

A photograph of two construction workers in a quarry. One worker is on the left, wearing a white hard hat, a grey long-sleeved shirt, blue jeans, and orange work boots. They are holding a white GPR antenna probe. The other worker is on the right, wearing a white hard hat with a green logo, a grey long-sleeved shirt, black pants, and orange work boots. They are holding a blue GPR control unit with a screen and a keyboard. They are standing on a gravel surface with a large pile of white aggregate in the background. A line of palm trees is visible under a blue sky.

# GROUND PENETRATING RADAR

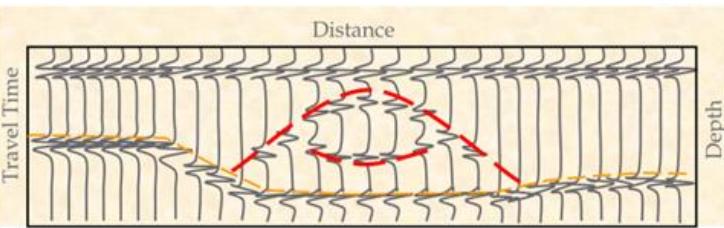
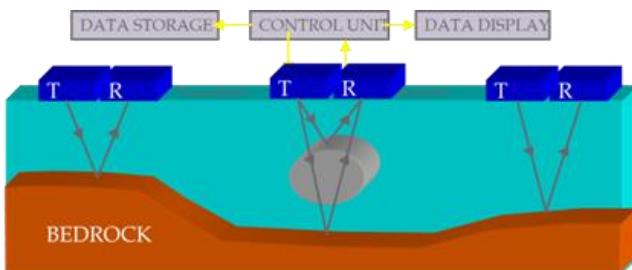
October, 2017

# Equipment and Scheme of GPR Survey



- The equipment for the survey from GSSI (Geophysical Survey System, Inc), from GPR IDS Italy or Mala from Canada.
- Type of equipment for survey in the field using SIR300 with 200MHz and 400MHz, IDS 200MHz and 600MHz or MALA from Mala Geo, Canada.

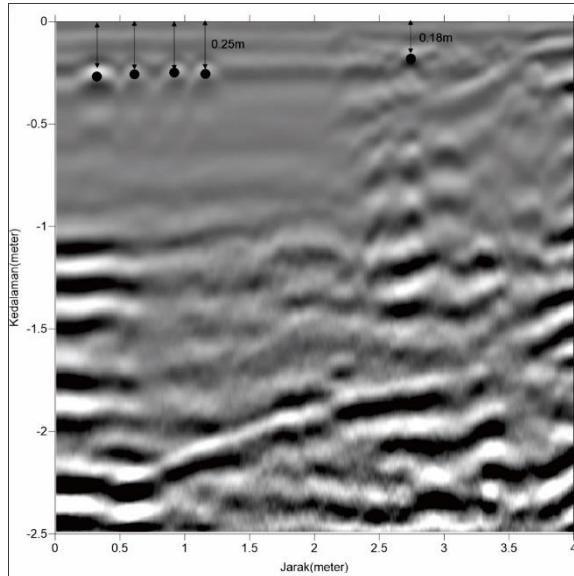
## GPR DATA ACQUISITION



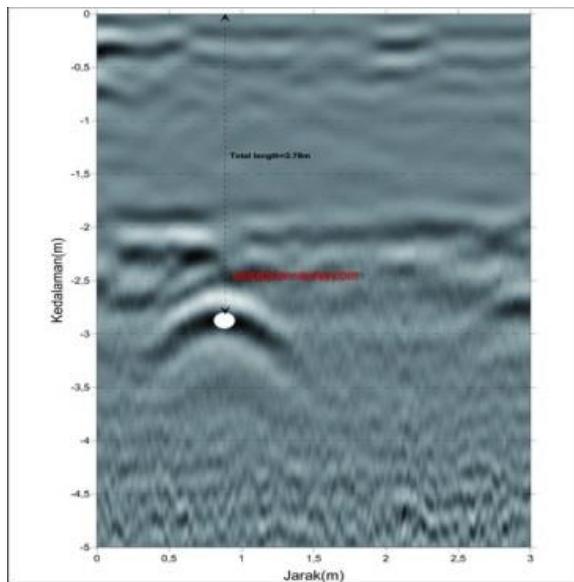
## SCHEME OF GPR SURVEY

- GPR is electromagnetic (EM) geophysical method for high resolution detection, imaging and mapping of subsurface objects and rock conditions.
- GPR system has three main components; transmitter, receiver (that are directly connected to an antenna), and control unit.
- The transmitting antenna radiates a short high-frequency EM pulse into the ground, where it is refracted, diffracted and reflected.
- The result of scanning will be displayed as an amplitude.

# Interpretation of GPR Data



GPR RESULT FOR FIBER OPTIC



GPR RESULT FOR PIPE

- GPR survey will be identified all objects in line survey acquisition as distance, depth, thickness, diameter and type of objects
- Strong amplitude identified as concrete medium and low amplitude as porous medium ;soil, sediment
- Pipes and cables will be identified as hyperbole anomaly ,strong anomaly as pipe and low anomaly as PVC
- Wide hyperbole identified as high diameter and small Hyperbole as small object or small diameter



Mala 200MHz



IDS 200MHz

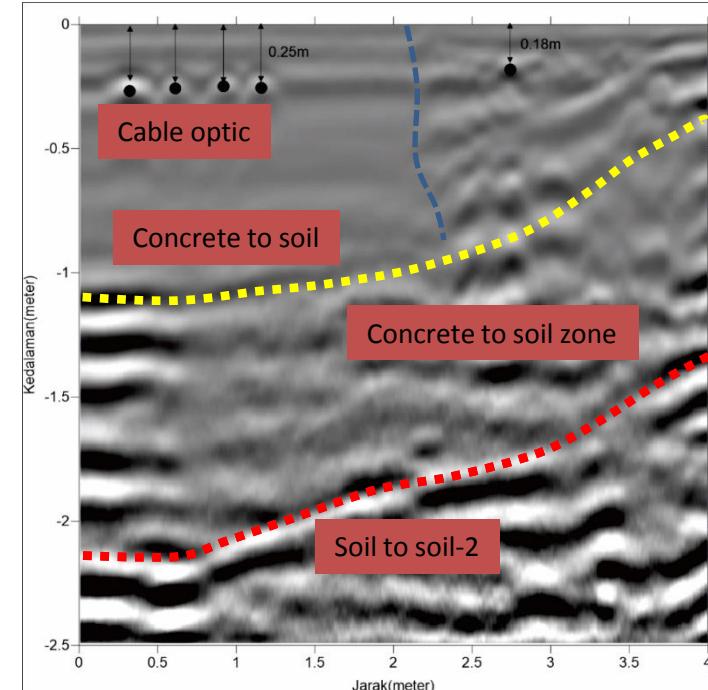


GSSI 400MHz



Mala RTA 25MHz

# Get Information from GPR Result



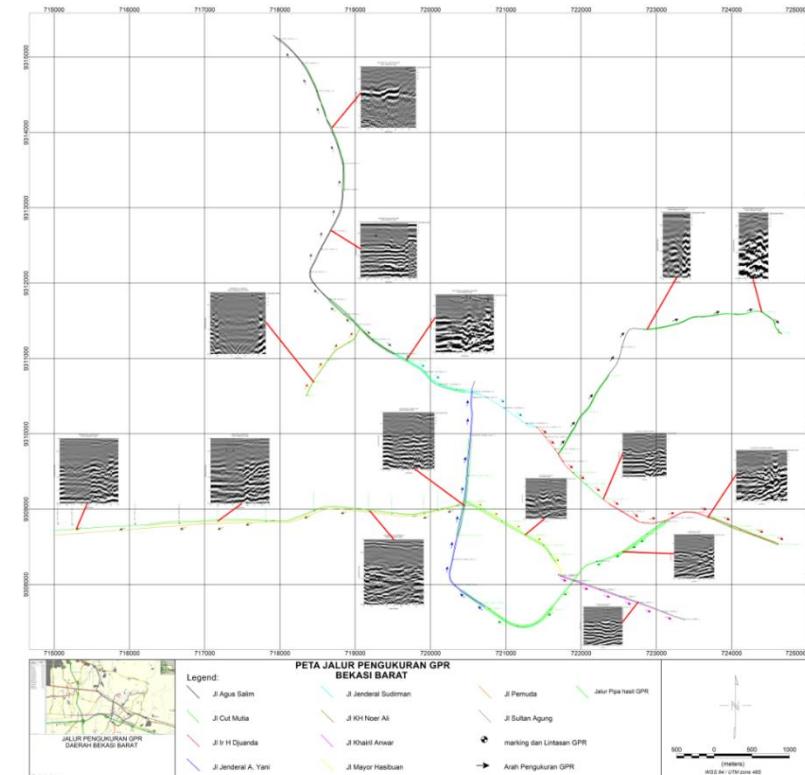
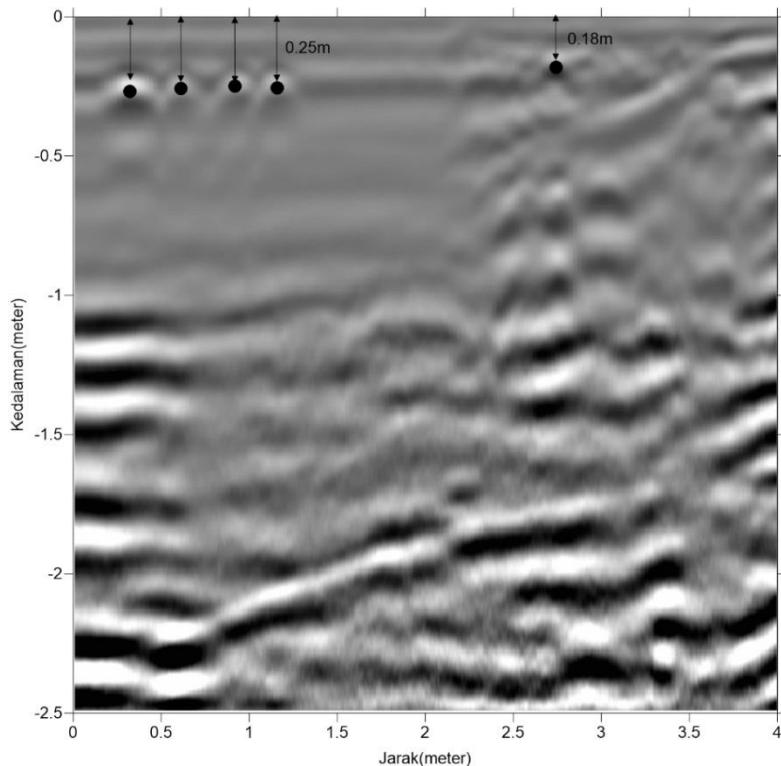
- Scanning result shown as hyperbole respond for utility and cilinder object
- Concret and low conductivity will be shown as continouse layer (yellow and red dash) and uncontinuity of layer shown as black dash (homogen and various layer).

## Information of underground facilities from GPR

No.	File_Name	Location	Length(m)	Orientation		Indication								Size( Inch)					
				South(S),North(N),West(W),East(E)				1	2	3	4	1	2	3	4	1	2	3	4
1	BTR_117	CRS_BTR	1.67		N-S	0.62				0.69					Electrical Cable				3
2	BTR_030	CRS_BTR	12.5		N-S	0.67				1.2					Pipe				18
3	BTR_021	CRS_BTR	12		W-E	8.4				0.9					unidentified object				
4	BTR_023	CRS_BTR	12		E-W														
5	BTR_024	CRS_BTR	12		W-E														
6	BTR_129	CRS_BTR	9.5		N-S	4.1	5.7	8		2.3	2.18	2.09			Pipe				23 21 11
7	BTR_130	CRS_BTR	9.5		N-S	4.14	5.5	7.8		2.336	2.18	2.09			Pipe				22 21 11
8	BTR_028	BTR	10		S-N	0.8				1.2					Pipe				18
9	BTR_029	BTR	10		S-N	0.8				1.1					Pipe				18
10	BTR_031	BTR	10		S-N	1				1					Pipe				18
11	BTR_032	BTR	10		S-N	1				1					Pipe				18
12	BTR_033	BTR	10		S-N	0.9				1.1					Pipe				18
13	BTR_034	BTR	10		S-N	0.9				1					Pipe				18
14	BTR_035	BTR	10		S-N	1.2				1					Pipe				18
15	BTR_036	BTR	10		S-N	0.8				1.1					Pipe				18
16	BTR_037	BTR	10		S-N	0.7				1.2					Pipe				18
17	BTR_038	BTR	10		S-N	0.8				1.1					Pipe				18
18	BTR_039	BTR	10		S-N	0.7				1.1					Pipe				18
19	BTR_040	BTR	10		S-N	0.7				1.1					Pipe				18
20	BTR_041	BTR	10		S-N	0.4				1.1					Pipe				18
21	BTR_042	BTR	10		S-N	0.6				1.3					Pipe				18
22	BTR_043	BTR	10		S-N	1				1					Pipe				18
23	BTR_044	BTR	10		S-N														
24	BTR_045	BTR	10		S-N	1.1				1					Pipe				18
25	BTR_046	BTR	10		S-N	1.1				1.1					Pipe				18

# Utilities Plot on The Map

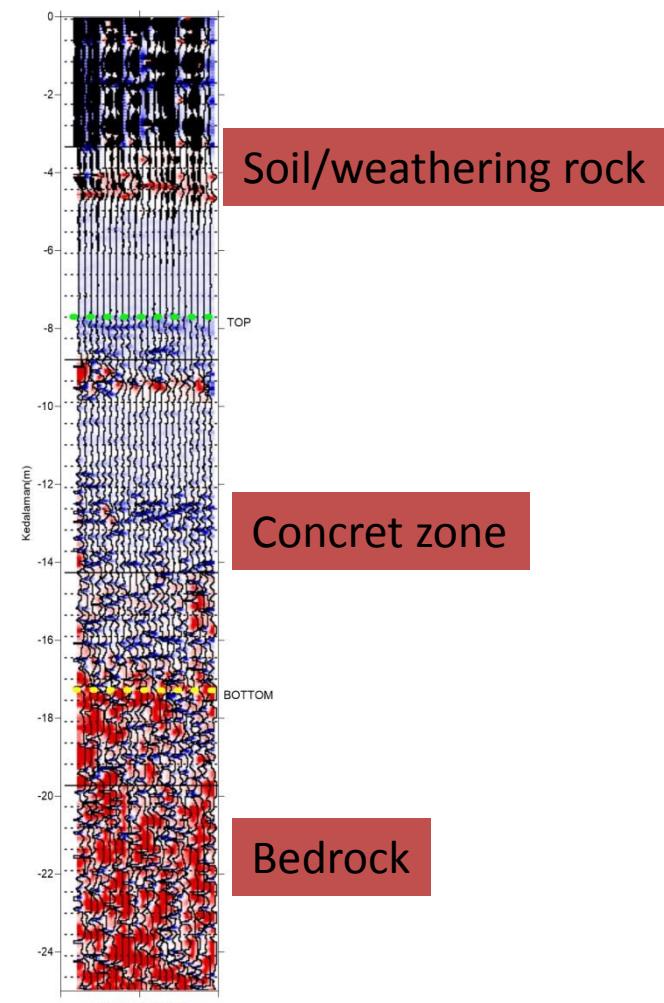
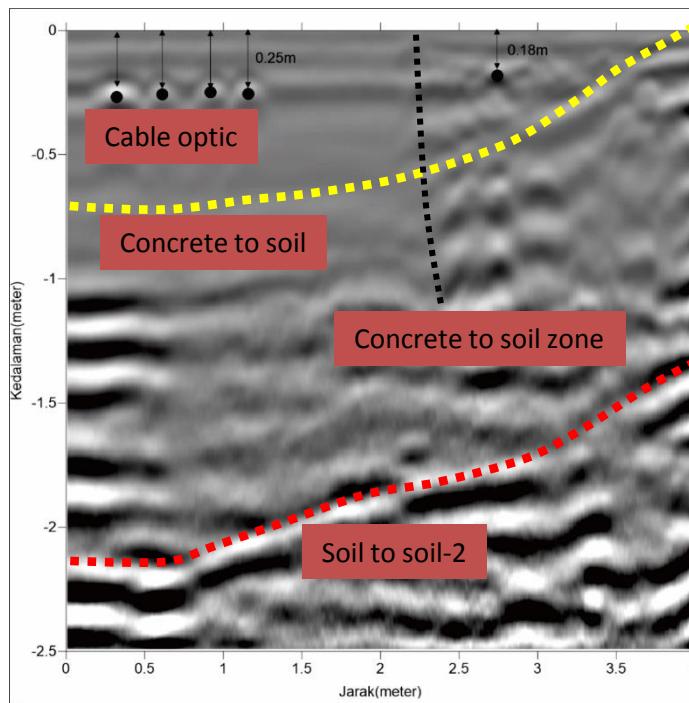
1. Section 2-D radargram based on identified design grid (regional and detail)
2. Plot plan identified obejct (utilities, concret object and so on)



Plot Plan identified obejct

# Bore Pile Investigation

- To investigate of bore pile or vertical object can be used static measurement. The result will be shown as stratigraphy rock/layers.
- High amplitude shows as non concret medium and homogen amplitude shows as concret medium.



# Experiences List

year	project	client	Location
2017	GPR for concrete and Utilities	WIKA	Lombok
2015	GPR for geological subsurface	PT KIMCO	Tenggarong
2015	GPR for subsurface investigation (pipe, cables)	Petronas Offshore Gresik	Gresik, Jatim
2015	GPR for nickel laterite exploration	BSA Group	North Konawe, SouthEast Sulawesi
2015	GPR for subsurface investigation (pipe, cable and concrete)	PT Bintang Subsea/Petronas/PGN Gresik	Gresik, Jawa Timur
2014	GPR for geotech and utilities	Pemda Bekasi	Bekasi Barat
2014	GPR for pipe investigation	Pertamina Avtur	Cengkareng, Banten
2014	Training Latest technology from UltraGPR for deep penetration target	UltraGPR Canada	Jakarta
2014	GPR for mapping utilities (cable and pipe)	Angkasa Pura	Cengkareng, Banten
2014	GPR for concrete investigation	Wika	Jakarta Pusat
2013	GPR for bore pile investigation	Wika-Museum Nasional	Jakarta Pusat
2013	GPR for bore pile investigation	Wika	Jakarta Pusat
2012	GPR for Coal exploration	EBL	Kalimantan Selatan
2011	Ground Penetrationg Radar Acquisition and data processing for Coal Exploration	Berau Coal Energy	East Kalimantan-Indonesia
2011	Ground Penetrationg Radar Acquisition and data processing for structures delineation	PT Sentosa	East Kalimantan-Indonesia
2011	Ground Penetrationg Radar Acquisition and data processing for UXO Detection	Seascape Survey Indonesia	Saumlaki and Kore Island-indonesia
2011	GPR for Coal and iron ore exploration	SILO	Pulau Laut
2011	GPR for Coal exploration	RecsaLog	Tasikmalaya
2011	GPR for Cavity	Berau Coal Energy	Berau-Kalimantan Timur
2011	GPR for Coal exploration	PCI	Muarakaman-Kalimantan Selatan
2011	GPR for Coal exploration	MRI	Muarateweh-Kalimantan Tengah