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August 19, 2015
W.O. 9344

m6 Consulting, Inc.
4165 E. Thousand Oaks Boulevard, Suite 355
Westlake Village, California 91362

Attention: Mr. Robert Woodward

SUBJECT: Geotechnical Constraints Report,
Proposed 24-inch Diameter Waterline in Lindero Canyon Road,
From Thousand Oaks Boulevard North to Ventura County Line,
City of Westlake Village, California

References: California Division of Mines and Geology; 2000; Seismic hazard zone report for the Thousand Oaks 7.5-Minute Quadrangle, Ventura and Los Angeles Counties, California; Seismic Hazard Zone Report 042.

Pacific Soils Engineering, Inc.; November 18, 1976; Soils and Geologic Report, Revised Tentative Tract No. 32994, Thousand Oaks Boulevard and Lindero Canyon Road, County of Los Angeles, California.

..., March 25, 1969; Preliminary Soil and Geologic Investigation for Tract 30729, Westlake Village, Los Angeles County, California.

Weber, F.H., Jr.; 1984; Geology of the Calabasas-Agoura-Eastern Thousand Oaks area, Los Angeles and Ventura Counties, California: in Calif. Div. Mines and Geology Open File Report 84-1LA.

Mr. Woodward:

The following report, requested by your office, presents our review of the geotechnical conditions that may impact construction of the proposed waterline. Our focus was to provide a basic geotechnical framework that can be incorporated in the preliminary planning of the project. A geotechnical investigation, including geologic mapping, subsurface exploration, sampling, laboratory testing, and analysis, may be necessary in order to develop specific components of the final design.

PROPOSED PROJECT

We understand that a 24-inch diameter pressurized waterline is to be installed within the right-of-way along Lindero Canyon Road. The pipeline will extend from Thousand Oaks Boulevard north to the Los Angeles County/Ventura County Line. A trench depth of about six feet with approximately four feet of cover over the pipeline is contemplated. The terminus will be just north of the existing Yerba Buena School at the Ventura/Los Angeles County line. Plans are not available at this time.

SCOPE OF WORK

Our study was limited to the following tasks:

- A review of pertinent, available published and unpublished data in both our files and those of the City of Westlake Village, including aerial photographs and images available on electronic media
- A cursory reconnaissance of the project area
- A geotechnical analysis of the assembled data
- Preparation of this report describing the geotechnical factors and/or constraints affecting the proposed project

LOCATION AND PHYSIOGRAPHY

The project site is located within the approximately 4,900-foot stretch of Lindero Canyon Road, between Thousand Oaks Boulevard and the Los Angeles/Ventura County lines, along the westerly side of Lindero Canyon (Figure 1). The road alignment slopes gently southward at gradients of generally less than 5%. Overall topographic relief within the project site is on the order of 60 feet from the highest to the lowest points.

GEOLOGIC SETTING

The site is situated at the southern foot of the Santa Monica Mountains in the Transverse Ranges geomorphic province of Southern California. The Transverse Ranges are essentially east-west trending elongate mountain ranges and valleys that are geologically complex. Structurally, the province reflects the north-south compressional forces that are the result of a bend in the San Andreas fault. As the Pacific Plate (westerly side of the fault) and the North American Plate (easterly side) move past one another along the fault, the bend creates a deflection allowing for large accumulations of compressional energy. Some of these forces are spent in deforming the crust into roughly east-west trending folds and secondary faults. The

most significant of these faults are typically reverse or thrust faults, which allow for the crustal shortening taking place regionally.

Lithology

A series of Miocene-age marine sedimentary rocks underlies the project area. For the purpose of this study we have not differentiated these bedrock units, but have grouped them on the attached Plot Map (Plate 1) as Bedrock. Overlying the bedrock units is a sequence of Quaternary-age alluvial sediments. Artificial fill supports the road right-of-way and was probably placed with some compactive effort. A generalized description of the geologic units is presented below.

Miocene-age Bedrock (Bedrock on Plate 1) – These marine sedimentary rocks are composed of interbedded sandstone, siltstone, shale, and localized conglomerate. They have been assigned to the Modelo and Topanga Formations by various workers. They are typically in a dense condition, but localized beds may be well cemented and hard.

Quaternary-age Alluvium – The alluvium consists of various admixtures of silt, and clay with minor fractions of sand. These sediments are generally in an unconsolidated to poorly consolidated condition. It is unlikely that the existing roadway is directly underlain by alluvial sediments due to their generally poorly consolidated condition. It is more likely the natural alluvial deposits were recompacted to a shallow depth (2'-3') before the roadway was paved. These areas are designated as "Shallow Fill Over Alluvium" on Plate 1. The trench depth (about six feet) for the proposed waterline may locally penetrate into the natural alluvial deposits.

Artificial Fill (Fill on Plate 1) – The artificial fill in the area supporting Lindero Canyon Road probably consists of admixtures of sand, silt, clay and a variety of rock fragments and may have varying degrees of compaction depending on the standards in effect at the time the fills were placed. Areas shown Plate 1 as "Fill" represent those areas where the fill might exceed the planned six-foot depth of the pipeline trench.

GEOLOGIC STRUCTURE

While we were unable to observe in-place bedrock outcrops within the right-of-way because of thick soil and/or landscaping, moderately to steeply dipping (20°-60°) folded bedding is shown on unpublished geotechnical reports (Pacific Soils, 1969 and 1976) and on

regional geologic maps (F.H. Weber, Jr., 1984). The fold axes trend east-west in the vicinity and are generally perpendicular to the right-of-way suggesting that the bedding will probably be neutral to the proposed pipeline trench.

FAULTING

No State-mandated Earthquake Fault Zone occurs within or adjacent to the project area.

SEISMICITY

While ground surface rupture due to faulting is not considered a constraint on the project site, the project area will experience strong groundshaking due to earthquakes generated along regional faults.

LANDSLIDING

No landslides are known to occur within or adjacent to the right-of–way.

GROUNDWATER

Borings drilled to depths of 21 feet (Pacific Soils, 1969) in the roadway vicinity did not encounter groundwater. It is possible that localized pockets of perched groundwater may occur in irregularities along the contact between the alluvium and the bedrock. The bedrock units underlying the alluvium are typically not water bearing, although inconsequential amounts of groundwater may occur in fracture zones within the bedrock.

LIQUEFACTION

Liquefaction is a condition where the soil undergoes continued deformation at a constant low residual stress due to the build-up of high porewater pressures. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; sufficient groundwater to cause high pore pressures; and on the grain size, relative density, and confining pressures of the soil at the site.

In the liquefied condition, soil may deform with little shear resistance. The amount of soil deformation following liquefaction depends on the looseness of the material, the depth, thickness, and areal extent of the liquefied layers, the ground slope, and the distribution of loads applied by structures. When liquefaction is accompanied by ground displacement or ground failure, it can be destructive. Adverse effects of liquefaction can include ground oscillation, lateral spreads, flow failures, loss of bearing strength, settlement, and increased

pressures on retaining walls.

The Seismic Hazard Zones map for the Thousand Oaks Quadrangle (C.D.M.G., 2000), which is attached as Figure 2 does not indicate any zones of liquefaction potential within the project area.

GEOTECHNICAL CONSTRAINTS SUMMARY

The impacts of the following geotechnical constraints will depend on the depth of the proposed pipeline.

Trench Stability

Because of the relatively favorable geologic structure and the apparent shallow proposed depth of the trench we do not expect that significant stretches of unfavorably inclined bedrock will be encountered. However, poorly consolidated alluvial deposits prone to caving may be exposed in areas of shallow fill. All applicable CalOsha excavation standards should be followed.

Hard Rock

Localized beds within the bedrock may be cemented and could be difficult to excavate. Special handling, such as jack-hammering, may be necessary.

Corrosivity

Water soluble sulfate at specific concentrations in soil can degrade concrete over time. Site specific tests should be performed at the project design level to evaluate the potential for such corrosion.

Groundwater

While no appreciable groundwater has been reported by previous investigators in vicinity of the project site, it is likely that because of the concentration of recent housing projects upstream and the attendant landscape watering, groundwater may now be present within the alluvial deposits. However, because of the proposed limited depth of the pipeline, it is unlikely that groundwater will pose a constraint to the project.

Miscellaneous Geotechnical Conditions

Geotechnical conditions that are considered routine such as expansive soil and settlement prone soils are commonly evaluated by site specific geotechnical investigations

performed prior to or during the design phase of the project. These studies typically involve sampling subsurface material, laboratory testing of selected samples, and preparing a geotechnical report addressing the geotechnical issues pertinent to the proposed project.

CLOSURE

This geotechnical report has been prepared in accordance with generally accepted engineering practices at this time and location. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

Thank you for this opportunity to be of service. Please do not hesitate to call if you have any questions regarding this report.

Respectfully submitted,
GEOLABS-WESTLAKE VILLAGE

Charles A. Swift
C.E.G. 948

Ronald Z. Shmerling
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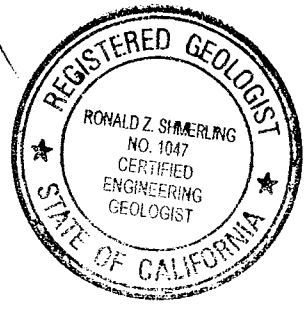

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Enclosures:
Location Map .....Figure 1
Seismic Hazard Zones.....Figure 2
Plot Map.....Plate 1

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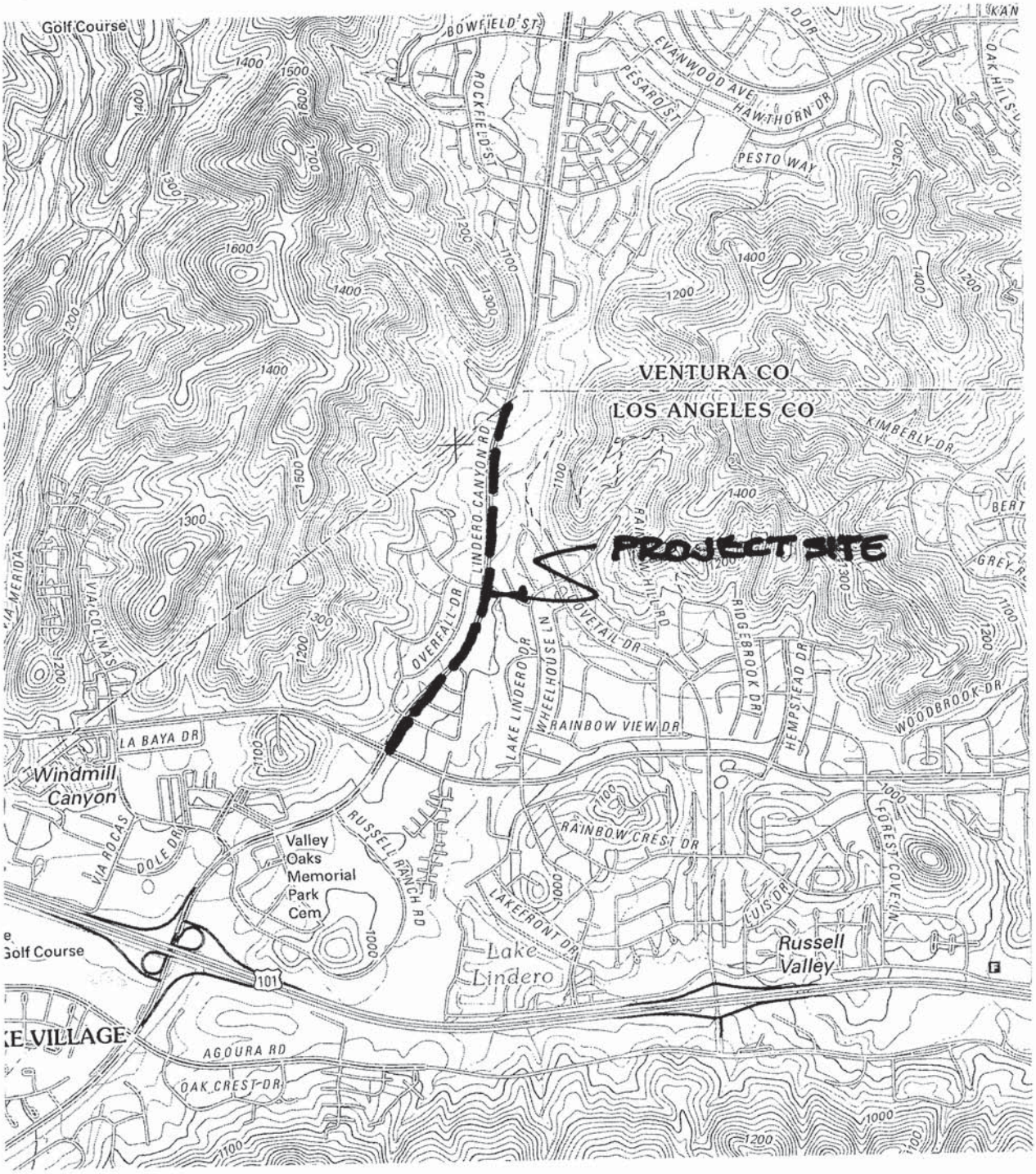

LOCATION MAP

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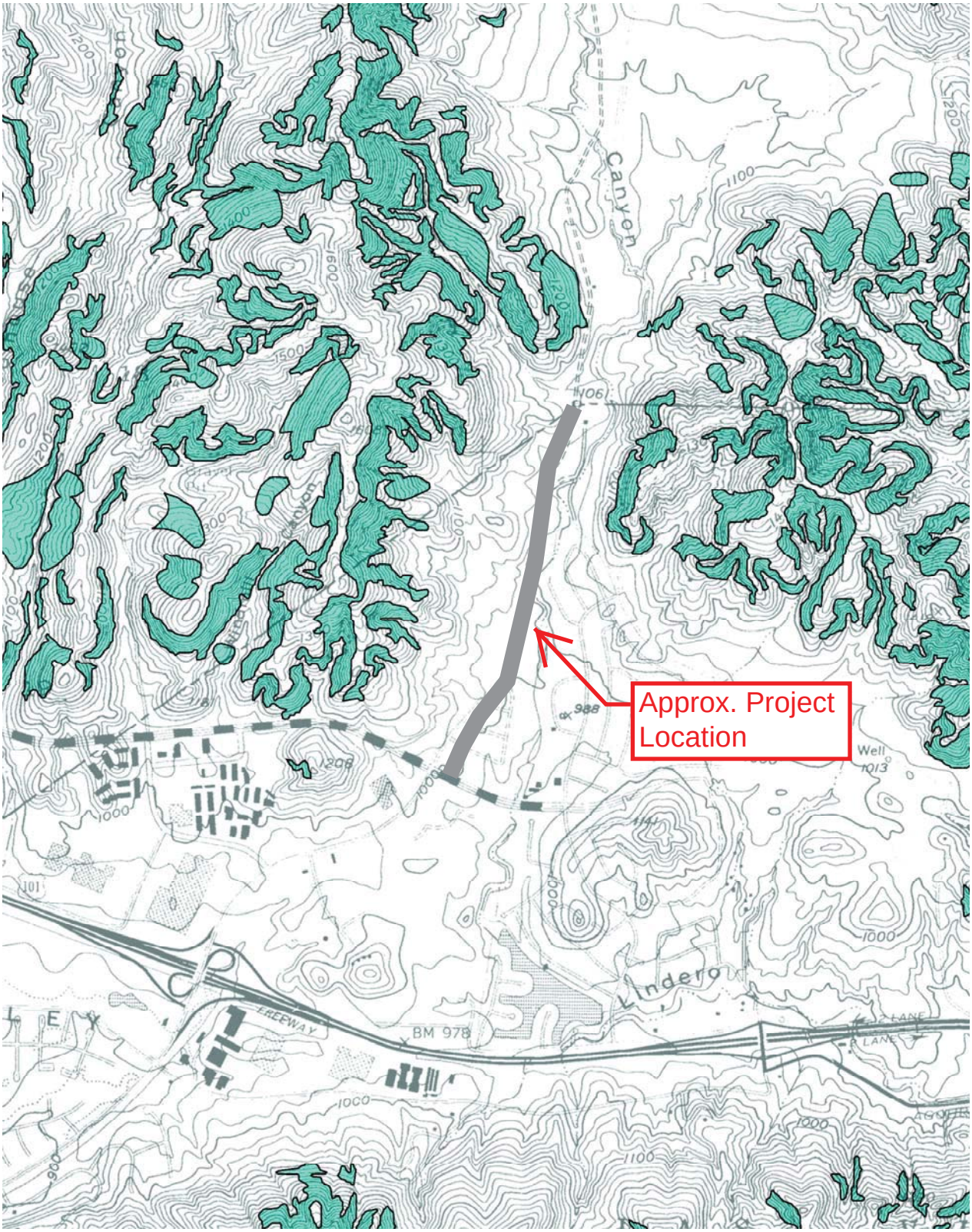
FIGURE 1

Portion of Seismic Hazard Zone Map



Source: SHZR 042, CDMG 2000

FIGURE 2

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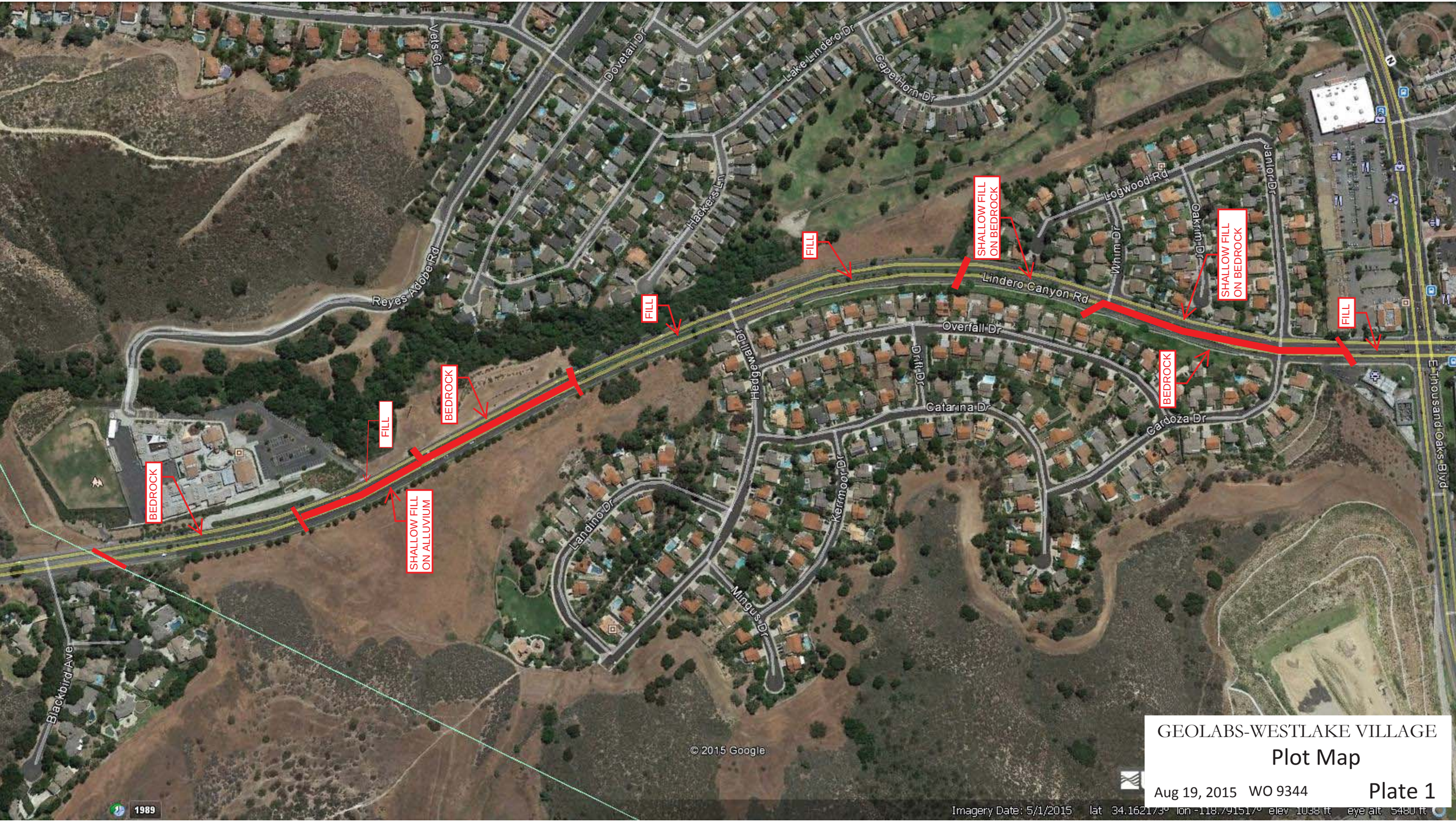

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Plot Map

Aug 19, 2015 WO 9344 Plate 1