Exhibit K
Geotechnical Investigation Report

Kleinfelder, Inc.

December 21, 2020

DICKINSON WRIGHT PLLC

December 21, 2020
Project No. 20212135.001A

Mr. Joshua Larimer
Lightsource bp
400 Montgomery St, 8th Floor
San Francisco, California 94104

Subject: **Geotechnical Investigation Report**
Birch Solar Project
Allen and Auglaize Counties, Ohio

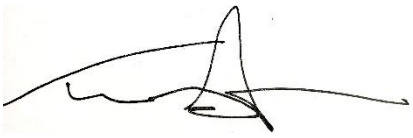
Dear Mr. Larimer,

Kleinfelder is pleased to present this report summarizing the geotechnical investigation findings for the Birch Solar project. The purpose of the geotechnical investigation is to characterize the subsurface conditions and provide geotechnical recommendations for design and construction of the Birch Solar project. The conclusions and recommendations presented in this report are subject to the limitations presented herein. In addition, the brief by the Geotechnical Business Association (GBA, Appendix H) provides additional information regarding data interpretation and industry-standard limitations of a geotechnical investigation.

We appreciate the opportunity to provide geotechnical engineering services on this project. Should you have any questions, please contact Terry Jennings at 303.297.5665.

Respectfully submitted,

KLEINFELDER, INC.



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GEOTECHNICAL INVESTIGATION REPORT
BIRCH SOLAR PROJECT
ALLEN AND AUGLAIZE COUNTIES, OHIO
KLEINFELDER PROJECT NO. 20212135.001A

December 21, 2020

Report Prepared for:

Mr. Joshua Larimer
Lightsource bp
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San Francisco, California 94104

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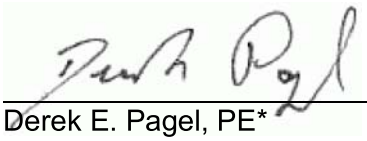

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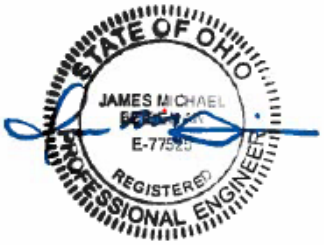

December 21, 2020

Kleinfelder Project No. 20212135.001A

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GEOTECHNICAL INVESTIGATION REPORT
BIRCH SOLAR PROJECT
ALLEN AND AUGLAIZE COUNTIES, OHIO

1 INTRODUCTION

This report presents the results of Kleinfelder's geotechnical investigation of the proposed Birch photovoltaic (PV) solar electric generation facility planned in Allen and Auglaize Counties, Ohio. The location of the project is shown on the Site Location Plan, Figure 1. Kleinfelder's services were performed in general accordance with our proposal dated September 18, 2020.

The scope of Kleinfelder's geotechnical investigation consists of a subsurface exploration, laboratory testing, engineering analysis, pile load testing, and preparation of this report. The purpose of Kleinfelder's geotechnical engineering investigation is to provide design and construction recommendations for the PV array foundations, equipment pads, access roads, site preparation, and general earthwork.

In summary, the site appears to be suitable for the intended development provided the recommendations outlined in this report are properly incorporated in the design and construction phases of the project.

The conclusions and recommendations presented in this report are based on subsurface information encountered in our explorations, our site observations, and our experience with similar developments. The recommendations contained in this report are subject to the provisions and requirements outlined in the Limitations section of this report.

1.1 PROJECT DESCRIPTION

We understand that the project will include the installation of ground-mounted solar PV arrays and construction of support infrastructure including asphalt, gravel, or soil access roads; perimeter fences; and ancillary electrical equipment.

Kleinfelder anticipates the PV panels to be attached to a single-axis tracker (SAT) system supported on driven steel piles, typically fabricated from wide-flange beams. Maximum axial and

lateral loads are expected to be on the order of two to three kips each. Other components will include overhead and underground electrical conductors, inverters, transformers, and other electrical components, to be supported on piles, slabs-on-grade, or combinations of slabs and piles. Additional site development will likely include access roadways for construction and maintenance purposes.

The finished site grades had not been provided at the time this report was prepared. Kleinfelder anticipates grading within the solar array field will be limited. Earthwork cuts and fills of no more than approximately two feet are expected for equipment pads. Utility trenches are not anticipated to exceed four feet in depth.

2 FIELD EXPLORATION & LABORATORY TESTING

2.1 FIELD EXPLORATION

Subsurface conditions at the site were explored with 30 soil test borings, 10 test pits, and 15 in-situ soil electrical resistivity tests between October 19 and November 4, 2020. The approximate test locations are presented on the Exploration Location Plan, Figure 2. Kleinfelder originally proposed 37 soil test borings, 22 test pits, and 23 in-situ soil electrical resistivity tests; however, some investigation locations were inaccessible during the investigation timeframe due to unharvested crops and saturated soil conditions and the requirement to not damage crops or land in these areas.

Prior to Kleinfelder's field exploration, the exploration locations were cleared for underground utilities through the Ohio 811 system. Kleinfelder staked the boring locations in the field using a handheld GPS unit. Kleinfelder geotechnical staff observed drilling and test pit operations, collected soil samples, and reviewed the subsurface conditions logged in each boring and test pit. Kleinfelder visually classified the observed soils in general accordance with ASTM D2488 and the Unified Soil Classification System. Keys to the soil descriptions and symbols used to describe the subsurface conditions encountered are presented in Appendix A. Kleinfelder geotechnical staff also visually evaluated the site for the presence of obvious geohazards, such as karst features, that could impact the construction of the PV arrays.

2.1.1 Soil Test Borings

Thirty soil test borings were advanced with an Acker Rebel track-mounted drill rig using hollow stem auger drilling techniques to depths ranging from 20 to 42 feet below the ground surface (bgs). Soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches, then driven an additional 18-inches with blows of a 140-pound auto-hammer falling 30 inches. Standard Penetration Tests (SPTs) were performed at two-foot intervals for the first 10 feet and at five-foot intervals thereafter, in general accordance with ASTM D1586. Standard Penetration Test data (SPT N-values) were used to estimate the in-situ soil strength and density. Soil samples were obtained at each test interval. Groundwater observations were recorded during drilling, upon completion, and prior to backfilling at the borings.

The borings were backfilled with cuttings from the drill operations. Logs of the borings are presented in Appendix A.

2.1.2 Test Pits

Ten test pits were excavated to depths of approximately eight feet bgs. Kleinfelder field personnel observed, classified, and logged the soil encountered in each test pit. Kleinfelder also obtained bulk samples from each test pit for laboratory testing. Groundwater observations were recorded in each test pit during excavation. The test pits were subsequently backfilled with the site soils. Logs of test pits are presented in Appendix A. Kleinfelder originally proposed 22 test pits excavated to a depth of three feet; however, Kleinfelder determined that excavating fewer test pits to greater depths would provide more appropriate geotechnical soil data for geotechnical and structural design purposes.

2.1.3 Field Resistivity Testing

Kleinfelder personnel measured soil resistivity with an L&R Instruments Ultra MiniRes Soil Resistivity Meter using the Wenner four-electrode method in accordance with ASTM G57 and IEEE Standard 81 at 15 locations as shown in Figure 2, Exploration Location Plan. Resistance measurements were conducted within the array areas using electrode spacings of 2, 4, 6, 10, 20, 30, 50, 100, and 200 feet. The results of the field resistivity testing are presented in Appendix B.

2.2 PILE LOAD TESTING

Kleinfelder completed load testing of 78 piles installed by J&B Solar. The piles were installed using a Vermeer PD10 pile driver in groups of 3 at 26 separate locations at the approximate locations shown in Figure 2. Of the 32 locations planned, 6 were inaccessible due to presence of unharvested crops at the time of exploration, or saturated soil conditions. Each pile testing location consisted of a W6x8.5 wide flange beam that was driven to a depth of 6 feet, a W6x8.5 wide flange beam that was driven to a depth of 10 feet, and a W6x15 wide flange beam that was driven to a depth of 8 feet. A summary of pile load testing results is provided in Section 4.5, while a summary of the pile installation, axial pullout loads, and pile drive times is presented in Appendix F.

The piles were tested under lateral and axial tension (pullout) loading. Each pile was first tested laterally by loading the pile in incremental loads up to approximately 3,000 and 4,000 pounds, W6x8.5 and W6x15 respectively, at 48 inches above grade and measuring the deflections at 4

and 48 inches above grade. After completion of lateral testing, piles were subject to axial tension testing to failure or up to approximately 12,500 pounds. Results of testing are presented in Appendix F.

2.3 LABORATORY TESTING

Laboratory testing was performed on selected samples to evaluate physical and engineering properties of the soils. The laboratory testing included the following tests performed in general accordance with the referenced standards:

- Moisture Content (ASTM D2216);
- Grain Size Distribution (ASTM D422);
- Atterberg Limits (ASTM D4318);
- Standard Proctor (ASTM D698);
- Thermal Resistivity (ASTM D5334); and
- Corrosion Suite:
    - pH of Soils (AASTHO T289),
    - Electrical Resistivity (AASHTO T288),
    - Sulfate Content (AASHTO T290),
    - Chloride Content (AASHTO T291),
    - Sulfide Content (SM 4500-S2-D), and
    - Oxidation-Reduction Potential (SM 2580 B Mod.).

Laboratory testing results are shown on the boring logs presented in Appendix A. A summary table and laboratory test results for classification testing is included in Appendix C. Thermal Resistivity Test Results are included in Appendix D and Corrosion Test Results are included in Appendix E.

3 SITE DESCRIPTION AND GEOLOGICAL SETTING

3.1 SITE DESCRIPTION

The project site consists of approximately 2,200 acres of predominantly undeveloped farmland. The topography of the site is relatively flat and level with low hills and shallow valleys. Twomile Creek traverses the center of the site, running roughly west to east. Irrigation ditches and branches of the creek are present throughout the site. Topographic relief is approximately 40 feet across the site. Ground cover at the time of our investigation consisted of a mix of predominantly tilled crop fields and unharvested crops of corn and soybean. Review of aerial and satellite photography from 1998 through 2020 indicates that the project site has remained mostly undeveloped agricultural land, with the exception of associated residential and agricultural structures, rural roads, and artificial ponds.

3.2 GEOLOGIC SETTING AND SURFACE SOILS

3.2.1 Physical Setting

Based on the “Physiographic Regions of Ohio” map published by Ohio Department of Natural Resources (OH DNR), the project site is mapped within the Central Ohio Clayey Till Plain Section of the Central Lowland Physiographic Province. This geology of this region consists of clayey, high-lime Wisconsinan-age till originating from the Erie glacial lobe, and lacustrine materials overlying the Lower Paleozoic-aged carbonate rocks. This region is also comprised of well-defined moraines with intervening flat-lying ground moraines and intermorainal lake basins. The ground surface ranges in elevation from 700 to 1150 feet above mean sea level with moderate relief.

3.2.2 Surficial Geology

A review of the Quaternary Geology Map published by the Ohio DNR’s Division of Geologic Survey indicates the presence of several surficial geologic units across the project site area. These geologic units are known to have originated from the Late Wisconsinan-aged Late Woodfordian ice deposits and are comprised predominantly of Clayey Till (Hiram Till). The clayey till is chiefly a matrix of calcareous clay, silty clay, silty clay loam, or clay loam. In Ohio, the till was modified extensively by solifluction, colluviation, and other mass-wasting processes, with

thickness ranging from 6 to 100 feet. The ground-moraine deposits are thick and continuous in some places and thin and discontinuous in others. In northern Ohio, these deposits are overlain by glacial-lake clay and silt. The thickness is estimated to range between 3 to 65 feet. Figure 3, Surficial Geology Map, shows the project site overlain on the OH DNR Quaternary Geologic map. More detailed descriptions of these units have been presented in Table 3-1 below:

Table 3-1. Surficial Geologic Units

Geologic Unit	Unit Symbol	Description
Ground Moraine	G4	Clayey Till (Hiram Till) - Ground moraine, flat to gently undulating
Lake-planed Moraine	L4	Clayey Till (Hiram Till) - very flat, planed by waves in glacial lakes; small patches of sand, silt, or clay on the surface in many areas
End Moraine	M4	Clayey Till (Hiram Till) - occurs as hummocky ridges higher than adjacent terrain

3.2.3 Bedrock Geology

Based on the Bedrock Geology map published by the Ohio DNR's Division of Geologic Survey, the project site is underlain by the Silurian-aged Tymochtee Dolomite (St) and Greenfield Dolomite (Sg). The Tymochtee Dolomite unit predominantly consists of thin to massively bedded olive gray to yellowish brown dolomite with gray shale laminations. The thickness of this unit is estimated to be up to 140 feet. The Greenfield Dolomite unit is comprised of thin to massively bedded olive gray to yellowish brown argillaceous dolomite with an estimated thickness of approximately 80 feet. Figure 4, Bedrock Geology map, shows the project site overlain on the regional bedrock geology.

3.2.4 Geologic Hazards

Based on our review of geologic literature and our explorations performed on the site, the following Table 3-2 summarizes our finding and the relative risk related to geologic hazards in the project site area. The geologic hazards listed below are also summarized on Figure 5, Geohazard Map.

Table 3-2. Summary of Geologic Hazards

Geologic Hazard	Relative Risk	Comments
Collapsible Soils	Low	Geologic setting and climate do not indicate likely presence of collapsible soils.
Expansive Soils	Moderate	Results of Atterberg Limits tests and Grain Size Analysis tests indicate moderate shrink/swell potential.
Landslides of Slide-Prone Soils	Low	Based on the *Landslide Overview Map of the Conterminous United States* (1982) by Radbruch-Hall, Dorothy, et al., US Geologic Survey there is a low incidence (less than 1.5% of the area involved) of landslides in the vicinity of the site.
Karst	Low	Based on the *Karst in the United States: A Digital Map Compilation*, by Weary, D.J., US Geological Survey Open-File Report 2014-1156, the project site is mapped within an area that is known to be comprised of flat-lying beds of carbonate rocks (such as dolomite) beneath an overburden of non-carbonate material. These areas may be susceptible to fissures, tubes, and caves with a vertical extent less than 50 feet. According to the bedrock geology map published by OH DNR, the project site is underlain by Silurian-aged Tymochtee Dolomite, which predominantly consists of dolomite with shale laminations. A review of the "Probable Karst areas of Ohio" map published by the OH DNR does not indicate the presence of known karst features in the general vicinity of the site. Kleinfelder did not observe indications of karst features such as depressions, vugs, or voids at the completed exploration or resistivity test locations.
Earthquakes	Low	Based on the USGS 2018 one-year model, the project site has a less than 1 percent chance of potentially minor damage (equivalent to a Modified Mercalli Intensity VI). There are no faults shown in the project area on the USGS Quaternary Faults and Folds Database.
Mining	Low	Based on the "Mines of Ohio" database published by the Ohio Division of Mineral Resources, there are no documented surficial or underground mines directly beneath or in the general vicinity of the project site.
Flooding	Low	Based on our review of the FEMA Flood Insurance Rate Maps, the project site area predominantly lies within Zone X (an area outside the 0.2% annual chance of flooding). A small portion of the site is mapped within the 1% Annual Chance Flood Hazard Zone, or Special Flood Hazard Area (SFHA). Special construction or other provisions may apply based on federal, state, and local codes.

3.3 SUBSURFACE CONDITIONS

The following description provides a general summary of the subsurface conditions encountered during the field exploration and further identified by the laboratory testing program. A more detailed description can be found on the Boring and Test Pit Logs presented in Appendix A.

The surface soil conditions encountered at the site generally consist of Glacial Till, comprised of medium stiff to hard lean clay (CL), fat clay (CH), and silt (ML) with various amounts of sand and gravel, overlying medium dense to very dense silty sand (SM), clayey sand (SC), poorly-graded gravel (GP and GP-GM), poorly-graded sand (SP and SP-SM), and well-graded sand (SW-SC and SW-SM) with varying amounts of gravel, clay, and silt. These soils extended to the termination depth of each boring, ranging from approximately 20 to 42 feet bgs. Bedrock was not encountered in any of the borings, although hard/very dense layers and weathered boulders were encountered near the termination depths of Borings B-12, B-15, B-17, B-21, B-26, B-27, and B-31.

The subsurface conditions in the test pits were generally similar to those observed in the borings. Excavation refusal was not encountered in our test pits, which extended to a depth of approximately 8 feet bgs.

Engineering properties of the soils were evaluated using field and laboratory testing and are included in Appendix C. Atterberg limits tests performed on selected samples of the soils indicated liquid limit (LL) values ranging from 31 to 51 and plasticity index (PI) values ranging from 14 to 31.

3.3.1 Groundwater

Groundwater was observed in Borings B-8, B-12 through B-15, B-17, B-19, B-20, B-23, B-25, B-27, B-31, B-33, and B-36, as well as Test Pits TP-3 and TP-5, at depths ranging from approximately 3.5 to 18 feet bgs. Some fluctuation in groundwater levels can occur with climatic and seasonal variations. Fluctuation of the groundwater level, localized zones of perched water, and increased soil moisture content should be anticipated during and following rain events. Therefore, subsurface water conditions at other times may be different from those described in this report.

3.4 CORROSIVITY TEST RESULTS

SoilCor completed laboratory testing of ten samples to provide data regarding corrosivity of onsite soils. These analytical laboratory tests were performed on discrete samples and do not provide a complete representation of all soil types at the site. The soil corrosion laboratory test results are general and should be considered only a random survey. The results of the chemical testing are summarized in Table 3-3 and provided in Appendix E.

Table 3-3. Summary of Laboratory Soil Corrosivity Testing

Boring No.	Depth (ft)	pH	Sulfide (mg/kg)	Chloride (mg/kg)	Sulfate (mg/kg)	Minimum Resistivity (ohm-cm)	Redox Potential Eh (mV)
TP-3	2-8	7.1	0.05	ND	10	3,000	296
TP-4	2-8	7.2	ND	20	10	2,900	303
TP-5	2-8	7.1	0.07	ND	10	2,400	314
TP-6	2-8	7.4	ND	ND	20	3,000	300
TP-8	2-8	7.2	0.11	10	10	3,300	311
TP-10	2-8	7.5	0.24	10	ND	3,300	268
TP-13	2-8	7.6	0.17	ND	10	3,400	283
TP-14	2-8	7.7	0.35	10	ND	3,500	279
TP-18	2-8	7.7	0.12	10	10	3,200	285
TP-22	2-8	7.5	0.04	ND	10	3,400	298

*ND- No Detection

These laboratory results were compared to the “Building Code Requirements for Reinforced Concrete”, ACI 318, to evaluate the potential of corrosion and attack to concrete. Based upon the tested sulfate concentrations, the soils have a Class S0 exposure rating for sulfate attack. ACI has no special requirements for cement type or concrete formulation for concrete in contact with soil based on the measured sulfate concentrations.

The results of the laboratory resistivity testing, as shown in Appendix E, generally indicate that there is the potential for corrosion to steel articles in contact with soils. Galvanization is typically used for protection of PV racking support piles, but additional measures such as coatings or active corrosion protection systems may be necessary depending on the design life of the system.

A Corrosion Evaluation Report, which includes recommendations for corrosion design for steel piles for the project site, is also provided in Appendix E.

3.5 THERMAL RESISTIVITY

Ten thermal resistivity tests were performed in the laboratory on samples obtained from the test pits. The thermal resistivity tests were performed in general accordance with IEEE Standard 442-2017-Guide for Soil Thermal Resistivity Measurements and ASTM standards. The results of the thermal resistivity testing are presented below in Table 3-2. Graphical results of the individual thermal dry-out curves and more detailed information regarding the sample preparation are presented in Appendix D.

Table 3-4. Thermal Resistivity of Native Soil Samples

Test Location	Tested Initial Moisture Content (% dry weight)	Tested Dry Density (lb/ft^3)	Thermal Resistivity, wet (°C-cm/W)	Thermal Resistivity, dry (°C-cm/W)	Standard Max. Dry Density (lb/ft^3)	Optimum Moisture Content (% dry weight)
TP-3	24	96	65	245	106.3	18.1
TP-4	19	96	77	249	106.1	19.2
TP-5	20	105	75	218	116.4	14.4
TP-6	17	96	83	253	106.1	17.1
TP-8	20	93	78	263	103.8	15.4
TP-10	17	98	77	247	109.2	16.5
TP-13	17	101	85	235	112.3	14.7
TP-14	17	99	89	244	109.9	15
TP-18	19	97	83	250	107.4	18.58
TP-22	19	93	85	258	103.3	19.0

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL CONCLUSIONS

The conclusions and recommendations presented below are based on the subsurface conditions observed in the explorations, laboratory test results, pile load testing, engineering analyses, and our experience with similar utility-scale PV solar projects. Based on the results of our field exploration and laboratory testing, the site appears to be geotechnically suitable for PV solar development.

4.2 EARTHWORK

4.2.1 Subgrade Preparation

Initial site work should consist of grubbing and stripping of vegetation, demolition, and removal of existing structures and other deleterious materials. Deleterious material should be removed for offsite disposal in accordance with local laws and regulations.

Subgrades below roadways, equipment pads, and areas planned for structural fill placement should be evaluated by an experienced geotechnical engineer or their representative prior to construction. Areas should be proof rolled with a loaded dump truck (minimum 18-kip axel load). Areas that express excessive rutting or pumping should be undercut and backfilled with structural fill per the following paragraphs. The excavations should extend horizontally beyond the construction limits, extending outward one foot for every one foot of excavation.

We recommend native soils below structural fill, equipment pads, spread foundations, and access roadways be scarified, moisture conditioned to zero to three percent above optimum moisture content, and recompacted at least eight inches below the engineered fill, access road subgrade, or base of concrete.

In the area where PV array piles will be installed, stripping of the organic materials is not required, unless there will be areas of fill in excess of 12 inches in depth. Preparation of the tilled or disturbed soils should be completed as required to facilitate array installation equipment access and will likely include minor levelling and compaction.

4.2.2 Excavation and Trenching

We anticipate that the site soils can be excavated using conventional heavy-duty construction equipment. Our borings and test pits did not encounter bedrock, boulders, or other layers anticipated to present difficult excavation conditions at typical utility installation depths.

All excavations must comply with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench Safety Standards. OSHA soil type and allowable sloping must be made in the field by the contractor's OSHA-qualified "competent person" whenever personnel exposure is anticipated. Construction site safety is the responsibility of the contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations.

4.2.3 Structural Fill

Structural fill is defined as any fill that will support structural elements. Structural fill will be required for backfill of utilities and for site-grading fill. All structural fill must be free of sod, rubbish, topsoil, frozen soil, and other deleterious materials. The onsite soils are generally suitable for reuse as structural fill provided they are properly moisture conditioned to maintain workability. Imported Structural fill materials should consist of a non-expansive, mainly granular material as specified below in Table 4-1.

Table 4-1. Structural Fill Criteria

Gradation Requirements	
Standard Sieve Size	Percent Passing
3 inch	100
3/4 inch	80 - 100
No. 200	10 - 35
Plasticity Requirements (Atterberg Limits)	
Liquid Limit	30 or less
Plasticity Index	12 or less

The materials encountered during Kleinfelder's evaluation were generally fine-grained (greater than 50 percent passing the No. 200 sieve) with higher liquid limits and plasticity indices than listed in Table 4-1 below. The in-situ moisture content of tested onsite soils ranged from about 13 to 24 percent, while proctor test results indicate optimum moisture contents ranging from approximately 14 to 20 percent. Fine-grained soils with elevated liquid limits and plastic indices are moisture sensitive and can be difficult to dry out to achieve compaction requirements.

A sample of any imported fill material should be submitted to the geotechnical engineer for approval and testing at least one week prior to stockpiling at the site. Structural fill should be placed according to the recommendations in Section 4.2.4.

4.2.4 Fill Placement and Compaction

Structural fill should be placed in loose lifts and in thicknesses appropriate for the compaction equipment being used. However, in no case should loose-lift thickness exceed eight inches. Structural fill should be compacted to the specifications presented in Table 4-2.

Table 4-2. Compaction Specifications

Fill Location	Fill Material Type	Minimum Percent Compaction (ASTM D698)	Moisture Content
Foundation and Roadway Subgrade Preparation or Site Grading	Clay Soil	95	0 to +3% of optimum
	Sandy Soil	95	-2 to +2% of optimum

4.2.5 Construction in Wet or Cold Weather

During construction, the site should be graded such that surface water can drain readily away from the excavations. Any water should be promptly pumped out or otherwise removed since water may accumulate in excavations or on subgrade surfaces. These wet areas should be allowed to dry before resuming construction. The use of berms, ditches, and similar means may be used to prevent stormwater from entering the work area and to convey any water off-site efficiently.

If earthwork is performed during the winter months when freezing may occur, no grading fill, structural fill, or other fill should be placed on frosted or frozen ground, nor should frozen material be placed as fill. Frozen ground should be allowed to thaw or be completely removed prior to placement of fill. A good practice is to cover the compacted fill with a "blanket" of loose fill to help prevent the compacted fill from freezing.

4.2.6 Construction Testing and Observation

Field testing and construction observation should take place under the direction of a qualified geotechnical engineer. Furthermore, the opinions and recommendations expressed in a geotechnical report are based on interpretation of limited information obtained from the field exploration. Therefore, it is common to find that actual site conditions differ from those indicated in the report. The geotechnical engineer should remain involved throughout the project to evaluate such differing conditions as they appear, and to modify or add to the geotechnical recommendations, as necessary.

4.2.7 Surface Drainage and Final Site Grading

Positive drainage away from structures is essential to the performance of foundations and roads and should be provided during the life of the facility. Consideration should be given to improving the slope and surface drainage of areas that have ponding of surface water and/or poor surface drainage near slab foundations or roads.

4.3 SEISMIC SITE CLASS

Based on the soil conditions encountered in the borings and our knowledge of geologic conditions in the area of the site, a Site Class of 'D' is considered appropriate. The seismic design parameters as determined in ASCE 7-16 are summarized below in Table 4-3.

Table 4-3. Seismic Design Parameters

Design Parameter	Recommended Value
Site Class	D
PGA	0.129
PGA_M	0.199
S_s	0.217
S_1	0.069
F_a	1.6
F_v	2.4
S_{MS}	0.348
S_{M1}	0.166
S_{DS}	0.232
S_{D1}	0.111

The typical soil profile encountered in our borings was predominately medium stiff to hard clay and silt and medium dense sand. It is our opinion that this soil profile presents negligible risk of liquefaction due to the stiff/dense soils.

4.4 FROST HEAVE CONSIDERATIONS

Frost depth at the project site is approximately thirty-six inches. Due to the presence shallow groundwater and sand pockets interbedded in clays encountered at the site, we anticipate the risk of frost action to be low to moderate.

4.5 PV ARRAY FOUNDATIONS

Typical foundations used for PV arrays, such as driven steel piles, drilled piers, helical piers, ballasts, or footings will likely be feasible for use for this project. We have assumed driven steel piles are preferred. A summary of the pile axial and lateral pullout load is presented in Appendix F. Driving refusal was not encountered at any of the 26 test locations. It should be noted that the piles were tested in uplift to a load of approximately 12,500 pounds or a movement of 1 inch or more, whichever occurred first.

The following design values for evaluation of axial and lateral pile capacity are based on the findings of our field investigation, laboratory testing, pile load testing, and our experience in the area. Based on the performance from the pile load testing and potential frost-heave considerations, we recommend all PV support piles have a minimum driven depth of at least 7.5 feet below grade. Greater depths may be required to achieve structural requirements.

4.5.1 Axial Capacity

Axial capacity of driven piles may be estimated based on the perimeter of the pile and embedment depth. The perimeter of a wide-flange beam should be taken as twice the sum of the flange width and web depth. We recommend the upper one foot of soil be neglected from the skin friction component of axial capacity.

Kleinfelder evaluated the skin friction of pile based on the results of the axial pullout testing. The ultimate skin friction of driven pile foundations can be taken as 500 psf. Thus, the nominal axial load capacity of the driven piles for PV racking can be calculated using the following formula:

$$Q_{ult} = 500psf * P * (L-1ft)$$

Where: Q_{ult} = ultimate (nominal) axial capacity (pounds)
P = perimeter equal to twice the section depth plus twice the flange width (ft)
L = embedment depth (ft), neglecting the upper 1ft

For design of piles, we recommend a factor of safety of at least 1.5 for evaluation of allowable skin friction, or a resistance factor of 0.7 for design using load and resistance factored design (LRFD).

For piles in compression, end bearing can be considered additive to the skin friction. Ultimate end bearing pressure can be taken as 5,000 psf, calculated based on the box end area of the pile. For evaluation of allowable end pressure, we recommend a factor of safety of 2.5. For LRFD, we recommend a maximum a resistance factor of 0.5. The above values can be used to estimate the capacity of piles for both refusal and non-refusal installations.

4.5.2 Lateral Capacity

Lateral load response of pile foundations can be calculated with the computer program L-Pile, created by Ensoft, Inc. The stiffness of the pile and the stress-strain properties of the surrounding

soils determine the lateral resistance of the foundation. Recommended L-Pile input parameters for the sand and clay soils encountered are included below in Table 4-4.

Table 4-4: LPile Input Parameters

Depth Below Grade (ft)	Soil Type	Effective Unit Weight (pcf)	Undrained Cohesion (psf)
0 to 0.5	Soft Clay (Matlock)	107.5	500
0.5 to 15	Stiff Clay w/o Free Water	107.5	2,000

Kleinfelder developed these parameters from the results of the field and laboratory testing and pile load testing. These parameters can be used for the full depth of pile embedment. If piles will be wider than seven inches, Kleinfelder should be given the opportunity to reevaluate these parameters.

4.5.3 Refusal Considerations

We recommend that all PV support piles have a minimum driven depth of at least 7.5 feet. Greater depths may be required to achieve structural requirements. Refusal is defined as no advancement after driving with full power (minimum 830 Joules) for at least 30 seconds. Piles that refuse and require additional embedment depth should be withdrawn and the pile location predrilled. Predrilled pile holes should be backfilled with compacted granular material. Compaction should be completed by tamping with a heavy tamping bar with at least three lifts.

4.6 EQUIPMENT FOUNDATIONS

We understand that the proposed substation equipment may be supported on shallow/mat foundations. We evaluated several foundation sizes to provide allowable bearing pressures for various sizes based on the limiting factors of soil bearing capacity and estimates for 1-inch of settlement (whichever is lower). Our recommendations are based on Boring B-36 from within the proposed substation area.

Table 4-5. Summary of Shallow Foundation Bearing Pressures

Width (ft)	Length (ft)	Allowable Bearing Pressure (psf)
2	2	4,000
6	6	4,000
10	10	3,500
20	20	2,500

We recommend mat foundations be designed in accordance with the following criteria:

- The recommended allowable bearing pressure range from 2,500 to 4,000 psf and include a factor of safety of 3 with regards to bearing capacity. Any unsuitable subgrade conditions encountered in the area of mat foundations should be improved as discussed in Section 4.2.1.
- A modulus of subgrade reaction (k1) of 200 pounds per square inch per inch (pci) of deflection for a 1 ft by 1 ft plate may be used for the design of the mat foundations bearing on approved materials. This modulus value may be adjusted for the design mat width by using the equation below with B equal to the width of the mat in feet.

$$\textit{Modulus of subgrade reaction adjusted for size of mat in pci} = k = \frac{k_1}{B}$$

- To provide frost protection, mat foundations should have a minimum embedment depth of 36 inches based on the frost depth in the area of the site or as required by more stringent codes. Minimum embedment may be achieved by turned down or thickened edges at least 36-inches below surrounding grades to provide perimeter confinement to reduce water infiltration. The soils included inside the turned down edges within the entire footprint of the mat should consist of gravel (AASHTO No. 57 or equivalent). Drainage provisions should be provided to ensure surface water does not become trapped beneath the mat.
- Mat foundations should be designed to distribute the loads uniformly over the mat area.
- Minimum foundation size should be 2-feet by 2-feet.
- Post-construction total settlements of the mat foundations are estimated to be up to about 1 inch (at the sizes and allowable bearing pressures provided in Table 4-5), with post-construction differential settlements of up to about 0.5-inch.
- Underground utilities running parallel to the mat and lying 3 feet or shallower, generally should be located no closer than 2 feet outside of the perimeter edges of the mat slab.

Deeper utilities should be located above a 1:1 (horizontal to vertical) slope projected downward from the bottom edges of the mat.

- For resistance to lateral loading, we recommend an ultimate coefficient of friction of 0.30 be utilized for calculation of friction resistance along the bottom of foundations constructed on approved subgrade soils. The vertical dead loads acting on the mat can be utilized to calculate the ultimate friction resistance. We recommend a minimum factor of safety of 1.5 when using sliding friction alone. A passive pressure coefficient of 3.0 may be used to calculate ultimate passive pressure resistance on the side of mats for resistance to sliding in Structural Fill and site soils. A moist unit weight of 110 pcf may be used to calculate passive pressures. The passive pressure can be assumed to act starting at a depth of 1-foot below grade in level unpaved areas. A larger magnitude of movement is required to engage the full passive resistance than sliding friction. Therefore, a minimum factor of safety of 2.0 is recommended when using passive pressure in conjunction with base friction to resist lateral loads. It should be noted that the lateral load resistance values discussed above are only applicable where the concrete for foundations are either placed directly against undisturbed soils or that the voids created from the use of forming are backfilled with properly compacted soil.

During construction, foundation excavations should be observed by a Geotechnical Engineer to evaluate the supporting capabilities of the bearing materials. If unsuitable bearing conditions are encountered, the area should be over-excavated and backfilled with compacted Structural Fill at the recommendation of a representative of the Geotechnical Engineer.

The Contractor should not allow surface and/or ground water to accumulate in foundation excavations. Foundations should be placed in excavations immediately after foundation subgrades are approved by the on-site geotechnical representative. Water entering foundation excavations should be removed and the subgrade scarified, moisture conditioned, and re-compacted in accordance with Section 4.2.1 of this report, prior to foundation placement. The use of a “mud mat”, an unreinforced concrete slab (approximately 3 inches thick), may be considered for foundation subgrades to protect the subgrade from damage resulting from precipitation.

4.7 DIRECT EMBEDMENT POLES

Overhead interconnection lines are assumed to be supported on direct embedment poles. Based on the "Design Manual for High Voltage Transmission Lines" RUS Bulletin 1724E-200, the standard for installation of direct embedment poles in “good soil” is "10 percent plus 2 feet". The

subsurface conditions encountered appear to fall within this category; however, the pole designer should review the logs to evaluate an appropriate depth for poles.

4.8 ACCESS ROADS

At typical solar sites, access roads are heavily used during construction, but see very low traffic volumes during the life of the installation. Vehicle types are anticipated to vary significantly, from lightly to heavily loaded trucks and construction equipment. Access road sections are typically designed based on post-construction traffic volumes, with the assumption that localized improvements and/or frequent maintenance of the roads will occur during construction. Gravel-surfaced or soil access roads are typical for these facilities.

Near surface soils encountered in the explorations were predominately lean clay with various amounts of sand with low to medium plasticity. These soils are considered fair to poor subgrade for roads, and the strength of the subgrade will be highly influenced by moisture content. We estimate these soils to have an R-value of 5 for road section design.

Performance of gravel-surface roads is greatly influenced by moisture in the subgrade soils. High subgrade moisture contents will increase the frequency and depth of rutting and ponding on the wearing surface. The use of subgrade stabilization (e.g., lime or fly-ash) or a geotextile separation fabric can improve support qualities and may be appropriate for high-traffic areas. A geotextile can also reduce rutting and maintain strength of a gravel surface course.

Based on AASHTO design criteria, we recommend a minimum wearing surface of eleven inches of aggregate pavement for a traffic load of six trucks per weekday for a year during construction. Traffic after construction is anticipated to be very limited and we recommend a wearing surface of a minimum of six inches of aggregate pavement. Wearing course should consist of imported granular material that meets the requirements of the Ohio Department of Transportation Construction and Material Specifications (2019) Section 703.04, Aggregate for Asphalt Concrete Base. These thicknesses assume no stabilization of the subgrade; subgrade stabilization should reduce these thickness estimates. An increased thickness of granular material may be required in isolated areas to achieve stability.

We recommend the roads be designed with cross-slope to promote drainage, and, where possible, with ditches to help drain water from the pavement subgrade and convey off-site.

Road alignments should be properly prepared by stripping all vegetation, organic soil, and deleterious materials and scarified and recompacted to a depth 12 inches below final subgrade elevation. The road alignment should be proof rolled with a fully loaded dump truck or similar vehicle. Areas that deflect, rut, or pump should be further excavated and recompacted, or stabilized.

Regular maintenance including grading and the addition of gravel should be anticipated during the facility construction because truck and heavy equipment traffic will be frequent. After construction, traffic volumes are anticipated to be very low, and mainly related to facility maintenance operations.

5 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by Lightsource bp and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

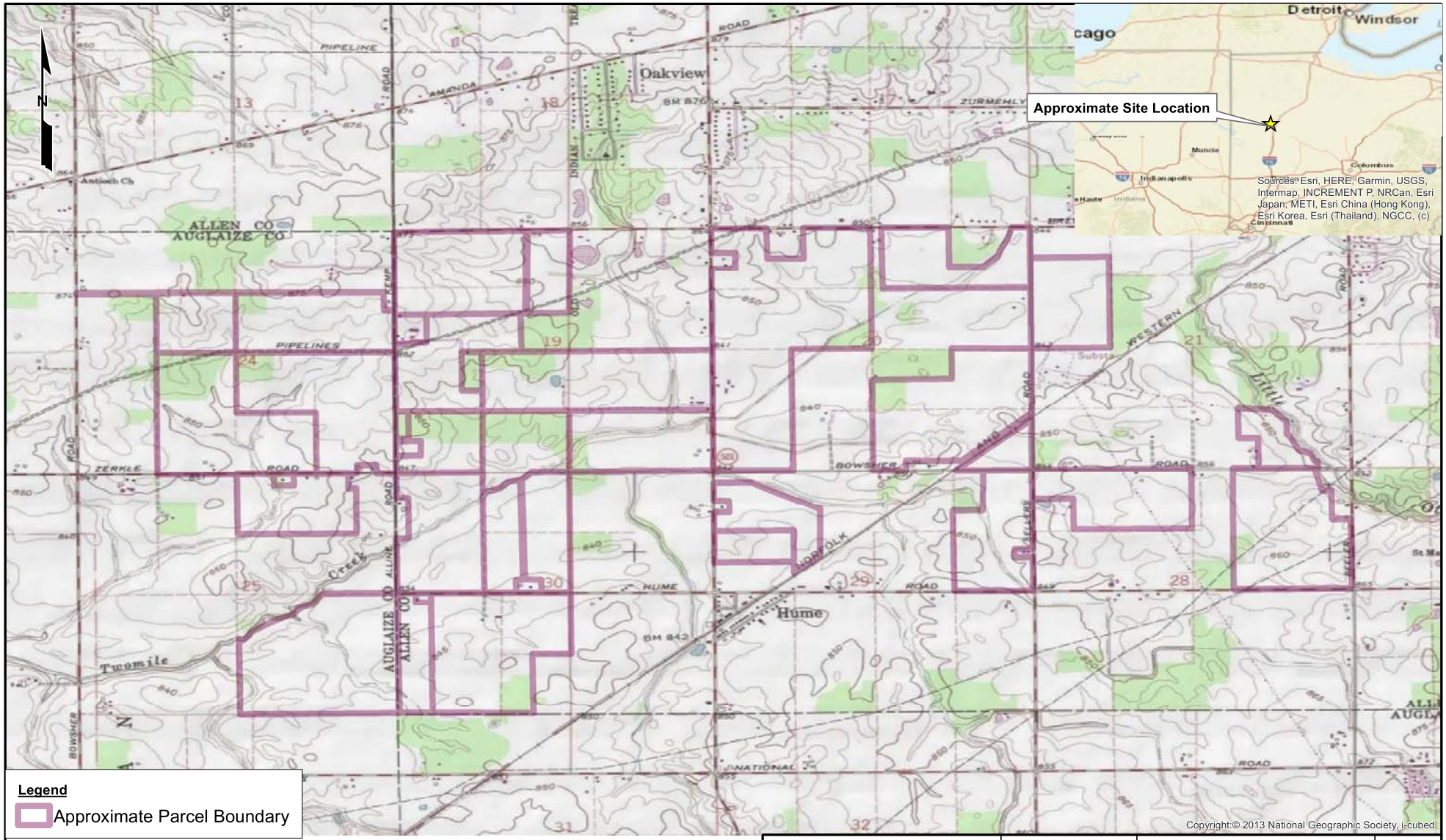
The work performed was based on project information provided by Lightsource bp. If Lightsource bp does not retain Kleinfelder to review any plans and specifications, including any revisions or modifications to the plans and specifications, Kleinfelder assumes no responsibility for the interpretation or implementation of our recommendations. In addition, if there are any changes in the field to the plans and specifications, Lightsource bp must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will vitiate Kleinfelder's recommendations.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. Although risk can never be eliminated, more detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service, which provide information for their purposes at acceptable levels of risk. Lightsource bp and key members of the design team should discuss the issues covered in this report with Kleinfelder, so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk and expectations for future performance and maintenance.

The scope of services for this subsurface exploration and geotechnical report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the soil, surface water, or groundwater at this site.

This report, and any future addenda or reports regarding this site, may be made available to bidders to supply them with only the data contained in the report regarding subsurface conditions and laboratory test results at the point and time noted. Bidders may not rely on interpretations, opinions, recommendations, or conclusions contained in the report. Because of the limited nature of any subsurface study, the contractor may encounter conditions during construction which differ from those presented in this report. In such event, the contractor should promptly notify the owner so that Kleinfelder's Geotechnical Engineer can be contacted to confirm those conditions. We recommend the contractor describe the nature and extent of the differing conditions in writing and that the construction contract include provisions for dealing with differing conditions. Contingency funds should be reserved for potential problems during foundation construction.

FIGURES



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PROJECT NO.	20212135.001A
DRAWN:	11/30/2020
DRAWN BY:	ASK
CHECKED BY:	JMB
FILE NAME:	Figure 1 - Site Location Plan

SITE LOCATION PLAN

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, Ohio

FIGURE
1

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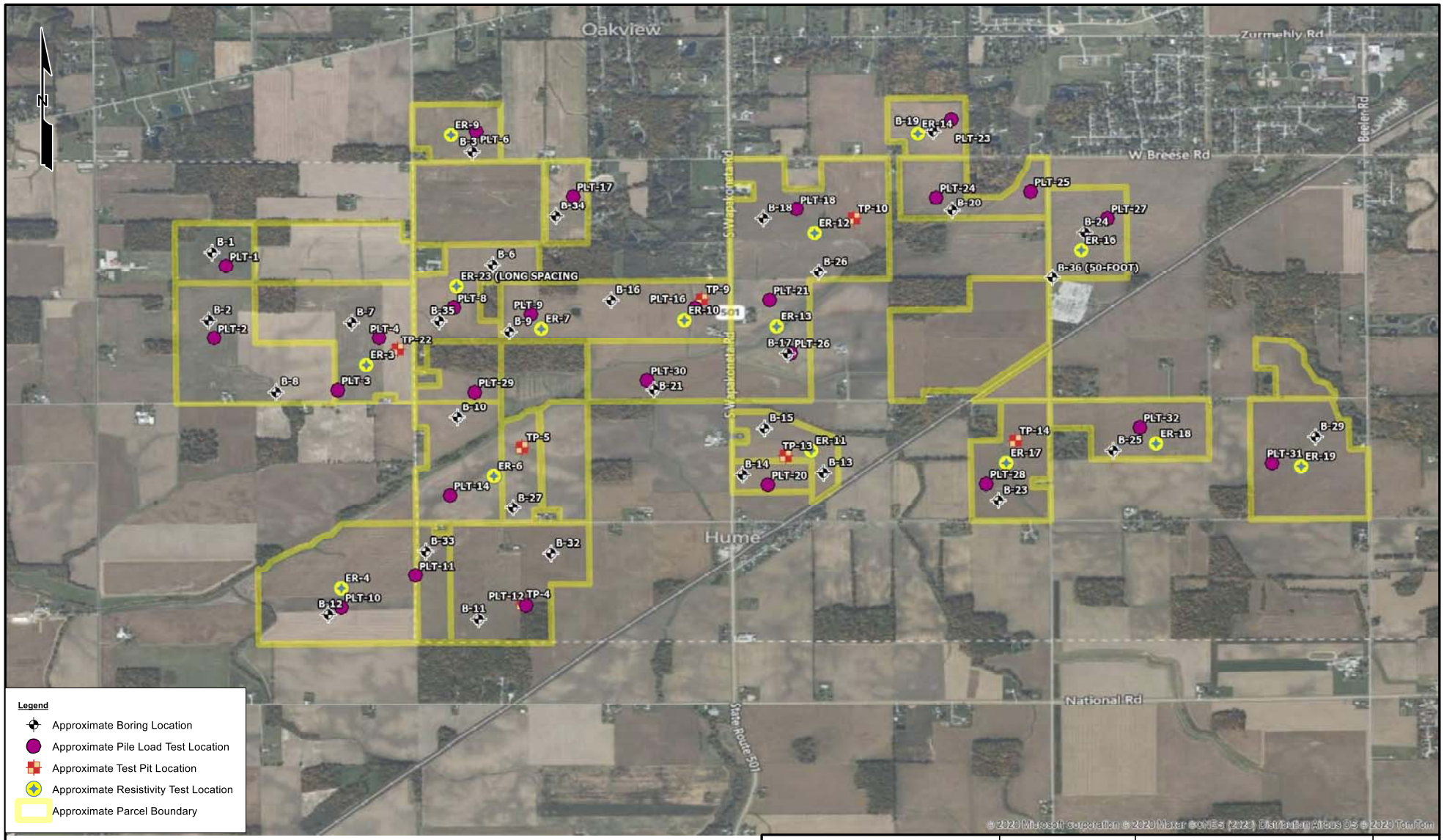

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PROJECT NO.	20212135.001A
DRAWN:	12/21/2020
DRAWN BY:	ASK
CHECKED BY:	JMB
FILE NAME:	Figure 2 - Exploration Location Plan_PLT

EXPLORATION & RESISTIVITY TEST LOCATION PLAN

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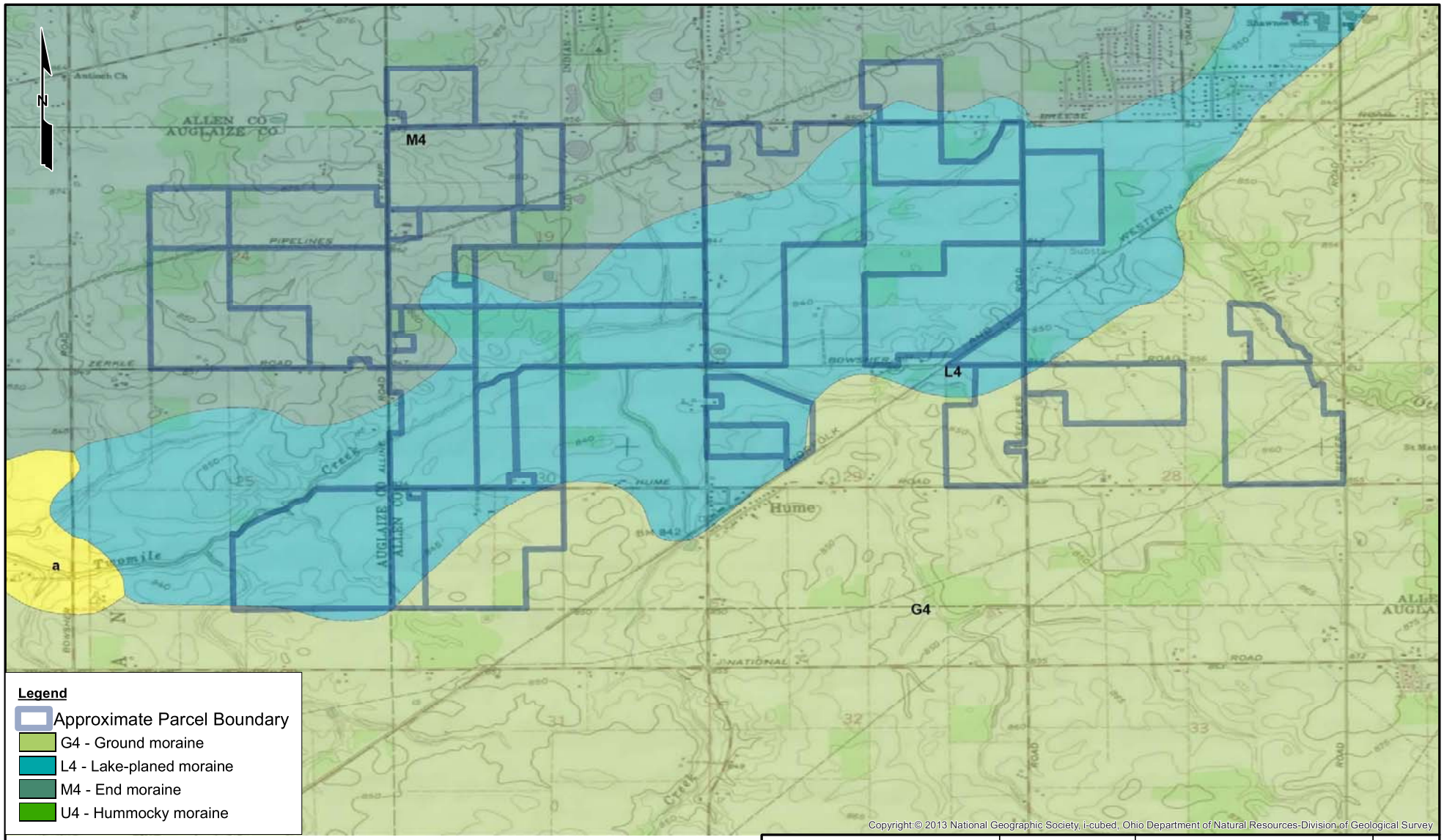
FIGURE
2

Document Path: K:_clients\Lightsource BP\Birch\Figure 2 - Exploration Location Plan_PLT.mxd



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REFERENCE
"Quaternary Geology 500K - Geologic Units"
Published by : Ohio Department of Natural Resources - Division of Geological Survey

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PROJECT NO.	20212135.001A
DRAWN:	12/21/2020
DRAWN BY:	ASK
CHECKED BY:	JMB
FILE NAME:	Figure 3 - Surficial Geology

SURFICIAL GEOLOGY MAP

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Birch Solar Project
Allen and Auglaize Counties, Ohio

FIGURE
3

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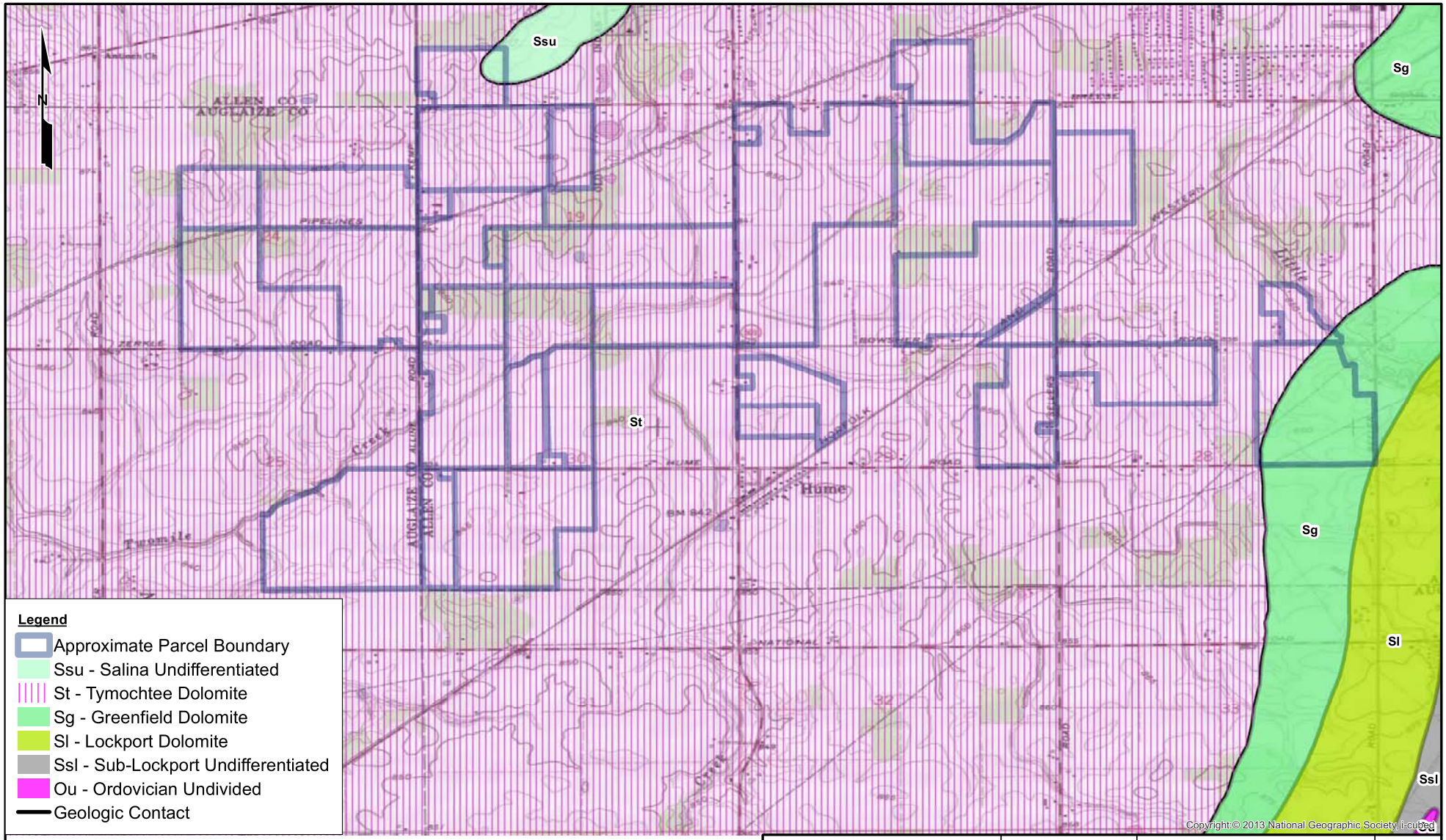

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REFERENCE
"Bedrock Geology 24K - Geologic Units"
Published by : Ohio Department of Natural Resources - Division of Geological Survey

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DRAWN:	12/21/2020
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FILE NAME:	Figure 4 - Bedrock Geology

BEDROCK GEOLOGY MAP

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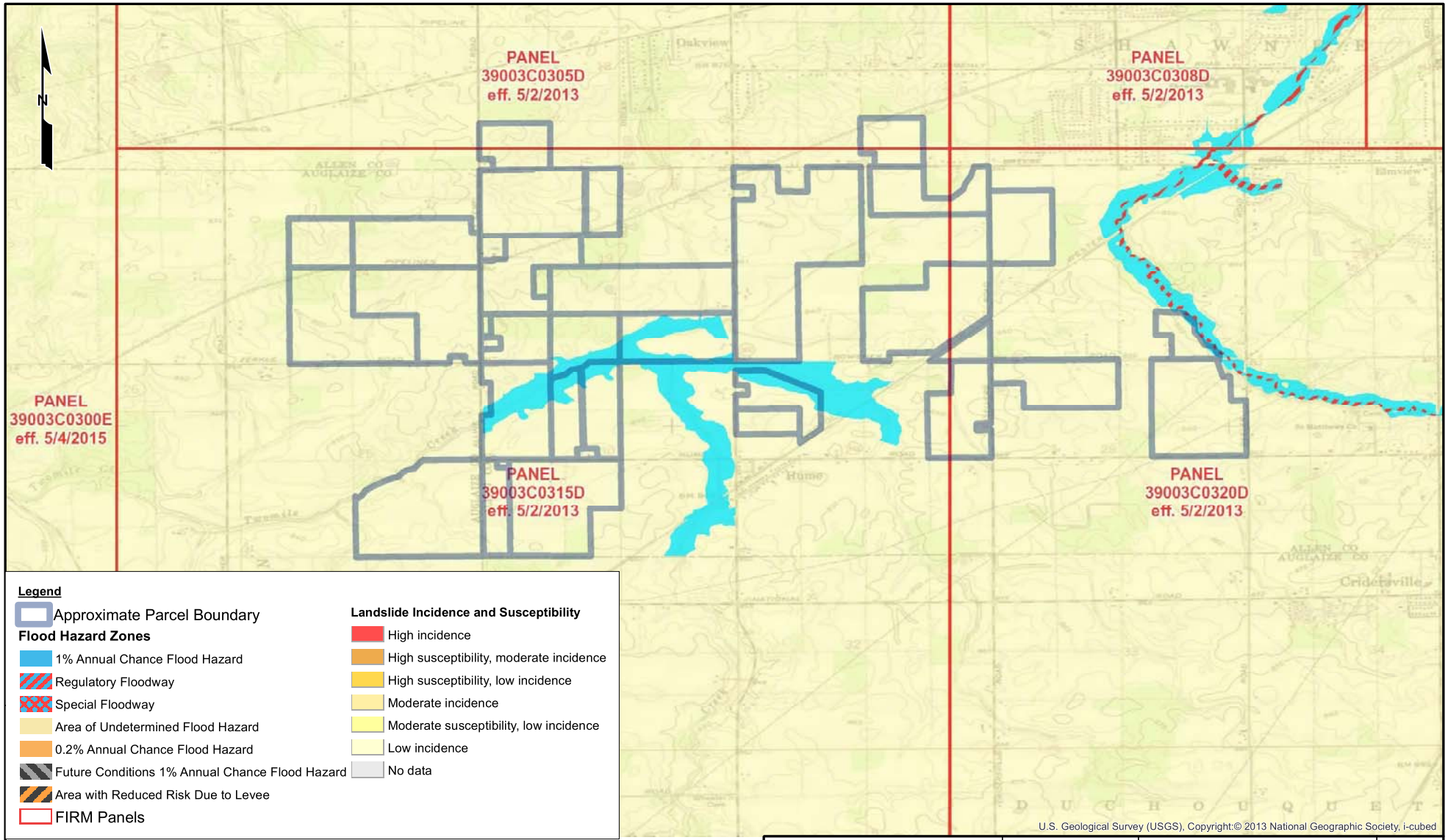
FIGURE
4

Document Path: K:_clients\Lightsource BP\Birch\Figure 4 - Bedrock Geology.mxd



0 2,000 4,000 8,000 Feet

REFERENCE

Radbruch-Hall, Dorothy, et al., "Landslide Overview Map of the Conterminous United States (1982)", published by : US Geologucal Survey
National Flood Hazard Layer (NFHL) obtained from Federal Emergency Management Agency (FEMA)

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PROJECT NO.	20212135.001A
DRAWN:	12/21/2020
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FILE NAME:	Figure 5 - Geohazard Map

GEOHAZARD MAP

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, Ohio

FIGURE
5

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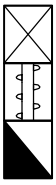
APPENDIX A
SOIL BORING AND TEST PIT LOGS

SAMPLE/SAMPLER TYPE GRAPHICS



BULK SAMPLE

HOLLOW STEM AUGER

STANDARD PENETRATION SPLIT SPOON SAMPLER (2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

GROUND WATER GRAPHICS

WATER LEVEL (level where first observed)

WATER LEVEL (level after exploration completion)

WATER LEVEL (additional levels after exploration)

OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual or differ from those shown.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS

PID - Photoionization Detector

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	**GRAVELS** (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVEL WITH <5% FINES	Cu≥4 and 1≤Cc≤3		**GW**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu<4 and/ or 1>Cc>3		**GP**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5% TO 12% FINES	Cu≥4 and 1≤Cc≤3		**GW-GM**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu<4 and/ or 1>Cc>3		**GP-GM**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GP-GC	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH > 12% FINES			**GM**	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
					GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
					GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (Half or more of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu≥6 and 1≤Cc≤3		**SW**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu<6 and/ or 1>Cc>3		**SP**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5% TO 12% FINES	Cu≥6 and 1≤Cc≤3		**SW-SM**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu<6 and/ or 1>Cc>3		**SP-SM**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SP-SC	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH > 12% FINES			**SM**	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
					SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
					SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES

FINE GRAINED SOILS (Half or more of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)	**ML**	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid Limit 50 or greater)	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

NOTE: USE MATERIAL DESCRIPTION ON THE LOG TO DEFINE A GRAPHIC THAT MAY NOT BE PROVIDED ON THIS LEGEND.

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PROJECT NO.: 20212135.001A

DRAWN BY: DH

CHECKED BY: DEP

DATE: 12/8/2020

GRAPHICS KEY

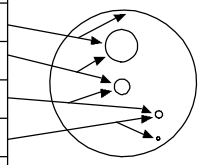
Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

APPENDIX

KEY-1

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		>12 in. (304.8 mm.)	>12 in. (304.8 mm.)	Larger than basketball-sized
Cobbles		3 - 12 in. (76.2 - 304.8 mm.)	3 - 12 in. (76.2 - 304.8 mm.)	Fist-sized to basketball-sized
Gravel	coarse	3/4 -3 in. (19 - 76.2 mm.)	3/4 -3 in. (19 - 76.2 mm.)	Thumb-sized to fist-sized
	fine	#4 - 3/4 in. (#4 - 19 mm.)	0.19 - 0.75 in. (4.8 - 19 mm.)	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)	Sugar-sized to rock salt-sized
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029 in. (<0.07 mm.)	Flour-sized and smaller



SECONDARY CONSTITUENT

	AMOUNT	
Term of Use	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT - N_{60} (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q_u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Thumb will penetrate more than 1 inch (25 mm). Extrudes between fingers when squeezed.
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1000	Thumb will penetrate soil about 1 inch (25 mm). Remolded by light finger pressure.
Medium Stiff	4 - 8	0.5 ≤ PP <1	1000 - 2000	Thumb will penetrate soil about 1/4 inch (6 mm). Remolded by strong finger pressure.
Stiff	8 - 15	1 ≤ PP <2	2000 - 4000	Can be imprinted with considerable pressure from thumb.
Very Stiff	15 - 30	2 ≤ PP <4	4000 - 8000	Thumb will not indent soil but readily indented with thumbnail.
Hard	>30	4 ≤ PP	>8000	Thumbnail will not indent soil.

REACTION WITH HYDROCHLORIC ACID

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT-N_{60} (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)
Very Loose	<4	<4	<5	0 - 15
Loose	4 - 10	5 - 12	5 - 15	15 - 35
Medium Dense	10 - 30	12 - 35	15 - 40	35 - 65
Dense	30 - 50	35 - 60	40 - 70	65 - 85
Very Dense	>50	>60	>70	85 - 100

FROM TERZAGHI AND PECK, 1948

PLASTICITY

DESCRIPTION	LL	Either the LL or the PI (or both) may be used to describe the soil plasticity. The ranges of numbers shown here do not imply that the LL ranges correlate with the PI ranges for all soils.	PI
Non-Plastic	NP		NP
Low	< 30		< 15
Medium	30 - 50		15 - 25
High	> 50		> 25

LL is from Casagrande, 1948. PI is from Holtz , 1959.

STRUCTURE

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. thick, note thickness.
Laminated	Alternating layers of varying material or color with the layer less than 1/4-in. thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.

ANGULARITY

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

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CHECKED BY: DEP
DATE: 12/8/2020

SOIL DESCRIPTION KEY

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Birch Solar Project
Allen and Auglaize Counties, OH

APPENDIX

KEY-2

INFILLING TYPE

NAME	ABBR	NAME	ABBR
Albite	Al	Muscovite	Mus
Apatite	Ap	None	No
Biotite	Bi	Pyrite	Py
Clay	Cl	Quartz	Qz
Calcite	Ca	Sand	Sd
Chlorite	Ch	Sericite	Ser
Epidote	Ep	Silt	Si
Iron Oxide	Fe	Talc	Ta
Manganese	Mn	Unknown	Uk

DENSITY/SPACING OF DISCONTINUITIES

DESCRIPTION	SPACING CRITERIA
Unfractured	>6 ft. (>1.83 meters)
Slightly Fractured	2 - 6 ft. (0.061 - 1.83 meters)
Moderately Fractured	8 in - 2 ft. (203.20 - 609.60 mm)
Highly Fractured	2 - 8 in (50.80 - 203.30 mm)
Intensely Fractured	<2 in (<50.80 mm)

ADDITIONAL TEXTURAL ADJECTIVES

DESCRIPTION	RECOGNITION
Pit (Pitted)	Pinhole to 0.03 ft. (3/8 in.) (>1 to 10 mm.) openings
Vug (Vuggy)	Small openings (usually lined with crystals) ranging in diameter from 0.03 ft. (3/8 in.) to 0.33 ft. (4 in.) (10 to 100 mm.)
Cavity	An opening larger than 0.33 ft. (4 in.) (100 mm.), size descriptions are required, and adjectives such as small, large, etc., may be used
Honeycombed	If numerous enough that only thin walls separate individual pits or vugs, this term further describes the preceding nomenclature to indicate cell-like form.
Vesicle (Vesicular)	Small openings in volcanic rocks of variable shape and size formed by entrapped gas bubbles during solidification.

ADDITIONAL TEXTURAL ADJECTIVES

DESCRIPTION	CRITERIA
Unweathered	No evidence of chemical / mechanical alternation; rings with hammer blow.
Slightly Weathered	Slight discoloration on surface; slight alteration along discontinuities; <10% rock volume altered.
Moderately Weathered	Discoloring evident; surface pitted and alteration penetration well below surface; Weathering "halos" evident; 10-50% rock altered.
Highly Weathered	Entire mass discolored; Alteration pervading most rock, some slight weathering pockets; some minerals may be leached out.
Decomposed	Rock reduced to soil with relic rock texture/structure; Generally molded and crumbled by hand.

RELATIVE HARDNESS / STRENGTH DESCRIPTIONS

GRADE		UCS (Mpa)	FIELD TEST
R0	Extremely Weak	0.25 - 1.0	Indented by thumbnail
R1	Very Weak	1.0 - 5.0	Crumbles under firm blows of geological hammer, can be peeled by a pocket knife.
R2	Weak	5.0 - 25	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer.
R3	Medium Strong	25 - 50	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single firm blow of a geological hammer.
R4	Strong	50 - 100	Specimen requires more than one blow of geological hammer to fracture it.
R5	Very Strong	100 - 250	Specimen requires many blows of geological hammer to fracture it.
R6	Extremely Strong	> 250	Specimen can only be chipped with a geological hammer.

ROCK QUALITY DESIGNATION (RQD)

DESCRIPTION	RQD (%)
Very Poor	0 - 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90
Excellent	90 - 100

APERTURE

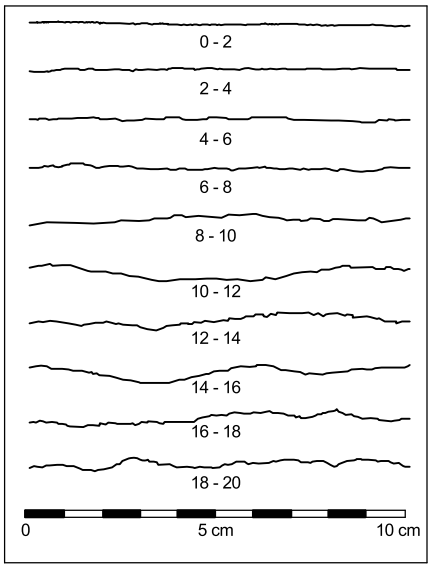
DESCRIPTION	CRITERIA [in (mm)]
Tight	<0.04 (<1)
Open	0.04 - 0.20 (1 - 5)
Wide	>0.20 (>5)

BEDDING CHARACTERISTICS

DESCRIPTION	Thickness [in (mm)]
Very Thick Bedded	>36 (>915)
Thick Bedded	12 - 36 (305 - 915)
Moderately Bedded	4 - 12 (102 - 305)
Thin Bedded	1 - 4 (25 - 102)
Very Thin Bedded	0.4 - 1 (10 - 25)
Laminated	0.1 - 0.4 (2.5 - 10)
Thinly Laminated	<0.1 (<2.5)

Bedding Planes	Planes dividing the individual layers, beds, or stratigraphy of rocks.
Joint	Fracture in rock, generally more or less vertical or traverse to bedding.
Seam	Applies to bedding plane with unspecified degree of weather.

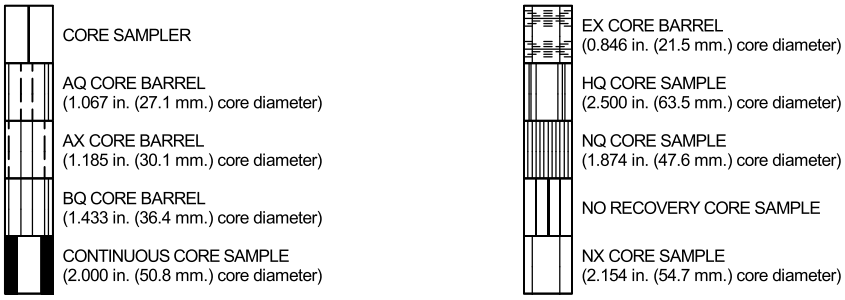
JOINT ROUGHNESS COEFFICIENT (JRC)



From Barton and Choubey, 1977

RQD Rock-quality designation (RQD) Rough measure of the degree of jointing or fracture in a rock mass, measured as a percentage of the drill core in lengths of 10 cm. or more.

CORE SAMPLER TYPE GRAPHICS



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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

ROCK DESCRIPTION KEY

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

APPENDIX

KEY-3

Date Begin - End:	10/21/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-1**	
Logged By:	M. Glassmeyer	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	50°F Partly Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.68093°
Longitude: -84.23476°
Approximate Ground Surface Elevation (ft.): 872
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=1 2 2 3 PP=2.5	24"								
870			**Glacial Till** **Lean CLAY with Sand (CL)**: medium plasticity, olive yellow, moist, medium stiff	S-2		BC=3 3 6 8 PP=3	16"	CL	19		99	82	43	24	
	5		yellowish brown, hard, trace gravel	S-3		BC=12 16 23 24 PP=4.5	24"								
865				S-4		BC=24 23 24 24 PP=4.5	24"								
				S-5		BC=11 12 12 16 PP=4.5	24"								
	10														
860				S-6		BC=6 9 11 16 PP=4.5	24"								
	15														
855				S-7		BC=6 9 10 13 PP=4.5	24"								
	20														
850															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 21, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 4.1 feet.
Caving was observed at a depth of 6.5 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	MG
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-1

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-1

Date Begin - End:	10/21/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-2**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	57°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67638°
Longitude: -84.23503°
Approximate Ground Surface Elevation (ft.): 856
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 3 4 5 PP=4.5	16"								
855			**Glacial Till** **Lean CLAY (CL)**: medium plasticity, reddish yellow mottled pink, moist, medium stiff, homogeneous												
			subangular to subrounded, brown multicolored white, stiff, trace gravel	S-2		BC=5 8 9 10 PP=4.5	20"								
	5			S-3		BC=9 15 19 23 PP=4.5	12"								
850				S-4		BC=21 24 25 22 PP=4.5	20"								
			Lean CLAY with Sand (CL): subangular to subrounded, medium plasticity, light gray, moist, hard, homogeneous, iron oxide staining, trace gravel	S-5		BC=10 9 13 19 PP=4.5	19"	CL	18		100	84	38	21	
	10														
845															
				S-6		BC=9 13 16 20 PP=4.5	24"								
	15														
840															
				S-7		BC=7 7 9 9 PP=2.5	24"								
			low plasticity, very stiff												
	20														
835															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 21, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 11.1 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-2

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-2

PAGE: 1 of 1

Date Begin - End:	10/22/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-3**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	57°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.68647°
Longitude: -84.21918°
Approximate Ground Surface Elevation (ft.): 867
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=1 1 3 4	18"								
865			**Glacial Till** **Lean CLAY with Sand (CL)**: low to medium plasticity, reddish yellow, moist, medium stiff, homogeneous light brown multicolored white, very stiff	S-2		BC=6 9 11 11	18"								
	5		**Lean CLAY (CL)**: subangular to subrounded, medium plasticity, pale red, hard, homogeneous, trace gravel	S-3		BC=10 14 19 25	21"	CL	16		99	88	48	27	
860			iron oxide staining	S-4		BC=20 24 21 23	18"								
			reddish yellow multicolored gray, very stiff	S-5		BC=9 11 14 16	22"								
	10														
855			**Fat CLAY (CH)**: subangular to subrounded, high plasticity, light brown, moist, very stiff, homogeneous, trace sand	S-6		BC=6 8 13 14	24"	CH	21		99	87	51	31	
	15														
850				S-7		BC=8 9 13 15	24"								
	20														
845															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 22, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 8.8 ft. below ground surface.

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PROJECT NO.:	20212135.001A
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DATE:	12/8/2020

BORING LOG B-3

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Allen and Auglaize Counties, OH

EXPLORATION
B-3

PAGE: 1 of 1

Date Begin - End:	10/20/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-6**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67919°
Longitude: -84.21795°
Approximate Ground Surface Elevation (ft.): 865
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 2 2 4 PP=3	18"								
			Glacial Till **Lean CLAY with Sand (CL)**: subrounded to rounded, low plasticity, reddish brown, moist, medium stiff, homogeneous	S-2		BC=5 6 7 8 PP=4.5	18"								
			reddish brown mottled light brownish gray, stiff	S-3		BC=3 5 8 8 PP=4.5	21"								
860	5			S-4		BC=6 6 8 6 PP=4.5	24"								
				S-5		BC=10 9 11 12 PP=4.5	24"								
855	10		**Lean CLAY (CL)**: subangular to subrounded, low plasticity, light greenish gray, moist, very stiff, homogeneous, trace gravel												
			brown	S-6		BC=10 9 15 13 PP=4.5	18"								
850	15														
			gray	S-7		BC=7 8 10 12 PP=3	24"								
845	20														

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 9 ft. below ground surface.

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PROJECT NO.:	20212135.001A
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BORING LOG B-6

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-6
PAGE: 1 of 1

Date Begin - End:	10/21/2020 - 10/21/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-7**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	67°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67584°
Longitude: -84.22660°
Approximate Ground Surface Elevation (ft.): 862
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=2 3 4 5 PP=4	21"								
860			**Glacial Till** **Lean CLAY (CL)**: subrounded to rounded, low to medium plasticity, reddish brown, moist, medium stiff, homogeneous, trace sand subangular to subrounded, low to medium plasticity, reddish brown mottled gray, very stiff, trace gravel and sand	S-2		BC=4 8 8 11 PP=4.5	18"								
			hard	S-3		BC=9 10 15 18 PP=2.5	13"								
	5														
			Lean CLAY with Sand (CL): brown multicolored reddish brown, hard, iron oxide staining	S-4		BC=10 16 19 19 PP=4.5	21"	CL	16		99	83	35	17	
855			very stiff	S-5		BC=12 13 16 18 PP=4.5	14"								
	10														
850															
			brown multicolored dark gray, very stiff	S-6		BC=6 9 13 14 PP=4.5	24"								
	15														
845															
				S-7		BC=5 6 5 8 PP=3	12"								
	20		**Lean CLAY (CL)**: subangular to subrounded, medium plasticity, light gray, moist, stiff, homogeneous, trace gravel												
840			The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 21, 2020.												

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 8 ft. below ground surface.

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PROJECT NO.:	20212135.001A
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DATE:	12/8/2020

BORING LOG B-7

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Allen and Auglaize Counties, OH

EXPLORATION
B-7

PAGE: 1 of 1

Date Begin - End:	10/21/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-8**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	63°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67212°
Longitude: -84.23112°
Approximate Ground Surface Elevation (ft.): 846
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=1 4 3 3 PP=3	19"								
845			**Glacial Till** **Lean CLAY with Sand (CL)**: subrounded, low plasticity, gray multicolored reddish brown, moist, medium stiff, homogeneous												
			brown multicolored reddish yellow, stiff, iron oxide staining	S-2		BC=6 6 7 5 PP=4.5	16"								
				S-3		BC=7 6 7 6 PP=4.5	18"								
	5		**Lean CLAY (CL)**: subangular to subrounded, pale red multicolored light greenish gray, stiff, trace gravel												
840			very stiff	S-4		BC=9 13 15 15 PP=4.5	24"								
				S-5		BC=9 7 10 11 PP=4.5	24"								
	10		**Silty SAND (SM)**: fine to medium-grained, subangular to subrounded, gray, moist to wet, medium dense												
835				S-6		BC=5 7 9 8	24"	SM	18		100	14.3			
	15														Flowing sands
830				S-7		BC=11 9 7 6	24"								
	20		**SILT (ML)**: low plasticity, gray, wet, very stiff, homogeneous												
825															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 21, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 12 ft. below ground surface during drilling.
▼ Groundwater was observed at approximately 4 ft. below ground surface at the end of drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 9 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-8

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-8

PAGE: 1 of 1

Date Begin - End:	10/19/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-9**	
Logged By:	M. Glassmeyer	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	44°F Light Rain	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.67556°
Longitude: -84.21720°
Approximate Ground Surface Elevation (ft.): 845
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 3 3 3 PP=3	18"								
			Glacial Till **Lean CLAY (CL)**: low plasticity, light brown, moist, medium stiff, homogeneous												
			very stiff	S-2		BC=6 7 9 9 PP=4.5	18"								
			Lean CLAY with Sand (CL): low plasticity, yellowish brown, moist, very stiff	S-3		BC=5 7 10 12 PP=4.5	24"	CL	13		100	80	36	18	
840	5			S-4		BC=10 14 15 18 PP=4.5	20"								
				S-5		BC=12 12 13 14 PP=4.5	24"								
835	10														
			hard	S-6		BC=13 18 17 22 PP=5	18"								
830	15														
				S-7		BC=4 5 8 10 PP=3.5	18"								
825	20		light brownish gray, stiff												

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 19, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 7.1 feet.
Caving was observed at a depth of 10 ft. below ground surface.

KLEINFELDER
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PROJECT NO.:	20212135.001A
DRAWN BY:	MG
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-9

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-9

PAGE: 1 of 1

Date Begin - End:	10/20/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-10**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	44°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67052°
Longitude: -84.21990°
Approximate Ground Surface Elevation (ft.): 840
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL: moist	S-1		BC=WH 3 5 6 PP=4.5	18"								
			Glacial Till **Lean CLAY (CL)**: reddish yellow mottled pink, moist, stiff, trace sand and gravel												
			very stiff	S-2		BC=9 8 8 7 PP=4.5	21"								
				S-3		BC=9 12 13 11 PP=4	6"								
835	5		stiff	S-4		BC=5 3 7 11 PP=0.5	22"								
			very stiff, iron oxide staining	S-5		BC=9 11 15 20 PP=4.5	24"								
830	10														
			stiff	S-6		BC=6 5 8 9 PP=3	9"								
825	15		light greenish gray, iron oxide staining												
			very stiff	S-7		BC=5 9 11 10 PP=3.5	24"								
820	20														

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 20, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 11.8 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-10

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-10

PAGE: 1 of 1

Date Begin - End:	10/20/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-12**	
Logged By:	M. Glassmeyer	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.65980°
Longitude: -84.22773°
Approximate Ground Surface Elevation (ft.): 837
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=1 2 2 2 PP=3	16"								
			Glacial Till **Lean CLAY (CL)**: low plasticity, olive yellow, moist, medium stiff, trace sand and gravel												
835			stiff	S-2		BC=2 4 5 4 PP=3	14"								
				S-3		BC=5 3 4 9 PP=4.5	24"								
	5		**Lean CLAY with Sand (CL)**: low plasticity, gray, moist, medium stiff, trace sand and gravel												
830			very stiff	S-4		BC=6 8 11 8 PP=4.5	24"								
			stiff	S-5		BC=6 6 7 8 PP=4	24"								3 inch sand seam at 9 feet
	10														
825															Grinding at 12 feet
			Clayey SAND with Gravel (SC): low plasticity, gray, moist, very dense, trace gravel	S-6		BC=50/5" PP=4.5	5"	SC	13		76	40	34	18	
	15														
820															
			Decomposed Shale, samped as Well-graded GRAVEL with Clay (GW-GC): fine to coarse-grained, angular to subangular, gray, wet, very dense	S-7		BC=40 50/5"	11"								
	20														
815															

The boring was terminated at approximately 19.9 ft. below ground surface. The boring was backfilled with auger cuttings on October 20, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 9 ft. below ground surface during drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 6.5 feet.
Caving was observed at a depth of 4.5 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	MG
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-12

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-12

PAGE: 1 of 1

Date Begin - End:	10/26/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-13**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	47°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.66733°
Longitude: -84.19807°
Approximate Ground Surface Elevation (ft.): 843
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 1 3 4 PP=3.25	12"								
			Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, gray mottled reddish yellow, moist, medium stiff, homogeneous, iron oxide staining, trace sand												
840			light gray mottled reddish yellow, stiff, homogeneous	S-2		BC=4 6 7 9 PP=4.0	16"								
	5		very stiff	S-3		BC=6 7 10 10 PP=4.25	24"								
			Lean CLAY with Sand (CL): stiff, trace sand and gravel	S-4		BC=5 8 6 10 PP=2.75	18"	CL	24		99	80	45	25	
835			very stiff	S-5		BC=10 13 15 21 PP=3.25	24"								
	10														
830			**Silty SAND with Gravel (SM)**: fine to coarse-grained, subangular to subrounded, non-plastic to low plasticity, gray, wet, medium dense	S-6		BC=5 7 11 8 PP=4.5	18"		13		85	21			
	15														
825				S-7		BC=9 5 7 7 PP=2.5	24"								
	20		**SILT (ML)**: subangular to subrounded, low plasticity, pink, wet, stiff, homogeneous, trace sand and gravel												
820			The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 26, 2020.												

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 12.5 ft. below ground surface during drilling.
▼ Groundwater was observed at approximately 5.2 ft. below ground surface at the end of drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 9.7 ft. below ground surface.

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

BORING LOG B-13

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-13
PAGE: 1 of 1

Date Begin - End: 10/23/2020 **Drilling Company:** Terra Testing

BORING LOG B-14

Logged By: D. Huntsman **Drill Crew:** B. Kirkpatrick

Hor.-Vert. Datum: WGS 1984 - NAVD88 **Drilling Equipment:** Acker Rebel **Hammer Type - Drop:** 140 lb. Auto - 30 in.

Plunge: -90 degrees **Drilling Method:** Hollow Stem Auger

Weather: 64°F Partly Cloudy **Exploration Diameter:** 3.25 in. I.D.

Latitude: 40.66704°
Longitude: -84.20295°
Approximate Ground Surface Elevation (ft.): 842
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 2 3 5 PP=3.25	16"								
840			**Glacial Till** **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, gray mottled reddish brown, moist, medium stiff, homogeneous, trace gravel												
			pale red mottled gray, stiff	S-2		BC=3 5 6 6 PP=4.0	15"								
	5		very stiff	S-3		BC=11 10 12 12 PP=4.0	18"								
			Lean CLAY with Sand (CL): subangular to subrounded, low plasticity, pink multicolored reddish yellow, moist, very stiff, iron oxide staining, trace gravel	S-4		BC=12 14 14 18 PP=4.5	23"	CL	15		98	72	31	14	
835															
			brown	S-5		BC=11 10 11 13 PP=4.5	24"								
	10														
830															
			SILT (ML): subangular to subrounded, low plasticity, gray, wet, very stiff, trace sand and gravel, 6" Gravely sand lens at 14.1-14.6 ft	S-6		BC=4 9 12 10 PP=2.0	24"								
	15														
825															
			Gravelly SAND with Silt (SP-SM): fine to coarse-grained, subangular to subrounded, non-plastic to low plasticity, light brown, wet, medium dense	S-7		BC=9 11 15 10	23"								
	20														
820															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 23, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 12.5 ft. below ground surface during drilling.
▼ Groundwater was observed at approximately 8 ft. below ground surface at the end of drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 11.9 ft. below ground surface.

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

BORING LOG B-14

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-14

PAGE: 1 of 1

Date Begin - End:	10/23/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-15**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	64°F Partly Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.66986°
Longitude: -84.20155°
Approximate Ground Surface Elevation (ft.): 838
Surface Condition: Bare Earth

Approx. Elevation (ft)	Depth (ft)	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
		~6 inches TOPSOIL	S-1		BC=1 2 3 4 PP=2.25	20"
		Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, reddish yellow mottled light greenish gray, moist, soft, iron oxide staining, trace gravel and sand	S-2		BC=1 2 2 2 PP=1.5	20"
835			S-3		BC=3 3 6 7 PP=2.0	18"
	5	**Poorly Graded GRAVEL with Silt and Sand (GP-GM)**: fine to medium-grained, subangular to subrounded, non-plastic to low plasticity, reddish yellow multicolored reddish brown, moist, loose, iron oxide staining	S-4		BC=10 10 12 10 PP=4.5	22"
		SILT (ML): subangular to subrounded, low plasticity, gray, moist to wet, stiff, trace gravel	S-5		BC=6 10 7 9 PP=1.5	24"
830						
		Poorly Graded SAND with Silt (SP-SM): subangular to subrounded, non-plastic to low plasticity, dark brown, wet, medium dense				
	10	**SILT (ML)**: subangular to subrounded, low plasticity, gray, moist to wet, very stiff, trace gravel and sand				
825		**Poorly Graded SAND with Gravel and Silt (SP-SM)**: fine to coarse-grained, subangular to subrounded, non-plastic to low plasticity, brown, wet, medium dense	S-6		BC=6 9 12 12 PP=2.5	21"
	15	**SILT (ML)**: subangular to subrounded, low plasticity, brown, wet, very stiff, trace gravel				
820			S-7		BC=28 31 50/1" PP=3.0	20"
	20					
815						

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 23, 2020.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 6.6 ft. below ground surface at the end of drilling.
▽ Groundwater was observed at approximately 8.5 ft. below ground surface during drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 7.6 ft. below ground surface.

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

BORING LOG B-15

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-15

PAGE: 1 of 1

Date Begin - End:	10/28/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-16**	
Logged By:	M. Glassmeyer	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	50°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.67517°
Longitude: -84.21150°
Approximate Ground Surface Elevation (ft.): 844
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=2 6 5 7	18"
			Glacial Till **Lean CLAY (CL)**: low plasticity, olive yellow, moist, stiff, trace sand	S-2		BC=5 4 7 10	20"
840	5			S-3		BC=6 5 8 11	24"
			very stiff	S-4		BC=11 9 13 13	24"
835	10			S-5		BC=9 10 13 19	24"
			Lean CLAY with Sand (CL): low plasticity, light brownish gray, moist, very stiff	S-6		BC=6 9 12 13	24"
830	15						
				S-7		BC=5 5 7 8	8"
825	20						
820							

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 28, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 4.9 feet.
Caving was observed at a depth of 11 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	MG
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-16

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-16

PAGE: 1 of 1

Date Begin - End:	10/22/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-17**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	70°F Partly Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.67440°
Longitude: -84.20015°
Approximate Ground Surface Elevation (ft.): 841
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=1 1 2 2 PP=1	17"
840			**Glacial Till** **Sandy Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, yellow mottled reddish yellow, moist, soft, homogeneous, iron oxide staining				
			stiff	S-2		BC=4 5 5 5 PP=1.5	18"
			medium stiff	S-3		BC=4 3 3 3 PP=1.5	17"
	5						
835 ▽			very stiff	S-4		BC=6 9 9 9 PP=0.5	20"
			Clayey SAND (SC): fine to coarse-grained, subangular to subrounded, low plasticity, pale olive multicolored black, wet, medium dense, homogeneous, trace gravel	S-5		BC=3 9 8 8 PP=1.5	20"
			SILT (ML): non-plastic to low plasticity, reddish yellow, moist to wet, very stiff				
	10		**Silty SAND (SM)**: subangular to subrounded, non-plastic to low plasticity, black multicolored				
830			gray, wet, medium dense, trace gravel	S-6		BC=5 9 12 14 PP=1.5	20"
			SILT (ML): subangular to subrounded, low plasticity, light greenish gray, moist to wet, very stiff, homogeneous, trace gravel				
	15						
825			**Lean CLAY with Sand (CL)**: subangular to subrounded, low to medium plasticity, reddish yellow, moist to wet, hard, homogeneous, trace gravel				
			Poorly graded SAND (SP): fine to medium-grained, subrounded, gray, wet, very dense	S-7		BC=21 24 31 50/5" PP=4.5	24"
	20		**Poorly Graded GRAVEL with Sand (GP)**: fine-grained, subangular to subrounded, gray, wet, very dense				
820							

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 22, 2020.

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 6 ft. below ground surface during drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 5.4 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-17

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-17

PAGE: 1 of 1

Date Begin - End:	10/22/2020 - 10/23/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-18**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	73°F Partly Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.68251°
Longitude: -84.20166°
Approximate Ground Surface Elevation (ft.): 849
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 2 3 3 PP=2	18"								
			Glacial Till **Lean CLAY (CL)**: low to medium plasticity, reddish brown mottled reddish yellow, moist, medium stiff, iron oxide staining	S-2		BC=2 3 3 4 PP=3	14"								
845	5		stiff	S-3		BC=5 6 7 9 PP=4.0	24"								
			SILT (ML): subangular to subrounded, low plasticity, pink multicolored reddish yellow, moist, very stiff, iron oxide staining, trace gravel	S-4		BC=8 10 11 12 PP=4.5	24"								
840	10		gray, moist to wet, medium stiff	S-5		BC=6 5 3 4 PP=1.25	20"								
835	15		stiff	S-6		BC=5 4 7 6 PP=4.0	24"								
830	20			S-7		BC=4 4 5 7 PP=1.25	24"								
825															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 23, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 3.8 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-18

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-18
PAGE: 1 of 1

Date Begin - End:	10/27/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-19**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.68771°
Longitude: -84.19138°
Approximate Ground Surface Elevation (ft.): 846
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=WH 2 2 5 PP=3.0	20"
845			**Glacial Till** **Lean CLAY (CL)**: subrounded, low to medium plasticity, reddish yellow multicolored light gray, moist, medium stiff, trace sand gray multicolored reddish yellow, stiff	S-2		BC=4 5 6 5 PP=3.5	15"
	5		**Sandy Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, very stiff	S-3		BC=6 9 12 12 PP=2.5	16"
840			**Clayey SAND (SC)**: subangular to subrounded, low to medium plasticity, light brown multicolored reddish yellow, moist, medium dense	S-4		BC=7 9 8 8 PP=2.25	16"
			loose	S-5		BC=3 2 3 3 PP=0.75	24"
	10		**Poorly graded SAND (SP)**: fine to medium-grained, subrounded, light brown multicolored black, moist to wet, loose				
835				S-6		BC=4 4 5 7	12"
	15						
830			wet, medium dense, Flowing sands	S-7		BC=9 7 10 6	24"
	20						
825							

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 27, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 18 ft. below ground surface during drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 8 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-19

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-19

PAGE: 1 of 1

Date Begin - End:	10/27/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-20**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.68306°
Longitude: -84.19026°
Approximate Ground Surface Elevation (ft.): 843
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	Additional Tests/ Remarks
		~6 inches TOPSOIL	S-1		BC=WH 2 3 3 PP=1.25	17"	
		Glacial Till **Lean CLAY with Sand (CL)**: subrounded, low to medium plasticity, brown multicolored reddish yellow, moist, medium stiff	S-2		BC=2 2 3 3 PP=1.25	16"	
840		**Well-graded SAND with Clay (SW-SC)**: fine to coarse-grained, subangular to subrounded, low plasticity, brown, moist to wet, loose, trace gravel	S-3		BC=3 3 8 6 PP=0.5	21"	Flowing sands clogged the auger, drill crew cleared blockage.
	5	**SILT with Sand (ML)**: subrounded to rounded, low plasticity, brown, moist to wet, stiff, homogeneous	S-4		BC=6 6 7 7	22"	
835		**Well-graded SAND with Silt (SW-SM)**: fine to coarse-grained, subangular to subrounded, low plasticity, gray, moist to wet, medium dense, homogeneous, trace gravel	S-5		BC=8 9 9 10 PP=0.75	21"	
		SILT (ML): non-plastic to low plasticity, light brown, moist to wet, very stiff					
	10	**Well-graded SAND with Silt (SW-SM)**: fine to coarse-grained, black, moist to wet, medium dense, trace gravel and silt					
830			S-6		BC=5 4 6 7 PP=3.5	13"	
		SILT (ML): subangular to subrounded, low plasticity, gray, moist, stiff, homogeneous, trace gravel					
	15						
825		very stiff	S-7		BC=6 9 11 26 PP=4.0	16"	
	20						
820							

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 27, 2020.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 4.2 ft. below ground surface at the end of drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 4.9 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-20

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-20

PAGE: 1 of 1

Date Begin - End:	10/26/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-21**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67226°
Longitude: -84.20827°
Approximate Ground Surface Elevation (ft.): 836
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=3 2 3 3 PP=2.25	20"								
835			**Glacial Till** **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, light gray mottled reddish brown, moist, medium stiff, iron oxide staining, trace gravel												
			very stiff	S-2		BC=6 8 8 8 PP=3.5	15"								
			stiff	S-3		BC=5 4 4 4 PP=1.25	24"								
	5		**Clayey SAND (SC)**: fine to coarse-grained, subangular to subrounded, low plasticity, brown multicolored reddish yellow, moist to wet, loose												
830				S-4		BC=4 3 5 4	15"								
			brown multicolored pink, trace gravel												
			Lean CLAY (CL): subangular to subrounded, low to medium plasticity, brown multicolored reddish yellow, moist to wet, medium stiff, iron oxide staining, trace gravel and sand	S-5		BC=3 3 4 4 PP=3.25	5"								
	10														
825															
			stiff	S-6		BC=4 5 8 10 PP=1.5	24"								
	15		**SILT (ML)**: subangular to subrounded, low plasticity, light gray, moist to wet, stiff, homogeneous, trace gravel												
820															
			light brown, hard	S-7		BC=20 27 50/5" PP=2.5	18"								
			Gravelly SILT (ML): subangular, light brown, moist, hard, trace sand												
	20														
815															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 26, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 10.6 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-21

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-21
PAGE: 1 of 1

Date Begin - End:	10/27/2020	**Drilling Company:**	Terra testing	**BORING LOG B-23**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	41°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.66556°
Longitude: -84.18752°
Approximate Ground Surface Elevation (ft.): 848
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=WH WH 2 3 PP=3	12"
			Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, reddish brown multicolored reddish yellow, moist, soft, trace gravel and sand	S-2		BC=7 8 10 10 PP=3.75	19"
845			reddish brown multicolored light gray, very stiff				
	5			S-3		BC=6 9 11 14 PP=3.25	19"
				S-4		BC=14 15 14 18 PP=4.0	24"
840				S-5		BC=14 12 13 16 PP=3.5	8"
	10						
835				S-6		BC=7 10 12 13 PP=4.5	24"
	15		**SILT (ML)**: subangular to subrounded, low plasticity, dark gray, moist, very stiff, trace sand and gravel				
830			**Poorly graded SAND with Silt (SP-SM)**: fine-grained, subrounded to rounded, non-plastic to low plasticity, gray multicolored black, wet, loose, trace gravel	S-7		BC=2 2 5 6	22"
	20						
825							

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 27, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 17.2 ft. below ground surface during drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 17 ft. below ground surface.

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PROJECT NO.:	20212135.001A
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BORING LOG B-23

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-23

PAGE: 1 of 1

Date Begin - End:	10/27/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-24**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.68170°
Longitude: -84.18230°
Approximate Ground Surface Elevation (ft.): 843
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 1 2 3 PP=1.75	16"								
			Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, reddish yellow, moist, soft, homogeneous, trace gravel	S-2		BC=WH WH 2 2 PP=1.25	15"								
840			**Well-graded SAND with Clay (SW-SC)**: fine to coarse-grained, subangular to subrounded, low plasticity, brown multicolored reddish yellow, moist, medium dense, trace gravel	S-3		BC=5 5 10 8 PP=1.25	16"								
	5			S-4		BC=7 8 7 9 PP=4.5	24"								
835			**SILT (ML)**: subangular to subrounded, non-plastic to low plasticity, gray, moist, stiff, homogeneous, trace gravel very stiff	S-5		BC=10 14 14 38 PP=1.5	8"								
	10														
830				S-6		BC=15 17 12 14 PP=2.5	24"								
	15		**Silty SAND (SP-SM)**: fine-grained, subrounded to rounded, non-plastic, light brown, moist to wet, medium dense **SILT (ML)**: subangular, non-plastic to low plasticity, gray, moist, very stiff, trace gravel												
825			**Silty SAND (SP-SM)**: fine-grained, subrounded, non-plastic, light brown, moist to wet, medium dense, trace gravel	S-7		BC=6 12 17 22 PP=3	14"								
	20														
820															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 27, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 3.5 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
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BORING LOG B-24

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-24
PAGE: 1 of 1

Date Begin - End:	10/27/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-25**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.66858°
Longitude: -84.18054°
Approximate Ground Surface Elevation (ft.): 852
Surface Condition: Bare Earth

Approx. Elevation (ft)	Depth (ft)	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		~6 inches TOPSOIL	S-1		BC=WH 2 4 5 PP=2.75	19"									
		Glacial Till **Lean CLAY (CL)**: low to medium plasticity, gray multicolored reddish yellow, moist, medium stiff												
850		stiff	S-2		BC=4 4 5 6 PP=2.5	15"								
	5	medium stiff	S-3		BC=3 4 4 4 PP=2.25	18"								
845		subangular to subrounded, low to medium plasticity, reddish yellow mottled gray, moist, stiff, iron oxide staining, trace gravel	S-4		BC=5 5 8 9 PP=1.75	21"								
		very stiff	S-5		BC=7 10 14 15 PP=4.5	20"								
	10	**SILT (ML)**: subangular to subrounded, low plasticity, gray, moist, very stiff, homogeneous, iron oxide staining, trace gravel												
840														
		stiff	S-6		BC=5 6 7 11 PP=4.5	19"								
	15													
835														
		very stiff	S-7		BC=5 7 16 25 PP=2.5	24"								
	20	**Well-graded SAND with Sand (SW-SM)**: fine to coarse-grained, subangular to subrounded, non-plastic, light brownish gray, moist to wet, medium dense, trace gravel and silt												
830		The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 27, 2020.												

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 14 ft. below ground surface at the end of drilling.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 14.2 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-25

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-25
PAGE: 1 of 1

Date Begin - End:	10/22/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-26**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	70°F Partly Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67883°
Longitude: -84.19893°
Approximate Ground Surface Elevation (ft.): 839
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=1 1 2 3 PP=1.25	24"
			Glacial Till **Lean CLAY (CL)**: low to medium plasticity, light greenish gray mottled reddish yellow, moist, soft, iron oxide staining medium stiff	S-2		BC=2 3 4 3 PP=2.0	9"
835				S-3		BC=4 3 3 3 PP=0.5	24"
	5		**Poorly graded SAND with Silt (SP)**: fine to medium-grained, subangular to subrounded, brown multicolored dark brown, moist, loose	S-4		BC=4 7 10 11	20"
			Well-graded SAND with Silt (SW): fine to coarse-grained, subangular to subrounded, non-plastic to low plasticity, gray multicolored black, moist to wet, medium dense, trace gravel	S-5		BC=6 8 10 10 PP=1.5	22"
830							
	10		**SILT with Sand (ML)**: subangular to subrounded, low plasticity, pink, very stiff, homogeneous, trace gravel				
			Well-graded SAND with Silt (SW): fine to coarse-grained, subangular to subrounded, non-plastic to low plasticity, gray multicolored black, wet, medium dense, trace gravel				
			loose	S-6		BC=3 1 4 4	24"
825							
	15						
			very dense	S-7		BC=12 50/5"	24"
			Clayey SAND: subangular to subrounded, low plasticity, wet, very dense, trace gravel				
820							
	20						
815							

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 22, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 6 ft. below ground surface.

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

BORING LOG B-26

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-26
PAGE: 1 of 1

Date Begin - End:	10/28/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-27**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.66509°
Longitude: -84.21677°
Approximate Ground Surface Elevation (ft.): 835
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH 1 2 3 PP=2.0									
			Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, light brown multicolored reddish yellow, moist, soft, trace sand and gravel stiff	S-2		BC=2 4 5 7 PP=2.25	11"								
830	5			S-3		BC=6 5 6 11 PP=2.5	19"								
			SILT (ML): subangular to subrounded, non-plastic to low plasticity, gray, moist, stiff, trace gravel very stiff	S-4		BC=11 13 16 15	NR								
				S-5		BC=8 10 12 17 PP=4.5	9"								
825	10														
			wet, homogeneous	S-6		BC=7 10 11 19 PP=2.0	18"								
820	15														
			Poorly graded GRAVEL with Silt (GP-GM): coarse-grained, angular, non-plastic, gray, wet, very dense, trace sand												
				S-7		BC=50/3"	3"								
815	20														

The boring was terminated at approximately 18.3 ft. below ground surface. The boring was backfilled with auger cuttings on October 28, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 12 ft. below ground surface during drilling.
▼ Groundwater was observed at approximately 6.9 ft. below ground surface at the end of drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 12.2 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-27

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Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-27

PAGE: 1 of 1

Date Begin - End:	10/27/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-29**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	43°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.66985°
Longitude: -84.16849°
Approximate Ground Surface Elevation (ft.): 866
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=WH 2 2 3 PP=1.0	22"
865			**Glacial Till** **Sandy Lean CLAY (CL)**: subrounded, low to medium plasticity, reddish brown, moist, medium stiff, homogeneous				
				S-2		BC=4 4 3 4 PP=1.5	18"
			Poorly graded SAND with Silt (SP-SM): fine-grained, subrounded, non-plastic, reddish yellow, moist, loose, iron oxide staining	S-3		BC=3 3 3 2 PP=1.75	17"
	5						
860				S-4		BC=1 2 5 5 PP=0.25	20"
			SILT (ML): rounded, non-plastic, reddish brown multicolored gray, wet, medium stiff, homogeneous, trace sand				
			subangular to subrounded, gray, moist to wet, stiff, trace gravel	S-5		BC=6 3 6 9 PP=1.0	18"
	10						
855							
				S-6		BC=4 5 5 4 PP=1.25	6"
	15						
850							
				S-7		BC=5 6 9 12 PP=2.75	20"
	20						
845							

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 27, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 3.6 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-29

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-29

Date Begin - End:	10/28/2020	**Drilling Company:**	Terra testing	**BORING LOG B-31**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.66784°
Longitude: -84.21291°
Approximate Ground Surface Elevation (ft.): 836
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
		~6 inches TOPSOIL	S-1		BC=WH 1 3 3 PP=1.0	15"
835		**Glacial Till** **Lean CLAY (CL)**: subrounded, low to medium plasticity, brown multicolored reddish yellow, moist, medium stiff, homogeneous, trace sand	S-2		BC=3 2 4 5 PP=2.25	16"
		subangular to subrounded, stiff, trace gravel	S-3		BC=5 5 10 16 PP=0.5	20"
830	5	gray, hard	S-4		BC=17 23 25 33 PP=4.5	24"
		SILT (ML): subangular to subrounded, non-plastic to low plasticity, gray, moist, very stiff, trace gravel	S-5		BC=8 11 14 17 PP=4.5	8"
825	10					
		wet	S-6		BC=7 15 14 13 PP=1.5	13"
820	15					
		Poorly graded GRAVEL (GP): angular, gray, moist, very dense, trace sand, Derived from highly weathered shale	S-7		BC=30 32 50/4" PP=4.5	6"
815	20	The boring was terminated at approximately 19.3 ft. below ground surface. The boring was backfilled with auger cuttings on October 28, 2020.				

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 12.5 ft. below ground surface during drilling.
▼ Groundwater was observed at approximately 5.5 ft. below ground surface at the end of drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 9.9 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-31

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-31

PAGE: 1 of 1

Date Begin - End:	10/20/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-32**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°C Light Rain	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.66242°
Longitude: -84.21431°
Approximate Ground Surface Elevation (ft.): 843
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=WH WH 1 2 PP=0.5	17"								
			Glacial Till **Lean CLAY (CL)**: low to medium plasticity, reddish yellow mottled light brownish gray, moist, very soft												
840			very stiff subangular, homogeneous, trace gravel	S-2		BC=4 8 10 12 PP=3.75	24"								
	5			S-3		BC=9 9 12 13 PP=3.25	22"								
				S-4		BC=9 12 14 16 PP=4.5	24"								
835			trace gravel	S-5		BC=8 10 16 21 PP=3	18"								
	10		iron oxide staining												
830				S-6		BC=9 9 10 11 PP=4.5	24"								Drilling rate decreased, dense layer
	15														
825			hard	S-7		BC=15 20 19 16	4"								
	20														
820															

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 21, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.
GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 6 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-32

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-32
PAGE: 1 of 1

Date Begin - End:	10/20/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-33**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	44°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.66247°
Longitude: -84.22269°
Approximate Ground Surface Elevation (ft.): 834
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=3 4 6 7 PP=4.5	18"
			Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, dark gray, moist, stiff, homogeneous, trace gravel light greenish gray mottled reddish yellow, medium stiff, homogeneous	S-2		BC=3 3 4 4 PP=3.5	15"
830			stiff	S-3		BC=6 6 5 4 PP=3	15"
	5		**Clayey SAND (SC)**: fine to medium-grained, olive brown multicolored white, moist, medium dense	S-4		BC=6 9 10 13	
825				S-5		BC=7 14 13 11 PP=3	20"
	10						
820			**Lean CLAY (CL)**: light gray, moist, hard, homogeneous	S-6		BC=24 27 32 24 PP=2.5	12"
	15		**SILT (ML)**: pink, moist, hard, homogeneous				
815				S-7		BC=32 19 29 33 PP=2.75	16"
	20						
810							

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
							Chattering

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 20, 2020.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 6.2 ft. below ground surface 0 minutes after drilling completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 6.5 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-33

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-33

PAGE: 1 of 1

Date Begin - End:	10/22/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-34**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	60°F Partly Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.68267°
Longitude: -84.21445°
Approximate Ground Surface Elevation (ft.): 851
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)
			~6 inches TOPSOIL	S-1		BC=WH 2 2 3 PP=2.0	18"
850			**Glacial Till** **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, reddish yellow multicolored brown, moist, medium stiff, trace sand and gravel				
			very stiff	S-2		BC=7 12 16 19 PP=4.5	18"
			hard	S-3		BC=15 15 15 20 PP=4.5	18"
	5						
845			iron oxide staining	S-4		BC=12 17 18 21 PP=4.5	23"
			gray, very stiff	S-5		BC=9 13 15 18 PP=4.5	24"
	10						
840							
			SILT (ML): low plasticity, gray, moist, stiff, homogeneous	S-6		BC=5 5 7 10 PP=2.0	24"
	15						
835							
				S-7		BC=6 6 7 9 PP=1.75	24"
	20						
830							

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 22, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 8.8 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-34

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-34

Date Begin - End:	10/19/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-35**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67614°
Longitude: -84.22127°
Approximate Ground Surface Elevation (ft.): 850
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=1 2 4 3 PP=4.5	24"								
			Glacial Till **Lean CLAY (CL)**: subangular to subrounded, low plasticity, reddish brown mottled olive gray, moist, medium stiff, homogeneous, iron oxide staining	S-2		BC=3 4 5 6 PP=4.5	12"								
			stiff	S-3		BC=6 6 9 10 PP=4.5	24"								
845	5			S-4		BC=8 6 6 8 PP=4.5	16"								
			olive yellow, trace gravel	S-5		BC=5 6 7 8 PP=4.5	24"								
840	10														
			light gray, very stiff	S-6		BC=7 8 11 16 PP=4	24"								
835	15														
				S-7		BC=6 7 12 15 PP=3	24"								
830	20														

The boring was terminated at approximately 20 ft. below ground surface. The boring was backfilled with auger cuttings on October 19, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 9 ft. below ground surface.

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

BORING LOG B-35

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
B-35

PAGE: 1 of 1

Date Begin - End:	10/28/2020	**Drilling Company:**	Terra Testing	**BORING LOG B-36**	
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

Latitude: 40.67904°
Longitude: -84.18436°
Approximate Ground Surface Elevation (ft.): 842
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL	S-1		BC=2 3 3 3 PP=1.0	21"								
840			**Glacial Till** **Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, light brown multicolored reddish yellow, moist, medium stiff, trace sand and gravel	S-2		BC=1 2 3 3 PP=1.5	17"								
			Well-graded SAND with Clay (SW-SC): fine to coarse-grained, subangular to subrounded, low plasticity, light brown, wet, loose, trace gravel	S-3		BC=7 7 8 9	20"								Flowing sands in auger, 18 inches. Drill crew cleared auger
	5		medium dense	S-4		BC=7 6 6 7	24"								
835			**Silty SAND (SM)**: subangular to subrounded, non-plastic, gray, wet, loose, homogeneous, trace gravel	S-5		BC=4 2 3 3	24"								
	10														
830			medium dense	S-6		BC=7 8 10 11	18"								
			Well-graded SAND with Silt (SW-SM): fine to coarse-grained, gray, wet, medium dense, trace gravel												
	15														
825				S-7		BC=8 7 4 3 PP=2.0	6"								Flowing sands in auger, drill crew clearing blockage. 18 inches of inflow.
	20		**SILT (ML)**: subangular to subrounded, medium to high plasticity, light gray, wet, stiff, trace sand and gravel												
820			**Silty SAND (SM)**: fine to medium-grained, subangular to subrounded, non-plastic to low plasticity, gray, moist to wet, medium dense	S-8		BC=16 15 13 10	3"								

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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
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DATE:	12/8/2020

BORING LOG B-36

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-36

BORING LOG B-36

Date Begin - End:	10/28/2020	**Drilling Company:**	Terra Testing		
Logged By:	D. Huntsman	**Drill Crew:**	B. Kirkpatrick		
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Drilling Equipment:**	Acker Rebel	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	45°F Cloudy	**Exploration Diameter:**	3.25 in. I.D.		

FIELD EXPLORATION

Latitude: 40.67904°
Longitude: -84.18436°
Approximate Ground Surface Elevation (ft.): 842
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr Blows/6 in. Pocket Pen(PP)= tsf RQD=%	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			Silty SAND (SM): fine to medium-grained, subangular to subrounded, non-plastic to low plasticity, gray, moist to wet, medium dense												
815			loose	S-9		BC=1 1 4 14	10"								Flowing sands, 12 inches into auger. Drill crew cleared auger.
	30														
810			very dense	S-10		BC=43 50/4"	10"								Flowing sands, 8 - 10 inch flow into auger Chattering from 34 to 38 ft
	35														
805			very dense	S-11		BC=10 50/3"	4"								Switching to NQ core barrels to drill remaining depth due to sand clogging hollow stem auger.
	40														
800															Drilling stopped at 42 ft due to NQ barrel refusal
	45														
795															

The boring was terminated because of practical auger refusal ( ) at approximately 42 ft. below ground surface on till. The boring was backfilled with auger cuttings on October 28, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was observed at approximately 3.5 ft. below ground surface during drilling.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 13.5 ft. below ground surface.

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PROJECT NO.:	20212135.001A
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DATE:	12/8/2020

BORING LOG B-36

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

B-36

Date Begin - End: 10/30/2020 **Excavation Company:** Terra Testing

Logged By: D. Huntsman **Excavation Crew:** B. Kirkpatrick

Hor.-Vert. Datum: WGS 1984 - NAVD88 **Excavation Equip.:** Bobcat E45

Plunge: -90 degrees **Excav. Dimensions:** 4 x 8 ft

Weather: 50°F Partly Cloudy

TEST PIT LOG TP-3

Latitude: 40.66269°
Longitude: -84.22498°
Approximate Ground Surface Elevation (ft.): 833
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
			Glacial Till **Sandy Lean CLAY (CL)**: subangular, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel	BS-3A		CL	24		96	54	45	27	**pH=** 7.1 **Resistivity=** 3000 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** ND **Redox=** 296 mV **Sulfides=** 0.05 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 106.3 pcf Opt. Water Content: 18.1%
830													
	5		**Well-graded SAND with Silt (SW-SM)**: fine to coarse-grained, gray, wet, trace gravel	BS-3B									
825													
	10												
820													
	15												
815													

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 5 ft. below ground surface during excavation.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 5.5 ft. below ground surface.

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

TEST PIT LOG TP-3

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
TP-3
PAGE: 1 of 1

TEST PIT LOG TP-4

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	50°F Cloudy		

FIELD EXPLORATION

Latitude: 40.65932°
Longitude: -84.21621°
Approximate Ground Surface Elevation (ft.): 844
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
			Glacial Till **Lean CLAY with Sand (CL)**: subangular, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel and sand										
840	5			BS-4		CL	14		99	75	37	20	**pH=** 7.2 **Resistivity=** 2900 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** 20 mg/kg **Redox=** 303 mV **Sulfides=** ND **ASTM D698 Method B=** Max. Dry Unit Wt.: 106.1 pcf Opt. Water Content: 19.2%
835	10												
830	15												
825													

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

TEST PIT LOG TP-4

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

TP-4

PAGE: 1 of 1

TEST PIT LOG TP-5

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	50°F Cloudy		

FIELD EXPLORATION

Latitude: 40.66804°
Longitude: -84.21657°
Approximate Ground Surface Elevation (ft.): 834
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
			Glacial Till **Clayey SAND (SC)**: subangular, low to medium plasticity, brown multicolored gray, moist, homogeneous, trace gravel	BS-5		SC	20		89	32	31	14	**pH=** 7.1 **Resistivity=** 2400 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** ND **Redox=** 314 mV **Sulfides=** 0.07 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 116.4 pcf Opt. Water Content: 14.4%
830	5												
			Well-graded SAND with Silt (SW-SM): fine to coarse-grained, subangular to subrounded, non-plastic, gray, wet, trace gravel										
825	10												
820	15												
815													

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was observed at approximately 7.5 ft. below ground surface during excavation.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.
Caving was observed at a depth of 7.5 ft. below ground surface.

KLEINFELDER
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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

TEST PIT LOG TP-5

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

TP-5

PAGE: 1 of 1

Date Begin - End: 10/30/2020 **Excavation Company:** Terra Testing

Logged By: D. Huntsman **Excavation Crew:** B. Kirkpatrick

Hor.-Vert. Datum: WGS 1984 - NAVD88 **Excavation Equip.:** Bobcat E45

Plunge: -90 degrees **Excav. Dimensions:** 4 x 8 ft

Weather: 36°F Cloudy

TEST PIT LOG TP-6

Latitude: 40.67675°
Longitude: -84.21533°
Approximate Ground Surface Elevation (ft.): 852
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
850	0		**Glacial Till** **Lean CLAY with Sand (CL)**: subangular to subrounded, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel	BS-6		CL	16		98	77	37	18	**pH=** 7.4 **Resistivity=** 3000 ohm-cm **Sulfates=** 20 mg/kg **Chlorides=** ND **Redox=** 300 mV **Sulfides=** ND **ASTM D698 Method B=** Max. Dry Unit Wt.: 106.1 pcf Opt. Water Content: 17.1%
	5												
845													
	10												
840													
	15												
835													

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
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PROJECT NO.: 20212135.001A

DRAWN BY: DH

CHECKED BY: DEP

DATE: 12/8/2020

TEST PIT LOG TP-6

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

TP-6

PAGE: 1 of 1

TEST PIT LOG TP-8

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	45°F Partly Cloudy		

FIELD EXPLORATION

Latitude: 40.68792°
Longitude: -84.22256°
Approximate Ground Surface Elevation (ft.): 877
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
875			**Glacial Till** **Lean CLAY (CL)**: subangular, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel	BS-8		CL	20		100	85	43	25	**pH=** 7.2 **Resistivity=** 3300 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** 10 mg/kg **Redox=** 311 mV **Sulfides=** 0.11 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 103.8 pcf Opt. Water Content: 15.4%
	5												
870													
	10												
865													
	15												
860													

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

TEST PIT LOG TP-8

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
TP-8
PAGE: 1 of 1

Date Begin - End: 10/30/2020 **Excavation Company:** Terra Testing

Logged By: D. Huntsman **Excavation Crew:** B. Kirkpatrick

Hor.-Vert. Datum: WGS 1984 - NAVD88 **Excavation Equip.:** Bobcat E45

Plunge: -90 degrees **Excav. Dimensions:** 4 x 8 ft

Weather: 36°F Cloudy

TEST PIT LOG TP-10

Latitude: 40.68302°
Longitude: -84.19617°
Approximate Ground Surface Elevation (ft.): 845
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
840	5		**Glacial Till** **Lean CLAY with Sand (CL)**: subangular, low to medium plasticity, light brown multicolored reddish brown, moist, homogeneous, trace gravel and sand	BS-10		CL	16		97	76	32	15	**pH=** 7.5 **Resistivity=** 3300 ohm-cm **Sulfates=** ND **Chlorides=** 10 mg/kg **Redox=** 268 mV **Sulfides=** 0.24 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 109.2 pcf Opt. Water Content: 16.5%
835	10												
830	15												

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 20212135.001A

DRAWN BY: DH

CHECKED BY: DEP

DATE: 12/8/2020

TEST PIT LOG TP-10

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

TP-10

PAGE: 1 of 1

TEST PIT LOG TP-13

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	45°F Partly Cloudy		

FIELD EXPLORATION

Latitude: 40.66813°
Longitude: -84.20032°
Approximate Ground Surface Elevation (ft.): 847
Surface Condition: Bare Earth

LABORATORY RESULTS

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
845	0		**~6 inches TOPSOIL**										
			Glacial Till **Sandy Lean CLAY (CL)**: subangular to subrounded, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel	BS-13		CL	17		98	64	32	14	**pH=** 7.6 **Resistivity=** 3400 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** ND **Redox=** 283 mV **Sulfides=** 0.17 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 112.3 pcf Opt. Water Content: 14.7%
840	5												
835	10												
830	15												

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

TEST PIT LOG TP-13

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

TP-13

PAGE: 1 of 1

TEST PIT LOG TP-14

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	40°F Cloudy		

FIELD EXPLORATION

Latitude: 40.66925°
Longitude: -84.18638°
Approximate Ground Surface Elevation (ft.): 845
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
			Glacial Till **Lean CLAY with Sand (CL)**: subangular, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel										
840	5			BS-14		CL	17		95	72	31	14	**pH=** 7.7 **Resistivity=** 3500 ohm-cm **Sulfates=** ND **Chlorides=** 10 mg/kg **Redox=** 279 mV **Sulfides=** 0.35 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 109.9 pcf Opt. Water Content: 15.0%
835	10												
830	15												

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
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PROJECT NO.:	20212135.001A
DRAWN BY:	DH
CHECKED BY:	DEP
DATE:	12/8/2020

TEST PIT LOG TP-14

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION

TP-14

PAGE: 1 of 1

TEST PIT LOG TP-18

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	40°F Cloudy		

FIELD EXPLORATION

Latitude: 40.66588°
Longitude: -84.17068°
Approximate Ground Surface Elevation (ft.): 857
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			~6 inches TOPSOIL										
855			**Glacial Till** **Lean CLAY with Sand (CL)**: subangular, low to medium plasticity, brown, moist, trace gravel	BS-18		CL	17		97	73	34	20	**pH=** 7.7 **Resistivity=** 3200 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** 10 mg/kg **Redox=** 285 mV **Sulfides=** 0.12 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 107.4 pcf Opt. Water Content: 18.8%
	5												
850													
	10												
845													
	15												
840													

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

TEST PIT LOG TP-18

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
TP-18
PAGE: 1 of 1

TEST PIT LOG TP-22

Date Begin - End:	10/30/2020	**Excavation Company:**	Terra Testing
Logged By:	D. Huntsman	**Excavation Crew:**	B. Kirkpatrick
Hor.-Vert. Datum:	WGS 1984 - NAVD88	**Excavation Equip.:**	Bobcat E45
Plunge:	-90 degrees	**Excav. Dimensions:**	4 x 8 ft
Weather:	45°F Partly Cloudy		

FIELD EXPLORATION

Latitude: 40.67475°
Longitude: -84.22469°
Approximate Ground Surface Elevation (ft.): 856
Surface Condition: Bare Earth

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
855	0		**~6 inches TOPSOIL**										
			Glacial Till **Lean CLAY with Sand (CL)**: subangular, low to medium plasticity, reddish brown multicolored gray, moist, homogeneous, trace gravel	BS-22		CL	16		100	78	37	18	**pH=** 7.5 **Resistivity=** 3400 ohm-cm **Sulfates=** 10 mg/kg **Chlorides=** ND **Redox=** 298 mV **Sulfides=** 0.04 mg/kg **ASTM D698 Method B=** Max. Dry Unit Wt.: 103.3 pcf Opt. Water Content: 19.9%
850	5												
845	10												
840	15												

The test pit was terminated at approximately 8 ft. below ground surface. The test pit was backfilled with excavated material on October 30, 2020.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during excavation or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.
A handheld GPS unit was used to locate the exploration with an accuracy of 5 meters.

KLEINFELDER
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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

TEST PIT LOG TP-22

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

EXPLORATION
TP-22
PAGE: 1 of 1

APPENDIX B
FIELD TESTING: RESISTIVITY TESTING RESULTS

Test Number: ER-3

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp

Project/Task Number: 20212135.001a

Test Performed By: DH

Date: 11/2/2020

Time: NA

Location: Allen and Auglaize Counties, OH

Array Center (lat/long): 40.673713, -84.225588

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes

Air Temp: 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field

Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	8.705	33.4	
	4.0	8	8	3.813	29.2	
	6.0	8	8	2.549	29.3	
	8.0	8	8	1.832	28.1	
	12.0	8	8	1.186	27.3	
	20.0	8	8	0.7244	27.8	
	30.0	8	8	0.5345	30.7	
	50.0	8	8	0.4116	39.4	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-3

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.673713, -84.225588
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	8.667	33.2	
	4.0	8	8	4.002	30.7	
	6.0	8	8	2.553	29.4	
	8.0	8	8	1.868	28.6	
	12.0	8	8	1.217	28.0	
	20.0	8	8	0.7431	28.5	
	30.0	8	8	0.543	31.2	
	50.0	8	8	0.4322	41.4	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-4**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp **Project/Task Number:** 20212135.001a

Test Performed By: DH **Date:** 11/2/2020 **Time:** NA

Location: Allen and Auglaize Counties, OH **Array Center (lat/long):** 40.660262, -84.227085

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes **Air Temp:** 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field **Topography:** Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	10.59	40.6	
	4.0	8	8	4.848	37.2	
	6.0	8	8	3.43	39.4	
	8.0	8	8	2.811	43.1	
	12.0	8	8	2.211	50.8	
	20.0	8	8	1.919	73.6	
	30.0	8	8	1.834	105.4	
	50.0	8	8	1.746	167.3	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-4

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.660262, -84.227085
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	9.605	36.8	
	4.0	8	8	4.591	35.2	
	6.0	8	8	3.384	38.9	
	8.0	8	8	2.739	42.0	
	12.0	8	8	2.218	51.0	
	20.0	8	8	1.905	73.0	
	30.0	8	8	1.804	103.7	
	50.0	8	8	1.709	163.8	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-6**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp

Project/Task Number: 20212135.001a

Test Performed By: DH

Date: 11/2/2020

Time: NA

Location: Allen and Auglaize Counties, OH

Array Center (lat/long): 40.667041, -84.217902

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes

Air Temp: 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field

Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	42.1	161.4	
	4.0	8	8	20.3	155.6	
	6.0	8	8	13.065	150.2	
	8.0	8	8	8.872	136.0	
	12.0	8	8	5.292	121.7	
	20.0	8	8	2.752	105.5	
	30.0	8	8	1.817	104.5	
	50.0	8	8	1.335	127.9	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-6

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.667041, -84.217902
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	35.6	136.4	
	4.0	8	8	19.24	147.5	
	6.0	8	8	11.089	127.5	
	8.0	8	8	8.686	133.2	
	12.0	8	8	5.78	132.9	
	20.0	8	8	2.865	109.8	
	30.0	8	8	1.788	102.8	
	50.0	8	8	1.319	126.4	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: ER-7

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a

Test Performed By: DH
Date: 11/2/2020
Time: NA

Location: Allen and Auglaize Counties, OH
Array Center (lat/long): 40.675896, -84.215047

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	8.161	31.3	
	4.0	8	8	3.229	24.8	
	6.0	8	8	1.957	22.5	
	8.0	8	8	1.323	20.3	
	12.0	8	8	0.9217	21.2	
	20.0	8	8	0.4785	18.3	
	30.0	8	8	0.3888	22.4	
	50.0	8	8	0.3391	32.5	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-7

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.675896, -84.215047
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	8.521	32.7	
	4.0	8	8	3.165	24.3	
	6.0	8	8	1.845	21.2	
	8.0	8	8	1.262	19.3	
	12.0	8	8	0.7701	17.7	
	20.0	8	8	0.4839	18.5	
	30.0	8	8	0.3814	21.9	
	50.0	8	8	0.3508	33.6	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-9**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp **Project/Task Number:** 20212135.001a

Test Performed By: DH **Date:** 11/2/2020 **Time:** NA

Location: Allen and Auglaize Counties, OH **Array Center (lat/long):** 40.67317361, -84.206167

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes **Air Temp:** 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field **Topography:** Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	9.181	35.2	
	4.0	8	8	3.180	24.4	
	6.0	8	8	1.906	21.9	
	8.0	8	8	1.271	19.5	
	12.0	8	8	0.7266	16.7	
	20.0	8	8	0.4192	16.1	
	30.0	8	8	0.3101	17.8	
	50.0	8	8	0.2266	21.7	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-9

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67317361, -84.206167
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	9.461	36.3	
	4.0	8	8	3.137	24.0	
	6.0	8	8	1.727	19.9	
	8.0	8	8	1.161	17.8	
	12.0	8	8	0.6655	15.3	
	20.0	8	8	0.4052	15.5	
	30.0	8	8	0.2992	17.2	
	50.0	8	8	0.2275	21.8	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-10**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp **Project/Task Number:** 20212135.001a

Test Performed By: DH **Date:** 11/2/2020 **Time:** NA

Location: Allen and Auglaize Counties, OH **Array Center (lat/long):** 40.67317361, -84.206167

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes **Air Temp:** 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field **Topography:** Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	21.2	81.3	
	4.0	8	8	8.416	64.5	
	6.0	8	8	4.990	57.4	
	8.0	8	8	3.812	58.4	
	12.0	8	8	2.748	63.2	
	20.0	8	8	1.858	71.2	
	30.0	8	8	1.454	83.6	
	50.0	8	8	1.206	115.6	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-10

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67317361, -84.206167
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	23.1	88.5	
	4.0	8	8	8.397	64.4	
	6.0	8	8	5.275	60.7	
	8.0	8	8	3.96	60.7	
	12.0	8	8	2.842	65.4	
	20.0	8	8	1.771	67.9	
	30.0	8	8	1.178	67.7	
	50.0	8	8	1.288	123.4	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-11**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp **Project/Task Number:** 20212135.001a

Test Performed By: DH **Date:** 11/2/2020 **Time:** NA

Location: Allen and Auglaize Counties, OH **Array Center (lat/long):** 40.67317361, -84.206167

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes **Air Temp:** 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field **Topography:** Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	8.351	32.0	
	4.0	8	8	4.018	30.8	
	6.0	8	8	2.775	31.9	
	8.0	8	8	2.195	33.7	
	12.0	8	8	1.583	36.4	
	20.0	8	8	1.102	42.2	
	30.0	8	8	0.889	51.1	
	50.0	8	8	0.7548	72.3	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-11

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67317361, -84.206167
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	8.297	31.8	
	4.0	8	8	4.103	31.5	
	6.0	8	8	2.767	31.8	
	8.0	8	8	2.157	33.1	
	12.0	8	8	1.53	35.2	
	20.0	8	8	1.1	42.2	
	30.0	8	8	0.897	51.6	
	50.0	8	8	0.7335	70.3	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: ER-12

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a

Test Performed By: DH
Date: 11/2/2020
Time: NA

Location: Allen and Auglaize Counties, OH
Array Center (lat/long): 40.67317361, -84.206167

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	9.973	38.2	
	4.0	8	8	4.491	34.4	
	6.0	8	8	2.968	34.1	
	8.0	8	8	2.284	35.0	
	12.0	8	8	1.601	36.8	
	20.0	8	8	1.134	43.5	
	30.0	8	8	0.9271	53.3	
	50.0	8	8	0.8097	77.6	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-12

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67317361, -84.206167
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	9.952	38.1	
	4.0	8	8	4.334	33.2	
	6.0	8	8	2.93	33.7	
	8.0	8	8	2.281	35.0	
	12.0	8	8	1.625	37.4	
	20.0	8	8	1.15	44.1	
	30.0	8	8	0.951	54.6	
	50.0	8	8	0.8265	79.2	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: ER-13

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Allen and Auglaize Counties, OH
Array Center (lat/long): 40.67603778, -84.20088946
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	5.927	22.7	
	4.0	8	8	3.305	25.3	
	6.0	8	8	2.382	27.4	
	8.0	8	8	1.848	28.3	
	12.0	8	8	1.493	34.3	
	20.0	8	8	1.212	46.5	
	30.0	8	8	1.082	62.2	
	50.0	8	8	1.002	96.0	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: ER-13

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67603778, -84.20088946
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	5.962	22.9	
	4.0	8	8	3.483	26.7	
	6.0	8	8	2.406	27.7	
	8.0	8	8	1.904	29.2	
	12.0	8	8	1.469	33.8	
	20.0	8	8	1.205	46.2	
	30.0	8	8	1.091	62.7	
	50.0	8	8	1.03	98.7	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-14**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp **Project/Task Number:** 20212135.001a

Test Performed By: DH **Date:** 11/4/2020 **Time:** NA

Location: Allen and Auglaize Counties, OH **Array Center (lat/long):** 40.68146622, -84.19703037

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes **Air Temp:** 50° F

Surface Conditions: (grass covered, paved, etc.) Farm field **Topography:** Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	24.7	94.7	
	4.0	8	8	9.053	69.4	
	6.0	8	8	5.164	59.4	
	8.0	8	8	3.748	57.5	
	12.0	8	8	2.415	55.5	
	20.0	8	8	1.492	57.2	
	30.0	8	8	1.035	59.5	
	50.0	8	8	0.6884	66.0	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-14

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/4/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.68146622, -84.19703037
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 50° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	22.3	85.5	
	4.0	8	8	8.436	64.7	
	6.0	8	8	5.249	60.4	
	8.0	8	8	3.779	57.9	
	12.0	8	8	2.439	56.1	
	20.0	8	8	1.511	57.9	
	30.0	8	8	1.0370	59.6	
	50.0	8	8	0.7438	71.3	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-16**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp **Project/Task Number:** 20212135.001a

Test Performed By: DH **Date:** 11/2/2020 **Time:** NA

Location: Allen and Auglaize Counties, OH **Array Center (lat/long):** 40.68146622, -84.19703037

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes **Air Temp:** 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field **Topography:** Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	8.021	30.7	
	4.0	8	8	3.281	25.2	
	6.0	8	8	2.614	30.1	
	8.0	8	8	2.378	36.5	
	12.0	8	8	2.051	47.2	
	20.0	8	8	1.513	58.0	
	30.0	8	8	1.154	66.3	
	50.0	8	8	0.9791	93.8	
	100.0	8	8	0.8853	169.7	
	200.0	8	8	0.7501	287.5	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-16

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.68146622, -84.19703037
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	7.976	30.6	
	4.0	8	8	3.222	24.7	
	6.0	8	8	2.517	28.9	
	8.0	8	8	2.345	36.0	
	12.0	8	8	2.013	46.3	
	20.0	8	8	1.469	56.3	
	30.0	8	8	1.1910	68.5	
	50.0	8	8	1.008	96.6	
	100.0	8	8	0.8906	170.7	
	200.0	8	8	0.8044	308.3	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-17**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp

Project/Task Number: 20212135.001a

Test Performed By: DH

Date: 11/1/2020

Time: NA

Location: Allen and Auglaize Counties, OH

Array Center (lat/long): 40.68146622, -84.19703037

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes

Air Temp: 50° F

Surface Conditions: (grass covered, paved, etc.) Farm field

Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	12.681	48.6	
	4.0	8	8	5.158	39.5	
	6.0	8	8	2.864	32.9	
	8.0	8	8	2.104	32.3	
	12.0	8	8	1.564	36.0	
	20.0	8	8	1.187	45.5	
	30.0	8	8	0.9894	56.9	
	50.0	8	8	0.8043	77.1	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-17

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/1/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.68146622, -84.19703037
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 50° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	11.945	45.8	
	4.0	8	8	4.859	37.2	
	6.0	8	8	3.095	35.6	
	8.0	8	8	2.301	35.3	
	12.0	8	8	1.705	39.2	
	20.0	8	8	1.21	46.4	
	30.0	8	8	0.9685	55.7	
	50.0	8	8	0.7624	73.1	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: **ER-18**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp

Project/Task Number: 20212135.001a

Test Performed By: DH

Date: 11/1/2020

Time: NA

Location: Allen and Auglaize Counties, OH

Array Center (lat/long): 40.67390372, -84.19488823

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes

Air Temp: 50° F

Surface Conditions: (grass covered, paved, etc.) Farm field

Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	18.289	70.1	
	4.0	8	8	5.452	41.8	
	6.0	8	8	3.677	42.3	
	8.0	8	8	2.658	40.7	
	12.0	8	8	1.71	39.3	
	20.0	8	8	1.114	42.7	
	30.0	8	8	0.8417	48.4	
	50.0	8	8	0.6532	62.6	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-18

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp

Project/Task Number: 20212135.001a

Test Performed By: DH

Date: 11/1/2020

Time: NA

Location: Henry and Rush Counties, Indiana

Array Center (lat/long): 40.67390372, -84.19488823

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes

Air Temp: 50° F

Surface Conditions: (grass covered, paved, etc.) Farm field

Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	17.537	67.2	
	4.0	8	8	6.141	47.1	
	6.0	8	8	3.572	41.1	
	8.0	8	8	2.601	39.9	
	12.0	8	8	1.669	38.4	
	20.0	8	8	1.073	41.1	
	30.0	8	8	0.8278	47.6	
	50.0	8	8	0.6411	61.4	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: **ER-19**

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp

Project/Task Number: 20212135.001a

Test Performed By: DH

Date: 11/1/2020

Time: NA

Location: Allen and Auglaize Counties, OH

Array Center (lat/long): 40.67390372, -84.19488823

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes

Air Temp: 50° F

Surface Conditions: (grass covered, paved, etc.) Farm field

Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	9.811	37.6	
	4.0	8	8	3.892	29.8	
	6.0	8	8	2.489	28.6	
	8.0	8	8	1.916	29.4	
	12.0	8	8	1.277	29.4	
	20.0	8	8	0.8905	34.1	
	30.0	8	8	0.753	43.3	
	50.0	8	8	0.6247	59.9	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-19

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/1/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67390372, -84.19488823
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 50° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	9.811	37.6	
	4.0	8	8	3.892	29.8	
	6.0	8	8	2.489	28.6	
	8.0	8	8	1.916	29.4	
	12.0	8	8	1.277	29.4	
	20.0	8	8	0.8905	34.1	
	30.0	8	8	0.7530	43.3	
	50.0	8	8	0.6247	59.9	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

Test Number: ER-23

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a

Test Performed By: DH
Date: 11/2/2020
Time: NA

Location: Allen and Auglaize Counties, OH
Array Center (lat/long): 40.67844, -84.220149

Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F

Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat

Energized Line within 50 ft : (Y/N, If Yes, please describe) No

Weather Conditions : Cloudy, windy

Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
East-West	2.0	8	8	8.704	33.4	
	4.0	8	8	4.381	33.6	
	6.0	8	8	2.727	31.4	
	8.0	8	8	1.844	28.3	
	12.0	8	8	1.127	25.9	
	20.0	8	8	0.6269	24.0	
	30.0	8	8	0.4471	25.7	
	50.0	8	8	0.2762	26.5	
	100.0	8	8	0.3398	65.1	
	200.0	8	8	0.3998	153.2	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020

Checked By: DEP
Date: 12/15/2020

Test Number: ER-23

Field Resistivity By Wenner Array Data Report

Project Name: Lightsource bp
Project/Task Number: 20212135.001a
Test Performed By: DH
Date: 11/2/2020
Time: NA
Location: Henry and Rush Counties, Indiana
Array Center (lat/long): 40.67844, -84.220149
Equipment Used (Make/Model): L&R Instruments Ultra MiniRes
Air Temp: 35° F
Surface Conditions: (grass covered, paved, etc.) Farm field
Topography: Flat
Energized Line within 50 ft : (Y/N, If Yes, please describe) No
Weather Conditions : Cloudy, windy
Other Surface Conditions : (drainage/evidence of contamination or buried structures) N/A

Array Orientation	Spacing (feet) *a*	Potential Probe Depth (inches)	Current Probe Depth (inches)	Measured Resistance (ohm) *V/I*	Apparent Resistivity (ohm-m) *p*	Comments
North-South	2.0	8	8	8.967	34.4	
	4.0	8	8	4.369	33.5	
	6.0	8	8	2.761	31.7	
	8.0	8	8	1.985	30.4	
	12.0	8	8	1.239	28.5	
	20.0	8	8	0.6349	24.3	
	30.0	8	8	0.3967	22.8	
	50.0	8	8	0.3155	30.2	
	100.0	8	8	0.2759	52.9	
	200.0	8	8	0.2438	93.4	

Comments: 1 - Test performed in general accordance with IEEE Standard 81, 2012, "Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System."

Entry By: DH
Date: 11/15/2020
Checked By: DEP
Date: 12/15/2020

APPENDIX C
LABORATORY TEST RESULTS: INDEX TESTING

Exploration ID	Depth (ft.)	Sample No.	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
						Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
B-1	2.0 - 4.0	S-2	LEAN CLAY WITH SAND (CL)	19			99	82	43	19	24	
B-2	8.0 - 10.0	S-5	LEAN CLAY WITH SAND (CL)	18			100	84	38	17	21	
B-3	4.0 - 6.0	S-3	LEAN CLAY (CL)	16			99	88	48	21	27	
B-3	13.0 - 15.0	S-6	FAT CLAY (CH)	21			99	87	51	20	31	
B-7	6.0 - 8.0	S-4	LEAN CLAY WITH SAND (CL)	16		100	99	83	35	18	17	
B-8	13.0 - 15.0	S-6	SILTY SAND (SM)	18			100	14.3				
B-9	4.0 - 6.0	S-3	LEAN CLAY WITH SAND (CL)	13			100	80	36	18	18	
B-12	13.0 - 13.42	S-6	CLAYEY SAND WITH GRAVEL (SC)	13		88	76	40	34	16	18	
B-13	6.0 - 8.0	S-4	LEAN CLAY WITH SAND (CL)	24		100	99	80	45	20	25	
B-13	13.0 - 15.0	S-6	SILTY SAND WITH GRAVEL (SM)	13		100	85	21				
B-14	6.0 - 8.0	S-4	LEAN CLAY WITH SAND (CL)	15		100	98	72	31	17	14	
TP-3	2.0 - 5.0	BS-3A	SANDY LEAN CLAY (CL)	24		100	96	54	45	18	27	**pH=** 7.1
												Resistivity= 3000 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= ND
												Redox= 296 mV
												Sulfides= 0.05 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 106.3 pcf
												Optimum Water Content: 18.1%

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic
NA = Not Available

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

LABORATORY TEST RESULT SUMMARY

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-1

Exploration ID	Depth (ft.)	Sample No.	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
						Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
TP-4	2.0 - 8.0	BS-4	LEAN CLAY WITH SAND (CL)	14		100	99	75	37	17	20	**pH=** 7.2
												Resistivity= 2900 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= 20 mg/kg
												Redox= 303 mV
												Sulfides= ND
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 106.1 pcf
												Optimum Water Content: 19.2%
TP-5	2.0 - 8.0	BS-5	CLAYEY SAND (SC)	20		100	89	32	31	17	14	**pH=** 7.1
												Resistivity= 2400 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= ND
												Redox= 314 mV
												Sulfides= 0.07 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 116.4 pcf
												Optimum Water Content: 14.4%
TP-6	1.0 - 8.0	BS-6	LEAN CLAY WITH SAND (CL)	16		100	98	77	37	19	18	**pH=** 7.4
												Resistivity= 3000 ohm-cm
												Sulfates= 20 mg/kg
												Chlorides= ND
												Redox= 300 mV
												Sulfides= ND
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 106.1 pcf
												Optimum Water Content: 17.1%

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic
NA = Not Available

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

LABORATORY TEST RESULT SUMMARY

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-2

Exploration ID	Depth (ft.)	Sample No.	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
						Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
TP-8	2.0 - 8.0	BS-8	LEAN CLAY (CL)	20			100	85	43	18	25	**pH=** 7.2
												Resistivity= 3300 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= 10 mg/kg
												Redox= 311 mV
												Sulfides= 0.11 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 103.8 pcf
												Optimum Water Content: 15.4%
TP-10	1.0 - 8.0	BS-10	LEAN CLAY WITH SAND (CL)	16		100	97	76	32	17	15	**pH=** 7.5
												Resistivity= 3300 ohm-cm
												Sulfates= ND
												Chlorides= 10 mg/kg
												Redox= 268 mV
												Sulfides= 0.24 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 109.2 pcf
												Optimum Water Content: 16.5%
TP-13	2.0 - 8.0	BS-13	SANDY LEAN CLAY (CL)	17		100	98	64	32	18	14	**pH=** 7.6
												Resistivity= 3400 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= ND
												Redox= 283 mV
												Sulfides= 0.17 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 112.3 pcf
												Optimum Water Content: 14.7%

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic
NA = Not Available

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DRAWN BY: DH
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DATE: 12/8/2020

LABORATORY TEST RESULT SUMMARY

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-3

Exploration ID	Depth (ft.)	Sample No.	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
						Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
TP-14	2.0 - 8.0	BS-14	LEAN CLAY WITH SAND (CL)	17		100	95	72	31	17	14	**pH=** 7.7
												Resistivity= 3500 ohm-cm
												Sulfates= ND
												Chlorides= 10 mg/kg
												Redox= 279 mV
												Sulfides= 0.35 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 109.9 pcf
												Optimum Water Content: 15.0%
TP-18	2.0 - 8.0	BS-18	LEAN CLAY WITH SAND (CL)	17		100	97	73	34	14	20	**pH=** 7.7
												Resistivity= 3200 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= 10 mg/kg
												Redox= 285 mV
												Sulfides= 0.12 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 107.4 pcf
												Optimum Water Content: 18.8%
TP-22	2.0 - 8.0	BS-22	LEAN CLAY WITH SAND (CL)	16			100	78	37	19	18	**pH=** 7.5
												Resistivity= 3400 ohm-cm
												Sulfates= 10 mg/kg
												Chlorides= ND
												Redox= 298 mV
												Sulfides= 0.04 mg/kg
												ASTM D698 Method B=
												Maximum Dry Unit Weight: 103.3 pcf
												Optimum Water Content: 19.9%

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic
NA = Not Available

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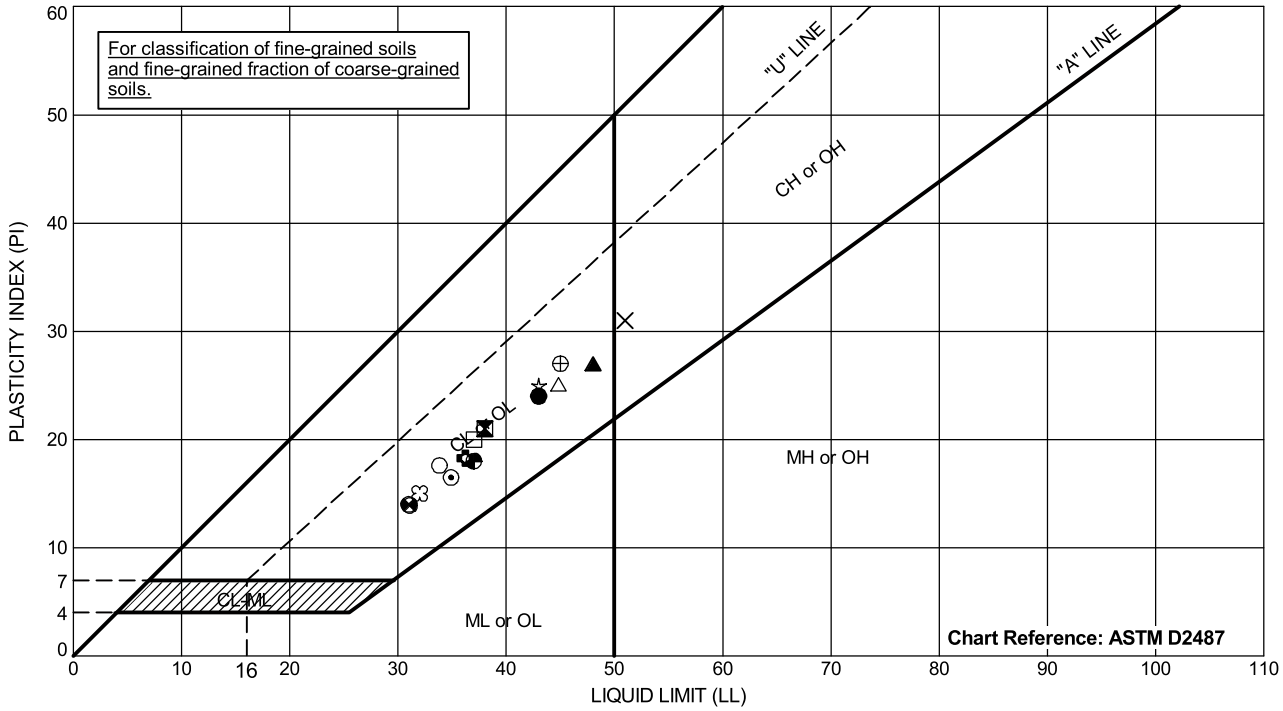
DATE: 12/8/2020

LABORATORY TEST RESULT SUMMARY

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-4



Exploration ID		Depth (ft.)	Sample Number	Sample Description	Passing #200	LL	PL	PI
●	B-1	2 - 4	S-2	LEAN CLAY with SAND (CL)	82	43	19	24
⊠	B-2	8 - 10	S-5	LEAN CLAY with SAND (CL)	84	38	17	21
▲	B-3	4 - 6	S-3	LEAN CLAY (CL)	88	48	21	27
×	B-3	13 - 15	S-6	FAT CLAY (CH)	87	51	20	31
⊙	B-7	6 - 8	S-4	LEAN CLAY with SAND (CL)	83	35	18	17
✿	B-9	4 - 6	S-3	LEAN CLAY with SAND (CL)	80	36	18	18
○	B-12	13 - 13.42	S-6	CLAYEY SAND with GRAVEL (SC)	40	34	16	18
△	B-13	6 - 8	S-4	LEAN CLAY with SAND (CL)	80	45	20	25
⊗	B-14	6 - 8	S-4	LEAN CLAY with SAND (CL)	72	31	17	14
⊕	TP-3	2 - 5	BS-3A	SANDY LEAN CLAY (CL)	54	45	18	27
□	TP-4	2 - 8	BS-4	LEAN CLAY with SAND (CL)	75	37	17	20
◓	TP-5	2 - 8	BS-5	CLAYEY SAND (SC)	32	31	17	14
◔	TP-6	1 - 8	BS-6	LEAN CLAY with SAND (CL)	77	37	19	18
☆	TP-8	2 - 8	BS-8	LEAN CLAY (CL)	85	43	18	25
⊠	TP-10	1 - 8	BS-10	LEAN CLAY with SAND (CL)	76	32	17	15

Testing performed in general accordance with ASTM D4318.
NP = Nonplastic
NA = Not Available
NM = Not Measured

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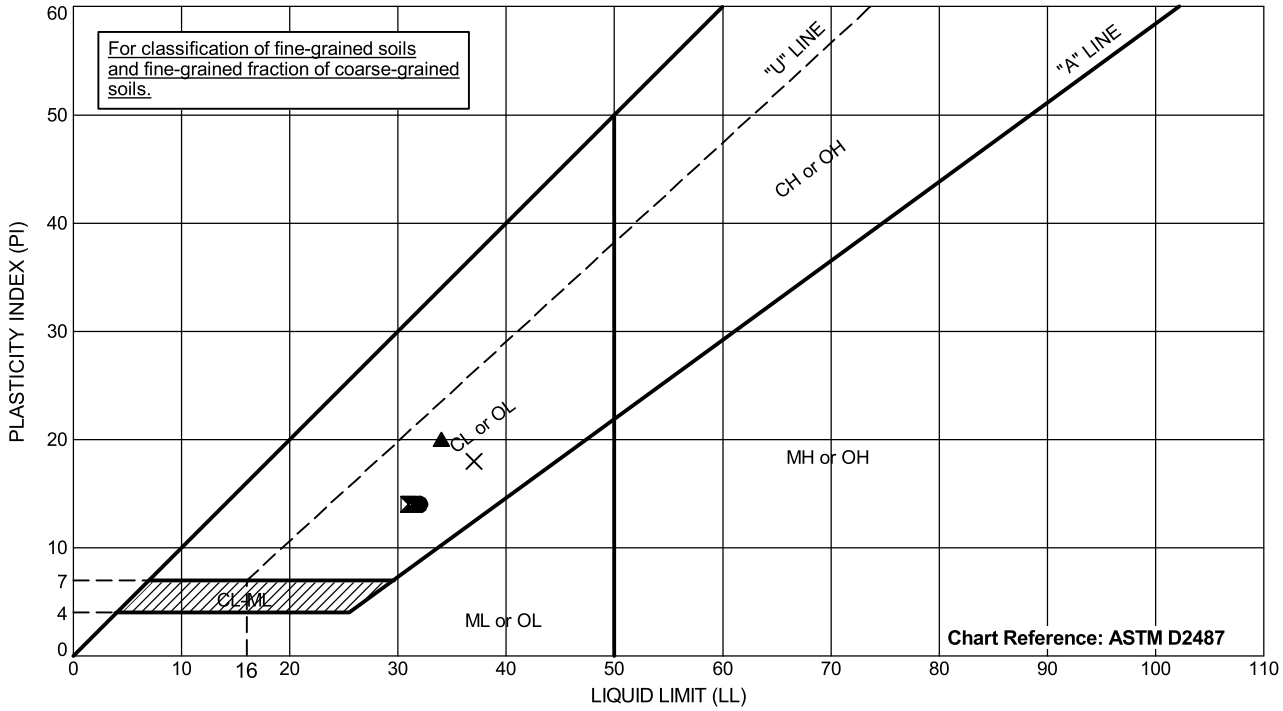
PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

ATTERBERG LIMITS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-5



Exploration ID		Depth (ft.)	Sample Number	Sample Description	Passing #200	LL	PL	PI
●	TP-13	2 - 8	BS-13	SANDY LEAN CLAY (CL)	64	32	18	14
⊠	TP-14	2 - 8	BS-14	LEAN CLAY with SAND (CL)	72	31	17	14
▲	TP-18	2 - 8	BS-18	LEAN CLAY with SAND (CL)	73	34	14	20
×	TP-22	2 - 8	BS-22	LEAN CLAY with SAND (CL)	78	37	19	18

Testing performed in general accordance with ASTM D4318.
NP = Nonplastic
NA = Not Available
NM = Not Measured

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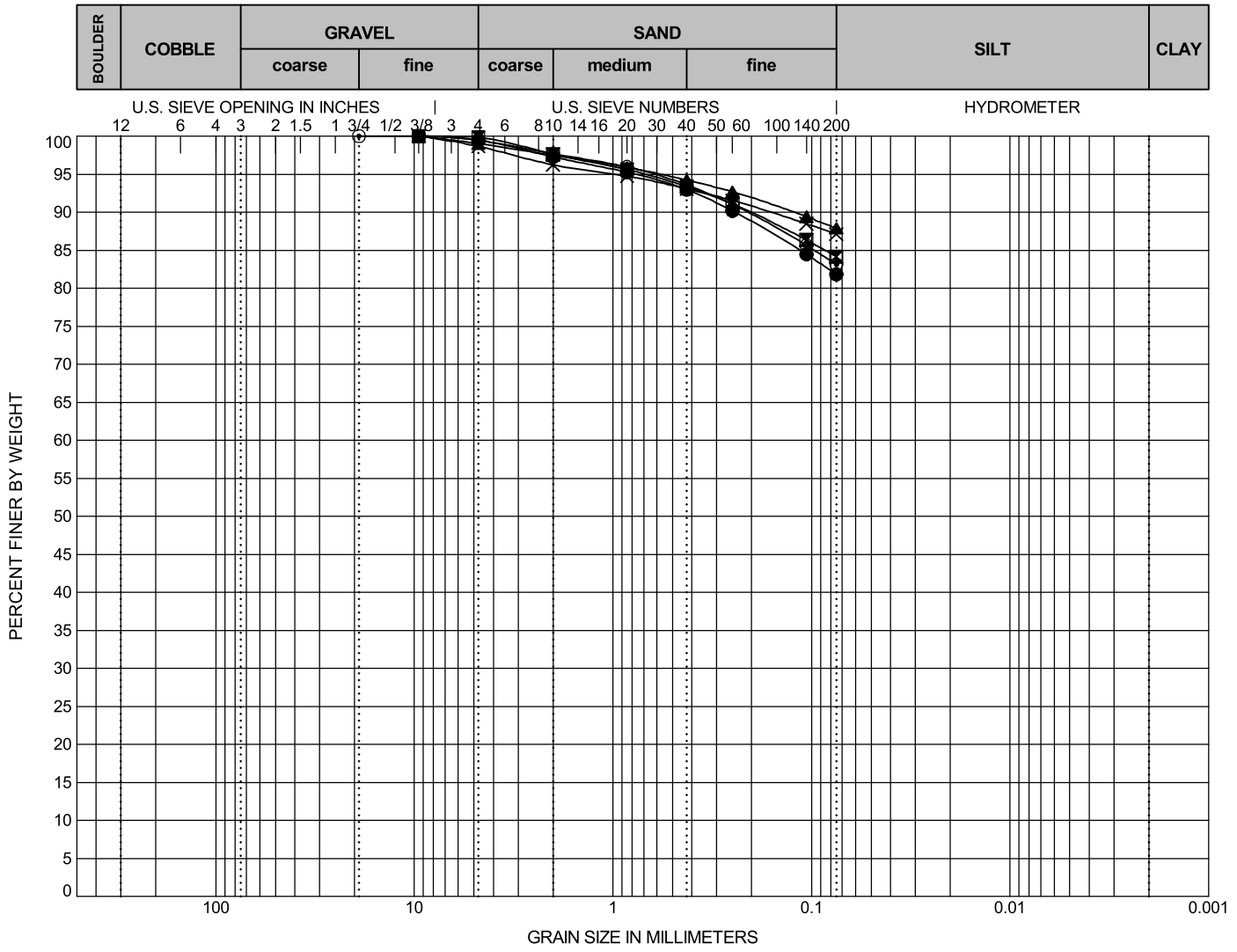
PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

ATTERBERG LIMITS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE

LAB-6



Exploration ID		Depth (ft.)	Sample Number	Sample Description	LL	PL	PI
●	B-1	2 - 4	S-2	LEAN CLAY with SAND (CL)	43	19	24
⊠	B-2	8 - 10	S-5	LEAN CLAY with SAND (CL)	38	17	21
▲	B-3	4 - 6	S-3	LEAN CLAY (CL)	48	21	27
×	B-3	13 - 15	S-6	FAT CLAY (CH)	51	20	31
⊙	B-7	6 - 8	S-4	LEAN CLAY with SAND (CL)	35	18	17

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	B-1	2 - 4	9.5	NM	NM	NM	NM	NM		99	82	NM	NM
⊠	B-2	8 - 10	9.5	NM	NM	NM	NM	NM		100	84	NM	NM
▲	B-3	4 - 6	9.5	NM	NM	NM	NM	NM		99	88	NM	NM
×	B-3	13 - 15	9.5	NM	NM	NM	NM	NM		99	87	NM	NM
⊙	B-7	6 - 8	19	NM	NM	NM	NM	NM	100	99	83	NM	NM

*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of the material with the engineering properties of silt or clay.
Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NA = Not Available
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

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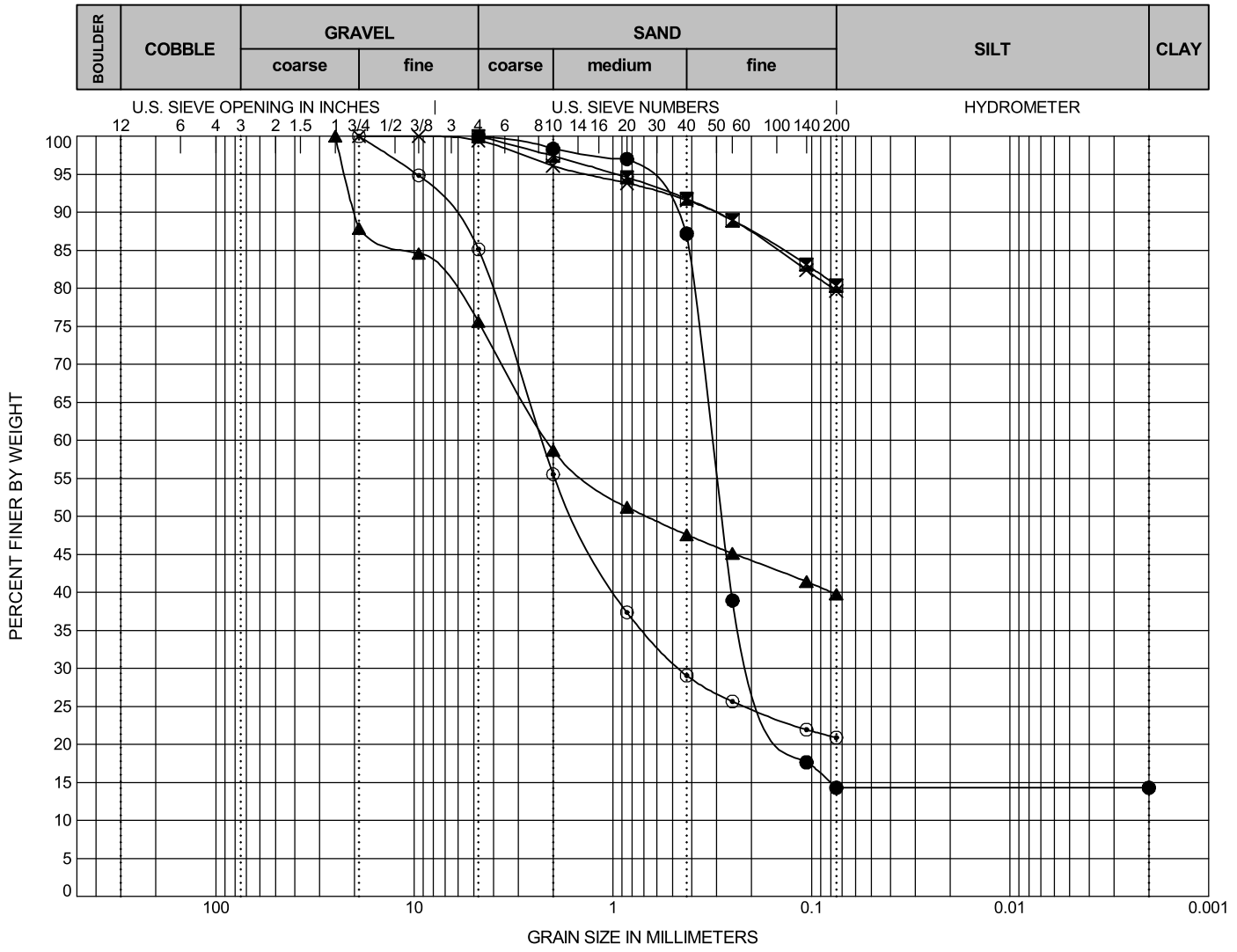
PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

SIEVE ANALYSIS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-7



Exploration ID		Depth (ft.)	Sample Number	Sample Description	LL	PL	PI
●	B-8	13 - 15	S-6	SILTY SAND (SM)	NM	NM	NM
⊠	B-9	4 - 6	S-3	LEAN CLAY with SAND (CL)	36	18	18
▲	B-12	13 - 13.42	S-6	CLAYEY SAND with GRAVEL (SC)	34	16	18
×	B-13	6 - 8	S-4	LEAN CLAY with SAND (CL)	45	20	25
⊙	B-13	13 - 15	S-6	SILTY SAND WITH GRAVEL (SM)	NM	NM	NM

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	B-8	13 - 15	4.75	0.315	0.175	NM	NM	NM		100	14.3	0.0	14.3
⊠	B-9	4 - 6	4.75	NM	NM	NM	NM	NM		100	80	NM	NM
▲	B-12	13 - 13.42	25	2.142	NM	NM	NM	NM	88	76	40	NM	NM
×	B-13	6 - 8	19	NM	NM	NM	NM	NM	100	99	80	NM	NM
⊙	B-13	13 - 15	19	2.28	0.46	NM	NM	NM	100	85	21	NM	NM

*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of the material with the engineering properties of silt or clay.
Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NA = Not Available
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

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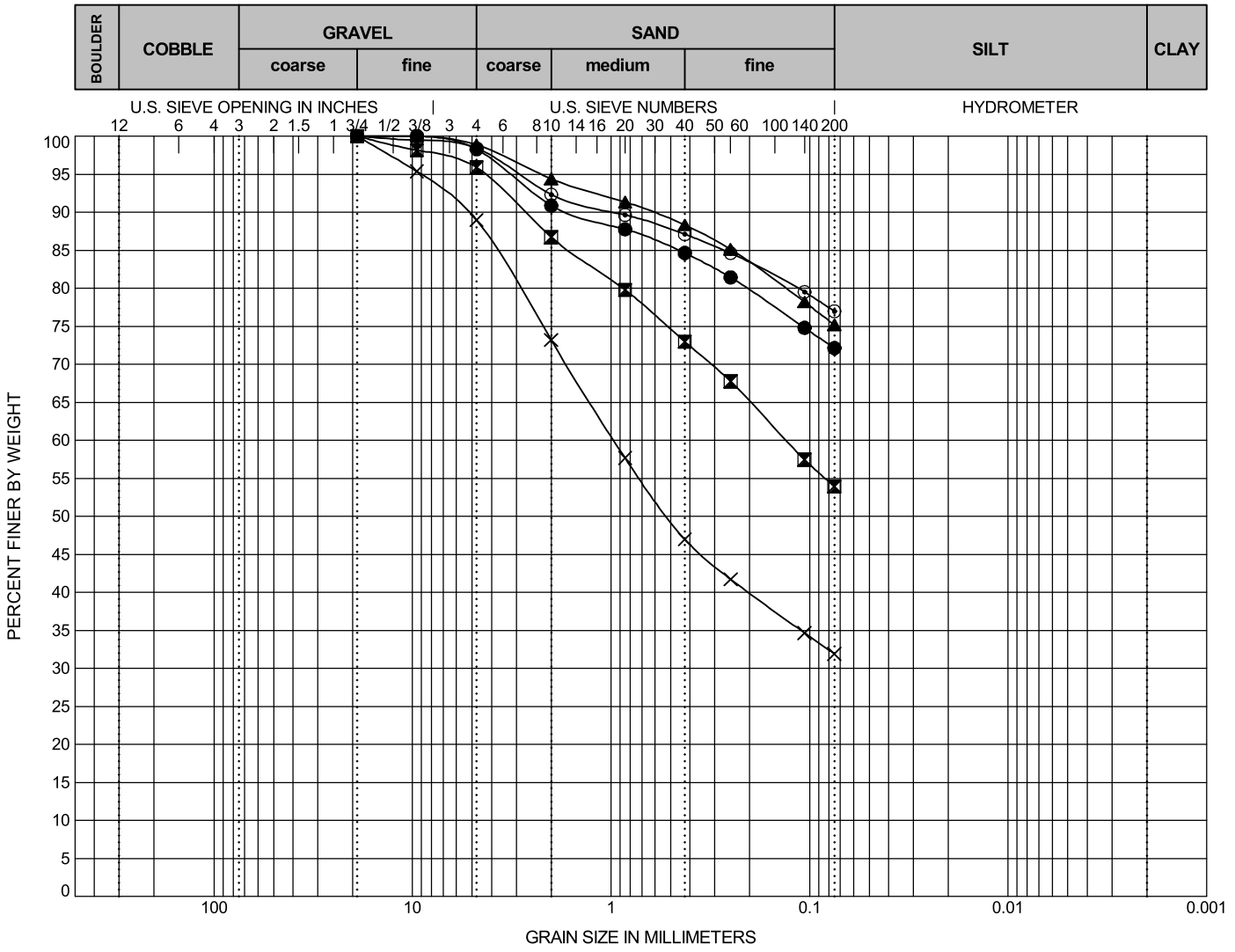
PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

SIEVE ANALYSIS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-8



Exploration ID		Depth (ft.)	Sample Number	Sample Description	LL	PL	PI
●	B-14	6 - 8	S-4	LEAN CLAY with SAND (CL)	31	17	14
⊠	TP-3	2 - 5	BS-3A	SANDY LEAN CLAY (CL)	45	18	27
▲	TP-4	2 - 8	BS-4	LEAN CLAY with SAND (CL)	37	17	20
×	TP-5	2 - 8	BS-5	CLAYEY SAND (SC)	31	17	14
⊙	TP-6	1 - 8	BS-6	LEAN CLAY with SAND (CL)	37	19	18

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	B-14	6 - 8	19	NM	NM	NM	NM	NM	100	98	72	NM	NM
⊠	TP-3	2 - 5	19	0.131	NM	NM	NM	NM	100	96	54	NM	NM
▲	TP-4	2 - 8	19	NM	NM	NM	NM	NM	100	99	75	NM	NM
×	TP-5	2 - 8	19	0.967	NM	NM	NM	NM	100	89	32	NM	NM
⊙	TP-6	1 - 8	19	NM	NM	NM	NM	NM	100	98	77	NM	NM

*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of the material with the engineering properties of silt or clay.
Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NA = Not Available
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

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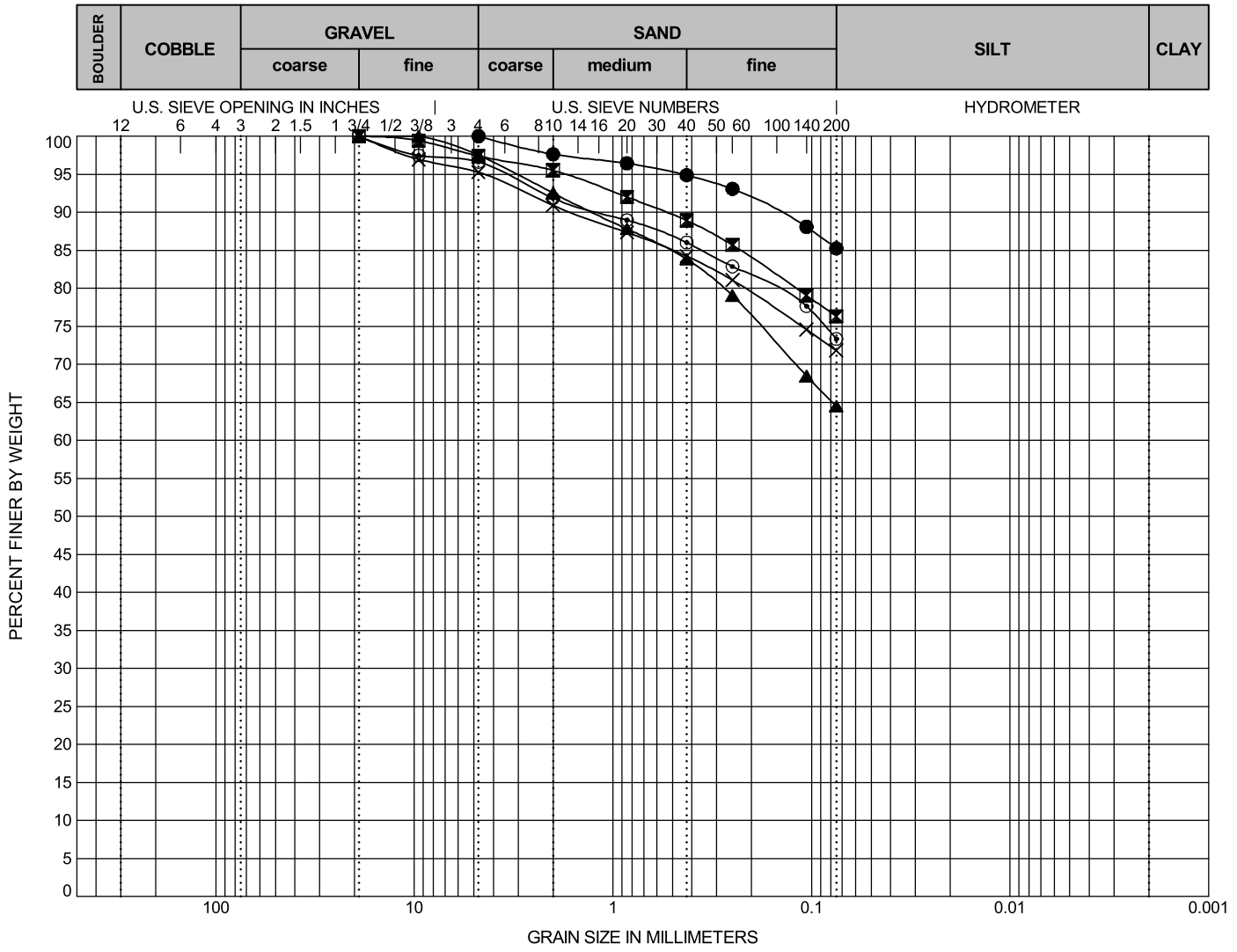
PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

SIEVE ANALYSIS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-9



Exploration ID		Depth (ft.)	Sample Number	Sample Description	LL	PL	PI
●	TP-8	2 - 8	BS-8	LEAN CLAY (CL)	43	18	25
⊠	TP-10	1 - 8	BS-10	LEAN CLAY with SAND (CL)	32	17	15
▲	TP-13	2 - 8	BS-13	SANDY LEAN CLAY (CL)	32	18	14
×	TP-14	2 - 8	BS-14	LEAN CLAY with SAND (CL)	31	17	14
⊙	TP-18	2 - 8	BS-18	LEAN CLAY with SAND (CL)	34	14	20

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	TP-8	2 - 8	4.75	NM	NM	NM	NM	NM		100	85	NM	NM
⊠	TP-10	1 - 8	19	NM	NM	NM	NM	NM	100	97	76	NM	NM
▲	TP-13	2 - 8	19	NM	NM	NM	NM	NM	100	98	64	NM	NM
×	TP-14	2 - 8	19	NM	NM	NM	NM	NM	100	95	72	NM	NM
⊙	TP-18	2 - 8	19	NM	NM	NM	NM	NM	100	97	73	NM	NM

*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of the material with the engineering properties of silt or clay.
Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NA = Not Available
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

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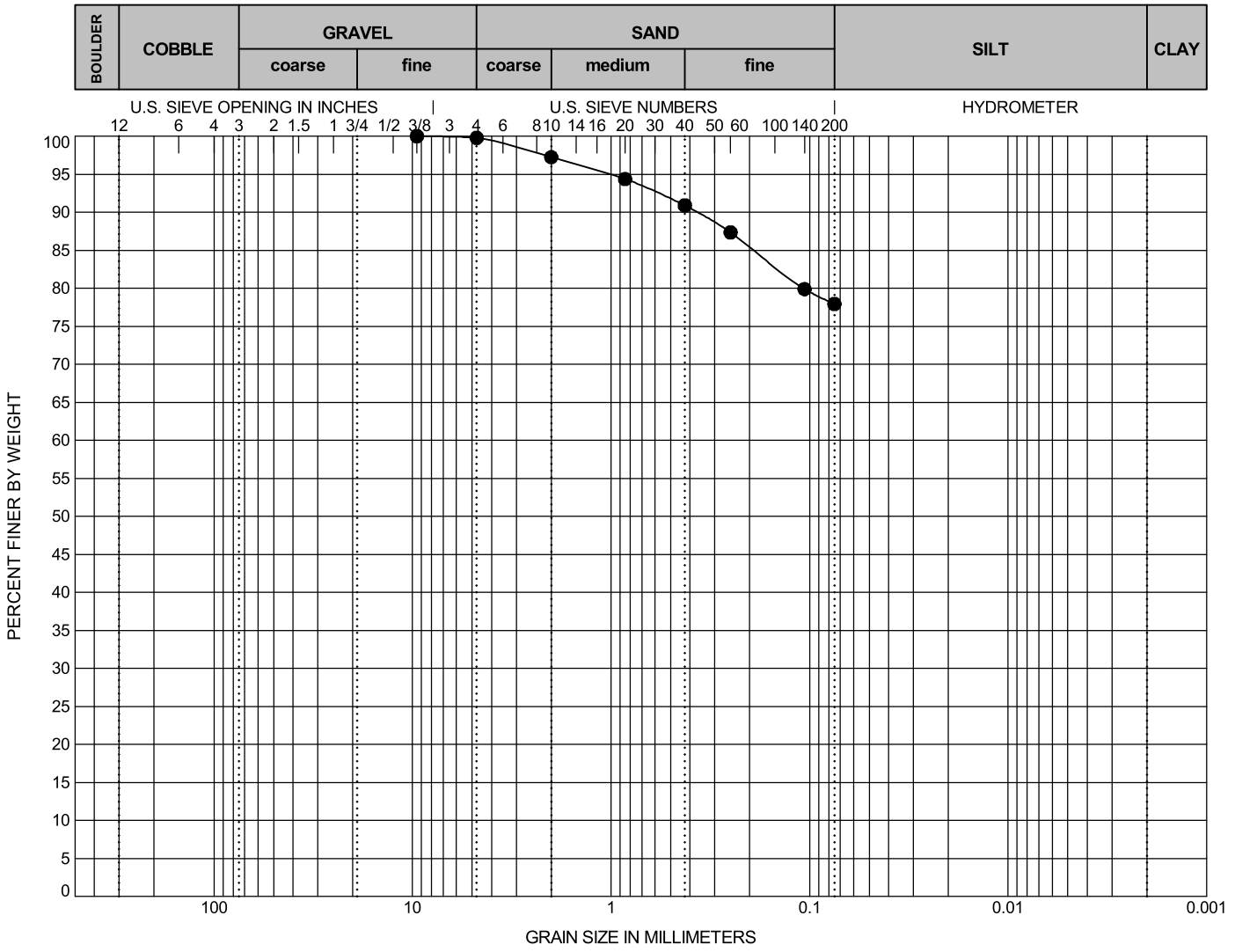
PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

SIEVE ANALYSIS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-10



Exploration ID	Depth (ft.)	Sample Number	Sample Description	LL	PL	PI
● TP-22	2 - 8	BS-22	LEAN CLAY with SAND (CL)	37	19	18

Exploration ID	Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
● TP-22	2 - 8	9.5	NM	NM	NM	NM	NM		100	78	NM	NM

*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of the material with the engineering properties of silt or clay. Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NA = Not Available
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

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PROJECT NO.: 20212135.001A
DRAWN BY: DH
CHECKED BY: DEP
DATE: 12/8/2020

SIEVE ANALYSIS

Lightsource bp
Birch Solar Project
Allen and Auglaize Counties, OH

TABLE
LAB-11

APPENDIX D
LABORATORY TEST RESULTS: THERMAL RESISTIVITY TESTING

21239 FM529 Rd., Bldg. F
Cypress, TX 77433
Tel: 281-985-9344
Fax: 832-427-1752
info@geothermusa.com

December 15, 2020

Kleinfelder
707 17th Street, Ste 3000
Denver, CO 80202
Attn: Brad Baum, MS, PMP

Re: Thermal Analysis of Native Soil Samples
LSBP Birch Solar Project – Lima, OH (PO No. 20212135.001A)

The following is the report of thermal dryout characterization tests conducted on ten (10) native soil samples from the referenced project sent to our laboratory.

Thermal Dryout Tests: The samples were tested at the higher of the "as received" or "optimum" moisture content and 90% of the maximum dry density ***provided by Kleinfelder.*** The tests were conducted in accordance with the IEEE standard 442-2017. The results are tabulated below and the thermal dry out curves are presented in **Figures 1 to 10.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

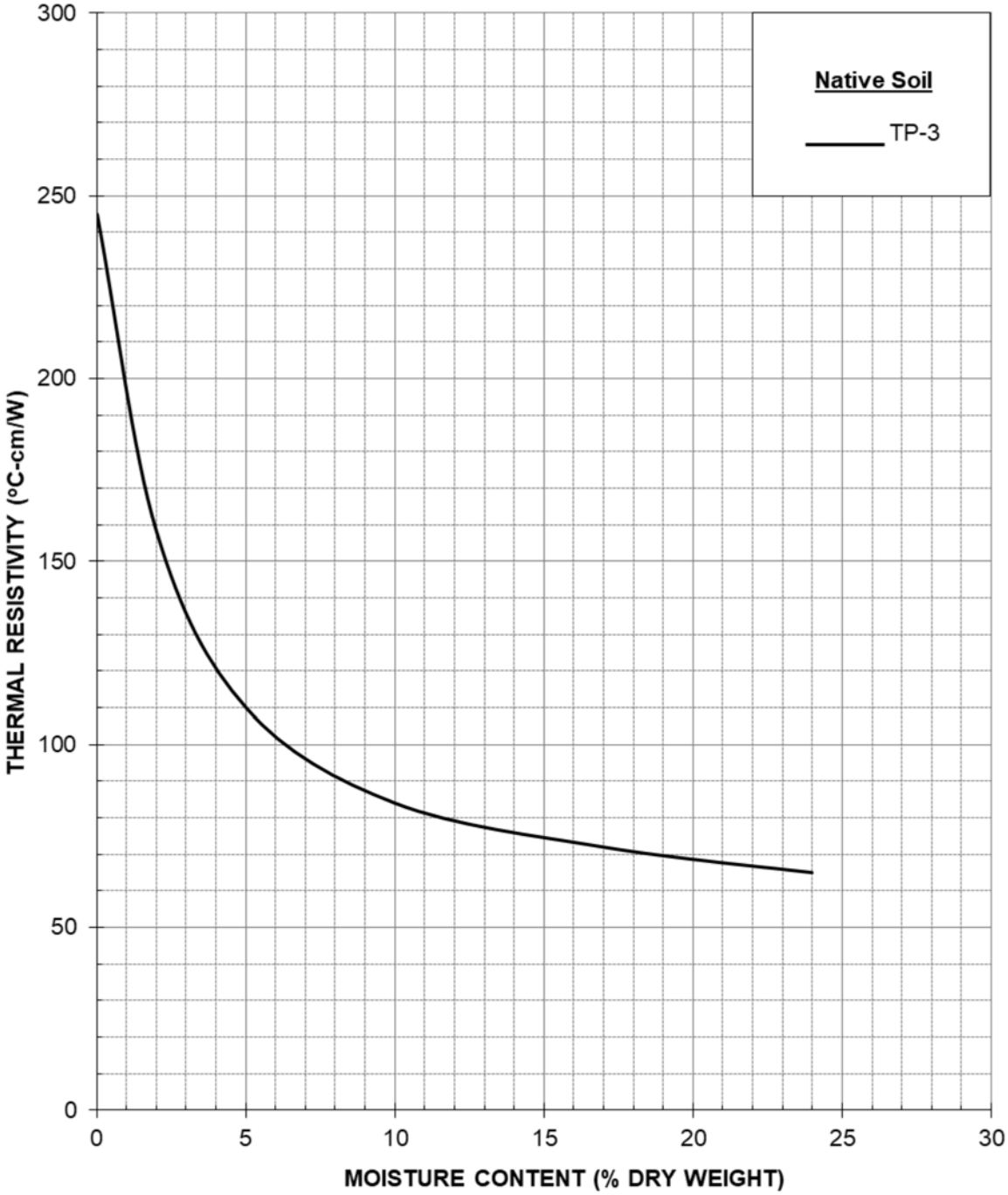
Sample ID	Soil Description (Kleinfelder)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
TP-3	Brown sandy lean clay	65	245	24	96
TP-4	Brown sandy lean clay	77	249	19	96
TP-5	Gray-brown sandy lean clay	75	218	20	105
TP-6	Brown sandy lean clay	83	253	17	96
TP-8	Brown sandy lean clay	78	263	20	93
TP-10	Light brown sandy lean clay	77	247	17	98
TP-13	Light brown sandy lean clay	85	235	17	101
TP-14	Light brown sandy lean clay	89	244	17	99
TP-18	Brown sandy lean clay	83	250	19	97
TP-22	Brown sandy lean clay	85	258	19	93

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel

THERMAL DRYOUT CURVE

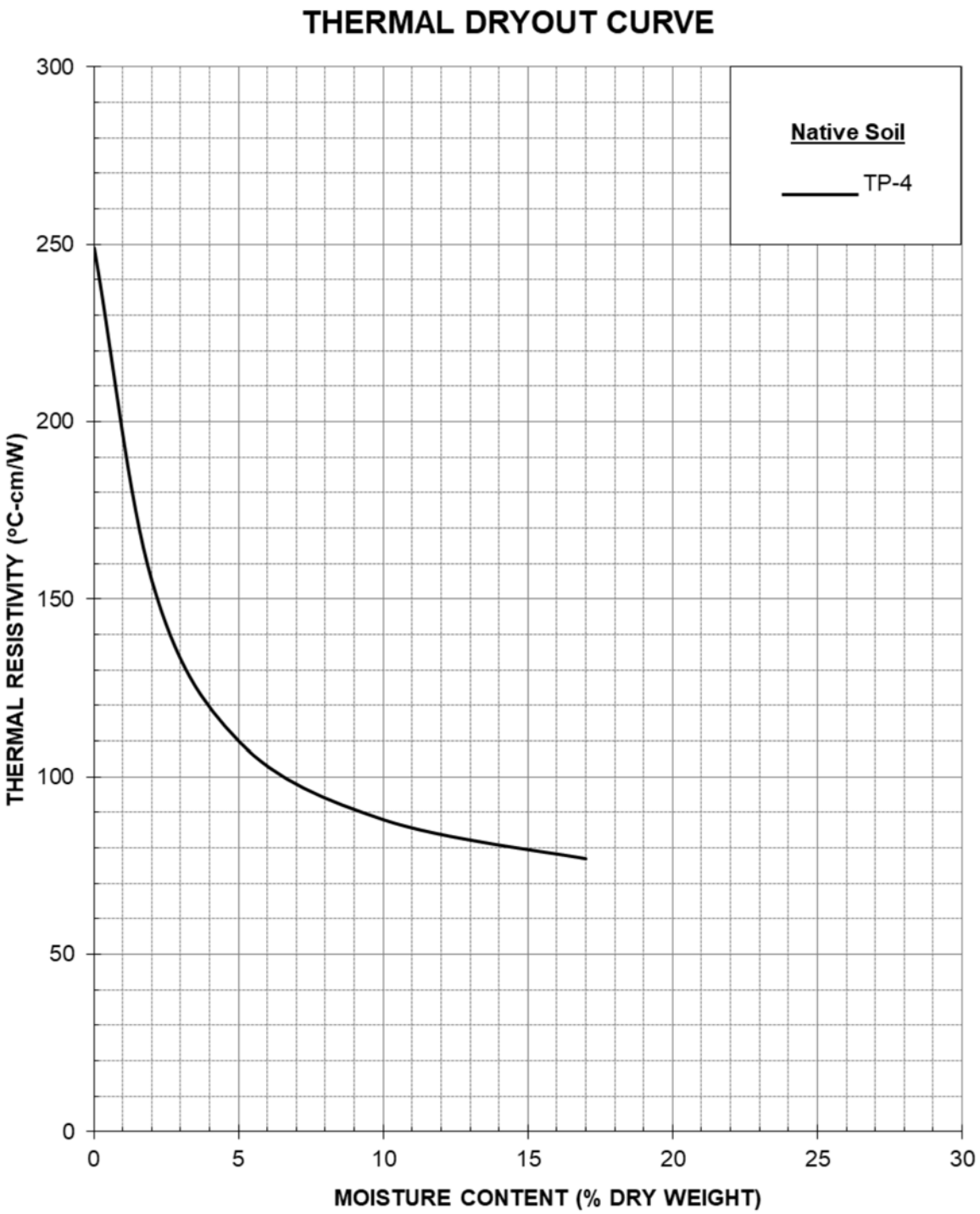


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 1**

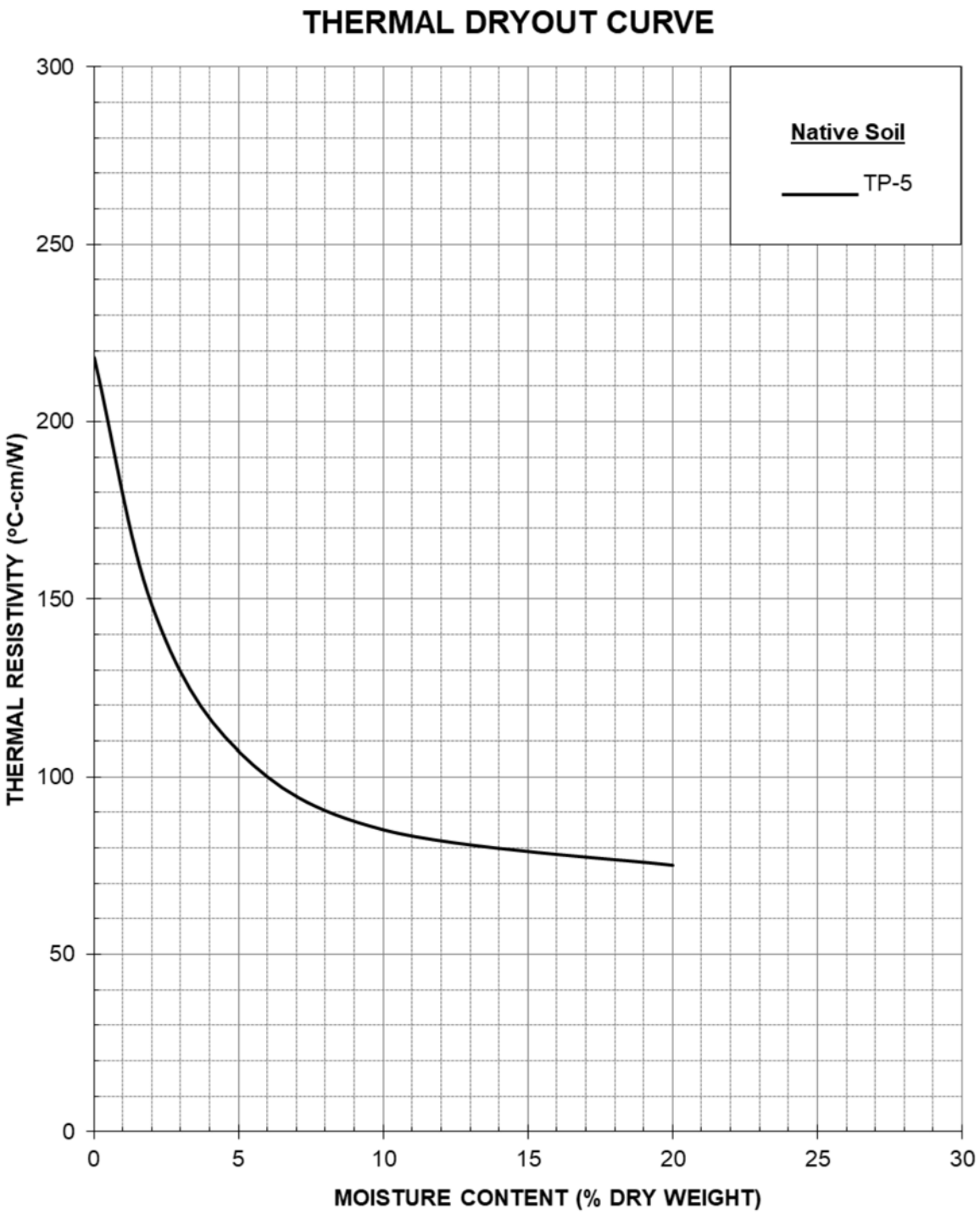


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 2**

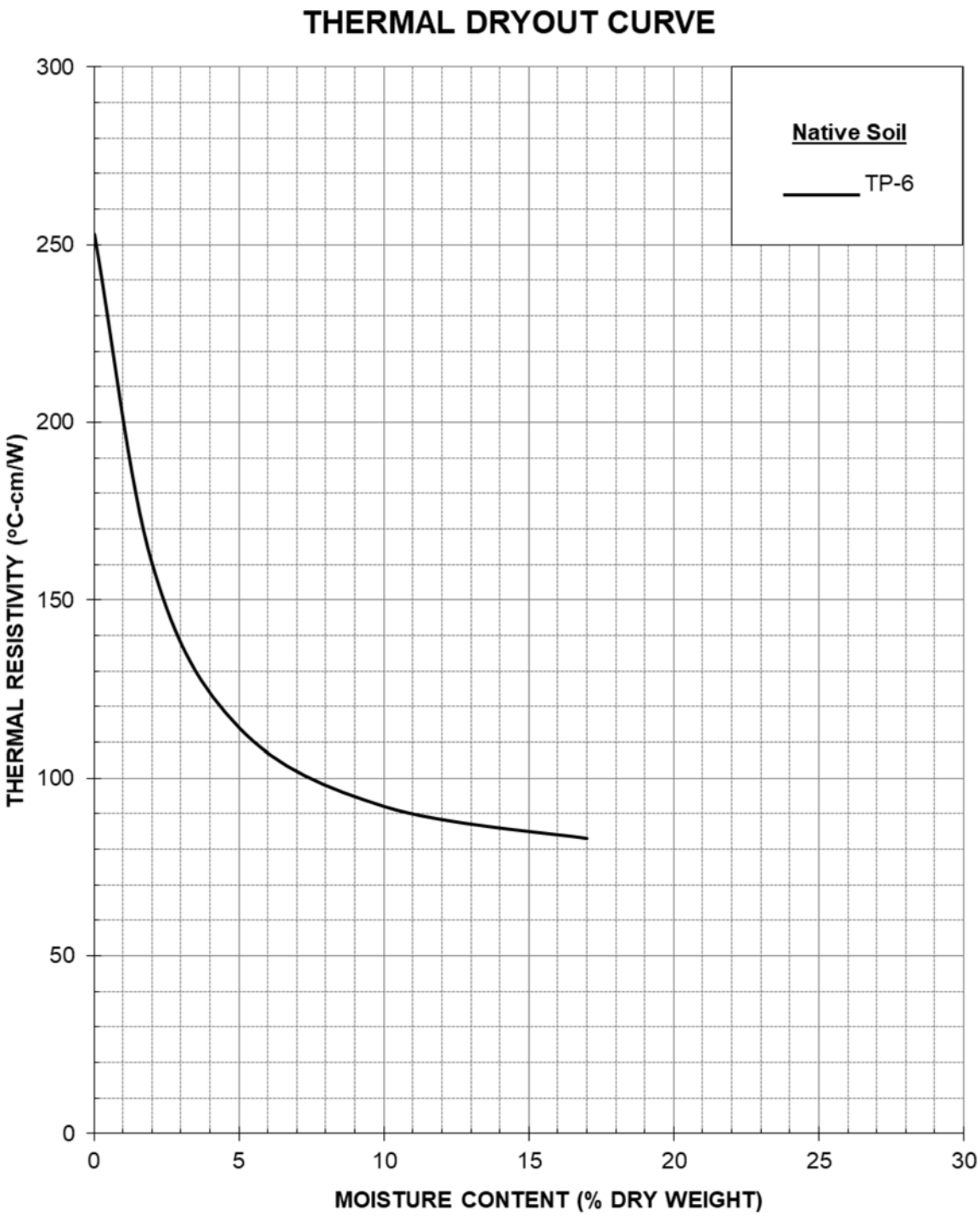


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 3**



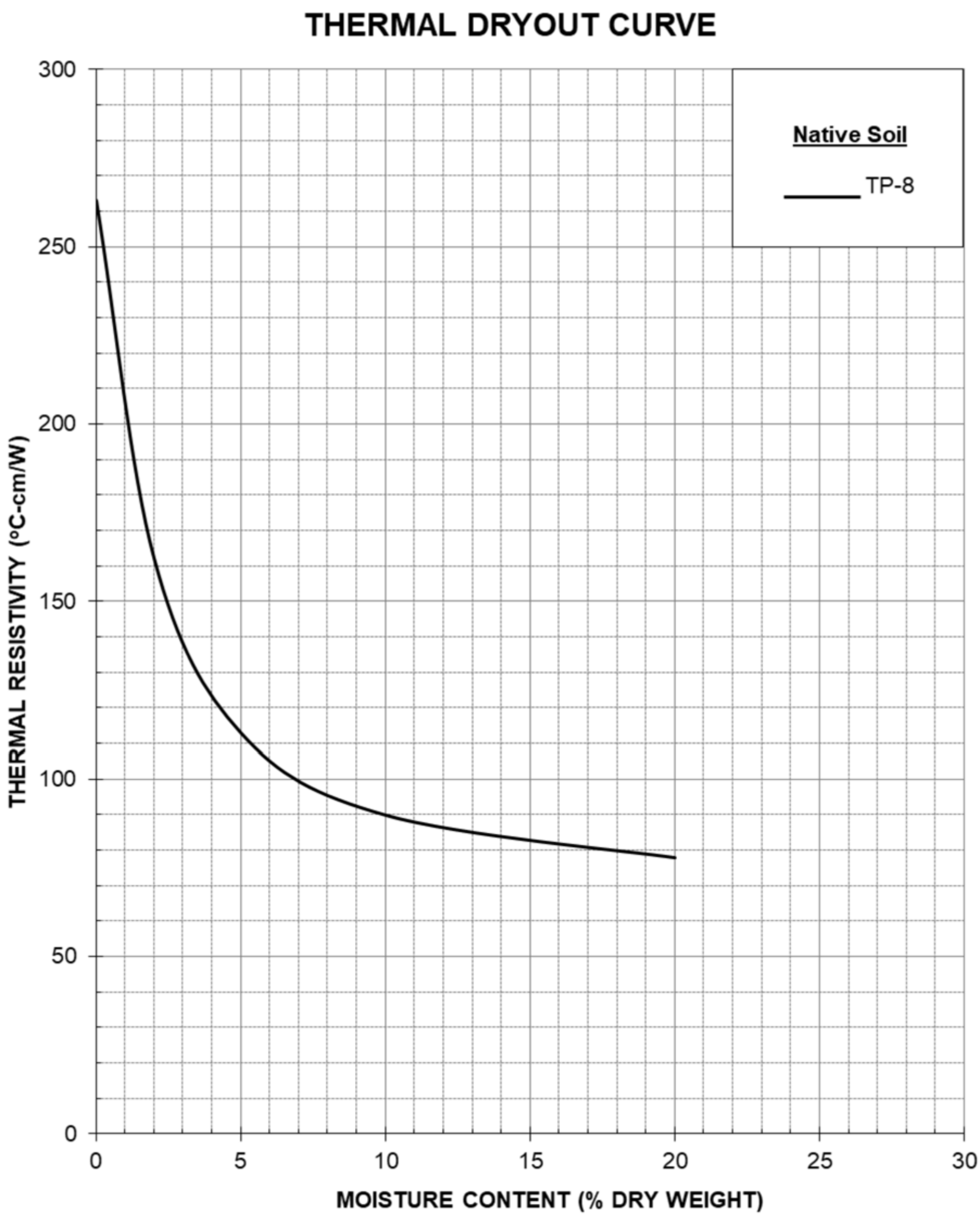
Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 4**

Geotherm USA

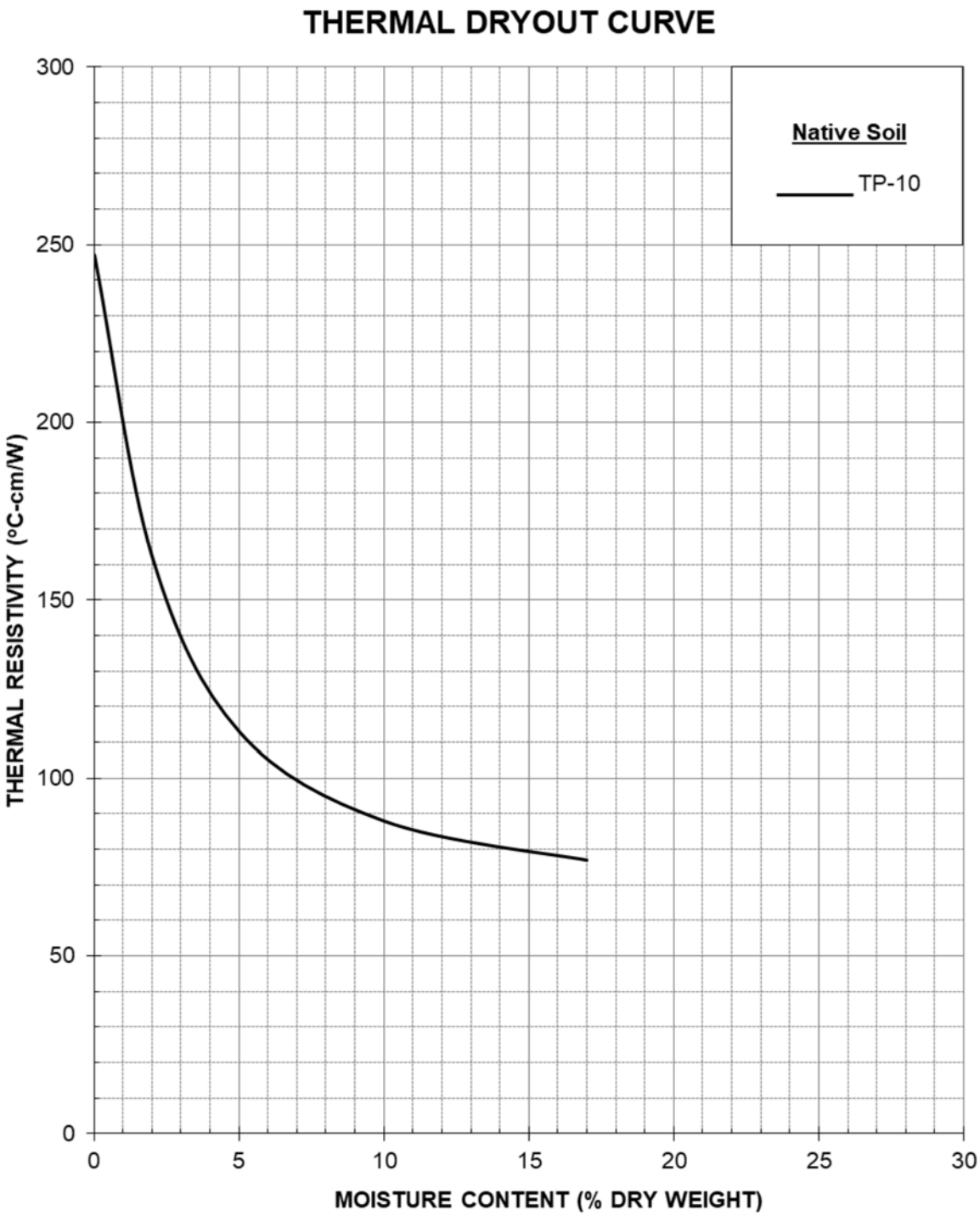


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 5**

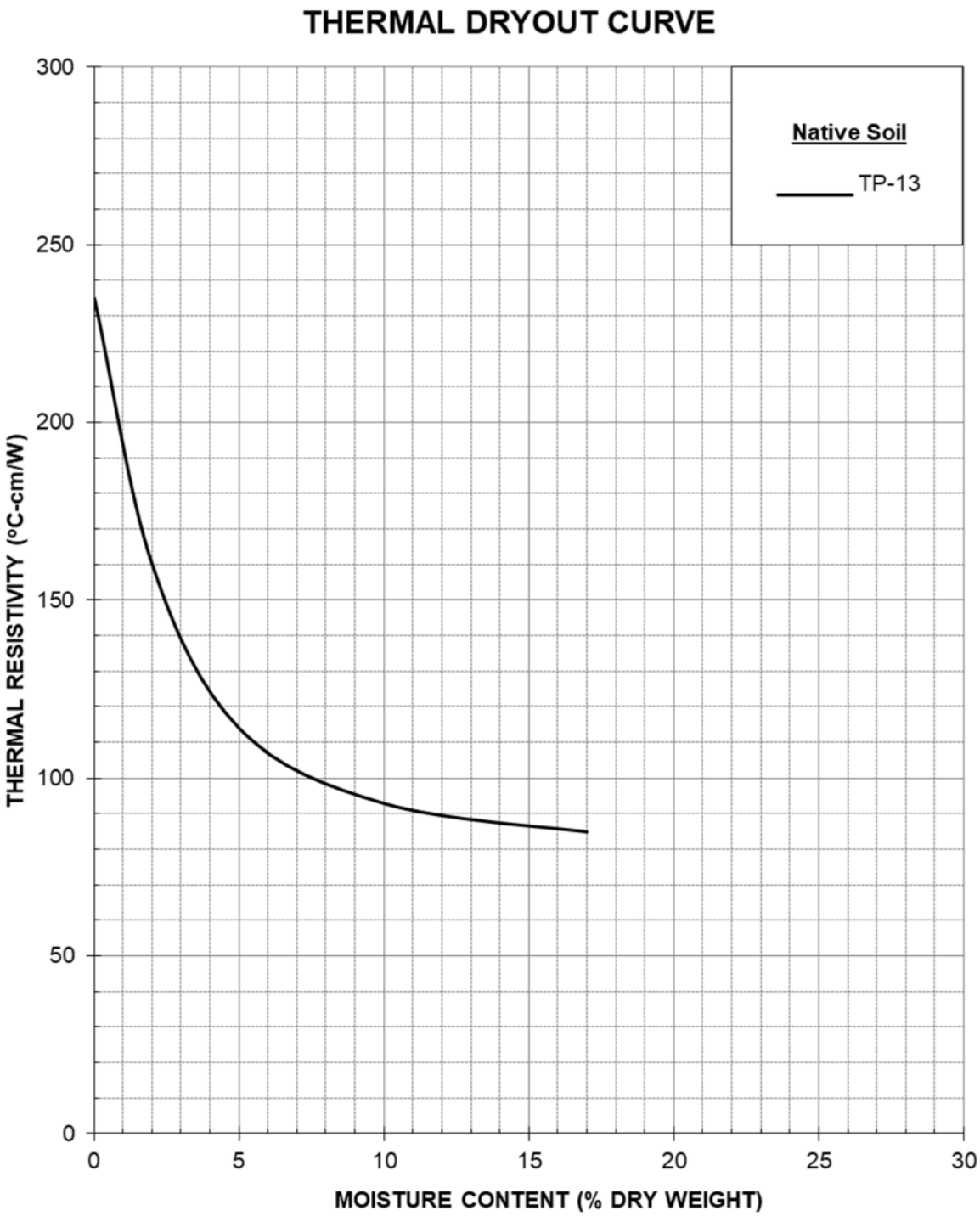


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 6**

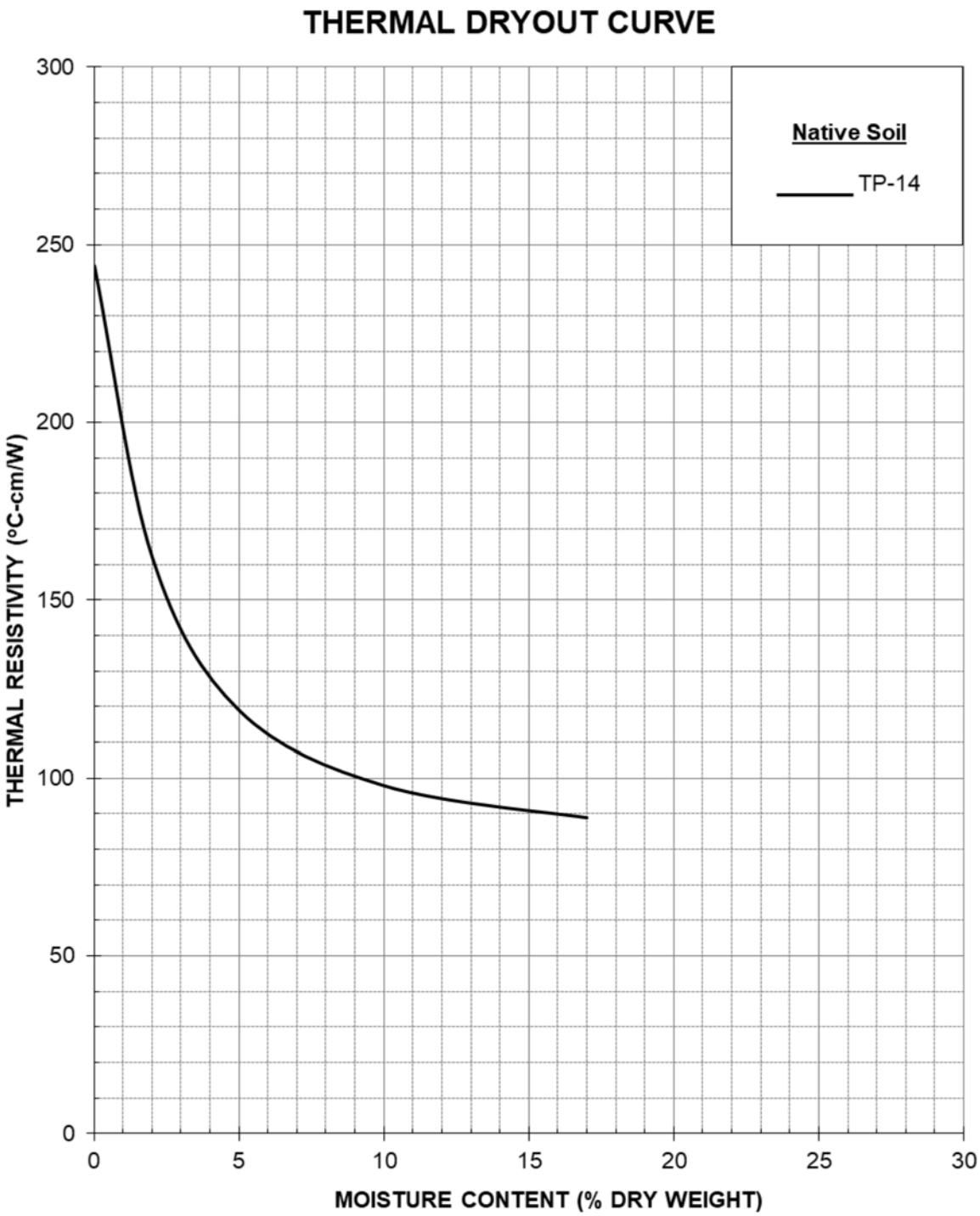


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 7**

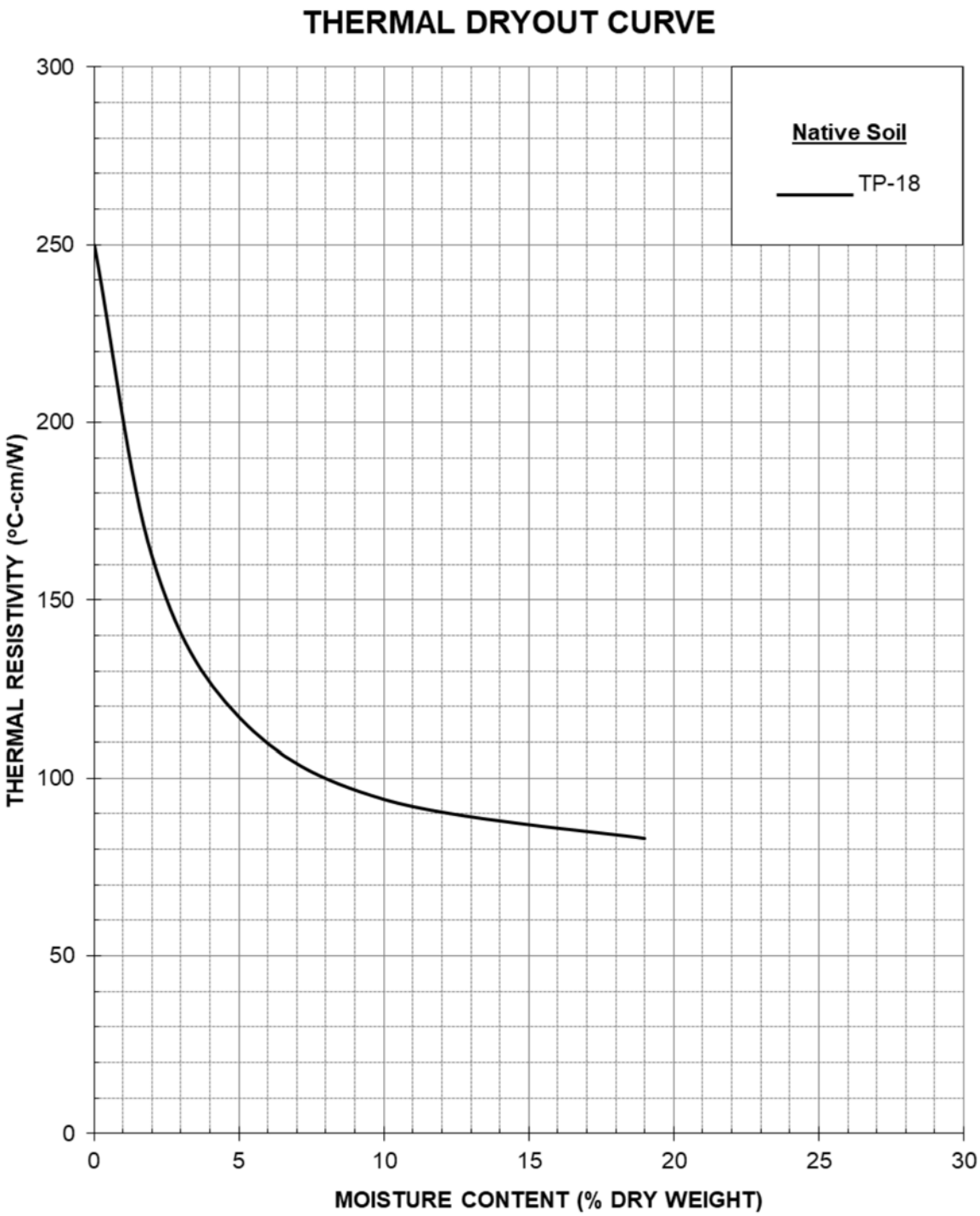


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 8**

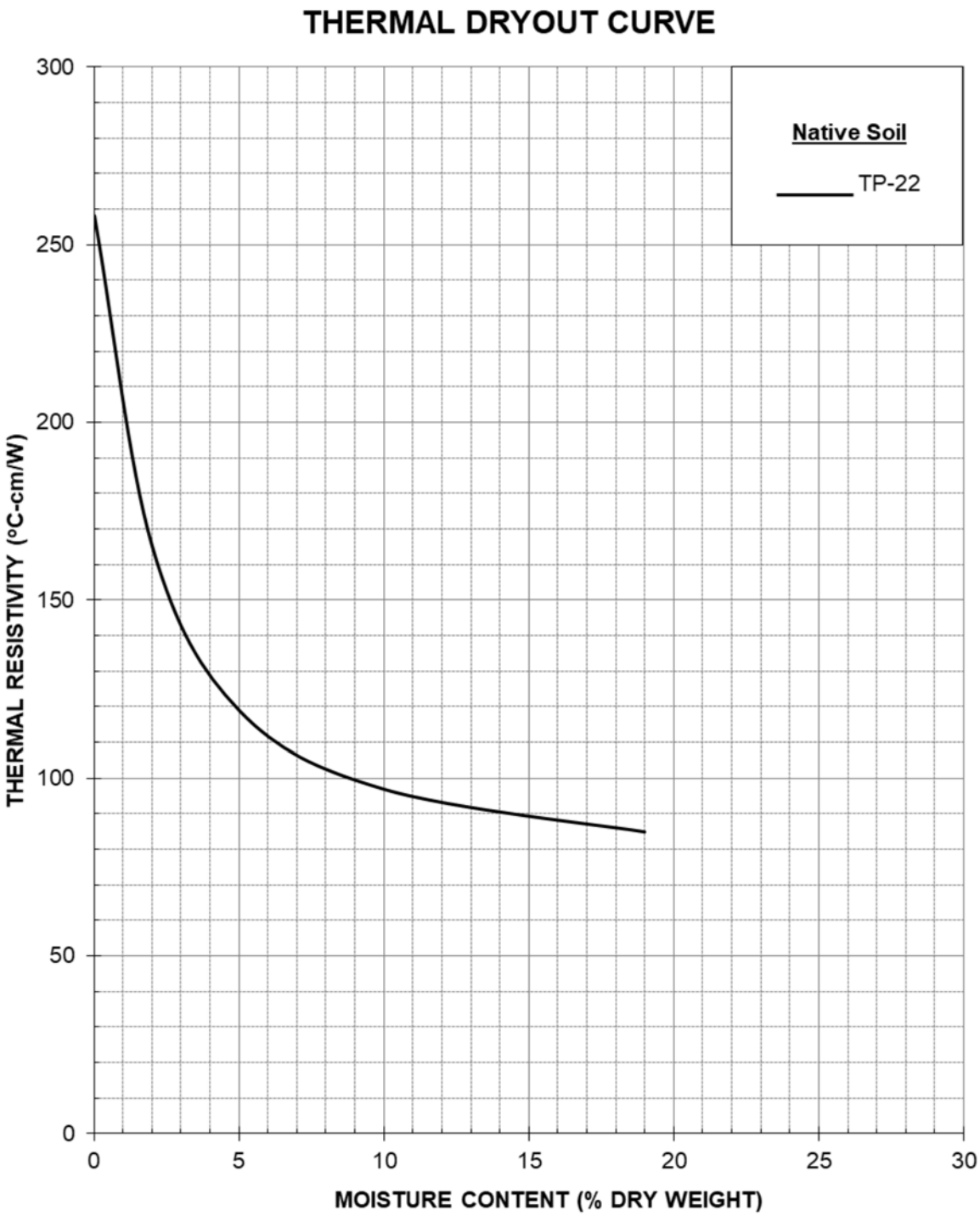


Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 9**



Kleinfelder (PO No. 20212135.001A)

Thermal Analysis of Native Soils

LSBP Birch Solar Project – Lima, OH

December 2020 **Figure 10**

APPENDIX E
CORROSON TESTING RESULTS AND EVALUATION REPORT

SoilCor
CORROSION & THERMAL SCIENCES
42184 Remington Ave, Temecula CA 92590
ph (951) 795-3135 • fx (951) 894-2683

Work Order No.: 20K2268
Client: Kleinfelder, Inc.
Project No.: 20212135.001A
Project Name: LSBP Birch Solar
Report Date: November 24, 2020

Laboratory Test(s) Results Summary

The subject soil samples were processed with the U.S. Standard No. 10 Sieve and tested for pH per AASHTO T 289-91 (2018), Minimum Electrical Resistivity per AASHTO T 288-12 (2016), Sulfate Ion Content per AASHTO T 290-95 (2016) Method B, Water-Soluble Chloride Ion Content per AASHTO T 291-94 (2018) Method A and in general accordance with Standard Methods procedures for Sulfide Content (SM 4500-S2- D) and Oxidation-Reduction Potential (SM 2580 B Mod.). Redox Potential value(s) reflect temperature correction based on Light's standard solution measurements applied to the calculation in section 6 of the procedure. The results follow:

Sample Identification	pH	Minimum Resistivity (ohm-cm)	Sulfate Content (mg/kg)	Chloride Content (mg/kg)	Sulfide Content (mg/kg)	Redox Potential	
						Eh (mV)	Temp. (°C)
TP-3,BS-1 @ 2-8 ft.	7.1	3,000	10	ND	0.05	296	19.6
TP-4,BS-1 @ 2-8 ft.	7.2	2,900	10	20	ND	303	19.5
TP-5,BS-1 @ 2-8 ft.	7.1	2,400	10	ND	0.07	314	19.6
TP-6,BS-1 @ 2-8 ft.	7.4	3,000	20	ND	ND	300	19.6
TP-8,BS-1 @ 2-8 ft.	7.2	3,300	10	10	0.11	311	19.6
TP-10,BS-1 @ 2-8 ft.	7.5	3,300	ND	10	0.24	268	19.7
TP-13,BS-1 @ 2-8 ft.	7.6	3,400	10	ND	0.17	283	19.7
TP-14,BS-1 @ 2-8 ft.	7.7	3,500	ND	10	0.35	279	19.8
TP-18,BS-1 @ 2-8 ft.	7.7	3,200	10	10	0.12	285	20.0
TP-22,BS-1 @ 2-8 ft.	7.5	3,400	10	ND	0.04	298	20.1

*ND=No Detection

We appreciate the opportunity to serve you. Please do not hesitate to contact us with any questions or clarifications regarding these results or procedures.

Ahmet K. Kaya, Laboratory Manager

BIRCH SOLAR PROJECT

CORROSION EVALUATION REPORT

Project .....Corrosion Evaluation
Job Number. 060-20-5
Facility .....Birch Solar Project
Location .....Ohio
County ..... Allen & Auglaize Counties
Report Date 12/18/2020

Included with report:

The opinions and statements included in this report are subject to the limitations presented below. We appreciate the opportunity of providing our services for this project. If you have questions regarding this letter or, if we may be of further assistance, please contact the undersigned.

Cay Strother, PMP, P.E., CP2
Senior Corrosion Control Manager

Kevin Cowan, PE, CP3
Manager Corrosion Control and Integrity Management

INTEGRITY Solutions
FIELD SERVICES

844-473-4353

1.0 INTRODUCTION

Per your request, Integrity Solutions Field Services, Inc. (ISFS) presents the corrosion control evaluation for the Birch Solar Project, a photovoltaic (PV) solar electric generating project located near the Lima, Ohio in Allen and Auglaize counties. Kleinfelder, Inc. performed the geotechnical investigation for the project and provided geotechnical results in the referenced report.

ISFS assumes that the PV racking will be installed on driven piles fabricated from six-inch steel beams (W6x7, W6x9, or W6x12). We assumed that the pile embedment will be a minimum of 7 feet. Subsurface data was provided in December 2020 draft geotechnical engineering information by Kleinfelder, Inc. (Project No. 20212135.001A). We understand the design life of the structure is 35 years.

Based on the soil, groundwater, and laboratory testing data presented in the geotechnical engineering report, and material standards and industry reports, ISFS is providing an assessment for galvanic and atmospheric corrosion, estimated corrosion rates, and recommendations for protection against corrosion.

Corrosion is defined as the deterioration of a metal that results from a reaction with its environment. "External corrosion" occurs below grade, where the pile is in contact with soil but at depths where relatively anoxic soils conditions exist. "Atmospheric corrosion" occurs within the soil-to-air transition zone located approximately 18-inches below grade to the top of pile above grade and is primarily due to moisture and oxygen but can be accentuated by other airborne contaminants such as sodium chloride.

2.0 CORROSION EVALUATION OBSERVATIONS

Information presented in the following paragraphs was considered in assessing external and atmospheric corrosion potential of the piles for the subject project. Only the soil test results for this parcel are included in this evaluation.

Surface Conditions:
The site is located west of the small community of Lima, OH near the intersection of Highway 501 and Zurmehly Rd. The proposed site is on predominantly undeveloped agricultural fields with some stand of tree and bushes. There is the meandering Little Ottawa bordering parts of the north east parcels. There are multiple small ponds scattered across the site. This region is also comprised of well-defined moraines with intervening flat-lying ground moraines and intermorainal lake basins

There appears to be high and medium voltage overhead electrical transmission lines (T-lines) bisecting the eastern portion of the site, and there is a power transmission substation on the north of Sellers Road and Bowsher Road.

Subsurface:
According to the geotechnical report the subsurface "indicates the presence of the several surficial geologic units across the project site area. These geologic units are known to have originated from

the Late Wisconsinan-aged Late Woodfordian ice deposits and predominantly comprise of Clayey Till (Hiram Till). The clayey till is chiefly a matrix of calcareous clay, silty clay, silty clay loam, or clay loam." Layers of shale, flat lying beds of rock and weathered boulders are also mentioned. Groundwater was observed in 14 of the 30 Bores and 2 of the test pits, between 3.5 and 18 feet at the time of exploration. Seasonal variations can cause fluctuations in groundwater that may not have been apparent at the time of drilling.

Climate:
The site is located near the Lima, OH where the average annual rainfall is approximately 38 inches[1].

Laboratory Test Results:
The geotechnical engineering report provided laboratory chemical test results samples taken from 10 locations. Sulfides were not reported.

Table 1 – Laboratory Test Results Summary

	pH	Red-Ox Potential (mV)	Moisture (%)	Soil Resistivity (Ohm-cm)	Sulfate Concentration (ppm)	Chloride Concentration (ppm)
Min. Value	7.1	268	13	2400	10	10
Ave. Value	7.4	294	18	3,140	11	12
Max. Value	7.7	314	24	3,500	20	20

ppm – Parts per Million, mv – Millivolt, cm – Centimeter

Field Resistivity Test Results:
The geotechnical engineering report provided in-situ soil resistivity reading at 15 sites at depths from 2-feet to 200-feet using the Wenner four-pin method (ASTM method G57). For the purpose of this study we used the limited available data as representative of the soil resistivity that will most affect the pilings. The results for up to 20 feet spacing were used in this evaluation, based on the suggested depth for the piles. This reading type by nature of the test is averaged to a depth equal to the pin spacings, therefore does consider the entire depth.

[1] https://www.bestplaces.net/weather/city/ohio/lima

Table 2 – Field Resistivity Test Results (Ω-cm)

Test Location	Spacing (ft)					
	2	4	6	8	12	20
Min. Value	2,270	2,403	1,984	1,779	1,529	1,552
Ave. Value	5,154	4,399	4,191	4,181	4,321	4,712
Max. Value	16,125	15,551	15,013	13,593	13,283	10,974
Overall Avg.	4,493					

3.0 EVALUATION FINDINGS

Through the design life of the piles, galvanization is first consumed in the zones of external and atmospheric corrosion. Once the galvanization is consumed, the steel begins to corrode. The design life of the pile is, therefore, the sum of the time that it takes to consume the galvanization and the time that it takes to reduce the steel section down to a level that is no longer structurally stable. No factor of safety has been included in our calculations.

Above-Grade Corrosion

Corrosion of the components above grade is related to humidity, chemical contaminants and pollutants in the air, and other factors. Considering the site's agricultural use, temperate climate, and rural location we estimate the Corrosivity Category to be **C3**, based on ISO 9223. ISO 9224 provides average and steady state yearly atmospheric corrosion rates up to 30 years. Using the ISO 9223 and 9224 formulas provided, along with publicly available site-specific climate data, we are able to project the rates further to assess for 35 years. **Tables 3 – 5** are summary ranges from the ISO standards. **Tables 6 – 8** provide site specific calculations. Per ISO 9223, there is an inherent level of uncertainly in the values produced and though there is general validity to the outcome, there can be variation in the corrosion attack depending on natural variation in climate that is not included. Sulfur dioxide and chloride mean levels have been steadily decreasing in northeast and the area since 2001.[2]

[2] https://earthobservatory.nasa.gov/images/87182/sulfur-dioxide-down-over-the-united-states

Table 3 – Atmospheric Corrosion Rate of Materials 1st Year[3]

Category	Corrosion Rate of Materials 1st Year mil/yr	
	Carbon steel	Zinc
C3	$0.98 < r_{corr} \leq 1.97$	$0.03 < r_{corr} \leq 0.08$

Table 4 – Average Atmospheric Corrosion Rate of Materials First 10 Years[4]

Category	Average corrosion rate, r_{av}, during the first 10 years for the following corrosivity categories mil/yr	
	Carbon steel	Zinc
C3	$0.33 < r_{av} < 0.67$	$0.02 < r_{av} < 0.06$

Table 5 – Steady-State Atmospheric Corrosion Rate First 30 Years[3]

Category	Steady-state corrosion rate. r_{lin} estimated as the average corrosion rate during the first 30 years for the following corrosivity categories mil/yr	
	Carbon steel	Zinc
C3	$0.19 < r_{lin} < 0.39$	$0.016 < r_{lin} < 0.04$

In order to estimate the site-specific corrosion rates to the 35-year design life, ISFS used the approaches outlined in ISO standards 9223 and ISO 9224 and made the following conservative assumptions:

- 50.7 degrees F ambient annual average temperature,
- 76.3%[5] annual average relative humidity,
- 14.6 mph annual average wind speed
- Rural level and source of sulfur dioxide (SO_2)(low pollution)
- Chloride Levels:
  Marion, OH
  2018 Annual deposition ~0.7kg/ha[6],
  2018 Annual concentration <0.1 mg/L [7]
- Site not within 6 miles of saltwater

[3] ISO 9223:2012 Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation
[4] ISO 9224:2012 Corrosion of metals and alloys - Corrosivity of atmospheres – Guiding values for corrosivity categories
5 http://www.usa.com/lima-oh-weather.htm
[6] National Atmospheric Deposition Program, http://nadp.slh.wisc.edu/maplib/pdf/2018/Cl_conc_2018.pdf
[7] National Atmospheric Deposition Program, http://nadp.slh.wisc.edu/maplib/pdf/2018/Cl_dep_2018.pdf

Table 6 – Site Specific Estimated Atmospheric Corrosion Rate of Materials 1st Year

Corrosion rate of Materials 1st Year (mils)	
Carbon Steel	**Zinc**
1.16	0.023

Table 7 – Site Specific Estimated (Linear) Atmospheric Corrosion Rate of Materials 35 Years

Steady State Corrosion Rate Estimated as the Average Corrosion Rate of Materials during 35 Years (mil/yr)	
Carbon Steel	**Zinc**
0.0009	0.00002

Table 8 – Site Specific Estimated Atmospheric Corrosion Loss of Materials 35 Years

Estimated Corrosion Loss of Materials 35 Years (mils)	
Carbon Steel	**Zinc**
1.27	0.026

Below-Grade Corrosion

In general, the site soils exhibit resistivity (averaging 4,493 ohm-cm field obtained and 3,140 ohm-cm lab results, with a minimum 1,529 ohm-cm) which are considered to be corrosive to metals. Sulfates concentration were classified in the negligible range (averaging 11 ppm), low chloride concentrations (averaging 12 ppm), slight soil oxidation reduction range (average 294 mV), and average pH values indicating neutral alkalinity. The representative soils used for analysis were chosen based upon their similar soil chemistry as well as their mechanical properties (grain type, size, and relative amounts). ISFS has performed calculations using the average and the minimum resistivity, in order to analyze the conservative, worst case conditions.

4.0 CONCLUSIONS AND RECOMMENDATION

When conducting a corrosion evaluation, we assume that geographic and soil data provided is representative of the entire site. Seasonal variations can also cause fluctuations in soil characteristics that may not have been apparent at the time of testing. The representative soils used for analysis were chosen based upon their similar soil chemistry as well as their mechanical properties (grain type, size, and relative amounts). Our calculations were performed using the average and worst-case resistivity with the more corrosive results presented below.

Lower resistivity, higher water table, and lower redox values contribute to the soil being more conductive and therefore more corrosive. Lower soil oxidation reduction (between 200 and 400 mV) indicates that anaerobic bacterial corrosion is possible in undisturbed soils, which would be the case for driven piles. Soils with these properties are considered to be corrosive to metals. The site soil conditions are more aggressive for bare carbon steel. Any bare steel on the site will experience more

severe corrosion loss than that with a coating, whether that coating be galvanization or dielectric. The site calculations show that a galvanized coating as specified in **Table 9** should provide the service life desired, based the site calculations and the findings of Romanoff, 1957.

Any structural fill required is assumed to be similar to the existing site soils and that over time the chemical composition of the fill would closely resemble the composition of the existing soil. Onsite soils may be suitable for fill, but sandy/granular loams tend to display higher resistivity therefore fewer corrosive properties. However, in regions where partially weathered rock or bedrock are encountered within the embedment depth and mechanically driving of the piles is unfeasible it may be necessary to excavate in order to set piles. If trenches are then backfilled with compacted soils this will change the in-situ values and could serve to change the corrosion regime estimated herein. If rock is found during the pile installation, care should be taken to minimize or prevent damage to the galvanization.

ISFS understands that the foundation designer will specify the required galvanization coating considering the allowable steel loss and the structural capacity of the pile. Corrosion rate of galvanization and bare steel was evaluated for external and atmospheric corrosion. All piles will be exposed to both corrosion regimes therefore ISFS presents only one corrosion rate based on the controlling external exposure. The magnitude of corrosion loss should be anticipated on both sides of the flanges and web of the piles. The structural engineer should consider the potential corrosion loss when sizing the piles.

The recommended design approximate corrosion rates (per face of exposed pile) for this project are:

For zinc galvanization:	0.26 mil/year for first three years
	0.03 mil/year thereafter until depletion
For steel:	0.99 mil/year for first three years
	0.4 mil/year thereafter

The above estimate is a simple summary approximation based off of our 35-year calculation.

The estimated times to zinc galvanization depletion for the available coating thicknesses are presented in **Table 9**. It should be noted, however, that estimates extending many decades past the design life of the proposed structure, while supported by engineering calculations, should not be taken as absolutes.

Table 9 – Estimated Galvanization Life

Coating Thickness	Estimated time until depletion (years)
1.16 mil	9.7
1.79 mil	35.9
1.89 mil	35+
3.0 mil	35+
3.9 mil	35+
5.0 mil	35+

For the estimated corrosion rates above, the existing equipment would expect to see metal loss similar to the following:

Table 10 – Estimated Corrosion Rates to Piles

Time of Exposure (years)	Approximate Loss of Material per Exposed Face	
	Hot Dip Galvanization (mil)	Bare Steel (mil)
10	1.2	6.4
20	1.5	10.2
30	1.7	13.5
35	1.8	15.0

Galvanization by its nature is not flawless. Thickness variations, manufacturer defects, and damage from shipping, handling, and installation can occur. There will be corrosion of underlying steel. For the design life of 35 years, the buried piles would be expected to experience approximately 1.8 -mils of galvanization loss on each face of the piles. If galvanization coating is damaged during installation, or there is no galvanization or coating, it is estimated that 15.0 -mils of steel loss across the webs could occur at those locations. Best practice would be to periodically inspect the site, and perform minor repairs to coatings as necessary. No safety factor is included in this calculation.

Though the likelihood of the T-lines crossing the site contributing to corrosion are small, they may contribute to induced alternating current on above ground structures with a possibility of a touch/step hazard to employees. After installation of facilities, further testing should be performed to confirm whether safety measures are required for employee safety.

Grounding of posts with buried, bare copper wire presents a risk to the galvanization from dissimilar metal corrosion. Dissimilar metal corrosion can occur if there is no shielding between the copper grounding wire and the grounded pile when in close proximity of each other. This dissimilar metal corrosion could accelerate the corrosion rate of the zinc galvanization in the vicinity of the copper wire. Providing special fasteners, at the connection between the galvanized post and bond wire, which are designed to reduce corrosion can alleviate the corrosion circuit. Alternately, electrical

shielding of ground wires could be accomplished by insulating wires (that is, THHN) that connect the grounded pile to the grounding trunk line, up to a distance of 10 feet. Zinc coated grounding rods in combination with insulated ground wire would be acceptable in the areas near grounded equipment and up to a distance of 10 feet from piles.

5.0 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of ISFS's profession, practicing in the same locality, under similar conditions, and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. ISFS assumes no liability for the accuracy or integrity of the data provided by others, which formed the basis for the analysis and report. Structural recommendations are not included in this corrosion evaluation. ISFS makes no other representation, guarantee or warranty (express or implied), regarding the services, communication (oral or written), report, opinion, or instrument of service provided. This report may be used only by Kleinfelder, Inc. and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than one year from the date of the report.

6.0 REFERENCES

American Galvanizers Association, 2011. "Service Life of Galvanized Steel Articles in Soil Applications".

Daflou, E., Rakanta, E., Batis, G, "Corrosion Protection Methods of Structural Steel Against Atmospheric Corrosion", Section of Materials Science and Technology, National Technical University of Athens, Greece. Retrieved September 2017. https://www.cortecvci.com/Publications/Papers/VpCIPolymerAdditives/DAFLOU%20BATIS%20VpCI%2 0_2_.pdf .

Decker, J., Rollins, K., Ellsworth, J., 2008. "Corrosion Rate Evaluation and Prediction for Piles Based on Long-Term Field Performance," Journal of Geotechnical and Geoenvironmental Engineering, March 2008, pp 342-351. Retrieved November 2013.

Hannigan, Patrick J., Frank Rausche, Likins E. Garland, Brent R. Robinson, Matthew L. Becker, and Heather Shelsta, Design and Construction of Driven Pile Foundations comprehensive design examples § . National Highway Institute, Federal Highway Administration Publication No. FHWA-NHI-16-009, GEC 012, Vol. 1. Washington, D.C., (July 2016).

International Organization for Standardization, 2012. "ISO 9223:2012 Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation".

International Organization for Standardization, 2012. "ISO 9224:2012 Corrosion of metals and alloys — Corrosivity of atmospheres — Guiding values for the corrosivity categories."

National Institute of Building Sciences. Corrosion Toolbox. (n.d.). Retrieved from https://www.wbdg.org/additional-resources/tools/corrosion-toolbox.

Romanoff, Melvin, 1957. "Underground Corrosion", National Bureau of Standards Circular 579. U.S. Government Printing Office, Washington 25, D.C.

Romanoff, Melvin. 1962. "Corrosion of Steel Pilings in Soils. Journal of Research of the National Bureau of Standards, Monograph 58 66C (3), 127th ser. doi:10.6028/nbs.mono.58

SoilWeb. Retrieved from https://casoilresource.lawr.ucdavis.edu/gmap/ (n.d.).

APPENDIX F
PILE LOAD TEST RESULTS

AXIAL PILE TEST SUMMARY (APPENDIX F)

Pile ID	Pile Section	Approximate Embedment Depth (ft)	Approximate Pullout Load at or Before Soil Failure (lb)*	Pile Drive Time (sec)
PLT-1A	W6x8.5	6	12,550	83
PLT-1B	W6x8.5	10	12,560	410
PLT-1C	W6x15	8	12,740	771
PLT-2A	W6x8.5	6	12,540	360
PLT-2B	W6x8.5	10	12,600	434
PLT-2C	W6x15	8	12,610	82
PLT-3A	W6x8.5	6	12,530	123
PLT-3B	W6x8.5	10	12,970	486
PLT-3C	W6x15	8	12,610	758
PLT-4A	W6x8.5	6	12,570	81
PLT-4B	W6x8.5	10	10,030	472
PLT-4C	W6x15	8	12,570	391
PLT-6A	W6x8.5	6	12,510	96
PLT-6B	W6x8.5	10	12,530	380
PLT-6C	W6x15	8	12,530	261
PLT-8A	W6x8.5	6	12,500	143
PLT-8B	W6x8.5	10	12,970	353
PLT-8C	W6x15	8	12,570	121
PLT-9A	W6x8.5	6	11,496	74
PLT-9B	W6x8.5	10	12,940	446
PLT-9C	W6x15	8	12,510	321
PLT-10A	W6x8.5	6	12,590	58
PLT-10B	W6x8.5	10	12,650	152
PLT-10C	W6x15	8	12,710	155
PLT-11A	W6x8.5	6	7,630	44
PLT-11B	W6x8.5	10	12,600	354
PLT-11C	W6x15	8	12,530	238
PLT-12A	W6x8.5	6	12,540	109
PLT-12B	W6x8.5	10	12,680	1026
PLT-12C	W6x15	8	12,540	195
PLT-14A	W6x8.5	6	3,940	25
PLT-14B	W6x8.5	10	7,510	58
PLT-14C	W6x15	8	7,520	55
PLT-16A	W6x8.5	6	3,190	30
PLT-16B	W6x8.5	10	4,310	58
PLT-16C	W6x15	8	5,030	80
PLT-17A	W6x8.5	6	12,790	72
PLT-17B	W6x8.5	10	12,590	340
PLT-17C	W6x15	8	12,530	199
PLT-18A	W6x8.5	6	5,010	36
PLT-18B	W6x8.5	10	12,500	252
PLT-18C	W6x15	8	12,550	170
PLT-20A	W6x8.5	6	5,040	55

Pile ID	Pile Section	Approximate Embedment Depth (ft)	Approximate Pullout Load at or Before Soil Failure (lb)*	Pile Drive Time (sec)
PLT-20B	W6x8.5	10	12,740	342
PLT-20C	W6x15	8	12,580	210
PLT-21A	W6x8.5	6	2,500	47
PLT-21B	W6x8.5	10	5,040	89
PLT-21C	W6x15	8	7,530	84
PLT-23A	W6x8.5	6	6,280	60
PLT-23B	W6x8.5	10	10,080	135
PLT-23C	W6x15	8	12,510	200
PLT-24A	W6x8.5	6	5,020	40
PLT-24B	W6x8.5	10	3,770	100
PLT-24C	W6x15	8	5,000	83
PLT-25A	W6x8.5	6	3,290	39
PLT-25B	W6x8.5	10	7,510	83
PLT-25C	W6x15	8	7,600	109
PLT-26A	W6x8.5	6	1,890	20
PLT-26B	W6x8.5	10	6,280	63
PLT-26C	W6x15	8	5,010	62
PLT-27A	W6x8.5	6	1,290	24
PLT-27B	W6x8.5	10	12,520	93
PLT-27C	W6x15	8	12,590	83
PLT-28A	W6x8.5	6	12,520	55
PLT-28B	W6x8.5	10	12,500	239
PLT-28C	W6x15	8	12,560	199
PLT-29A	W6x8.5	6	12,510	62
PLT-29B	W6x8.5	10	12,590	375
PLT-29C	W6x15	8	12,540	195
PLT-30A	W6x8.5	6	5,080	32
PLT-30B	W6x8.5	10	6,310	54
PLT-30C	W6x15	8	12,500	110
PLT-31A	W6x8.5	6	4,990	45
PLT-31B	W6x8.5	10	12,510	272
PLT-31C	W6x15	8	12,540	181
PLT-32A	W6x8.5	6	5,050	55
PLT-32B	W6x8.5	10	12,570	240
PLT-32C	W6x15	8	12,680	125

*Note: Values tested to 12,500 lbs or more reached the desired limit of the test and were stopped. Soil failure, defined as 1 inch of movement or more, was not reached in those locations.

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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

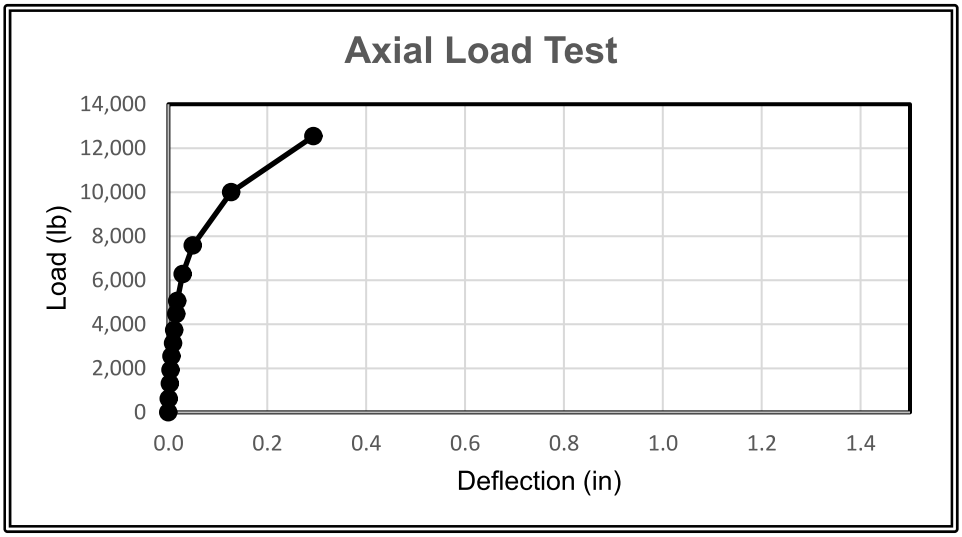
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-1**

Notes:

Pile Indentifier: PLT-1A
Pile Type: W6x8.5
Embedment Depth: 5.88 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,470	0.016
620	0.001	5,060	0.018
1,310	0.003	6,280	0.029
1,930	0.005	7,580	0.050
2,550	0.007	10,000	0.127
3,140	0.010	12,550	0.294
3,740	0.012		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

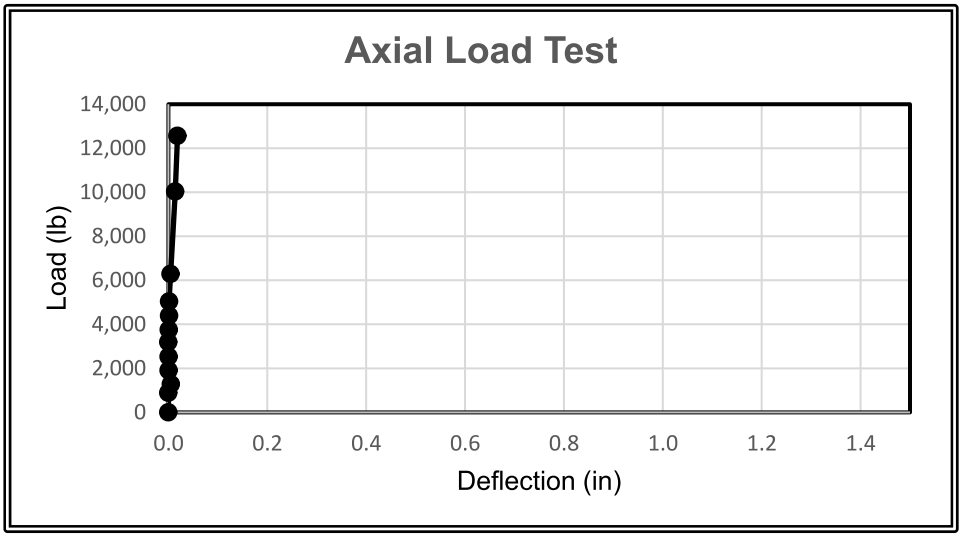
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-1**

Notes:

Pile Indentifier: PLT-1B
Pile Type: W6x8.5
Embedment Depth: 9.42 ft
Pile Reveal: 67 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.002
890	0.000	5,040	0.002
1,280	0.005	6,290	0.005
1,910	0.001	10,030	0.014
2,530	0.001	12,560	0.019
3,190	0.000		
3,750	0.001		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

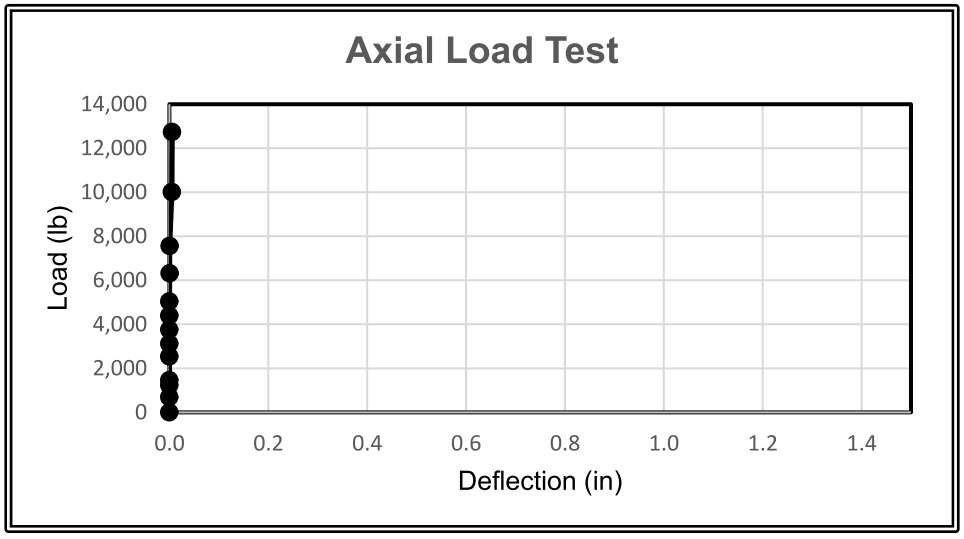
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-1**

Notes:

Pile Indentifier: PLT-1C
Pile Type: W6x15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.000
690	0.000	5,040	0.000
1,240	0.000	6,320	0.001
1,460	0.000	7,560	0.001
2,540	0.000	10,010	0.005
3,120	0.000	12,740	0.006
3,750	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

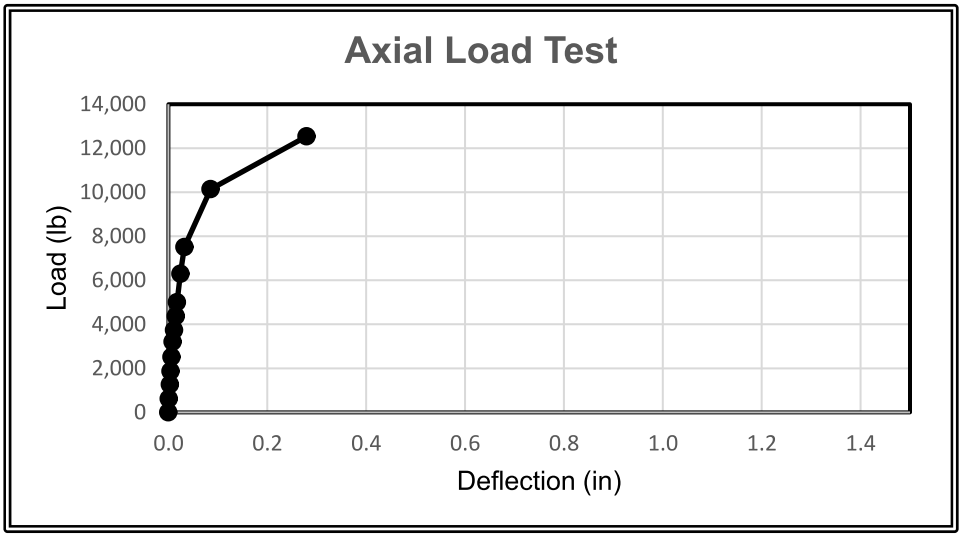
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-2**

Notes:

Pile Indentifier: PLT-2A
Pile Type: W6x8.5
Embedment Depth: 5.79 ft
Pile Reveal: 63 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.015
620	0.001	5,000	0.018
1,270	0.003	6,300	0.025
1,870	0.005	7,510	0.033
2,520	0.007	10,140	0.086
3,210	0.009	12,540	0.280
3,740	0.012		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

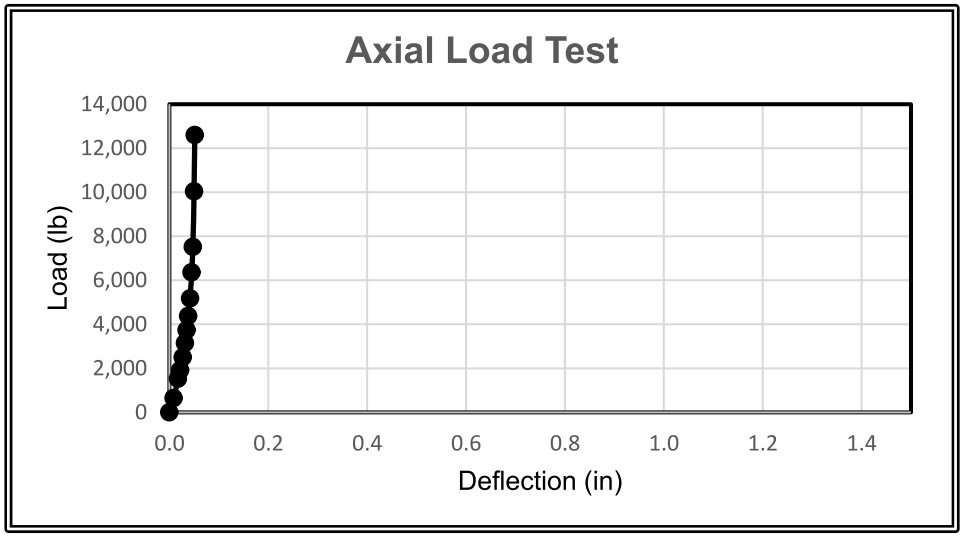
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-2**

Notes:

Pile Indentifier: PLT-2B
Pile Type: W6x8.5
Embedment Depth: 9.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.038
650	0.009	5,180	0.042
1,530	0.018	6,360	0.045
1,920	0.022	7,520	0.048
2,500	0.027	10,040	0.050
3,150	0.032	12,600	0.052
3,740	0.035		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

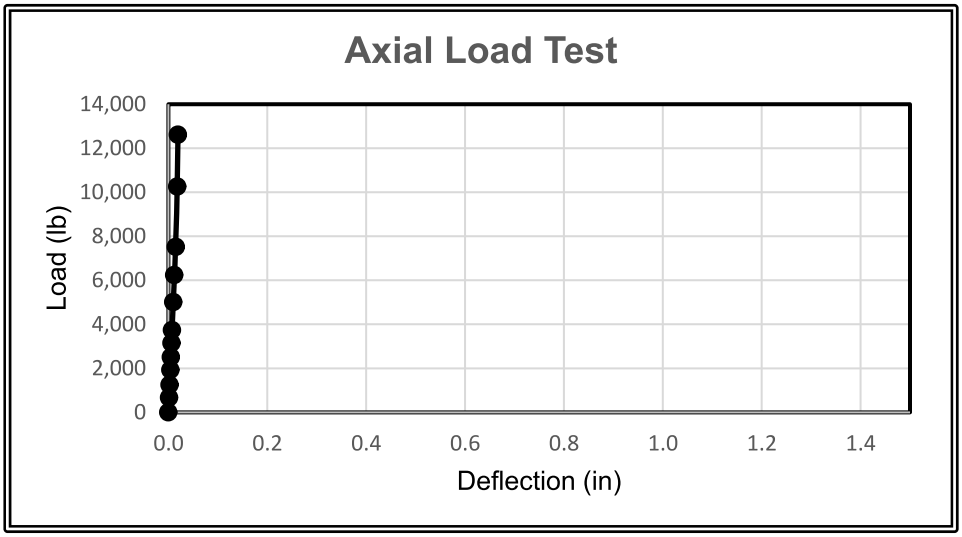
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-2**

Notes:

Pile Indentifier: PLT-2C
Pile Type: W6x15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	5,010	0.010
670	0.002	6,240	0.012
1,250	0.003	7,520	0.015
1,930	0.004	10,260	0.018
2,510	0.005	12,610	0.020
3,150	0.007		
3,740	0.008		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

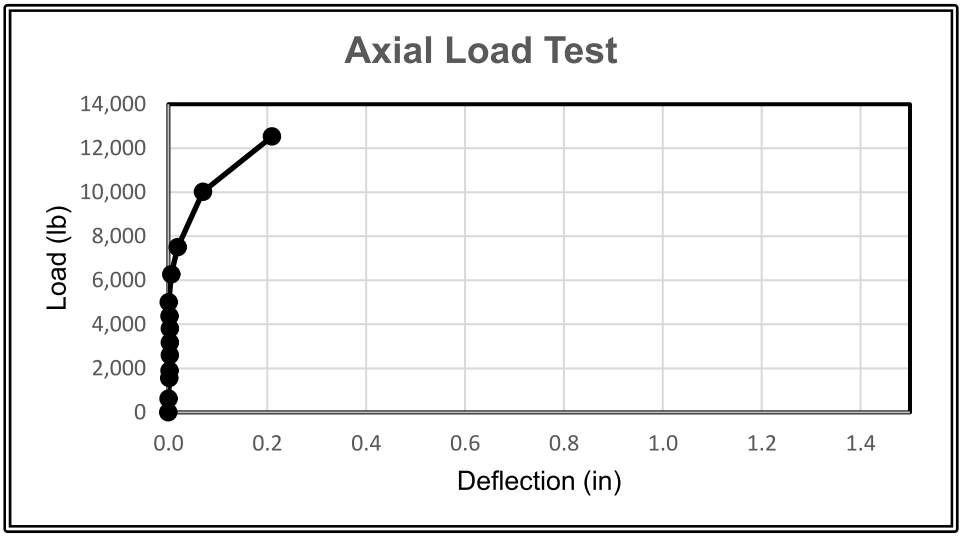
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-3**

Notes:

Pile Indentifier: PLT-3A
Pile Type: W6x8.5
Embedment Depth: 5.88 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.003
620	0.001	5,000	0.001
1,560	0.002	6,270	0.006
1,890	0.003	7,500	0.019
2,600	0.003	10,020	0.070
3,170	0.003	12,530	0.210
3,800	0.003		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

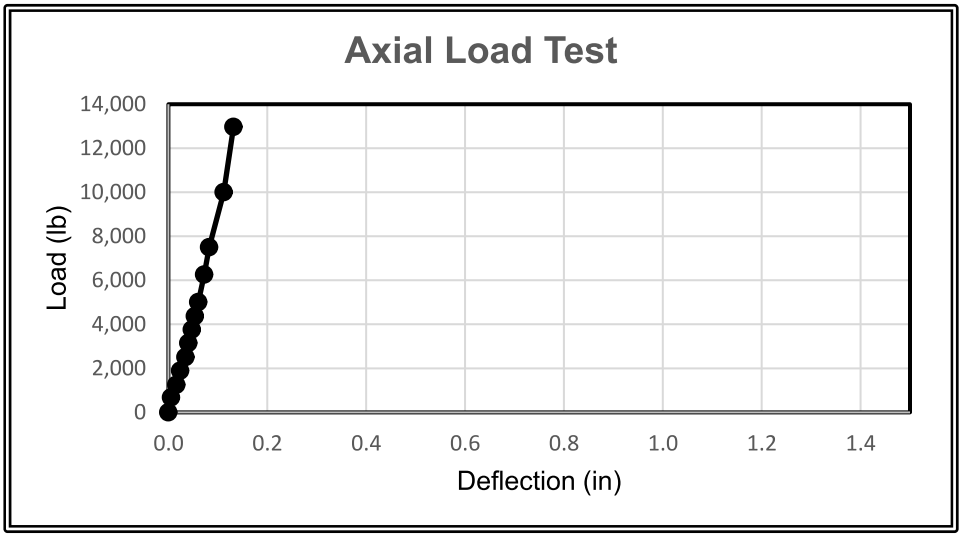
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-3**

Notes:

Pile Indentifier: PLT-3B
Pile Type: W6x8.5
Embedment Depth: 9.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.054
680	0.006	5,010	0.061
1,250	0.016	6,260	0.073
1,890	0.024	7,500	0.083
2,510	0.035	10,000	0.112
3,150	0.041	12,970	0.132
3,760	0.048		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

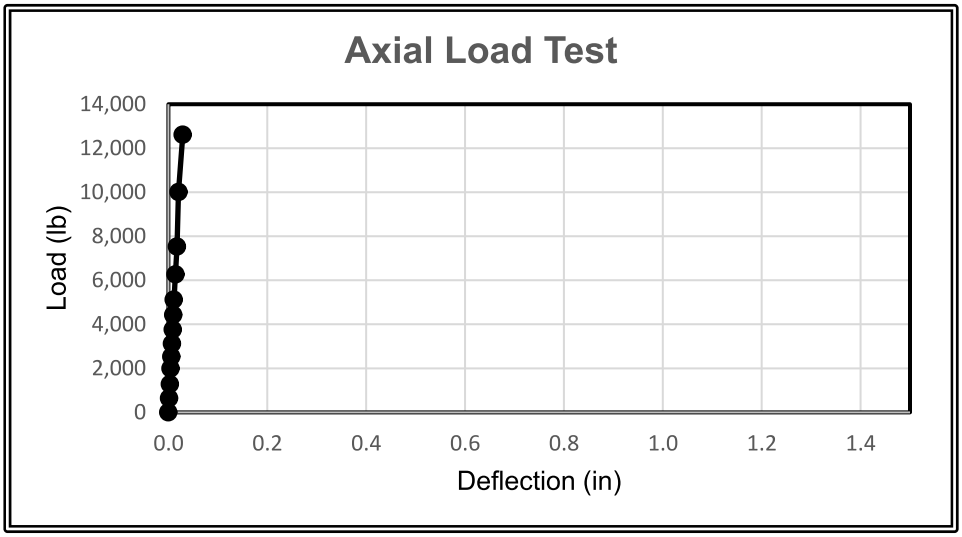
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-3**

Notes:

Pile Indentifier: PLT-3C
Pile Type: W6x15
Embedment Depth: 7.81 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,430	0.010
640	0.002	5,120	0.011
1,280	0.003	6,270	0.015
1,990	0.005	7,530	0.018
2,530	0.006	10,010	0.021
3,120	0.008	12,610	0.029
3,760	0.009		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

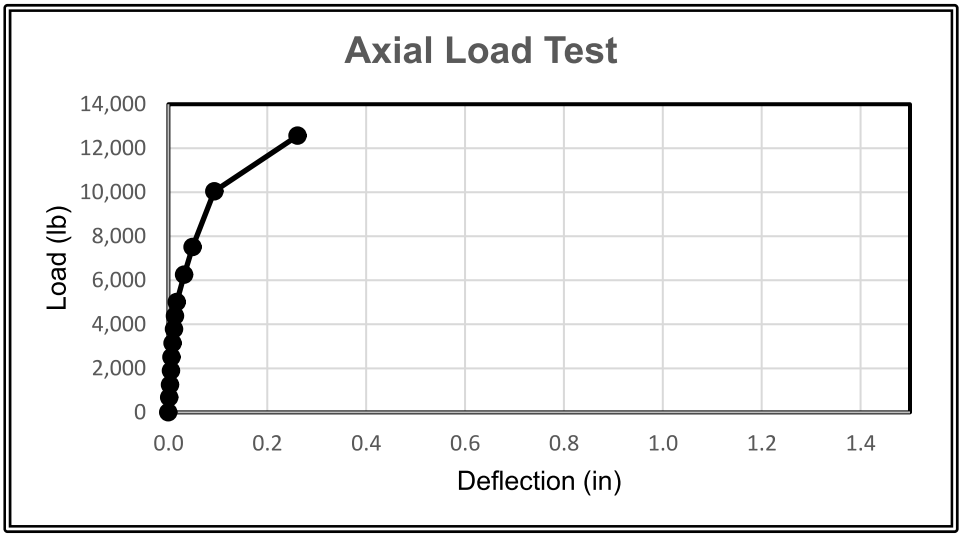
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-4**

Notes:

Pile Indentifier: PLT-4A
Pile Type: W6x8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.014
680	0.002	5,010	0.017
1,250	0.004	6,250	0.032
1,890	0.006	7,510	0.049
2,510	0.007	10,040	0.093
3,140	0.009	12,570	0.262
3,780	0.012		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

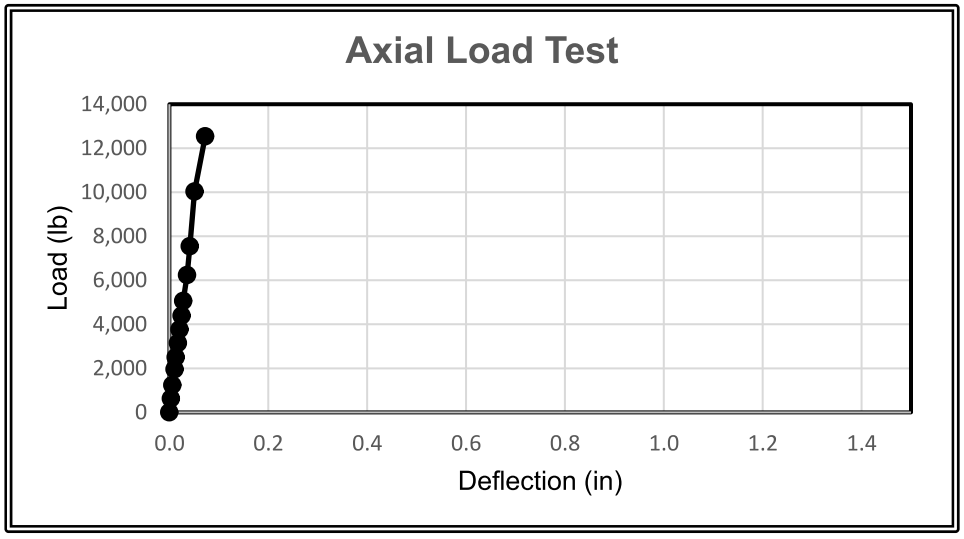
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-4**

Notes:

Pile Indentifier: PLT-4B
Pile Type: W6x8.5
Embedment Depth: 9.25 ft
Pile Reveal: 69 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.025
630	0.003	5,060	0.028
1,240	0.006	6,240	0.036
1,960	0.011	7,550	0.042
2,500	0.013	10,030	0.051
3,150	0.018	12,540	0.073
3,770	0.021		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

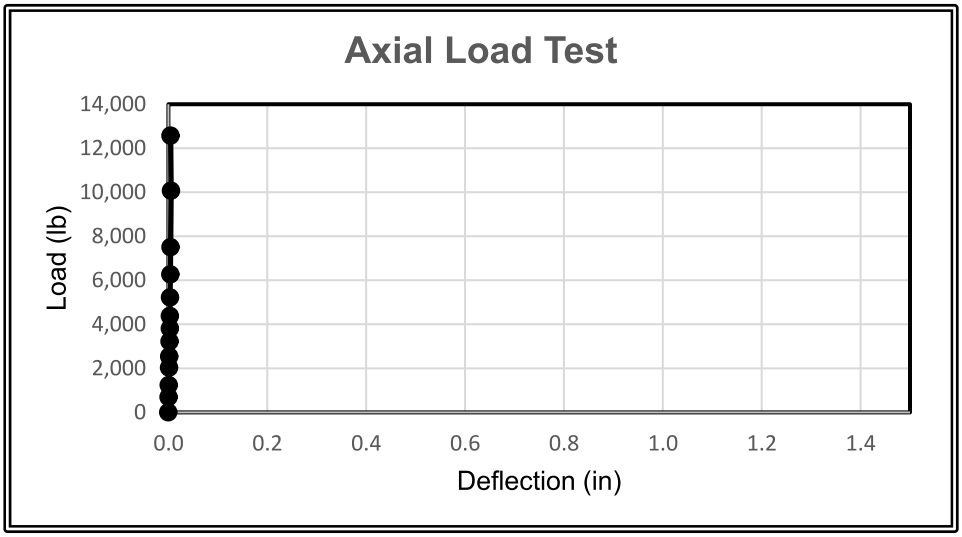
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-4**

Notes:

Pile Indentifier: PLT-4C
Pile Type: W6x15
Embedment Depth: 8.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.003
690	0.001	5,220	0.004
1,240	0.001	6,270	0.004
2,030	0.002	7,500	0.005
2,540	0.002	10,070	0.006
3,220	0.003	12,570	0.005
3,810	0.003		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

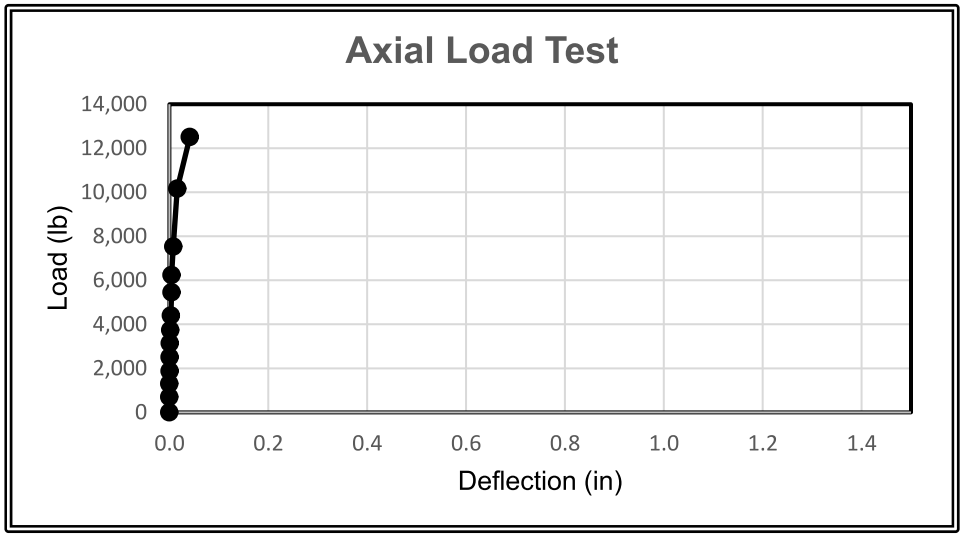
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-6**

Notes:

Pile Indentifier: PLT-6A
Pile Type: W6x8.5
Embedment Depth: 5.92 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,400	0.003
700	0.000	5,450	0.005
1,300	0.000	6,240	0.005
1,880	0.001	7,530	0.008
2,510	0.001	10,160	0.016
3,140	0.001	12,510	0.042
3,740	0.002		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

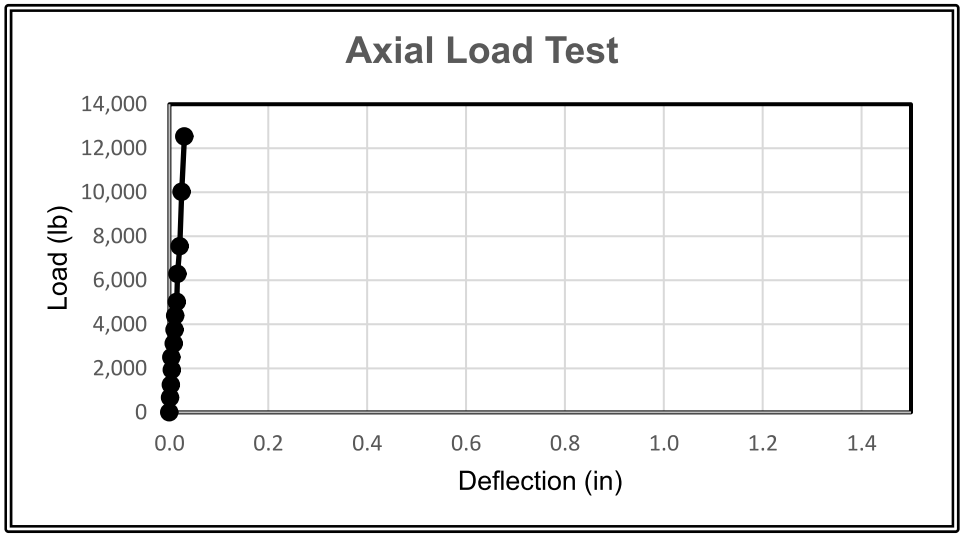
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-6**

Notes:

Pile Indentifier: PLT-6B
Pile Type: W6x8.5
Embedment Depth: 9.88 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.012
670	0.002	5,020	0.015
1,250	0.003	6,290	0.017
1,930	0.005	7,550	0.021
2,500	0.004	10,020	0.025
3,130	0.009	12,530	0.031
3,750	0.011		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

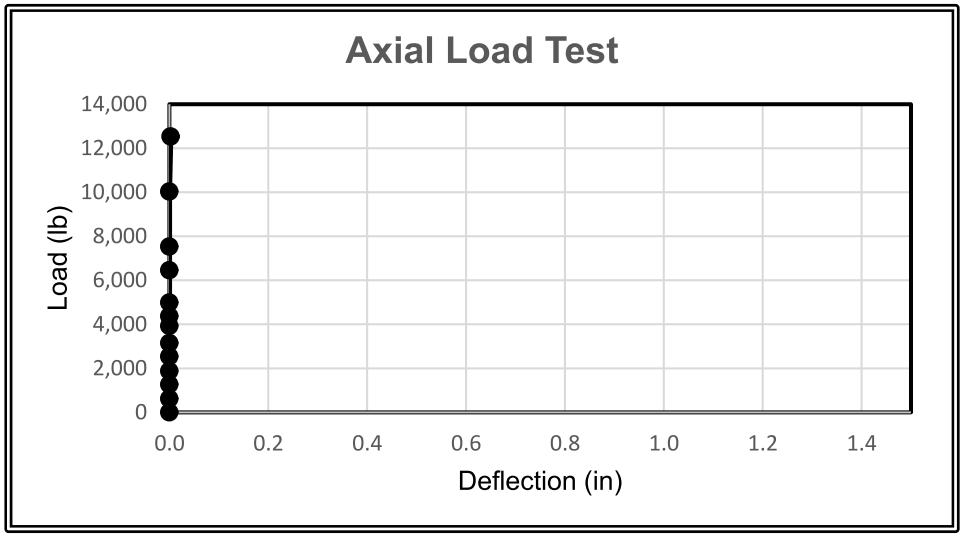
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-6**

Notes:

Pile Indentifier: PLT-6C
Pile Type: W6x15
Embedment Depth: 8.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.000
620	0.000	4,990	0.000
1,270	0.000	6,460	0.000
1,880	0.000	7,530	0.000
2,540	0.000	10,030	0.000
3,150	0.000	12,530	0.003
3,930	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

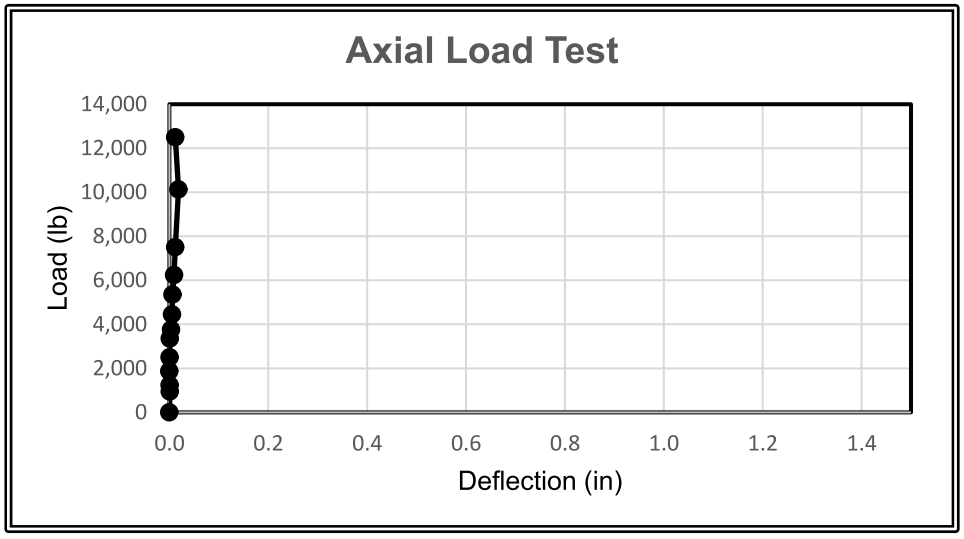
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-8**

Notes:

Pile Indentifier: PLT-8A
Pile Type: W6x8.5
Embedment Depth: 5.92 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,450	0.006
950	0.001	5,350	0.007
1,240	0.001	6,240	0.010
1,870	0.000	7,500	0.012
2,500	0.001	10,130	0.019
3,350	0.001	12,500	0.012
3,760	0.004		



Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

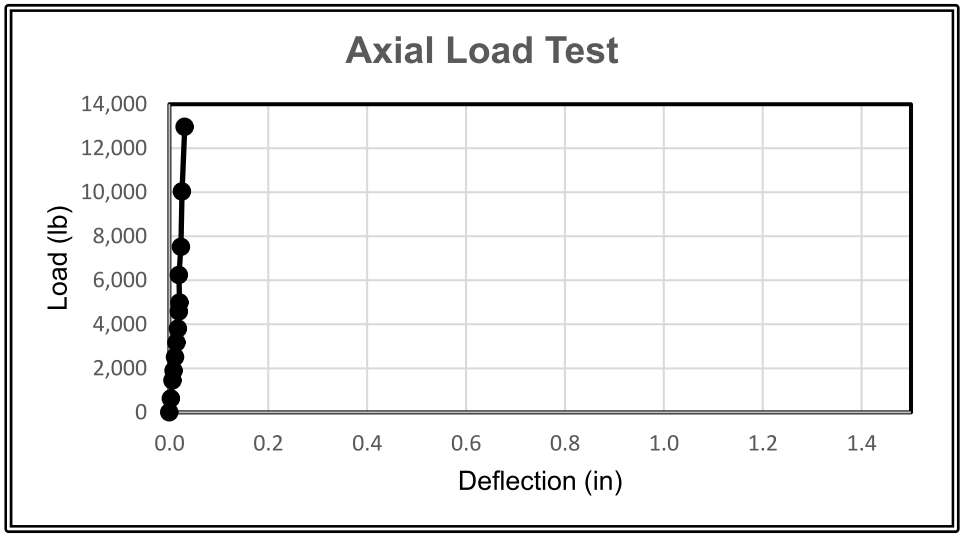
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-8**

Notes:

Pile Indentifier: PLT-8B
Pile Type: W6x8.5
Embedment Depth: 9.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,580	0.020
630	0.003	4,990	0.021
1,450	0.007	6,240	0.020
1,890	0.009	7,520	0.024
2,510	0.012	10,030	0.026
3,170	0.015	12,970	0.031
3,800	0.018		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

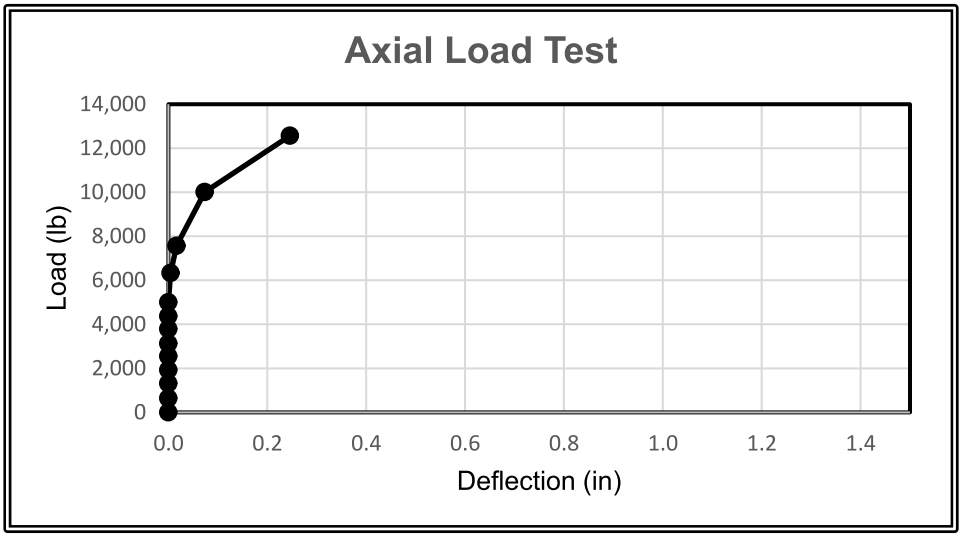
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-8**

Notes:

Pile Indentifier: PLT-8C
Pile Type: W6x15
Embedment Depth: 7.90 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.000
640	0.000	5,000	0.000
1,320	0.000	6,330	0.005
1,930	0.000	7,570	0.017
2,550	0.000	10,010	0.074
3,130	0.000	12,570	0.246
3,790	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

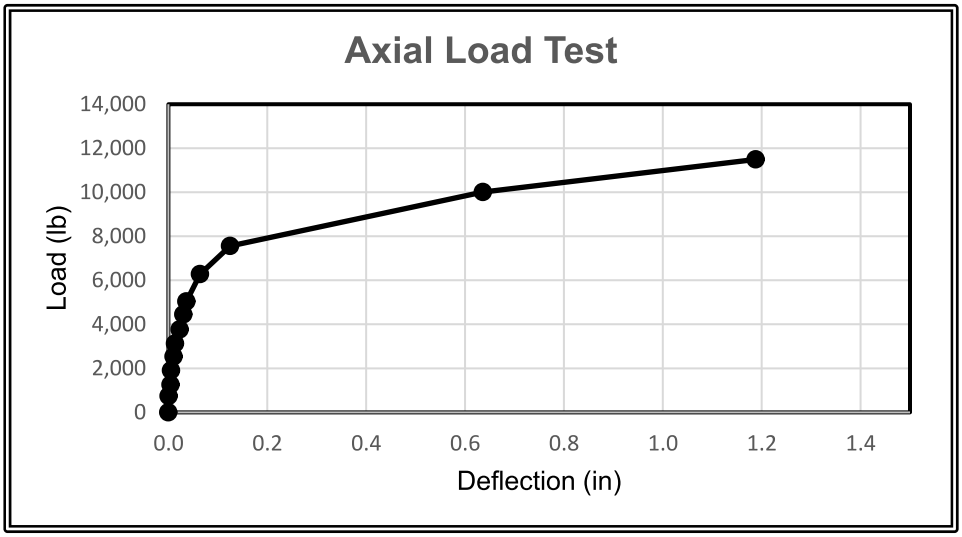
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-9**

Notes:

Pile Indentifier: PLT-9A
Pile Type: W6x8.5
Embedment Depth: 5.85 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,450	0.031
740	0.001	5,040	0.037
1,260	0.005	6,280	0.064
1,910	0.006	7,560	0.125
2,540	0.011	10,010	0.636
3,130	0.014	11,496	1.188
3,770	0.023		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

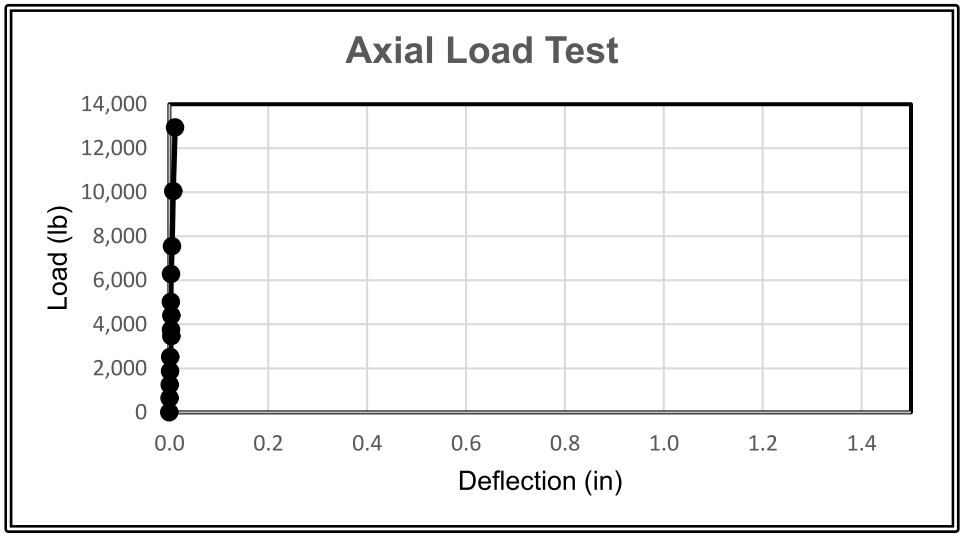
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-9**

Notes:

Pile Indentifier: PLT-9B
Pile Type: W6x8.5
Embedment Depth: 9.90 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,400	0.004
650	0.001	5,020	0.003
1,250	0.001	6,280	0.004
1,870	0.002	7,550	0.006
2,520	0.002	10,050	0.008
3,460	0.004	12,940	0.012
3,750	0.004		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

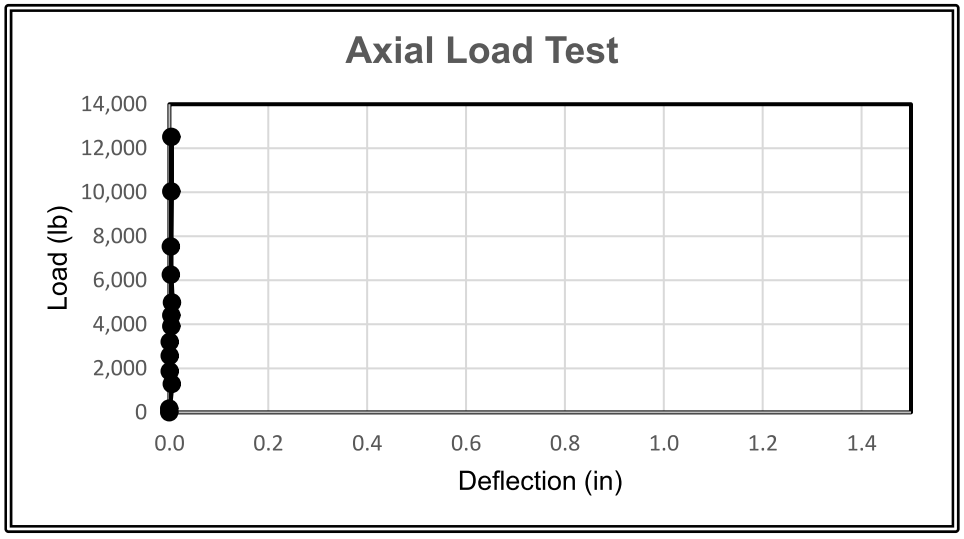
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-9**

Notes:
guage fell over at 4990#

Pile Indentifier: PLT-9C
Pile Type: W6x8.5
Embedment Depth: 7.96 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,410	0.004
170	0.000	4,990	0.006
1,290	0.005	6,250	0.003
1,860	0.001	7,530	0.003
2,570	0.001	10,030	0.004
3,200	0.001	12,510	0.004
3,910	0.004		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

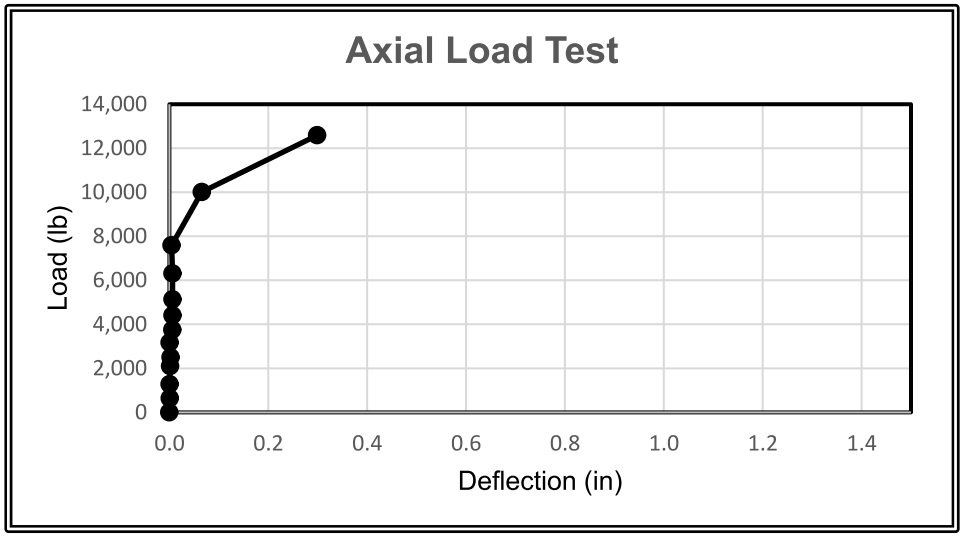
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-10**

Notes:

Pile Indentifier: PLT-10A
Pile Type: W6x8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,410	0.007
640	0.001	5,130	0.007
1,280	0.001	6,310	0.007
2,100	0.002	7,590	0.005
2,500	0.003	10,010	0.066
3,170	0.000	12,590	0.299
3,750	0.006		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

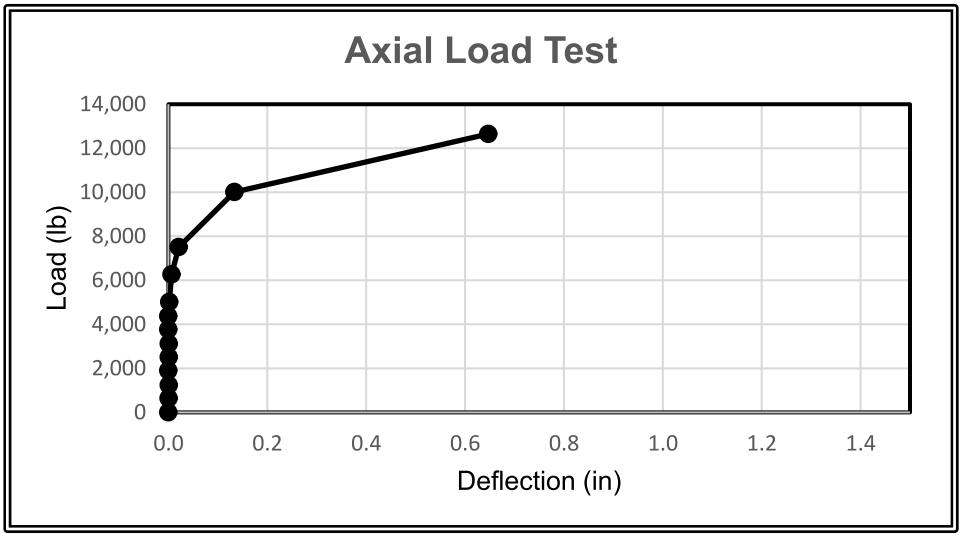
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-10**

Notes:

Pile Indentifier: PLT-10B
Pile Type: W6x8.5
Embedment Depth: 10.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.000
640	0.001	5,020	0.002
1,240	0.001	6,270	0.007
1,900	0.000	7,510	0.021
2,510	0.001	10,010	0.134
3,120	0.001	12,650	0.647
3,770	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

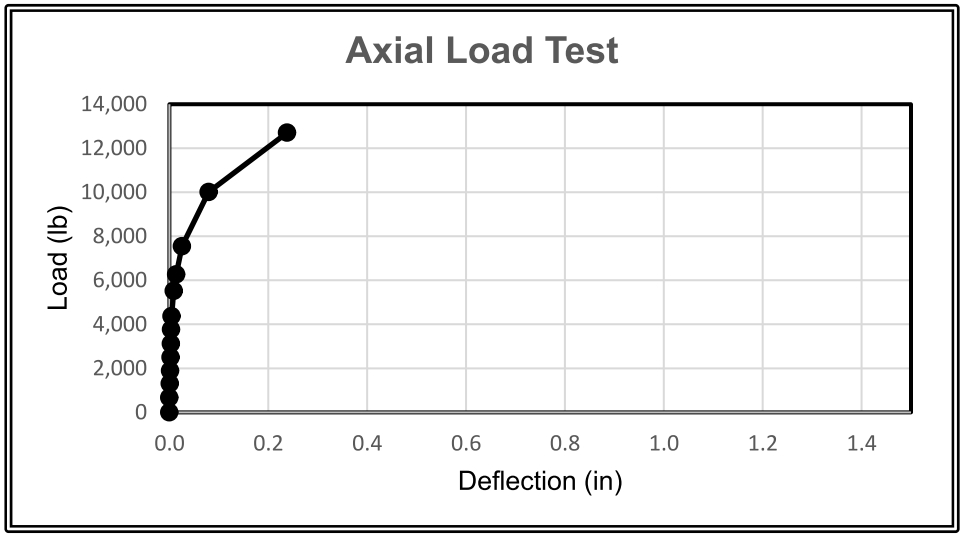
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-10**

Notes:

Pile Indentifier: PLT-10C
Pile Type: W6x15
Embedment Depth: 7.96 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.005
670	0.000	5,520	0.009
1,310	0.001	6,270	0.014
1,890	0.002	7,550	0.026
2,500	0.003	10,010	0.080
3,120	0.003	12,710	0.238
3,770	0.004		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

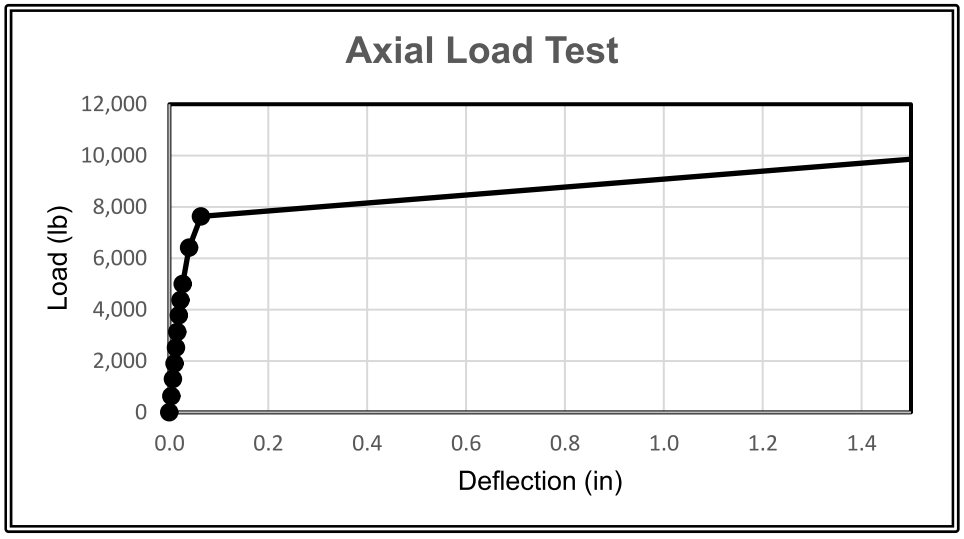
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-11**

Notes:

Pile Indentifier: PLT-11A
Pile Type: W6x8.5
Embedment Depth: 6.23 ft
Pile Reveal: 57 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.023
630	0.004	5,000	0.027
1,300	0.008	6,410	0.040
1,900	0.011	7,630	0.064
2,520	0.014	9,940	1.551
3,130	0.016		
3,780	0.020		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

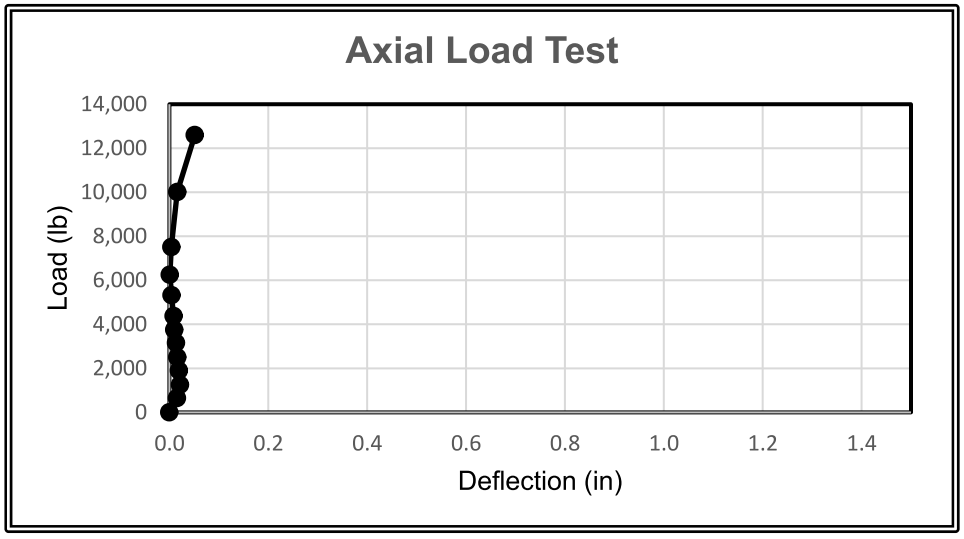
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-11**

Notes:

Pile Indentifier: PLT-11B
Pile Type: W6x8.5
Embedment Depth: 10.04 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.009
650	0.016	5,320	0.005
1,250	0.022	6,250	0.001
1,900	0.020	7,510	0.004
2,500	0.016	10,010	0.016
3,160	0.014	12,600	0.052
3,750	0.010		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

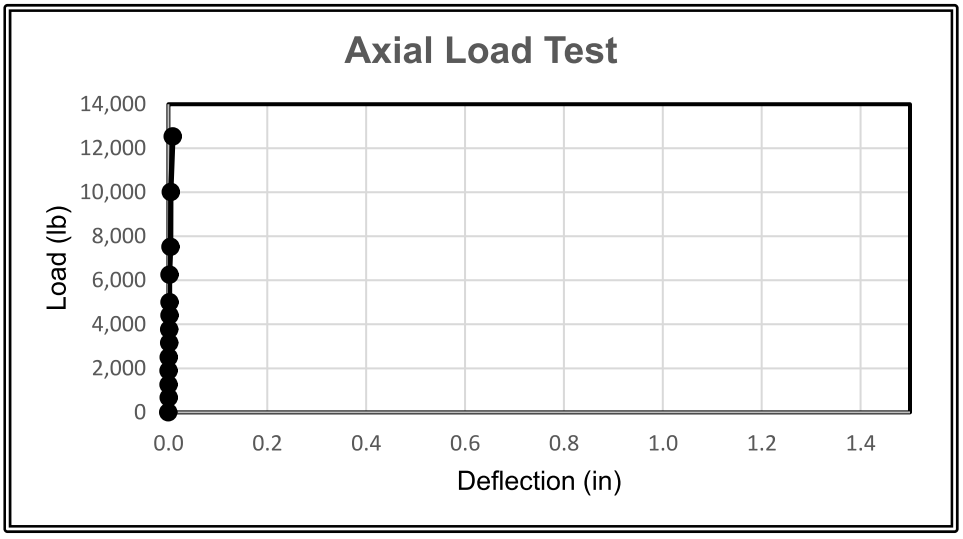
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-11**

Notes:

Pile Indentifier: PLT-11C
Pile Type: W6x15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,410	0.003
670	0.001	5,000	0.003
1,260	0.001	6,250	0.003
1,890	0.001	7,520	0.005
2,500	0.001	10,010	0.005
3,160	0.002	12,530	0.009
3,770	0.002		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

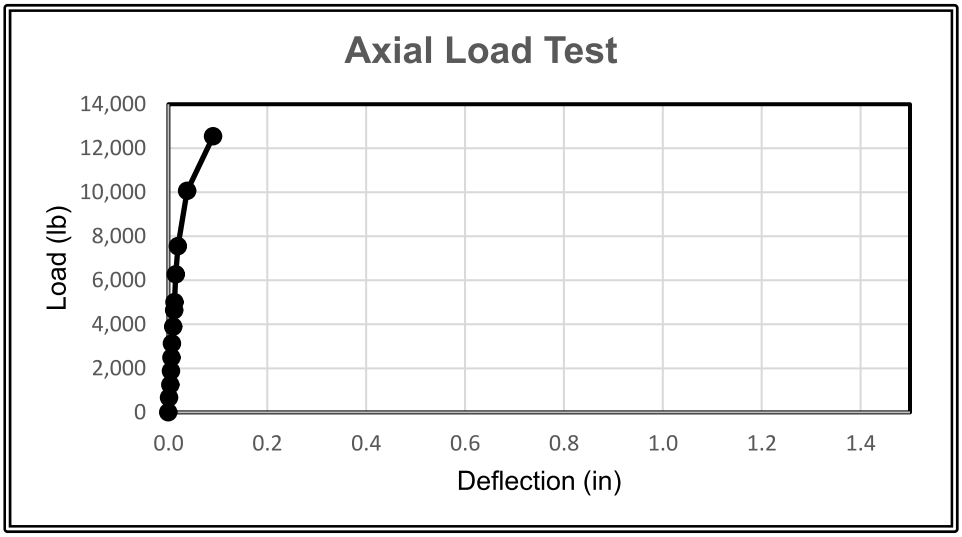
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-12**

Notes:

Pile Indentifier: PLT-12A
Pile Type: W6x8.5
Embedment Depth: 5.90 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,640	0.012
670	0.002	5,000	0.013
1,250	0.004	6,270	0.015
1,880	0.006	7,550	0.020
2,490	0.007	10,060	0.038
3,130	0.008	12,540	0.091
3,890	0.010		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

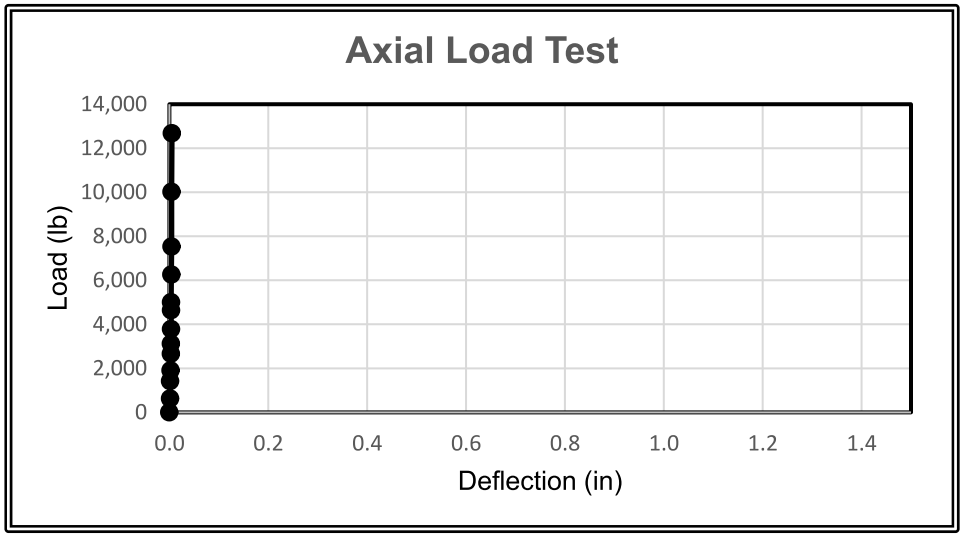
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-12**

Notes:

Pile Indentifier: PLT-12B
Pile Type: W6x8.5
Embedment Depth: 9.83 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,640	0.004
630	0.002	5,000	0.004
1,420	0.002	6,260	0.004
1,910	0.003	7,530	0.005
2,660	0.003	10,020	0.005
3,120	0.003	12,680	0.005
3,780	0.004		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

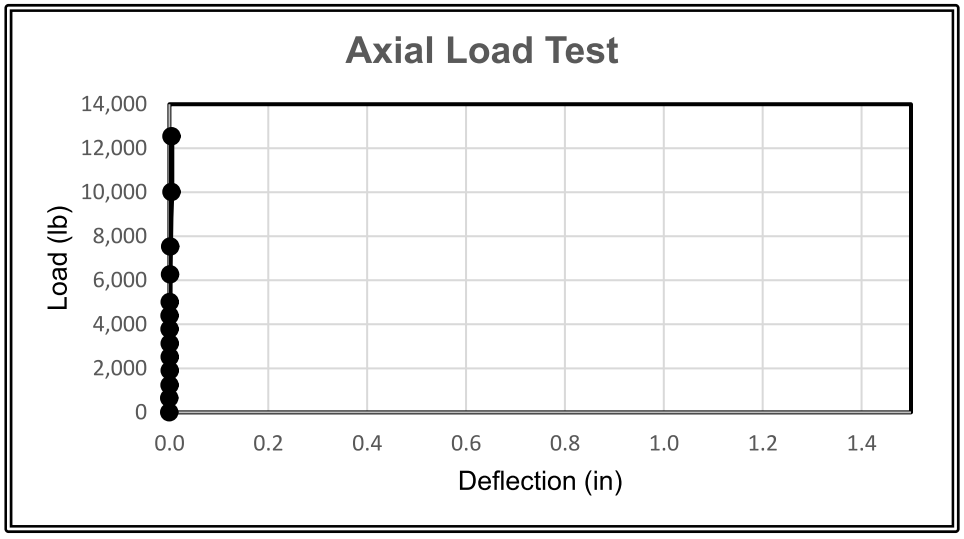
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-12**

Notes:

Pile Indentifier: PLT-12C
Pile Type: W6x15
Embedment Depth: 8.13 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.001
650	0.000	5,010	0.001
1,240	0.001	6,270	0.002
1,900	0.001	7,530	0.002
2,520	0.001	10,010	0.005
3,130	0.001	12,540	0.005
3,780	0.001		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

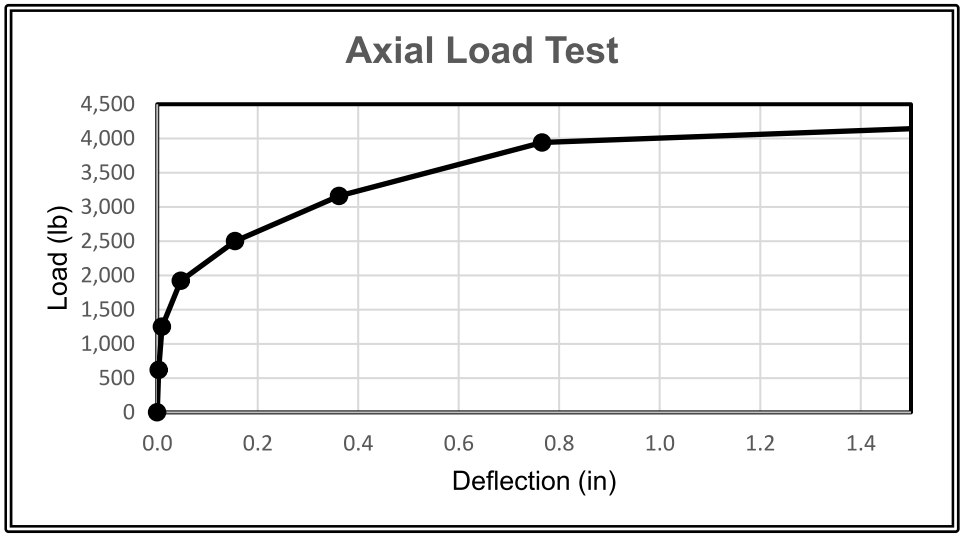
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-14**

Notes:

Pile Indentifier: PLT-14A
Pile Type: W6x8.5
Embedment Depth: 5.96 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,270	1.961
620	0.003		
1,250	0.010		
1,920	0.047		
2,500	0.155		
3,160	0.362		
3,940	0.766		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

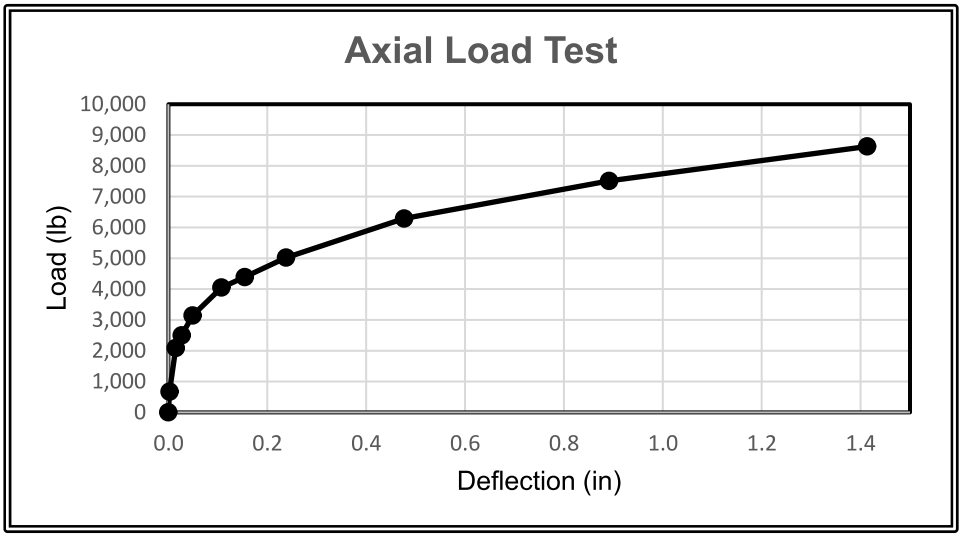
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-14**

Notes:

Pile Indentifier: PLT-14B
Pile Type: W6x8.5
Embedment Depth: 10.02 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	5,020	0.238
670	0.003	6,290	0.477
2,090	0.015	7,510	0.892
2,500	0.027	8,630	1.414
3,140	0.049		
4,050	0.108		
4,390	0.155		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

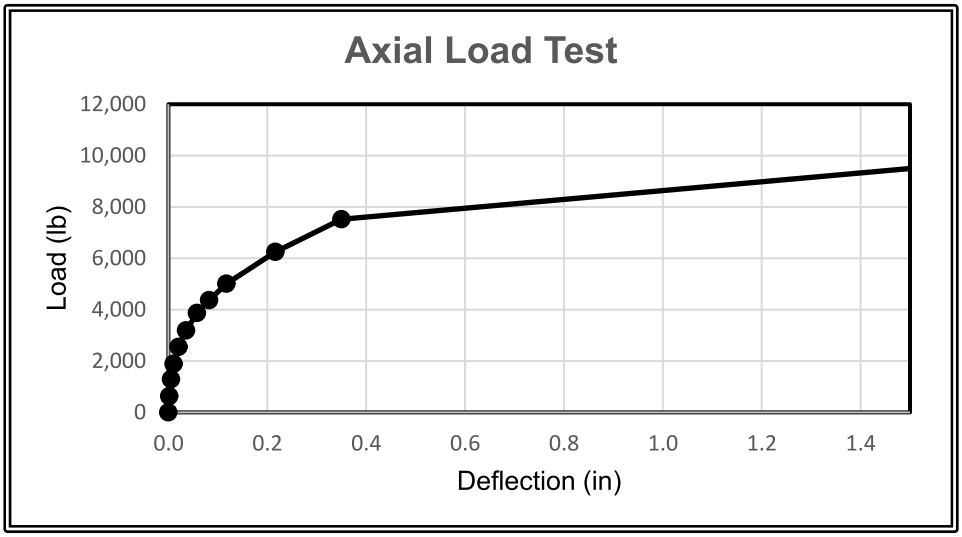
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-14**

Notes:

Pile Indentifier: PLT-14C
Pile Type: W6x15
Embedment Depth: 8.08 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.083
630	0.002	5,010	0.118
1,290	0.006	6,250	0.217
1,890	0.011	7,520	0.350
2,550	0.021	9,850	1.706
3,190	0.036		
3,870	0.058		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

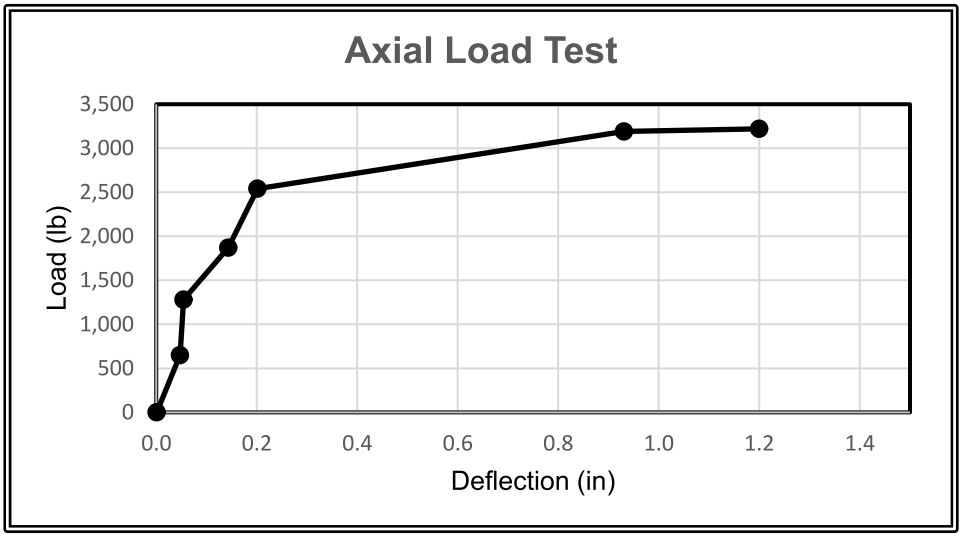
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-16**

Notes:

Pile Indentifier: PLT-16A
Pile Type: W6x8.5
Embedment Depth: 5.83 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.001		
650	0.048		
1,280	0.055		
1,870	0.144		
2,540	0.202		
3,190	0.931		
3,220	1.200		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

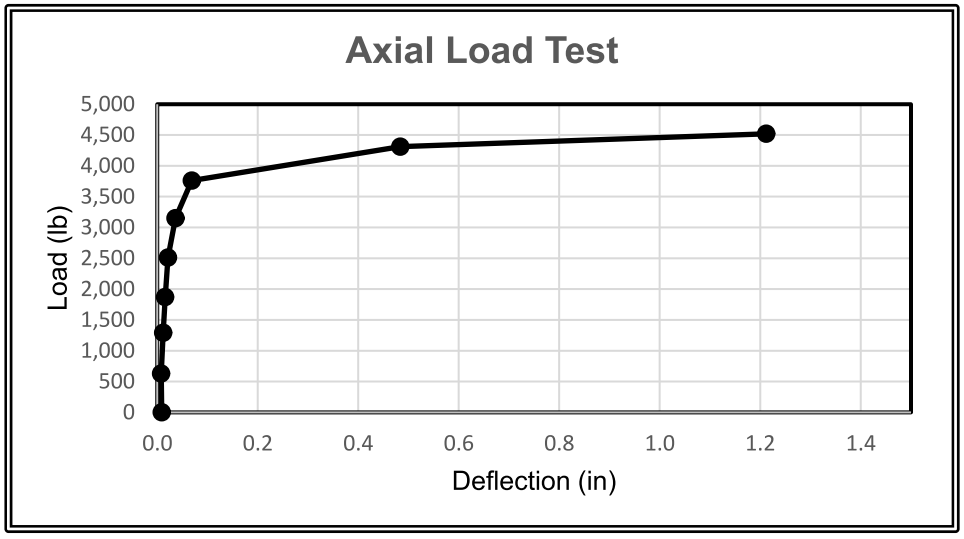
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-16**

Notes:

Pile Indentifier: PLT-16B
Pile Type: W6x8.5
Embedment Depth: 10.06 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.009	4,310	0.484
630	0.008	4,520	1.212
1,290	0.012		
1,870	0.016		
2,510	0.022		
3,150	0.037		
3,760	0.069		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

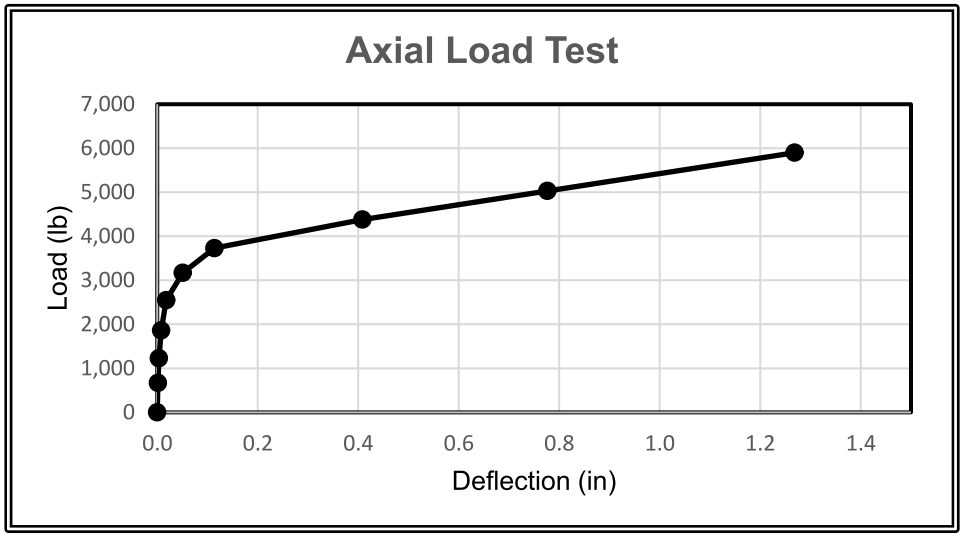
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-16**

Notes:

Pile Indentifier: PLT-16C
Pile Type: W6x15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.409
670	0.002	5,030	0.777
1,230	0.004	5,900	1.269
1,860	0.008		
2,550	0.018		
3,170	0.051		
3,730	0.114		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

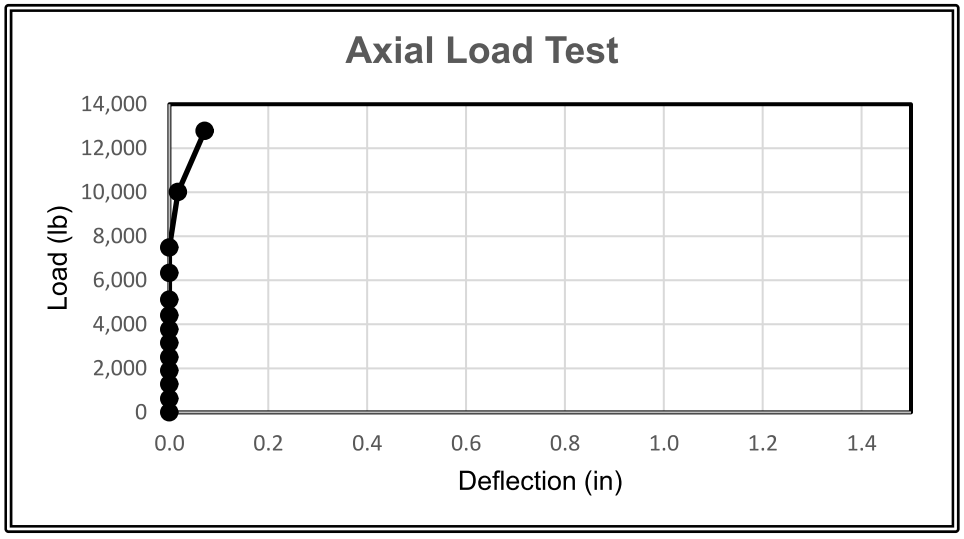
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-17**

Notes:

Pile Indentifier: PLT-17A
Pile Type: W6x8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,410	0.000
620	0.000	5,120	0.000
1,280	0.000	6,330	0.000
1,900	0.000	7,490	0.000
2,500	0.000	10,010	0.018
3,160	0.000	12,790	0.072
3,770	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

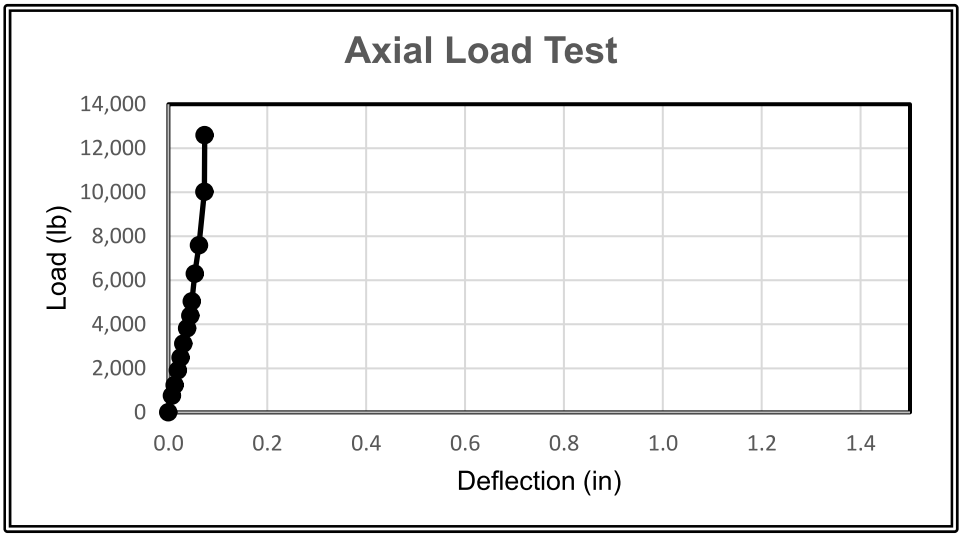
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-17**

Notes:

Pile Indentifier: PLT-17B
Pile Type: W6x8.5
Embedment Depth: 9.44 ft
Pile Reveal: 67 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.045
760	0.008	5,040	0.048
1,240	0.013	6,300	0.054
1,910	0.020	7,590	0.062
2,490	0.025	10,020	0.073
3,120	0.031	12,590	0.074
3,820	0.038		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

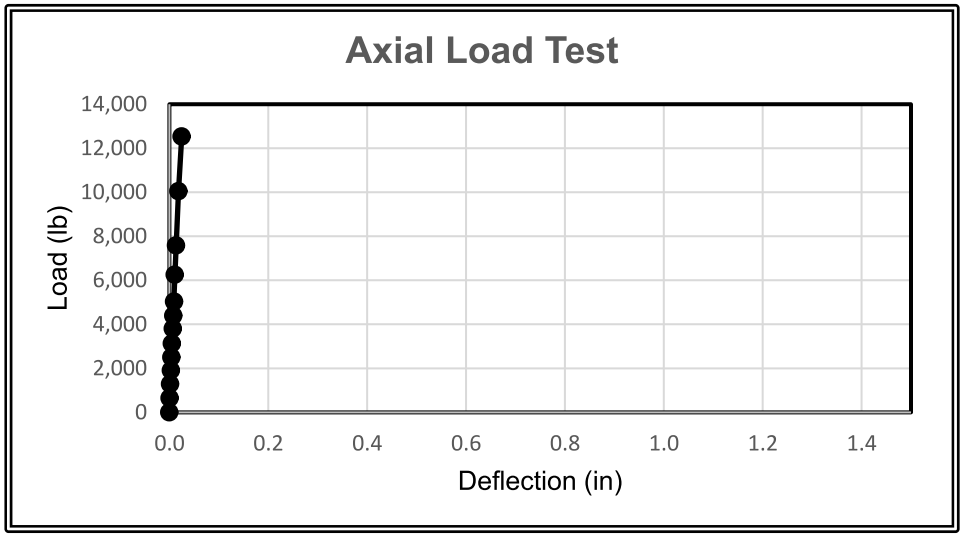
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-17**

Notes:

Pile Indentifier: PLT-17C
Pile Type: W6x15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.008
650	0.001	5,030	0.010
1,290	0.002	6,250	0.011
1,910	0.003	7,580	0.014
2,500	0.004	10,050	0.019
3,130	0.005	12,530	0.025
3,800	0.007		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

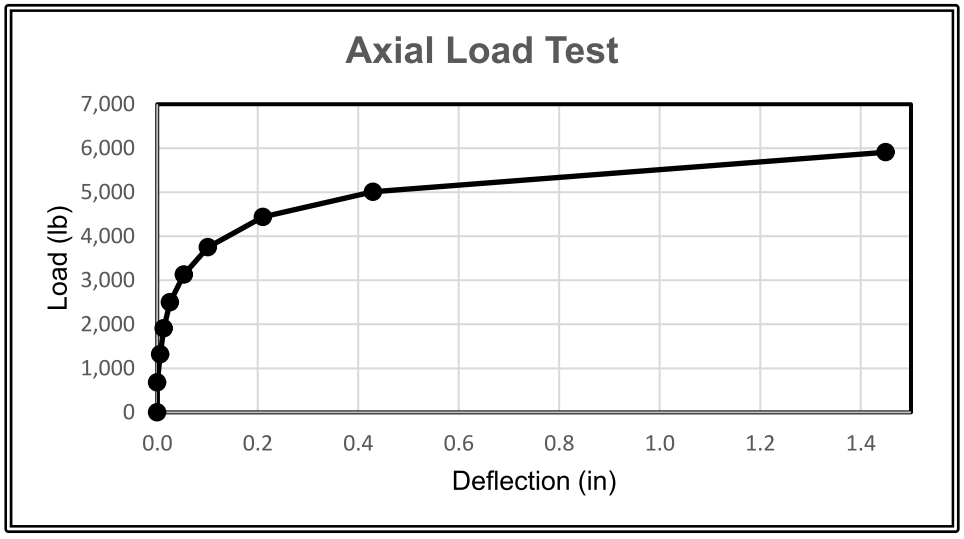
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-18**

Notes:

Pile Indentifier: PLT-18A
Pile Type: W6x8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,440	0.211
680	0.000	5,010	0.430
1,320	0.006	5,910	1.450
1,910	0.013		
2,500	0.026		
3,130	0.053		
3,750	0.101		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

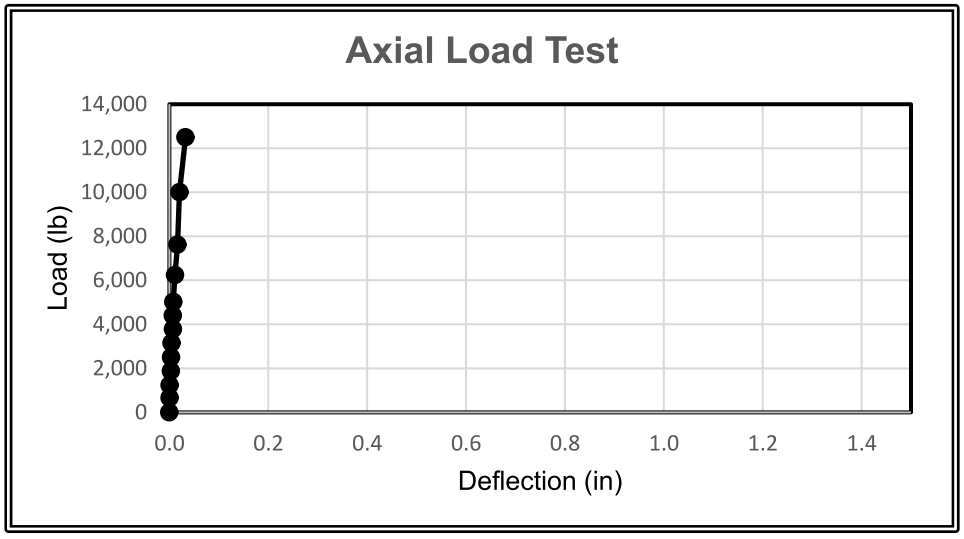
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-18**

Notes:

Pile Indentifier: PLT-18B
Pile Type: W6x8.5
Embedment Depth: 10.04 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,400	0.007
660	0.001	5,020	0.008
1,240	0.001	6,240	0.012
1,880	0.003	7,620	0.017
2,500	0.004	10,000	0.021
3,150	0.005	12,500	0.033
3,780	0.008		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

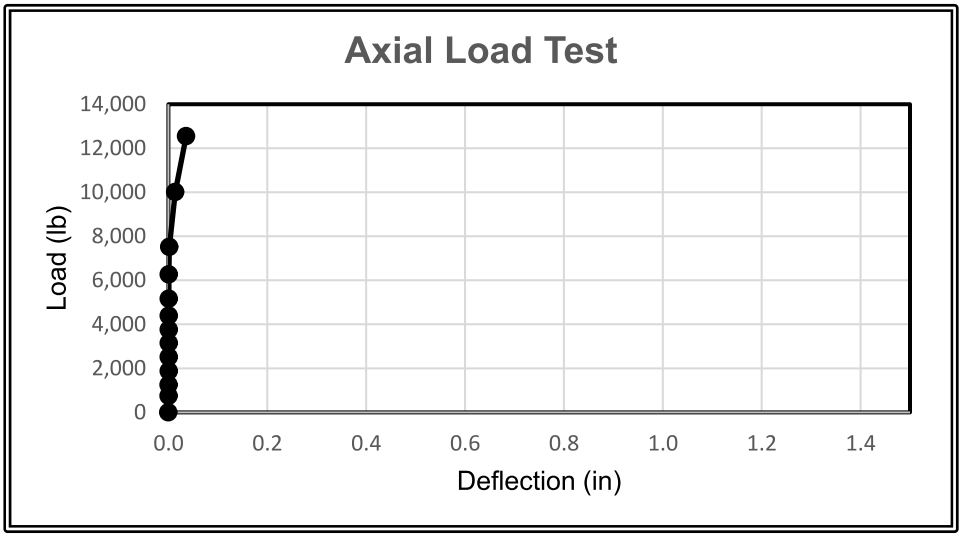
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-18**

Notes:

Pile Indentifier: PLT-18C
Pile Type: W6x15
Embedment Depth: 8.03 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.001
750	0.001	5,160	0.001
1,250	0.001	6,270	0.001
1,880	0.001	7,520	0.002
2,520	0.001	10,010	0.014
3,150	0.001	12,550	0.036
3,760	0.001		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

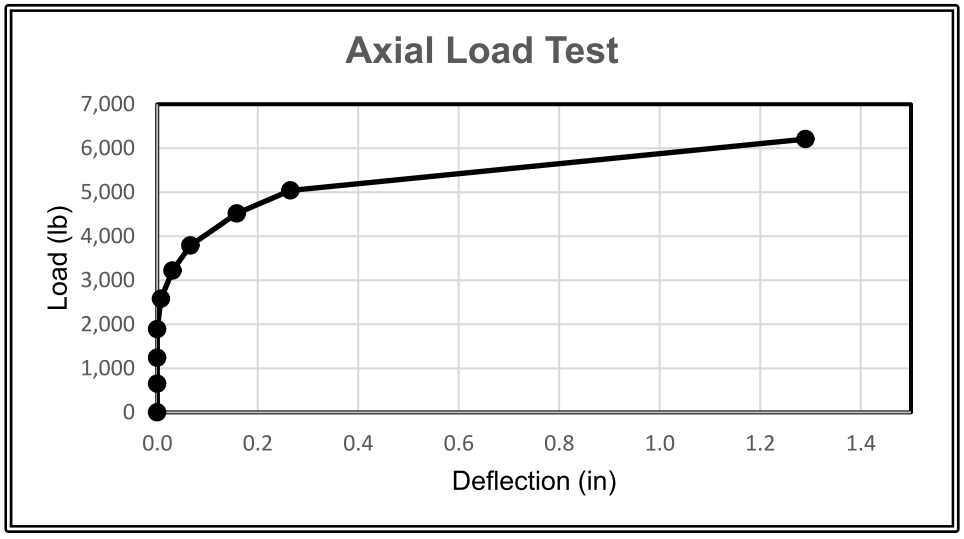
Technician: DH
Test Date: 10/31/2020

Test Location: **PLT-20**

Notes:

Pile Indentifier: PLT-20A
Pile Type: W6x8.5
Embedment Depth: 5.83 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,520	0.159
650	0.000	5,040	0.265
1,240	0.000	6,210	1.290
1,890	0.000		
2,580	0.008		
3,220	0.031		
3,790	0.066		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

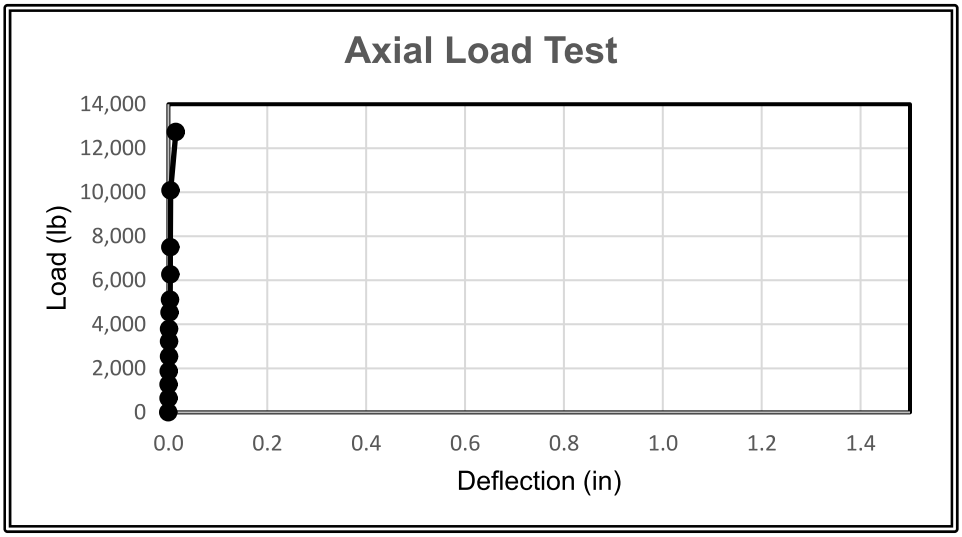
Technician: DH
Test Date: 10/31/2020

Test Location: **PLT-20**

Notes:

Pile Indentifier: PLT-20B
Pile Type: W6x8.5
Embedment Depth: 10.06 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,540	0.003
640	0.001	5,120	0.004
1,270	0.001	6,270	0.004
1,870	0.001	7,500	0.004
2,540	0.002	10,080	0.005
3,220	0.002	12,740	0.015
3,790	0.002		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

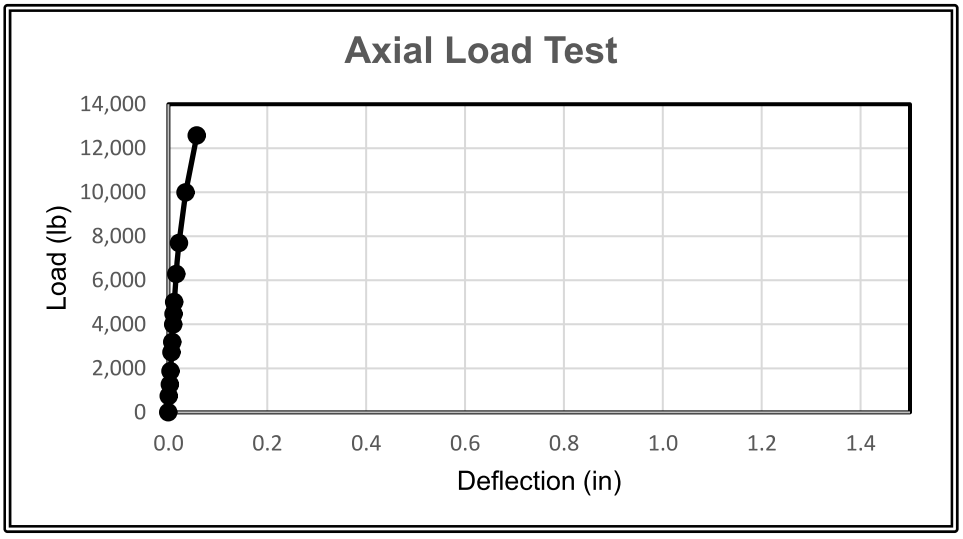
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-20**

Notes:

Pile Indentifier: PLT-20C
Pile Type: W6x15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,470	0.011
740	0.001	5,010	0.012
1,270	0.003	6,280	0.016
1,870	0.005	7,690	0.022
2,730	0.007	9,990	0.035
3,190	0.008	12,580	0.058
3,990	0.010		



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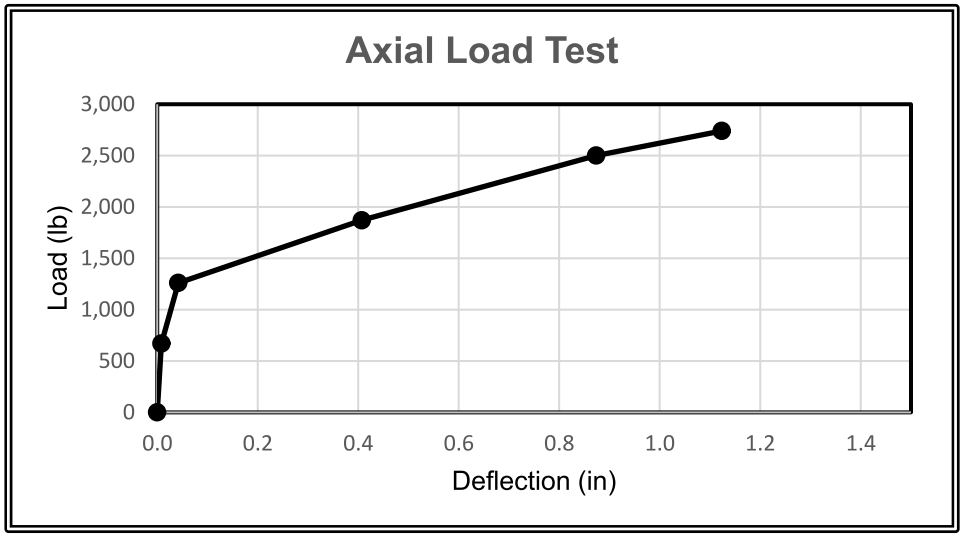
Axial Pile Test Results

Project Name:	**Birch Solar Project**	Technician:	MG
Project Number:	**20212135.001A**	Test Date:	11/3/2020
Client Name:	**Lightsource bp**		
Test Location:	**PLT-21**	**Notes:**	
Pile Indentifier:	PLT-21A		
Pile Type:	W6x8.5		
Embedment Depth:	5.96 ft		
Pile Reveal:	61 in		

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000		
670	0.009		
1,260	0.042		
1,870	0.407		
2,500	0.874		
2,740	1.124		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

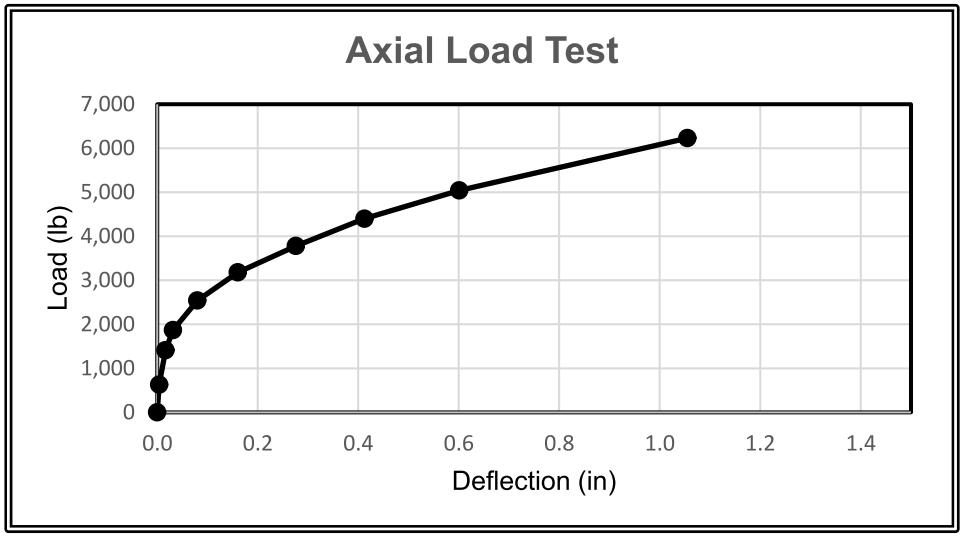
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-21**

Notes:

Pile Indentifier: PLT-21B
Pile Type: W6x8.5
Embedment Depth: 10.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,400	0.413
630	0.004	5,040	0.601
1,410	0.017	6,230	1.055
1,870	0.032		
2,540	0.080		
3,180	0.161		
3,780	0.276		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

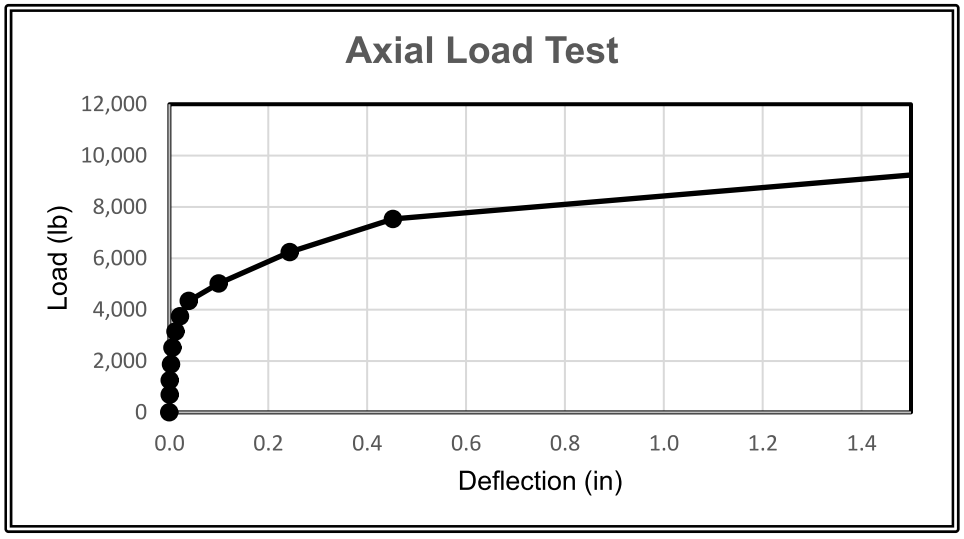
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-21**

Notes:

Pile Indentifier: PLT-21C
Pile Type: W6x15
Embedment Depth: 8.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,340	0.040
690	0.001	5,020	0.100
1,250	0.001	6,240	0.244
1,870	0.004	7,530	0.453
2,520	0.007	9,810	1.844
3,150	0.013		
3,740	0.022		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

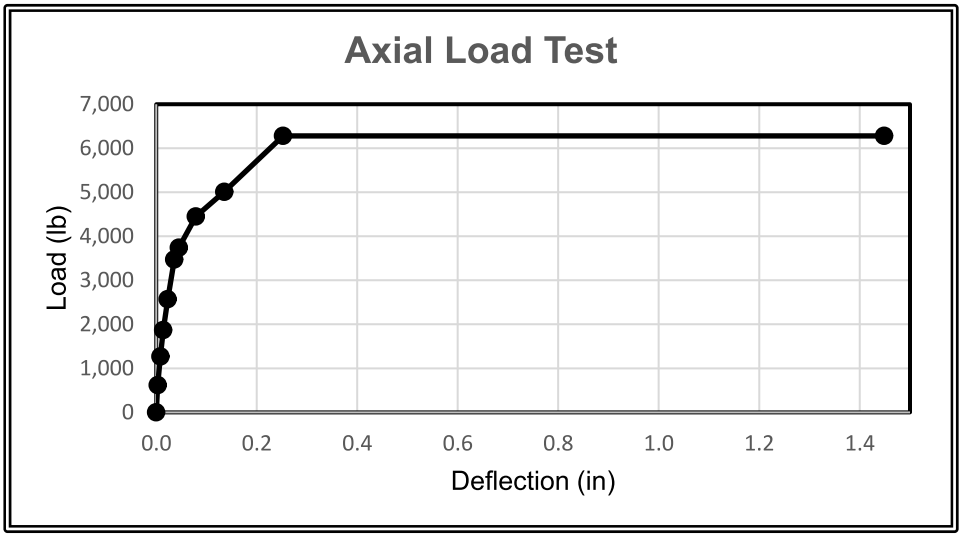
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-23**

Notes:

Pile Indentifier: PLT-23A
Pile Type: W6x8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,450	0.079
620	0.003	5,010	0.136
1,270	0.009	6,280	0.253
1,870	0.014	6,280	1.449
2,570	0.023		
3,470	0.036		
3,740	0.045		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

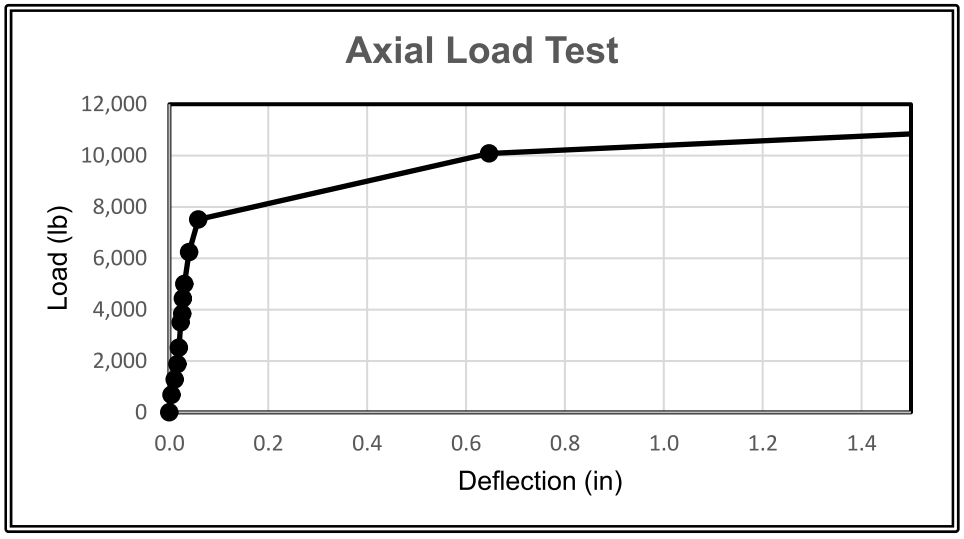
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-23**

Notes:

Pile Indentifier: PLT-23B
Pile Type: W6x8.5
Embedment Depth: 9.98 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,430	0.028
680	0.005	5,000	0.031
1,280	0.011	6,240	0.040
1,880	0.017	7,510	0.059
2,520	0.020	10,080	0.647
3,500	0.023	11,060	1.741
3,840	0.026		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

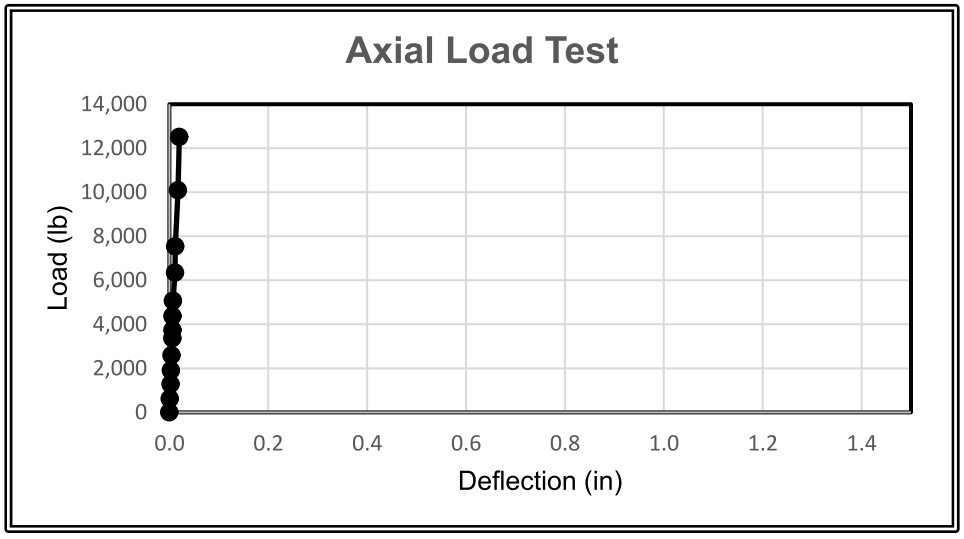
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-23**

Notes:

Pile Indentifier: PLT-23C
Pile Type: W6x15
Embedment Depth: 7.96 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.007
620	0.001	5,070	0.008
1,280	0.003	6,350	0.012
1,910	0.003	7,540	0.012
2,590	0.005	10,090	0.018
3,370	0.006	12,510	0.020
3,740	0.007		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

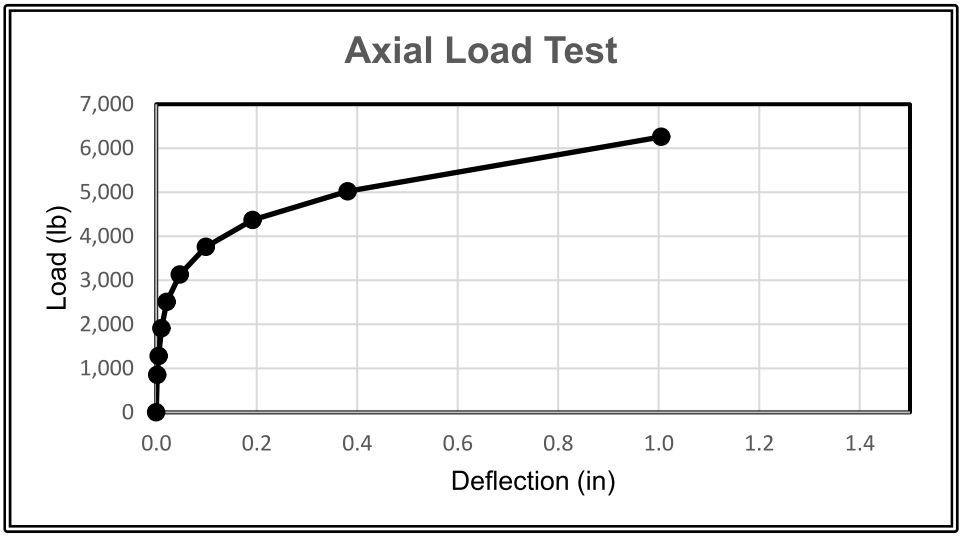
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-24**

Notes:

Pile Indentifier: PLT-24A
Pile Type: W6x8.5
Embedment Depth: 6.08 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.192
850	0.002	5,020	0.381
1,280	0.005	6,260	1.005
1,910	0.011		
2,510	0.021		
3,130	0.047		
3,760	0.099		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

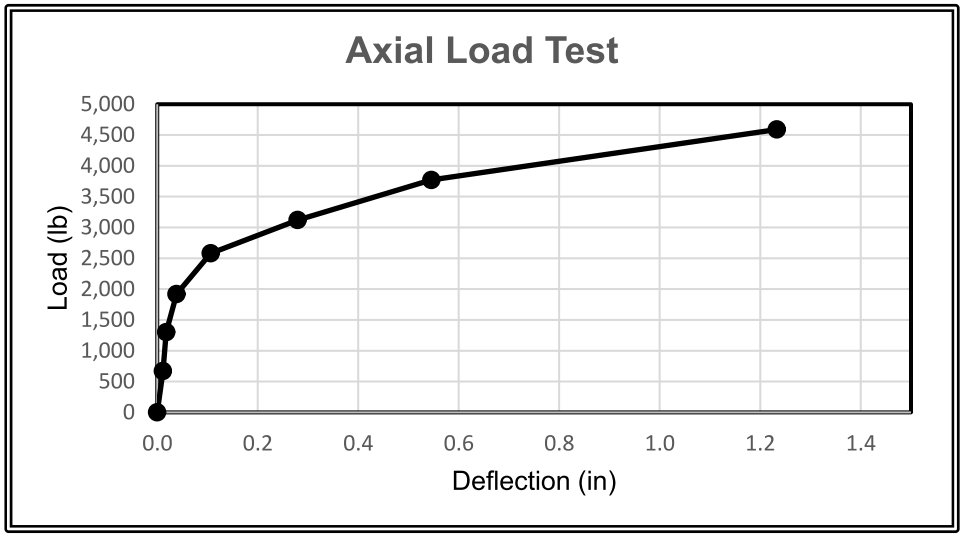
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-24**

Notes:

Pile Indentifier: PLT-24B
Pile Type: W6x8.5
Embedment Depth: 10.02 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,590	1.233
670	0.012		
1,300	0.018		
1,920	0.039		
2,580	0.107		
3,120	0.280		
3,770	0.546		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

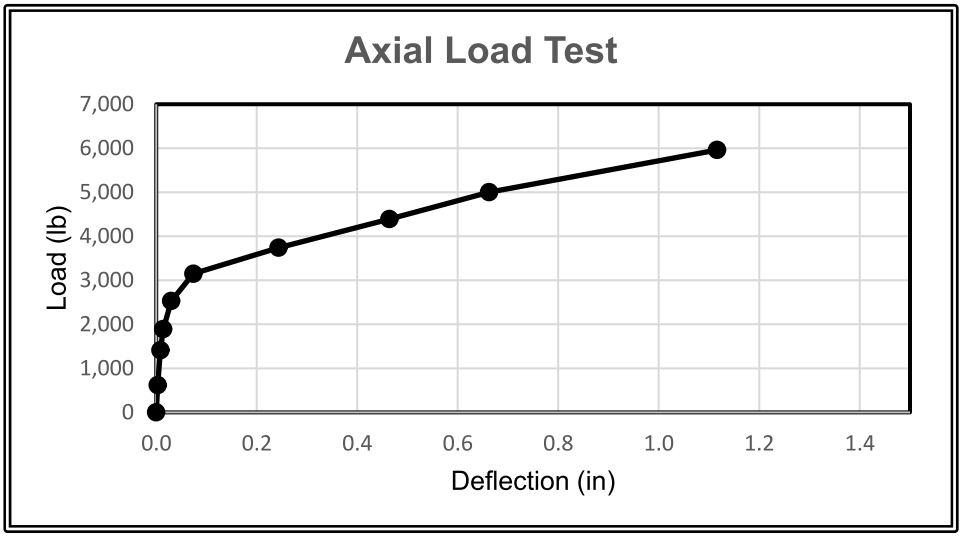
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-24**

Notes:

Pile Indentifier: PLT-24C
Pile Type: W6x15
Embedment Depth: 8.10 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.464
620	0.003	5,000	0.663
1,410	0.009	5,960	1.116
1,890	0.014		
2,530	0.030		
3,150	0.074		
3,740	0.244		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

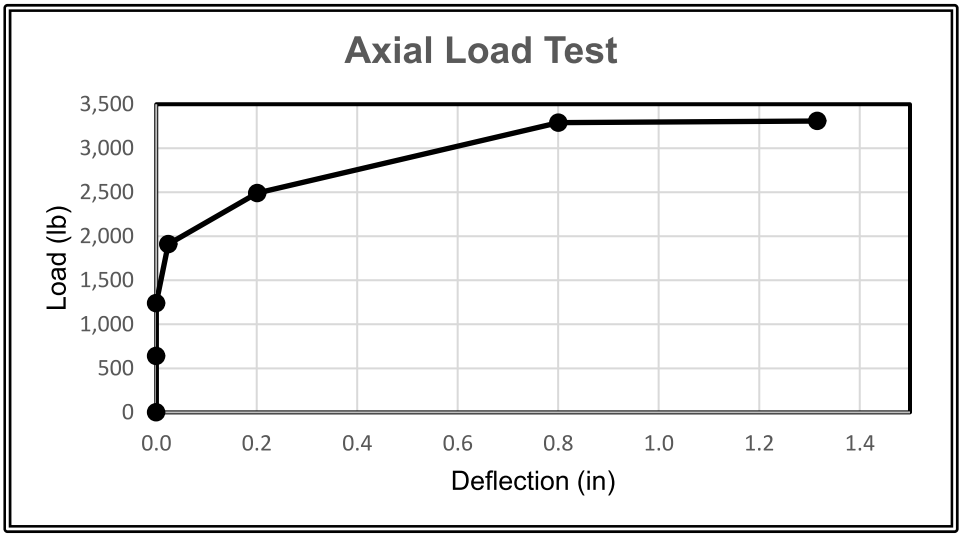
Technician: MG
Test Date: 11/1/2020

Test Location: **PLT-25**

Notes:

Pile Indentifier: PLT-25A
Pile Type: W6x8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000		
640	0.000		
1,240	0.000		
1,910	0.024		
2,490	0.201		
3,290	0.801		
3,310	1.316		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

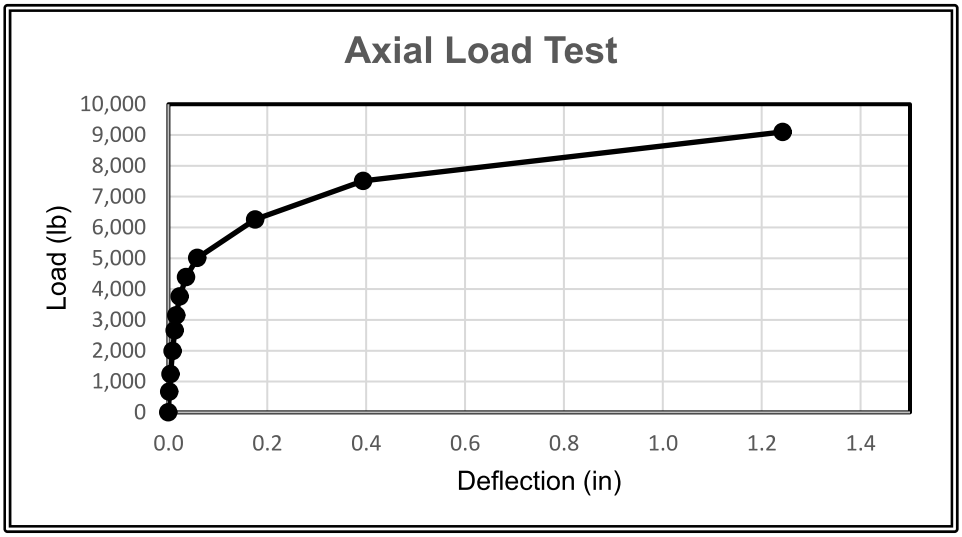
Technician: MG
Test Date: 11/1/2020

Test Location: **PLT-25**

Notes:

Pile Indentifier: PLT-25B
Pile Type: W6x8.5
Embedment Depth: 10.10 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.036
670	0.002	5,010	0.059
1,240	0.005	6,260	0.176
1,990	0.009	7,510	0.394
2,660	0.013	9,100	1.243
3,150	0.016		
3,760	0.023		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

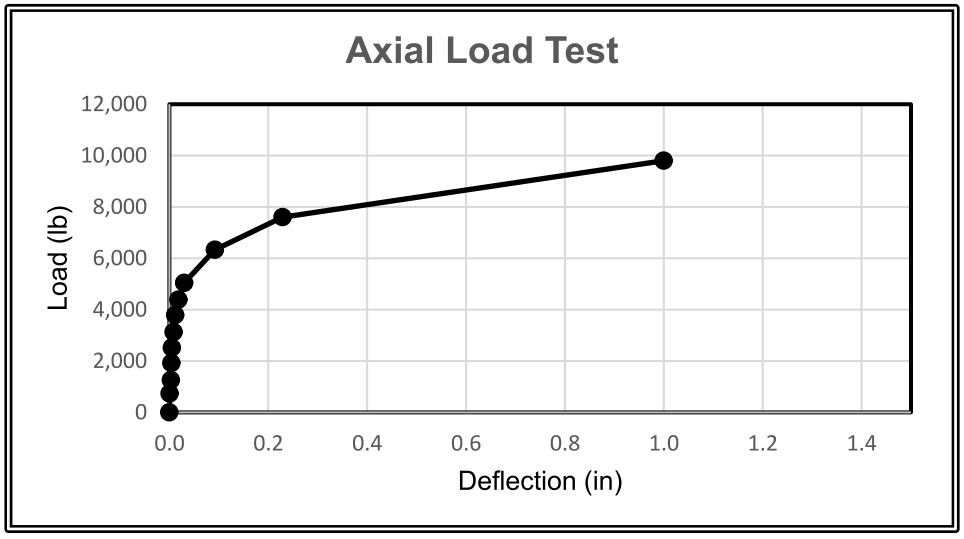
Technician: MG
Test Date: 11/1/2020

Test Location: **PLT-25**

Notes:

Pile Indentifier: PLT-25C
Pile Type: W6x15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.019
740	0.001	5,040	0.030
1,260	0.003	6,330	0.092
1,920	0.004	7,600	0.229
2,520	0.005	9,800	1.000
3,130	0.009		
3,790	0.012		



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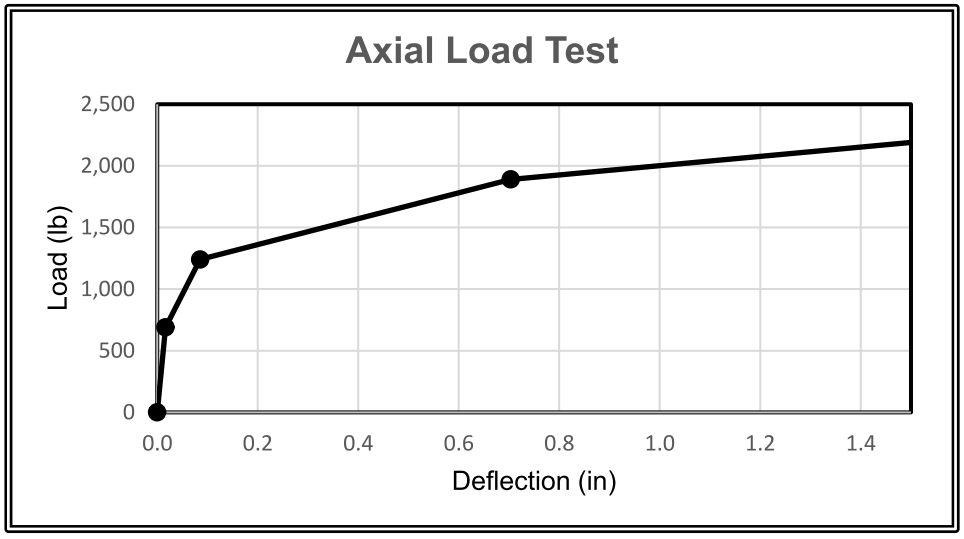
Axial Pile Test Results

Project Name:	**Birch Solar Project**	Technician:	MG
Project Number:	**20212135.001A**	Test Date:	11/3/2020
Client Name:	**Lightsource bp**		
Test Location:	**PLT-26**	**Notes:**	
Pile Indentifier:	PLT-26A		
Pile Type:	W6x8.5		
Embedment Depth:	6.02 ft		
Pile Reveal:	60 in		

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000		
690	0.017		
1,240	0.086		
1,890	0.704		
2,240	1.634		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

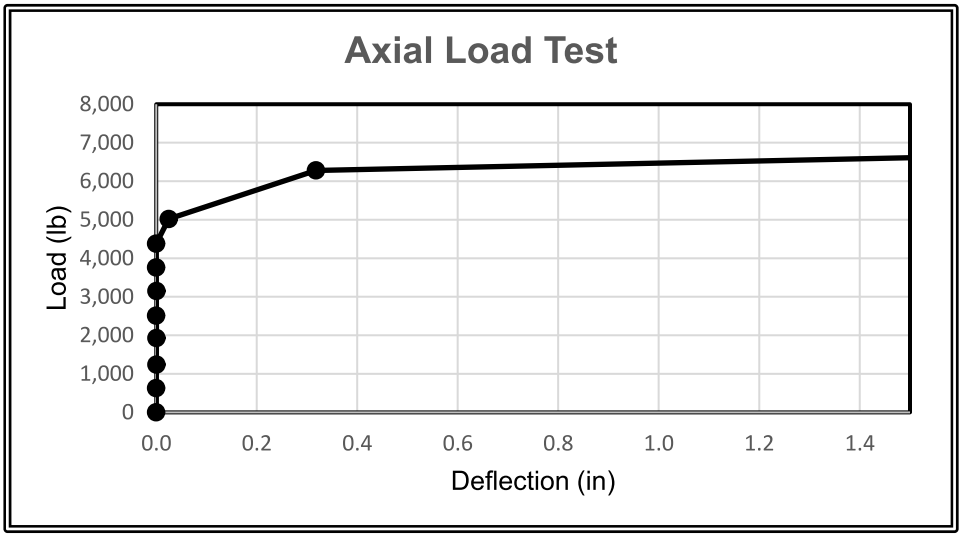
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-26**

Notes:

Pile Indentifier: PLT-26B
Pile Type: W6x8.5
Embedment Depth: 10.08 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.000
630	0.000	5,020	0.025
1,240	0.001	6,280	0.318
1,930	0.001	6,740	1.965
2,510	0.000		
3,150	0.001		
3,760	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

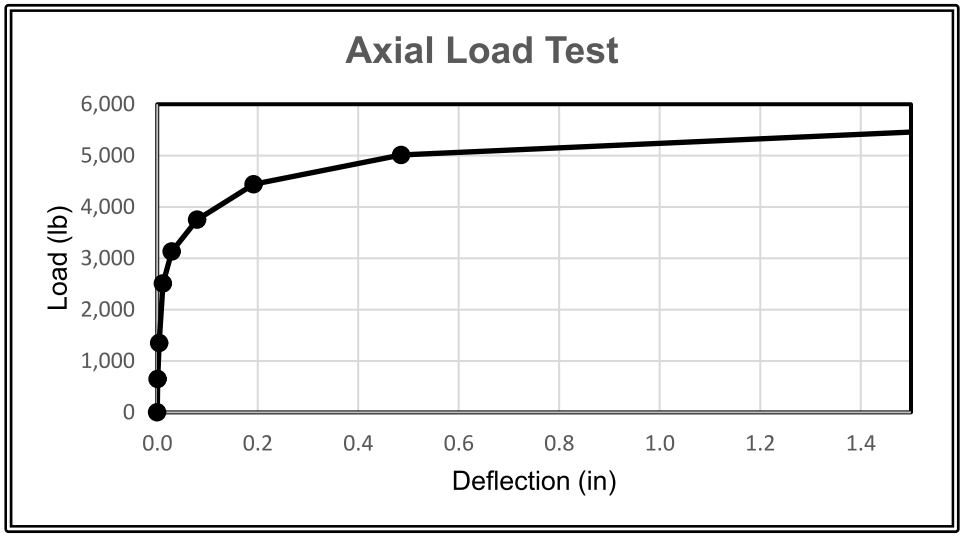
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-26**

Notes:

Pile Indentifier: PLT-26C
Pile Type: W6x15
Embedment Depth: 7.92 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	5,010	0.486
650	0.001	5,530	1.663
1,350	0.004		
2,510	0.012		
3,130	0.029		
3,750	0.080		
4,440	0.192		



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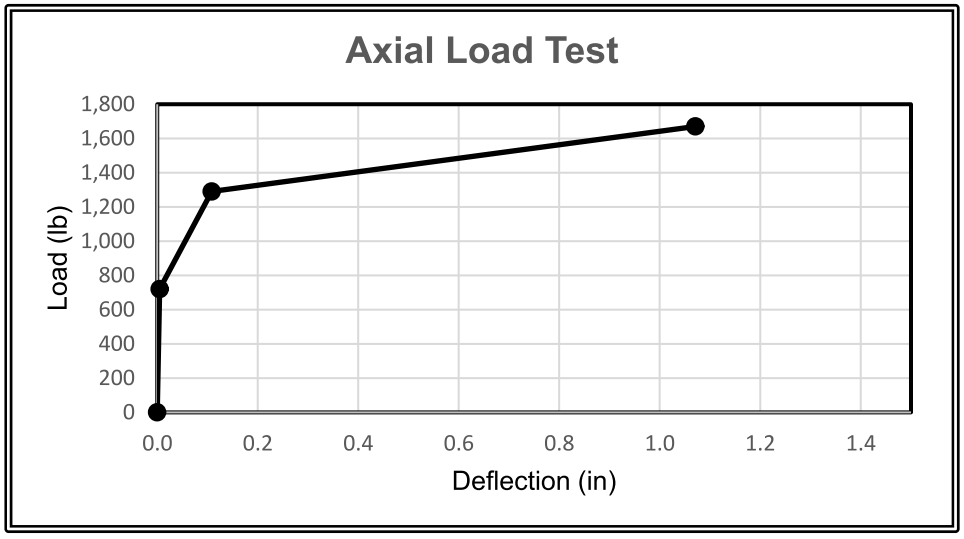
Axial Pile Test Results

Project Name:	**Birch Solar Project**	Technician:	MG
Project Number:	**20212135.001A**	Test Date:	11/2/2020
Client Name:	**Lightsource bp**		
Test Location:	**PLT-27**	**Notes:**	
Pile Indentifier:	PLT-27A		
Pile Type:	W6x8.5		
Embedment Depth:	6.06 ft		
Pile Reveal:	59 in		

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000		
720	0.005		
1,290	0.109		
1,670	1.071		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

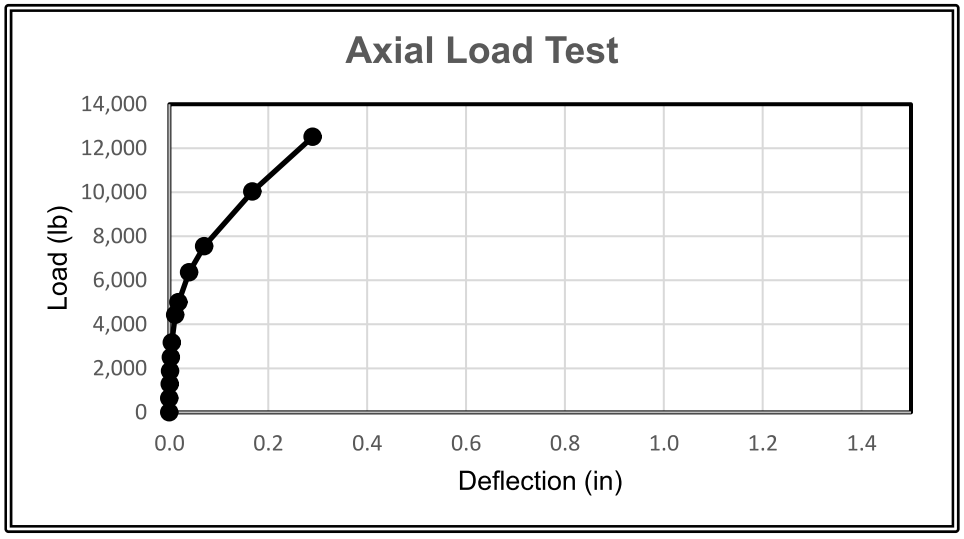
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-27**

Notes:

Pile Indentifier: PLT-27B
Pile Type: W6x8.5
Embedment Depth: 10.10 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	5,000	0.019
640	0.000	6,360	0.040
1,290	0.001	7,550	0.071
1,880	0.002	10,030	0.168
2,500	0.003	12,520	0.290
3,170	0.005		
4,430	0.012		



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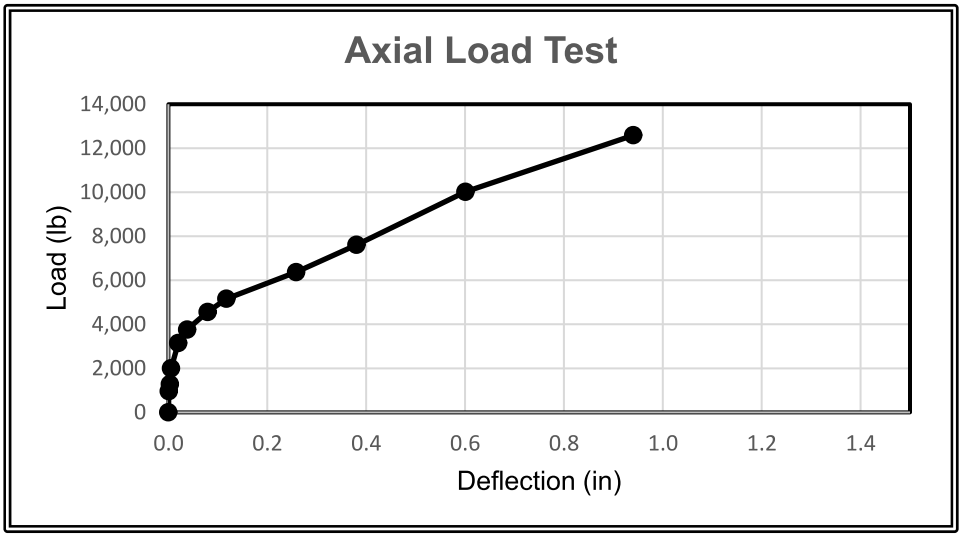
Axial Pile Test Results

Project Name:	**Birch Solar Project**	Technician:	MG
Project Number:	**20212135.001A**	Test Date:	11/2/2020
Client Name:	**Lightsource bp**		
Test Location:	**PLT-27**	**Notes:**	
Pile Indentifier:	PLT-27C		
Pile Type:	W6x15		
Embedment Depth:	7.92 ft		
Pile Reveal:	61 in		

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	5,160	0.118
960	0.001	6,370	0.259
1,280	0.003	7,610	0.381
2,000	0.006	10,020	0.601
3,150	0.020	12,590	0.941
3,760	0.038		
4,560	0.080		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

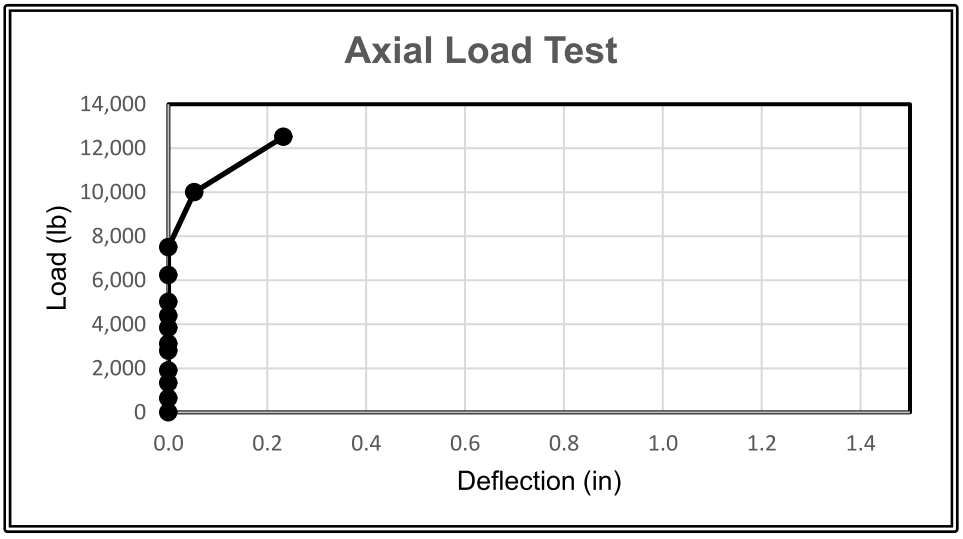
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-28**

Notes:

Pile Indentifier: PLT-28A
Pile Type: W6x8.5
Embedment Depth: 6.02 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,390	0.000
640	0.000	5,020	0.000
1,340	0.000	6,240	0.000
1,910	0.000	7,500	0.000
2,800	0.000	10,000	0.053
3,120	0.000	12,520	0.233
3,840	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

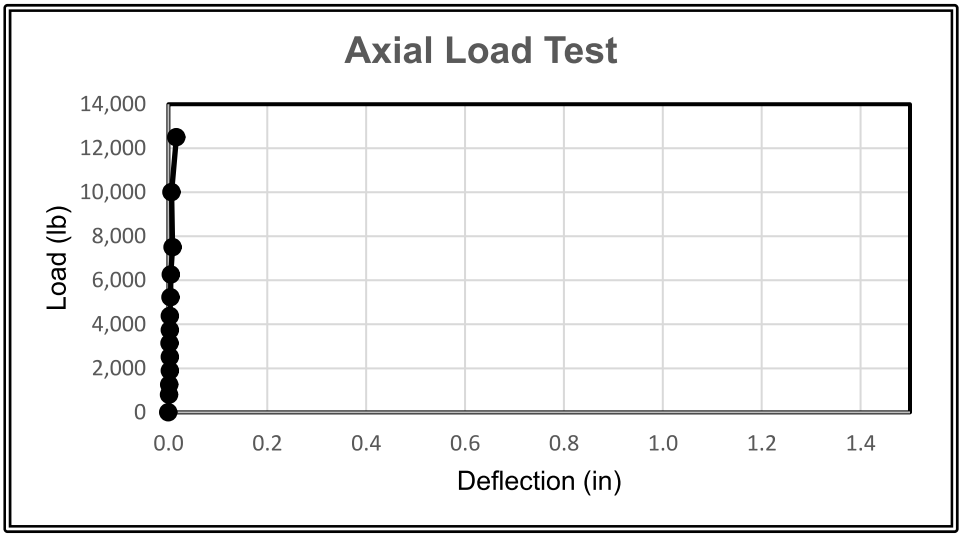
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-28**

Notes:

Pile Indentifier: PLT-28B
Pile Type: W6x8.5
Embedment Depth: 10.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.003
800	0.002	5,230	0.005
1,260	0.002	6,260	0.005
1,890	0.003	7,500	0.009
2,520	0.003	10,000	0.007
3,140	0.003	12,500	0.016
3,740	0.003		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

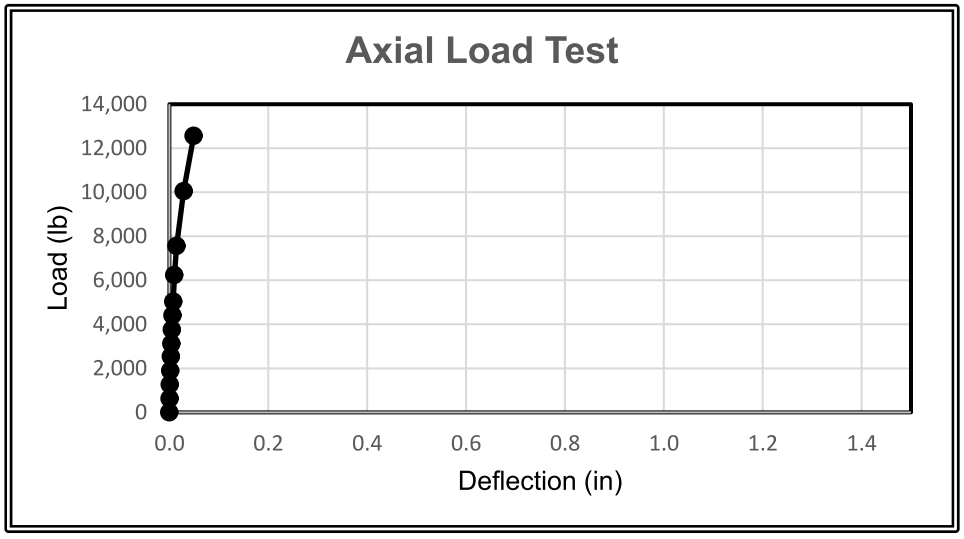
Technician: MG
Test Date: 10/31/2020

Test Location: **PLT-28**

Notes:

Pile Indentifier: PLT-28C
Pile Type: W6x15
Embedment Depth: 7.85 ft
Pile Reveal: 62 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,410	0.007
630	0.001	5,030	0.008
1,270	0.001	6,240	0.010
1,890	0.002	7,560	0.015
2,540	0.003	10,050	0.029
3,120	0.004	12,560	0.049
3,760	0.005		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

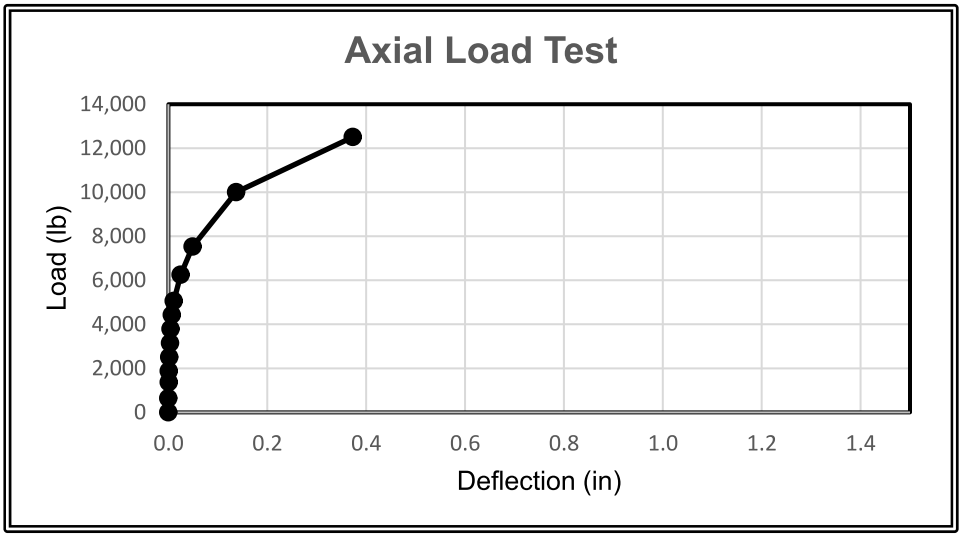
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-29**

Notes:

Pile Indentifier: PLT-29A
Pile Type: W6x8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,430	0.007
640	0.000	5,060	0.011
1,370	0.001	6,250	0.025
1,880	0.001	7,530	0.049
2,510	0.002	10,000	0.137
3,150	0.004	12,510	0.373
3,790	0.005		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

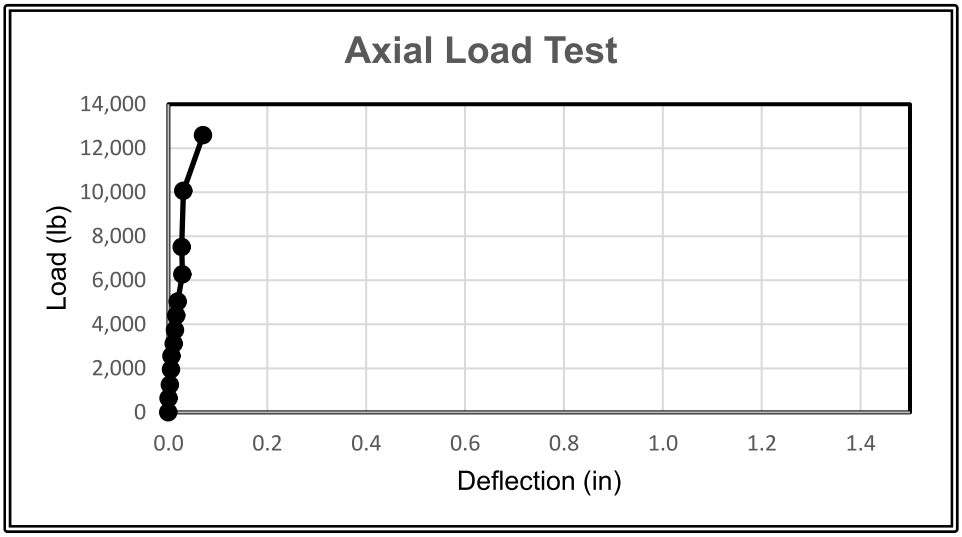
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-29**

Notes:

Pile Indentifier: PLT-29B
Pile Type: W6x8.5
Embedment Depth: 9.92 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,400	0.016
640	0.001	5,030	0.019
1,250	0.003	6,270	0.029
1,950	0.006	7,510	0.027
2,560	0.007	10,060	0.031
3,120	0.011	12,590	0.070
3,740	0.014		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

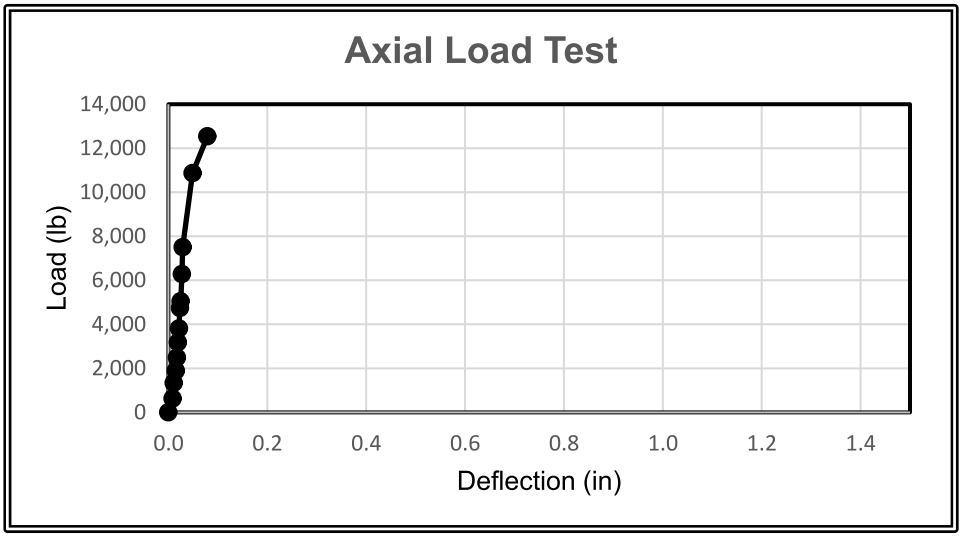
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-29**

Notes:

Pile Indentifier: PLT-29C
Pile Type: W6x15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,740	0.024
630	0.009	5,050	0.025
1,340	0.011	6,280	0.028
1,890	0.015	7,500	0.029
2,490	0.018	10,870	0.049
3,180	0.020	12,540	0.079
3,810	0.022		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

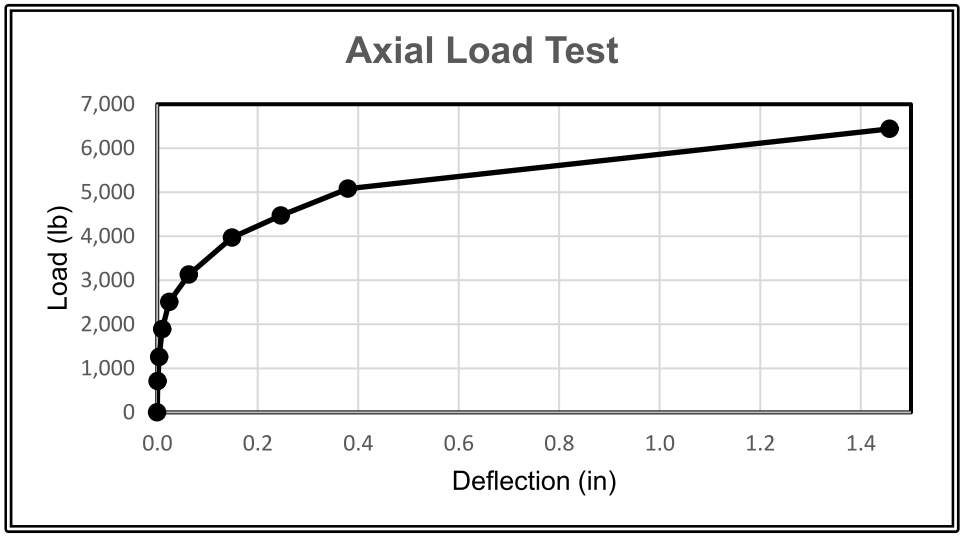
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-30**

Notes:

Pile Indentifier: PLT-30A
Pile Type: W6x8.5
Embedment Depth: 6.10 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,470	0.246
710	0.001	5,080	0.380
1,260	0.004	6,440	1.458
1,890	0.010		
2,510	0.024		
3,130	0.063		
3,970	0.149		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

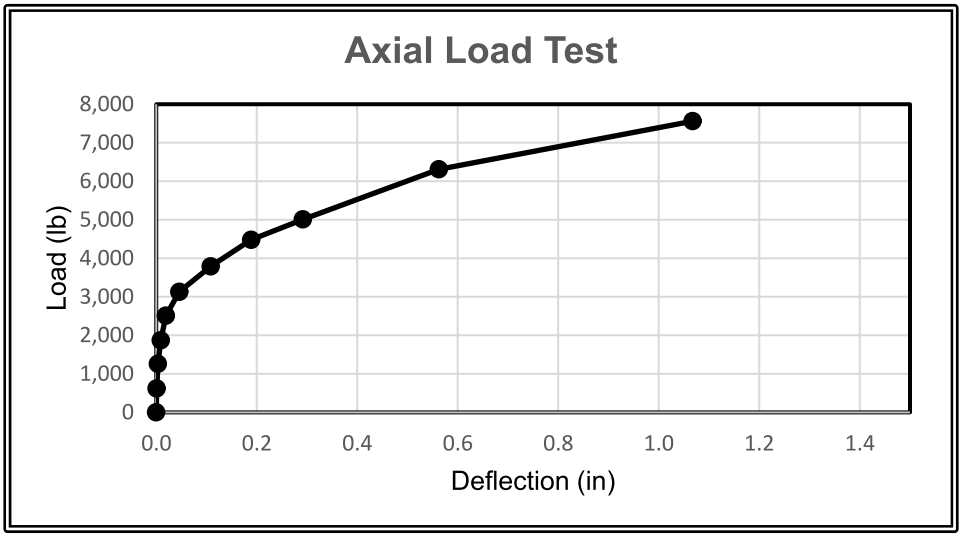
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-30**

Notes:

Pile Indentifier: PLT-30B
Pile Type: W6x8.5
Embedment Depth: 10.02 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,480	0.189
620	0.001	5,010	0.292
1,260	0.004	6,310	0.563
1,870	0.009	7,560	1.068
2,510	0.020		
3,130	0.046		
3,790	0.109		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

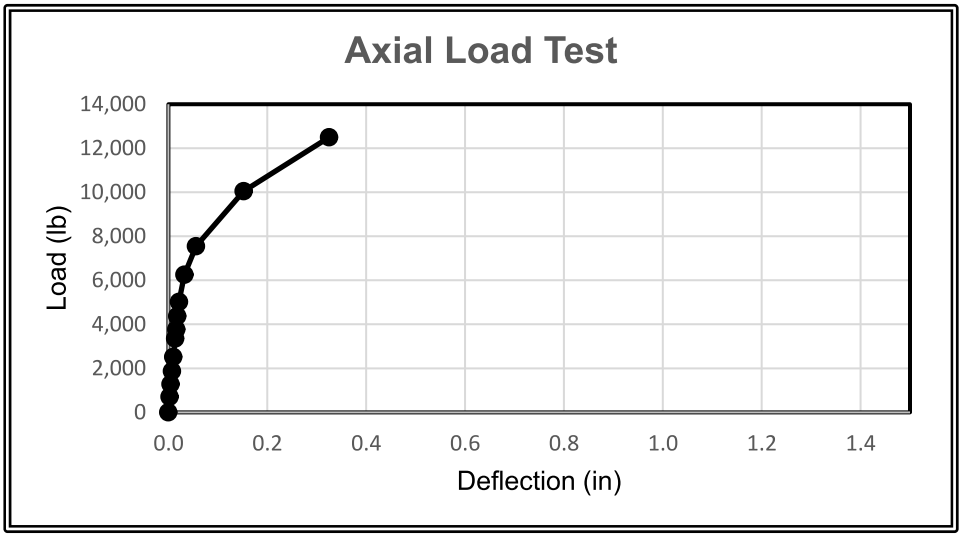
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-30**

Notes:

Pile Indentifier: PLT-30C
Pile Type: W6x15
Embedment Depth: 8.15 ft
Pile Reveal: 58 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,370	0.018
710	0.003	5,020	0.022
1,280	0.005	6,250	0.033
1,870	0.008	7,550	0.056
2,520	0.010	10,050	0.153
3,350	0.014	12,500	0.325
3,770	0.016		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

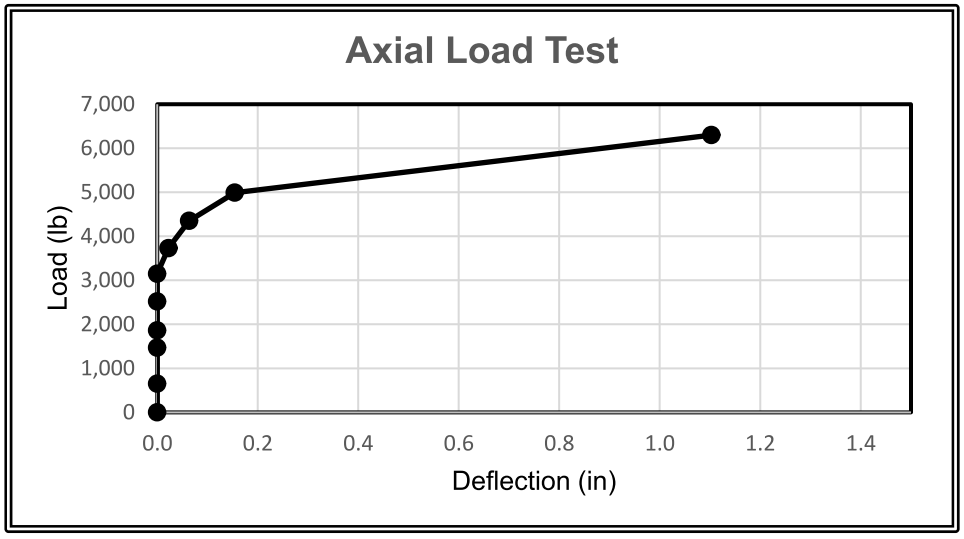
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-31**

Notes:

Pile Indentifier: PLT-31A
Pile Type: W6x8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,350	0.064
650	0.000	4,990	0.155
1,470	0.000	6,300	1.103
1,860	0.000		
2,520	0.000		
3,150	0.000		
3,730	0.023		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

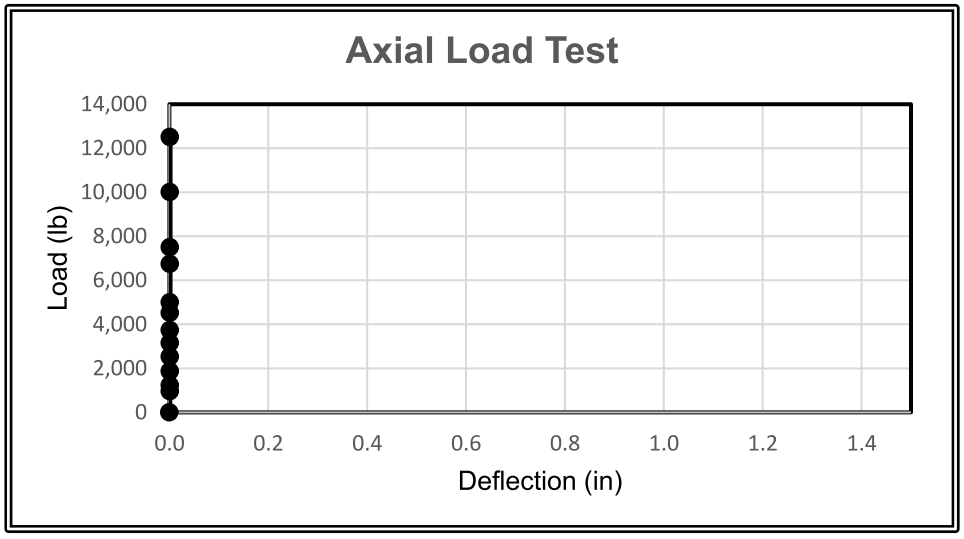
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-31**

Notes:

Pile Indentifier: PLT-31B
Pile Type: W6x8.5
Embedment Depth: 10.08 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,520	0.001
960	0.001	5,000	0.001
1,230	0.001	6,750	0.001
1,870	0.001	7,500	0.001
2,530	0.001	10,010	0.001
3,160	0.001	12,510	0.001
3,740	0.001		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

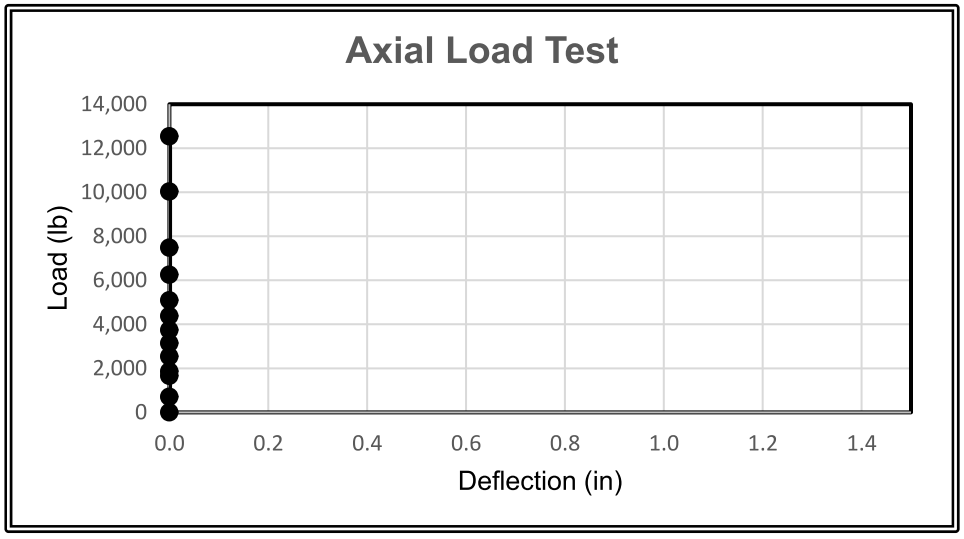
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-31**

Notes:

Pile Indentifier: PLT-31C
Pile Type: W6x15
Embedment Depth: 7.92 ft
Pile Reveal: 61 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,380	0.000
710	0.000	5,090	0.000
1,660	0.000	6,250	0.000
1,860	0.000	7,480	0.000
2,540	0.000	10,030	0.000
3,140	0.000	12,540	0.000
3,740	0.000		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

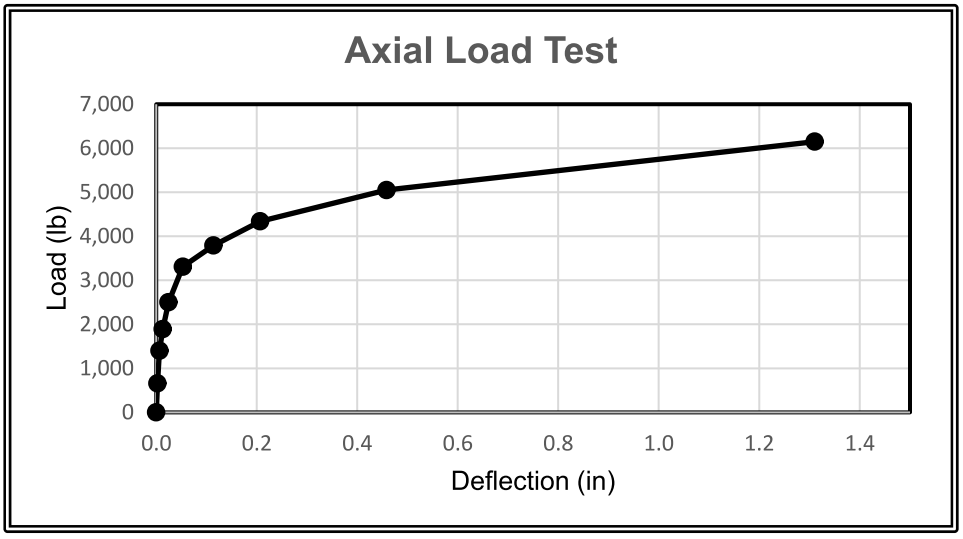
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-32**

Notes:

Pile Indentifier: PLT-32A
Pile Type: W6x8.5
Embedment Depth: 6.02 ft
Pile Reveal: 60 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,340	0.207
660	0.003	5,050	0.459
1,400	0.007	6,150	1.311
1,890	0.013		
2,500	0.025		
3,310	0.053		
3,790	0.114		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

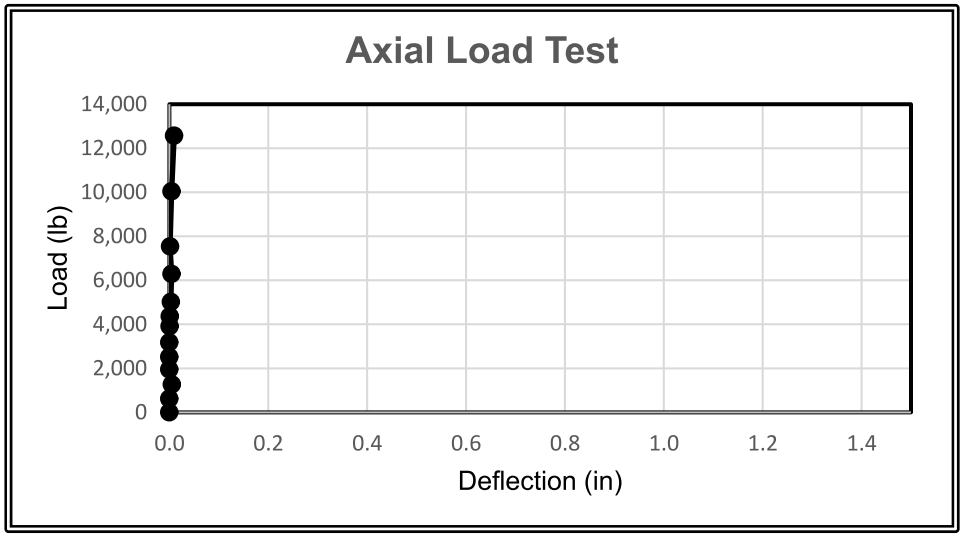
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-32**

Notes:

Pile Indentifier: PLT-32B
Pile Type: W6x8.5
Embedment Depth: 10.08 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,360	0.001
620	0.000	5,020	0.003
1,270	0.005	6,290	0.005
1,950	0.000	7,540	0.002
2,520	0.000	10,040	0.005
3,180	0.000	12,570	0.010
3,910	0.001		



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Axial Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

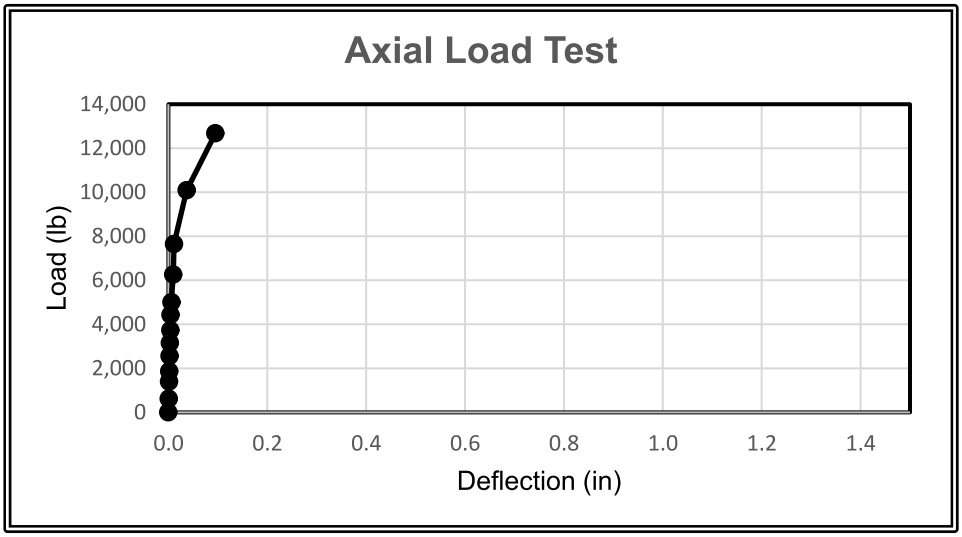
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-32**

Notes:

Pile Indentifier: PLT-32C
Pile Type: W6x15
Embedment Depth: 8.08 ft
Pile Reveal: 59 in

Load (lb)	Deflection (in)	Load (lb)	Deflection (in)
0	0.000	4,430	0.005
620	0.001	5,000	0.007
1,400	0.002	6,260	0.010
1,860	0.002	7,650	0.012
2,560	0.003	10,090	0.037
3,160	0.003	12,680	0.095
3,730	0.004		



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

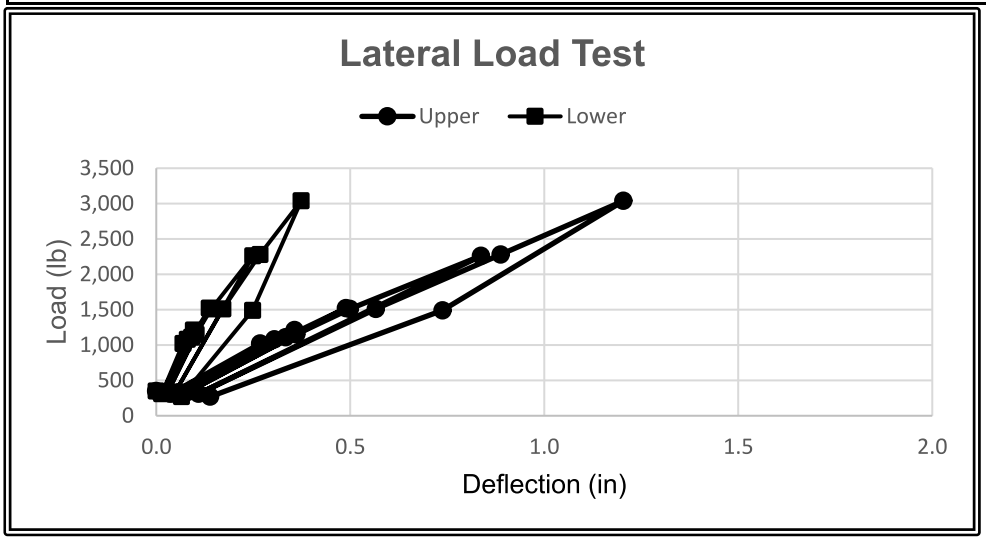
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-1**

Pile Indentifier: PLT-1A
Pile Type: W6X8.5
Embedment Depth: 5.88 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 47.5 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
350	0.000	0.000	330	0.079	0.030
			1150	0.361	0.103
1020	0.268	0.069	1510	0.500	0.142
310	0.037	0.014	2260	0.837	0.249
1080	0.305	0.081	310	0.109	0.047
1210	0.357	0.096	1510	0.566	0.172
330	0.057	0.022	2280	0.888	0.268
1110	0.334	0.092	3040	1.204	0.374
1520	0.489	0.137	1490	0.738	0.249
330	0.079	0.030	270	0.139	0.065



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

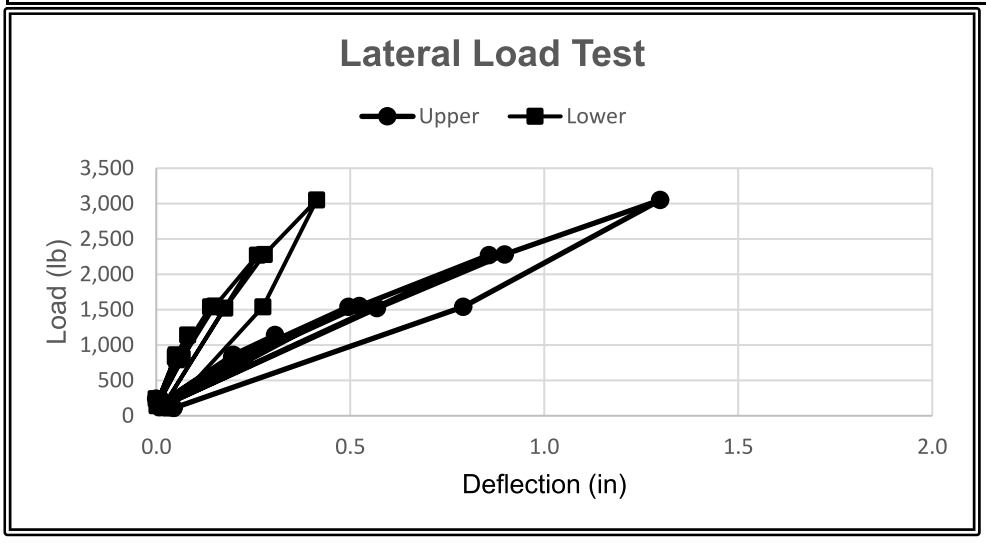
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-1**

Pile Indentifier: PLT-1B
Pile Type: W6X8.5
Embedment Depth: 9.42 ft
Pile Reveal: 67 in

Load Application Height: 48 in
Upper Measurement Height: 47.75 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
240	0.000	0.000	140	0.019	0.003
			810	0.228	0.067
830	0.196	0.050	1550	0.524	0.151
200	0.018	0.003	2270	0.858	0.261
860	0.199	0.051	120	0.009	0.017
1140	0.307	0.081	1520	0.569	0.177
150	0.025	0.003	2280	0.898	0.279
790	0.196	0.053	3050	1.299	0.414
1540	0.496	0.140	1540	0.792	0.275
140	0.019	0.003	110	0.045	0.036



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

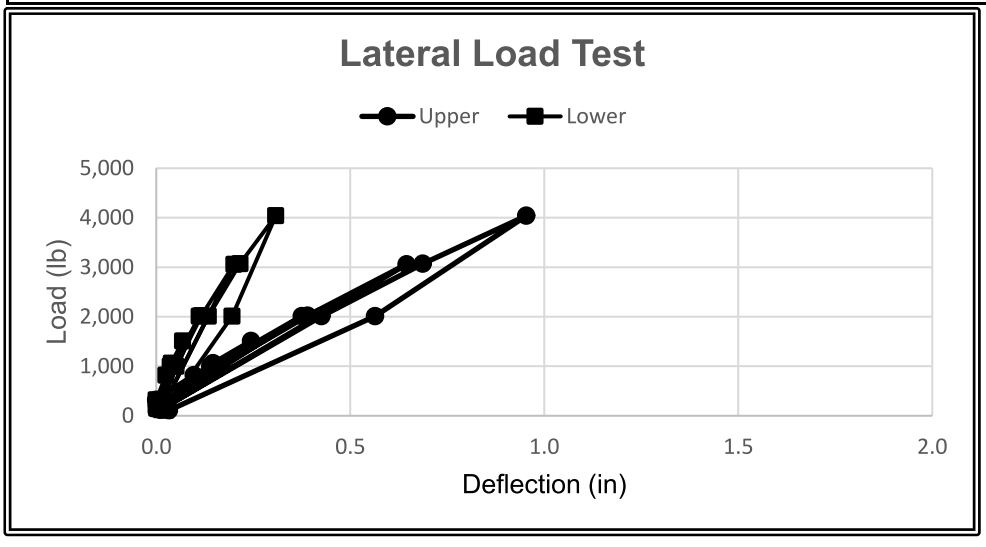
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-1**

Pile Indentifier: PLT-1C
Pile Type: W6X8.5
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 47.75 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.000	0.000	140	0.004	0.006
820	0.097	0.025	1000	0.167	0.051
1000	0.140	0.036	2020	0.390	0.117
190	0.010	0.000	3060	0.646	0.201
1060	0.147	0.039	120	0.011	0.013
1510	0.245	0.068	2010	0.426	0.135
150	0.013	0.001	3070	0.687	0.216
1020	0.155	0.045	4040	0.954	0.308
2010	0.375	0.111	2010	0.564	0.196
140	0.004	0.006	110	0.033	0.025



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

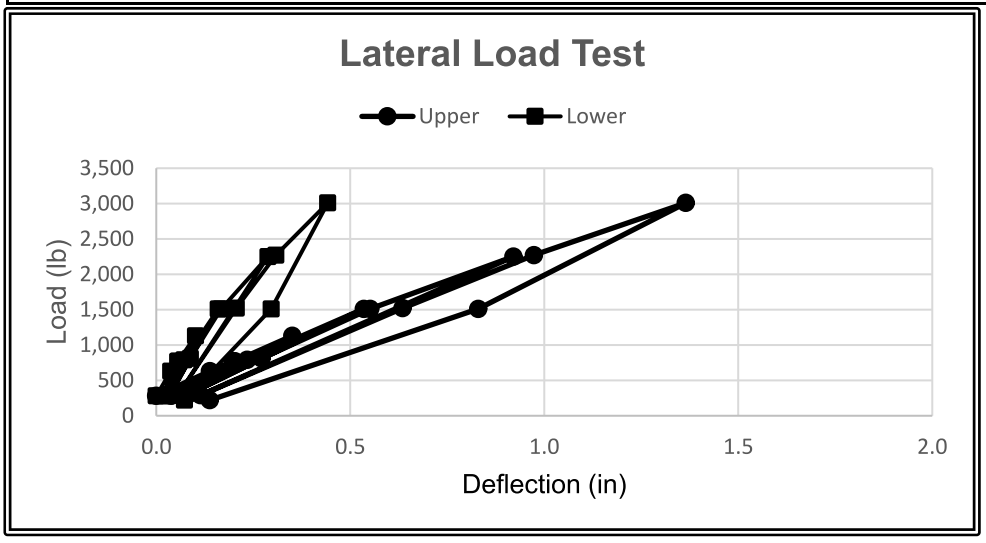
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-2**

Pile Indentifier: PLT-2A
Pile Type: W6X8.5
Embedment Depth: 5.79 ft
Pile Reveal: 63 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
280	0.000	0.000	300	0.083	0.037
630	0.139	0.038	810	0.272	0.088
770	0.198	0.056	1510	0.552	0.168
280	0.039	0.016	2250	0.921	0.288
770	0.203	0.057	290	0.114	0.056
1130	0.351	0.102	1520	0.635	0.207
280	0.064	0.027	2270	0.974	0.309
790	0.235	0.072	3010	1.365	0.442
1510	0.535	0.160	1510	0.830	0.297
300	0.083	0.037	220	0.138	0.073



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

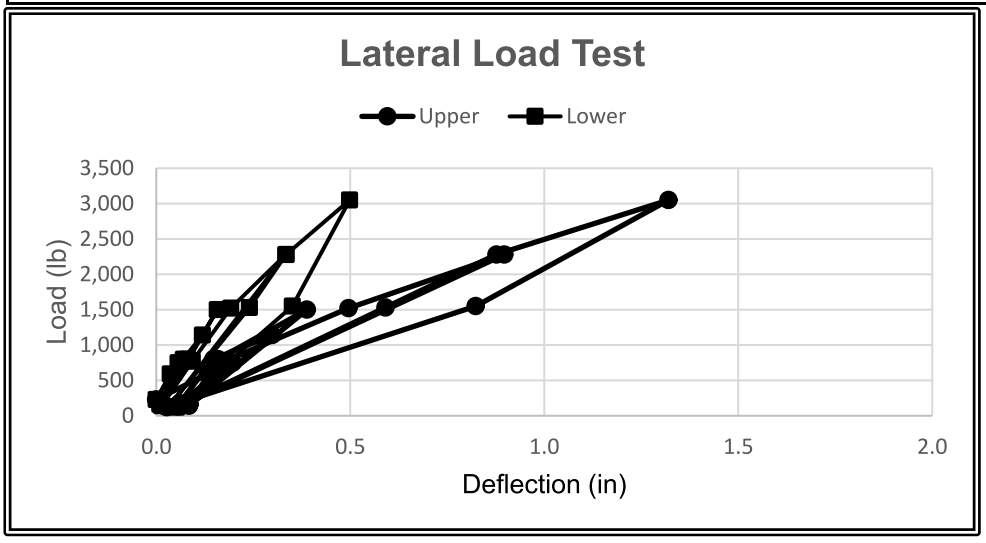
Technician: DH
Test Date: 11/5/2020

Test Location: **PLT-2**

Pile Indentifier: PLT-2B
Pile Type: W6X8.5
Embedment Depth: 9.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
230	0.000	0.000	140	0.085	0.014
590	0.134	0.036	770	0.177	0.093
750	0.198	0.057	1520	0.496	0.192
180	0.061	0.011	2280	0.898	0.334
800	0.148	0.070	130	0.057	0.033
1140	0.299	0.119	1530	0.591	0.241
160	0.086	0.010	2280	0.877	0.335
800	0.160	0.081	3050	1.321	0.499
1500	0.389	0.158	1550	0.824	0.351
140	0.085	0.014	120	0.027	0.053



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

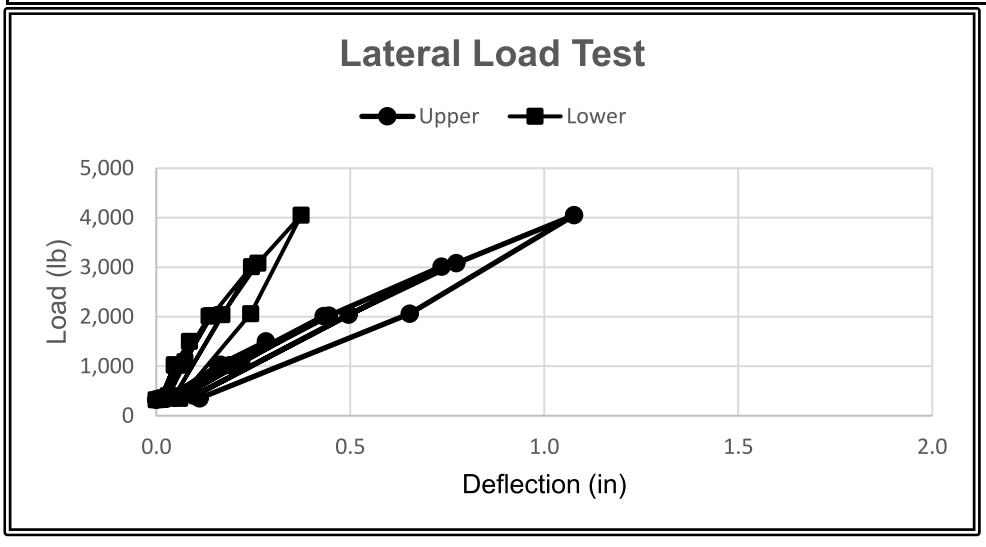
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-2**

Pile Indentifier: PLT-2C
Pile Type: W6X15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.000	0.000	400	0.070	0.031
			1090	0.219	0.074
1030	0.166	0.047	2020	0.446	0.143
340	0.026	0.011	3010	0.736	0.246
1020	0.161	0.047	400	0.098	0.048
1500	0.283	0.086	2040	0.496	0.170
360	0.048	0.020	3080	0.774	0.262
1020	0.190	0.060	4050	1.077	0.374
2010	0.432	0.137	2060	0.654	0.244
400	0.070	0.031	350	0.112	0.061



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

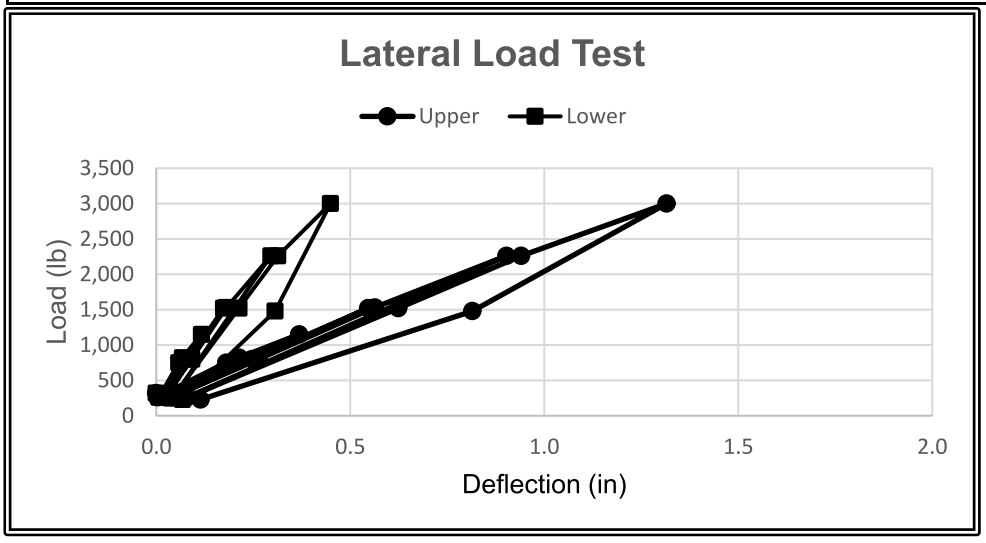
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-3**

Pile Indentifier: PLT-3A
Pile Type: W6x8.5
Embedment Depth: 5.88 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.000	0.000	260	0.039	0.025
			800	0.264	0.092
750	0.181	0.058	1530	0.564	0.181
260	0.003	0.007	2260	0.903	0.296
820	0.214	0.068	250	0.077	0.042
1150	0.369	0.117	1520	0.624	0.214
260	0.023	0.016	2260	0.941	0.314
800	0.247	0.083	3000	1.316	0.449
1520	0.547	0.174	1480	0.815	0.307
260	0.039	0.025	230	0.114	0.068



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

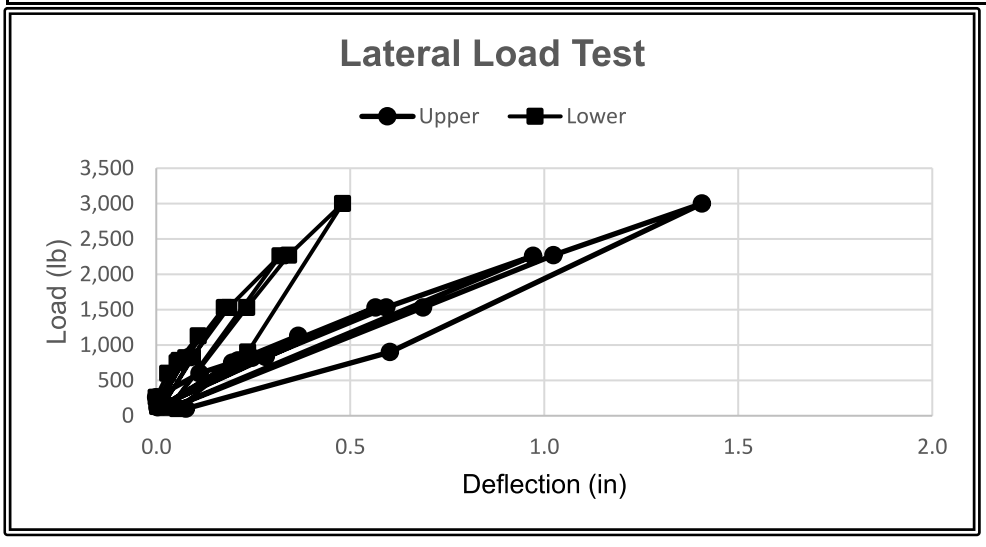
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-3**

Pile Indentifier: PLT-3B
Pile Type: W6x8.5
Embedment Depth: 9.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
260	0.000	0.000	120	0.003	0.014
600	0.112	0.030	830	0.282	0.094
750	0.196	0.054	1530	0.593	0.187
160	0.024	0.003	2260	0.972	0.319
780	0.211	0.059	120	0.042	0.036
1130	0.366	0.109	1530	0.688	0.234
130	0.015	0.004	2270	1.024	0.342
820	0.248	0.076	3000	1.407	0.481
1530	0.566	0.176	900	0.603	0.236
120	0.003	0.014	100	0.077	0.055



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

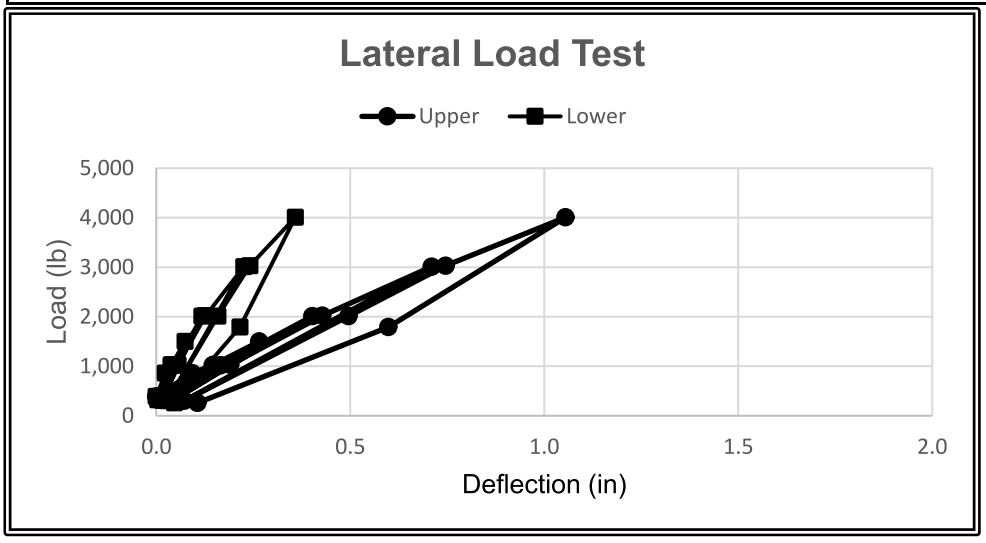
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-3C**

Pile Indentifier: PLT-3C
Pile Type: W6x15
Embedment Depth: 7.81 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
390	0.000	0.000	310	0.042	0.016
860	0.093	0.024	1030	0.191	0.057
1030	0.148	0.039	2020	0.428	0.127
320	0.011	0.004	3010	0.710	0.226
1020	0.146	0.039	300	0.072	0.029
1500	0.266	0.075	2010	0.496	0.159
330	0.029	0.010	3030	0.746	0.242
1020	0.167	0.047	4010	1.055	0.359
2010	0.403	0.118	1790	0.599	0.216
310	0.042	0.016	260	0.107	0.048



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

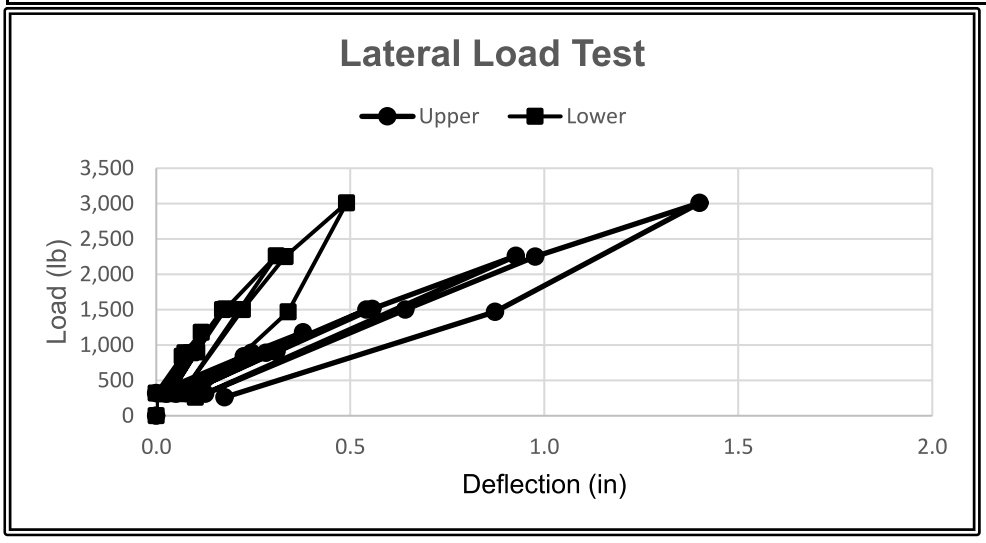
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-4**

Pile Indentifier: PLT-4A
Pile Type: W6x8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	320	0.077	0.039
320	0.000	0.000	900	0.310	0.105
840	0.226	0.067	1510	0.557	0.179
310	0.027	0.016	2260	0.927	0.310
890	0.246	0.074	310	0.126	0.066
1180	0.379	0.116	1500	0.642	0.222
310	0.051	0.026	2250	0.977	0.333
890	0.283	0.090	3010	1.401	0.491
1500	0.542	0.171	1470	0.874	0.340
320	0.077	0.039	260	0.176	0.101



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

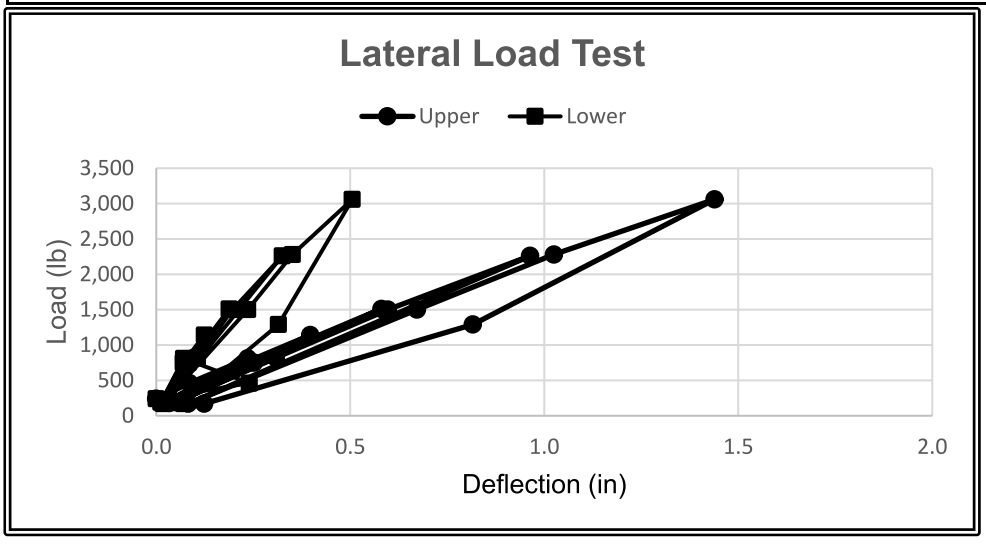
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-4B**

Pile Indentifier: PLT-4B
Pile Type: W6x8.5
Embedment Depth: 9.25 ft
Pile Reveal: 69 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
240	0.000	0.000	190	0.051	0.030
460	0.240	0.086	820	0.309	0.107
810	0.236	0.071	1500	0.597	0.197
190	0.023	0.012	2260	0.964	0.325
750	0.229	0.070	170	0.083	0.018
1140	0.397	0.124	1500	0.672	0.236
180	0.034	0.020	2280	1.025	0.351
750	0.252	0.083	3060	1.439	0.505
1510	0.581	0.188	1290	0.816	0.315
190	0.051	0.030	170	0.124	0.071



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

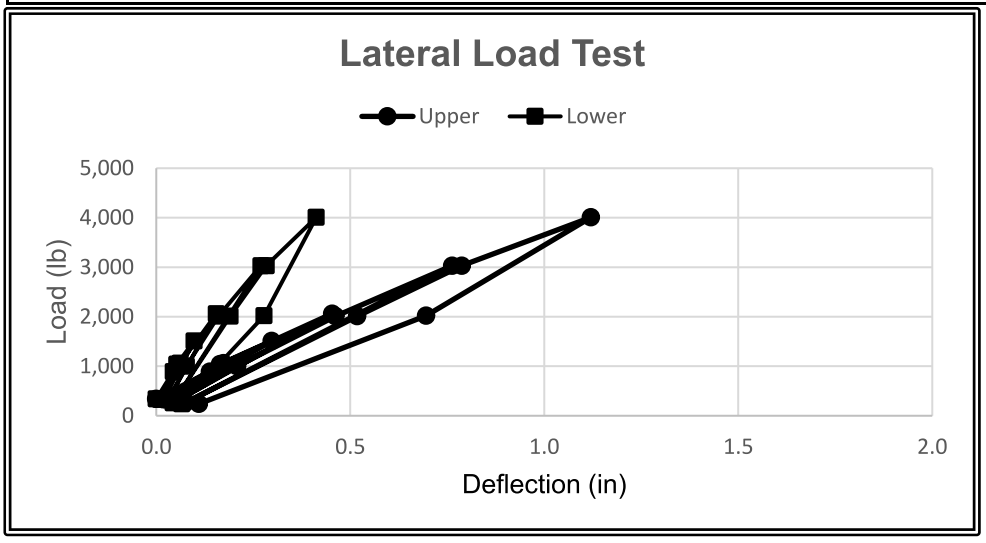
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-4**

Pile Indentifier: PLT-4C
Pile Type: W6x15
Embedment Depth: 8.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
340	0.000	0.000	320	0.057	0.031
890	0.139	0.044	1000	0.209	0.078
1030	0.171	0.054	2010	0.462	0.160
330	0.023	0.012	3030	0.763	0.270
1040	0.165	0.054	260	0.075	0.044
1510	0.298	0.098	2010	0.518	0.191
330	0.036	0.020	3030	0.788	0.284
1060	0.174	0.062	4010	1.121	0.413
2060	0.454	0.155	2020	0.696	0.278
320	0.057	0.031	240	0.110	0.066



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

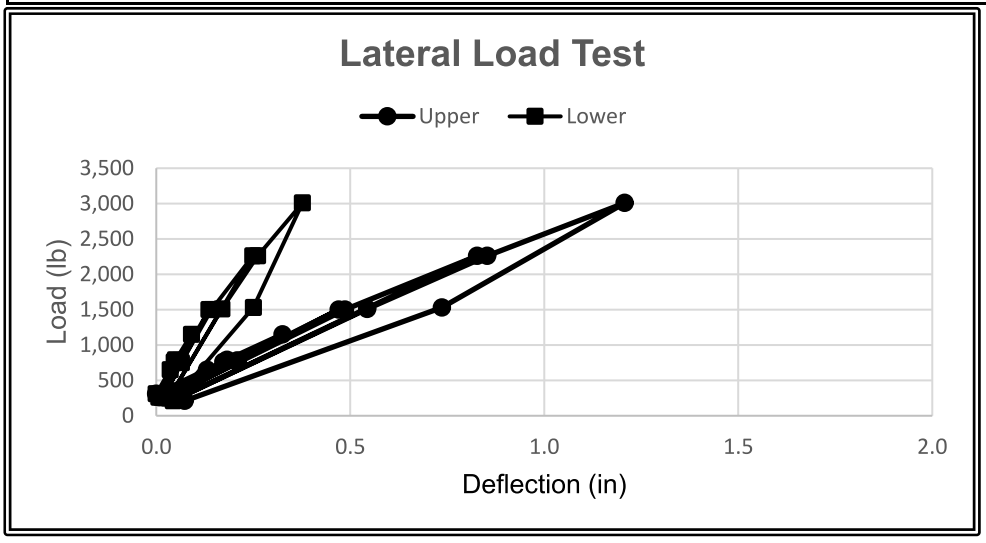
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-6**

Pile Indentifier: PLT-6A
Pile Type: W6X8.5
Embedment Depth: 5.92 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
310	0.000	0.000	270	0.037	0.020
650	0.131	0.036	750	0.211	0.065
760	0.173	0.047	1500	0.487	0.143
260	0.009	0.007	2260	0.827	0.249
790	0.183	0.050	250	0.058	0.033
1150	0.326	0.091	1510	0.544	0.170
260	0.021	0.013	2260	0.853	0.262
780	0.209	0.061	3010	1.208	0.377
1500	0.471	0.136	1530	0.737	0.251
270	0.037	0.020	210	0.074	0.044



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

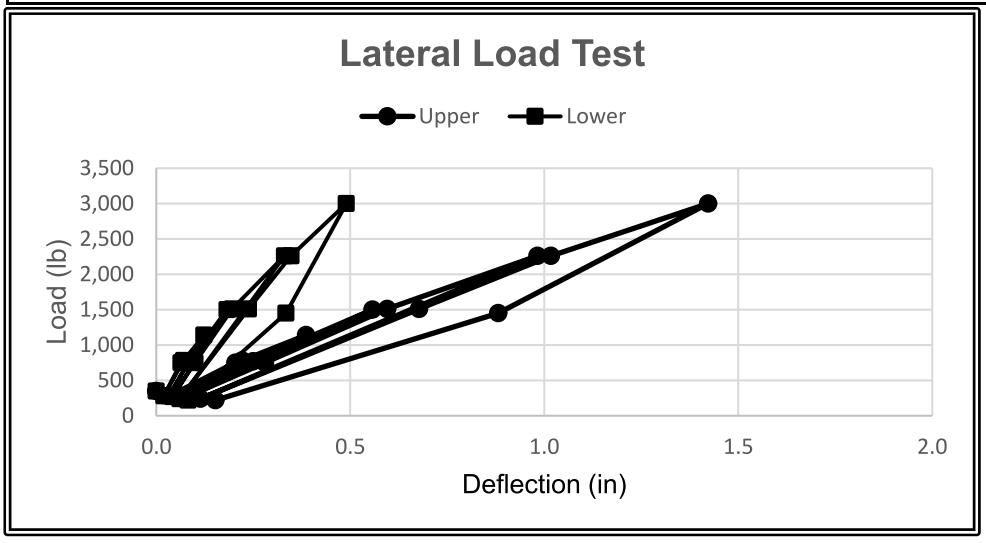
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-6**

Pile Indentifier: PLT-6B
Pile Type: W6X8.5
Embedment Depth: 9.88 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
350	0.000	0.000	270	0.081	0.043
			750	0.281	0.100
750	0.204	0.064	1510	0.596	0.196
280	0.036	0.020	2260	0.983	0.331
780	0.222	0.071	240	0.114	0.061
1140	0.387	0.123	1510	0.678	0.238
280	0.062	0.033	2260	1.018	0.348
770	0.250	0.085	3000	1.423	0.490
1500	0.558	0.183	1450	0.882	0.335
270	0.081	0.043	220	0.153	0.082



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

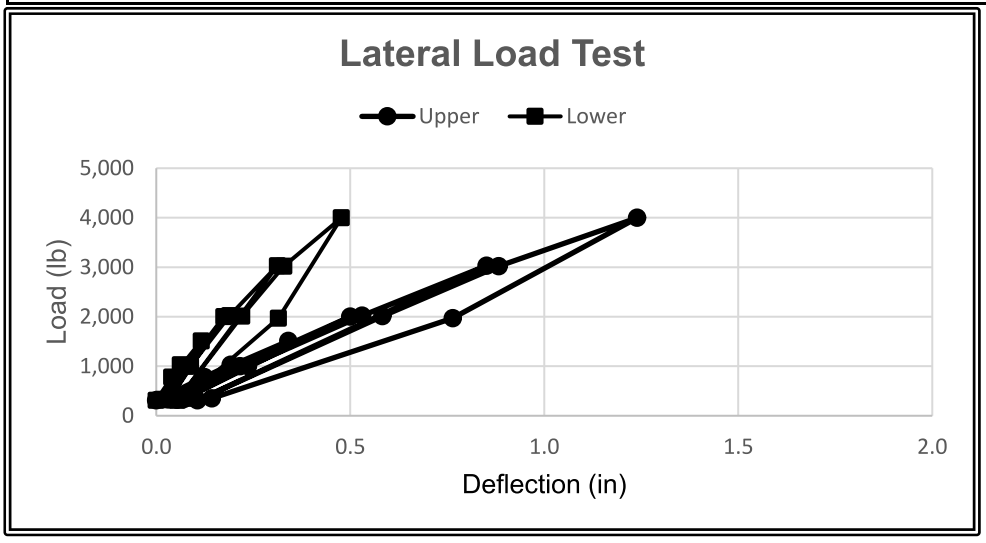
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-6**

Pile Indentifier: PLT-6C
Pile Type: W6X15
Embedment Depth: 8.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
310	0.000	0.000	330	0.070	0.035
780	0.125	0.040	1000	0.237	0.089
1030	0.192	0.062	2020	0.531	0.189
330	0.032	0.016	3030	0.852	0.313
1010	0.194	0.065	310	0.107	0.055
1510	0.341	0.116	2010	0.583	0.221
320	0.054	0.026	3020	0.883	0.329
1000	0.216	0.077	4000	1.240	0.477
2000	0.500	0.175	1970	0.765	0.315
330	0.070	0.035	350	0.144	0.076



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

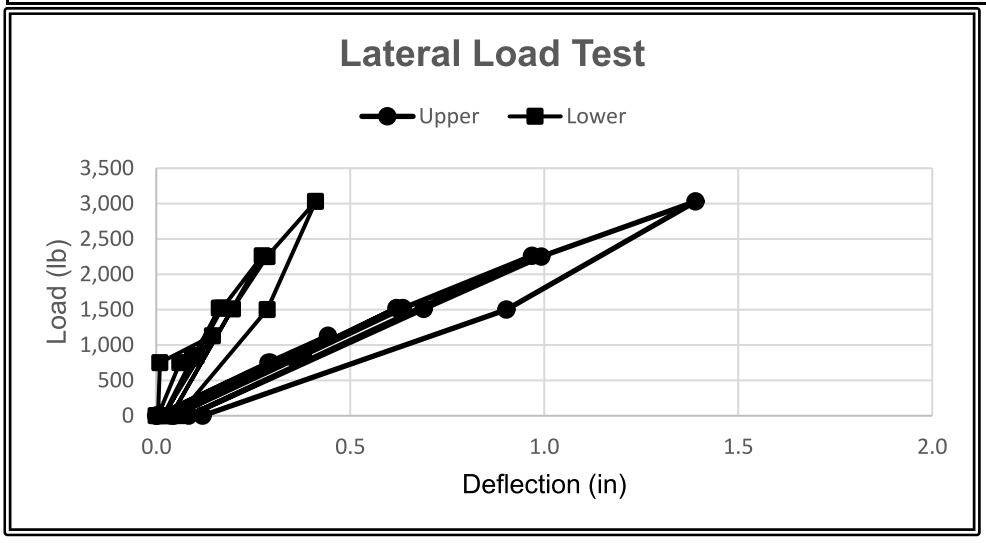
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-8**

Pile Indentifier: PLT-8A
Pile Type: W6x8.5
Embedment Depth: 5.92 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.045	0.022
			850	0.378	0.103
750	0.295	0.061	1520	0.636	0.170
0	0.002	0.005	2260	0.969	0.274
750	0.290	0.010	0	0.084	0.038
1130	0.443	0.145	1510	0.690	0.197
0	0.040	0.018	2250	0.993	0.286
810	0.357	0.094	3030	1.390	0.411
1520	0.620	0.163	1500	0.903	0.286
0	0.045	0.022	0	0.120	0.057



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

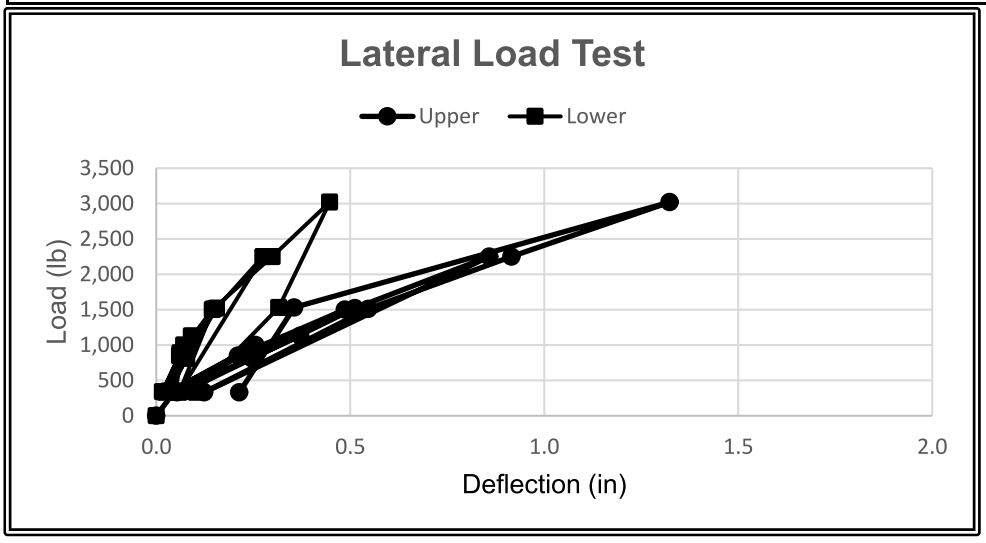
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-8**

Pile Indentifier: PLT-8B
Pile Type: W6X8.5
Embedment Depth: 9.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	350	0.075	0.033
350	0.048	0.049	810	0.247	0.079
1000	0.256	0.071	1520	0.512	0.156
340	0.037	0.016	2250	0.859	0.275
850	0.211	0.060	330	0.124	0.059
1130	0.371	0.091	1510	0.547	0.147
330	0.054	0.024	2250	0.916	0.299
890	0.229	0.062	3020	1.324	0.447
1500	0.486	0.145	1530	0.356	0.316
350	0.075	0.033	330	0.214	0.103



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

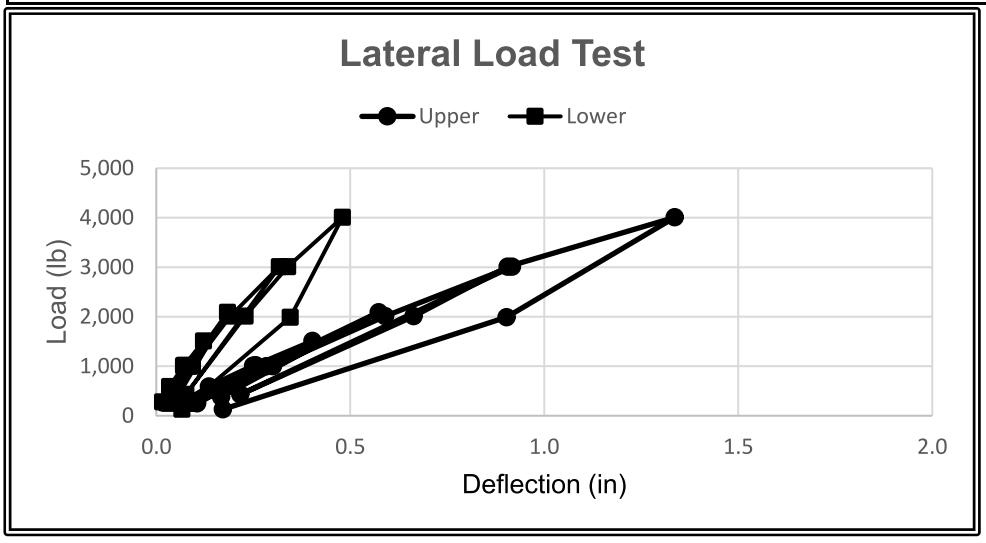
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-8**

Pile Indentifier: PLT-8C
Pile Type: w6x15
Embedment Depth: 7.90 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
280	0.070	0.017	380	0.168	0.055
590	0.136	0.035	1000	0.301	0.094
1010	0.250	0.071	2010	0.590	0.191
260	0.092	0.027	3010	0.917	0.318
1020	0.256	0.073	430	0.217	0.077
1510	0.403	0.122	2010	0.664	0.229
250	0.106	0.034	3010	0.906	0.339
1000	0.285	0.085	4010	1.337	0.480
2090	0.574	0.184	1990	0.903	0.346
380	0.168	0.055	130	0.172	0.067



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

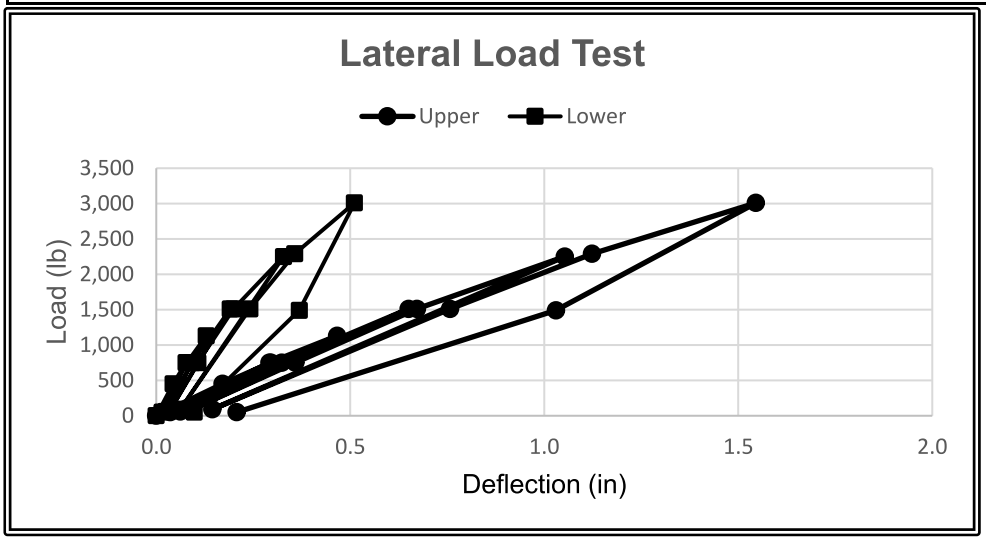
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-9**

Pile Indentifier: PLT-9A
Pile Type: W6x8.5
Embedment Depth: 5.85 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	80	0.089	0.037
450	0.171	0.044	750	0.359	0.108
750	0.296	0.077	1510	0.672	0.200
50	0.036	0.015	2250	1.053	0.328
750	0.292	0.079	90	0.145	0.062
1130	0.467	0.129	1510	0.758	0.242
60	0.062	0.025	2290	1.124	0.357
750	0.324	0.094	3010	1.546	0.511
1510	0.651	0.191	1490	1.031	0.369
80	0.089	0.037	50	0.208	0.098



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

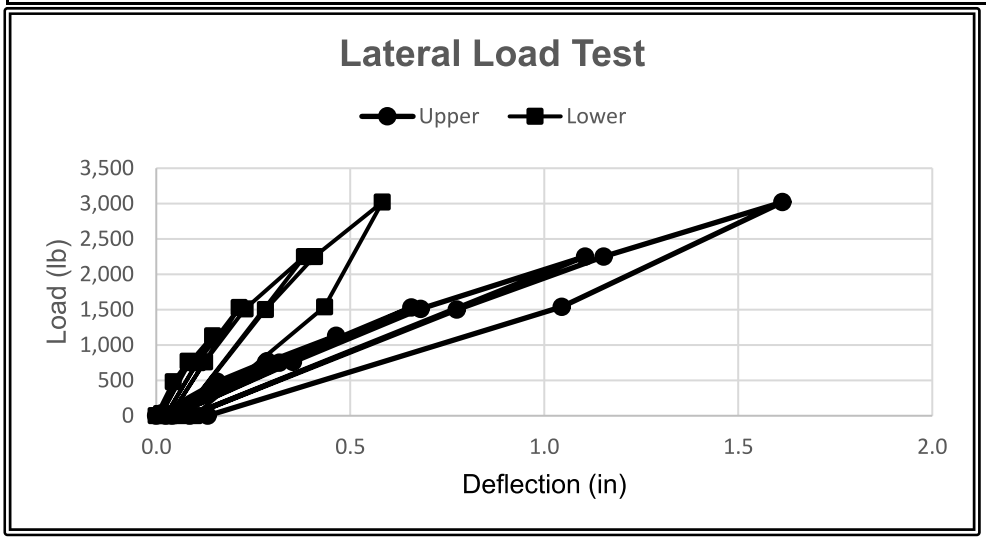
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-9**

Pile Indentifier: PLT-9B
Pile Type: W6x8.5
Embedment Depth: 9.90 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.041	0.036
480	0.157	0.044	760	0.353	0.125
770	0.286	0.083	1510	0.682	0.229
30	0.013	0.014	2250	1.106	0.382
750	0.283	0.086	0	0.087	0.066
1130	0.464	0.146	1500	0.775	0.282
0	0.025	0.024	2250	1.154	0.408
750	0.318	0.106	3020	1.614	0.583
1530	0.658	0.214	1540	1.046	0.434
0	0.041	0.036	0	0.133	0.098



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

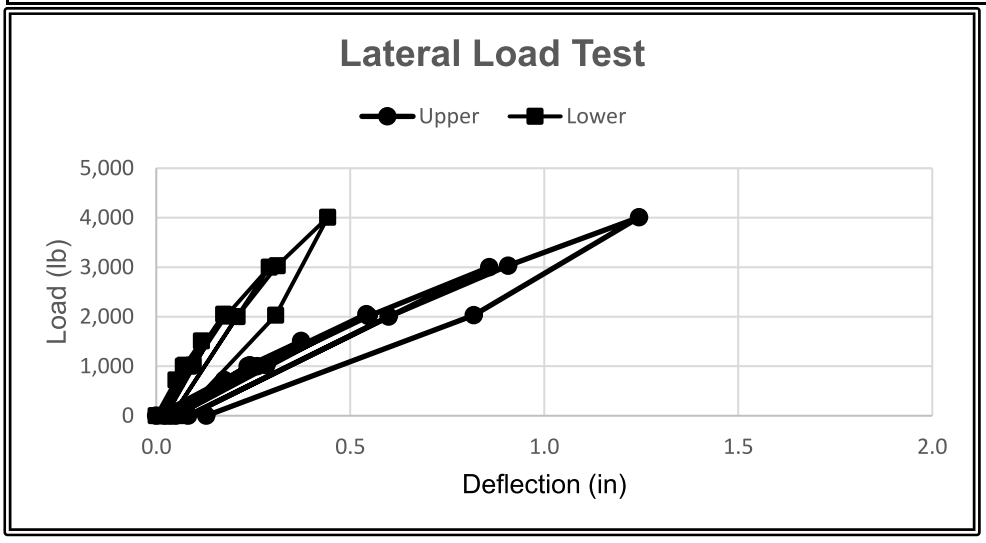
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-9**

Pile Indentifier: PLT-9C
Pile Type: W6x15
Embedment Depth: 7.96 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.050	0.025
720	0.175	0.051	1020	0.284	0.096
1000	0.236	0.070	2010	0.547	0.179
0	0.022	0.013	3000	0.859	0.292
1020	0.241	0.074	0	0.083	0.042
1510	0.374	0.117	2000	0.599	0.209
0	0.037	0.018	3030	0.907	0.312
1000	0.260	0.084	4010	1.245	0.442
2050	0.542	0.174	2030	0.819	0.308
0	0.050	0.025	0	0.129	0.064



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

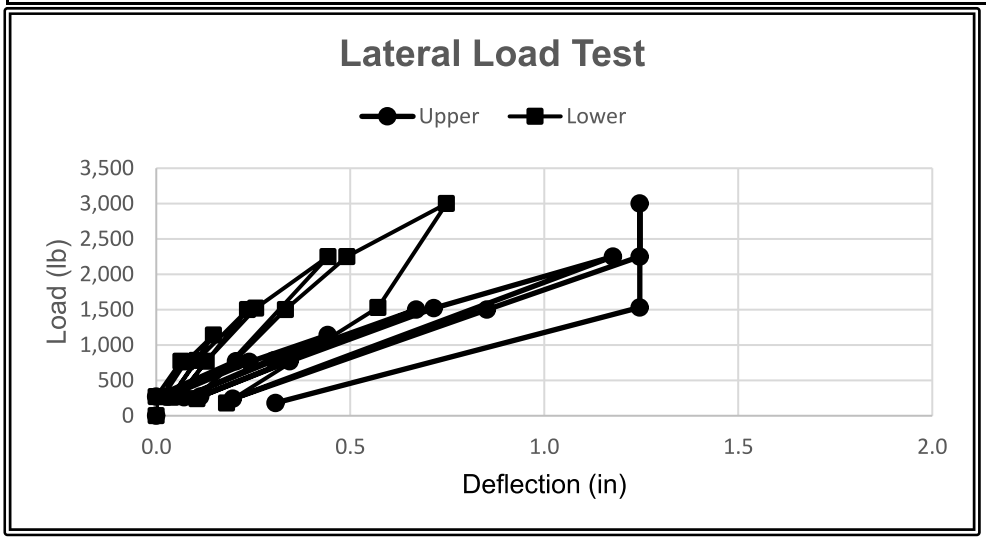
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-10**

Pile Indentifier: PLT-10A
Pile Type: W6x8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	270	0.114	0.058
270	0.000	0.000	770	0.344	0.129
770	0.206	0.064	1520	0.716	0.257
270	0.031	0.018	2250	1.178	0.443
760	0.240	0.076	240	0.198	0.105
1140	0.442	0.148	1500	0.853	0.333
260	0.072	0.038	2250	1.246+	0.492
780	0.303	0.105	3000	1.246+	0.748
1500	0.670	0.236	1530	1.246+	0.572
270	0.114	0.058	180	0.308	0.182



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

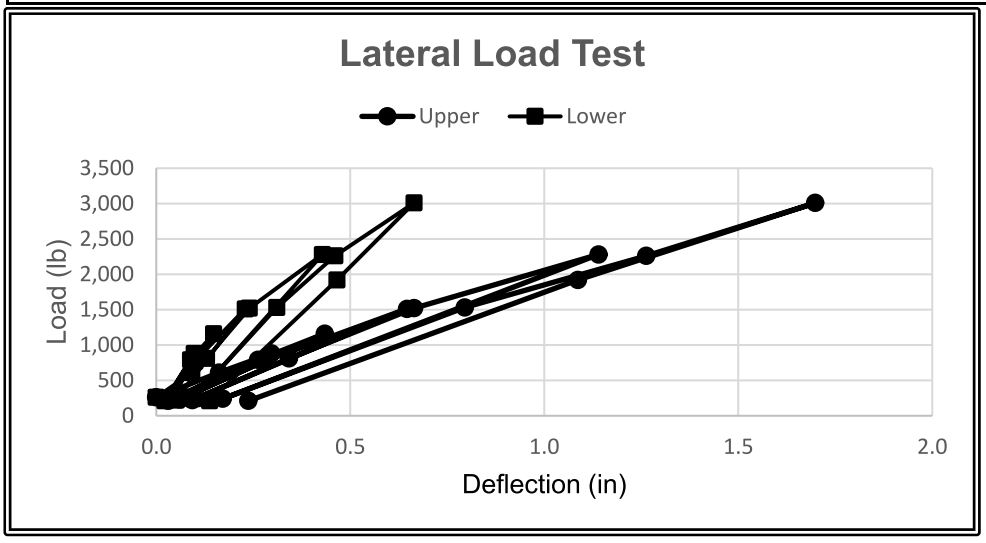
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-10**

Pile Indentifier: PLT-10B
Pile Type: W6x8.5
Embedment Depth: 10.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
260	0.000	0.000	220	0.093	0.052
610	0.162	0.092	810	0.342	0.130
880	0.297	0.098	1520	0.665	0.240
210	0.031	0.023	2280	1.140	0.429
790	0.263	0.089	240	0.172	0.096
1160	0.435	0.148	1530	0.796	0.311
230	0.061	0.034	2260	1.263	0.461
770	0.278	0.100	3010	1.699	0.665
1510	0.647	0.230	1920	1.087	0.466
220	0.093	0.052	210	0.238	0.138



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

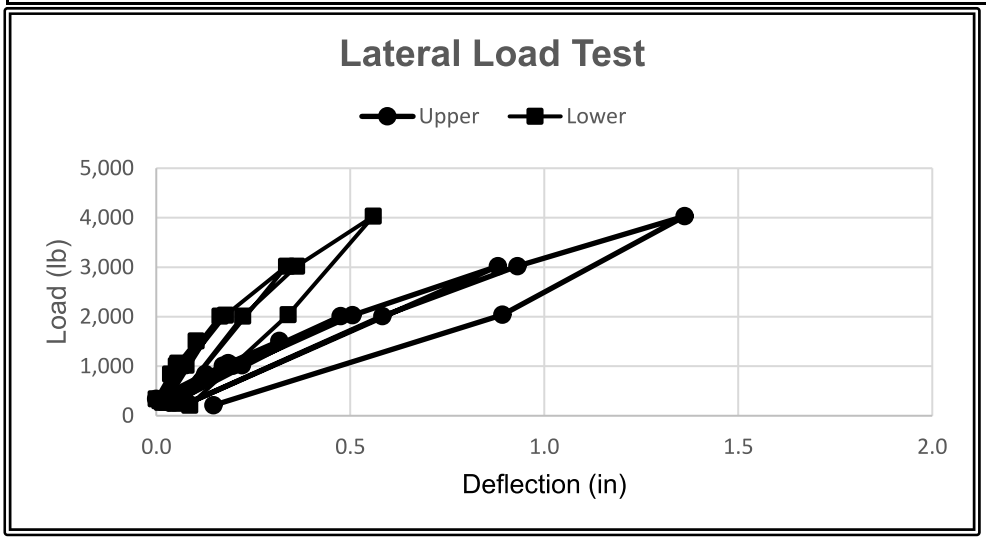
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-10**

Pile Indentifier: PLT-10C
Pile Type: W6x15
Embedment Depth: 7.96 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
340	0.000	0.000	270	0.046	0.026
840	0.127	0.037	1020	0.221	0.077
1060	0.186	0.056	2030	0.506	0.179
300	0.019	0.010	3020	0.881	0.336
1010	0.172	0.052	250	0.082	0.048
1510	0.318	0.103	2010	0.583	0.223
270	0.032	0.016	3020	0.931	0.362
1010	0.198	0.064	1030	1.362	0.560
2010	0.476	0.165	2040	0.893	0.340
270	0.046	0.026	210	0.148	0.087



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

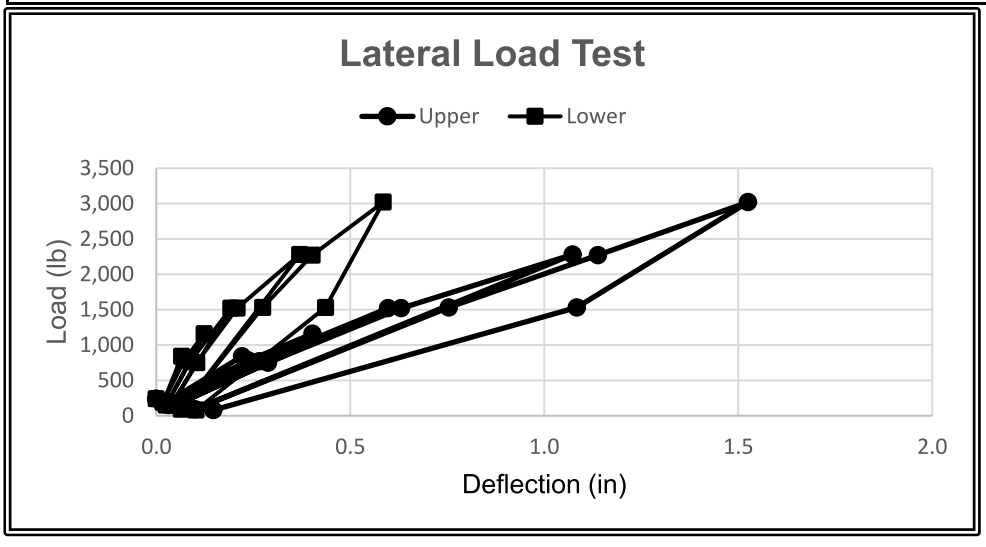
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-11**

Pile Indentifier: PLT-11A
Pile Type: W6X8.5
Embedment Depth: 6.23 ft
Pile Reveal: 57 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
240	0.000	0.000	150	0.051	0.039
			750	0.288	0.105
840	0.222	0.066	1520	0.632	0.209
190	0.027	0.018	2280	1.074	0.370
780	0.238	0.072	90	0.100	0.065
1160	0.403	0.124	1530	0.754	0.275
150	0.032	0.026	2270	1.139	0.402
770	0.266	0.088	3020	1.526	0.585
1520	0.598	0.193	1530	1.084	0.437
150	0.051	0.039	80	0.147	0.103



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

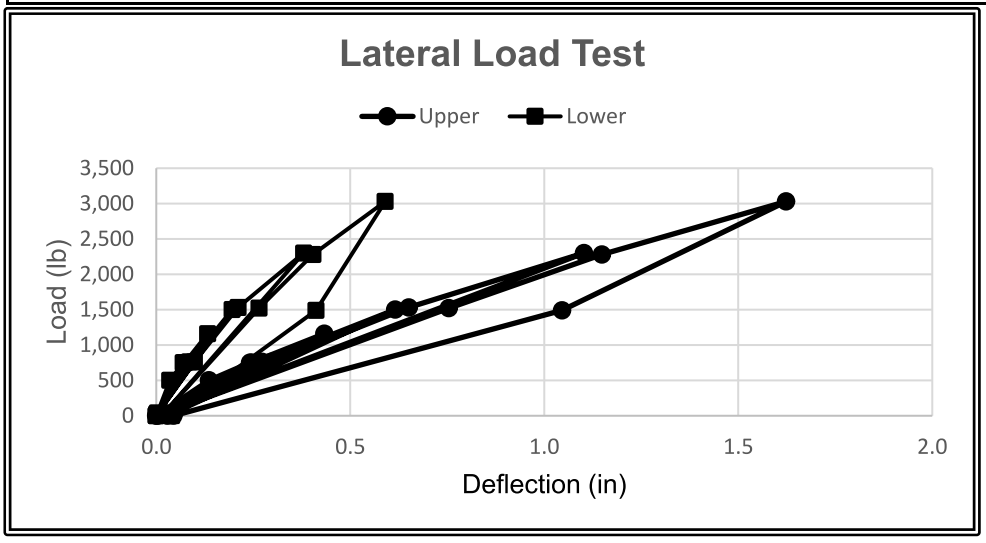
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-11**

Pile Indentifier: PLT-11B
Pile Type: W6X8.5
Embedment Depth: 10.04 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.030	0.000
500	0.136	0.035	760	0.298	0.099
750	0.242	0.070	1530	0.651	0.211
40	0.022	0.003	2300	1.103	0.380
750	0.246	0.073	0	0.004	0.014
1160	0.434	0.133	1520	0.754	0.265
20	0.016	0.001	2280	1.149	0.404
760	0.274	0.086	3030	1.624	0.590
1500	0.616	0.196	1490	1.046	0.412
0	0.030	0.000	0	0.044	0.040



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

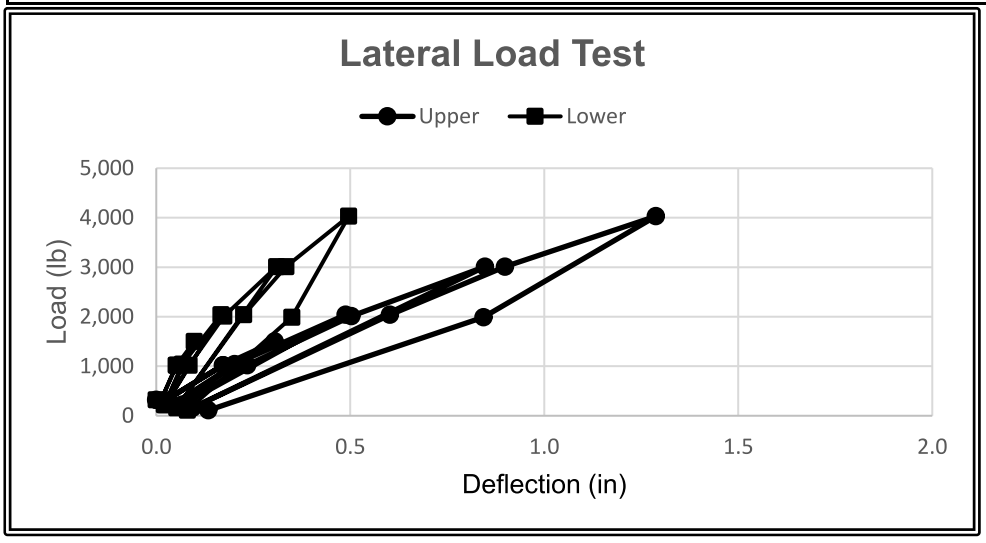
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-11**

Pile Indentifier: PLT-11C
Pile Type: W6X15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.000	0.000	220	0.066	0.024
			1020	0.235	0.085
1020	0.172	0.052	2010	0.503	0.175
310	0.024	0.012	3010	0.848	0.311
1020	0.173	0.053	160	0.094	0.053
1500	0.306	0.098	2040	0.603	0.226
220	0.042	0.021	3010	0.899	0.335
1040	0.202	0.068	4030	1.288	0.496
2040	0.488	0.167	1990	0.844	0.350
220	0.066	0.024	110	0.135	0.081



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

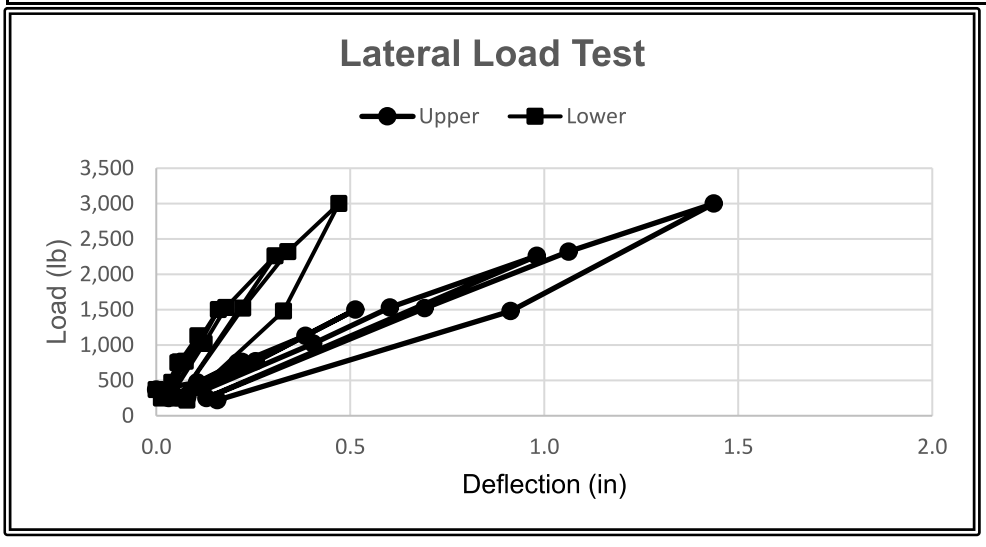
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-12**

Pile Indentifier: PLT-12A
Pile Type: W6X8.5
Embedment Depth: 5.90 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
370	0.000	0.000	260	0.080	0.036
470	0.106	0.041	1020	0.405	0.124
750	0.210	0.056	1530	0.603	0.180
250	0.033	0.014	2260	0.981	0.307
760	0.222	0.061	250	0.130	0.060
1130	0.385	0.108	1520	0.692	0.223
260	0.053	0.024	2320	1.063	0.340
770	0.256	0.075	3000	1.437	0.471
1500	0.514	0.161	1480	0.914	0.328
260	0.080	0.036	220	0.158	0.079



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

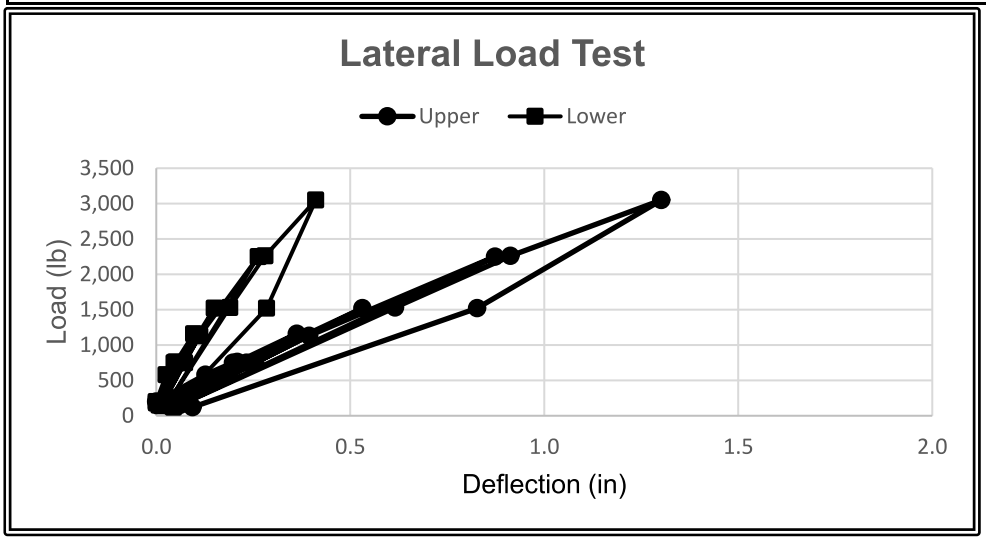
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-12**

Pile Indentifier: PLT-12B
Pile Type: W6X8.5
Embedment Depth: 9.83 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
200	0.000	0.000	140	0.037	0.014
580	0.127	0.026	750	0.255	0.074
750	0.198	0.046	1130	0.394	0.113
180	0.014	0.001	2250	0.874	0.263
760	0.209	0.050	150	0.061	0.027
1160	0.363	0.097	1530	0.616	0.190
150	0.025	0.008	2260	0.913	0.281
750	0.233	0.062	3050	1.302	0.411
1520	0.532	0.150	1520	0.827	0.285
140	0.037	0.014	120	0.094	0.045



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

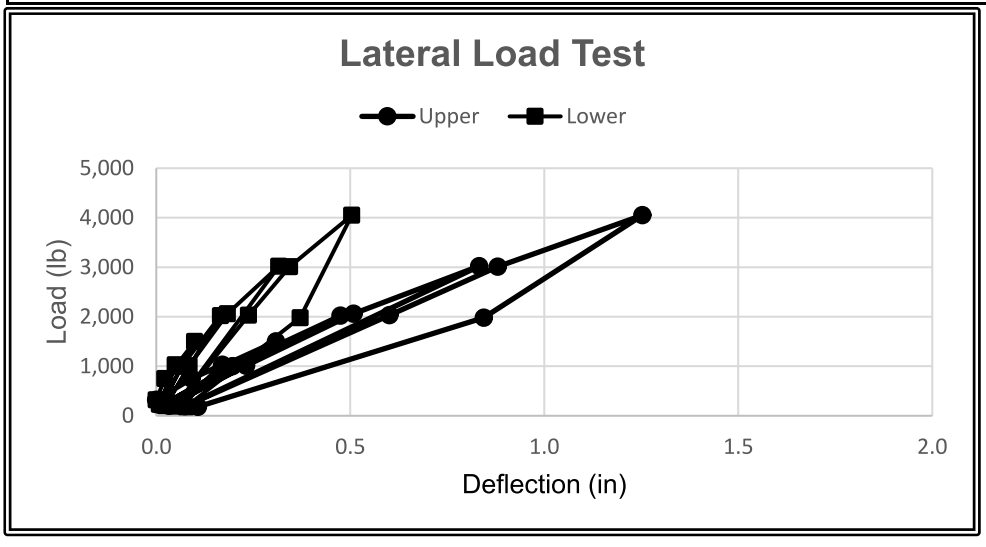
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-12**

Pile Indentifier: PLT-12C
Pile Type: W6X15
Embedment Depth: 8.13 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.000	0.000	200	0.032	0.023
750	0.091	0.022	1010	0.232	0.085
1030	0.171	0.049	2060	0.509	0.184
230	0.066	0.008	3020	0.833	0.316
1000	0.170	0.051	190	0.075	0.049
1500	0.309	0.099	2030	0.601	0.238
220	0.017	0.014	3010	0.881	0.344
1000	0.197	0.066	4050	1.253	0.504
2020	0.475	0.166	1980	0.845	0.371
200	0.032	0.023	180	0.108	0.077



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

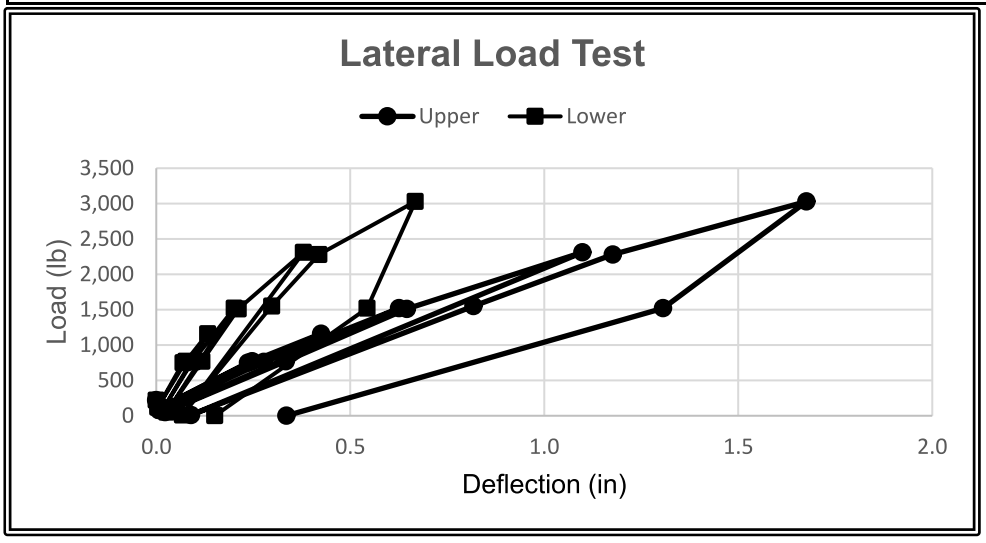
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-14**

Pile Indentifier: PLT-14A
Pile Type: W6X8.5
Embedment Depth: 5.96 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
220	0.000	0.000	50	0.023	0.027
			770	0.334	0.118
750	0.237	0.069	1510	0.646	0.212
120	0.013	0.004	2310	1.099	0.380
770	0.248	0.077	10	0.090	0.068
1160	0.425	0.133	1550	0.818	0.298
80	0.007	0.016	2280	1.177	0.420
760	0.278	0.093	3030	1.676	0.668
1520	0.626	0.201	1520	1.307	0.544
50	0.023	0.027	0	0.336	0.151



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

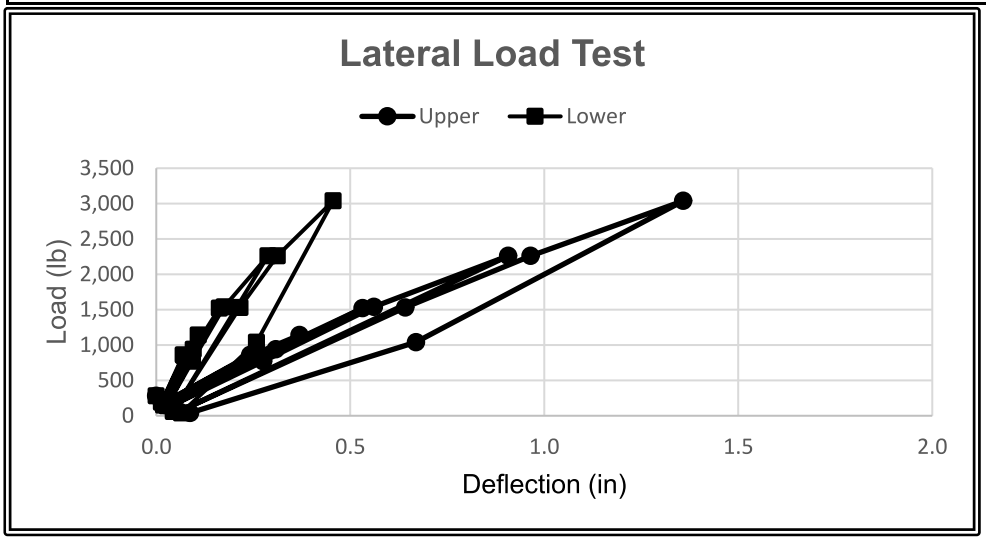
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-14**

Pile Indentifier: PLT-14B
Pile Type: W6X8.5
Embedment Depth: 10.02 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
280	0.000	0.000	140	0.038	0.028
			770	0.276	0.094
860	0.243	0.070	1540	0.561	0.175
190	0.022	0.014	2260	0.907	0.288
850	0.244	0.072	60	0.059	0.044
1140	0.370	0.109	1530	0.642	0.216
150	0.024	0.019	2260	0.965	0.312
940	0.309	0.096	3040	1.359	0.456
1520	0.532	0.163	1040	0.670	0.259
140	0.038	0.028	40	0.088	0.065



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

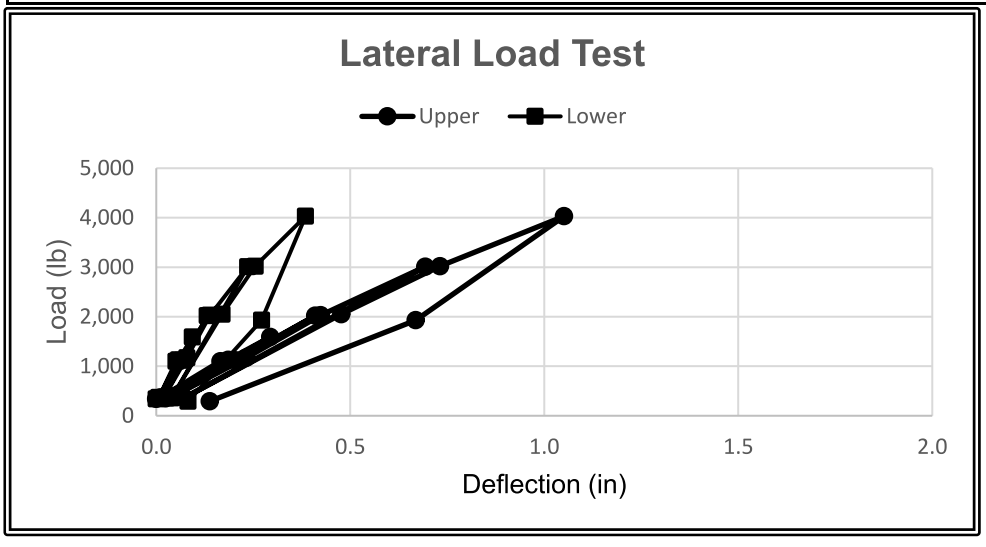
Technician: MG
Test Date: 11/4/2020

Test Location: **PLT-14**

Pile Indentifier: PLT-14C
Pile Type: W6X15
Embedment Depth: 8.08 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
340	0.000	0.000	370	0.039	0.020
			1170	0.232	0.079
1100	0.166	0.051	2030	0.424	0.139
370	0.012	0.007	3010	0.694	0.236
1130	0.186	0.058	360	0.072	0.040
1590	0.294	0.093	2050	0.477	0.170
350	0.024	0.013	3020	0.732	0.255
1120	0.204	0.067	4030	1.051	0.385
2020	0.410	0.132	1930	0.669	0.272
370	0.039	0.020	290	0.138	0.082



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

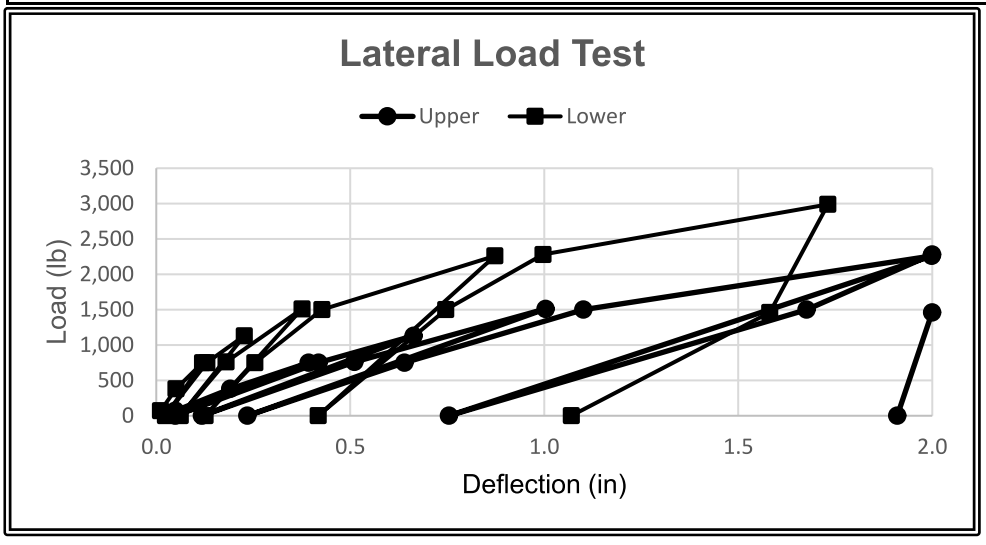
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-16**

Pile Indentifier: PLT-16A
Pile Type: W6X8.5
Embedment Depth: 5.83 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
70	0.050	0.011	0	0.235	0.126
380	0.191	0.051	750	0.640	0.255
750	0.393	0.120	1500	1.101	0.427
0	0.049	0.024	2260	1.999	0.873
750	0.419	0.131	0	0.755	0.418
1130	0.664	0.227	1500	1.677	0.747
0	0.118	0.062	2280	2.000+	0.997
760	0.511	0.180	2990	2.000+	1.731
1510	1.004	0.376	1460	2.000+	1.582
0	0.235	0.126	0	1.910	1.070



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

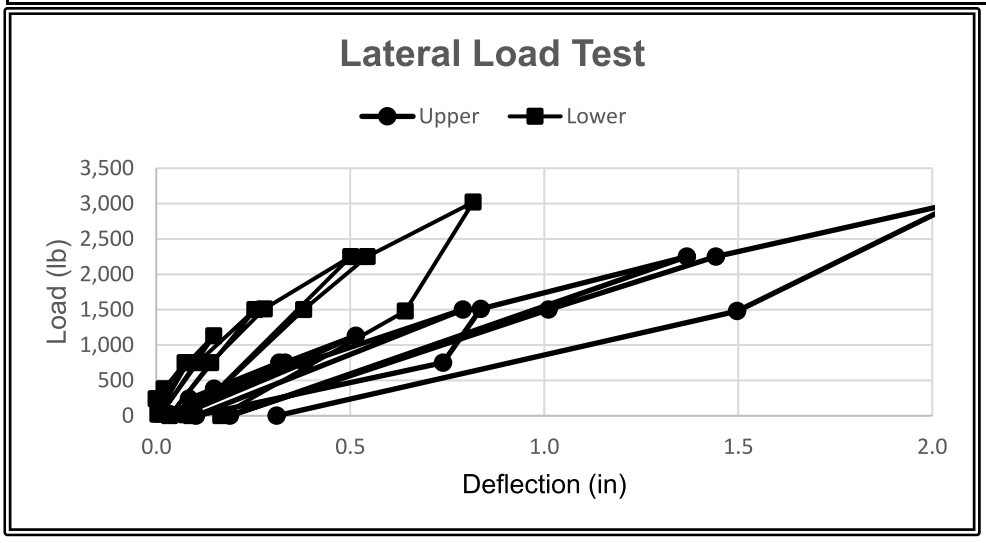
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-16**

Pile Indentifier: PLT-16B
Pile Type: W6X8.5
Embedment Depth: 10.06 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
240	0.085	0.000	0	0.103	0.035
380	0.149	0.021	750	0.740	0.141
750	0.318	0.075	1510	0.837	0.279
20	0.036	0.005	2250	1.368	0.502
750	0.333	0.082	0	0.190	0.091
1130	0.515	0.149	1500	1.011	0.380
20	0.066	0.012	2250	1.443	0.544
750	0.383	0.107	3020	2.069	0.817
1500	0.791	0.255	1480	1.498	0.642
0	0.103	0.035	0	0.311	0.167



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

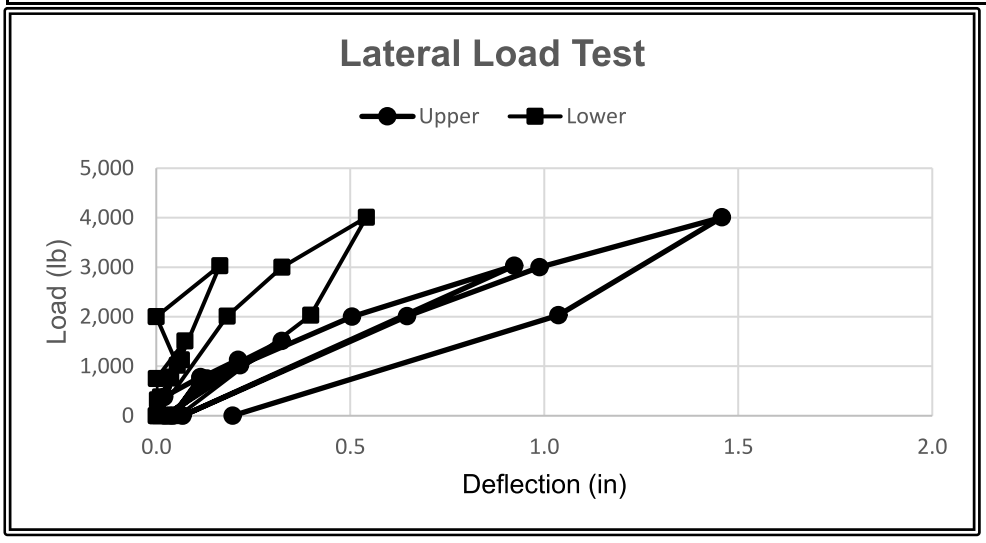
Technician: MG
Test Date: 10/27/2020

Test Location: **PLT-16**

Pile Indentifier: PLT-16C
Pile Type: W6X15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.008	0.003	0	0.023	0.010
380	0.021	0.011	1020	0.216	0.055
780	0.114	0.038	2000	0.505	0.000
0	0.043	0.002	3030	0.923	0.164
760	0.114	0.032	0	0.068	0.000
1130	0.211	0.065	2010	0.647	0.183
0	0.034	0.002	3000	0.988	0.324
750	0.131	0.001	4010	1.458	0.542
1510	0.324	0.074	2030	1.037	0.398
0	0.023	0.010	0	0.197	0.058



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

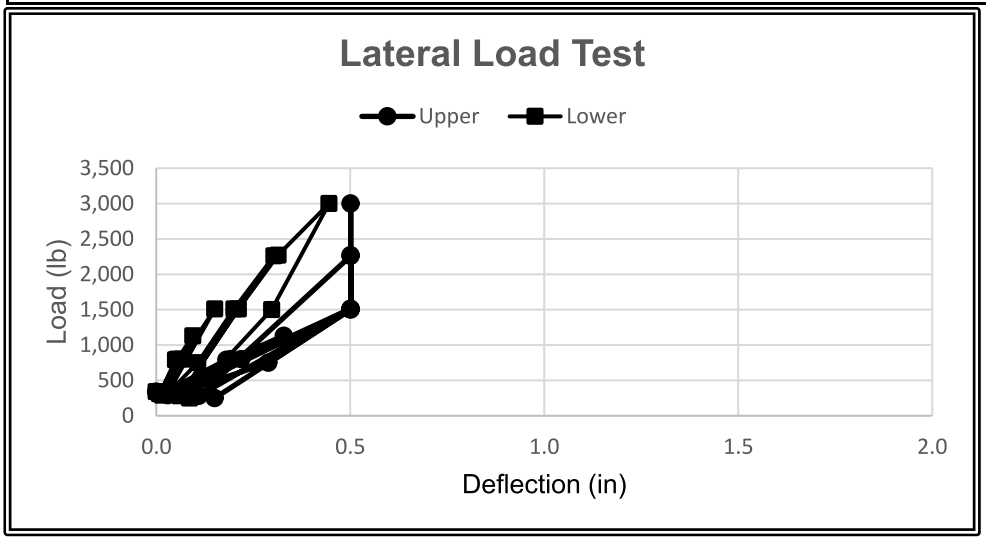
Technician: DH
Test Date: 11/6/2020

Test Location: **PLT-17**

Pile Indentifier: PLT-17A
Pile Type: W6X8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
340	0.000	0.000	310	0.053	0.029
			750	0.289	0.107
790	0.181	0.050	1510	0.501	0.201
310	0.015	0.009	2260	0.501	0.304
800	0.192	0.055	280	0.110	0.062
1130	0.329	0.095	1510	0.501+	0.212
290	0.030	0.017	2270	0.501+	0.314
800	0.220	0.066	3000	0.501+	0.446
1510	0.501	0.151	1500	0.501+	0.298
310	0.053	0.029	250	0.151	0.086



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

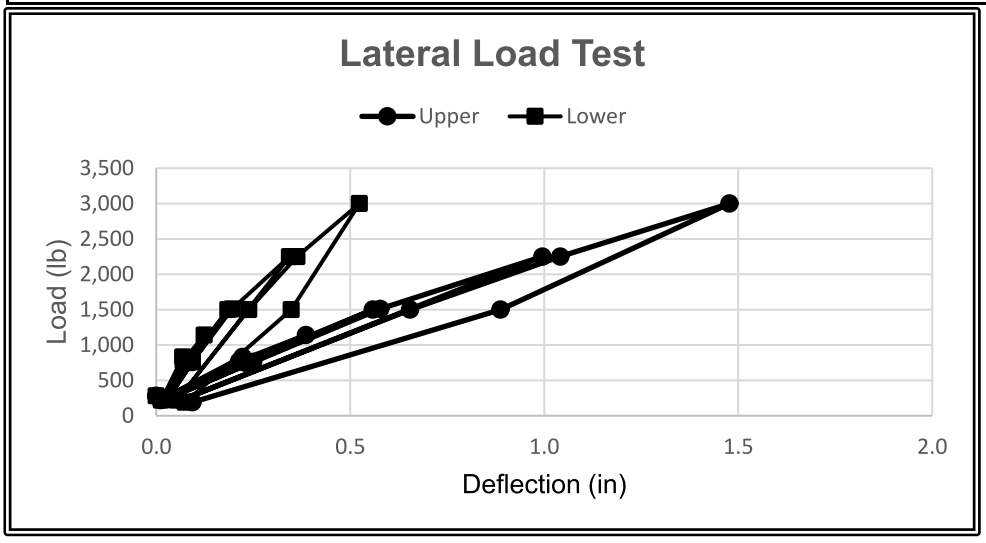
Technician: DH
Test Date: 11/6/2020

Test Location: **PLT-17**

Pile Indentifier: PLT-17B
Pile Type: W6X8.5
Embedment Depth: 9.44 ft
Pile Reveal: 67 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
280	0.000	0.000	250	0.033	0.032
			760	0.250	0.094
830	0.223	0.069	1510	0.578	0.196
220	0.011	0.013	2250	0.996	0.344
770	0.214	0.070	220	0.064	0.054
1140	0.386	0.124	1500	0.655	0.239
230	0.018	0.021	2250	1.042	0.363
750	0.229	0.081	3000	1.478	0.524
1500	0.559	0.185	1500	0.888	0.348
250	0.033	0.032	190	0.094	0.075



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

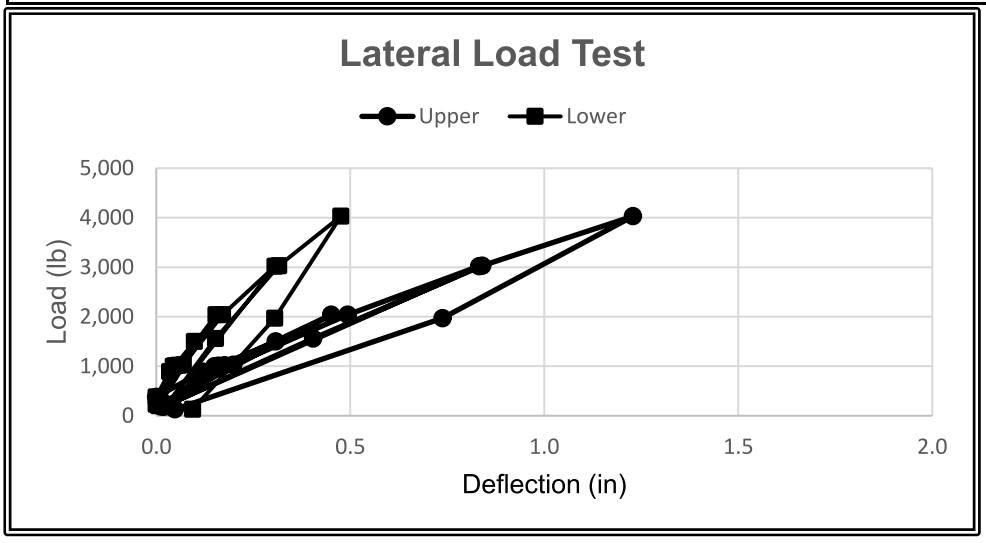
Technician: MG
Test Date: 11/6/2020

Test Location: **PLT-17**

Pile Indentifier: PLT-17C
Pile Type: W6X15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
380	0.000	0.000	200	0.009	0.007
890	0.120	0.035	1030	0.199	0.070
1000	0.151	0.044	2040	0.494	0.171
250	0.021	0.003	3020	0.833	0.307
1010	0.161	0.048	180	0.018	0.023
1500	0.308	0.099	1560	0.405	0.153
230	0.019	0.000	3030	0.841	0.316
1020	0.177	0.058	4030	1.229	0.476
2040	0.451	0.154	1970	0.738	0.306
200	0.009	0.007	130	0.048	0.094



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

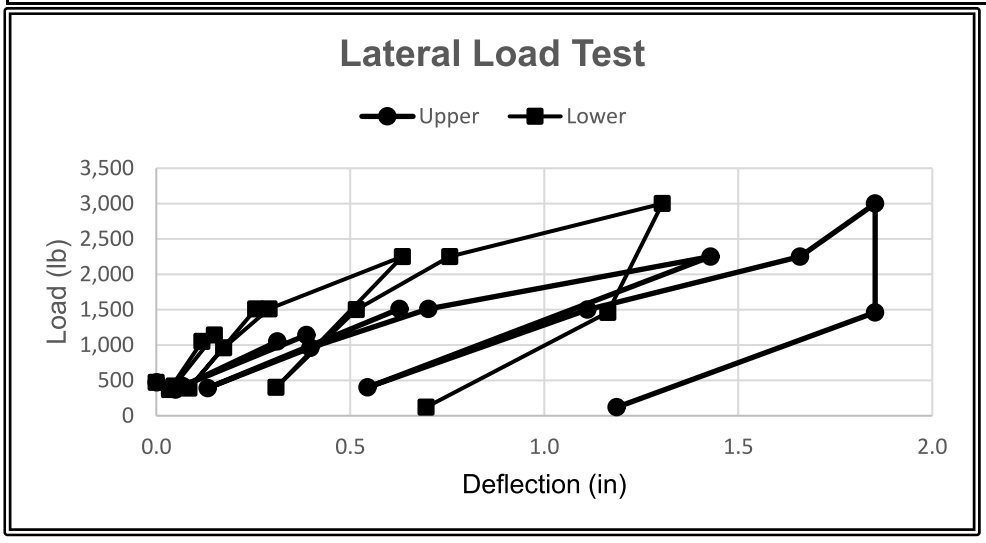
Technician: DH
Test Date: 11/2/2020

Test Location: **PLT-18**

Pile Indentifier: PLT-18A
Pile Type: W6X8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
470	0.001	0.000	390	0.133	0.085
			960	0.398	0.174
1050	0.312	0.118	1510	0.702	0.291
370	0.050	0.034	2250	1.429	0.635
			400	0.545	0.309
1140	0.387	0.150	1500	1.112	0.516
420	0.068	0.046	2250	1.660	0.757
			3000	1.853	1.305
1510	0.627	0.257	1460	1.853	1.164
390	0.133	0.085	120	1.187	0.696



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

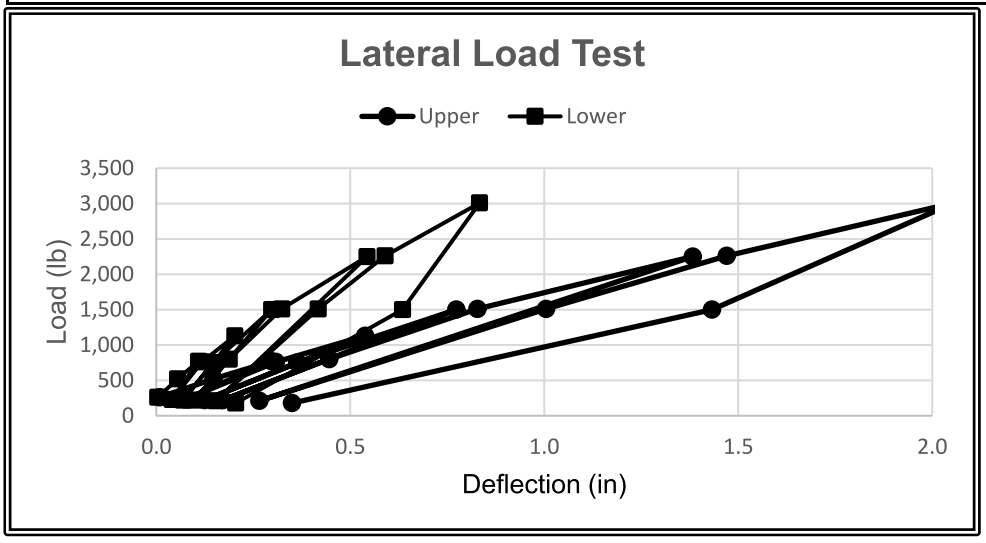
Technician: DH
Test Date: 11/2/2020

Test Location: **PLT-18**

Pile Indentifier: PLT-18B
Pile Type: W6X8.5
Embedment Depth: 10.04 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
260	0.009	0.004	220	0.172	0.098
520	0.148	0.055	800	0.446	0.189
770	0.298	0.109	1510	0.828	0.324
230	0.075	0.041	2250	1.383	0.544
760	0.309	0.118	210	0.266	0.154
1130	0.539	0.203	1510	1.005	0.418
220	0.125	0.070	2260	1.471	0.590
750	0.364	0.147	3010	2.056	0.834
1500	0.774	0.298	1500	1.433	0.635
220	0.172	0.098	180	0.350	0.205



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

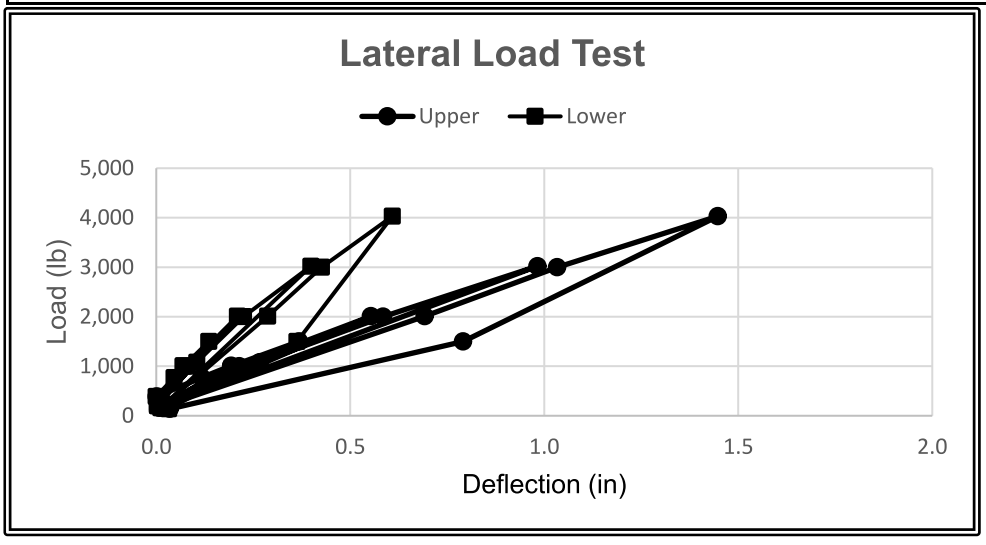
Technician: DH
Test Date: 11/3/2020

Test Location: **PLT-18**

Pile Indentifier: PLT-18C
Pile Type: W6X15
Embedment Depth: 8.03 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
390	0.001	0.000	200	0.024	0.003
770	0.118	0.046	1080	0.267	0.105
1010	0.194	0.069	2000	0.585	0.225
240	0.025	0.003	3020	0.983	0.399
1000	0.194	0.071	160	0.008	0.012
1500	0.368	0.136	2010	0.692	0.288
200	0.028	0.003	3000	1.034	0.426
1000	0.214	0.081	4030	1.448	0.609
2010	0.554	0.210	1500	0.791	0.363
200	0.024	0.003	140	0.035	0.032



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

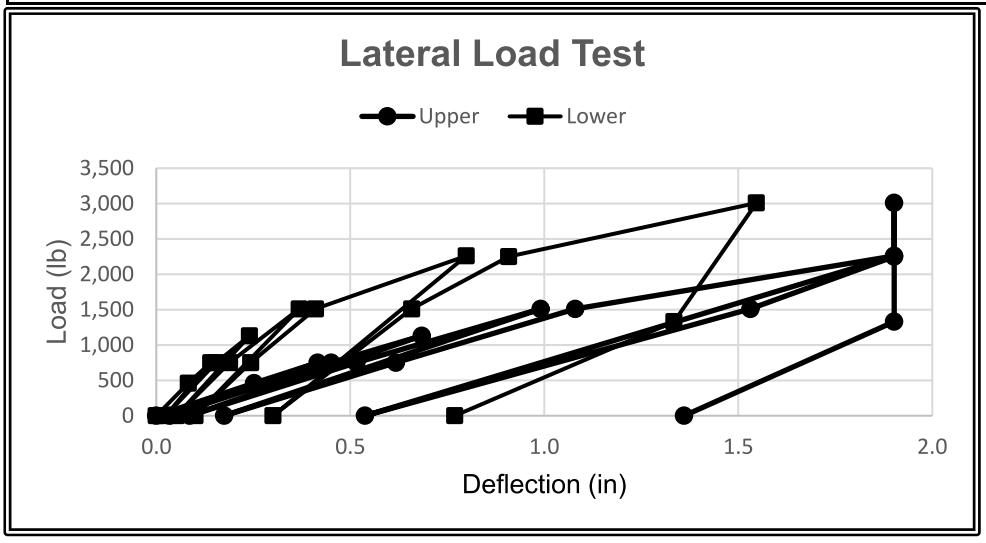
Technician: DH
Test Date: 10/31/2020

Test Location: **PLT-20**

Pile Indentifier: PLT-20A
Pile Type: W6X8.5
Embedment Depth: 5.83 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.175	0.100
460	0.253	0.083	750	0.618	0.244
750	0.416	0.141	1510	1.080	0.411
0	0.035	0.024	2260	1.902	0.799
750	0.451	0.155	0	0.538	0.301
1130	0.685	0.241	1510	1.532	0.659
0	0.086	0.052	2250	1.902	0.909
750	0.516	0.189	3010	1.902	1.547
1510	0.991	0.369	1330	1.902	1.335
0	0.175	0.100	0	1.361	0.770



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

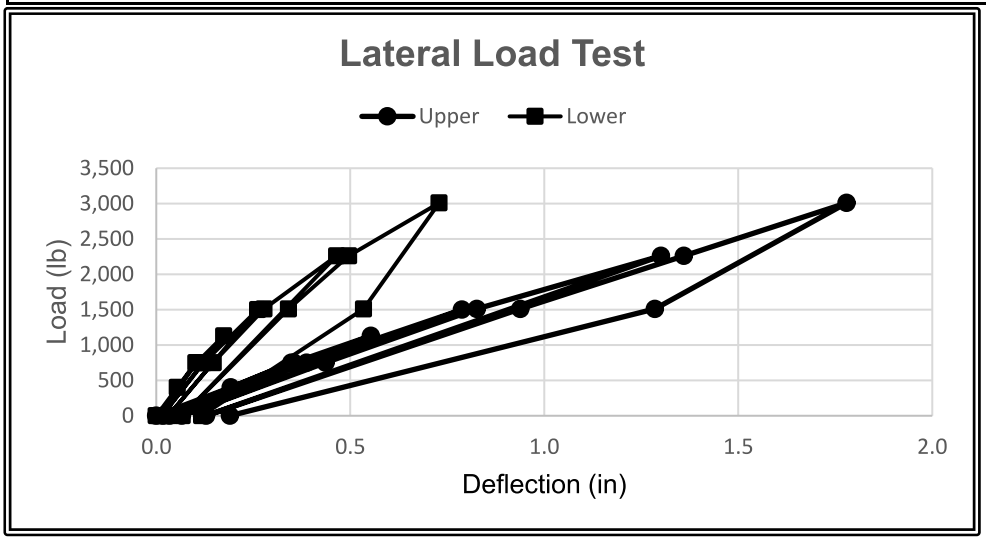
Technician: DH
Test Date: 10/31/2020

Test Location: **PLT-20**

Pile Indentifier: PLT-20B
Pile Type: W6X8.5
Embedment Depth: 10.06 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.066	0.031
400	0.192	0.055	750	0.437	0.147
750	0.349	0.102	1510	0.827	0.278
0	0.018	0.006	2260	1.301	0.465
750	0.355	0.105	0	0.129	0.067
1130	0.554	0.174	1510	0.939	0.341
0	0.035	0.015	2260	1.360	0.496
750	0.388	0.123	3010	1.780	0.729
1500	0.788	0.262	1510	1.286	0.535
0	0.066	0.031	0	0.190	0.117



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

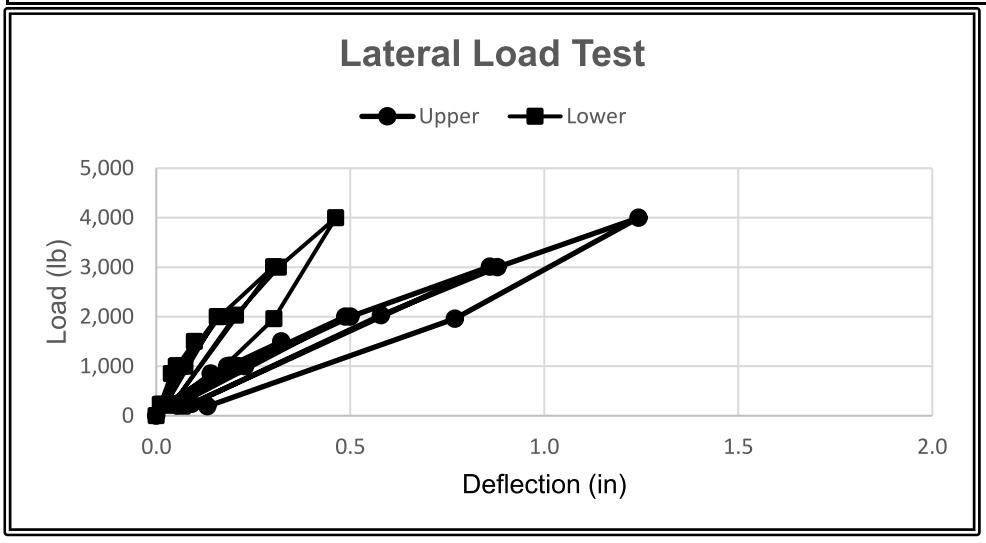
Technician: DH
Test Date: 10/31/2020

Test Location: **PLT-20**

Pile Indentifier: PLT-20C
Pile Type: W6X15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	210	0.052	0.024
850	0.141	0.039	1000	0.229	0.074
1000	0.183	0.052	2000	0.501	0.163
230	0.022	0.011	3010	0.860	0.303
1010	0.190	0.055	240	0.092	0.043
1500	0.323	0.099	2030	0.580	0.205
230	0.037	0.017	3000	0.880	0.315
1000	0.211	0.064	4000	1.244	0.463
2000	0.488	0.158	1960	0.770	0.304
210	0.052	0.024	190	0.132	0.068



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

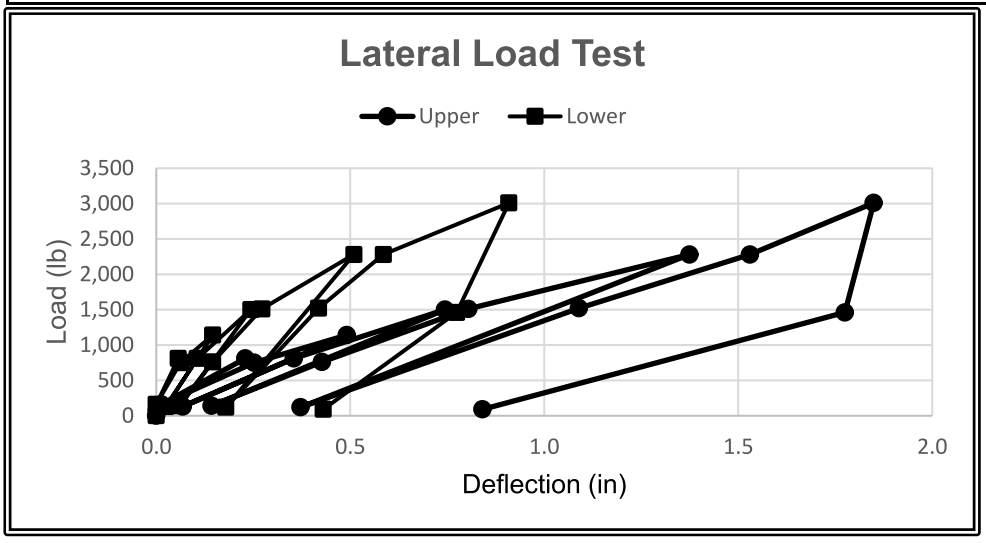
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-21**

Pile Indentifier: PLT-21A
Pile Type: W6X8.5
Embedment Depth: 5.96 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	140	0.143	0.061
			760	0.427	0.146
810	0.230	0.057	1510	0.805	0.273
160	0.013	0.000	2280	1.375	0.510
750	0.253	0.063	120	0.372	0.180
1140	0.491	0.146	1520	1.090	0.419
130	0.069	0.025	2280	1.531	0.586
810	0.355	0.106	3010	1.849	0.909
1500	0.745	0.244	1460	1.775	0.775
140	0.143	0.061	90	0.841	0.431



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

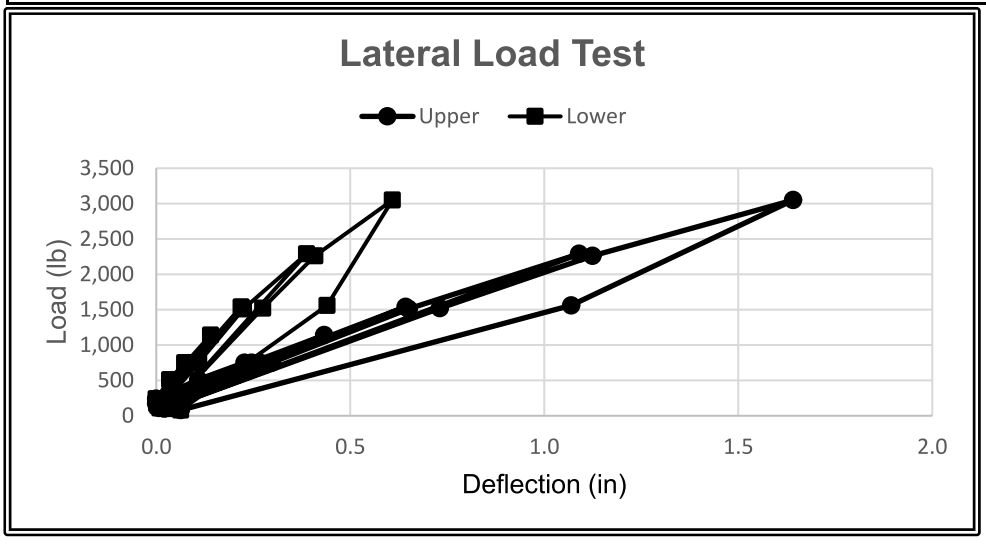
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-21**

Pile Indentifier: PLT-21B
Pile Type: W6X8.5
Embedment Depth: 10.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
240	0.000	0.000	110	0.008	0.010
510	0.109	0.035	750	0.298	0.110
750	0.228	0.074	1510	0.651	0.225
170	0.000	0.001	2290	1.090	0.388
750	0.246	0.077	100	0.021	0.030
1140	0.433	0.140	1520	0.731	0.275
140	0.005	0.005	2260	1.125	0.409
750	0.268	0.092	3050	1.642	0.609
1540	0.643	0.219	1560	1.070	0.441
110	0.008	0.010	80	0.063	0.063



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

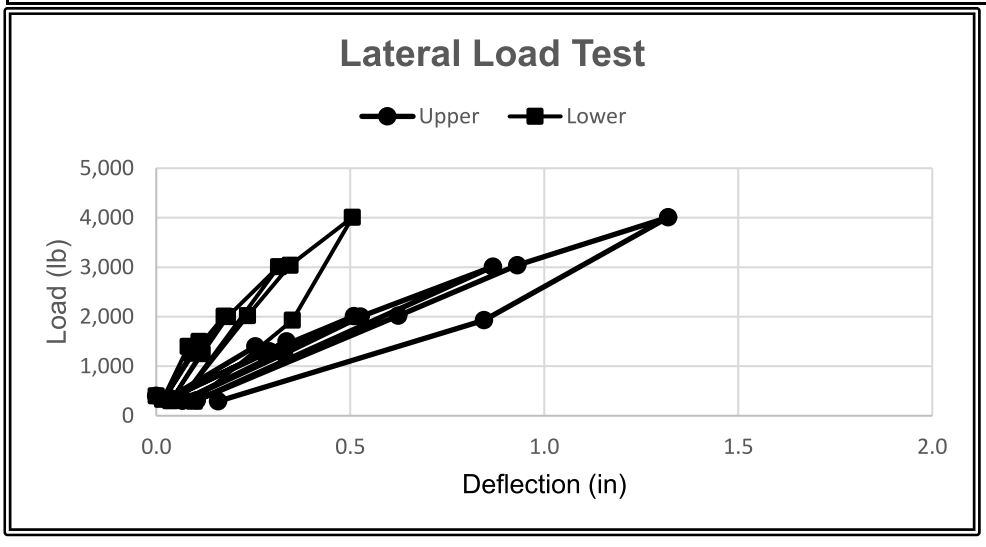
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-21**

Pile Indentifier: PLT-21C
Pile Type: W6X15
Embedment Depth: 8.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
400	0.000	0.000	300	0.068	0.038
			1250	0.330	0.119
1400	0.256	0.083	2000	0.527	0.184
330	0.027	0.017	3010	0.868	0.316
1260	0.277	0.091	310	0.105	0.062
1500	0.336	0.111	2020	0.624	0.236
350	0.037	0.022	3040	0.931	0.345
1300	0.292	0.099	4010	1.320	0.506
2010	0.510	0.175	1930	0.845	0.351
300	0.068	0.038	290	0.160	0.098



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

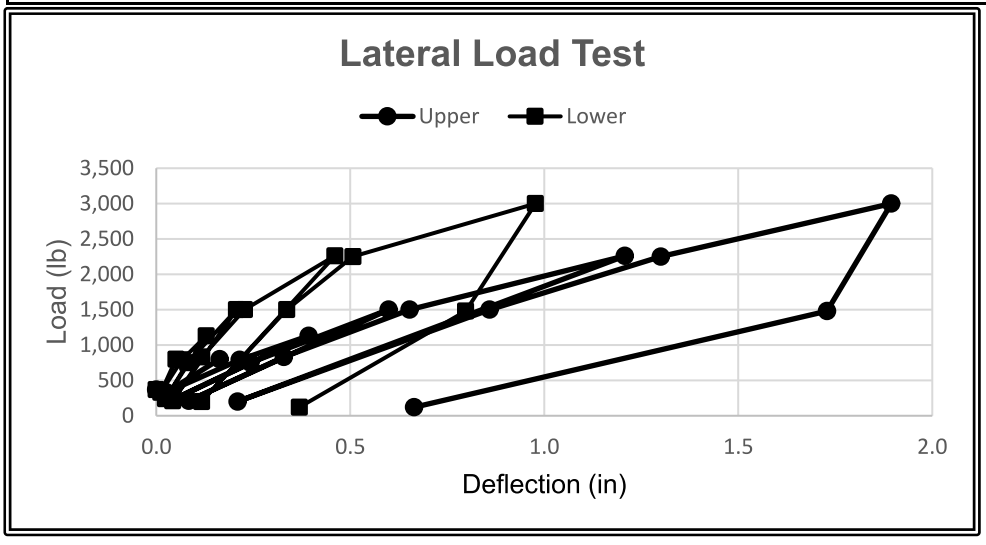
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-23**

Pile Indentifier: PLT-23A
Pile Type: W6X8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
370	0.000	0.000	210	0.084	0.043
			830	0.329	0.118
800	0.164	0.051	1500	0.653	0.228
330	0.026	0.012	2260	1.208	0.461
790	0.215	0.066	200	0.210	0.117
1130	0.393	0.129	1500	0.860	0.337
240	0.048	0.024	2250	1.301	0.507
750	0.243	0.081	3000	1.895	0.978
1500	0.599	0.207	1480	1.729	0.798
210	0.084	0.043	120	0.665	0.369



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

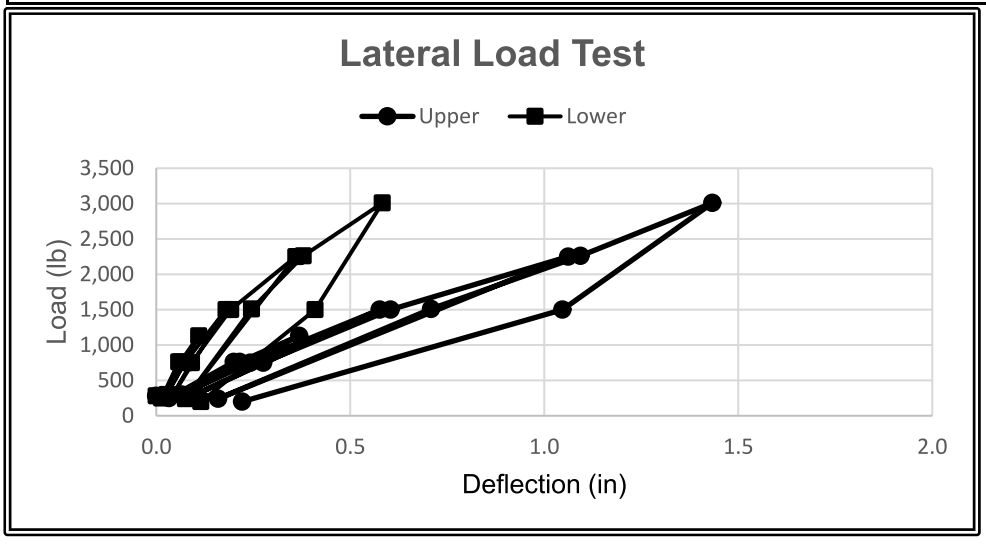
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-23**

Pile Indentifier: PLT-23B
Pile Type: W6X8.5
Embedment Depth: 9.98 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
280	0.000	0.000	300	0.102	0.044
			750	0.276	0.091
760	0.200	0.058	1500	0.604	0.192
250	0.033	0.014	2250	1.062	0.360
760	0.215	0.062	240	0.160	0.076
1130	0.369	0.110	1510	0.709	0.246
300	0.066	0.028	2260	1.094	0.379
750	0.243	0.074	3010	1.434	0.583
1500	0.576	0.180	1500	1.047	0.410
300	0.102	0.435	200	0.222	0.115



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

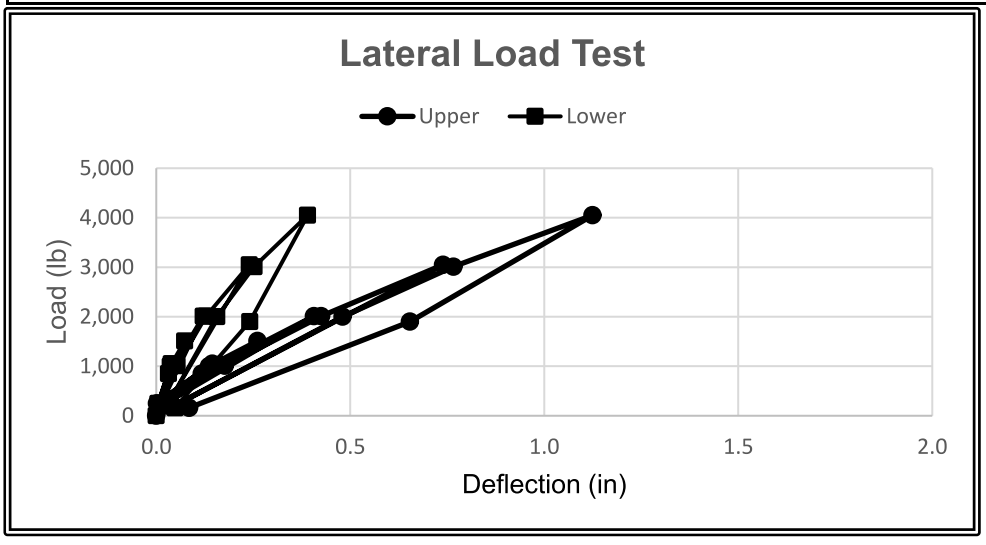
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-23**

Pile Indentifier: PLT-23C
Pile Type: W6X15
Embedment Depth: 7.96 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	220	0.016	0.012
850	0.118	0.032	1010	0.177	0.054
1050	0.145	0.039	2010	0.425	0.129
250	0.002	0.005	3050	0.740	0.240
1000	0.136	0.036	190	0.044	0.027
1510	0.261	0.074	2000	0.481	0.156
220	0.009	0.008	3010	0.766	0.253
1030	0.164	0.047	4050	1.125	0.390
2010	0.407	0.121	1900	0.654	0.241
220	0.016	0.012	160	0.085	0.049



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

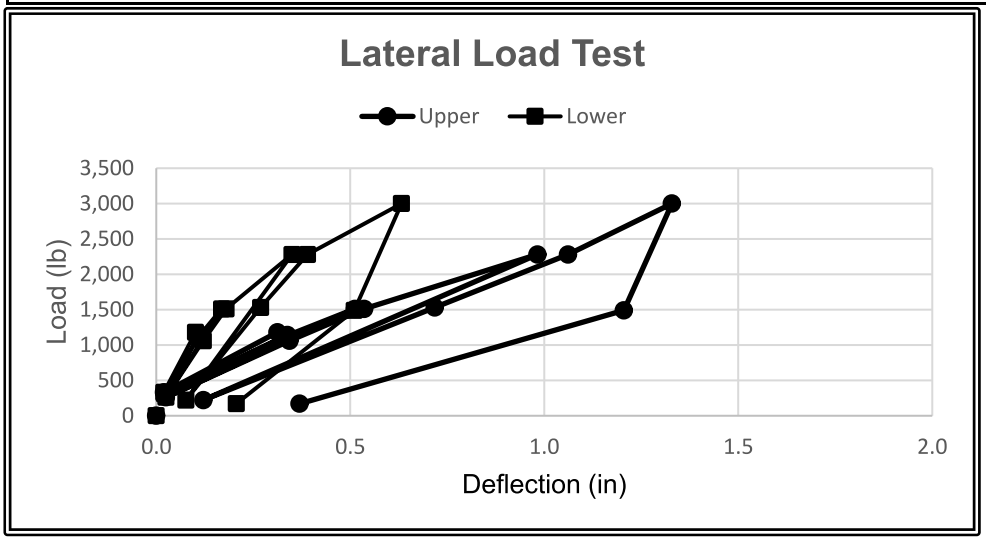
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-24**

Pile Indentifier: PLT-24A
Pile Type: W6X8.5
Embedment Depth: 6.08 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	260	0.025	0.025
			1060	0.344	0.122
1180	0.313	0.102	1510	0.536	0.180
330	0.020	0.020	2280	0.983	0.350
			220	0.122	0.077
1140	0.338	0.111	1530	0.718	0.269
310	0.022	0.021	2280	1.062	0.390
1130	0.337	0.111	3000	1.329	0.632
1510	0.512	0.169	1490	1.206	0.511
260	0.025	0.025	170	0.370	0.207



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

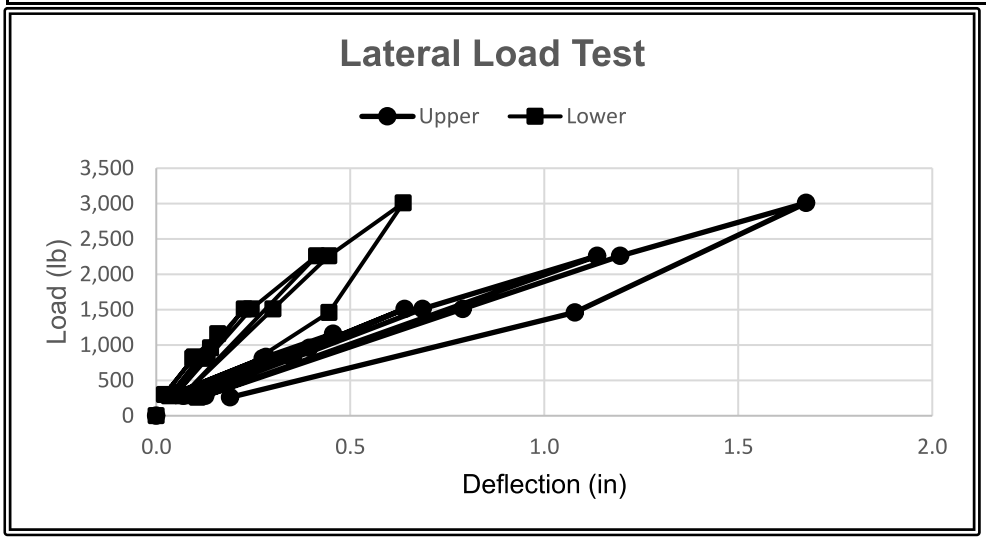
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-24**

Pile Indentifier: PLT-24B
Pile Type: W6X8.5
Embedment Depth: 10.02 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	330	0.117	0.055
			810	0.352	0.132
810	0.275	0.095	1510	0.687	0.245
300	0.043	0.022	2260	1.137	0.414
830	0.283	0.098	280	0.127	0.068
1160	0.456	0.159	1510	0.790	0.301
280	0.070	0.034	2260	1.196	0.445
960	0.395	0.140	3010	1.675	0.637
1510	0.641	0.227	1460	1.079	0.446
330	0.117	0.055	260	0.191	0.107



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

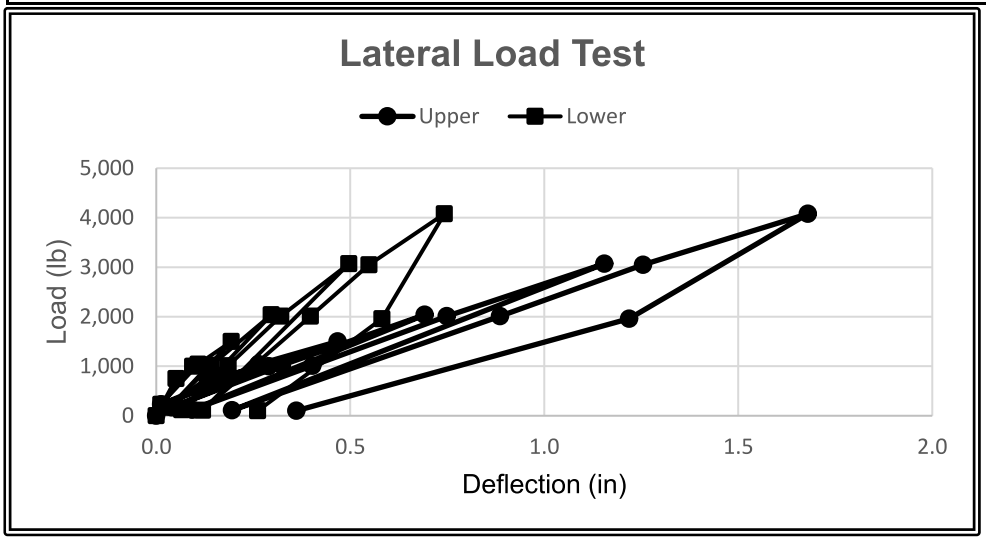
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-24**

Pile Indentifier: PLT-24C
Pile Type: W6X15
Embedment Depth: 8.10 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	120	0.093	0.066
750	0.132	0.051	1010	0.403	0.186
1000	0.290	0.094	2010	0.749	0.321
230	0.013	0.012	3070	1.155	0.497
1040	0.264	0.108	110	0.196	0.120
1500	0.468	0.194	2010	0.886	0.398
170	0.041	0.035	3050	1.255	0.549
1020	0.324	0.142	4080	1.680	0.743
2040	0.692	0.297	1960	1.219	0.582
120	0.093	0.066	100	0.361	0.262



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

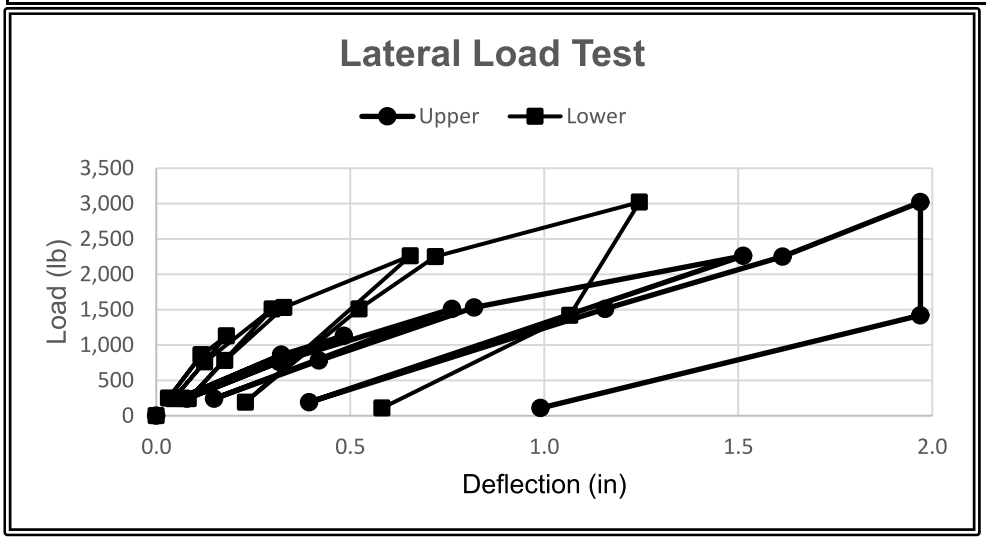
Technician: MG
Test Date: 11/1/2020

Test Location: **PLT-25**

Pile Indentifier: PLT-25A
Pile Type: W6X8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	240	0.149	0.083
			780	0.420	0.177
860	0.322	0.116	1530	0.820	0.329
250	0.062	0.032	2260	1.513	0.655
860	0.323	0.118	190	0.394	0.230
1130	0.484	0.181	1510	1.157	0.523
240	0.079	0.045	2250	1.615	0.720
760	0.317	0.125	3020	1.970	1.246
1510	0.763	0.299	1420	1.970	1.066
240	0.149	0.083	110	0.991	0.582



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

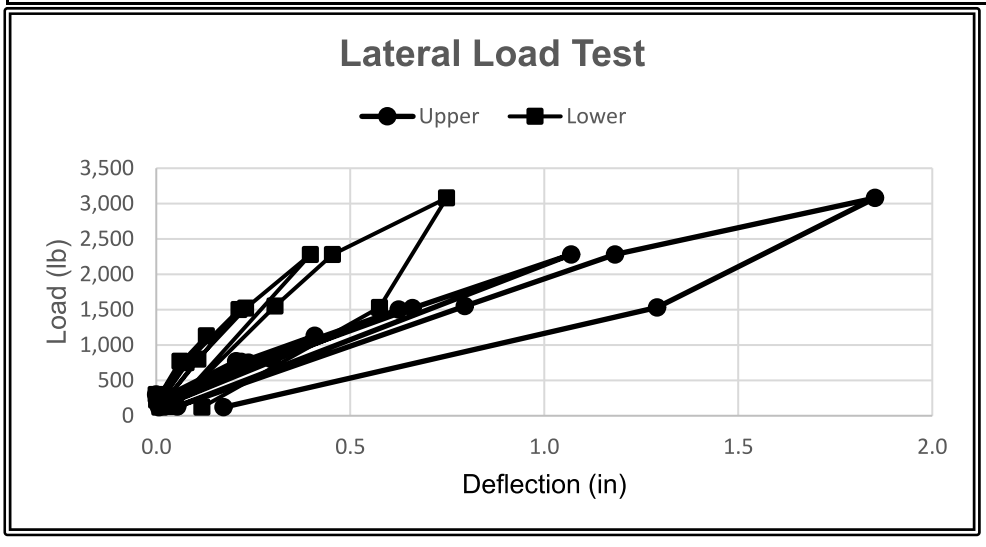
Technician: MG
Test Date: 11/1/2020

Test Location: **PLT-25**

Pile Indentifier: PLT-25B
Pile Type: W6X8.5
Embedment Depth: 10.10 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
300	0.000	0.000	120	0.008	0.010
			800	0.298	0.108
770	0.206	0.062	1520	0.661	0.231
220	0.007	0.001	2280	1.070	0.398
760	0.220	0.066	130	0.055	0.045
1130	0.409	0.130	1550	0.796	0.307
180	0.007	0.009	2280	1.183	0.455
750	0.238	0.077	3080	1.853	0.749
1500	0.625	0.214	1530	1.291	0.576
120	0.008	0.010	120	0.174	0.118



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

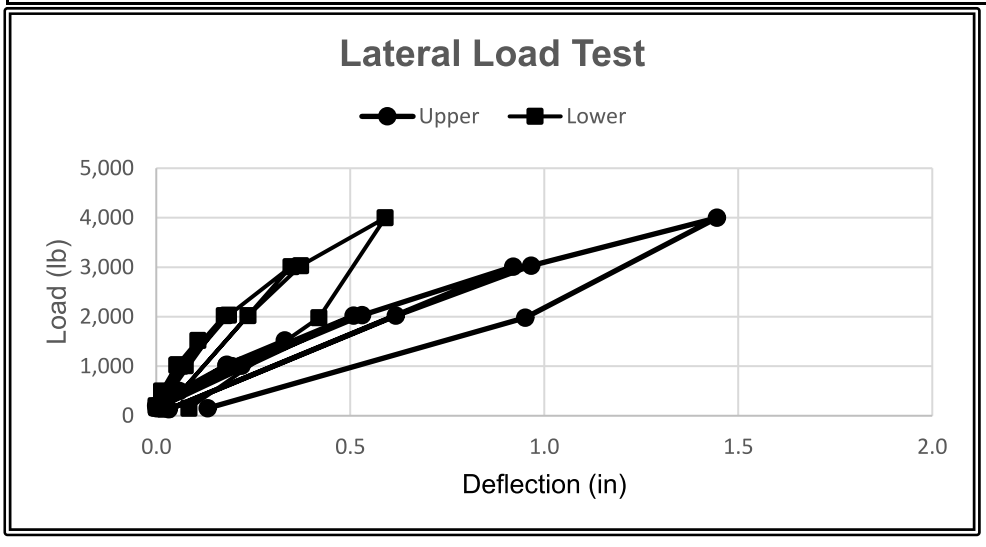
Technician: MG
Test Date: 11/1/2020

Test Location: **PLT-25**

Pile Indentifier: PLT-25C
Pile Type: W6X15
Embedment Depth: 8.04 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
200	0.000	0.000	150	0.002	0.006
500	0.060	0.014	1010	0.220	0.075
1020	0.181	0.053	2030	0.531	0.187
180	0.007	0.001	3010	0.921	0.348
1030	0.182	0.055	130	0.033	0.024
1520	0.332	0.108	2020	0.618	0.237
160	0.006	0.002	3030	0.967	0.373
1000	0.196	0.062	4000	1.446	0.590
2020	0.509	0.176	1980	0.952	0.420
150	0.002	0.006	150	0.133	0.085



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

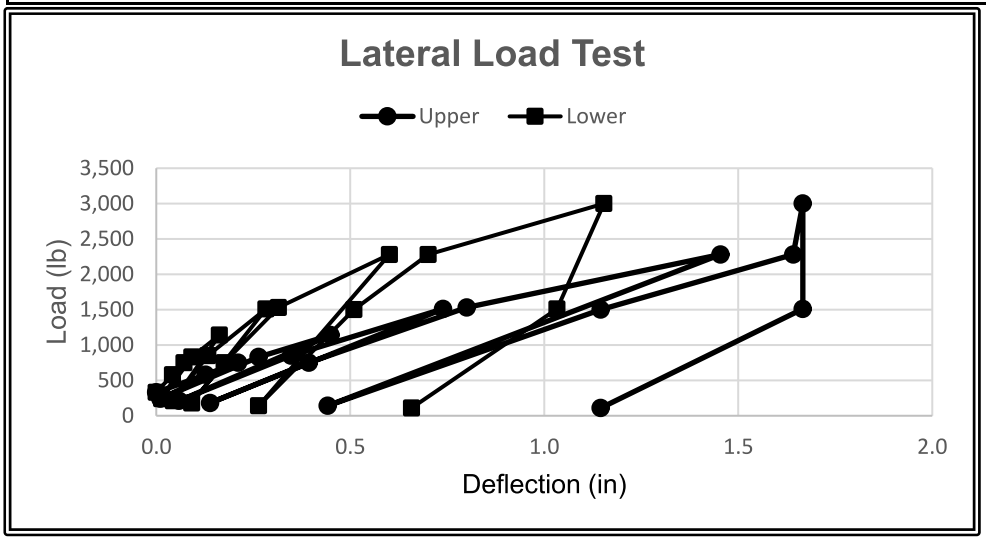
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-26**

Pile Indentifier: PLT-26A
Pile Type: W6X8.5
Embedment Depth: 6.02 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
330	0.000	0.000	180	0.139	0.092
580	0.128	0.042	750	0.394	0.175
750	0.211	0.072	1530	0.801	0.315
240	0.011	0.014	2280	1.455	0.601
830	0.264	0.092	140	0.442	0.264
1140	0.450	0.163	1500	1.146	0.510
210	0.059	0.044	2280	1.642	0.701
850	0.348	0.133	3000	1.667	1.154
1510	0.740	0.283	1510	1.6665+	1.033
180	0.139	0.092	110	1.146	0.658



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

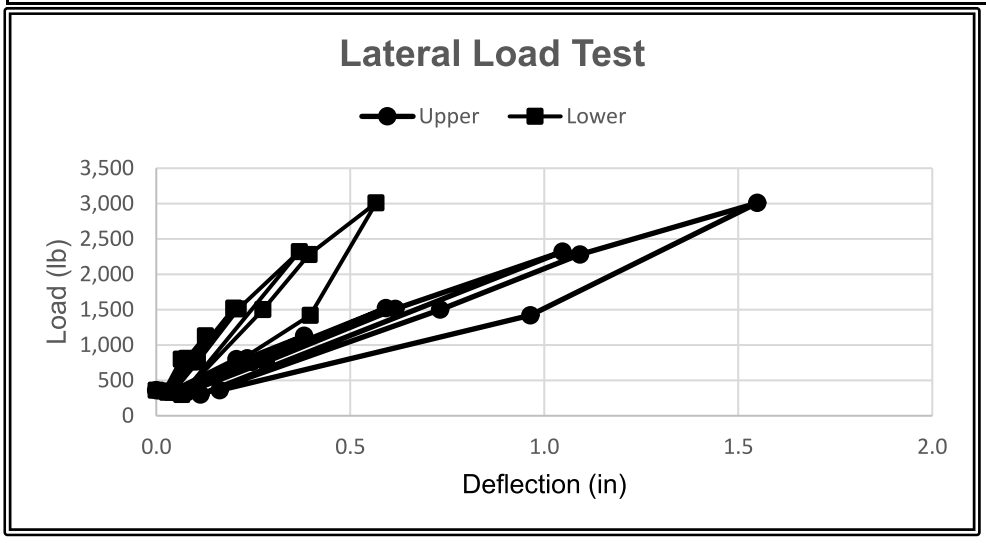
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-26**

Pile Indentifier: PLT-26B
Pile Type: W6X8.5
Embedment Depth: 10.08 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
360	0.000	0.000	330	0.079	0.042
			760	0.282	0.107
800	0.207	0.065	1510	0.617	0.212
350	0.043	0.021	2320	1.048	0.369
810	0.235	0.079	300	0.114	0.066
1130	0.382	0.127	1500	0.732	0.275
330	0.049	0.029	2280	1.093	0.394
760	0.247	0.088	3010	1.550	0.567
1520	0.592	0.200	1420	0.965	0.397
330	0.079	0.042	360	0.164	0.096



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

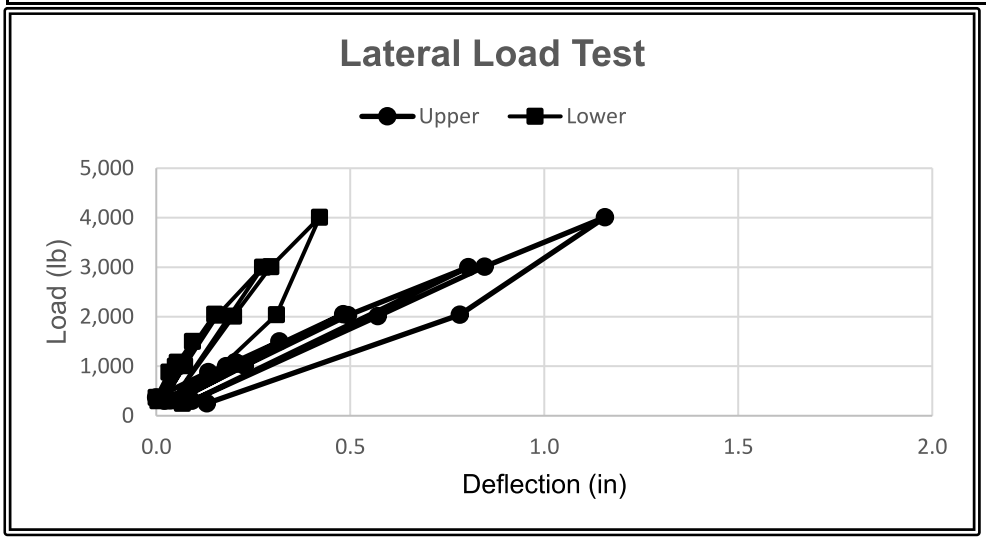
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-26**

Pile Indentifier: PLT-26C
Pile Type: W6X15
Embedment Depth: 7.92 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
370	0.000	0.000	310	0.053	0.020
880	0.135	0.033	1010	0.229	0.074
1080	0.204	0.055	2030	0.495	0.158
300	0.022	0.005	3000	0.805	0.274
1000	0.180	0.050	300	0.092	0.042
1500	0.318	0.094	2010	0.571	0.200
310	0.036	0.011	3010	0.847	0.296
1050	0.211	0.062	4010	1.157	0.421
2050	0.482	0.151	2040	0.783	0.310
310	0.053	0.020	250	0.131	0.068



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

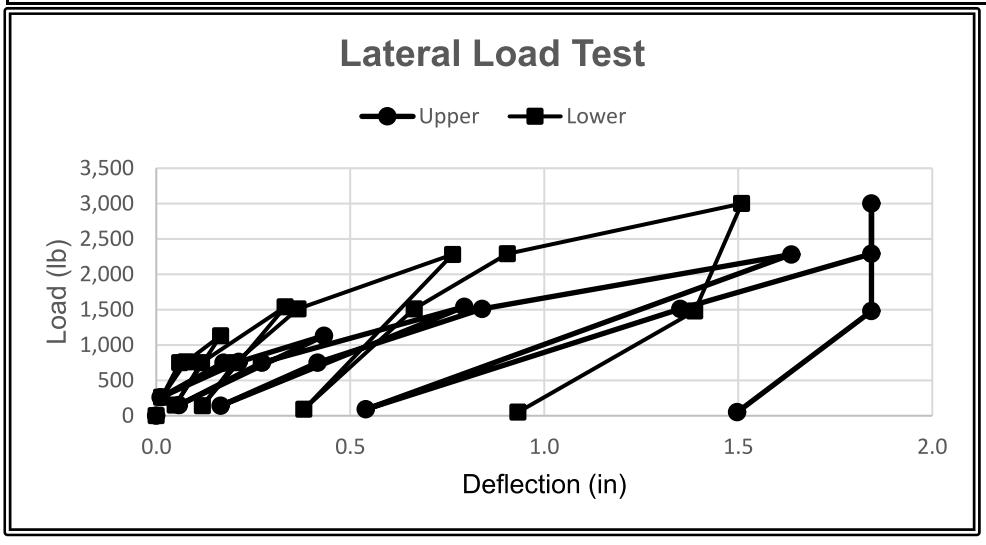
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-27**

Pile Indentifier: PLT-27A
Pile Type: W6X8.5
Embedment Depth: 6.06 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	140	0.166	0.119
			750	0.416	0.204
750	0.174	0.061	1510	0.840	0.366
260	0.012	0.014	2280	1.637	0.764
760	0.213	0.077	90	0.540	0.381
1130	0.433	0.166	1510	1.351	0.665
150	0.059	0.049	2290	1.844	0.905
750	0.273	0.117	3000	1.844+	1.509
1540	0.794	0.333	1480	1.844+	1.388
140	0.166	0.119	50	1.498	0.933



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

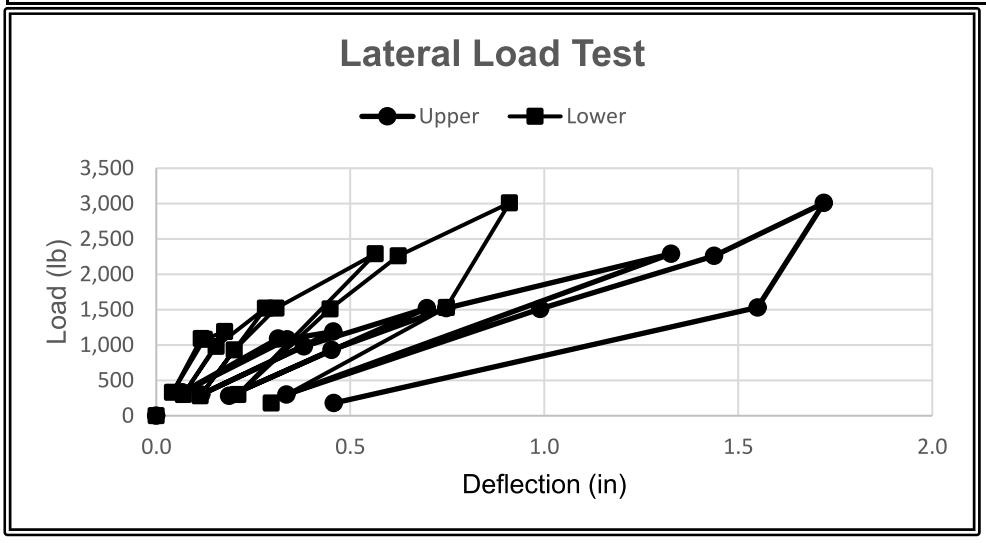
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-27**

Pile Indentifier: PLT-27B
Pile Type: W6X8.5
Embedment Depth: 10.10 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	280	0.188	0.114
			930	0.452	0.201
1090	0.314	0.116	1520	0.748	0.309
330	0.067	0.042	2290	1.327	0.565
1080	0.338	0.124	300	0.336	0.211
1190	0.457	0.177	1510	0.990	0.448
300	0.116	0.070	2260	1.438	0.624
980	0.381	0.155	3010	1.721	0.911
1520	0.698	0.282	1530	1.550	0.748
280	0.188	0.114	180	0.458	0.297



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

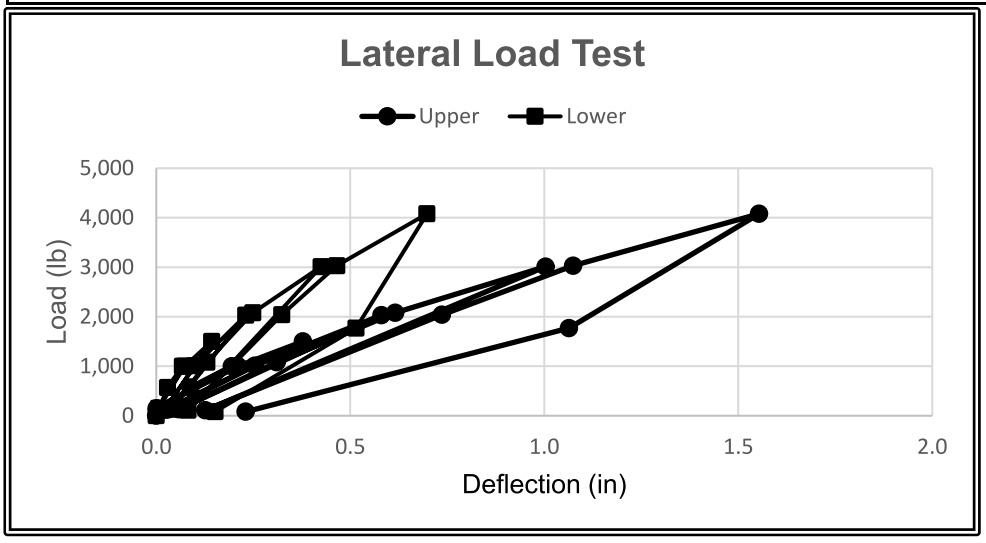
Technician: MG
Test Date: 11/2/2020

Test Location: **PLT-27**

Pile Indentifier: PLT-27C
Pile Type: W6X15
Embedment Depth: 7.92 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	130	0.059	0.040
570	0.088	0.029	1080	0.311	0.131
1000	0.195	0.068	2080	0.616	0.249
150	0.001	0.007	3010	1.004	0.425
1000	0.211	0.074	110	0.127	0.082
1500	0.378	0.143	2040	0.737	0.324
120	0.026	0.021	3030	1.075	0.466
1010	0.254	0.099	4080	1.554	0.698
2030	0.581	0.231	1770	1.064	0.515
130	0.059	0.040	80	0.231	0.152



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

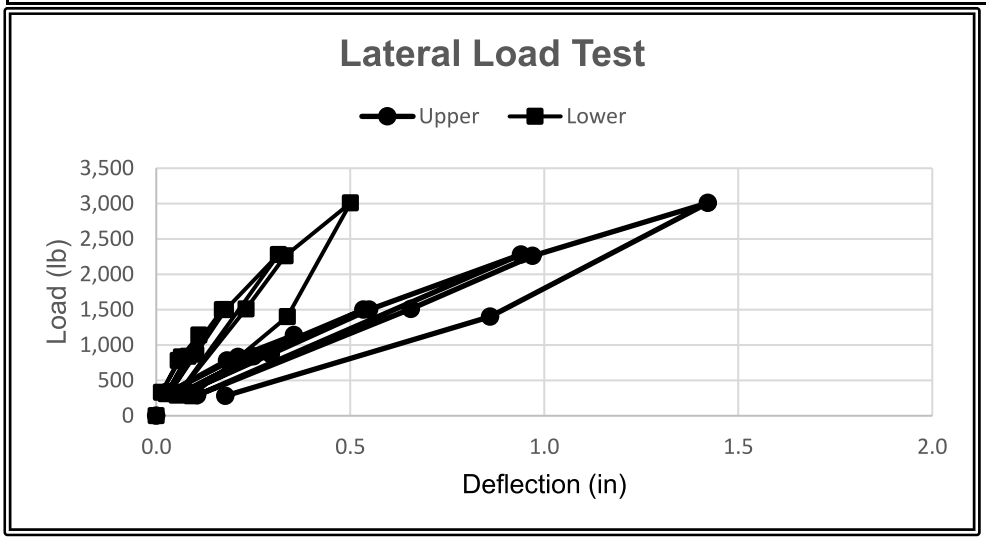
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-28**

Pile Indentifier: PLT-28A
Pile Type: W6X8.5
Embedment Depth: 6.02 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	340	0.081	0.037
			870	0.296	0.102
780	0.183	0.057	1500	0.549	0.179
330	0.033	0.014	2280	0.940	0.315
830	0.211	0.065	290	0.106	0.054
1140	0.355	0.110	1510	0.657	0.232
310	0.061	0.026	2260	0.970	0.333
840	0.251	0.082	3010	1.422	0.501
1500	0.534	0.171	1400	0.861	0.338
340	0.081	0.037	280	0.178	0.093



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

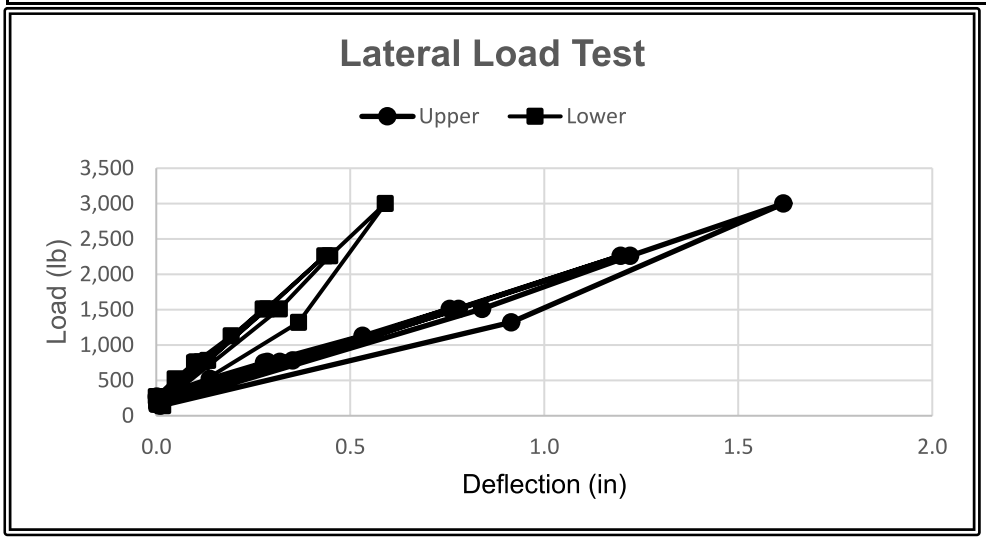
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-28**

Pile Indentifier: PLT-28B
Pile Type: W6X8.5
Embedment Depth: 10.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
270	0.002	0.001	160	0.007	0.005
520	0.138	0.049	780	0.352	0.133
750	0.278	0.099	1510	0.780	0.286
200	0.011	0.001	2260	1.197	0.435
760	0.287	0.103	160	0.015	0.010
1130	0.532	0.194	1510	0.840	0.318
170	0.011	0.003	2260	1.222	0.448
760	0.319	0.118	3000	1.617	0.591
1510	0.757	0.276	1320	0.915	0.367
160	0.007	0.005	140	0.011	0.017



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

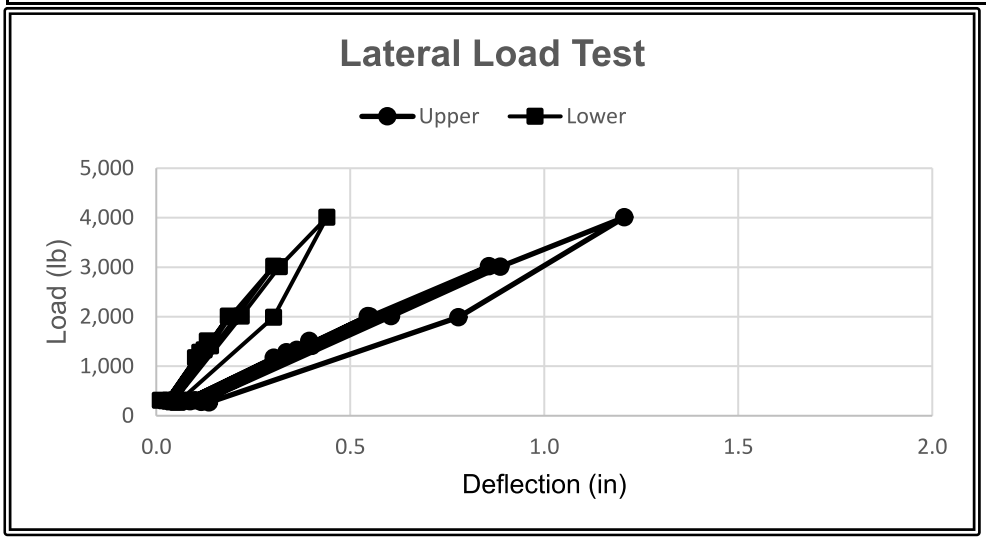
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-28**

Pile Indentifier: PLT-28C
Pile Type: W6X15
Embedment Depth: 7.85 ft
Pile Reveal: 62 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
310	0.041	0.011	310	0.100	0.036
			1410	0.401	0.140
1170	0.303	0.102	2000	0.551	0.191
300	0.074	0.025	3020	0.858	0.303
1280	0.336	0.113	280	0.116	0.044
1510	0.395	0.132	2010	0.606	0.220
290	0.088	0.035	3010	0.887	0.318
1330	0.363	0.124	4010	1.207	0.440
2010	0.546	0.186	1990	0.779	0.303
310	0.100	0.036	270	0.136	0.055



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

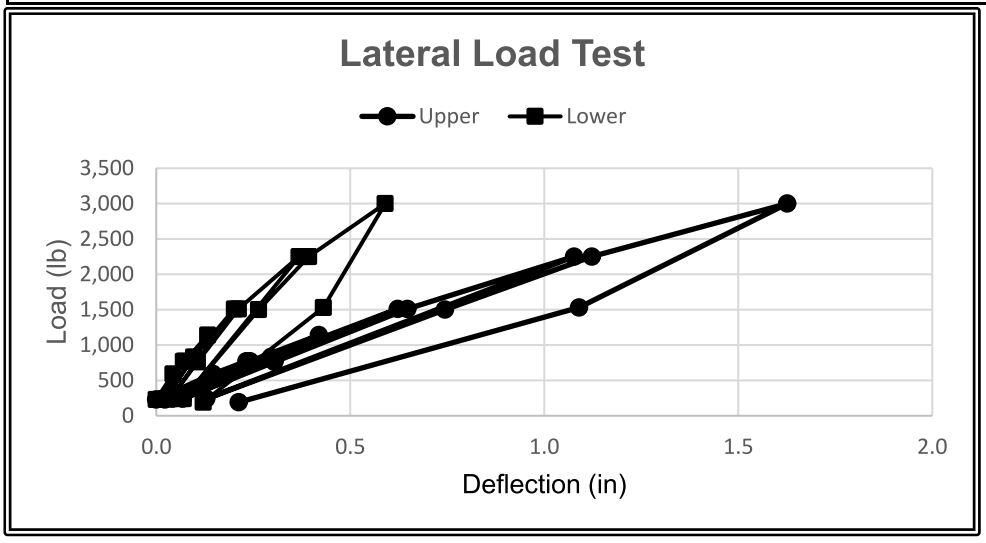
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-29**

Pile Indentifier: PLT-29A
Pile Type: W6X8.5
Embedment Depth: 5.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
230	0.000	0.000	240	0.069	0.036
590	0.147	0.043	760	0.305	0.107
770	0.233	0.070	1510	0.648	0.212
230	0.023	0.013	2250	1.077	0.368
770	0.242	0.074	240	0.129	0.070
1140	0.420	0.133	1500	0.745	0.264
240	0.042	0.024	2250	1.123	0.393
830	0.296	0.097	3000	1.627	0.590
1510	0.623	0.202	1530	1.090	0.431
240	0.069	0.036	190	0.213	0.121



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

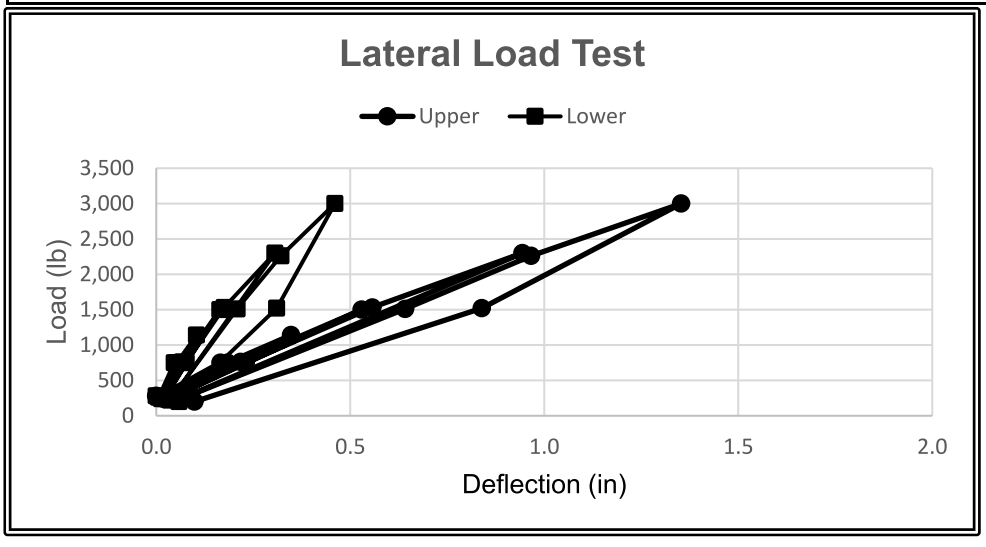
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-29**

Pile Indentifier: PLT-29B
Pile Type: W6X8.5
Embedment Depth: 9.92 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
280	0.000	0.000	240	0.033	0.022
			750	0.231	0.078
750	0.166	0.047	1530	0.557	0.175
260	0.003	0.006	2300	0.944	0.306
750	0.184	0.053	220	0.056	0.036
1140	0.348	0.104	1510	0.642	0.209
240	0.019	0.014	2260	0.966	0.322
760	0.218	0.068	3000	1.353	0.461
1500	0.530	0.164	1520	0.839	0.311
240	0.033	0.022	200	0.099	0.059



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

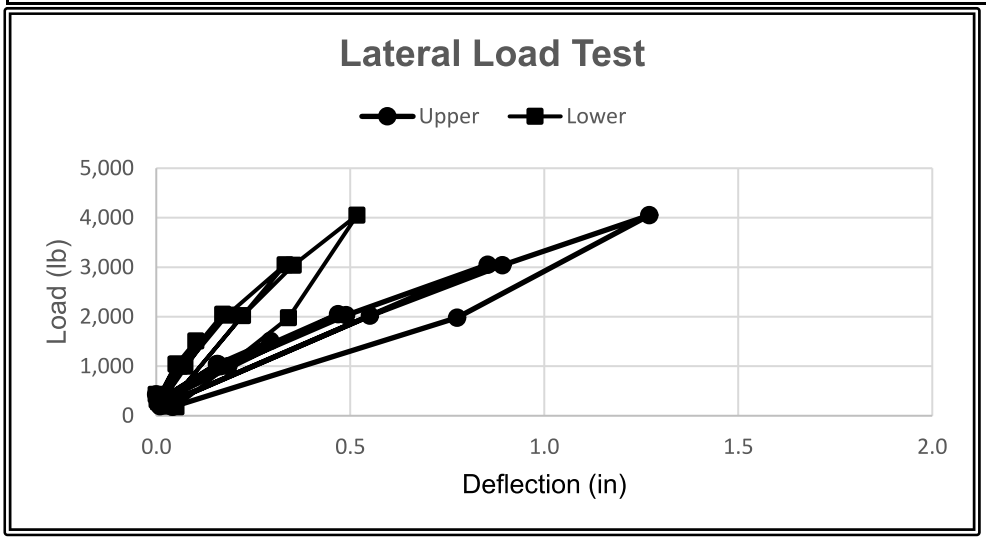
Technician: MG
Test Date: 11/5/2020

Test Location: **PLT-29**

Pile Indentifier: PLT-29C
Pile Type: W6X15
Embedment Depth: 7.94 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
430	0.000	0.000	260	0.005	0.012
			1000	0.186	0.074
1040	0.157	0.051	2030	0.490	0.183
320	0.010	0.003	3050	0.855	0.333
1040	0.159	0.053	190	0.010	0.028
1510	0.295	0.102	2020	0.551	0.223
280	0.012	0.006	3040	0.893	0.354
1000	0.166	0.061	4050	1.271	0.518
2050	0.469	0.172	1980	0.776	0.341
260	0.005	0.012	180	0.043	0.051



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

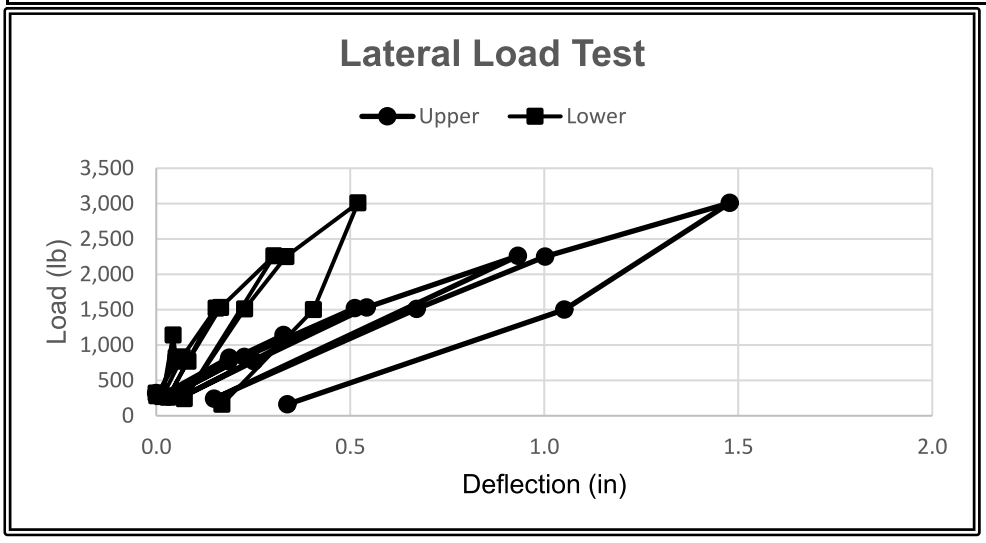
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-30**

Pile Indentifier: PLT-30A
Pile Type: W6X8.5
Embedment Depth: 6.10 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
320	0.000	0.000	260	0.064	0.031
			770	0.253	0.082
820	0.189	0.052	1530	0.543	0.166
280	0.011	0.002	2260	0.933	0.304
770	0.187	0.052	240	0.149	0.073
1140	0.328	0.044	1510	0.672	0.228
270	0.033	0.016	2250	1.003	0.335
830	0.227	0.067	3010	1.479	0.520
1520	0.512	0.155	1500	1.052	0.406
260	0.064	0.031	160	0.338	0.170



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

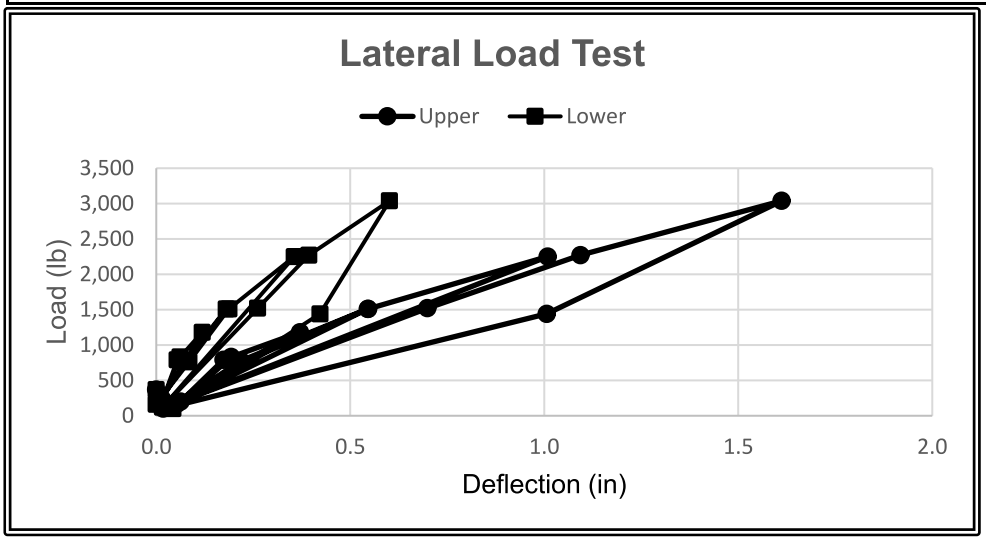
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-30**

Pile Indentifier: PLT-30B
Pile Type: W6X8.5
Embedment Depth: 10.02 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
370	0.000	0.000	160	0.044	0.000
			760	0.221	0.085
790	0.174	0.054	1510	0.547	0.188
200	0.063	0.015	2250	1.009	0.356
830	0.194	0.062	120	0.024	0.016
1180	0.371	0.119	1520	0.699	0.262
170	0.055	0.008	2270	1.094	0.394
770	0.216	0.074	3040	1.612	0.601
1510	0.546	0.181	1440	1.007	0.422
160	0.044	0.000	100	0.018	0.043



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

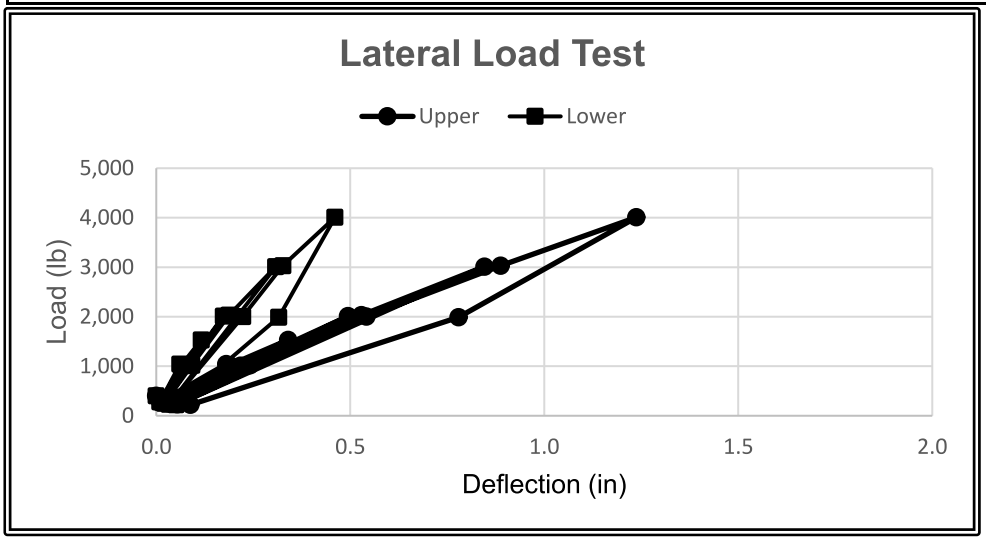
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-30**

Pile Indentifier: PLT-30C
Pile Type: W6X15
Embedment Depth: 8.15 ft
Pile Reveal: 58 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
400	0.000	0.000	250	0.033	0.022
			1020	0.242	0.092
1040	0.181	0.061	2030	0.529	0.188
280	0.011	0.010	3010	0.846	0.308
1020	0.189	0.065	230	0.055	0.034
1530	0.340	0.116	2000	0.542	0.223
270	0.023	0.016	3030	0.888	0.327
1010	0.218	0.079	4010	1.238	0.461
2010	0.495	0.173	1990	0.780	0.316
250	0.033	0.022	220	0.088	0.051



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

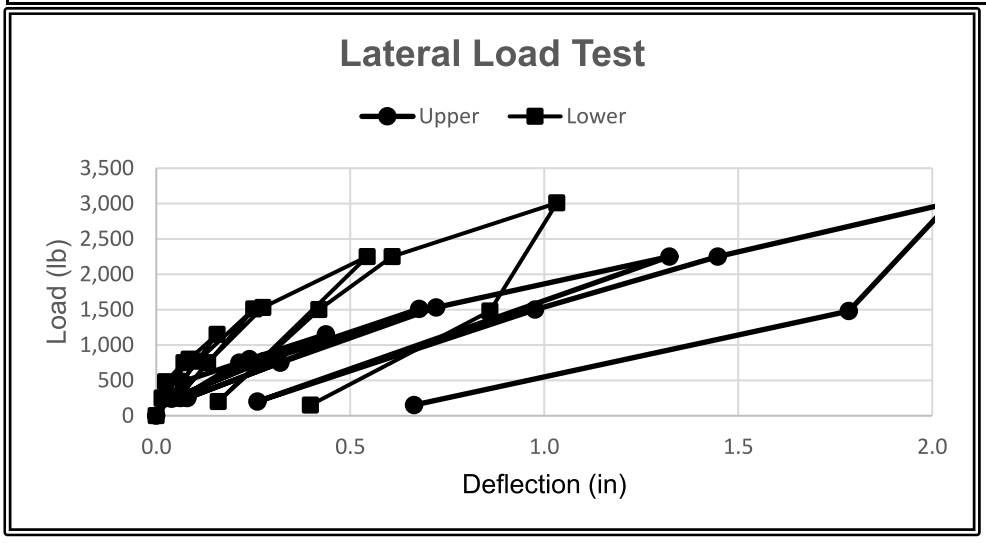
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-31**

Pile Indentifier: PLT-31A
Pile Type: W6X8.5
Embedment Depth: 6.00 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	250	0.081	0.056
480	0.068	0.024	750	0.320	0.133
750	0.215	0.072	1530	0.722	0.275
250	0.063	0.015	2250	1.323	0.544
800	0.241	0.085	200	0.261	0.160
1150	0.438	0.157	1500	0.977	0.420
240	0.040	0.032	2250	1.448	0.608
770	0.278	0.107	3010	2.046	1.033
1510	0.678	0.252	1480	1.785	0.860
250	0.081	0.056	150	0.665	0.398



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

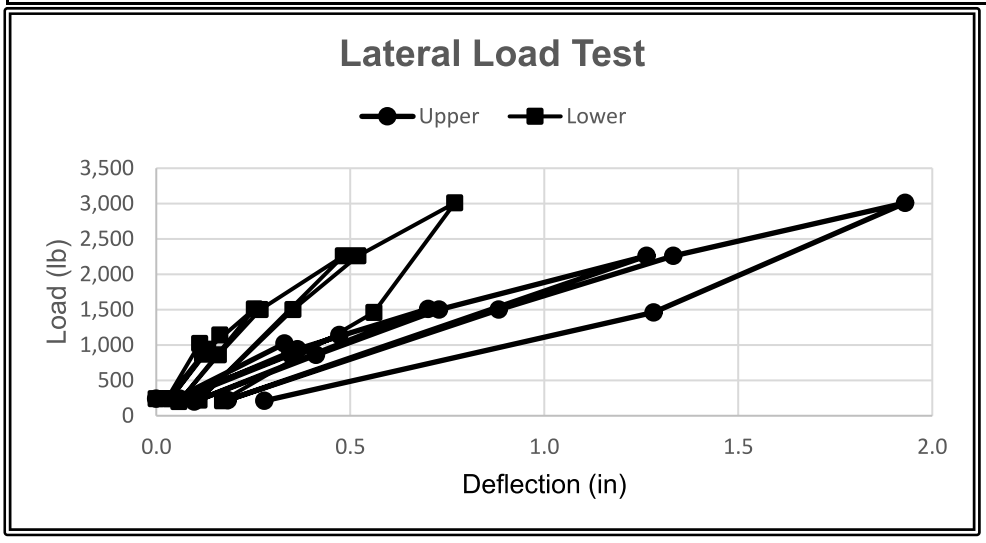
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-31**

Pile Indentifier: PLT-31B
Pile Type: W6X8.5
Embedment Depth: 10.08 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
240	0.000	0.000	200	0.098	0.059
			860	0.412	0.161
1020	0.331	0.112	1500	0.729	0.268
240	0.048	0.028	2260	1.264	0.483
870	0.346	0.120	220	0.185	0.111
1140	0.472	0.164	1500	0.883	0.353
240	0.061	0.037	2260	1.333	0.520
940	0.364	0.133	3010	1.931	0.770
1510	0.701	0.253	1460	1.282	0.561
200	0.098	0.059	210	0.279	0.171



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

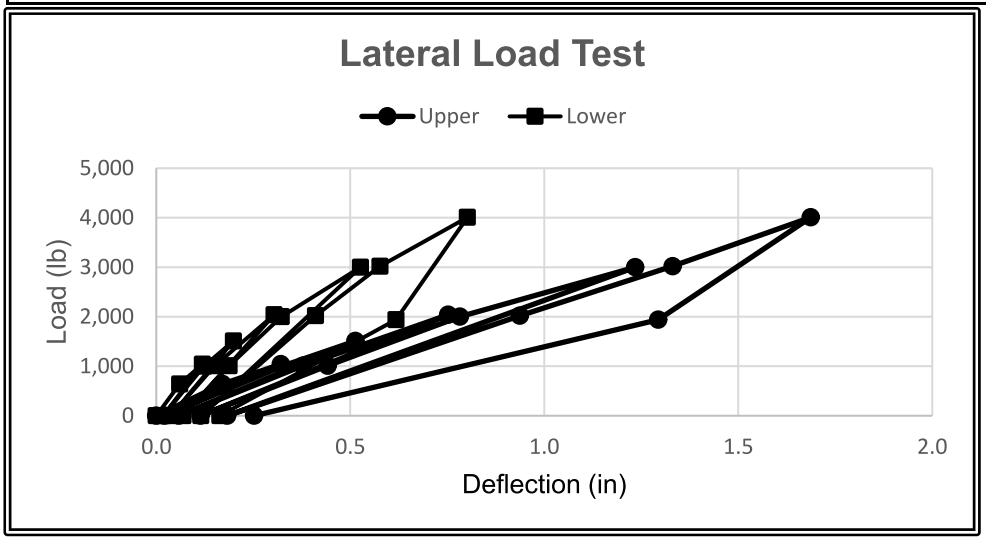
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-31**

Pile Indentifier: PLT-31C
Pile Type: W6X15
Embedment Depth: 7.92 ft
Pile Reveal: 61 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	0	0.114	0.069
640	0.171	0.061	1010	0.442	0.188
1040	0.321	0.119	2000	0.783	0.323
0	0.022	0.018	3000	1.235	0.527
1000	0.325	0.123	0	0.183	0.115
1510	0.514	0.199	2020	0.938	0.411
0	0.059	0.038	3020	1.331	0.577
1010	0.378	0.151	4010	1.687	0.802
2040	0.753	0.304	1940	1.294	0.618
0	0.114	0.069	0	0.253	0.164



Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

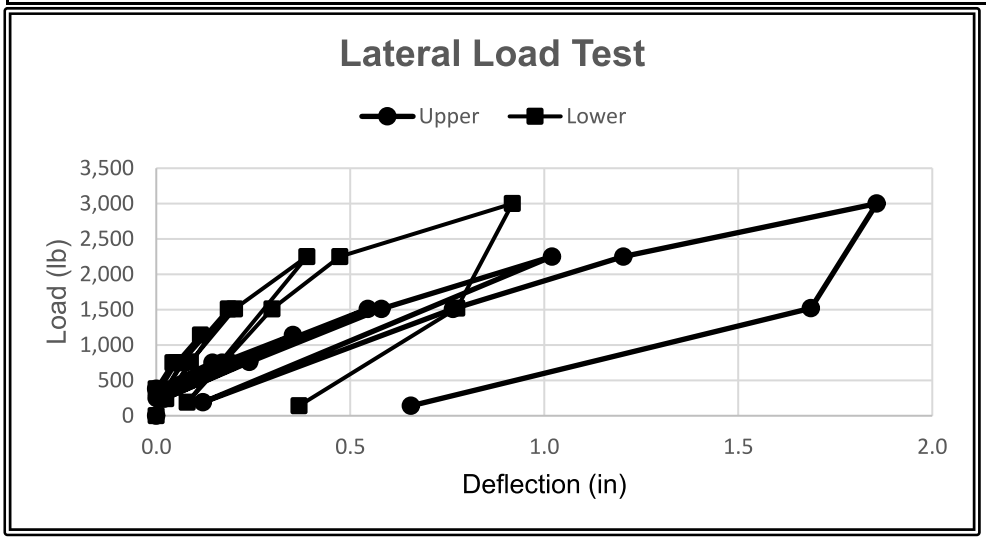
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-32**

Pile Indentifier: PLT32A
Pile Type: W6X8.5
Embedment Depth: 6.02 ft
Pile Reveal: 60 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	240	0.021	0.025
380	0.000	0.000	760	0.240	0.088
750	0.145	0.043	1510	0.581	0.202
310	0.005	0.003	2250	1.020	0.389
750	0.170	0.052	190	0.121	0.080
1140	0.353	0.114	1510	0.765	0.299
250	0.001	0.012	2250	1.204	0.474
750	0.192	0.066	3000	1.857	0.918
1510	0.546	0.186	1520	1.688	0.775
240	0.021	0.025	140	0.657	0.368



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

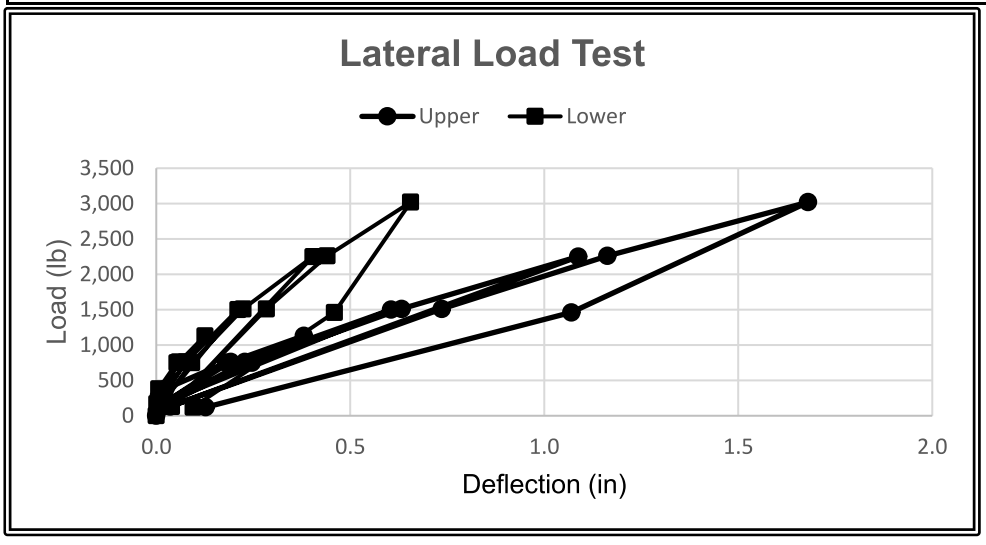
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-32**

Pile Indentifier: PLT-32B
Pile Type: W6X8.5
Embedment Depth: 10.08 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	160	0.009	0.011
380	0.024	0.007	750	0.247	0.092
750	0.180	0.054	1510	0.633	0.224
210	0.029	0.006	2250	1.088	0.404
760	0.192	0.059	130	0.036	0.040
1130	0.381	0.126	1510	0.736	0.284
170	0.029	0.002	2260	1.163	0.441
760	0.229	0.077	3020	1.680	0.656
1500	0.606	0.211	1460	1.070	0.460
160	0.009	0.011	120	0.128	0.095



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Lateral Pile Test Results

Project Name: **Birch Solar Project**
Project Number: **20212135.001A**
Client Name: **Lightsource bp**

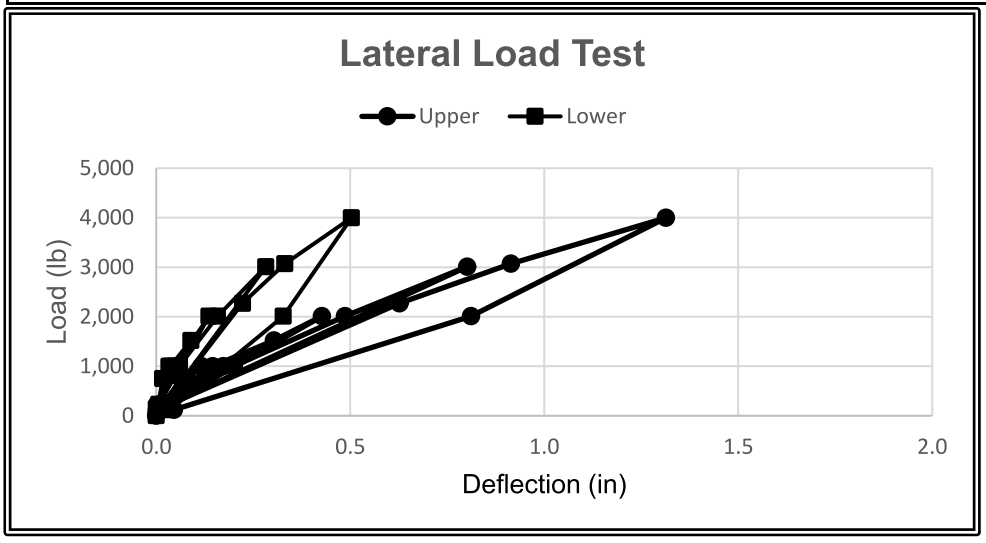
Technician: MG
Test Date: 11/3/2020

Test Location: **PLT-32**

Pile Indentifier: PLT-32C
Pile Type: W6X15
Embedment Depth: 8.08 ft
Pile Reveal: 59 in

Load Application Height: 48 in
Upper Measurement Height: 48 in
Lower Measurement Height: 4 in

Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)	Load (lb)	Top Gauge Deflection (in)	Lower Gauge Deflection (in)
0	0.000	0.000	140	0.010	0.001
750	0.064	0.017	1000	0.200	0.060
1000	0.117	0.033	2010	0.487	0.158
230	0.009	0.007	3010	0.802	0.283
1000	0.146	0.037	130	0.007	0.012
1520	0.304	0.090	2270	0.627	0.223
180	0.011	0.003	3070	0.914	0.332
1000	0.173	0.048	4000	1.314	0.503
2010	0.427	0.136	2010	0.812	0.328
140	0.010	0.001	120	0.046	0.035



APPENDIX G
GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

Summary: Application - 16 of 31 (Exhibit K – Geotechnical Investigation Report) electronically filed by Christine M.T. Pirik on behalf of Birch Solar 1, LLC