GPRS

SUBSURFACE SCANNING SOLUTIONS

Concrete Investigation

Prepared For: [redacted]

Prepared By:

[redacted]

Project Manager | Southeast Region

6/11/2019

GPRS SUBSURFACE SCANNING SOLUTIONS

June 11, 2019

[redacted]
Attn: [redacted]
Project: [redacted]

GPRS appreciates the opportunity to provide this written report for our work completed on 5/30/19 at the above referenced project in [redacted]

PURPOSE

The purpose of the project was to determine the spacing of reinforcing steel for ongoing guardrail work. The guardrail span was scanned as instructed by the site contact.

EQUIPMENT

- **2300 MHz GPR Antenna.** The antenna is only approximately 4"x3.5" and rolls over the surface. The antenna needs a reasonably smooth, unobstructed surface for scanning so we would not be able to scan within 1.75" of obstructions such as walls and metal tracks unless they are removed prior to our work. The data is displayed on a screen during the scanning and marked on the surface in real time. GPR works by sending pulses of energy into a material and recording the strength and the time required for the return of the reflected signal. Reflections are produced when the energy pulses enter into a material with different electrical properties from the material it left. The strength of the reflection is determined by the contrast in signal speed between the two materials. The total depth achieved can be as much as 18" or more with this antenna but can vary widely depending on the conductivity of the materials and other factors such as the spacing of the reinforcing. Depth accuracy depends on the ability to obtain an accurate dielectric for the concrete or other material being scanned through. ***No harmful radiation is emitted and the work can be performed at any time with people in close proximity***. For more information, please visit: Link

PROCESS

The scan process began by using the GPR to collect initial scans throughout the area. These scans were used to calibrate the equipment and determine the type of slab, reinforcing patterns, maximum depth penetration, and any other potential limitations present. The location/area was then scanned in a grid pattern in multiple directions as well as with the antenna cross polarized. The GPR data was interpreted in real time and anomalies in the data were located and minimally marked on the surface as needed for interpretation/representation.

LIMITATIONS

Please keep in mind that there are limitations to any subsurface investigation. The equipment may not achieve maximum effectiveness due to conditions in the concrete or soil such as moisture content, age of the concrete, reinforcing size and spacing, and a variety of other factors. No subsurface investigation or equipment can provide a complete image of what lies below. Our results should always be used in conjunction with as many methods as

possible such as consulting existing plans and drawings, visual inspection of above ground features, drilling or cutting as far as possible from all of our markings, etc.

FINDINGS

GPRS was able to determine multiple aspects regarding the properties of concrete for this site. Each anomaly was named based on the type of anomaly suspected founded on previous experience and knowledge of standard construction practices. Please keep in mind, differentiating between reinforcing, post-tension cables, and conduits is an interpretation based on depths, patterns, and other clues. Please avoid drilling or saw cutting near any of our markings or carefully expose any line to confirm its identity prior to coring or saw cutting as needed. Our findings for each area scanned are summarized in the table below:

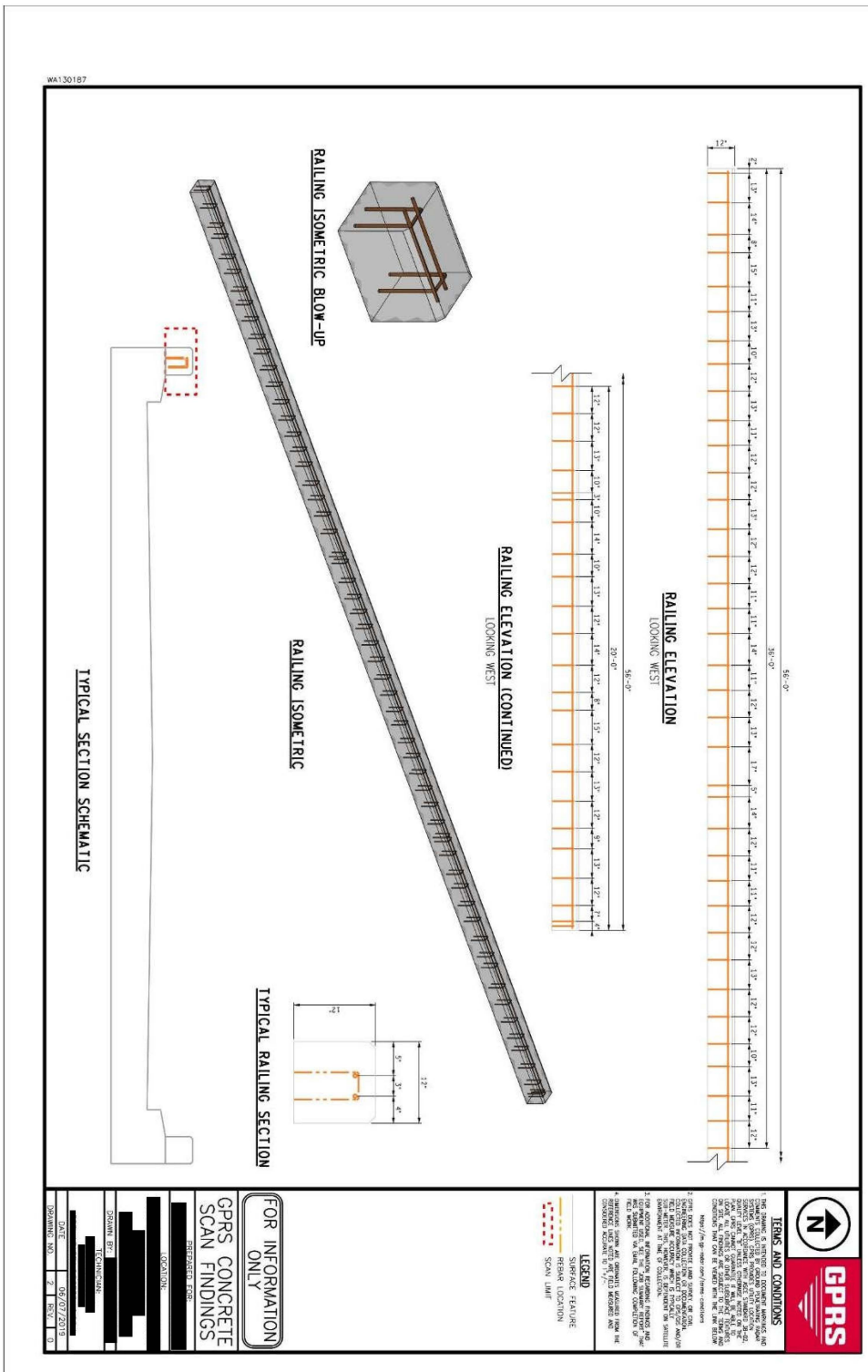
SCAN AREA	REINFORCEMENT NOTES			CONCRETE NOTES
	TYPE/SIZE	COVERAGE	SPACING	
Span 1	#4 Rebar, 1/2"	2 3/4"	Varies	12"x12"x56' (top of guardrail area scanned)

NOTES:

1. Thickness of concrete and coverages were averaged based on data encountered.
2. Rebar pattern and spacing was based on overall data captured.
3. Size of rebar may vary +/- one bar size

The following pages will provide photos and further explanation of our findings.

SITE MAP	**CONCRETE INVESTIGATION** [redacted]	GPRS

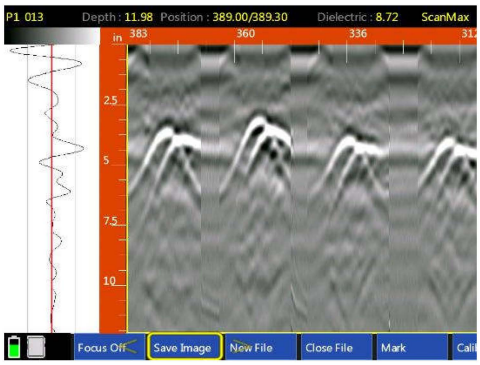


SITE MAP

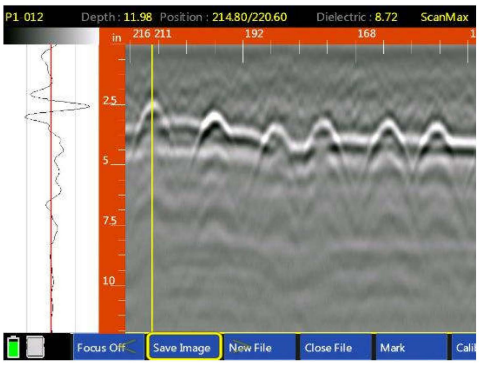
CONCRETE INVESTIGATION

[redacted]

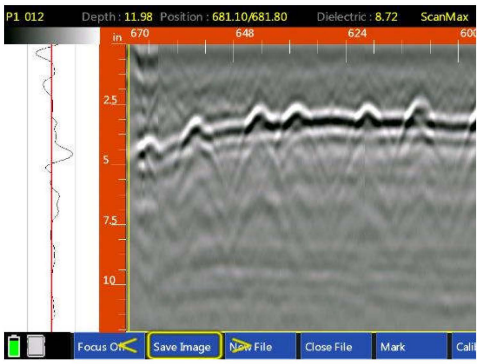
GPRS



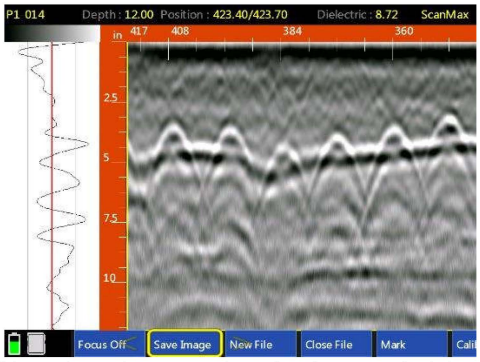
GPR data screenshot taken from guardrail showing rebar spacing and coverage. Shows rebar running parallel to roadway in four (4) equally spaced along span (horizontal bars).



GPR data screenshot taken from guardrail showing rebar spacing and coverage. Shows rebar running perpendicular to roadway (stirrup bars).



Additional GPR data screenshot taken from guardrail showing rebar spacing and coverage of stirrup bars for reference.



Additional GPR data screenshot taken from guardrail showing rebar spacing and coverage of stirrup bars for reference.

Typical rebar spacing of horizontal bars running parallel to roadway.

Typical rebar spacing of stirrups running perpendicular to roadway.

TYPICAL FIELD MARKINGS

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CLOSING

GPRS, Inc. has been in business since 2001, specializing in underground storage tank location, concrete scanning, utility locating, and shallow void detection for projects throughout the United States. I encourage you to visit our website (www.gprsinc.com) and contact any of the numerous references listed.

The results within this report are based on the field findings from the GPR investigation conducted. Based on the accessible areas scanned, GPRS believes the concrete contains reinforcing steel within the areas scanned as indicated in the supporting GPR data presented within this report. It should be noted that GPRS's standard procedure is to over-mark an area to ensure the highest levels of safety. Additional exploration measures may be required in order to confirm or deny the presence of these anomalies and reactions (i.e. limited destructive testing).

GPRS appreciates the opportunity to offer our services, and we look forward to continuing to work with you on future projects. Please feel free to contact us for additional information or with any questions you may have regarding this GPR Investigation.

Respectfully submitted,
Ground Penetrating Radar Systems, Inc.

[redacted]

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