DB project, involving construction of a diverging diamond interchange, multiple FP structures, two multi-span bridges, and a landslide repair.

As an SME, Brice has a wide range of experience working with multi-disciplinary teams on projects such as those listed in Table 1, including the ***US 101/SR 109 Coastal 29 FP*** PDB project. He has found that the most common thread to success with these complex projects is actively listening to other disciplines, understanding their challenges, and clearly communicating solutions so the various disciplines understand the tasks and risks.

Dan strives to educate design teams to help them select geotechnical approaches that best mesh with the overall project strategy. As an example, the ***Clark County 10th Avenue Creek Crossing*** involved weak soils that necessitated the use of ground improvement for liquefaction and global instability. However, County roadway and drainage engineers, environmental and permitting specialists, hydrologists, and construction staff were unfamiliar with the recommended deep soil mixing (DSM). Dan coordinated with a specialty contractor to host field trips for the team to observe the DSM process in action. Dan then developed performance-based specifications for the DSM, which were now more readily understandable by County staff.

Madan has diverse experience as an SME reviewer on both DBB and DB projects. These range from high-rise buildings with deep excavations (***SIXO Highrise Towers*** in Seattle), ports and other waterfront projects (***Terminal 46 Cruise Terminal Site Development***), navy projects (***NBK Manchester Fuel Pier Repairs***), and transportation projects (***Fluke Anchors for SR 520 Floating Bridge***). In this role, he has extensive experience interacting with multi-disciplinary teams to develop optimal solutions to complex project delivery challenges.

Sandy has extensive experience working on various transportation projects with multi-disciplinary teams throughout the Pacific Northwest, including complex transportation projects. As a senior geotechnical engineer, she understands the importance of early planning, communication, and identification of the unique geotechnical challenges of each project site. She schedules field discovery meetings with the design team to discuss geotechnical findings and present

different approaches to these challenges. Sandy's active involvement in the design process ensures that geotechnical strategies seamlessly integrate with the evolving project design.

2D. Familiarity with Design Build Project Team Leadership/Membership (Criterion 2D)

1. Experience preparing geotechnical documents for design build contracts

Mike has prepared geotechnical DB documents on many WSDOT projects, including geotechnical baseline reports, geotechnical data reports, geotechnical reference documents, and Section 2.6 of the technical requirements. Examples of this include: ***I-90/SR 900 Lewis, West Village Park, Schneider Creek FP; I-405/Brickyard to SR 527 Improvements***; and ***SR 3/SR 104/SR 303/SR 307/SR 308 Kitsap County – Remove Fish Barriers*** PDB.

Brice has 13 years of experience delivering DB projects both working for the design builder and as an owner's representative. He has contributed to preparation of seismic DB documents for ***I-90/SR 900 Lewis, West Village Park, Schneider FP***; ***I-405/NE 85th Street***; and ***I-405/Brickyard to SR 527 Improvements*.** He focuses on identifying areas where pre-award documents (such as seismic spectrum) can provide additional bidding certainty and intentionally discuss construction risk allocation.

Dan has been involved with DB projects for transportation, waterfront, and building projects since 2012. For the ***Chehalis River Overflow Bridge*** in Oakville, he prepared geotechnical data, baseline, and preliminary design reports, in conformance with GDM Chapter 22. He is currently the geotechnical lead for a PDB bridge project (***Boeckman Road***), where his design team has prepared multiple geotechnical documents, including subsurface investigation plans, basis of design memos, geotechnical instrumentation plans, risk assessments, soil and rock properties memo, and various technical memoranda and calculation packets.

Madan has substantial experience delivering DB geotechnical documents for projects such as the ***DRLE***, ***I-405 Bellevue to Lynnwood (BTL) express toll lanes***, and ***Sound Transit Operations and Maintenance Facility East (OMFE)*** projects. He has developed or reviewed geotechnical documents for DB projects on behalf of the owner as well as the design builder.

Sandy has prepared geotechnical documents for many DB contracts, providing critical input to multi-disciplinary design teams that aid in the success of each project. Recent WSDOT examples of this include the ***OR-24FP Olympic Region – 24 FP*** and ***SR 3/SR 16/SR 166, Gorst Vicinity – Remove Fish Barriers*** projects. On these projects, Sandy completed a geotechnical site investigation, developed the DB procurement documents (RFQ, RFP, and Concept Plans), and assisted WSDOT with geotechnical support during the DB procurement process.

2. Experience as a subject matter expert on teams supporting design build contracts

Mike has served as the geotechnical SME on most of the DB projects listed in Table 1, along with the ***US 101/SR 109 Coastal 29 FP*** PDB project. Specifically as an SME during DB general procurement, he has attended one-on-one meetings with prospective bidders and reviewed Alternative Technical Concepts (ATC) submittals. During the DB implementation phase, Mike has attended weekly task force meetings, over the shoulder meetings, and reviewed geotechnical and structural submittals for compliance with the contract documents and mandatory standards (followed by comment resolution meetings). On PDB projects, Mike has directly contributed to the success of the design builder by being open to new ideas that create a better end product or results in reduced costs for WSDOT.

Brice has worked as SGO geotechnical SME for the ***Children of the Sun Trail*** DB project and is currently representing SGO on the ***US 101/SR 109 Coastal 29 FP*** PDB contract. He has also reviewed finite element models on multiple WSDOT DB projects, including actively supporting our ***I-405/Brickyard to SR 527 Improvements*** reviews of 2D and 3D FLAC models.

Dan has served as a geotechnical SME on several WSDOT projects, including the pre-design pursuits for the ***SR 530/Trafton Creek and Schoolyard Creek FP*** and ***SR 167 and 70th Avenue Improvement*** projects. His DB SME experience also include road, bridge, pier, and building design for the ***Boeckman Road Corridor***, ***Veterans Affairs Vancouver Medical Center,*** and ***USCG Fast Response Cutter*** projects. Specifically, Dan helped the DB teams assess deep shoring, deep and shallow foundations, ground improvement, lightweight fill, and MSE walls to name a few.

Madan has served as geotechnical SME during the pursuit phase and during implementation of multiple DB projects, including ***I-405 BTL express toll lanes***, ***Sound Transit OMFE***, and ***SR 520 Montlake*** projects.

As an SME, Sandy brings geotechnical engineering expertise to all DB projects she is involved with. For example, on the ***OR-24FP Olympic Region – 24 FP*****,** Sandy directly assisted WSDOT preparing the geotechnical sections of the RFP and RFQ during the procurement process. She also assisted WSDOT's geotechnical team respond to geotechnical questions during the bidding process. Finally, after the selection of the DB team, Sandy provided geotechnical review of RFIs, submittals, transmittals, and geotechnical reports, memos, and DB design calculations.

2E. Familiarity with Construction Support (Criterion 2E)

1. Experience that demonstrates familiarity with the WSDOT Standard Specifications for Road Bridge and Municipal Construction

Since he first moved to Washington in 2016, Mike has become very familiar with the WSDOT Standard Specifications for Road Bridge and Municipal Construction (WSS) through his wide range of highway transportation work. This includes WSDOT projects such as ***I-5 Steilacoom-DuPont Road to Thorne Lane Corridor***, and the more recent ***I-90/SR 18 I/C to Deep Creek***. As a DB reviewer, he has also become well-versed in the WSS from reviewing contractor submittals.

Brice started applying the WSS on WSDOT projects in 2011 with the ***SR 99 Tunnel*** and ***SR 520 Floating Bridge*** projects, for which he was both a design engineer and provided geotechnical special inspections. Since then, he has developed a deep understanding of the WSS working on a multitude of highway transportation projects. Most recently Brice has prepared WSS special provisions on projects such as ***I-405 Renton to Bellevue*** and ***SR 9 Marsh Road to 2nd Street Vicinity – Widening Project***.

Dan has been working in the Pacific Northwest for more than 20 years and uses the WSS on a near-daily basis. He has filled out multiple General Special Provisions and prepared Special Provisions for local agencies and WSDOT projects. He recently helped prepare WSS special provisions for soil mixing on the ***SR 542 UNT to Mitchell Creek FP*** and for settlement monitoring on the ***SR 20/Fish Creek and Lorenzan Creek FP*** projects.

Madan has worked on many different WSDOT projects since 2011 starting with the ***SR 99 Tunnel*** and ***SR 520 Floating Bridge*** projects. He is thoroughly familiar with the WSS.

With her extensive experience working public infrastructure projects in the Pacific Northwest, Sandy is very familiar with the WSS requirements. This includes a wide range of WSDOT projects.

2. Experience evaluating and reviewing contractor submittals, RFIs, and cost reduction incentive proposals

Mike has reviewed many contractor submittals during his time working on DB projects, both for Haley & Aldrich and WSDOT (such as ***US 101/SR 109 Olympic 29 FP PDB***). While working with contractors on DB projects, he will often review and answer RFIs and technical questions from the contractor and other SMEs on the project team. He has also taken part in several practical design workshops for cost reduction where the design builder and the State share in the savings. As a SGO reviewer on DB projects, Mike has taken part in answering RFIs from the DB team where an interpretation of the GDM or contract is needed.

Over the past few years, Brice has been actively supporting the ***US 101/SR 109 Olympic 29 FP PDB*** contract with submittal review. He takes a collaborative approach to work with the DB team to resolve issues with their submittals, especially when they are on a critical path for the project schedule. On the ***I-5 M Street or Portland Avenue – HOV NBN-A Wall (CRIP)*** project, Brice provided geotechnical support for the DB team's cost-reduction incentive proposal.

Dan has provided geotechnical construction support on hundreds of projects, including reviewing and responding to contractor submittals and RFIs, often providing added value over a strict compliance check. For example, on the ***Ocosta School*** project, Dan identified that the contractor did not have automated data recording equipment called for in the specifications. Instead of blindly rejecting the submittal, Dan worked with the owner and contractor to develop more rigorous QA/QC specifications that allowed use of non-automated equipment. Dan has been involved in development and review of several CRIPs, including alternative shoring systems, temporary embankment configurations, and changes from spread footings to driven pile foundations.

Over his more than 29 years of professional practice as geotechnical engineer, Madan has reviewed and addressed many contractor submittals and request for information. A recent example of this is the ***DRLE*** DB project. He has experience participating in cost reduction discussions and VE sessions (such as WSF ***Mukilteo Ferry Terminal***) and developing alternate technical solutions for DB teams (such as ***I-405 Bellevue to Lynnwood***).

Sandy has extensive experience reviewing submittals, RFIs, and cost incentive proposals. Sandy reviews RFIs regularly, providing feedback to internal and external project teams. Her attention to detail and experience on various projects gives her the ability to provide clear, quick, and concise reviews. For example, on the ***OR-24FP Olympic Region – 24 FP*** project, Sandy WSDOT's geotechnical team with geotechnical support reviewing RFIs and submittals.

3. Experience evaluating change of condition claims and plans errors

Mike has provided geotechnical support for change of condition claim evaluations as an SME for SGO on the ***I-90, SR 161, SR 202, and SR 203 FP*** DB projects. He has also helped prepare change of condition claims for evaluation while working for a design builder.

Brice has worked with jurisdictional authorities on evaluating change of condition claims for a variety of projects, including a tunnel claim for the ***Climate Pledge Arena.*** He has also evaluated change of condition claims related to offshore pile driving and shoring systems.

Dan has performed plan review for both internal team QA and as external third-party peer reviewer. As such, he has identified errors associated with stormwater infiltration systems, utility/structure foundation conflicts, and earthwork/excavation impacts to nearby structures. Dan's attention to detail in reviewing submittals is exemplified by his more than 10 years of work as a ***third-party reviewer*** for the ***City of Vancouver***. Dan recently assisted a sewer district with a change claim associated with a directional drilling project that developed sinkholes requiring repair.

Madan has evaluated several change of condition claims on behalf of the owner and on behalf of the design builder. For example, he evaluated the change of condition claim in the WSF ***Mukilteo Ferry Terminal*** project on behalf of the owner and contributed to change of condition claim for evaluation by the owner for the ***DRLE*** project.

Sandy has direct experience with change of condition claims and plan errors on several projects. For example, during installation of a replacement sewer system using trenchless methods for the ***Alderwood Water and Wastewater Sewer Replacement*** project, the contractor filed a differing site condition claim alleging that cobbles encountered during tunneling were stronger and more extensive than described in the geotechnical baseline report. Through laboratory strength tests and site reconnaissance, Sandy confirmed that the contractual baseline representations were correct and the project owner was able to reject the contractor's claim.

B. AVAILABILITY OF KEY STAFF AND RESOURCES FOR EACH FIRM ON THE HALEY & ALDRICH TEAM

Rolf Hyllseth is dedicated as our SLGE to working for SGO full-time five days per week, as he has done on the Haley & Aldrich current Geotechnical Engineering Staff Augmentation contract. He will also continue to co-locate in the SGO office in Tumwater as needed or requested for project-related work, SGO staff meetings, and other SGO staff collaboration.

Table 2 presents the monthly available hours for our proposed SLGE, senior staff, DBE team members, and project managers. In addition to key staff, both Haley & Aldrich and HWA have significant advanced laboratory capabilities.

TABLE 2. STAFF AVAILABILITY PER MONTH

Personnel Name	Project Role	Hours per Month*	Personnel Name	Project Role	Hours per Month*
Haley & Aldrich					
Rolf Hyllseth, P.E., L.G.	SLGE	149	Bethany Jackson, P.E.	Project/Task Manager	112
Mike Schmitz, P.E.	Senior Staff (10+ yrs)	75	Barbara Thunder, P.E.	Project/Task Manager	37
Brice Exley, P.E.	Senior Staff (10+ yrs)	37	Jenna Jacoby, P.E.	Project/Task Manager	37
Dan Trisler, P.E.	Senior Staff (10+ yrs)	37	Zachary Yell, P.E.	Project/Task Manager	112
Madan Karkee, Ph.D., P.E.	Senior Staff (10+ yrs)	37	Jason Sved, P.E.	Project/Task Manager	112
Luke Kevan, P.E.	Project/Task Manager	112	Michael Liu, P.E.	Project/Task Manager	37
HWA GeoSciences					
Sandy Brodahl, P.E.	Senior Staff (10+ yrs)	60	Carson Wall, P.E.	Project/Task Manager	60
			Saul Cortez, P.E.	Project/Task Manager	60
Ciani & Hatch Engineering					
Whitney Ciani, P.E.	Senior Staff (10+ yrs)	12	Mikaela Hatch	Project/Task Manager	40

1. *These numbers represent average available work hours for WSDOT contract work, based on full-time employee (FTE) annual workload (1,790 hrs/year, discounting vacation and holidays).*
2. *The total number of hours above represent a workload effort roughly equivalent to meet the required $8 million workload over four years using the anticipated staff support personnel listed in the table.*