

APPENDIX I1

Copco Road Geotechnical Survey Technical Memorandum (by GeoServ, Inc.)

(Pages I1-1 to I1-55)

DRAFT



April 6, 2020

Knight Piésold Ltd. (KP)

Subject: KRRP Copco Road Surface and Subsurface Geotechnical Survey Technical Memorandum

Dear Knight Piésold:

In accordance with your request and authorization of GeoServ, Inc. (GSI) has prepared the enclosed Geotechnical Survey based on the requirements and proposed project specifics identified during our review. Specifically, this technical memorandum (memo) provides a summary of the methods used to survey Copco Road from the Klamathon Bride to the Copco Dam Road intersection. The memo also includes Appendix A that shows and lists relevant data and diagrams to include:

- Survey Field Road Core Test Results
- Road Core Logs
- Survey Diagrams
- Summary Photographs

Data and results presented in this technical memorandum are preliminary and subject to change. Additional analyses and interpretations need to be made from the survey data. Design recommendations are not included at this time pending input from KP and laboratory test results. If you have any questions regarding the data and results, please do not hesitate to contact this office. The opportunity to be of service is appreciated.

Respectfully submitted,

James Fitzgerald, Senior Geologist
GeoServ, Inc.
624 South Mount Shasta Blvd.
Mount Shasta, CA 96067
(530) 227-8963
jf@geoscienceserv.com

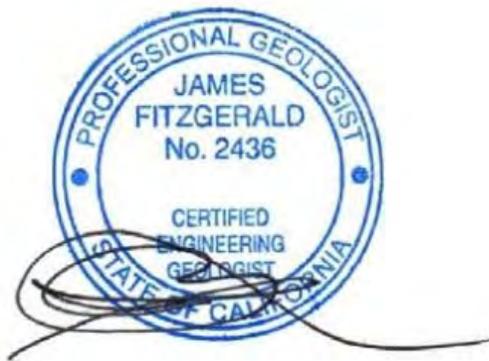


KRRP Copco Road Surface and Subsurface Geotechnical Survey Technical Memorandum

Prepared for: Knight Piésold Ltd. (KP)

Prepared by: GeoServ, Inc. (GSI)

Initial Report Date: April 6, 2020



Summary

GSI completed a surface and subsurface road survey of 17.5 miles of Copco/Iron Gate Lake Road (Copco Road). The survey included drilling 18 road cores and surveying both traffic lanes with ground penetrating radar (GPR) survey equipment. These data were used to characterize surface/subsurface road conditions. This report includes a summary of the methods used for data collection and analysis, data results, preliminary conclusions, and limitation and assumptions (see Appendix A for survey data). Copco Road is a rural Siskiyou County Road with an asphalt and gravel surface that accesses both the Iron Gate and Copco dams, as well as recreational areas and private properties. This survey focused on Copco Road starting at the Klamathon Bridge on the west end and Copco Dam on the east end (Appendix A: Figure C1).

Assessment of the Copco Road surface and shallow subsurface was accomplished through advancement of 18 road cores spread evenly along the road survey segment (Appendix A: Figure C1). The road cores were used to help determine asphalt, aggregate base, and native fill thickness, depth to bedrock, fill conditions, groundwater conditions, and road bearing capacity. To provide indirect data on the shallow subsurface and to allow for interpolation and extrapolation between drill sites, a GPR survey was completed along each lane of the surveyed road segments. The direct and indirect data were compiled and analyzed to give an estimate of average asphalt thickness and condition, aggregate base conditions, and cut and fill conditions.

Asphalt: Most of the Copco Road surface is paved with asphalt that is in fair to poor condition based on the direct and indirect measurements taken as part of this survey. There are short sections of gravel surface road. The average measured asphalt thickness is 2” and is in fair to poor condition.

Asphalt Subgrade: Directly under the pavement there is either aggregate base rock with moderate to high density or native fill material with moderate to high density.

Road Subgrade: The road prism is a combination of cut and fill with most of the prism having both cut and fill. Overall, most of the fill is native material locally sourced from the cut areas. The native fill tends to be firm to very stiff cohesive gravelly clay with moderate to high plasticity.

Methods

Direct Measurements: Road core sampling was completed at 18 locations along Copco Road, and the core locations were spread out with about 1 core per mile of road surveyed (Appendix A: Figure C1 and Table 1). The asphalt was cored using a 6” diamond core bit. The road subgrade was sampled using a 6” hollow stem auger and a Standard Penetration Test (SPT) sampler. The road cores were located along the outside lane and were generally within the outside primary vehicle wheel tread.

Indirect Measurements: GPR survey was completed on 17.5 miles of Copco Road from the Klamathon Bridge crossing the Klamath River to the Copco Dam Access Road. The survey was completed to help evaluate existing asphalt thickness and condition and to estimate road subgrade soil/rock types and condition. Two GPR survey passes were made along the road, one in each lane, for a total of 35 miles of survey. Each traffic lane was scanned by one pass that corresponded with the primary vehicle wheel tread. Heading east, the survey line was on the outside lane within the outer tire tread. Heading west, the survey line was on the inside lane within the inner tire tread.

Within areas of obvious asphalt and/or subgrade failure, additional GPR passes were completed to better define the horizontal and vertical extents of the failures.

Results

In general, drilling of the road surface and prism was accomplished with minimal drilling effort. Total road core depth to auger refusal ranged from 0.8' to 7.8' below ground surface (bgs) (Appendix A: Figures C2-C13 and Road Core Logs). Even with the presence of clay rich soils, the road core and GPR data correlate relatively well, and general conclusions of road condition can be estimated with relatively good certainty. A summary of the measured and estimated asphalt, aggregate base, road subgrade conditions is shown in Appendix A: Figures C2-C13 and Table 1.

The survey data indicate that in areas where an asphalt surface is present asphalt thickness is typically 1.5"-2". In road segments where repairs have taken place, the asphalt thickness generally increases, with the thickest measured asphalt at 6.25" in a repaired segment. Asphalt was typically dry with partial cracking visible on the road surface, areas of apparent subgrade failure show larger arcuate shaped cracking along the perimeter of the failing area as well as alligator cracking along some sections. It appears that repairs on the roadway typically consist of additional layer(s) of asphalt being placed on top of a failing section of road to make grade/alignment adjustment to bring the roadway surface back up to grade. Road segments with newer asphalt have a higher asphalt density, less cracking, and higher oil content.

Inferred from the road core and GPR data correlation, it appears that most of the surveyed road segment is underlain by between 4" to 6" of aggregate base rock. Recently repaired areas have up to 1' of base. The directly observed aggregate base rock is typically a cohesionless medium dense to dense $\frac{3}{4}$ " minus gravel. The average measured in-place bearing capacity is 17,500 pounds per square foot (psf) (Appendix A: Table 1).

The measured native fill thickness along the surveyed road ranges from 0' to 7.5' with the thickest areas being associated with placement of culverts and fill across drainages and swales. The native fill thickness also varies from lane to lane as most of the roadway required the use of cut and fill construction methods in order to provide a level road surface and proper road alignment for vehicle traffic. Fill material most commonly consists of locally or adjacently sourced native soil and rock placed during original road building efforts. Fill material typically consists of cohesive sandy/gravelly/cobble clay with firm to very stiff consistency with an average measured undrained shear strength (N60) 7,500 psf (Appendix A: Table 1). For the directly observed native fill, the sand is very fine to coarse, the clay has medium to high plasticity, gravels are less than 1" in diameter, and cobbles are about 2.5" in diameter.

For fill areas of the road prism, below the aggregate base rock or native fill material, there is in-place native soil and rock. Most of the in-place material is hard volcanic rock varying from fresh to very weathered into clay with gravel and cobbles. The volcanic rock has an average measured bearing capacity of 37,500 psf (Appendix A: Table 1).

No groundwater was observed within the road cores or GPR data (Appendix A: Road Core Logs). Groundwater levels can fluctuate from season to season and year to year. Given that this survey was

completed during a dry time of year, shallow groundwater may be present during wet times of the year.

Preliminary Conclusions

Overall, the surveyed road segments with full bench cuts are founded on hard bedrock and are stable. Road segments constructed using native fill are relatively unstable. Segments that are founded on rock have an estimated average ultimate bearing capacity of 37,000 psf (Appendix A). Road segments constructed using native fill have an estimated ultimate bearing capacity of (N60) 7,500 psf. The segments that are full bench cuts have good to fair road surface and subgrade conditions whereas segments that are cut/fill or all fill have fair to poor surface and subsurface conditions.

Based on the data interpretations and visual road assessment, there are likely two main causes of poor road surface condition. First, road prisms that are founded on relatively uncompacted expansive clay fill, very little or no aggregate base under the asphalt, a relatively thin layer of asphalt, and the age of the asphalt. Road segments assessed to be in poor condition tend to have an irregular surface, less aggregate base rock, and old and dray asphalt (e.g., alligator cracking). Second, road segments with a combination of cut and fill (i.e., sliver fills) tend to have outboard edge failures with arcuate shaped drops in the road prism. These fill failures are likely result from a lack of keyways into in-place native rock and soil on the outboard edge of the road, poor compaction of expansive clay soils, and heavy live loads.

Limitations and Assumptions

The analysis and conclusions presented in this report have been conducted according to current geologic and engineering practice and the standard of care exercised by reputable professional consultants performing similar tasks in this area. The conclusions made are preliminary and subject to change. This is a preliminary summary and interpretation of these data. No other warranty, expressed or implied, is made regarding the conclusions and opinions expressed in this report. Variations may exist and conditions not observed or described in this report may be encountered during future assessments. GSI's conclusions are based on an analysis of the observed conditions and data available at the time of this report.

Data for this survey is inherently limited given the density of direct measurements (i.e., one road core per mile of survey). The point data at road core locations have the most objective and greatest certainty in the accuracy of conclusions made from these data. GPR data have the most uncertainty given the indirect nature of non-visual testing. The GPR data do have the most coverage relative to the road core data. The correlation between road core data and GPR data is limited to extrapolation between road cores. The conclusions made herein assume that asphalt composition and thickness between known points is relatively constant and that the aggregate base material is from the same source with similar thickness, and that native fill material is the same from station to station. Also assumed is that the aggregate base differs greatly from native fill material in gradation, density, and plasticity. It follows that fill compaction and or composition varies from adjacent native fill and in place material(s) allowing for differentiation with the return signal detected by the GPR equipment. As of this report, the laboratory testing of soil and rock samples has not occurred and is forthcoming.

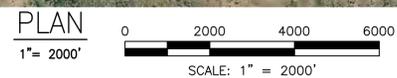
APPENDIX A



GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

SHEET INDEX			
DRAWING #	TITLE	REVISION	DATE
C1	COPCO ROAD GPR PROJECT AREA		2/19/20
C2	COPCO ROAD STA 157+00.0-236+20.0		2/19/20
C3	COPCO ROAD STA 236+20.0-328+60.0		2/19/20
C4	COPCO ROAD STA 328+60.0-407+80.0		2/19/20
C5	COPCO ROAD STA 394+60.0-473+80.0		2/19/20
C6	COPCO ROAD STA 473+80.0-539+80.0		2/19/20
C7	COPCO ROAD STA 539+80.0-619+00.0		2/19/20
C8	COPCO ROAD STA 632+20.0-711+40.0		2/19/20
C9	COPCO ROAD STA 711+40.0-790+60.0		2/19/20
C10	COPCO ROAD STA 790+60.0-869+80.0		2/19/20
C11	COPCO ROAD STA 869+80.0-949+00.0		2/19/20
C12	COPCO ROAD STA 949+00.0-1028+20.0		2/19/20
C13	COPCO ROAD STA 2028+20.0-1092+00		2/19/20



ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:
COPCO ROAD GPR
PROJECT AREA

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

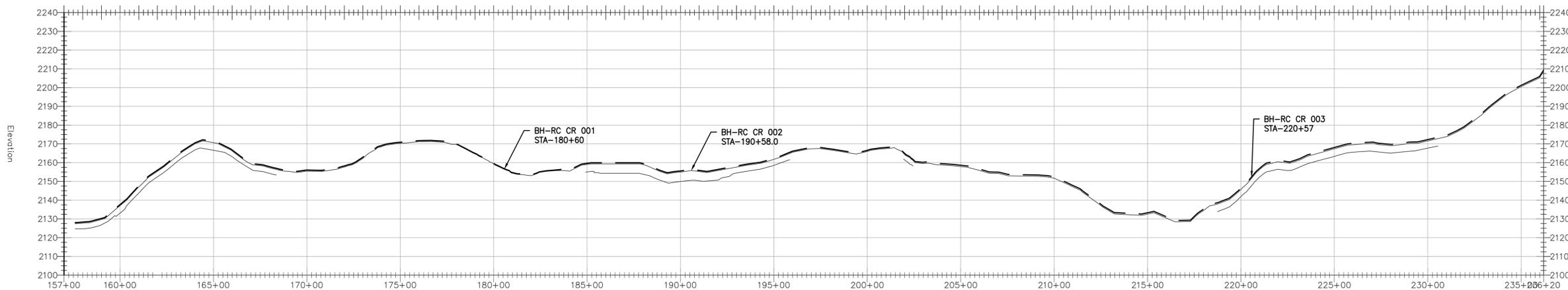
CHECKED:
JF

SHEET:
C1



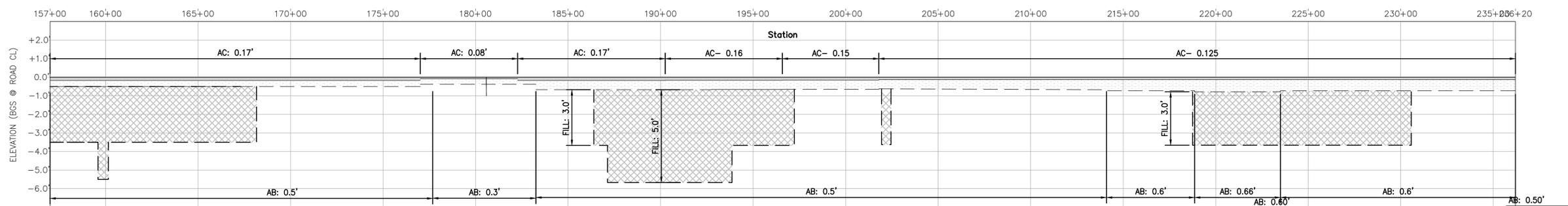
GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



ELEVATION

1" = 300'; 1H = 10V



ELEVATION

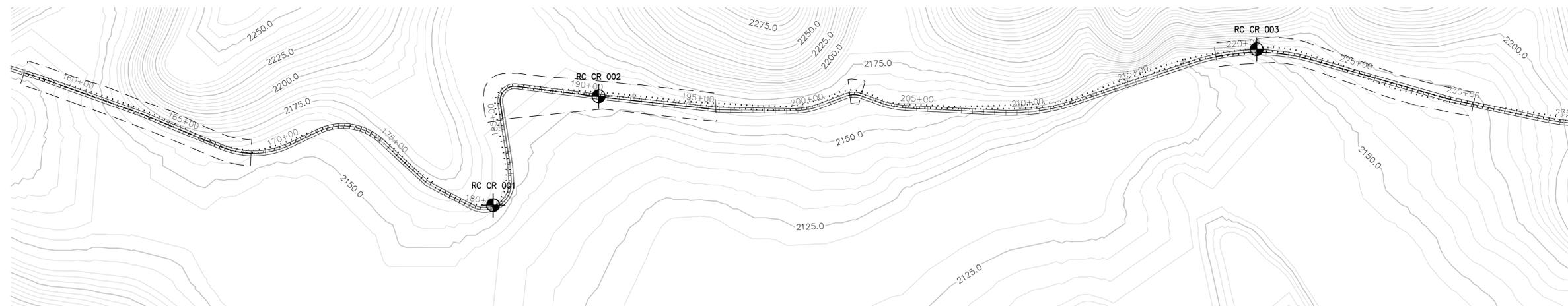
HORIZ. SCALE 1" = 300'

NOTES:

1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

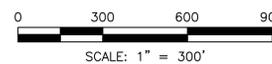
LEGEND

	EXISTING ASPHALT
	EXISTING AGGREGATE BASE R _x
	EXISTING FILL
	COPCO GPR MAPPING TICKS-25'



PLAN

1" = 300'



NOTE:

FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5340, 550) EASTBOUND LANE;
(4730, 5875) WEST BOUND LANE.

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

COPCO ROAD STA
157+00-236+20
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:

190725

ISSUE DATE:

2/19/20

SCALE:

AS NOTED

DRAWN BY:

KF

ENGINEERED:

CHECKED:

JF

SHEET:

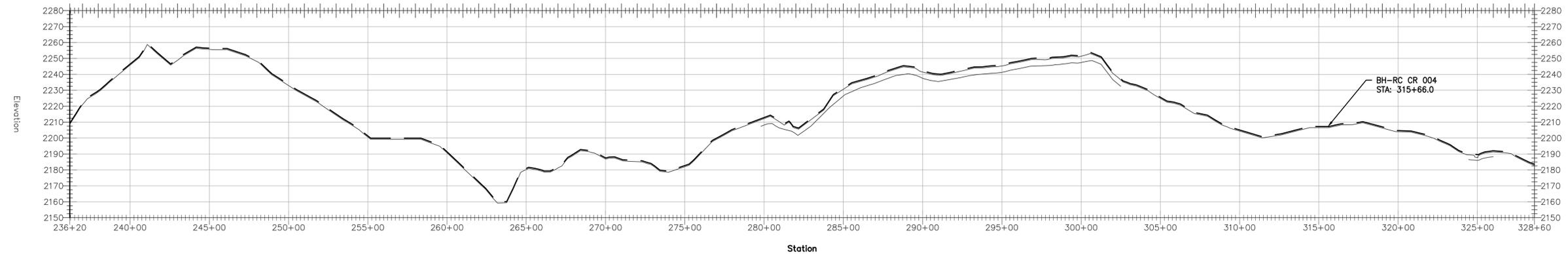
C2



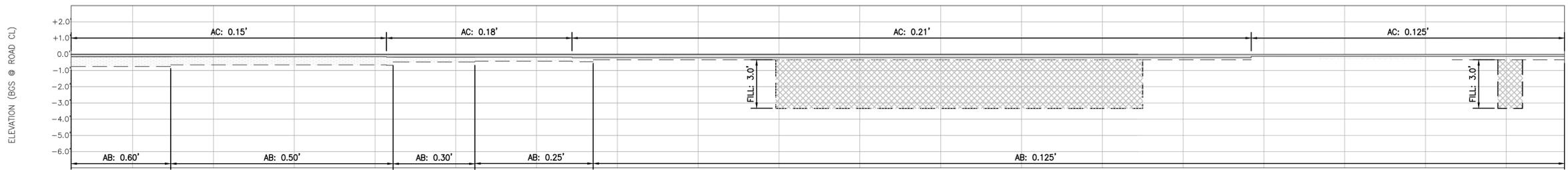
GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



ELEVATION
1" = 350' 1 H = 10 V



ELEVATION
HORZ. SCALE 1" = 350'

- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

LEGEND

	EXISTING ASPHALT
	EXISTING AGGREGATE BASE R _x
	EXISTING FILL
	COPCO GPR MAPPING TICKS-25'

SHEET NAME:
COPCO ROAD STA
236+20-328+60
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

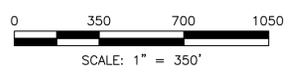
CHECKED:
JF

SHEET:
C3



NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (10665, 5365) EASTBOUND LANE;
(5380, 5920, 4730) WEST BOUND LANE.

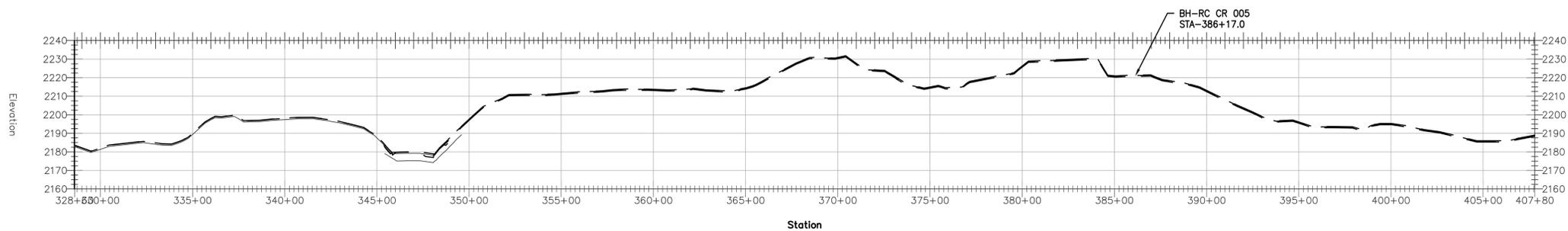
PLAN
1" = 350'





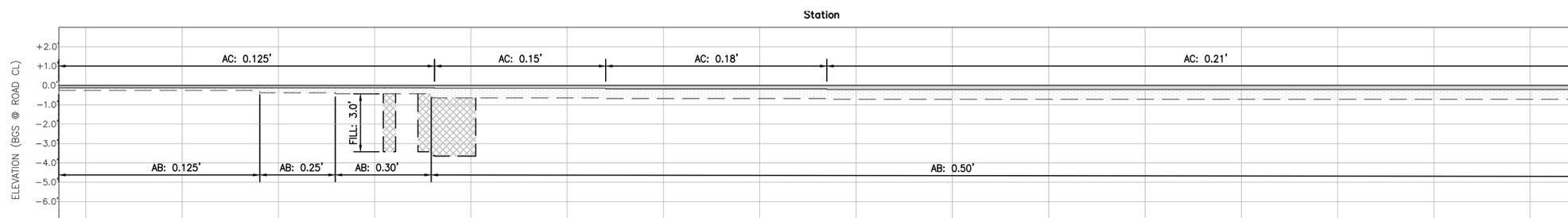
GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



ELEVATION

1" = 350' 1 H = 10 V



ELEVATION

HORZ. SCALE 1" = 300'

NOTES:

1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

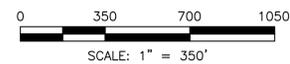


LEGEND

- EXISTING ASPHALT
- EXISTING AGGREGATE BASE Rx
- EXISTING FILL
- COPCO GPR MAPPING TICKS-25'

PLAN

1" = 350'



NOTE:

FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5340, 550) EASTBOUND LANE;
(4730, 5875) WEST BOUND LANE.

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

COPCO ROAD STA
328+60-407+80
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:

190725

ISSUE DATE:

2/19/20

SCALE:

AS NOTED

DRAWN BY:

KF

ENGINEERED:

CHECKED:

JF

SHEET:

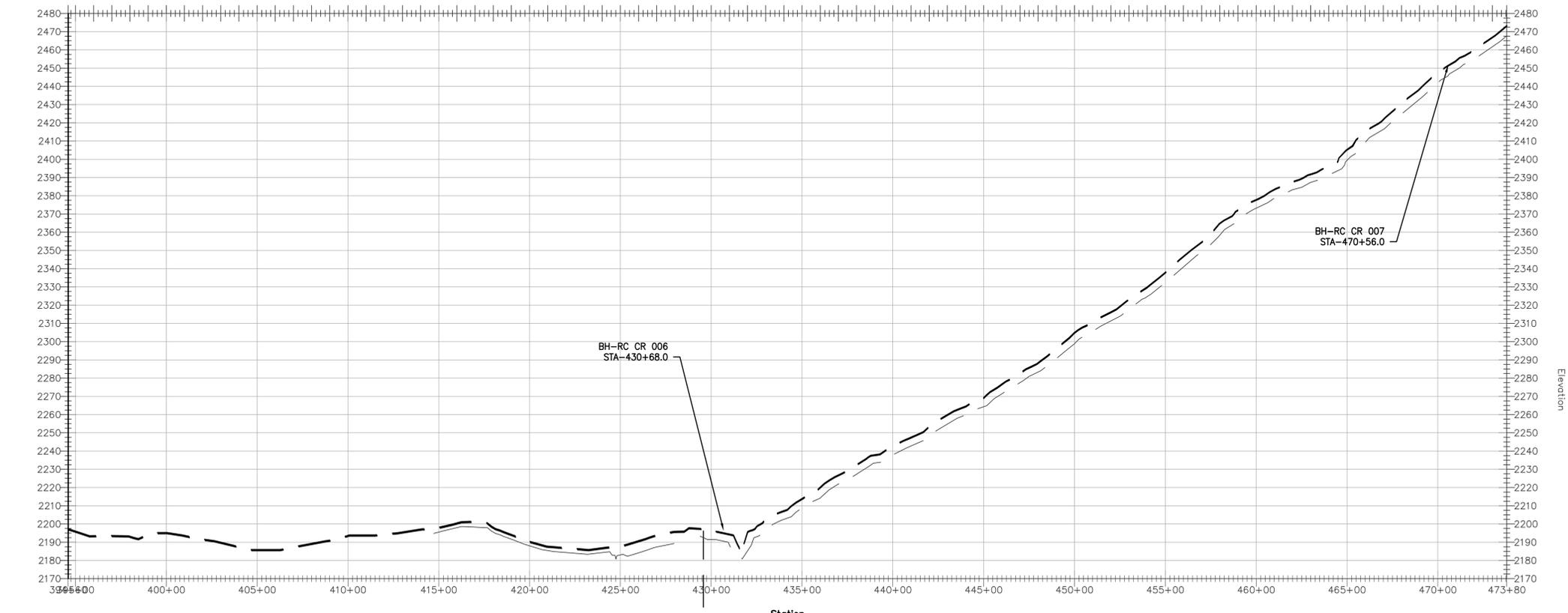
C4



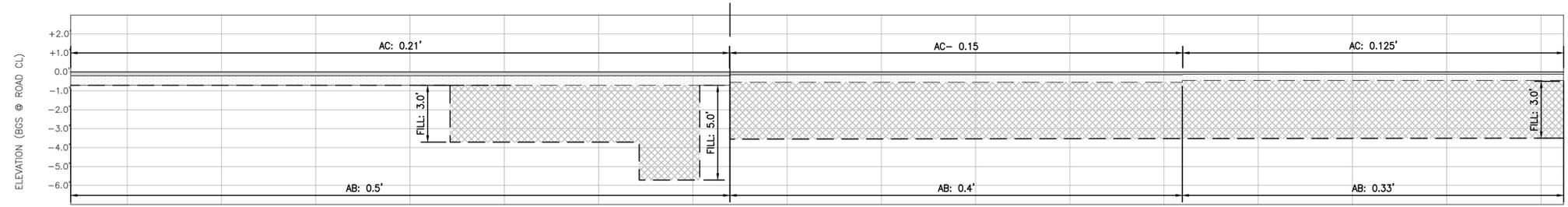
GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



ELEVATION
1" = 350' 1 H = 10 V



ELEVATION
HORZ. SCALE 1" = 350'

- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

LEGEND

- EXISTING ASPHALT
- EXISTING AGGREGATE BASE Rx
- EXISTING FILL
- COPCO GPR MAPPING TICKS-25'



PLAN
1" = 350'
SCALE: 1" = 350'

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5546, 5520) EASTBOUND LANE;
(5550, 5521) WEST BOUND LANE.

SHEET NAME:
COPCO ROAD STA
394+60-473+80
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

SHEET:

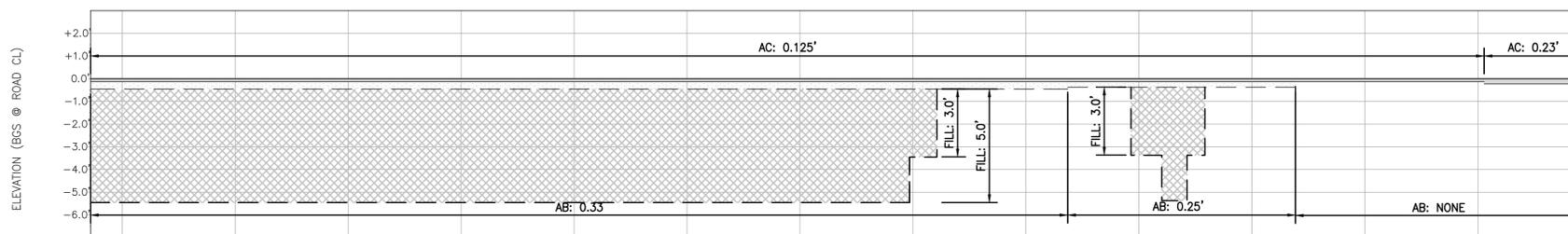
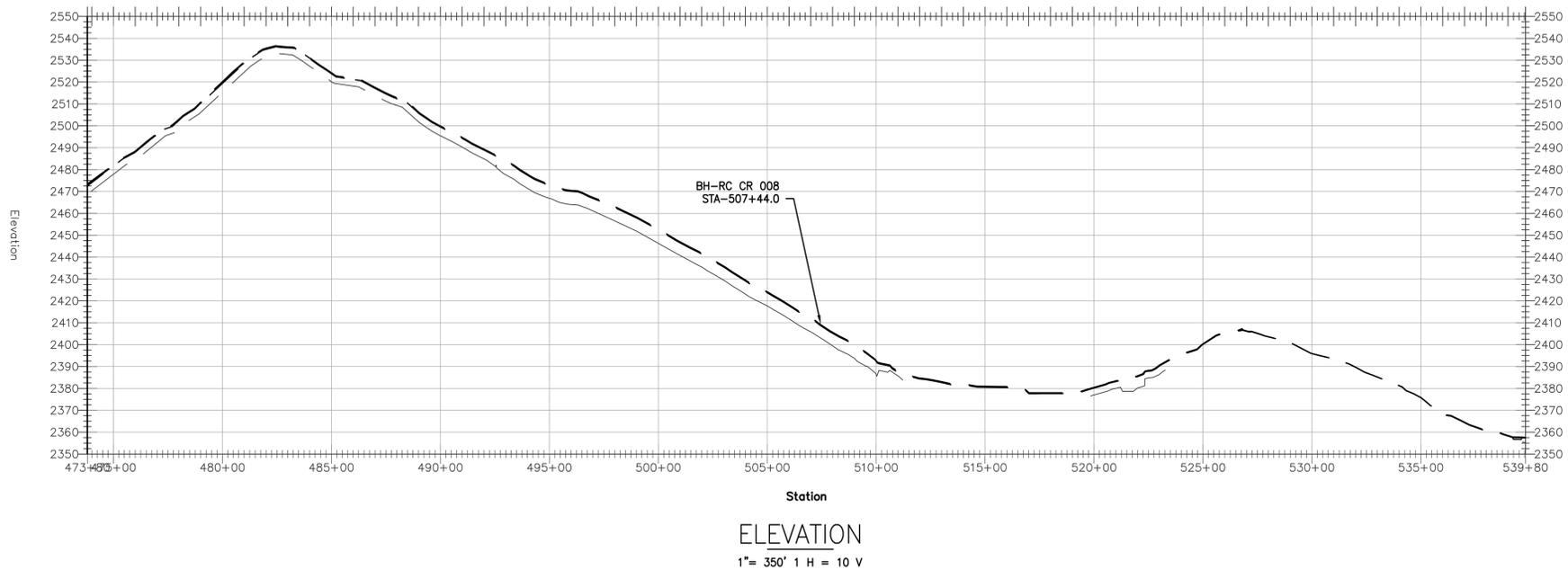
C5



GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOCS: (5384, 4632, 5546) EASTBOUND LANE;
(5420, 900, 4430, 5550) WEST BOUND LANE.



LEGEND

	EXISTING ASPHALT
	EXISTING AGGREGATE BASE R _x
	EXISTING FILL
	COPCO GPR MAPPING TICKS-25'

SHEET NAME:

COPCO ROAD STA
473+80-539+80
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:

190725

ISSUE DATE:

2/19/20

SCALE:

AS NOTED

DRAWN BY:

KF

ENGINEERED:

CHECKED:

JF

SHEET:

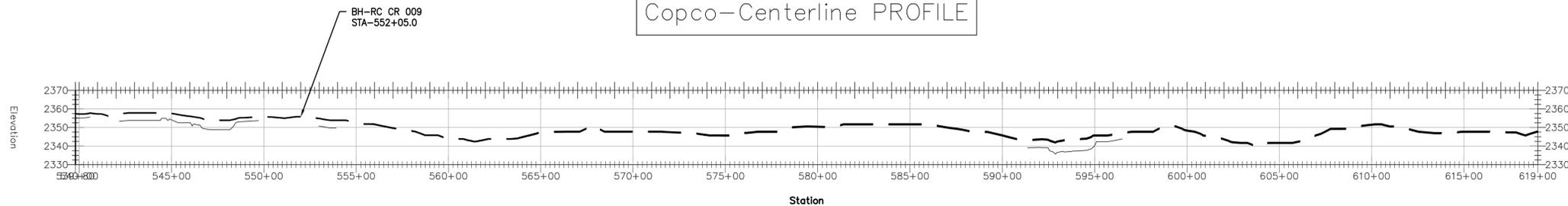
C6



GEO SERV, INC.

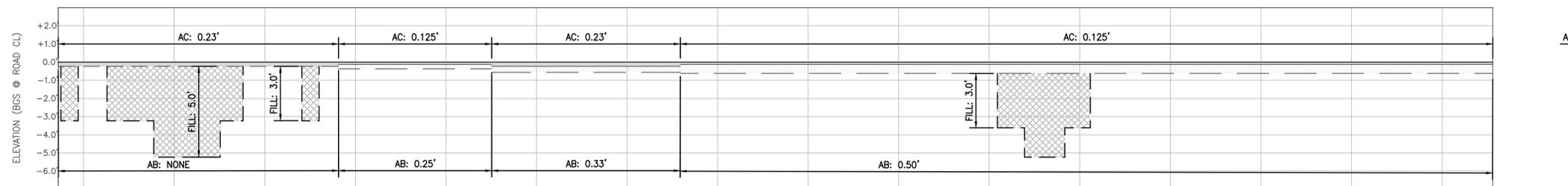
P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

Copco-Centerline PROFILE



ELEVATION

1" = 350' 1 H = 10 V



ELEVATION

HORZ. SCALE 1" = 350'

NOTES:

1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

LEGEND

	EXISTING ASPHALT
	EXISTING AGGREGATE BASE R _x
	EXISTING FILL
	COPCO GPR MAPPING TICKS-25'



NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (1090, 5360) EASTBOUND LANE;
(4200, 5400) WEST BOUND LANE.

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

COPCO ROAD STA
539+80-619+00
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:

190725

ISSUE DATE:

2/19/20

SCALE:

AS NOTED

DRAWN BY:

KF

ENGINEERED:

CHECKED:

JF

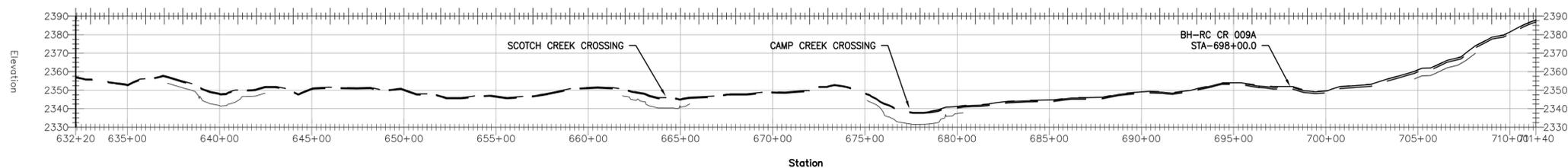
SHEET:

C7

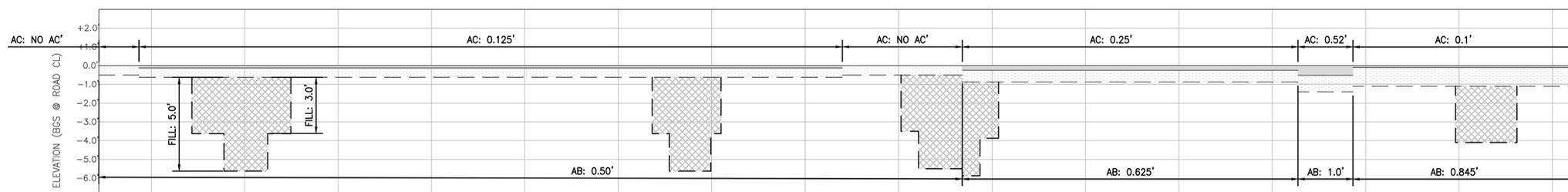


GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



ELEVATION
1" = 350' 1 H = 10 V



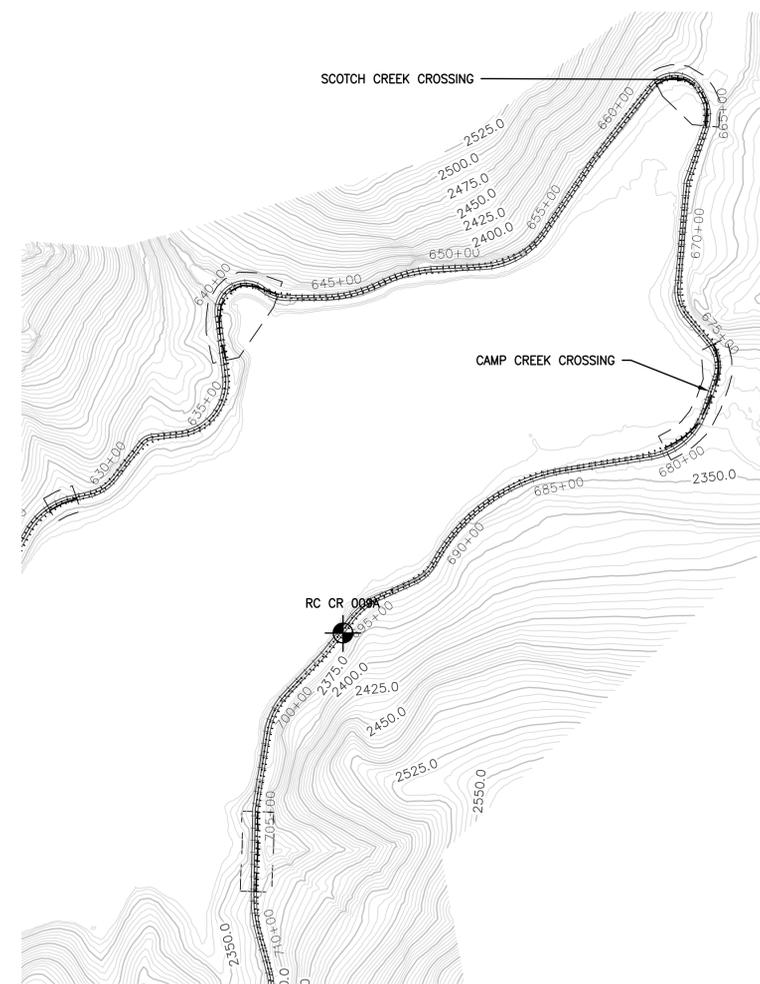
- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

ELEVATION
HORZ. SCALE 1" = 350'

LEGEND

	EXISTING ASPHALT
	EXISTING AGGREGATE BASE R _x
	EXISTING FILL
	COPCO GPR MAPPING TICKS-25'

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5360, 5310, 5395) EASTBOUND LANE;
(5370, 5340) WEST BOUND LANE.



PLAN
1" = 350' SCALE: 1" = 350'

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

COPCO ROAD STA
632+20-711+40
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

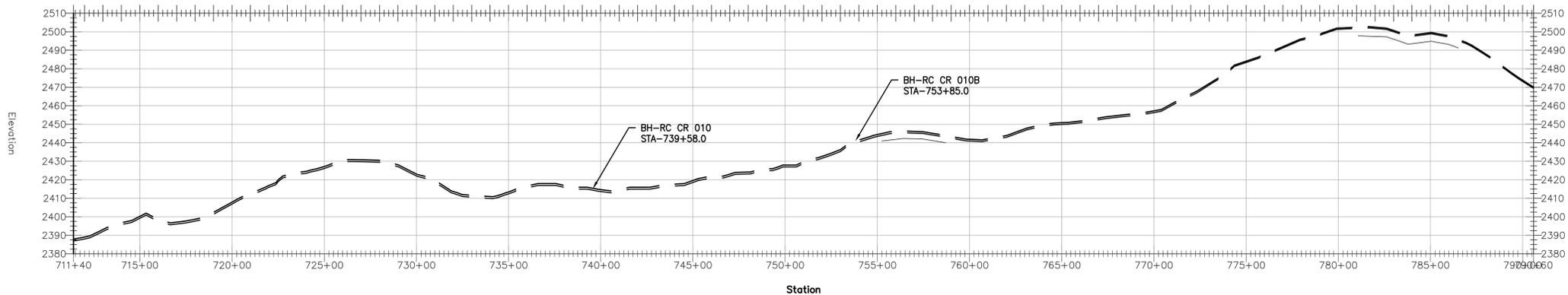
SHEET:

C8

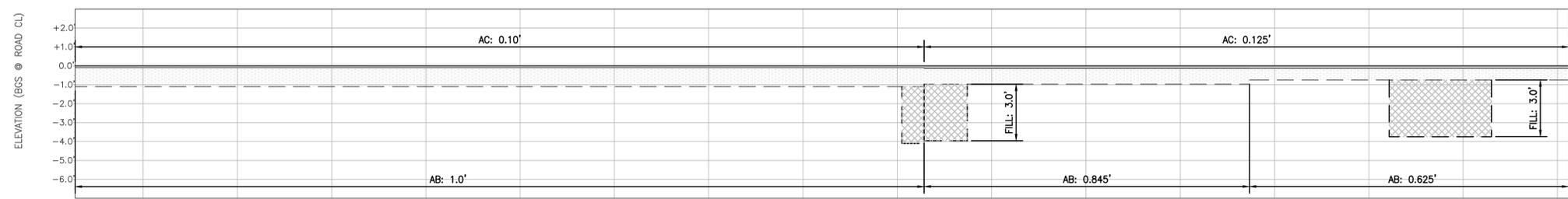


GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



ELEVATION
1" = 350' 1 H = 10 V

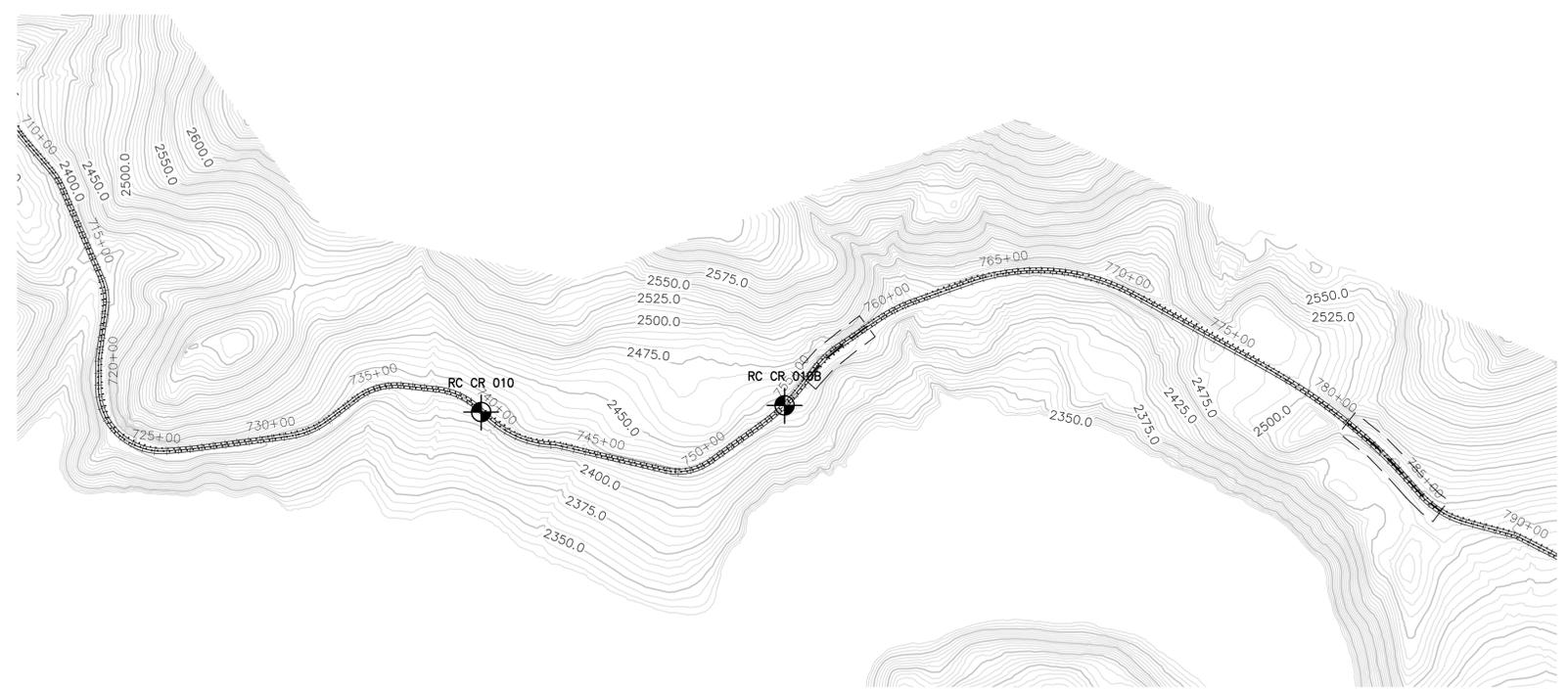


ELEVATION
HORZ. SCALE 1" = 350'

- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

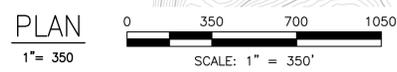
ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5310, 5395, 5385) EASTBOUND LANE;
(5365) WEST BOUND LANE.



LEGEND

- EXISTING ASPHALT
- EXISTING AGGREGATE BASE R_x
- EXISTING FILL
- COPCO GPR MAPPING TICKS-25'



SHEET NAME:
COPCO ROAD STA
711+40-790+60
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725
ISSUE DATE:
2/19/20
SCALE:
AS NOTED

DRAWN BY:
KF
ENGINEERED:

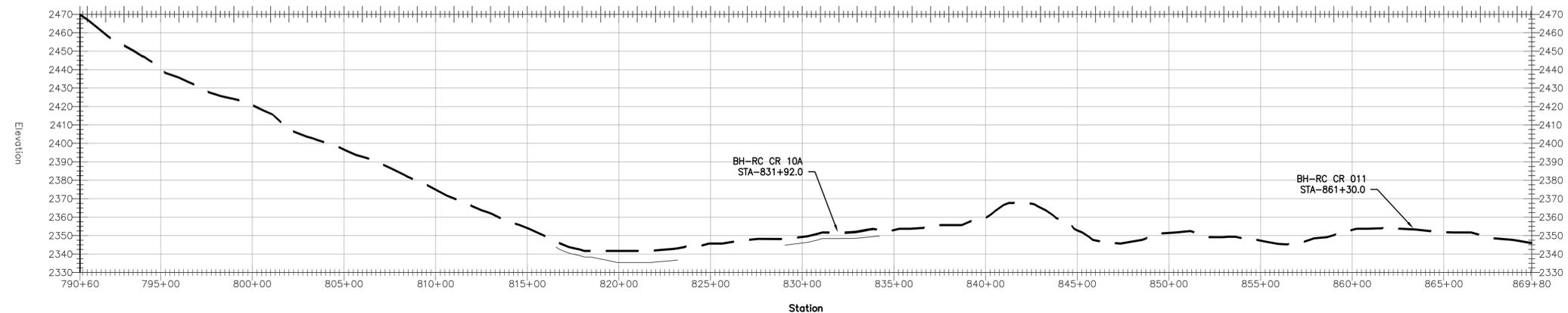
CHECKED:
JF

SHEET:
C9

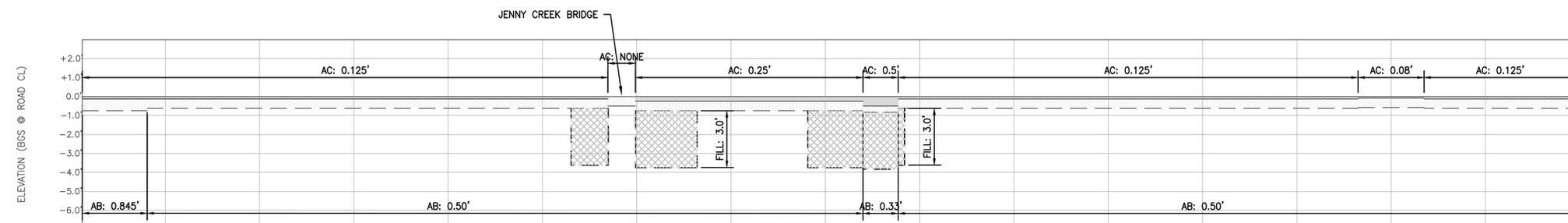


GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



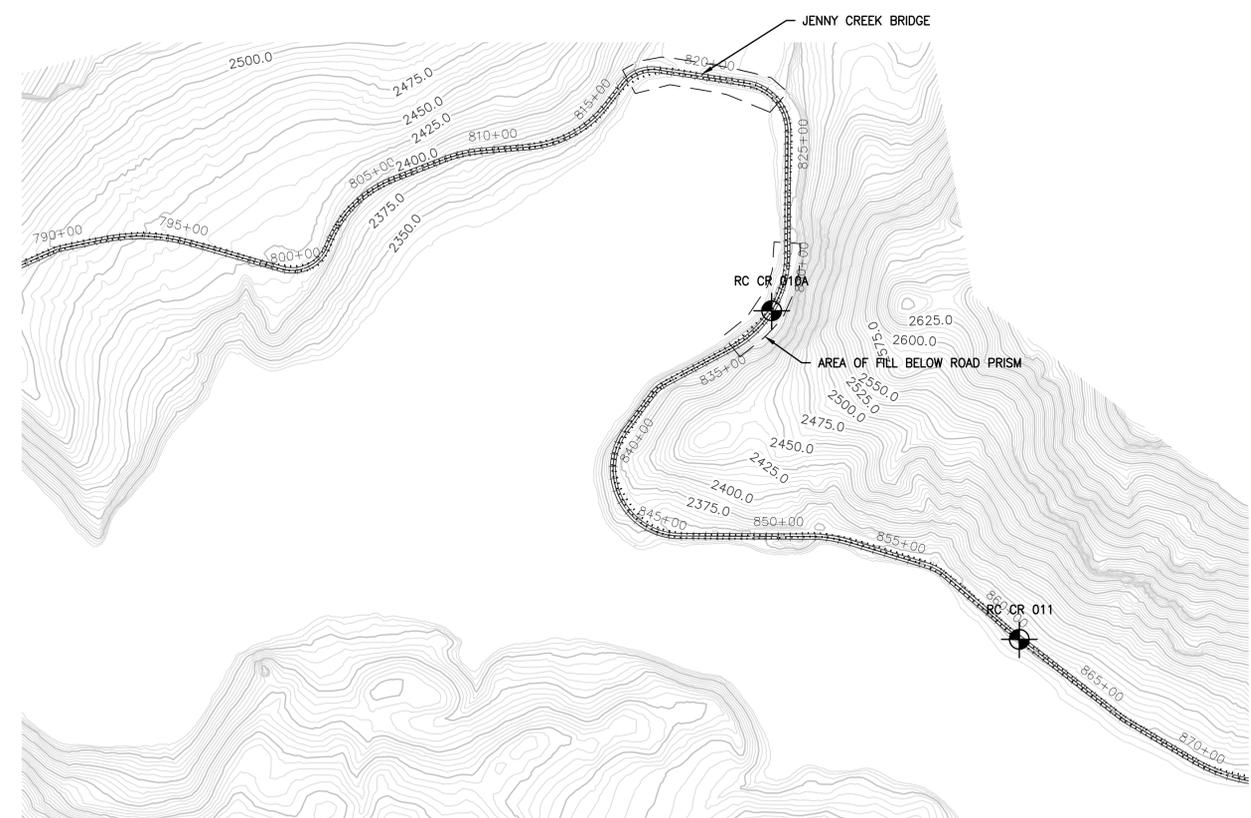
ELEVATION
1" = 350' 1 H = 10 V



ELEVATION
HORZ. SCALE 1" = 350'

- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5385, 5345) EASTBOUND LANE;
(5530, 3565) WEST BOUND LANE.



PLAN
1" = 350'

LEGEND

- EXISTING ASPHALT
- EXISTING AGGREGATE BASE R_x
- EXISTING FILL
- COPCO GPR MAPPING TICKS-25'



ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:
COPCO ROAD STA
790+60-869+80
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

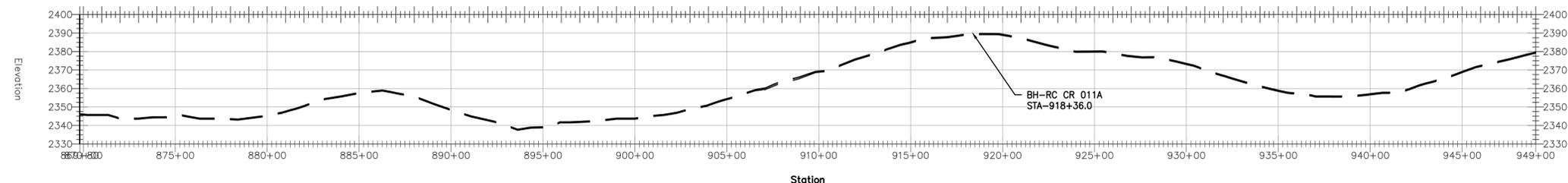
SHEET:

C10

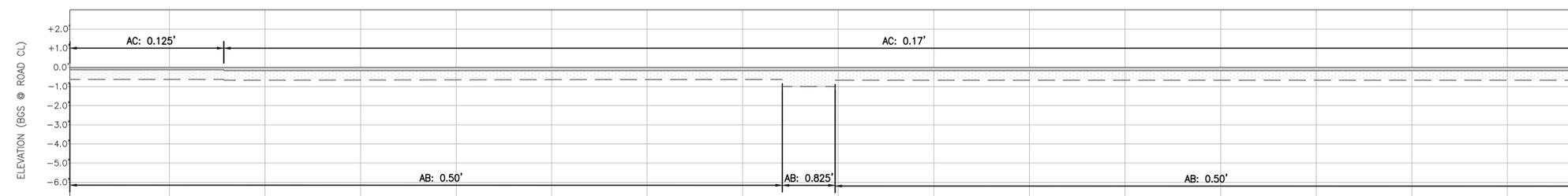


GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



ELEVATION
1" = 350' 1 H = 10 V



ELEVATION
HORZ. SCALE 1" = 350'

- NOTES:**
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

LEGEND

- EXISTING ASPHALT
- EXISTING AGGREGATE BASE R_x
- EXISTING FILL
- COPCO GPR MAPPING TICKS-25'

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

COPCO ROAD STA
869+80-949+00
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

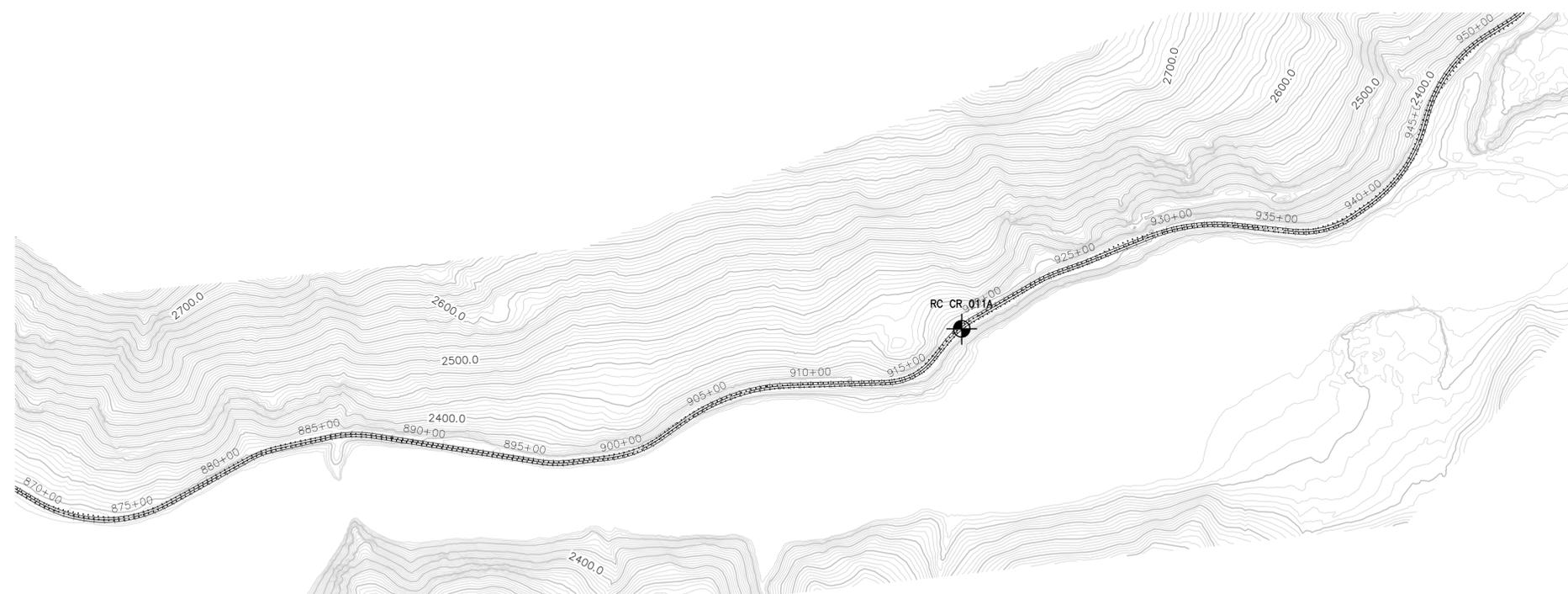
DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

SHEET:

C11



PLAN
1" = 350'

SCALE: 1" = 350'



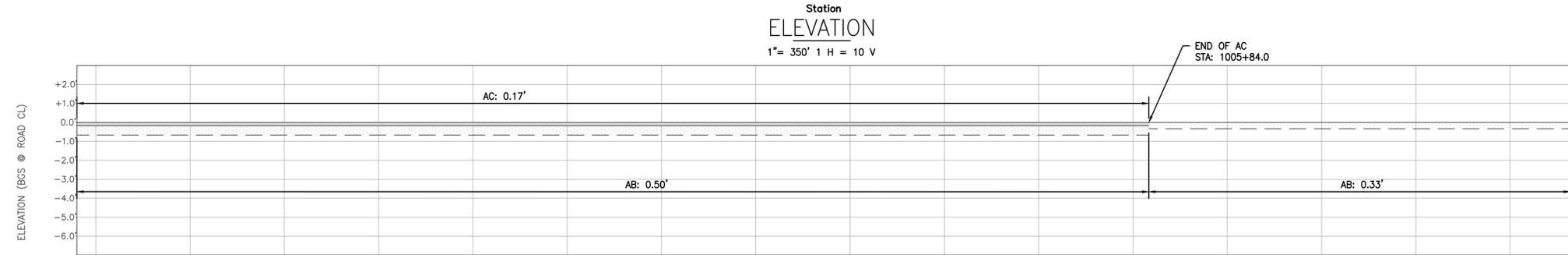
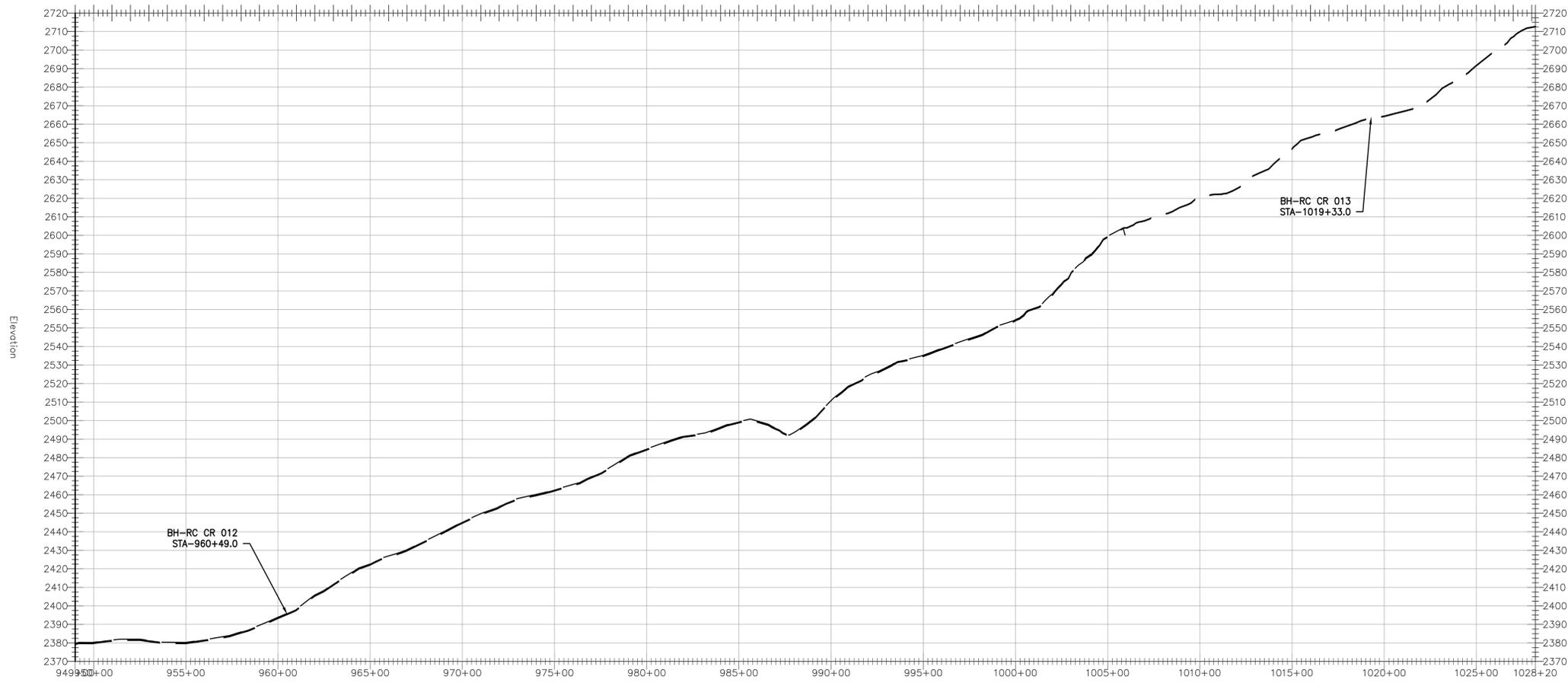
NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5345, 5320) EASTBOUND LANE;
(5280, 1921, 3530) WEST BOUND LANE.



GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



Station
ELEVATION
1" = 350' 1 H = 10 V

ELEVATION
HORZ. SCALE 1" = 350'

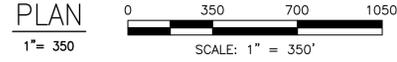
- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (5320, 5140) EASTBOUND LANE;
(4435, 5280) WEST BOUND LANE.



LEGEND

- EXISTING ASPHALT
- EXISTING AGGREGATE BASE R_x
- EXISTING FILL
- COPCO GPR MAPPING TICKS-25'



PLAN
1" = 350'

SHEET NAME:
COPCO ROAD STA
949+00-1028+20
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

SHEET:

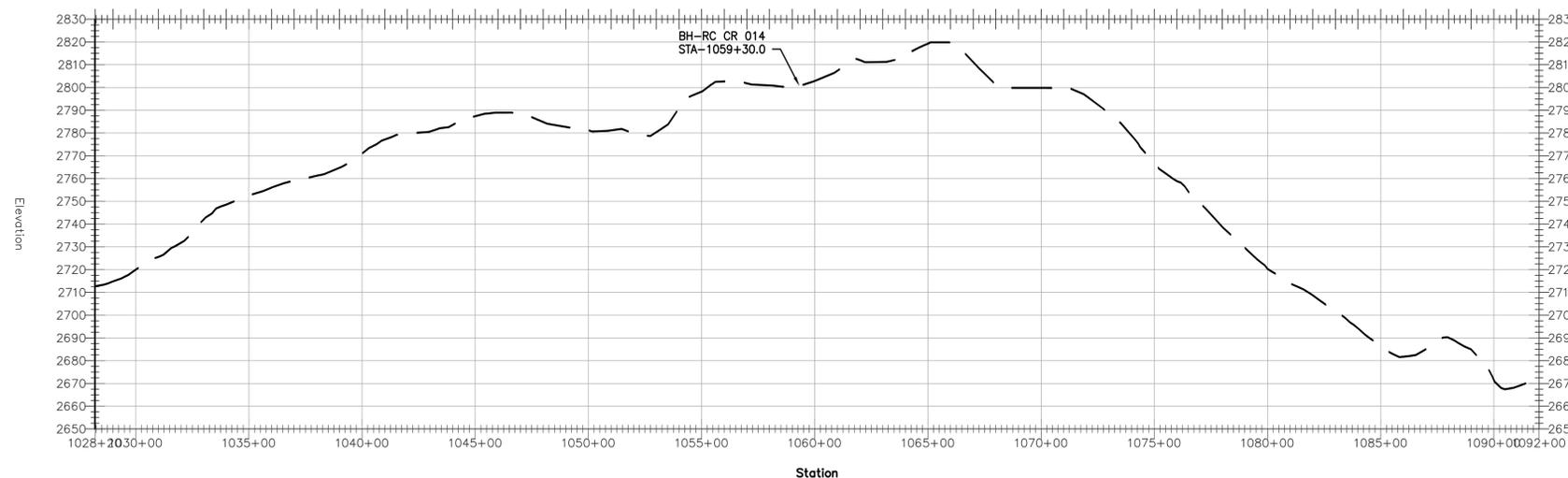
C12



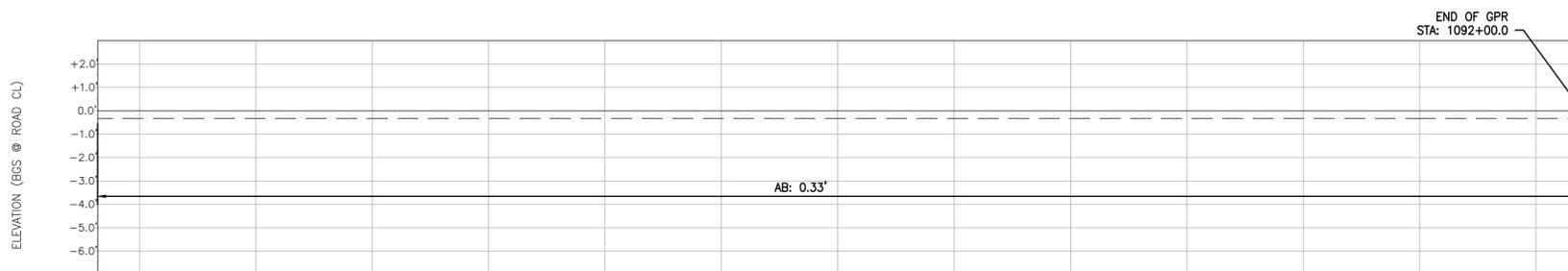
GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

ROAD CONDITION SURVEY,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



ELEVATION
1" = 350' 1 H = 10 V

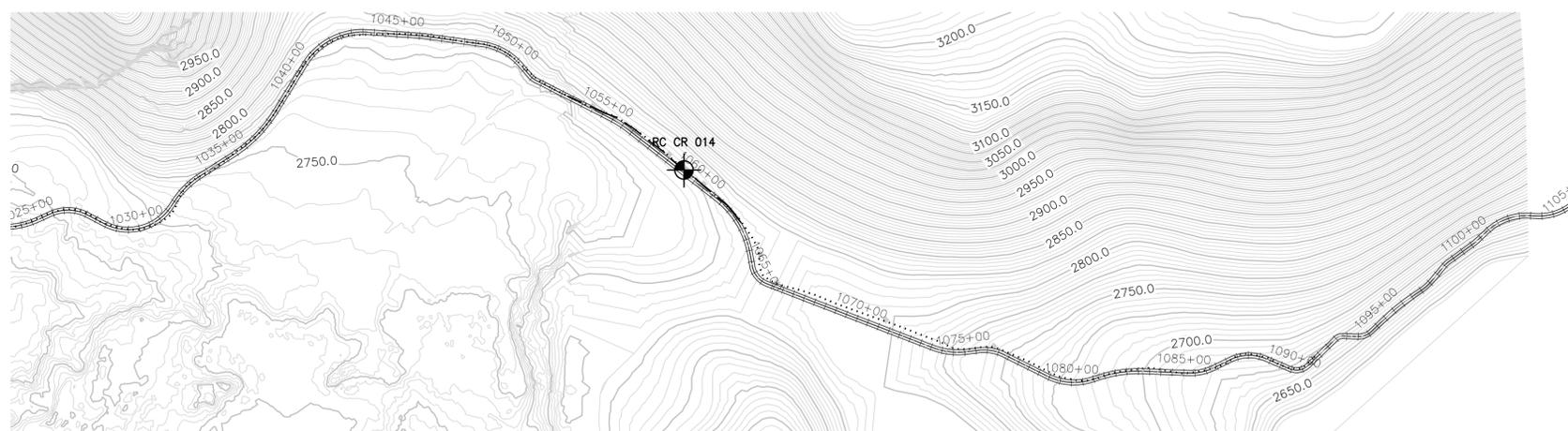


ELEVATION
HORZ. SCALE 1" = 350'

- NOTES:
1. DIMENSIONS SHOWN ARE OF MATERIAL THICKNESS
 2. AREAS OUTSIDE OF MAPPED FILL COULD HAVE A FILL DEPTH RANGING IN 0'-2'.
 3. MAPPED FILL AREAS SHOWN AT A 3.0' THICKNESS COULD RANGE FROM 2'-4'.
 4. MAPPED FILL AREAS SHOWN AT A 5.0' THICKNESS COULD RANGE FROM 4'-6'.

LEGEND

	EXISTING ASPHALT
	EXISTING AGGREGATE BASE R _x
	EXISTING FILL
	COPCO GPR MAPPING TICKS-25'



PLAN
1" = 350'

NOTE:
FOR GROUND PENETRATION LOGS SEE APPENDIX #
FOOTAGE LOGS: (4660, 2030) EASTBOUND LANE;
NO MAPPING DONE ON THE WEST BOUND LANE.

SHEET NAME:
COPCO ROAD STA
949+00-1028+20
PLAN SECTION &
PROFILE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
2/19/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

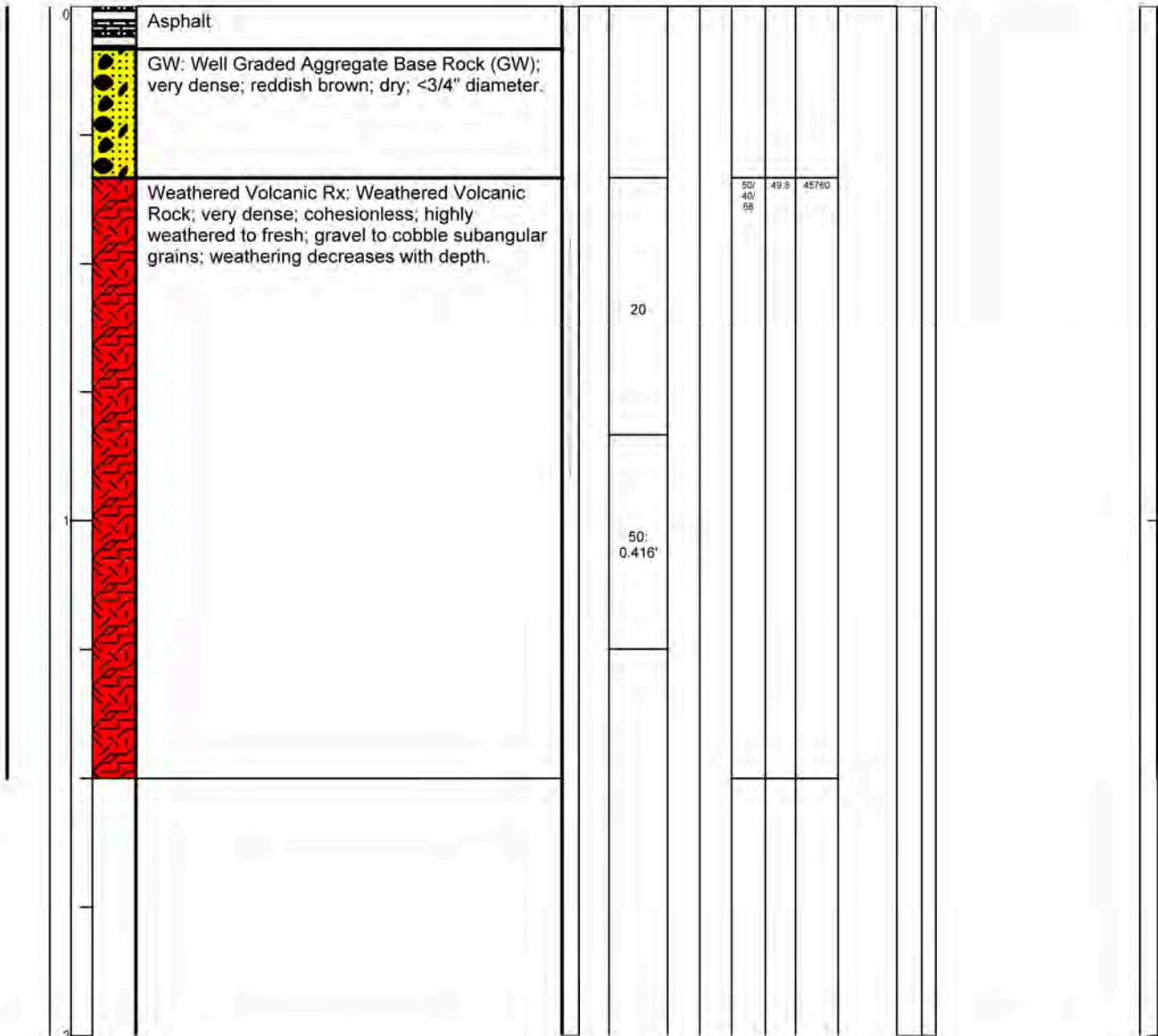
SHEET:

C13

Table 1. Road Core Data Summary and Field Tested Parameters.

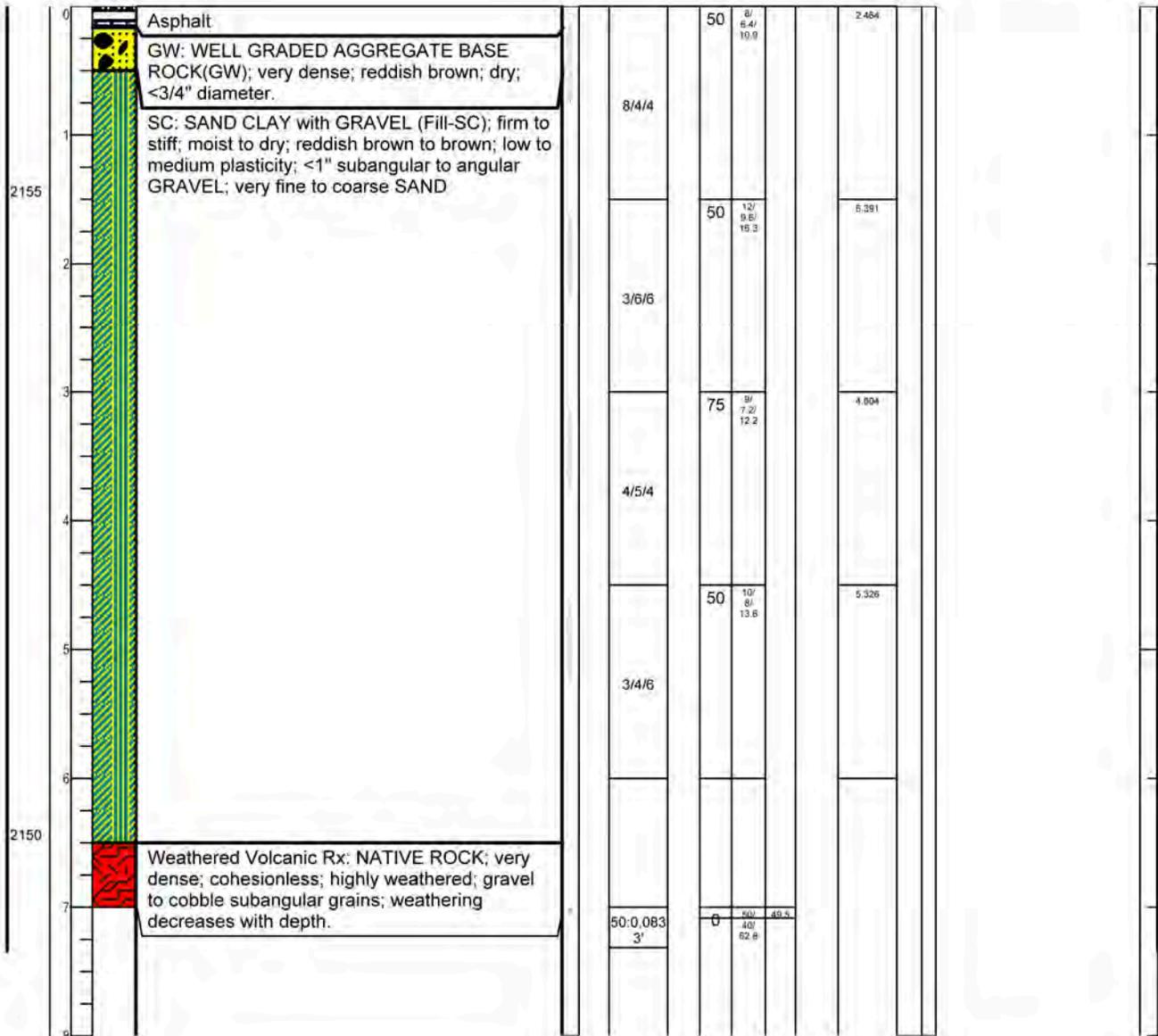
STA	Distance (feet)	Borehole Number	Depth (feet)	Depth (meters)	GW Depth (feet)	GW Depth (meters)	Type	Material Type	Cohesion Type	N	N60	N1,600 (N60)	Relative Density (N60)	Relative Density (psf)	Friction Angle (N60)	Friction Angle	Undrained Shear Strength (kPa)	Undrained Shear Strength (psf)	Undrained Shear Strength (N60)	Undrained Shear Strength (psf)	Non-cohesive Soil Density	Cohesive Soil Consistency	Presumptive Bearing Capacity (psf)	Calculated Bearing Capacity (kPa)	Calculated Bearing Capacity (psf)
180+60	18060	RC-CR-001	1.0	0.3	No Water	No Water	Native Rock	Weathered Volcanic	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
236+20	23620	RC-CR-002	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	8	6.4	10.9	47.0	52.00			94	118	1,963	2,464		Firm			
236+20	23620	RC-CR-002	2.0	0.6			Fill	Sandy Clay with Gravel	Cohesive	12	9.6	16.3	53.0	59			245	306	5,117	6,391		Stiff			
236+20	23620	RC-CR-002	4.0	1.2			Fill	Sandy Clay with Gravel	Cohesive	9	7.2	12.2	43.0	47			184	230	3,843	4,804		Stiff			
236+20	23620	RC-CR-002	5.0	1.5			Fill	Sandy Clay with Gravel	Cohesive	10	8.0	13.6	44.0	48			204	255	4,261	5,326		Stiff			
236+20	23620	RC-CR-002	7.0	2.1			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	62.8	88.0	100	47.0	49.5					Very Dense			2,191	45,760
220+57	22057	RC-CR-003	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	16	12.8	21.8	65.0	72			326	408	6,809	8,521		Very Stiff			
220+57	22057	RC-CR-003	2.0	0.6			Fill	Sandy Clay with Gravel	Cohesive	27	21.6	36.7	77.0	85			551	688	11,508	14,369		Very Stiff			
220+57	22057	RC-CR-003	4.0	1.2			Fill	Sandy Clay with Gravel	Cohesive	25	20.0	8.0	41.0	46			510	637	10,652	13,304		Very Stiff			
315+66	31566	RC-CR-004	1.0	0.3			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
386+17	38617	RC-CR-005	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	45	36.0	61.2	120.0	133	38.0	41.0					Dense			1,567	32,727
386+17	38617	RC-CR-005	1.7	0.5			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
430+68	43068	RC-CR-006	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
470+56	47056	RC-CR-007	0.5	0.2			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
507+44	50744	RC-CR-008	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	13	10.4	17.7	59.0	65.0			265	332	5,535	6,934		Stiff			
507+44	50744	RC-CR-008	3.0	0.9			Fill	Sandy Clay with Gravel	Cohesive	5	4.0	6.8	34.0	37			102	128	2,130	2,673		Firm			
507+44	50744	RC-CR-008	4.5	1.4			Fill	Sandy Clay with Gravel	Cohesive	16	12.8	21.8	65.0	72			326	408	6,809	8,521		Very Stiff			
507+44	50744	RC-CR-008	6.0	1.8			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
552+05	55205	RC-CR-009	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	33	26.4	44.9	90.0	100			673	841	14,056	17,565		Hard			
552+05	55205	RC-CR-009	2.5	0.8			Fill	Sandy Clay with Gravel	Cohesive	13	10.4	17.7	59.0	65.0			265	332	5,535	6,934		Stiff			
698+00	69800	RC-CR-009A	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	17	13.6	23.1	67.0	74			345	434	7,205	9,064		Very Stiff			
698+00	69800	RC-CR-009A	2.5	0.8			Fill	Sandy Clay with Gravel	Cohesive	20	16.0	27.2	65.0	72			408	510	8,521	10,652		Very Stiff			
698+00	69800	RC-CR-009A	4.5	1.4			Native Rock	Weathered Volcanic	Cohesionless	28	22.4	38.1	71.0	78	41.0	43.0					Medium Dense			490	10,234
739+58	73958	RC-CR-010	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	19	15.2	25.8	70.0	78			388	485	8,104	10,129		Very Stiff			
739+58	73958	RC-CR-010	2.0	0.6			Fill	Sandy Clay with Gravel	Cohesive	40	32.0	54.4	92.0	102			816	1,020	17,043	21,303		Hard			
831+92	83192	RC-CR-010A	1.0	0.3			Fill	Sandy Clay with Gravel	Cohesive	19	15.2	25.8	70.0	78			388	485	8,104	10,129		Very Stiff			
831+92	83192	RC-CR-010A	2.0	0.6			Fill	Sandy Clay with Gravel	Cohesive	16	12.8	21.8	65.0	72			326	408	6,809	8,521		Very Stiff			
831+92	83192	RC-CR-010A	4.0	1.2			Fill	Sandy Clay with Gravel	Cohesive	10	8.0	13.6	44.0	48			204	255	4,261	5,326		Stiff			
753+85	75385	RC-CR-010B	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	18	14.4	24.5	73.0	81	28.0	30.0					Medium Dense			229	4,783
753+85	75385	RC-CR-010B	2	0.6			Fill	Sandy Clay with Gravel	Cohesive	7	5.6	9.5	41.0	46			143	179	2,987	3,738		Firm			
753+85	75385	RC-CR-010B	3.5	1.1			Fill	Sandy Clay with Gravel	Cohesive	6	4.8	8.2	36.0	40			122	153	2,548	3,195		Firm			
753+85	75385	RC-CR-010B	5	1.5			Fill	Sandy Clay with Gravel	Cohesive	3	2.4	4.1	25.0	28			61	77	1,274	1,608		Firm			
861+30	86130	RC-CR-011	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	24	19.2	32.6	83.0	92	30.0	32.0					Medium Dense			365	7,623
861+30	86130	RC-CR-011	2	0.6			Fill	Sandy Clay with Gravel	Cohesive	10	8.0	13.6	44.0	48			204	255	4,261	5,326		Stiff			
861+30	86130	RC-CR-011	3.5	1.1			Fill	Sandy Clay with Gravel	Cohesive	22	17.6	30.0	65.0	72			449	561	9,378	11,717		Very Stiff			
861+30	86130	RC-CR-011	5	1.5			Fill	Sandy Clay with Gravel	Cohesive	20	16.0	27.2	60.0	66			408	510	8,521	10,652		Very Stiff			
918+36	91836	RC-CR-011A	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	35	28.0	47.6	99.0	110	33.0	36.0					Dense			798	16,667
918+36	91836	RC-CR-011A	2	0.6			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	68.0	114.0	121.28	46.9	49.5					Very Dense			2,191	45,760
960+49	96049	RC-CR-012	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	28	22.4	38.1	89.0	99	31.0	33.0					Medium Dense			490	10,234
960+49	96049	RC-CR-012	2.5	0.8			Native Rock	Weathered Volcanic	Cohesionless	37	29.6	50.3	86.0	95	44.0	46.0					Dense			916	19,131
1019+33	101933	RC-CR-013	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	38	30.4	51.7	102.0	114	34.0	36.0					Dense			980	20,468
1019+33	101933	RC-CR-013	2	0.6			Fill	Sandy Clay with Gravel	Cohesive	50	40.0	68.0	113.0	102.00			1020	1,275	21,303	26,629		Hard			
1059+30	105930	RC-CR-014	0.5	0.2			AB	Aggregate Base Rock	Cohesionless	16	12.8	21.8	69.0	76	31.0	33.0					Medium Dense			193	4,031
1059+30	105930	RC-CR-014	2	0.6			Fill	Sandy Clay with Gravel	Cohesive	18	14.4	24.5	64.0	71			367	459	7,665	9,586		Very Stiff			
1059+30	105930	RC-CR-014	3.5	1.1			Fill	Sandy Clay with Gravel	Cohesive	24	19.2	32.6	68.0	75			490	612	10,234	12,782		Very Stiff			
1059+30	105930	RC-CR-014	5	1.5			Fill	Sandy Clay with Gravel	Cohesive	11	8.8	15.0	46.0	50			224	281	4,678	5,869		Stiff			
1059+30	105930	RC-CR-014	6.5	2.0			Fill	Sandy Clay with Gravel	Cohesive	32	25.6	41.2	72.0	80			653	816	13,638	17,043		Hard			
1059+30	105930	RC-CR-014	7.9	2.4			Native Rock	Weathered Volcanic	Cohesionless	50	40.0	59.0	86.0	96	47.0	50.0					Very Dense			1,393	29,093

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.89861862, -122.50257862				HOLE ID RC-CR-001								
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-180+60				SURFACE ELEVATION 2157.76								
DRILLING METHOD Power Augering			DRILLING RIG Little Beaver				BOREHOLE DIAMETER 6"								
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Saftey Hammer				HAMMER EFFICIENCY, ERI Edit-Text								
BOREHOLE BACKFILL AND COMPLETION Holeplug, Nov 25th, 2019			GROUNDWATER READINGS	DURING DRILLING ND	AFTER DRILLING (DATE)	NA	TOTAL DEPTH OF BORING 1.5'								
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



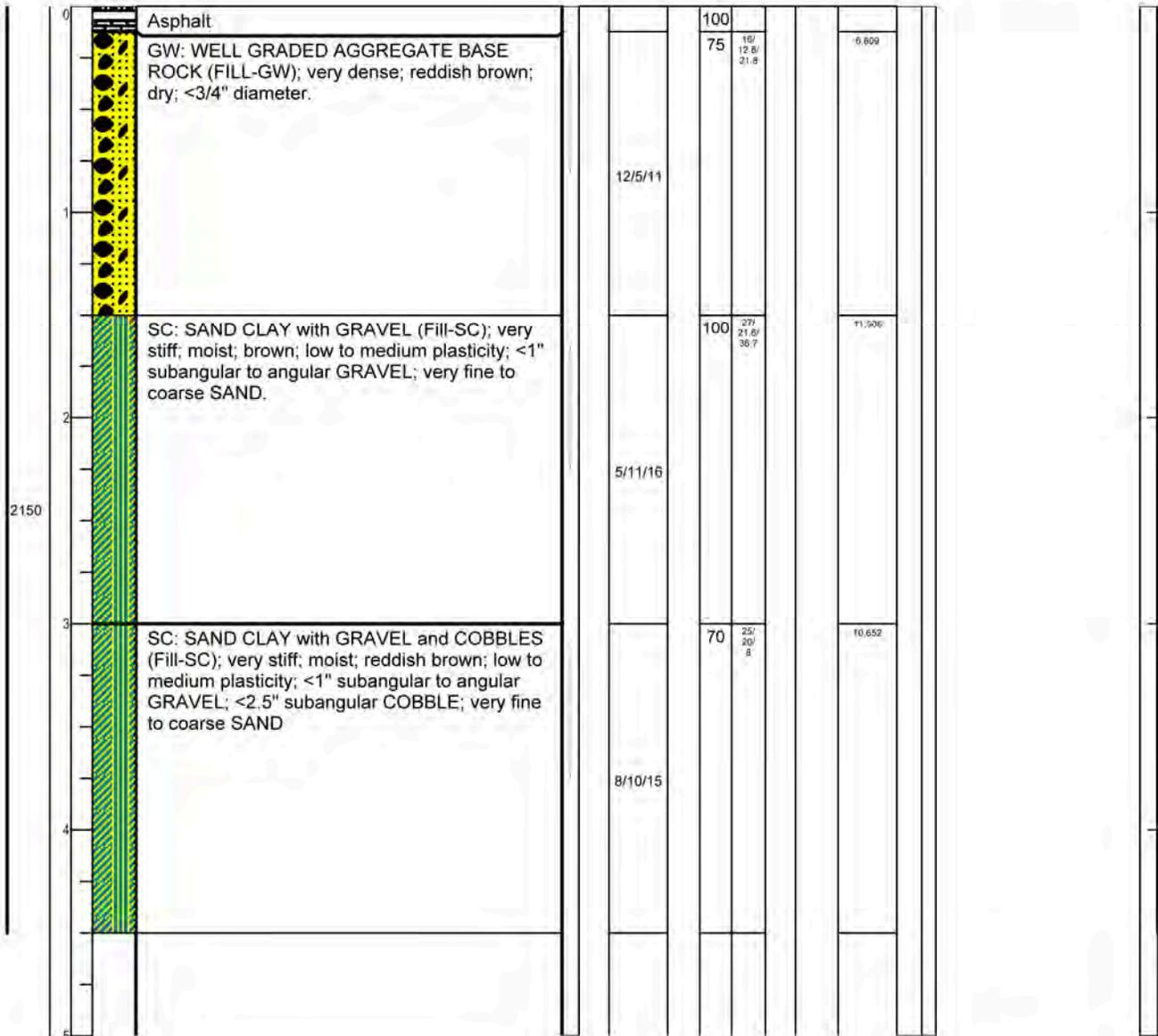
	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-001
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 1	

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.89997054, -122.50084894		HOLE ID RC-CR-002	
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-236+20		SURFACE ELEVATION 2156.44'	
DRILLING METHOD Power Augering			DRILLING RIG Little Beaver		BOREHOLE DIAMETER 6"	
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sathey Hammer		HAMMER EFFICIENCY, ERI	
BOREHOLE BACKFILL AND COMPLETION Holeplug, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA	AFTER DRILLING (DATE) NA	
					TOTAL DEPTH OF BORING 7.0'	
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location Sample Number	Blows per 6 in. Blows per foot Recovery (%) N/100 N1, 60 Friction Angle Calc. Bearing Capacity (psf) Undrained Shear Strength (psf) Drilling Method Casing Depth	Remarks



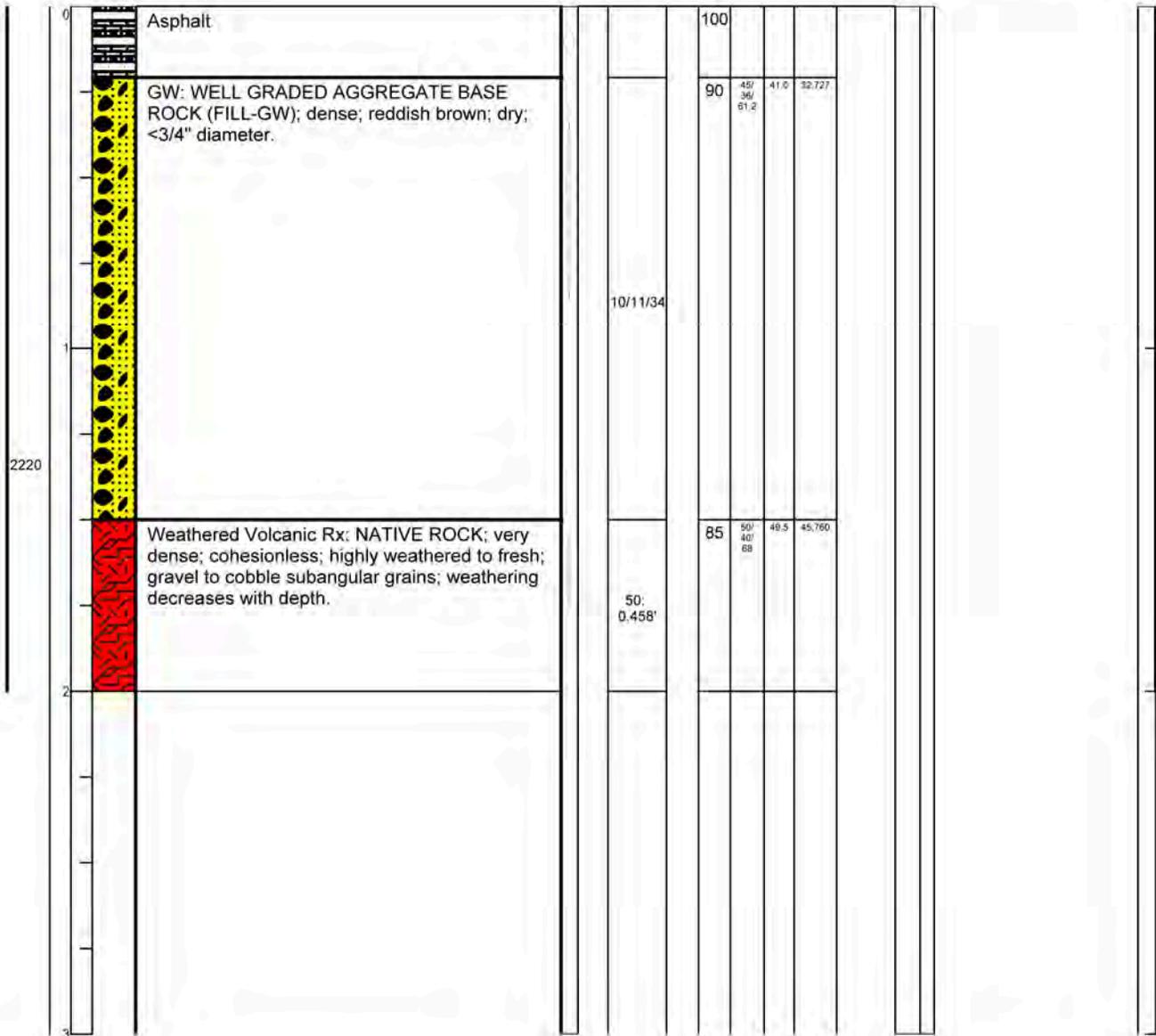
				REPORT TITLE Road Condition Survey, Copco Road	HOLE ID RC-CR-002
				DIST. COUNTY ROUTE POSTMILE NA Siskiyou	EA
PROJECT OR BRIDGE NAME KRRP					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 2		

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.90057592, -122.49007457		HOLE ID RC-CR-003
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-220+57		SURFACE ELEVATION 2152.45'
DRILLING METHOD Power Augering			DRILLING RIG Little Beaver		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sattey Hammer		HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Holeplug, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA	AFTER DRILLING (DATE) TOTAL DEPTH OF BORING 4.5'



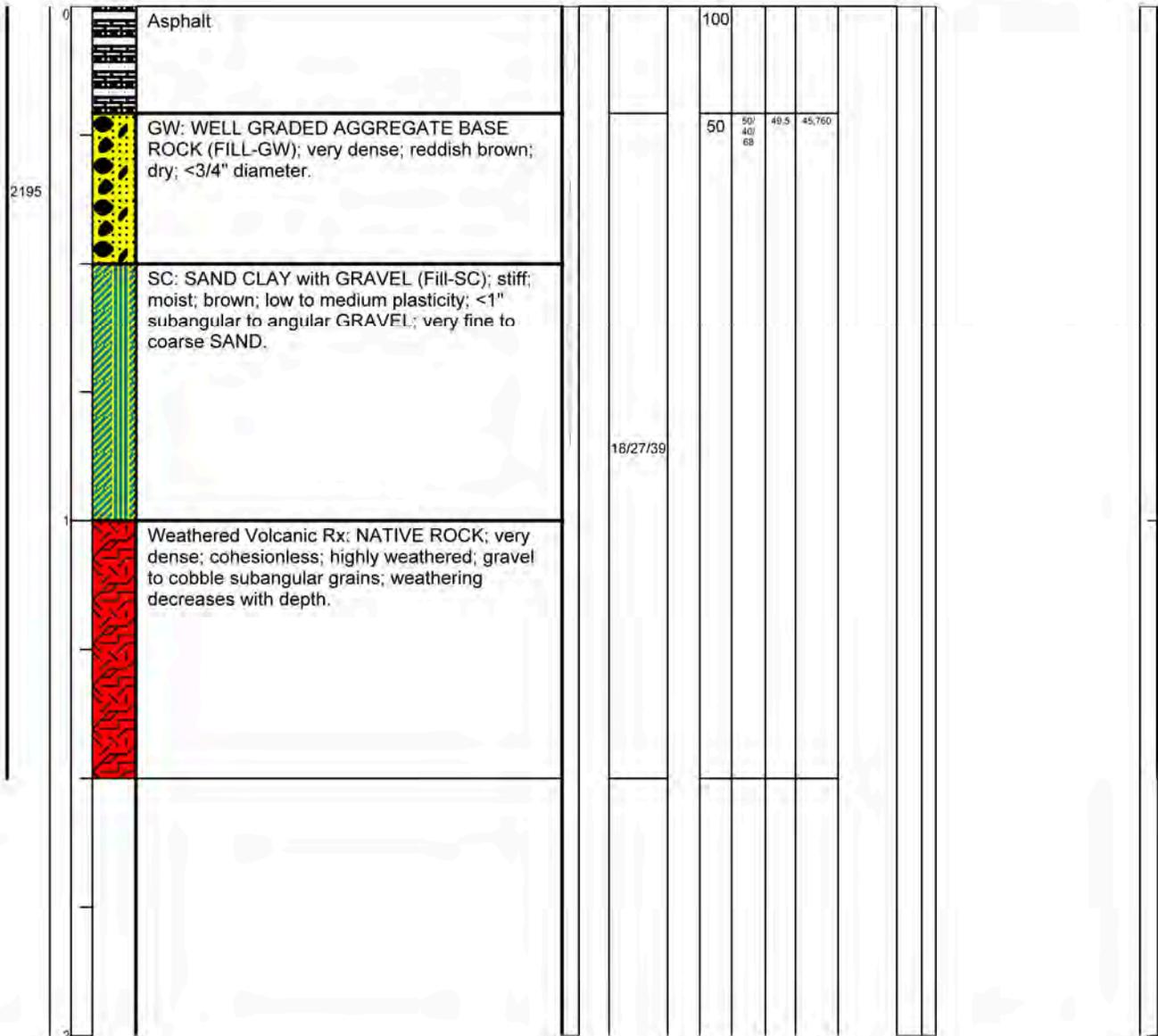
	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-003	
	DIST.	COUNTY	ROUTE	POSTMILE	EA	
	PROJECT OR BRIDGE NAME KRRP					
	BRIDGE NUMBER NA	PREPARED BY KF		DATE 2/18/20	SHEET 3	

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.9227841, -122.44965139				HOLE ID RC-CR-005								
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-386+17				SURFACE ELEVATION 2221.34'								
DRILLING METHOD Power Augering			DRILLING RIG Little Beaver				BOREHOLE DIAMETER 6"								
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sattey Hammer				HAMMER EFFICIENCY, ERI								
BOREHOLE BACKFILL AND COMPLETION Holeplug, Nov 25th, 2019			GROUNDWATER READINGS	DURING DRILLING ND	AFTER DRILLING (DATE) NA	TOTAL DEPTH OF BORING 2.0'									
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-005
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 5	

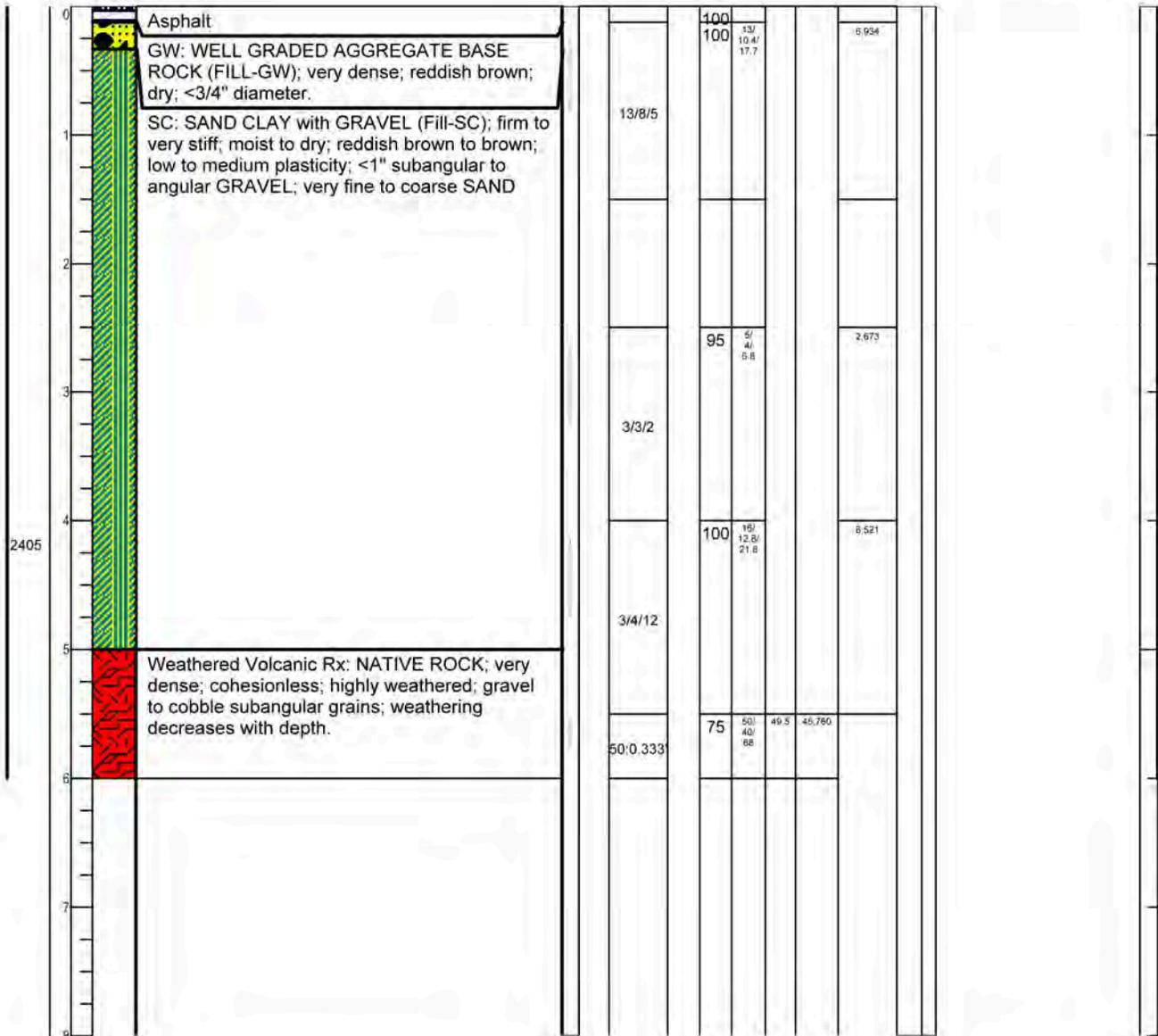
LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.93238193, -122.44157609				HOLE ID RC-CR-006								
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-430+68				SURFACE ELEVATION 2195.36'								
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver				BOREHOLE DIAMETER 6"								
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sattey Hammer				HAMMER EFFICIENCY, ERI								
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS	DURING DRILLING ND	AFTER DRILLING (DATE) NA	TOTAL DEPTH OF BORING 1.5'									
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-006
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 6	

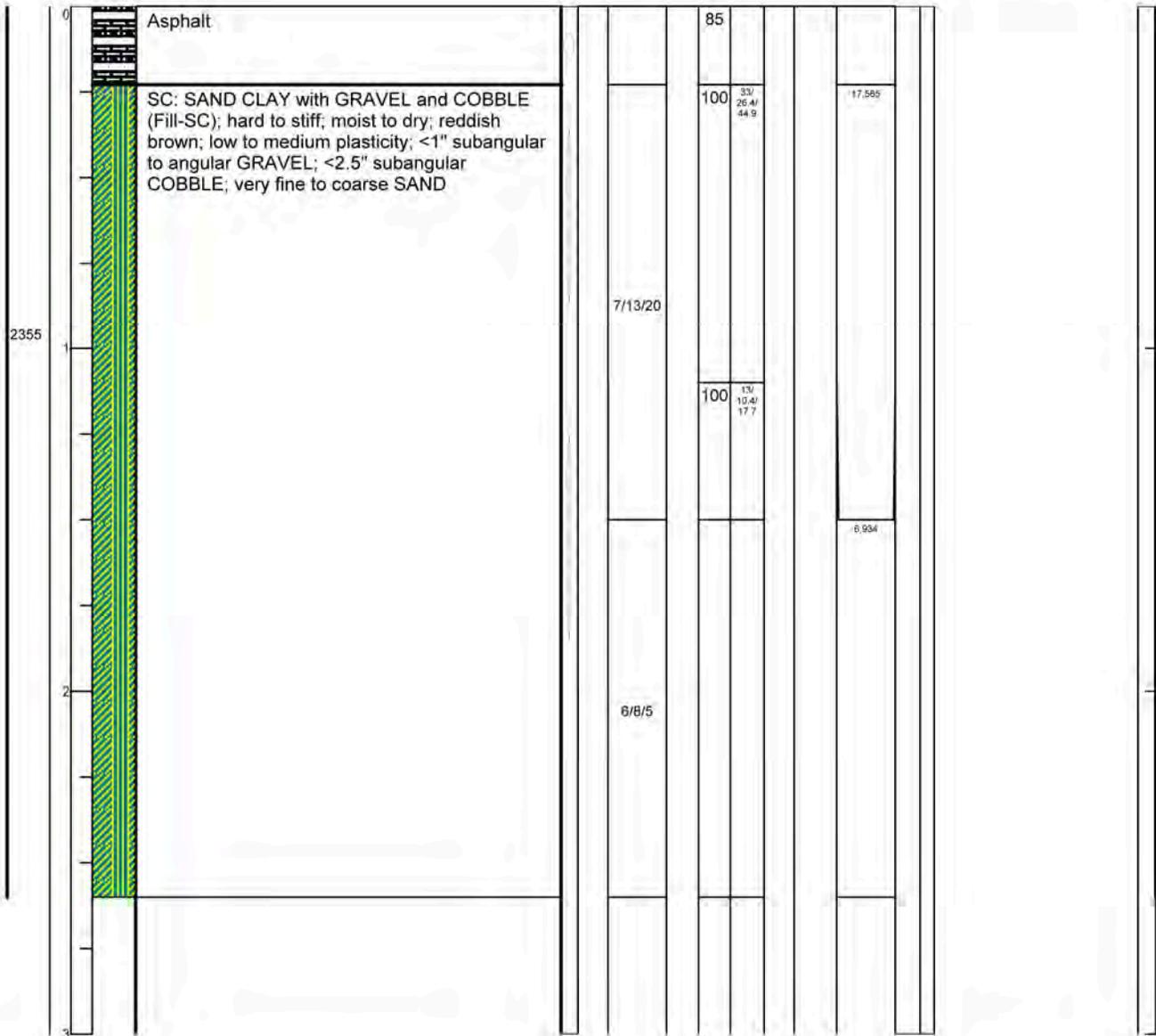
LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.94752309, -122.43652720	HOLE ID RC-CR-008
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-507+44	SURFACE ELEVATION 2409.19'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 6.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
----------------	------------	-------------------	-------------	-----------------	---------------	-----------------	----------------	--------------	--------------	----------------	------------------------------	--------------------------------	-----------------	--------------	---------



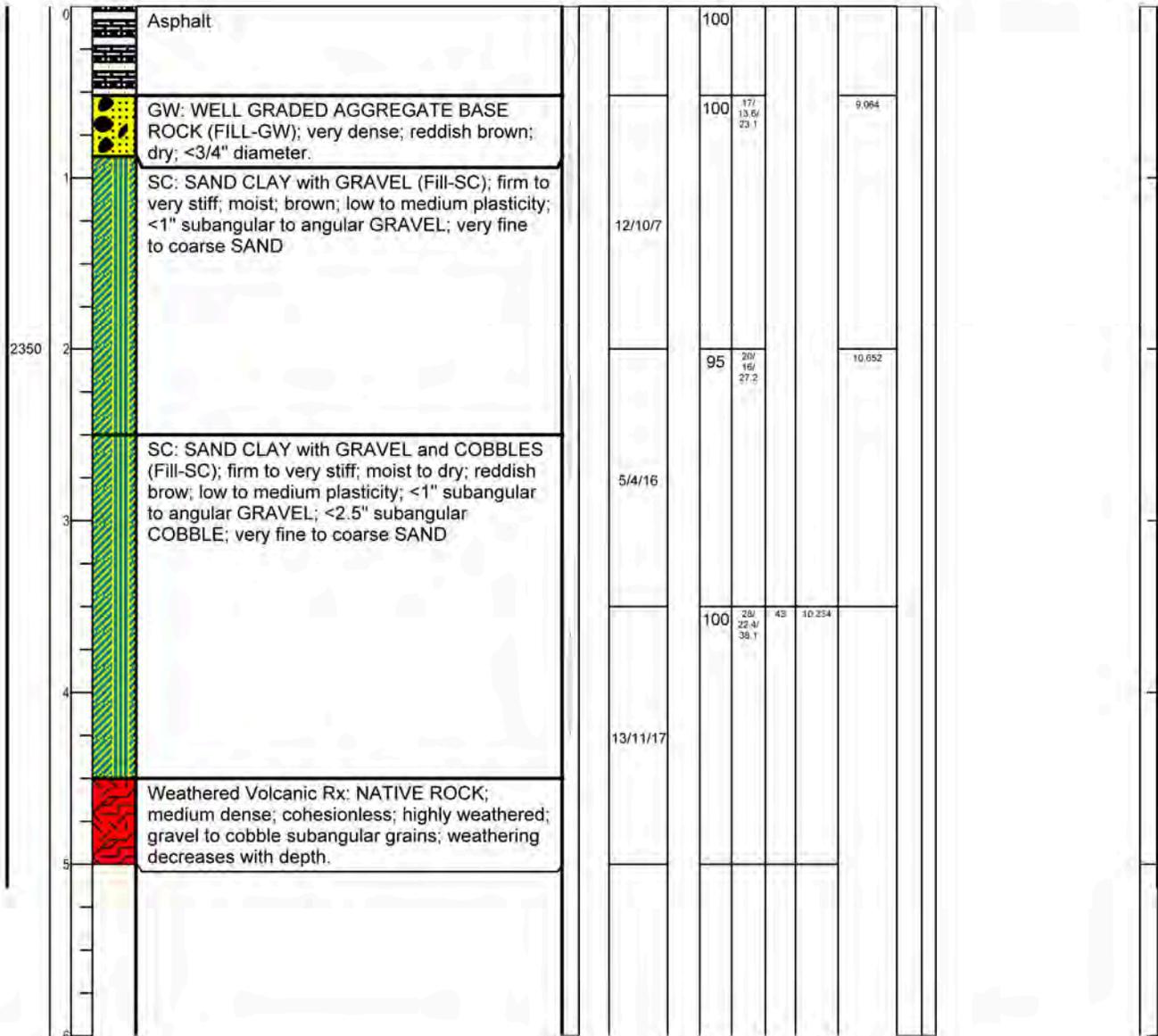
	REPORT TITLE Road Condition Survey, Copco Road			HOLE ID RC-CR-008	
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 8	

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.95554070, -122.43910704				HOLE ID RC-CR-009								
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-552+05				SURFACE ELEVATION 2355.96'								
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver				BOREHOLE DIAMETER 6"								
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Satety Hammer				HAMMER EFFICIENCY, ERI								
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING ND	AFTER DRILLING (DATE) NA	TOTAL DEPTH OF BORING 2.6'									
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N'100' N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



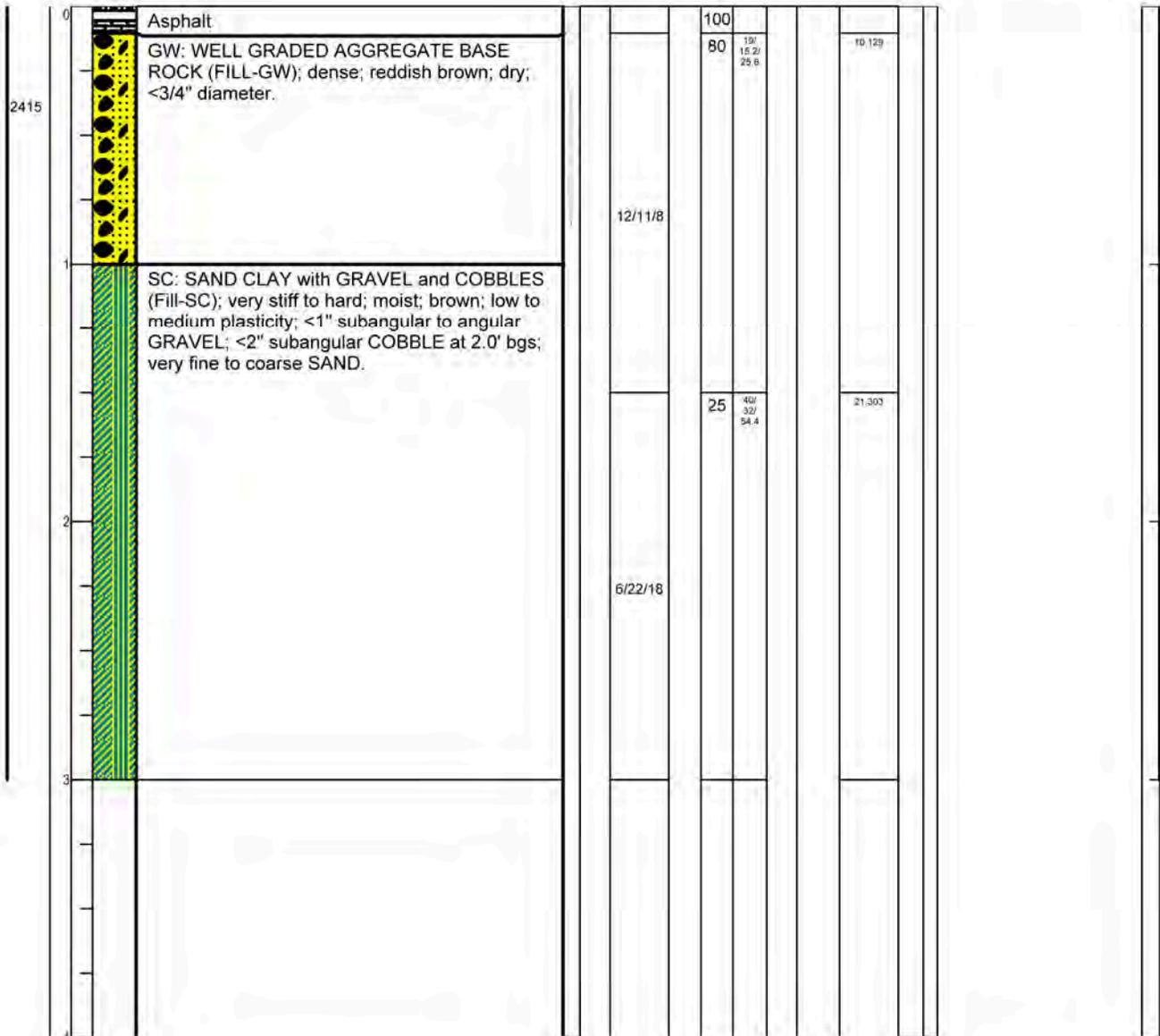
	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-009	
	DIST.	COUNTY	ROUTE	POSTMILE	EA	
	PROJECT OR BRIDGE NAME KRRP					
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 9		

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.96907399, -122.43490124	HOLE ID RC-CR-009A
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-698+00	SURFACE ELEVATION 2352.0'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Satety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 5.0'



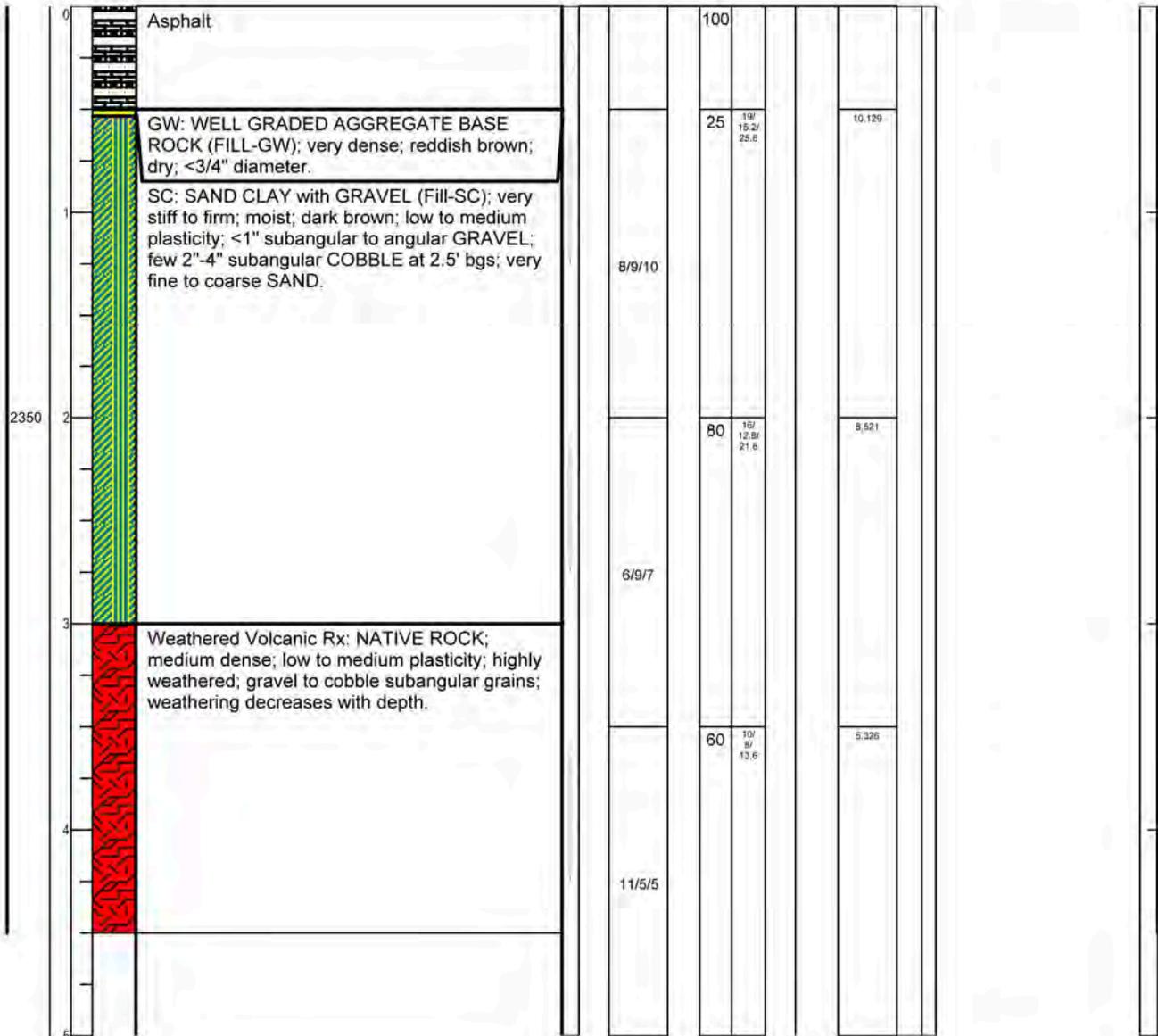
				REPORT TITLE Road Condition Survey, Copco Road	HOLE ID RC-CR-009A
				DIST. COUNTY ROUTE POSTMILE NA Siskiyou	EA
PROJECT OR BRIDGE NAME KRRP					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 10		

LOGGED BY JF & JS	BEGIN DATE Nov 25th, 2019	COMPLETION DATE Nov 25th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.96769722, -122.42322706	HOLE ID RC-CR-010
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-739+58	SURFACE ELEVATION 2415.39'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sattey Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 3.0'



	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-010
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 11	

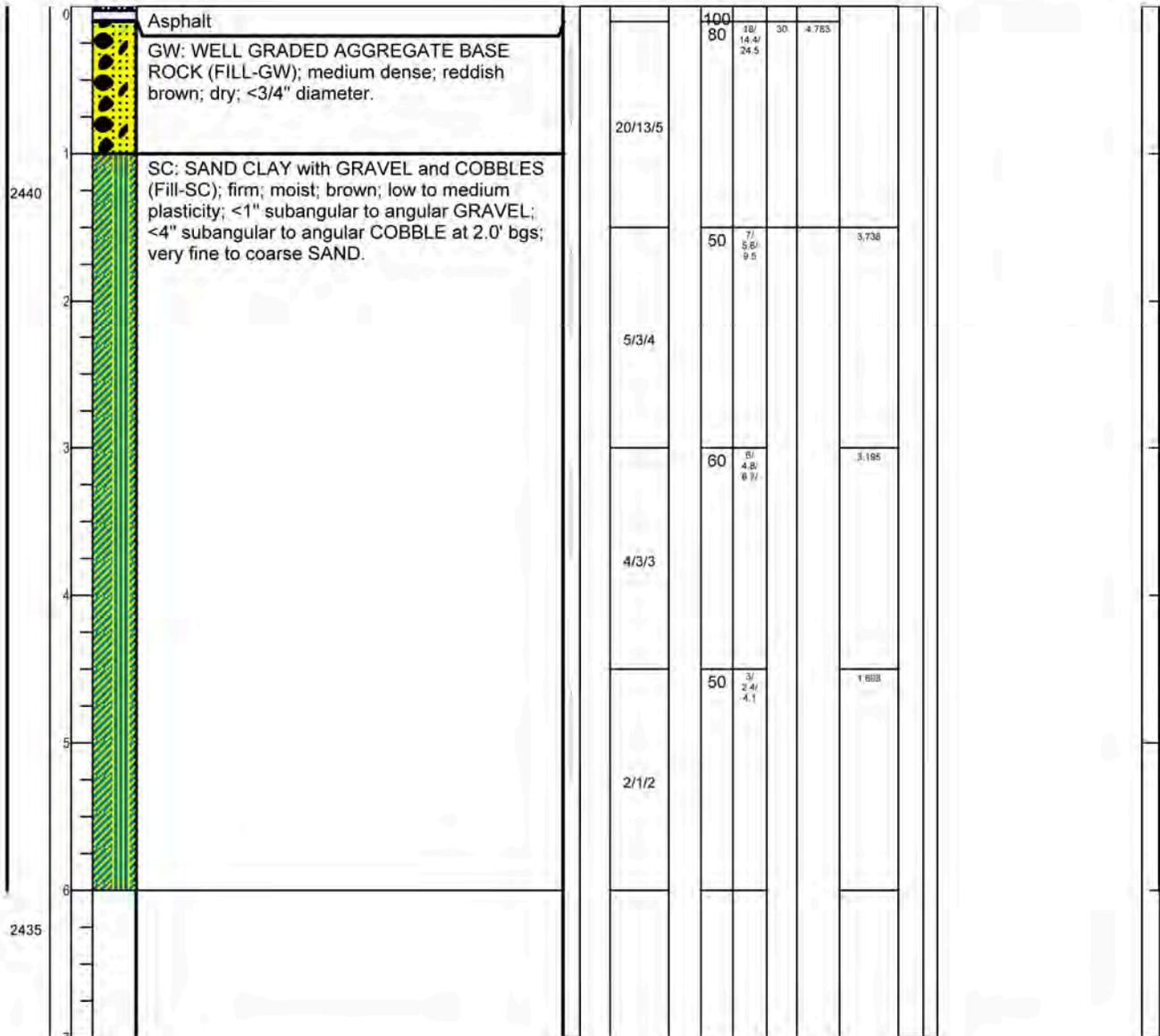
LOGGED BY JF & JS	BEGIN DATE Dec 4th, 2019	COMPLETION DATE Dec 4th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97357373, -122.39873857	HOLE ID RC-CR-010A											
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-831+92	SURFACE ELEVATION 2352.0'											
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"											
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Satety Hammer	HAMMER EFFICIENCY, ERI											
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA											
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 4.5'											
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/N60 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-010A
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 12	

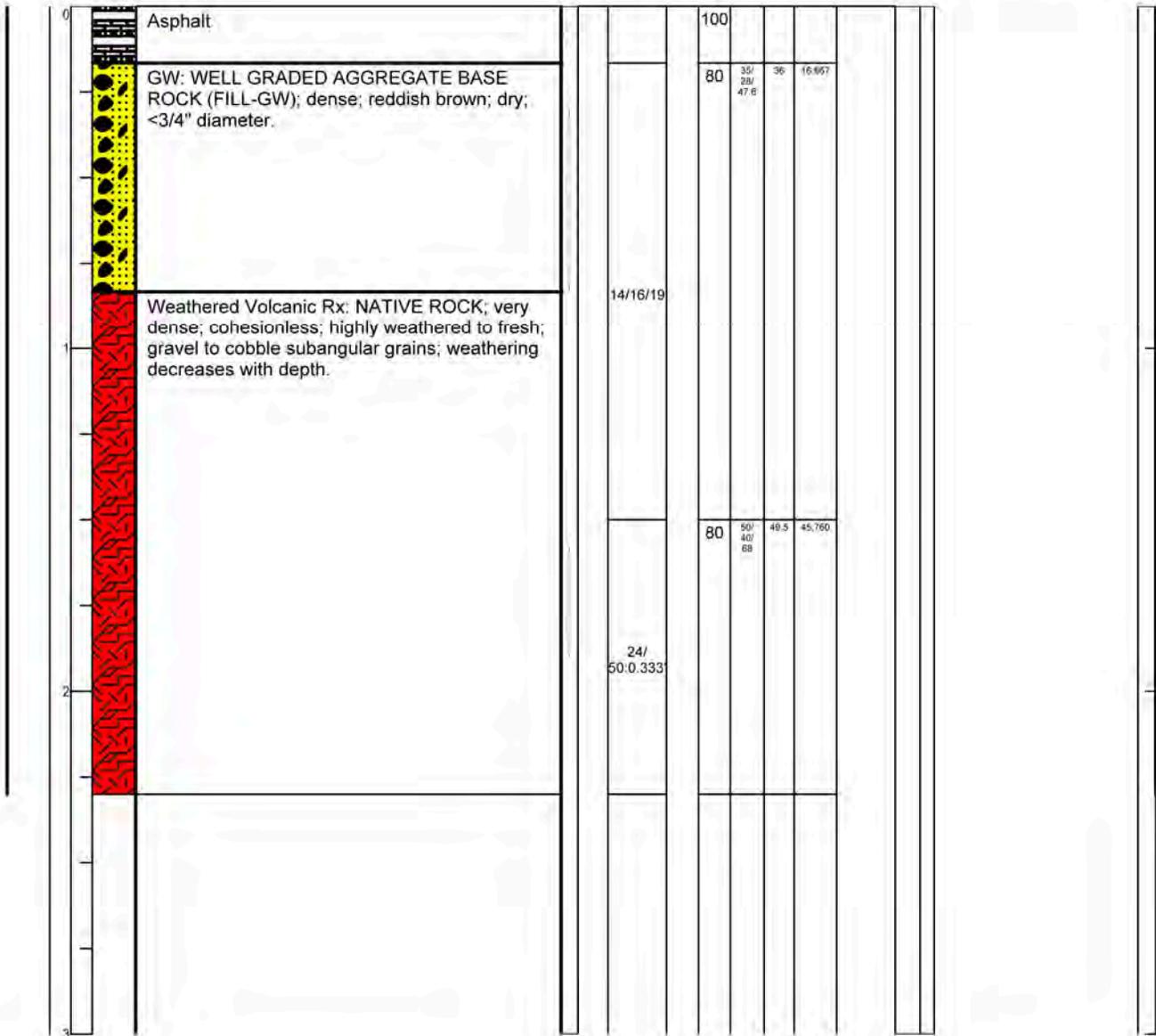
LOGGED BY JF & JS	BEGIN DATE Dec 4th, 2019	COMPLETION DATE Dec 4th, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.96998006, -122.41964575	HOLE ID RC-CR-010B
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-753+85	SURFACE ELEVATION 2441.27'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Satety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 6.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
----------------	------------	-------------------	-------------	-----------------	---------------	-----------------	----------------	--------------	--------------	----------------	------------------------------	--------------------------------	-----------------	--------------	---------



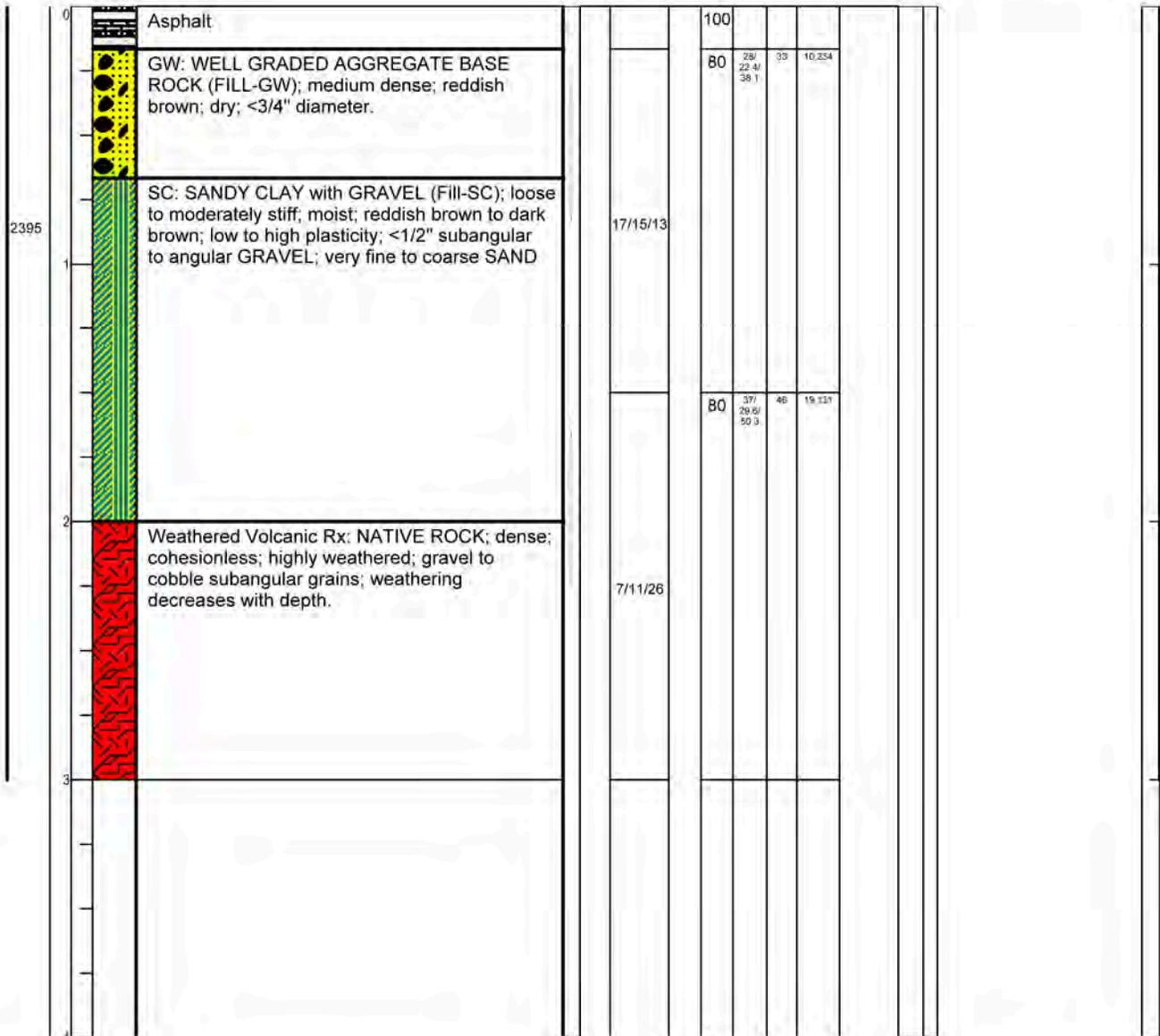
	REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-010B
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME KRRP				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 13	

LOGGED BY JF & JS	BEGIN DATE Dec 3rd, 2019	COMPLETION DATE Dec 3rd, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97099703, -122.37556893				HOLE ID RC-CR-011B								
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-918+36				SURFACE ELEVATION 2389.63'								
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver				BOREHOLE DIAMETER 6"								
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sathey Hammer				HAMMER EFFICIENCY, ERI								
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Dec 3rd, 2019			GROUNDWATER READINGS ND	DURING DRILLING ND	AFTER DRILLING (DATE) NA	TOTAL DEPTH OF BORING 2.3'									
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



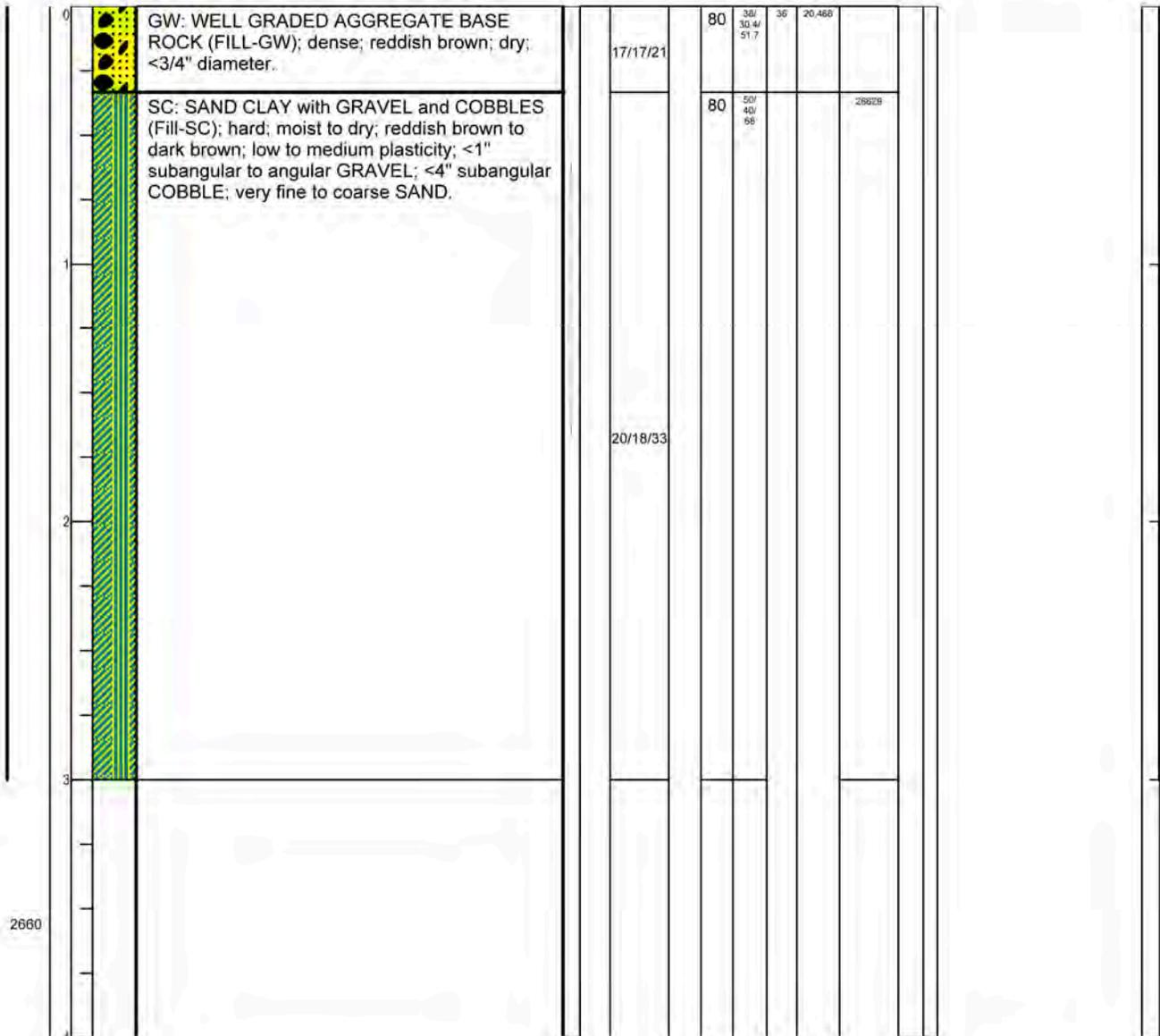
				REPORT TITLE Road Condition Survey, Copco Road				HOLE ID RC-CR-011B	
				DIST.	COUNTY	ROUTE	POSTMILE	EA	
PROJECT OR BRIDGE NAME KRRP									
BRIDGE NUMBER NA		PREPARED BY KF		DATE 2/18/20	SHEET 15				

LOGGED BY JF & JS	BEGIN DATE Dec 3rd, 2019	COMPLETION DATE Dec 3rd, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97727691, -122.36430688	HOLE ID RC-CR-012
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-960+49	SURFACE ELEVATION 2395.86'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Saftey Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Dec 3rd, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 3.0'



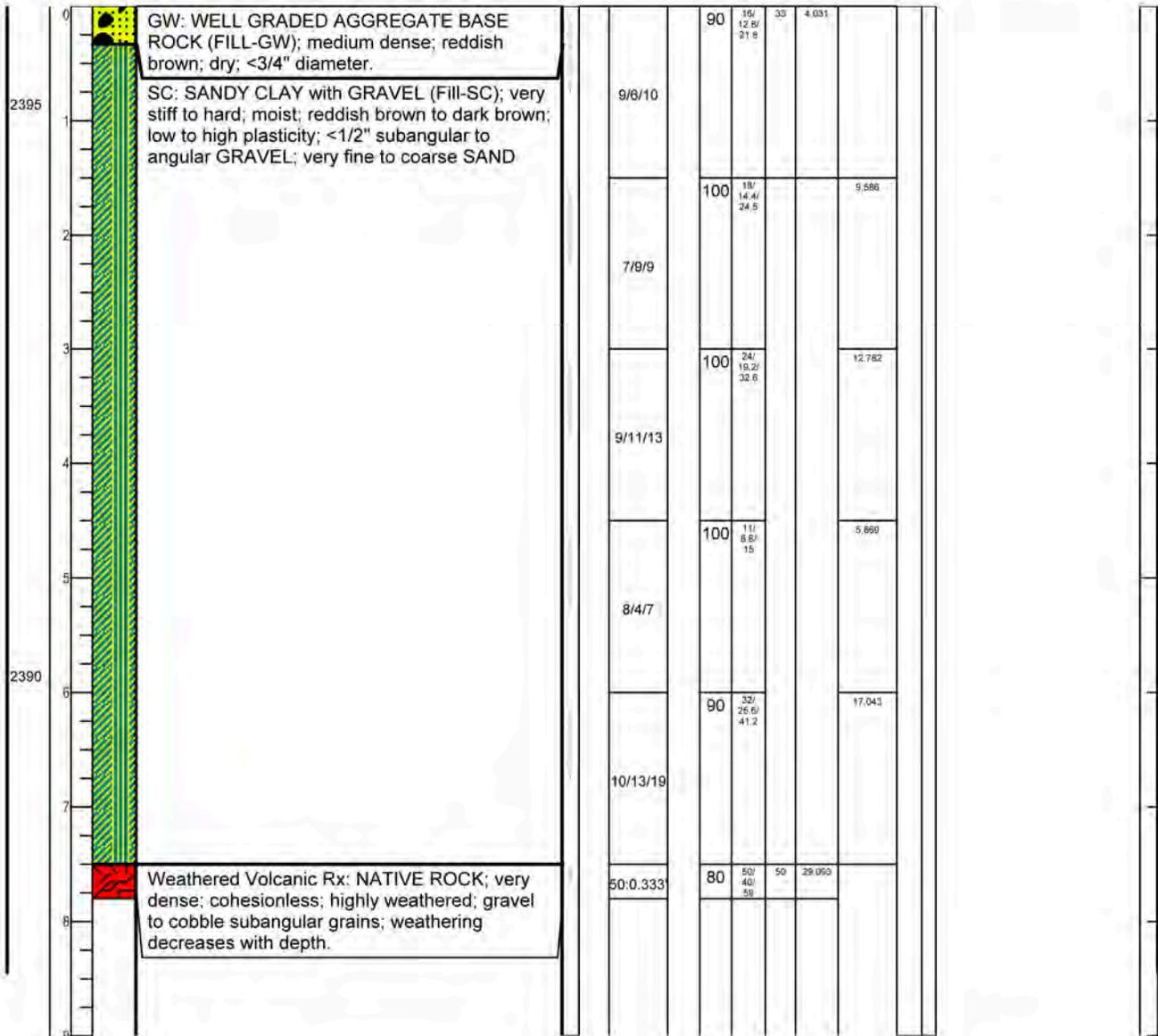
				REPORT TITLE Road Condition Survey, Copco Road			HOLE ID RC-CR-012	
				DIST. Siskiyou	COUNTY Siskiyou	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME KRRP								
BRIDGE NUMBER NA		PREPARED BY KF		DATE 2/18/20		SHEET 16		

LOGGED BY JF & JS	BEGIN DATE Dec 3rd, 2019	COMPLETION DATE Dec 3rd, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.98730504, -122.35332753	HOLE ID RC-CR-013	
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-1019+33	SURFACE ELEVATION 2663.56'	
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"	
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Saftey Hammer	HAMMER EFFICIENCY, ERI	
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Nov 25th, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA	
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 3.0'	
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location Sample Number Blows per 6 in. Blows per foot Recovery (%) N/100 N1, 60 Friction Angle Calc. Bearing Capacity (psf) Undrained Shear Strength (psf) Drilling Method Casing Depth	Remarks



	REPORT TITLE Road Condition Survey, Copco Road			HOLE ID RC-CR-013
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE
	PROJECT OR BRIDGE NAME KRRP			
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 17

LOGGED BY JF & JS	BEGIN DATE Dec 3rd, 2019	COMPLETION DATE Dec 3rd, 2019	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97727691, -122.36430688	HOLE ID RC-CR-014											
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) STA-1059+30	SURFACE ELEVATION 2395.86'											
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Little Beaver	BOREHOLE DIAMETER 6"											
SAMPLER TYPE(S) AND SIZES (ID) CA Split Spoon 2"			STP HAMMER TYPE Sattey Hammer	HAMMER EFFICIENCY, ERI											
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, Dec 3rd, 2019			GROUNDWATER READINGS ND	DURING DRILLING NA											
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 7.8'											
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100 N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks



	REPORT TITLE Road Condition Survey, Copco Road			HOLE ID RC-CR-014
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE
	PROJECT OR BRIDGE NAME KRRP			
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 2/18/20	SHEET 18



Photographs 1. Road Core RC-CR-001 (STA 180+60.0) SPT sample taken from 0-1.5' bgs.



Photograph 2. Asphalt core sample at Road Core RC-CR-002 (STA 236+20.0).



Photograph 3/4/5. SPT samples taken at 0-1.5' bgs -Left, 1.5-3' bgs -Middle, & 3-4.5' bgs -Right (CR-RC-002).



Photograph 6 & 7. SPT sample taken at 4.5-6.0' bgs-Left, & 6.5-6.584' bgs-Right (CR-RC-002).



Photograph 7. Asphalt core sample at Road Core RC-CR-003 (STA 220+57.0).



Photographs 8/9/10. SPT samples taken at 0-1.5' bgs-**Left**, 1.5'-3.0' bgs-**Middle**, & 3.0-4.5' bgs-**Right** (CR-RC-003).



Photograph 11. Looking at asphalt coring at Road Core RC-CR-004 (STA 315+66.0).



Photograph 12. Asphalt core sample at Road Core RC-CR-004.



Photograph 13. SPT sample taken at 0-0.8' bgs (CR-RC-004).



Photograph 14. Asphalt core sample at Road Core RC-CR-005 (STA 386+17.0).



Photograph 15 & 16. SPT samples taken at 0-1.5' bgs -Left, & 1.5-1.958' bgs-Right (CR-RC-005)



Photograph 17. Looking at asphalt coring at Road Core RC-CR-006 (STA 430+68.0).



Photograph 18. SPT sample taken at 0-1.5' bgs (CR-RC-006)



Photograph 19. Asphalt core sample at Road Core RC-CR-007 (STA 470+56.0)



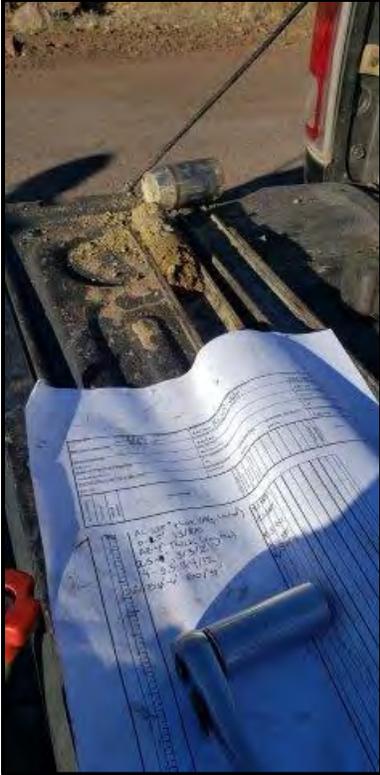
Photograph 20. SPT sample taken at 0-0.8' bgs (CR-RC-007)



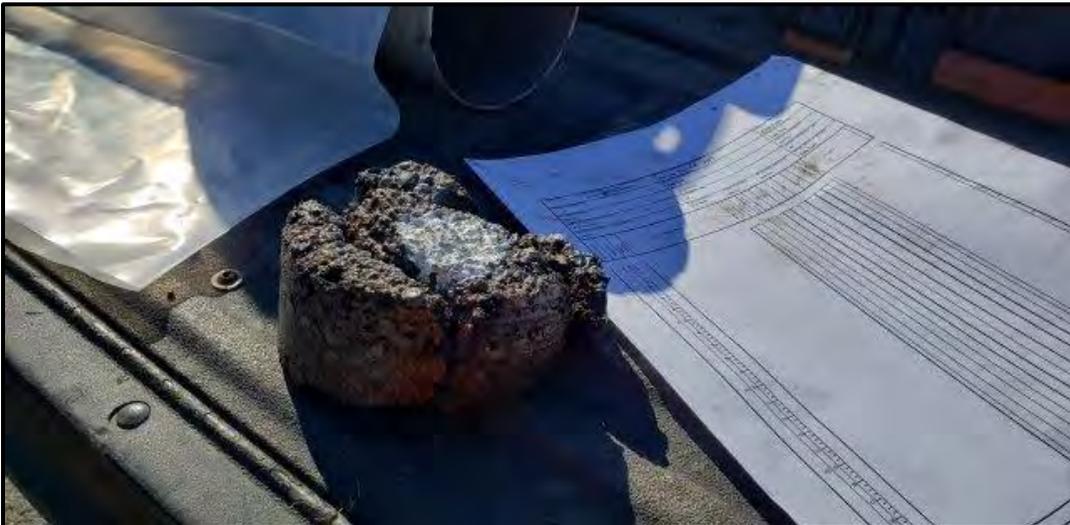
Photograph 21. Asphalt core sample at Road Core RC-CR-008. (507+44.0)



Photographs 22 & 23. SPT samples taken at 0-1.5' bgs-Left, & 2.5-4.0' bgs-Right (CR-RC-008)



Photograph 24. SPT sample taken at 4.0-5.5' bgs (CR-RC-008)



Photograph 25. Asphalt core sample at Road Core RC-CR-009 (STA 552+05).



Photograph 26 & 27. SPT samples taken at 0-1.5' bgs -Left, & 1.5-3.0' bgs -Right (CR-RC-009)



Photograph 28. Asphalt core sample at Road Core RC-CR-09A, (STA-739+58.0).



Photograph 29. Looking at SPT sample taken from 0.5-2.5' bgs (RC-CR-09A).



Photograph 30. Looking at Road Core location RC-CR-010 (STA 739+58.0).



Photograph 31. Looking at Road Core location RC-CR-010A (STA 831+92.0).



Photograph 32. Looking at Road Core location RC-CR-010B (STA 753+85).



Photograph 33. Looking at Road Core location RC-CR-011 (STA 861+30.0).



Photograph 34. Looking at Road Core location RC-CR-011A (STA 918+36.0).



Photograph 35. Looking at Road Core location RC-CR-012 (STA 960+49.0).



Photograph 36. Looking at Road Core location RC-CR-013 (STA 1019+33).



Photograph 37. Looking at Road Core location RC-CR-013 (STA 1059+30).

Kiewit Infrastructure West Co.
Klamath River Renewal Project
Geotechnical Data Report

APPENDIX I2

Transportation Geotechnical Data Report (by GeoServ, Inc.)

(Pages I2-1 to I2-64)

DRAFT



July 14, 2020

Knight Piésold Ltd. (KP)

Subject: KRRP Transportation Geotechnical Data Report

Dear Knight Piésold:

In accordance with your request and authorization of GeoServ, Inc. (GSI) has prepared the enclosed Geotechnical Data Report based on the requirements and proposed project specifics identified during our review. Specifically, this report provides a summary of the methods used to collect geotechnical data and the data results for the following sites:

Sheet 1 - Copco Road at Dry Creek Bridge
Sheet 2 - Lakeview Road Bridge
Sheet 3 - Scotch Creek Culvert
Sheet 4 - Camp Creek Culvert
Sheet 5 - Fall Creek at Daggett Road
Sheet 6 - Fall Creek at Substation Road Bridge
Sheet 7 - Fall Creek at Copco Road Bridge

The memo includes Appendix A that shows and lists relevant data and diagrams to include:

- Borehole Locations and Logs
- Borehole Data
- Site Summary Photographs
- Available Laboratory Data

Data and results presented in this report are preliminary and subject to change. Additional analyses and interpretations need to be made from the data at the 90% design phase. Data analysis, interpretation, and design recommendations are not included at this time pending input from KP. If you have any questions regarding the data and results, please do not hesitate to contact this office. The opportunity to be of service is appreciated.

Respectfully submitted,

James Fitzgerald, Senior Geologist
GeoServ, Inc.
624 South Mount Shasta Blvd.
Mount Shasta, CA 96067
(530) 227-8963
jif@geoscienceserv.com



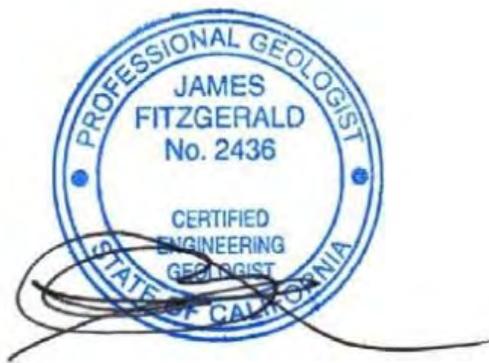
KRRP Transportation Geotechnical Data Report

Prepared for: Knight Piésold Ltd. (KP)

Prepared by: GeoServ, Inc. (GSI)

Initial Draft Report Date: June 24, 2020

Second Draft Report Date: July 14, 2020



Summary

GSI completed a subsurface geotechnical investigation at seven sites associated with the transportation system needed for KRRP construction access and post dam drawdown road improvements. The investigation included compiling existing data and information and drilling geotechnical borings. These data were used to characterize and measure subsurface conditions. This report includes a summary of the methods used for data collection, presents the geotechnical data, and lists the data limitations.

Field investigation of the transportation sites was accomplished through advancement of 18 geotechnical borings at the following sites:

Site	Borehole ID
Copco Road at Dry Creek Bridge	BH-DR01
	BH-DR02
	BH-DR03
	BH-DR04
Lakeview Road Bridge	BH-A01
	BH-A02
Scotch Creek Culvert	BH-SC01
	BH-SC02
Camp Creek Culvert	BH-CC01
	BH-CC02
Fall Creek Culvert at Daggett Road	BH-DG03
	BH-DG04
Fall Creek Culvert at Substation	BH-DG01
	BH-DG02
Copco Road at Fall Creek Bridge	BH-FL01
	BH-FL02
	BH-FL03
	BH-FL04

The borehole locations are shown on the following sheets:

- Sheet 1 - Copco Road at Dry Creek Bridge
- Sheet 2 - Lakeview Bridge
- Sheet 3 - Scotch Creek Culvert
- Sheet 4 - Camp Creek Culvert
- Sheet 5 - Fall Creek at Daggett Road
- Sheet 6 - Fall Creek at Substation Road Bridge
- Sheet 7 - Fall Creek at Copco Road Bridge

Methods

This investigation was completed to obtain information on the engineering properties of site fill, soil, rock, and groundwater at sites associated with the project road, bridge, and culvert improvements sites. The engineering properties of the site rocks and soils were assessed using industry standard methods (BOR 2001, U.S. Army Corps of Engineers 1960, and Williamson 1984). The rocks and soils were classified and assessed following the most recent ASTM methods.

Eighteen (18) boreholes were advanced at 7 project sites using either a Lonestar Auger Drill, Deere 35G Limited Access Drill, or a T1 Air Hammer Drill. The drilling tools included a 6" hollow stem auger and a 10" tri-cone bit. Standard Penetration Test (SPT) and bulk samples were taken in each borehole. Relatively undisturbed samples were taken with a 2" SPT sampler at 2.5' to 5' intervals or at changes in soil/rock type. At Lakeview Bridge, once the rock layer was reached, the holes were advanced with the T1 Air Hammer Drill with a 10" Tri-Cone bit.

Borehole logs and summary sheets were drafted following CalTrans standards. For each borehole, the rock/soil depth, color, particle size and volume, relative density/consistency, particle angularity and shape, moisture content, strength, cohesion, plasticity, and compaction were visually noted and field classified. SPT tests were completed following ASTM 1586. Split spoon core samples were collected, photographed, and field classified. The recovery of un-disturbed samples was limited given the material characteristics. The borehole logs are shown in Appendix A. A subset of the samples were sent to a soil laboratory and tested for gradation, plasticity, and strength (Appendix A). Field and laboratory measured soil and rock properties are summarized in Appendix A – Table 1. Summary photos of each site are included in Appendix A.

This report includes the data for each site and does not provide data analysis, interpretation, or design recommendations. At Scotch and Camp Creeks, that have had existing geotechnical data, their historic data was combined with the GSI data to help characterize the horizontal and vertical extent of subsurface conditions (Sheet 3 and Sheet 4).

Results

Copco Road at Dry Creek Bridge

Drilling at this site was accomplished with moderate to high drilling effort. The boreholes were located as close to the existing bridge abutments as possible (Sheet 1). For all four boreholes, there is a layer of rock rubble and native fill at the surface. That fill likely extends down to the base of the abutments. The total depth drilled to auger refusal ranged from 5.5' to 11.5' below ground surface (bgs) (Appendix A – Borehole Logs and Table 1). The measured fill thickness ranges from 5' to 7.5' bgs. The material consists of cohesive sandy gravel/cobble clay with soft to very stiff consistency (Appendix A – Borehole Logs and Table 1). For the directly observed fill bulk samples, the sand is very fine to coarse, the clay has medium to high plasticity, gravels are less than 1" in diameter, and cobbles are about 2.5" in diameter. Below the fill layer, there is in-place native rock. Most of the in-place material is hard volcanic rock varying from fresh to very weathered into clay with gravel and cobbles. No groundwater was observed within the boreholes.

Lakeview Bridge

Drilling at this site was accomplished with moderate to high drilling effort. Boreholes BH-AB01 and BH-AB02 were located on the right bank of the river on the shoulder of Copco Road and the boat ramp (Sheet 2). At BH-AB01 and BH-AB02 depth to refusal ranged from 35' and 30' bgs, respectively (Appendix A – Borehole Logs and Table 1). The right river bank has three prominent layers of material, an upper artificial fill (containing: gravels, cobbles, and boulders), a clay rich material, and a volcanic bedrock material to at least 35' bgs. The artificial fill layer was encountered to a depth of about 5' bgs. The upper layer was rock rubble likely placed as part of road construction. The fill was generally loose near the surface and dense before the clay soil was encountered. The clay soil is stiff and moist from ~5' to 18' bgs. At 18' bgs, the stiff clay soil transitioned to a soft organic sandy clay in BH-AB01 and a loose gravelly clay in BH-AB02. The thickness of these soft and loose layers ranges from 2.5' to 5.0'. Below the weaker layer of gravelly clay and sandy clay is a very dense weathered volcanic rock. The USGS mapped the dominant geological unit in the area as Tertiary volcanic rock; minor pyroclastic deposits that correlates to the observed rock. The degree of weathering decreased with depth at 35.0' bgs in BH-AB-01 and 30.0' bgs in BH-AB02. The depth to bedrock in BH-AB01 and BH-AB02 correlated well. Groundwater was encountered in BH-AB01 at 13.0' bgs and in BH-AB02 at 10.0' bgs. The observed groundwater depths were well above the river water level. It appears that there is perched shallow groundwater flowing along the soil-rock contact.

Scotch Creek Culvert

Drilling at this site was accomplished with moderate to high drilling effort. Boreholes BH-SC01 and BH-SC02 were located on the right and left banks, respectively, of Scotch Creek just downstream of Copco Road (Sheet 3). At BHSC-01 and BH-SC02 depth to refusal ranged from 7.5' and 7' bgs, respectively (Appendix A – Borehole Logs and Table 1). The right and left streambanks have two prominent layers of material, alluvial sandy to clayey gravel and weathered volcanic rock (at a relatively shallow depth). The upper layer of clay, sand, and gravel is stiff/dense and moist from 0' to 7' bgs. At about 7' bgs, the alluvium transitioned to a very dense weathered volcanic rock. The USGS mapped the dominant geological unit in the area as Tertiary volcanic rock; minor pyroclastic deposits that correlates to the observed rock. The degree of weathering decreased with depth at 7.5' bgs at BH-SC01. No groundwater was not encountered within the boreholes.

Camp Creek Culvert

Drilling at this site was accomplished with low to moderate drilling effort. Boreholes BH-CC01 and BH-CC02 were located on the left and right banks, respectively, of Camp Creek just downstream of Copco Road (Sheet 4). At BH-CC01 and BH-CC02 depth to refusal ranged from 20' and 22' bgs, respectively (Appendix A – Borehole Logs and Table 1). The right and left streambanks have two prominent layers of material, loose alluvial sandy clay to clayey sand and medium dense well graded sand. No bedrock was encountered in either borehole. From 0' to 18' bgs, the alluvium is likely sediment deposited in Camp Creek delta on top of the original stream channel (Sheet 4). The upper layer of alluvial material is loose and liquefiable given that during drilling sand flowed up into the auger. Groundwater was encountered in both boreholes between 3' and 4' bgs. The groundwater was perched above the stream with the surface water in the stream 2' to 3' lower than the water level measured in the boreholes.

Fall Creek at Daggett Road

Drilling at this site was accomplished with low to high drilling effort. The boreholes were located as close to the existing culvert as possible (Sheet 5); however, given the road width, underground utilities, and the need to keep the road open during drilling, the holes had to be located at a less than ideal proximity to the culvert (Sheet 5). For BH-DG03, the top of the borehole was located adjacent to the road at the toe of the road fillslope. The fill consists of medium dense clayey sand and gravel and extends to about 10.5' bgs (Appendix A – Borehole Logs and Table 1). Below the fill is a 2.5' thick layer of loose to stiff sandy clay. Below the clay is a very dense weathered volcanic rock. The USGS mapped the dominant geological unit in the area as Tertiary volcanic rock; minor pyroclastic deposits that correlates to the observed rock. For BH-DG04, the borehole was located in the road shoulder about 40' west of the existing culvert. The top 3' is fill consisting of loose to medium dense clayey sand and gravel (Appendix A – Borehole Logs and Table 1). Below the fill there is a stiff sandy silty clay with gravel to 6.5' bgs. Below the clay a very dense weathered volcanic rock similar to the rock encountered in BH-DG03. No groundwater was observed within the boreholes.

Fall Creek at Substation Road Bridge

Drilling at this site was accomplished with medium to high drilling effort. The boreholes were located as close to the existing bridge as possible (Sheet 6); however, given the road width and the need to keep the road open during drilling, the holes had to be located at a less than ideal distance from the bridge (Sheet 6). For BH-DG02, there is fill that consists of medium dense sandy gravel to about 1.5' bgs (Appendix A – Borehole Logs and Table 1). Below the fill is stiff sandy clay with gravel to 9.5' bgs. Below the clay is a very dense weathered volcanic rock was encountered to at least about 11' bgs. The USGS mapped the dominant geological unit in the area as Tertiary volcanic rock; minor pyroclastic deposits that correlates to the observed rock. For BH-DG01, there is fill that consists of very stiff gravelly clay to 7' bgs (Appendix A – Borehole Logs and Table 1). Below the fill is a stiff to very stiff gravelly clay with sand to 9.0' bgs. Auger refusal was met in this hole before hitting rock. No groundwater was observed within the boreholes.

Fall Creek at Copco Road Bridge

Drilling at this site was accomplished with high drilling effort. The boreholes were located as close to the existing bridge abutments as possible (Sheet 7). At the surface there was a layer of rock rubble that extends to the base of the abutments in most locations. Only one borehole could be advanced through the rock rubble layer (i.e., BH-FC1). The total depth drilled to auger refusal ranged from 2' to 6.1' bgs (Appendix A – Borehole Logs and Table 1). The fill consists loose to medium dense clayey sand and gravel. No groundwater was observed within the boreholes.

Limitations

The geotechnical data presented in this report were collected following current geologic and engineering practice and the standard of care exercised by reputable professional consultants performing similar tasks in this area. The data are preliminary and subject to change. No other warranty, expressed or implied, is made regarding the data in this report. Variations may exist and conditions not observed or measured as part of this effort may exist at the site(s).

References

U.S. Army Corps of Engineers, 1960. The Unified Soil Classification System: U.S. Army Technical Memorandum 3-357.

U.S. Bureau of Reclamation (BOR), 2001. Engineering Geology Field Manual, Second Edition, Volume I.

Williamson, D.A., 1984, Unified Rock Classification System: Bulletin of the Association of Engineering Geologists, Vol. XXI, No. 3, p. 345-354.



GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

SITE INVESTIGATION,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

COPCO ROAD at DRY
CREEK BRIDGE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

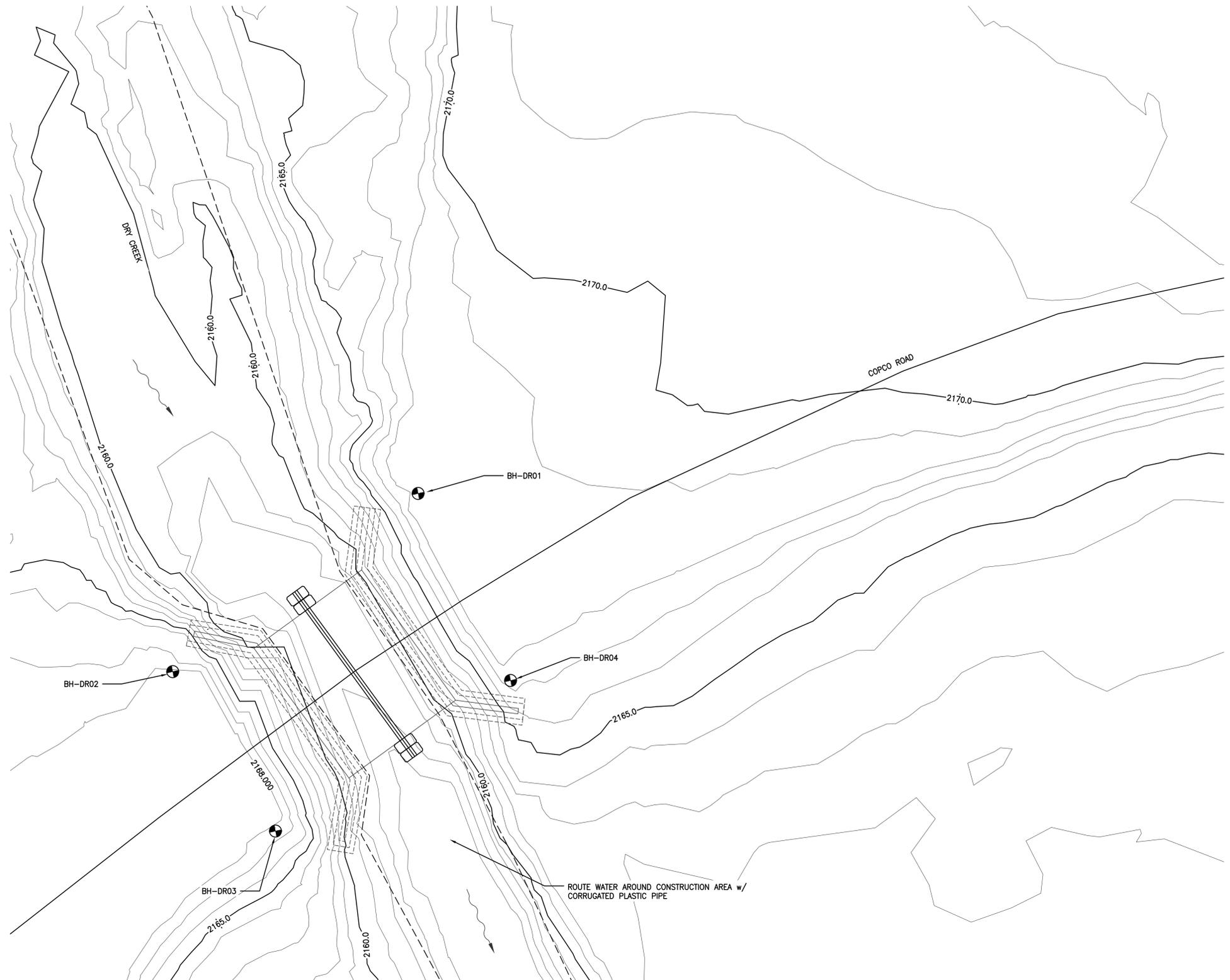
SCALE:
AS NOTED

DRAWN BY:
KF

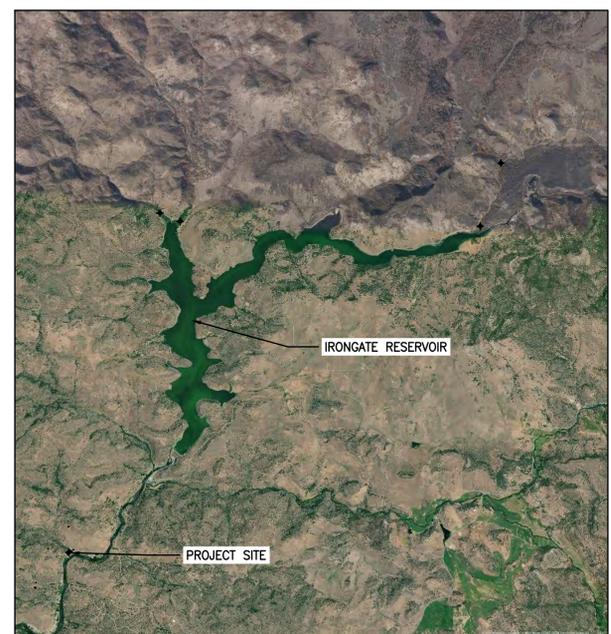
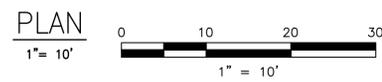
ENGINEERED:

CHECKED:
JF

FIGURE:
1



ROUTE WATER AROUND CONSTRUCTION AREA w/
CORRUGATED PLASTIC PIPE



VICINITY MAP
1" = 1 MILE

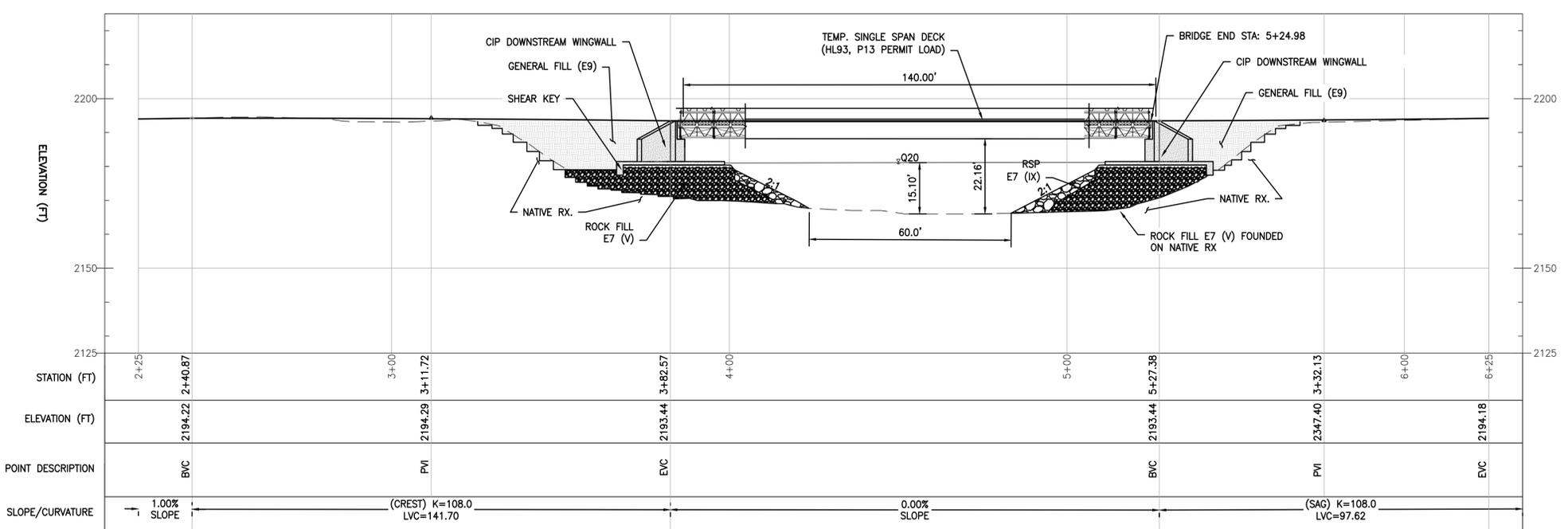
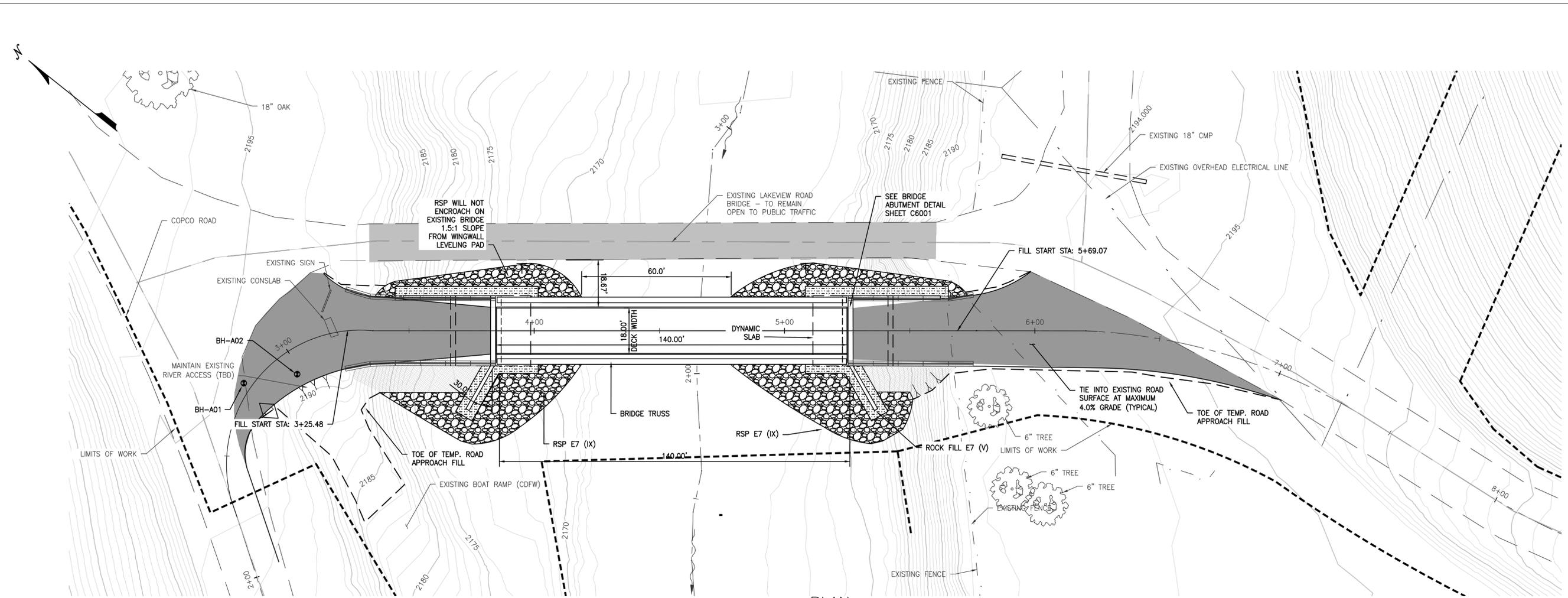
FOR INFORMATION ONLY



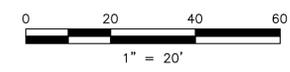
GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

SITE INVESTIGATION,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



ELEVATION
1" = 20'; 1H = 1V



FOR INFORMATION ONLY

SHEET NAME:

LAKEVIEW ROAD
BRIDGE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

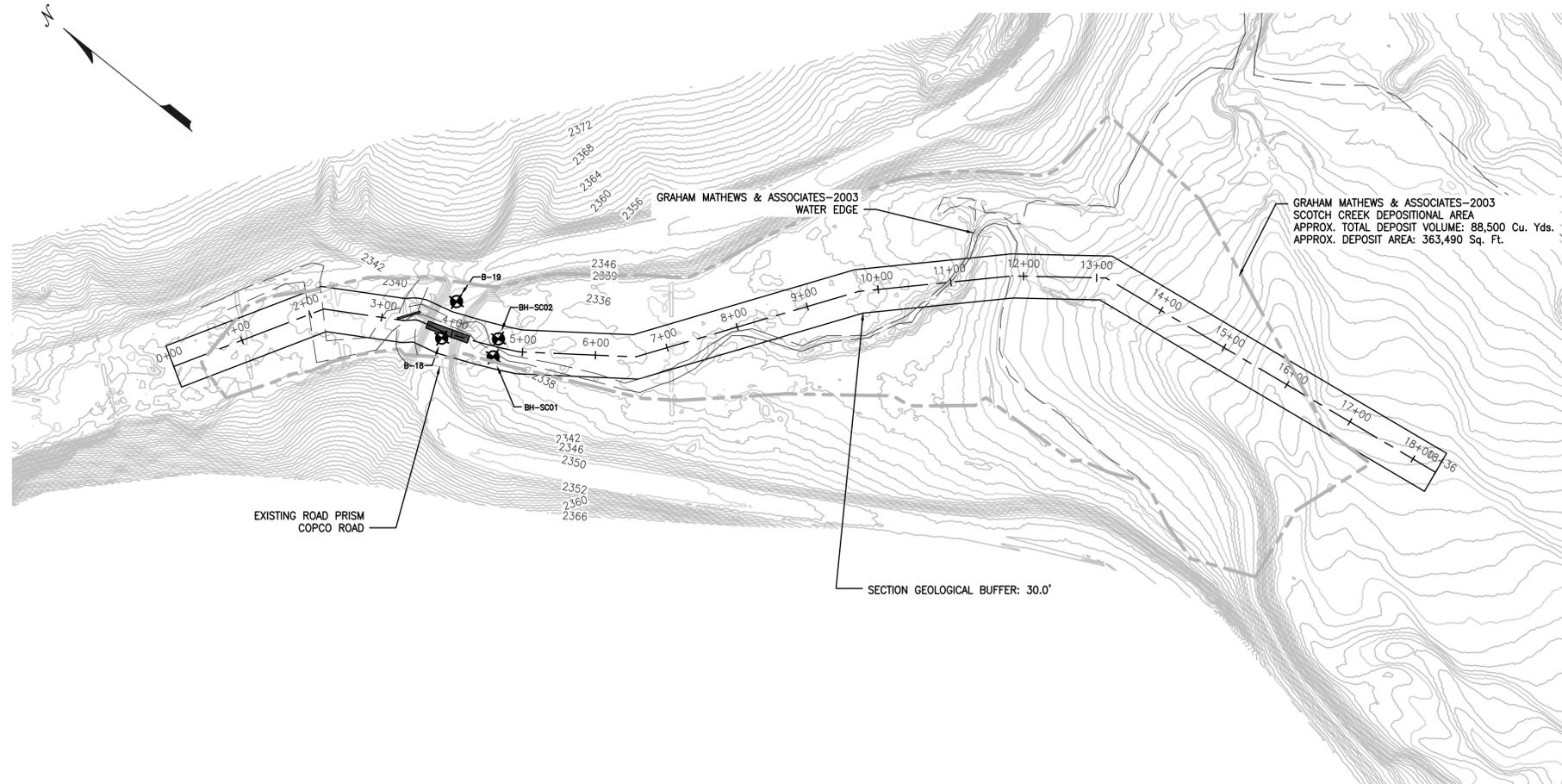
CHECKED:
JF

FIGURE:
2

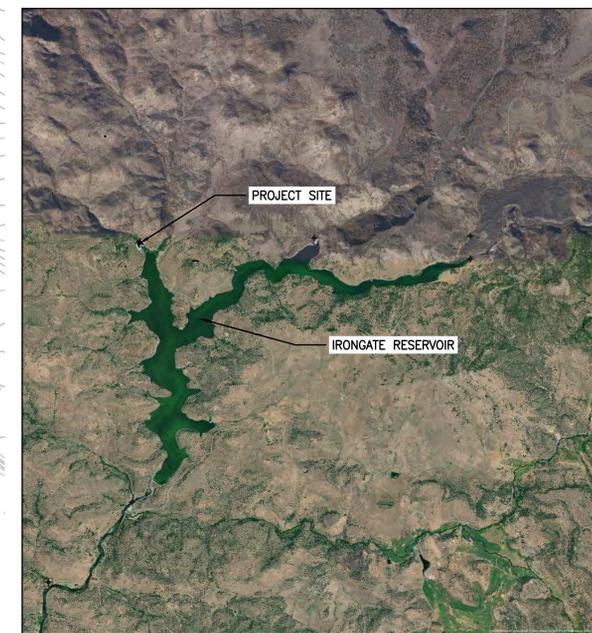


GEO SERV, INC.

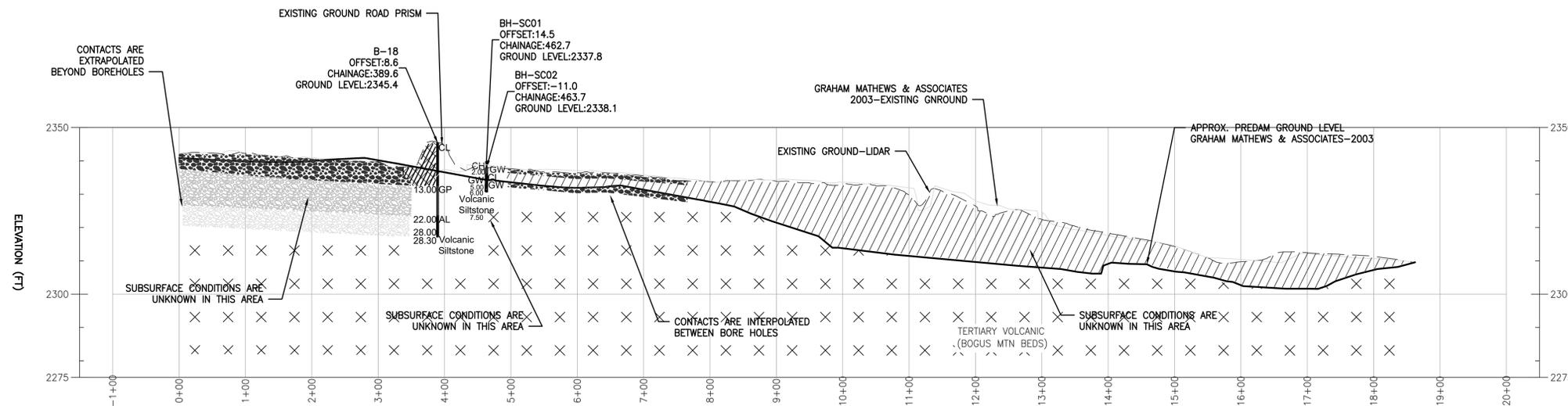
P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



PLAN
1" = 100'

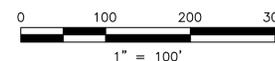


VICINITY MAP
1" = 1 MILE



SECTION-1
1" = 100'; 5H : 1V

LEGEND				
HATCH	STRATA DESC.	STRENGTH/DENSITY DESC.	CALC. BEARING CAPACITY (PSF)	UNDRAINED SHEAR STRENGTH (PSF)
[Solid Black]	AC	NA		
[Dotted]	AL	MEDIUM DENSE		
[Diagonal Lines]	CH	VERY STIFF		2,214
[Horizontal Lines]	CL	MEDIUM STIFF/STIFF		1,107
[Cross-hatch]	FILL	SEE INNER STRATA		
[Stippled]	GP	MEDIUM DENSE		
[Large Dots]	GW	MEDIUM DENSE	3,305-9,148	
[X-hatch]	Volcanic Siltstone	WEAK TO VERY DENSE	17,878	



FOR INFORMATION ONLY

SHEET NAME:

SCOTCH CREEK
CULVERT

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

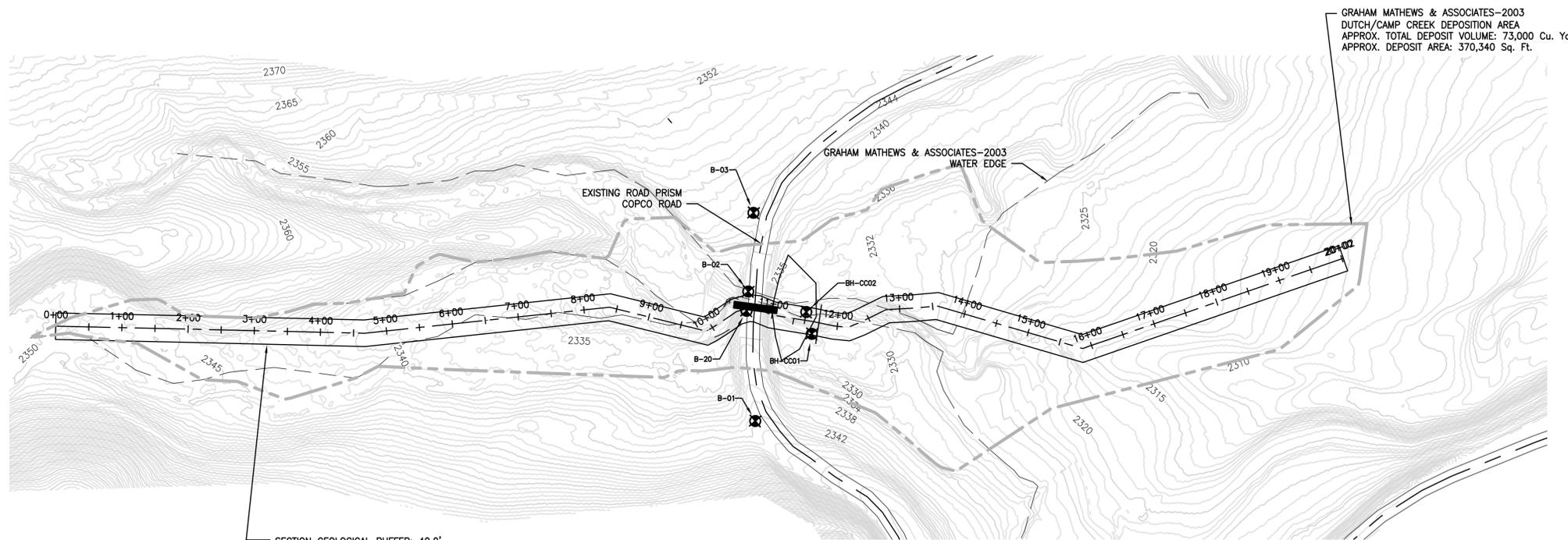
CHECKED:
JF

FIGURE:
3

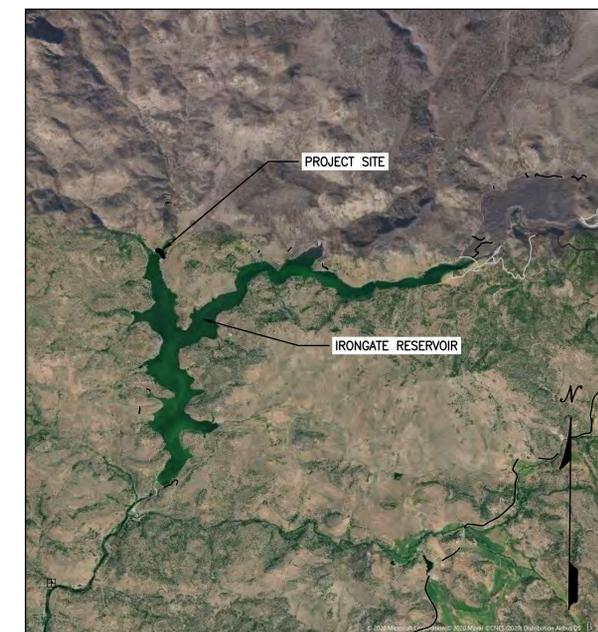


GEO SERV, INC.

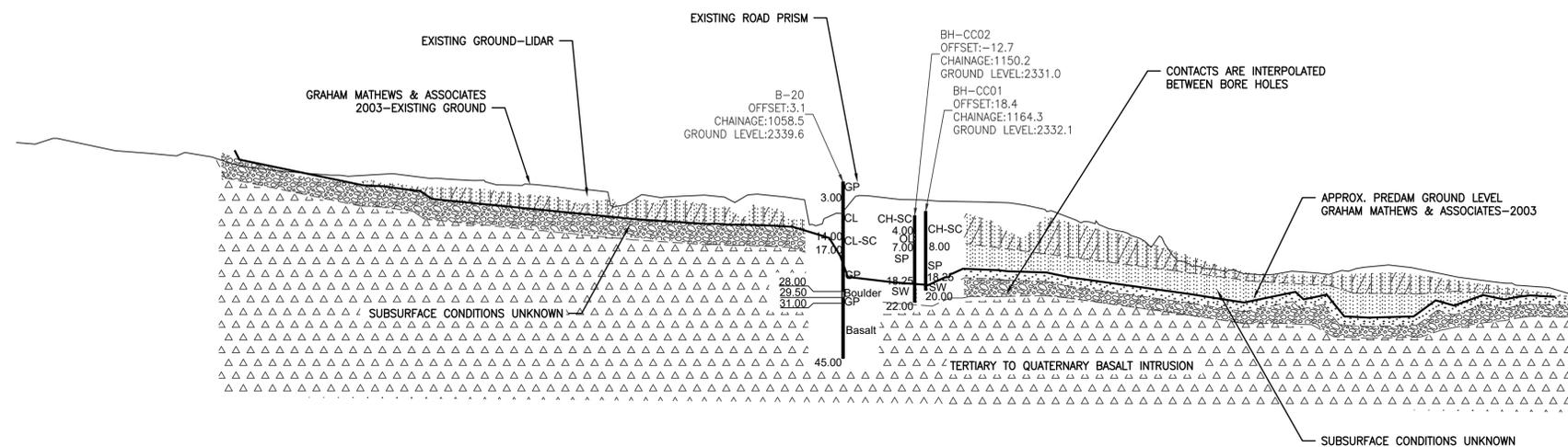
P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



PLAN
1" = 100'

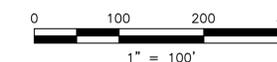


VICINITY MAP
1" = 1 MILE



SECTION-1
1" = 100'; 5H = 1V

LEGEND				
STRATA DESCRIPTION	STRENGTH/DENSITY DESC.	CALC. BEARING CAPACITY (PSF)	UNDRAINED SHEAR STRENGTH (PSF)	
BASALT	MODERATELY STRONG			
BOULDER				
BOULDER & COBBLE				
CL	MEDIUM STIFF			
FILL	SEE INNER STRATUM			
CH-SC	VERY LOOSE	196-355		
GC	VERY STIFF			
GP	MEDIUM DENSE TO DENSE			
OL	VERY SOFT		123	
SP	LOOSE TO MEDIUM DENSE	196-3,008		
SW	VERY LOOSE TO DENSE	1,878-3,008		
VOLCANIC BRECCIA	VERY WEAK			
VOLCANIC SILTSTONE	WEAK TO MOD. STRONG			



SITE INVESTIGATION,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

CAMP CREEK
CULVERT

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

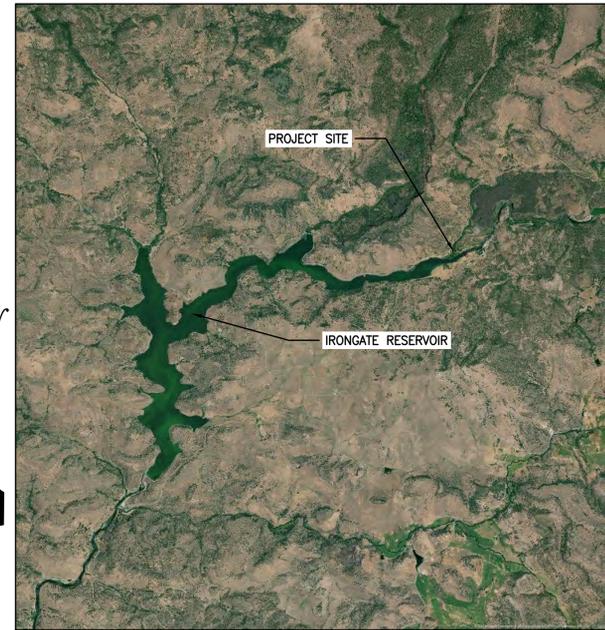
FIGURE:

4

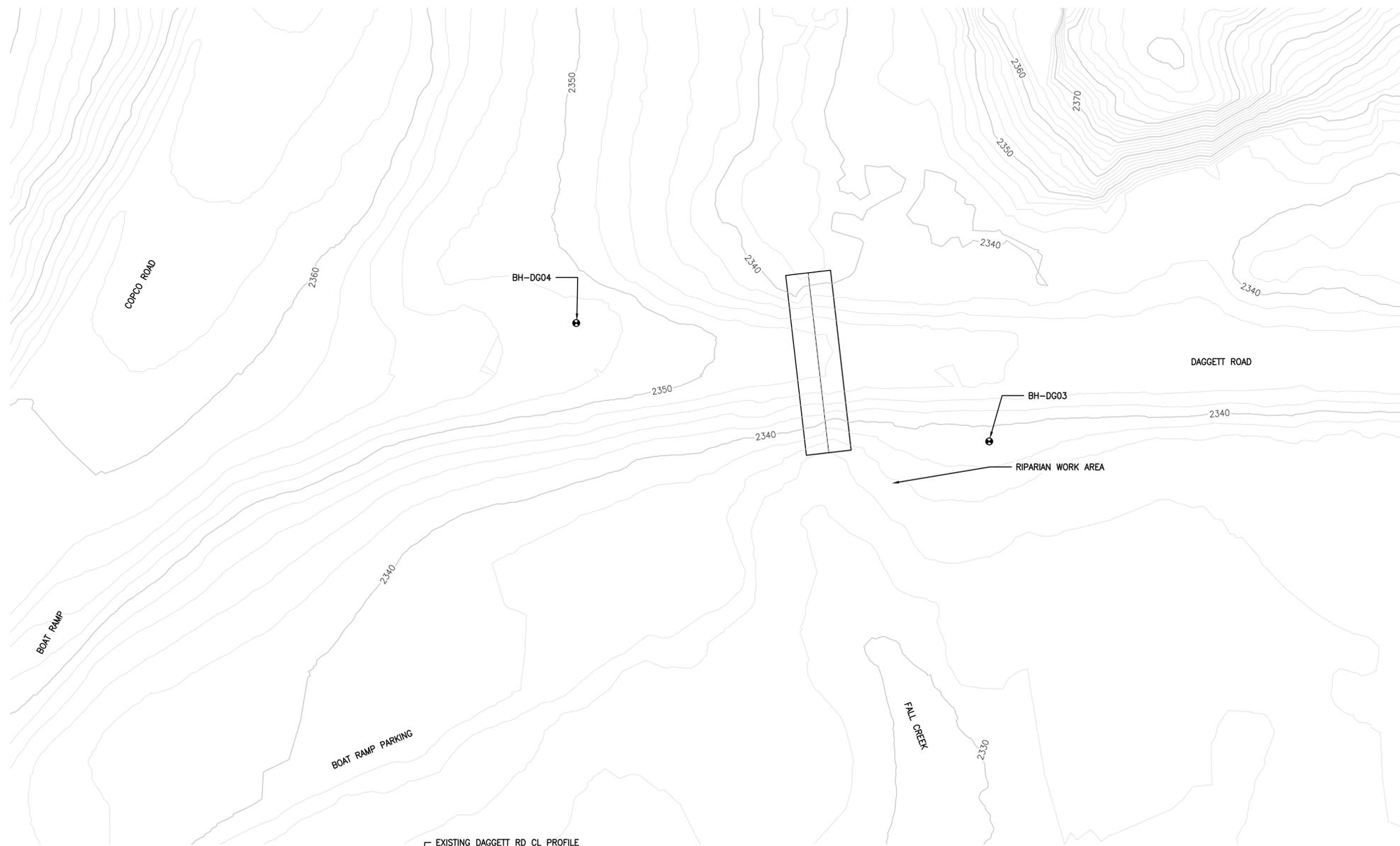


GEOSERV, INC.

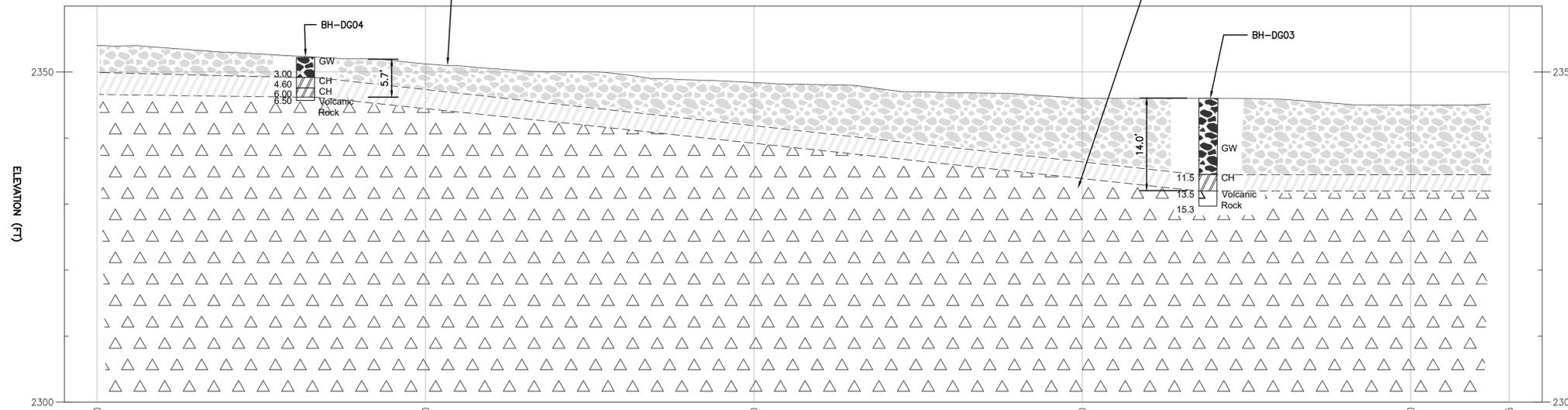
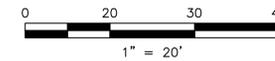
P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921



VICINITY MAP
1" = 1 MILE



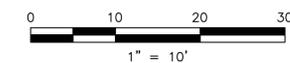
PLAN
1" = 20'



SECTION
1" = 10'; 1H = 1V

LEGEND			
	CH	SANDY SILTY GRAVEL WITH CLAY TO CLAY	LOOSE TO VERY STIFF
	FILL-GW	CLAYEY SAND WITH GRAVEL COBBLES AND BOULDERS	LOOSE TO MODERATELY DENSE
	Volcanic Rock	WEATHERED Rx, HIGHLY WEATHERED TO FRESH BASALT AND ANDESITE	VERY DENSE

FOR INFORMATION ONLY



SHEET NAME:

FALL CREEK CULVERT at DAGGETT ROAD

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

FIGURE:
5



GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

SITE INVESTIGATION,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY

SHEET NAME:

FALL CREEK CULVERT
at SUBSTATION

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

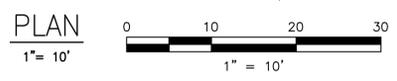
SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

FIGURE:
6



VICINITY MAP
1" = 1 MILE

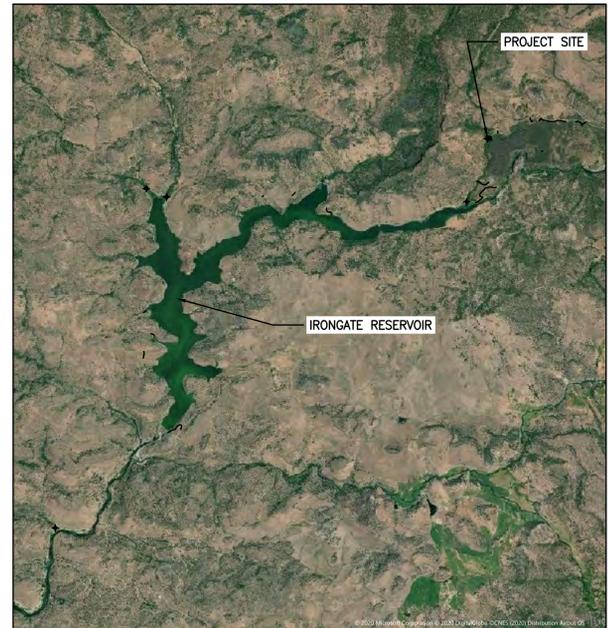
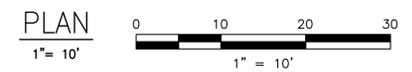
FOR INFORMATION ONLY



GEO SERV, INC.

P.O. BOX 831
MOUNT SHASTA, CA 96067
PH: (530) 227-8963
FAX: (530) 926-8921

SITE INVESTIGATION,
COPCO ROAD, HORN BROOK,
SISKIYOU COUNTY



VICINITY MAP
1" = 1 MILE

FOR INFORMATION ONLY

SHEET NAME:

COPCO ROAD at FALL
CREEK BRIDGE

REVISIONS:

PROJECT NO:
190725

ISSUE DATE:
7/14/20

SCALE:
AS NOTED

DRAWN BY:
KF

ENGINEERED:

CHECKED:
JF

FIGURE:
7

APPENDIX A
Borehole Logs and Data

Table 1. KRRP Transportation Geotechnical Data Borehole Data Summary Table

Feature	Borehole Number	Depth (feet)	Groundwater Depth (feet)	Material Type	Cohesion Type	N	N60	N1,60	Relative Density (N60)	Relative Density	Field	Lab	Lab	Undrained	Lab Measured Plasticity	Non-cohesive Soil Density	Cohesive Soil Consistency	Presumptive Bearing Capacity (psf)	Calculated Bearing Capacity (psf)
											Measured Friction Angle (deg)	Measured Friction Angle (deg)	Measured Cohesion (psf)	Shear Strength (N60) (psf)					
Copco Road at Dry Creek Bridge	BH-DR01	3	No Water	Clayey Sand	Cohesive	13	10.4	17.7	56					5,538			Stiff		
Copco Road at Dry Creek Bridge	BH-DR02	5.5	No Water	Sandy Clay	Cohesive	10	8.0	13.6	44					4,260			Firm		
Copco Road at Dry Creek Bridge	BH-DR02	8	No Water	Sandy Clay	Cohesive	7	5.6	8.2	34					2,982			Firm		
Copco Road at Dry Creek Bridge	BH-DR02	10.5	No Water	Sandy Clay	Cohesive	22	17.6	22.4	63			31.2	222.0	9,372	25		Very Stiff		
Copco Road at Dry Creek Bridge	BH-DR03	6	No Water	Sandy Clay	Cohesive	2	1.6	2.7	18					852			Very Soft		
Copco Road at Dry Creek Bridge	BH-DR03	8.5	No Water	Sandy Clay	Cohesive	9	7.2	10.2	39					3,834			Stiff		
Copco Road at Dry Creek Bridge	BH-DR04	6	No Water	Sandy Clay	Cohesive	5	4.0	6.8	30					2,130			Firm		
Copco Road at Dry Creek Bridge	BH-DR04	10	No Water	Sandy Clay	Cohesive	11	8.8	11.5	42					4,686			Stiff		
Lakeview Road Bridge	BH-AB01	3	No Water	Fill	Non-cohesive	20	16.0	27.2	59	65	41					Medium Dense		5,117	4,950
Lakeview Road Bridge	BH-AB01	6.5	No Water	Clay with Gravel	Non-cohesive	21	16.8	28.6	60	66	41					Medium Dense		5,117	5,305
Lakeview Road Bridge	BH-AB01	10	No Water	Clay with Gravel	Non-cohesive	25	20.0	32.6	58	64	42					Medium Dense		5,117	6,767
Lakeview Road Bridge	BH-AB01	15	13	Clay with Gravel	Cohesive	15	12.0	13.2						3,697			Stiff		
Lakeview Road Bridge	BH-AB01	20	13	Sandy Clay	Cohesive	26	20.5	16.7						5,033			Very Stiff		
Lakeview Road Bridge	BH-AB01	25	13	Rock	Non-cohesive	33	26.0	24.7	63	57	45					Dense		9,190	9,774
Lakeview Road Bridge	BH-AB02	6.5	No Water	Clay with Gravel	Cohesive	18	14.4	23.2						4,428			Stiff		
Lakeview Road Bridge	BH-AB02	10	10	Clay with Gravel	Cohesive	15	12.0	15.7						3,697			Stiff		
Lakeview Road Bridge	BH-AB02	15	10	Clay with Sand	Cohesive	3	2.4	2.8						737			Firm		
Lakeview Road Bridge	BH-AB02	20	10	Rock	Non-cohesive	28	17.2	18.4	49	54	41					Medium Dense		5,117	5,472
Scotch Creek Culvert	BH-SC01	1	No Water	Sandy Gravely Cobbles	Non-cohesive	15	12.0	20.0	66	60	30					Medium Dense		5,117	3,300
Scotch Creek Culvert	BH-SC01	4	No Water	Sandy Clay	Cohesive	9	7.2	12.2	35	31				1,107			Stiff	2,089	
Scotch Creek Culvert	BH-SC01	6.5	No Water	Clayey Gravel and Sand	Non-cohesive	21	16.8	29.0	78	69	33					Medium Dense		5,117	5,305
Scotch Creek Culvert	BH-SC01	7	No Water	Rock	Non-cohesive	50	40.0	68.0	100	90	37					Very Dense		9,189	17,878
Scotch Creek Culvert	BH-SC02	1	No Water	Sandy Clay with Cobbles	Cohesive	18	14.4	24.5	73	65				2,214			Very Stiff	2,089	
Scotch Creek Culvert	BH-SC02	3.5	No Water	Sandy Gravely Cobbles	Non-cohesive	31	24.8	42.2	84	74	32					Dense		5,117	9,148
Scotch Creek Culvert	BH-SC02	6.5	No Water	Rock	Non-cohesive	50	40.0	68.0	100	90	37					Very Dense		9,189	17,878
Camp Creek Culvert	BH-CC01	1	No Water	Sandy Clay to Clayey Sand	Non-cohesive	3	2.4	4.1	24	22	20					Very Loose		500	355
Camp Creek Culvert	BH-CC01	5	3.0	Sandy Clay to Clayey Sand	Non-cohesive	2	1.6	2.7	20	19	19					Very Loose		400	196
Camp Creek Culvert	BH-CC01	7.5	3.0	Poorly Graded Sand	Non-cohesive	12	9.6	16.3	52	46	26					Medium Dense		2,000	2,423
Camp Creek Culvert	BH-CC01	19	3.0	Well Graded Sand with Gravel	Non-cohesive	34	19.6	24.9	55	49	30	37.5	607.0			Dense		5,117	6,579
Camp Creek Culvert	BH-CC02	1	4.0	Sandy Clay to Clayey Sand	Non-cohesive	3	2.4	4.1	24	22	20					Very Loose		500	347
Camp Creek Culvert	BH-CC02	5	4.0	Organic Debris with Sand	Cohesive	1	0.8	1.4	16	14				123			Very Soft	300	0
Camp Creek Culvert	BH-CC02	7.5	4.0	Poorly Graded Sand	Non-cohesive	14	11.2	19.0	42	38	27					Medium Dense		2,000	3,008
Camp Creek Culvert	BH-CC02	13	4.0	Poorly Graded Sand	Non-cohesive	10	8.0	11.4	35	32	25					Loose		1,500	1,876
Camp Creek Culvert	BH-CC02	19	4.0	Well Graded Sand with Trace Gravel	Non-cohesive	3	2.4	3.0	18	16	20					Very Loose		400	349
Camp Creek Culvert	BH-CC02	21	4.0	Well Graded Sand with Trace Gravel	Non-cohesive	3	2.4	2.9	18	16	20					Very Loose		400	349
Camp Creek Culvert	BH-CC02	21.5	4.0	Clayey Sand	Non-cohesive	33	26.0	31.0	67	75	41	43.4	39.0			Dense		400	349
Fall Creek Culvert at Daggett Road	BH-DG03	11	No Water	Sandy Clay	Cohesive	9	7.2	9.1						2,214	46		Stiff		
Fall Creek Culvert at Daggett Road	BH-DG03	15	No Water	Rock	Non-cohesive	50	40.0	46.8	99	113	49					Very Dense		15,500	17,857
Fall Creek Culvert at Daggett Road	BH-DG04	3.5	No Water	Sandy Silty Clay	Cohesive	12	9.6	16.3						2,945			Stiff		
Fall Creek Culvert at Daggett Road	BH-DG04	5	No Water	Clay	Cohesive	21	16.8	28.6						5,159			Very Stiff		
Fall Creek at Substation Road Bridge	BH-DG02	3.5	No Water	Clay with Sandy Gravel	Cohesive	14	11.2	19.0						3,446			Stiff		
Fall Creek at Substation Road Bridge	BH-DG02	8.5	No Water	Rock	Non-cohesive	33	26.4	25.3	61	69	44					Dense		9,190	9,983
Fall Creek at Substation Road Bridge	BH-DG01	3.5	No Water	Gravelly Clay with Sand	Cohesive	34	27.2	46.2						8,354			Hard		
Fall Creek at Substation Road Bridge	BH-DG01	7.5	No Water	Gravelly Clay with Sand	Cohesive	26	20.8	31.2						6,391			Very Stiff		
Fall Creek at Copco Road Bridge	BH-FC01	3	No Water	Silty Clay with Gravel	Cohesive	7	5.6	9.5						1,713			Firm		
Fall Creek at Copco Road Bridge	BH-FC01	4.5	No Water	Silty Clay with Gravel	Cohesive	14	11.2	19.0						3,425			Stiff		

LOGGED BY JF & JS	BEGIN DATE January 26th, 2020	COMPLETION DATE January 27th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.91759, -122.46046	HOLE ID BH-DR01
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) None	SURFACE ELEVATION 2168.06'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 1/27/20			GROUNDWATER READINGS ND	DURING DRILLING ND
			AFTER DRILLING (DATE) ND	TOTAL DEPTH OF BORING 5.5'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSO(N)60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
	0		Fill: ARTIFICIAL FILL - GRAVEL (FILL); brown; moist, loose; SAND coarse to very coarse; GRAVEL < 3/4" dia. angular, road base rx.												
	1		Fill: ARTIFICIAL FILL - GRAVELLY CLAYEY SAND with BOULDERS and COBBLES (FILL); reddish brown; moist, firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded; BOULDERS < 8" dia. subangular to angular.												
2165	2														
	3					9/8/5	13	50							Bulk sample taken from 2'-3' bgs
	4		Fill: ARTIFICIAL FILL - GRAVELLY CLAY with BOULDERS and COBBLES (Fill); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded; BOULDERS < 8" dia. subangular to angular.												
	5														Bulk sample taken @ 4.0' bgs
	6					50.6"									Auger refusal @ 5.5' bgs

	REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-DR01
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME Copco Road Bridge Over Dry Creek				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 1	

LOGGED BY JF & JS	BEGIN DATE January 27th, 2020	COMPLETION DATE January 27th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.9175, -122.46062	HOLE ID BH-DR02
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) None	SURFACE ELEVATION 2168.19'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 1/27/20			GROUNDWATER READINGS ND	DURING DRILLING ND
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 11.5'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG(N1,60)	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2165	0		Fill: ARTIFICIAL FILL - GRAVEL (FILL); brown; moist, loose; SAND coarse to very coarse; GRAVEL < 3/4" dia. angular, road base rock.												
	1		Fill: ARTIFICIAL FILL - GRAVELLY CLAYEY SAND with BOULDERS and COBBLES (FILL); reddish brown; moist, firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded; BOULDERS < 8" dia. subangular to angular.												Bulk sample taken from 2.0'-3.0' bgs
	2		Fill: ARTIFICIAL FILL - GRAVELLY CLAY with BOULDERS and COBBLES (Fill); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded; BOULDERS < 8" dia. subangular to angular.												Bulk sample taken from 4.0'-5.0' bgs
	3		GC: GRAVELLY CLAY with BOULDERS and COBBLES (GC); reddish brown; moist, firm to stiff; CLAY medium to high plasticity; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded; BOULDERS < 8" dia. subangular to angular.			4/5/5	10	75							
	4		SC: SANDY CLAY and GRAVEL and COBBLES (SC); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded.												
2160	5		SC: SANDY CLAY and GRAVEL and COBBLES (SC); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded.			4/3/5	8	75							
	6		SC: SANDY CLAY and GRAVEL and COBBLES (SC); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded.												
	7		SC: SANDY CLAY and GRAVEL and COBBLES (SC); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded.			5/8/14	22	80							
	8		SC: CLAYEY SAND with GRAVEL (SC); pruplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. rounded to subrounded.												Auger refusal @ 11.25'
	9		SC: CLAYEY SAND with GRAVEL (SC); pruplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. rounded to subrounded.												
	10		SC: CLAYEY SAND with GRAVEL (SC); pruplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. rounded to subrounded.												
	11		SC: CLAYEY SAND with GRAVEL (SC); pruplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. rounded to subrounded.												
	12		SC: CLAYEY SAND with GRAVEL (SC); pruplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. rounded to subrounded.												
	13		SC: CLAYEY SAND with GRAVEL (SC); pruplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. rounded to subrounded.												



REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-DR02
DIST. Siskiyou	COUNTY Siskiyou	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME Copco Road at Dry Creek Bridge				
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 2	

LOGGED BY JF & JS	BEGIN DATE January 26th, 2020	COMPLETION DATE January 27th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.91743, -122.46056	HOLE ID BH-DR03
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) None	SURFACE ELEVATION 2166.64'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 1/27/20			GROUNDWATER READINGS ND	DURING DRILLING ND
			AFTER DRILLING (DATE) ND	TOTAL DEPTH OF BORING 9.5'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	W/N60 (N1,60)	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2165	0		Fill: ARTIFICIAL FILL - GRAVEL (FILL); brown; moist, loose; SAND coarse to very coarse; GRAVEL < 3/4" dia. angular, road base rx.												
	2		Fill: ARTIFICIAL FILL - GRAVELLY CLAYEY SAND (FILL); reddish brown; moist, firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. subangular to subrounded.												Bulk sample taken from 2.0'-4.0' bgs
	4		Fill: ARTIFICIAL FILL - SANDY CLAY and GRAVEL and COBBLES (Fill); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded.												Bulk sample taken at 4.5' bgs
2160	6		GC: SANDY CLAY and GRAVEL and COBBLES (GC); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded, more COBBLE @ 7.5'.			1/1/1	2	20							Bulk sample taken at 6.0' bgs
	9					9/4/5	9	60							Auger refusal @ 9.5' bgs.

	REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-DR03
	DIST. Siskiyou	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME Copco Road at Dry Creek Bridge				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 3	

LOGGED BY JF & JS	BEGIN DATE January 26th, 2020	COMPLETION DATE January 27th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.9175, -122.46039	HOLE ID BH-DR-04
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) None	SURFACE ELEVATION 2167.62'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 1/27/20			GROUNDWATER READINGS ND	DURING DRILLING ND
			AFTER DRILLING (DATE) ND	TOTAL DEPTH OF BORING 11.5'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG(N1,60)	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2165	0		Fill: ARTIFICIAL FILL - GRAVEL (FILL); brown; moist, loose; SAND coarse to very coarse; GRAVEL < 3/4" dia. angular, road base rx.												
2165	1		Fill: ARTIFICIAL FILL - GRAVELLY CLAYEY SAND (FILL); reddish brown; moist, firm; CLAY med. to high plasticity; SAND coarse to very coarse; GRAVEL < 0.5" dia. subangular to subrounded.												
2165	2														Bulk sample taken from 3.0'-4.0' bgs
2165	3														
2165	4		Fill: ARTIFICIAL FILL - SANDY CLAY and GRAVEL and COBBLES (Fill); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded.												Easy drilling from 0-5.5' bgs
2165	5														
2165	6					2/3/2	5	30							
2165	7														
2160	8		GC: SANDY CLAY and GRAVEL and COBBLES (GC); reddish brown; moist, firm to stiff; CLAY med. to high plasticity; SAND coarse; GRAVEL < 0.5" dia. subangular to subrounded; COBBLES less than 4" dia. subangular to subrounded, more COBBLE @ 7.5'.												
2160	9														
2160	10					5/4/7	11	75							Auger refusal @ 11.5' bgs
2160	11		SC: CLAYEY SAND (SC); purplish brown; moist; firm; CLAY med. to high plasticity; SAND coarse to very coarse.												
2160	12														

	REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-DR-04	
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA	
	PROJECT OR BRIDGE NAME Copco Road at Dry Creek Bridge					
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 4		

LOGGED BY JF & JS	BEGIN DATE Jan 29th, 2020	COMPLETION DATE Jan 30th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.93146, -122.4421	HOLE ID BH-A01
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) None	SURFACE ELEVATION 2194.21'
DRILLING METHOD Air Rotary Drill		DRILLING RIG T1		BOREHOLE DIAMETER 6" to 10"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 1/31/20			GROUNDWATER READINGS 18.0'	DURING DRILLING 13.0' (1/30/20)
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 35'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100(N):60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2190	0		GW: WELL GRADED AGGREGATE BASE ROCK (FILL-GW); dry; <3/4" diameter.												
	1														
	2		GP: GRAVELS COBBLES, and BOULDERS (Fill-GP); loose to dense; dry; subangular to angular GRAVEL/COBBLE/BOULDER; <18" BOULDER.			3/10/10	20	0							Sample NO. 1.1-STP
	3														
	4														
	5														
	6		CH: CLAY with GRAVEL (Fill-SC); firm; moist; reddish brown; CLAY medium to high plasticity; <1/2" subround to angular GRAVEL.												Sample NO. 1.2-SPT
	7														
	8					4/9/12	21	30							
	9														
	10														
	11					10/12/13	25	100							Sample NO. 1.3-SPT
	12														
	13														
	14														
	15					5/6/9	15	100							Sample NO. 1.4-SPT
	16														
	17														
	18														
	19		CH: CLAY with GRAVEL to Gravelly Clay (CH-GC); very soft to firm; moist to wet; dark grey; CLAY medium to high plasticity; <1/2" subround to angular GRAVEL.												
	20														
	21					2/16/10	26	60							Sample NO. 1.5-SPT
	22														
	23														
	24		Weathered Volcanic Rx: NATIVE WEATHERED ROCK; hard; CLAYEY GRAVEL WITH SAND; Clay medium to high plasticity; <0.375" subangular to angular GRAVEL; coarse to very coarse SAND; weathering decreases with depth.												
	25					50: 0.25'		10							Sample NO. 1.6-SPT
	26														
	27														
	28														
	29														
	30														
	31														
	32														
	33														
	34														
	35														
	36														



REPORT TITLE Geotechnical Investigation				HOLE ID BH-A01
DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME Lakeview Road Bridge				
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 5	

LOGGED BY JF & JS	BEGIN DATE Jan 30th, 2020	COMPLETION DATE Jan 30th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.93143, -122.44202	HOLE ID BH-A02
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) None	SURFACE ELEVATION 2188.92'
DRILLING METHOD Air Rotary Drill		DRILLING RIG T1		BOREHOLE DIAMETER 6" to 10"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 1/31/20			GROUNDWATER READINGS 15.5'	DURING DRILLING 10.0' (1/31/20)
			AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING 30'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/100(N):60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2185	0		GW: WELL GRADED AGGREGATE BASE ROCK (FILL-GW); dry; <3/4" diameter.												
2185	1		GP: GRAVELS COBBLES, and BOULDERS (Fill-GP); loose to dense; dry; subangular to angular GRAVEL/COBBLE/BOULDER; <18" BOULDER.												
2185	2														
2185	3														
2185	4														
2185	5		CH: CLAY with GRAVEL (Fill-CH); firm; moist; reddish brown; CLAY medium to high plasticity; <1/2" subround to angular GRAVEL.												
2185	6														
2185	7														
2185	8					5/7/11	18	30							Sample NO. 2.1-SPT
2185	9														
2185	10														
2185	11					4/7/8	15	100							Sample NO. 2.2-SPT
2185	12														
2185	13														
2185	14														
2185	15														
2185	16		SC: CLAY with SAND to SAND with ORGANIC DEBRIS (CH-SC); very soft to firm; moist to wet; greenish grey; CLAY medium to high plasticity; fine to very fine SAND; organic debris throughout up to 1/8"x1/2" in size.			1/1/2	3	100							Sample NO. 2.3-SPT
2185	17														
2185	18														
2185	19		Weathered Volcanic Rx: NATIVE VOLCANIC WEATHERED ROCK; hard; CLAYEY GRAVEL WITH SAND; Clay medium to high plasticity; <0.375" subangular to angular GRAVEL; coarse to very coarse SAND; weathering decreases with depth; preserved amygdules.			18/10/18	28	60							Sample NO. 2.4-SPT
2185	20														
2185	21														
2185	22														
2185	23														
2185	24														
2185	25														
2185	26														
2185	27														
2185	28														
2185	29														
2185	30														

				REPORT TITLE Geotechnical Investigation	HOLE ID BH-A02
				DIST. COUNTY ROUTE POSTMILE Siskiyou	EA
PROJECT OR BRIDGE NAME Lakeview Road Bridge					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 6		

LOGGED BY JF & JS	BEGIN DATE April 14th, 2020	COMPLETION DATE April 14th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97509531, -122.44002545	HOLE ID BH-SC01
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2338'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/14/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 7.5'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NS0/N1.60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
	0		GW: SANDY GRAVELLY COBBLES and BOULDERS (GW); tannish brown; dry to moist; medium dense; SAND fine to coarse; GRAVEL < 1.5" dia. and subangular to rounded; COBBLE <5" dia. and subangular to rounded; BOULDER < 12" dia. and subangular to rounded.			7/8/9	15	60	15/12.0 29.0	20.0	3,200				
	2		CL: SANDY CLAY (CL); reddish brown; moist; firm; CLAY medium plasticity; SAND fine.												Medium Drilling Torque/Effort
2335	3														
	4					3/4/5	9	100	97.2 12.2			1,107			Bulk sample 2'-6'
	5														Medium Drilling Torque/Effort
	6		GW: CLAYEY GRAVEL and SAND (GW); reddish brown; moist; firm; CLAY medium plasticity; SAND fine to coarse; GRAVEL < 1.5" angular to subangular.			7/14/7	21	60	21/15.0 29.0	29.5	5,805				
	7		Weathered Volcanic Rx: VOLCANIC SILTY CLAYSTONE/SILTSTONE; reddish purple; slightly weathered; very dense. --Tertiary Volcanics (BOGUS MOUNTAIN BEDS, undifferentiated)--			50-0"		0	50/40.0 63.0	37.0	7,878				Max. Drilling Torque/Effort Auger refusal @ 7.5'



REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-SC01
DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME Scotch Creek Culvert				
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 7	

LOGGED BY JF & JS	BEGIN DATE April 13th, 2020	COMPLETION DATE April 13th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97511937, -122.43993749	HOLE ID BH-SC02
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2338.1'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Lonestar Drill	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/14/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 7.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSO(N), 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
	0		CH: SANDY CLAY with COBBLES and ORGANIC DEBRIS (CH); dark brown; moist to wet; firm; CLAY medium to high plasticity; Sand very fine to fine; COBBLE <6" dia. and subangular to rounded; ORGANIC DEBRIS < 0.5" dia. roots..			3/4/14	18	60	15/14.4 / 34.5			2,214			Medium Drill Effort/Torque
	2		GW: SANDY GRAVEL with COBBLES (GW); tannish brown; moist to wet; medium dense; SAND fine to coarse; GRAVEL < 1.5" sub rounded to rounded; COBBLES < 4" dia. and subrounded to rounded.			6/14/17	31	100	3/128.7 / 42.2	22.2	9,144				Max. Drilling Torque/Effort
	5		Weathered Volcanic Rx: VOLCANIC SILTY CLAYSTONE/SILTSTONE; reddish purple; slightly weathered; very dense. --Tertiary Volcanics (BOGUS MOUNTAIN BEDS, undifferentiated)--			50-6"		0	50/40.0 / 78.0	37.0	17,878				Auger refusal @ 7.0'

				REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-SC02	
				DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA	
PROJECT OR BRIDGE NAME Scotch Creek Culvert									
BRIDGE NUMBER NA				PREPARED BY KF		DATE 7/14/2020	SHEET 8		

LOGGED BY JF & JS	BEGIN DATE April 13th, 2020	COMPLETION DATE April 13th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97385602, -122.43609419	HOLE ID BH-CC01
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2332.1'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"		STP HAMMER TYPE Safety Hammer		HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 4/14/2020		GROUNDWATER READINGS 3.0'	DURING DRILLING 3.0'	AFTER DRILLING (DATE) 20.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NGO (N/60)	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2330	0		SC: SANDY CLAY TO CLAYEY SAND (CH-SC); tan to dark brown; moist; loose; CLAY medium to high plasticity; SAND very fine to fine.			2/1/2	3	30	3/24/4.1	24.4	355				Min. Drill Effort/Torque
	3														
	5					1/1/1	2	30	3/16/2.7	19.0	166				SPT Sample Interference due to sand flowing into auger.
2325	7														Sand flowing up into HSA
	8					2/3/9	12	70	13/16/16.1	29.8	2,421				
	9		SP: POORLY GRADED SAND (SP); dark grey; wet; loose; SAND coarse to very coarse.												
	12														SPT Sample Interference due to sand flowing into auger.
2320	13					16/10/10	10	50							Sand flowing up into HSA
	14														
	16														Min. Drill Effort/Torque
2315	17														
	18														Harder Drilling @ 18.5'
	19		SW: WELL GRADED SAND WITH GRAVEL (SW); dark grey; wet; medium dense; SAND fine to very coarse.			17/15/19	34	70	34/19/16/154.0	30.8	6,575				Max. Drill Effort/Torque
	20														

				REPORT TITLE Geotechnical Investigation, Copco Road	HOLE ID BH-CC01
				DIST. Siskiyou	COUNTY Siskiyou
PROJECT OR BRIDGE NAME Camp Creek Culvert					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 9		

LOGGED BY JF & JS	BEGIN DATE April 13th, 2020	COMPLETION DATE April 13th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97381485, -122.43598248	HOLE ID BH-CC02
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2331'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Neat Cement, 4/14/2020		GROUNDWATER READINGS	DURING DRILLING 4.0'	AFTER DRILLING (DATE) 4.0'
				TOTAL DEPTH OF BORING 22.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG (N1, 60)	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2330	0		SC: SANDY CLAY TO CLAYEY SAND (CH-SC); tan to dark brown; moist; loose; CLAY medium to high plasticity; Sand very fine to fine.			2/1/2	3	30	3/2-4/4.1	20.4	387				Min. Drill Effort/Torque
2325	4		OL: ORGANIC DEBRIS WITH SAND (OL); greyish brown; wet; loose; ORGANIC DEBRIS < 0.5" dia. plant matter; SAND coarse to very coarse.			1-12"/1	1	90	1/0-6/1.8			1251			SPT Sample Interference due to sand flowing into auger.
	7		SP: POORLY GRADED SAND (SP); dark grey; wet; loose; SAND coarse to very coarse.			3/6/8	14	90	10/11.2/19.0	20.6	3,008				Sand flowing up into HSA
2320	11														SPT Sample Interference due to sand flowing into auger.
	13					4/5/5	10	90	10/6.0/11.4	24.8	1,976				Sand flowing up into HSA
2315	16														Min. Drill Effort/Torque
	18.5														Harder Drilling @ 18.5'
	19		SW: WELL GRADED SAND WITH TRACE GRAVEL (SW); dark grey; wet; medium dense; SAND fine to very coarse; GRAVEL < 0.75" sub rounded to rounded.			1/2/1	3	50	3/2-4/3.0	20.4	349				
2310	20					1/1/2	3	30	3/2-4/2.9	20.4	349				Max. Drill Effort/Torque
	22														Auger Refusal @ 22.0'

	REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-CC02
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME Camp Creek Culvert				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 10	

LOGGED BY JF & JS	BEGIN DATE April 16th, 2020	COMPLETION DATE April 16th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97318588, -122.36643994	HOLE ID BH-DG03
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2345'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Deere 35G		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/18/2020		GROUNDWATER READINGS	DURING DRILLING ND	AFTER DRILLING (DATE) ND
				TOTAL DEPTH OF BORING 9.3'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG(N)1.60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2345	0		Fill: ARTIFICIAL FILL-CLAYEY SAND and GRAVEL with BOULDERS and COBBLES (FILL); light to dark brown; dry to moist; loose to medium dense; CLAY medium to high plasticity; SAND fine to very coarse; GRAVEL < 1.5" dia., angular to subangular; COBBLES and BOULDERS, 8" dia., subangular.												
2340	5		CH: SANDY CLAY (CH); dark brown; moist; very soft to firm; CLAY medium to high plasticity; SAND coarse to very coarse; trace organic debris.			3/4/5	9	30							Harder drilling @ 13.0' bgs
2335	10		Weathered Rx: WEATHERED ROCK; highly weathered to nearly fresh fragments of andesite/basalt; level of weathering decreases with depth.												Hard Drilling Max Drill Effort/Torque @ 14.0' bgs
2330	15					50.5'		50							Auger Refusal @ 15.3' bgs below existing top of road

				REPORT TITLE Geotechnical Investigation, Daggett Road	HOLE ID BH-DG03
				DIST. Siskiyou	COUNTY Siskiyou
PROJECT OR BRIDGE NAME Fall Creek Culvert at Daggett Road					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 11		

LOGGED BY JF & KF	BEGIN DATE April 17th, 2020	COMPLETION DATE April 17th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97329581, -122.36694418	HOLE ID BH-DG04
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2352.2'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/18/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 6.5'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSO/N1.60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2350	0		Fill: ARTIFICIAL FILL-CLAYEY SAND and GRAVEL with BOULDERS and COBBLES (FILL); light to dark brown; dry to moist; loose to medium dense; CLAY medium to high plasticity; SAND fine to very coarse; GRAVEL < 1.5" dia., angular to subangular; COBBLES and BOULDERS, 8" dia., subangular.												
	3		CH: SANDY SILTY CLAY WITH GRAVEL (CH); dark brown; dry to moist; very soft to firm; CLAY medium to high plasticity; SAND coarse to very coarse; GRAVEL less than 1.5in diameter angular to subangular.			7/6/6	12	20							
	5		Clay: CLAY (CH); dark brown, moist; firm to very stiff; clay medium to high plasticity; harder drilling with depth.			5/8/13	21	90							Hard Drilling Max Drill Effort/Torque @ 5.0' bgs
	6		Weathered Rx: WEATHERED ROCK; highly weathered to nearly fresh fragments of andesite/basalt; level of weathering decreases with depth.												Auger Refusal @ 6.5' bgs.



REPORT TITLE Geotechnical Investigation, Daggett Road				HOLE ID BH-DG04	
DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA	
PROJECT OR BRIDGE NAME Fall Creek Culvert at Daggett Road					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 12		

LOGGED BY JF & JS	BEGIN DATE April 16th, 2020	COMPLETION DATE April 16th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97665, -122.36415	HOLE ID BH-DG01
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2386.0'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/19/2020		GROUNDWATER READINGS ND	DURING DRILLING ND	AFTER DRILLING (DATE) ND
				TOTAL DEPTH OF BORING 10.9'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NGO N1, 60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
	0		Fill: ARTIFICIAL FILL - SANDY GRAVEL: (GW); dark brown; dry to moist; medium dense; SAND very fine to coarse; GRAVEL < 1.5" dia., angular to subangular.												
2385	2		CH: CLAY with SANDY GRAVEL: (CH); dark brown; moist; firm; CLAY medium to high plasticity; sand very fine; GRAVEL < 0.375" dia, angular to subangular, GRAVEL occurs below 5.5' bgs.			3/5/9	14	80							Bulk sample taken @ 1.5'-5.5' bgs
2380	7		Weathered Rx: WEATHERED ROCK; high weathering to nearly fresh fragments of andesite/basalt; level of weathering decreases with depth.			5/10/23	33	80							Harder drilling @ 9.5' bgs
	10														Auger Refusal @ 10.9' bgs

				REPORT TITLE Geotechnical Investigation	HOLE ID BH-DG01
				DIST. Siskiyou	COUNTY Siskiyou
PROJECT OR BRIDGE NAME Fall Creek culvert at Substation					
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 13		

LOGGED BY JF & JS	BEGIN DATE April 18th, 2020	COMPLETION DATE April 18th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.97676, -122.36455	HOLE ID BH-DG02
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2387.0'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Lonestar Drill	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/19/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 9.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG(N1,60)	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
2385	0		Fill: ARTIFICIAL FILL - GRAVELLY CLAY with SAND (CH): dark reddish brown; moist; stiff to very stiff; CLAY medium to high plasticity; SAND coarse; GRAVEL < 1.0" dia., angular to subrounded.												
	1														
	2														
	3														
	4														
	5														
	6					7/14/20	34	30							
	7		CH: GRAVELLY CLAY with SAND: (CH); dark reddish brown; moist; stiff to very stiff; CLAY medium to high plasticity; SAND coarse; GRAVEL < 0.5" dia, subrounded to round.												Easier drilling @ 7.0' bgs
	8					7/12/14	26	50							
	9														Auger Refusal @ 9.0' bgs

	REPORT TITLE Geotechnical Investigation				HOLE ID BH-DG02
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME Fall Creek culvert at Substation				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 14	

LOGGED BY JF & KF	BEGIN DATE April 16th, 2020	COMPLETION DATE April 16th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.98390289, -122.36220577	HOLE ID BH-FL01
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2494.87'
DRILLING METHOD Hollow Stem Auger			DRILLING RIG Lonestar Drill	BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/19/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 2.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG/N1.60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
	0		Fill: ARTIFICIAL FILL-CLAYEY SAND AND GRAVEL WITH BOULDERS AND COBBLES (FILL); light to dark brown; dry to moist; loose to medium dense; CLAY medium to high plasticity; SAND fine to very coarse; GRAVEL < 1.5" dia., angular to subangular; COBBLES and BOULDERS, 12" dia., subangular.												Boulders and RSP
															Refusal due to boulders @ 2.0'



REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-FL01
DIST. Siskiyou	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME Copco Road at Fall Creek Bridge				
BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 15	

LOGGED BY JF & KF	BEGIN DATE April 16th, 2020	COMPLETION DATE April 16th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.98390289, -122.36220577	HOLE ID BH-FL02
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2494.88'
DRILLING METHOD Hollow Stem Auger		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/19/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 6.1'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSO/N1.60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
	0		Fill: ARTIFICIAL FILL - CLAYEY SAND and GRAVEL with BOULDERS and COBBLES (FILL); light to dark brown; dry to moist; loose to medium dense; CLAY medium to high plasticity; SAND fine to very coarse; GRAVEL < 1.5" dia., angular to subangular; COBBLES and BOULDERS, 8" dia., subangular.												Boulders and RSP
	1		CH: SILTY CLAY with GRAVEL and TRACE COBBLE (CH); reddish brown; moist; moderately stiff; CLAY medium to high plasticity; GRAVEL < 1" dia., subrounded; COBBLE < 4" dia, subangular.												
	2														
	3														Hand cleared to 3' bgs
	4					2/3/4	7	10							
	5					9/8/6	14	30							
2490	6														Refusal @ 6.1' bgs

	REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-FL02
	DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA
	PROJECT OR BRIDGE NAME Copco Road at Fall Creek Bridge				
	BRIDGE NUMBER NA	PREPARED BY KF	DATE 7/14/2020	SHEET 16	

LOGGED BY JF & KF	BEGIN DATE April 16th, 2020	COMPLETION DATE April 16th, 2020	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 41.98406971, -122.36207834	HOLE ID BH-FL03
DRILLING CONTRACTOR GeoServ, Inc.			BOREHOLE LOCATION (Offset, Station, Line) NA	SURFACE ELEVATION 2493.27'
DRILLING METHOD Hand Cleared		DRILLING RIG Lonestar Drill		BOREHOLE DIAMETER 6"
SAMPLER TYPE(S) AND SIZES (ID) SPT 2"			STP HAMMER TYPE Safety Hammer	HAMMER EFFICIENCY, ERI
BOREHOLE BACKFILL AND COMPLETION Bentonite Chip, 4/19/2020			GROUNDWATER READINGS DURING DRILLING: ND AFTER DRILLING (DATE): ND	TOTAL DEPTH OF BORING 3.0'

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	N/NSG/N1.60	Friction Angle	Calc. Bearing Capacity (psf)	Undrained Shear Strength (psf)	Drilling Method	Casing Depth	Remarks
0	0		Fill: ARTIFICIAL FILL - CLAYEY SAND and GRAVEL with BOULDERS and COBBLES (FILL); light to dark brown; dry to moist; loose to medium dense; CLAY medium to high plasticity; SAND fine to very coarse; GRAVEL < 1.5" dia., angular to subangular; COBBLES and BOULDERS, 12" dia., subangular.												Boulders and RSP
	1														
	2														Hand cleared to 3.0' bgs
	3														Refusal due to boulders @ 3.0'



REPORT TITLE Geotechnical Investigation, Copco Road				HOLE ID BH-FL03	
DIST.	COUNTY Siskiyou	ROUTE	POSTMILE	EA	
PROJECT OR BRIDGE NAME Copco Road at Fall Creek Bridge					
BRIDGE NUMBER NA	PREPARED BY KF		DATE 7/14/2020	SHEET 17	



Copco Road at Dry Creek Bridge Photo 1 – BH-DR02 Sample 2.2 from 8-9.5 ft bgs. #



Copco Road at Dry Creek Bridge Photo 2 – BH-DR03 Sample 3.2 from 8-9.5 ft bgs.



Copco Road at Dry Creek Bridge Photo 3 – BH-DR04 Sample 4.2 from 9.5-11 ft bgs. #



Copco Road at Dry Creek Bridge Photo 4 – BH-DR02 (far cone) location viewed from BH-DR03 looking to the northwest, Copco Road at Dry Creek Bridge in background.



Lakeview Road Bridge Photo 1 – BH-AB01 Sample 1.1 from 7-9.5 ft bgs. #



Lakeview Road Bridge Photo 2 – BH-AB01 Sample 1.2 from 10-11.5 ft bgs.



Lakeview Road Bridge Photo 3 – BH-AB01 Sample 1.3 from 15-16.5 ft bgs. #



Lakeview Road Bridge Photo 4 – BH-AB01 Sample 1.4 from 20-21.5 ft bgs.



Lakeview Road Bridge Photo 5 – BH-AB01 Sample 1.5 from 25-25.25 ft bgs.



Lakeview Road Bridge Photo 6 – BH-AB02 Sample 2.3 from 15-16.5 ft bgs.



Lakeview Road Bridge Photo 7 – BH-AB2 Sample 2.4 from 20-21.5 ft bgs.



Lakeview Road Bridge Photo 8 – BH-AB01 location looking south.



Lakeview Road Bridge Photo 9 – BH-AB02 Location looking southwest.



Scotch Creek Culvert Photo 1 – BH-SC01 Sample 1.1 from 0-1.5 ft bgs. #



Scotch Creek Culvert Photo 2 – BH-SC02 Sample 2.1 from 0-1.5 ft bgs. #



Scotch Creek Culvert Photo 3 – BH-SC02 Sample 2.2 from 3.5-5 ft bgs.



Scotch Creek Culvert Photo 4 – BH-SC02 Sample 2.3 from 6-7.5 ft bgs. #



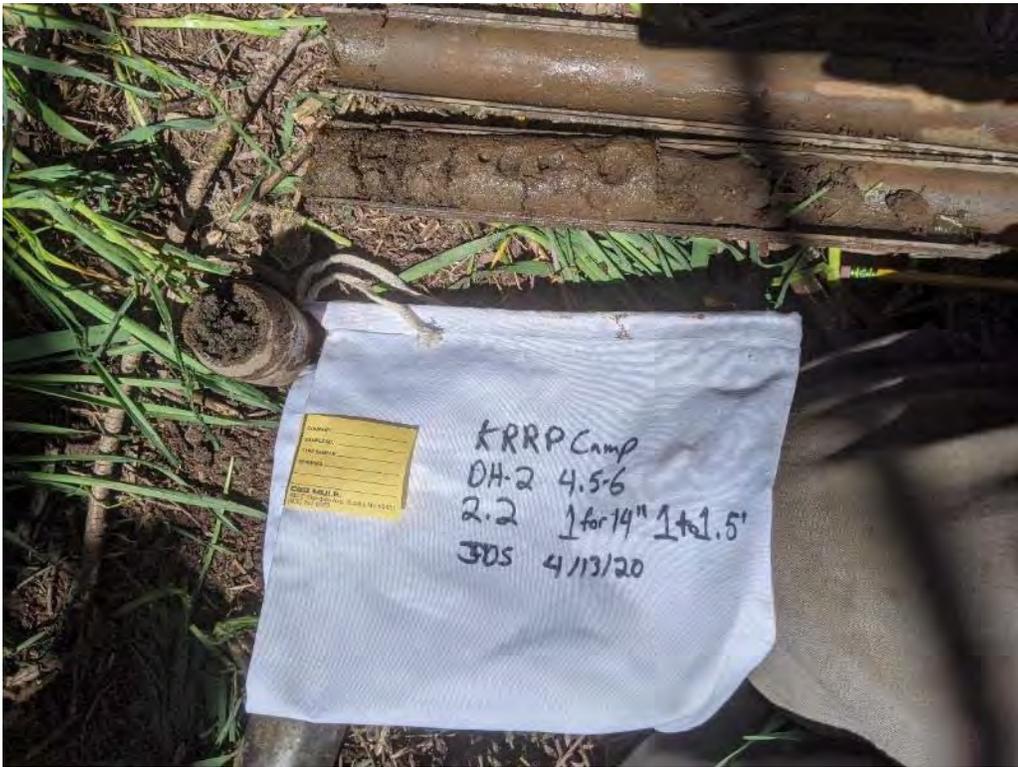
Scotch Creek Culvert Photo 5 – BH-SC01 location looking south.



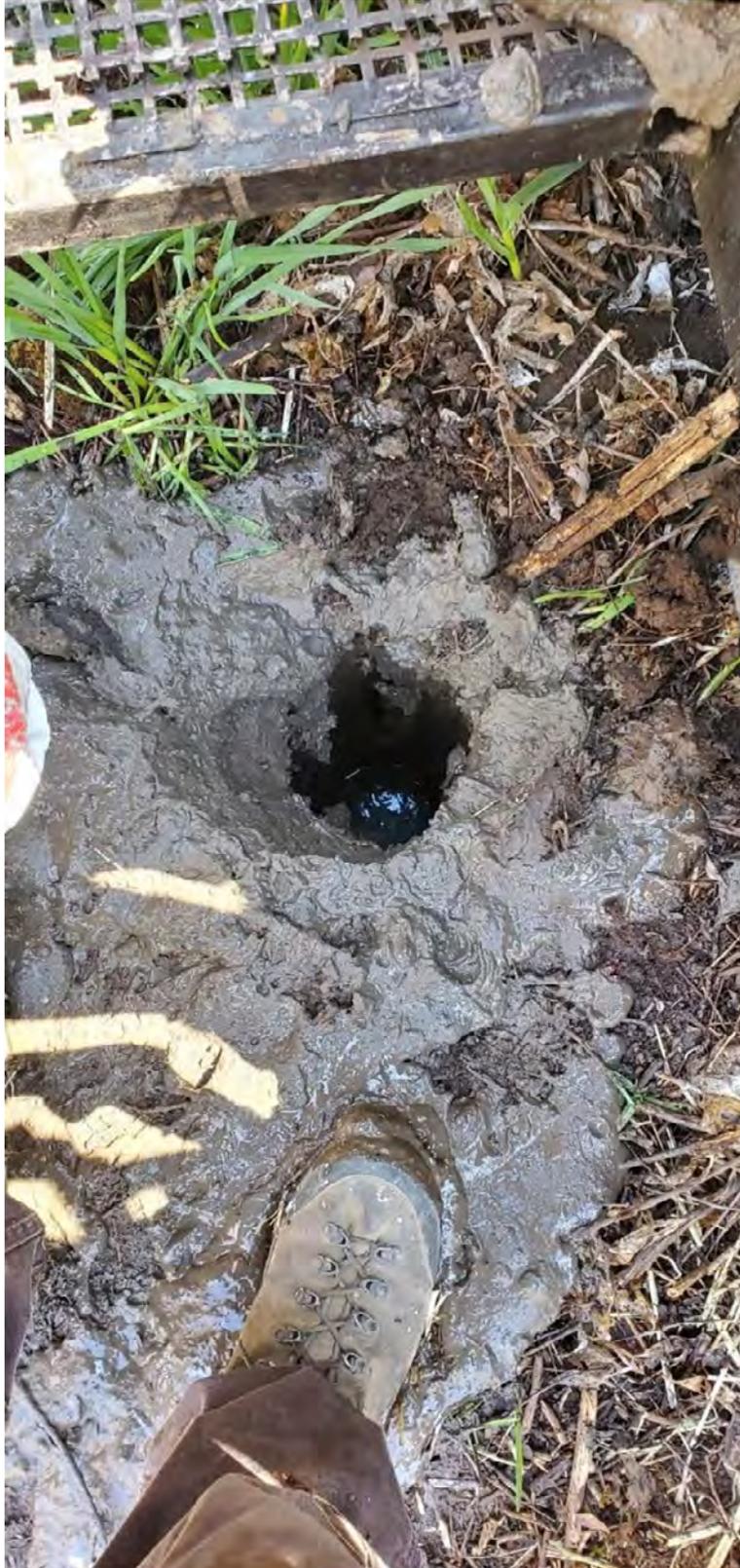
Scotch Creek Culvert Photo 6 – BH-SC02 Location looking southwest.



Camp Creek Culvert Photo 1 – BH-CC01 Sample 1.3 from 7-8.5 ft bgs. #



Camp Creek Culvert Photo 2 – BH-CC02 Sample 2.2 from 4-6 ft bgs. #



Camp Creek Culvert Photo 3 – BH-CC01 immediately after drilling completion, ground water present in borehole.



Camp Creek Culvert Photo 4 – BH-CC02 location looking North East, Camp Creek Culvert to the right of picture frame (not pictured).



Fall Creek at Daggett Road Photo 1 – BH-DG03 looking west. #



Fall Creek at Daggett Road Photo 2 – BH-DG03 looking south.



Fall Creek at Daggett Road Photo 3 – BH-DG04 bulk sample at 5 ft bgs. #



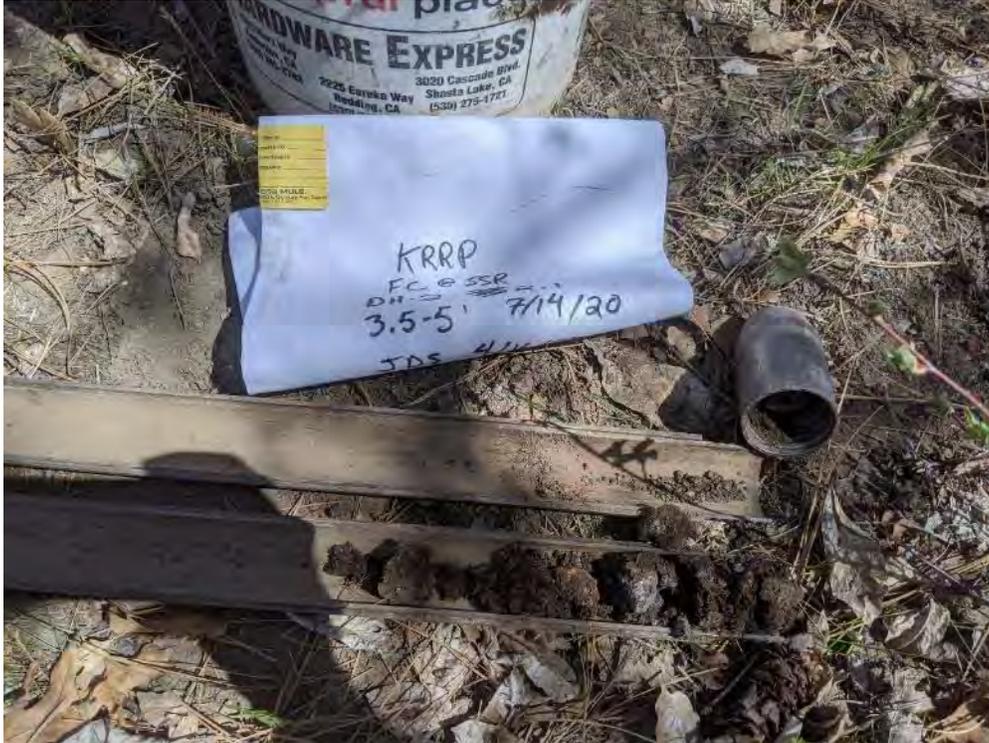
Fall Creek at Daggett Road Photo 4 – BH-DG04 looking south-east.



Fall Creek at Substation Road Photo 1 – BH-DG02 Sample 1.1 from 3.5-5 ft bgs. #



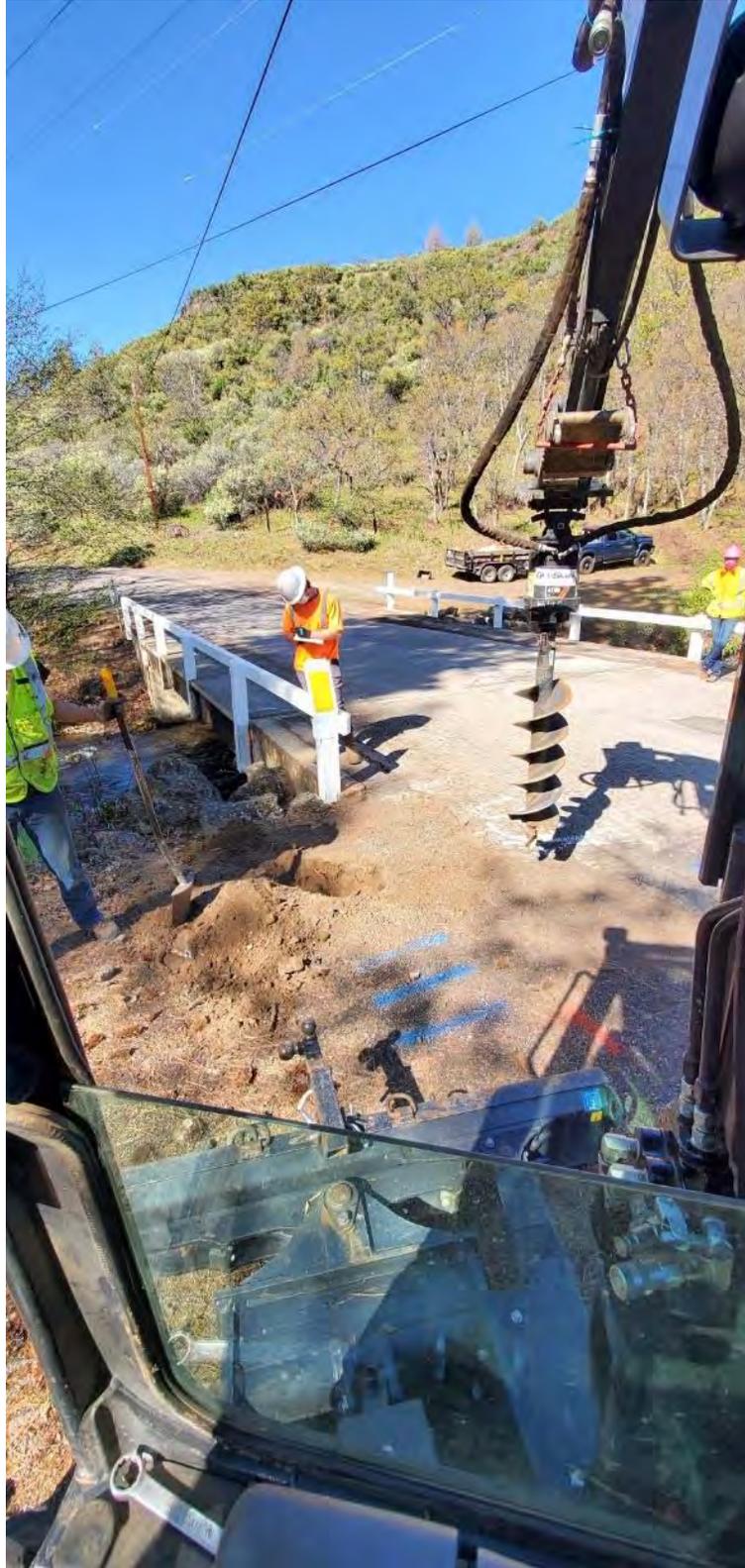
Fall Creek at Substation Road Photo 2 – BH-DG02 Sample 1.3 from 8.5-10 ft bgs.



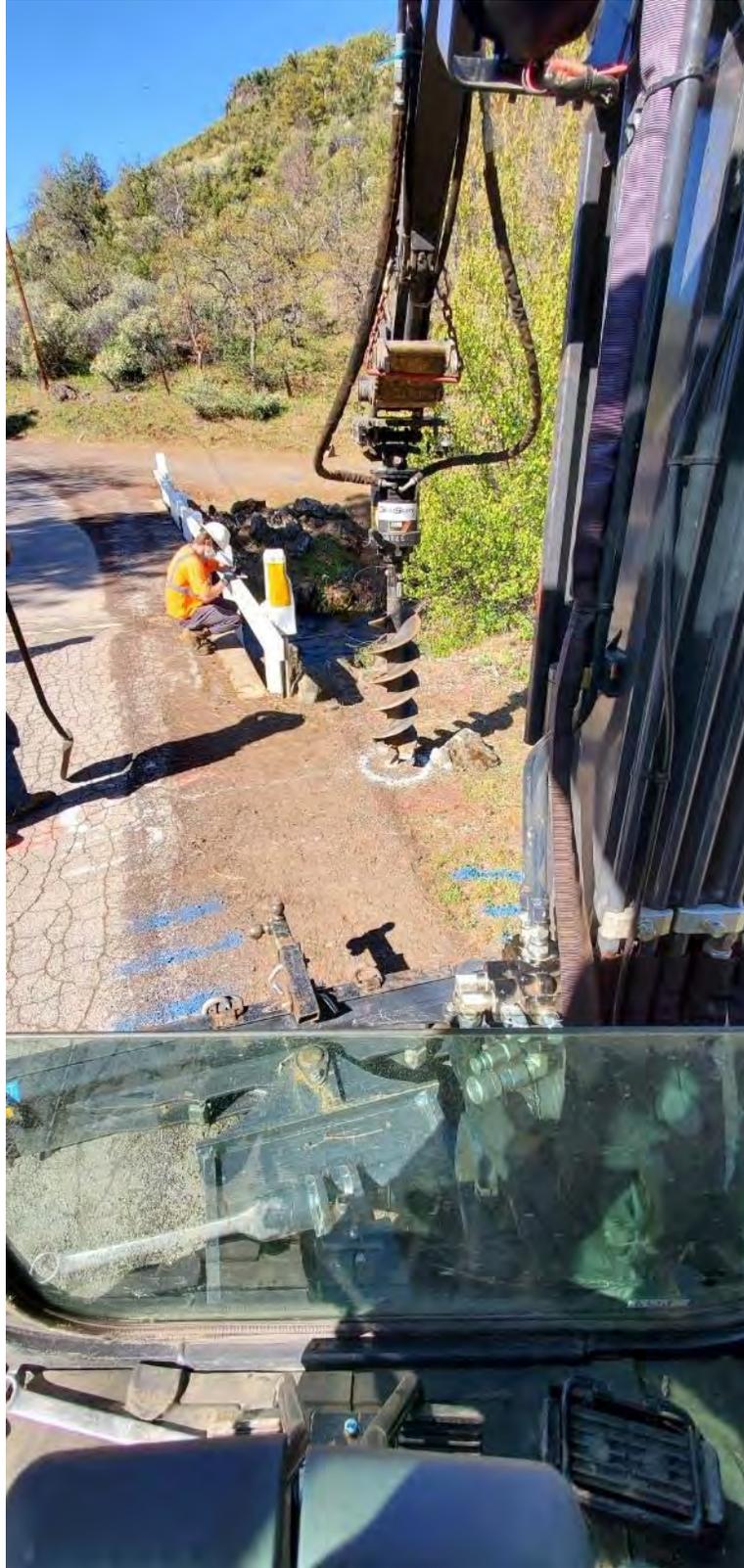
Fall Creek at Substation Road Photo 3 – BH-DG01 Sample 2.1 from 3.5-5 ft bgs. #



Fall Creek at Substation Road Photo 4 – BH-DG01 location in foreground to the left (white circle), BH-FCSSR-01 location at back of drill rig trailer behind stop sign in background, looking west-northwest.



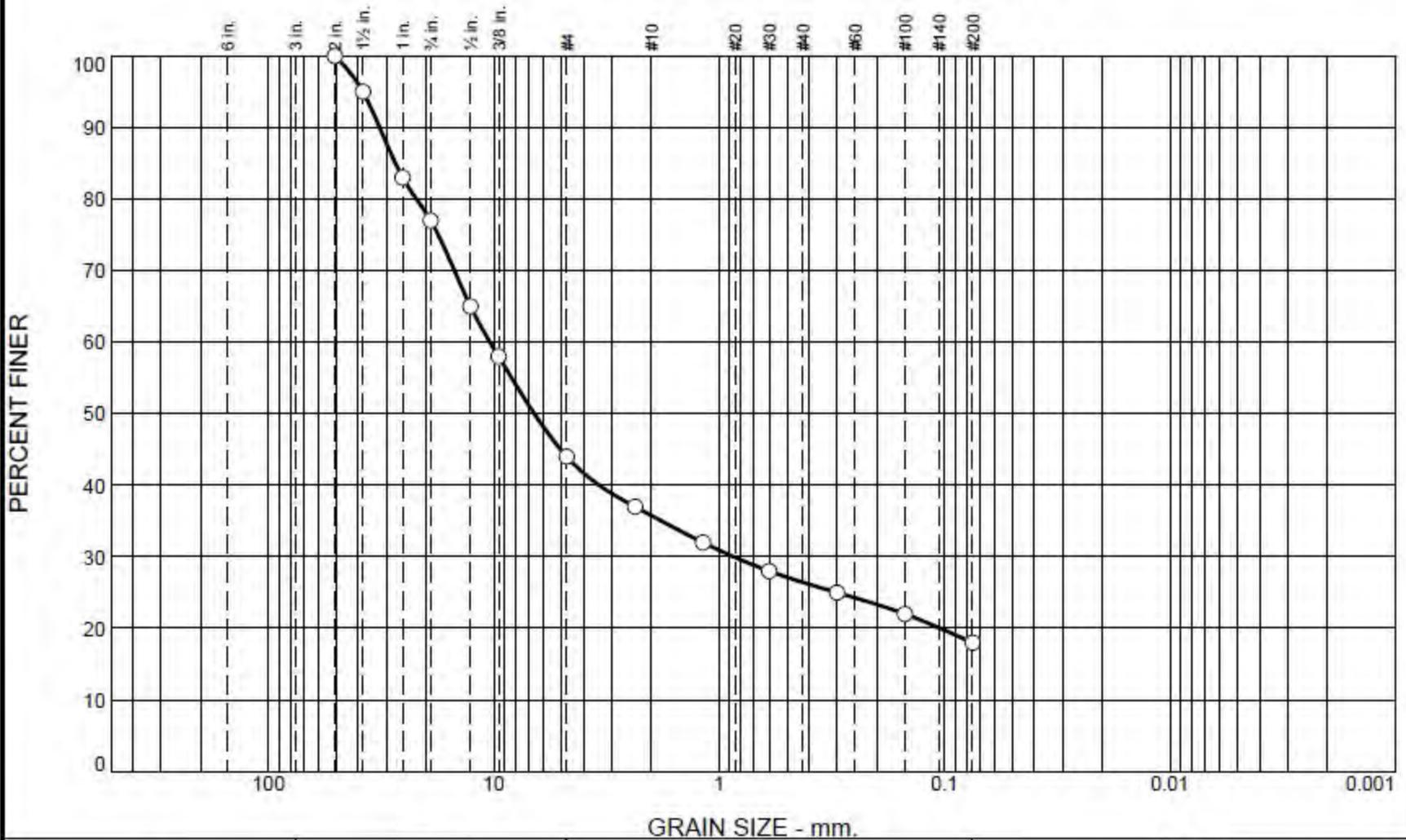
Fall Creek at Copco Road Photo 1 – BH-FC03 in foreground, BH-FC01 and BH-FC02 across the bridge in background on left and right respectively, view is looking west-southwest.



Fall Creek at Copco Road Photo 2 – BH-FC04 in foreground, BH-FC02 across the bridge in background, view is looking west-southwest, Fall Creek upstream to the right.

Particle Size Distribution Report

PRIVILEGED AND CONFIDENTIAL



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	23	33	8	10	8	18	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100		
1 1/2"	95		
1"	83		
3/4"	77		
1/2"	65		
3/8"	58		
#4	44		
#8	37		
#16	32		
#30	28		
#50	25		
#100	22		
#200	18		

Material Description
Dark Brown Clayey Gravel with Sand

Atterberg Limits
PL= 19 LL= 44 PI= 25

Coefficients
 D₉₀= 32.0836 D₈₅= 27.3453 D₆₀= 10.4077
 D₅₀= 6.6082 D₃₀= 0.8621 D₁₅=
 D₁₀= C_u= C_c=

Classification
USCS= GC AASHTO= A-2-7(0)

Remarks
Material tested in accordance with ASTM D6913.

* (no specification provided)

Sample Number: 1

Date: 07/13/2020

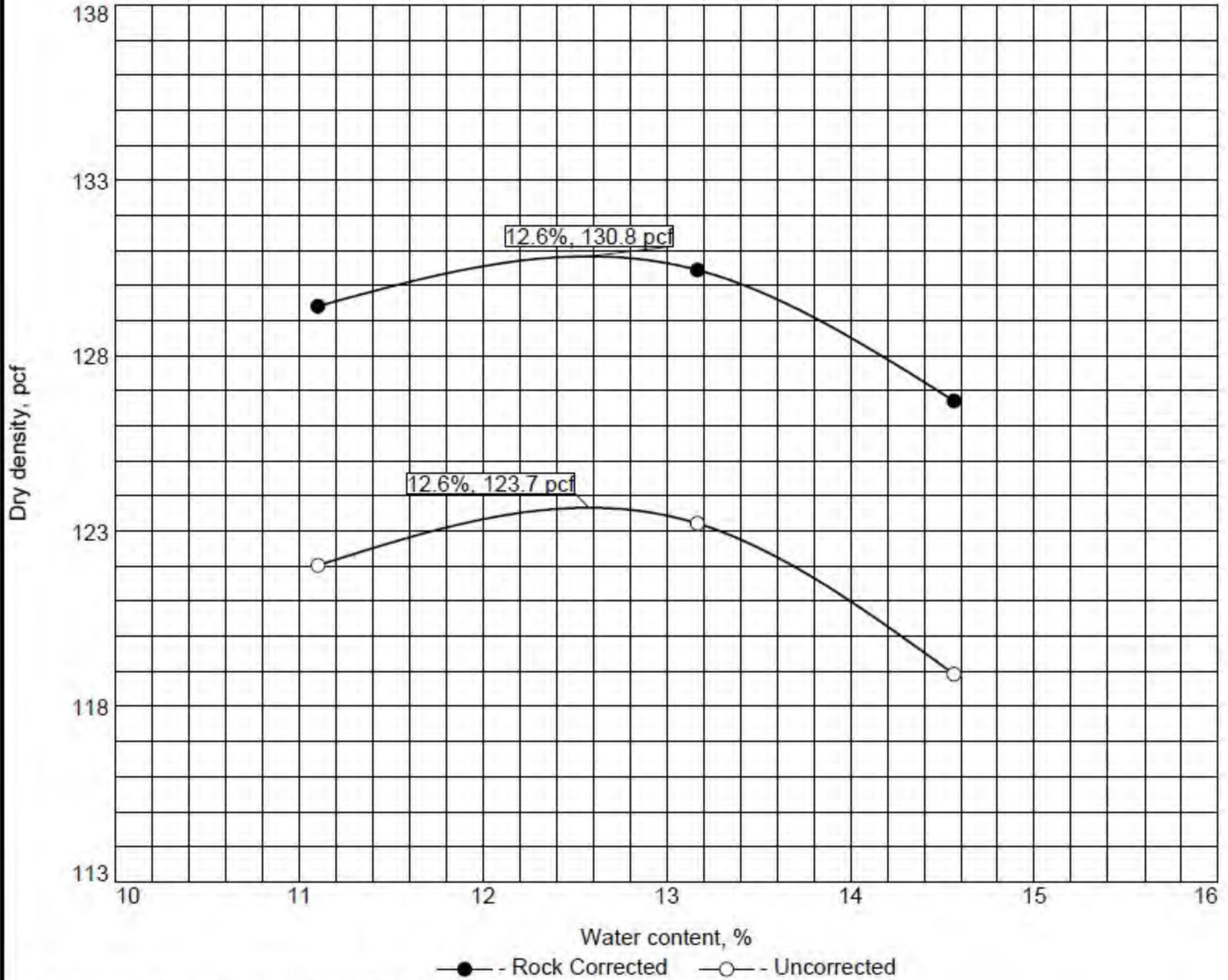


Client: GeoServ, Inc.
 Project: KRRP Dry Creek Site Investigation
 Project No: 3155-025

Figure 0300-001

COMPACTION TEST REPORT

PRIVILEGED AND CONFIDENTIAL



Test specification: ASTM D1557-12 Method C (with uncorrected) Modified
 ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
	GC	A-2-7(0)		2.60	44	25	23	18

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 130.8 pcf Optimum moisture = 12.6 %	Dark Brown Clayey Gravel with Sand

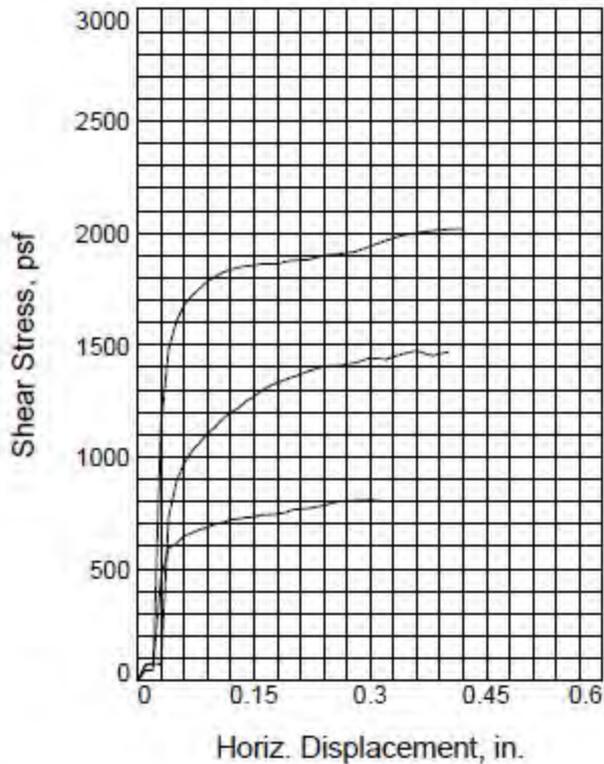
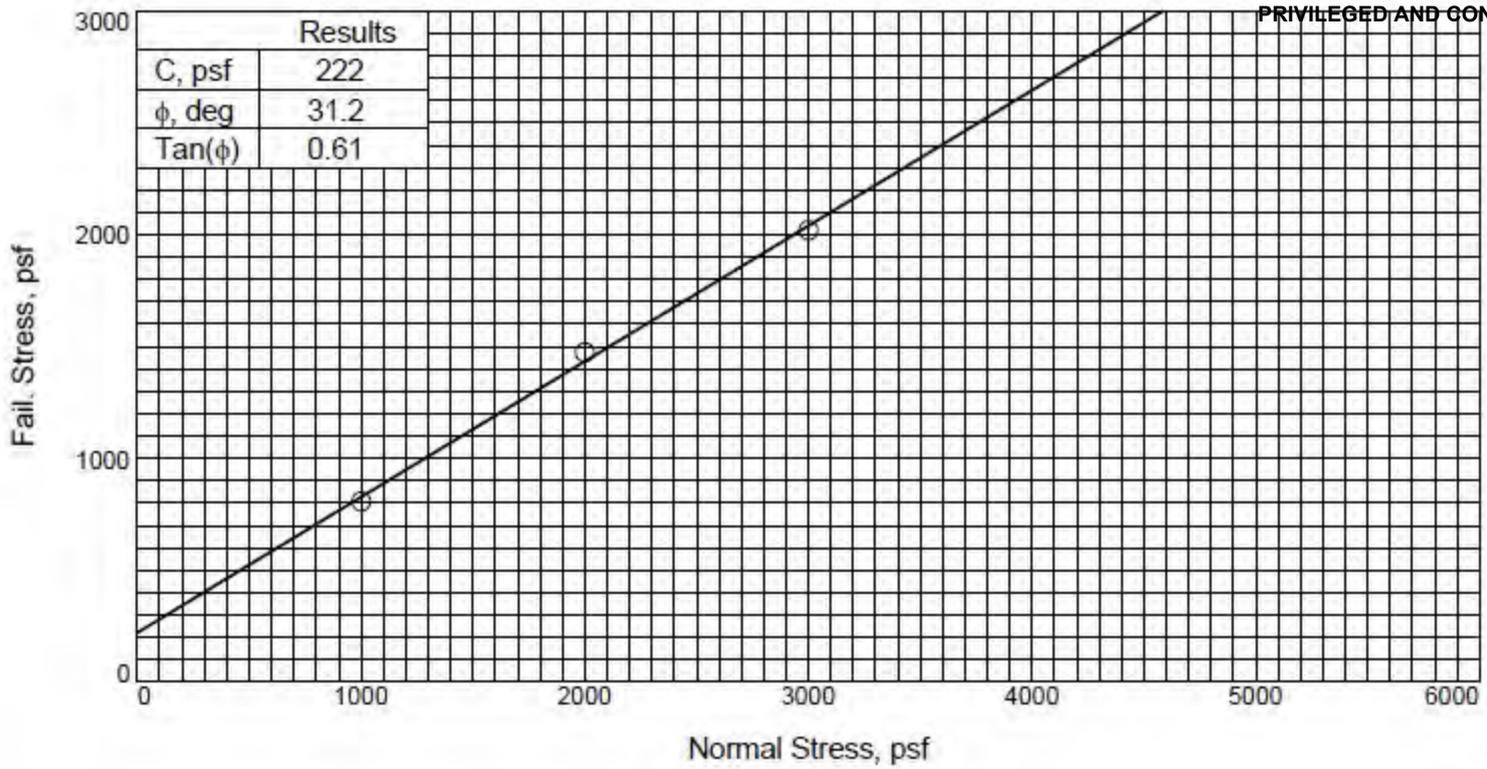
Project No. 3155-025 **Client:** GeoServ, Inc.
Project: KRRP Dry Creek Site Investigation

○ **Sample Number:** 1

Remarks:
 Curve #1
 07/01/2020



Figure 0300-002



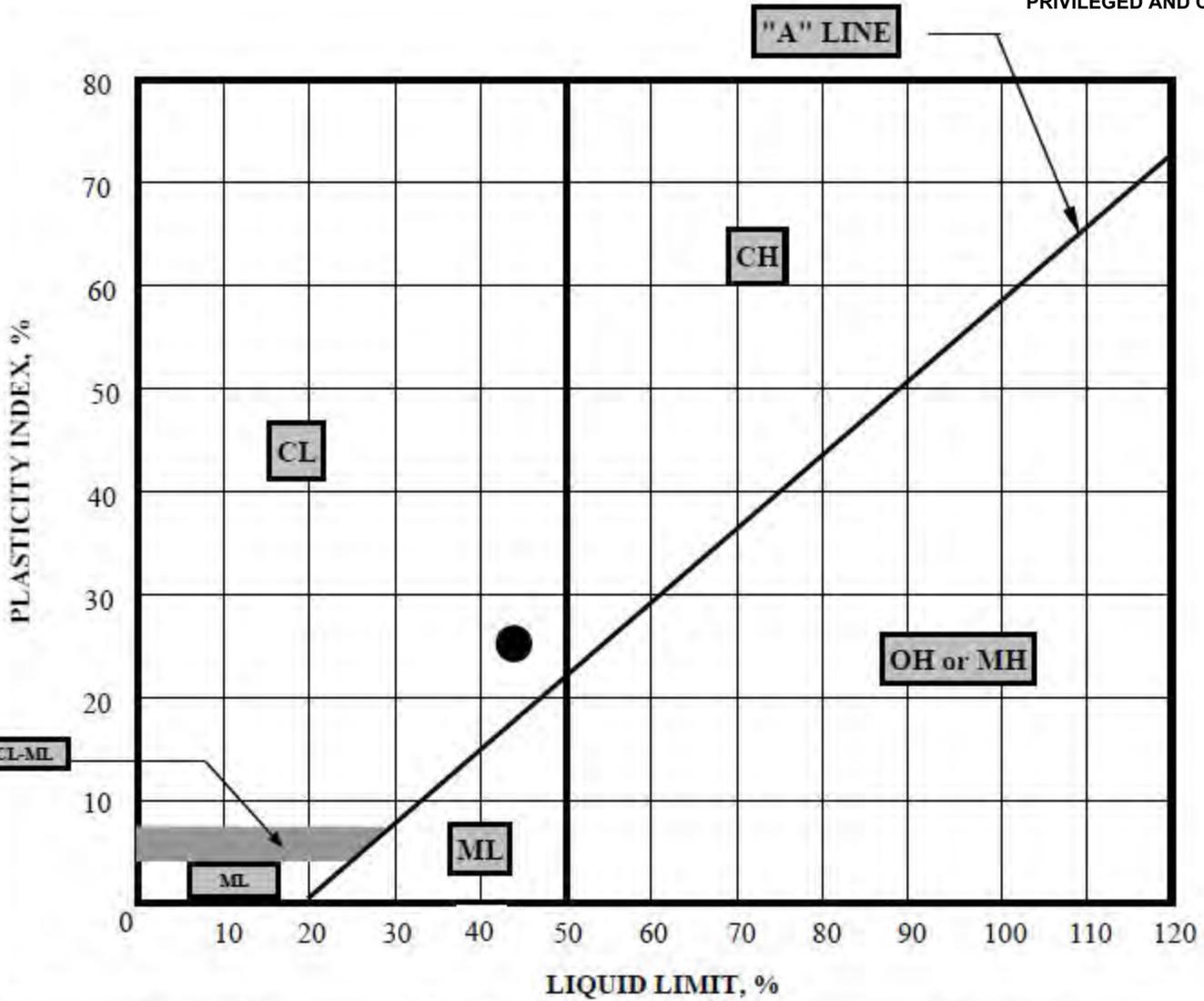
Sample No.		1	2	3
Initial	Water Content, %	17.6	17.6	17.6
	Dry Density, pcf	117.5	117.5	117.5
	Saturation, %	109.3	109.3	109.3
	Void Ratio	0.4348	0.4348	0.4348
	Diameter, in.	2.41	2.41	2.41
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	29.2	26.2	25.6
	Dry Density, pcf	85.2	112.8	113.7
	Saturation, %	80.6	143.1	143.2
	Void Ratio	0.9786	0.4936	0.4826
	Diameter, in.	2.41	2.41	2.41
	Height, in.	1.38	1.04	1.03
Normal Stress, psf		1000	2000	3000
Fail. Stress, psf		808	1474	2020
Displacement, in.		0.30	0.36	0.42
Ult. Stress, psf				
Displacement, in.				
Strain rate, in./min.		0.002	0.002	0.002

Sample Type: Remolded
Description: Dark Brown Clayey Gravel with Sand
 LL= 44 PL= 19 PI= 25
 Specific Gravity= 2.70
Remarks: Material tested in accordance with ASTM D3080. Remolded to 95% Maximum Uncorrected at 5% above Optimum Moisture.

Client: GeoServ, Inc.
Project: KRRP Dry Creek Site Investigation
Sample Number: 1
Proj. No.: 3155-025 **Date Sampled:** 07/13/2020



Figure 0300-003



KEY SYMBOL	SAMPLE NUMBER	DEPTH	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, LL, %	PLASTIC LIMIT, PL, %	PLASTICITY INDEX, PI, %	LIQUIDITY INDEX	UNIFIED SOIL CLASSIFICATION SYMBOL
●	1	—	N/A	44	19	25	N/A	GC

Note: Atterberg Limits tested in accordance with ASTM D4318.



Materials Testing, Inc.

PLASTICITY CHART AND DATA

KRRP Dry Creek Site Investigation

Project No:

3155-025

Date:

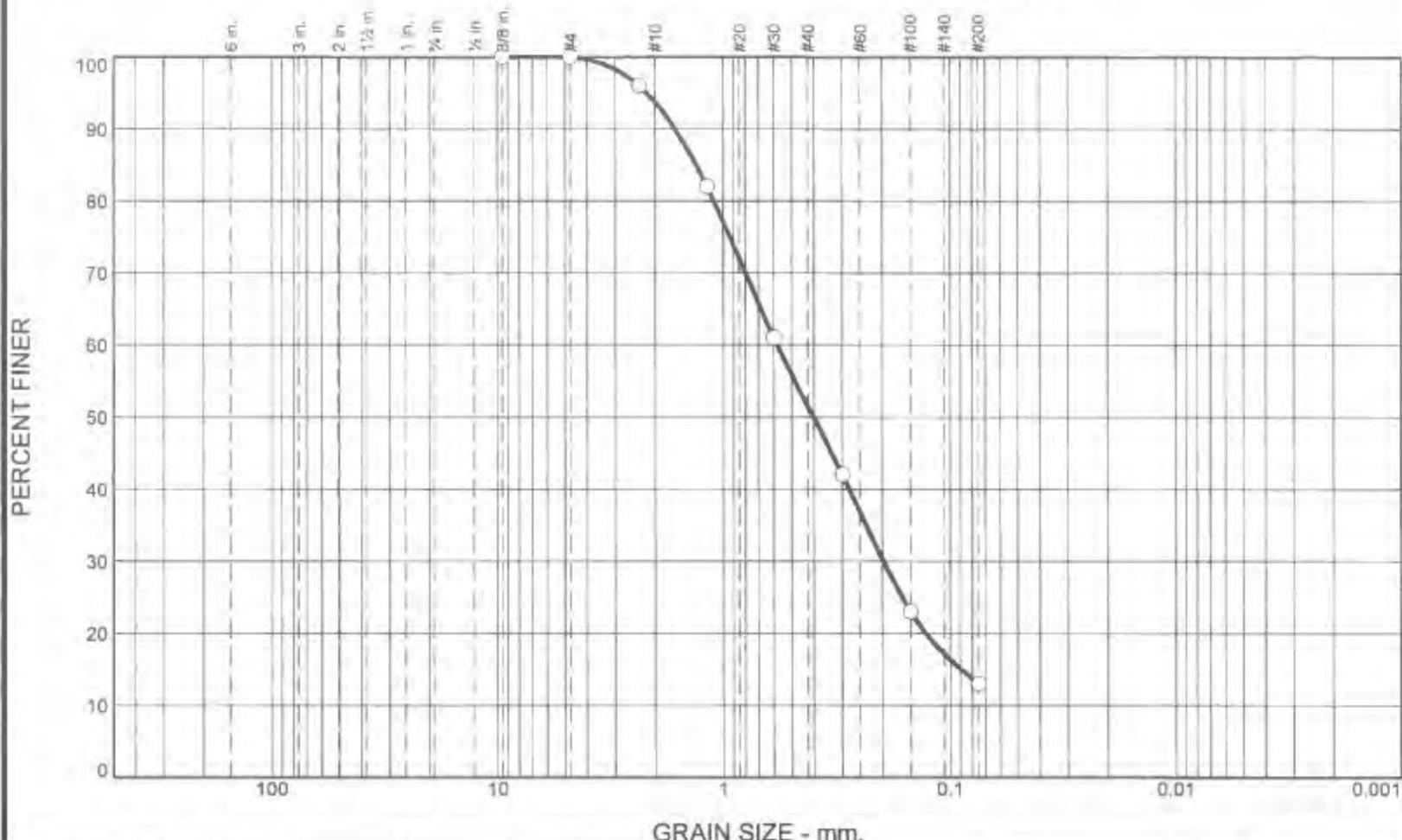
7/13/2020

Figure No:

0300-004

Particle Size Distribution Report

PRIVILEGED AND CONFIDENTIAL



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	6	43	38	13	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100		
#4	100		
#8	96		
#16	82		
#30	61		
#50	42		
#100	23		
#200	13		

Material Description
Gray Clayey Sand (visual)

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 1.6382 D₈₅= 1.3199 D₆₀= 0.5800
 D₅₀= 0.4030 D₃₀= 0.1982 D₁₅= 0.0898
 D₁₀= C_u= C_c=

Classification
 USCS= SC AASHTO=

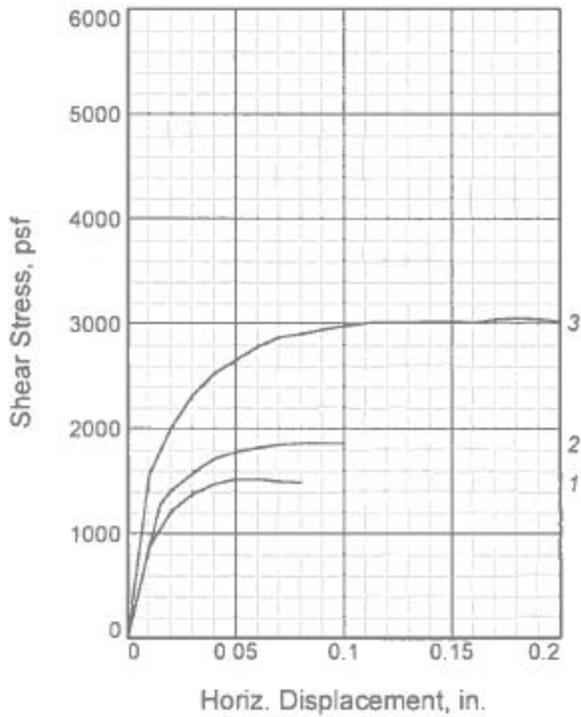
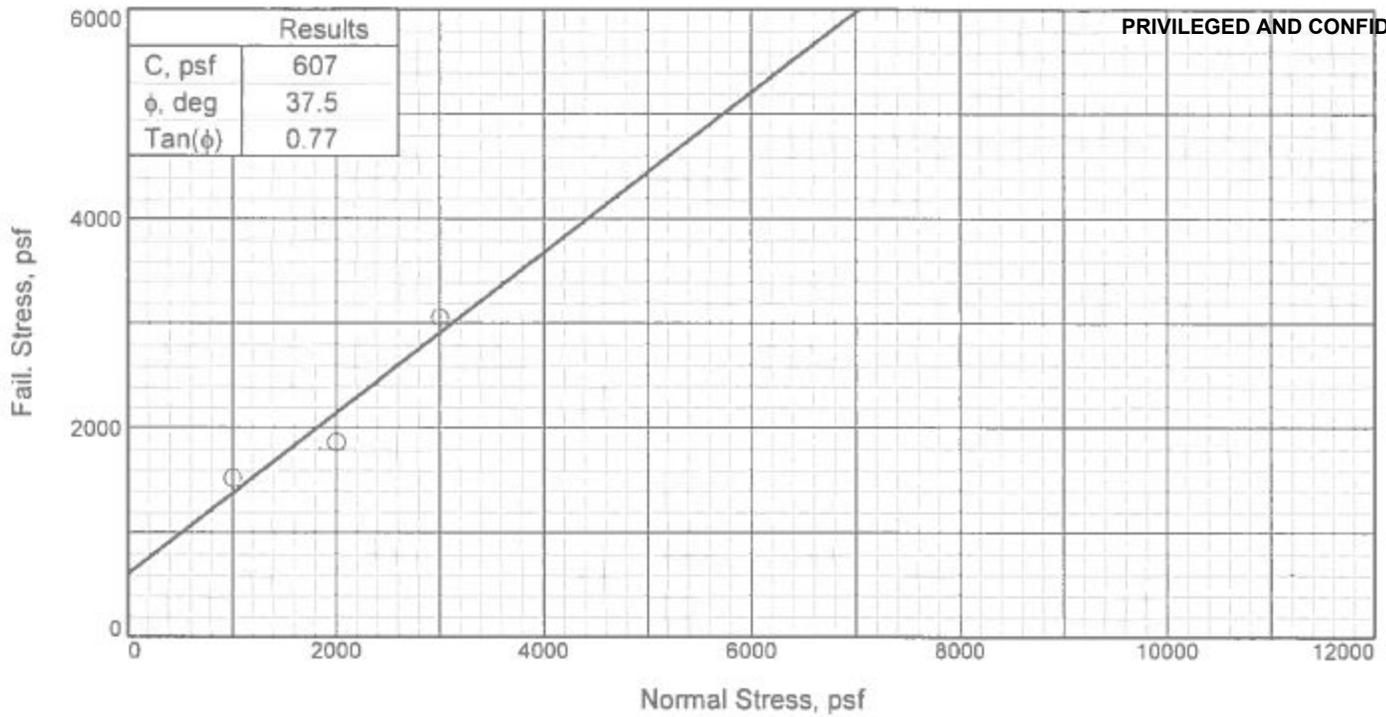
Remarks
 Material tested in accordance with ASTM D6913.

* (no specification provided)

Location: BH-CC-02 Sample Number: 2 Depth: 7.0' - 20.0' Date: 05/29/2020



Client: GeoServ, Inc.
 Project: KRRP Camp Creek Site Investigation
 Project No: 3155-023 Figure 0300-002



Sample No.	1	2	3	
Initial	Water Content, %	15.0	15.0	15.0
	Dry Density, pcf	90.0	90.0	90.0
	Saturation, %	44.2	44.2	44.2
	Void Ratio	0.9566	0.9566	0.9566
	Diameter, in.	1.94	1.94	1.94
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	26.2	28.4	26.8
	Dry Density, pcf	87.8	86.8	87.7
	Saturation, %	73.6	77.8	75.1
	Void Ratio	1.0043	1.0272	1.0063
	Diameter, in.	1.94	1.94	1.94
	Height, in.	1.02	1.04	1.03
Normal Stress, psf	1000	2000	3000	
Fail. Stress, psf	1515	1861	3050	
Displacement, in.	0.05	0.09	0.18	
Ult. Stress, psf				
Displacement, in.				
Strain rate, in./min.	0.002	0.002	0.002	

Sample Type: Remold
Description: Brown Sand with Clay (visual)

Specific Gravity= 2.82
Remarks: Material tested in accordance with ASTM D3080.
 Remolded to 90 p.c.f. @ 15% Moisture.

Figure 0300-003

Client: GeoServ, Inc.

Project: KRRP Camp Creek Site Investigation

Location: BH-CC-01

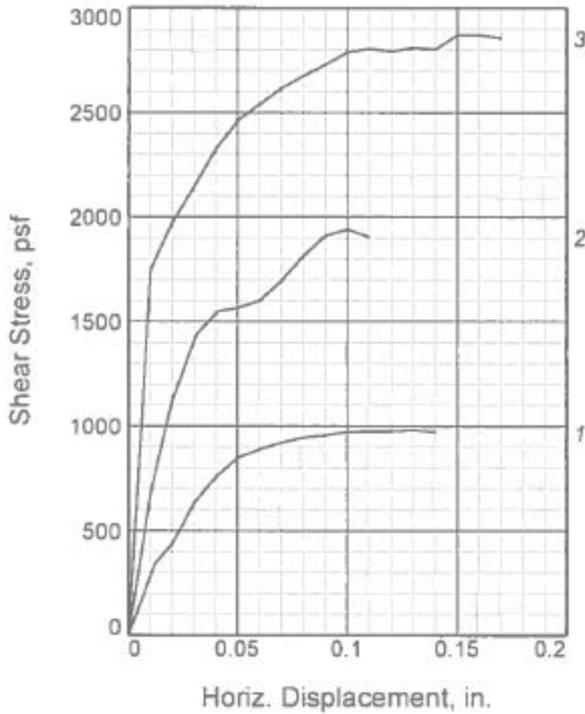
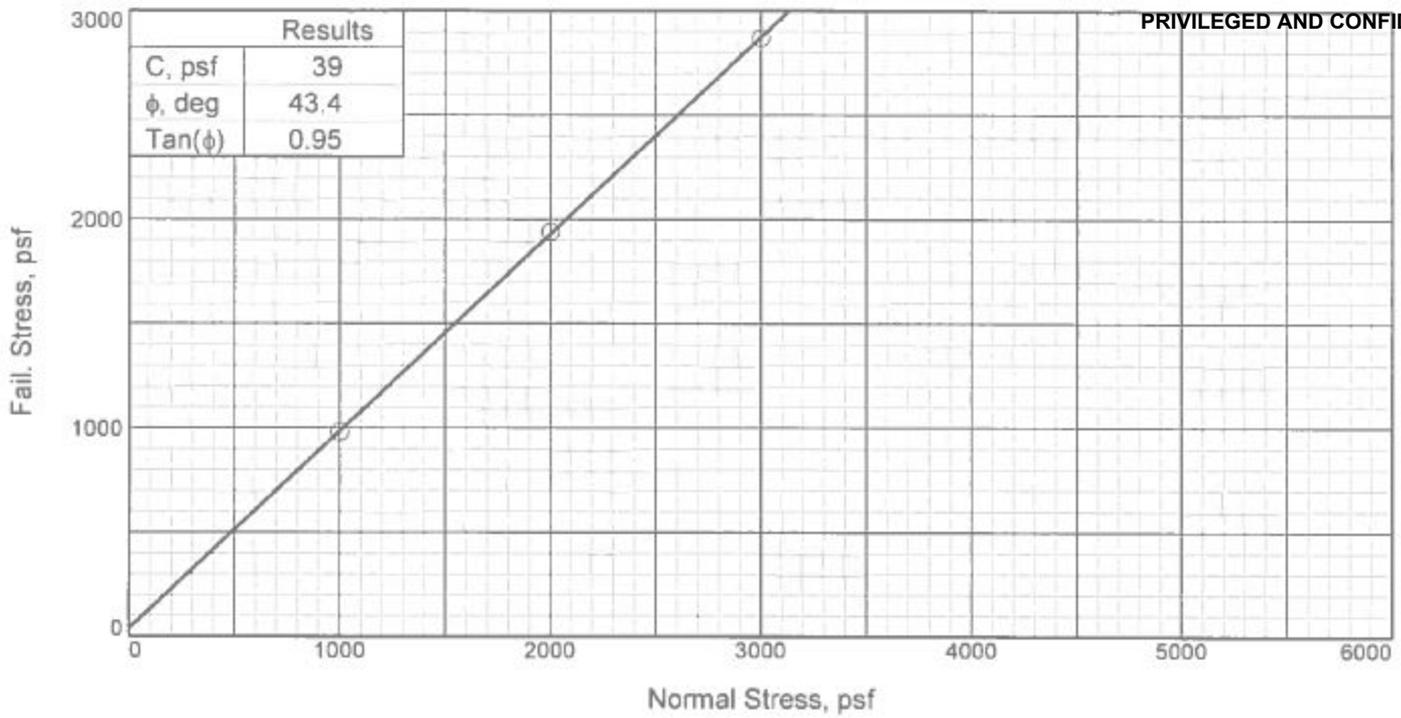
Sample Number: 1

Depth: 7.0' - 20.0'

Proj. No.: 3155-023

Date Sampled: 05/29/2020





Sample No.	1	2	3
Initial			
Water Content, %	15.0	15.0	15.0
Dry Density, pcf	90.0	90.0	90.0
Saturation, %	46.2	46.2	46.2
Void Ratio	0.8803	0.8803	0.8803
Diameter, in.	1.94	1.94	1.94
Height, in.	1.00	1.00	1.00
At Test			
Water Content, %	26.4	24.6	25.8
Dry Density, pcf	87.4	88.3	88.4
Saturation, %	76.6	72.8	76.4
Void Ratio	0.9356	0.9169	0.9145
Diameter, in.	1.94	1.94	1.94
Height, in.	1.03	1.02	1.02
Normal Stress, psf	1000	2000	3000
Fail. Stress, psf	979	1939	2869
Displacement, in.	0.13	0.10	0.15
Ult. Stress, psf			
Displacement, in.			
Strain rate, in./min.	0.002	0.002	0.002

Sample Type: Remold
Description: Gray Clayey Sand (visual)

Specific Gravity= 2.71
Remarks: Material tested in accordance with ASTM D3080.
 Remolded to 90 p.c.f. @ 15% Moisture.

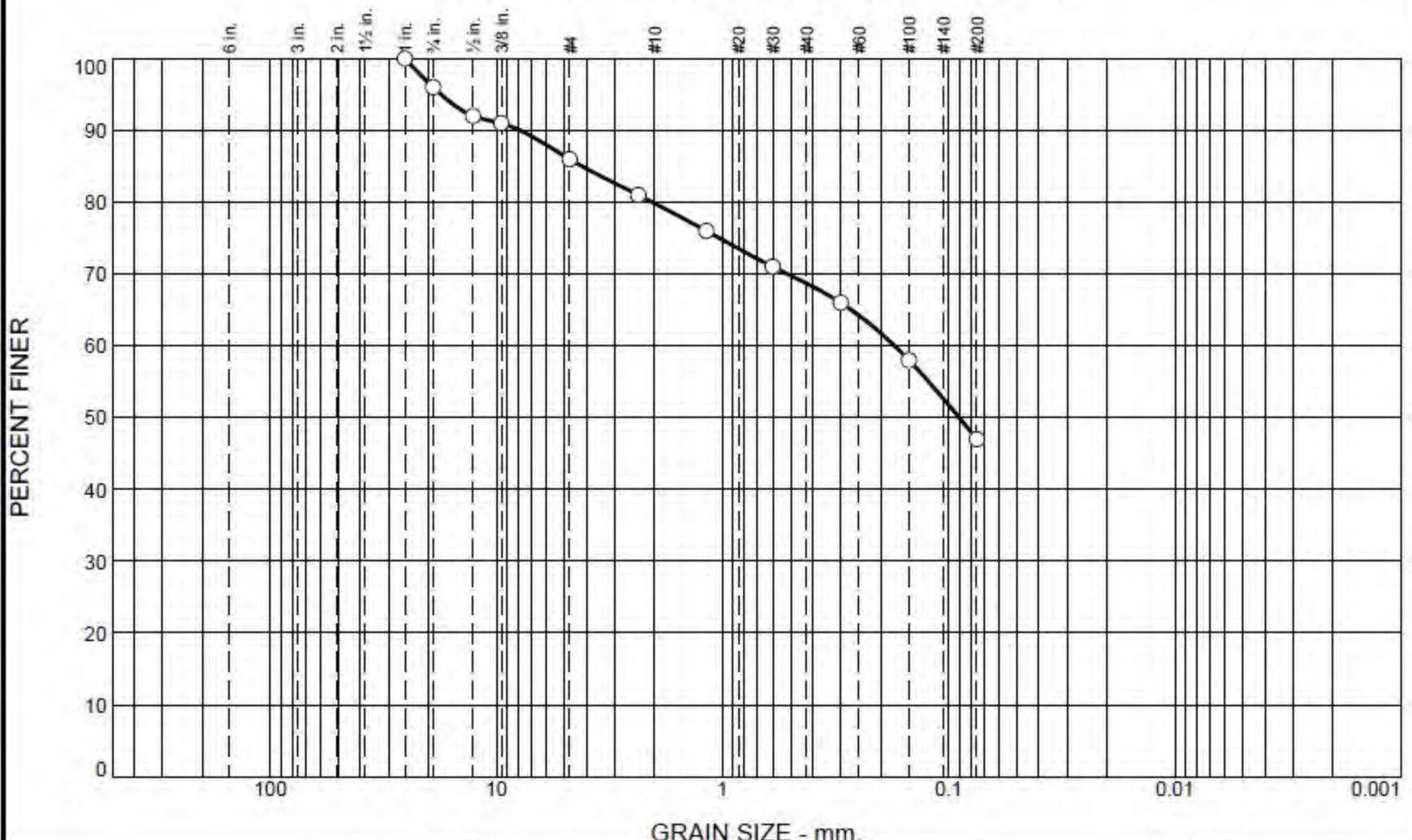
Figure 0300-004

Client: GeoServ, Inc.
Project: KRRP Camp Creek Site Investigation
Location: BH-CC-02
Sample Number: 2 **Depth:** 7.0' - 20.0'
Proj. No.: 3155-023 **Date Sampled:** 05/29/2020



Particle Size Distribution Report

PRIVILEGED AND CONFIDENTIAL



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	10	6	11	22	47	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	96		
1/2"	92		
3/8"	91		
#4	86		
#8	81		
#16	76		
#30	71		
#50	66		
#100	58		
#200	47		

Material Description

Brown Clayey Sand

Atterberg Limits
 PL= 21 LL= 67 PI= 46

Coefficients
 D₉₀= 7.8598 D₈₅= 4.1801 D₆₀= 0.1737
 D₅₀= 0.0898 D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SC AASHTO= A-7-6(16)

Remarks
 Material testd in accordance with ASTM D6913.

* (no specification provided)

Sample Number: 1

Date: 07/09/2020

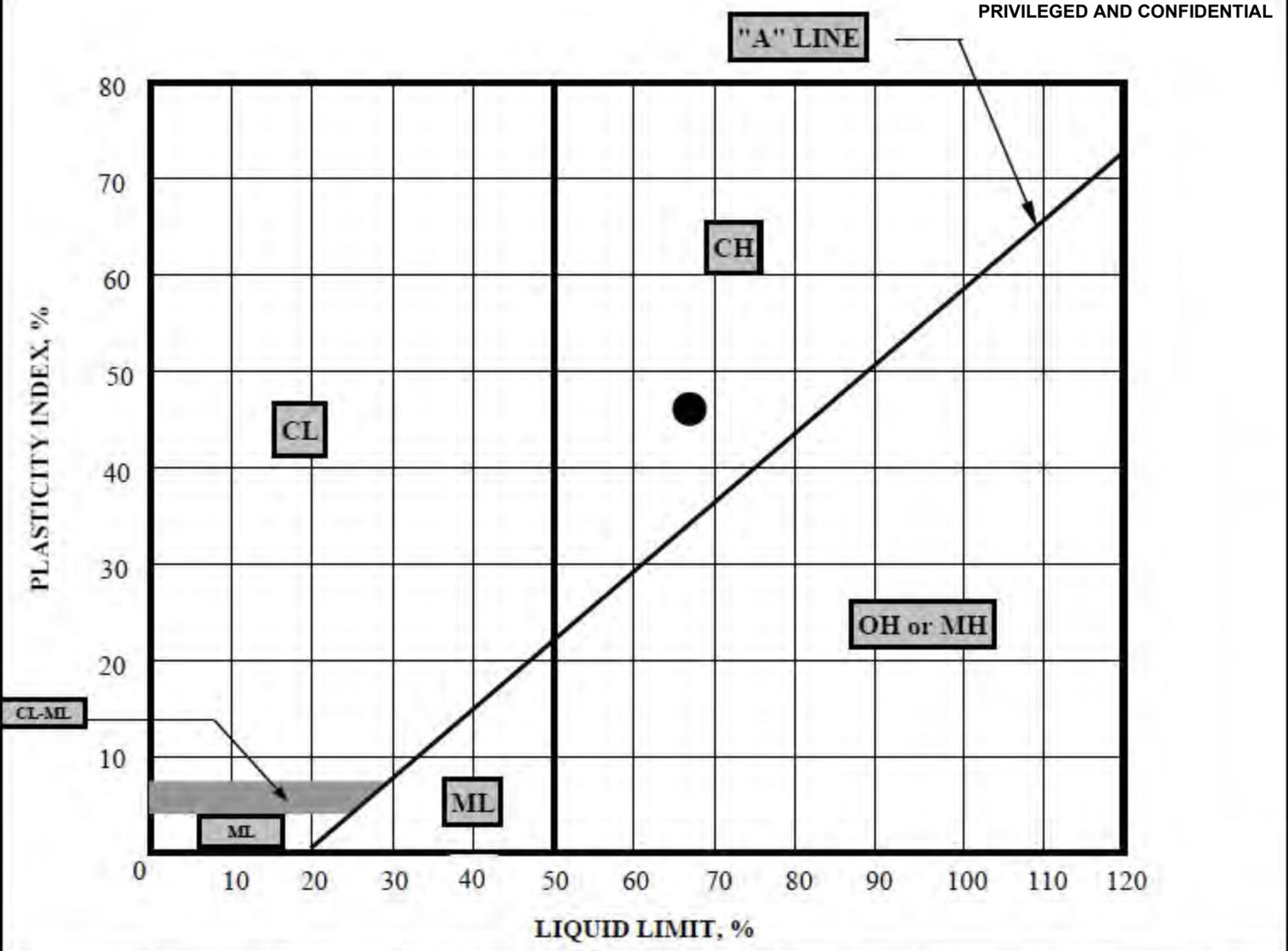


Client: GeoServ, Inc.
 Project: KRRP Fall Creek at Daggett Road Site Investigation

Project No: 3155-026

Figure 0300-001

Tested By: John Hubbard



KEY SYMBOL	SAMPLE NUMBER	DEPTH	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, LL, %	PLASTIC LIMIT, PL, %	PLASTICITY INDEX, PI, %	LIQUIDITY INDEX	UNIFIED SOIL CLASSIFICATION SYMBOL
●	1	---	N/A	67	21	46	N/A	SC

Note: Atterberg Limits tested in accordance with ASTM D4318.



Materials Testing, Inc.

PLASTICITY CHART AND DATA

KRRP Fall Creek @ Daggett Road
Site Investigation

Project No:	Date:	Figure No:
3155-026	7/9/2020	0300-002