Appendix 7

Result of the investigation on Nueva Santa Rosa

Investigation and analysis of La Guillen and Nueva Santa Rosa

Working Group1 & 2

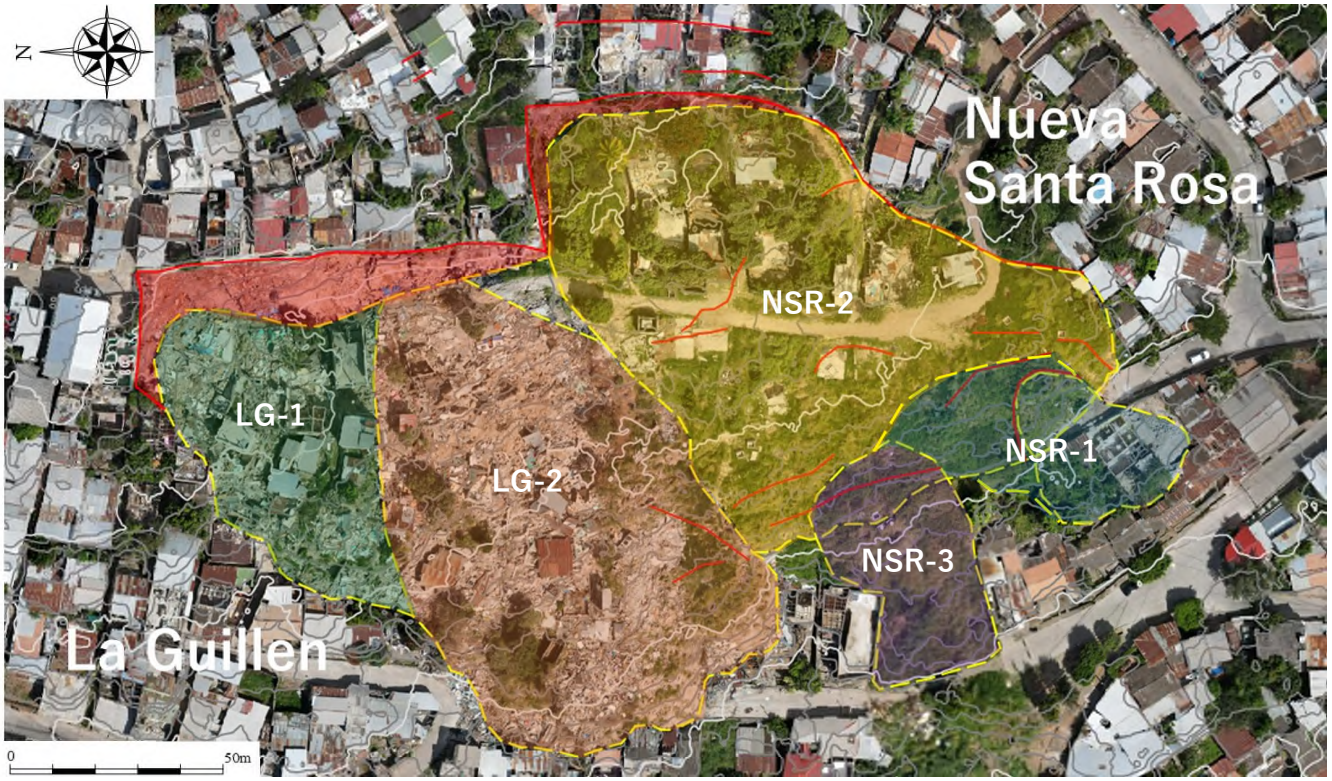
Project for Control and Mitigation of Slope Disasters in the Central District in Republic of Honduras

Contents

1. Compiling and analysis of investigation result of LG and NSR

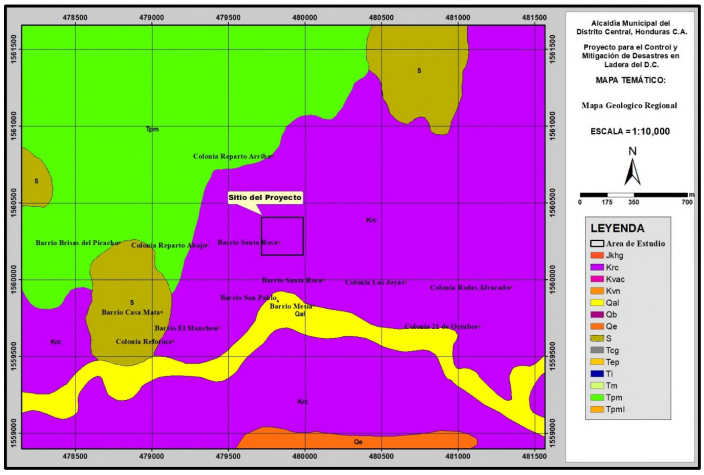
- The landslides in the La Guillen and Nueva Santa Rosa areas that collapsed in September 2022 are being investigated and monitored, especially in the NSR since 2010 when the first landslide occurred. The results of these investigations were summarized, and the mechanism of the disaster occurrence was discussed.
- Based on the results of the investigation, the models of both landslides were created for stability analysis and design.

1-1. Landslide block in NSR and LG areas



1-2. Geology

- Formación Río Chiquito (Roger, 1994).
- Rocas sedimentarias principalmente lutitas y areniscas y ocasionalmente conglomerados cuarzos.
- Las capas de lutitas presenta un buzamiento general de 38 NW, en la zona de estudio es de 77SW.
- Se encuentran en contacto con el Miembro Cerro Grande (Williams & McBirney, 1969).
- Esta formado principalmente por ignimbritas y tobas, ocasionalmente sedimentos volcánicos mezclados con sedimentos, originados de rocas sedimentarias de Krc.
- Se encuentra en discordancia angular con Krc, se observan zonas de inestabilidad en esta zona de contacto.



1-2. Geology

- De las observaciones en superficie se pudieron observar afloramientos de un deposito de toba (Ignimbrita) retrabajados: Material sedimentario compuesto por bloques angulosos de máximo 1m (tobas) en una matriz más fina del mismo material. Los bloques evidencian poco transporte por lo tanto se estiman que son depósitos coluviales o aluviales de la secuencia Tpm del grupo Padre Miguel.
- El espesor de este deposito puede variar desde unos pares de metros a casi inexistente en las vecindades del sitio piloto, dejando expuesto el basamento rocoso de lutitas de la formación Rio Chiquito.

1-3. Geological/Geotechnical Investigation

- Boring survey

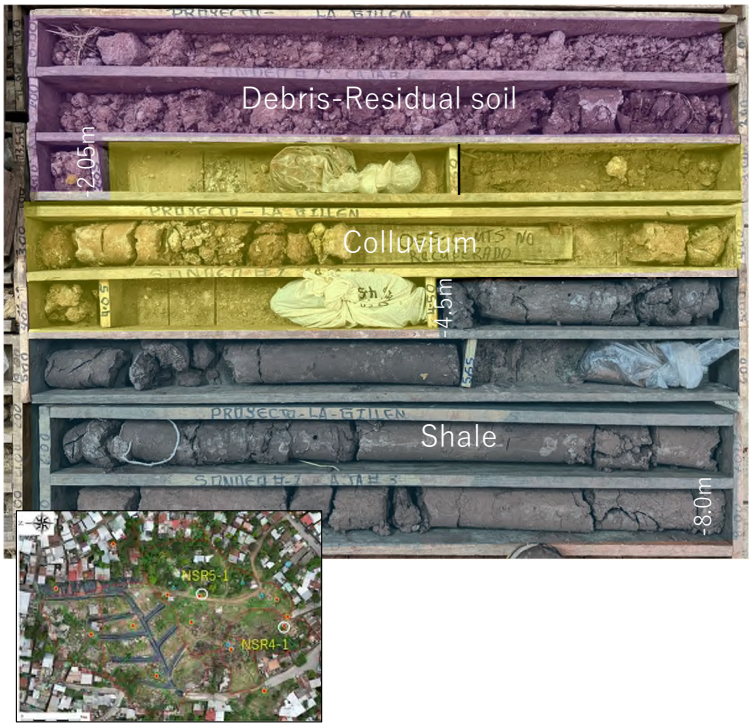
A number of borehole investigations have been conducted in the area. The purpose is to determine the geological conditions of the study area and to install monitoring wells of landslide activity and GWL.

There are 8 boreholes conducted core boring in NSR area and 3 boreholes in the LG area. These are important surveys for understanding the geological conditions of the subject landslide.

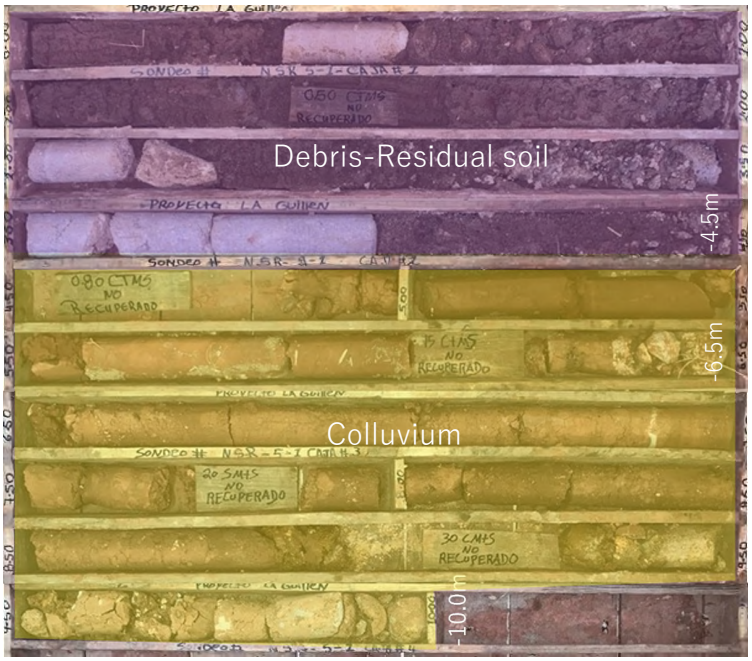
Location of point of core boring executed

Core sample-NSR

NSR4-1



NSR5-1



Core sample-LG

LG2-1

LG3-1

Laboratory test

Samples were collected on the scarp of landslide in LG and laboratory tests were conducted using the samples by Engineering Facility of UNAH.

MUESTRA:	MUESTRA #1
UBICACIÓN:	PUNTO A
HUMEDADDE MUESTRA:	13.9%
PESO VOLUMÉTRICO:	2.04g/cm³

ANÁLISIS GRANULOMÉTRICO MECÁNICO ASTM D 422

Tamiz	Porcentaje pasado (%)
1	100.0
3/4"	98.5
3/8"	96.1
#4	91.9
#10	83.8
#40	64.9
#200	44.6

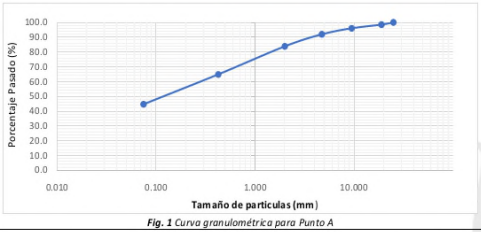


Fig. 1 Curva granulométrica para Punto A

LÍMITES DE CONSISTENCIA ASTM D 4318	
Límite Líquido	40.5
Límite Plástico	23.8
Índice de Plasticidad	16.7
CLASIFICACIÓN DEL SUELO ASTM D 2487	
Clasificación Unificada	SC(Arena Arcillosa)

MUESTRA:	MUESTRA #2
UBICACIÓN:	PUNTO C
HUMEDADDE MUESTRA:	11.82 %
PESO VOLUMÉTRICO:	1.95g/cm³

ANÁLISIS GRANULOMÉTRICO MECÁNICO ASTM D 422

Tamiz	Porcentaje pasado (%)
3/4"	100.0
3/8"	99.4
#4	98.1
#10	91.6
#40	65.9
#200	49.0

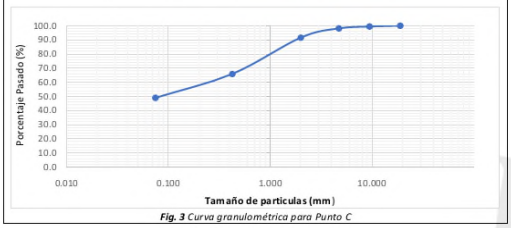


Fig. 3 Curva granulométrica para Punto C

LÍMITES DE CONSISTENCIA ASTM D 4318	
Límite Líquido	47.8
Límite Plástico	25.00
Índice de Plasticidad	22.83
CLASIFICACIÓN DEL SUELO ASTM D 2487	
Clasificación Unificada	SC (Arena Arcillosa)

Nota: No fue posible realizar ensayo de cortante directo a la muestra Punto C, debido al bajo porcentaje de humedad y alto contenido de raíces.

PARÁMETROS DE RESISTENCIA AL CORTE MEDIANTE ENSAYO DE CORTE DIRECTO ASTM D3080

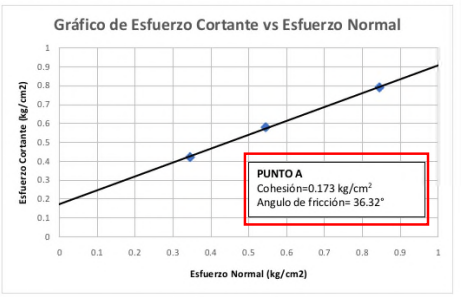
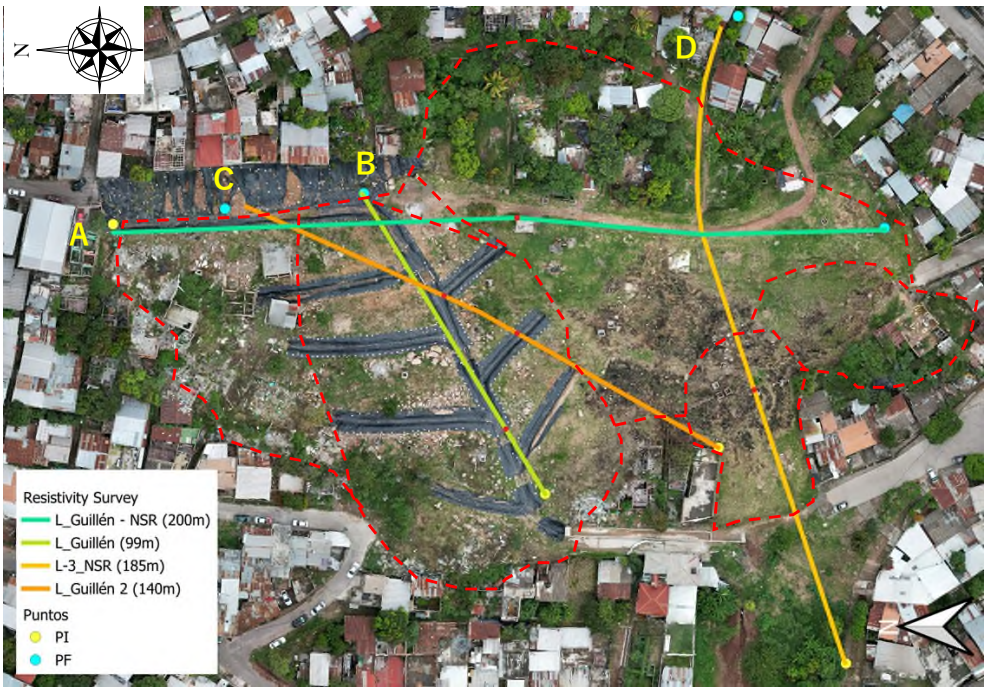


Fig.2Envolvente de falla para Punto A

1-3. Geological/Geotechnical Investigation

- Geophysical survey (Electrical Resistivity Survey)

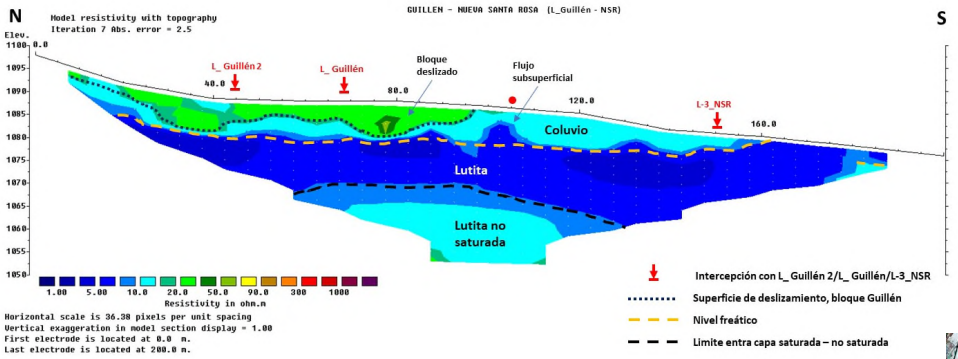


Electrical resistivity survey was implemented by IHCIT, UNAH after the landslide happened.

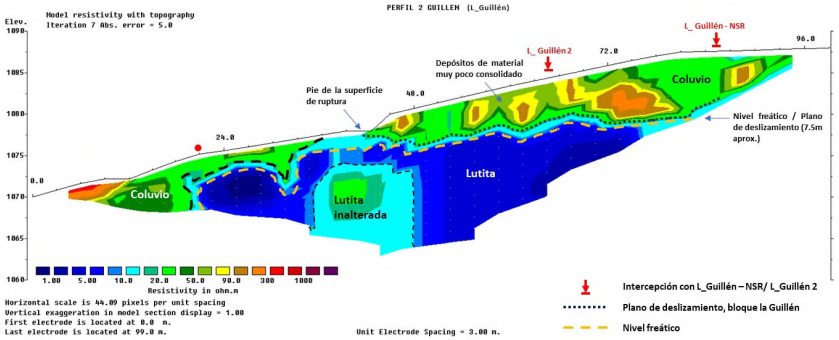
Source: **IHCIT, UNAH Resistivity survey….** Colonia Guillen - Nueva Santa Rosa, julio/noviembre 2023 (partially modified)

- Geophysical survey (Electrical Resistivity Survey)

A



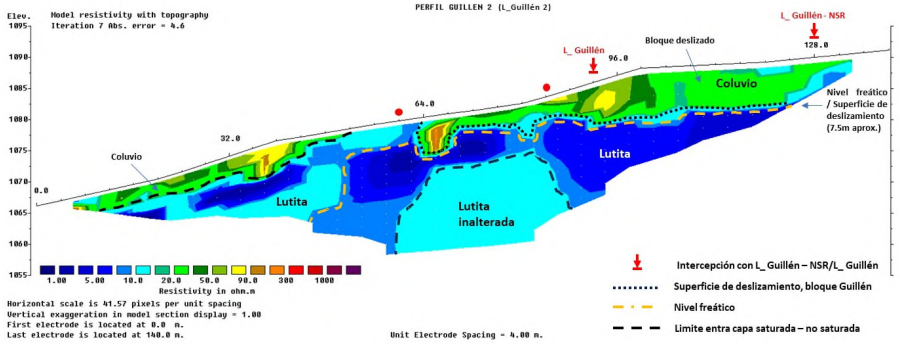
B



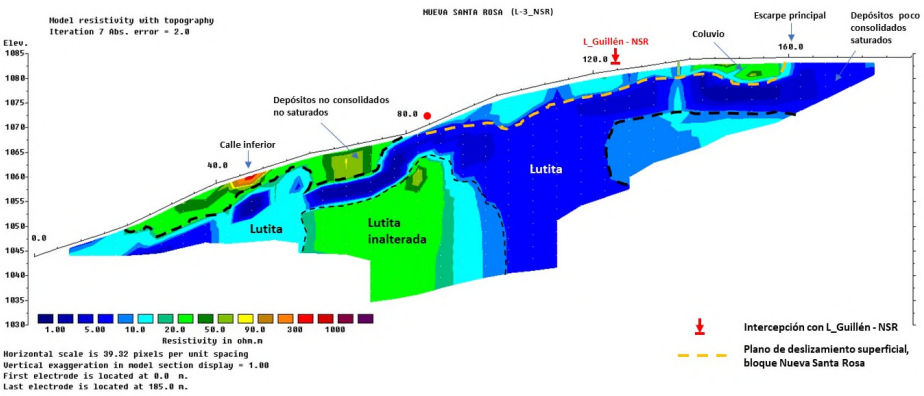
Source: ICHIT, UNAH Resistivity survey…. Colonia Guillen - Nueva Santa Rosa, julio/noviembre 2023

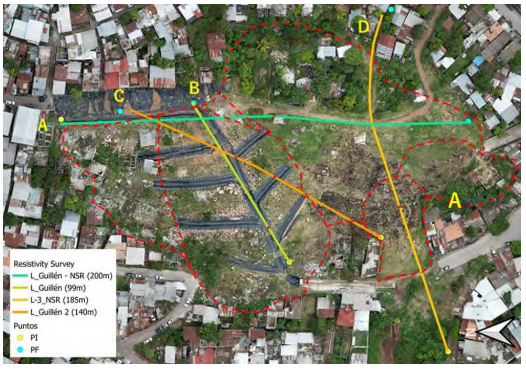
- Geophysical survey (Electrical Resistivity Survey)

C



D





Source: ICHIT, UNAH Resistivity survey…. Colonia Guillen - Nueva Santa Rosa, julio/noviembre 2023

1-4. Monitoring

- Landslide monitoring has been conducted since April 2018 in the NSR area, which has a long history of landslide occurrence. The project has also installed monitoring boreholes in the NSR area for monitoring. However, due to Hurricane ETA/IOTA in 2020 and a major collapse in 2022, the existing monitoring wells in the landslide block were damaged, making it impossible to continue observations. However, the monitoring results until then can be used for analysis.
- Monitoring wells were installed in the NSR and LG areas from 2023 to 2024. As a result, we were able to confirmed the slip surface in the LG area and also determined the shape of the NSR slip surface.

N

Location of monitoring well

Legend

Landslide block

Inclinometer (Active)

Inclinometer (N/A)

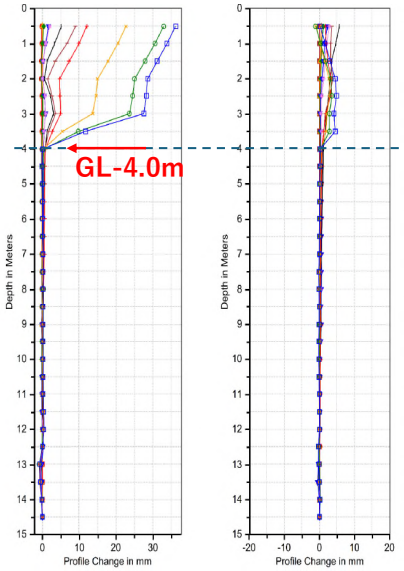
Piezometer (Active)

Piezometer (N/A)

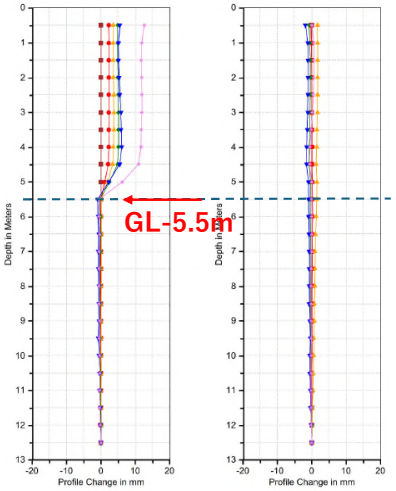
NSR2-1 Well Number

Inclinometer-Nueva Santa Rosa area

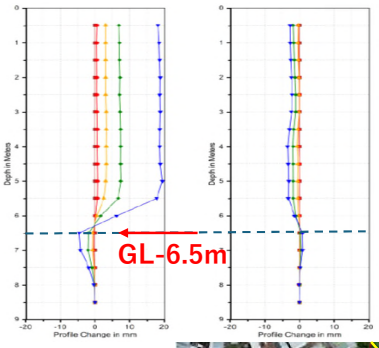
NSR1-1

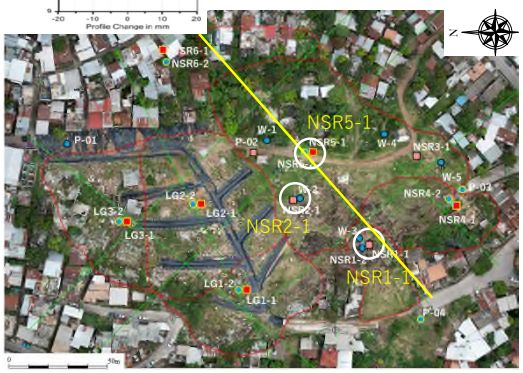


NSR2-1



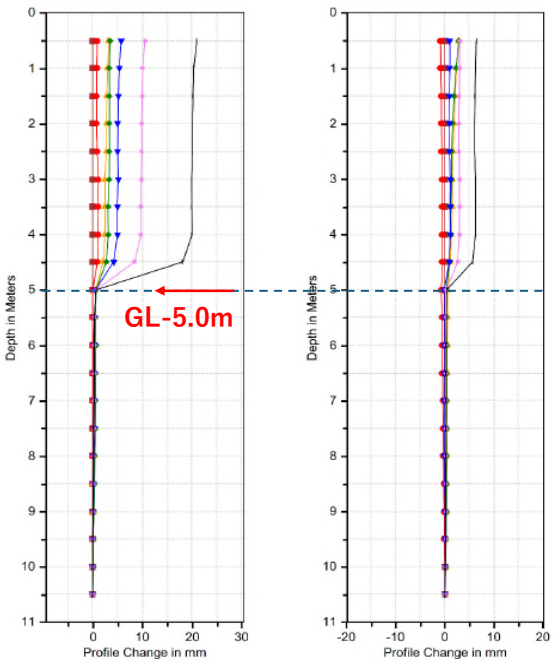
NSR5-1



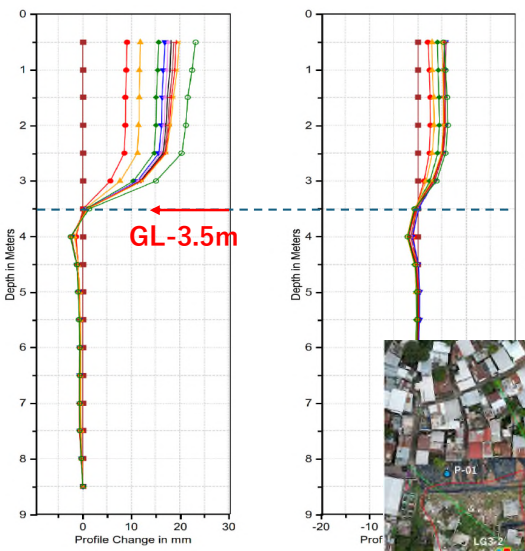


Inclinometer-Nueva Santa Rosa area

NSR3-1

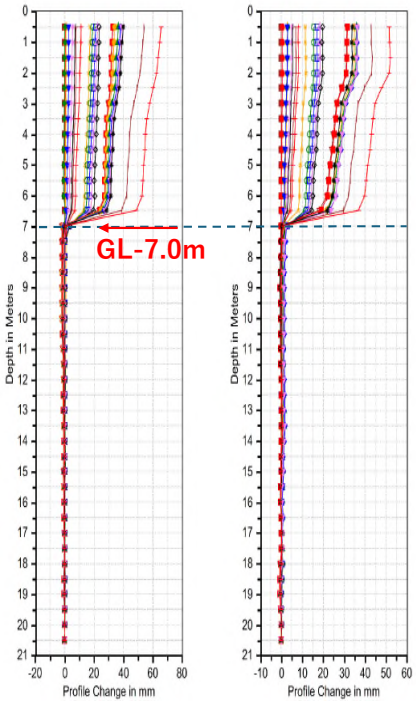


NSR4-1

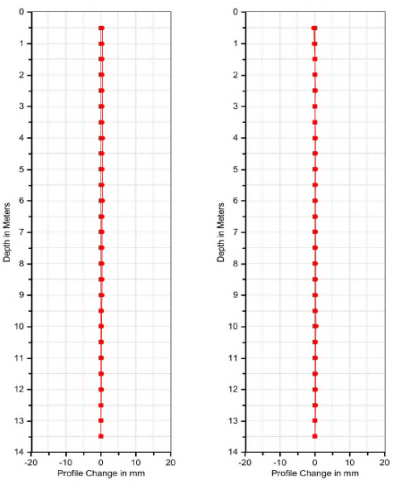


Inclinometer-Nueva Santa Rosa area

P-02



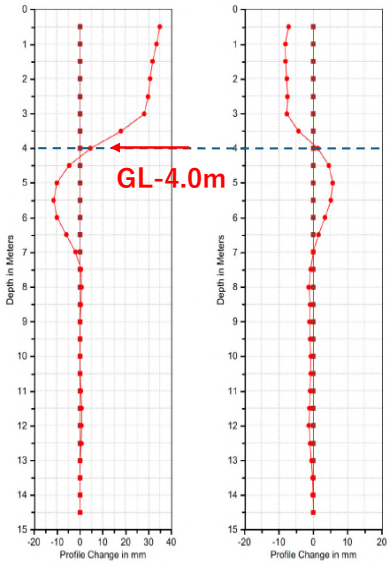
NSR6-1



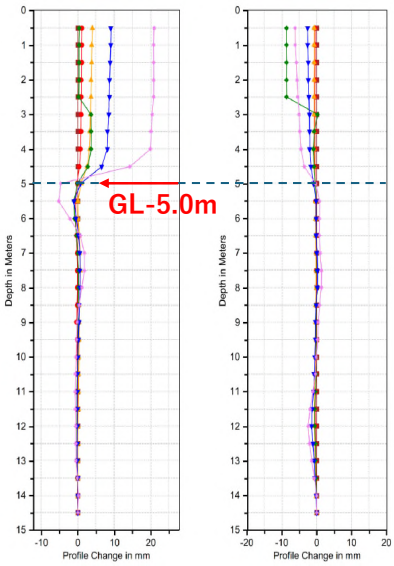
No deformation

Inclinometer-La Guillen area

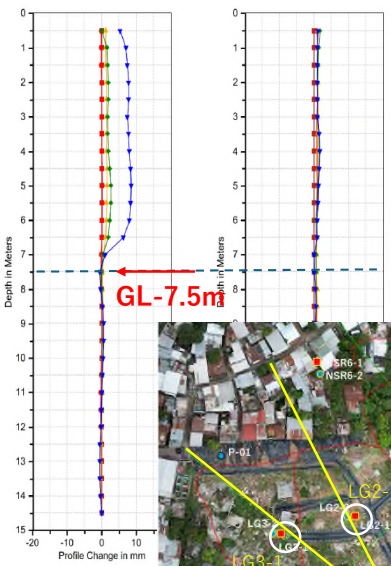
LG1-1



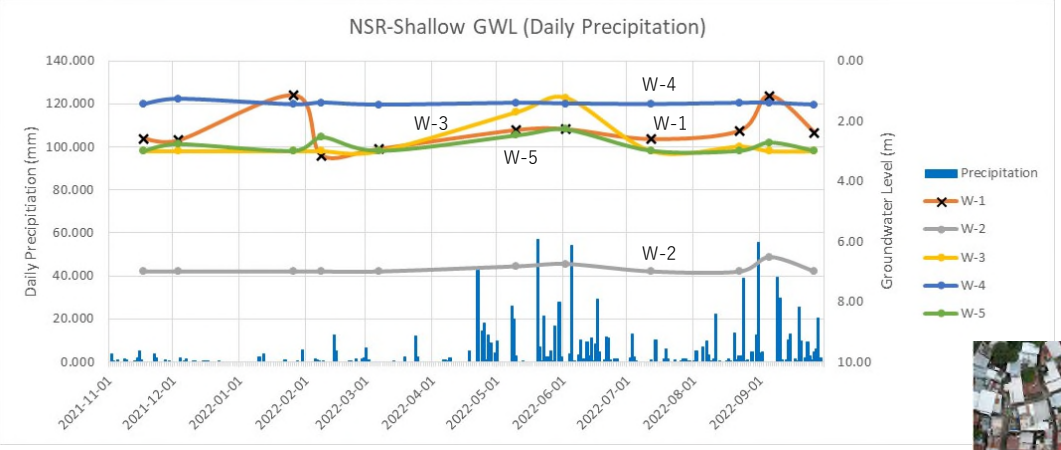
LG2-1



LG3-1

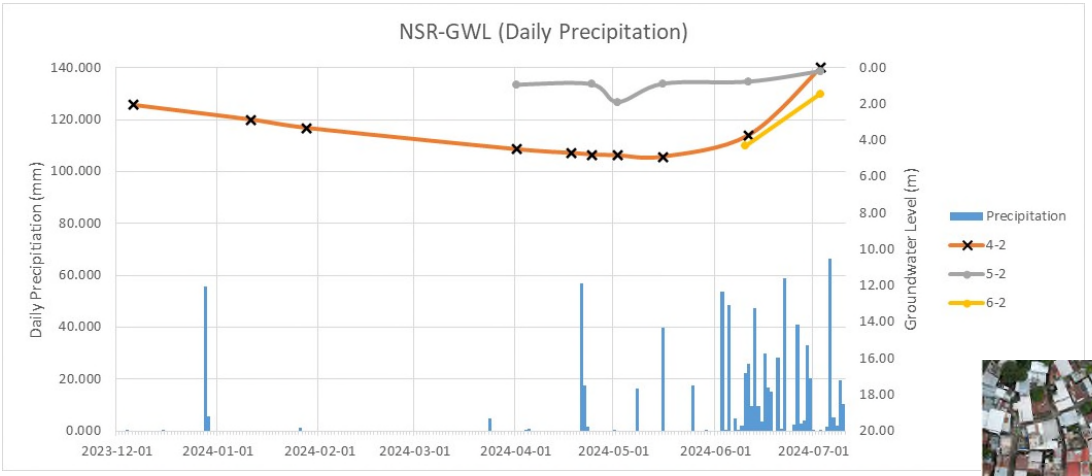


Groundwater level-Nueva Santa Rosa



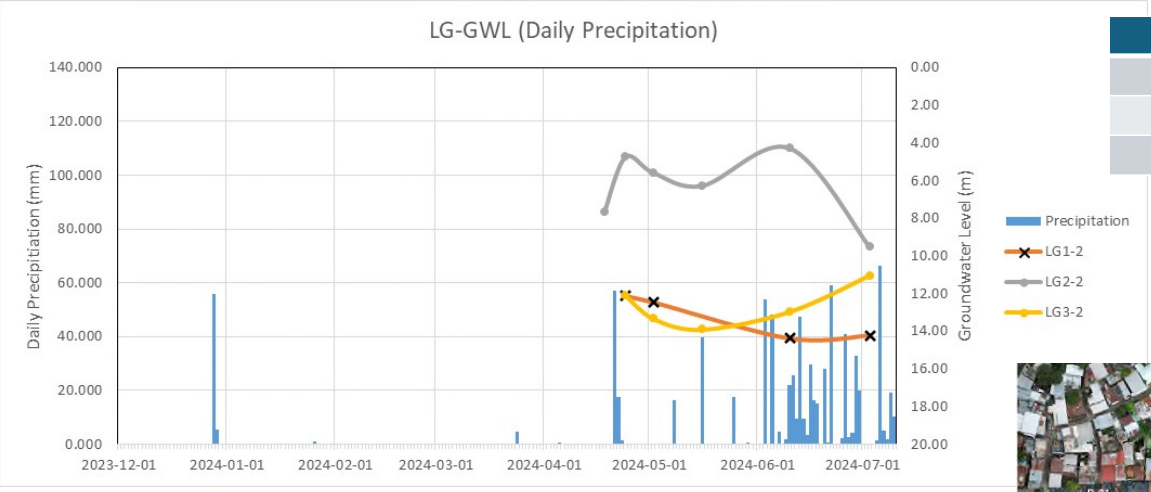
Well No.	HGWL
W-1	GL-1.15m
W-2	GL-6.52m
W-3	GL-1.24m
W-4	GL-1.27m
W-5	GL-2.27m

Groundwater level-Nueva Santa Rosa



Well No.	HGWL
NSR4-2	GL-0.00m
NSR5-2	GL-0.20m
NSR6-2	GL-1.45m

Groundwater level-La Guillen

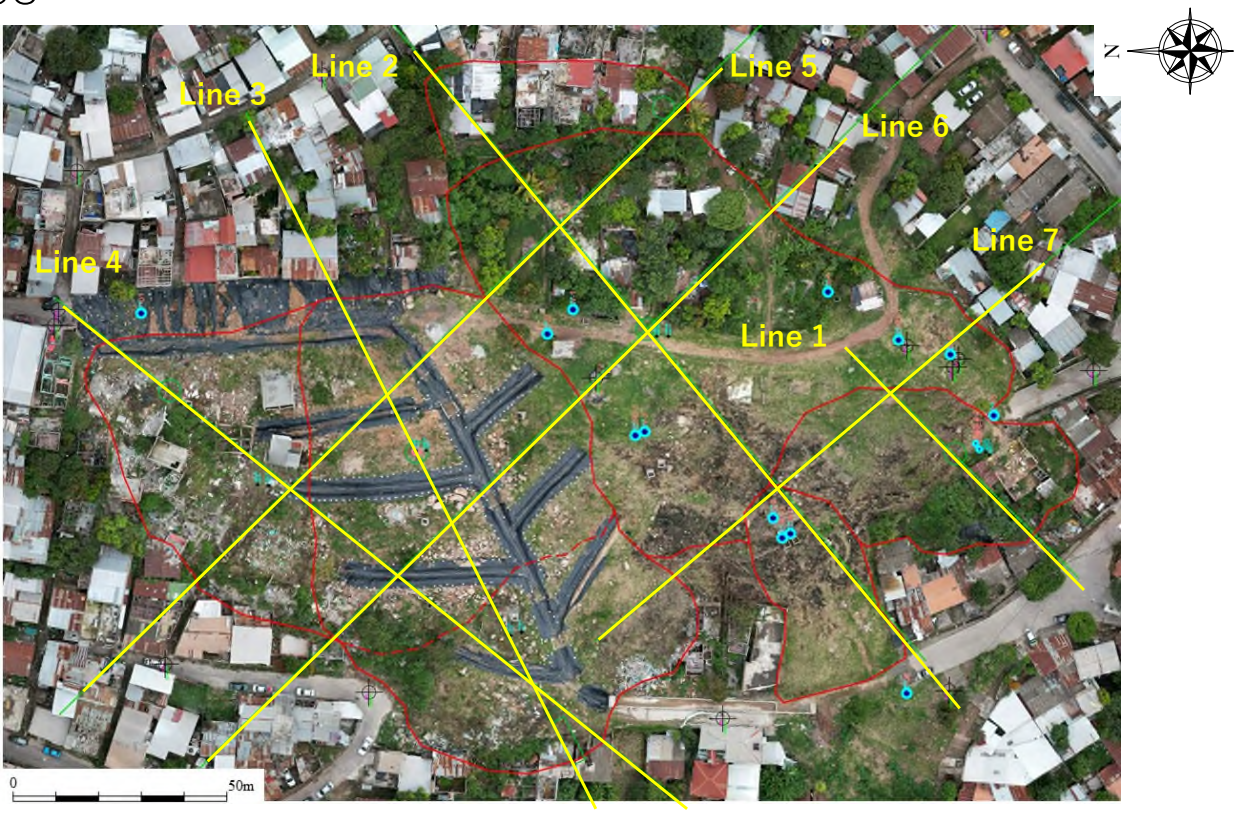


Well No.	HGWL
LG1-2	GL-12.12m
LG2-2	GL-4.27m
LG3-2	GL-11.05m

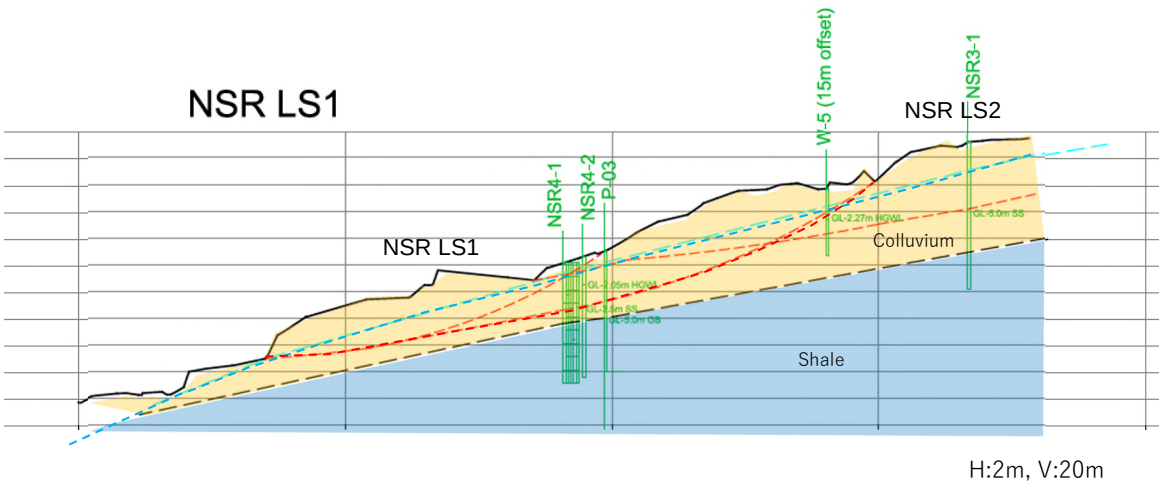
1-5. Compiling and Analysis

- Landslide monitoring has been conducted since April 2018 in the NSR area, which has a long history of landslide occurrence. The project has also installed monitoring wells in the NSR area for monitoring. However, due to Hurricane ETA/IOTA in 2020 and a major collapse in 2022, the existing monitoring wells in the landslide block were damaged, making it impossible to continue observations. However, the monitoring results until then can be used for analysis.
- Monitoring wells were installed in the NSR and LG areas from 2023 to 2024. As a result, we were able to confirm the slip surface in the LG area and also determine the shape of the NSR slip surface.

Survey lines

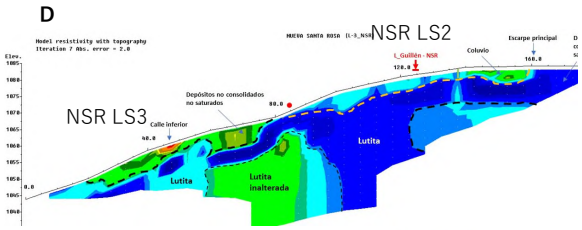


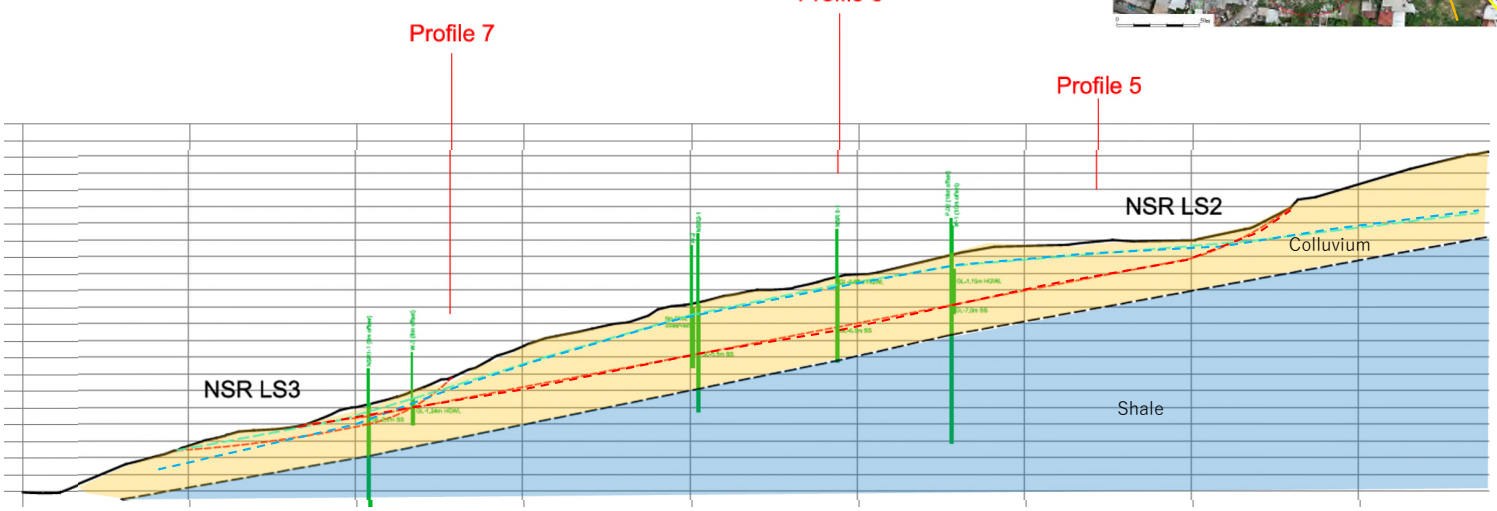
Cross section Line-1



H:2m, V:20m

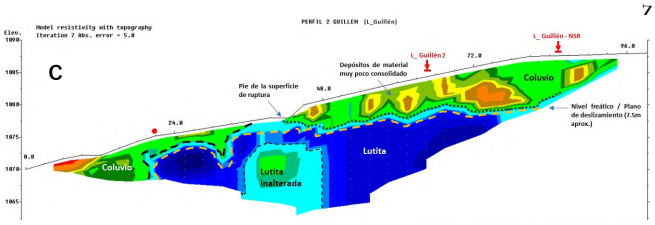
CS Line-2

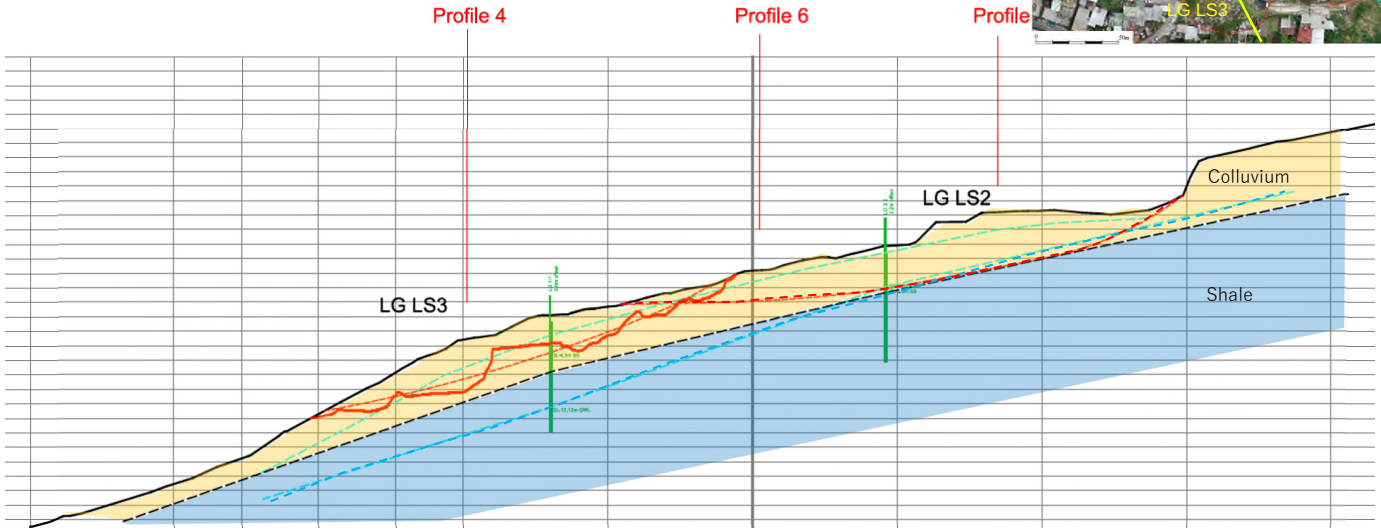




H:2m, V:20m

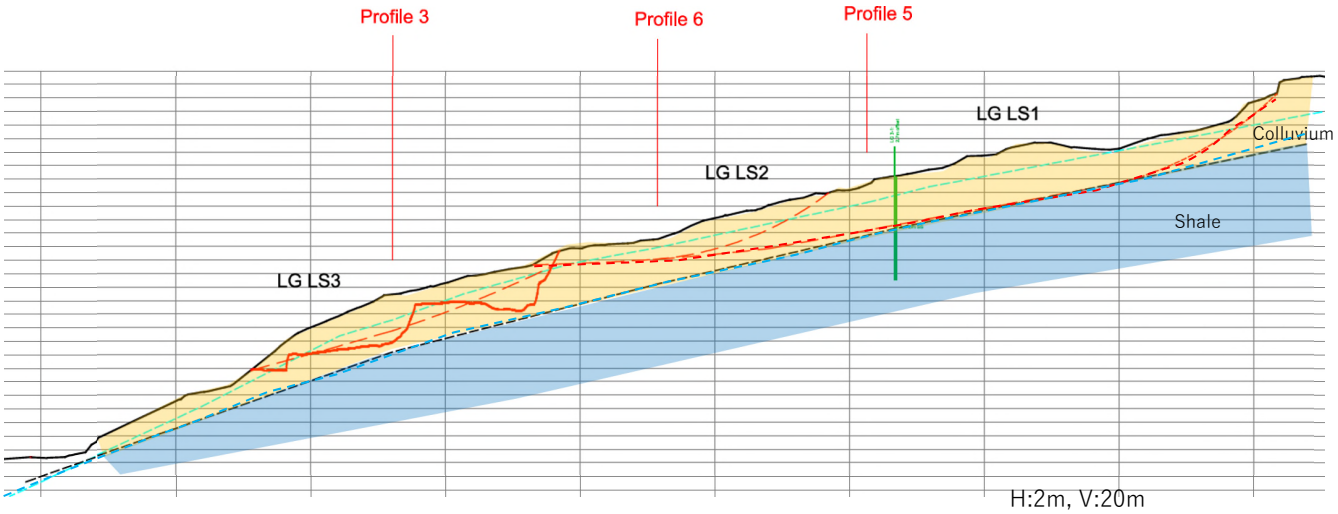
CS Line-3



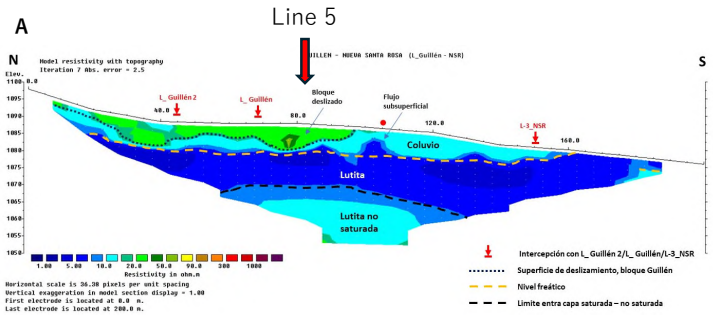


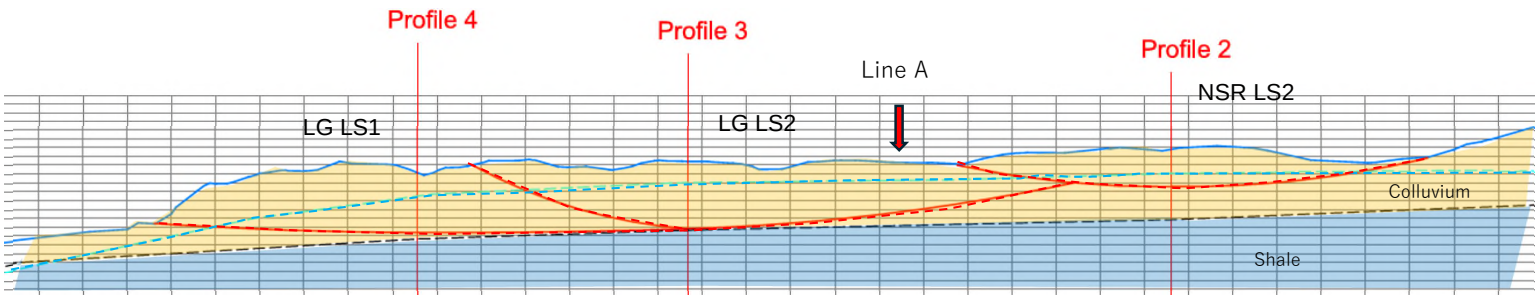
H:2m, V:20m

Cross section Line-4



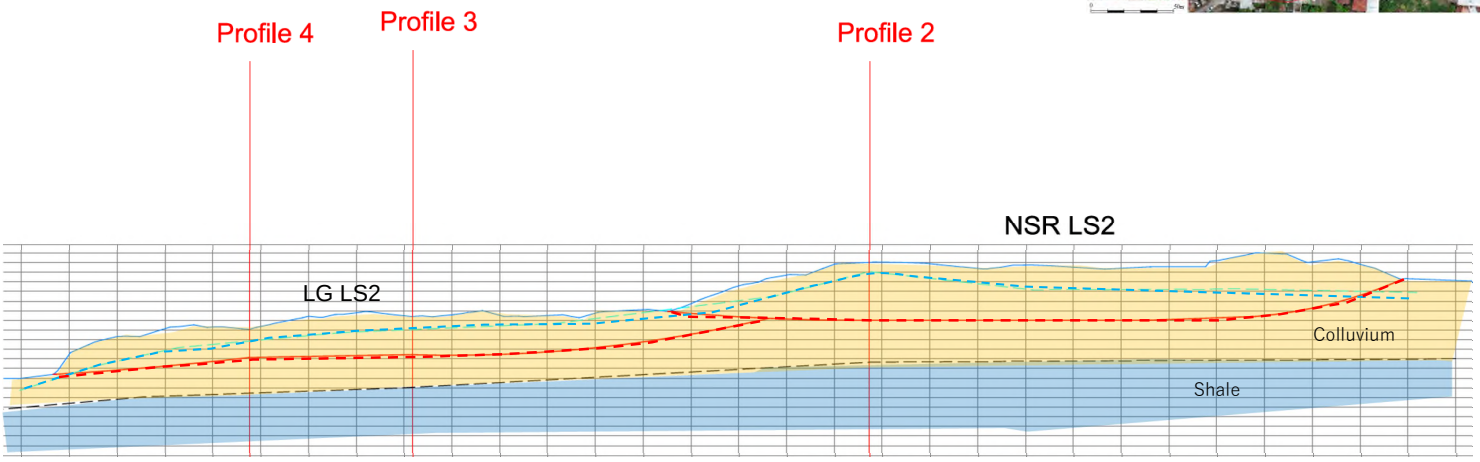
CS Line- 5





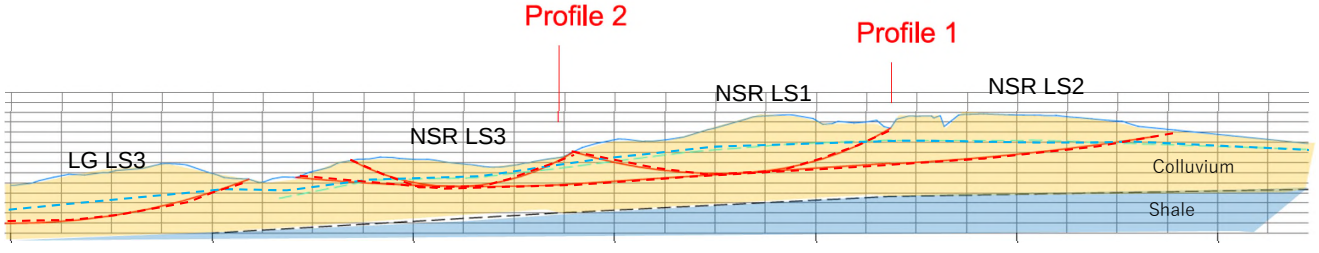
H:2m, V:20m

Cross section Line-6



H:2m, V:20m

Cross section Line-7



H:2m, V:20m

Discussion of setting of parameter for design of countermeasure work

- Based on the survey results, a landslide model was developed for stability analysis. Stability calculations were performed using these models.
- Cohesion and internal friction angles obtained from direct shear tests using undisturbed samples taken at the LG scarp were used to examine the validity of the shear strength.

γ t = 20.4kN/m3
c = 1.73kN/m2
ϕ = 36.32 degrees

MUESTRA:	MUESTRA #1
UBICACIÓN:	PUNTO A
HUMEDADDE MUESTRA:	13.9%
PESO VOLUMÉTRICO:	2.04g/cm³

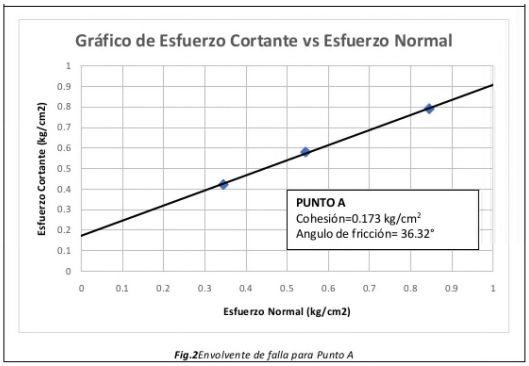


Fig.2Envolvente de falla para Punto A

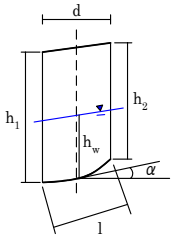
定数の検討

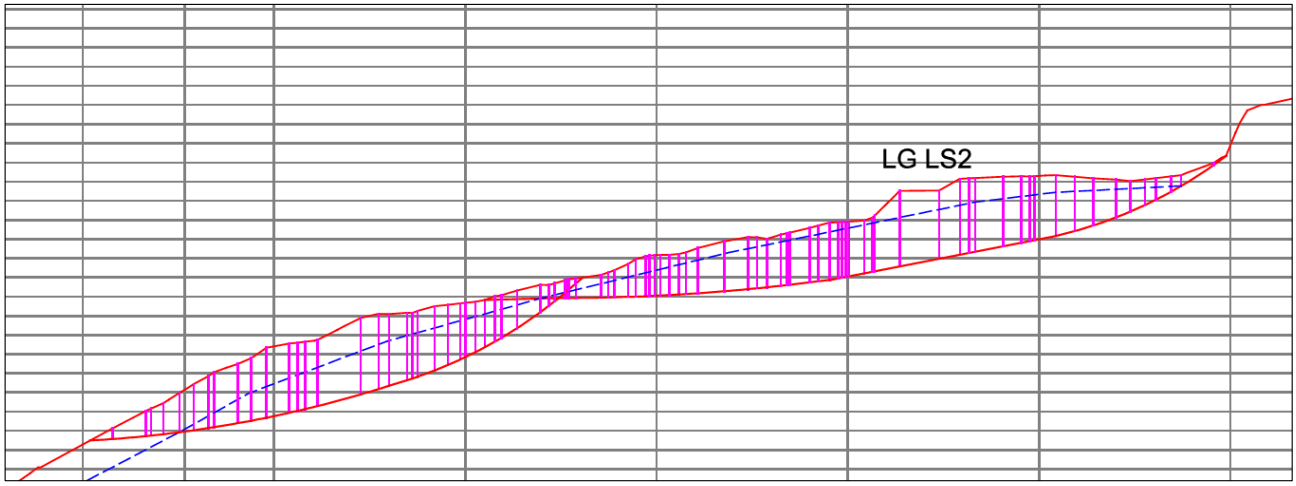
Modified Fellenius method

$$Fs = \frac{S}{T} = \frac{\sum\{c \cdot l + (W - U \cdot d)\cos\alpha \cdot \tan\phi\}}{\sum W \cdot \sin\alpha} = 2.91$$

Soil Constants (Soil Parameter) **LG-2**

No.	Strata	Geological Material	Unit Weight		Cohesion	Internal Friction Angle	
			γ_t (kN/m³)	γ_{sat} (kN/m³)	c (kN/m²)	φ (°)	tanφ
1	Dls1	Sandy silt	20.40		1.73	36.32	0.7351
2							0.0000
3							0.0000
4							0.0000
5							0.0000





Study of parameter setting

Stability calculations were performed on landslide models using the parameters obtained from the laboratory test results. The resulting safety factor are as follows

Landslide block	Fs
NSR -1	2,59
NSR -2	2.12
LG -1	2.74
LG -2	2.91

This result is not consistent with the actual situation where landslide activity is currently observed from monitoring results. Therefore, it is possible that the samples collected are not representative of strength of the slip surface of the LG and NSR landslides.

Study of parameter setting （Back analysis)

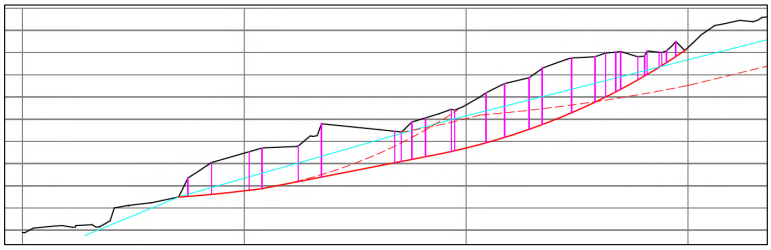
- The shear strength obtained from the undisturbed samples collected in the field could not show the current situation.
- Therefore, the shear strength of the slip surface was estimated by back analysis.
- The condition of Back analysis is as follows,

  Estimated current safety factor：Fs = 0.98
  Unit weight： γ t = 18kN/m3
  Estimated groundwater level：H.G.W.L

- Based on the above conditions, back analysis was performed for each of the four landslide models to estimate shear strength.

Result of Back analysis

Block NSR-1



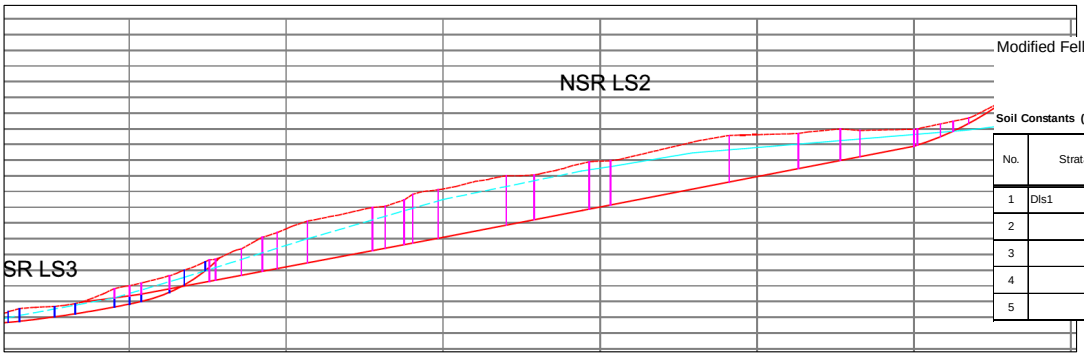
Modified Fellenius method

$$Fs=\frac{S}{T}=\frac{\sum\{c\cdot l+(W-U\cdot d)\cos\alpha\cdot\tan\phi\}}{\sum W\cdot\sin\alpha}=$$ **0.98**

Soil Constants (Soil Parameter) **NSR-1**

No.	Strata	Geological Material	Unit Weight		Cohesion	Internal Friction Angle	
			γ_t (kN/m^3)	γ_{sat} (kN/m^3)	c (kN/m^2)	φ (°)	tanφ
1	Dls1	Sandy silt	18.00		5.0	14.2	0.2530
2							0.0000
3							0.0000
4							0.0000
5							0.0000

Block NSR-2



Modified Fellenius method

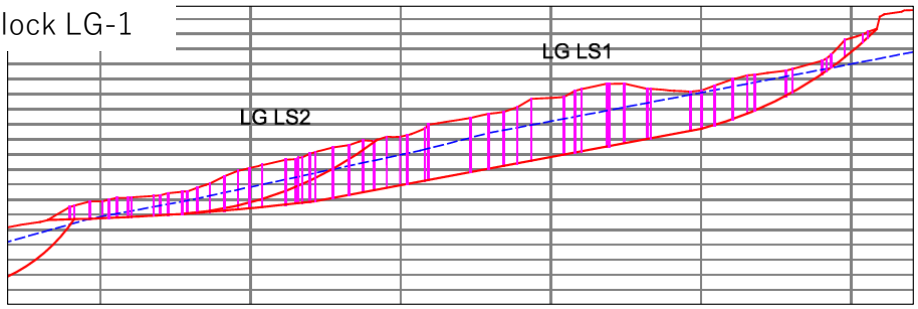
$$Fs=\frac{S}{T}=\frac{\sum\{c\cdot l+(W-U\cdot d)\cos\alpha\cdot\tan\phi\}}{\sum W\cdot\sin\alpha}=$$ **0.98**

Soil Constants (Soil Parameter) **NSR-2**

No.	Strata	Geological Material	Unit Weight		Cohesion	Internal Friction Angle	
			γ_t (kN/m^3)	γ_{sat} (kN/m^3)	c (kN/m^2)	φ (°)	tanφ
1	Dls1	Sandy silt	18.00		5.0	11.33	0.2004
2							0.0000
3							0.0000
4							0.0000
5							0.0000

Back analysis結果

Block LG-1



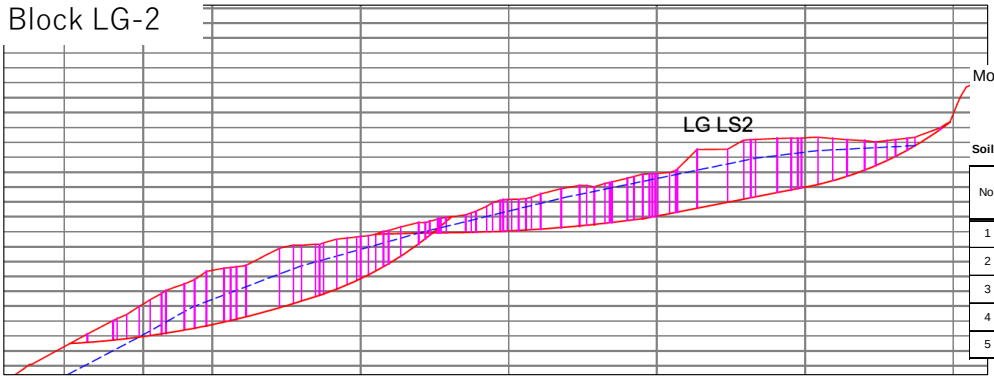
Modified Fellenius method

$$Fs=\frac{S}{T}=\frac{\sum\{c\cdot l+(W-U\cdot d)\cos\alpha\cdot\tan\phi\}}{\sum W\cdot\sin\alpha}=$$ **0.98**

Soil Constants (Soil Parameter) **LG-1**

No.	Strata	Geological Material	Unit Weight		Cohesion	Internal Friction Angle	
			γ_t (kN/m^3)	γ_{sat} (kN/m^3)	c (kN/m^2)	φ (°)	tanφ
1	Dls1	Sandy silt	18.00		5.3	11.13	0.1968
2							0.0000
3							0.0000
4							0.0000
5							0.0000

Block LG-2



Modified Fellenius method

$$Fs=\frac{S}{T}=\frac{\sum\{c\cdot l+(W-U\cdot d)\cos\alpha\cdot\tan\phi\}}{\sum W\cdot\sin\alpha}=$$ **0.98**

Soil Constants (Soil Parameter) **LG-2**

No.	Strata	Geological Material	Unit Weight		Cohesion	Internal Friction Angle	
			γ_t (kN/m^3)	γ_{sat} (kN/m^3)	c (kN/m^2)	φ (°)	tanφ
1	Dls1	Sandy silt	18.00		3.8	11.07	0.1957
2							0.0000
3							0.0000
4							0.0000
5							0.0000

Setting parameter for design

Landslide block	Unit weight (kN/m3)	Cohesion (kN/m2: kPa)	Internal friction angle (degree)
NSR-1	18.0	5.0	14.20
NSR-2	18.0	5.0	11.33
LG-1	18.0	5.3	11.13
LG-2	18.0	3.8	11.07

Policy of countermeasure work for landslide in LG and NSR

- Groundwater control

To drain a ground water that is the one of the main trigger of landslide by horizontal drainage boring work.

- Surface water control

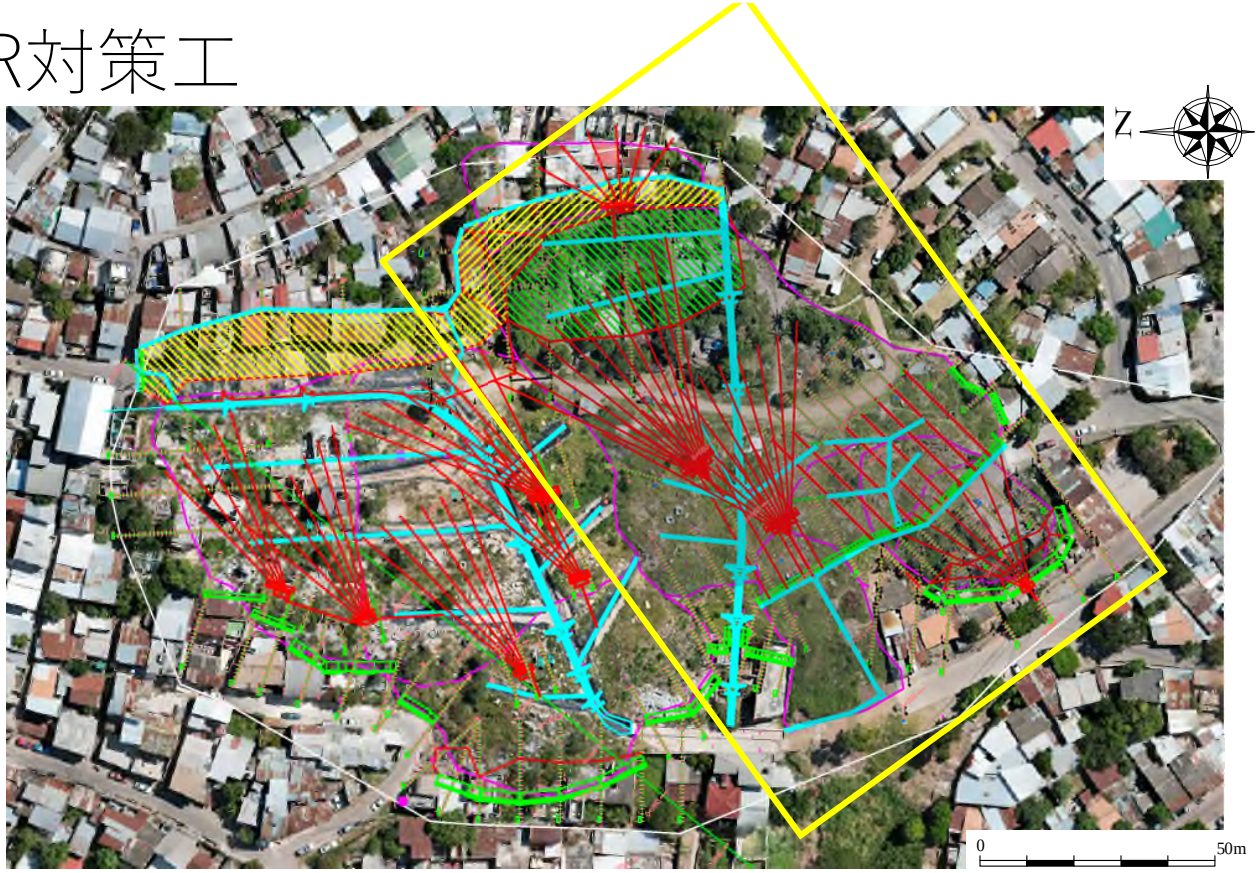
To drain the surface water on the landslide block by channel, and to prevent infiltration behind the landslide scarp by the ditch.

- Retaining wall

To retain the bottom of the landslide block by gabion wall with permeability to drain the water from landslide block and flexibility against deformation.

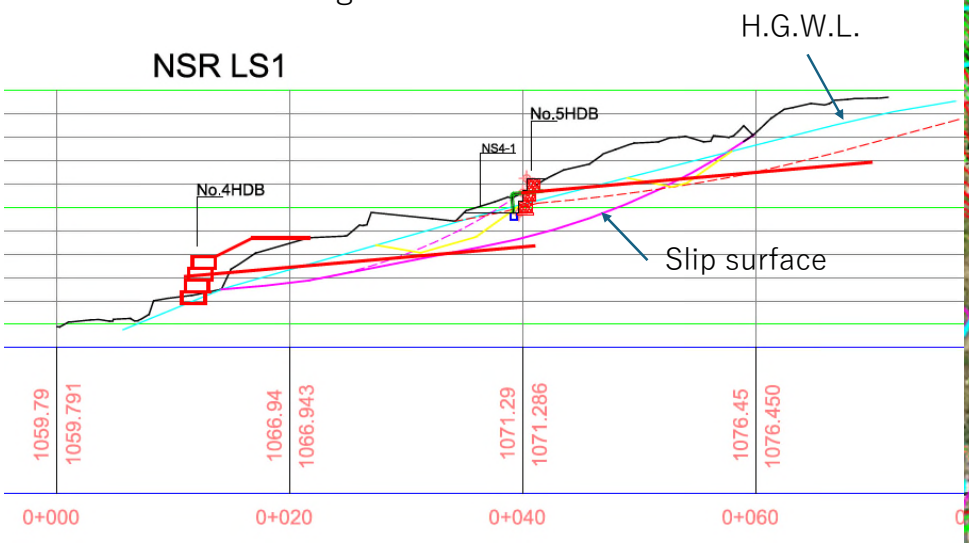
Ensure a safety factor of 1.05 as much as possible from 0.98 by implementing countermeasure works, and improve the safety factor by at least 5%.

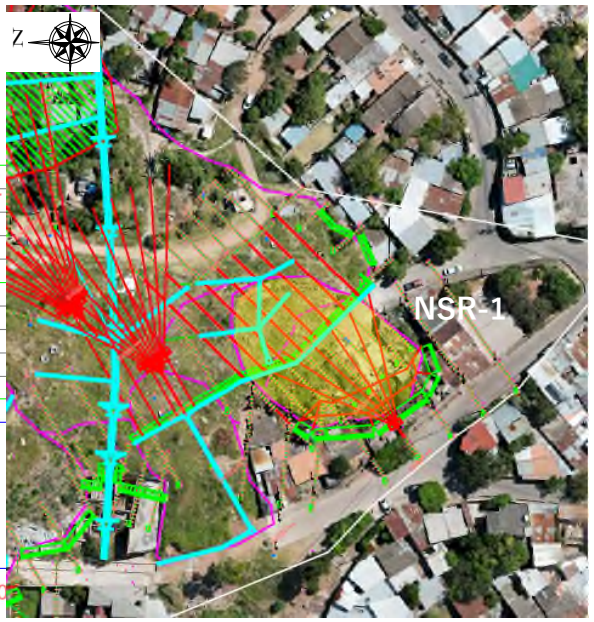
NSR対策工



Block NSR-1

- HD Work: No.4HDB @30m*6+Gabion wall
- HD Work: No.5HDB @30m*8+Gabion wall
- Buttress fill work＋Gabion wall
- Surface drainage work

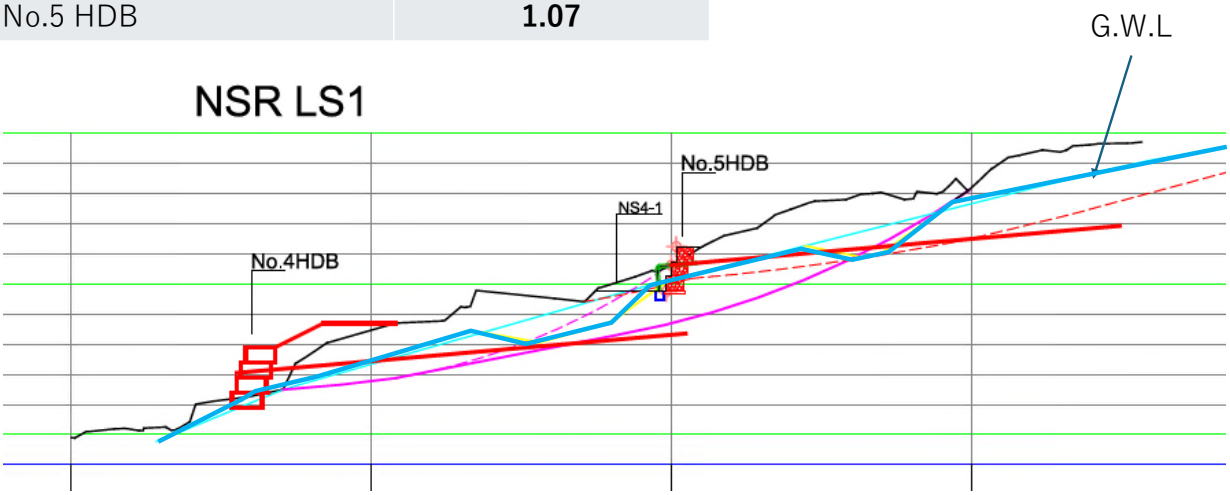




V: 2m interval, H: 20m interval

Block NSR-1

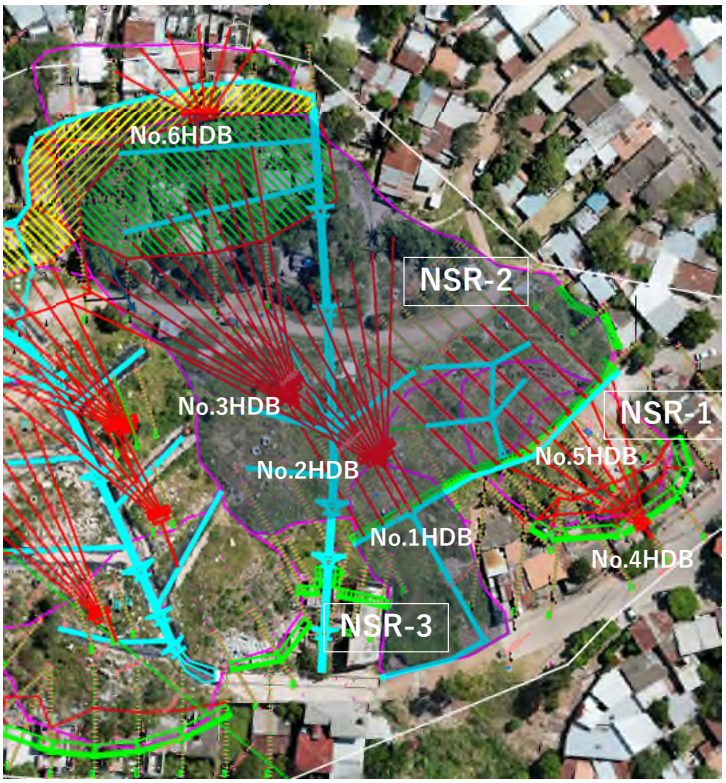
Countermeasure work	Expected Fs
No countermeasure	0.98
+ No.4 HDB	0.99
+ Counterweight fill	1.03
+ No.5 HDB	**1.07**



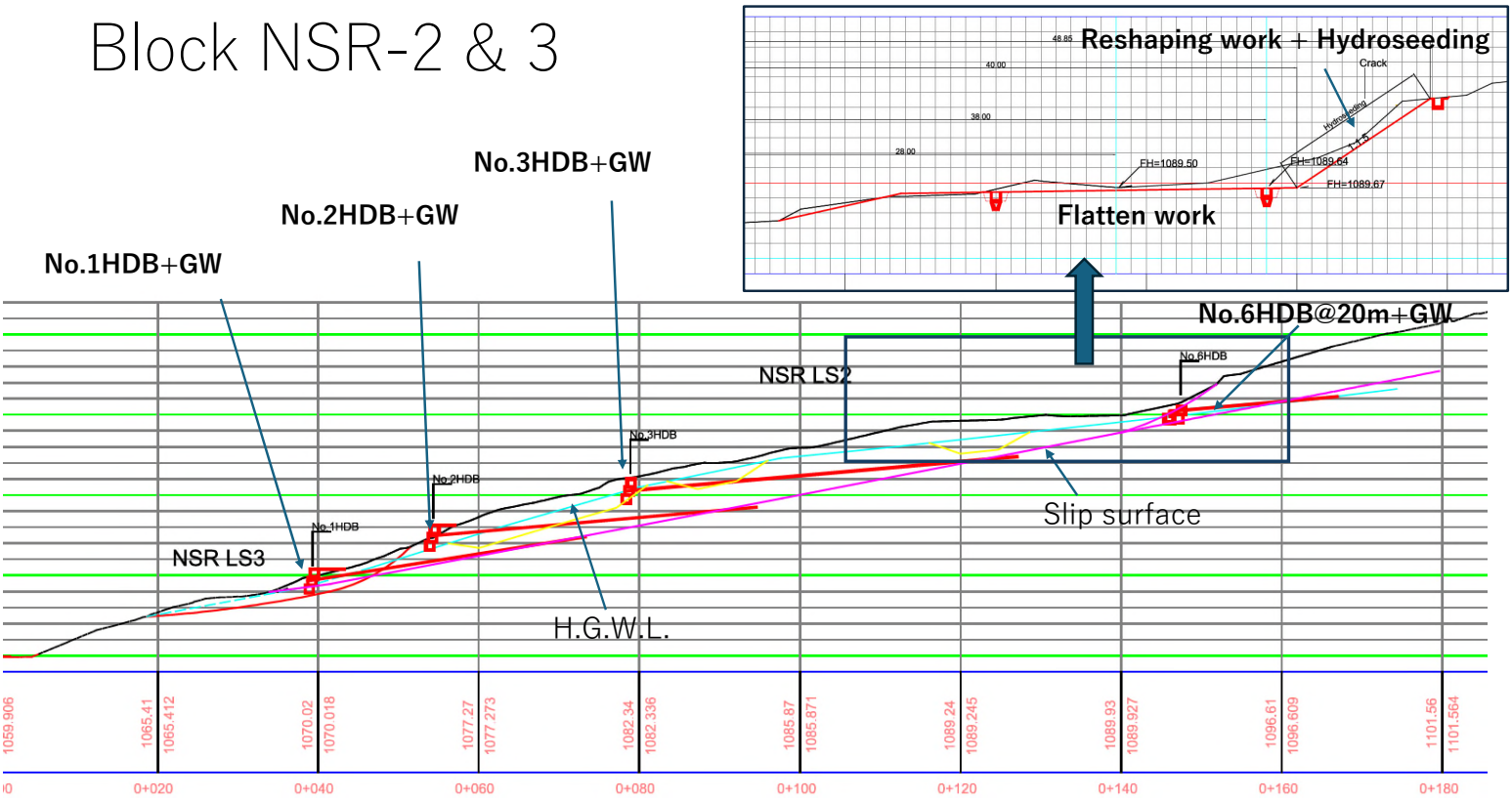
V: 2m interval, H: 20m interval

Block NSR-2 & 3

- HD Work: No.1HDB *5＋Gabion wall
- HD Work: No.2HDB *11＋Gabion wall
- HD Work: No.3HDB *12＋Gabion wall
- HD Work: No.6HDB *6＋Gabion wall
- Reshaping work＋Erosion control work (Hydroseeding work)
- Surface drainage work
- Gabion retaining wall



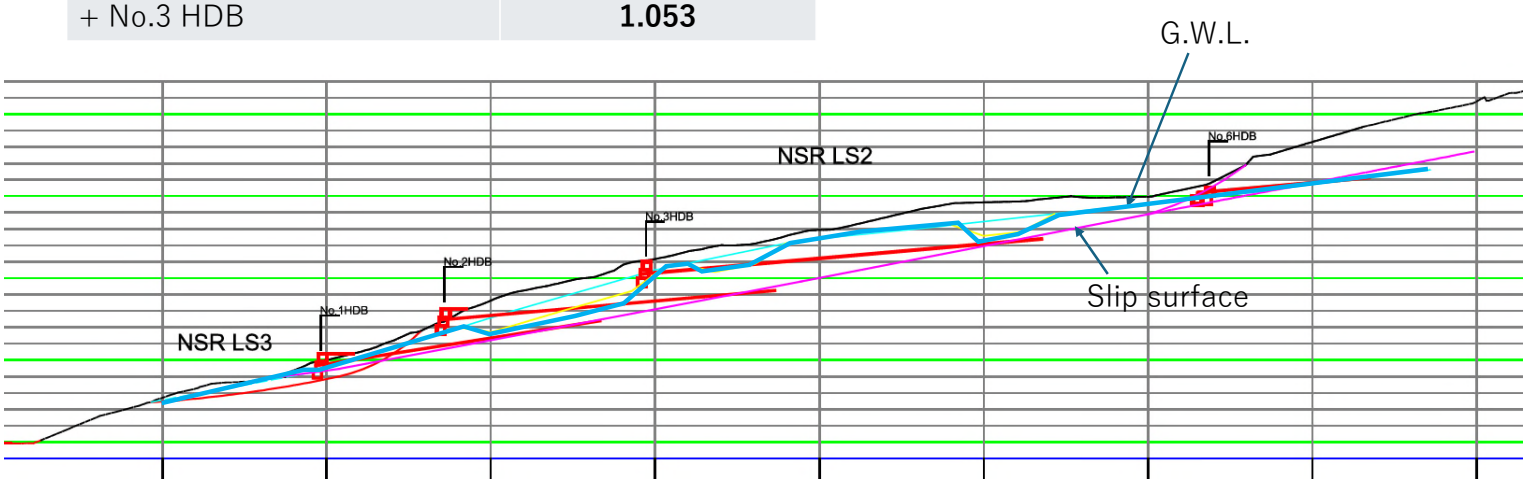
Block NSR-2 & 3



V: 2m interval, H: 20m interval

Block NSR-2 & 3

Countermeasure work	Expected Fs
No countermeasure	0.98
+ No.1 HDB	1.02
+ No.2 HDB	1.037
+ No.3 HDB	**1.053**

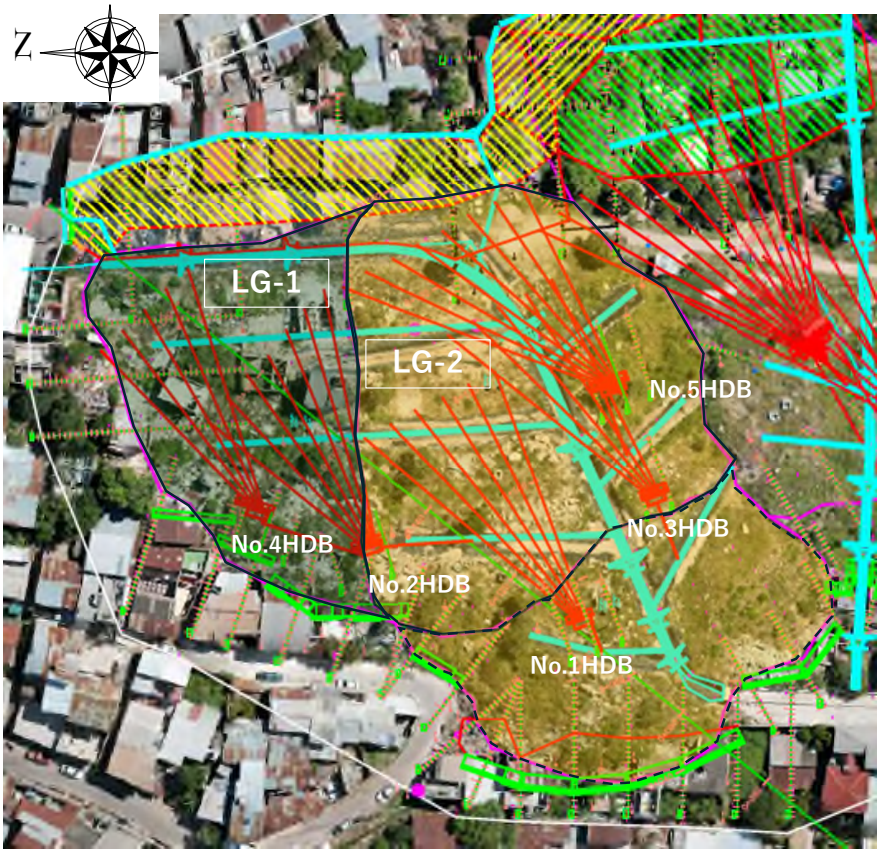


V: 2m interval, H: 20m interval

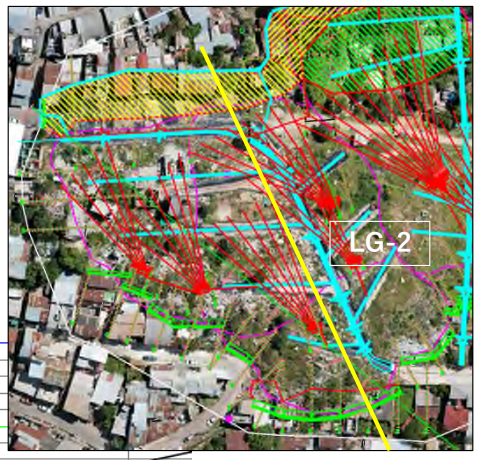
LG対策工

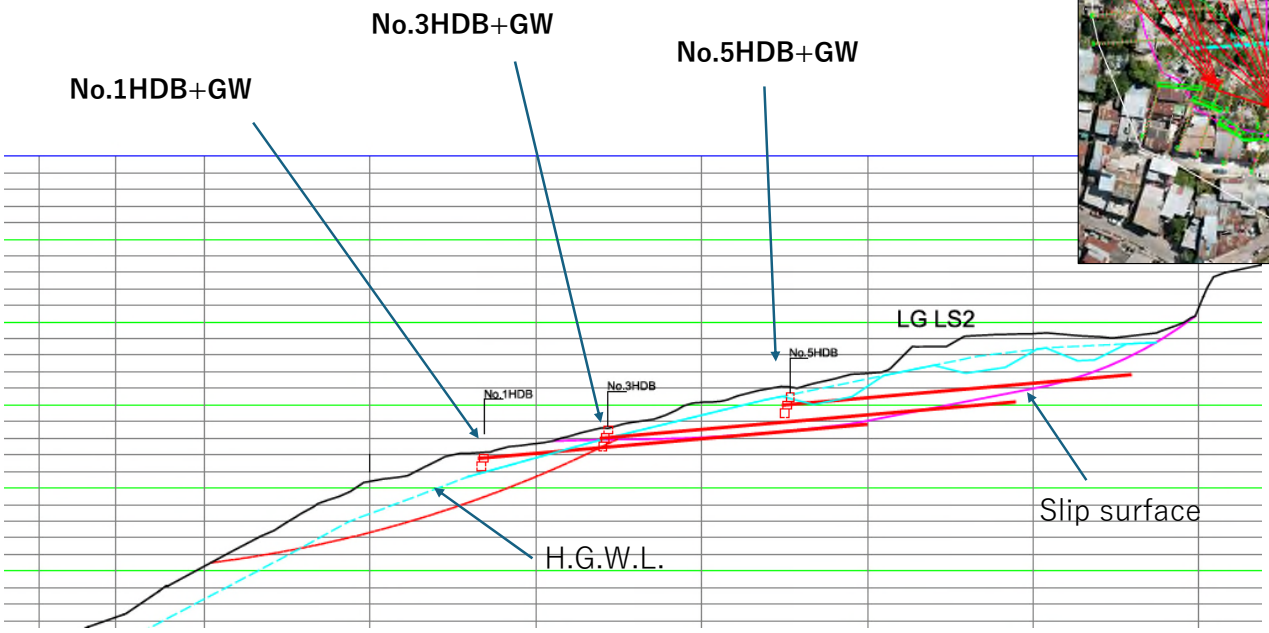
Block LG-1 & 2

- HD Work: No.1HDB *6+GW
- HD Work: No.2HDB *7+GW
- HD Work: No.3HDB *5+GW
- HD Work: No.4HDB *5+GW
- HD Work: No.5HDB *8+GW
- Reshaping work＋Erosion control work (Hydroseeding work)
- Surface drainage work
- Gabion retaining wall



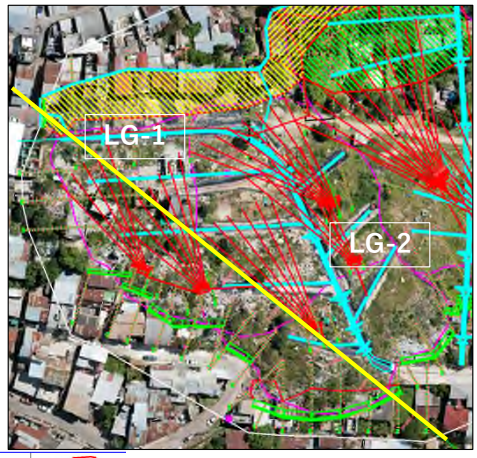
Block LG-1 & 2

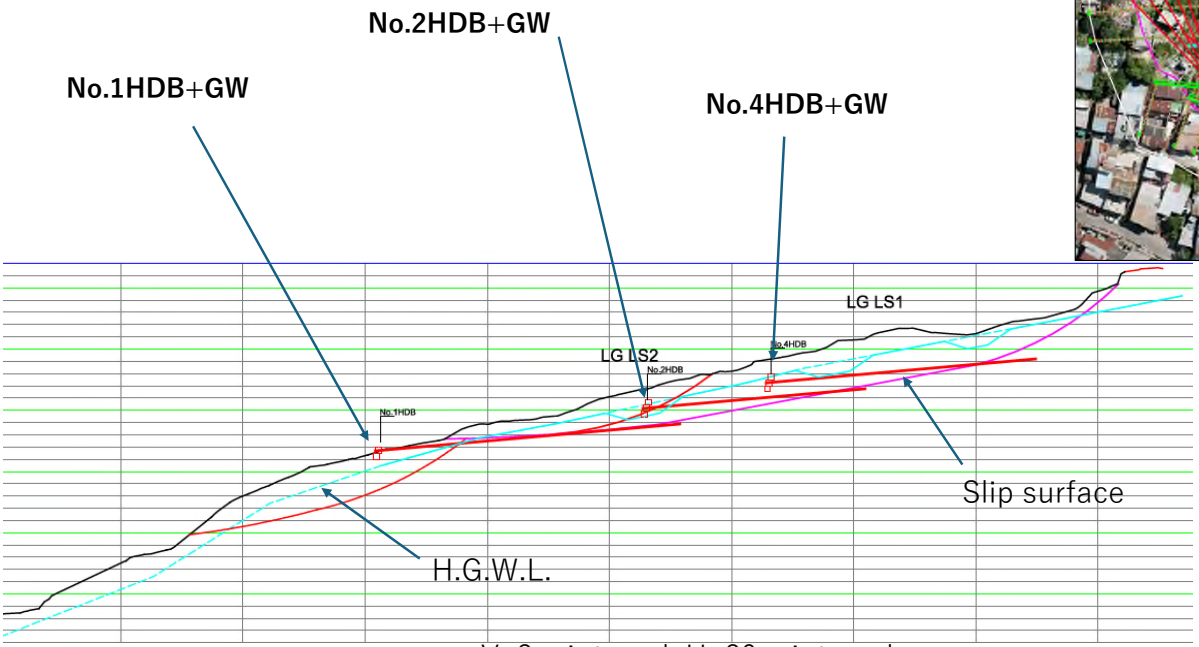




V: 2m interval, H: 20m interval

Block LG-1 & 2

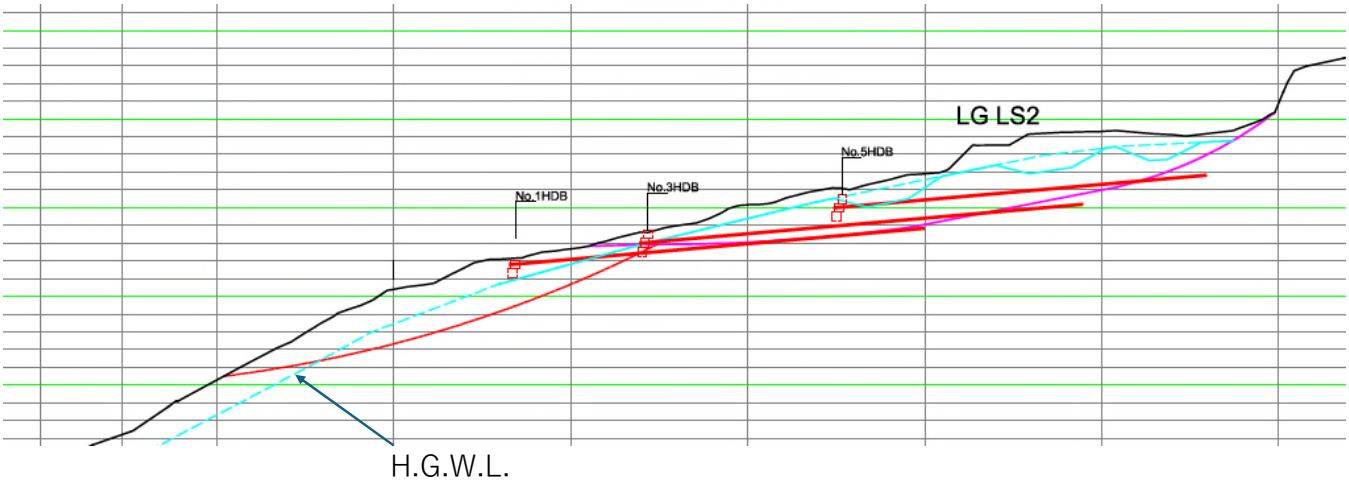




V: 2m interval, H: 20m interval

Block LG-1

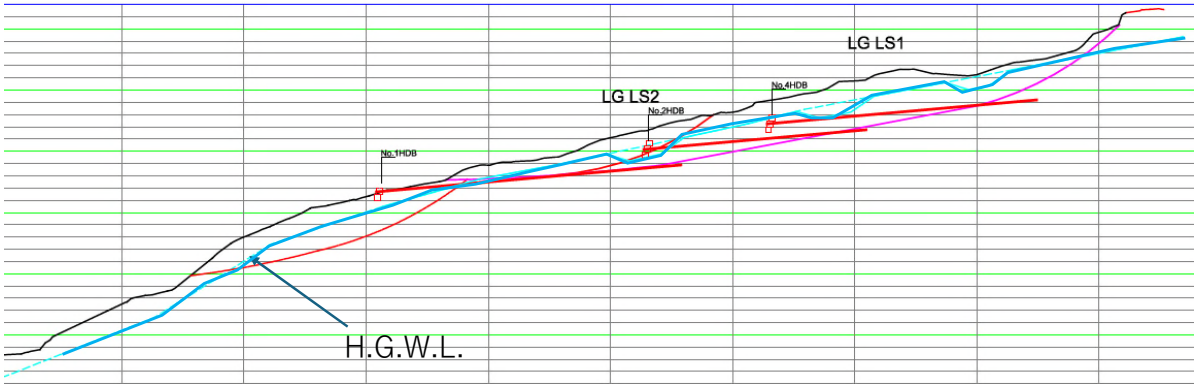
Countermeasure work	Expected Fs
No countermeasure	0.98
+ No.1 HDB	1.01
+ No.3 HDB	1.03
+ No.5 HDB	**1.05**



V: 2m interval, H: 20m interval

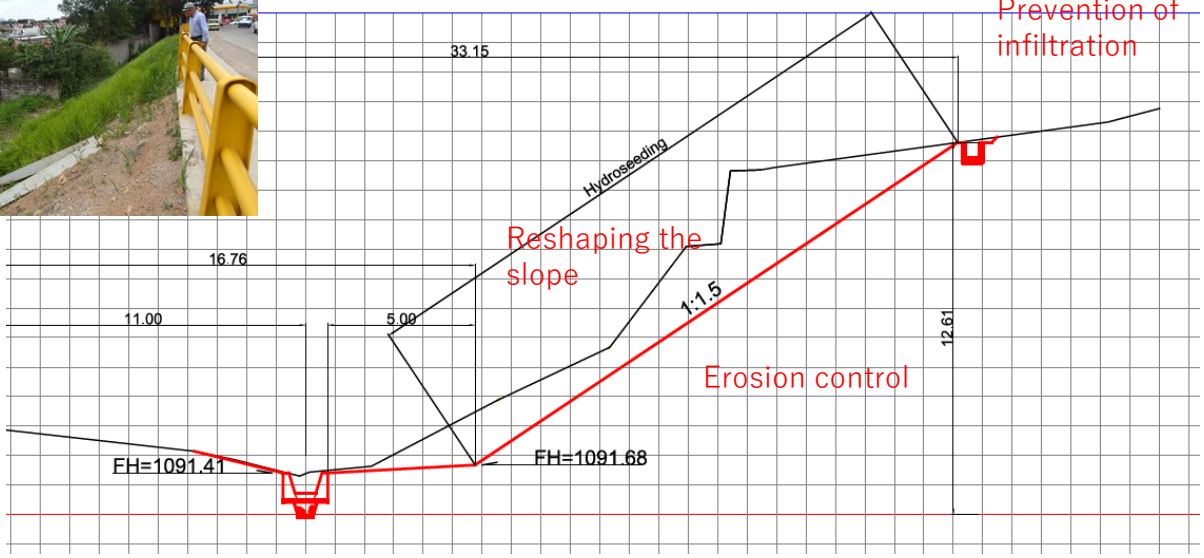
Block LG-2

Countermeasure work	Expected Fs
No countermeasure	0.98
+ No.1 HDB	1.00
+ No.2 HDB	1.01
+ No.4 HDB	**1.03**

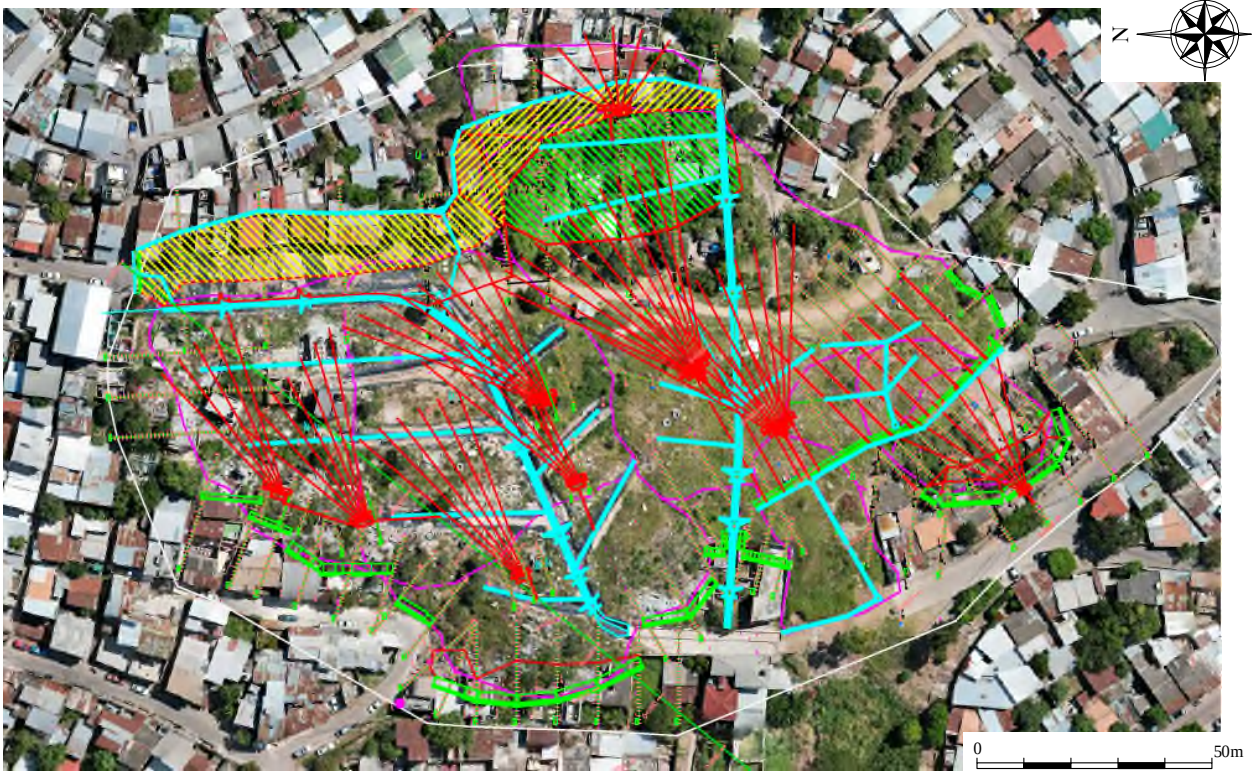


V: 2m interval, H: 20m interval

Reshape work and hydroseeding work



Countermeasure work plan for landslide at NSR LG area



Appendix 8

Result of the investigation on Villa Nueva

1

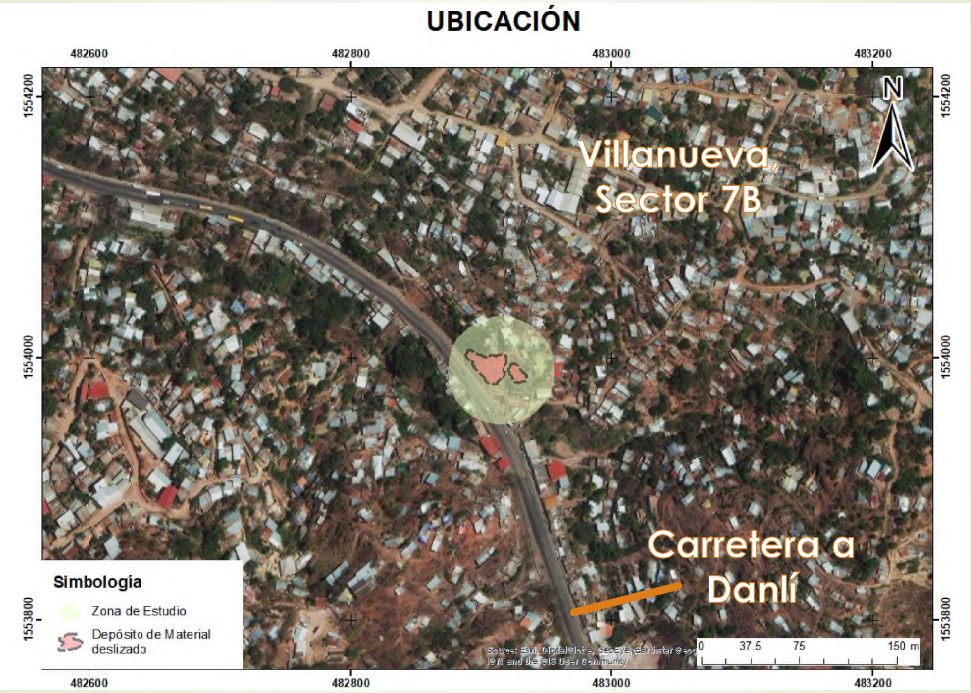
CARACTERIZACIÓN DEL DERRUMBE EN VILLANUEVA SECTOR 7B

JULIO DE 2020

PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL

2

UBICACIÓN



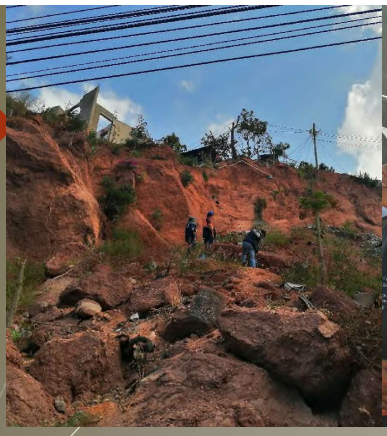
3

IMÁGENES PREVIAS AL DERRUMBE

4

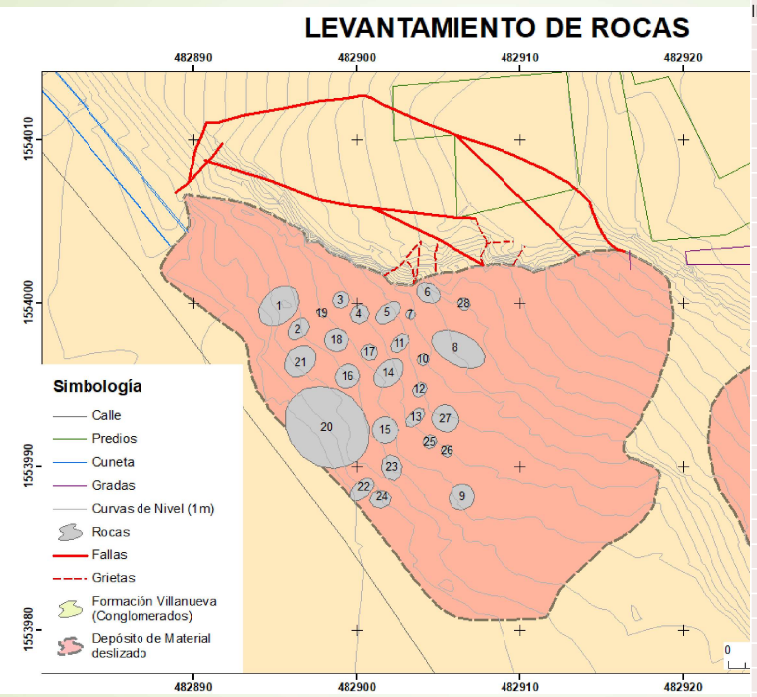
IMÁGENES POSTERIORES AL DERRUMBE DE 29 OCTUBRE DE 2017

5




LEVANTAMIENTO DE ROCAS DESPRENDIDAS

6



ID	Largo	Ancho	Alto
1	2.80	2.00	1.00
2	1.10	1.50	0.70
3	1.10	1.00	1.00
4	1.20	1.10	0.80
5	1.70	1.10	0.80
6	1.50	1.20	0.90
7	0.60	0.60	0.60
8	3.50	1.90	1.50
9	1.60	1.50	0.70
10	0.70	0.80	1.00
11	1.40	0.90	0.60
12	1.00	0.80	0.70
13	1.40	0.80	0.80
14	2.10	1.40	1.10
15	1.60	1.60	1.40
16	1.55	1.40	1.20
17	1.00	1.00	0.50
18	1.40	1.40	0.90
19	0.40	0.70	0.80
20	5.40	4.60	3.00
21	1.70	2.10	0.70
22	1.70	1.00	1.10
23	1.30	0.80	0.75
24	1.30	1.10	0.70
25	0.90	0.80	0.30
26	0.70	0.75	0.60
27	1.60	1.70	
28	0.70	0.80	

7




RECONOCIMIENTO GEOLÓGICO

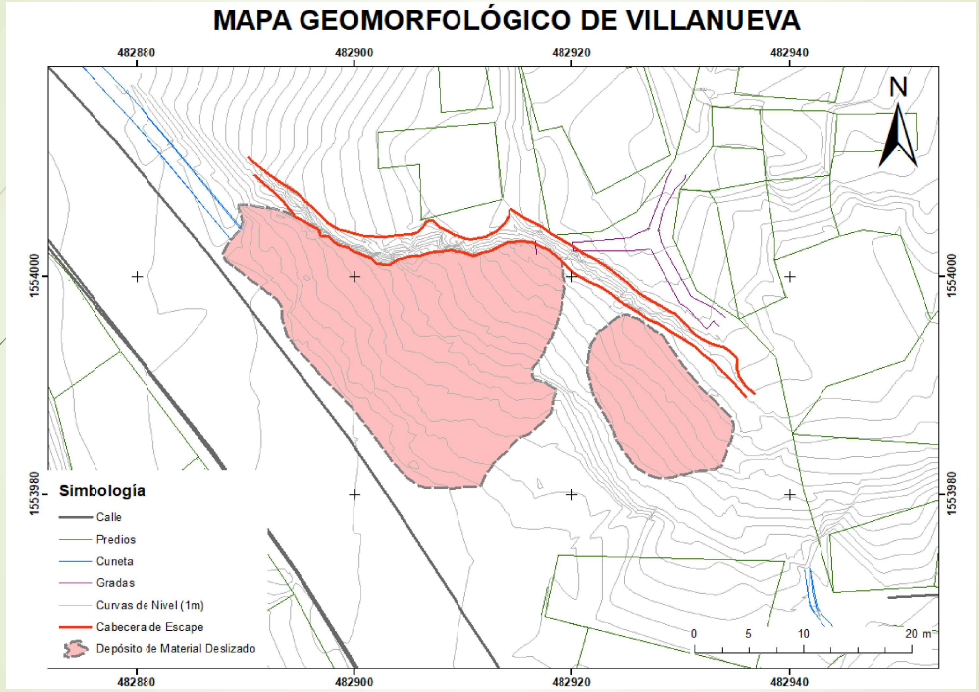
8

Aspecto de las rocas afectadas por el derrumbe



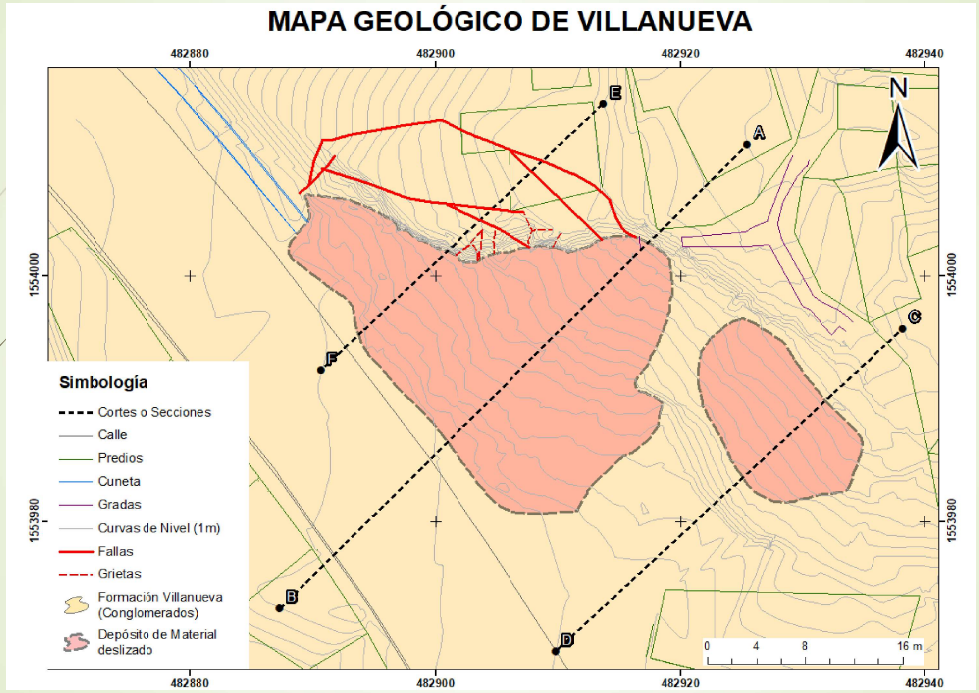
9

MAPA GEOMORFOLÓGICO DE VILLANUEVA

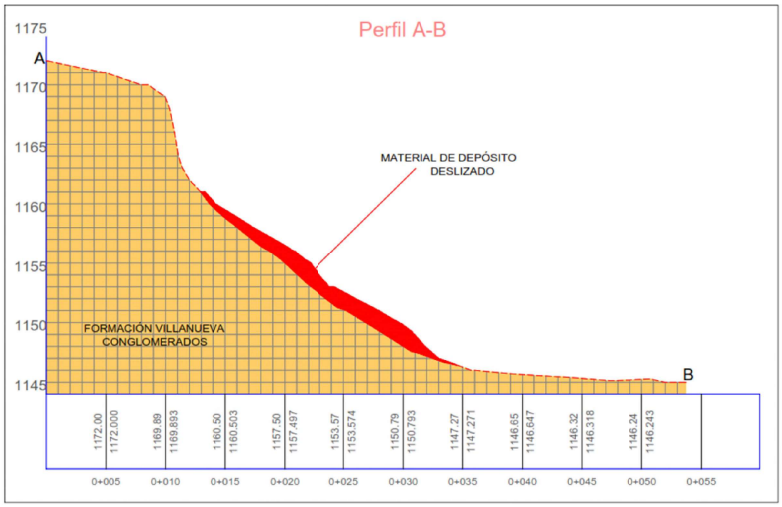


10

MAPA GEOLÓGICO DE VILLANUEVA



11


Perfil A-B
1175
1170
1165
1160
1155
1150
1145
A
B
MATERIAL DE DEPÓSITO
DESLIZADO
FORMACIÓN VILLANUEVA
CONGLOMERADOS
1172.00
1172.000
1169.89
1169.893
1160.50
1160.503
1157.50
1157.497
1153.57
1153.574
1150.79
1150.793
1147.27
1147.271
1146.65
1146.647
1146.32
1146.318
1146.24
1146.243
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0+015
0+020
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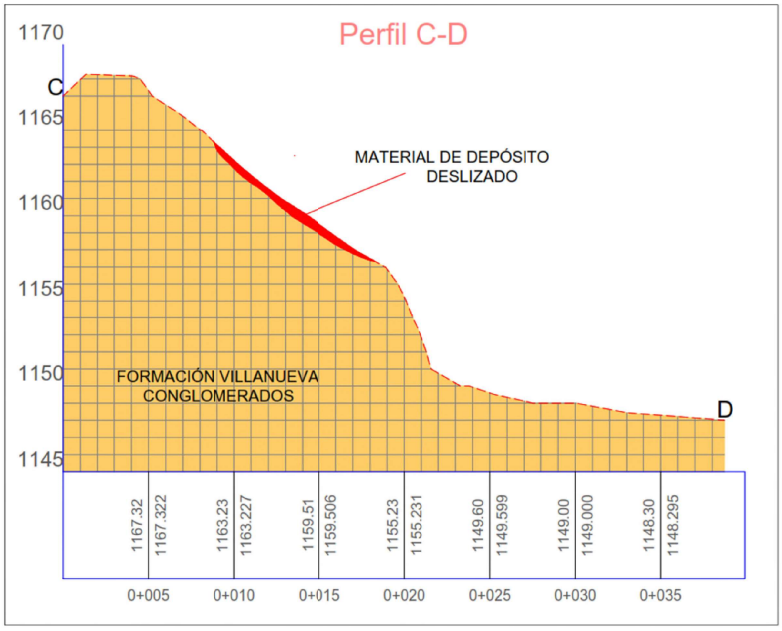
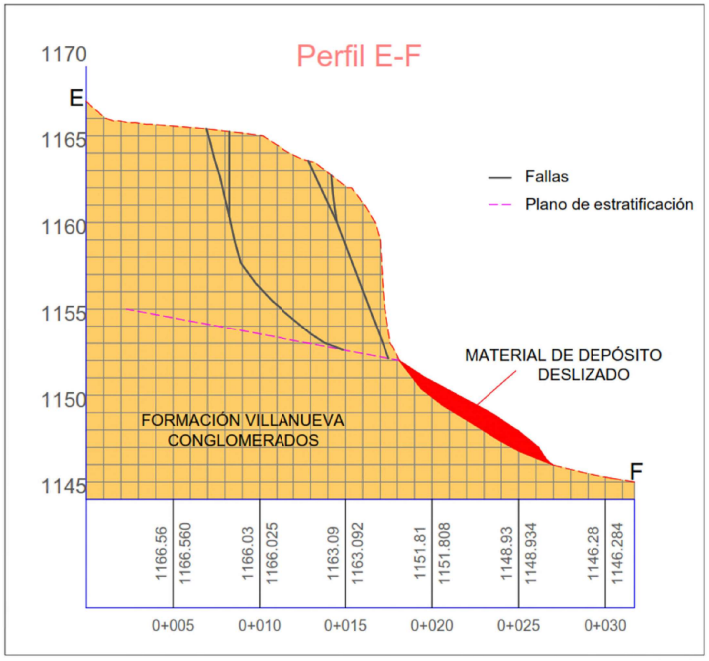
0+035
0+040
0+045
0+050
0+055

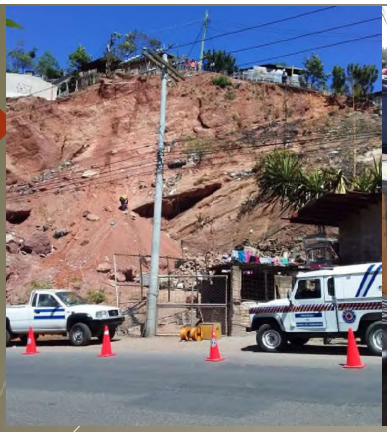
12

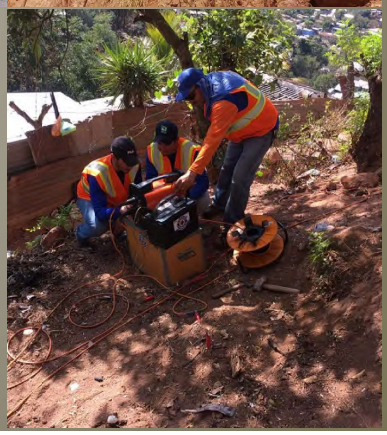

Perfil C-D
1170
1165
1160
1155
1150
1145
C
D
MATERIAL DE DEPÓSITO
DESLIZADO
FORMACIÓN VILLANUEVA
CONGLOMERADOS
1167.32
1167.322
1163.23
1163.227
1159.51
1159.506
1155.23
1155.231
1149.60
1149.599
1149.00
1149.000
1148.30
1148.295
0+005
0+010
0+015
0+020
0+025
0+030
0+035

13


Perfil E-F
1170
E
1165
1160
1155
1150
1145
Fallas
Plano de estratificación
MATERIAL DE DEPÓSITO DESLIZADO
FORMACIÓN VILLANUEVA CONGLOMERADOS
F
1166.56
1166.560
1166.03
1166.025
1163.09
1163.092
1151.81
1151.808
1148.93
1148.934
1146.28
1146.284
0+005
0+010
0+015
0+020
0+025
0+030

14

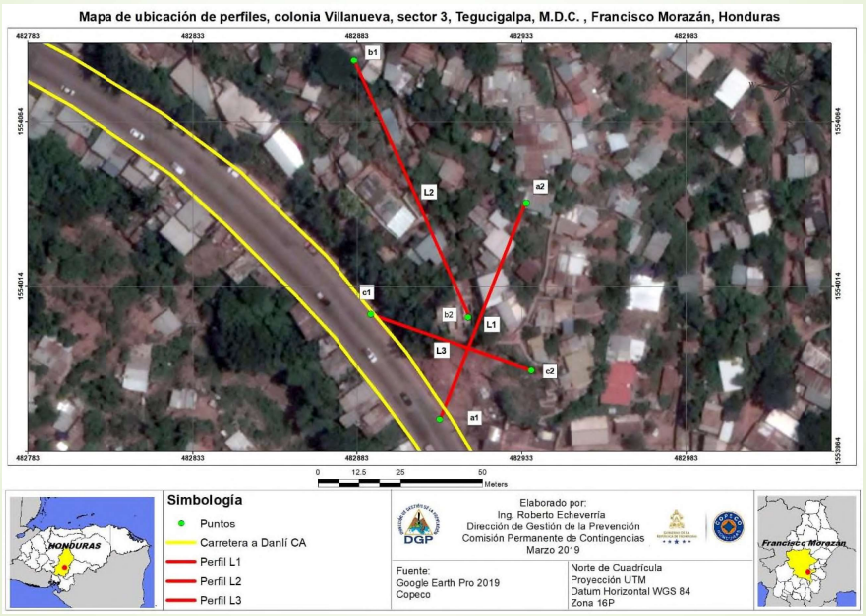




COPECO

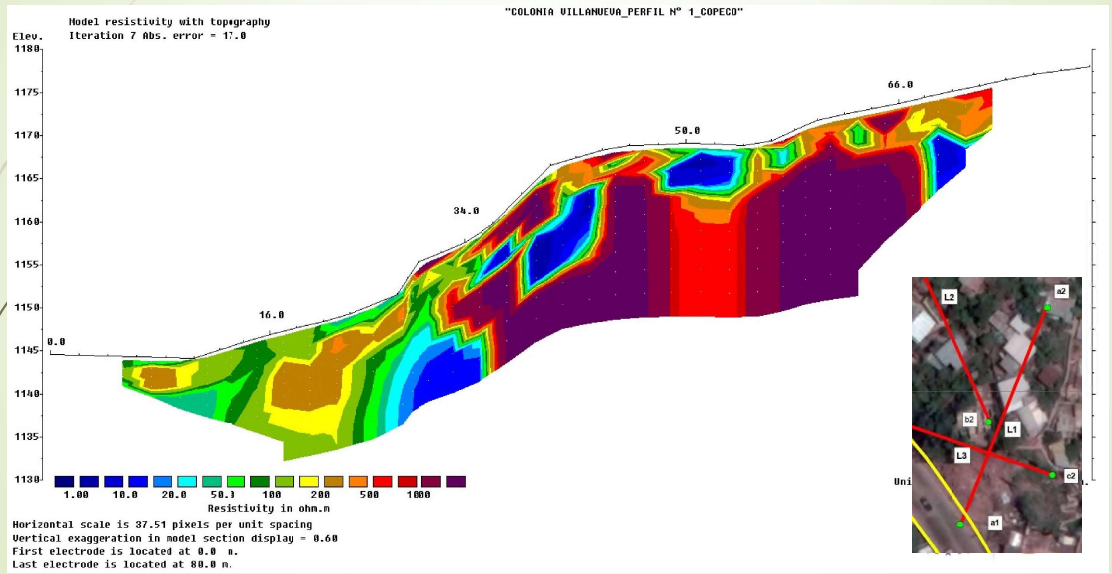
15

UBICACIÓN SONDEOS DE RESISTIVIDAD DE COPECO



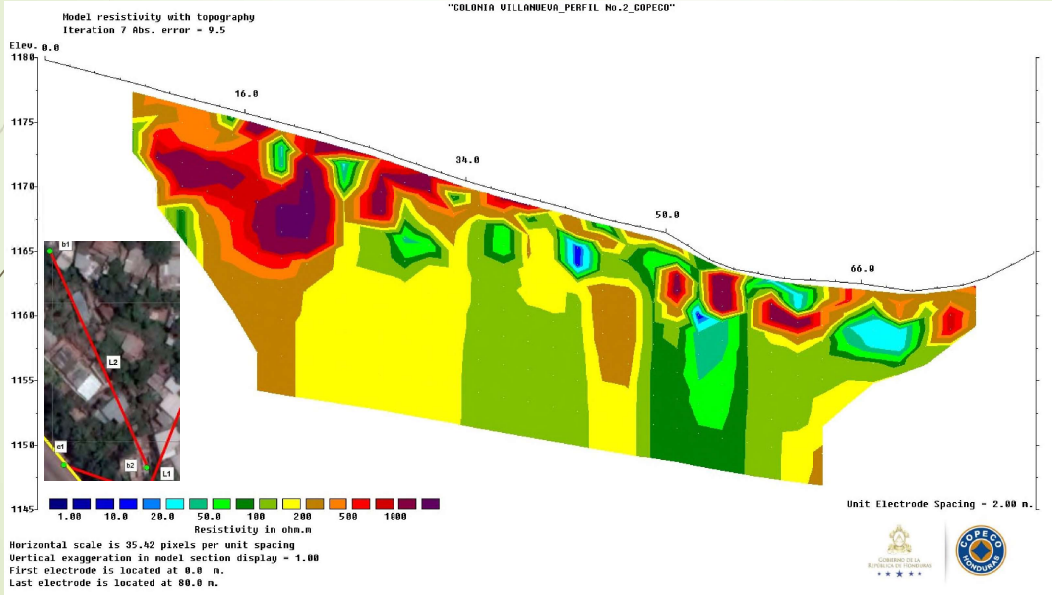
16

Perfil de Resistividad No.1



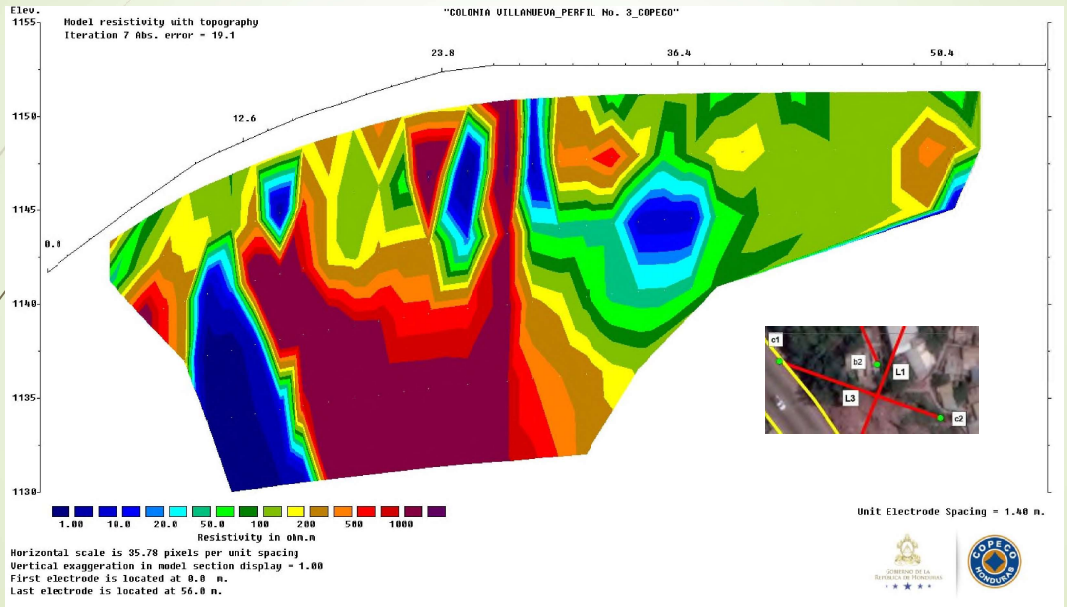
17

Perfil de Resistividad No.2

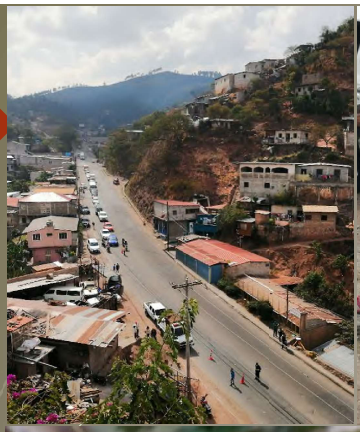


18

Perfil de Resistividad No.3



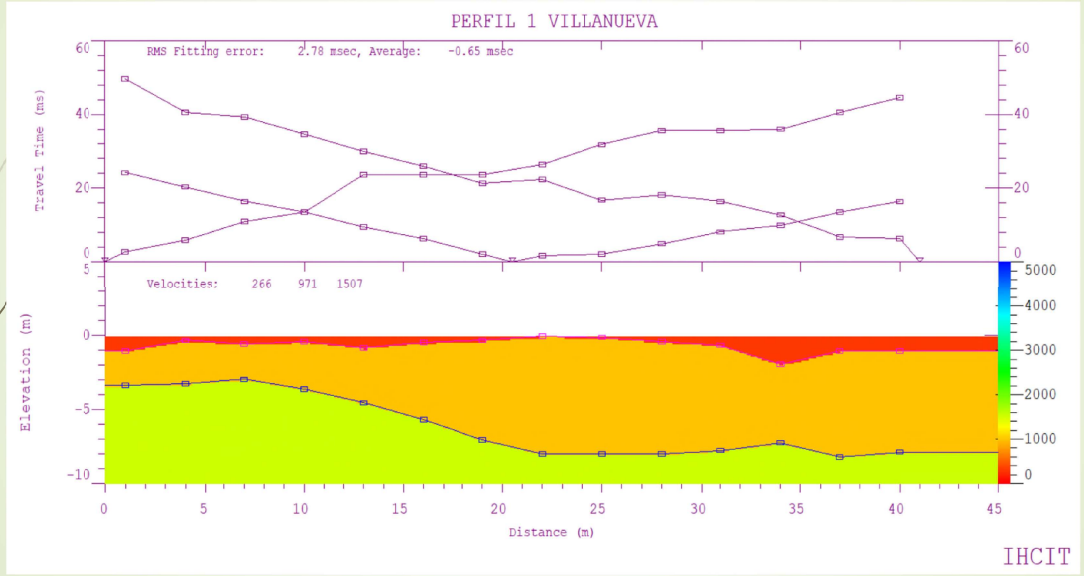
19



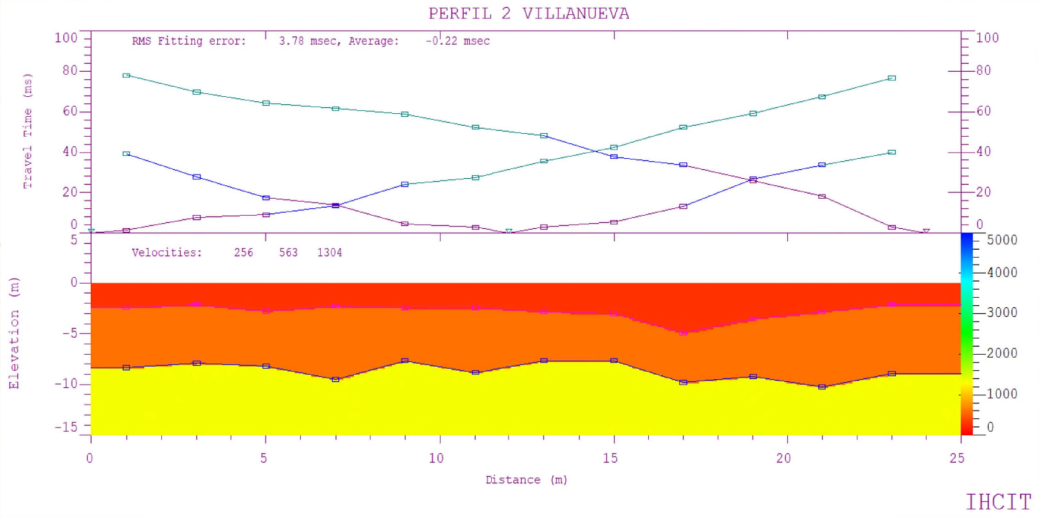
REFRACCIÓN SÍSMICA DEL IHCIT

20

Perfil de Refracción Sísmica 1

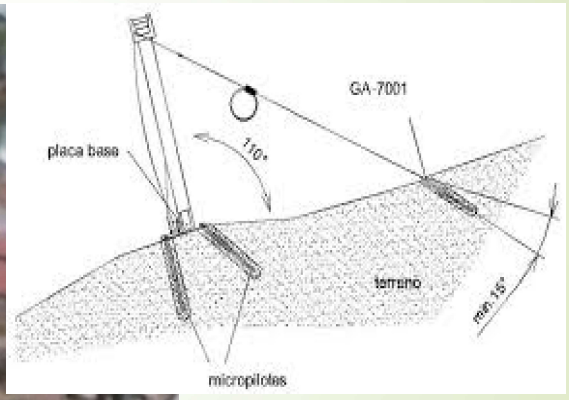


Perfil de Refracción Sísmica 2



OBRAS PROPUESTAS

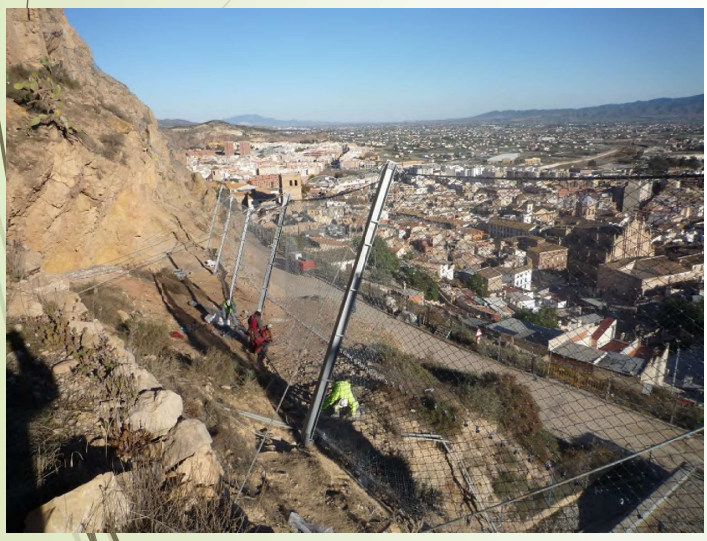
- **PROTECCIÓN: BARRERA DINÁMICA**



23

OBRAS PROPUESTAS

- **PROTECCIÓN: BARRERA DINÁMICA**



24

OBRAS PROPUESTAS

- **ESTABILIZACIÓN: MEMBRANAS FLEXIBLES**

25

OBRAS PROPUESTAS

- **ESTABILIZACIÓN: MEMBRANAS FLEXIBLES**

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CONCLUSIONES

- **El fenómeno geológico que tuvo lugar en la zona fue una caída de rocas**
- **Los materiales afectados han sido conglomerados de la Formación Villa Nueva**
- **El fenómeno ha afectado tanto a edificios como a vías de comunicación**
- **Los estudios realizados identificaron dos zonas claramente diferenciadas: una basal formada por estratos de espesor decímetrico, aparentemente sin fracturación; y otra zona situada a techo de la anterior, masiva y fracturada, que es la que ha sido afectada por el evento.**

CONCLUSIONES

- **Como factores condicionantes se han considerado el estado de la roca, el agua (tanto de lluvia como la proveniente de conducciones), y la acción de las raíces de los árboles.**
- **Con los estudios de geofísica no se han detectado planos claros de debilidad, si bien se puede intuir a partir de la tomografía eléctrica una posible zona susceptible al movimiento.**
- **Durante los trabajos de campo se han podido cartografiar una serie de fracturas dentro del talud que pueden afectar a la estabilidad del mismo en el futuro**
- **Se han propuesto dos tipos de intervenciones, una destinada a la protección, por medio de barreras dinámicas, y otra de estabilización, por medio de membranas flexibles**
- **Como obras secundarias se recomienda la canalización de las aguas superficiales**

GRACIAS POR SU ATENCION!

Appendix 9

Result of Vulnerability Analysis

Methodology of Vulnerability Analysis

- Vulnerability is analyzed based on the 4 factors.
- The evaluation items of each factor are evaluated in 3 ranks.

E	Strength of house	Counter-measure	Shelter, Evacuation route	Electricity, Water	Sanitary sewage	Waste collection Service	**P**	**F**	ExPxF	PxF
1		X					3	1	3	3
2	X				X	X	2	3	12	6
3			X	X			1	2	6	2
TOTAL VALUE = ((Σ (E x P x F)) /(Σ (P x F)) = 21/11= **1.91**									21	11

Vulnerability Index = Physical (V)x0.35 + Social (V)x0.25+ Economic (V)x0.20 + Environmental(V)x0.20

Matrix: Case of Campo Cielo

Evaluation (E)	Physical Factor						
	Strength of house	**Countermeasure**	**Shelter, Evacuation route**	**Electricity, Water**	**Sanitary sewage system**	**Waste collection Service**	
1	Less than 20% of houses in the zone are made in concrete	No countermeasure work has been installed.	There is no shelter and unsafe route to outside of the zone.	Infrastructure is maintained in less than 50% of the zone	Less than 50% of houses have sanitary sewage system	No waste collection service, and solid waste occupied road	
2	More than 20% and less than 50% of houses in the zone are made in concrete	Countermeasure works have been installed but it is not enough and/or not work properly.	There is no shelter or unsafe route to outside of the zone.	Infrastructure is maintained in more than 50% and less than 80% of the zone	More than 50% and less than 80% of houses have sanitary sewage system	No waste collection service, or solid waste is obstruction of passage	
3	More than 50% of houses in the zone are made in concrete	Appropriate countermeasure work(s) have been installed and work properly.	There is a shelter or a safe evacuation route to outside of the zone.	Infrastructure is maintained in more than 80% of the zone	More than 80% of houses have sanitary sewage system	There is waste collection service, and no obstruction of passage by solid waste.	
	Election: **1**	Election: **1**	Election: **3**	Election: **3**	Election: **1**	Election: **2**	
	Justification: 35% Brick, 39% Wood, 18% Concrete	Justification: None	Justification: Rafael Antonio Castillo, Basic Education Center	Justification: 100% water distribution, 100% power line, 100% mobile and internet.	Justification: sanitary sewage system is not working properly	Justification: Junk car on the road	

Evaluation (E)	Social Factor						
	Residential network	**Support organization in community**	**Trained, Skilled person**	**Vulnerable person**	**Security**		
1	Residents are estranged and the relationship is weak.	There is no support organization on/after disaster.	There is no trained or skilled person in the zone to support the vulnerable people and victims in disaster.	More than 30% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is gang support group in the neighborhood.		
2	A relationship has been established in which some residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, but it is not functioning properly.	Less than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 30% and more than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is no gang support group in the neighborhood.		
3	A relationship has been established in which all residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, and it is functioning.	More than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is police station and there is no gang support group in the neighborhood.		
	Election: **3**	Election: **3**	Election: **2**	Election: **2**	Election: **1**		

	Justification: They have	Justification: Patronage, CODEL and Political group intermediates support organizations to support them	Justification: Security Guard 3%	Justification: Resident:201 Chronic ill: 11 Pregrant:2 Elderly (>70): 9 22/201=10%	Justification: No police station Gang support group		

Evaluation (E)	Economic Factor						
	Asset	**Public deed**	**Income**	**Financial support**			
1	Less than 30% of the families in the zone live in own house.	Less than 30% of families in the zone have public deed of the land.	Less than 50% of the representative of the families has income by regular base.	There is no organization in/around the neighborhood that provide financial support to the victims.			
2	Less than 80% and more than 30% of the families in the zone live in own house.	More than 30% and less than 80% of families in the zone have public deed of the land.	Less than 80% and more than 50% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide some financial support to the victims.			
3	More than 80% of families in the zone live in own house.	More than 80% of families in the zone have public deed of the land.	More than 80% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide financial support to the victims.			
	Election: **3**	Election: **2**	Election: **3**	Election: **1**			
	Justification: 94% of families in the zone live in own house.	Justification: 45% of families in the zone have public deed of the land.	Justification: 80% of the representative of the families has income by salary base.	Justification: Unknown			

Evaluation (E)	Environmental factor						
	Medical Care	**Disaster Condition (Frequency of disaster)**					
1	No medical center in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occur once a year at least.					
2	No medical center in this neighborhood, but there is one in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occurred within 3 years.					
3	There is medical center in this neighborhood.	The slope disaster (landslide/slope failure¥rockfall) occurred within 5 years.					
	Election: **2**	Election: **1**					
	Justification: No medical center in this neighborhood, but there is one near there.	Justification: 60% of houses damaged by disaster happens every year.					

Matrix: Case of Fuerzas Unidas

Evaluation (E)	Physical Factor					
	Strength of house	**Countermeasure**	**Shelter, Evacuation route**	**Electricity, Water**	**Sanitary sewage system**	**Waste collection Service**
1	Less than 20% of houses in the zone are made in concrete	No countermeasure work has been installed.	There is no shelter and unsafe route to outside of the zone.	Infrastructure is maintained in less than 50% of the zone	Less than 50% of houses have sanitary sewage system	No waste collection service, and solid waste occupied road
2	More than 20% and less than 50% of houses in the zone are made in concrete	Countermeasure works have been installed but it is not enough and/or not work properly.	There is no shelter or unsafe route to outside of the zone.	Infrastructure is maintained in more than 50% and less than 80% of the zone	More than 50% and less than 80% of houses have sanitary sewage system	No waste collection service, or solid waste is obstruction of passage
3	More than 50% of houses in the zone are made in concrete	Appropriate countermeasure work(s) have been installed and work properly.	There is a shelter or a safe evacuation route to outside of the zone.	Infrastructure is maintained in more than 80% of the zone	More than 80% of houses have sanitary sewage system	There is waste collection service, and no obstruction of passage by solid waste.
	Election: **1**	Election: **1**	Election: **3**	Election: **3**	Election: **3**	Election: **2**
	Justification: Blick: 23%, Concrete: 8%, Wood: 69%	Justification: None	Justification: Church, Public school in the neighborhood	Justification: 100% water distribution, 100% power line, 100% mobile and internet.	Justification: The all interviewees have sanitary sewage system	Justification: the service is available for 8% of the interviewee, Wastewater, Junk car, vacancy

Evaluation (E)	Social Factor					
	Residential network	**Support organization in community**	**Trained, Skilled person**	**Vulnerable person**	**Security**	
1	Residents are estranged and the relationship is weak.	There is no support organization on/after disaster.	There is no trained or skilled person in the zone to support the vulnerable people and victims in disaster.	More than 30% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is gang support group in the neighborhood.	
2	A relationship has been established in which some residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, but it is not functioning properly.	Less than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 30% and more than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is no gang support group in the neighborhood.	
3	A relationship has been established in which all residents can	There is an organization to support vulnerable people and victims	More than 5% of the residents in the zone are trained or skilled person such as	Less than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is police station and there is no gang support group in	

	keep in touch and share information in an emergency.	in/after disaster, and it is functioning.	police or security guard.		the neighborhood.	
	Election: **2**	Election: **1**	Election: **1**	Election: **2**	Election: **1**	
	Justification: They have	Justification: Patronage, CODEL and Political group intermediates support organizations to support them	Justification: Police/military 1%	Justification: Resident:99 Chronic ill: 3 Pregrant:1 Elderly (>70):1 5/99=5%	Justification: No police station Gang support group	

Evaluation (E)	Economic Factor					
	Asset	**Public deed**	**Income**	**Financial support**		
1	Less than 30% of the families in the zone live in own house.	Less than 30% of families in the zone have public deed of the land.	Less than 50% of the representative of the families has income by regular base.	There is no organization in/around the neighborhood that provide financial support to the victims.		
2	Less than 80% and more than 30% of the families in the zone live in own house.	More than 30% and less than 80% of families in the zone have public deed of the land.	Less than 80% and more than 50% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide some financial support to the victims.		
3	More than 80% of families in the zone live in own house.	More than 80% of families in the zone have public deed of the land.	More than 80% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide financial support to the victims.		
	Election: **1**	Election: **1**	Election: **1**	Election: **3**		
	Justification: 85% of families in the zone live in own house.	Justification: 23% of families in the zone have public deed of the land.	Justification: 37% of the representative of the families has regular income.	Justification: CDH, Church, European Org,		

Evaluation (E)	Environmental factor				
	Medical Care	**Disaster Condition (Frequency of disaster)**			
1	No medical center in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occur once a year at least.			
2	No medical center in this neighborhood, but there is one in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occurred within 3 years.			
3	There is medical center in this neighborhood.	The slope disaster (landslide/slope failure¥rockfall) occurred within 5 years.			
	Election: **2**	Election: **1**			
	Justification: No medical center in this neighborhood, but there is one near there.	Justification: 42% of interviewee has experience of disaster happens once a year.			

Matrix: Nueva Santa Rosa

Evaluation (E)	Physical Factor						
	Strength of house	**Countermeasure**	**Shelter, Evacuation route**	**Electricity, Water**	**Sanitary sewage system**	**Waste collection Service**	
1	Less than 20% of houses in the zone are made in concrete block	No countermeasure work has been installed.	There is no shelter and unsafe route to outside of the zone.	Infrastructure is maintained in less than 50% of the zone	Less than 50% of houses have sanitary sewage system	No waste collection service, and solid waste occupied road	
2	More than 20% and less than 50% of houses in the zone are made in concrete block	Countermeasure works have been installed but it is not enough and/or not work properly.	There is no shelter or unsafe route to outside of the zone.	Infrastructure is maintained in more than 50% and less than 80% of the zone	More than 50% and less than 80% of houses have sanitary sewage system	No waste collection service, or solid waste is obstruction of passage	
3	More than 50% of houses in the zone are made in concrete block	Appropriate countermeasure work(s) have been installed and work properly.	There is a shelter or a safe evacuation route to outside of the zone.	Infrastructure is maintained in more than 80% of the zone	More than 80% of houses have sanitary sewage system	There is waste collection service, and no obstruction of passage by solid waste.	
	Election: **2**	Election: **1**	Election: **3**	Election: **3**	Election: **3**	Election: **3**	
	Justification: Concrete block: 35%, Brick: 26%, Wood: 35%	Justification: No Countermeasure works	Justification: Church, Public school in the neighborhood	Justification: 100% water distribution, 100% power line, 100% mobile and internet.	Justification: 99% of the interviewees have sanitary sewage system	Justification: the service is available for 83% of the interviewee	

Evaluation (E)	Social Factor						
	Residential network	**Support organization in community**	**Trained, Skilled person**	**Vulnerable person**	**Security**		
1	Residents are estranged and the relationship is weak.	There is no support organization on/after disaster.	There is no trained or skilled person in the zone to support the vulnerable people and victims in disaster.	More than 30% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is gang support group in the neighborhood.		
2	A relationship has been established in which some residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, but it is not functioning properly.	Less than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 30% and more than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is no gang support group in the neighborhood.		
3	A relationship has been established in which all residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, and it is functioning.	More than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is police station and there is no gang support group in the neighborhood.		
	Election: **3**	Election: **3**	Election: **1**	Election: **1**	Election: **3**		

	Justification: They have.	Justification: Patronage, CODEL and Political group intermediates support organizations to support them	Justification: It is not sure. The job type was not researched in this survey.	Justification: Pregnant: 3 Handicap: 15 Elderly person:53 Chronically ill: 53	Justification: There in police station in/near the neighborhood.		

Evaluation (E)	Economic Factor						
	Asset	**Public deed**	**Income**	**Financial support**			
1	Less than 30% of the families in the zone live in own house.	Less than 30% of families in the zone have public deed of the land.	Less than 50% of the representative of the families has income by regular base.	There is no organization in/around the neighborhood that provide financial support to the victims.			
2	Less than 80% and more than 30% of the families in the zone live in own house.	More than 30% and less than 80% of families in the zone have public deed of the land.	Less than 80% and more than 50% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide some financial support to the victims.			
3	More than 80% of families in the zone live in own house.	More than 80% of families in the zone have public deed of the land.	More than 80% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide financial support to the victims.			
	Election: **2**	Election: **2**	Election: **2**	Election: **1**			
	Justification: 64% family has own house	Justification: 50% family has public deed	Justification: 56% person has permanent job	Justification: Unknown			

Evaluation (E)	Environmental factor						
	Medical Care	**Disaster Condition (Frequency of disaster)**					
1	No medical center in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occur once a year at least.					
2	No medical center in this neighborhood, but there is one in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occurred within 3 years.					
3	There is medical center in this neighborhood.	The slope disaster (landslide/slope failure¥rockfall) occurred within 5 years.					
	Election: **2**	Election: **1**					
	Justification: No medical center in this neighborhood, but there is one near there.	Justification: 52% of houses damaged by disaster happens every year.					

Matrix: Villa Nueva

Evaluation (E)	Physical Factor					
	Strength of house	**Countermeasure**	**Shelter, Evacuation route**	**Electricity, Water**	**Sanitary sewage system**	**Waste collection Service**
1	Less than 20% of houses in the zone are made in concrete	No countermeasure work has been installed.	There is no shelter and unsafe route to outside of the zone.	Infrastructure is maintained in less than 50% of the zone	Less than 50% of houses have sanitary sewage system	No waste collection service, and solid waste occupied road
2	More than 20% and less than 50% of houses in the zone are made in concrete	Countermeasure works have been installed but it is not enough and/or not work properly.	There is no shelter or unsafe route to outside of the zone.	Infrastructure is maintained in more than 50% and less than 80% of the zone	More than 50% and less than 80% of houses have sanitary sewage system	No waste collection service, or solid waste is obstruction of passage
3	More than 50% of houses in the zone are made in concrete	Appropriate countermeasure work(s) have been installed and work properly.	There is a shelter or a safe evacuation route to outside of the zone.	Infrastructure is maintained in more than 80% of the zone	More than 80% of houses have sanitary sewage system	There is waste collection service, and no obstruction of passage by solid waste.
	Election: **2**	Election: **1**	Election: **3**	Election: **3**	Election: **2**	Election: **3**
	Justification: Concrete block: 33%, Brick: 44%, Wood: 22%	Justification: No countermeasure works	Justification: There is route to outside of the hazard zone.	Justification: 100% of family has water and electric power service	Justification: 67% of family has sanitary sewage system	Justification: There is waste collection service, and no obstruction of passage by solid waste.

Evaluation (E)	Social Factor					
	Residential network	**Support organization in community**	**Trained, Skilled person**	**Vulnerable person**	**Security**	
1	Residents are estranged and the relationship is weak.	There is no support organization on/after disaster.	There is no trained or skilled person in the zone to support the vulnerable people and victims in disaster.	More than 30% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is gang support group in the neighborhood.	
2	A relationship has been established in which some residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, but it is not functioning properly.	Less than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 30% and more than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is no police station and there is no gang support group in the neighborhood.	
3	A relationship has been established in which all residents can keep in touch and share information in an emergency.	There is an organization to support vulnerable people and victims in/after disaster, and it is functioning.	More than 5% of the residents in the zone are trained or skilled person such as police or security guard.	Less than 5% of residents in the zone are pregnant, chronically ill and/or elderly person	There is police station and there is no gang support group in the neighborhood.	

	Election: **3**	Election: **3**	Election: **1**	Election: **1**	Election: **1**	
	Justification: They have.	Justification: They have.	Justification: No information	Justification: Chronical ill 8 Handicaps: 3 Elderly person: 38%	Justification: There is no police station and there is gang support group in the neighborhood	

Evaluation (E)	Economic Factor					
	Asset	**Public deed**	**Income**	**Financial support**		
1	Less than 30% of the families in the zone live in own house.	Less than 30% of families in the zone have public deed of the land.	Less than 50% of the representative of the families has income by regular base.	There is no organization in/around the neighborhood that provide financial support to the victims.		
2	Less than 80% and more than 30% of the families in the zone live in own house.	More than 30% and less than 80% of families in the zone have public deed of the land.	Less than 80% and more than 50% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide some financial support to the victims.		
3	More than 80% of families in the zone live in own house.	More than 80% of families in the zone have public deed of the land.	More than 80% of the representative of the families has income by regular base.	There is an organization in/around the neighborhood that provide financial support to the victims.		
	Election: **3**	Election: **1**	Election: **1**	Election: **1**		
	Justification: 89% family has own house	Justification: 11% of family has public deed.	Justification: 88% of representative of family has regular job.	Justification: Unknown		

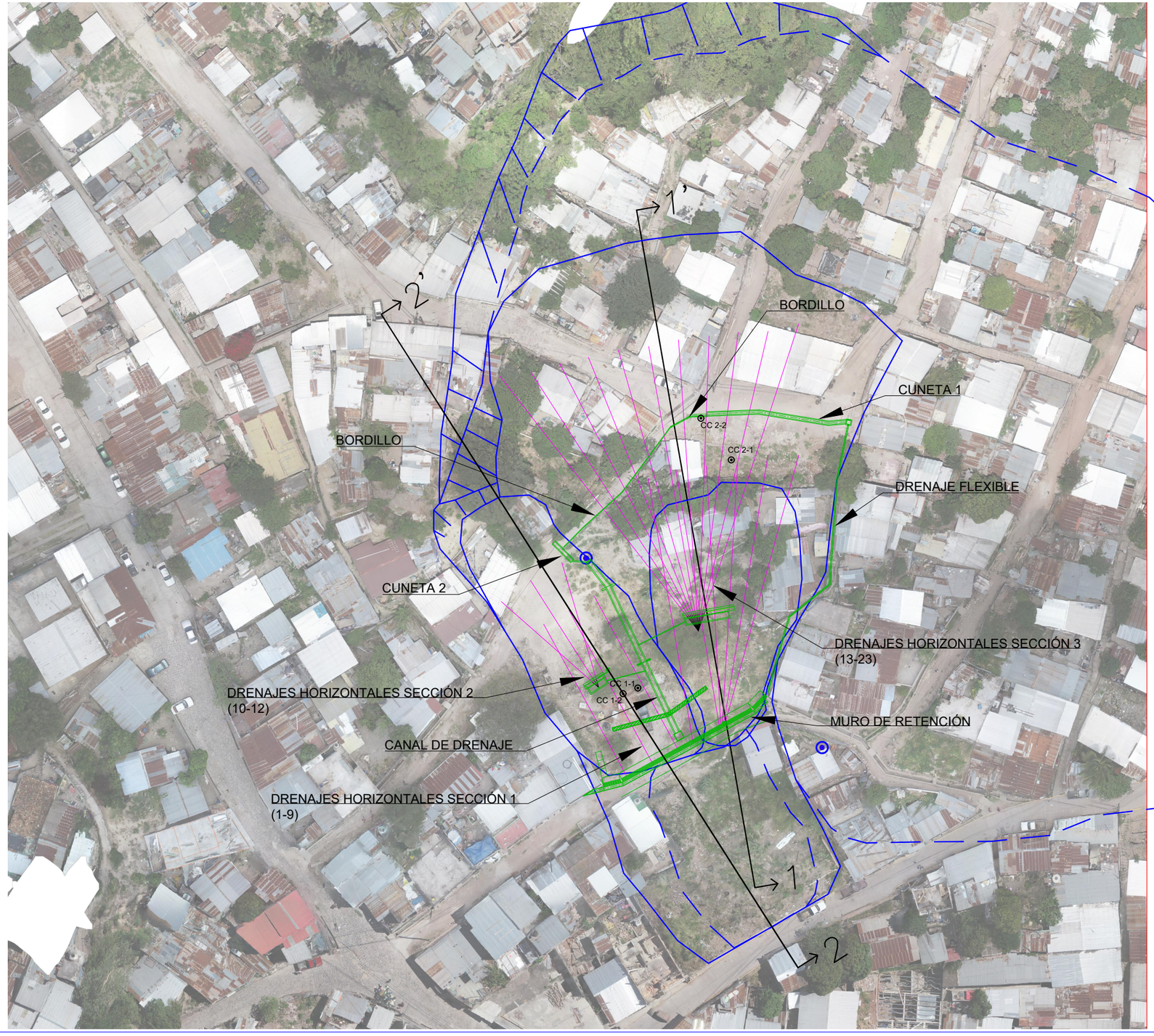
Evaluation (E)	Environmental factor				
	Medical Care	**Disaster Condition (Frequency of disaster)**			
1	No medical center in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occur once a year at least.			
2	No medical center in this neighborhood, but there is one in the area within 30 mins by car.	The slope disaster (landslide/slope failure¥rockfall) occurred within 3 years.			
3	There is medical center in this neighborhood.	The slope disaster (landslide/slope failure¥rockfall) occurred within 5 years.			
	Election: **3**	Election: **2**			
	Justification: There is medical center quite near this neighborhood.	Justification: 67% of family face the disaster occurred every 2 years.			

Appendix 10

Design work for countermeasure works in Campo Cielo

LEYENDA

- Nacimiento de Agua
- CC 1-1 — Dispositivos de Monitoreo
- Bloque de Deslizamiento (Definido)
- Bloque de Deslizamiento (Estimado)
- Escarpe del Deslizamiento
- Estructuras
- Drenajes Horizontales



JICA

ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
PLANTA GENERAL
ORTOFOTO

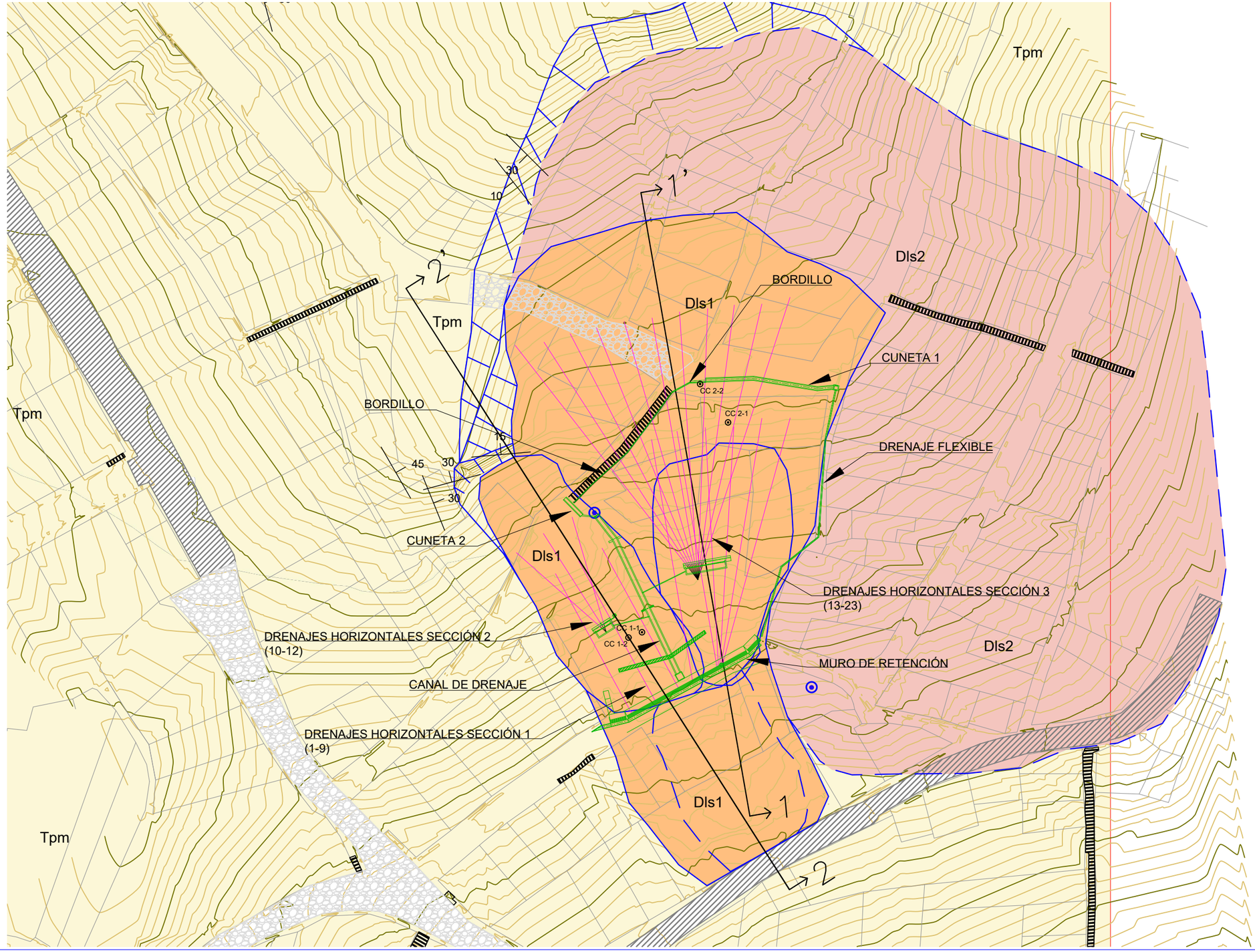
DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA: 1:750
COTAS: METROS

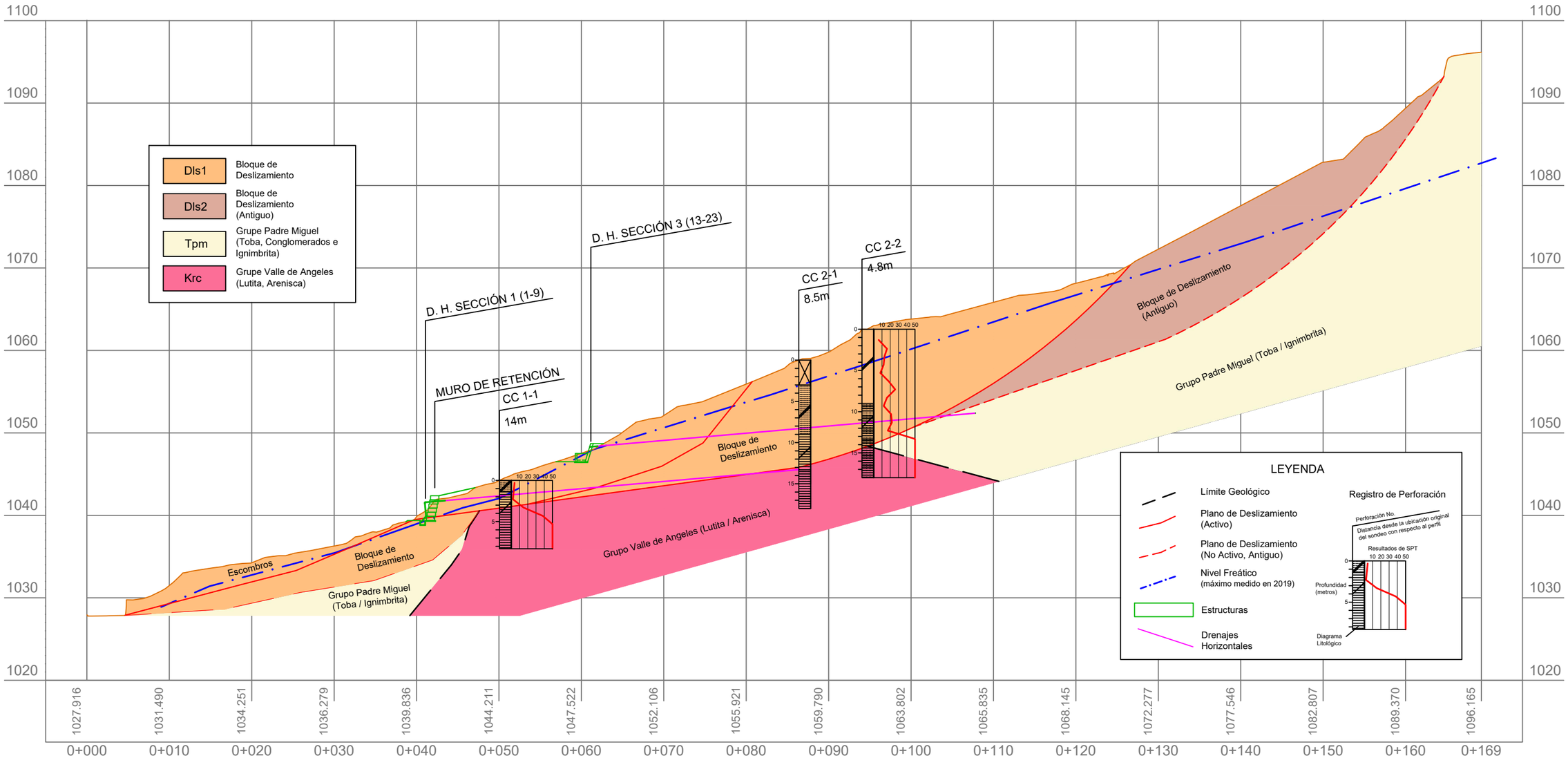
HOJA NO. 01

LEYENDA

- Dls1 — Bloque de Deslizamiento
- Dls2 — Bloque de Deslizamiento (Antiguo)
- Tpm — Grupe Padre Miguel (Toba, Conglomerados e Ignimbrita)
- Krc — Grupe Valle de Angeles (Lutita, Arenisca)
- Límite Geológico
- 30 — Buzamiento
- Nacimiento de Agua
- CC 1-1 — Dispositivos de Monitoreo
- Bloque de Deslizamiento (Definido)
- Bloque de Deslizamiento (Estimado)
- Escarpe del Deslizamiento
- Estructuras
- Drenajes Horizontales



JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PLANTA GENERAL GEOLOGÍA	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:750 COTAS: METROS	HOJA NO. 02



JICA

ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

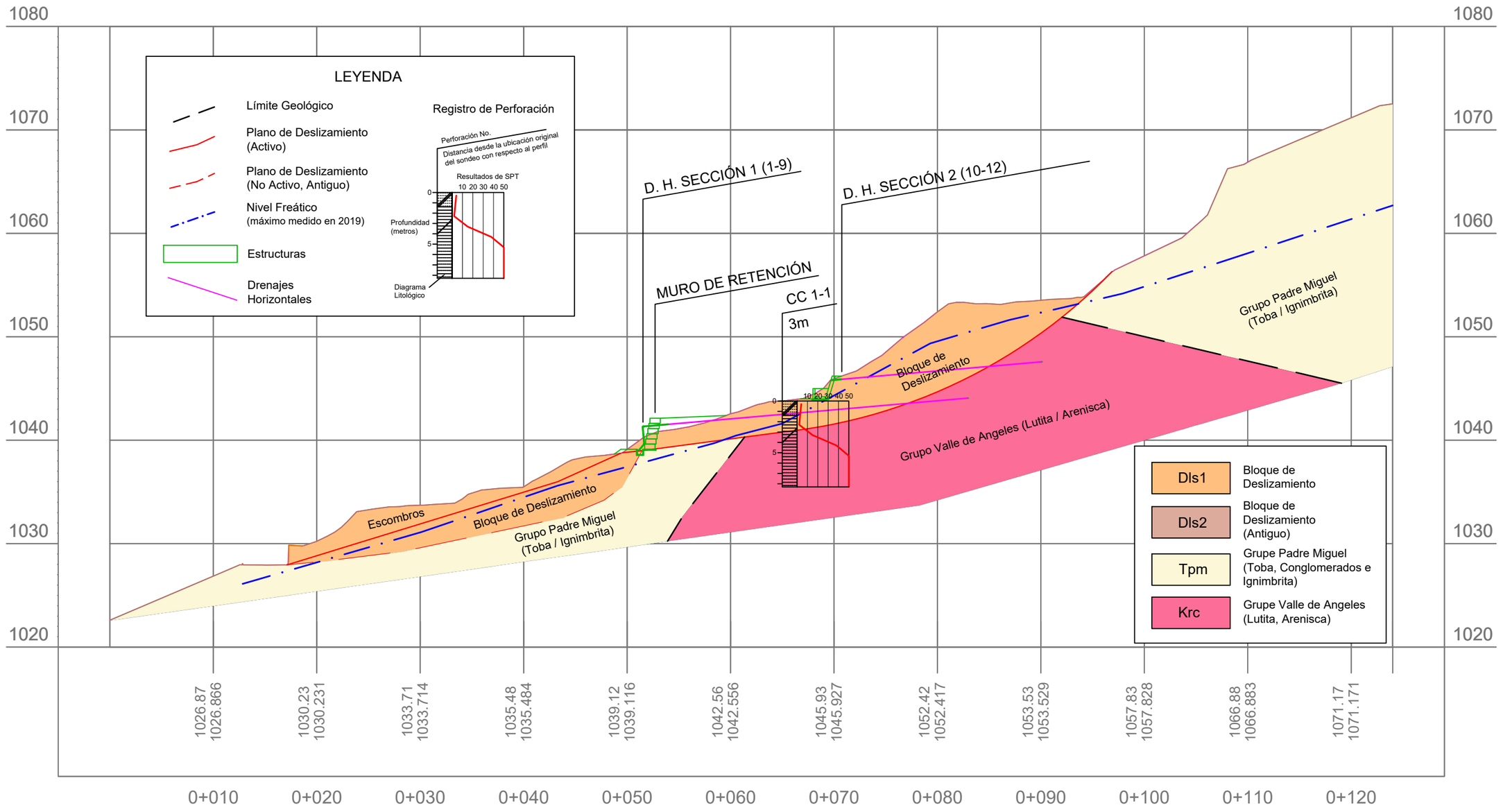
UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
PERFIL GEOLÓGICO 1

DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA:
1:500
COTAS: METROS

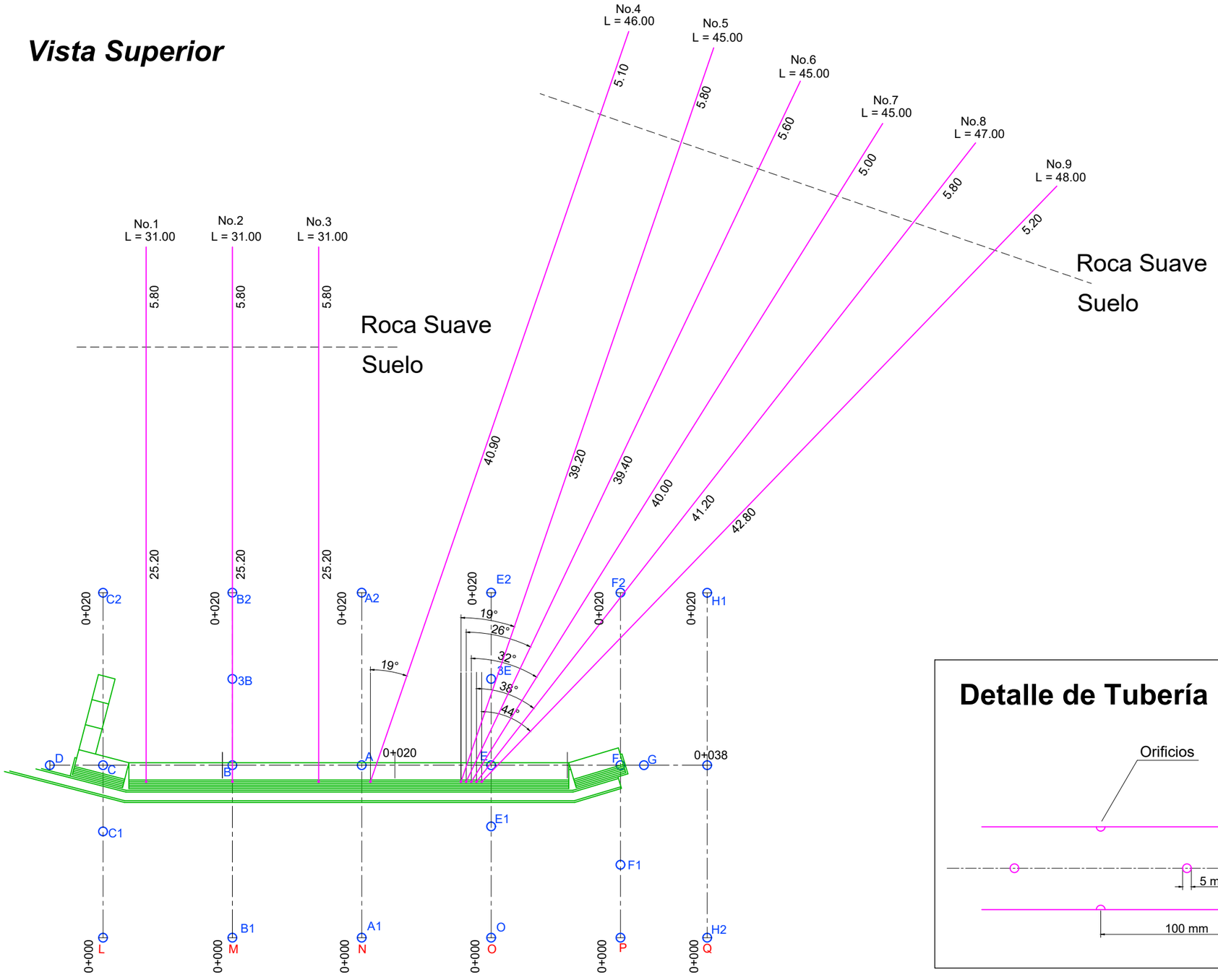
HOJA NO.
03



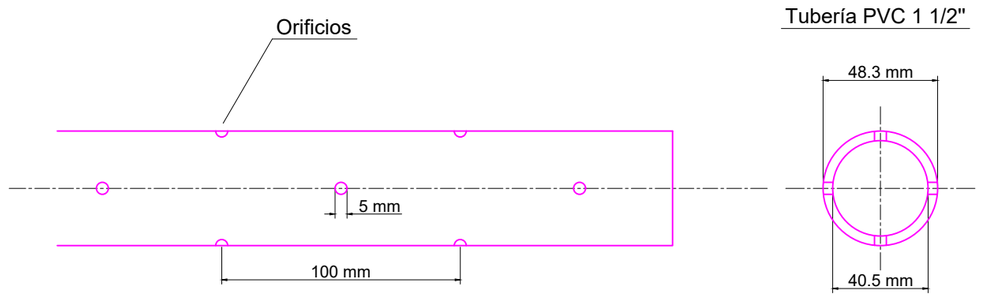
JICA / ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL GEOLÓGICO 2	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:400 COTAS: METROS	HOJA NO. 04

Drenajes Horizontales
Sección 1

Vista Superior



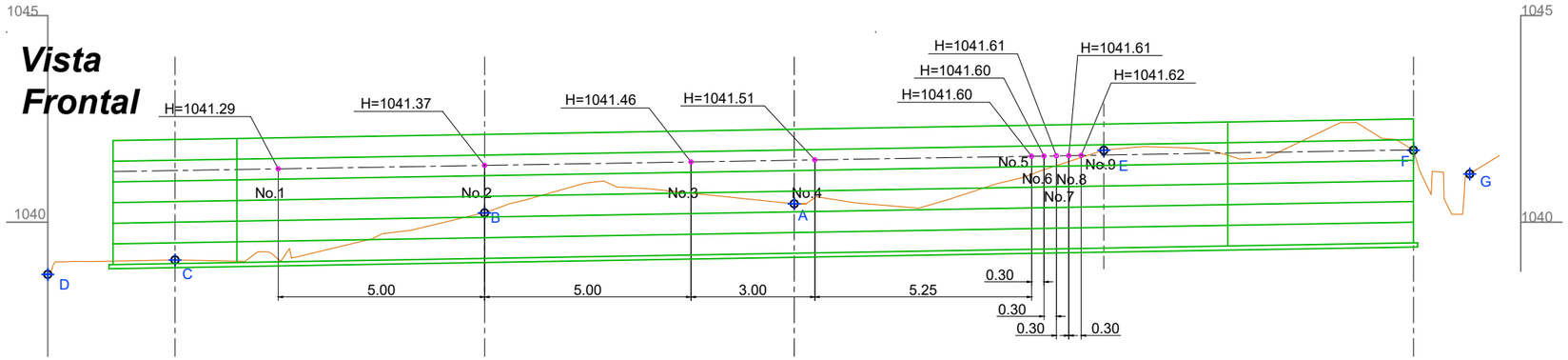
Detalle de Tubería para Drenaje



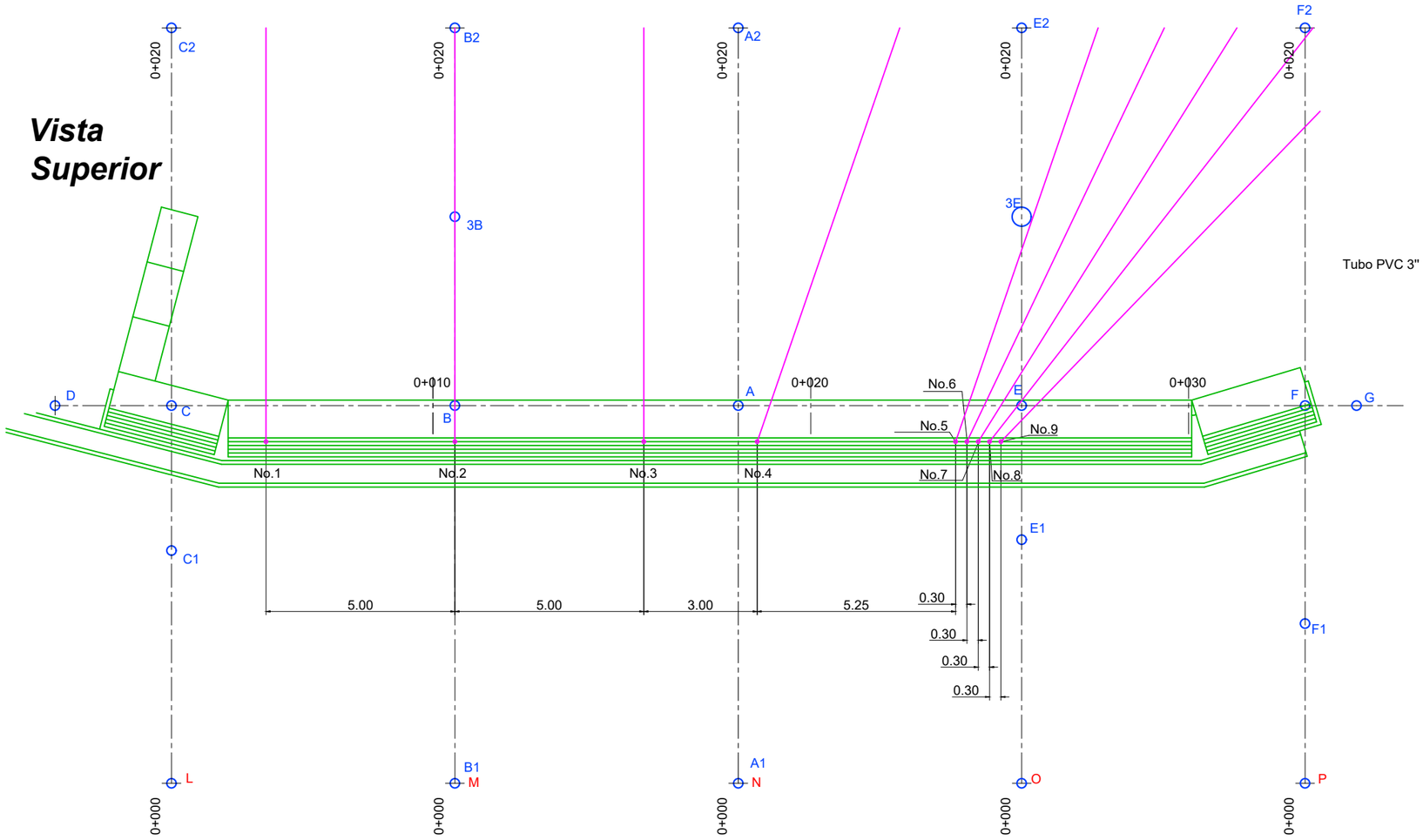
PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: DRENAJES HORIZONTALES SECCIÓN 1	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 05

Drenajes Horizontales
Sección 1

Vista Frontal

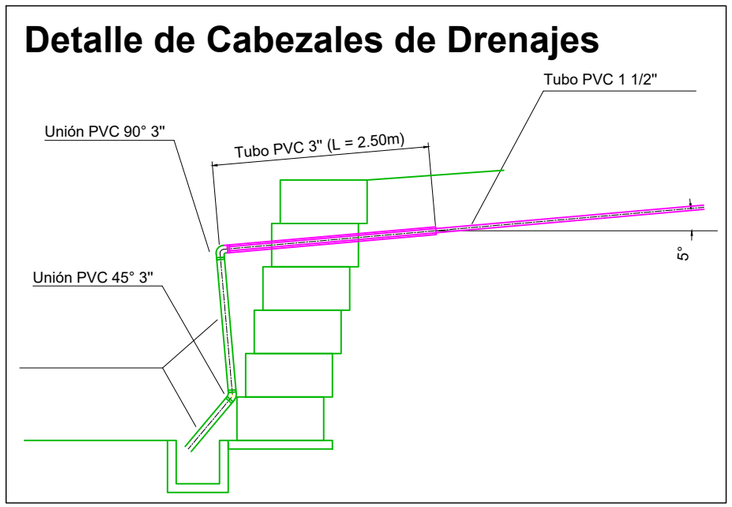


Vista Superior



Tubo PVC 3"

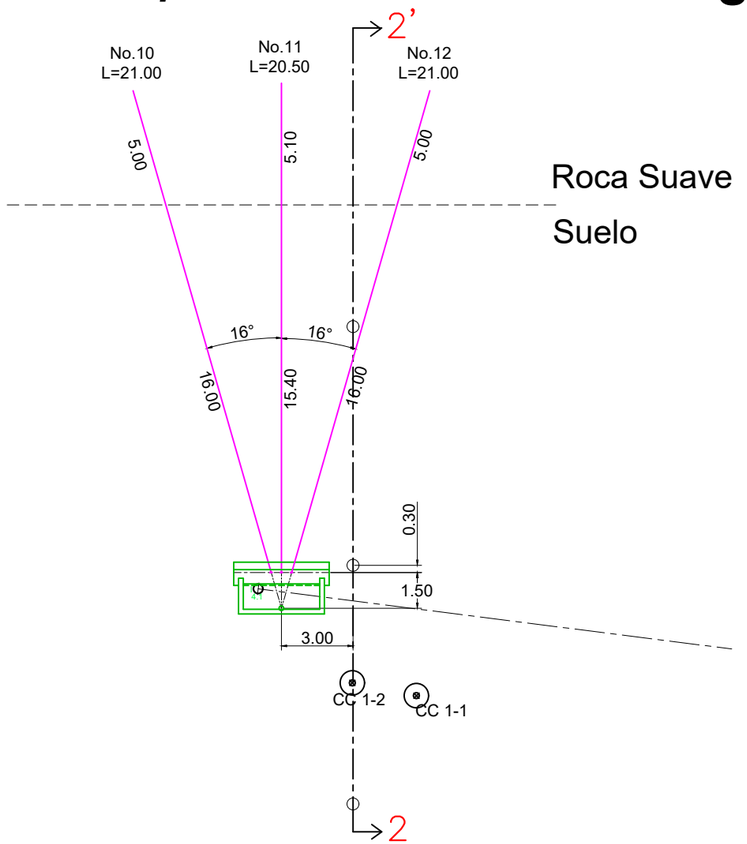
Detalle de Cabezales de Drenajes



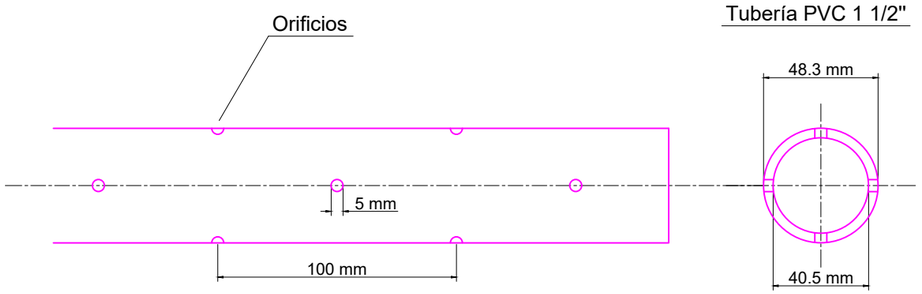
JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: DRENAJES HORIZONTALES SECCIÓN 1	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:275 COTAS: METROS	HOJA NO. 06

Drenajes Horizontales
Sección 2

Vista Superior

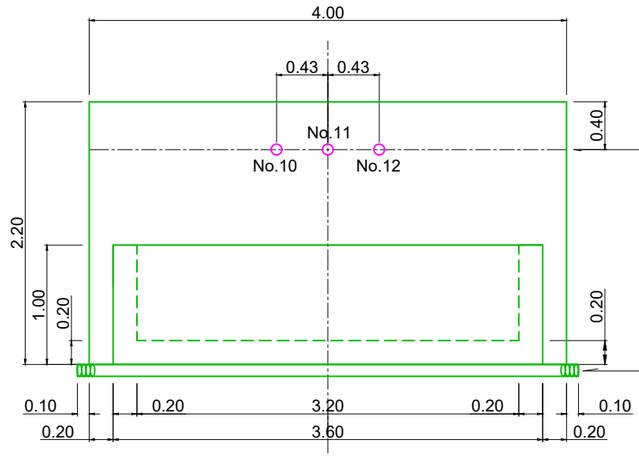


Detalle de Tubería para Drenaje

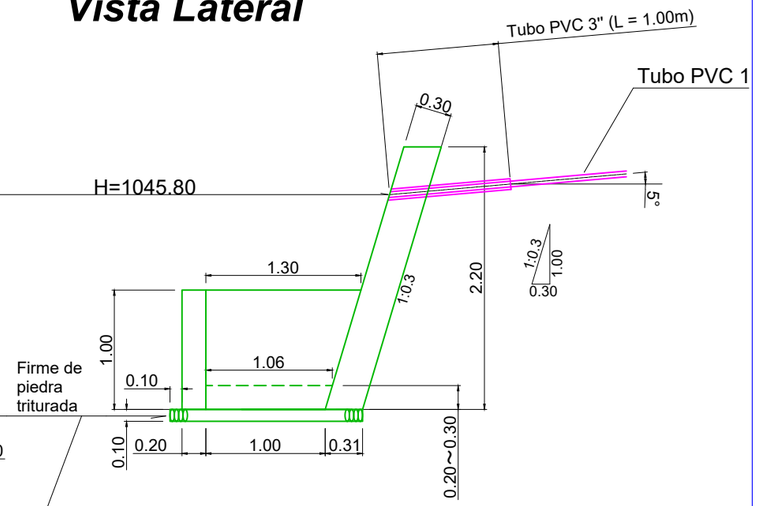


Esquema Estructural de Caja de Recolección

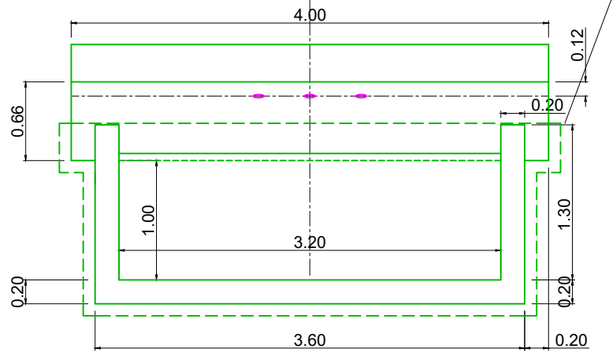
Vista Frontal



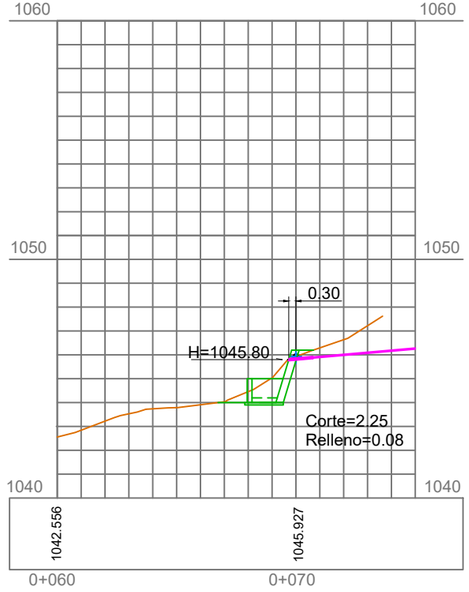
Vista Lateral



Vista Superior

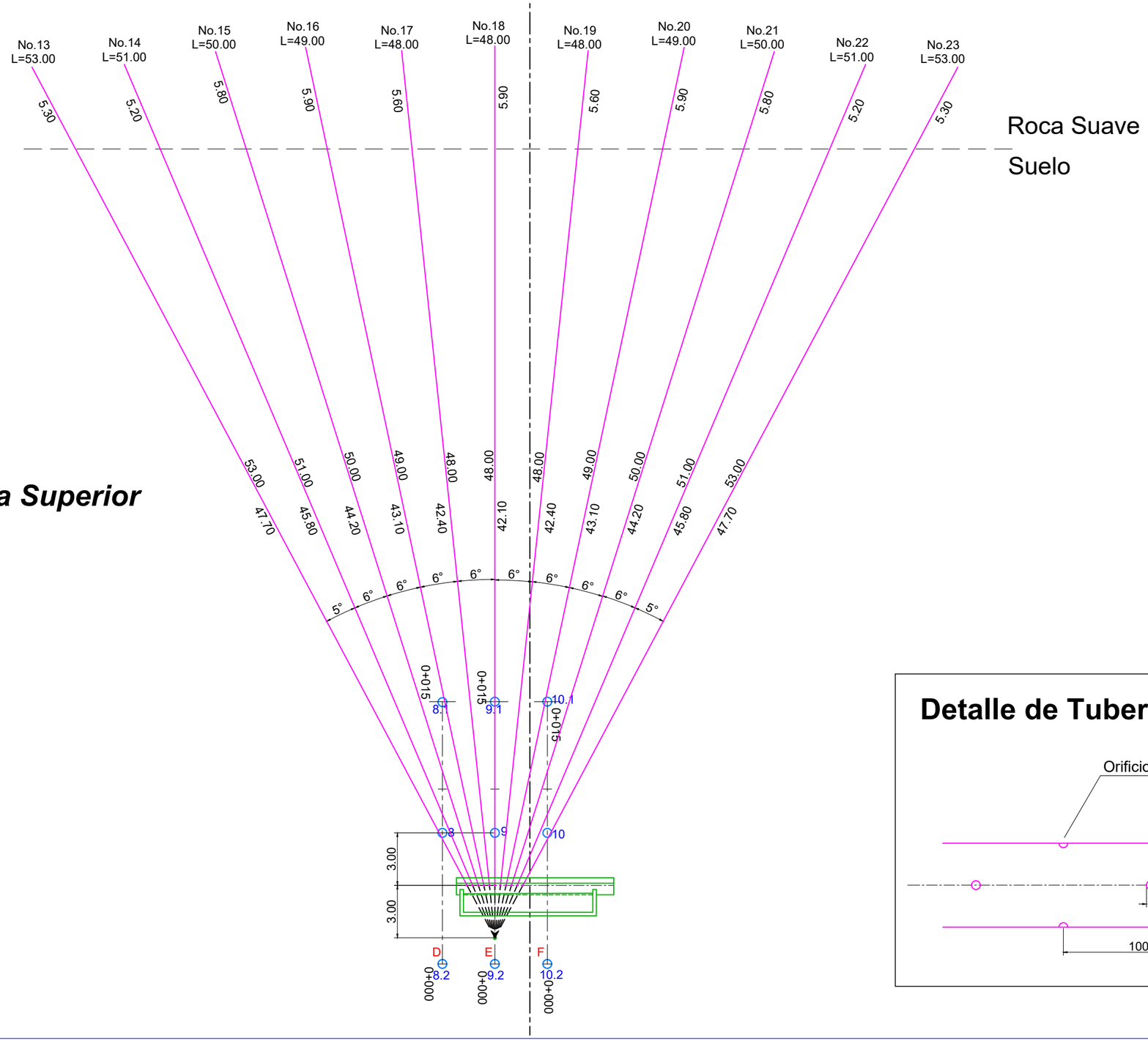


Sección de Perfil Geológico 2



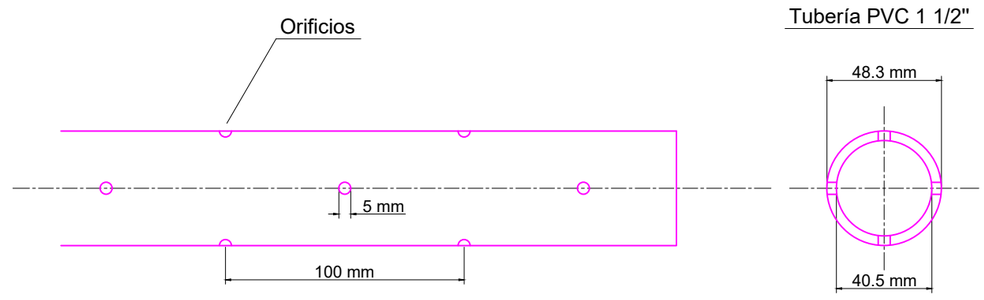
PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: DRENAJES HORIZONTALES SECCIÓN 2	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 07

Drenajes Horizontales
Sección 3



Vista Superior

Detalle de Tubería para Drenaje



ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
DRENAJES HORIZONTALES
SECCIÓN 3

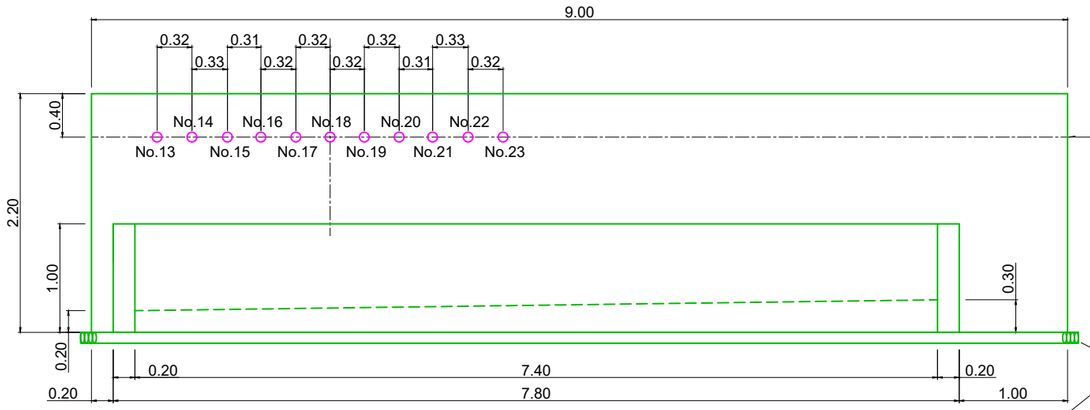
DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA: 1:250
COTAS: METROS

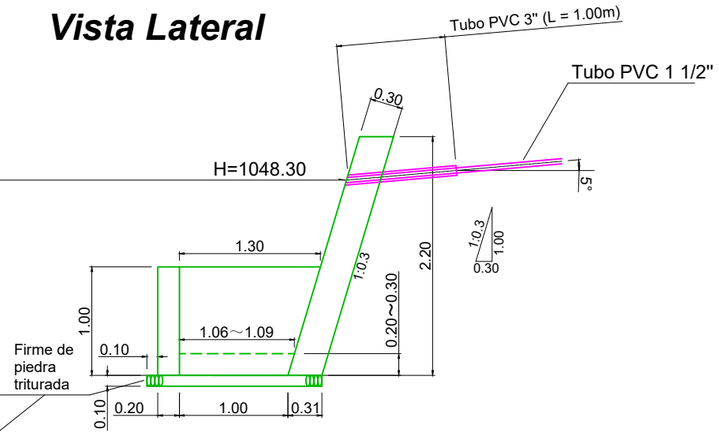
HOJA NO. 08

Esquema Estructural de Caja de Recolección

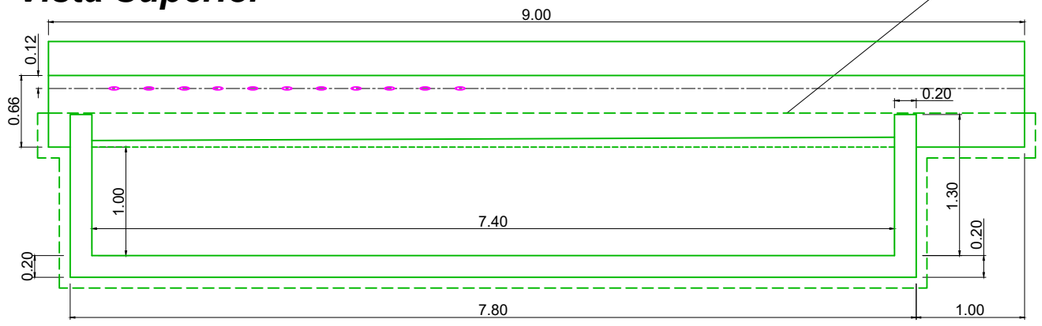
Vista Frontal



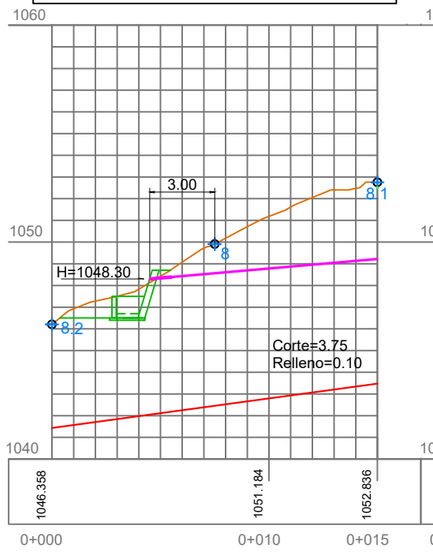
Vista Lateral



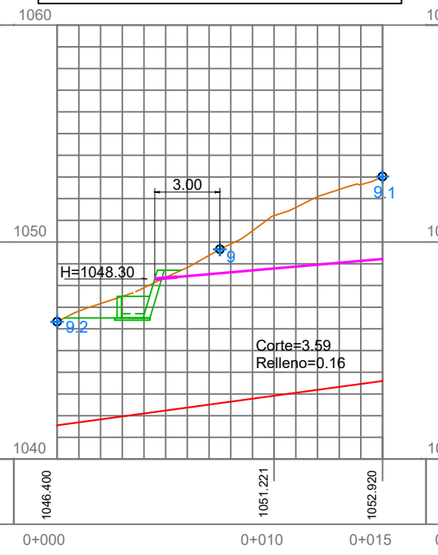
Vista Superior



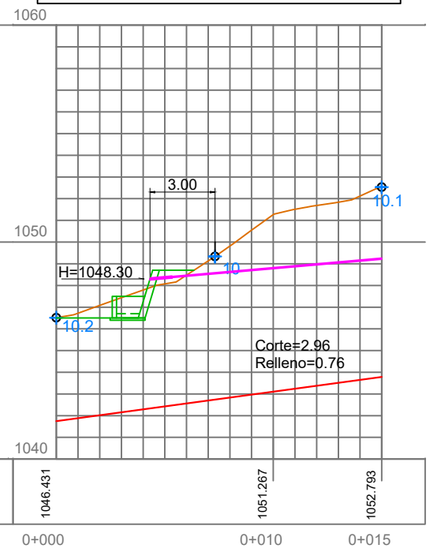
Sección D



Sección E



Sección F



JICA

ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
DRENAJES HORIZONTALES
SECCIÓN 3

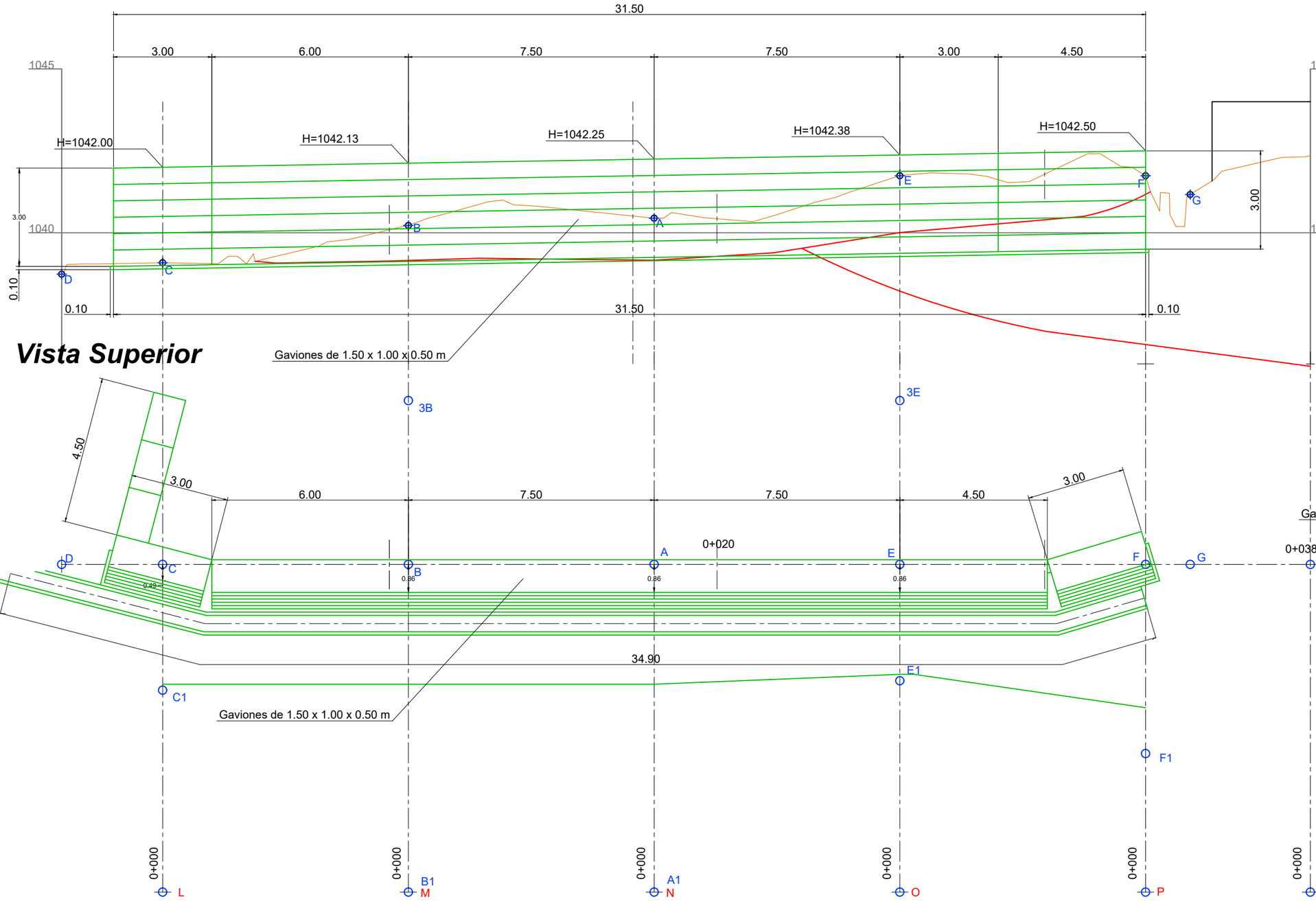
DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA: 1:275
COTAS: METROS

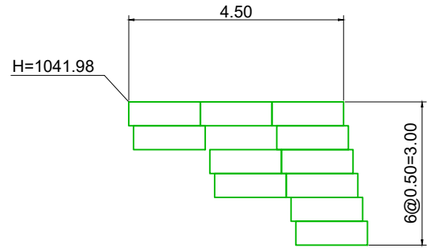
HOJA NO. 09

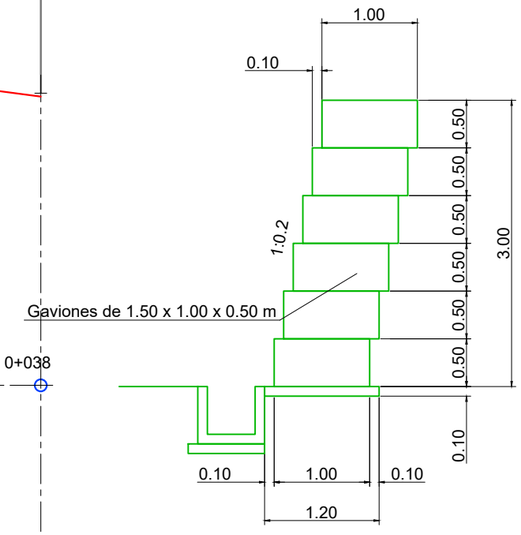
Esquema Estructural de Muro de Retención

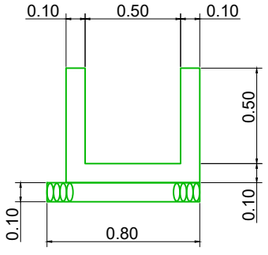
Vista Frontal



Vista Lateral



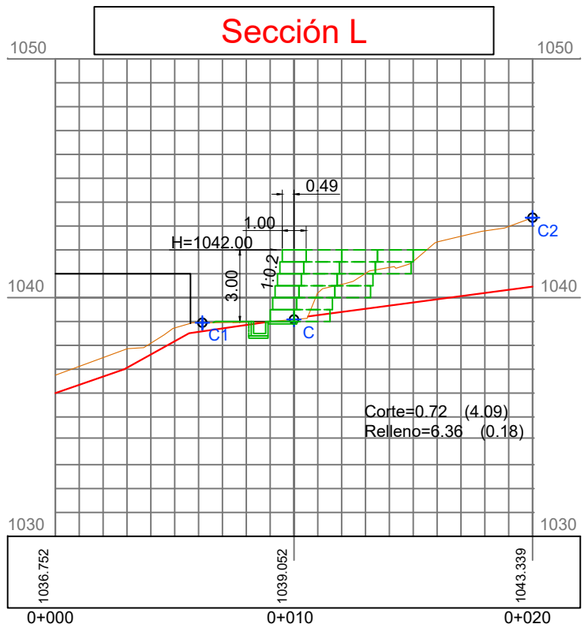




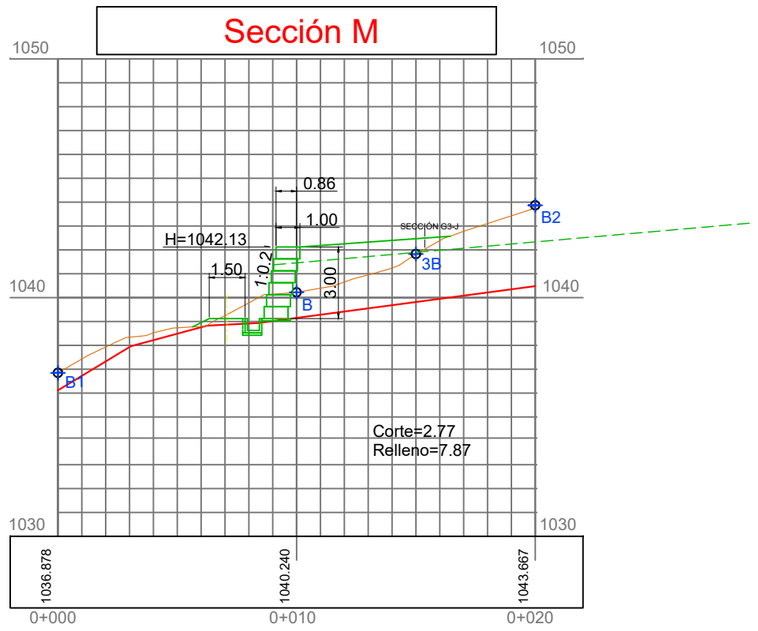
Vista Superior

PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: MURO DE RETENCIÓN	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 10

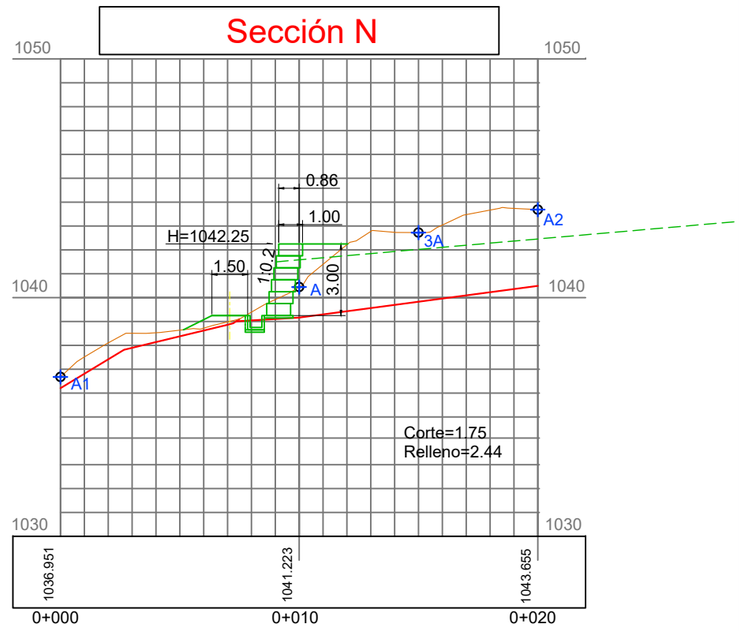
Sección L



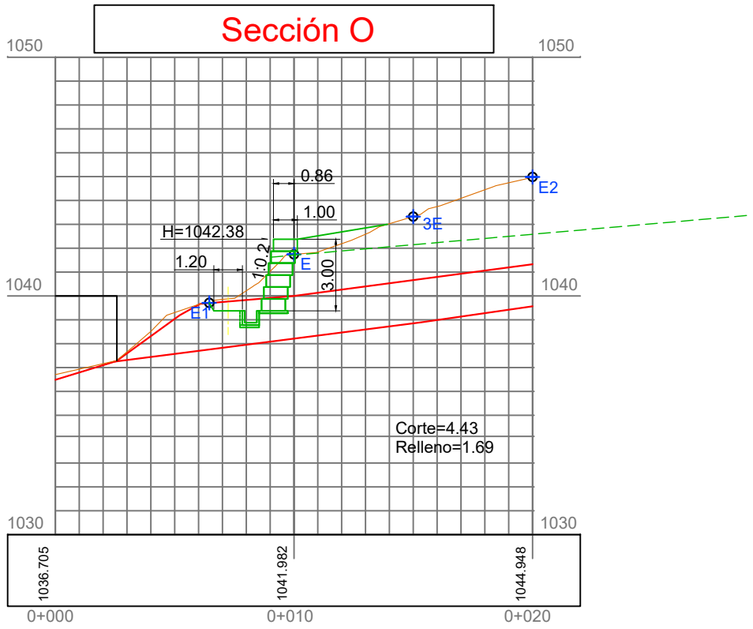
Sección M



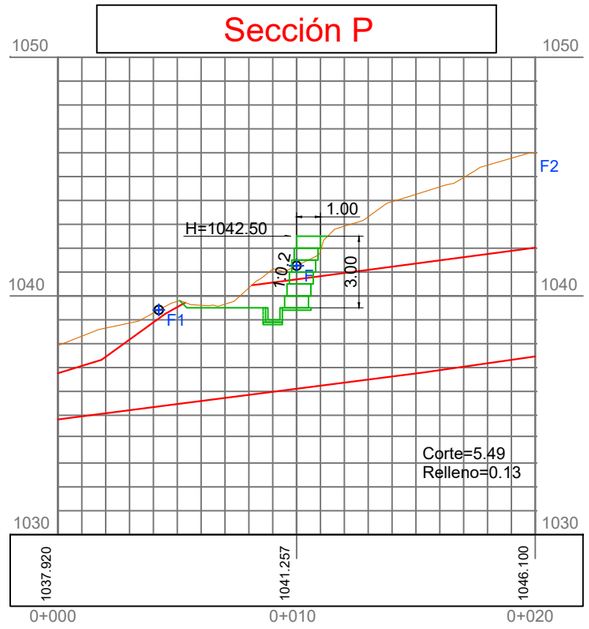
Sección N



Sección O



Sección P



JICA

ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
MURO DE RETENCIÓN (SECCIONES)

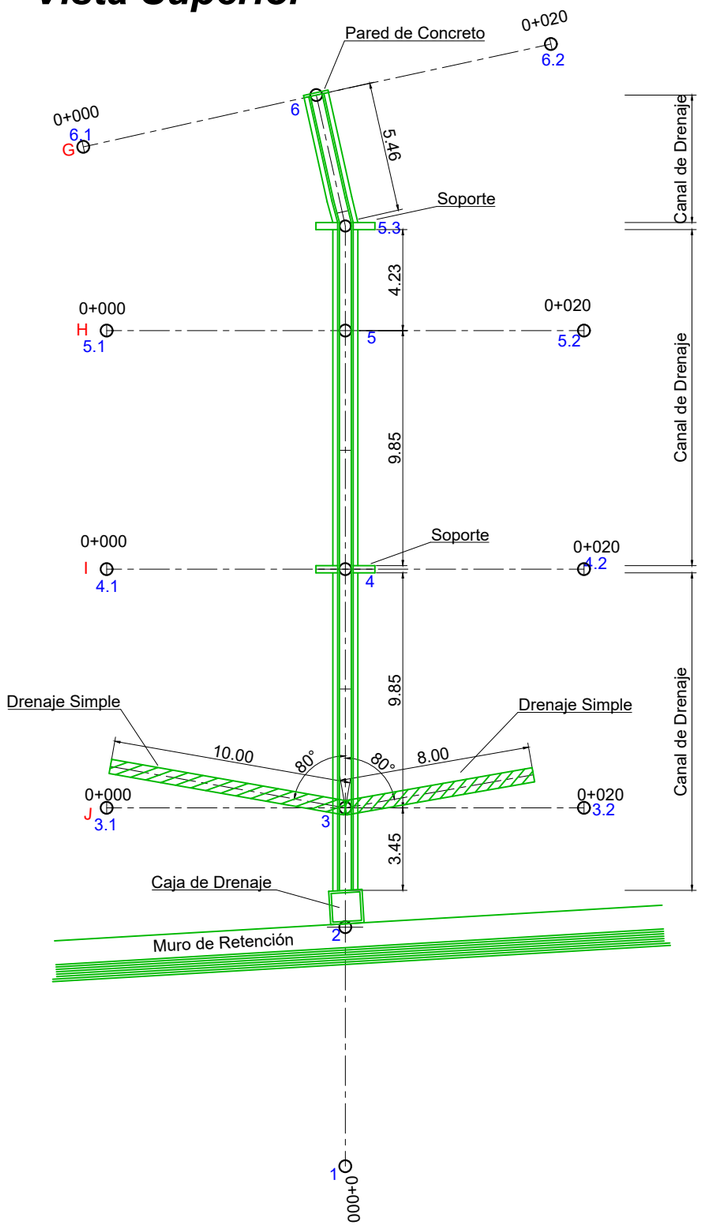
DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA: 1:250
COTAS: METROS

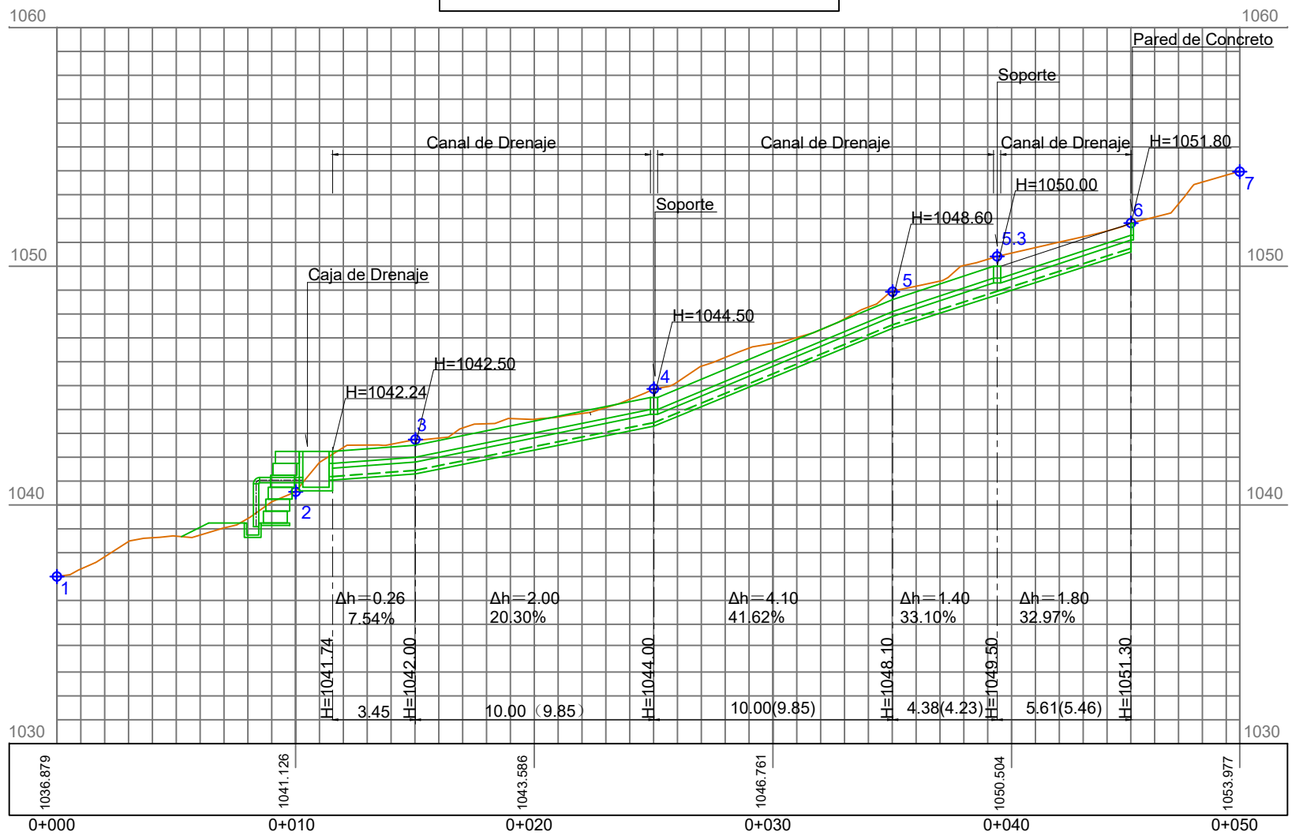
HOJA NO. 11

Canal de Drenaje

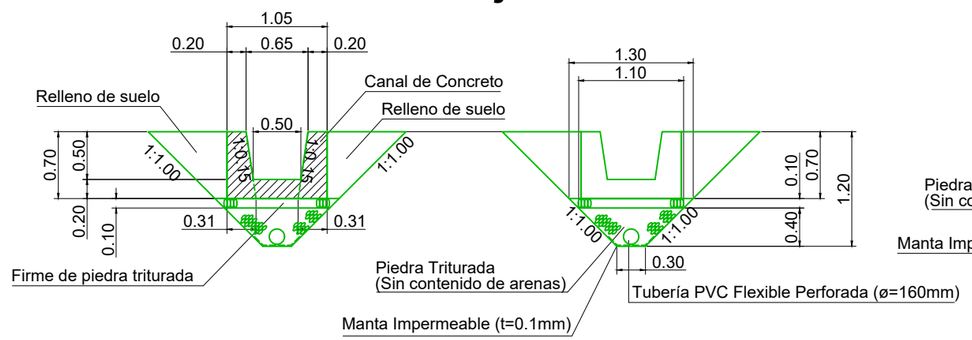
Vista Superior



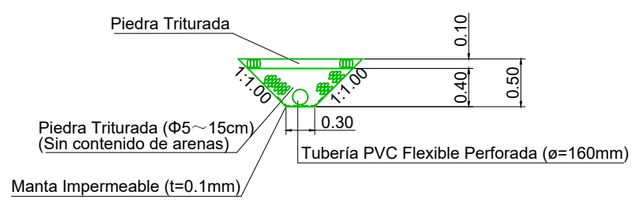
Línea Central del Canal



Detalle de Canal de Drenaje

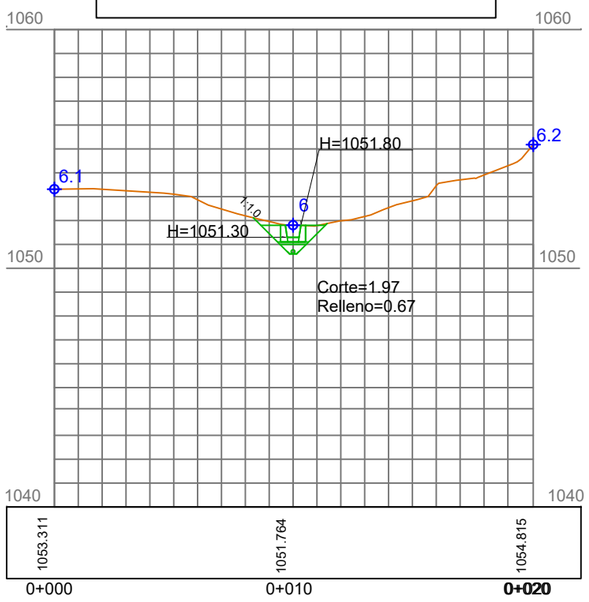


Detalle de Drenaje Simple

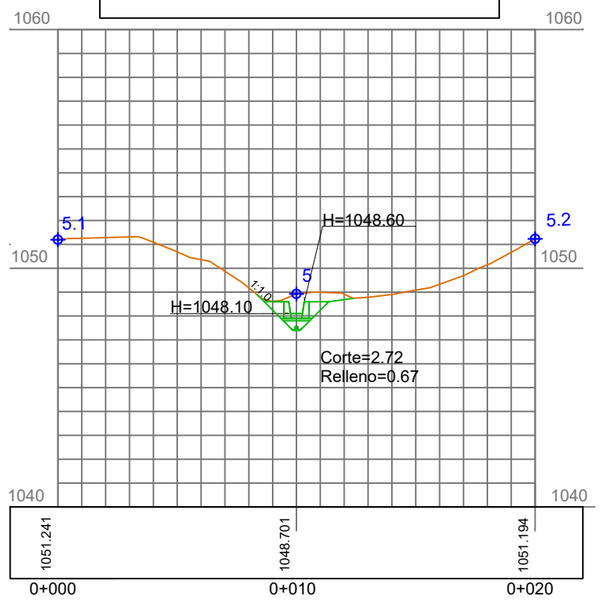


JICA / ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: CANAL DE DRENAJE	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 12

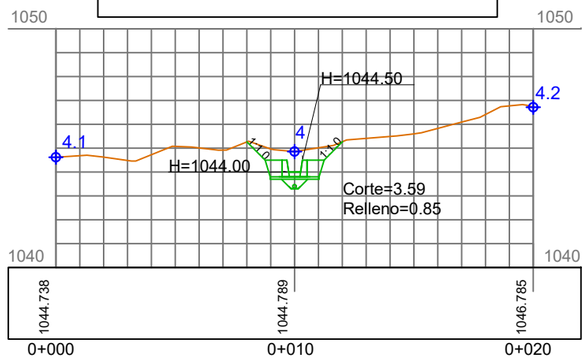
Sección G



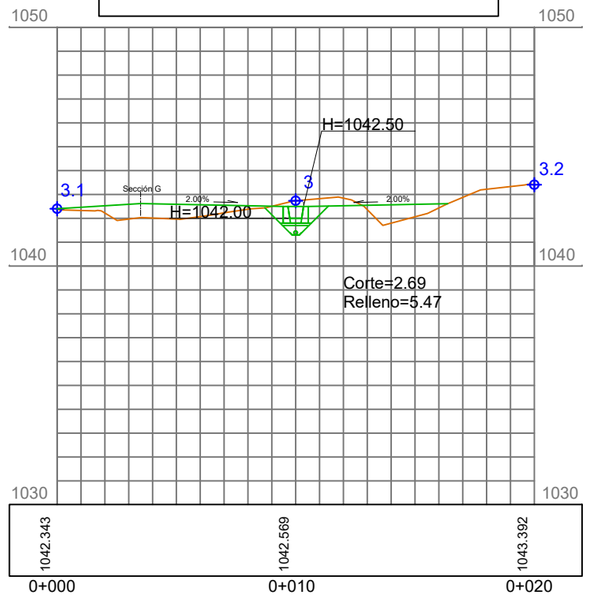
Sección H



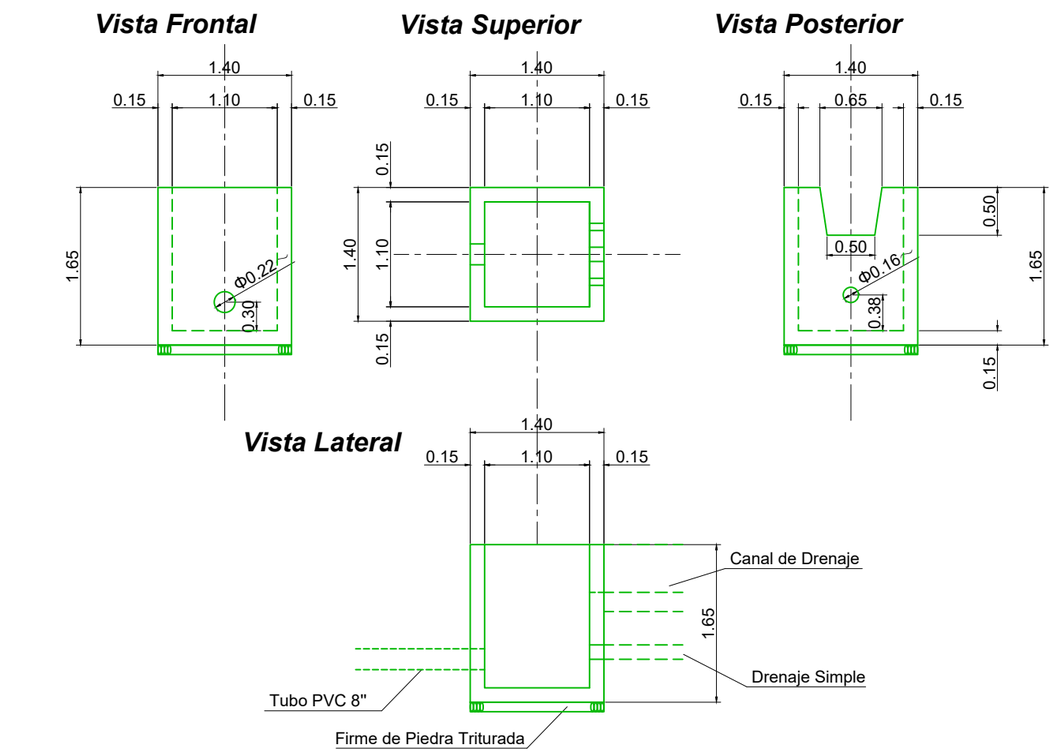
Sección I



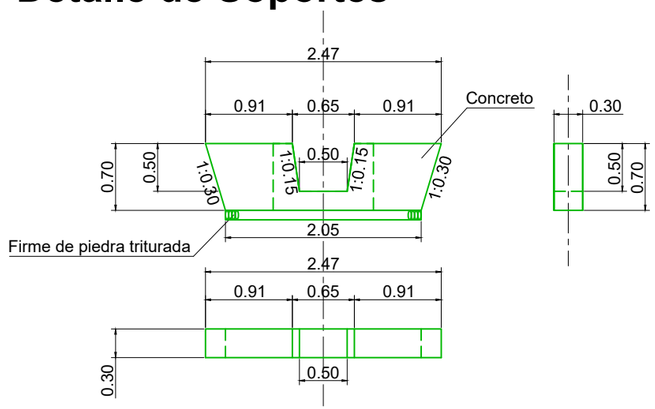
Sección J



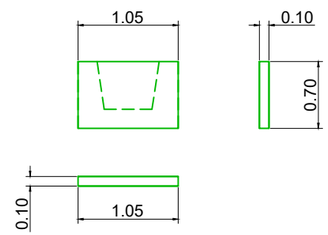
Detalle de Caja de Drenaje



Detalle de Soportes

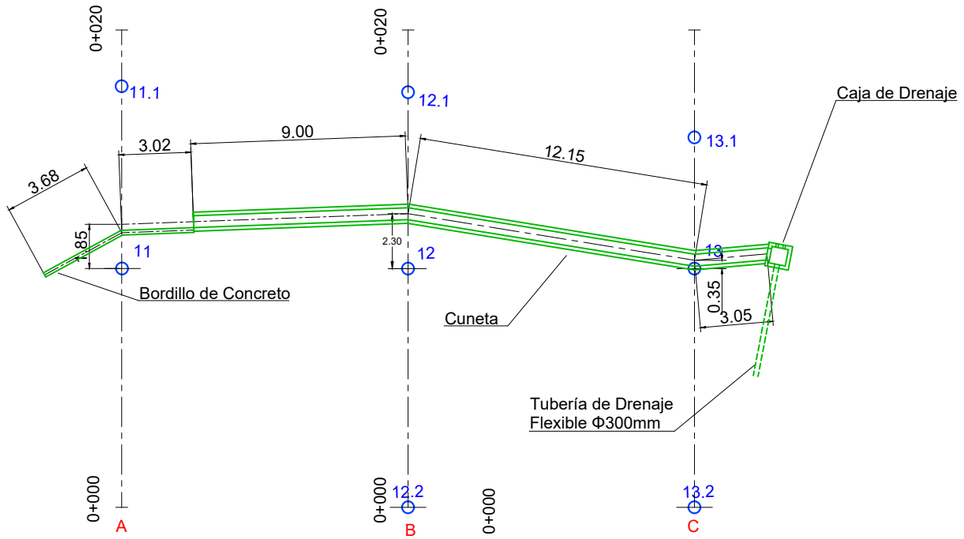


Detalle de Pared de Concreto

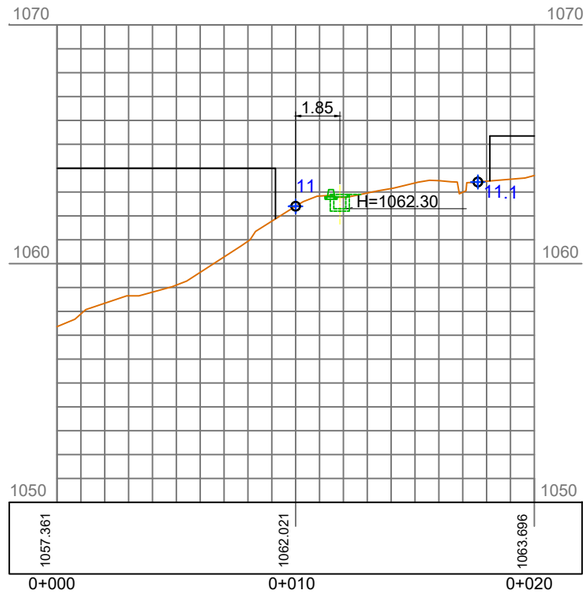


PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: CANAL DE DRENAJE	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 13

Cuneta 1



Sección A



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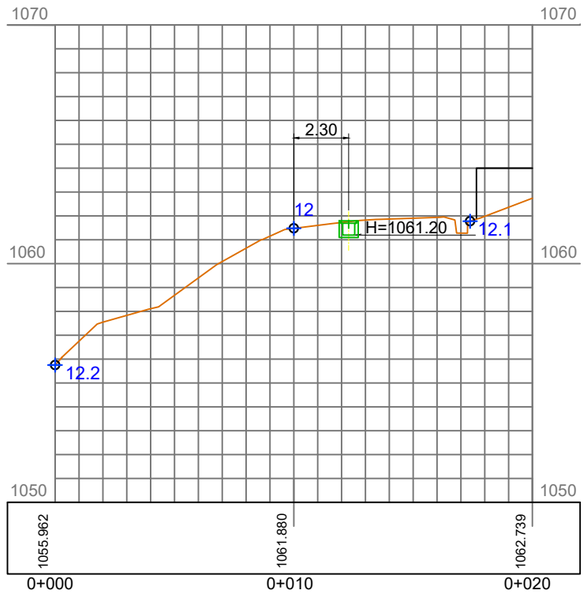
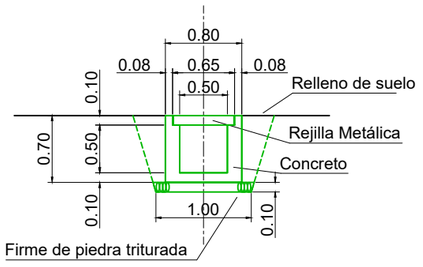
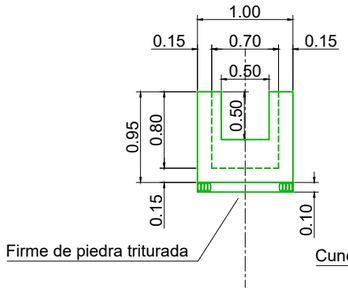


Detalle de Cuneta 1

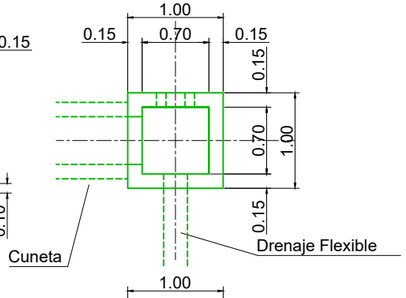


Detalle de Caja de Drenaje

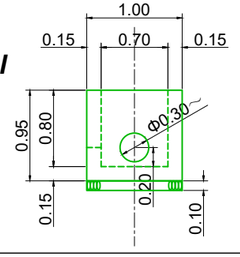
Vista Lateral



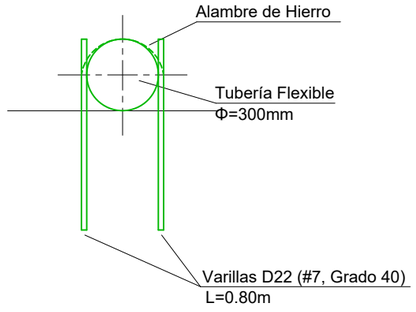
Vista Superior



Vista Frontal



Detalle de Drenaje Flexible



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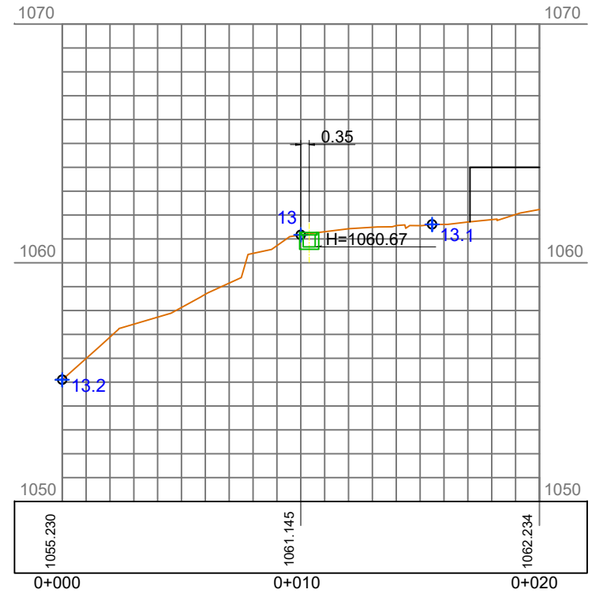


PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
CUNETA 1 Y DRENAJE FLEXIBLE

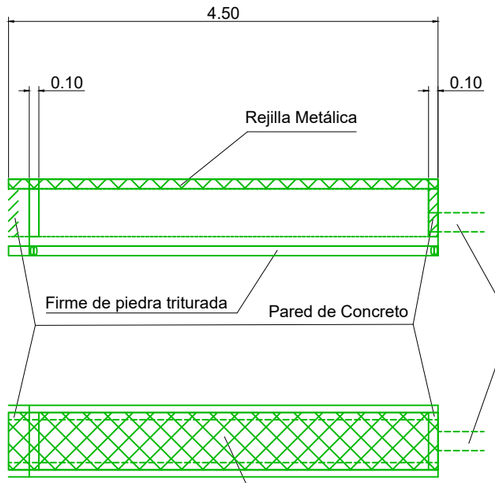
DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA: 1:250
COTAS: METROS

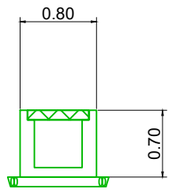
HOJA NO. 14

Cuneta 2

Vista Lateral

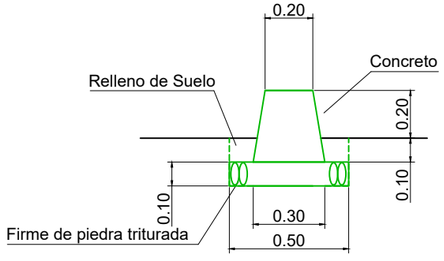


Vista Frontal



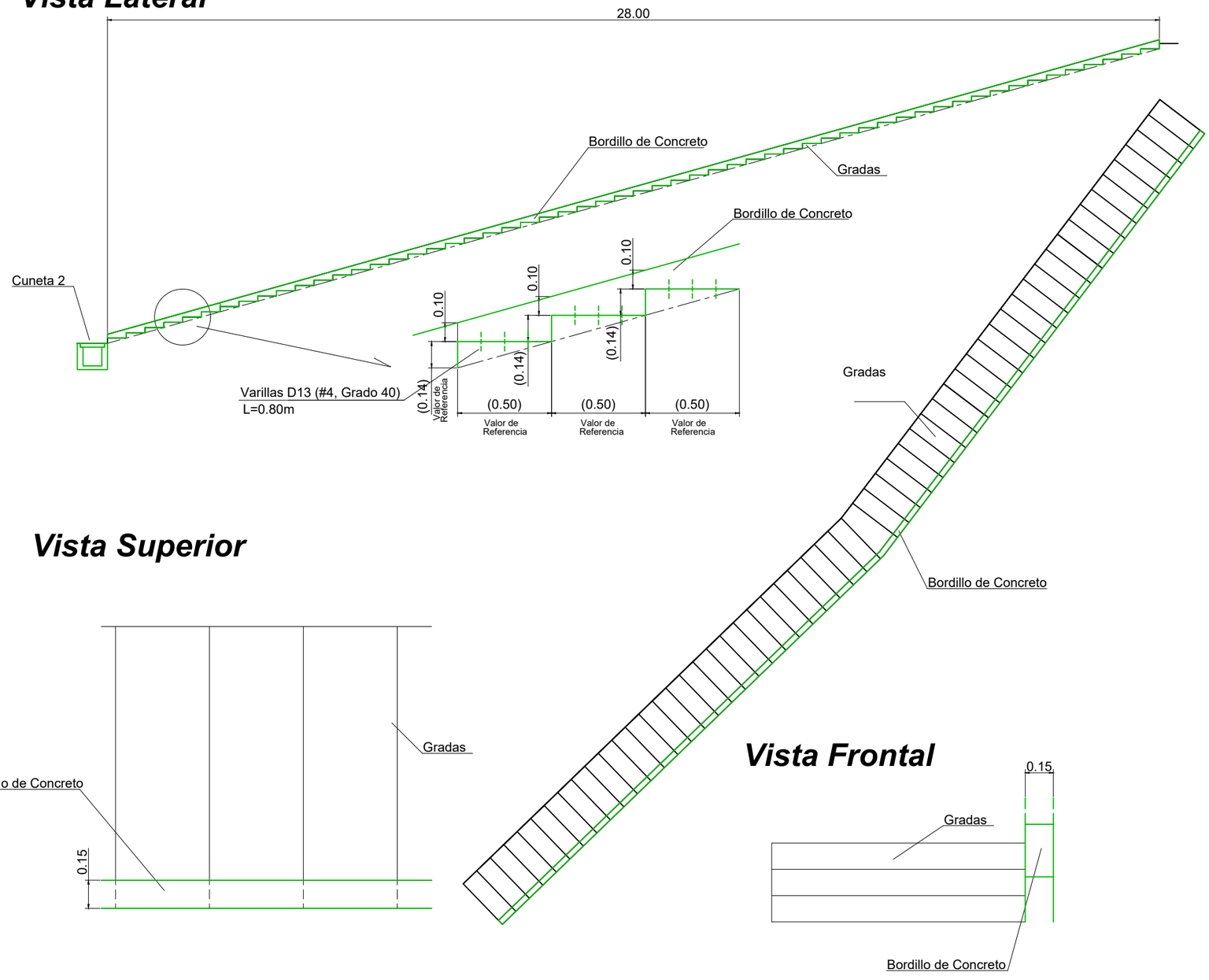
Vista Superior

Detalle de Bordillo de Concreto



Esquema de Referencia para Bordillo de Concreto

Vista Lateral



Vista Superior

Vista Frontal

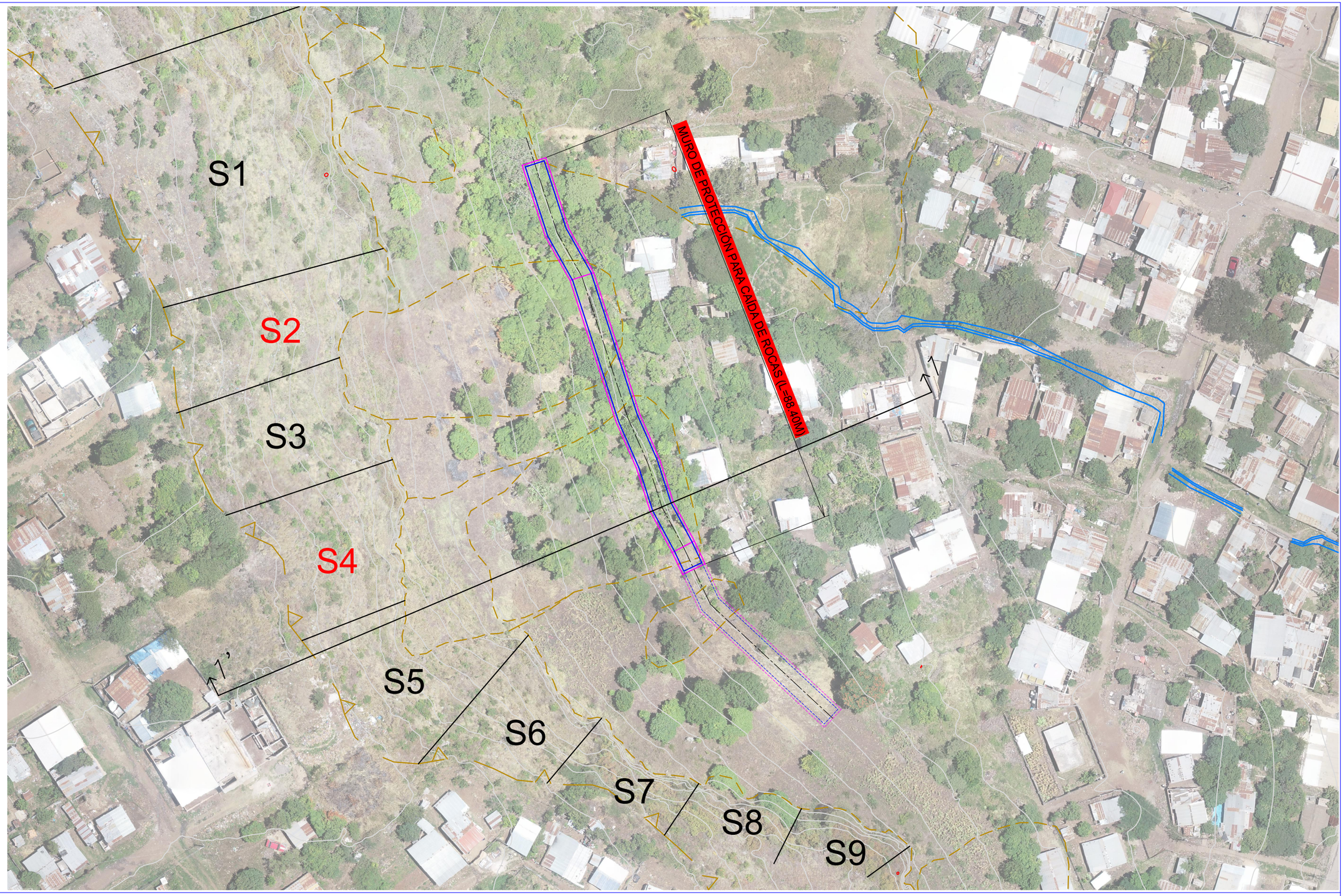
PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: CAMPO CIELO, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: CUNETA 2 Y BORDILLO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 15

Appendix 11

Design work for countermeasure works in Fuerzas Unidas

LEYENDA

- Linea de Quiebre Sup.
- Linea de Quiebre Inf.
- Límite Geológico
- Estructuras



JICA

ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
PLANTA GENERAL
ORTOFOTO

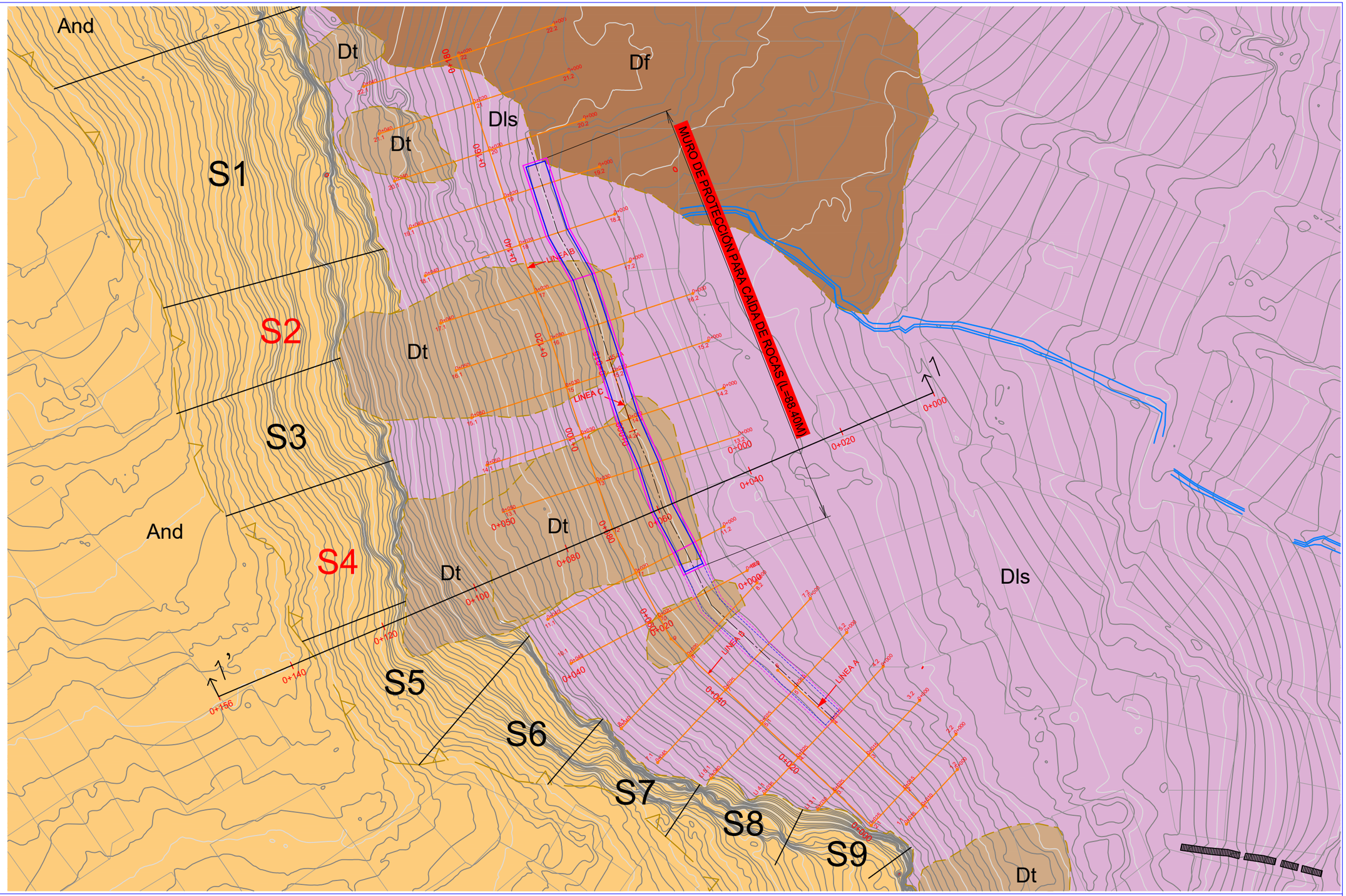
DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA: 1:750
COTAS: METROS

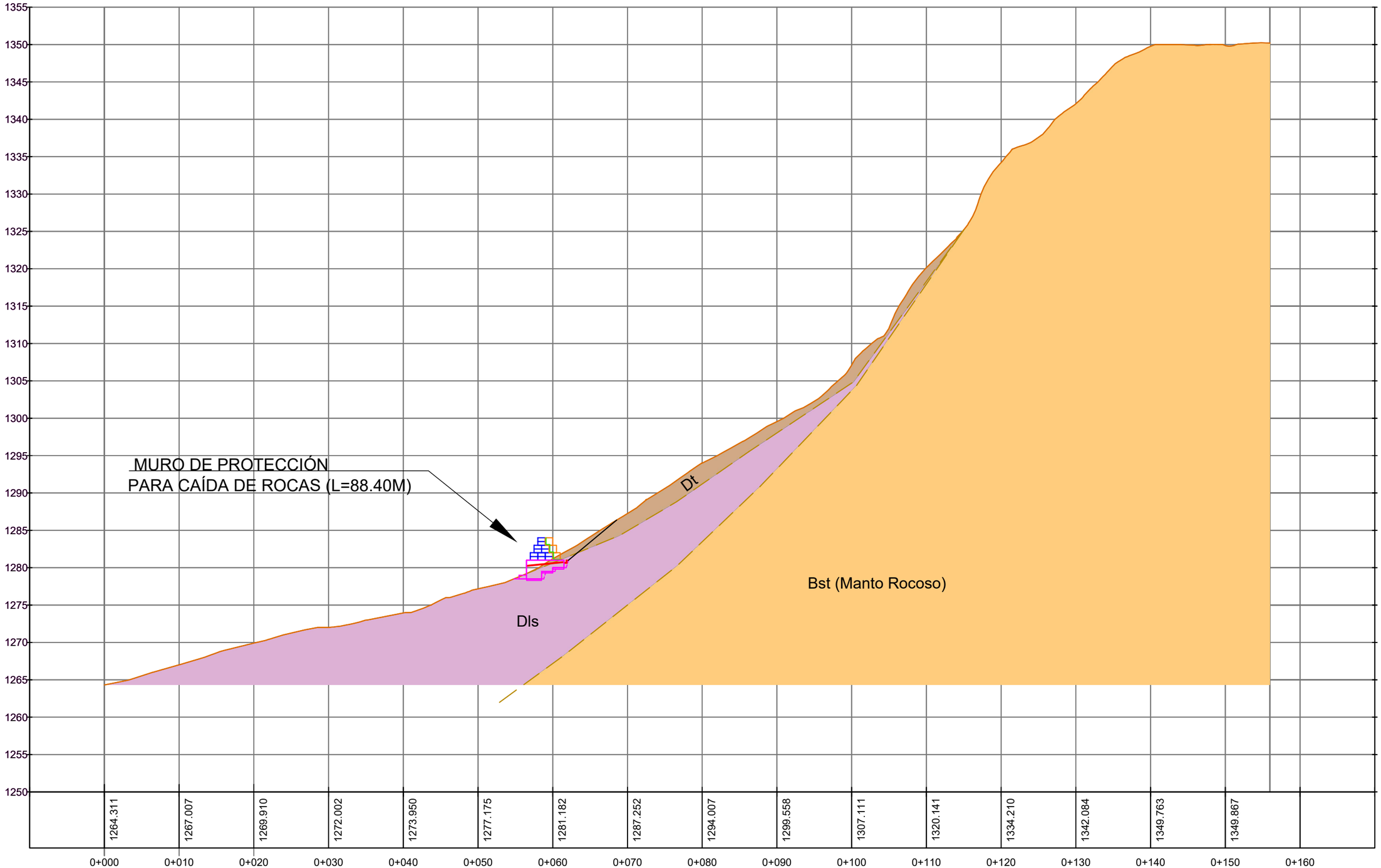
HOJA NO. 01

LEYENDA

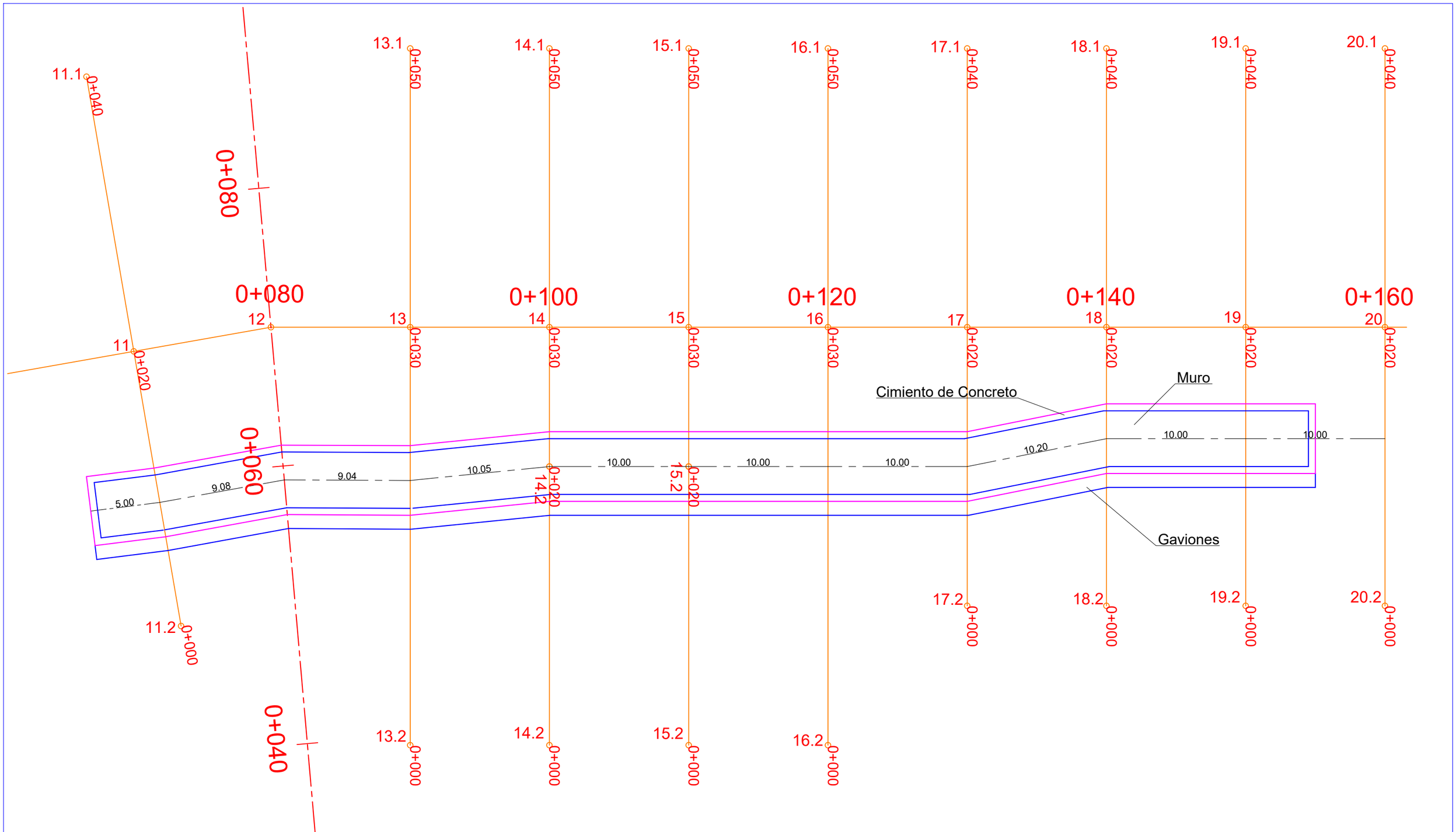
- Linea de Quiebre Sup.
- Linea de Quiebre Inf.
- Límite Geológico
- Estructuras
- Df — Depositos de Detritos
- Dt — Depositos del Talud Fallado
- Dls — Depositos del Deslizamiento
- And — Lava Andesítica y Roca Piroclástica



PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PLANTA GEOLÓGICA Y TOPOGRÁFICA	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:750 COTAS: METROS	HOJA NO. 02



JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL GEOLÓGICO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:500 COTAS: METROS	HOJA NO. 03



JICA

ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

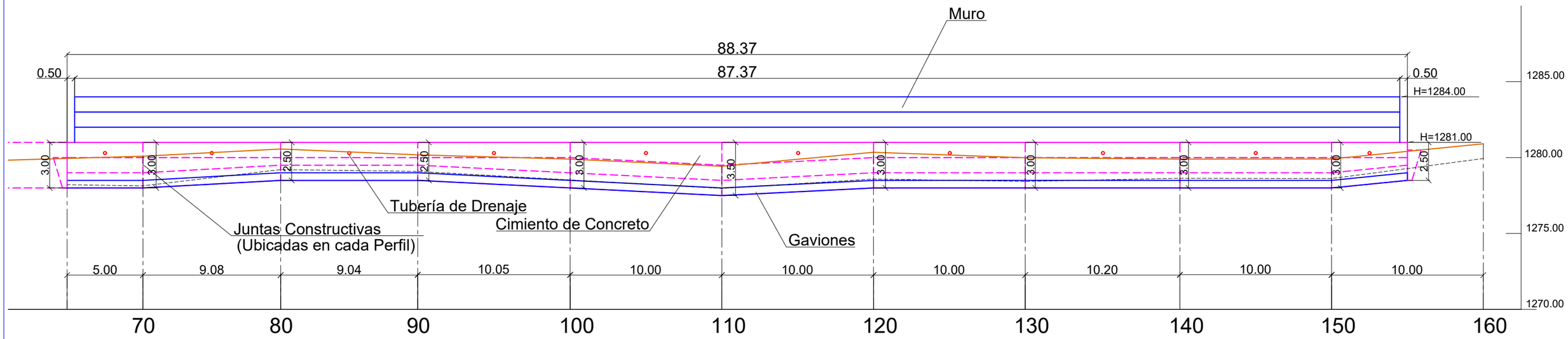
UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS

CONTENIDO:
VISTA EN PLANTA DE MURO

DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

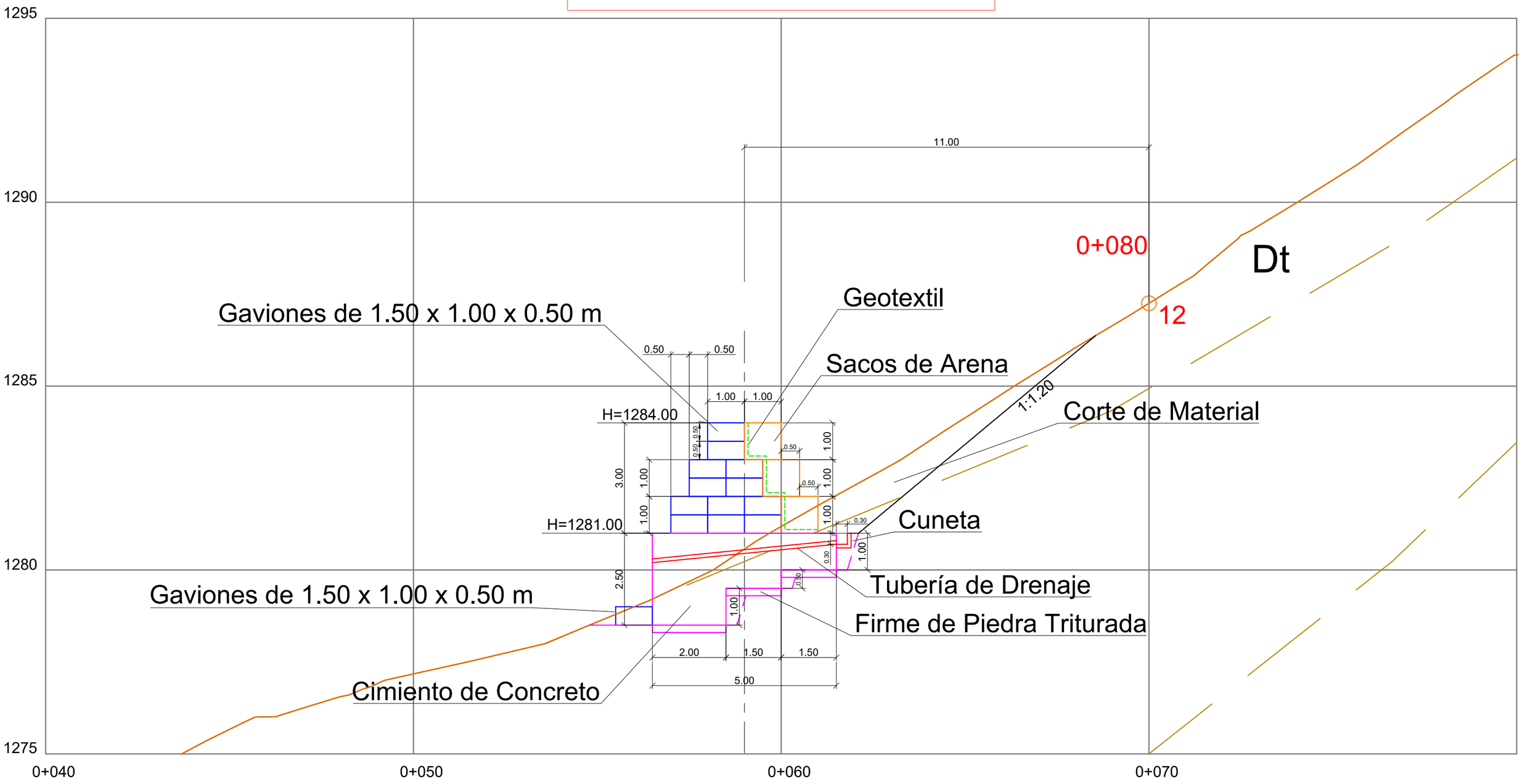
ESCALA:
1:250
COTAS: METROS

HOJA NO.
04



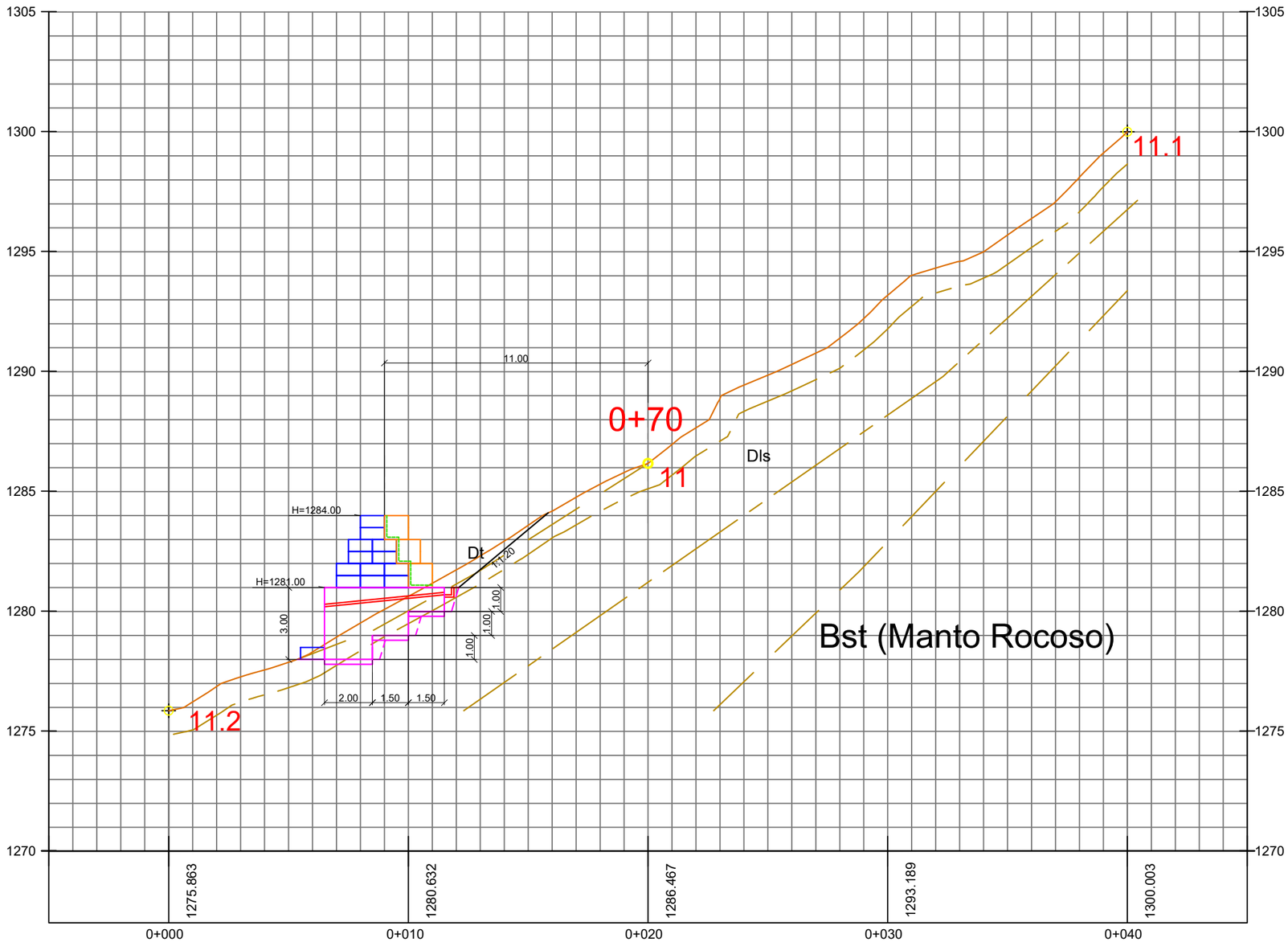
JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: VISTA FRONTAL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:250 COTAS: METROS	HOJA NO. 05

PERFIL 12



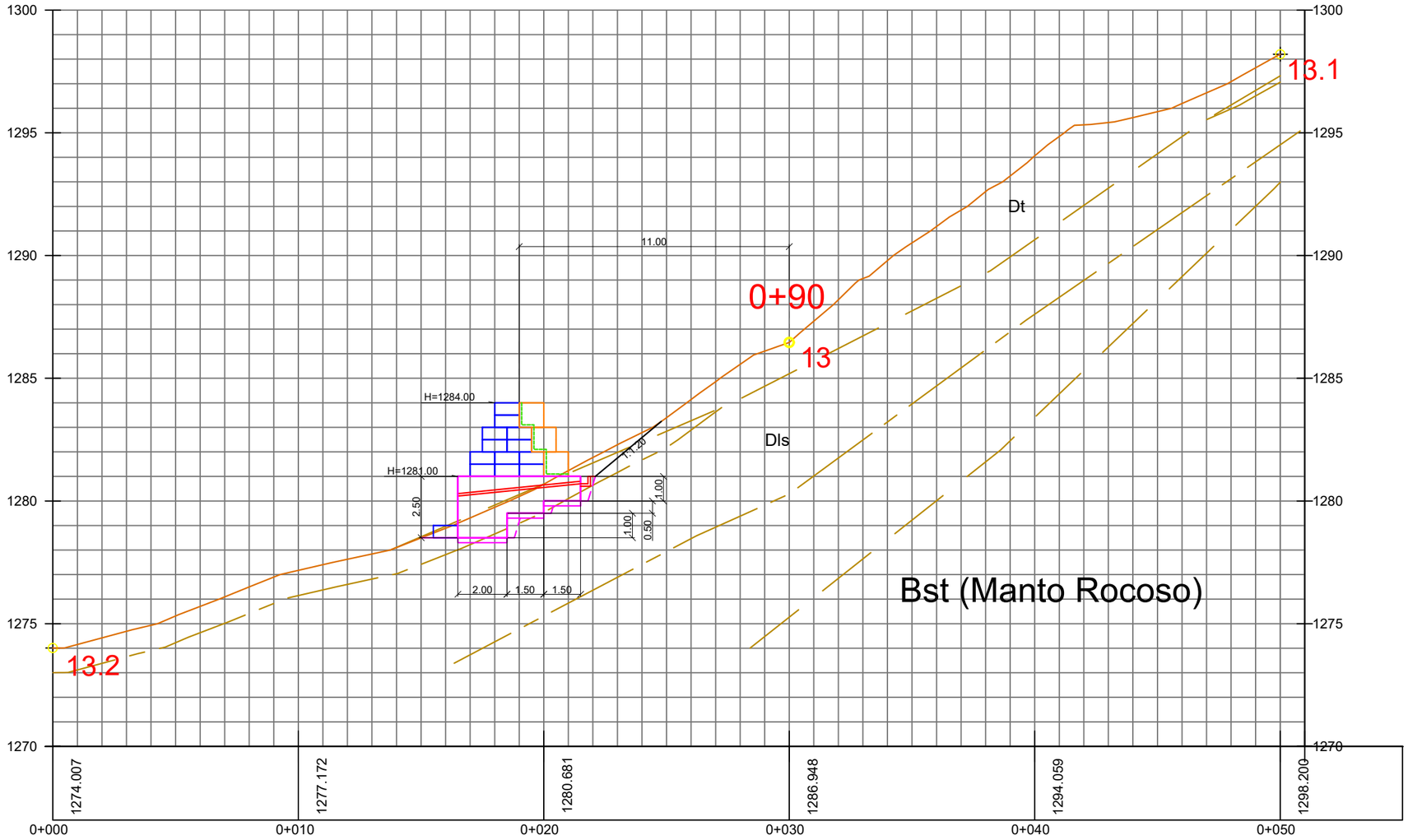
JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: SECCIÓN TÍPICA DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:150 COTAS: METROS	HOJA NO. 06

PERFIL 11



PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 07

PERFIL 13



JICA

ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL

PROYECTO:
PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS

UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS

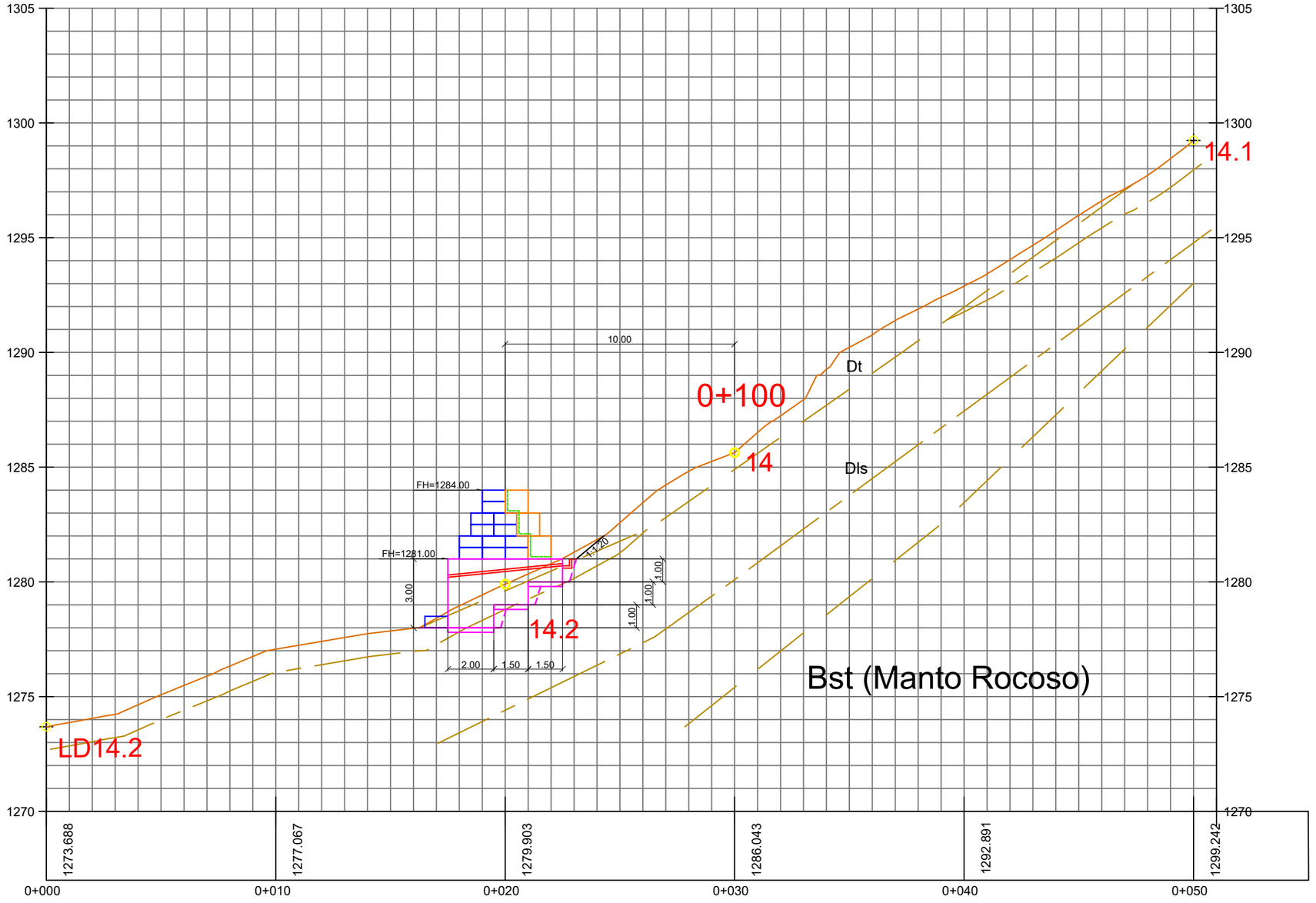
CONTENIDO:
PERFIL DE MURO

DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA)
REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960)
FECHA: JULIO 2021

ESCALA:
1:200
COTAS: METROS

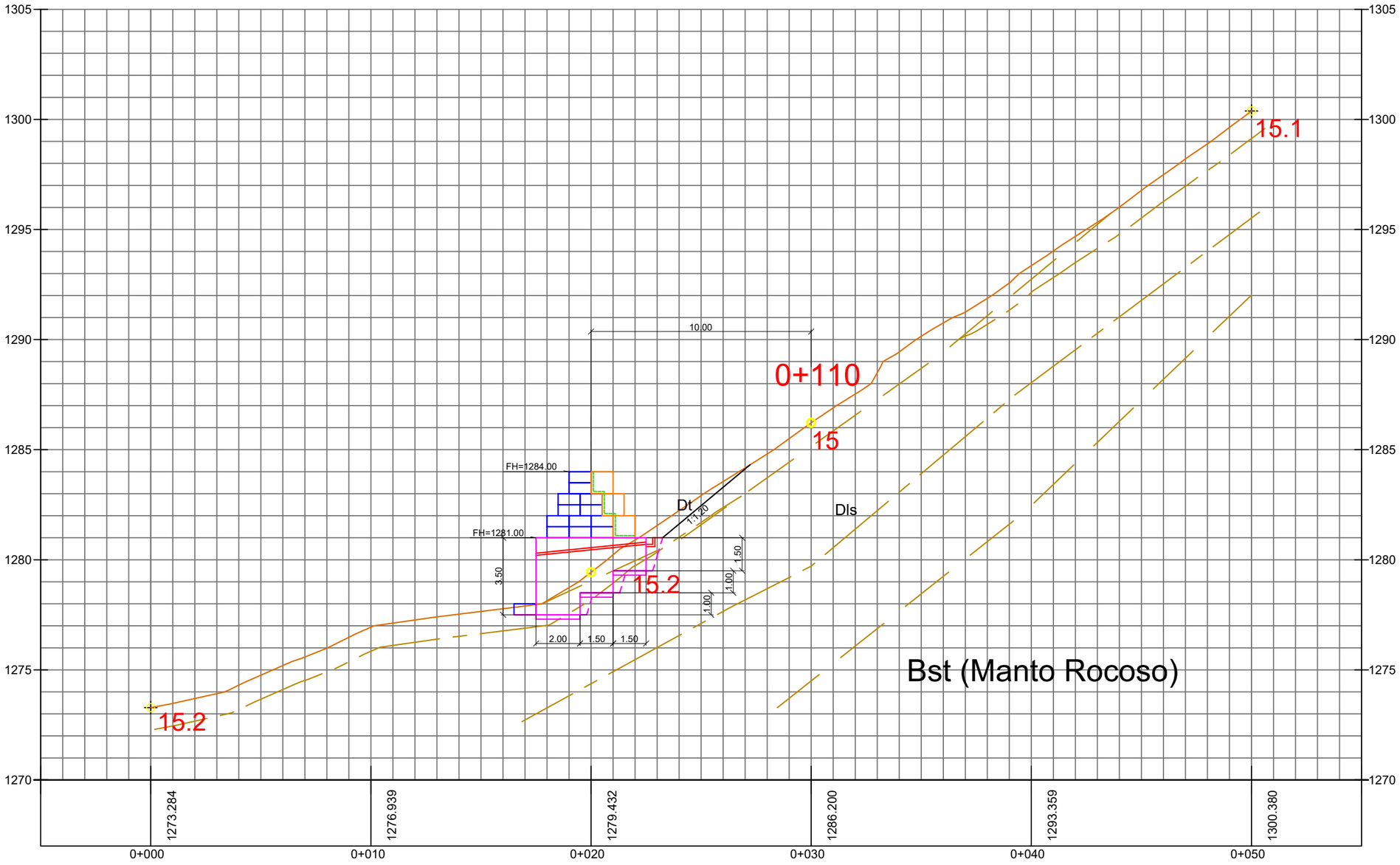
HOJA NO.
08

PERFIL 14



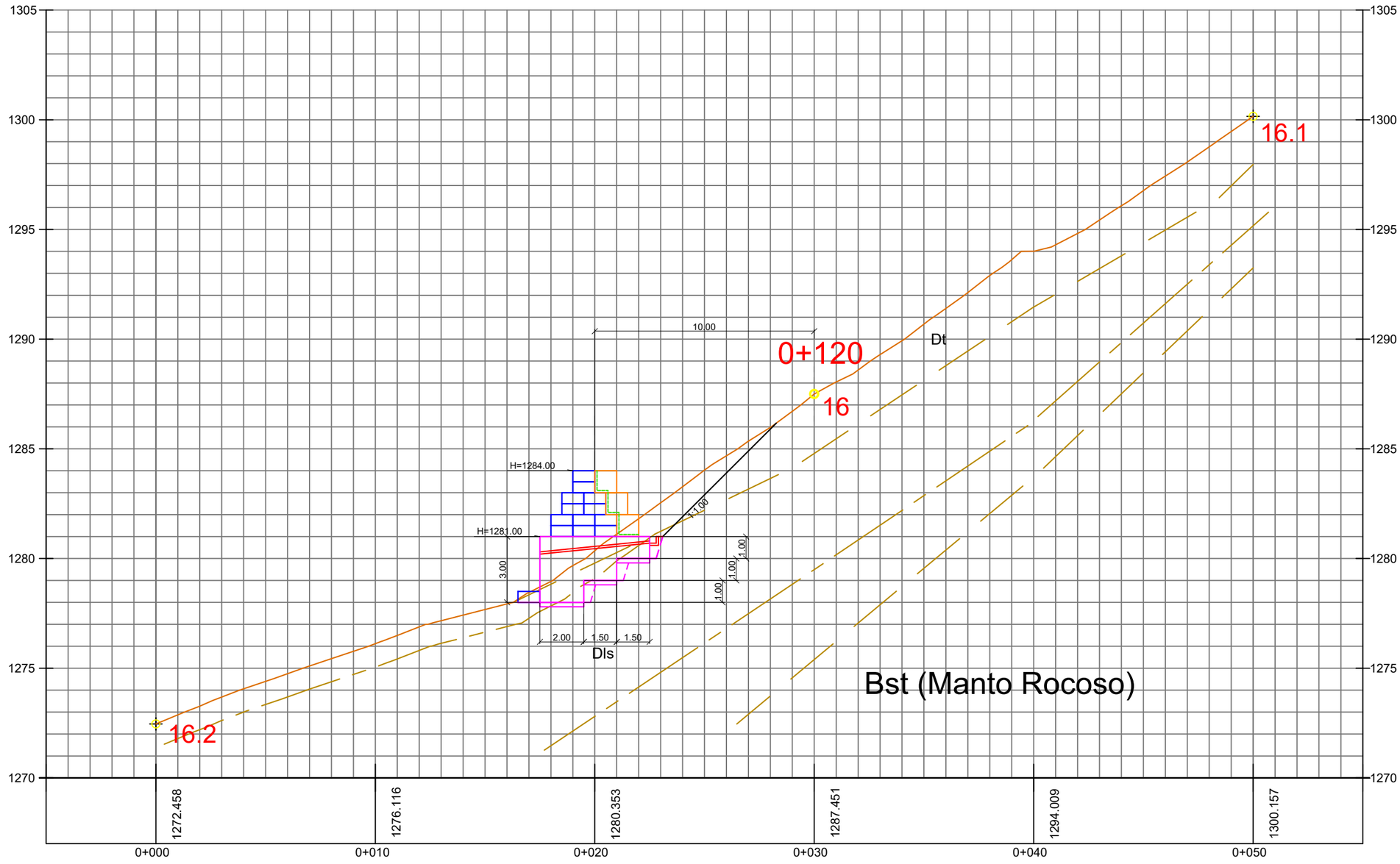
JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 09

PERFIL 15



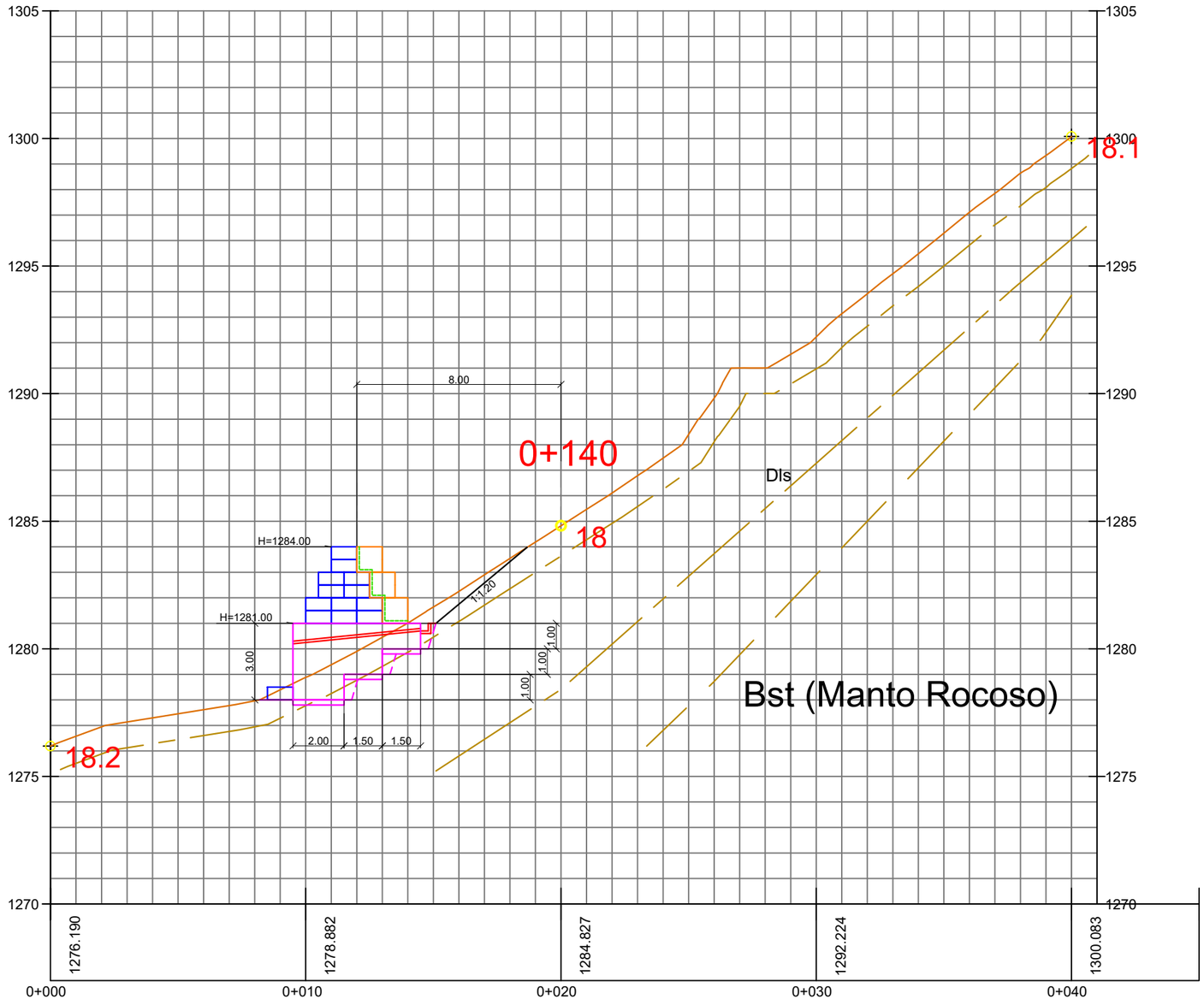
JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 10

PERFIL 16



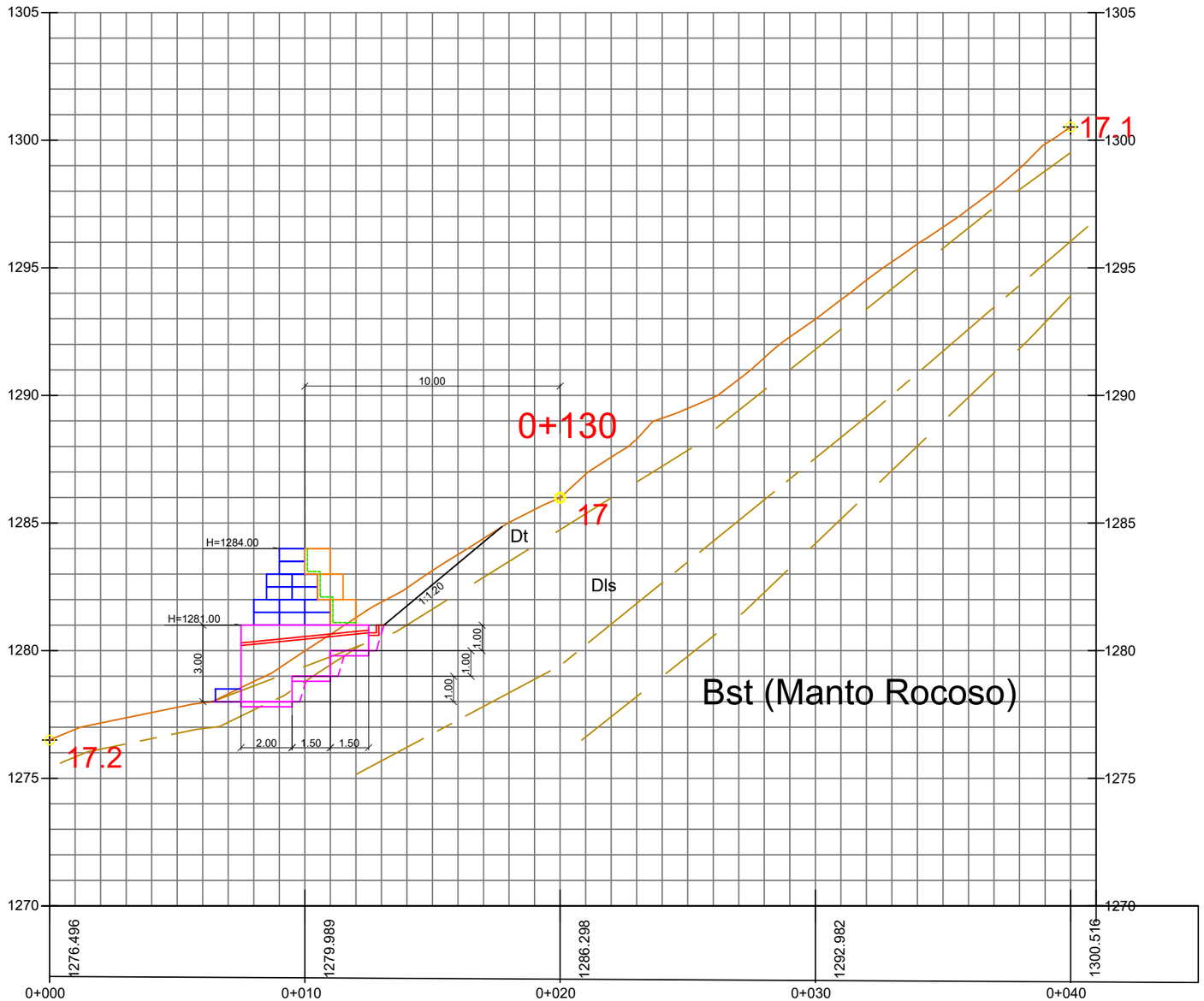
JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 11

PERFIL 18



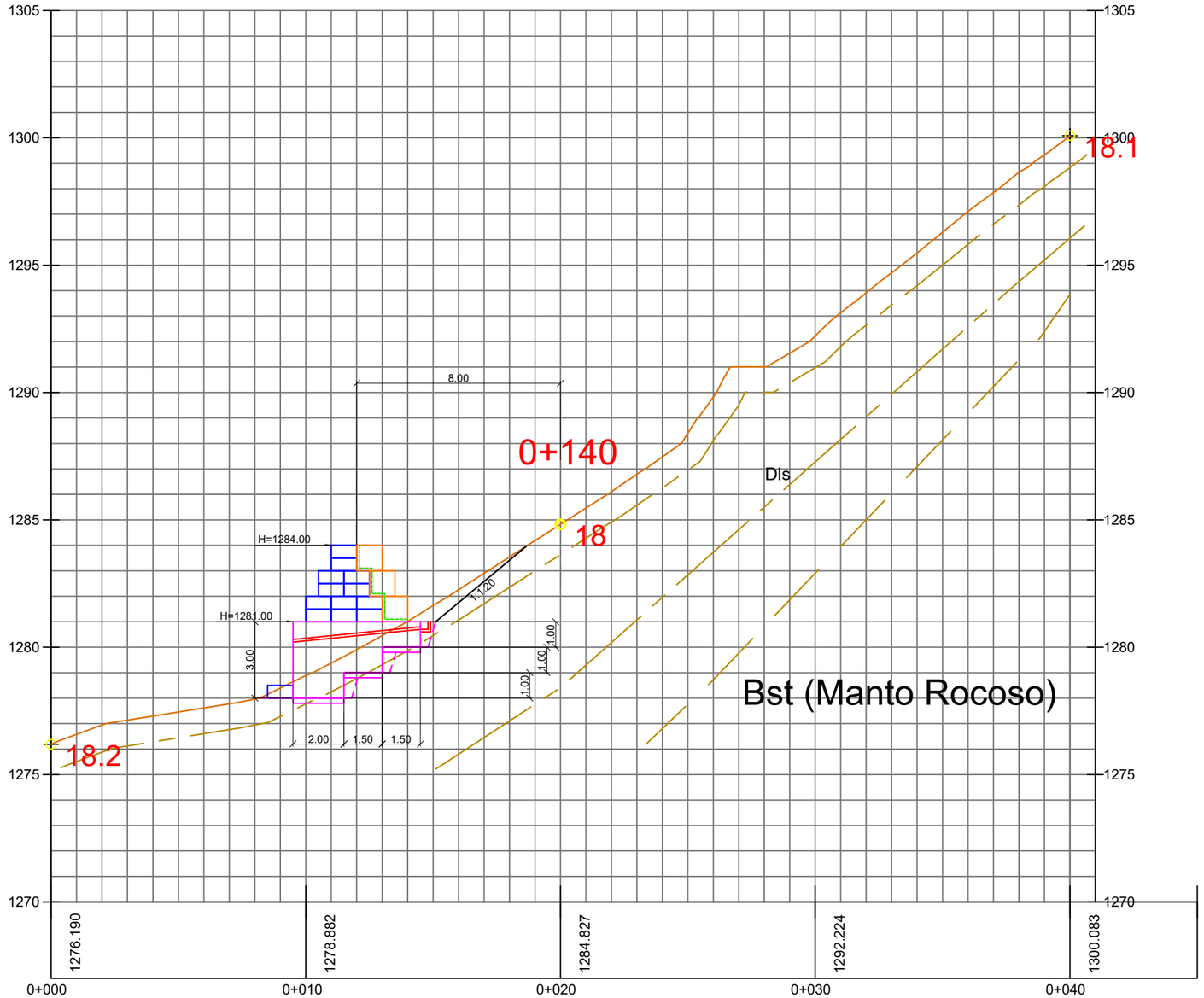
JICA / ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 12

PERFIL 17



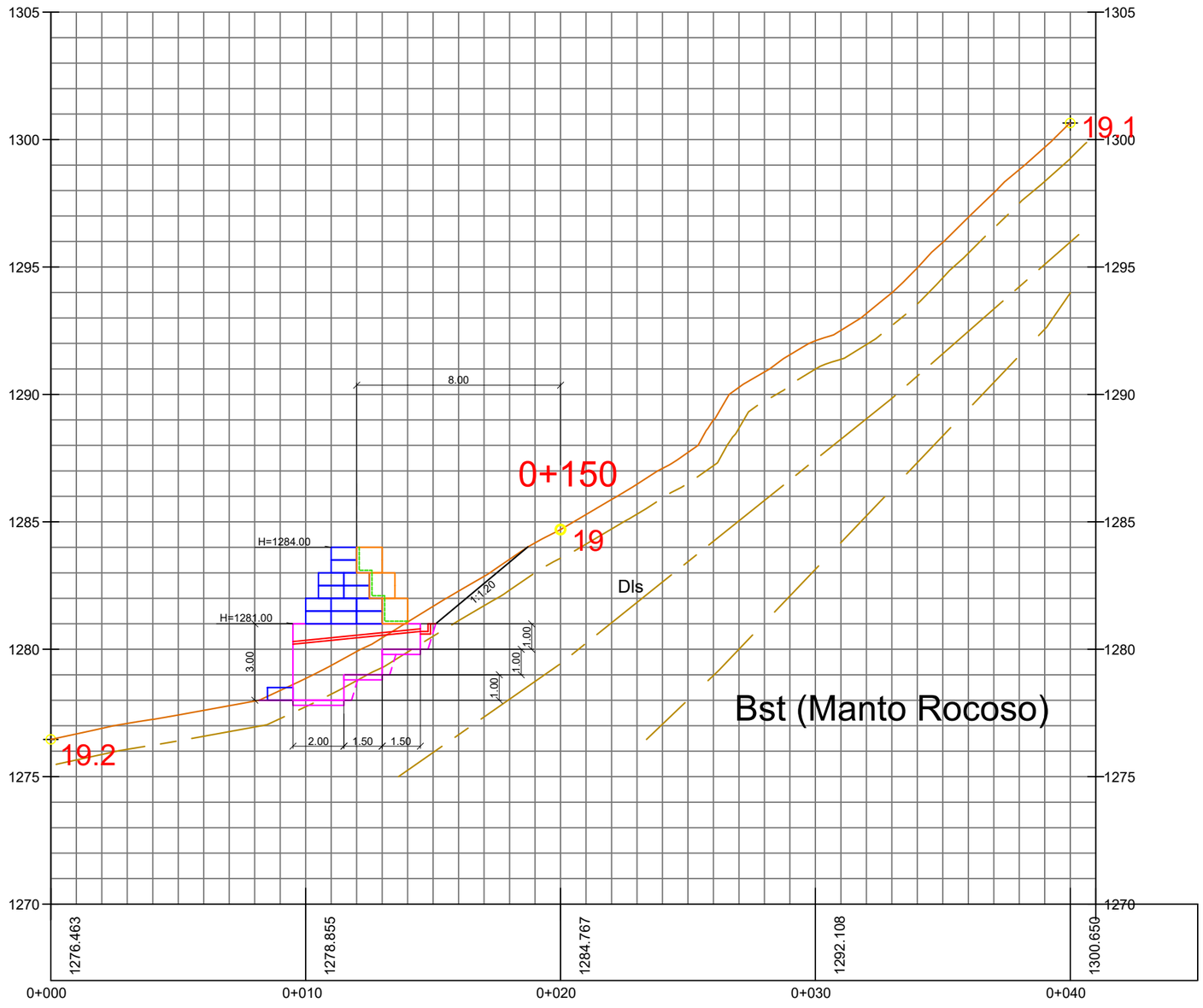
JICA / ALCALDIA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 13

PERFIL 18



JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 14

PERFIL 19



JICA / ALCALDÍA MUNICIPAL DEL DISTRITO CENTRAL	PROYECTO: PROYECTO PARA EL CONTROL Y MITIGACIÓN DE DESASTRES EN LADERAS DEL DISTRITO CENTRAL DE LA REPÚBLICA DE HONDURAS UBICACIÓN: FUERZAS UNIDAS, COMAYAGÜELA, M.D.C., HONDURAS	CONTENIDO: PERFIL DE MURO	DISEÑÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) DIBUJÓ: ING. HOTAKA AOKI (EQUIPO DE EXPERTOS JICA) REVISÓ Y APROBÓ: ING. ALEJANDRO FLORES (CICH 8960) FECHA: JULIO 2021	ESCALA: 1:200 COTAS: METROS	HOJA NO. 15

Appendix 14

Design work for countermeasure works in Nueva Santa Rosa

Appendix 15

Design work for countermeasure works in Villa Nueva

Appendix 16

Figures by GIS for the analysis of topography

Appendix 17

Public buildings

Appendix 18

Application procedure

Appendix 19

Criteria for selection of pilot special regime zone

Appendix 20

Explanation material on land use regulation for slope disaster

Appendix 21

Draft of the Land use regulation for slope disaster

Appendix 22

Buildings which is subject of the structural regulation

Appendix 23

La Gaceta on the approval of the land use reregulate for slope disasters