

April 19, 2016 Project No. 16-249

NAI Black c/o Mr. Bryan Walker 107 South Howard Suite 500 Spokane, WA 99201

Re: Supplemental Geotechnical Evaluation Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA

Dear Mr. Walker:

As you authorized, we have completed the supplemental geotechnical evaluation for the Painted Hills Golf Course property at the above-referenced site in Spokane Valley, Washington. The purpose of the supplemental evaluation is to provide additional soil and groundwater data to address concerns of the City of Spokane Valley. This report summarizes the results of our field investigation, laboratory testing, engineering analyses, and our opinions and recommendations for stormwater management.

PROJECT DESCRIPTION

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. Stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. These type of facilities will also be used to manage potential floodwaters, if needed. This supplemental evaluation is intended to provide additional subsurface data at the north end of the site to assist in identifying areas where subsurface infiltration of stormwater may be feasible due to the presence of suitable soils at depth.

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AVAILABLE INFORMATION

We were provided a topographic survey for the project site by Whipple Consulting Engineers, Inc. (WCE). This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

In addition, we performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

We also performed a geotechnical evaluation for certification of the existing levee along Chester Creek in April 2014. The results of that evaluation are summarized in our Geotechnical Evaluation report dated February 12, 2015.

Lastly, we performed a geotechnical evaluation in July 2015 consisting of ten 50-foot borings in the south half of the property. The results of that evaluation are summarized in our Geotechnical Evaluation Phase 2 report dated July 23, 2015.

FIELD EVALUATION

Procedures

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) observed the drilling of three penetration test borings at the site. The borings were drilled between March 17 and 19, 2016 using a truck-mounted drill operated by an independent firm working under subcontract to IPEC. A geotechnical engineer or engineering assistant from IPEC observed the borings and logged the surface and subsurface conditions. After we logged the borings, they were abandoned in accordance with state requirements. Ground surface elevations at the borings were provided by WCE.

The soils encountered in the borings were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedures)". The samples were returned to our facility for review of the classification by a geotechnical engineer and laboratory testing.

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Soils Encountered

In general, the borings encountered 2 feet of topsoil at the surface. Below the topsoil, the borings generally encountered glacially-deposited silty to clayey sands and/or gravels overlying poorly graded sands to termination depths of the borings. The clayey sands and gravels were generally encountered in the upper 12 to 18 feet.

Penetration resistances in the sands and gravels ranged from 15 to 90 blows per foot (BPF) and averaged 37 BPF, indicating that these soils were medium dense to very dense, but were typically dense.

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Hardesty ashy silt loam, Narcisse silt loam, Endoaquolls and Fluvaquents, Phoebe ashy sandy loam, and Urban land-Springdale disturbed complex. The native soils encountered in the borings were consistent with the NRCS data.

Groundwater was encountered in Boring B-2 at a depth of 71 feet. This depth corresponds to an elevation of 1934.6. Groundwater was not encountered in the remaining borings. The observed water levels further indicates that groundwater levels drop generally from south to north with higher levels near Chester Creek. Fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made.

ANALYSIS, OPINIONS, AND RECOMMENDATIONS

Based on the data obtained from the recent and previous borings, previous test pits, field permeability tests, and laboratory tests performed, it is our opinion that subsurface infiltration of stormwater is feasible. The most promising layers are the glacial sands and gravels. These soils would be suitable for infiltration using standard drywells.

We will perform a mounding analysis for the drywells after the proposed full-scale drywell test is completed to assess down-gradient impacts

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,

Paul T. Nelson, P.E. Principal Engineer

Attachments: Figure 1, Site Location Map

Figure 2, NRCS Map

Figure 3, Boring Location Map Logs of Borings B-1 through B-3

Descriptive Terminology Laboratory Test Results



FIGURE 1





Project No. 16-249 Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA

April 19, 2016

FIGURE 2



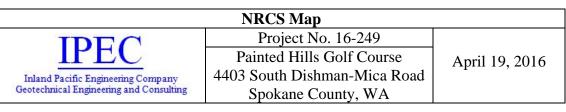
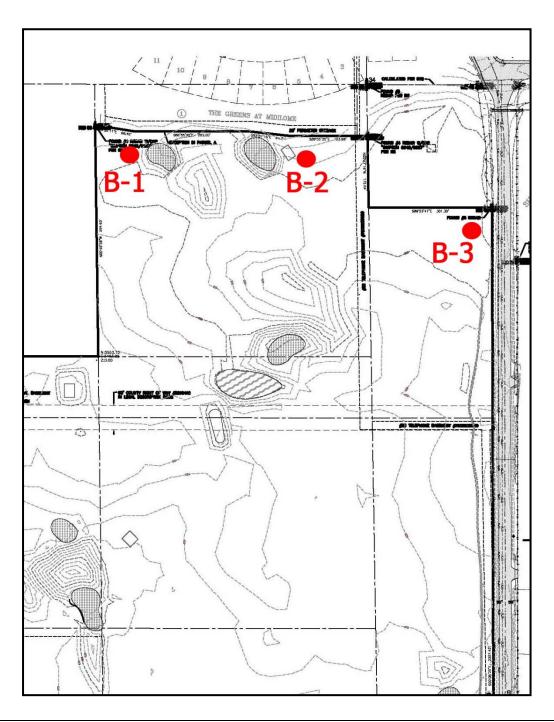


FIGURE 3



| Boring Location Map | | | | | | | |
|---|------------------------------|-------------------------|--|--|--|--|--|
| IDEC | Project No. 16-249 | | | | | | |
| IPEC | Painted Hills Golf Course | April 19, 2016 | | | | | |
| Inland Pacific Engineering Company | 4403 South Dishman-Mica Road | 11p111 19, 2 010 | | | | | |
| Geotechnical Engineering and Consulting | Spokane County, WA | | | | | | |

Inland Pacific Engineering Company 3012 North Sullivan Road, Suite C

BORING NUMBER B-1
PAGE 1 OF 2

| <u> </u> | Pr | | ephone | | , WA 99216 0-209-6262 734 | TAGE TOT 2 | | | |
|--|-----------------------|-----------------|-----------|----------------|---------------------------------|---|--|--|--|
| CLIE | NT NALE | | | | 754 | PROJECT NAME Painted Hills Supplemental | | | |
| | | IBER 16-249 | | | | PROJECT LOCATION 4403 South Dishman-Mica Road | | | |
| | | | | COMP | I FTFD 3/17/16 | GROUND ELEVATION 2005.9 ft HOLE SIZE 8 inches | | | |
| 1 | | | | | on Drilling | | | | |
| | | | | | on brilling | | | | |
| | | HOD Hollow Sten | | | MED DV DTM | AT TIME OF DRILLING Not encountered | | | |
| | | PRF | | CHEC | KED BY PTN | | | | |
| NOTE | ES | | | | | AFTER DRILLING Not encountered | | | |
| DEPTH (#) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | | MATERIAL DESCRIPTION | | | |
| | - | | SM | 7. 311 | moist. | AND, fine to medium grained, with roots, dark brown, | | | |
| TO DEPTH (#) (#) (#) (#) (#) (#) (#) (#) (#) (#) | ss | | | | (SP-SM) POC | DRLY GRADED SAND with SILT, medium to coarse ce of Gravel, brown, moist, medium dense. ash) | | | |
| 10 | -X ss | | SP- SM | | | | | | |
| 25 | ss | | | | | 1988.9 ' GRADED SAND with GRAVEL, medium to coarse n, moist, very dense to medium dense. | | | |
| - | | | | | (Glacial Outw | | | | |
| 20 | | | | | (0.00.00 | | | | |
| 5 20 | SS | | | | | | | | |
| <u></u> | | | | | | | | | |
| - | | | | | | | | | |
| | 4 | | | | | | | | |
| |] | | | | | | | | |
| 25 | | | SP | | | | | | |
| | SS | | | | | | | | |
| - | 1 | | | | | | | | |
| <u>-</u> | | | | | | | | | |
| <u> </u> - | | | | | | | | | |
| [| | | | | | | | | |
| 30 | ss | Fines = 7% | | | | | | | |
| اَدِّ | | | | | | | | | |



BORING NUMBER B-1

PAGE 2 OF 2

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|---|-----------------------|-------|----------|----------------|--|--------|
| ED HILLS SUPPLEMENTAL.GPJ | ss | | | | (SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, very dense to medium dense. (Glacial Outwash) (continued) | |
| LEMENTAL/GINT/16-249 PAINTE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | ss | | SP | | | |
| ROJECTS/16-249 PAINTED HILLS SUPPLEMENTAL/GINTY/6-249 PAINTED HILLS SUPPLEMENTAL/GPU CO CO CO CO CO CO CO CO CO C | ss Ss Ss | | | 50. | 5 | 1955.4 |
| 30JECTS/16-24 00 05 05 05 05 05 05 05 05 05 05 05 05 0 | ss | | | 50. | 5 End of boring | |

End of boring.

Groundwater not encountered with 49' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then abandoned.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/5/16 11:26 - J:_IPEC PROJECTS_2016 PRC

IPEC

Inland Pacific Engineering Company 3012 North Sullivan Road, Suite C Spokane Valley, WA 99216

BORING NUMBER B-2
PAGE 1 OF 3

| | | | Telephone: 50 Fax: 509-290- | | 6262 | | | | | |
|--|--|-----------------------------|--------------------------------|----------|----------------|-----------------------------|--|--|--|--|
| CLIEN | NT NALE | Black | 1 ax. 000 200 · | 0.01 | | | PROJECT NAME Painted Hills Supplemental | | | |
| 1 | | IBER _16-2 | 249 | | | | PROJECT LOCATION _4403 South Dishman-Mica Road | | | |
| DATE STARTED 3/17/16 COMPLETED 3/18/16 | | | | | | 18/16 | | | | |
| DRILL | DRILLING CONTRACTOR Johnson Exploration Drilling | | | | | | GROUND WATER LEVELS: | | | |
| DRILL | ING MET | HOD Holl | ow Stem Auger | | | | AT TIME OF DRILLING Not encontered | | | |
| | | | CHE | CKED | BY P | TN | TAT END OF DRILLING 71.00 ft / Elev 1934.60 ft | | | |
| | s | | | | | | ▼ AFTER DRILLING _73.50 ft / Elev 1932.10 ft | | | |
| | | | | | | | | | | |
| O DEPTH (ft) | SAMPLE TYPE NUMBER | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | | MATERIAL DESCRIPTION | | | |
| | | | | SM | 1/ · 2/ · 1/ | brown | SILTY SAND, fine to medium grained, with roots, dark , moist. pil) | | | |
| 5 | ss | 12-33 (45) | | sc | | (SC) C graine (Glacia | CLAYEY SAND with GRAVEL, medium to coarse d, brown, moist to wet, dense. al Outwash) | | | |
| | | | | | 0// | 6.5 (GC) (| 1995 CLAYEY GRAVEL with SAND, fine to coarse grained, | | | |
| | X ss | 24-20 | | GC | | brown | , moist, dense. al Outwash) | | | |
| | . 33 | (44) | | | | 12.0 | 1993 | | | |
| 15 | ss | 24-29 (53) | | | | coarse to med | POORLY GRADED SAND with GRAVEL, medium to e grained, a trace of Cobbles, brown, moist, very dense dium dense. al Outwash) | | | |
| 20 | X ss | 25-28 | | | | | | | | |
| | | (53) | | SP | | | | | | |
| 25 | SS | 10-18 (28) | Fines = 8% | | | | | | | |
| 30 | ss | 11-13 (24) | | | | | | | | |



BORING NUMBER B-2

PAGE 2 OF 3

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249 PROJECT LOCATION 4403 South Dishman-Mica Road

| PROJ | ECT NUN | IBER 16-2 | 49 | | | PROJECT LOCATION 4403 South Dishman-Mica Road |
|--|-----------------------|-----------------------------|-------|----------|----------------|--|
| DEPTH (ft) | SAMPLE TYPE NUMBER | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
| LS SUPPLEMENTAL.GPJ | × ss | 28-37 (65) | | | | (SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. (Glacial Outwash) (continued) |
| NTAL/GINTY16-249 PAINTED HIL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | ⊠ ss , | 50/5" | | | | |
| 19 PAINTED HILLS SUPPLEMEN 19 19 19 19 19 19 19 19 19 19 19 19 19 | ⊠ SS | 50/5" | | | | |
| 6 11:26 - J. IPEC PROJECTS_2016 PROJECTS\16-246 | ⊠ ss_ | 50/5" | | SP | | |
| GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/5/16 11:26 - J.\(\) PROJECTS\(\) 249 PAINTED HILLS SUPPLEMENTAL\(\) GINT STD US LAB. GDT - 4/5/16 11:26 - J.\(\) PROJECTS\(\) PR | ss | 8-17 (25) | | | | |



BORING NUMBER B-2

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CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

| DEPTH (ft) | SAMPLE TYPE NUMBER | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|--------------------------|-----------------------|-----------------------------|-------|----------|----------------|--|--------|
| D HILLS SUPPLEMENTAL GPJ | ss s | 21-11 (32) | | SP | | (SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. ▼ (Glacial Outwash) (continued) ▼ | 1930.6 |

End of boring.

Groundwater encountered at 71' with 75' of hollow-stem auger in the ground.

Goundwater encountered at 73.5' 10 minutes later.

Groundwater not encountered to cave-in depth of 15' immediately after withdrawal of the auger.

Bore hole then abandoned.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 4/5/16 11:26 - J.\. IPEC PROJECTS_2016 PROJECTS\16-249 PAINTED HILLS SUPPLEMENTAL\GINT\16-249 PAINTE

Inland Pacific Engineering Company 3012 North Sullivan Road, Suite C

BORING NUMBER B-3
PAGE 1 OF 2

| <u> </u> | PC | | phone | | WA 99216 -209-6262 734 | | | | | |
|--------------|-----------------------|-----------------|----------|---|------------------------------|---------------------------------|---|--------------------|--|--------|
| CLIEN | IT NAI BI | | | | | | PROJECT NAME Pair | nted Hills Supplen | nental | |
| | | | | | | | PROJECT LOCATION | 4403 South Dish | nman-Mica Road | |
| DATE | STARTED | 3/18/16 | | СОМР | LETED 3/19/ | 16 | GROUND ELEVATION | 2004.5 ft | HOLE SIZE 8 inches | |
| DRILL | ING CONT | TRACTOR Johns | on Ex | plorati | on Drilling | | GROUND WATER LEV | ELS: | | |
| DRILL | ING METH | HOD Hollow Stem | ո Aug | er | | | AT TIME OF DRII | LLING Not en | countered | |
| LOGG | ED BY P | RF | | CHEC | KED BY PTN | | AT END OF DRIL | LING Not end | countered | |
| NOTE | s | | | | | | AFTER DRILLING | 3 Not encoun | tered | |
| | | | | | | | | | | |
| O DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | | | MATERIAL | DESCRIPTION | | |
| | | | ML | 1/ 1/1/1/ | (IVIL. | | ILT, with roots, dark | k brown, moist | i. | |
| <u>-</u> | | | | 1 1 1 · · · · · · · · · · · · · · · · · | |) CLAVEV | CDAVEL with SANI | D fine to see | as grained brown | 2002.5 |
| 5 | X ss | | GC | | mois | t, dense. cial Outwas | GRAVEL with SANI | D, fine to coar | se grained, brown, | |
| | | | | 62/ | 8.0 | | OAND with ODANE | l 4 . | | 1996.5 |
| 10 | X ss | | sc | | mois | CLAYEY St to wet, decial Outwas | ense. | L, medium to | coarse grained, brown, | 1992.5 |
| 15 | X ss | | GC | | (GC brow | | AYEY GRAVEL wit nedium dense. sh) | h SAND, fine | to coarse grained, | 1986.5 |
| 20 | ss | | | | (SP) grair | | | | nedium to coarse dense to medium dense. | |
| 25 | ss | | SP | | | | | | | |
| 30 | X ss | Fines = 6% | | | | | | | | |



Fax: 509-290-5734

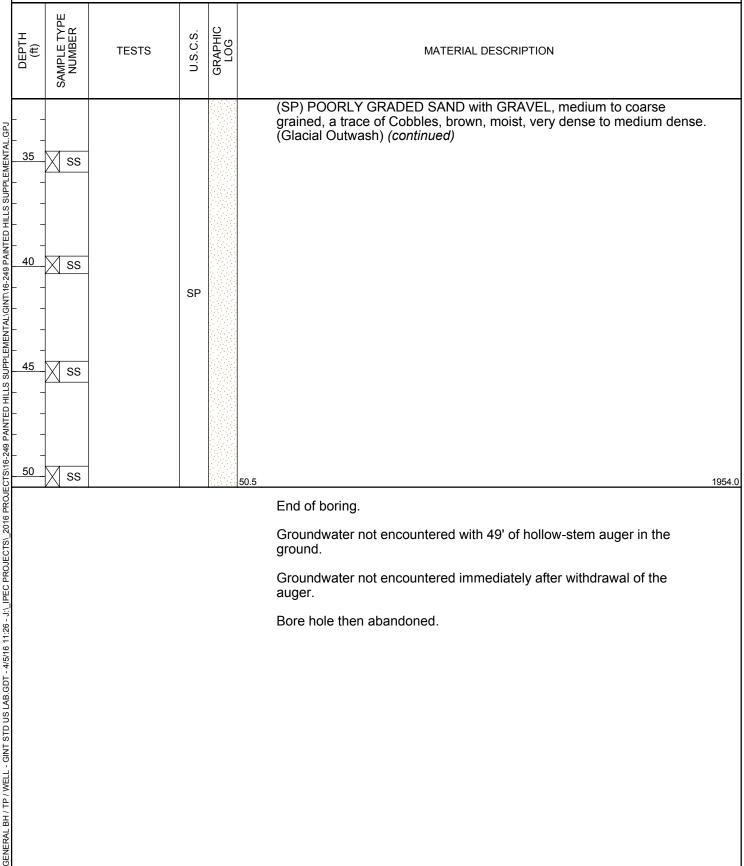
BORING NUMBER B-3

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road



End of boring.

Groundwater not encountered with 49' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then abandoned.



| RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE | | | | | | | | | |
|--|----------------|--------------------|-------------|--|--|--|--|--|--|
| COARSE | -GRAINED SOILS | FINE-GRAINED SOILS | | | | | | | |
| DENSITY | N(BLOWS/FT) | CONSISTENCY | N(BLOWS/FT) | | | | | | |
| Very Loose | 0 - 4 | Very Soft | 0 - 1 | | | | | | |
| Loose | 4 - 10 | Soft | 2 - 3 | | | | | | |
| Medium-Dense | 11 - 30 | Rather Soft | 4 - 5 | | | | | | |
| Medium-Dense | 11 - 30 | Medium | 6 - 8 | | | | | | |
| Dense | 31 - 50 | Rather Stiff | 9 - 12 | | | | | | |
| Delise | 31 - 30 | Stiff | 13 - 16 | | | | | | |
| Vary Danca | > 50 | Very Stiff | 17 - 30 | | | | | | |
| Very Dense | > 30 | Hard | > 30 | | | | | | |

| | USCS SOIL CLASSIFICATION | | | | | | | | | |
|-------------|--------------------------|---------------------------|----|--|--|--|--|--|--|--|
| l | MAJOR DIVISIONS | GROUP DESCRIPTIONS | | | | | | | | |
| Coarse- | Gravel and | Gravel | GW | Well Graded Gravel | | | | | | |
| Grained | Gravelly Soils | (with little or no fines) | GP | Poorly Graded Gravel | | | | | | |
| Soils | <50% coarse fraction | Gravel | GM | Silty Gravel | | | | | | |
| | passes #4 sieve | (with >12% fines) | GC | Clayey Gravel | | | | | | |
| <50% | Sandy and | Sand | SW | Well Graded Sand | | | | | | |
| passes #200 | · · | (with little or no fines) | SP | Poorly Graded Sand | | | | | | |
| sieve | | Sand | SM | Silty Sand | | | | | | |
| | passes #4 sieve | (with >12% fines) | SC | Clayey Sand | | | | | | |
| Fine- | | | ML | Silt | | | | | | |
| Grained | Silt and Clay | | CL | Lean Clay | | | | | | |
| Soils | Liquid Limit < 50 | | OL | Organic Silt and Clay (low plasticity) | | | | | | |
| >50% | | | MH | Inorganic Silt | | | | | | |
| passes #200 | Salt and Clay | | CH | Fat Clay | | | | | | |
| sieve | Liquid Limit > 50 | | ОН | Organic Clay and Silt (med to high plasticity) | | | | | | |
| | Highly Organic Soils | | PT | Peat Muck | | | | | | |

| MODIFIERS | | | | | | | | | |
|-------------|----------|--|--|--|--|--|--|--|--|
| DESCRIPTION | RANGE | | | | | | | | |
| Occasional | <5% | | | | | | | | |
| Trace | 5% - 12% | | | | | | | | |
| With | >12% | | | | | | | | |

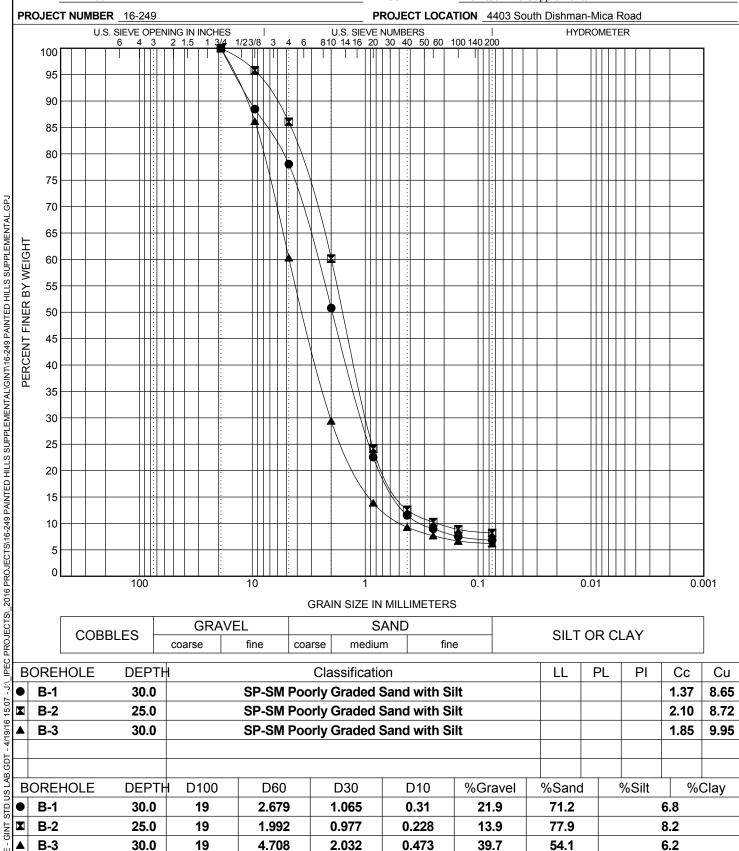
| MO | MOISTURE CONTENT | | | | | | | |
|-------------|--|--|--|--|--|--|--|--|
| DESCRIPTION | FIELD OBSERVATION | | | | | | | |
| Dry | Absence of moisture, dusty, dry to the touch | | | | | | | |
| Moist | Dry of optimum moisture content | | | | | | | |
| Wet | Wet of optimum moisture content | | | | | | | |

| | MAJOR DIVISIONS WITH GRAIN SIZE | | | | | | | | | | |
|----------|------------------------------------|--------|------|--------|--------|------|----------------|--|--|--|--|
| | SIEVE SIZE | | | | | | | | | | |
| | 12" 3" 3/4" 4 10 40 200 | | | | | | | | | | |
| | GRAIN SIZE (INCHES) | | | | | | | | | | |
| | 12 3 0.75 0.19 0.079 0.0171 0.0029 | | | | | | | | | | |
| Boulders | Cobbles | Gra | ıvel | | Sand | | Silt and Clay | | | | |
| Doulders | Copples | Coarse | Fine | Coarse | Medium | Fine | Silt allu Clay | | | | |

GRAIN SIZE DISTRIBUTION

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental



2.032

0.473

54.1