



## LEGEND

### Geologic Formations



**Alluvium (Recent)** - alluvial materials (sand, silt, clay); valley fill.



**Undivided Marine Sedimentary Rocks (Cretaceous)** - sandstone, shale, and conglomerate.



**Franciscan Volcanic and Metavolcanic Rocks (Jurassic-Cretaceous)** - greenstone of the Franciscan Formation



**CONTACT**  
(Dashed where approximately located, gradational or inferred)



**FAULT**  
(Dashed where approximately located)



NORTH

#### Map Source:

Jennings, C.W. and Strand, R.G., 1960, *Geologic Map of California, Ukiah Sheet*, California Division of Mines and Geology, Scale 1:250,000



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**GEOTECHNICAL INVESTIGATION**  
**PINE RIDGE ROAD (CR 220)**  
**FAILURE AT MP 4.52**

UKIAH, MENDOCINO COUNTY, CA

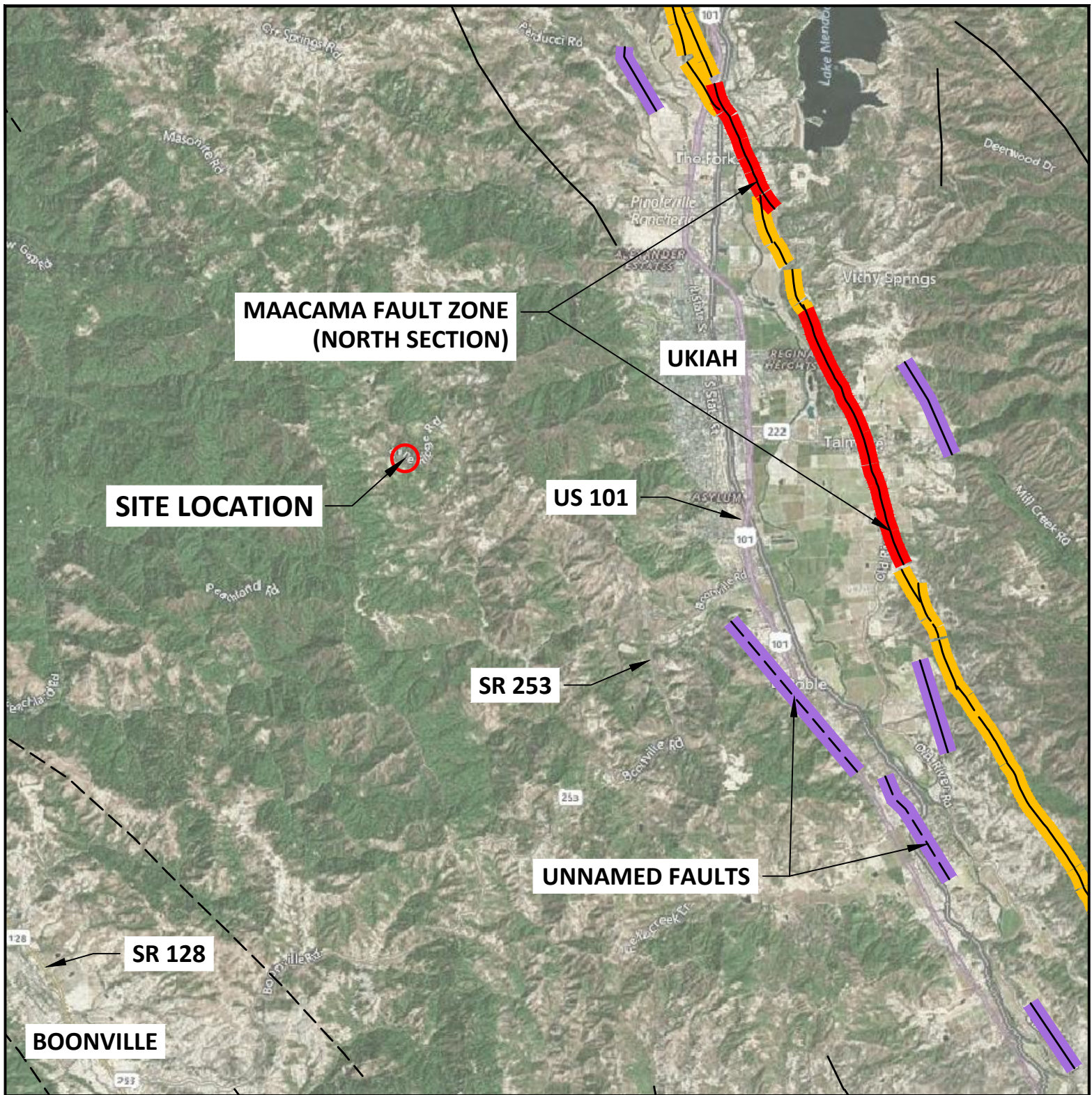
#### Figure 3

Regional  
Geologic Map

Prj. No: 16-337.11

Scale: 1" = 10,000'

Date: 05/11/2018



## LEGEND

### CGS Faults (Last Activity Age)

- <200 years (Historic)
- <11,700 years (Holocene)
- <700,000 years (Late Quaternary)

### CGS Faults (Last Activity Age)

- <1.6 million years (Quaternary)
- >1.6 million years (Pre-Quaternary)

### Fault Location

- Certain
- Approx. or Inferred
- Concealed



NORTH

### Map and Data Sources:

1. Basemap via AutoCAD Civil 3D geolocation tool
2. Fault data via CGS Fault Activity Map of California 2010 GIS data



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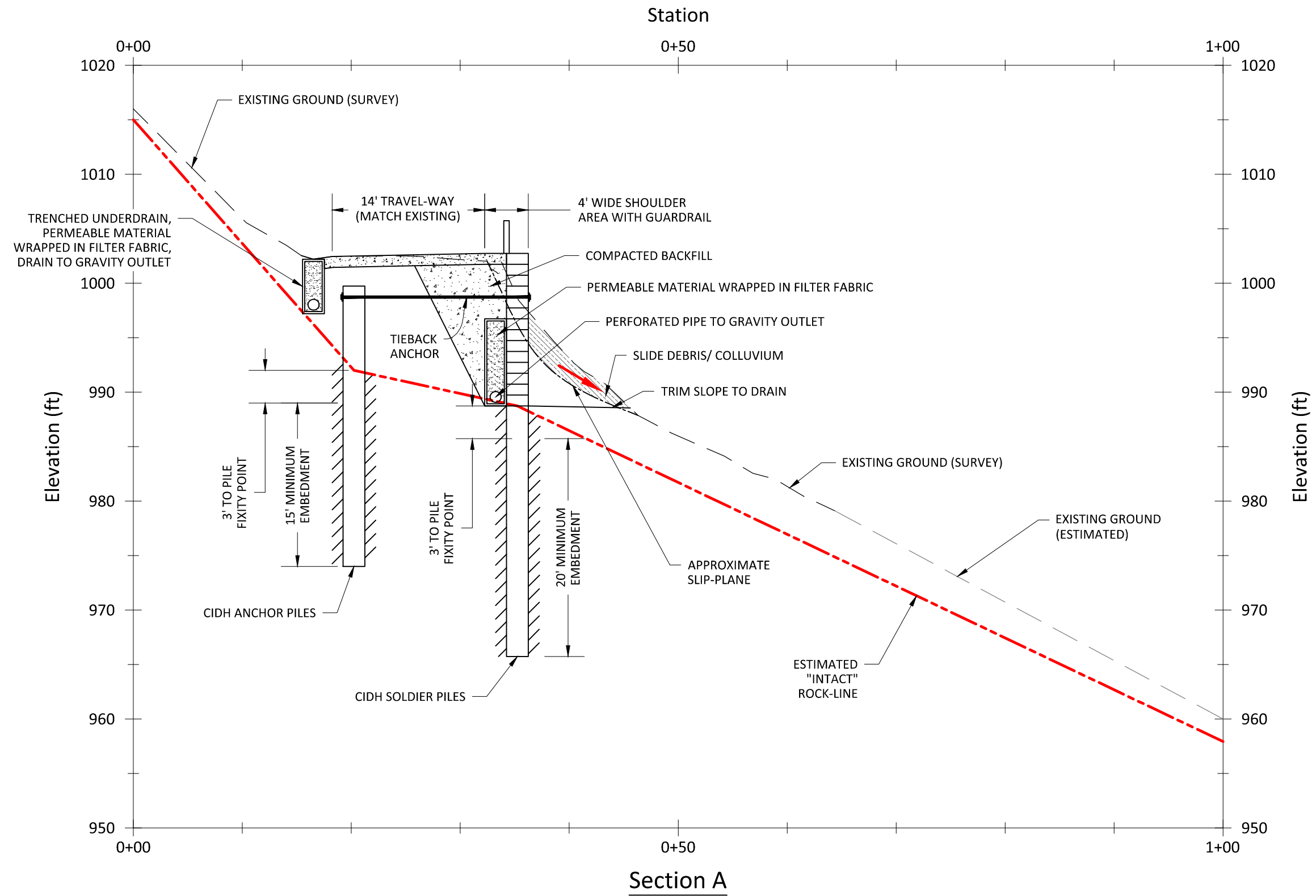
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**Figure 4**  
**Fault Activity**  
**Map**

Prj. No: 16-337.11  
Scale: 1" = 10,000'  
Date: 05/11/2018



NORTH

**Data Source:**  
Topographic data provided by MCDOT via electronic transfer on 10/31/2017. Survey completed by MCDOT.

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**Figure 5**  
Typical Section of a Soldier Pile Tieback Wall  
Prj. No: 16-337.11  
Scale: 1" = 10'  
Date: 09/10/2018

**APPENDIX A**

**BORING LOGS LEGEND**

**BORING LOGS**

| GROUP SYMBOLS AND NAMES |       |  |                  |       |   |
|-------------------------|-------|--|------------------|-------|---|
| Graphic / Symbol        |       | Group Names  | Graphic / Symbol |       | Group Names                             |
|                         | GW    | Well-graded GRAVEL   |                  | CL    | Lean CLAY                               |
|                         |       | Well-graded GRAVEL with SAND                                       |                  |       | Lean CLAY with SAND                     |
|                         | GP    | Poorly graded GRAVEL   |                  | CL    | Lean CLAY with GRAVEL                   |
|                         |       | Poorly graded GRAVEL with SAND                                     |                  |       | SANDY lean CLAY                         |
|                         | GW-GM | Well-graded GRAVEL with SILT                                       |                  | CL-ML | SILTY CLAY                              |
|                         |       | Well-graded GRAVEL with SILT and SAND                              |                  |       | SILTY CLAY with SAND                    |
|                         | GW-GC | Well-graded GRAVEL with CLAY (or SILTY CLAY)                       |                  | CL-ML | SILTY CLAY with GRAVEL                  |
|                         |       | Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)     |                  |       | SANDY SILTY CLAY                        |
|                         | GP-GM | Poorly graded GRAVEL with SILT                                     |                  | CL-ML | SANDY SILTY CLAY with GRAVEL            |
|                         |       | Poorly graded GRAVEL with SILT and SAND                            |                  |       | GRAVELLY SILTY CLAY                     |
|                         | GP-GC | Poorly graded GRAVEL with CLAY (or SILTY CLAY)                     |                  | CL-ML | GRAVELLY SILTY CLAY                     |
|                         |       | Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)   |                  |       | GRAVELLY SILTY CLAY with SAND           |
|                         | GM    | SILTY GRAVEL   |                  | ML    | SILT                                    |
|                         |       | SILTY GRAVEL with SAND   |                  |       | SILT with SAND                          |
|                         | GC    | CLAYEY GRAVEL  |                  | ML    | SILT with GRAVEL                        |
|                         |       | CLAYEY GRAVEL with SAND  |                  |       | SANDY SILT                              |
|                         | GC-GM | SILTY, CLAYEY GRAVEL   |                  | ML    | SANDY SILT with GRAVEL                  |
|                         |       | SILTY, CLAYEY GRAVEL with SAND                                     |                  |       | GRAVELLY SILT                           |
|                         | SW    | Well-graded SAND   |                  | ML    | GRAVELLY SILT with SAND                 |
|                         |       | Well-graded SAND with GRAVEL                                       |                  |       |   |
|                         | SP    | Poorly graded SAND   |                  | OL    | ORGANIC lean CLAY                       |
|                         |       | Poorly graded SAND with GRAVEL                                     |                  |       | ORGANIC lean CLAY with SAND             |
|                         | SW-SM | Well-graded SAND with SILT   |                  | OL    | ORGANIC lean CLAY with GRAVEL           |
|                         |       | Well-graded SAND with SILT and GRAVEL                              |                  |       | SANDY ORGANIC lean CLAY                 |
|                         | SW-SC | Well-graded SAND with CLAY (or SILTY CLAY)                         |                  | OL    | SANDY ORGANIC lean CLAY                 |
|                         |       | Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)   |                  |       | SANDY ORGANIC lean CLAY with GRAVEL     |
|                         | SP-SM | Poorly graded SAND with SILT                                       |                  | OL    | GRAVELLY ORGANIC lean CLAY              |
|                         |       | Poorly graded SAND with SILT and GRAVEL                            |                  |       | GRAVELLY ORGANIC lean CLAY with SAND    |
|                         | SP-SC | Poorly graded SAND with CLAY (or SILTY CLAY)                       |                  | MH    | ORGANIC SILT                            |
|                         |       | Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL) |                  |       | ORGANIC SILT with SAND                  |
|                         | SM    | SILTY SAND   |                  | MH    | Elastic SILT                            |
|                         |       | SILTY SAND with GRAVEL   |                  |       | Elastic SILT with SAND                  |
|                         | SC    | CLAYEY SAND  |                  | MH    | SANDY elastic SILT                      |
|                         |       | CLAYEY SAND with GRAVEL  |                  |       | SANDY elastic SILT with GRAVEL          |
|                         | SC-SM | SILTY, CLAYEY SAND   |                  | MH    | GRAVELLY elastic SILT                   |
|                         |       | SILTY, CLAYEY SAND with GRAVEL                                     |                  |       | GRAVELLY elastic SILT with SAND         |
|                         | PT    | PEAT   |                  | OH    | ORGANIC fat CLAY                        |
|                         |       |  |                  |       | ORGANIC fat CLAY with SAND              |
|                         |       | COBBLES  |                  | OH    | ORGANIC fat CLAY with GRAVEL            |
|                         |       | COBBLES and BOULDERS   |                  |       | SANDY ORGANIC fat CLAY                  |
|                         |       |  |                  | OH    | GRAVELLY ORGANIC fat CLAY               |
|                         |       |  |                  |       | GRAVELLY ORGANIC fat CLAY with SAND     |
|                         |       |  |                  | OH    | ORGANIC elastic SILT                    |
|                         |       |  |                  |       | ORGANIC elastic SILT with SAND          |
|                         |       |  |                  | OH    | SANDY organic ELASTIC SILT              |
|                         |       |  |                  |       | SANDY ORGANIC elastic SILT with GRAVEL  |
|                         |       |  |                  | OH    | GRAVELLY ORGANIC elastic SILT           |
|                         |       |  |                  |       | GRAVELLY ORGANIC elastic SILT with SAND |
|                         |       |  |                  | OL/OH | ORGANIC SOIL                            |
|                         |       |  |                  |       | ORGANIC SOIL with SAND                  |
|                         |       |  |                  | OL/OH | ORGANIC SOIL with GRAVEL                |
|                         |       |  |                  |       | SANDY ORGANIC SOIL                      |
|                         |       |  |                  | OL/OH | GRAVELLY ORGANIC SOIL                   |
|                         |       |  |                  |       | GRAVELLY ORGANIC SOIL with SAND         |

| FIELD AND LABORATORY TESTS |  |
|----------------------------|--|
| C                          | Consolidation (ASTM D 2435)  |
| CL                         | Collapse Potential (ASTM D 4546)   |
| CP                         | Compaction Curve (CTM 216)   |
| CR                         | Corrosion, Sulfates, Chlorides (CTM 643, CTM 417, CTM 422)               |
| CU                         | Consolidated Undrained Triaxial (ASTM D 4767)                            |
| DR                         | Drained Residual Shear Strength (ASTM D 6467)                            |
| DS                         | Direct Shear (ASTM D 3080)   |
| EI                         | Expansion Index (ASTM D 4829)  |
| M                          | Moisture Content (ASTM D 2216)   |
| OC                         | Organic Content (ASTM D 2974)  |
| P                          | Permeability (CTM 220)   |
| PA                         | Particle Size Analysis (ASTM D 422)                                      |
| PI                         | Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90) |
| PL                         | Point Load Index (ASTM D 5731)   |
| PM                         | Pressure Meter   |
| R                          | R-Value (CTM 301)  |
| SE                         | Sand Equivalent (CTM 217)  |
| SG                         | Specific Gravity (AASHTO T 100)  |
| SW                         | Swell Potential (ASTM D 4546)  |
| UC                         | Unconfined Compression - Soil (ASTM D 2166)                              |
|                            | Unconfined Compression - Rock (ASTM D 7012-C)                            |
| UU                         | Unconsolidated Undrained Triaxial (ASTM D 2850)                          |
| UW                         | Unit Weight (ASTM D 7263)  |

| SAMPLER GRAPHIC SYMBOLS |  |
|-------------------------|--|
|                         | Standard Penetration Test (SPT)          |
|                         | Standard California Sampler (ID 2.5 in.) |
|                         | Modified California Sampler (ID 2.0 in.) |
|                         | Shelby Tube                              |
|                         | Piston Sampler                           |
|                         | NX Rock Core                             |
|                         | HQ Rock Core                             |
|                         | Bulk Sample                              |
|                         | Other (see remarks)                      |

| DRILLING METHOD SYMBOLS |                             |
|-------------------------|-----------------------------|
|                         | Auger Drilling              |
|                         | Rotary Drilling             |
|                         | Dynamic Cone or Hand Driven |
|                         | Diamond Core                |

| WATER LEVEL SYMBOLS |   |
|---------------------|---|
|                     | First Water Level Reading (during drilling) |
|                     | Static Water Level Reading (short-term)     |
|                     | Static Water Level Reading (long-term)      |

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010) with Errata Sheet (2015).

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010) with Errata Sheet (2015).

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Boring Record Legend

Soil Legend

Sheet 1 of 2

### CONSISTENCY OF COHESIVE SOILS

| Descriptor   | Unconfined Compressive Strength (tsf) | Pocket Penetrometer (tsf) | Torvane (tsf) | Field Approximation   |
|--------------|---------------------------------------|---------------------------|---------------|---|
| Very Soft    | < 0.25                                | < 0.25                    | < 0.12        | Easily penetrated several inches by fist                        |
| Soft         | 0.25 - 0.50                           | 0.25 - 0.50               | 0.12 - 0.25   | Easily penetrated several inches by thumb                       |
| Medium Stiff | 0.50 - 1.0                            | 0.50 - 1.0                | 0.25 - 0.50   | Can be penetrated several inches by thumb with moderate effort  |
| Stiff        | 1.0 - 2.0                             | 1.0 - 2.0                 | 0.50 - 1.0    | Readily indented by thumb but penetrated only with great effort |
| Very Stiff   | 2.0 - 4.0                             | 2.0 - 4.0                 | 1.0 - 2.0     | Readily indented by thumbnail                                   |
| Hard         | > 4.0                                 | > 4.0                     | > 2.0         | Indented by thumbnail with difficulty                           |

### APPARENT DENSITY OF COHESIONLESS SOILS

| Descriptor   | SPT $N_{60}$ (blows / 12 inches) |
|--------------|----------------------------------|
| Very Loose   | 0 - 5                            |
| Loose        | 5 - 10                           |
| Medium Dense | 10 - 30                          |
| Dense        | 30 - 50                          |
| Very Dense   | > 50                             |

### MOISTURE

| Descriptor | Criteria                            |
|------------|-------------------------------------|
| Dry        | No discernable moisture             |
| Moist      | Moisture present, but no free water |
| Wet        | Visible free water                  |

### PERCENT OR PROPORTION OF SOILS

| Descriptor | Criteria   |
|------------|--|
| Trace      | Particles are present but estimated to be less than 5% |
| Few        | 5 to 10%   |
| Little     | 15 to 25%  |
| Some       | 30 to 45%  |
| Mostly     | 50 to 100%   |

### SOIL PARTICLE SIZE

| Descriptor    |        | Size                          |
|---------------|--------|-------------------------------|
| Boulder       |        | > 12 inches                   |
| Cobble        |        | 3 to 12 inches                |
| Gravel        | Coarse | 3/4 inch to 3 inches          |
|               | Fine   | No. 4 Sieve to 3/4 inch       |
| Sand          | Coarse | No. 10 Sieve to No. 4 Sieve   |
|               | Medium | No. 40 Sieve to No. 10 Sieve  |
|               | Fine   | No. 200 Sieve to No. 40 Sieve |
| Silt and Clay |        | Passing No. 200 Sieve         |

### PLASTICITY OF FINE-GRAINED SOILS

| Descriptor | Criteria   |
|------------|--|
| Nonplastic | A 1/8-inch thread cannot be rolled at any water content.   |
| Low        | The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.  |
| Medium     | The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.                                 |
| High       | It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit. |

### CEMENTATION

| Descriptor | Criteria  |
|------------|---|
| Weak       | Crumbles or breaks with handling or little finger pressure. |
| Moderate   | Crumbles or breaks with considerable finger pressure.       |
| Strong     | Will not crumble or break with finger pressure.             |

**REFERENCE:** Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

### ROCK GRAPHIC SYMBOLS



IGNEOUS ROCK



SEDIMENTARY ROCK



METAMORPHIC ROCK

### BEDDING SPACING

| Descriptor          | Thickness or Spacing |
|---------------------|----------------------|
| Massive             | > 10 ft              |
| Very thickly bedded | 3 ft - 10 ft         |
| Thickly bedded      | 1 ft - 3 ft          |
| Moderately bedded   | 4 in - 1 ft          |
| Thinly bedded       | 1 in - 4 in          |
| Very thinly bedded  | 1/4 in - 1 in        |
| Laminated           | < 1/4 in             |

### WEATHERING DESCRIPTORS FOR INTACT ROCK

|                      | Diagnostic Features   |  |   |  |  |   |
|----------------------|---|--|---|--|--|---|
| Descriptor           | Chemical Weathering-Discoloration-Oxidation   |  | Mechanical Weathering and Grain Boundary Conditions                                       | Texture and Solutioning  |  | General Characteristics   |
|                      | Body of Rock  | Fracture Surfaces  |   | Texture  | Solutioning  |   |
| Fresh                | No discoloration, not oxidized  | No discoloration or oxidation  | No separation, intact (tight)   | No change  | No solutioning                                       | Hammer rings when crystalline rocks are struck.   |
| Slightly Weathered   | Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull   | Minor to complete discoloration or oxidation of most surfaces          | No visible separation, intact (tight)   | Preserved  | Minor leaching of some soluble minerals may be noted | Hammer rings when crystalline rocks are struck. Body of rock not weakened.  |
| Moderately Weathered | Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"  | All fracture surfaces are discolored or oxidized                       | Partial separation of boundaries visible  | Generally preserved  | Soluble minerals may be mostly leached               | Hammer does not ring when rock is struck. Body of rock is slightly weakened.  |
| Intensely Weathered  | Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation (refer to grain boundary conditions) | All fracture surfaces are discolored or oxidized; surfaces are friable | Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated | Altered by chemical disintegration such as via hydration or argillation  | Leaching of soluble minerals may be complete         | Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened. |
| Decomposed           | Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay  |  | Complete separation of grain boundaries (disaggregated)                                   | Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete |  | Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".  |

**Note:** Combination descriptors (such as "slightly weathered to fresh") are used where equal distribution of both weathering characteristics is present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, combination descriptors should not be used where significant identifiable zones can be delineated. Only two adjacent descriptors shall be combined. "Very intensely weathered" is the combination descriptor for "decomposed to intensely weathered".

### PERCENT CORE RECOVERY (REC)

$$\frac{\sum \text{Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

### ROCK QUALITY DESIGNATION (RQD)

$$\frac{\sum \text{Length of intact core pieces} > 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100$$

**Note:** RQD\* indicates soundness criteria not met

### ROCK HARDNESS

| Descriptor      | Criteria   |
|-----------------|--|
| Extremely Hard  | Specimen cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows                                     |
| Very hard       | Specimen cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows  |
| Hard            | Specimen can be scratched with pocket knife or sharp pick with heavy pressure; heavy hammer blows required to break specimen                           |
| Moderately Hard | Specimen can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows                           |
| Moderately Soft | Specimen can be grooved 1/16 in. with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure |
| Soft            | Specimen can be grooved or gouged with pocket knife or sharp pick with light pressure, breaks with light to moderate hand pressure                     |
| Very Soft       | Specimen can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light manual pressure.                  |

### FRACTURE DENSITY

| Descriptor               | Criteria                                |
|--------------------------|---|
| Unfractured              | No fractures                            |
| Very Slightly Fractured  | Core lengths greater than 3 ft.         |
| Slightly Fractured       | Core lengths mostly from 1 ft. to 3 ft. |
| Moderately Fractured     | Core lengths mostly from 4 in. to 1 ft. |
| Intensely Fractured      | Core lengths mostly from 1 in. to 4 in. |
| Very Intensely Fractured | Mostly chips and fragments.             |

**REFERENCE:** Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

## LOG OF BORING B1

PROJECT NO: 16.337.11

PROJECT: Pine Ridge Road MP 4.52

LOCATION: Pine Ridge Rd (CR 220), Ukiah

CITY/COUNTY: Mendocino

CLIENT: MCDOT

LOGGED BY: MVG

DEPTH OF BORING: 50.33 (ft)

BEGIN DATE: 3/7/18

COMPLETION DATE: 3/7/18

SURFACE ELEVATION: 1007.9 (ft)\*

SURFACE CONDITION: Dirt/Gravel

WATER DEPTH: 20 (ft)

READING TAKEN: 3/7/18

HAMMER EFFICIENCY: 80 (%)

DRILLING CONTRACTOR: Clear Heart Drilling, Inc.

DRILLING METHOD: Hollow-Stem Auger (6" OD, 2.25" ID)

DRILL RIG: Deeprock - DR5K (Truck)

HAMMER TYPE: Automatic, 140 lbs, 30" drop

SAMPLER TYPE & SIZE: SPT (ID 1.4")

BOREHOLE DIAMETER: 6"

BACKFILL METHOD: Type II-V Portland Cement

| FIELD     |            |        |           |                  |                | GRAPHIC LOG       | DESCRIPTION   | RECOVERY (%) | LABORATORY |              |               |              |                  |                     | REMARKS |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|---|--------------|------------|--------------|---------------|--------------|------------------|---------------------|---------|
| ELEV (ft) | DEPTH (ft) | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |   |              | RQD (%)    | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE |         |
| 1006      | 0          |        | 0         |                  |                |                   | SILTY GRAVEL (GM); light brown; moist; about 60% coarse to fine, subangular to subrounded GRAVEL; about 20% medium to fine SAND; nonplastic to low plasticity fines [FILL]. | 100          |            |              |               |              |                  |                     |         |
| 1004      | 1          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 1002      | 2          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 1000      | 3          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 998       | 4          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 996       | 5          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 994       | 6          |        | 1         | 38               | 98             |                   | SEDIMENTARY ROCK (GRAYWACKE), fine sand, light brown, intensely weathered, moderately hard, (SILTY SAND (SM)) [UNDIVIDED MARINE FORMATION].                                 | 33           |            |              |               |              |                  |                     |         |
| 992       | 7          |        |           | 48               |                |                   |   |              |            |              |               |              |                  |                     |         |
| 990       | 8          |        |           | 50               |                |                   |   |              |            |              |               |              |                  |                     |         |
| 988       | 9          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 986       | 10         |        | 2         | 17               | 68             |                   |   |              |            |              |               |              |                  |                     |         |
| 984       | 11         |        |           | 20               |                |                   |   |              |            |              |               |              |                  |                     |         |
| 982       | 12         |        |           | 48               |                |                   | SEDIMENTARY ROCK (SHALE), poorly lithified, clay, laminated, light brown to dark brown, very intensely weathered, soft.   | 67           |            |              |               |              |                  |                     |         |
| 980       | 13         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 978       | 14         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 976       | 15         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 974       | 16         |        | 3         | 26               | 53             |                   | Partially decomposed; (Lean CLAY (CL), very stiff).   | 67           |            |              |               |              |                  |                     |         |
| 972       | 17         |        |           | 21               |                |                   |   |              |            |              |               |              |                  |                     |         |
| 970       | 18         |        |           | 32               |                | 3.50              |   |              |            |              |               | 8.1          | 97               |                     |         |
| 968       | 19         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 966       | 20         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |
| 964       | 21         |        |           |                  |                |                   | SEDIMENTARY ROCK (GRAYWACKE), fine-grained, yellowish brown, very intensely weathered, (SILTY SAND (SM), dense).  |              |            |              |               |              |                  |                     |         |
| 962       | 22         |        | 4         | 17               | 46             |                   |   |              |            |              |               |              |                  |                     |         |
| 960       | 23         |        |           | 26               |                |                   |   |              |            |              |               |              |                  |                     |         |
| 958       | 24         |        |           | 20               |                | >4.50             |   |              |            |              |               |              |                  |                     |         |
| 956       | 25         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |         |



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PROJECT NUMBER: 16.337.11  
PROJECT: Pine Ridge Road MP 4.52  
BORING: B1  
ENTRY BY: MVG  
CHECKED BY: RRH

SHEET 1 of 2

| ELEV (ft) | DEPTH (ft) | FIELD  |           |                  |                |                   | GRAPHIC LOG | DESCRIPTION   | RECOVERY (%) | LABORATORY |              |               |              |                  |                     |              | REMARKS   |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|-------------|---|--------------|------------|--------------|---------------|--------------|------------------|---------------------|--------------|---|
|           |            | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |             |   |              | RQD (%)    | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE | DRILL METHOD |   |
| 982       | 25         | X      | 5         | 23               | 35             |                   |             | SEDIMENTARY ROCK (Graywacke) (continued).   | 33           |            |              |               |              |                  |                     |              | Chemical Analysis<br>pH = 7.36<br>Min. Res. = 1020 ohm-cm<br>Chloride = 7.7 ppm<br>Sulfate = 291.4 ppm  |
|           | 26         | X      |           | 17               |                | 1.75              |             | Decomposed, very soft.  |              |            |              |               | 13.4         | 118.9            |                     |              |   |
|           | 27         |        |           |                  |                |                   |             | Lean CLAY with SAND (CL); hard; dark brown; moist; about 5 to 10% fine, subangular GRAVEL; about 20% medium to fine SAND; medium plasticity, medium toughness fines [DECOMPOSED BEDROCK]. |              |            |              |               |              |                  |                     |              |   |
| 980       | 28         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 29         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 978       | 30         | X      | 6         | 20               | 50/6           | 4.50              |             |   | 92           |            |              |               |              |                  |                     |              |   |
|           | 31         | X      |           | 50/6"            |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 976       | 32         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 33         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 974       | 34         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 35         | X      | 7         | 29               | 51             |                   |             | Moderate to strong cementation; <1" moderate hard Sandstone fragments, very little rock structure.  | 33           |            |              |               |              |                  |                     |              |   |
| 972       | 36         | X      |           | 27               |                | >4.50             |             |   |              |            |              |               | 7.7          | 136.3            |                     |              |   |
|           | 37         |        |           | 24               |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 970       | 38         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 39         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (SHALE), clay, thinly bedded, dark gray, very intensely weathered, soft to moderately soft, interbedded with sandstone [UNDIVIDED MARINE FORMATION].                     |              |            |              |               |              |                  |                     |              |   |
| 968       | 40         | X      | 8         | 40               | 46             |                   |             |   | 33           |            |              |               |              |                  |                     |              |   |
|           | 41         | X      |           | 18               |                | >4.50             |             |   |              |            |              |               |              |                  |                     |              |   |
| 966       | 42         |        |           | 28               |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 43         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (GRAYWACKE), medium sand to fine sand, yellowish brown, very intensely weathered, very soft to soft, laminated with soft to very soft Shale.                             |              |            |              |               |              |                  |                     |              |   |
| 964       | 44         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 45         | X      | 9         | 35               | 50/5           | 4.50              |             |   | 73           |            |              |               |              |                  |                     |              |   |
| 962       | 46         | X      |           | 50/5"            |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 47         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 960       | 48         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 49         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 958       | 50         | X      | 10        | 50/4"            | REF            | >4.50             |             |   | 75           |            |              |               |              |                  |                     |              |   |
|           | 51         |        |           |                  |                |                   |             | Bottom of borehole at 50.3 ft bgs   |              |            |              |               |              |                  |                     |              | Backfilled with 94lbs bags of portland cement grout (mix 6 bags/60 gal. water)<br><br>*Elevation Reference: CP 1, Elev. 1000.00 feet per MCDOT topographic survey |
| 956       | 52         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 53         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
| 954       | 54         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           | 55         |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |
|           |            |        |           |                  |                |                   |             |   |              |            |              |               |              |                  |                     |              |   |



**Crawford & Associates, Inc.**  
 Geotechnical Engineering, Design and Construction Services

Crawford & Associates, Inc.  
 1100 Corporate Way, Suite 230  
 Sacramento, CA 95831  
 (916) 455-4225

PROJECT NUMBER: 16.337.11  
 PROJECT: Pine Ridge Road MP 4.52  
 BORING: B1  
 ENTRY BY: MVG  
 CHECKED BY: RRH

SHEET 2 of 2

## LOG OF BORING B2

PROJECT NO: 16.337.11  
 PROJECT: Pine Ridge Road MP 4.52  
 LOCATION: Pine Ridge Rd (CR 220), Ukiah  
 CITY/COUNTY: Mendocino  
 CLIENT: MCDOT  
 LOGGED BY: MVG  
 DEPTH OF BORING: 50.25 (ft)

BEGIN DATE: 3/6/18  
 COMPLETION DATE: 3/6/18  
 SURFACE ELEVATION: 1004.5 (ft)\*  
 SURFACE CONDITION: Dirt/Gravel  
 WATER DEPTH: 24 (ft)  
 READING TAKEN: 3/6/18  
 HAMMER EFFICIENCY: 80 (%)

DRILLING CONTRACTOR: Clear Heart Drilling, Inc.  
 DRILLING METHOD: Hollow-Stem Auger (6" OD, 2.25" ID)  
 DRILL RIG: Deeprack - DR5K (Truck)  
 HAMMER TYPE: Automatic, 140 lbs, 30" drop  
 SAMPLER TYPE & SIZE: SPT (ID 1.4")  
 BOREHOLE DIAMETER: 6"  
 BACKFILL METHOD: Type II-V Portland Cement

| FIELD     |            |        |           |                   |                | GRAPHIC LOG       | DESCRIPTION   | RECOVERY (%) | RQD (%) | LABORATORY   |               |              |                  |                     |              | REMARKS |
|-----------|------------|--------|-----------|-------------------|----------------|-------------------|---|--------------|---------|--------------|---------------|--------------|------------------|---------------------|--------------|---------|
| ELEV (ft) | DEPTH (ft) | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH  | BLOWS PER FOOT | POCKET PEN. (TSF) |   |              |         | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE | DRILL METHOD |         |
| 1004      | 0          |        |           |                   |                |                   | SILTY GRAVEL (GM); light brown; moist; about 60% coarse to fine, subangular GRAVEL, max. 2 in. dia.; about 20% medium to fine SAND; nonplastic fines [FILL].  |              |         |              |               |              |                  |                     |              |         |
| 1002      | 2          |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |
| 1000      | 4          |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |
| 998       | 6          | X      | 1         | 9<br>7            | 14             |                   | Medium dense; angular to subangular GRAVEL; (GRAVEL is sandstone, dark bluish gray with a maroon coating).  | 33           |         |              |               |              |                  |                     |              |         |
| 996       | 8          |        |           |                   |                |                   | SANDY lean CLAY (CL); yellowish brown; moist; about 40% medium to fine SAND; low to medium plasticity, low to medium toughness fines [RESIDUAL SOIL].   |              |         |              |               |              |                  |                     |              |         |
| 994       | 10         | X      | 2         | 35<br>31<br>34    | 65             |                   | SEDIMENTARY ROCK (SANDSTONE), poorly lithified, medium sand to fine sand, thickly bedded, tan variegated w/ black, very intensely weathered, very soft to soft, laminated with black SILT (ML) [UNDIVIDED MARINE FORMATION].                  | 67           |         |              |               |              |                  |                     |              |         |
| 992       | 12         |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |
| 990       | 14         |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |
| 988       | 16         | X      | 3         | 30<br>48<br>50/5" | 98/11          | 4.00              | Very soft, laminations are oxidized.  | 88           |         |              |               | 13.8         | 86.8             |                     |              |         |
| 986       | 18         |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |
| 984       | 20         | X      | 4         | 27<br>28<br>40    | 68             |                   | CLAYEY SAND (SC); very dense; gray variegated w/ yellowish brown; moist; about 72% medium to fine SAND; medium plasticity, medium toughness fines; indurated CLAY nodules [DECOMPOSED BEDROCK].   | 83           |         | 35           | 20            |              |                  | 28                  |              |         |
| 982       | 22         |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |
| 980       | 24         |        |           |                   |                |                   | SEDIMENTARY ROCK (GRAYWACKE), lithified, medium sand to fine sand, bluish gray, intensely to moderately weathered, very soft, angular rock fragments are moderately hard; decomposed lenses have low plasticity [UNDIVIDED MARINE FORMATION]. | 75           |         |              |               | 9.3          | 133.7            |                     |              |         |
|           | 25         | X      | 5         | 35<br>50/6"       | 50/6           | >4.50             |   |              |         |              |               |              |                  |                     |              |         |
|           | 26         |        |           |                   |                |                   |   |              |         |              |               |              |                  |                     |              |         |

| FIELD     |            |        |           |                  |                |                   | GRAPHIC LOG | DESCRIPTION  | RECOVERY (%) | LABORATORY |              |               |              |                  |                     | DRILL METHOD | CASING DEPTH  | REMARKS |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|-------------|--|--------------|------------|--------------|---------------|--------------|------------------|---------------------|--------------|---|---------|
| ELEV (ft) | DEPTH (ft) | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |             |  |              | RQD (%)    | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE |              |   |         |
| 978       | 26         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (Graywacke) (continued).  |              |            |              |               |              |                  |                     |              | Driller reports rock feels harder and more competent; drilling progression slows at 28' |         |
| 976       | 27         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 28         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 29         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 974       | 30         |        | 6         | 50/2"            | REF            |                   |             | Light bluish gray, decomposed, very soft, laminated with SILT (ML); bluish gray; low plasticity.   | 100          |            |              |               |              |                  |                     |              |   |         |
|           | 31         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 32         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 972       | 33         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 34         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 970       | 35         |        | 7         | 45               | 90             |                   |             | SILTY SAND (SM); dense; bluish gray; moist; about 70% coarse to medium SAND; low plasticity fines [DECOMPOSED BEDROCK].  | 89           |            |              |               |              |                  |                     |              |   |         |
|           | 36         |        |           | 45               |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 968       | 37         |        |           | 45               |                | >4.50             |             | SEDIMENTARY ROCK (GRAYWACKE), lithified, medium sand to fine sand, thinly to moderately bedded, light bluish gray, very intensely weathered, moderately hard [UNDIVIDED MARINE FORMATION]. |              |            | 6.2          | 144.7         |              |                  |                     |              |   |         |
|           | 38         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 966       | 39         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 40         |        | 8         | 50/1"            | REF            |                   |             |  | 0            |            |              |               |              |                  |                     |              |   |         |
| 964       | 41         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 42         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 962       | 43         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 44         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 960       | 45         |        | 9         | 50/3"            | REF            |                   |             | Dark gray, decomposed, very soft, interbedded with CLAY.   | 67           |            |              |               |              |                  |                     |              |   |         |
|           | 46         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 958       | 47         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 48         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (SHALE), poorly lithified, clay, moderately bedded, dark gray, very intensely weathered, very soft to soft, rock fragments are platy.                                     |              |            |              |               |              |                  |                     |              |   |         |
| 956       | 49         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 50         |        | 10        | 50/3"            | REF            | >4.50             |             |  | 100          |            |              |               |              |                  |                     |              |   |         |
| 954       | 51         |        |           |                  |                |                   |             | Bottom of borehole at 50.3 ft bgs  |              |            |              |               |              |                  |                     |              |   |         |
|           | 52         |        |           |                  |                |                   |             | Backfilled with 94lbs bags of portland cement grout (mix 7 bags/70 gal. water)   |              |            |              |               |              |                  |                     |              |   |         |
| 952       | 53         |        |           |                  |                |                   |             | *Elevation Reference: CP 1, Elev. 1000.00 feet per MCDOT topographic survey  |              |            |              |               |              |                  |                     |              |   |         |
|           | 54         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 950       | 55         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
|           | 56         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |
| 948       | 57         |        |           |                  |                |                   |             |  |              |            |              |               |              |                  |                     |              |   |         |



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PROJECT NUMBER: 16.337.11  
PROJECT: Pine Ridge Road MP 4.52  
BORING: B2  
ENTRY BY: MVG  
CHECKED BY: RRH

SHEET 2 of 2

## LOG OF BORING B3

PROJECT NO: 16.337.11

PROJECT: Pine Ridge Road MP 4.52

LOCATION: Pine Ridge Rd (CR 220), Ukiah

CITY/COUNTY: Mendocino

CLIENT: MCDOT

LOGGED BY: MVG

DEPTH OF BORING: 50.33 (ft)

BEGIN DATE: 3/7/18

COMPLETION DATE: 3/7/18

SURFACE ELEVATION: 1000.4 (ft)\*

SURFACE CONDITION: Dirt/Gravel

WATER DEPTH: 45 (ft)

READING TAKEN: 3/7/18

HAMMER EFFICIENCY: 80 (%)

DRILLING CONTRACTOR: Clear Heart Drilling, Inc.

DRILLING METHOD: Hollow-Stem Auger (6" OD, 2.25" ID)

DRILL RIG: Deeprock - DR5K (Truck)

HAMMER TYPE: Automatic, 140 lbs, 30" drop

SAMPLER TYPE & SIZE: SPT (ID 1.4")

BOREHOLE DIAMETER: 6"

BACKFILL METHOD: Type II-V Portland Cement

| FIELD     |            |        |           |                  |                | GRAPHIC LOG       | DESCRIPTION  | RECOVERY (%) | LABORATORY |              |               |              |                  |                     | DRILL METHOD | CASING DEPTH | REMARKS  |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|--|--------------|------------|--------------|---------------|--------------|------------------|---------------------|--------------|--------------|--|
| ELEV (ft) | DEPTH (ft) | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |  |              | RQD (%)    | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE |              |              |  |
| 1000      | 0          |        | 0         |                  |                |                   | CLAYEY SAND with GRAVEL (SC); brown; moist; about 25% coarse to fine, subangular to subrounded GRAVEL, max. 1 in. dia.; about 43% medium to fine SAND; medium plasticity, medium toughness fines [FILL]. | 100          |            | 35           | 18            |              |                  | 32                  |              |              | Chemical Analysis<br>pH = 6.52<br>Min. Res. = 1450 ohm-cm<br>Chloride = 3.1 ppm<br>Sulfate = 5.5 ppm |
| 998       | 1          |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 2          |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 996       | 3          |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 4          |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 5          |        | 1         | 10               | 15             |                   | SILTY GRAVEL (GM); medium dense; gray; dry; about 70% coarse to fine, subangular to subrounded GRAVEL, max. 1 in. dia.; about 10% coarse to fine SAND; nonplastic fines; (GRAVEL has a maroon coating).  | 44           |            |              |               |              |                  |                     |              |              |  |
| 994       | 6          |        |           | 5                |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 7          |        |           | 10               |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 8          |        |           |                  |                |                   | Lean CLAY (CL); yellowish brown; moist; about 10 to 15% medium to fine SAND; medium plasticity, medium toughness fines [RESIDUAL SOIL].  |              |            |              |               |              |                  |                     |              |              |  |
| 992       | 9          |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 10         |        | 2         | 22               | 50/5           |                   | SEDIMENTARY ROCK (GRAYWACKE), lithified, fine sand, gray, intensely to moderately weathered, moderately hard [UNDIVIDED MARINE FORMATION].   | 64           |            |              |               | 2.6          |                  |                     |              |              |  |
| 990       | 11         |        |           | 50/5"            |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 12         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 988       | 13         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 14         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 986       | 15         |        | 3         | 50/2"            | REF            |                   |  | 0            |            |              |               |              |                  |                     |              |              | Hard drilling at 15'   |
|           | 16         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 984       | 17         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 18         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 982       | 19         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              | Driller reports soft material at 18'   |
|           | 20         |        | 4         | 26               | 33             |                   | Yellowish brown, very intensely weathered, Lithic fragments are <1", moderately hard, fracture faces are completely oxidized and decomposed to Silty SAND (SM) w/ <2" CLAY lenses.                       | 67           |            |              |               | 16.5         | 99.7             |                     |              |              |  |
| 980       | 21         |        |           | 25               |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 22         |        |           | 8                |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 978       | 23         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
|           | 24         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |
| 976       | 25         |        |           |                  |                |                   |  |              |            |              |               |              |                  |                     |              |              |  |



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PROJECT NUMBER: 16.337.11  
PROJECT: Pine Ridge Road MP 4.52  
BORING: B3  
ENTRY BY: MVG  
CHECKED BY: RRH

SHEET 1 of 2

| ELEV (ft) | DEPTH (ft) | FIELD  |           |                  |                |                   | GRAPHIC LOG | DESCRIPTION   | RECOVERY (%) | RQD (%) | LABORATORY   |               |              |                  |                     |              | REMARKS |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|-------------|---|--------------|---------|--------------|---------------|--------------|------------------|---------------------|--------------|---------|
|           |            | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |             |   |              |         | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE | DRILL METHOD |         |
| 974       | 25         | X      | 5         | 29<br>36<br>35   | 71             |                   |             | SEDIMENTARY ROCK (Graywacke) (continued).<br>Soft, partially decomposed; (CLAYEY SAND/SILTY SAND (SC/SM), hard).                            | 44           |         |              |               | 8.2          | 101.3            |                     |              |         |
|           | 26         |        |           |                  |                | 4.50              |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 27         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (SHALE), clay, dark gray, very intensely weathered, very soft to soft, (stiff).  |              |         |              |               |              |                  |                     |              |         |
|           | 28         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 972       | 29         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 30         | X      | 6         | 48<br>50/2"      | 50/2           |                   |             |   | 100          |         |              |               |              |                  |                     |              |         |
| 970       | 31         |        |           |                  |                | 1.50              |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 32         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 968       | 33         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 34         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (GRAYWACKE), lithified, fine sand, light gray, intensely to moderately weathered, moderately hard, interbedded with Shale. |              |         |              |               |              |                  |                     |              |         |
| 966       | 35         | X      | 7         | 45<br>50/6"      | 50/6           |                   |             |   | 75           |         |              |               |              |                  |                     |              |         |
|           | 36         |        |           |                  |                | 4.50              |             |   |              |         |              |               |              |                  |                     |              |         |
| 964       | 37         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 38         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 962       | 39         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 40         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 960       | 41         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 42         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 958       | 43         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 44         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 956       | 45         | X      | 8         | 48<br>50/4"      | 50/4           |                   |             | Bluish gray, very intensely weathered, very soft, partially decomposed; (SILTY SAND (SM), wet, very dense).                                 | 60           |         |              |               |              |                  |                     |              |         |
|           | 46         |        |           |                  |                | 3.75              |             |   |              |         |              |               |              |                  |                     |              |         |
| 954       | 47         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
|           | 48         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 952       | 49         |        |           |                  |                |                   |             | SEDIMENTARY ROCK (SHALE), clay, dark gray, moderately weathered, moderately soft.   |              |         |              |               |              |                  |                     |              |         |
|           | 50         | X      | 9         | 50/4"            | REF            | >4.50             |             |   | 75           |         |              |               |              |                  |                     |              |         |
| 950       | 51         |        |           |                  |                |                   |             | Bottom of borehole at 50.3 ft bgs   |              |         |              |               |              |                  |                     |              |         |
|           | 52         |        |           |                  |                |                   |             | Backfilled with 94lbs bags of portland cement grout (mix 7 bags/65 gal. water)  |              |         |              |               |              |                  |                     |              |         |
| 948       | 53         |        |           |                  |                |                   |             | *Elevation Reference: CP 1, Elev. 1000.00 feet per MCDOT topographic survey   |              |         |              |               |              |                  |                     |              |         |
|           | 54         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |
| 946       | 55         |        |           |                  |                |                   |             |   |              |         |              |               |              |                  |                     |              |         |



**Crawford & Associates, Inc.**  
Geotechnical Engineering, Design and Construction Services

Crawford & Associates, Inc.  
1100 Corporate Way, Suite 230  
Sacramento, CA 95831  
(916) 455-4225

PROJECT NUMBER: 16.337.11  
PROJECT: Pine Ridge Road MP 4.52  
BORING: B3  
ENTRY BY: MVG  
CHECKED BY: RRH

SHEET 2 of 2

## LOG OF BORING P1

|   |                                   |  |
|---|-----------------------------------|--|
| PROJECT NO: 16.337.11                   | BEGIN DATE: 3/6/18                | DRILLING CONTRACTOR: Clear Heart Drilling, Inc.    |
| PROJECT: Pine Ridge Road MP 4.52        | COMPLETION DATE: 3/6/18           | DRILLING METHOD: Dynamic Cone Penetrometer (2" OD) |
| LOCATION: Pine Ridge Rd (CR 220), Ukiah | SURFACE ELEVATION: 1006.2 (ft)*   | DRILL RIG: Deeprock - DR5K (Truck)                 |
| CITY/COUNTY: Mendocino                  | SURFACE CONDITION: Dirt/Gravel    | HAMMER TYPE: Automatic, 140 lbs, 30" drop          |
| CLIENT: MCDOT                           | WATER DEPTH: Not Encountered (ft) | SAMPLER TYPE & SIZE: N/A                           |
| LOGGED BY: MVG                          | READING TAKEN: 3/6/18             | BOREHOLE DIAMETER: 2"                              |
| DEPTH OF BORING: 11.5 (ft)              | HAMMER EFFICIENCY: 80 (%)         | BACKFILL METHOD: Type II-V Portland Cement         |

| FIELD     |            |        |           |                  |                | GRAPHIC LOG       | DESCRIPTION   | RECOVERY (%) | LABORATORY |              |               |              |                  |                     |              | REMARKS       |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|---|--------------|------------|--------------|---------------|--------------|------------------|---------------------|--------------|---------------|
| ELEV (ft) | DEPTH (ft) | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |   |              | RQD (%)    | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE | DRILL METHOD |               |
| 1006      | 0          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 1          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 1004      | 2          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 3          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 1002      | 4          |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 5          |        |           |                  | 6              |                   |   |              |            |              |               |              |                  |                     |              |               |
| 1000      | 6          |        |           |                  | 7              |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 7          |        |           |                  | 8              |                   |   |              |            |              |               |              |                  |                     |              |               |
| 998       | 8          |        |           |                  | 22             |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 9          |        |           |                  | 27             |                   |   |              |            |              |               |              |                  |                     |              |               |
| 996       | 10         |        |           |                  | 59             |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 11         |        |           |                  | 100            |                   | REFUSAL.  |              |            |              |               |              |                  |                     |              | 100/6" at 11' |
| 994       | 12         |        |           |                  |                |                   | Bottom of borehole at 11.5 ft bgs   |              |            |              |               |              |                  |                     |              |               |
|           | 13         |        |           |                  |                |                   | Backfilled with 94lbs bags of portland cement grout (mix 1.5 bags/7 gal. water) |              |            |              |               |              |                  |                     |              |               |
| 992       | 14         |        |           |                  |                |                   | *Elevation Reference: CP 1, Elev. 1000.00 feet per MCDOT topographic survey     |              |            |              |               |              |                  |                     |              |               |
|           | 15         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 990       | 16         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 17         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 988       | 18         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 19         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 986       | 20         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 21         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 984       | 22         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 23         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
| 982       | 24         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |
|           | 25         |        |           |                  |                |                   |   |              |            |              |               |              |                  |                     |              |               |



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PROJECT NUMBER: 16.337.11  
PROJECT: Pine Ridge Road MP 4.52  
BORING: P1  
ENTRY BY: MVG  
CHECKED BY: RRH  
SHEET 1 of 1

## LOG OF BORING P2

|   |                                   |  |
|---|-----------------------------------|--|
| PROJECT NO: 16.337.11                   | BEGIN DATE: 3/6/18                | DRILLING CONTRACTOR: Clear Heart Drilling, Inc.    |
| PROJECT: Pine Ridge Road MP 4.52        | COMPLETION DATE: 3/6/18           | DRILLING METHOD: Dynamic Cone Penetrometer (2" OD) |
| LOCATION: Pine Ridge Rd (CR 220), Ukiah | SURFACE ELEVATION: 1003.2 (ft)*   | DRILL RIG: Deeprock - DR5K (Truck)                 |
| CITY/COUNTY: Mendocino                  | SURFACE CONDITION: Dirt/Gravel    | HAMMER TYPE: Automatic, 140 lbs, 30" drop          |
| CLIENT: MCDOT                           | WATER DEPTH: Not Encountered (ft) | SAMPLER TYPE & SIZE: N/A                           |
| LOGGED BY: MVG                          | READING TAKEN: 3/6/18             | BOREHOLE DIAMETER: 2"                              |
| DEPTH OF BORING: 16.83 (ft)             | HAMMER EFFICIENCY: 80 (%)         | BACKFILL METHOD: Type II-V Portland Cement         |

| FIELD     |            |        |           |                  |                | GRAPHIC LOG       | DESCRIPTION   | RECOVERY (%) | RQD (%) | LABORATORY   |               |              |                  |                     |              | REMARKS            |
|-----------|------------|--------|-----------|------------------|----------------|-------------------|---|--------------|---------|--------------|---------------|--------------|------------------|---------------------|--------------|--------------------|
| ELEV (ft) | DEPTH (ft) | SAMPLE | SAMPLE NO | BLOWS PER 6 INCH | BLOWS PER FOOT | POCKET PEN. (TSF) |   |              |         | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE (%) | D. DENSITY (PCF) | % PASSING 200 SIEVE | DRILL METHOD |                    |
| 1002      | 1          |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 2          |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 1000      | 3          |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              | HSA used as casing |
|           | 4          |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 998       | 5          |        |           |                  | 8              |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 6          |        |           |                  | 28             |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 996       | 7          |        |           |                  | 8              |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 8          |        |           |                  | 6              |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 994       | 9          |        |           |                  | 4              |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 10         |        |           |                  | 5              |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 992       | 11         |        |           |                  | 7              |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 12         |        |           |                  | 18             |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 990       | 13         |        |           |                  | 28             |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 14         |        |           |                  | 33             |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 988       | 15         |        |           |                  | 54             |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 16         |        |           |                  | 100            |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 17         |        |           |                  |                |                   | REFUSAL.  |              |         |              |               |              |                  |                     |              | 100/10" at 16'     |
| 986       | 18         |        |           |                  |                |                   | Bottom of borehole at 16.8 ft bgs   |              |         |              |               |              |                  |                     |              |                    |
|           | 19         |        |           |                  |                |                   | Backfilled with 94lbs bags of portland cement grout (mix 1.5 bags/7 gal. water) |              |         |              |               |              |                  |                     |              |                    |
| 984       | 20         |        |           |                  |                |                   | *Elevation Reference: CP 1, Elev. 1000.00 feet per MCDOT topographic survey     |              |         |              |               |              |                  |                     |              |                    |
|           | 21         |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 982       | 22         |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 23         |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
| 980       | 24         |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |
|           | 25         |        |           |                  |                |                   |   |              |         |              |               |              |                  |                     |              |                    |

**APPENDIX B**

**LABORATORY AND FIELD TEST SUMMARY**

Job: Pine Ridge Road MP 4.52  
 Job No: 16-337.11  
 Date: 9/4/18

### Laboratory and Field Test Summary

| Laboratory and Field Test Summary |             |                            |             |                             |             |                     |                                 |                   |                    |                       |                  |               |                  |            |          |           |                    |                    |      |                              |                        |                       |
|-----------------------------------|-------------|----------------------------|-------------|-----------------------------|-------------|---------------------|---------------------------------|-------------------|--------------------|-----------------------|------------------|---------------|------------------|------------|----------|-----------|--------------------|--------------------|------|------------------------------|------------------------|-----------------------|
|                                   | Boring I.D. | Top of Sampling Depth (ft) | Sample I.D. | Retained Sample Depths (ft) | USCS Class. | Field Blows N (bpf) | SPT Blows N <sub>60</sub> (bpf) | Moisture/Density  |                    |                       | Classification   |               |                  |            |          | Strength  |                    | Chemical Analysis  |      |                              |                        |                       |
|                                   |             |                            |             |                             |             |                     |                                 | Dry Density (pcf) | Moist. Content (%) | In-Situ Density (pcf) | Atterberg Limits |               |                  | Gravel (%) | Sand (%) | Fines (%) | Pocket Pent. (tsf) | Uncon. Comp. (psf) | pH   | Minimum Resistivity (ohm-cm) | Chloride Content (ppm) | Sulfate Content (ppm) |
|                                   |             |                            |             |                             |             |                     |                                 |                   |                    |                       | Liquid Limit     | Plastic Limit | Plasticity Index |            |          |           |                    |                    |      |                              |                        |                       |
| Road-level Borings                | B1          | 0.0                        | 0           | 0.0-5.0                     | GM          | N/A                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B1          | 5.0                        | 1           | 6.0-6.5                     | W. ROCK     | 98                  | 131                             |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B1          | 10.0                       | 2           | 10.5-11.5                   | W. ROCK     | 68                  | 91                              |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B1          | 15.0                       | 3           | 15.5-16.5                   | W. ROCK     | 53                  | 71                              | 97.0              | 8.1                | 104.9                 |                  |               |                  |            |          |           | 3.50               |                    |      |                              |                        |                       |
|                                   | B1          | 20.0                       | 4           | 21.0-21.5                   | W. ROCK     | 46                  | 61                              |                   |                    |                       |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B1          | 25.0                       | 5           | 26.0-26.5                   | W. ROCK     | 35                  | 47                              | 118.9             | 13.4               | 134.8                 |                  |               |                  |            |          |           | 1.75               |                    |      |                              |                        |                       |
|                                   | B1          | 30.0                       | 6           | 30.0-30.8                   | CL          | 50/6"               | -                               |                   |                    |                       |                  |               |                  |            |          |           | 4.50               |                    | 7.36 | 1,020                        | 7.7                    | 291.4                 |
|                                   | B1          | 35.0                       | 7           | 36.0-36.5                   | CL          | 51                  | 68                              | 136.3             | 7.7                | 146.8                 |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B1          | 40.0                       | 8           | 41.0-41.5                   | W. ROCK     | 46                  | 61                              |                   |                    |                       |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B1          | 45.0                       | 9           | 45.5-45.9                   | W. ROCK     | 50/5"               | -                               |                   |                    |                       |                  |               |                  |            |          |           | 4.50               |                    |      |                              |                        |                       |
|                                   | B1          | 50.0                       | 10          | 50.0-50.3                   | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B2          | 5.0                        | 1           | 5.0-5.5                     | GM          | 14                  | 19                              |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B2          | 10.0                       | 2           | 10.5-11.5                   | W. ROCK     | 65                  | 87                              |                   |                    |                       |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B2          | 15.0                       | 3           | 15.5-16.5                   | W. ROCK     | 98/11"              | -                               | 86.8              | 13.8               | 98.8                  |                  |               |                  |            |          |           | 4.00               |                    |      |                              |                        |                       |
|                                   | B2          | 20.0                       | 4           | 20.5-21.5                   | SC          | 68                  | 91                              |                   |                    |                       | 35               | 20            | 15               |            |          | 28        | +4.50              |                    |      |                              |                        |                       |
|                                   | B2          | 25.0                       | 5           | 25.5-26.0                   | W. ROCK     | 50/6"               | -                               | 133.7             | 9.3                | 146.1                 |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B2          | 30.0                       | 6           | None                        | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B2          | 35.0                       | 7           | 35.5-36.5                   | W. ROCK     | 90                  | 120                             | 144.7             | 6.2                | 153.7                 |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B2          | 40.0                       | 8           | None                        | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B2          | 45.0                       | 9           | None                        | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B2          | 50.0                       | 10          | 50.0-50.3                   | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |
|                                   | B3          | 0.0                        | 0           | 0.0-5.0                     | SC          | N/A                 | -                               |                   |                    |                       | 35               | 18            | 17               |            |          | 32        | -                  |                    | 6.52 | 1,450                        | 3.1                    | 5.5                   |
|                                   | B3          | 5.0                        | 1           | 5.0-5.5                     | GM          | 15                  | 20                              |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B3          | 10.0                       | 2           | 10.5-10.9                   | W. ROCK     | 50/5"               | -                               |                   | 2.6                |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B3          | 15.0                       | 3           | None                        | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B3          | 20.0                       | 4           | 20.5-21.5                   | W. ROCK     | 33                  | 44                              | 99.7              | 16.5               | 116.2                 |                  |               |                  |            |          |           | -                  |                    |      |                              |                        |                       |
|                                   | B3          | 25.0                       | 5           | 25.5-26.5                   | W. ROCK     | 71                  | 95                              | 101.3             | 8.2                | 109.6                 |                  |               |                  |            |          |           | 4.50               |                    |      |                              |                        |                       |
|                                   | B3          | 30.0                       | 6           | 30.0-30.5                   | W. ROCK     | 50/2"               | -                               |                   |                    |                       |                  |               |                  |            |          |           | 1.50               |                    |      |                              |                        |                       |
|                                   | B3          | 35.0                       | 7           | 35.5-36.0                   | W. ROCK     | 50/6"               | -                               |                   |                    |                       |                  |               |                  |            |          |           | 4.50               |                    |      |                              |                        |                       |
|                                   | B3          | 45.0                       | 8           | 45.5-45.8                   | W. ROCK     | 50/4"               | -                               |                   |                    |                       |                  |               |                  |            |          |           | 3.75               |                    |      |                              |                        |                       |
|                                   | B3          | 50.0                       | 9           | 50.0-50.3                   | W. ROCK     | REF                 | -                               |                   |                    |                       |                  |               |                  |            |          |           | +4.50              |                    |      |                              |                        |                       |

Project Name: Pine Ridge Road MP 4.52

CAInc File No: 16-337.11

Date: 6/28/18

Technician: GL

### MOISTURE-DENSITY TESTS - D2216

|                                  | 1           | 2            | 3            | 4           | 5            |
|----------------------------------|-------------|--------------|--------------|-------------|--------------|
| Sample No.                       | B1-3A       | B1-5A        | B1-7A        | B2-3A       | B2-5A        |
| USCS Symbol                      | W.Rock      | W.Rock       | W.Rock       | W.Rock      | W.Rock       |
| Depth (ft.)                      | 16          | 26           | 36           | 16          | 25.5         |
| Sample Length (in.)              | 5.711       | 5.978        | 4.767        | 3.434       | 5.282        |
| Diameter (in.)                   | 1.423       | 1.418        | 1.405        | 1.421       | 1.411        |
| Sample Volume (ft <sup>3</sup> ) | 0.00526     | 0.00546      | 0.00428      | 0.00315     | 0.00478      |
| Total Mass Soil+Tube (g)         | 386.0       | 465.0        | 416.2        | 271.8       | 448.7        |
| Mass of Tube (g)                 | 135.9       | 130.7        | 131.3        | 130.5       | 131.9        |
| Tare No.                         | A6          | G22          | D12          | E3          | D17          |
| Tare (g)                         | 13.7        | 13.6         | 13.7         | 13.9        | 13.7         |
| Wet Soil + Tare (g)              | 80.0        | 72.9         | 69.5         | 63.7        | 74.2         |
| Dry Soil + Tare (g)              | 75.0        | 65.9         | 65.5         | 57.6        | 69.0         |
| Dry Soil (g)                     | 61.4        | 52.3         | 51.9         | 43.7        | 55.3         |
| Water (g)                        | 5.0         | 7.0          | 4.0          | 6.0         | 5.1          |
| <b>Moisture (%)</b>              | <b>8.1</b>  | <b>13.4</b>  | <b>7.7</b>   | <b>13.8</b> | <b>9.3</b>   |
| <b>Dry Density (pcf)</b>         | <b>97.0</b> | <b>118.9</b> | <b>136.3</b> | <b>86.8</b> | <b>133.7</b> |

Notes:

Project Name: Pine Ridge Road MP 4.52

CALnc File No: 16-337.11

Date: 6/28/18

Technician: GL

### MOISTURE-DENSITY TESTS - D2216

|                                  | 1            | 2          | 3           | 4            | 5 |
|----------------------------------|--------------|------------|-------------|--------------|---|
| Sample No.                       | B2-7A        | B3-2A      | B3-4A       | B3-5A        |   |
| USCS Symbol                      | W.Rock       | W.Rock     | W.Rock      | W.Rock       |   |
| Depth (ft.)                      | 35.5         | 10.5       | 21          | 26           |   |
| Sample Length (in.)              | 5.456        | -          | 2.675       | 4.766        |   |
| Diameter (in.)                   | 1.410        | -          | 1.408       | 1.407        |   |
| Sample Volume (ft <sup>3</sup> ) | 0.00493      | -          | 0.00241     | 0.00429      |   |
| Total Mass Soil+Tube (g)         | 463.4        | -          | 260.2       | 348.9        |   |
| Mass of Tube (g)                 | 119.6        | -          | 133.2       | 135.9        |   |
| Tare No.                         | E7           | B15        | G18         | C18          |   |
| Tare (g)                         | 13.8         | 13.8       | 13.7        | 13.6         |   |
| Wet Soil + Tare (g)              | 74.0         | 68.8       | 78.1        | 74.8         |   |
| Dry Soil + Tare (g)              | 70.5         | 67.4       | 69.0        | 70.2         |   |
| Dry Soil (g)                     | 56.7         | 53.6       | 55.3        | 56.6         |   |
| Water (g)                        | 3.5          | 1.4        | 9.1         | 4.6          |   |
| <b>Moisture (%)</b>              | <b>6.2</b>   | <b>2.6</b> | <b>16.5</b> | <b>8.2</b>   |   |
| <b>Dry Density (pcf)</b>         | <b>144.7</b> | <b>-</b>   | <b>99.7</b> | <b>101.3</b> |   |

Notes:

Project Name: Pine Ridge Road MP 4.52

CALnc File No: 16-337.11

Date: 6/28/18

Technician: GL

**200 Wash - ASTM D1140**

Method A

| Max Particle Size (100% Passing) | Standard Sieve Size | Recommended Min Mass of Test Specimens |
|----------------------------------|---------------------|--|
| 2 mm or less                     | No. 10              | 20 g                                   |
| 4.75 mm                          | No. 4               | 100 g                                  |
| 9.5 mm                           | 3/8 "               | 500 g                                  |
| 19.0 mm                          | 3/4 "               | 2.5 kg                                 |
| 37.5 mm                          | 1 1/2 "             | 10 kg                                  |
| 75.0 mm                          | 3 "                 | 50 kg                                  |

Table from 6.2 of ASTM D1140

|                     |       |         |  |  |  |
|---------------------|-------|---------|--|--|--|
| Sample No.          | B2-4B | B3-Bulk |  |  |  |
| USCS Symbol         | SC    | SC      |  |  |  |
| Depth (ft.)         | 20.5  | 0-5     |  |  |  |
| Tare No.            | P10   | R6      |  |  |  |
| Tare (g)            | 131.6 | 124.9   |  |  |  |
| Dry Soil + Tare (g) | 407.2 | 440.4   |  |  |  |
| Dry Mass before (g) | 275.6 | 315.5   |  |  |  |
| Dry Mass after (g)  | 197.5 | 214.8   |  |  |  |
| Percent Fines (%)   | 28    | 32      |  |  |  |

Notes:

Project Name: Pine Ridge Road MP 4.52

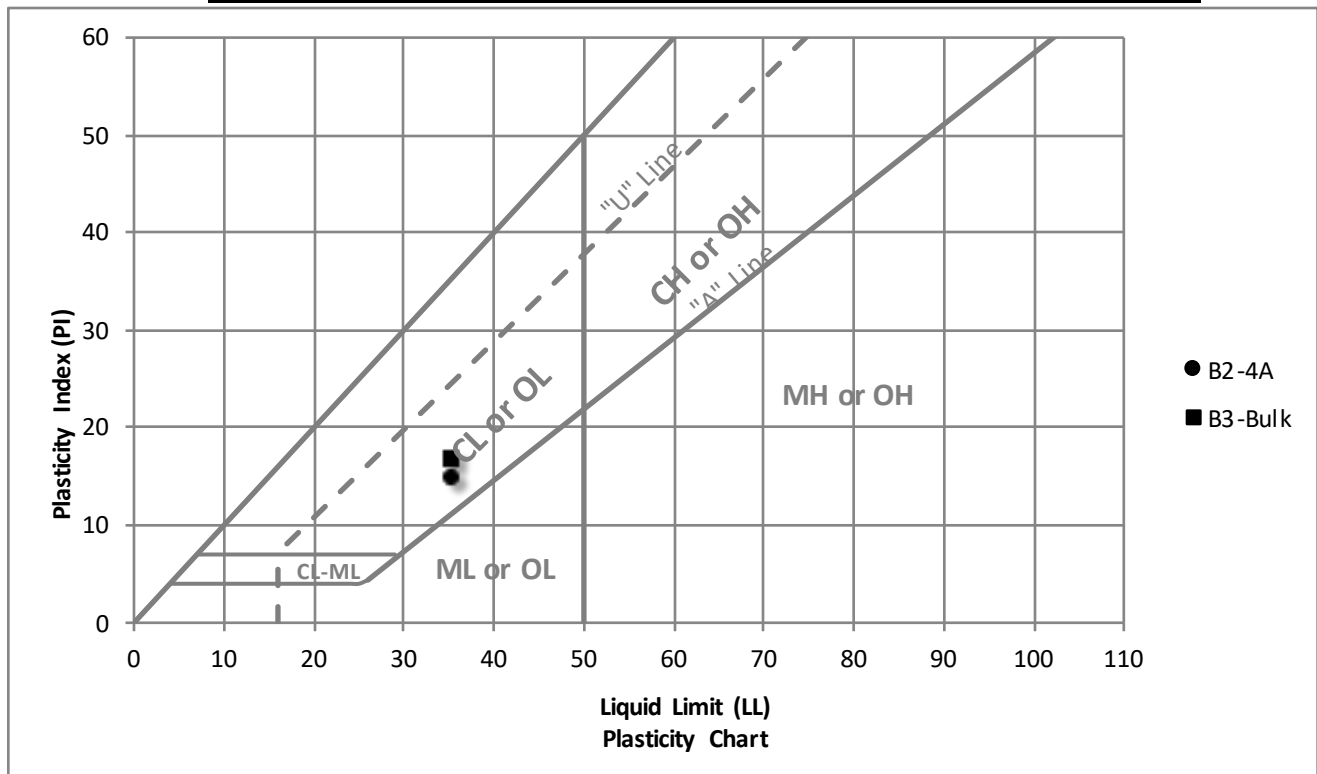
CAInc File No: 16-337.11

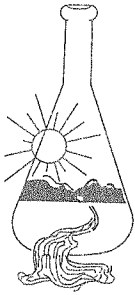
Date: 6/18/18

Technician: GL

**Plastic Index - ASTM D4318**

| Sample ID | Depth (ft) | Liquid Limit | Plastic Limit | PI |
|-----------|------------|--------------|---------------|----|
| B2-4A     | 20.5       | 35           | 20            | 15 |
| B3-Bulk   | 0-5        | 35           | 18            | 17 |
|           |            |              |               |    |
|           |            |              |               |    |
|           |            |              |               |    |





## Sunland Analytical

11419 Sunrise Gold Circle, #10  
Rancho Cordova, CA 95742  
(916) 852-8557

Date Reported 06/20/2018

Date Submitted 06/15/2018

To: Hailey Wagenman  
Crawford & Associates, Inc.  
1100 Corporate Way STE. 230  
Sacramento, CA 95831-6120

From: Gene Oliphant, Ph.D. \ Randy Horney  
General Manager \ Lab Manager

The reported analysis was requested for the following location:  
Location : 16-337.11 4.52 Site ID : B1-6A.

Thank you for your business.

\* For future reference to this analysis please use SUN # 77250-161247.

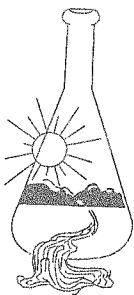
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### EVALUATION FOR SOIL CORROSION

|                     |                     |          |   |
|---------------------|---------------------|----------|---|
| Soil pH             | 7.36                |          |   |
| Minimum Resistivity | 1.02 ohm-cm (x1000) |          |   |
| Chloride            | 7.7 ppm             | 00.00077 | % |
| Sulfate             | 291.4 ppm           | 00.02914 | % |

### METHODS

pH and Min. Resistivity CA DOT Test #643  
Sulfate CA DOT Test #417, Chloride CA DOT Test #422



# Sunland Analytical

11419 Sunrise Gold Circle, #10  
Rancho Cordova, CA 95742  
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1100 Corporate Way STE. 230  
Sacramento, CA 95831-6120

From: Gene Oliphant, Ph.D. \ Randy Horney  
General Manager \ Lab Manager

The reported analysis was requested for the following location:  
Location : 16-337.11 4.52 Site ID : B3-BULK.  
Thank you for your business.

\* For future reference to this analysis please use SUN # 77250-161248.

## EVALUATION FOR SOIL CORROSION

|                     |         |                |   |
|---------------------|---------|----------------|---|
| Soil pH             | 6.52    |                |   |
| Minimum Resistivity | 1.45    | ohm-cm (x1000) |   |
| Chloride            | 3.1 ppm | 00.00031       | % |
| Sulfate             | 5.5 ppm | 00.00055       | % |

## METHODS

pH and Min.Resistivity CA DOT Test #643  
Sulfate CA DOT Test #417, Chloride CA DOT Test #422