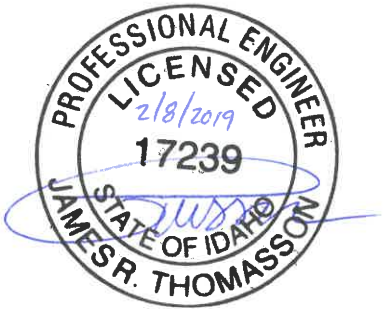
PRELIMINARY
GEOTECHNICAL EVALUATION
ATLAS WATERFRONT PROJECT – PHASE 2
3074 W. SELTICE WAY
COEUR D'ALENE, IDAHO
ALLWEST PROJECT NO. 118-014G



February 8, 2019

Prepared for:
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Construction Materials Testing & Special Inspection
Geotechnical Engineering
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Welder Certification

February 8, 2019

Mr. Phil Boyd
Welch, Comer and Associates, Inc.
350 E. Kathleen Drive
Coeur d'Alene, Idaho 83814

RE: ALLWEST Project No. 118-014G
Preliminary Geotechnical Evaluation
Atlas Waterfront Project – Phase 2
3074 West Seltice Way
Coeur d'Alene, Idaho

Mr. Boyd,

ALLWEST Testing & Engineering, Inc. has completed the authorized preliminary geotechnical evaluation for the proposed Atlas Waterfront Project – Phase 2 at 3074 W Seltice Way in Coeur d'Alene, Idaho. The purpose of this evaluation was to characterize the soil and geologic conditions on the property. The attached report presents the results of the field evaluation and our recommendations to assist with design and construction of the proposed project.

We appreciate the opportunity to work with you on this project. If you have any questions or need additional information, please do not hesitate to call us at (208) 762-4721.

Sincerely,
ALLWEST Testing & Engineering, Inc.

Prepared by:

Scott Marshall, P.G.
Engineering Geologist

Reviewed by:

James Thomasson, P.E.
Senior Geotechnical Engineer

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Preliminary Geotechnical Evaluation
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ALLWEST Testing & Engineering, Inc. (ALLWEST) has completed the authorized preliminary geotechnical evaluation for the proposed Atlas Waterfront Project – Phase 2 (Phase 2) south of W. Seltice Way and north of the Spokane River in Coeur d'Alene, Idaho. The general location of the project is shown on the Vicinity Map, Figure A-1, in Appendix A of this report. The purpose of the evaluation was to assess the subsurface conditions on the property with respect to the proposed conceptual construction. This report details the results of the field evaluation and laboratory testing and presents our recommendations to assist the design and construction of the proposed project.

This report was prepared to provide preliminary design and construction recommendations for Phase 2. Findings and recommendations herein may contain preliminary guidance for construction but do not constitute a geotechnical evaluation report for individual lot development. Owners are encouraged to solicit the services of a licensed Geotechnical Engineer to evaluate specific single-lot conditions as they pertain to the proposed specific construction intent.

1.0 SCOPE OF SERVICES

To complete the geotechnical evaluation, we accomplished the following scope of services:

1) Reviewed the USDA Natural Resources Conservation Service (NRCS) soil mapping and Idaho Geological Survey geologic mapping information for the project site area.

2) Completed a site reconnaissance by walking the property and observing exposed surface conditions including soil, vegetation, erosion, and surface drainage.

3) Performed a field evaluation by observing the excavation of 12 test pits in the area of proposed construction. The subsurface conditions observed in the test pits were described and visually classified and the subsurface profiles were logged.

4) Performed laboratory tests on soil samples to assess some of the soil engineering characteristics.

5) Reviewed the results of the field evaluation and laboratory testing with respect to the proposed construction.

6) Performed engineering analyses and prepared recommendations to assist project planning, design, and construction.

7) Prepared this report.

Our services were provided in general accordance with ALLWEST proposal number 118-014P, dated October 23, 2018.

2.0 PROJECT DESCRIPTION

Phase 2 of the Atlas Waterfront Project can generally be divided into two areas for purposes of description, discussion, and recommendations for this preliminary geotechnical evaluation. The two areas are: 1) Phase 2 - Main Road, that will come in from the north from West Seltice Way. The Phase 2 - Main Road splits phases 3 and 4 and will drop in grade to the south; 2) Phase 2 – Residential, which is the balance of phase 2 in the central southern part of the Atlas Waterfront Project. It is planned for multi-story apartments or condominiums and townhomes.

Preliminary assumptions for Phase 2 - Residential are that the buildings will be supported on shallow concrete spread footings. Wall loads of up to 4 kips per linear foot and column loads of up to 100 kips are anticipated. Site improvements will include the construction of asphalt paved parking areas and sidewalk. **If the building design or loads vary from the above stated we should be notified to review our recommendations.**

Compacted fill was placed in the south and central portion of Phase 2 – Residential as part of Interstate 90 grading project. The excess material was stripped from the I-90 to lower the grade to increase the bridge clearance at the overpasses, and then placed and documented in a grading report by ALLWEST Testing & Engineering, Inc. Up to approximately 10 feet of compacted fill was placed. Prior to compacted fill placement, the area was substantially stripped of deleterious material to expose undisturbed native sands and gravels.

3.0 EVALUATION PROCEDURES

We evaluated the subsurface conditions at the site by excavating 12 test pits in the Phase 2 – Residential area. Ten of those test pits were excavated prior to fill placement from the I-90 grading project. The approximate locations of the test pits are shown on Figure A-3, Test Pit Location Map included in Appendix A. Information obtained from the field evaluation, laboratory testing, and geotechnical analysis was utilized to develop preliminary recommendations for the geotechnical aspects of the project.

4.0 SITE CONDITIONS

The Atlas Waterfront Project area was previously used as a lumber mill and log storage area for the past 100 years. The site has been highly altered from its natural state. For discussion purposes Phase 2 is divided into two areas as stated in section 2.0.

The Phase 2 - Main Road portion of the site consists of an old paved roadway section that splits Phase 3 and Phase 4 and runs approximately north-south. Field exploration as part of Phase 3 and Phase 4 appears to indicate the Phase 2 - Main Road may lie between the old borrow pit areas to the east and west. Indirect exploration indicates these conditions. The thick existing asphaltic pavement section impedes test pit exploration. The southernmost portion, approximately 100 feet long, of the Main Road is underlain by documented fill as part the I-90 grading project.

The Phase 2 - Residential portion of the site has an approximate 10 to 15 feet high slope on the north edge that generally appears to consist of native material, with a few trees. This area slopes down to the south. The southern portion of Phase 2 - Residential generally consists of documented fill placed as part of I-90 grading project. Test pits excavated prior to documented fill placement indicated an area of uncontrolled fill and topsoil (test pits TP-3 and TP-4) that was removed and replaced with documented fill. The documented fill area is generally graded with a gentle slope to the south.

4.1 GENERAL GEOLOGIC CONDITIONS

The geologic conditions on the property were mapped on the Geologic Map of the Coeur d'Alene 30 x 60 Minute Quadrangle, Idaho by Lewis, et al, 2002. The mapping indicates the geology is Channel gravel, undivided. The deposit consists of the latest Wisconsin age catastrophic flood and outwash gravel and sand deposited in channel ways cut into high energy fans and bars of Glacial Lake Missoula flood origin. The southernmost area of the project is mapped as Holocene age Alluvial Deposits. Most deposits are composed of stratified, poorly sorted, and laterally discontinuous beds of sandy gravel with sand and silt lenses. Thickness of 10 feet or less. Interpreted as the reworking of sediment by the Spokane River.

4.2 GENERAL SOIL CONDITIONS

The NRCS has mapped the soils on and around the property as McGuire-Marble association. The McGuire-Marble association is approximately 60 percent McGuire gravelly sandy loam and about 30 percent Marble sandy loam. The McGuire soil is described as very deep, somewhat excessively-drained soil formed in glacial outwash materials mixed with minor amounts of loess and volcanic ash. The permeability is estimated to be moderately rapid. Run-off is slow. The water erosion hazard is slight. The Marble soil is described as very deep, excessively-drained soil formed in wind-

and water-worked sandy outwash materials. The permeability is estimated to be rapid. Run-off is slow. The water erosion hazard is slight.

4.3 HYDROGEOLOGIC CONDITIONS

The project site is underlain by the Rathdrum Prairie aquifer. We did not observe groundwater during our site evaluation. We did not observe surface water on the property. Well logs in the vicinity of the project report static groundwater depths of greater than 85 feet below ground surface. However, changes in precipitation, irrigation, construction, or other factors may impact depth to groundwater and the surface water flow on the property.

5.0 SUBSURFACE CONDITIONS

Twelve test pits were excavated at the site on July 26, and December 12, 2018. The test pits were excavated with a Volvo 210 excavator with a standard soil excavation bucket. The approximate locations of the test pits are shown on Figure A-3, Test Pit Location Map in Appendix A. The soil conditions observed in the test pits were visually described and classified in general accordance with ASTM D2487 and D2488 and the subsurface profiles were logged.

Detailed descriptions of the soil observed in the test pits are presented on the Test Pit Logs included in Appendix B. The descriptive soil terms used on the test pit logs and in this report can be referenced by the Unified Soil Classification System (USCS). A summary of the USCS is included in Appendix B. The subsurface conditions may vary significantly between test pit locations. Such changes in conditions would not be apparent until construction. **If the subsurface conditions do change from those observed in the test pits, the construction timing, plans, and costs may change.**

5.1 SUBSURFACE SOIL CONDITIONS

Soil observed in the test pits generally consisted of uncontrolled fill or documented fill, underlain by native sands and gravels. Topsoil was observed at the uncontrolled fill and native sand and gravel interface in test pit TP-3 and TP-4. At the completion of the field work some of the test pit locations were surveyed by Welch Comer. Soil types observed consisted of the following:

The Phase 2 - Main Road

The Phase 2 – Main Road appears to be situated between borrow pits identified in the test pits excavated for Phase 3 and Phase 4. Test pit exploration within the main road was impeded by the thick asphalt section. Based on observations in test pits TP-11A West from Phase 3, the north end of the main road may be underlain by up to 10 feet of uncontrolled fill and construction debris.

Phase 2 – Residential

Topsoil: Silty sand – Topsoil was generally observed to be silty sand and was encountered in test pits TP-3, and TP-4. It was observed to be generally dark brown to black, moist, and loose. Organics were observed. The topsoil was removed as part of the over-excavation in preparation of the I-90 grading fill import.

Uncontrolled fill – The uncontrolled fill was variable in composition but generally consisted of poorly-graded gravel that was observed to be brown, moist, and loose. Minor inorganic debris observed. The uncontrolled fill was observed in test pits TP-3, and TP-4. The uncontrolled fill was removed as part of the over-excavation in preparation of the I-90 grading fill import.

Documented fill – The documented fill was variable in composition but generally consisted of silty gravel with sand to poorly-graded sand that was observed to be brown or gray, moist, and dense. The documented fill was observed in test pits TP-1, and TP-11.

Native: Sands and gravels – Native material was variable and was generally gravel with silt and sand, to sand with silt and gravel. Native material was encountered in all the test pits and was observed to be brown, moist, and medium dense.

5.2 GROUNDWATER CONDITIONS

We anticipate groundwater may be present at relatively shallow depths near the Spokane River during late winter and spring months in response to elevated Spokane River pool elevation. We generally did not observe groundwater during our site evaluation. However, changes in precipitation, irrigation, construction, or other factors may impact depth to groundwater and the surface water flow on the property.

6.0 LABORATORY TESTING

Laboratory testing was performed to supplement field classifications and to assess some of the soil engineering parameters. The laboratory testing included sieve analysis/gradation (ASTM D6913). The laboratory test results are presented in Appendix C of this report. The laboratory testing was performed by ALLWEST.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are presented to assist the planning and design of the proposed Phase 2 development. The recommendations are based on our understanding of the conceptual proposed construction, the conditions observed in the test pits, and engineering analyses. **If the scope of the construction**

changes, or if conditions are encountered during construction which are different than those described in this report, we should be notified so we can review our recommendations and provide revisions if necessary.

7.1 PLANNING CONSIDERATIONS

Phase 2 – Main Road, depending on the final grades, the soils below the main road on the south end will be documented fill or native sand and gravels. On the north end the main road may be underlain by uncontrolled fill or construction debris up to 10 feet in depth, or native sands and gravels.

Phase 2 – Residential is generally underlain by documented fill placed as part of the I-90 grading project. The north side of Phase 2 – Residential is a native slope and, depending on final grades, likely underlain by native sands and gravel. There may be areas of uncontrolled fill that have not been identified. The preliminary plans show about 11 buildings planned for the area. We assume they are multi-story structures on spread footings. Depending on the final grades the footings will likely bear on native sand and gravels or documented fill.

Caving of the natural sand and gravel was observed during the field evaluation and should be expected within the subgrade soil across the project site. The on-site sand and gravel soil will be susceptible to caving during excavation. Construction traffic may disturb the prepared subgrade due to the low content of fines (material passing the No. 200 sieve).

7.2 SITE PREPARATION

We recommend surface organics, topsoil, and deleterious materials be removed to expose firm, non-yielding, inorganic natural soil. Subsequent to removal of unsuitable materials, we recommend subgrade surface be scarified to a depth of eight inches, properly moisture conditioned and compacted to a minimum of 90 percent of the maximum dry density established by ASTM D1557 (modified Proctor).

7.3 EXCAVATION

Excavation of the on-site soil can be achieved with typical excavation equipment. We recommend excavations greater than four feet deep be sloped no steeper than 1.5:1 (horizontal to vertical). Alternatively, deeper excavations may be shored or braced in accordance with Occupational Safety and Health Administration (OSHA) specifications and local codes. Regarding trench wall support, the site soil is considered Type C soil according to OSHA guidelines. The contractor is responsible to provide appropriate trench wall support and/or sloping. The natural granular soils are susceptible to caving.

7.4 MATERIALS

The Phase 2 on-site uncontrolled fill is generally not considered suitable for re-use as structural fill, site grading, or utility trench backfill.

The on-site natural granular soils are generally suitable for re-use as structural fill, site grading, and utility trench backfill provided the soil is free of organics, debris, other deleterious material, and material larger than six inches in size. Use of natural sand may require screening to remove larger cobbles and boulders, if encountered.

Import materials, if required, should be well-graded granular soil free of organics, debris, and other deleterious material and meet the following recommendations. Import materials should be approved by the Geotechnical Engineer prior to delivery to the site.

Fill Type	Recommendations
Structural Fill	Maximum size ≤ 3 inches; Retained on ¾"-sieve <30% Passing No. 200 Sieve ≤ 15%; Non-plastic
Utility Trench Backfill	Maximum size ≤ 2 inches; Passing No. 200 Sieve ≤ 15%; Non-plastic

7.5 FILL PLACEMENT AND COMPACTION

Fill should be placed in lift thicknesses which are appropriate for the compaction equipment used. Typically, 8-inch loose lifts are appropriate for typical rubber tire and steel drum compaction equipment. Lift thicknesses should be reduced to four inches for hand operated compaction equipment. Fill should be moisture conditioned to within two percentage points of the optimum moisture content prior to placement to facilitate compaction. Structural fill and utility trench backfill should be compacted to a minimum of 95 percent of the maximum density established by ASTM D1557 (modified Proctor). In wet conditions, using silty or fine-grained soil for fill may delay construction and increase costs.

7.6 WET WEATHER CONSTRUCTION

Due to the climatic effects in this region during late fall, winter, and spring (generally wet conditions), we recommend construction (especially site grading) take place during the summer and early fall season, if possible. If construction occurs during or immediately after excessive precipitation, it may be necessary to over-excavate and replace saturated subgrade soil which might otherwise be suitable.

We recommend earthwork for this site be scheduled for the drier seasons of the year. If construction is undertaken in wet periods of the year, it will be important to slope the ground surface to provide drainage away from construction.

7.7 COLD WEATHER CONSTRUCTION

If site grading and construction are anticipated during cold weather, we recommend good winter construction practices be observed. Snow and ice should be removed from excavated and fill areas prior to additional earthwork or construction. Footings, floor slabs or structural portions of the construction should not be placed on frozen ground; nor should the supporting soils for buildings be permitted to freeze during or after construction. Frozen soils should not be used as backfill or fill.

7.8 PRELIMINARY FOUNDATION RECOMMENDATIONS

The proposed buildings may be supported on conventional spread footings bearing directly on documented structural fill or native sands and gravels, but not a combination of both, if prepared as recommended in the Site Preparation section of this report. The following preliminary recommendations are provided for foundations based on the subsurface conditions observed and the stated assumptions:

- Footings bearing on properly prepared documented structural fill or properly prepared natural sand and gravel subgrade may be designed for an allowable bearing pressure of 2,500 pounds per square foot (psf). The allowable bearing pressure value may be increased by one-third to account for transient loads such as wind and seismic.

- Unless specified by project engineer or governing codes, continuous footings should be a minimum of 18 inches in width and column footings should be a minimum of 24 inches in width.

- A coefficient of friction between cast-in-place concrete and documented structural fill or natural sand and gravel soils or structural fill of 0.45 may be used for design.

- Foundation bearing surfaces should be free of loose soil and debris.

- Footings should be embedded at least 24 inches below finished exterior ground surface and interface with natural sands and gravels or structural fill to help protect against frost action.

- We recommend backfill placed adjacent to foundation walls be placed uniformly on both sides of the foundation walls to reduce displacement of the foundation walls.

- If the previous recommendations are implemented, it is our opinion the total settlement will be less than 1-inch and differential settlement will be less than ½-inch in 30-feet.

7.9 CONCRETE SLABS

Concrete slabs-on-grade should be supported by at least four inches of crushed base course. The crushed base course below the slabs should be compacted to at least 95 percent of the maximum dry density established by modified Proctor (ASTM D1557). The slab subgrade should be prepared as previously recommended.

We recommend consideration be given to including a moisture vapor retarder or barrier beneath concrete slab-on-grade floors to retard moisture migration through the slabs if moisture sensitive floor coverings are planned. We recommend the moisture retarder or barrier be installed per American Concrete Institute (ACI) recommendations and specifications. To protect slabs from moisture migration which may impact flooring performance, it is important to include the moisture vapor retarder or barrier as well as directing surface and subsurface water away from the slabs. In addition, concrete should have adequate time to cure prior to placing impermeable flooring.

7.10 LATERAL EARTH PRESSURES

Below-grade walls should be designed to resist lateral earth pressures. The lateral earth pressures for approved import structural fill or structural fill derived from on-site soil should be calculated using the following equivalent fluid pressures:

Condition	Equivalent Fluid Pressure Structural Fill (pcf)
At-rest	60
Active	35
Passive	300

The above values are for level backfill and do not account for hydrostatic forces. Walls should be provided with adequate drainage so hydrostatic forces do not adversely affect the walls. We recommend placement of gravel behind walls and/or weep holes to assist with drainage and reduce the potential for the buildup of hydrostatic pressures.

7.11 SEISMICITY

We anticipate the 2015 International Building Code (IBC) will be used as the basis for design of the proposed structures. The soil at the site can be characterized as Site Class D for seismic design.

The following seismic parameters were calculated using USGS U.S. Seismic Design Maps for use with the 2015 IBC. The latitude and longitude for the site were used to specify the location of the subject property. The following Site Class D seismic parameters may be used for design.

Latitude (degrees)	Longitude (degrees)	Spectral Accelerations		Site Coefficients	
		S_s	S_1	F_a	F_v
47.6987	-116.8229	0.354g	0.116g	1.517	2.338

7.12 STORM WATER AND DRAINAGE

We recommend the grading plan include slopes such that storm water run-off is directed away from the building and pavement areas to a storm water management system. We recommend ground surface adjacent to foundations be sloped a minimum of five percent within ten feet of the building. If the adjoining ground surface consists of hardscapes it may be sloped a minimum of two percent in the first ten feet. Water should not be allowed to infiltrate or pond adjacent to the foundations.

Local codes require that grass infiltration areas be sized adequately to store and infiltrate the first ½-inch of runoff from a storm event. Drywells are suitable for additional stormwater disposal at this site and should be excavated to interface with the natural poorly-graded sand with silt and gravel stratum. Double depth drywells are considered, by the City of Coeur d'Alene, to have an assumed capacity of 1.0 cubic foot per second (cfs); single depth drywells are considered to have an assumed capacity of 0.3 cfs.

Drywells placed within the compacted structural fill placed on the south portion of the site should have specific borehole infiltration testing to determine the suitability of the fill for dry well placement. Drywells within the compacted structural fill should have a minimum 25 feet set back from structures and site improvements.

It has been our experience that grass infiltration areas can fail if construction traffic and/or other activities impact the infiltration area. We recommend the grass infiltration areas be constructed at the end of the project when construction activity is ending. The areas should be scarified to loosen the upper soil profile if compaction has occurred. We recommend infiltration testing be conducted at the site to verify infiltration rates.

8.0 ADDITIONAL RECOMMENDED SERVICES

We recommend ALLWEST Testing & Engineering, Inc. be retained to provide construction materials testing and observation to verify the soil and geologic conditions and the report recommendations are incorporated into the actual construction. The design engineer of record should determine applicable testing and special inspection requirements in accordance with the governing code documents. If we are not retained

to provide required construction observation and testing services, we cannot be responsible for soil engineering related construction errors or omissions.

9.0 EVALUATION LIMITATIONS

This report has been prepared to assist the planning and design of the proposed Atlas Waterfront Project – Phase 2, south of W. Seltice Way in Coeur d'Alene, Idaho. Reliance by any party other than the addressee is prohibited without the written authorization of ALLWEST. Our services consist of professional opinions and conclusions made in accordance with generally accepted geotechnical engineering principles and practices in the local area at the time this report was prepared. This acknowledgement is in lieu of all warranties, express or implied.

The following appendices complete this report:

Appendix A – Vicinity Map, Phase 2 Boundary Map, Test Pit Location Map
Appendix B – Test Pit Logs, Unified Soil Classification System
Appendix C – Laboratory Test Results