

DESCRIPTION AND DESIGN OF RESTORATION MEASURES
FOR EACH DISASTER SPOT (BENGUET)

PROVINCE: **BENQUET**
SPOT No. : **Bt-1(1/3)**

NAME OF ROAD : **ITOGON-BALATOK ROAD**
ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.
24

BENQUET SPOT NO. 1 (Bt-1)

1.) General Situation

- Disaster Classification : Cut Slope Failure
- Road Name : Itogon - Balatok Road
- Location : Km. 0+600 away from Itogon Proper
- Road Class/Office Concerned : National Secondary Road/
Benguet Engineering District
- Municipalities/Barangays connected : City / Provincial
Boundary - Antamok -
Itogon
- Road Width/Pavement Width : Not passable due to huge
quantity of fallen rocks on roadway which cause the
roadway to collapsed and closed to traffic.
- Pavement Type : AC
- Surface Condition : Very bad
- Detour : Available detour road is being utilized at present
going to Balatok Proper and Mining Site.

2.) Damage Identified

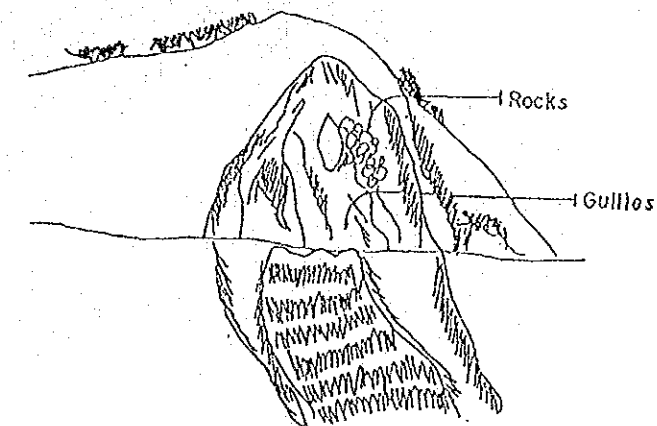
- Type of Disaster : Cut Slope Failure
- Magnitude of Damage : 75.0 meters wide x 70.0 meters high
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : High and totally
not passable to traffic
- Description of Disaster

This disaster occurred during the July 16, 1990 earthquake that hit the Benguet Province. The shape of the slope failure is like an inverted V with its vertex on top and the base lying on the road surface. Existence of some gullies were also noticed on the slope surface. The fallen rocks are deposited and exposed to weathering on the roadway causing the road to close to traffic.

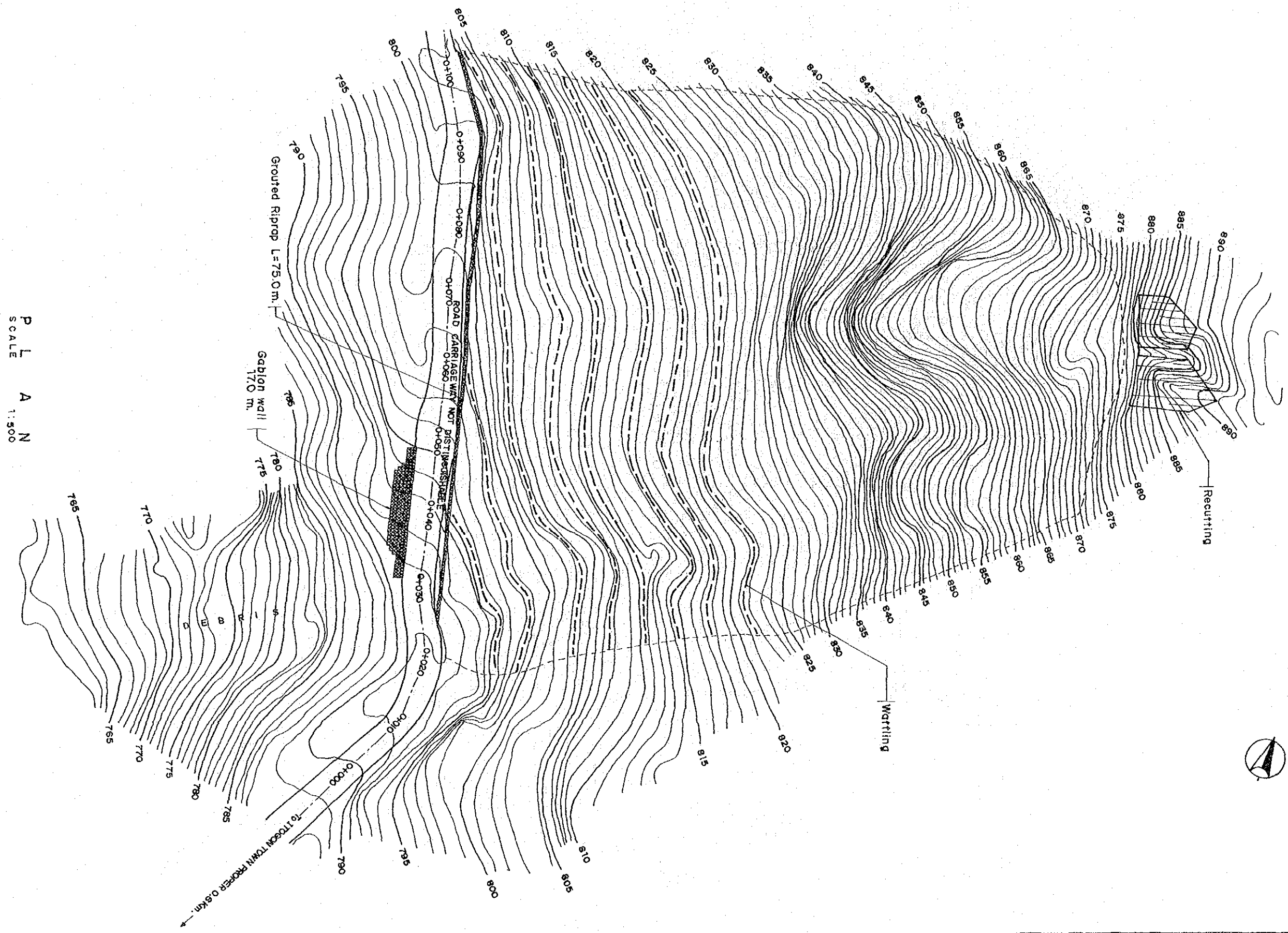
3.) Causes of Damage

This failure is caused by loose contact of soil on slope surface. Weathering and fracturing of rock joints caused the rock to land into the road surface.

Translational failure which occurs along structural weakness such as faults, bedding planes and border planes between firm bedrock and overlying detritus or soils.



PROVINCE : BENGUET SPOT No. : B1-1(2/3)	NAME OF ROAD : ITOGON-BALATOK ROAD ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD	TYPE OF DISASTER : CUT SLOPE FAILURE	DRAWING NO. 25
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P L A N
 SCALE 1:500

PROVINCE: **BENGUET**
 SPOT No. : **B1-1(3/3)**

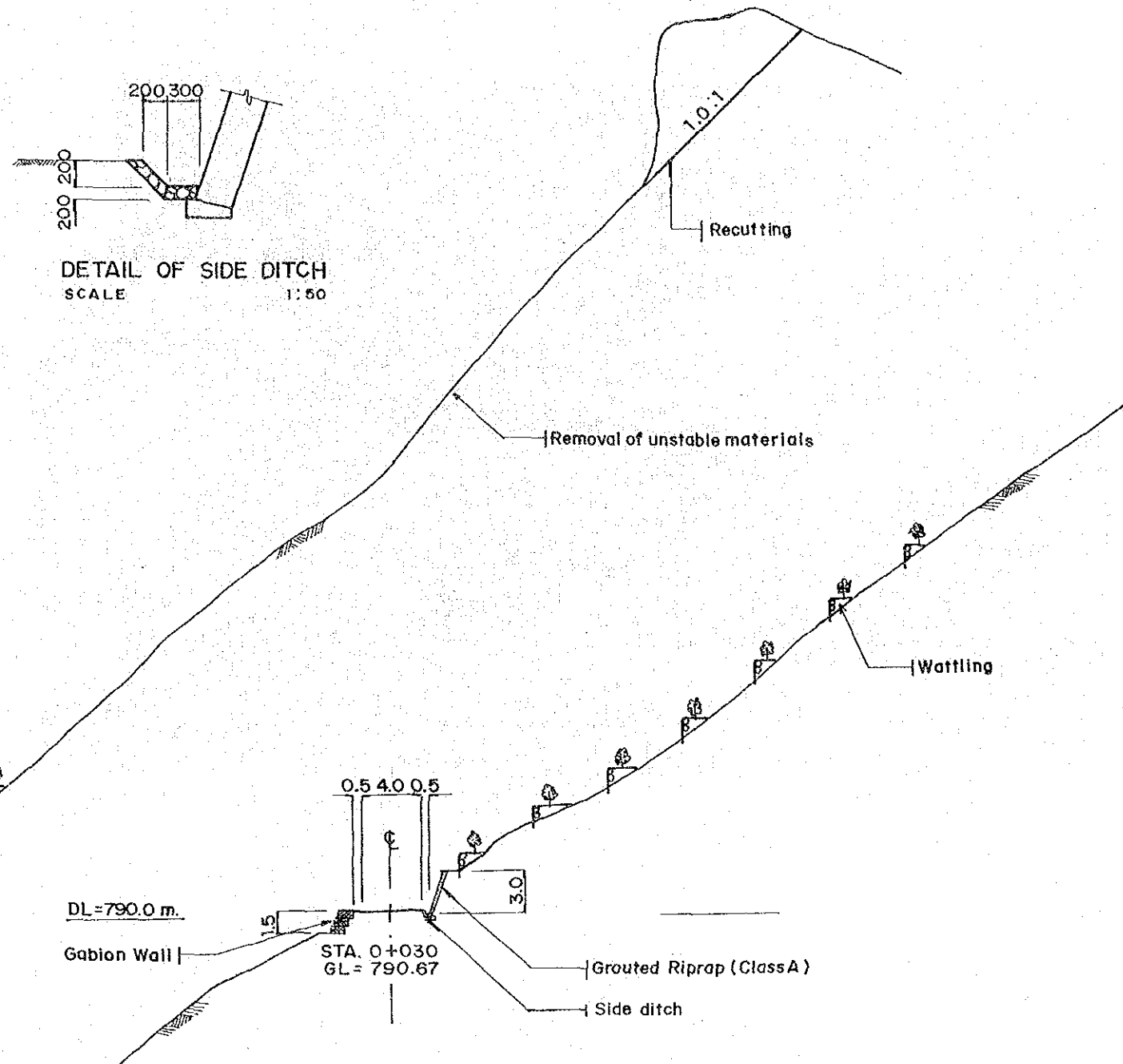
NAME OF ROAD : **ITOGON - BALATOK ROAD**
 ROAD CLASSIFICATION: **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.
26

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-1	RECURTING	CU. M.	1,260
P2-2	SIDE DITCH	L.M.	80
P4-8	WATTLING	L.M.	590
P6-2	GROUTED RIPRAP	CU. M.	78
P6-8	GABION WALL	CU. M.	75
URGENT RESTORATION			
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU. M.	1,200
U1-2	REMOVAL OF UNSTABLE MATERIALS	CU. M.	28



CROSS SECTION
 SCALE 1:400

- URGENT RESTORATION**
- Removal of deposit materials
 - Removal of unstable materials

DL = 800.0m

DL = 790.0 m

STA. 0+060
 GL = 797.58

STA. 0+030
 GL = 790.67

PROVINCE: **BENGUET**
SPOT No. : **Bt-2(1/2)**

NAME OF ROAD : **BENGUET-ITOGON ROAD**
ROAD CLASSIFICATION: **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **SCOUR/WASHOUT OF ROADBED**

DRAWING NO.
27

Benguet Spot No. 2

1.) General Situation

- Disaster Classification : Road Damage (Rd-D)
- Road Name : Benguet-Itogon Road
- Location : 300 m. away from Itogon Proper
- Road Class/Office Concerned : National Secondary/DEO, Benguet
- Municipalities/Barangays connected : Itogon, Balatok
- Road/Pavement Width : Totally collapsed
- Pavement Type : AC washed out
- Surface Condition : Very Bad
- Detour : Available

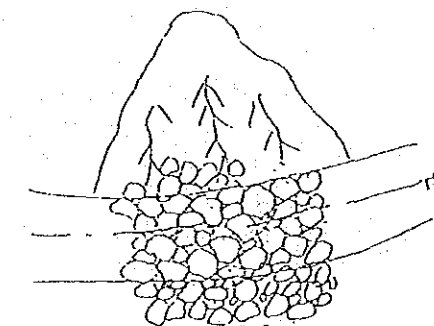
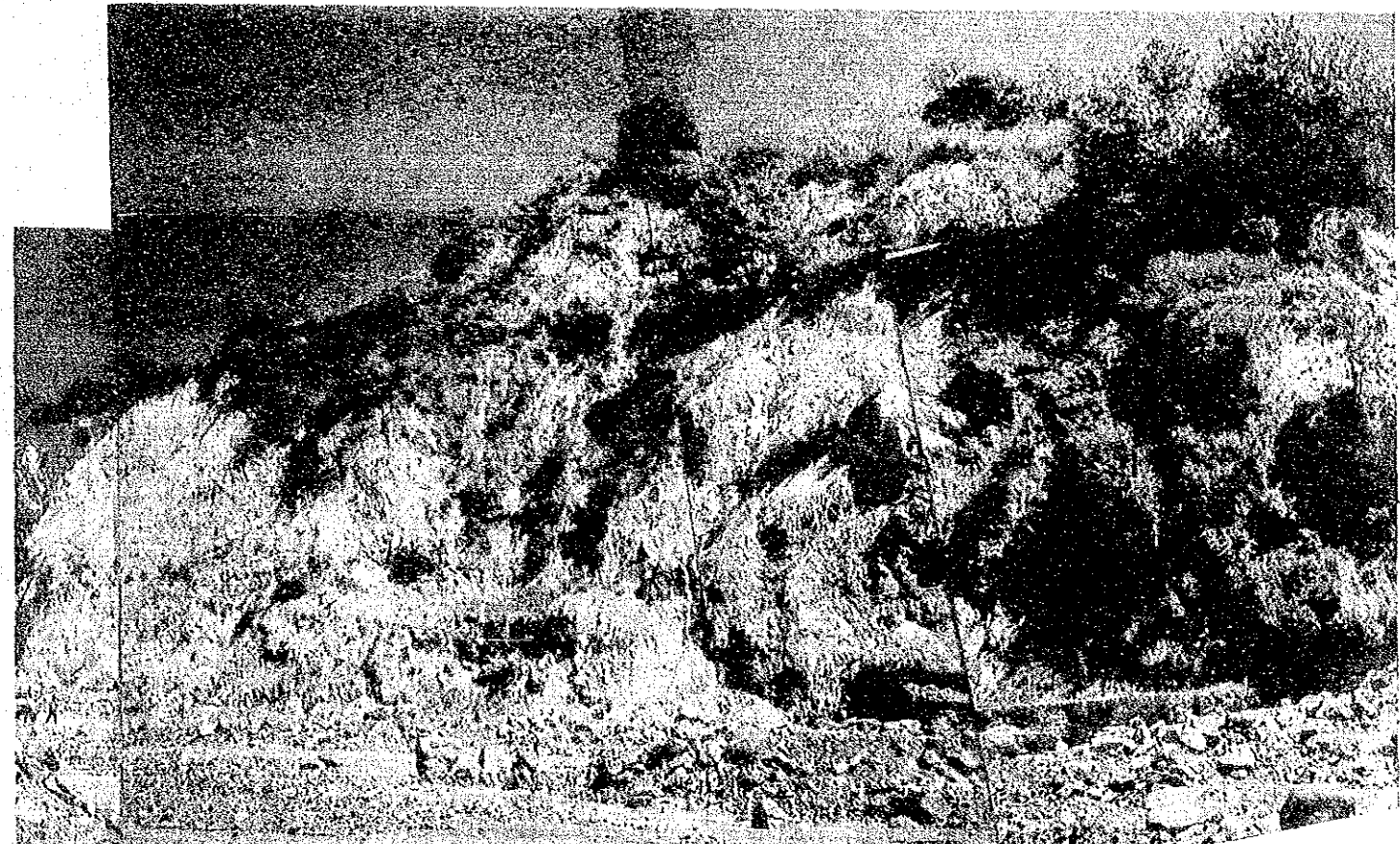
2.) Damage Identified

- Type of Disaster : Washed-out pavement
- Magnitude of Damage : 30 meters high by 320 meter wide
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : Totally collapsed/not passable the all year round.
- Description of Disaster :

The spot is located on cut slope portion, wherein rock joint was inclined towards the road, rockfalls are most likely to occur along these joints during heavy rains. Due to insufficient vegetation control, loosening of soil and rock materials were observed.

3.) Causes of Damage

The cause of this failure was due to the earthquake and a strong typhoon that hits the Benguet Province last July 16, 1990. The asphalt pavement was totally washed-out due to no provision of slope protection on the slope surface.

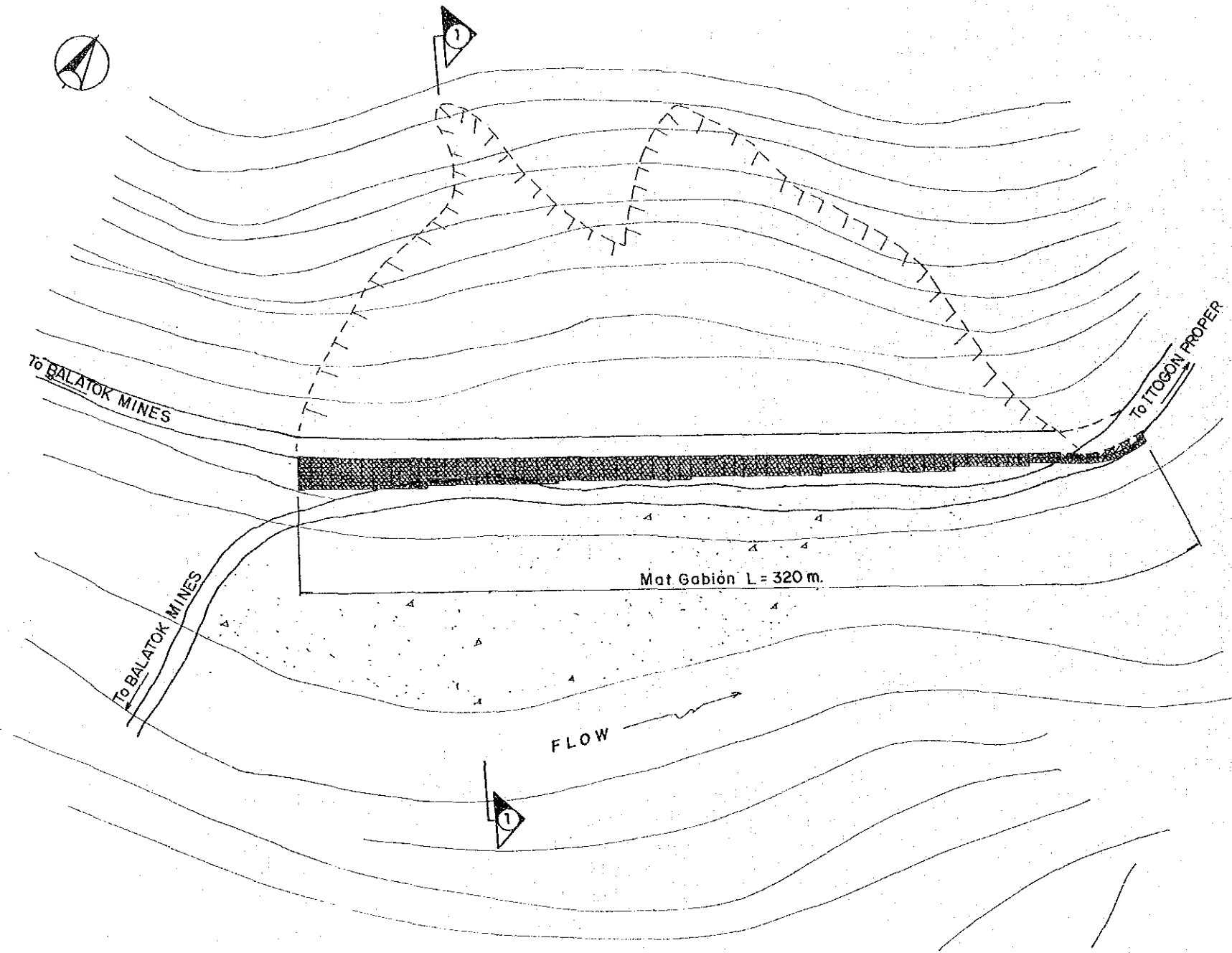


PROVINCE: BENGUET
 SPOT No. : Bt-2(2/2)

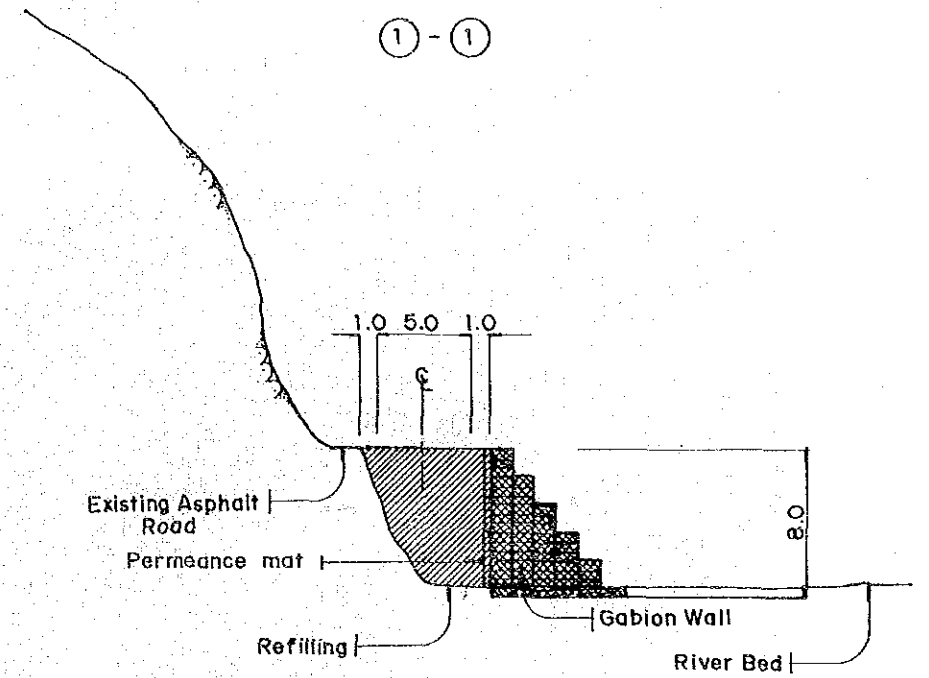
NAME OF ROAD : BENGUET-ITOGON ROAD
 ROAD CLASSIFICATION: NATIONAL SECONDARY ROAD

TYPE OF DISASTER : SCOUR WASHOUT OF ROADBED

DRAWING NO.
 28



PLAN
 SCALE 1:2000



CROSS SECTION
 SCALE 1:400

SUMMARY OF QUANTITY

	TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION			
P1-3	REFILLING / EMBANKMENT	CU. M.	8,700
P6-9	GABION WALL	CU. M.	7,371
PT9-1	GRAVEL SURFACING	SQ. M.	2,240

PROVINCE: BENGUET SPOT No. : Bt-7(1/2)	NAME OF ROAD : BENGUET-ITOGON ROAD ROAD CLASSIFICATION: NATIONAL SECONDARY ROAD	TYPE OF DISASTER : CULVERT DAMAGE	DRAWING NO. 29
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BENGUET SPOT 7 (Bt-7)

1.) General Situation

- Disaster Classification : CLV-D
- Road Name : Benguet-Itogon Road
- Location : km 6+300 from Itogon Proper
- Road Class/Office Concerned : National Secondary/Benguet Engineering District

- Municipality/Barangay Connected :
City/Province Boundary-Antamok-Itogon

- Road Width/Pavement Width : 6.0 meter
- Pavement Type : Gravel
- Surface Condition : Bad Condition
- Detour : No available

2.) Damage Identified

- Type of Disaster : Culvert and Its related Damages
- Magnitude of Damage : RCPC - 2 x 0.60 meter diameter
RCBC - 2.4 meter x 1.6 meter
Embankment Slope - 18 meter wide x
5 meter high

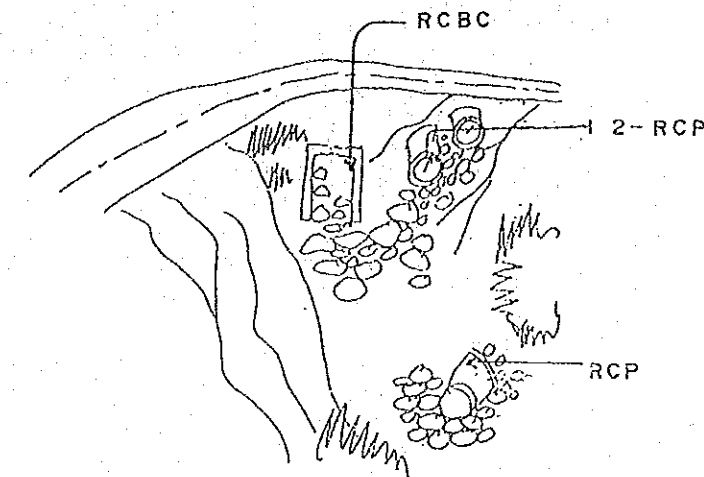
- Date Noticed :
- Degree/Period of Traffic Interruption : Medium / one lane passable

Description of Disaster :

Two (2) lines of RCPC (0.6 meter in diameter) and one (1) RCBC (2.4 meter in height x 1.6 meter in width) were placed at this spot. All of them were clogged by debris brought from upstream. Water from upstream overflowed the road surface, then scoured the embankment slope.

3.) Causes of Failure

RCBC was not the proper structure to cope with debris flow from upstream or road alignment was selected too close to the stream which is always subjected to debris flow.

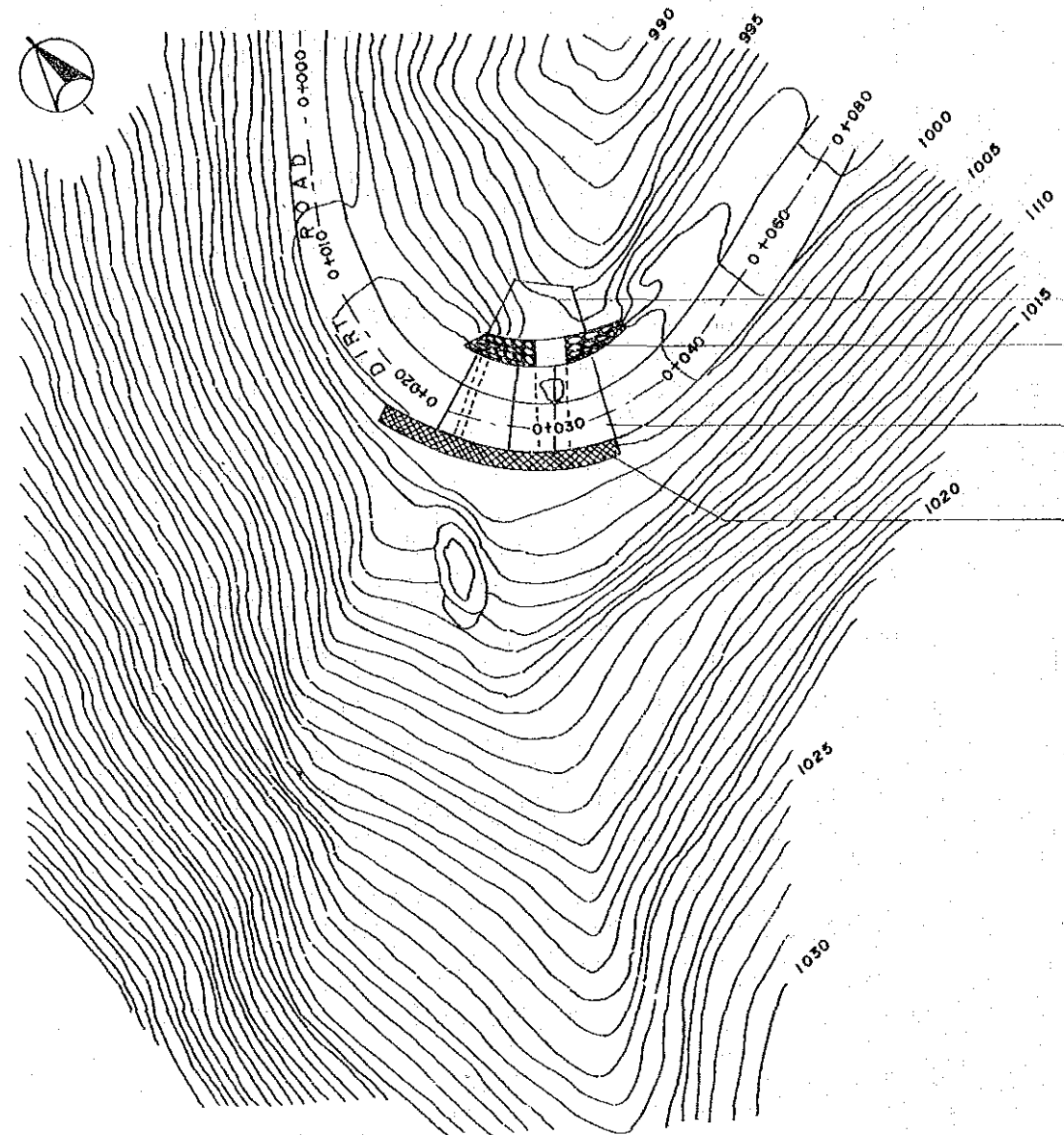


PROVINCE : **BENGUET**
 SPOT No. : **Bf-7(2/2)**

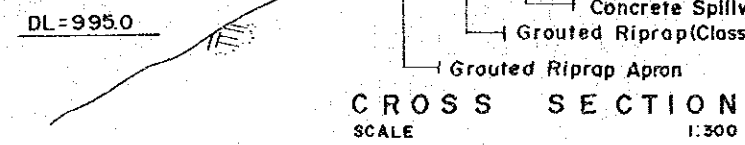
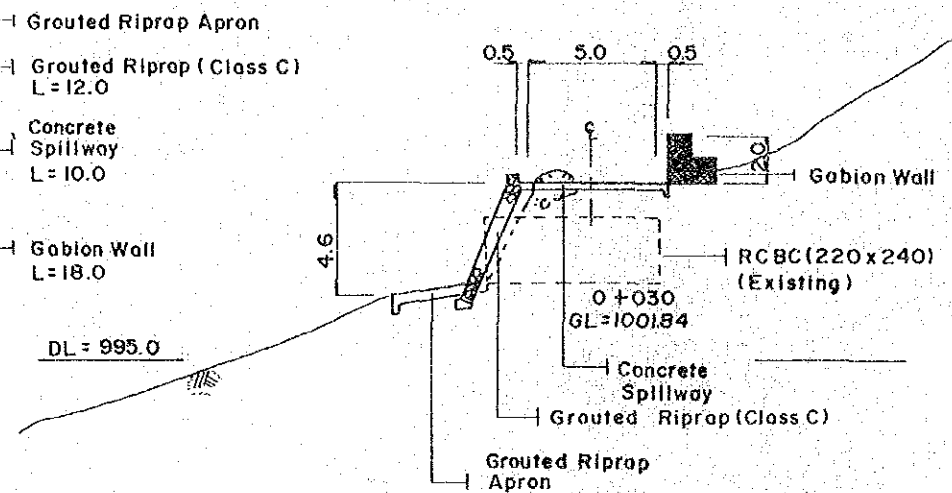
NAME OF ROAD : **BENGUET - ITOGON ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CULVERT DAMAGE**

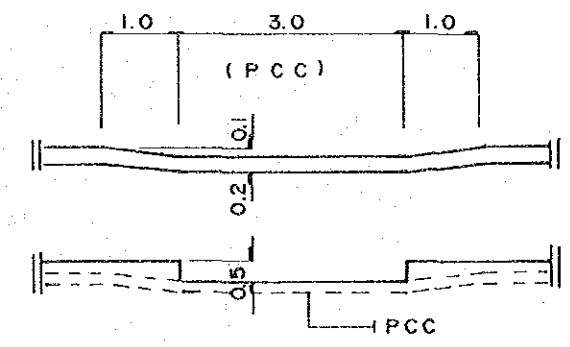
DRAWING NO.
30



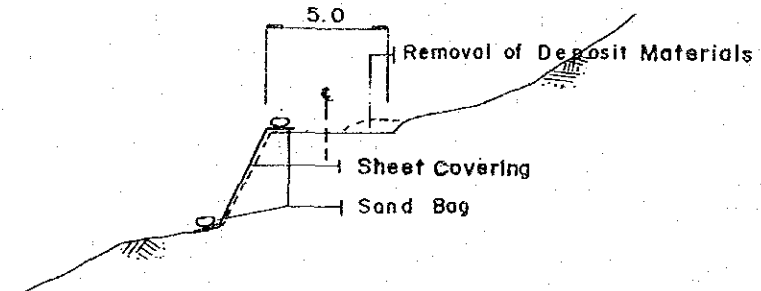
PLAN
 SCALE 1:500



CROSS SECTION
 SCALE 1:300



CROSS SECTION
 Concrete Spillway and Top of Grouted Riprap
 SCALE 1:100



CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:300

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P6-2	GRouted RIPRAP	CU. M.	36
P6-9	GABION WALL	CU. M.	22
P16-3	GRouted RIPRAP APRON	CU. M.	8
P18-1	CONCRETE SPILLWAY	CU. M.	12

URGENT RESTORATION			
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU. M.	30
U3-1	SHEET COVERING	SQ. M.	48

PROVINCE: BENGUET SPOT No. : Bt-11 (1/2)	NAME OF ROAD : BENGUET-ITOGON ROAD ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD	TYPE OF DISASTER : LANDSLIDE	DRAWING NO. 31
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BENGUET SPOT NO. 11 (Bt-11)

1.) General Situation

- Disaster Classification : L - SL
- Road Name : Benguet-Itogon Road
- Location : Km 14+300 kilometers from Itogon Proper
- Road Class/Office Concerned : National Secondary /Benguet Engineering District
- Municipalities/Barangays Connected : City/Provincial Boundary-Antamok-Itogon
- Road Width/Pavement Width : 6.0 / 5.0 meters
- Pavement Type : AC
- Surface Condition : Fair to Bad Condition
- Detour : No available

2.) Damaged Identified

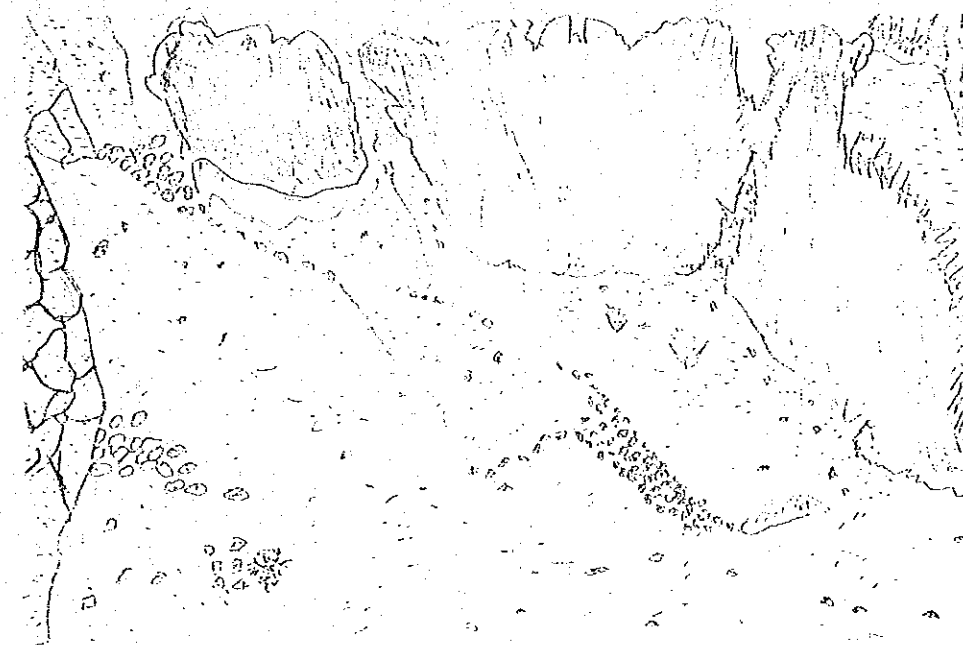
- Types of Disaster : Landslide
- Magnitude of Damage : 70 meters in width x 30 meters in height
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : High / both lane still passable

Description of Disaster

The road is paved with asphalt in fair condition having a gradient slope that varies from 8-10 percent. This particular section was extensively damaged by earthquake causing a massive landslide eroding the slope surface and partly damaging the residence situated on top of the mountain. The embankment side of this spot was immediately restored by the City Engineers Office to protect the roadway from scouring and it was considered as sinking area.

3.) Causes of Damage

The soil slide along the slope of the mountain when saturated water caused loss of shear resistance between soils. It is also considered this portion as sinking area on the locality.

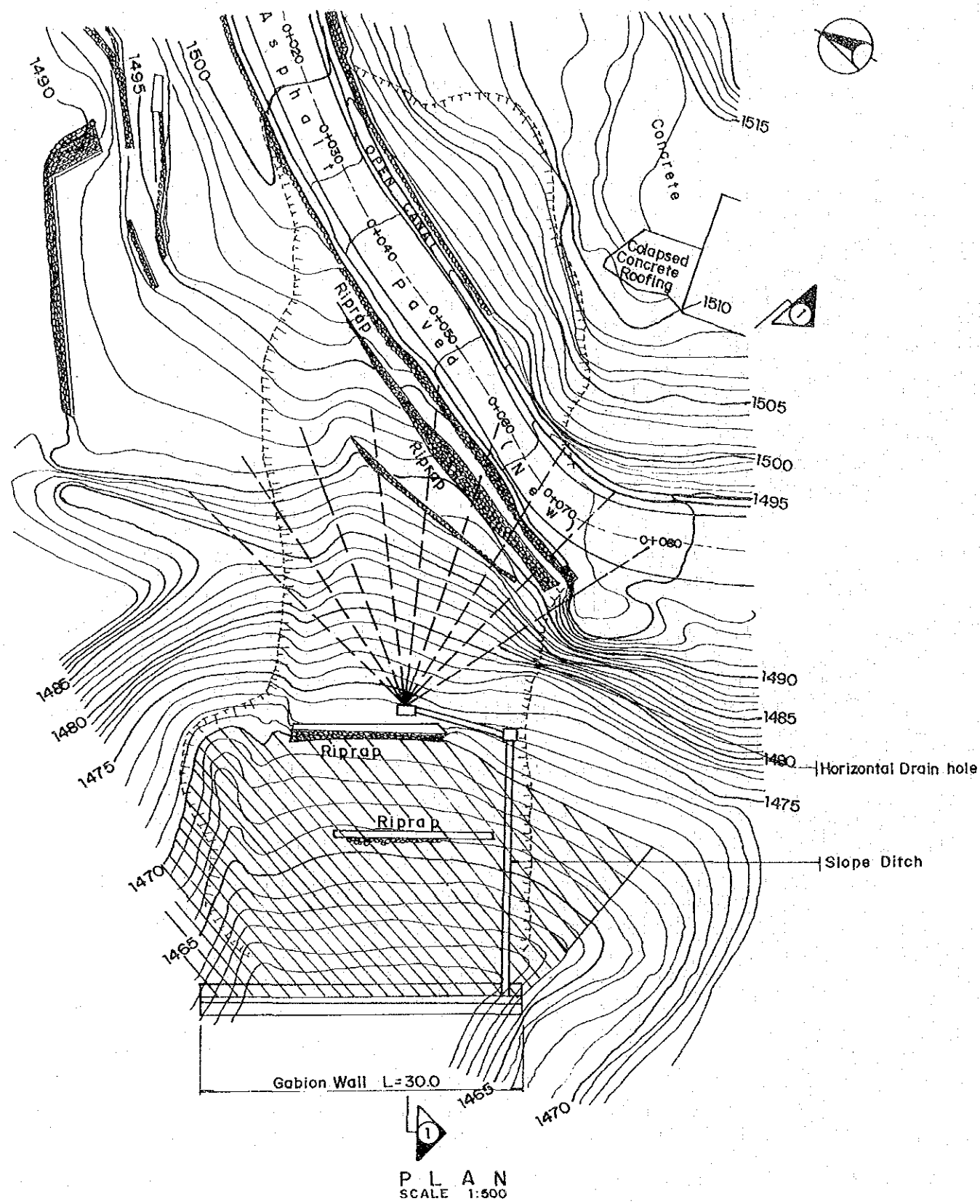


PROVINCE: **BENGUET**
 SPOT No. : **Bt-11 (2/2)**

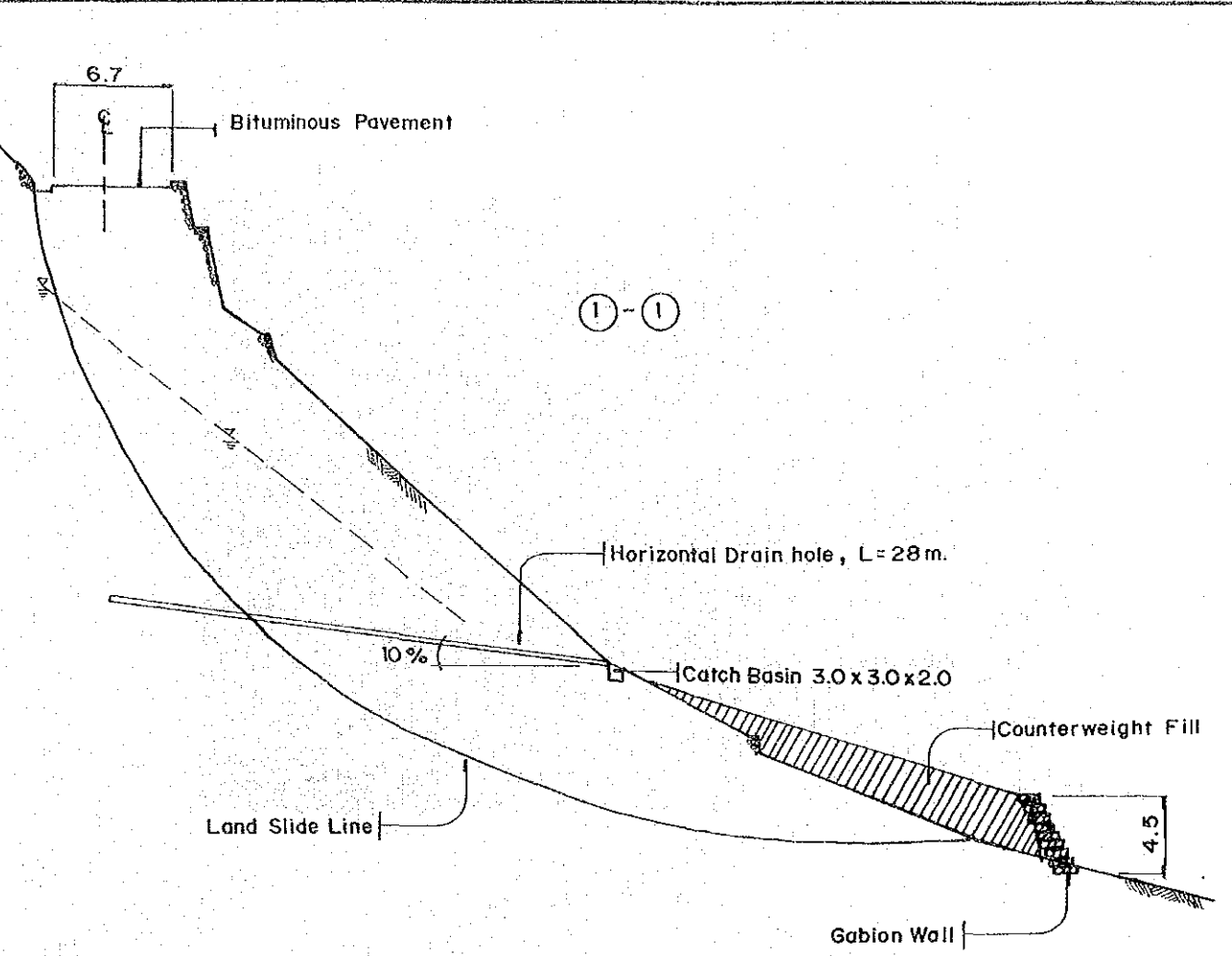
NAME OF ROAD : **BENGUET - ITOGON ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **LANDSLIDE**

DRAWING NO.
32



P L A N
 SCALE 1:500



CROSS SECTION
 SCALE 1:400

SUMMARY OF QUANTITY

TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION		
P1-4 COUNTERWEIGHT FILL	CU. M.	1300
P2-1 SLOPE DITCH	L.M.	32
P2-5 CATCH BASIN	E.A.	2
P3-2 HORIZONTAL DRAIN HOLE	L.M.	252
P6-9 GABION WALL	CU.M.	162
P19-2 BITUMINOUS PAVEMENT	SQ.M.	268
URGENT RESTORATION		
U7-1 GRAVEL SURFACING	CU.M.	3082

PROVINCE: **BENGUET**
SPOT No. : **Bt-14(1/2)**

NAME OF ROAD : **BENGUET-AMBUKLAO ROAD**
ROAD CLASSIFICATION: **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.

33

BENGUET SPOT NO. 14 (Bt-14)

1.) General Situation

- Disaster Classification : C-F
- Road Name : Benguet-Ambuklao Road
- Location : Km 2+700 from the City/
Provincial, Boundary
- Road Class/Office Concerned : National Secondary Road /
District Engineers Office,
Benguet Province

- Municipalities/Barangays connected : Baguio City, Ambuklao

- Road Width/Pavement Width : 6.5 meter
- Pavement Type : Asphalt
- Surface Condition : Fair to Bad Condition
- Detour : No available

2.) Damage identified

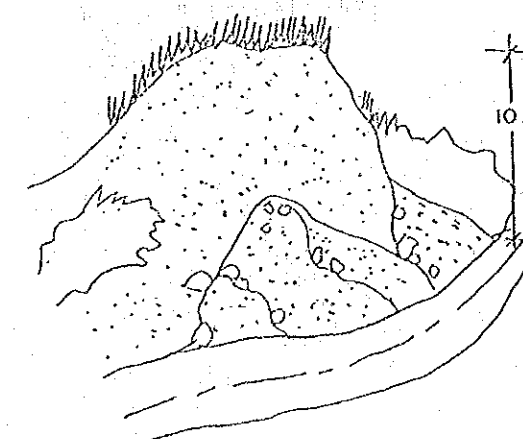
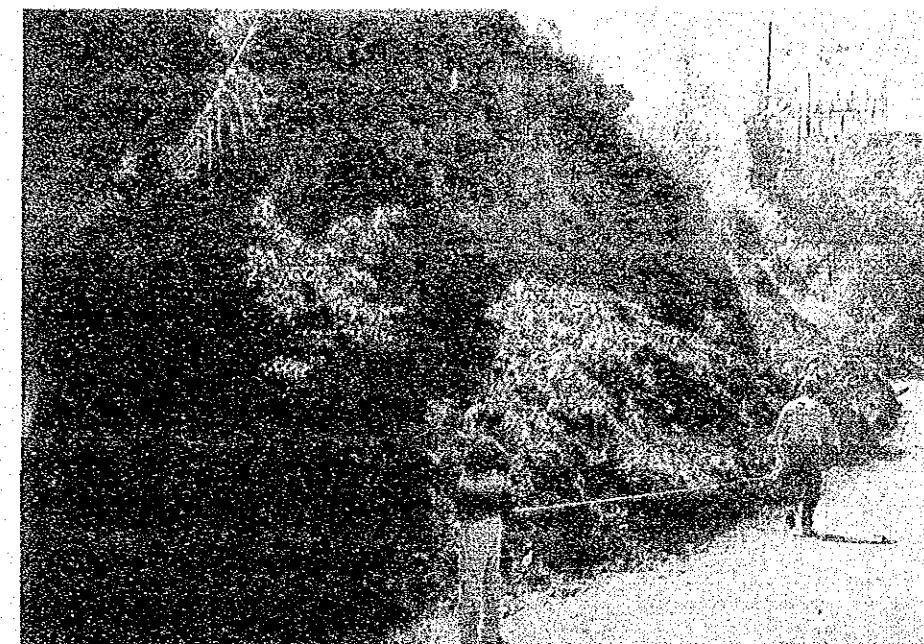
- Type of Disaster : Cut Slope Failure
- Magnitude of Damage : 40.0 meter in wide x 10.72 meter in
height
- Date Noticed :
- Degree/Period of Traffic Interruption : Low with one lane
passable

Description of Disaster

This failure is directly caused by earthquake that hits the Benguet Province last July 16, 1990 and heavy rains poured down in this locality after the earthquake. Slope surface water runs with high velocity along the steep gradient slope of 50 degrees to roadway causing erosion. Existence of gullies were also observed on the slope surface.

3.) Causes of Damage

A slope has irregular surface and water concentrated at sagged portion causing erosion. Soil material deposits on the slope surface slide due to saturated water in top soils.

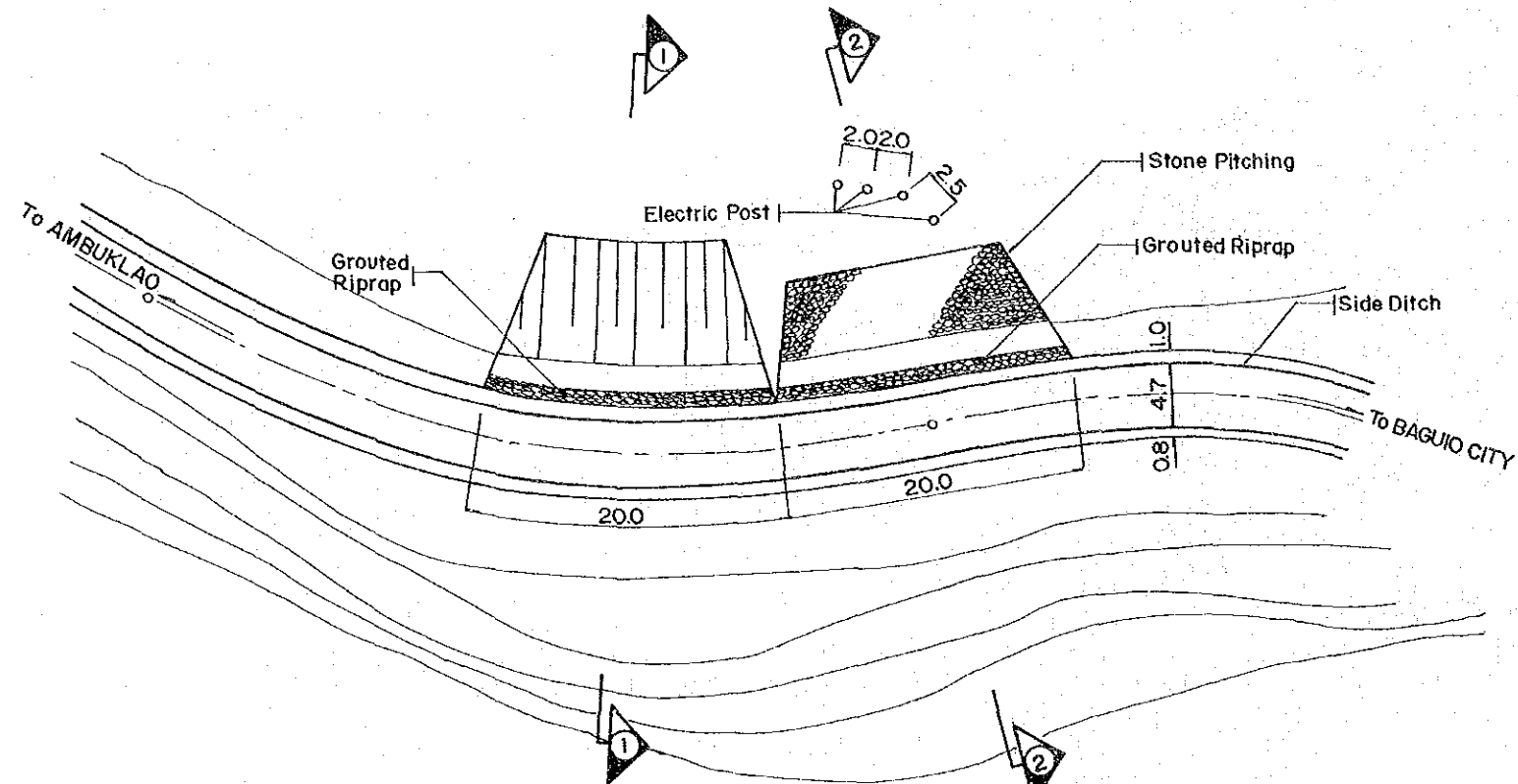


PROVINCE : BENGUET
 SPOT No. : Bt-14(2/2)

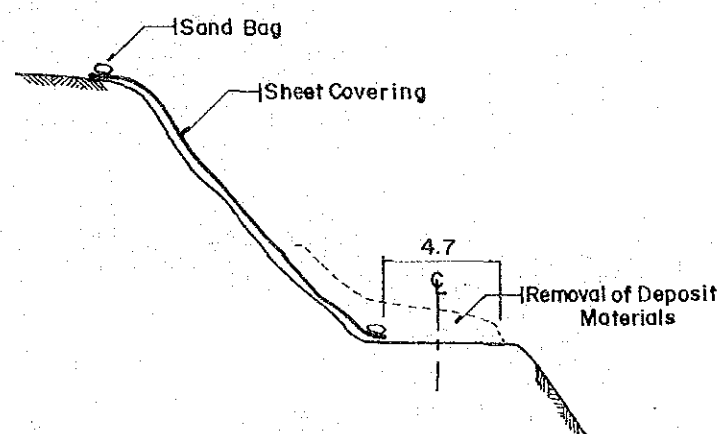
NAME OF ROAD : BENGUET - AMBUKLAO ROAD
 ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : CUT SLOPE FAILURE

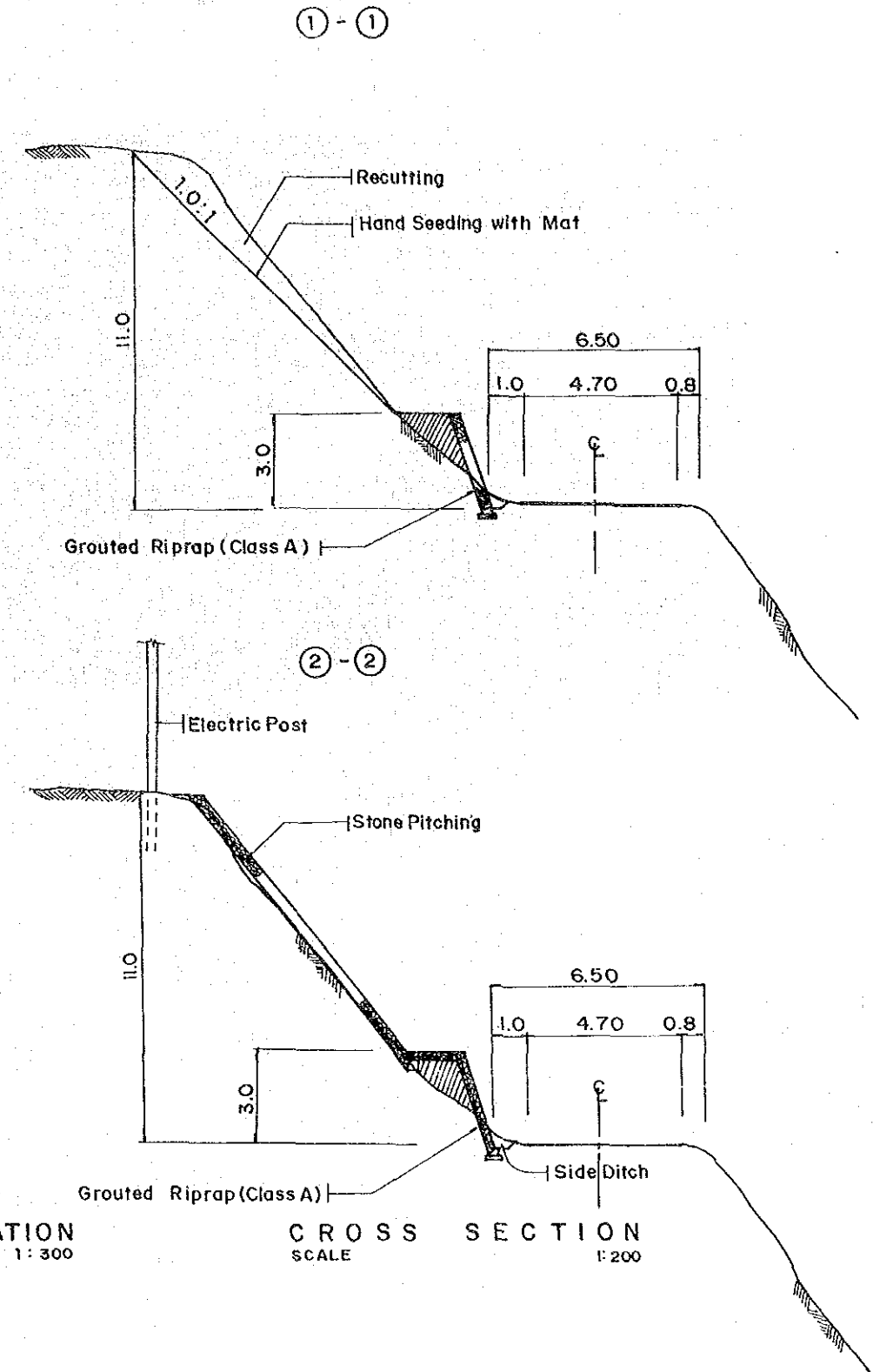
DRAWING NO.
 34



PLAN
 SCALE 1:500



CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:300



CROSS SECTION
 SCALE 1:200

SUMMARY OF QUANTITY

TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION		
P1-1	RECUTTING	CU.M. 360
P2-2	SIDE DITCH	L.M. 40
P4-2	HAND SEEDING WITH MAT	SQ.M. 180
P5-3	STONE PITCHING	CU.M. 54
P6-2	GROUTED RIPRAP	CU.M. 45
URGENT RESTORATION		
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU.M. 230
U3-1	SHEET COVERING	SQ.M. 520

PROVINCE: **BENGUET**
SPOT No. : **Bt-20(1/2)**

NAME OF ROAD : **BENGUET-AMBUKLAO ROAD**
ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **EMBANKMENT SLOPE FAILURE**

DRAWING NO.

35

BENGUET SPOT NO. 20 (Bt-20)

1.) General Situation

- Disaster Classification : E - F
- Road Name : Benguet - Ambuklao Road
- Location : Km 11+350 from City / Provincial Boundary (Km 266+000)
- Road Class/Office Concerned : National Secondary Road / Benguet Engineering District
- Municipalities/Barangays Connected : Baguio City, Ambuklao
- Road Width/Pavement Width : 5.2 meter / 4.20 meter
- Pavement Type : AC
- Surface Condition : Fair to Bad Condition
- Detour : None

2.) Damage Identified

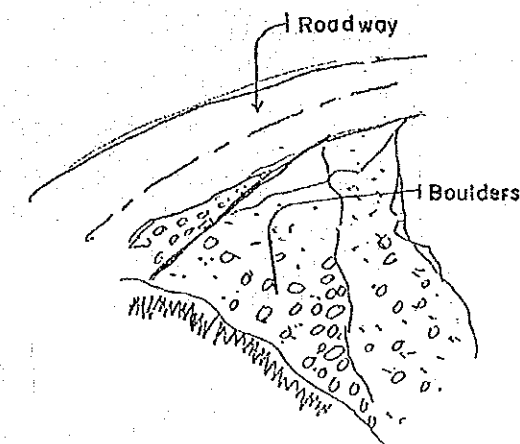
- Type of Disaster : Embankment Failure
- Magnitude of Damage : 20 meters wide x 19.0 meters high
- Date Noticed : Sept. 1990
- Degree/Period of Traffic Interruption : Medium / one lane Passable

Description of Disaster :

This embankment failure is 20.0 meters wide and 19.0 meters high on slope. Previously, the slope was protected by riprap, however, it collapsed. Boulders on the present slope surface were those used for riprap. A triangular side ditch having a depth of 0.20 meter x 0.50 meter wide exists on the mountain side portion of the road. The asphalt pavement has a cut of 14.50 meters in length and 1.50 meter wide near the shoulder of the road where the eroded embankment had occurred.

3.) Causes of Damage

The spot is located at the sagged section and surface water concentrates. Soil materials on the embankment side were not properly compacted where water saturates causing the drywall riprap to collapse and fall down on the slope.

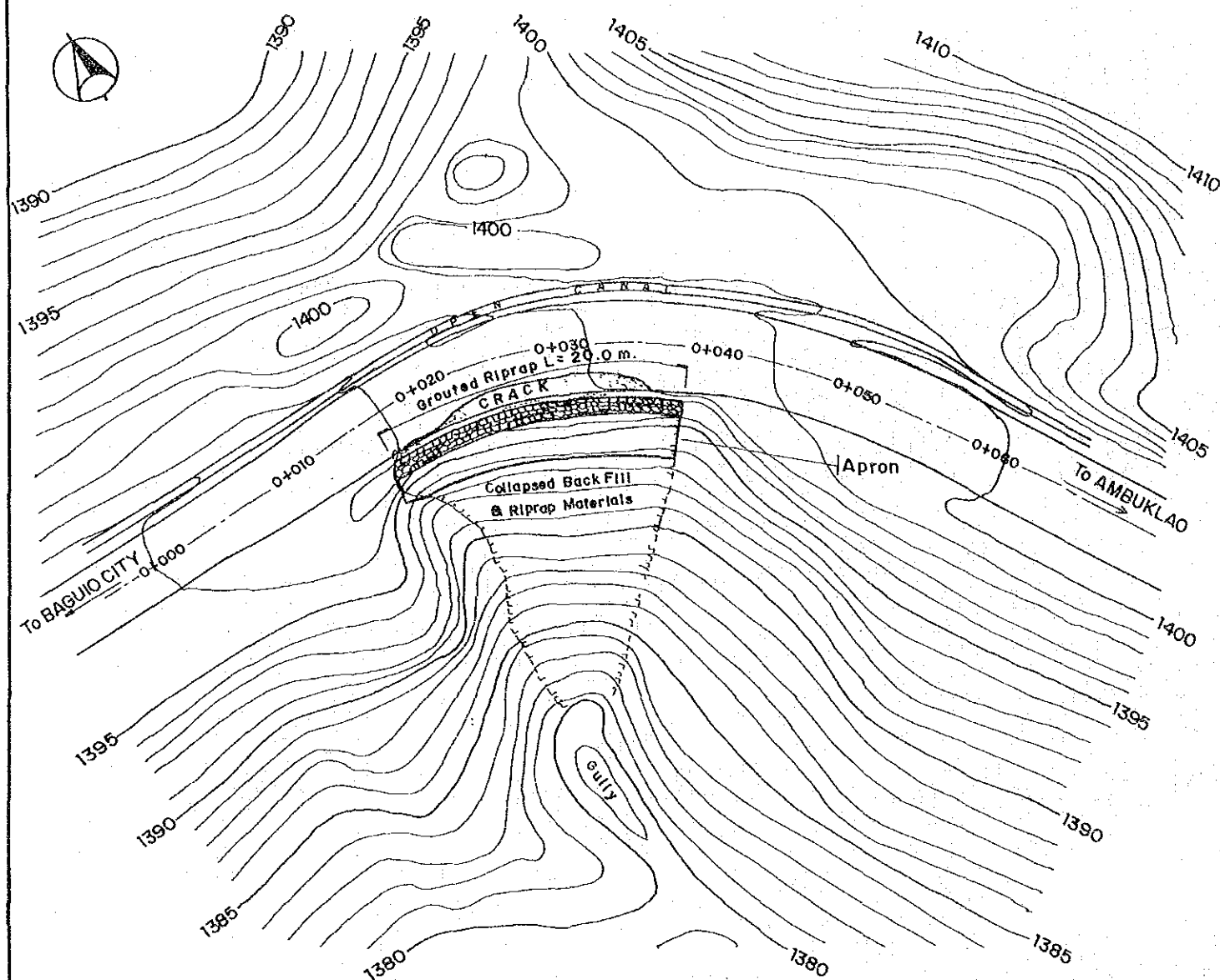


PROVINCE : BENGUET
 SPOT No. : Bt-20(2/2)

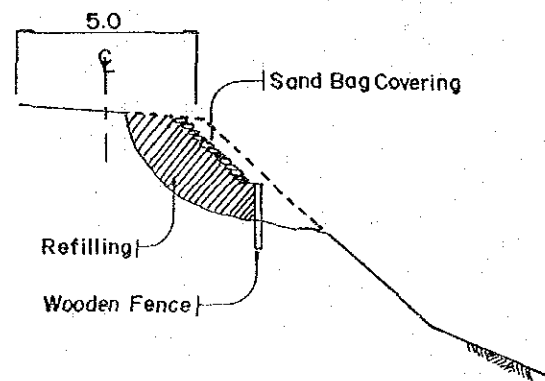
NAME OF ROAD : BENGUET-AMBUKLAO ROAD
 ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : EMBANKMENT SLOPE FAILURE

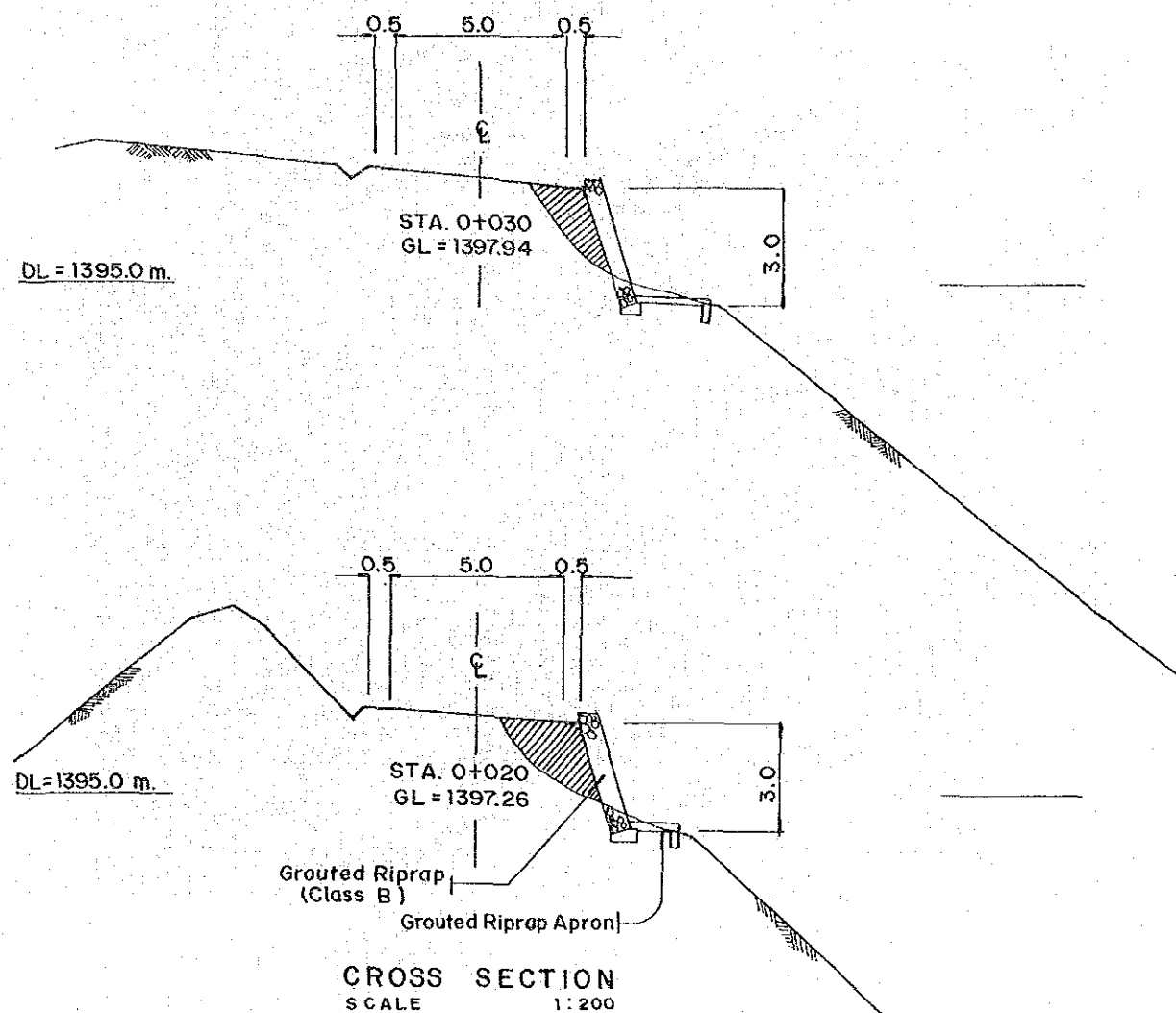
DRAWING NO.
 36



P L A N
 SCALE 1:400



CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:200



SUMMARY OF QUANTITY

TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION		
P6-2 GROUTED RIPRAP	CU. M.	33
P16-3 GROUTED RIPRAP APRON	CU. M.	4
URGENT RESTORATION		
U1-4 REFILLING / EMBANKMENT	CU. M.	90
U3-2 SAND BAG COVERING	SQ. M.	50
U4-3 WOODEN FENCE	LM.	20

PROVINCE: **BENGUET**
SPOT No. : **Bt-24(1/2)**

NAME OF ROAD : **BENGUET-AMBUKLAO ROAD**
ROAD CLASSIFICATION: **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **ROCK FALL/DEBRIS FALL**

DRAWING NO.
37

BENGUET SPOT NO. 24 (Bt-24)

1.) General Situation

- Disaster Classification : Debris Flow
- Road Name : Benguet-Ambuklao Road
- Location : Km 16+500 from City/
Provincial Boundary
- Road Class/Office Concerned : National Secondary Road/
Benguet Engineering Office
- Municipalities/Barangays connected : Baguio City/Ambuklao
- Road Width/Pavement Width : 7.5 meter/5 meter
- Pavement Type : Gravel
- Surface Condition : Bad
- Detour : No available

2.) Damage identified

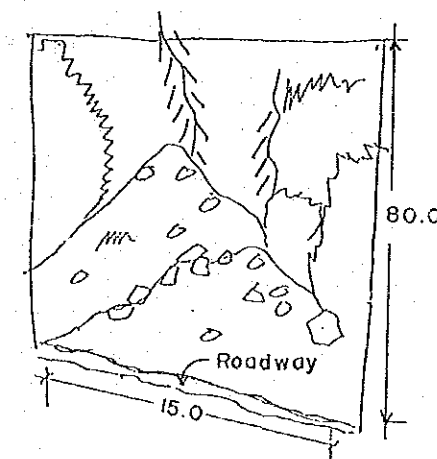
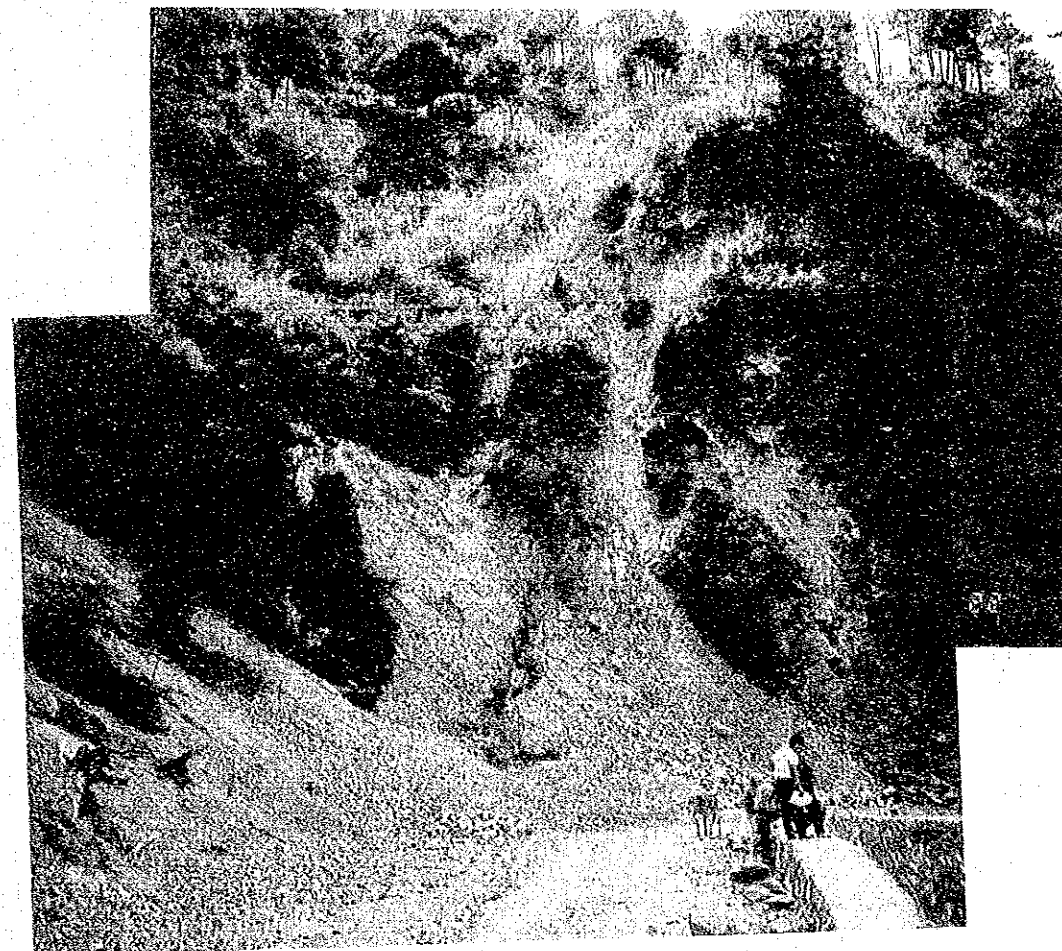
- Type of Disaster : Cut Slope Failure
- Magnitude of Damage : 18.0 meters in width x 40.0 meters in
height
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : High/Passable

Description of Disaster

This failure occurred at the area on the slope surface at a height of 40 meters and width of 18 meters. Crop boulders were piled upon the side of the roadway. Existence of vegetation were also observed in this site. The slope surface has a gradient of 50 degrees. No existence of drainage facilities in the locality.

3.) Causes of Damage

This failure is caused by earthquake and heavy rainfall which loosen the soil condition wherein debris slid on slope surface.

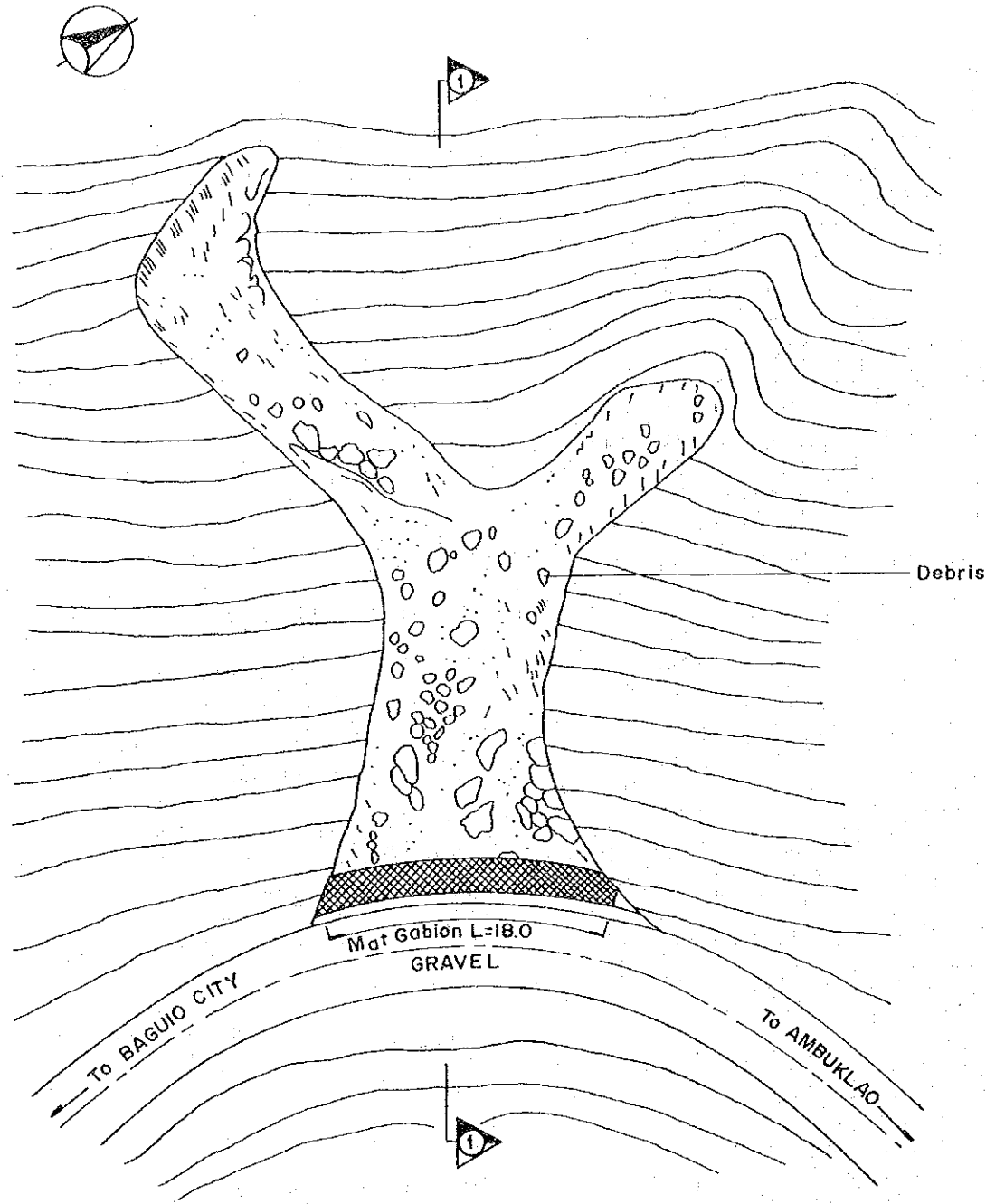


PROVINCE: **BENQUET**
 SPOT No. : **B1-24(2/2)**

NAME OF ROAD : **BENQUET - AMBUKLAO ROAD**
 ROAD CLASSIFICATION: **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **ROCK FALL / DEBRIS FALL**

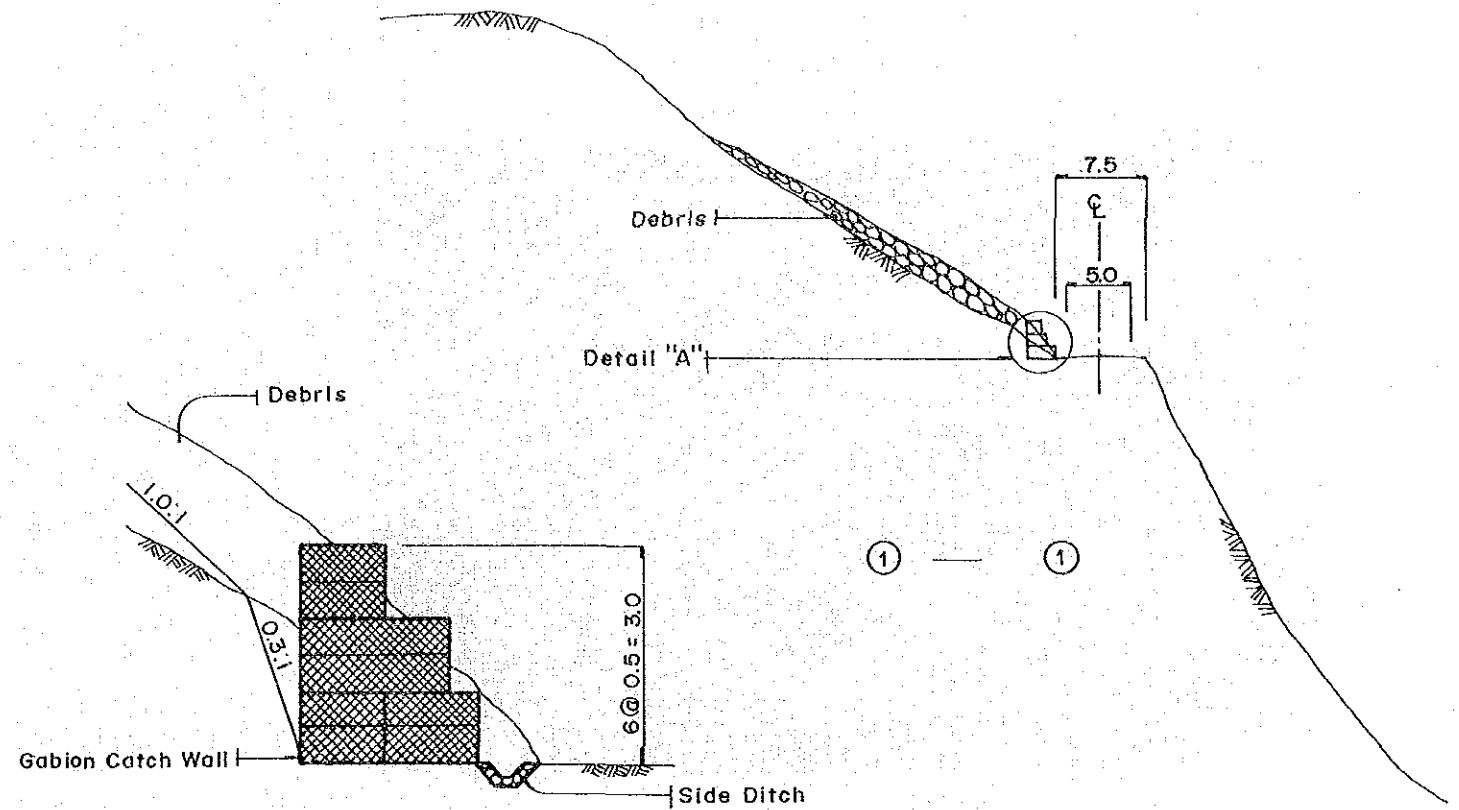
DRAWING NO.
38



P L A N
 SCALE 1:400

URGENT RESTORATION

- Removal of Deposit Materials



DETAIL "A"
 SCALE 1:100

CROSS SECTION
 SCALE 1:600

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-1	RECURTING	CU.M.	250
P2-2	SIDE DITCH	L.M.	18
P8-2	GABION CATCH WALL	CU.M.	101
URGENT RESTORATION			
UI-1	REMOVAL OF DEPOSIT MATERIALS	CU.M.	180

PROVINCE : BENGUET
SPOT No. : Bt-25(1/2)

NAME OF ROAD : BENGUET-AMBUKLAO ROAD
ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : EMBANKMENT SLOPE FAILURE

DRAWING NO.
39

BENGUET SPOT NO. 25 (Bt-25)

1.) General Situation

- Disaster Classification : Embankment Failure
- Road Name : Benguet-Ambuklao Road
- Location : Km 18+150 from the City/
Provincial Boundary
- Road Class/Office Concerned : National Secondary Road/
Benguet Engineering District

- Municipalities/Barangays connected : Baguio City, Ambuklao

- Road Width/Pavement Width : 7.0 meter/6.0 meter
- Pavement Type : Gravel
- Surface Condition : Bad Condition
- Detour : No available

2.) Damage Identified

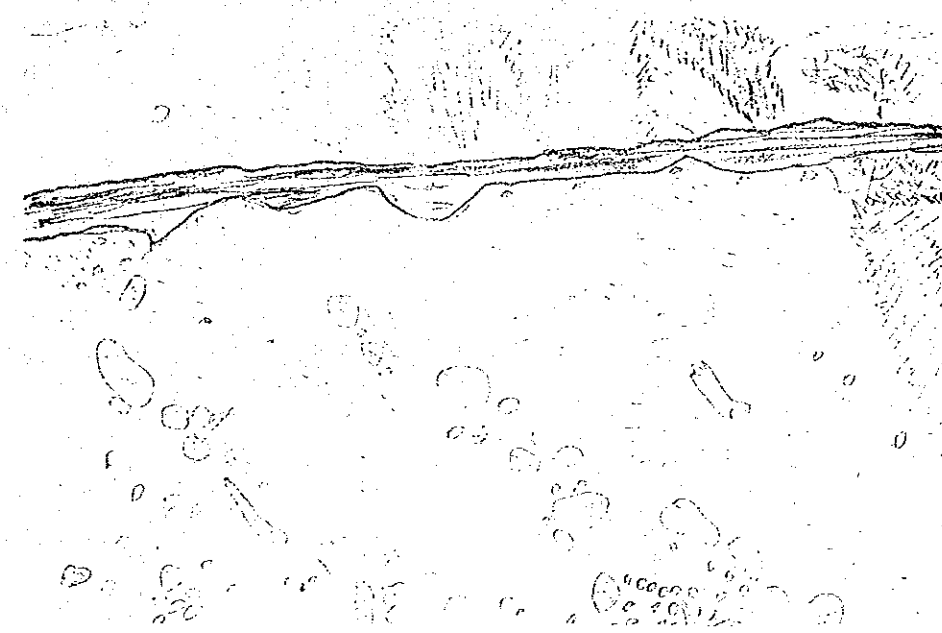
- Type of Disaster : Fall
- Magnitude of Damage : 40 meters in width x 100 meters in
height
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : High but still
passable

Description of Disaster:

This embankment failure was caused by earthquake that struck the province last July 16, 1990. The magnitude of damage is 40 meters wide and 6 meters high on the slope. No side ditches on both side of the road and no existing of drainage facilities in the locality. The flow of water coming from the mountain slope runs through the roadway causing this damage to occur.

3.) Causes of Damage:

The embankment failure is caused by earthquake and concentration of water surface on the roadway during heavy rains. Failure was aggravated non-provision of drainage facilities and gradual devegetation of the slope surface.

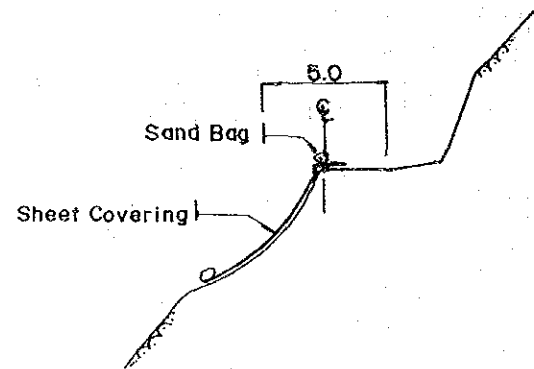
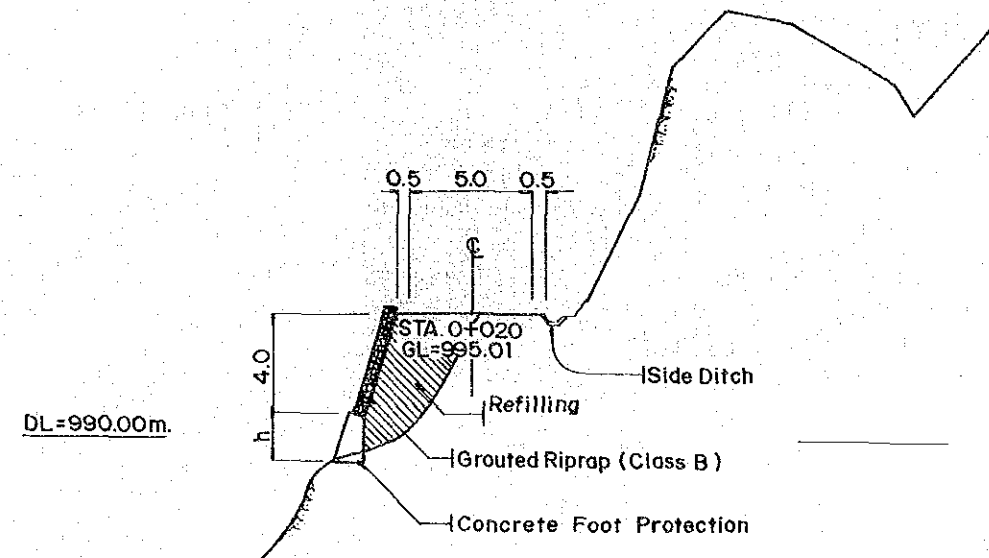
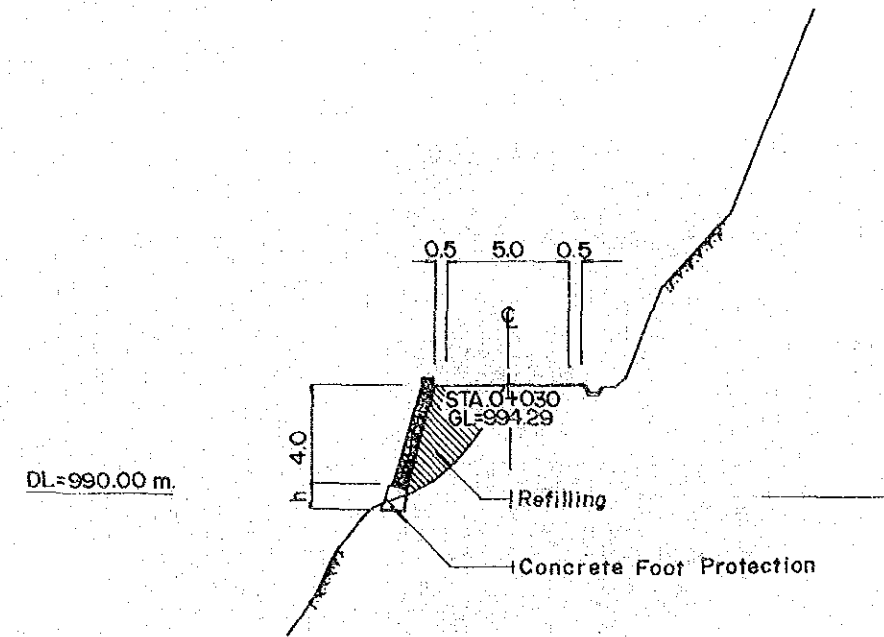
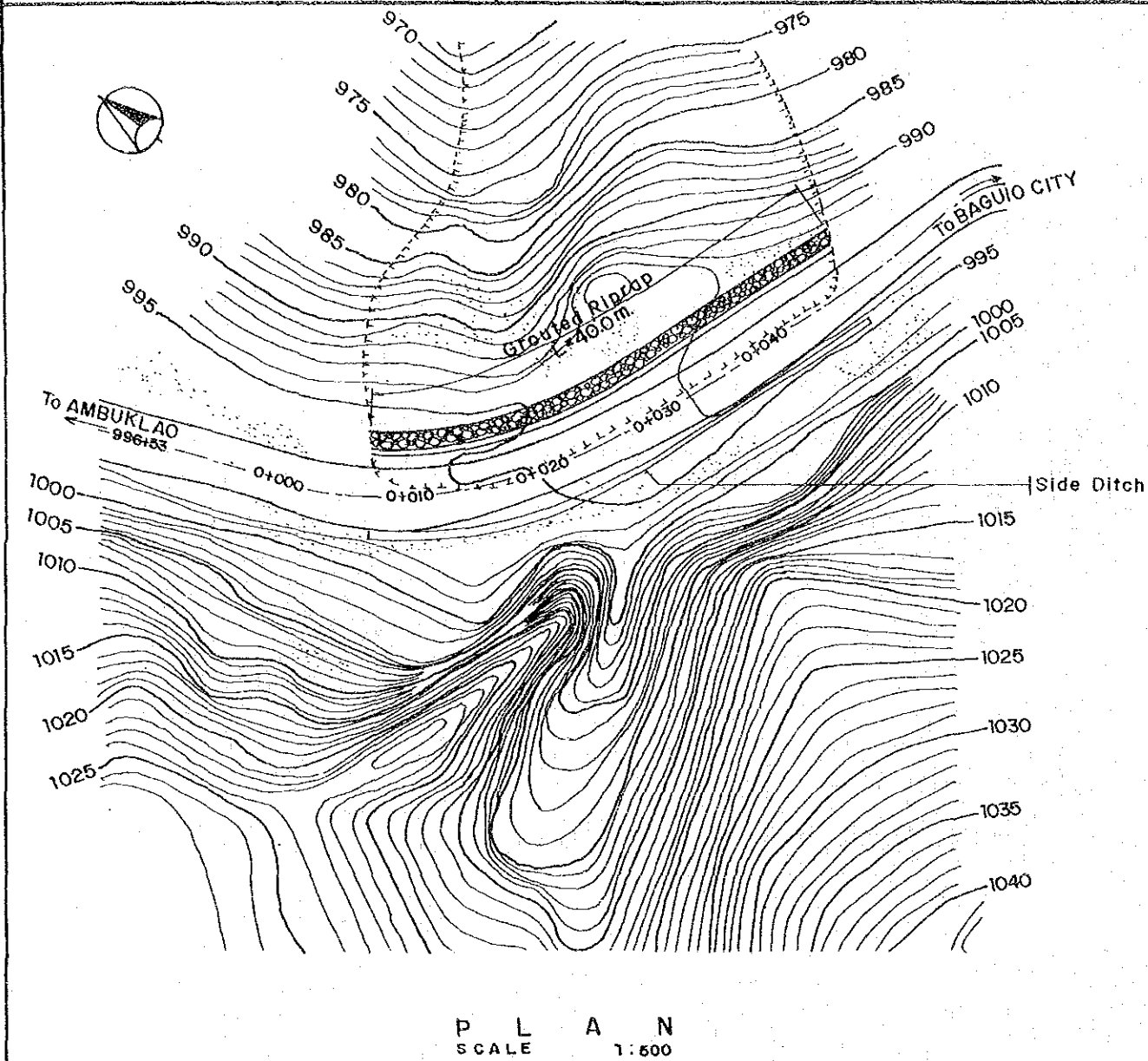


PROVINCE: **BENGUET**
 SPOT No.: **B1-25(2/2)**

NAME OF ROAD : **BENGUET-AMBUKLAO ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **EMBANKMENT SLOPE FAILURE**

DRAWING NO.
40

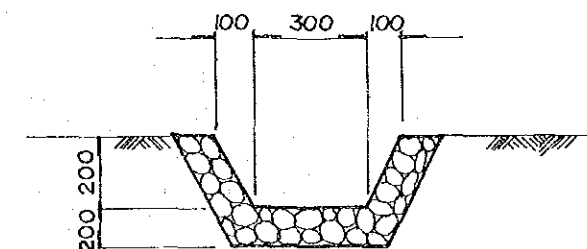


CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:300

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-3	REFILLING / EMBANKMENT	CU. M.	420
P2-2	SIDE DITCH	L. M.	40
P6-2	GROUTED RIPRAP	CU. M.	94
P1B-1	CONCRETE FOOT PROTECTION	CU. M.	86
URGENT RESTORATION			
U3-1	SHEET COVERING	SQ. M.	240

CROSS SECTION
 SCALE 1:300



DETAIL OF SIDE DITCH
 SCALE 1:20

PROVINCE: **BENGUET**
SPOT No. : **Bt-33(1/2)**

NAME OF ROAD : **KAPANGAN-ACOP ROAD**
ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **ROCK FALL/DEBRIS FALL**

DRAWING NO.

41

BENGUET SPOT NO. 33 (Bt-33)

1.) General Situation

- Disaster Classification : Fall
- Road Name : Kapangan-Acop Jct. Road
- Location : Km 2+150 from Kapangan Proper
- Road Class/Office Concerned : National Secondary Road/
District Engineers Office,
Benguet Province

- Municipalities/Barangays connected : Kapangan, Tublay, Acop
- Road Width/Pavement Width : / 5.5 meter
- Pavement Type : Gravel
- Surface Condition : Bad
- Detour : No available

2.) Damage identified

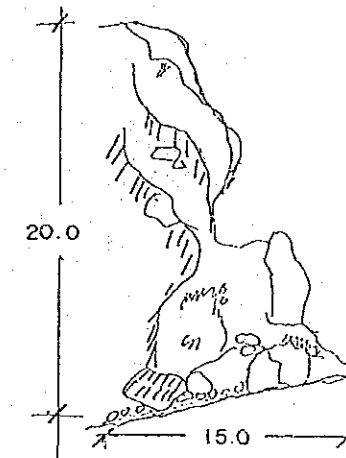
- Type of Disaster : Fall
- Magnitude of Damage : 33 meter wide x 10 meter high
- Date Noticed :
- Degree/Period of Traffic Interruption : Low/Passable

Description of Disaster

The slope of this section has irregular surface. Rock deposits were formed at the foot of the slope which covers almost half of the roadway. There is no existence of side ditches or drainage facilities in the locality.

3.) Causes of Damage

The cause of fall was the earthquake (July 16, 1990) that fractured the rock joints dislocating a portion from the bedrock. The seepage of water into the bedrock softens and causing it to fall. Top soil slides and comes half of the roadway.

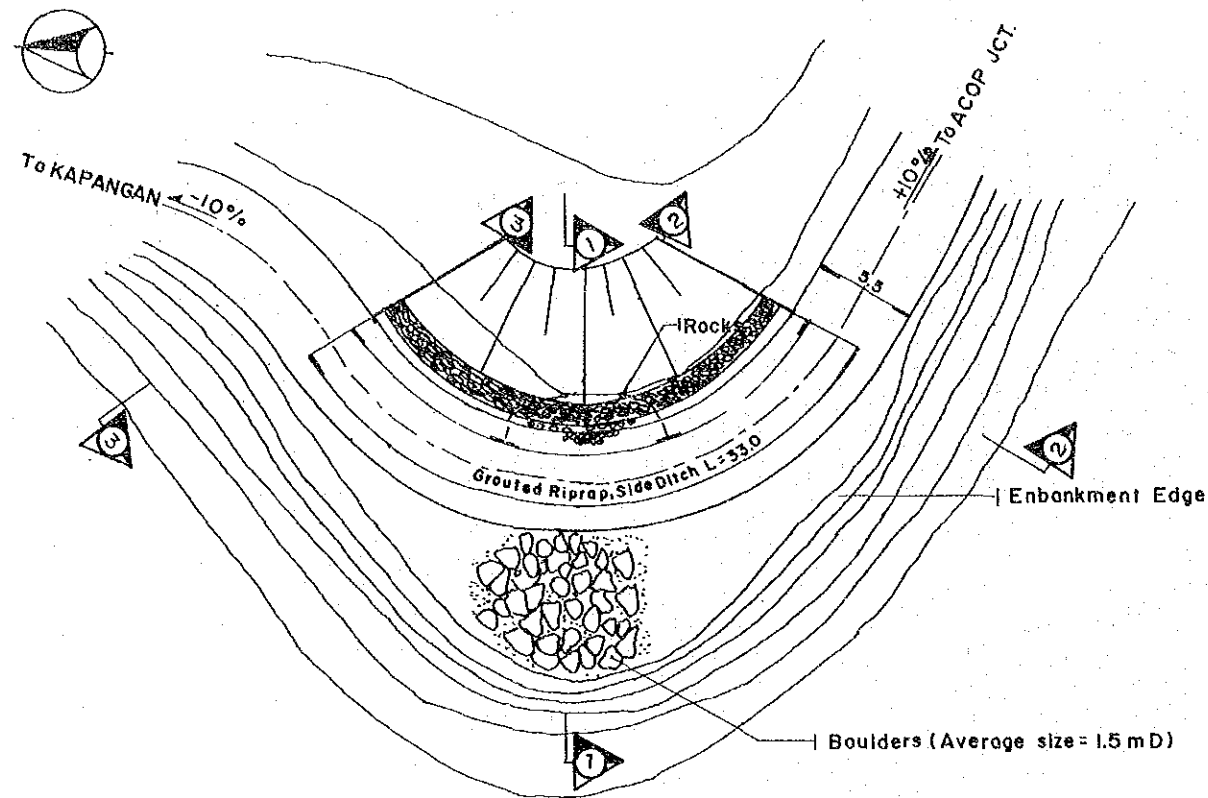


PROVINCE : BENGUET
 SPOT No. : Bt-33(2/2)

NAME OF ROAD : KAPANGAN - ACOP ROAD
 ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : ROCK FALL / DEBRIS FALL

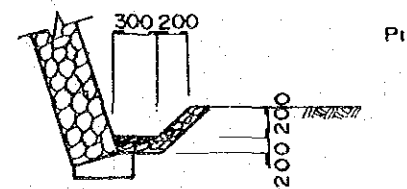
DRAWING NO.
 42



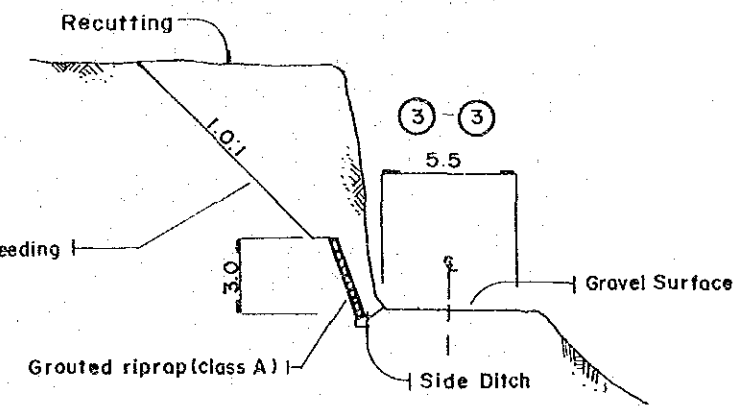
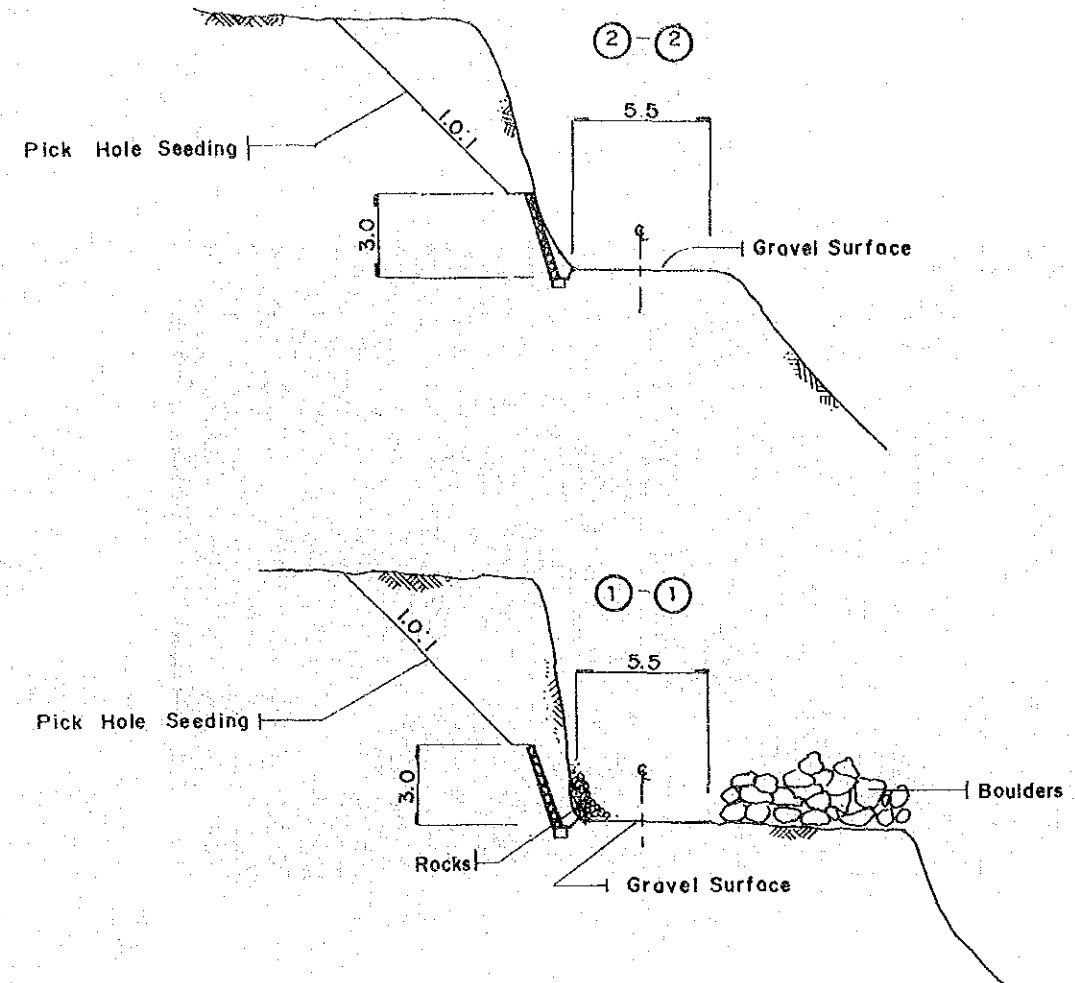
PLAN
 SCALE 1:400

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
PI-1	RECURTING	CU.M	800
P2-2	SIDE DITCH	L.M.	33
P4-6	PICK HOLE SEEDING	SQ.M	210
P6-2	GROUTED RIPRAP	CU.M.	33
URGENT RESTORATION			
UI-1	REMOVAL OF DEPOSIT MATERIALS	CU.M.	67
UI-2	REMOVAL OF UNSTABLE MATERIALS	CU.#	5



DETAIL OF SIDE DITCH
 SCALE: 1:50



CROSS SECTION
 SCALE 1:300

URGENT RESTORATION

- Removal of Deposit Materials
- Removal of Unstable Materials

PROVINCE: BENGUET
SPOT No. : Bt-38(1/2)

NAME OF ROAD : KAPANGAN-ACOP ROAD
ROAD CLASSIFICATION: NATIONAL SECONDARY ROAD

TYPE OF DISASTER : EMBANKMENT SLOPE FAILURE

DRAWING NO.
43

BENGUET SPOT NO. 38 (Bt-38)

1.) General Situation

- Disaster Classification : Embankment Failure
- Road Name : Kapangan-Acop Road
- Location : Km 10+900 from Kapangan Proper
- Road Class/Office Concerned : Secondary National Road/
Benguet Engineering District
- Municipalities/Barangays connected : Acop, Tublay - Kapangan
- Kibungan
- Road Width/Pavement Width : 6.50 meters / 5.00 meters
- Pavement Type : Gravel
- Surface Condition : Fair
- Detour : Not available

2.) Damage Identified

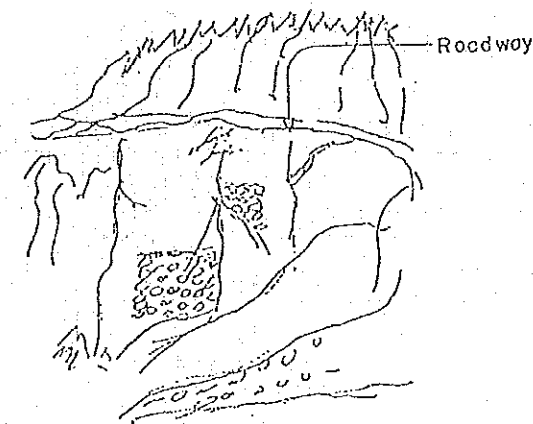
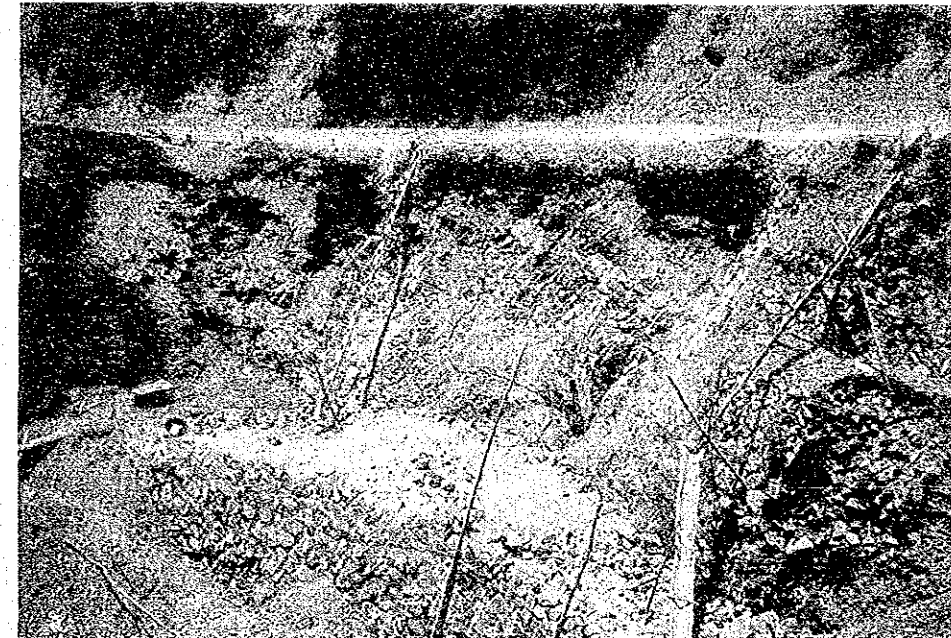
- Type of Disaster : Embankment Slope Failure
- Magnitude of Damage : 35.0 meters in width x 15.0 meters in height
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : Low with one lane passable

Description of Disaster :

This failure occurs during the July 16, 1990 earthquake. The spot is located at the concaved portion of the road where water converges at this point. Since the composition of the natural grade is purely soil and unconsolidated, erosion is inevitable. A collapsed grouted riprap was observed along the embankment slope which is almost covered with soil materials. The size of the failure is 35.0 meter long and 15.0 meter deep.

3.) Causes of Damage

It is caused by heavy rains where the rainwater converged on the concaved portion of the road where embankment failure was aggravated by the nonprovision of drainage facilities and the gradual devegetation of the slope surface.

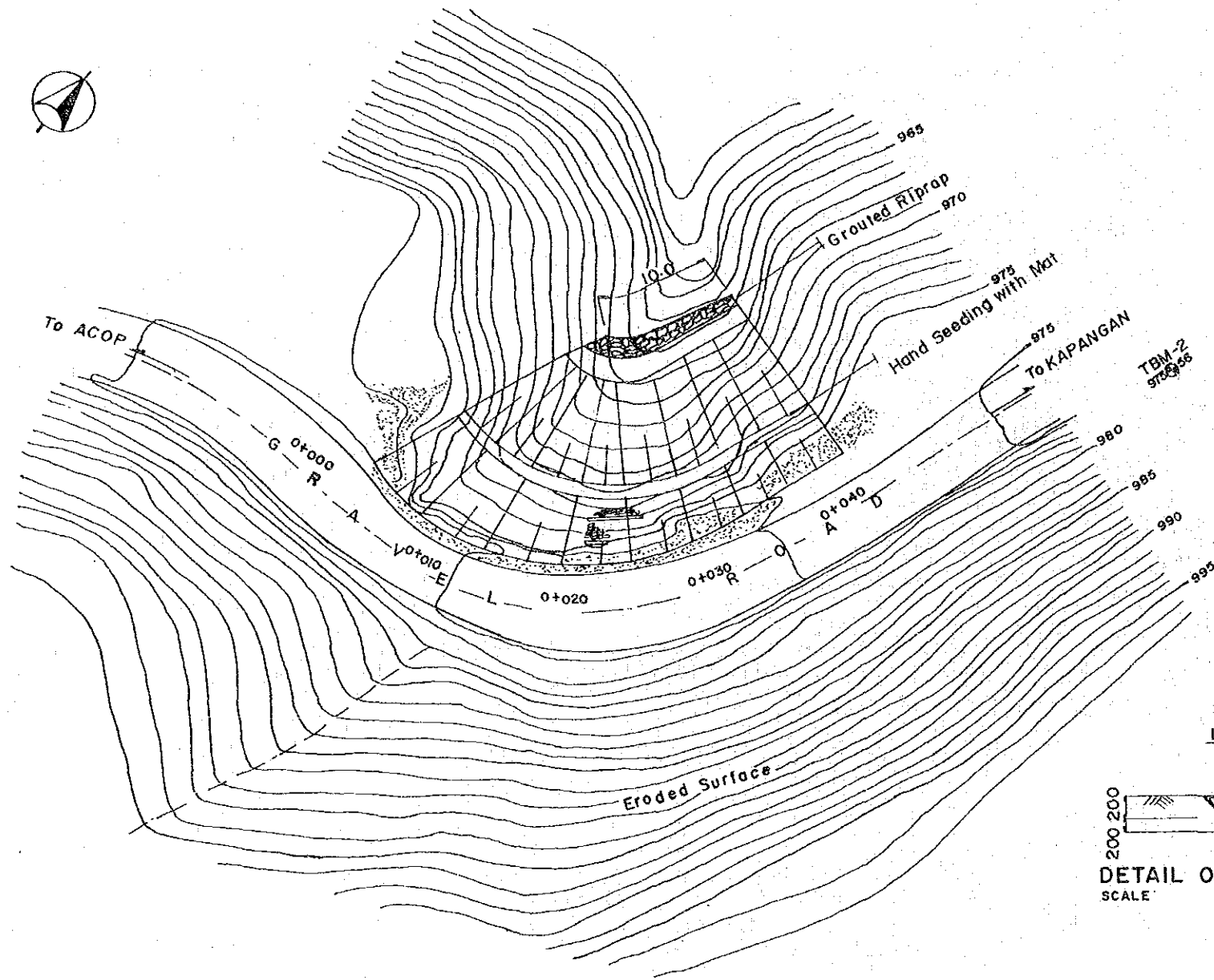


PROVINCE : BENGUET
 SPOT No. : Bt-38 (2/2)

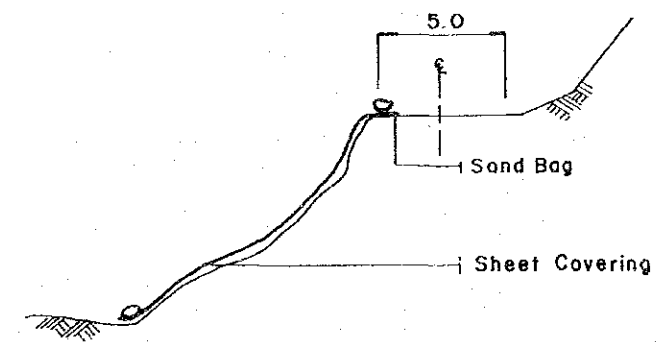
NAME OF ROAD : KAPANGAN - ACOP ROAD
 ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : EMBANKMENT SLOPE FAILURE

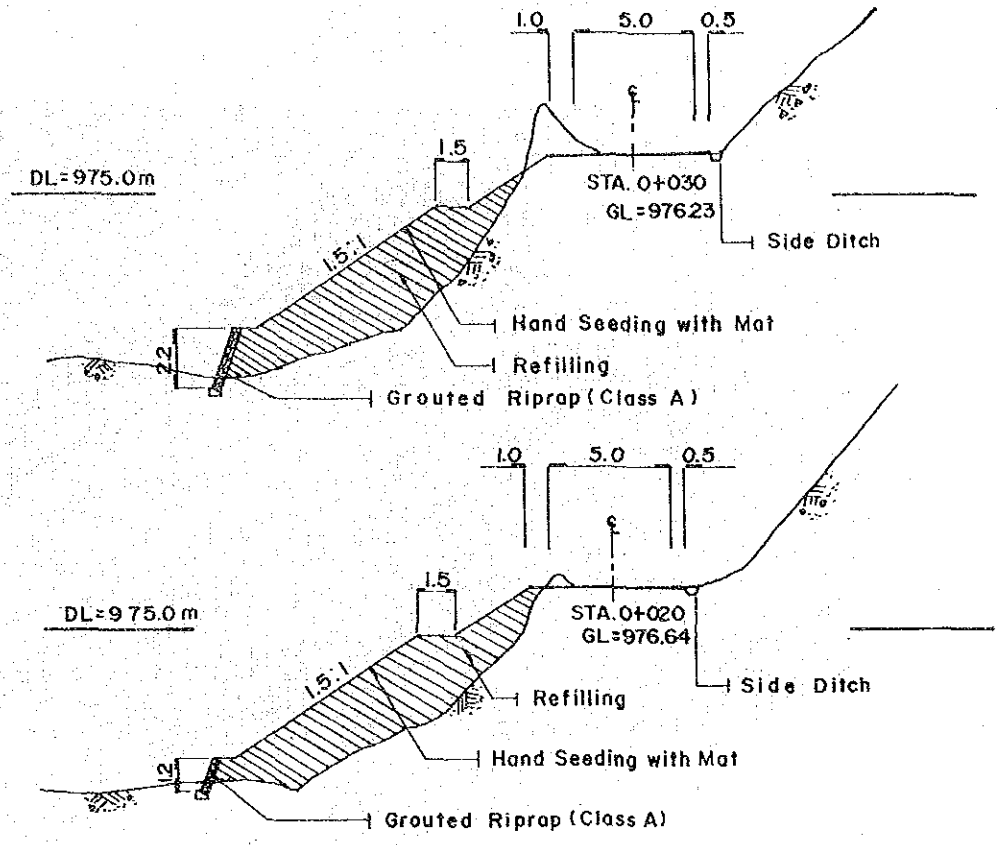
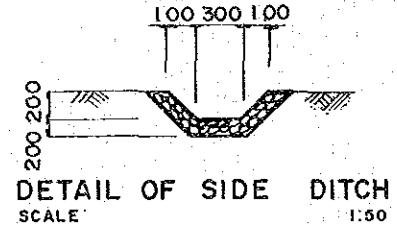
DRAWING NO.
 44



PLAN
 SCALE 1:400



CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:300



CROSS SECTION
 SCALE 1:300

SUMMARY OF QUANTITY

TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION		
P1-3 REFILLING/EMBANKMENT	CU.M	750
P2-2 SIDE DITCH	L.M	45
P4-2 HAND SEEDING WITH MAT	SQ.M	300
P6-2 GROUDED RIPRAP	CU.M	7
URGENT RESTORATION		
U3-1 SHEET COVERING	SQ.M	320

PROVINCE: **BENGUET**
SPOT No. : **Bt-39(1/2)**

NAME OF ROAD : **KAPANGAN-ACOP ROAD**
ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **DEBRIS FLOW**

DRAWING NO.
45

BENGUET SPOT NO. 39 (Bt-39)

1.) General Situation

- Disaster Classification : Debris Flow
- Road Name : Kapangan-Acop Road
- Location : Km 15+200 from Kapangan
Municipal Hall
- Road Class/Office Concerned : Secondary National Road/
Engineering District Office

- Municipalities/Barangays connected : Acop, Tublay, -
Kapangan-Kibungan
- Road Width/Pavement Width : 9.30 meters / 4.30 meters
- Pavement Type : Gravel
- Surface Condition : Bad condition
- Detour : No available

2.) Damaged Identified

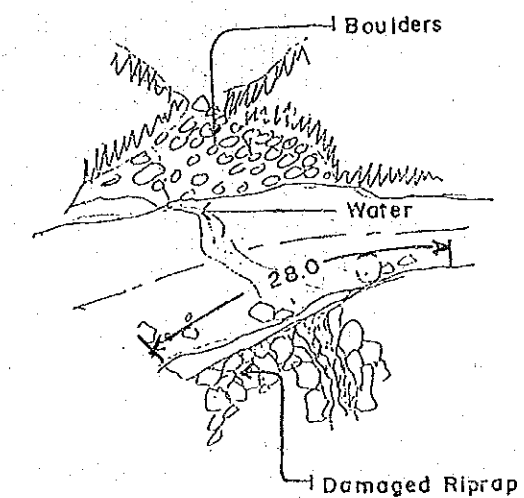
- Type of Disaster : Shoulder erosion, flooded roadway
- Magnitude of Damage : 16.0 meters in length x 8.0 meter in
wide
- Date Noticed :
- Degree/Period of Traffic Interruption : Medium / 2 lane
passable

Description of Disaster

The rocks deposited on the bed of ravine was brought about by the flow of water from upstream. Outside this area is vegetated with tree. The riprap on the embankment side is eroded due mainly to the flow of water from upstream.

3.) Causes of Damage

Rocks and boulders deposited along the ravine flew down with rainwater. Sabo work should have been provided, or spillway should have been constructed.

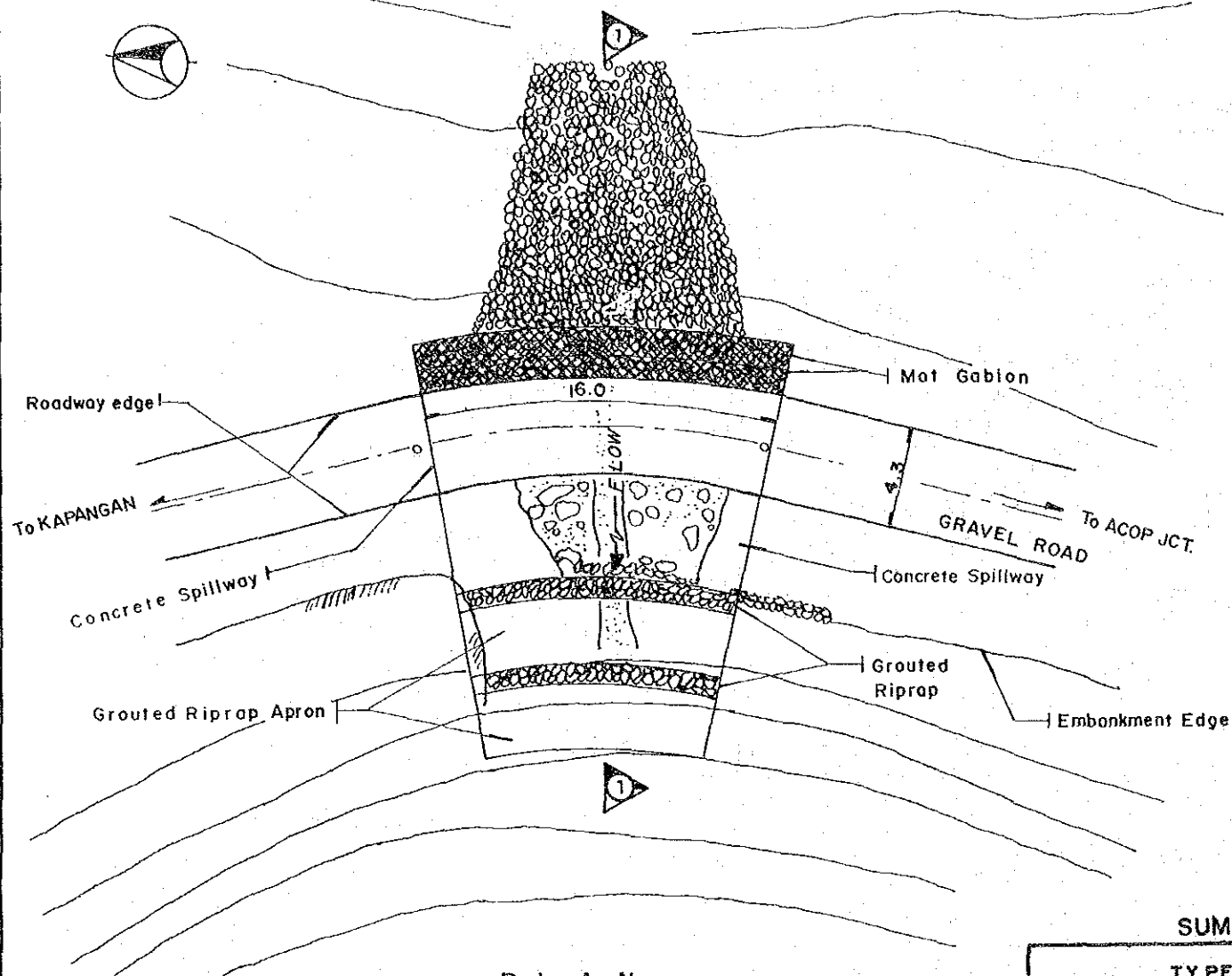


PROVINCE: **BENGUET**
 SPOT No. : **B1-39 (2/2)**

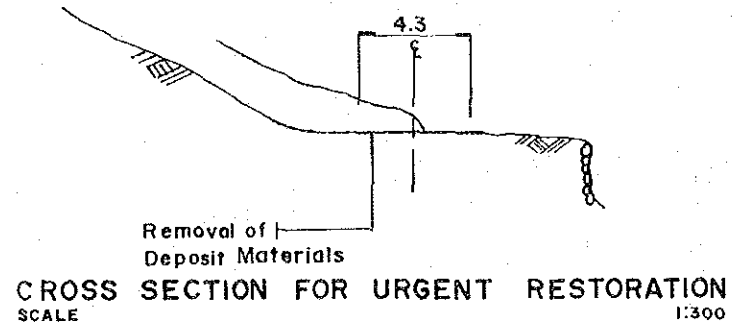
NAME OF ROAD : **KAPANGAN - ACOP ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **DEBRIS FLOW**

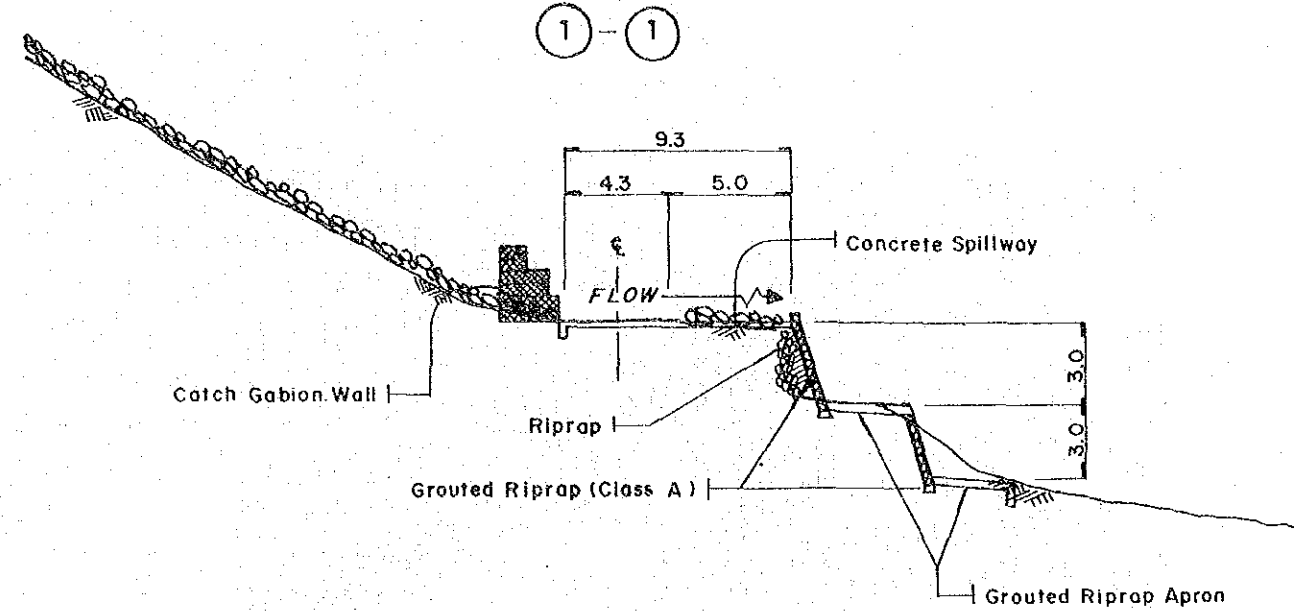
DRAWING NO.
46



PLAN
 SCALE 1:300



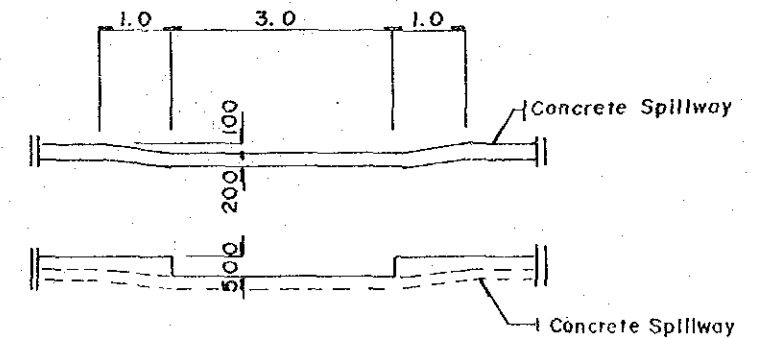
CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:300



CROSS SECTION
 SCALE 1:300

SUMMARY OF QUANTITY

	TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION			
P6-2	GRouted RIPRAP	CU.M	24
P8-2	CATCH GABION WALL	CU.M	36
P16-3	GRouted RIPRAP APRON	CU.M	21
P18-1	CONCRETE SPILLWAY	CU.M	28
URGENT RESTORATION			
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU.M	150



CROSS SECTION
Concrete Spillway and Top of Grouted Riprap
 SCALE 1:100

PROVINCE: **BENGUET**
SPOT No. : **Bt-43(1/2)**

NAME OF ROAD : **KIBUNGAN-KAPANGAN ROAD**
ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.
47

BENGUET SPOT NO. 43 (Bt-43)

1.) General Situation

- Disaster Classification : C-F
- Road Name : Kibungan-Kapangan
- Location : Km 0+650 from Kibungan Proper
- Road Class/Office Concerned : National Secondary Road/
District Engineers Office,
Benguet Province
- Municipalities/Barangays connected : Acop, Tublay, Kapangan,
Kibungan
- Road Width/Pavement Width : 5.0 meter / 5.0 meter
- Pavement Type : Gravel
- Surface Condition : Bad
- Detour : No available

2.) Damage identified

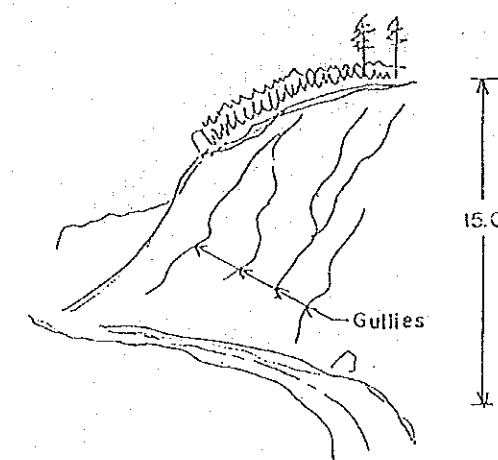
- Type of Disaster : Cut Slope Failure
- Magnitude of Damage : 60 meters in wide x 15 meters in height
- Date Noticed :
- Degree/Period of Traffic Interruption : Medium / Passable

Description of Disaster

The length of the slope failure is 45 meters and 15 meters high with a slope grade of 35 degrees. The exposed surface is nearly soil with patches of stone. Water freely runs on the slope surface due to its steep and high gradient. The absence of drainage facilities made possible the stagnant water in road surface.

3.) Causes of Damage

This failure is caused by saturation of water in slope surface due to heavy rainfall and weak sub-surface condition.

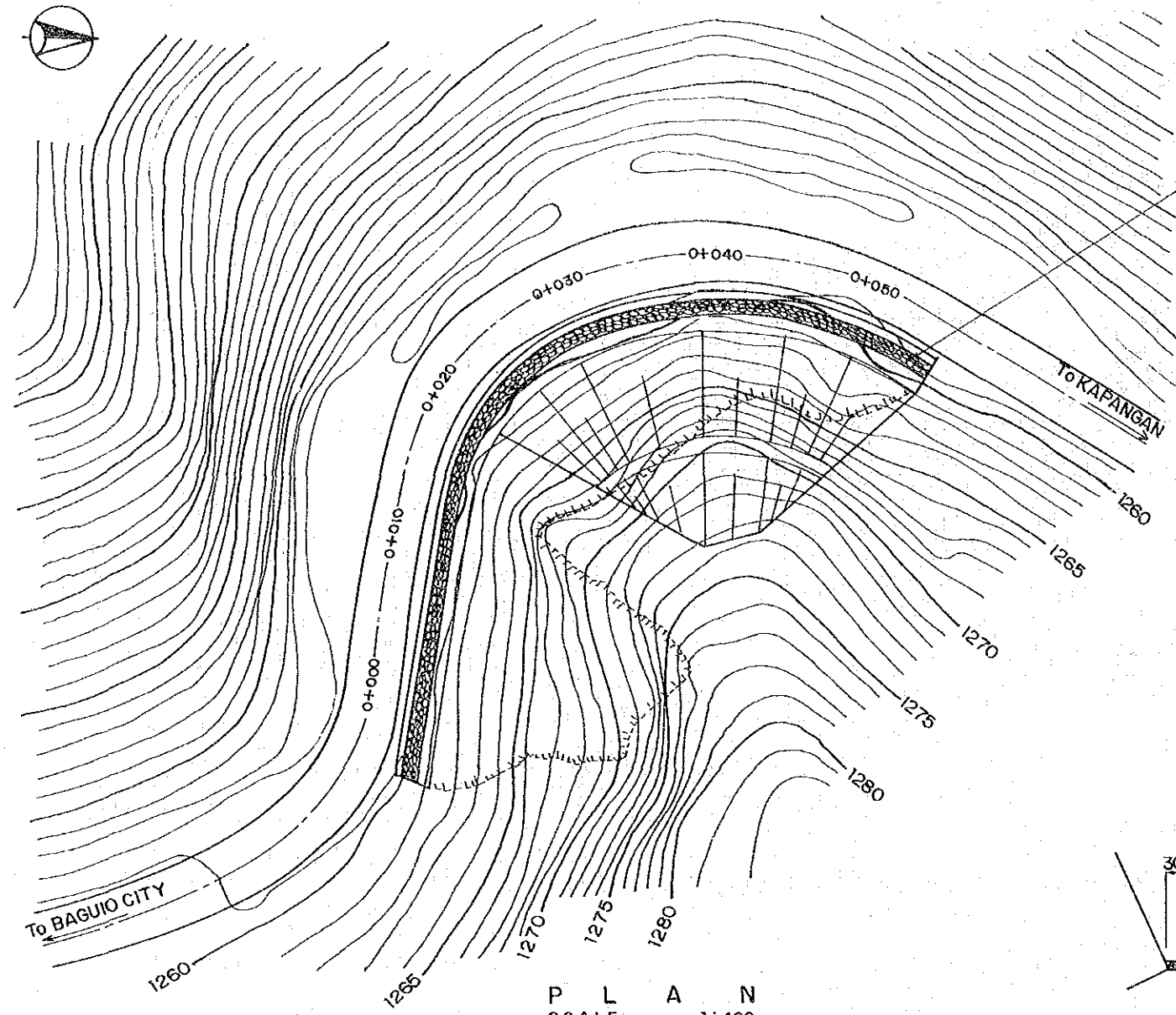


PROVINCE : **BENGUET**
 SPOT No. : **Bf-43 (2/2)**

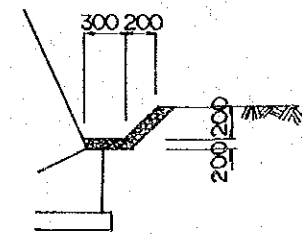
NAME OF ROAD : **KIBUNGAN - KAPANGAN ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

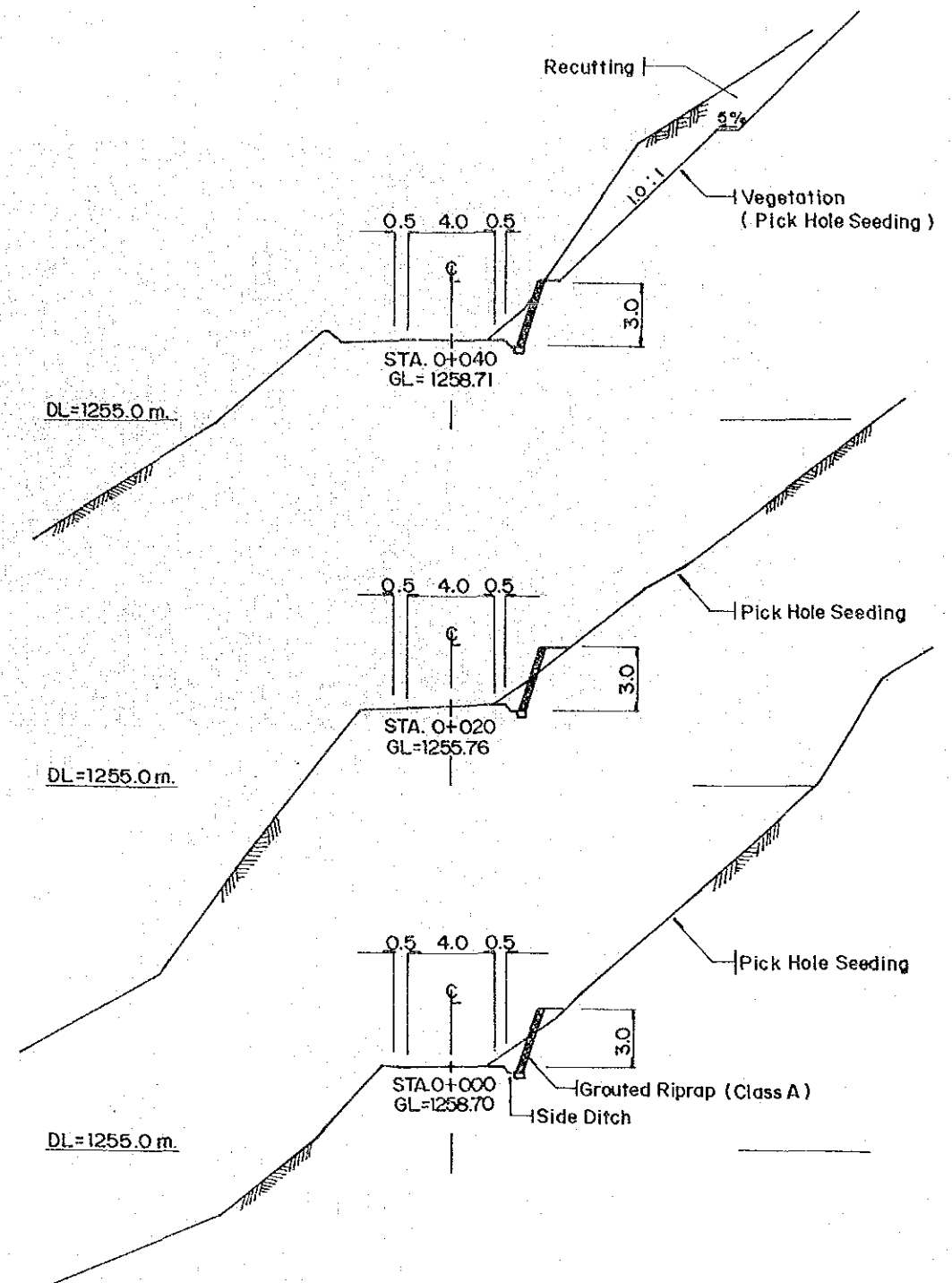
DRAWING NO.
48



P L A N
 SCALE 1:400



DETAIL OF SIDE DITCH
 SCALE: 1:50



CROSS SECTION
 SCALE 1:300

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-1	RECURTING	CU. M.	390
P2-2	SIDE DITCH	L. M.	60
P4-6	PICK HOLE SEEDING	SQ. M.	800
P6-2	GROUTED RIPRAP	CU. M.	61
URGENT RESTORATION			
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU. M.	200

URGENT RESTORATION

- Removal of deposit materials

PROVINCE: BENGUET SPOT No. : Bt-54(1/2)	NAME OF ROAD : KIBUNGAN-KAPANGAN ROAD ROAD CLASSIFICATION: NATIONAL SECONDARY ROAD	TYPE OF DISASTER : EMBANKMENT SLOPE FAILURE	DRAWING NO. 49
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BENGUET SPOT NO. 54 (Bt.54)

1.) General Situation

- Disaster Classification : Embankment Slope Failure
- Road Name : Kibungan - Kapangan Road
- Location : Km 23+400 from Kibungan Proper
- Road Class/Office Concerned : National Secondary Road / District Engineers Office, Benguet Province
- Municipalities/Barangays connected : Tublay - Kapangan - Kibungan
- Road Width/Pavement Width : 4.0 meters / 3.0 meters
- Pavement Type : AC
- Surface Condition : Bad
- Detour : No available



2.) Damage identified

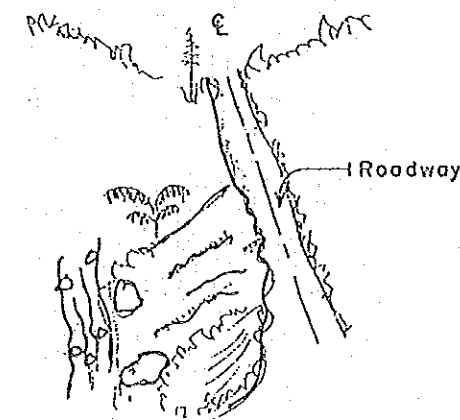
- Type of Disaster : Eroded embankment
- Magnitude of Damage : 16.0 meter in width x 7.0 meters in height
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : Low with one lane passable

Description of Disaster

The embankment washout is 16.0 meters wide and 7.0 meters deep having a slope gradient of 45 degrees. A river stream at the foot of the embankment has some debris deposits. A triangular side ditch on the mountain side of the road is silted.

3.) Causes of Damage

Debris deposits on the river bed narrowed river width at this spot, resulting in raising of water level and high velocity of water which caused erosion of embankment.

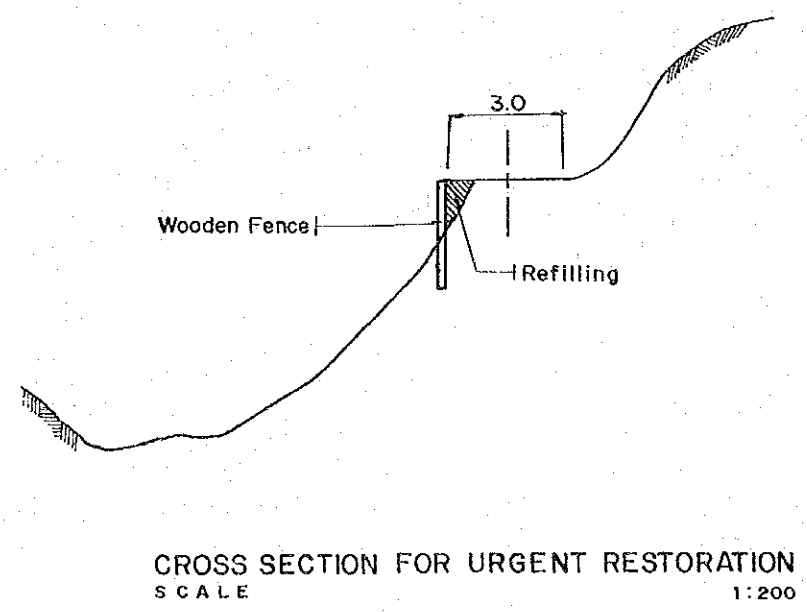
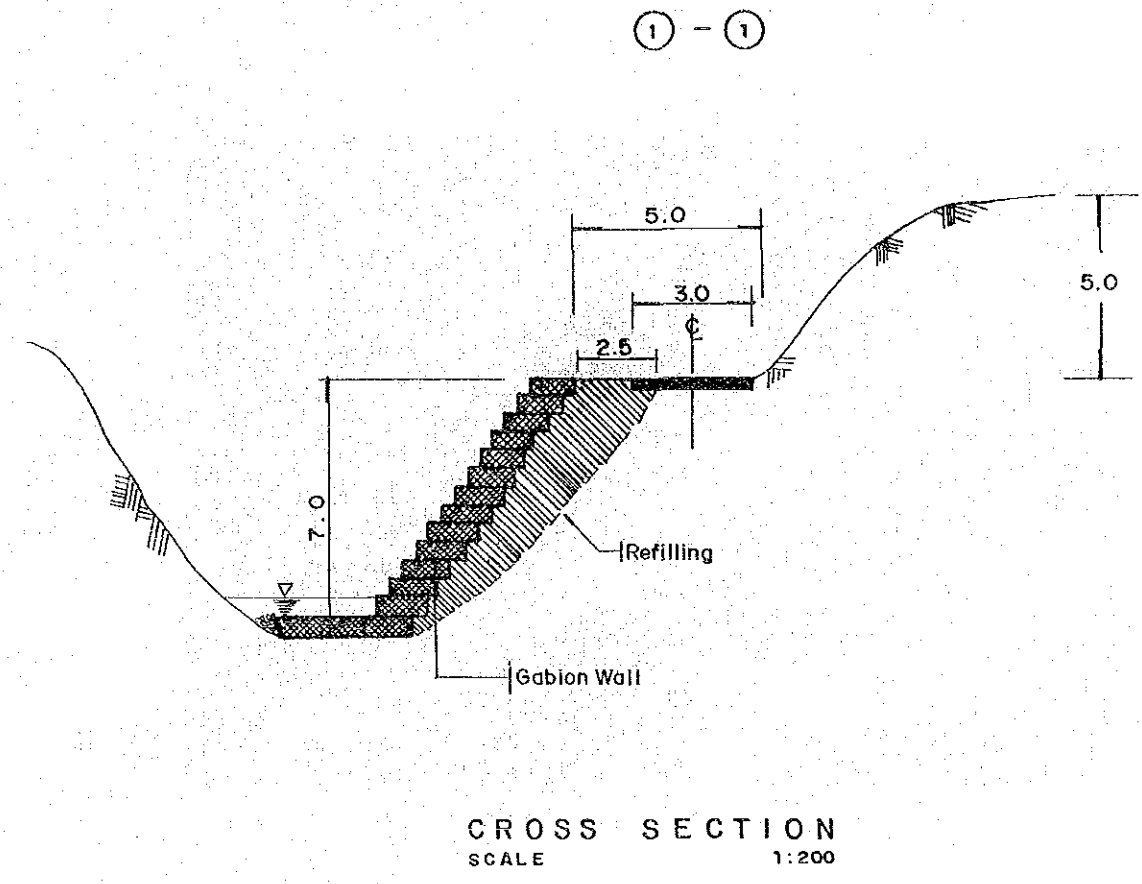
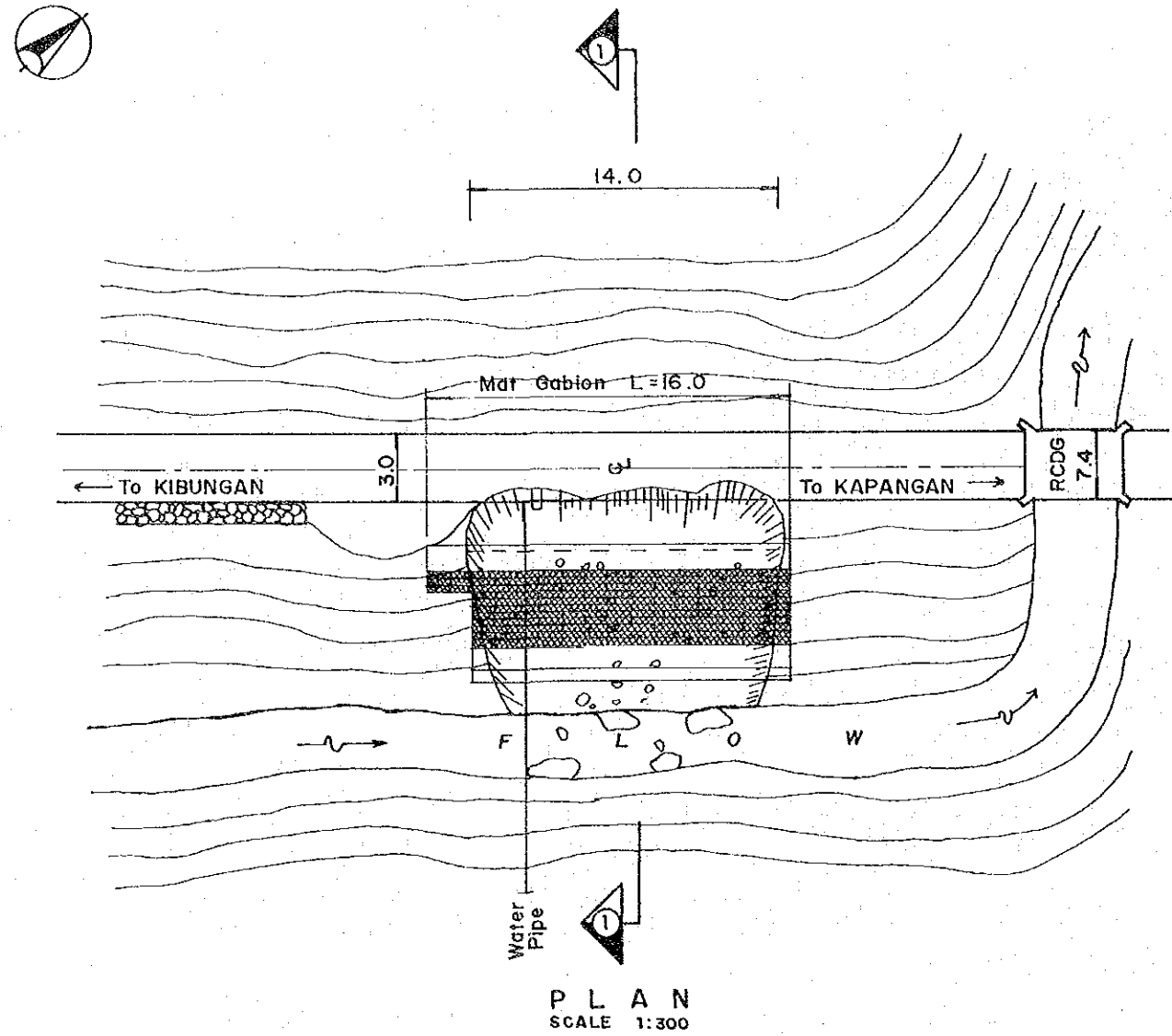


PROVINCE: **BENGUET**
 SPOT No. : **Bf-54 (2/2)**

NAME OF ROAD : **KIBUNGAN-KAPANGAN ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **EMBANKMENT SLOPE FAILURE**

DRAWING NO.
50



SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-3	REFILLING / EMBANKMENT	CU. M.	310
P6-9	GABION WALL	CU. M.	154
URGENT RESTORATION			
U1-4	REFILLING / EMBANKMENT	CU. M.	7
U4-3	WOODEN FENCE	LM.	16

PROVINCE: BENGUET
SPOT No. : Bt-55 (1/2)

NAME OF ROAD : KIBUNGAN-KAPANGAN ROAD
ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : PERMANENT BRIDGE APPROACH WASHOUT

DRAWING NO.

51

BENGUET SPOT NO. 55 (Bt-55)

1.) General Situation

- Disaster Classification : Pbr - Aw
- Road Name : Kibungan-Kapangan Road
- Location : Km. 29+200 from Kibungan Proper
- Road Class/Office Concerned : National Secondary Road/
Benguet Engineering District
- Municipalities/Barangays connected : Kibungan - Kapangan -
Tublay - Acop
- Road Width/Pavement Width : 7.40 meters / 7.40 meters
- Pavement Type : Gravel
- Surface Condition : Bad condition
- Detour : No available

2.) Damage Identified

- Type of Disaster : Bridge Approach Washout
- Magnitude of Damage :
 - Baguio City Side Approach
 - Upstream side : 1.5 m x 4.5 m
 - Downstream side : 2.0 m x 9.5 m
 - Kibungan Side Approach
 - Upstream side : 2.0 m x 1.5 m
- Date Noticed : Sept. 1990
- Degree/Period of Traffic Interruption : Medium/ one lane passable

- Description of Disaster

The bridge has a total length of 12 meter width, 1 span of RCDG. In Baguio City side, two (2) bridge approaches in the upstream and downstream side, and in Kibungan side, only in the upstream side were destroyed due to the strong flow of water coming from upstream of the Lomon River. Flood plain has a width of 10.0 meters. Scoured bridge approaches were restored temporarily to facilitate the continuous flow of traffic.

3.) Causes of Damage

Strong current hit the ripraps with no foundation around the abutments which were scoured and collapsed. The cause of this scoured bridge approach was the strong flow of water from upstream and surface running water coming from upper grade of roadway.

