GEOPHYSICAL ENGINEERING SURVEY REPORT

Commercial Site
130 Saint Felix Street,
Brooklyn, New York 11217

NOVA PROJECT NUMBER:
20-1614

DATED:
January 14, 2020

PREPARED FOR:

LANGAN

300 Kimball Drive, 4th Floor
Parsippany, New Jersey 07054-2172

PREPARED BY:

NOVA
GEOPHYSICAL
ENGINEERING
Subsurface Mapping Solutions
56-01 Marathon Parkway # 765
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NOVA GEOPHYSICAL SERVICES

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January 14, 2020

Brandon Reiner
Senior Project Engineer
LANGAN
300 Kimball Drive, 4th Floor
Parsippany, New Jersey 07054-2172
P: 973.560.4900 | E: BReiner@langan.com

Re: Geophysical Engineering Survey (GES) Report
Commercial Site
130 Saint Felix Street,
Brooklyn, New York 11217

Dear Mr. Reiner,

Nova Geophysical Services (NOVA) is pleased to provide the findings of the geophysical engineering survey (GES) at the above referenced project site: 130 Saint Felix Street, Brooklyn, New York 11217 (the "Site").

INTRODUCTION TO GEOPHYSICAL ENGINEERING SURVEY (GES)

NOVA performed a geophysical engineering survey (GES) consisting of a Ground Penetrating Radar (GPR) and Electromagnetic (EM) survey at the site. The purpose of this survey is to locate and identify utilities, underground storage tanks and other substructures as well as to clear nad mark proposed boring areas on January 10th, 2020.

The equipment selected for this investigation was a Sensors and Software Noggin 250 MHz ground penetrating radar (GPR) with a shielded antenna and a Radio Detection RD7100 Electromagnetic utility locator.

A GPR system consists of a radar control unit, control cable, and transducer (antenna). The control unit transmits a trigger pulse at a normal repetition rate of 250 MHz. The trigger pulse is sent to the transmitter electronics in the transducer via the control cable. The transmitter electronics amplify the trigger pulse into bipolar pulses that are radiated to the surface. The transformed pulses vary in shape and frequency according to the transducer used. In the

subsurface, variations of the signal occur at boundaries where there is a dielectric contrast (void, steel, soil type, etc.). Signal reflections travel back to the control unit and are represented as color graphic images for interpolation.

A typical electromagnetic (EM) utility locating system consists of a transmitter unit and a receiver unit. The receiver unit can be used independently of the transmitter unit in order to detect utility lines with an inherent EM signature (electric utility lines, water lines, etc.). If needed a current at a specific frequency can also be placed on a utility that is being located. This can be done via the transmitter unit by either direct connection or induction via an EM field varying at specific frequency. The receiver unit is then set to the selected frequency and the electromagnetic field created by the current running through the utility can be located allowing the utility to be marked.

GEOPHYSICAL METHODS

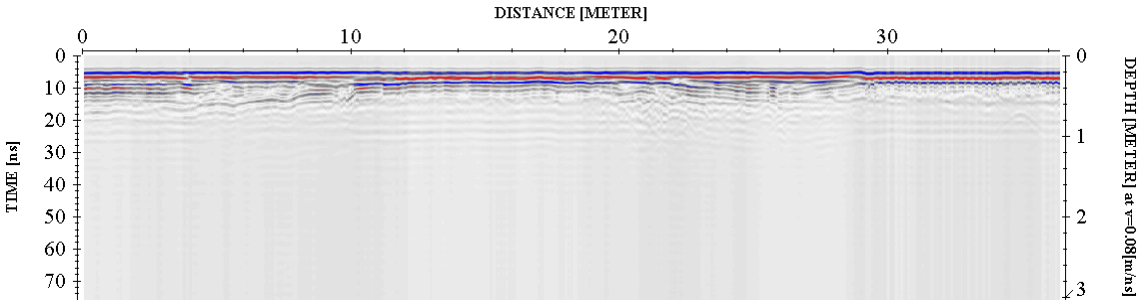
The project site was screened using GPR to search the specified area and inspected for reflections, which could be indicative of substructures and utilities within the subsurface. An EM utility locator was used to help determine the locations of utilities within the survey area.

EM data was collected and interpreted on site and suspected utilities marked as needed. GPR data profiles were collected for the areas of the Site specified by the client and processed as specified below.

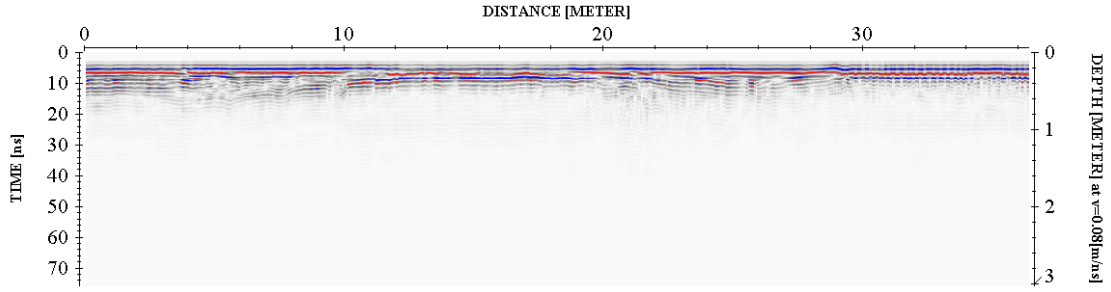
DATA PROCESSING

In order to improve the quality of the results and to better identify anomalies NOVA processed the collected data. The processing work flow is briefly described in this section.

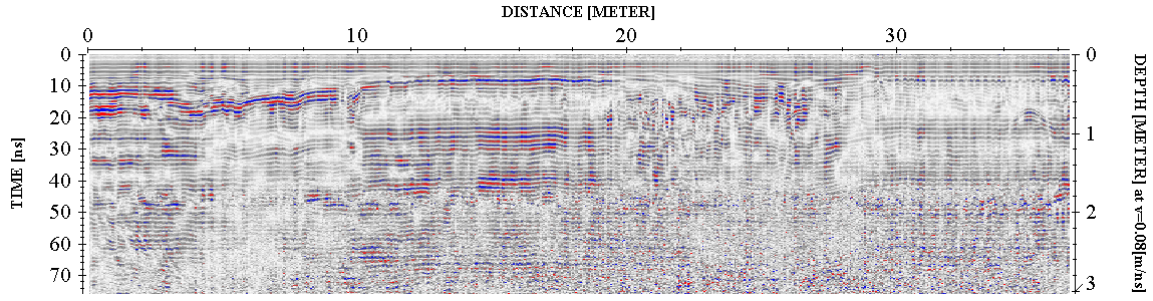
Step 1. Import Raw RAMAC data to standard processing format



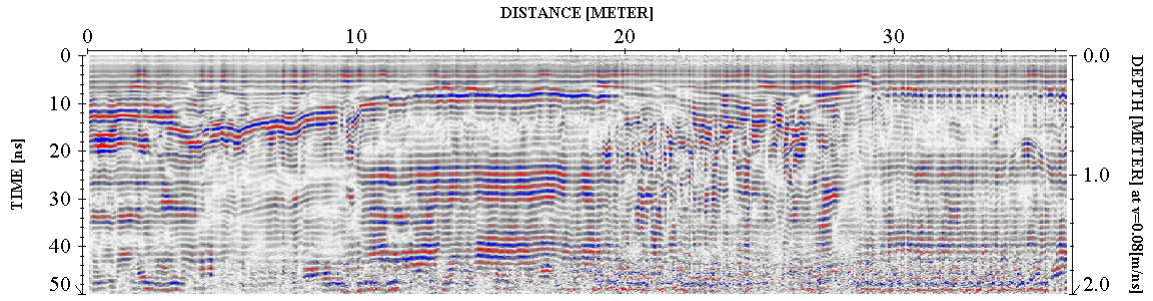
Step 2. Remove instrument noise *(dewow)*



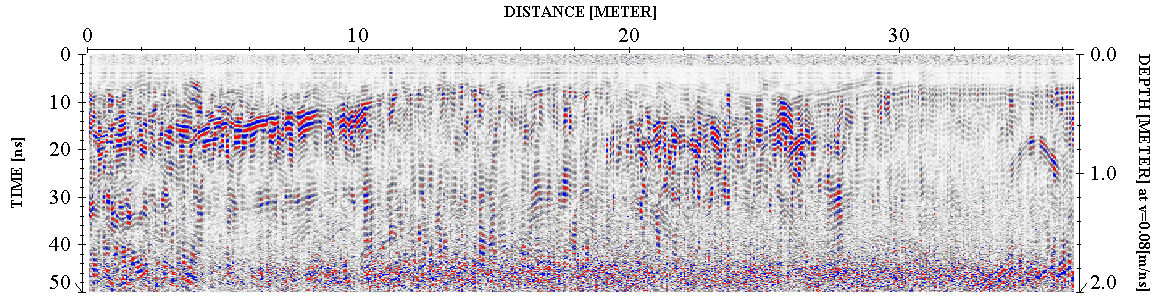
Step 3. Correct for attenuation losses *(energy decay function)*



Step 4. Remove static from bottom of profile *(time cut)*



Step 5. Mute horizontal ringing/noise *(subtracting average)*



The above example shows the significance of data processing. The last image (step 5) has higher resolution than the starting image (raw data – step 1) and represents the subsurface anomalies much more accurately.

PHYSICAL SETTINGS

NOVA observed the following physical conditions at the time of the survey.

Weather: Overcast

Temperature: 35° F

Surface: Asphalt, Concrete

Limitations: The geophysical noise level at the site was high due to having accumulated excessive fill materials on the property which appears to contained former structures with a basement.

RESULTS

The results of the geophysical engineering survey (GES) identified the following at the project site:

- Anomalies resembling potential subsurface utilities (such as drainage and conduit) were identified within the survey area. Shown in the survey plan.
- Two large geophysical anomalies resembling a potential buried foundation were identified during the GES. Shown in the Survey Plan.
- A suspected fill port was identified in the sidewalk of the survey area and traced entering an area of potential buried foundation. Shown in the survey plan. The GES could not identify the continuation of the above-mentioned anomaly / suspected fill port.
- All detected subsurface anomalies were marked in the onsite mark out.
- All cleared boring locations were marked in the onsite mark out.

If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

NOVA Geophysical Services

Levent Eskicakit, P.G., E.P.

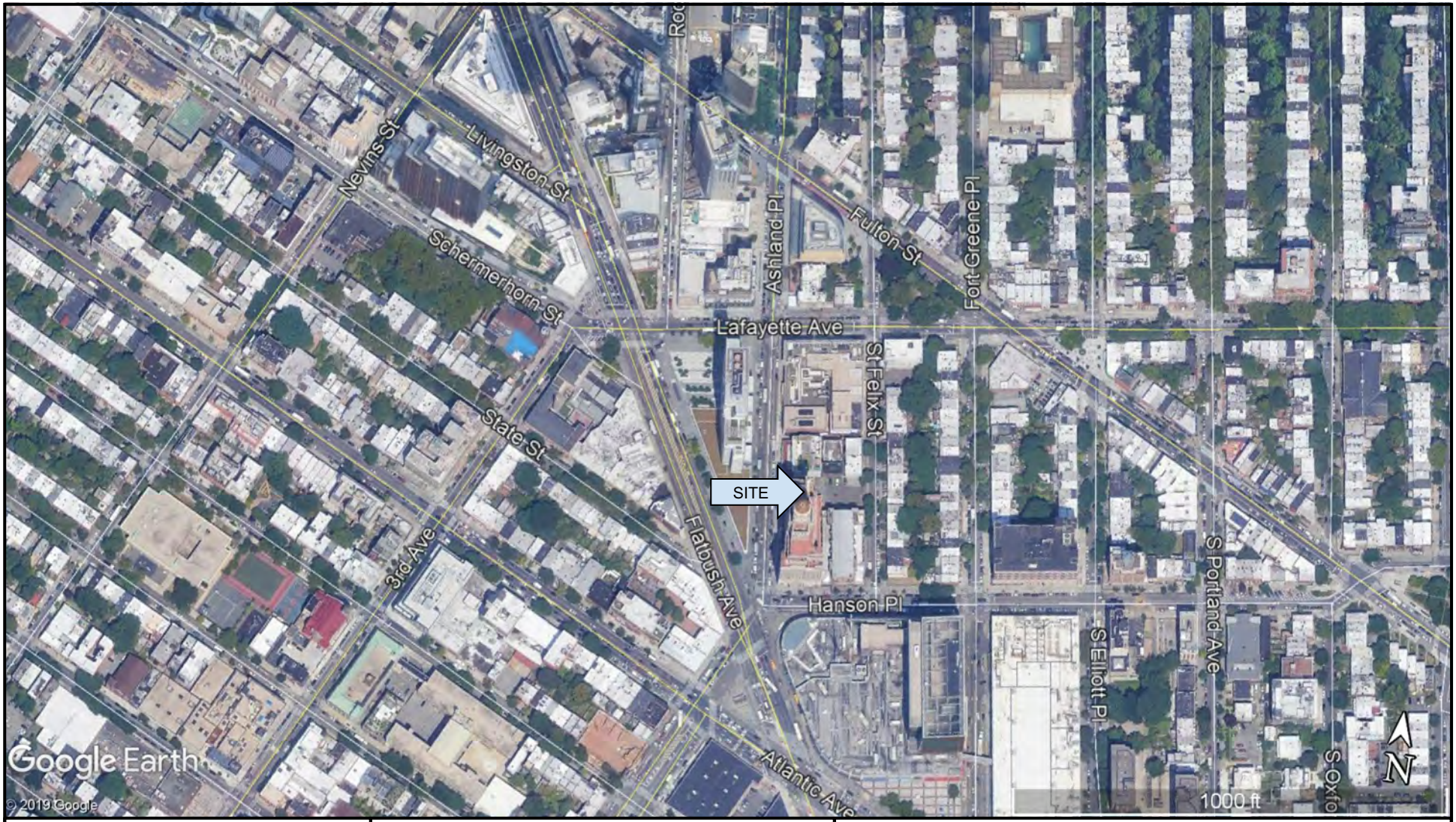
Project Engineer

Attachments:

Location Map

Survey Plan

Geophysical Images



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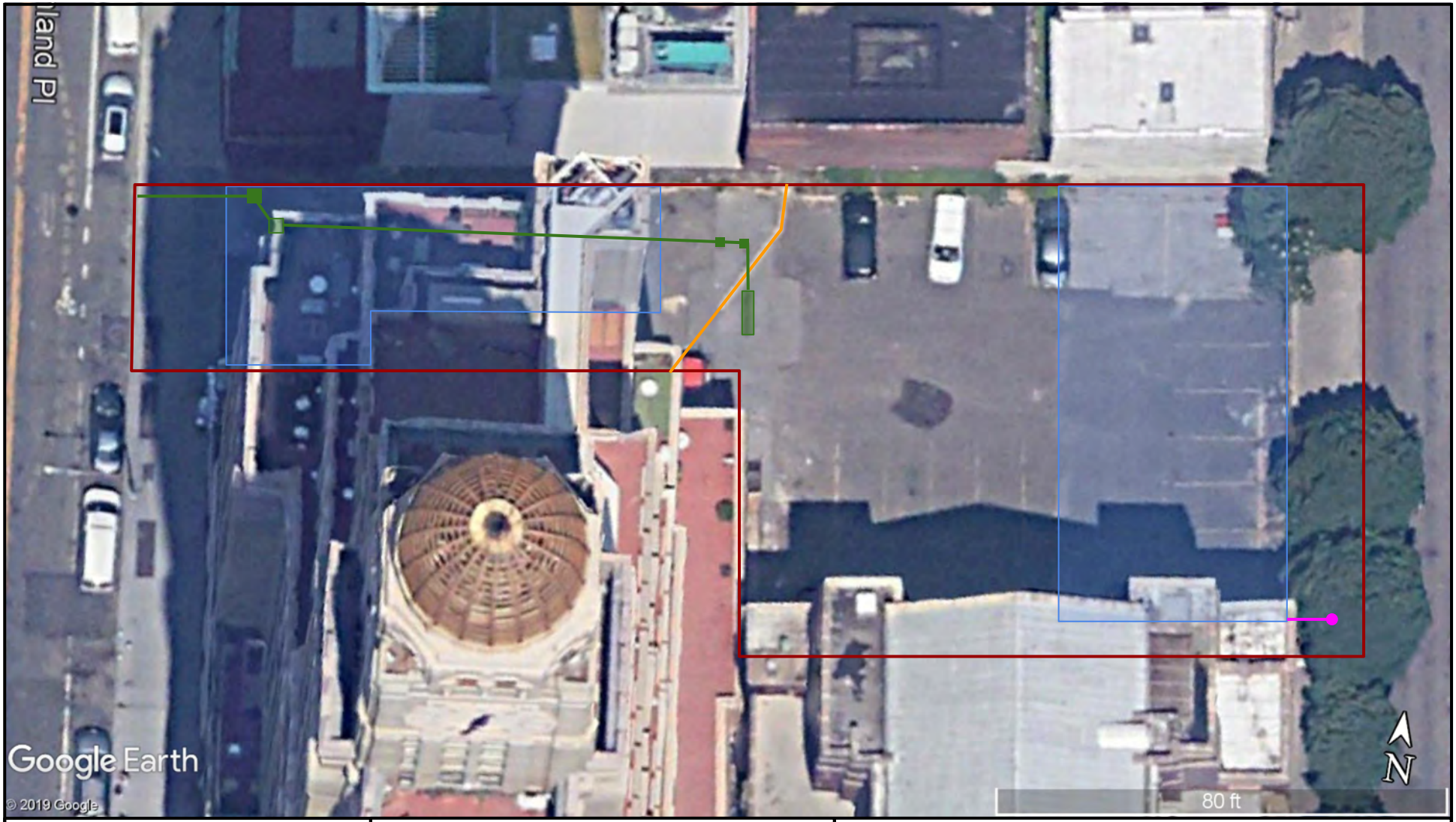
Location Map

SITE:	**Commercial Site** 130 Saint Felix Street, Brooklyn, New York 11217
CLIENT:	Langan
DATE:	January 10th, 2020
AUTH:	Chris Steinley

LEGEND



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SURVEY PLAN

SITE:	**Commercial Site** 130 Saint Felix Street, Brooklyn, New York 11217
CLIENT:	Langan
DATE:	January 10th, 2020
AUTH:	Chris Steinley

LEGEND

- Survey Area
- Conduit
- Cleanout
- Drain
- Former Foundation
- Fill Port

GEOPHYSICAL IMAGES

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