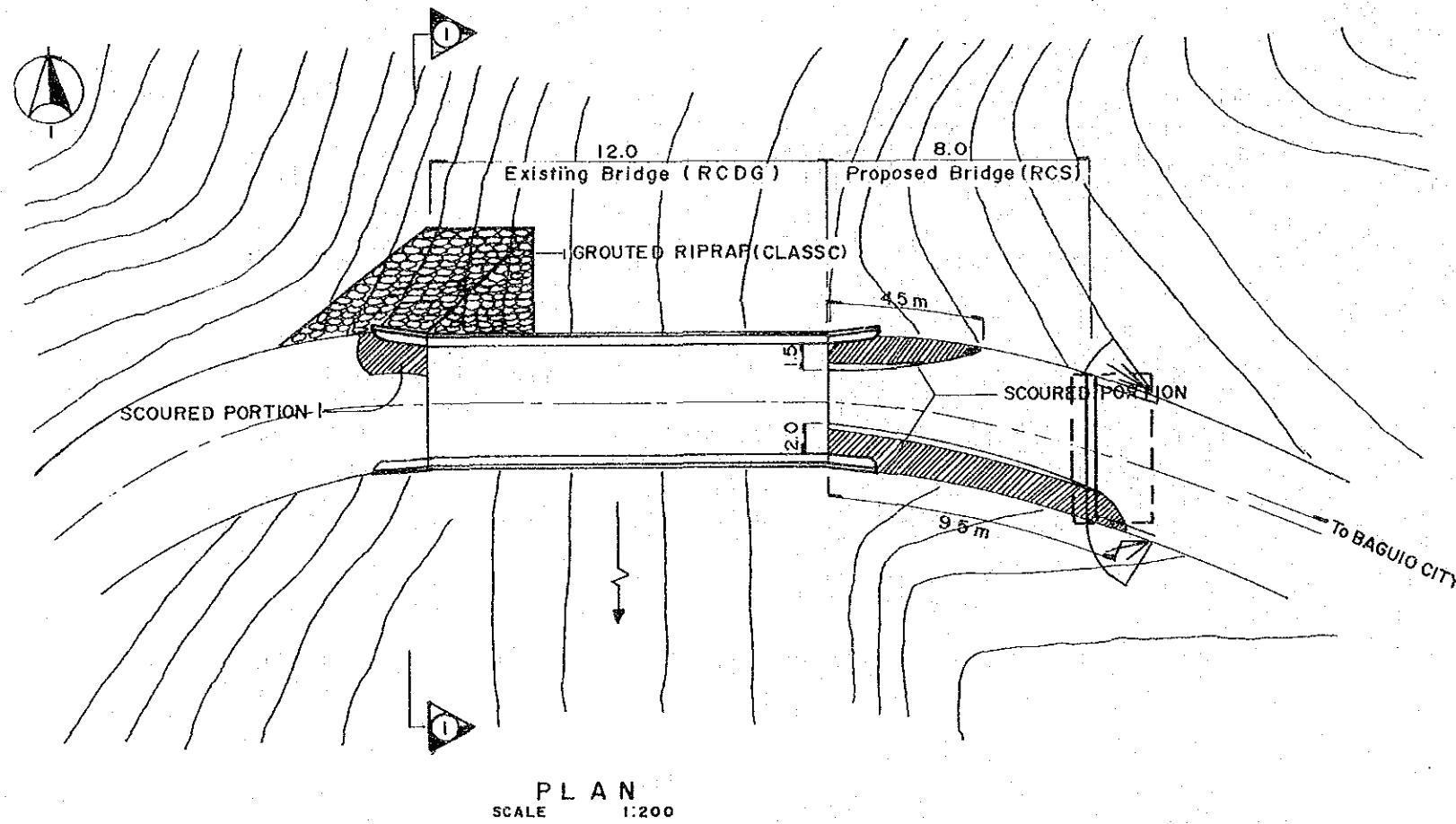
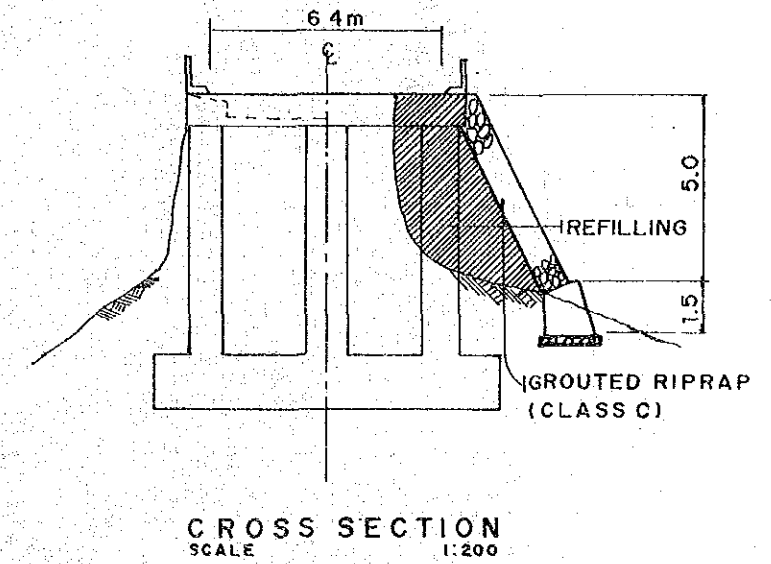
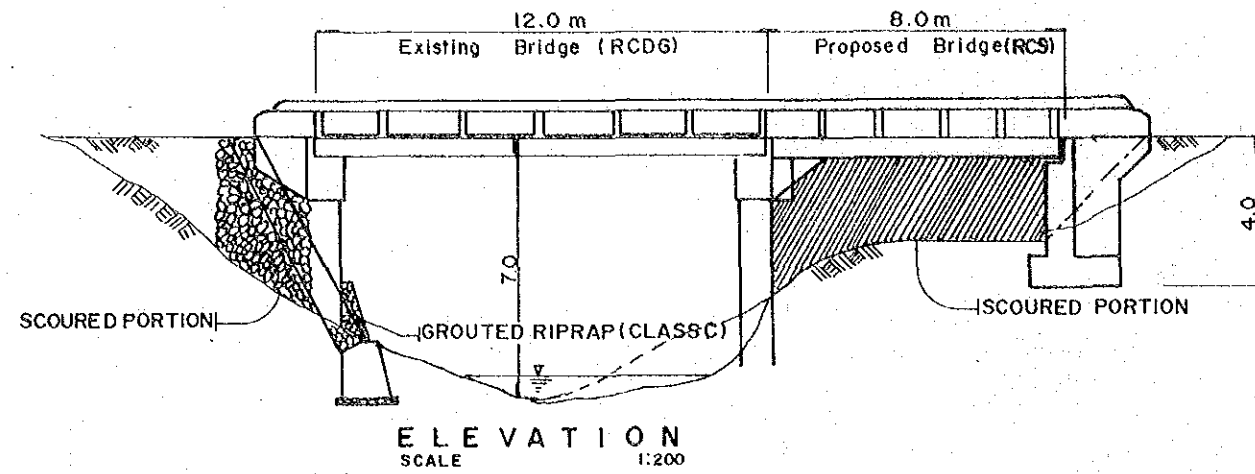


PROVINCE : **BENGUET**
 SPOT No. : **Bt-55 (2/2)**

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

TYPE OF DISASTER : **PERMANENT BRIDGE APPROACH**
WASH OUT

DRAWING NO.
52



URGENT RESTORATION

- Pile up the Sand Bag at the Scoured Portion.

SUMMARY OF QUANTITY

TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION		
P1 - 3 REFILLING / EMBANKMENT	CU. M	30
P6 - 2 GROUDED RIPRAP	CU. M.	35
P15 - 1 CONCRETE BRIDGE	L. M.	8
URGENT RESTORATION		
U4 - 1 SAND BAG WALL	SO. M	120

PROVINCE : BENGUET
SPOT No. : Bt -57 (1/2)

NAME OF ROAD : ATOK PROVINCIAL ROAD
ROAD CLASSIFICATION : PROVINCIAL ROAD

TYPE OF DISASTER : CUT-SLOPE FAILURE

DRAWING NO.

53

BENGUET SPOT NO. 57 (Bt-57)

1.) General Situation

- Disaster Classification : Cut Slope Failure
- Road Name : Atok Provincial Road
- Location : Km 1+400 from Atok Proper
- Road Class/Office Concerned : Provincial Road/Provincial Engineers Office, Benguet Province

- Municipalities/Barangays connected : Sapiangao , Atok

- Road Width/Pavement Width : 3.50 meters / 3.50 meters
- Pavement Type : Earth
- Surface Condition : Bad
- Detour : No available

2.) Damage Identified

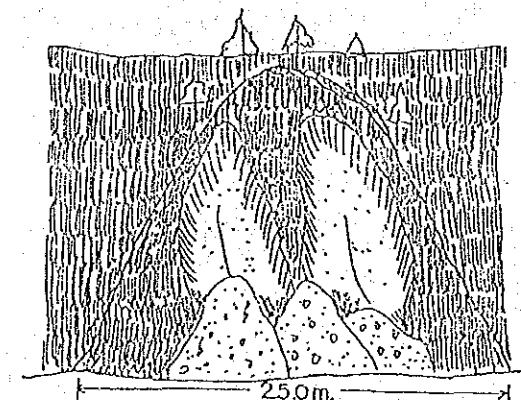
- Type of Disaster : Cut Slope Failure
- Magnitude of Damage : 32.0 meter in length, 10.0 meters in height
- Date Noticed :
- Degree/Period of Traffic Interruption : Low and passable

Description of Disaster :

The length of the slope failure is 23.0 meters and a height of 10.0 meters. The surrounding area is vegetated with grasses and sparsely with some stones. The slope gradient is steep and high enabling the water to flow freely into the road surface. The slope gradient is 50 degrees after the cut slope failure occurs. Existence of gullies on slope surface.

3.) Causes of Damage

Slope was not stable (too high and too steep). Very loose soil strata.

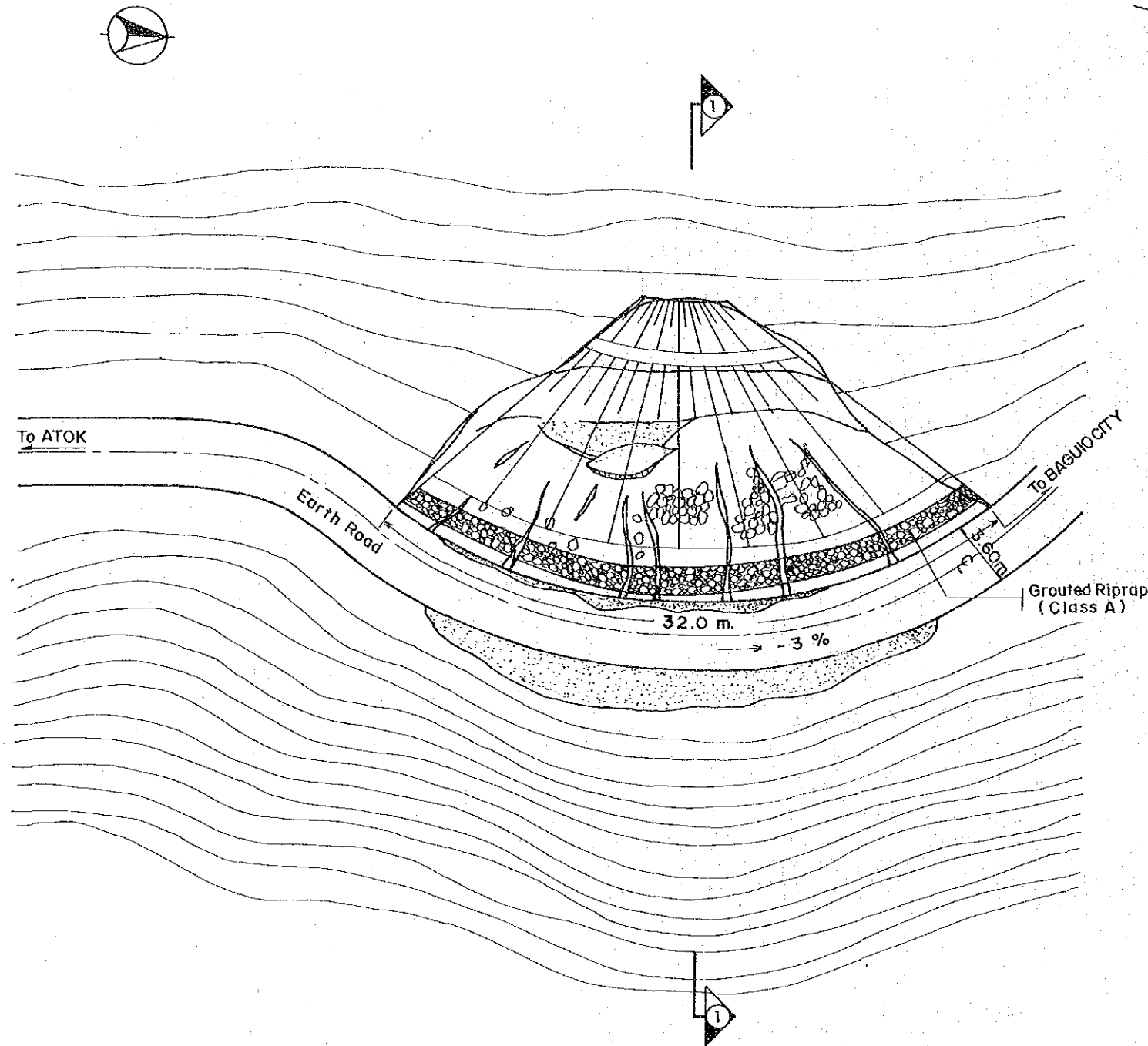


PROVINCE : **BENGUET**
 SPOT No. : **Bt-57(2/2)**

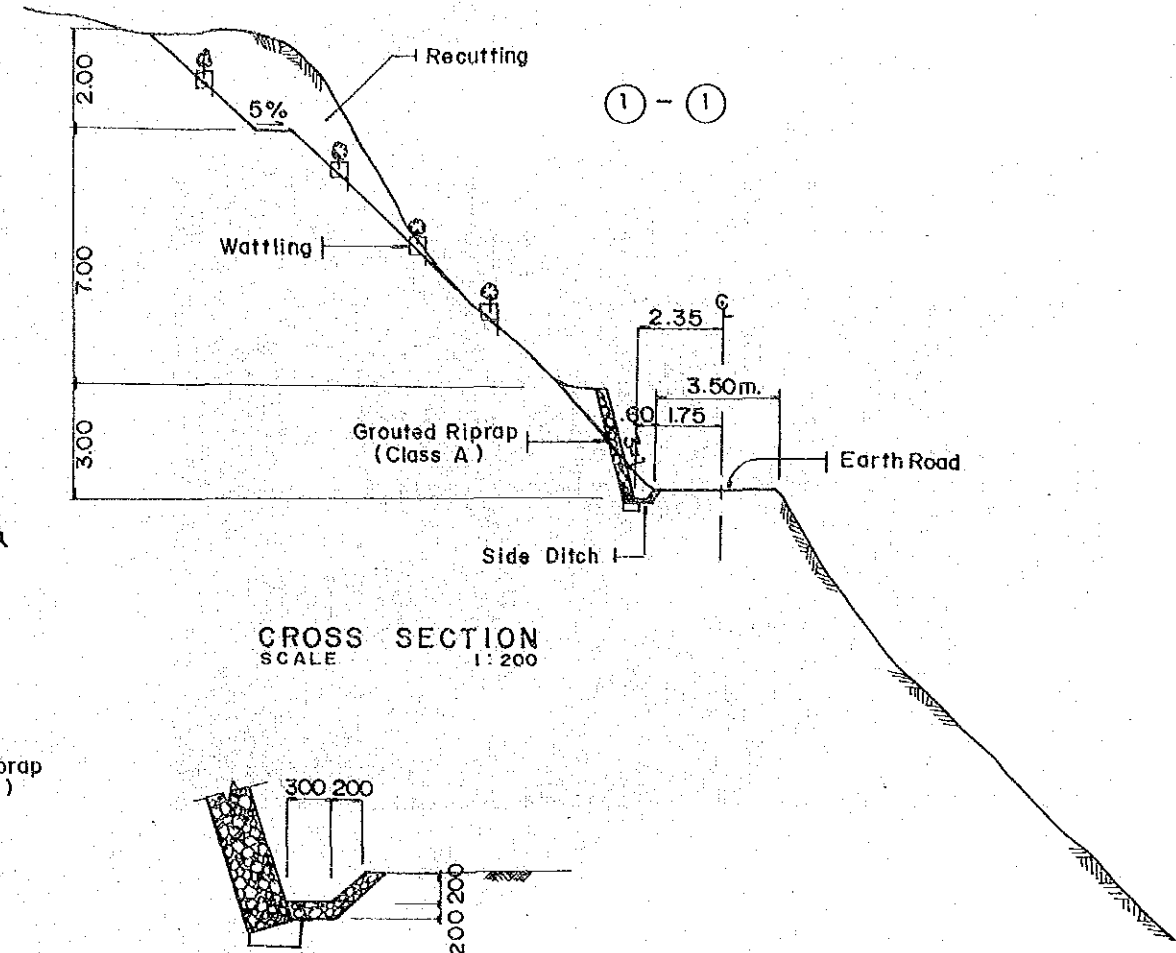
NAME OF ROAD : **ATOK PROVINCIAL ROAD**
 ROAD CLASSIFICATION : **PROVINCIAL ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

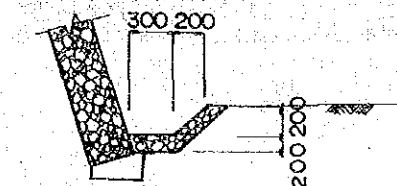
DRAWING NO.
54



P L A N
 SCALE 1:300



CROSS SECTION
 SCALE 1:200



DETAIL OF SIDE DITCH
 SCALE 1:50

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-1	RECUTTING	CU. M.	240
P2-2	SIDE DITCH	L.M.	32
P4-8	WATTLING	L.M.	80
P6-2	GROUTED RIPRAP (CLASS A)	CU.M.	33
URGENT RESTORATION			
UI-1	REMOVAL OF DEPOSIT MATERIALS	CU. M.	193
UI-2	REMOVAL OF UNSTABLE MATERIALS	CU. M.	8

URGENT RESTORATION

- Removal of deposit materials
- Removal of unstable materials

PROVINCE: **BENGUET**
SPOT No. : **Bt-58 (1/2)**

NAME OF ROAD : **ATOK PROVINCIAL ROAD**
ROAD CLASSIFICATION: **PROVINCIAL ROAD**

TYPE OF DISASTER : **EMBANKMENT SLOPE FAILURE**

DRAWING NO.

55

BENGUET SPOT NO. 58 (Bt-58)

1.) General Situation

- Disaster Classification : Embankment Slope Failure
- Road Name : Atok Provincial Road
- Location : Km 3+300 from Atok Proper
- Road Class/Office Concerned : National Secondary Road/
District Engineers Office,
Benguet Province

- Municipalities/Barangays connected : Barangay Sapiangao,
Atok
- Road Width/Pavement Width : 3.0 meters / 3.0 meters
- Pavement Type : Earth
- Surface Condition : Fair
- Detour : No available

Damage Identified

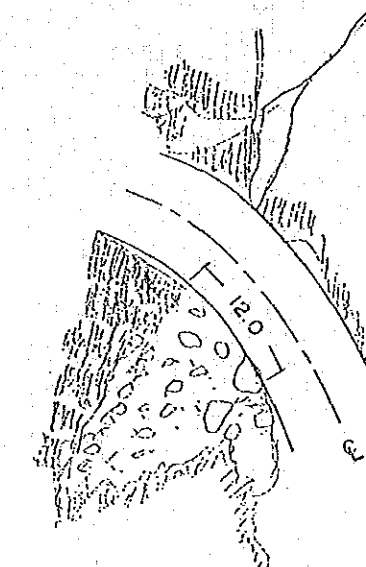
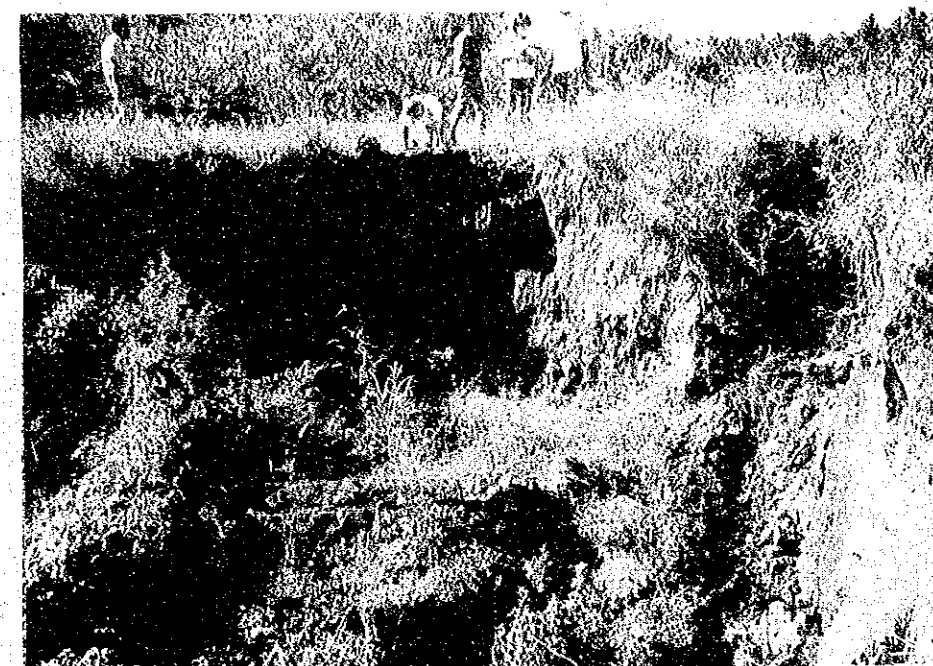
- Type of Disaster : Embankment Slope Failure
- Magnitude of Damage : 18 meters wide & 40 meters deep
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : Low with one lane passable

Description of Disaster

The failure in this spot was caused by the earthquake last July 16, 1990. The road embankment was eroded at about 12 meters wide and 40 meters deep. The roadway becomes narrow because of this failure making it dangerous for commuters in travelling.

3.) Causes of Damage

This failure is caused by earthquake and heavy rainwater. The embankment failure was aggravated by the non-provision of embankment protection and the gradual devegetation of the slope surface.

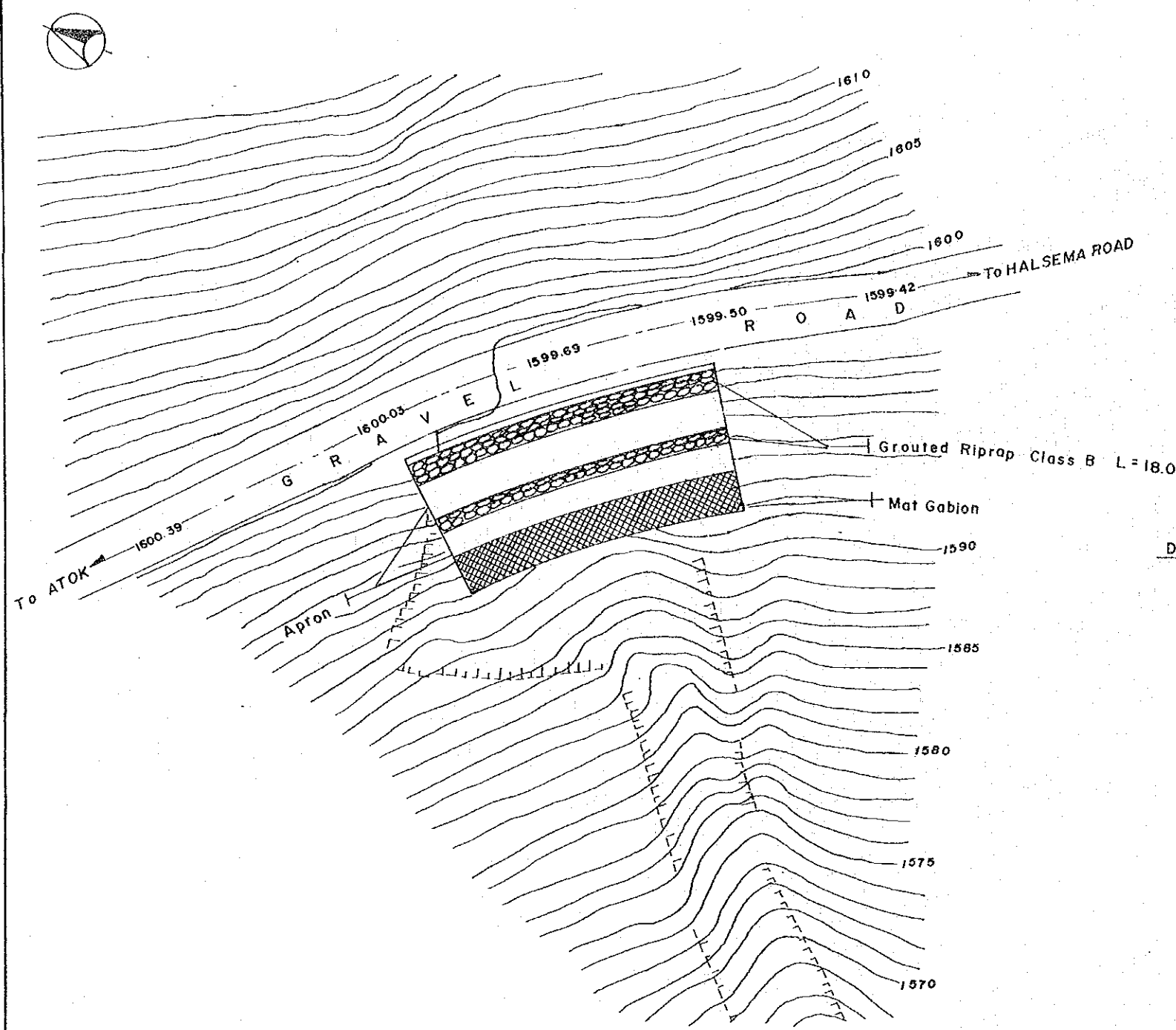


PROVINCE : **BENGUET**
 SPOT No. : **B1-58(2/2)**

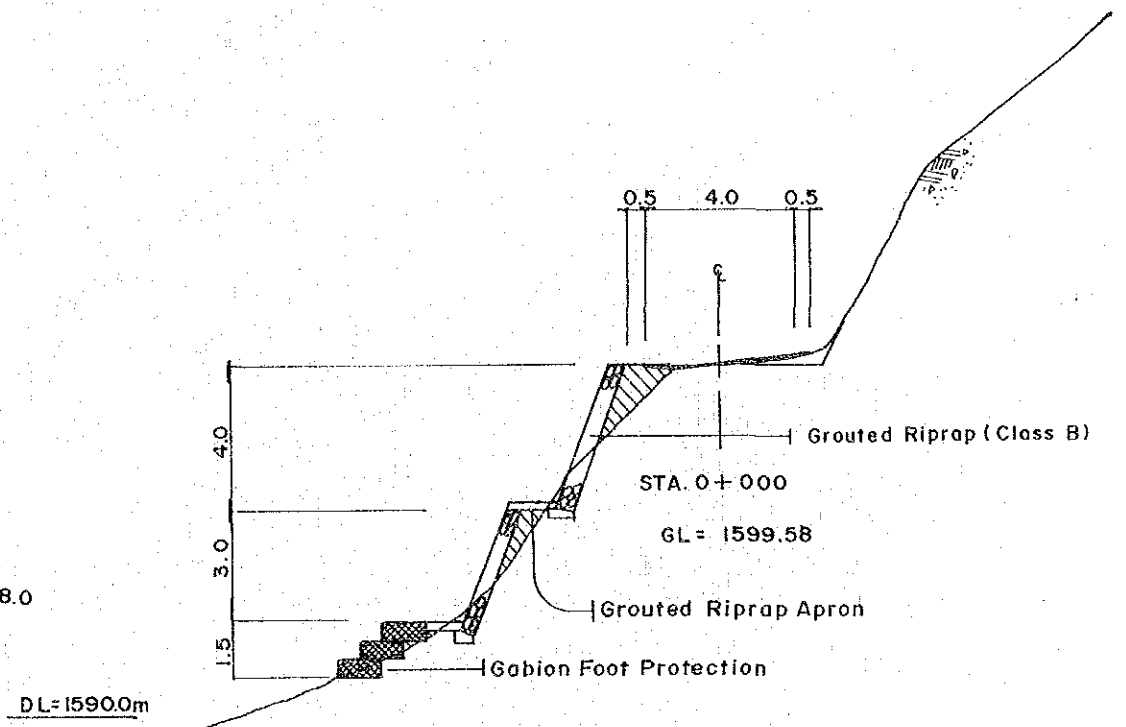
NAME OF ROAD : **ATOK PROVINCIAL ROAD**
 ROAD CLASSIFICATION : **PROVINCIAL ROAD**

TYPE OF DISASTER : **EMBANKMENT SLOPE FAILURE**

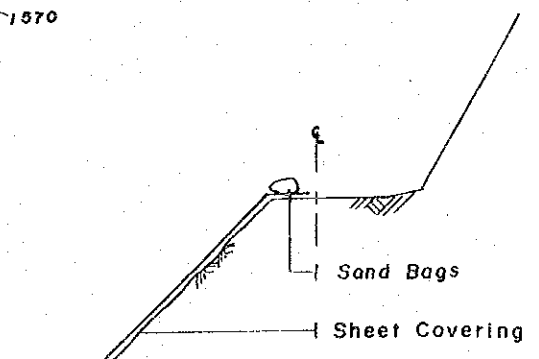
DRAWING NO. **56**



PLAN
 SCALE 1:300



CROSS SECTION
 SCALE 1:200



CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:200

SUMMARY OF QUANTITY

	TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION			
P 6-2	GROUTED RIPRAP	CU.M	69
P16-3	GROUTED RIPRAP APRON	CU.M	9
P16-2	GABION FOOT PROTECTION	CU.M	32
URGENT RESTORATION			
U 3-1	SHEET COVERING	SQ.M	150

PROVINCE: **BENGUET**
SPOT No. : **Bt-59(1/3)**

NAME OF ROAD : **ATOK PROVINCIAL ROAD**
ROAD CLASSIFICATION: **PROVINCIAL ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.
57

BENGUET SPOT NO. 59 (Bt-59)

1.) General Situation

- Disaster Classification : C - F
- Road Name : Atok Provincial Road
- Location : Km 5+350 from Atok Proper
- Road Class/Office Concerned : Provincial Road/Provincial Engineering Office
- Municipalities/Barangays connected : Atok, Sapiangao
- Road Width/Pavement Width : 3.0 meters / 3.0 meters
- Pavement Type : Earth
- Surface Condition : Bad Condition
- Detour : No available

2.) Damage Identified

- Type of Disaster : Cut Slope Failure
- Magnitude of Damage : 350 meters in wide x 100 meters high
- Date Noticed : July 16, 1990
- Degree/Period of Traffic Interruption : High/still passable

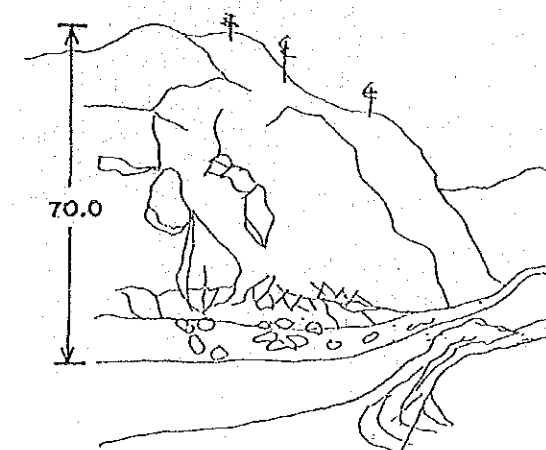
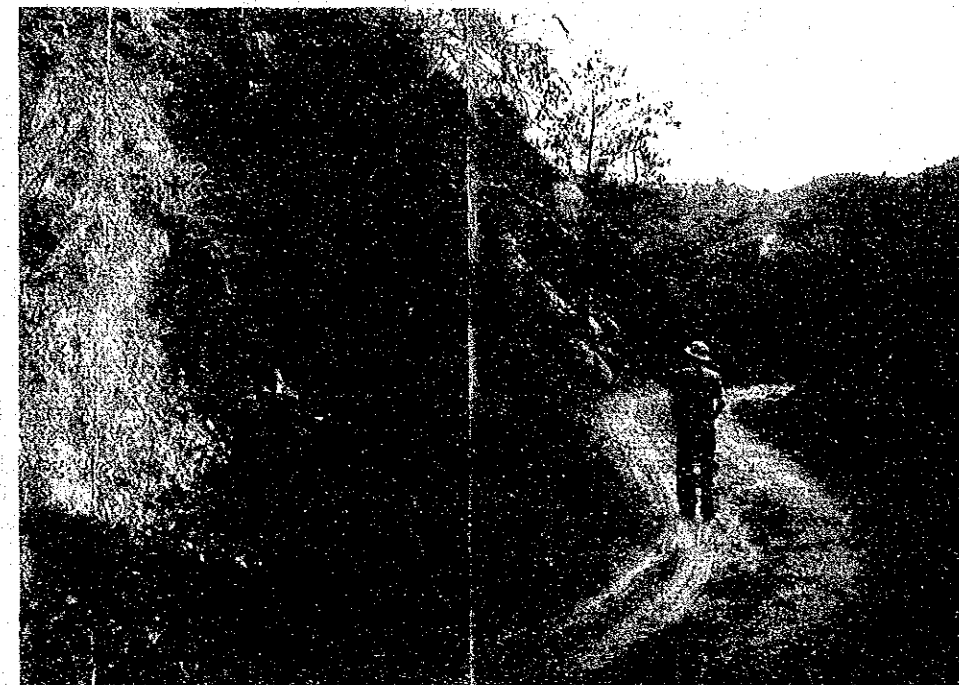
Description of Disaster

The cause of failure was the July 16, 1990 earthquake which registered a magnitude of 7.3 in the richter scale. It was, however, aggravated by heavy downpour that loosen the soil condition of the surface. A big volume of earth slid into the roadway which thereby made the road temporarily impassable.

The length of the slope failure is 350 meters and a height of approximately 100 meters. It is triangular in shape with its base lying on the road surface. The slope failure is easily identifiable because it is a wide clayey brown earth with gullies, surrounded by vegetation of trees and ferns.

3.) Causes of Damage

The cause of cut slope failure is due to loosen subsurface condition. As manifested from the photo, the rock condition is highly weathered. During heavy rain, the slope surface is soaked to saturation which causes the slope surface to soften and sliding. The slide plane of the earth surface being eroded was caused not only by earthquake but also heavy rain downpour.

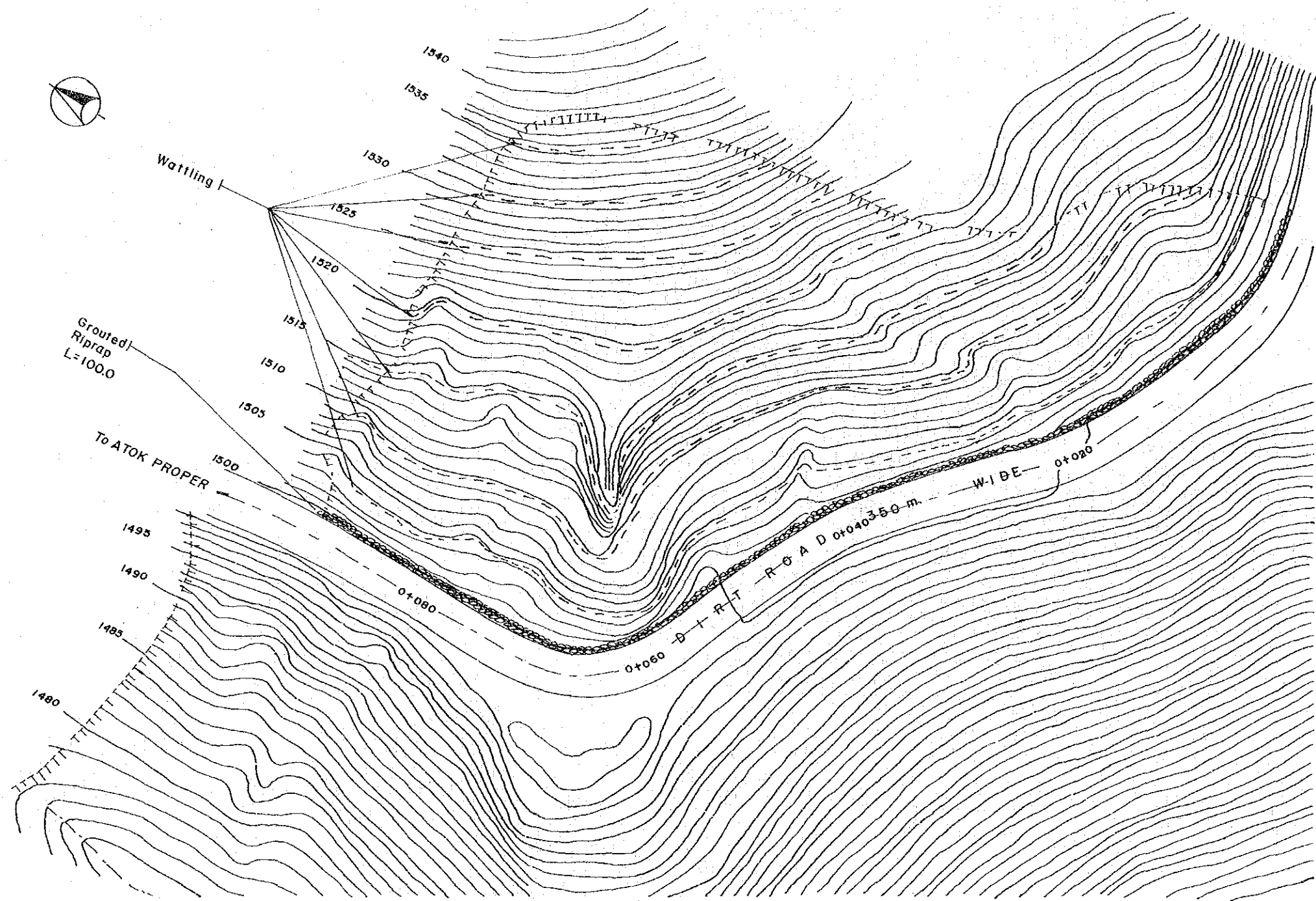


PROVINCE: **BENGUET**
SPOT No. : **B1-59(2/3)**

NAME OF ROAD : **ATOK PROVINCIAL ROAD**
ROAD CLASSIFICATION : **PROVINCIAL ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.
58



PLAN
SCALE 1:400

URGENT RESTORATION
● Removal of Deposit materials

PROVINCE: **BENGUET**
 SPOT No. : **B1-59 (3/3)**

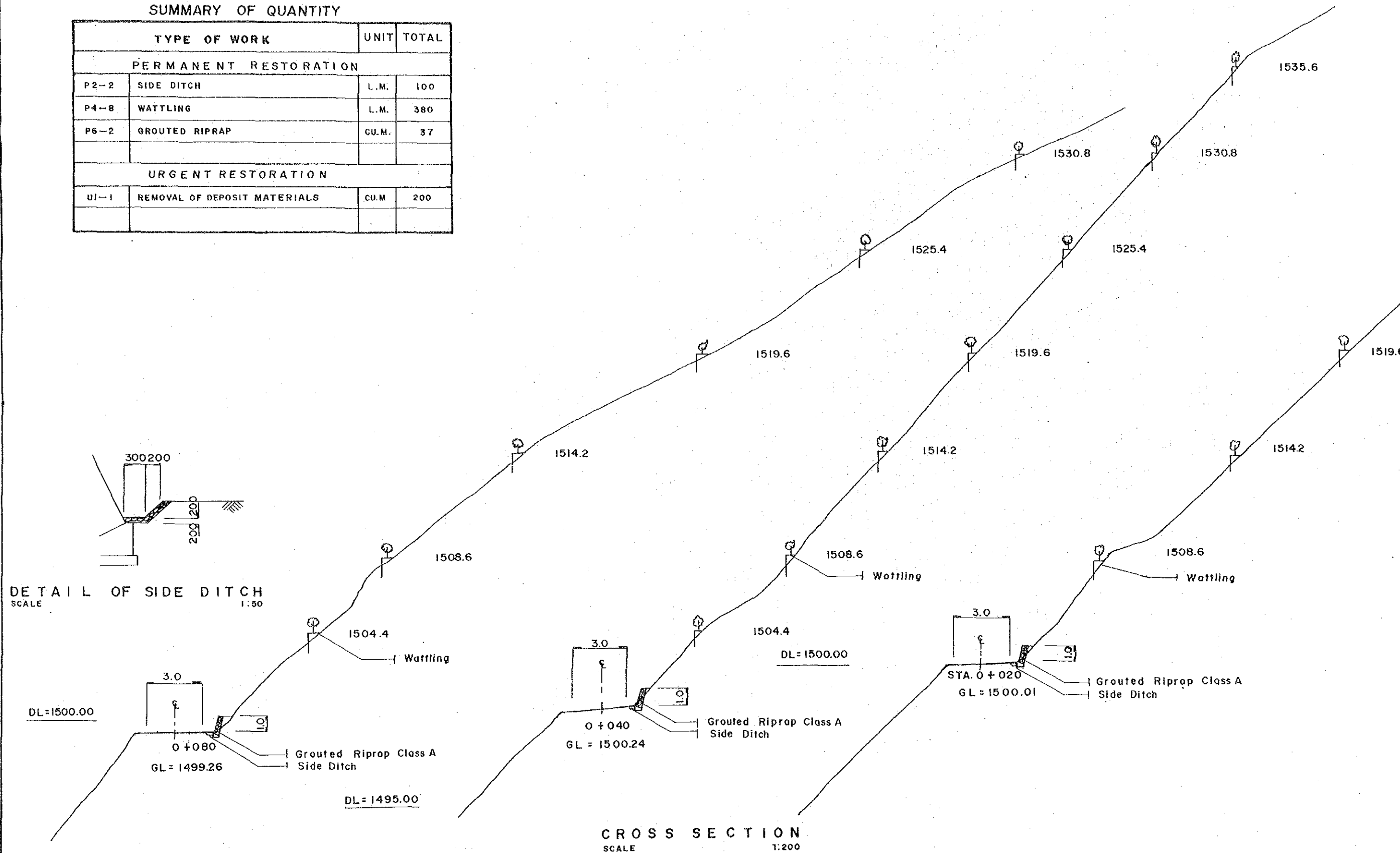
NAME OF ROAD : **ATOK PROVINCIAL ROAD**
 ROAD CLASSIFICATION : **PROVINCIAL ROAD**

TYPE OF DISASTER : **CUT SLOPE FAILURE**

DRAWING NO.
59

SUMMARY OF QUANTITY

TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION		
P2-2 SIDE DITCH	L.M.	100
P4-8 WATTLING	L.M.	380
P6-2 GROUTED RIPRAP	CU.M.	37
URGENT RESTORATION		
U1-1 REMOVAL OF DEPOSIT MATERIALS	CU.M.	200



DETAIL OF SIDE DITCH
 SCALE 1:50

CROSS SECTION
 SCALE 1:200

PROVINCE: BENGUET
SPOT No. : Bt-62 (1/2)

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

TYPE OF DISASTER : DEBRIS FLOW

DRAWING NO.
60

BENGUET SPOT NO. 62 (Bt-62)

1.) General Situation

- Disaster Classification : Debris Flow
- Road Name : Benguet-Ilogon Road
- Location : Km 4+400 from Ilogon Proper
- Road Class/Office Concerned : Secondary National Road/
District Engineers Office,
Benguet Province
- Municipalities/Barangays connected : City / Provincial
Boundary-Anlamok Mines
-Ilogon
- Road Width/Pavement Width : 5.0 meters / 5.0 meters
- Pavement Type : Gravel
- Surface Condition : Bad
- Detour : No available

2.) Damage Identified

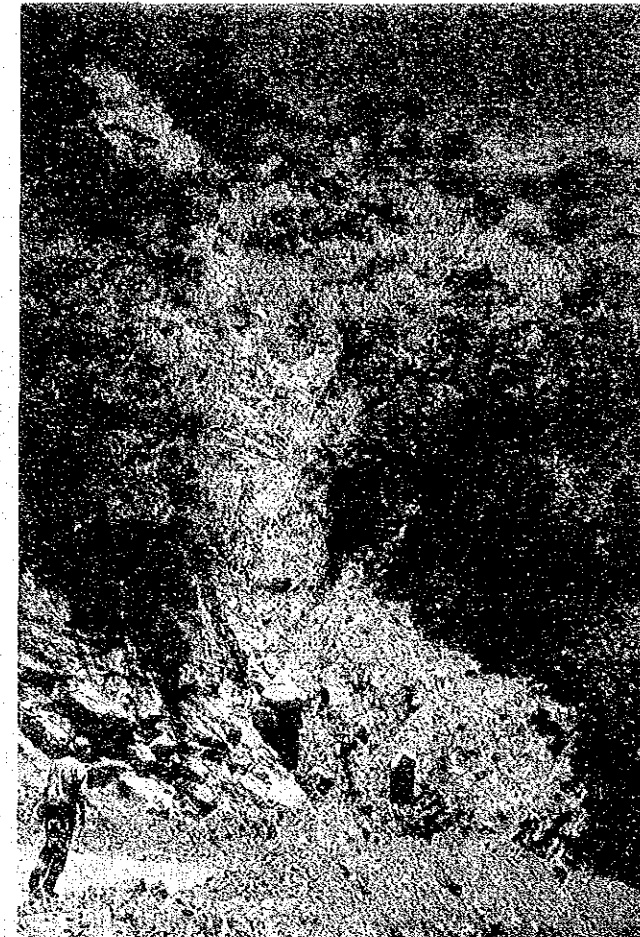
- Type of Disaster : Rockfall
- Magnitude of Damage : 32.0 meter long x 30.0 meter high
- Date Noticed :
- Degree/Period of Traffic Interruption : Low with two lane
passable

Description of Disaster

This disaster spot is located at the valley like shape topography curved out from the mountain side. The surface is like inverted V with its vertex tapering to the top with some vegetations on slope surface. It has a base of 10.0 meters wide and 30.0 meters in high. The average rock size is 1.0 meters with a minimum of 0.20 meter and a maximum of 1.5 meters.

3.) Causes of Damage

The cause of fall was the earthquake (July 16,1990) that hit the Benguet Province fractured causing rock joints dislocating a portion from the bedrock. The seepage of water from the bedrock softens cracks and joints and causing it to fall.

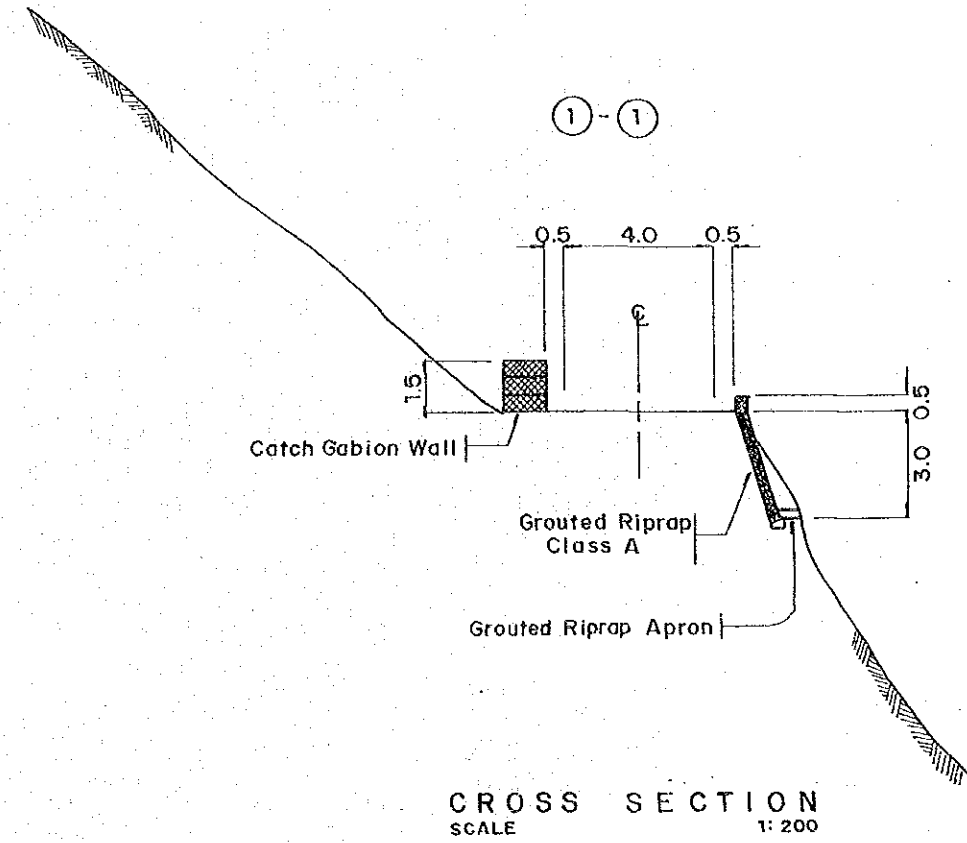
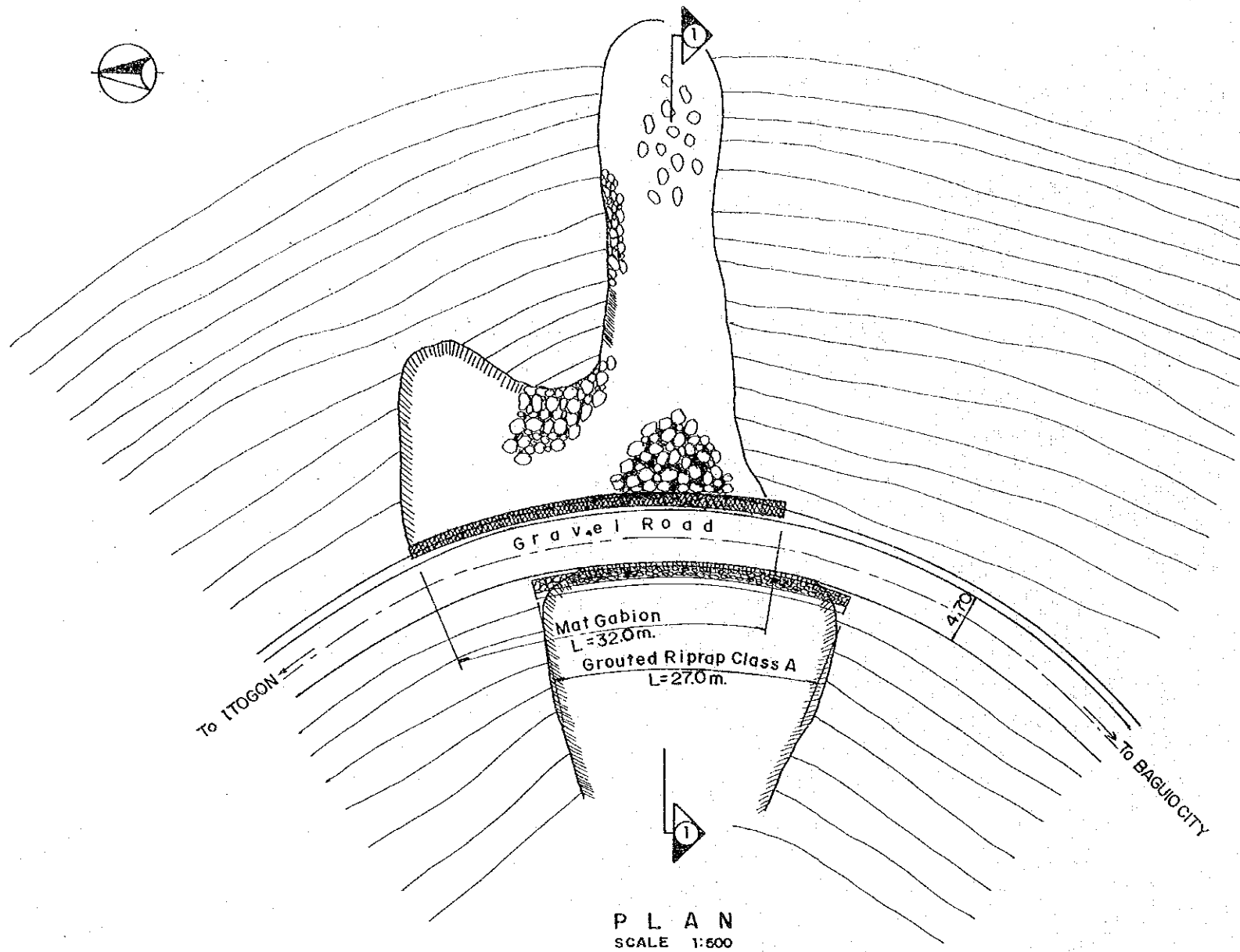


PROVINCE : BENGUET
 SPOT No. : B1-62 (2/2)

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

TYPE OF DISASTER : DEBRIS FLOW

DRAWING NO.
 61



SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P6-2	GROUTED RIPRAP	CU. M.	27
P8-2	CATCH GABION WALL	CU. M.	58
P16-3	GROUTED RIPRAP APRON	CU. M.	3
URGENT RESTORATION			
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU. M.	170
U1-2	REMOVAL OF UNSTABLE MATERIALS	CU. M.	15

URGENT RESTORATION

- Removal of deposit materials
- Removal of unstable materials

PROVINCE : BENGUET
SPOT No. : Bt-63(1/2)

NAME OF ROAD : ABATAN-MANKAYAN-CERVANTES ROAD
ROAD CLASSIFICATION : NATIONAL SECONDARY ROAD

TYPE OF DISASTER : PERMANENT BRIDGE APPROACH WASHOUT

DRAWING NO.
62

BENGUET SPOT NO. 63 (Bt-63)

1.) General Situation

- Disaster Classification : Permanent Bridge Damage Approach Washout (PBr-Aw)
- Road Name : Abatan- Mankayan- Cervantes Road
- Location : Km 0+350 from boundary of Benguet/Ilocos Sur Province
- Road Class/Office Concerned : Secondary National Road/ Benguet Engineering District
- Municipalities/Barangays connected : Abatan, Buguias - Mankayan, Cervantes, Ilocos Sur
- Road Width/Pavement Width : 4.10 meter
- Pavement Type : Gravel
- Surface Condition : Fair
- Detour : No available

2.) Damage Identified

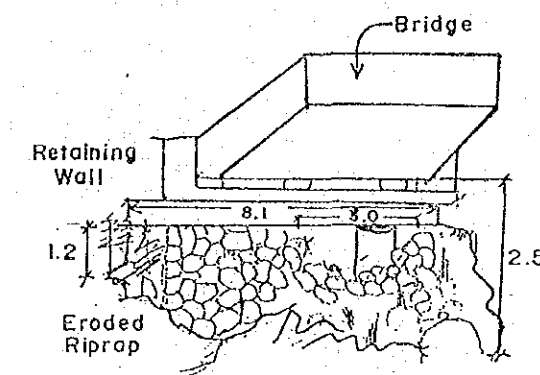
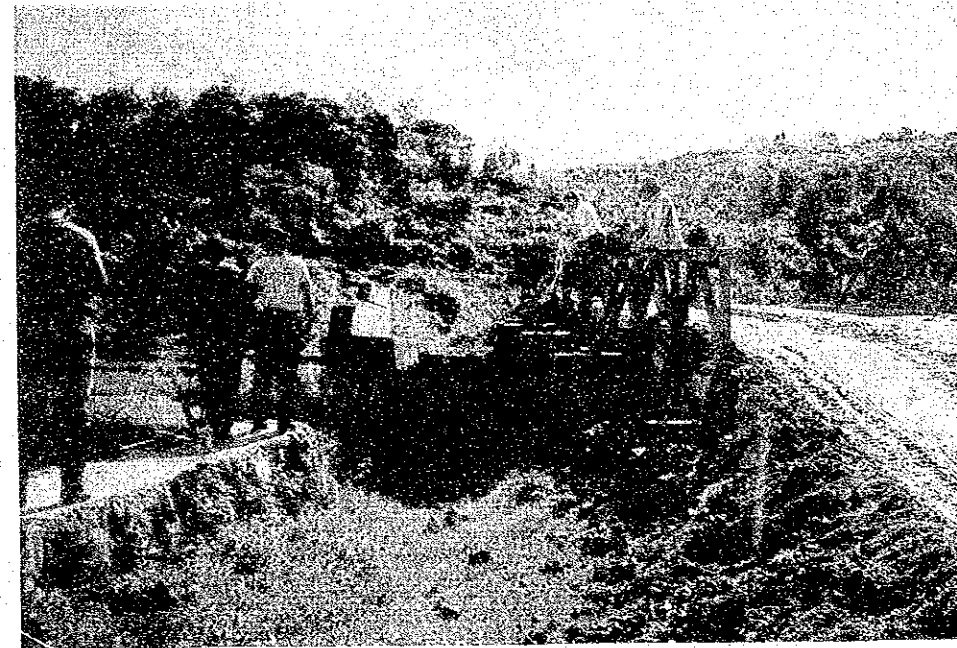
- Type of Disaster : Bridge approach washout
- Magnitude of Damage : 9.0 meters in length x 4.0 meters in width x 6.0 meters in height
- Date Noticed :
- Degree/Period of Traffic Interruption : High/ one week

Description of Disaster :

The permanent concrete bridge has length of 23.0 meters and a two (2) lane structure. The flood plain of the river stream has width of 35.0 meters. The bridge approach failure was caused by typhoon which struck the northern part of Luzon Island in 1990. The scoured approach was remedied by adding a temporary 9.0 meter long Bailey Bridge to allow continues flow of traffic.

3.) Causes of Damage

Bridge length was too short. Meandering of river channel and debris coming from the mining site directly hit and washed out the approach.

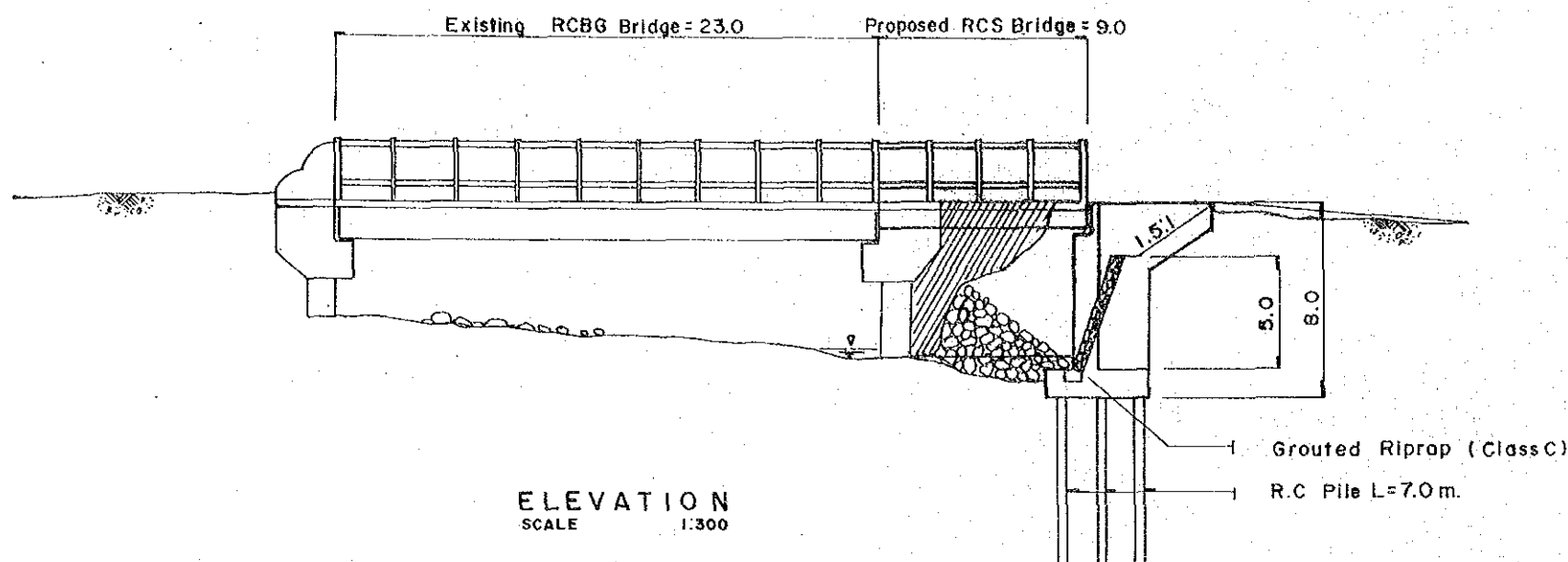


PROVINCE: **BENGUET**
 SPOT No. : **B1-63(2/2)**

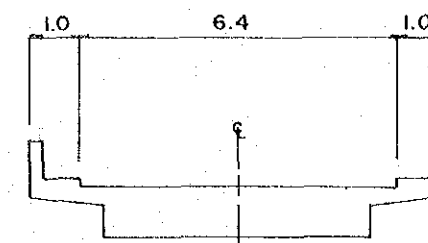
NAME OF ROAD : **ABATAN-MANKAYAN-CERVANTES ROAD**
 ROAD CLASSIFICATION: **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER: **PERMANENT BRIDGE APPROACH WASH OUT**

DRAWING NO. **63**



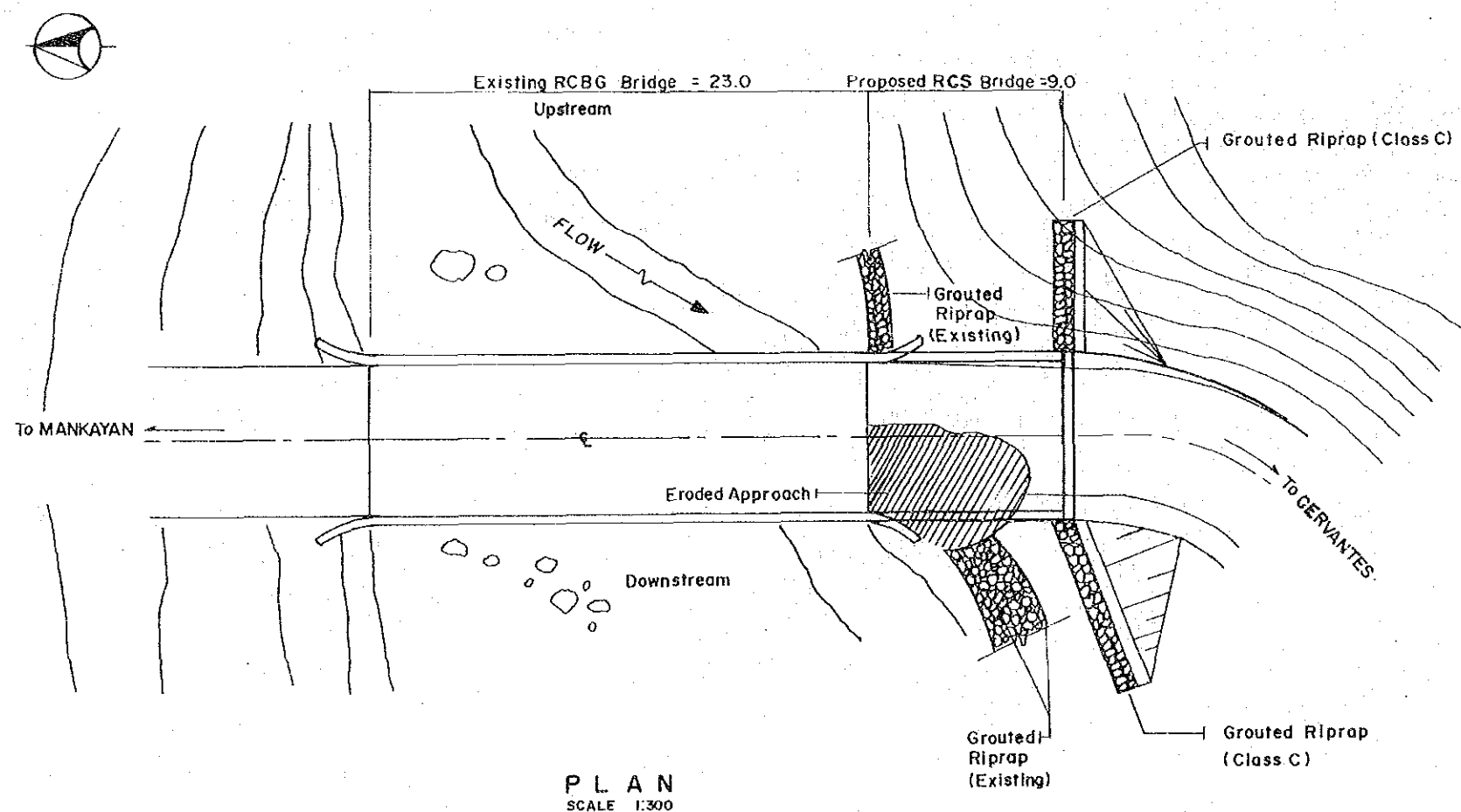
ELEVATION
 SCALE 1:300



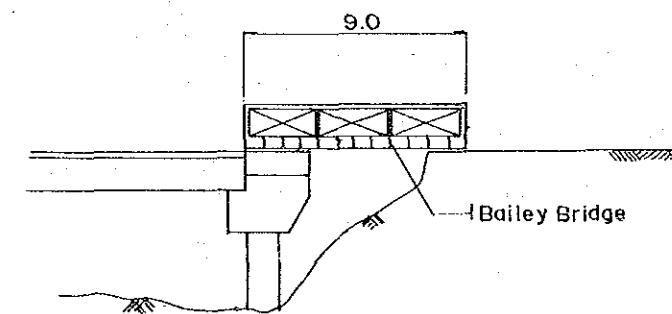
CROSS SECTION
 (Typical)
 SCALE 1:150

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P 6-2	GRouted RIPRAP	CU. M	49
P15-1	CONCRETE BRIDGE	LM.	9
URGENT RESTORATION			
U6-3	BAILEY BRIDGE	LM.	9



PLAN
 SCALE 1:300



ELEVATION FOR URGENT RESTORATION
 SCALE 1:300

PROVINCE: **BENGUET**
SPOT No. : **Bt-68(1/2)**

NAME OF ROAD : **ABATAN-MANKAYAN-CERVANTES ROAD**
ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CULVERT DAMAGE**

DRAWING NO.

64

BENGUET SPOT NO. 68 (Bt-68)

1.) General Situation

- Disaster Classification : Culvert and its related damages
- Road Name : Abatan - Mankayan - Cervantes Road
- Location : Km 10+350 from boundary of Benguet-Ilocos Sur Province
- Road Class/Office Concerned : Secondary National Road/
Benguet Engineering District
- Municipalities/Barangays Connected :
Abatan, Buguias - Mankayan - Cervantes, Ilocos Sur
- Road Width/Pavement Width : 5.0 meters / 4.10 meters
- Pavement Type : Gravel
- Surface Condition : Fair
- Detour : No available

2.) Damage Identified

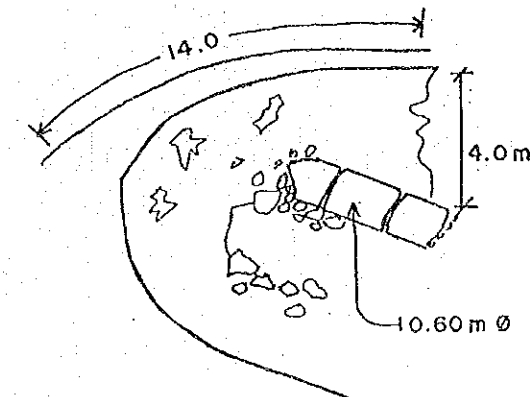
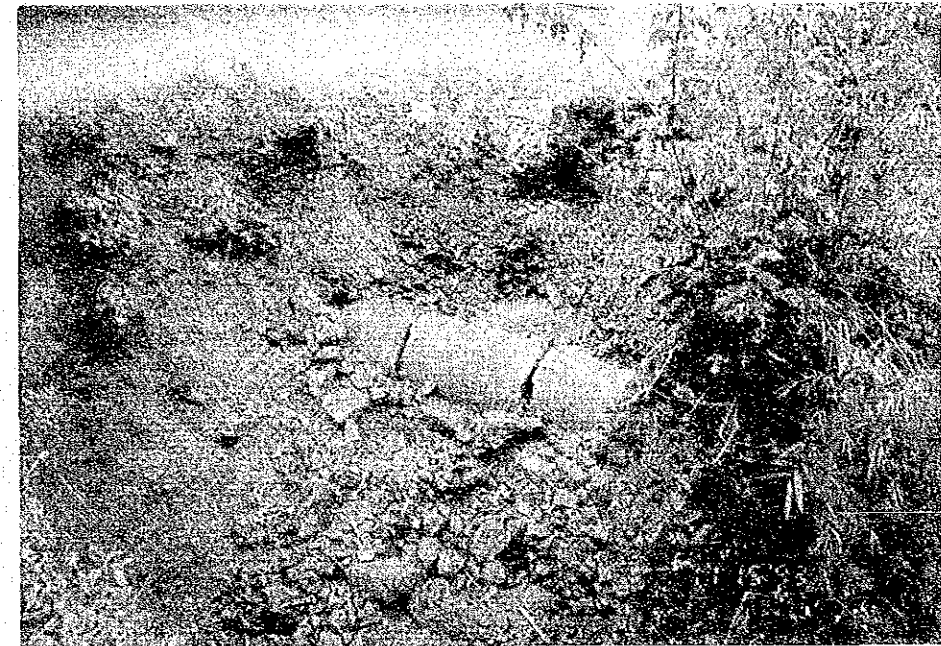
- Type of Disaster : Washout Reinforced Concrete Pipe (RCP),
damaged embankment, eroded road surface.
- Magnitude of Damage : Embankment 12.0 meters in length x
4.0 meters in width x 3.6 meters in
height, RCP washout
- Date Noticed : Aug. 1990
- Degree/Period of Traffic Interruption : Low and still
passable

Description of Disaster :

The spot is located at sharp curve . The reinforced concrete pipe culvert (diameter 0.6 meter) mounted on the embankment side slope of the road was silted & clogged. The grouted riprap that protects the roadway from scouring was destroyed due to the concentration of surface running water coming from upstream.

3.) Causes of Damage

During heavy rains water coming from upstream as well as running on the road surface concentrates at this point and overflow the road surface. The absence of drainage facilities such as side ditches and cross drainage at upper grade of roadway causes the surface water to flow on the roadway. The water on the Mankayan side scoured the inlet of the RCPC. No headwall and collaring was provided on RCPC.

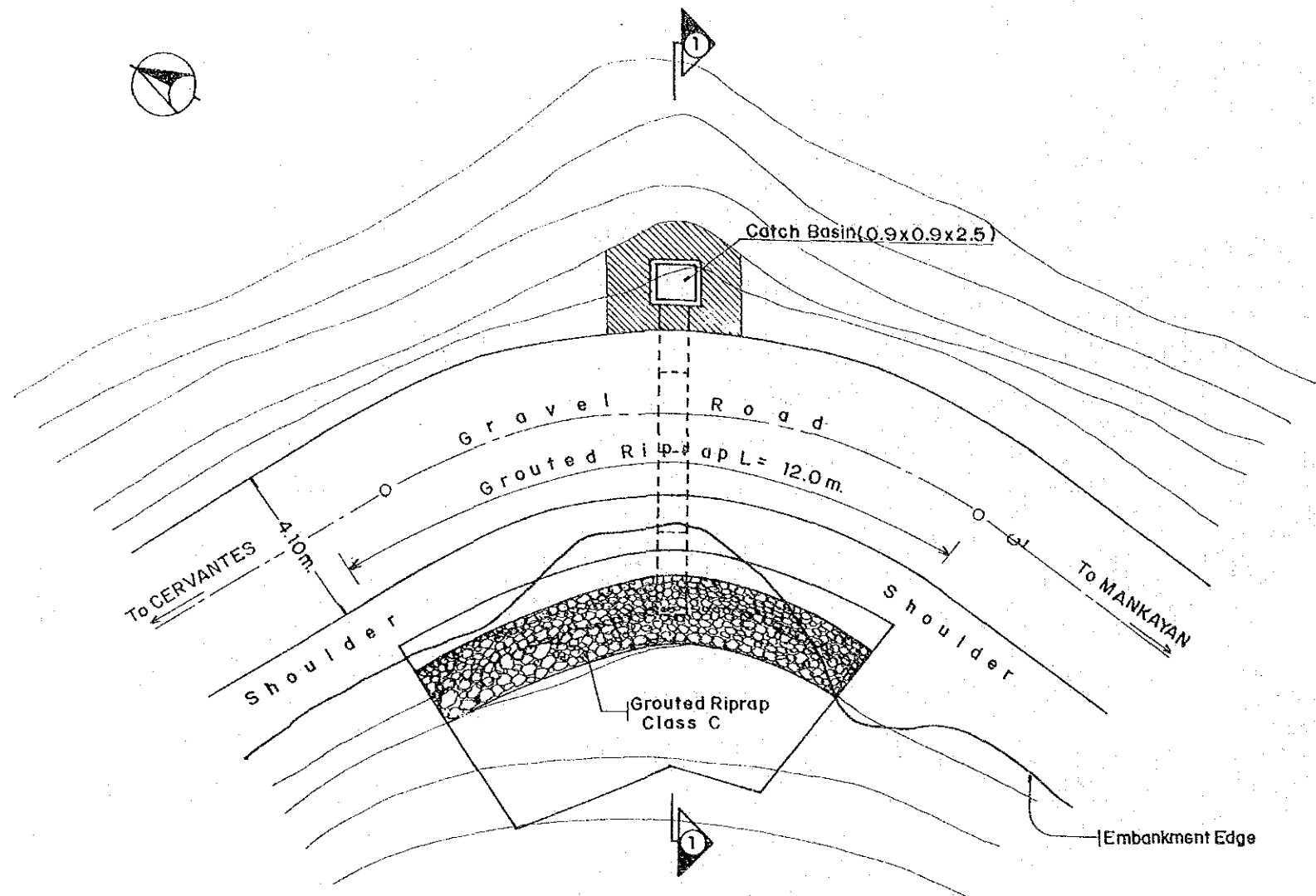


PROVINCE : **BENGUET**
 SPOT No. : **B1-68(2/2)**

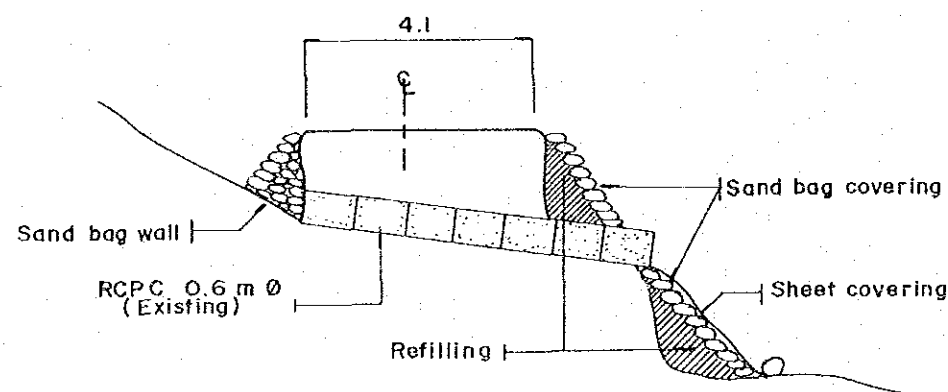
NAME OF ROAD : **ABATAN-MANKAYAN-CERVANTES ROAD**
 ROAD CLASSIFICATION : **NATIONAL SECONDARY ROAD**

TYPE OF DISASTER : **CULVERT DAMAGE**

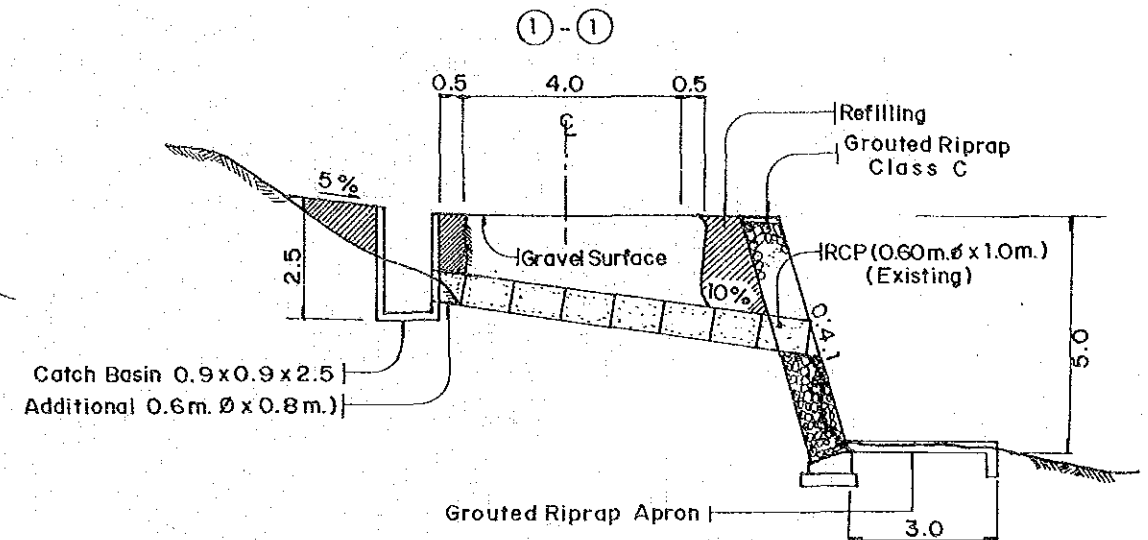
DRAWING NO.
65



P L A N
 SCALE 1:150



CROSS SECTION FOR URGENT RESTORATION
 SCALE 1:150



CROSS SECTION
 SCALE 1:150

SUMMARY OF QUANTITY

	TYPE OF WORK	UNIT	TOTAL
PERMANENT RESTORATION			
P2-4	RC PIPE CULVERT	L.M.	1
P2-5	CATCH BASIN	E.A.	1
P6-2	GROUTED RIPRAP	CU.M.	40
P16-3	GROUTED RIPRAP APRON	CU.M.	6
URGENT RESTORATION			
U1-4	REFILLING / EMBANKMENT	CU.M.	85
U3-1	SHEET COVERING	SQ.M.	36
U3-2	SAND BAG COVERING	SQ.M.	66
U4-1	SAND BAG WALL	SQ.M.	9

PROVINCE: **BENGUET**
SPOT No. : **Bt-70(1/2)**

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

TYPE OF DISASTER : **DEBRIS FLOW**

DRAWING NO.

66

BENGUET SPOT NO. 70 (Bt-70)

1.) General Situation

- Disaster Classification : Debris Flow
- Road Name : Acop - Kapangan Road
- Location : 16 + 200 from Kapangan
- Road Class/Office Concerned : National Secondary Road/
District's Engineers Office

- Municipalities/Barangays
connected : Tublay - Kapangan Towns
- Road/Pavement Width : 4.30 m.
- Pavement Type : Gravel
- Surface Condition : Bad
- Detour : No available

2.) Damage Identified

- Type of Disaster : Debris Flow
- Magnitude of Damage : 25 m. in length x 5 m. wide
- Date Noticed : every time after heavy rain
- Degree/Period of Traffic
Interruption : 3 days - 1 week not passable

Description of Disasters:

The debris flow on the ravine was brought down the flow of rain water at the far distance from upstream. After heavy rains debris flow already deposited on the bed of ravine.

3.) Causes of Damage

This failure is caused by concentration of surface water from upstream. Rock and boulders deposited along the ravine flow down with rain water. Sabo work should have been provided on this spot.

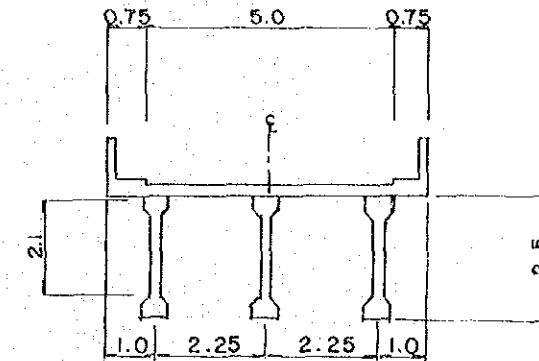
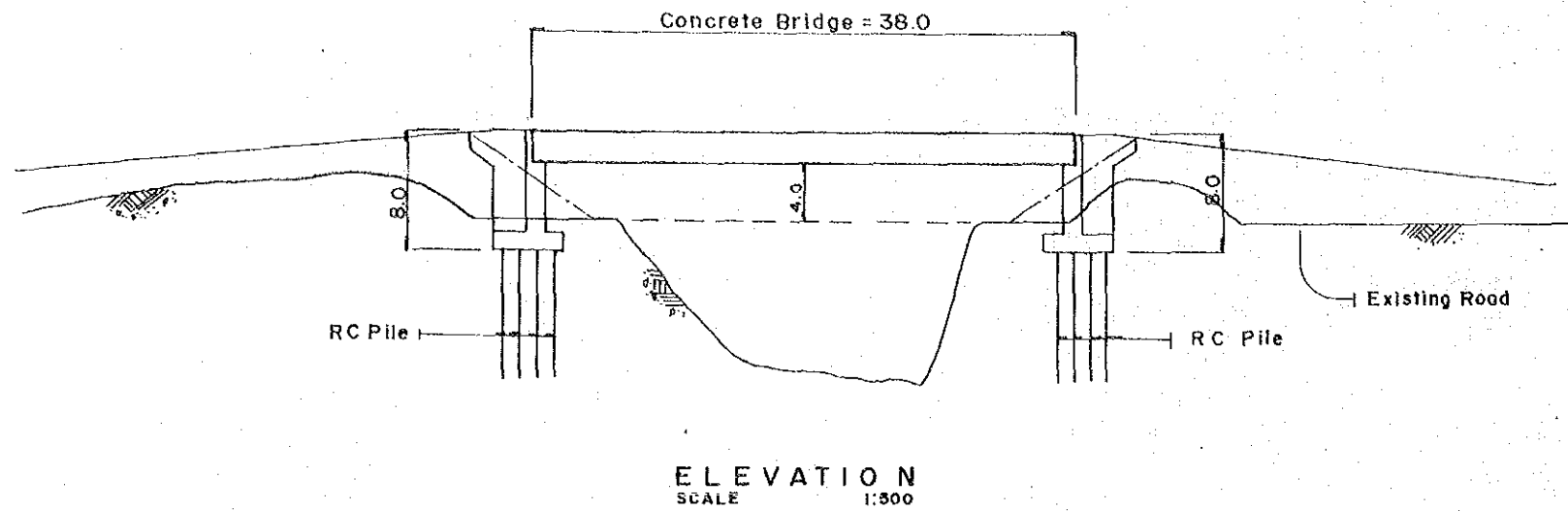


PROVINCE : BENGUET
 SPOT No. : Bt-70(2/2)

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

TYPE OF DISASTER : DEBRIS FLOW

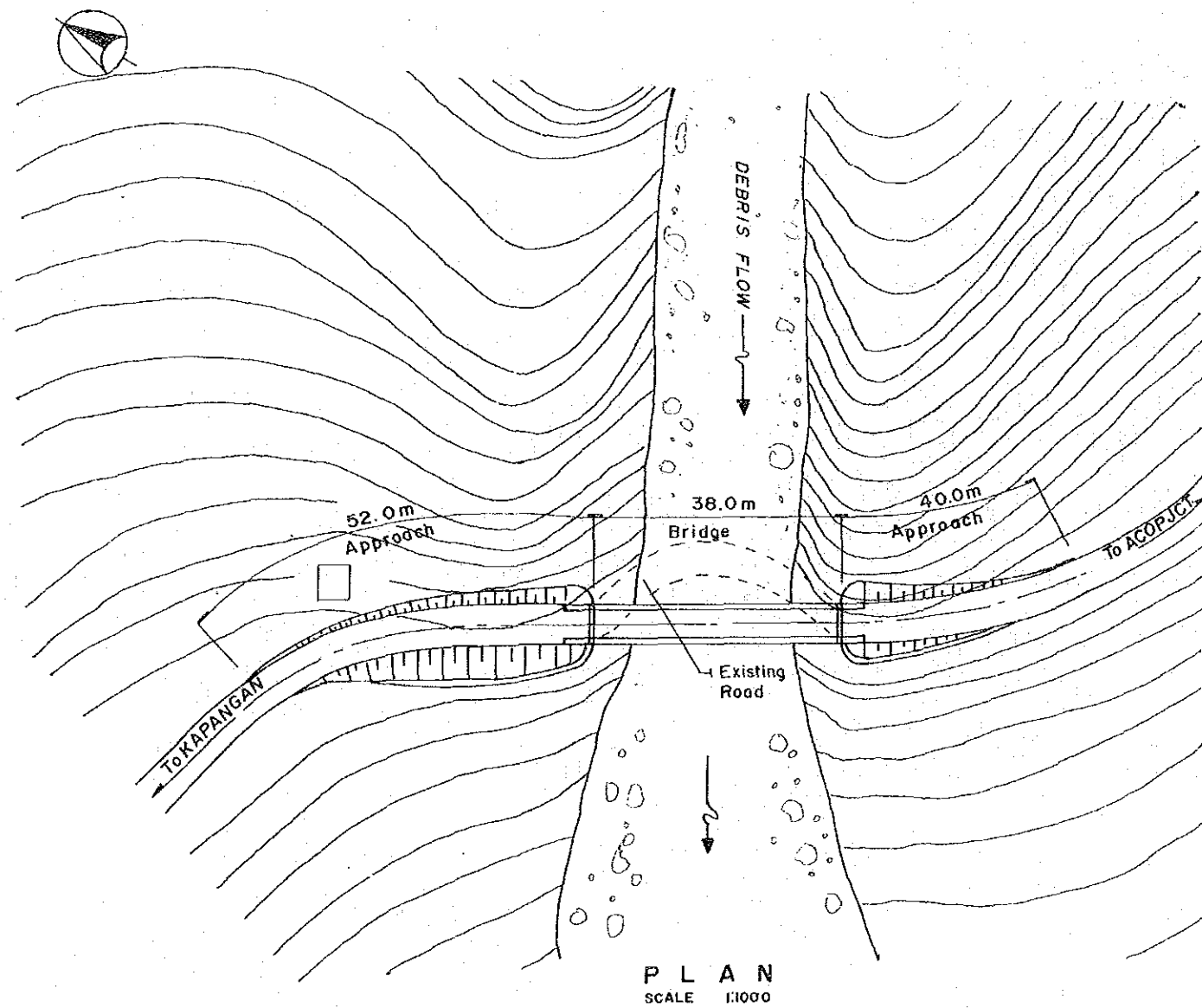
DRAWING NO.
 67



CROSS SECTION
 SCALE: 1:200

SUMMARY OF QUANTITY

TYPE OF WORK		UNIT	TOTAL
PERMANENT RESTORATION			
P1-3	REFILLING / EMBANKMENT	CU.M.	960
P15-1	CONCRETE BRIDGE	L.M.	38
P19-1	GRAVEL SURFACING	CU.M.	69
URGENT RESTORATION			
U1-1	REMOVAL OF DEPOSIT MATERIALS	CU.M.	200



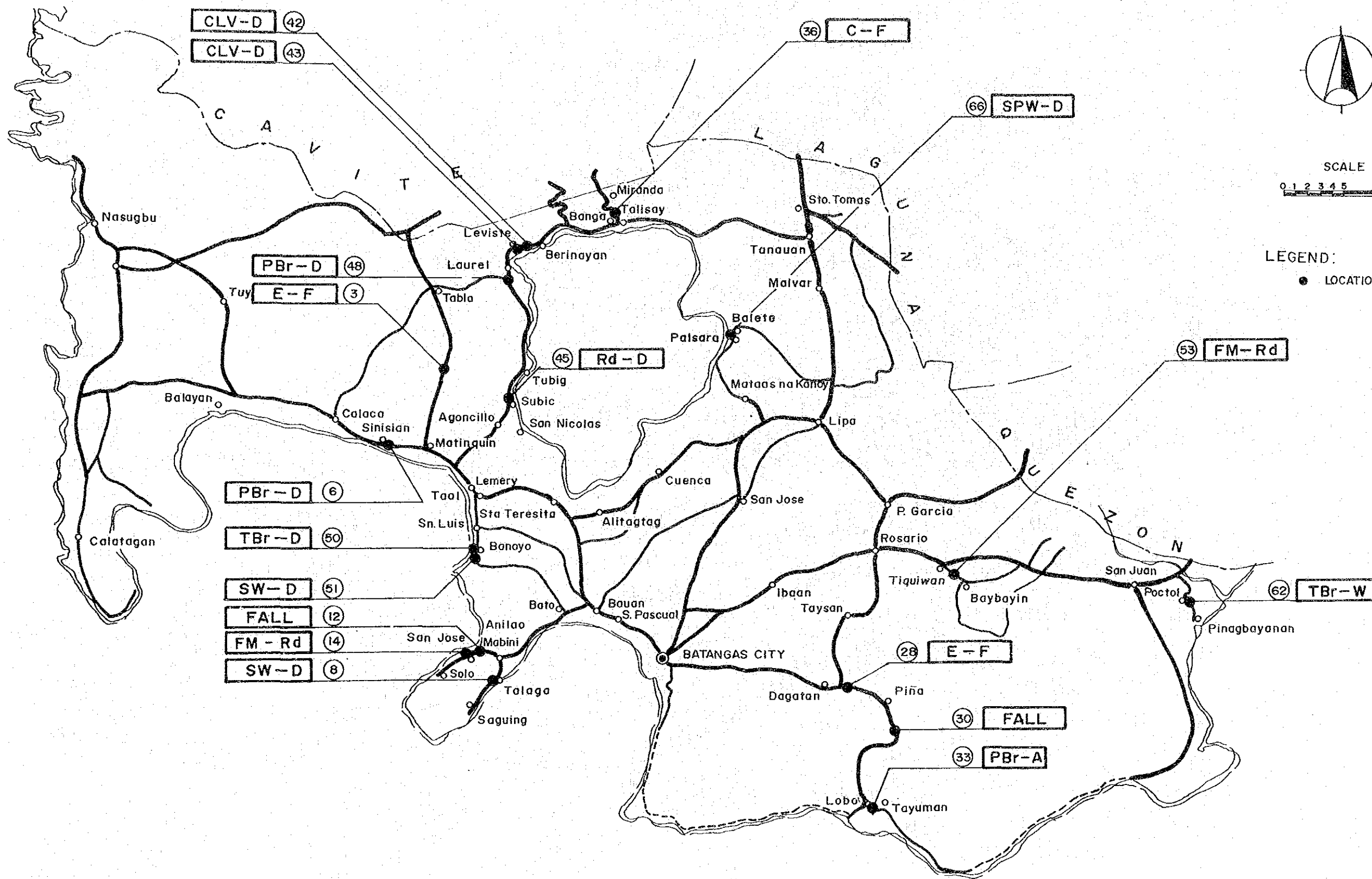
URGENT RESTORATION
 • Removal of Deposit materials

4. RESTORATION MEASURES FOR SELECTED SPOTS IN BATANGAS

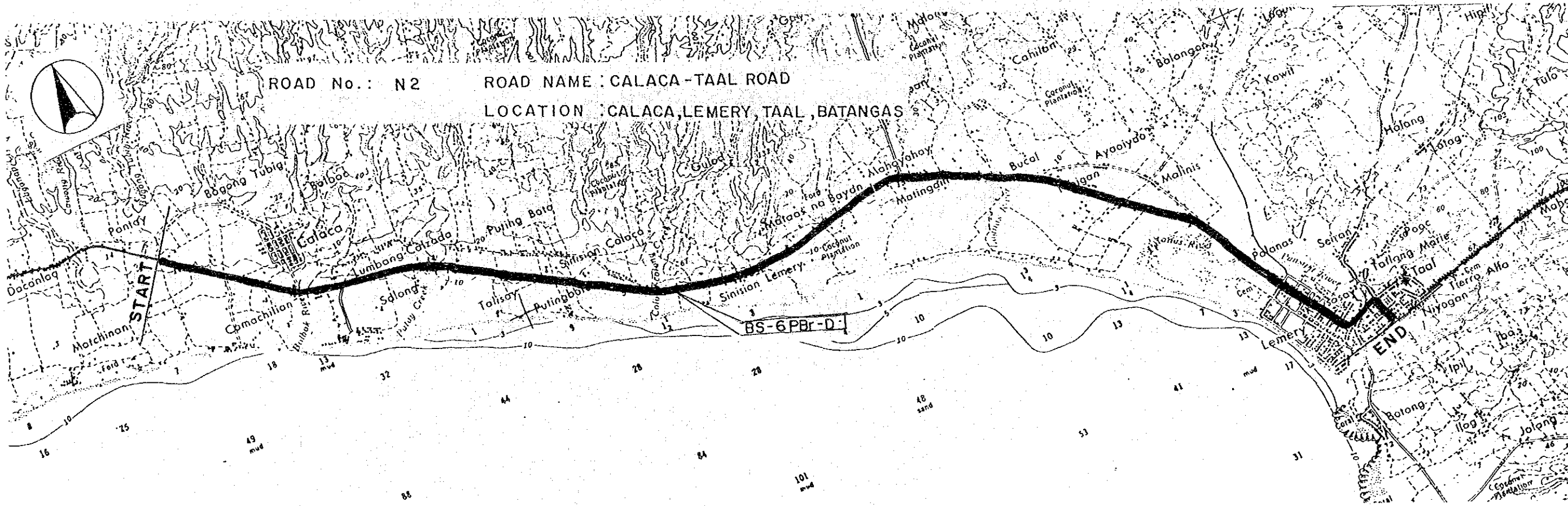
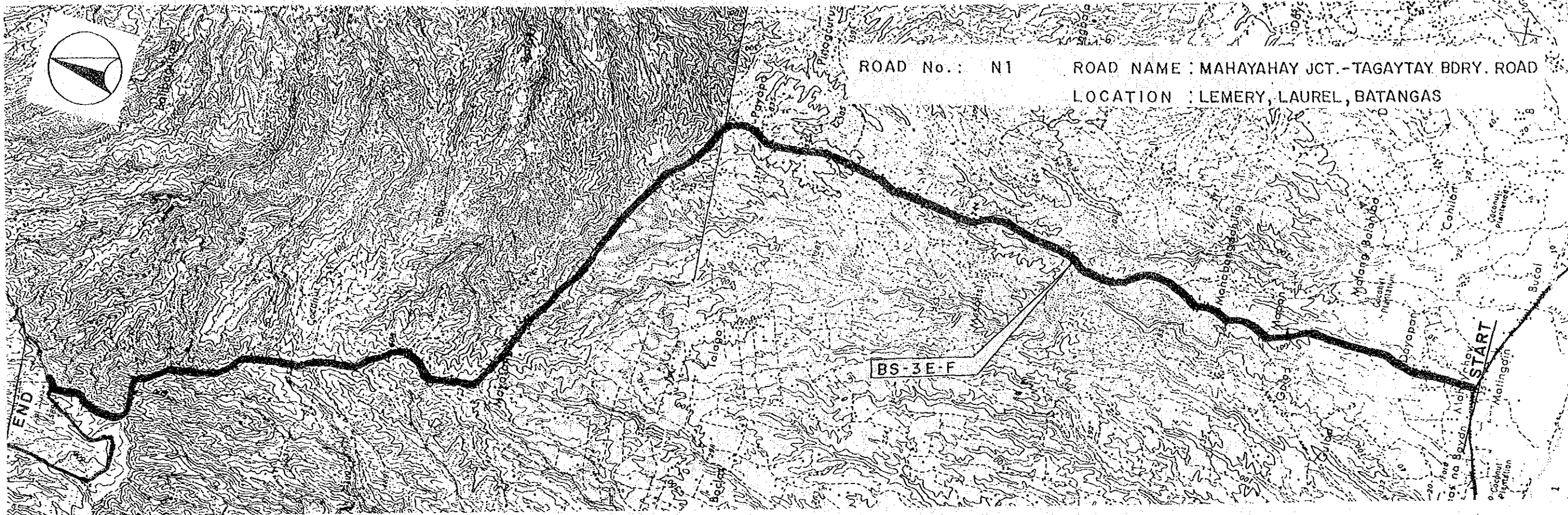
LOCATION OF SELECTED SPOTS IN BATANGAS (1/8)

DRAWING NO.

68



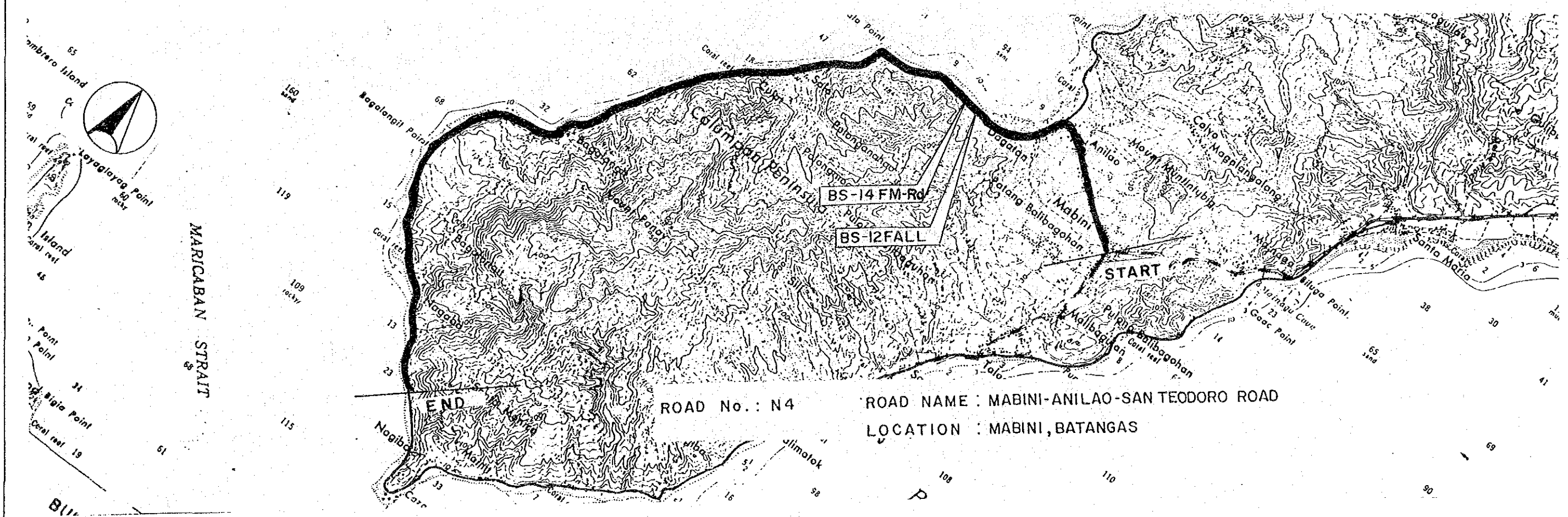
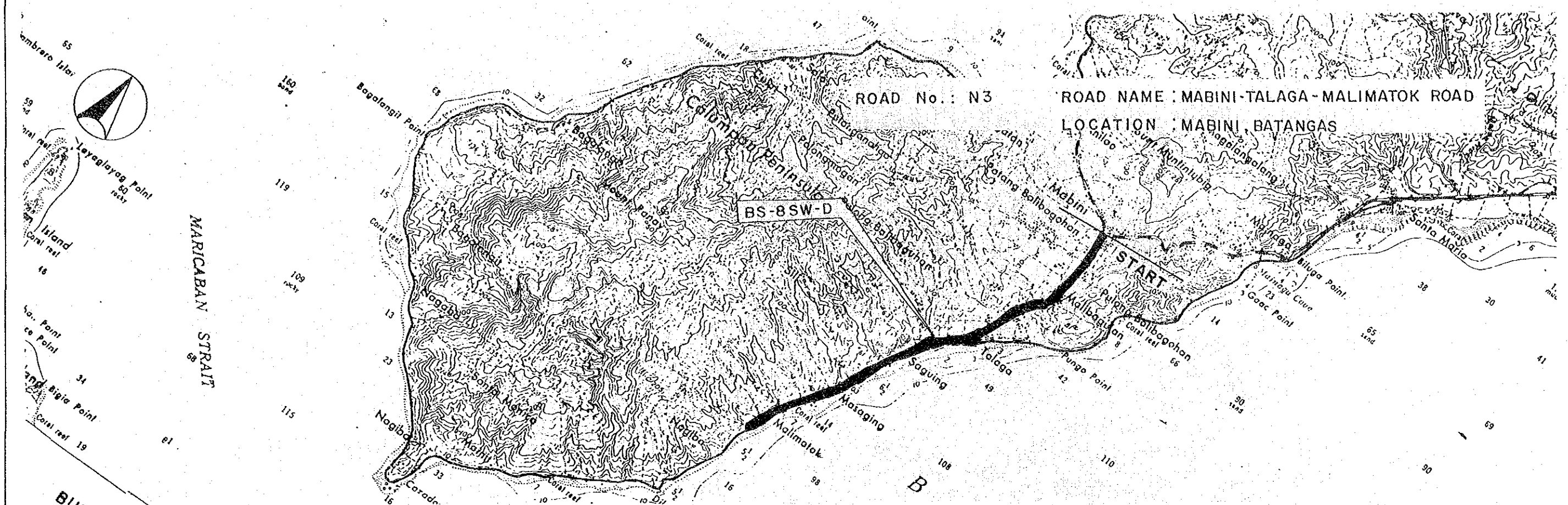
LOCATION OF SELECTED SPOTS IN BATANGAS



LOCATION OF SELECTED SPOTS IN BATANGAS (3/8)

Scale
1:50,000

Drawing No.
70



LOCATION OF SELECTED SPOTS IN BATANGAS (4/8)

Scale
1:50,000

Drawing No.
71

